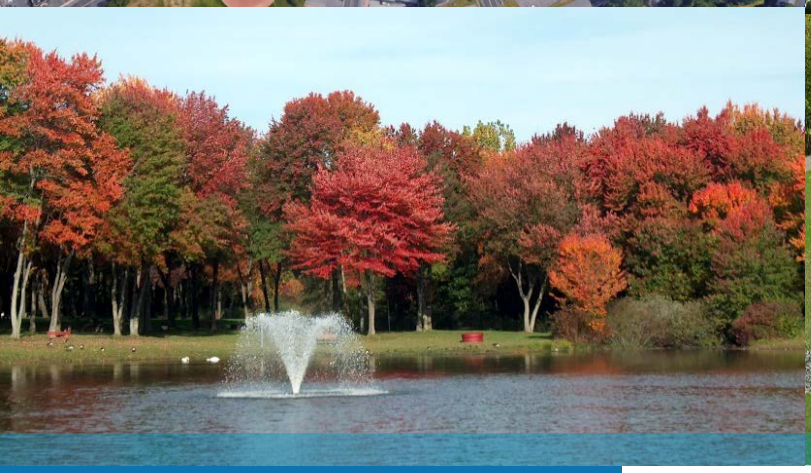
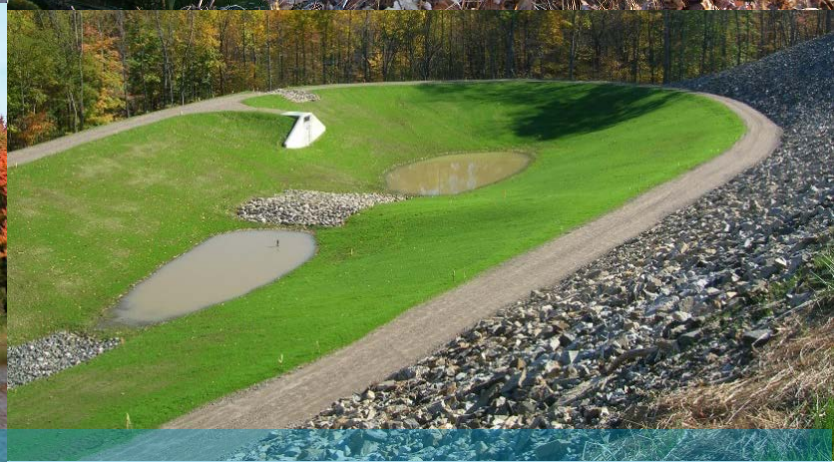

Town of East Longmeadow

STORMWATER MANAGEMENT PLAN

NPDES Permit # MA0410005

June 2019

Tighe&Bond
Engineers | Environmental Specialists

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CONTENTS

Section 1 Introduction

1.1 Purpose of this Plan 1-1
1.2 Regulatory Requirements 1-1
1.2.1 Overview of EPA's NPDES MS4 Program 1-1
1.2.2 East Longmeadow's Regulated Area 1-3
1.3 East Longmeadow's Stormwater Management Program under the 2003 Small MS4 General Permit 1-4
1.3.1 MCM 1: Public Education and Outreach 1-4
1.3.2 MCM 2: Public Involvement and Participation 1-4
1.3.3 MCM 3: Illicit Discharge and Detection Elimination 1-4
1.3.4 MCM 4: Construction Site Stormwater Runoff Control and MCM 5: Post-Construction Stormwater Management 1-5
1.3.5 MCM 6: Pollution Prevention and Good Housekeeping 1-5
1.3.6 Additional Permit Requirements 1-5
1.4 Summary of Requirements of EPA's 2016 Small MS4 General Permit 1-6
1.5 Authorization for East Longmeadow to Discharge Stormwater 1-7
1.6 General Eligibility Determination 1-7
1.7 Special Eligibility Determinations 1-8
1.7.1 Endangered Species Act 1-8
1.6.2 National Historic Properties 1-8
1.8 SWMP Program Implementation 1-8

Section 2 Watershed Resources

2.1 Watershed Inventory 2-1
2.2 Receiving Waters 2-2
2.3 Water Quality 2-2
2.3.1 2014 Integrated List of Waters 2-2
2.3.2 Applicable TMDLs 2-4

Section 3 BMPs to Address 2016 Small MS4 GP MCMs

3.1 MCM 1: Public Education and Outreach 3-1
3.1.1 MCM 1 BMPs from NOI 3-1
3.1.2 MCM 1 Implementation Plan 3-3
3.1.3 MCM 1 Implementation Schedule 3-5
3.1.4 Public Education and Outreach Goals and Progress 3-5
3.1.5 MCM 1 Guidelines and Resources 3-6
3.1.6 MCM 1 Checklist of Key Documentation 3-6
3.2 MCM 2: Public Involvement and Participation 3-7
3.2.1 MCM 2 BMPs from NOI 3-7
3.2.2 MCM 2 Implementation Plan 3-7
3.2.3 MCM 2 Implementation Schedule 3-8
3.2.4 MCM 2 Guidelines and Resources 3-8

3.2.5 MCM 2 Checklist of Key Documentation....3-8
3.3 MCM 3: Illicit Discharge Detection and Elimination (IDDE) Program....3-9
3.3.1 MCM 3 BMPs from NOI....3-9
3.3.2 MCM 3 Implementation Plan....3-10
3.3.3 MCM 3 Implementation Schedule....3-12
3.3.4 MCM 3 Guidelines and Resources....3-13
3.3.5 MCM 3 Checklist of Key Documentation....3-13
3.4 MCM 4: Construction Site Stormwater Runoff Control....3-14
3.4.1 MCM 4 BMPs from NOI....3-14
3.4.2 MCM 4 Implementation Plan....3-14
3.4.3 MCM 4 Implementation Schedule....3-15
3.4.4 MCM 4 Guidelines and Resources....3-15
3.4.5 MCM 4 Checklist of Key Documentation....3-16
3.5 MCM 5: Post-Construction Stormwater Management....3-16
3.5.1 MCM 5 BMPs from NOI....3-17
3.5.2 MCM 5 Implementation Plan....3-17
3.5.3 MCM 5 Implementation Schedule....3-18
3.5.4 MCM 5 Guidelines and Resources....3-19
3.5.5 MCM 5 Checklist of Key Documentation....3-19
3.6 MCM 6: Good Housekeeping and Pollution Prevention....3-20
3.6.1 MCM 6 BMPs from NOI....3-20
3.6.2 MCM 6 Implementation Plan....3-21
3.6.3 MCM 6 Implementation Schedule....3-22
3.6.4 MCM 6 Guidelines and Resources....3-23
3.6.5 MCM 6 Checklist of Key Documentation....3-23

Section 4 BMPs to Address Specific Waterbody Requirements

4.1 Long Island Sound TMDL for Nitrogen....4-1
4.1.1 Enhanced BMPs....4-1
4.1.2 Other Enhanced Requirements....4-2
4.3 Additional Requirements for Discharges to Surface Drinking Water Supplies and Their Tributaries....4-2

Section 5 Program Evaluation, Record Keeping, and Reporting

5.1 Program Evaluation....5-1
5.2 Record Keeping....5-1
5.3 Annual Reports....5-1
5.4 SWMP Modifications....5-3

Section 6 SWMP Certification

List of Tables

Table 1-1 Names and Titles of Persons Responsible for SWMP Implementation
Table 2-1 Summary of Receiving Waters and Number of Outfalls

List of Figures

Figure 1.1 Location of East Longmeadow, Hampden County, Massachusetts
Figure 1.2 East Longmeadow's Urbanized Area Based on 2000 and 2010 Census
Figure 2.1 Subdrainage Basins of the CT River Watershed
Figure 2.2 Major Watersheds of the Long Island Sound Drainage Basin
Figure 2.3 2010 Waterbody Assessment and TMDL Status Map of East Longmeadow

Appendices

Appendix A Notice of Intent and Authorization to Discharge Letter from EPA
Appendix B Summary of 2003 and 2016 MS4 General Permit BMPs
Appendix C Endangered Species Act Eligibility Certification Documentation
Appendix D National Historic Preservation Act Eligibility Certification Documentation
Appendix E Reference Documents
Appendix F Record Keeping
Appendix G Sanitary Sewer Overflow Inventory
Appendix H Plan Amendment Log
Appendix I Delegation of Authority Documentation
Appendix J IDDE Program

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Commonly Used Abbreviations	Definition
BMP	Best Management Practice
CFR	Code of Federal Regulations
CGP	Construction General Permit
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 Resources Information System
MassDEP	Massachusetts Department of Environmental Protection
MCM	Minimum Control Measure
MS4	Municipal Separate Storm Sewer System
MSGP	Multi-Sector General Permit
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
PY	Permit Year
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 East Longmeadow is located in Hampden County in the Pioneer Valley region of western Massachusetts. East Longmeadow is a part of the City of Springfield Metropolitan Statistical Area, and is approximately five miles southeast of downtown Springfield. It is abutted by the Towns of Longmeadow to the west, Hampden to the east, and Wilbraham to the northeast, the City of Springfield to the north and northwest, and the Towns of Enfield and Somer, Connecticut to the south.

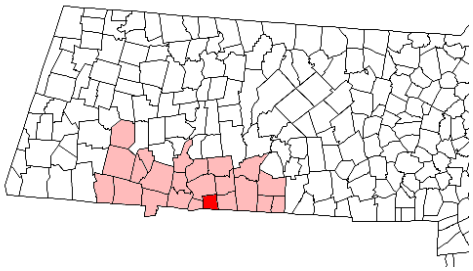

Figure 1.1 Location of East Longmeadow, Hampden County, Massachusetts

East Longmeadow is 13.0 square miles in size, of which 0.04 square miles is water, and is home to approximately 16,296 according to 2017 U.S. Census estimates.[1] Protecting the quality of East Longmeadow'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 East Longmeadow, 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 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] https://www.census.gov/quickfacts/fact/table/eastlongmeadowtownhampdencountymassachusetts

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 East Longmeadow 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 General Permit."

Under the 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 General Permit expired in May 2008, but remained in full force and effect until a replacement permit was issued on April 13, 2016. 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 East Longmeadow's Regulated Area

The Town of East Longmeadow 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 East Longmeadow 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.

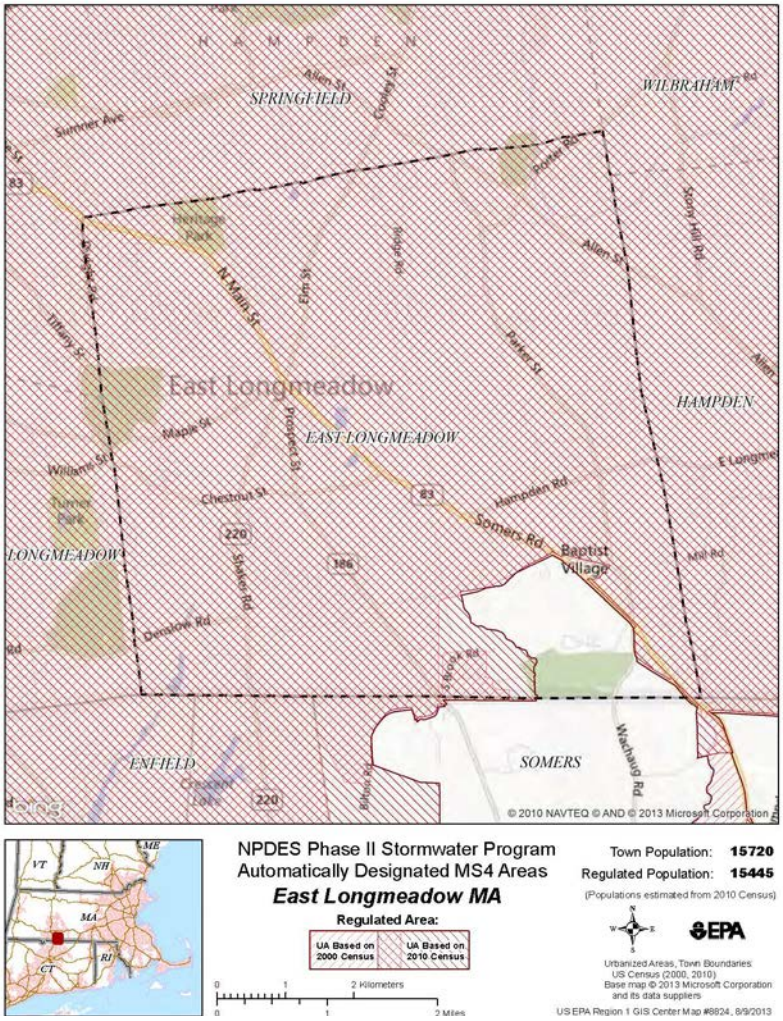

Figure 1.2. East Longmeadow's Urbanized Area based on 2000 and 2010 Census data.

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]

According to EPA Region 1, the area covered by the 2000 census and the 2010 census are regulated by EPA under the MS4 program. East Longmeadow is considered nearly entirely to be urbanized area regulated under the MS4 program, as illustrated by the hatching in Figure 1.2,[3] with the exception of the corner of the Town southeast of Pease Road.

[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/east-longmeadow.pdf

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

East Longmeadow's stormwater management program is managed within the Department of Public Works (DPW). Currently, stormwater management tasks are carried out by various Town departments and volunteer boards, including the Town Manager, Planning and Community Development Department, Planning Board, Health Department, Conservation, Building Department, and Town Council.

The Town of East Longmeadow 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 General Permit requirement of distributing educational material to the community early in the permit term by passive distribution of educational materials. The Town continues to utilize the DPW webpage and passive distribution of brochures to disseminate information regarding stormwater pollution, management, and permitting. The Town has provided stormwater brochures at Town Hall, the Library, and the DPW office; distributed an Environmental Services Booklet at Town Hall office; and maintains a poster with information on the NPDES program in the lobby of the Library and a display board with stormwater information outside of DPW offices.

The DPW maintains a designated Stormwater webpage,[4] which includes information about and links to the Town's stormwater management by-law, stormwater rules and regulations, stormwater application, stormwater application checklist, and EPA's 2016 Massachusetts Small MS4 General Permit.

Information about the Town's recycling program is also available on the Town website, which discourages illegal dumping and improper disposal of hazardous materials and yard waste. In addition to curbside pickup of solid waste and recyclables, the Town publishes links to a brochure on the benefits of composting; textiles disposal options; information on medication and sharps disposal; the Town of East Longmeadow Somers Road Transfer Station, which is open Saturdays and Wednesdays; and various recycling events.

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 and proper disposal of household hazardous waste. The Town participates annually in a 5-Town hazardous waste collection day.

1.3.3 MCM 3: Illicit Discharge and Detection Elimination

The Town has developed and implemented an IDDE program in accordance with the requirements of the 2003 General Permit.

[4] https://www.eastlongmeadowma.gov/191/Stormwater

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. The Town's *Stormwater Management By-Law* (Section 8.070, as revised 3/15/2012[5]) 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 DPW has been working with the Board of Health and local businesses to identify failing septic systems and illicit discharges, and utilizes a camera system to inspect stormwater lines for illicit connections.

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

The Town of East Longmeadow *Stormwater Management By-Law* (Section 8.070, as revised 3/15/2012) applies to activities that will result in disturbance of one or more acres of land or will be part of a project that will disturb greater than one acre, and requires proponents of such projects to prepare, submit, and follow a stormwater management and erosion control plan. The by-law includes penalties for violations, and the associated *Rules and Regulations for the Management of Stormwater*[6] contain inspection and long-term operation and maintenance requirements. A stormwater inspection checklist is available on the stormwater website,[7] and the DPW reviews site plans undergoing the Planning Board approval process.

1.3.5 MCM 6: Pollution Prevention and Good Housekeeping

The Town of East Longmeadow has developed and implemented a robust Good Housekeeping and Pollution Prevention Program. The Town sweeps roads annually in the spring and collector roads are swept a second time. The Town has developed a GIS based application to track inspection and cleaning of catch basins, and annually cleans at least 33% of all catch basins in Town. Maintenance/housekeeping training is held annually.

The Town has completed a Stormwater Pollution Prevention Plan (SWPPP) for the transfer station, and continues to implement BMPs described in the SWPPP. The winter road maintenance program includes use of an automated salt spreader to monitor and limit salt application. The Town implements a municipal maintenance program, including inspections and cleaning of oil-water separator in the vehicle wash bay system.

1.3.6 Additional Permit Requirements

1.3.6.1 Groundwater Recharge and Infiltration

Section 4.2, Stormwater Management Performance Standards of the Town's *Rules and Regulations for the Management of Stormwater* requires that loss of annual recharge to groundwater be minimized through the use of infiltration measures to the maximum extent practicable.

[5] https://www.eastlongmeadowma.gov/DocumentCenter/View/87/StormWater-Management-By-Law

[6] https://www.eastlongmeadowma.gov/DocumentCenter/View/139/SW-Rules-and-Regulations

[7] https://www.eastlongmeadowma.gov/DocumentCenter/View/137/Stormwater-Inspection-Checklist

Additionally, per Section 4.3 Erosion and Sediment Control Performance Standards, the erosion and sediment control plan should be designed to maximize groundwater recharge.

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,[8] there are no water quality impaired waters identified within the Town of East Longmeadow.

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. The MassDEP also adopted this delayed effective date.

The 2016 Small MS4 General Permit[9] is intended to be more prescriptive than the 2003 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 (PY) 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.

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

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

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. 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**: Increased requirements for public outreach, street sweeping, and pollution source identification and removal relative to the 2003 Small MS4 General Permit.

According to Section 1.10.b of the 2016 General Permit, East Longmeadow must modify or update the BMPs being implemented under the 2003 General Permit to meet the terms and conditions of part 2.3 of the 2016 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 East Longmeadow to Discharge Stormwater

An NOI must be submitted within 90 days of the effective date of the permit. A copy of the NOI submitted to EPA on September 26, 2018[10] is included in **Appendix A**. Documentation of the Town of East Longmeadow's Authorization to Discharge, issued by EPA on May 30, 2019,[11] is also provided in **Appendix A**.

1.6 General Eligibility Determination

Section 1.2.1 of the 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*

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

[11] https://www3.epa.gov/region1/npdes/stormwater/ma/tms4noi/east-longmeadow-auth.pdf

The Town of East Longmeadow is located within Hampden County, Massachusetts. The population of East Longmeadow is 16,291 according to 2017 Census data,[12] 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, East Longmeadow is partially located within an urbanized area.

1.7 Special Eligibility Determinations

1.7.1 Endangered Species Act

On behalf of the Town of East Longmeadow, Tighe & Bond completed the Endangered Species Act 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 East Longmeadow meets Criterion C, wherein the Town's stormwater discharges and discharge related activities will have "no affect" on 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 Properties

On behalf of the Town of East Longmeadow, Tighe & Bond completed the National Historic Preservation Act Eligibility Determination screening process in accordance with Part 1.9.2 and Appendix D of the Small MS4 General Permit, and determined that the Town of East Longmeadow 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 East Longmeadow's regulated area from the Massachusetts Cultural Resource Information System (MACRIS) and the National Register of Historic Places.

1.8 SWMP Program Implementation

In April of 2019, the East Longmeadow Town Council approved a bylaw creating a Stormwater Enterprise Fund to support the Town's stormwater management program and services.[13]

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.

[12] https://www.census.gov/quickfacts/eastlongmeadowtownhampdencountymassachusetts

[13] https://www.eastlongmeadowma.gov/DocumentCenter/View/7816/Stormwater-Enterprise-Fund-Bylaw

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

Name	Title	Department	Contact Information	Role / Responsibilities
Bruce Fenney	Superintendent	DPW	(413) 525-5400 ext. 1200 Bruce.Fenney@EastLongmeadowMA.gov	Manages the Town's SWMP and compliance with the MS4 Permit. Oversees stormwater operations, including outfall screening, IDDE training, and the Good Housekeeping program
Craig Jernstrom	Chair	Conservation Commission	(413) 525-5400 ext. 1700	Assists with development of construction regulations, inspections, and enforcement
Denise Menard	Town Manager	Town Manager	(413) 525-5400 ext. 1100 TownManager@EastLongmeadowMA.gov	Assists with development of construction and post-construction regulations, retrofit inventory, green infrastructure report, low impact design report
Constance Brawders	Director	Planning and Community Development Department	(413) 525-5400 ext. 1700 Constance.Brawders@EastLongmeadowMA.gov	Assists with development of construction and post-construction regulations, public outreach and education, retrofit inventory, green infrastructure report, low impact design report
Kathleen Hill	Council President	Town Council	Kathleen.Hill@EastLongmeadowMA.gov	Assists with development of retrofit inventory, green infrastructure report, low impact design report

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SECTION 2

Section 2
Watershed Resources

2.1 Watershed Inventory

The Town of East Longmeadow 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).

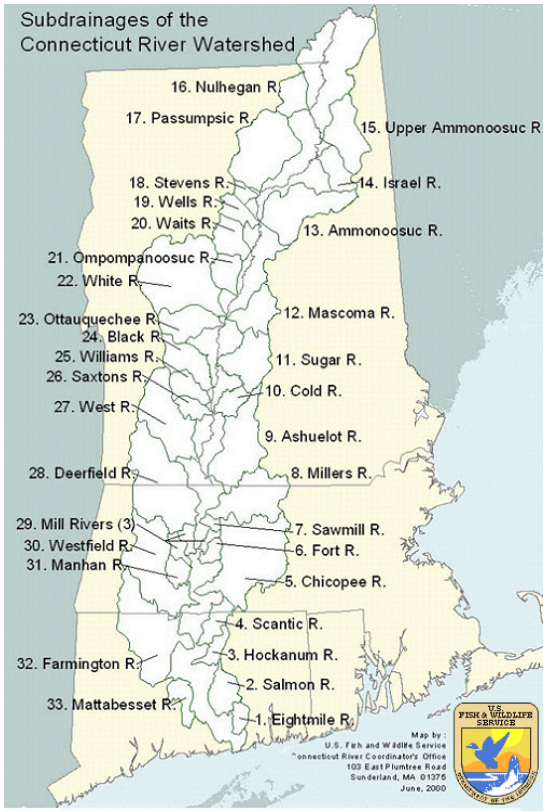


Figure 2.1. Subdrainage Basins of the CT River Watershed; the Scantic River subdrainage is labeled as number 4.

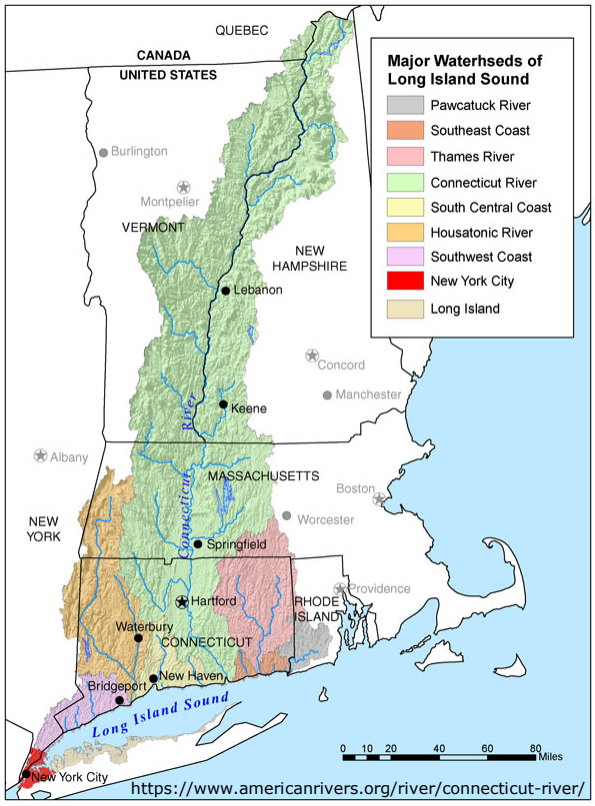


Figure 2.2. Major Watersheds of the Long Island Sound Drainage Basin; the Connecticut River is highlighted in green.

Within East Longmeadow, the main tributary streams are Pecousic Brook (in the northwest), Watchuag Brook (in the southeast), Mill River (in the northeast), and Jawbuck Brook and Freshwater Brook (in the southwest).

The Town has abundant wetland resource areas, primarily adjacent to streams and brooks with some isolated pockets of wetland areas. There is a mapped high yield aquifer within the southwest corner of the Town, but the aquifer is not currently in use as a drinking water supply. The Town purchases its water from the City of Springfield, which sources its drinking water from the Cobble Mountain Reservoir in the town of Blandford, Massachusetts.[14]

[14] https://www.eastlongmeadowma.gov/183/About-Our-Water

2.2 Receiving Waters

The following table lists all receiving waters, impairments, 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 East Longmeadow 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
Freshwater Book	5	N/A
Wetland/tributary to Freshwater Brook	1	N/A
Pecousic Brook	25	N/A
Wetland/Tributary to Pecousic Brook	7	N/A
Schnelock Brook	3	N/A
Wetland/Tributary to Schnelock Brook	2	N/A
South Branch Mill River	7	N/A
Wetland/Tributary to South Branch Mill River	23	N/A
Watchuag Brook	1	N/A
Wetland/Tributary to Watchuag Brook	34	N/A
Wetland/Tributary to Jawbuck Brook Reservoir	3	N/A
Wetland/Tributary to Unnamed Pond on Somers Road	1	N/A
Isolated Wetland Chestnut Street	3	N/A
Isolated Wetland Evergreen Drive	4	N/A
Isolated Wetland Melvin Avenue	1	N/A
Isolated Wetland Pease Road	3	N/A
Isolated Wetland Prospect Street	1	N/A
Isolated Wetland Shaker Road	2	N/A
Interconnections with Springfield	4	N/A
Interconnections with Longmeadow	5	N/A
Outside Receiving Water	196	
Total	**331**	

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:

- Category 1: Unimpaired
- Category 2: Attaining some uses; others not assessed
- Category 3: No uses assessed
- Category 4a: TMDL completed
- Category 4b: Impairment controlled by alternative pollution control requirements
- Category 4c: Impairment not caused by pollutant (i.e., by non-native aquatic plants)
- Category 5: TMDL required

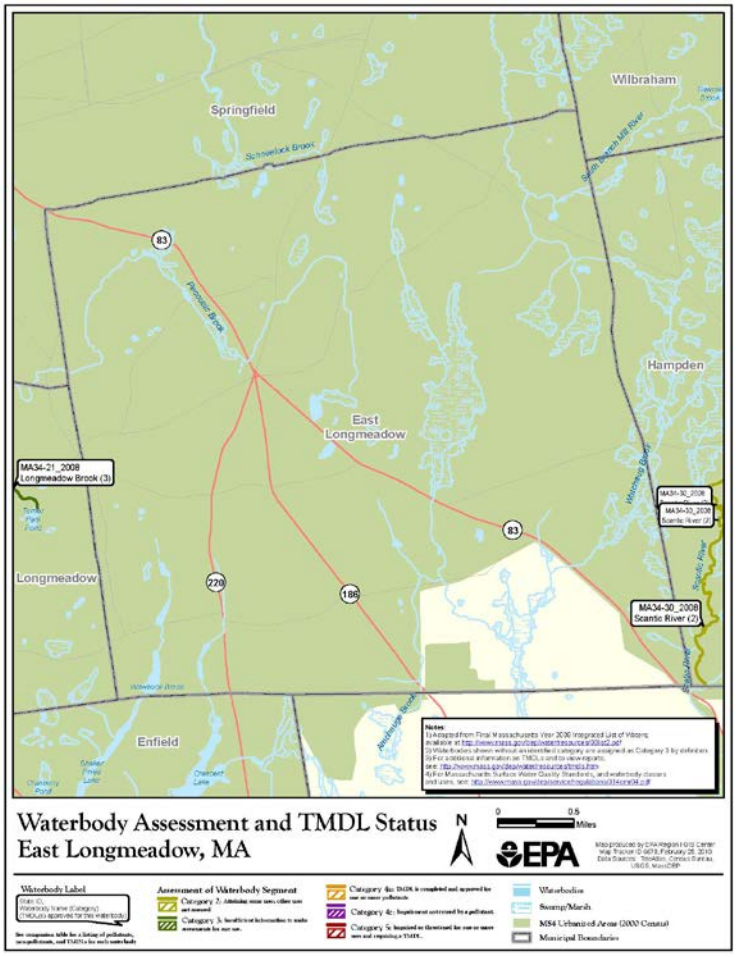


Figure 2.3. 2010 Waterbody Assessment and TMDL Status Map of East Longmeadow.

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 East Longmeadow. Figure 2.3, a waterbody assessment and TMDL status summary figure from 2010, also shows no impaired waterbodies within East Longmeadow.

A draft 2016 Integrated List of Waters is available from MassDEP,[15] 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 also does not include any waterbodies located within the Town of East Longmeadow.

[15] 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

2.3.2 Applicable TMDLs

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

Tighe&Bond

SECTION 3

Section 3
BMPs to Address 2016 Small MS4 GP 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	DPW, Planning Board, PVPC CRSWC	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	DPW, Planning Board, PVPC CRSWC	Distribute a minimum of three (3) timed messages annually on specific Nitrogen TMDL related topics	2018
1C	Multi-media (print and web materials)	Education and outreach on stormwater management topics of significance in East Longmeadow (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)	DPW, Planning Board, PVPC CRSWC	Distribute a minimum of two (2) educational messages spaced at least a year apart	2019
1D	Multi-media (print and web materials)	Education and outreach on stormwater management topics of significance in East Longmeadow (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	DPW	Distribute a minimum of two (2) educational messages spaced at least a year apart	2020

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

East Longmeadow 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

East Longmeadow 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

East Longmeadow will provide educational materials and general outreach to developers for stormwater management topics relevant to East Longmeadow. 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

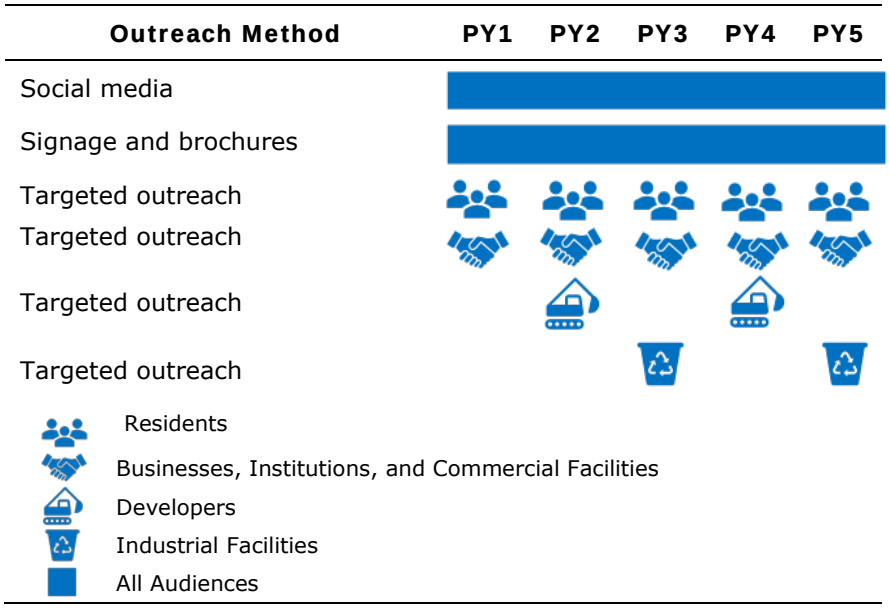
East Longmeadow will provide educational materials and general outreach to industrial facilities within Town for stormwater management topics relevant to East Longmeadow. Topics may include:

- 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 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 East Longmeadow 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 review (Plan and reports available at public meetings)	DPW	Allow annual review of stormwater management plan and posting of stormwater management plan on website	2018
2B	Public Participation	Provide public participation opportunities (e.g., clean-up events)	All Town Departments, Boards, and Committees	Ongoing compliance	2018

3.2.2 MCM 2 Implementation Plan

BMP 2A Stormwater Management Plan Public Review

East Longmeadow 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 DPW 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 25, 2019 to solicit input from the general public. Additionally, the SWMP is available to the public for review and comment at the DPW 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 East Longmeadow's stormwater program
- Improving water quality through local clean up and waste collection events

East Longmeadow 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
- 5-Town Hazardous waste drop off day
- Yard waste collection days
- Adopt-a-Stream program

Appendix E includes a document with helpful tips for organizing and conducting volunteer clean-up events that East Longmeadow 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 East Longmeadow 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	IDDE Ordinance/By-Law	Complete. Continue to enforce and update as necessary	DPW	Review current procedures and modify if necessary within 1 year of permit effective date	2018
3B	SSO Inventory	Develop SSO inventory in accordance of permit conditions	DPW	Complete within 1 year of effective date of permit. Track # of SSOs identified and corrective measures planned and completed	2018
3C	Storm sewer system map	Outfall Inventory Complete. Improve map during IDDE Program implementation 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.	DPW	Update existing GIS 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	Create written IDDE program	DPW	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	Employee training	Provide internal training to employees involved in IDDE program and utilize PVPC CRSWC sponsored training	DPW, PVPC CRSWC	Train annually. Track employees trained, training topic, date/time, and materials presented, include details in annual report	2018
3F-1	Assessment and Priority Ranking of Outfalls & Interconnections	Dry Weather Outfall Screening & Sampling in accordance with IDDE Plan and permit conditions	DPW	Complete 3 years after effective date of permit. Track # of illicit discharges identified & volume removed, sampling results	2018
3F-2	Assessment and Priority Ranking of Outfalls & Interconnections	Catchment Investigations according to IDDE Program and permit conditions	DPW	Complete 10 years after effective date of permit. Track # and percentage of MS4 catchments evaluated. Track # of illicit discharges identified & volume removed. Summarize screening/sampling results	2019

3.3.2 MCM 3 Implementation Plan

A written IDDE Plan has been developed by the Town of East Longmeadow. Refer to this Plan for the complete IDDE program and requirements of MCM 3. This SWMP section presents a brief summary of the information presented in the IDDE Plan.

BMP 3A IDDE By-Law

The IDDE program shall include adequate legal authority to prohibit, investigate, and eliminate illicit discharges and implement enforcement procedures and actions. East Longmeadow has met this requirement by adopting a by-Law entitled *Stormwater Management* (Section 8.070 of the Town's By-Laws) in May of 2010. This by-law prohibits illicit discharges to the Town's drainage system. The Town Manager or their designee serves as the enforcement agency for the by-law. See Section 2 and Appendix A of the IDDE Plan for additional information.

BMP 3B 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 inventory must be kept up to date and appended to this SWMP. Each municipal Department can aid in the development and maintenance of the inventory by reporting instances of SSOs found during field work to the DPW. The SSO inventory is available in **Appendix G**. See Section 4 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 3C Storm Sewer System Map

A comprehensive map of East Longmeadow'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. The outfall inventory is complete. See Section 3 of the IDDE Plan for additional information.

BMP 3D Written IDDE Program

East Longmeadow has implemented a town-wide IDDE Plan, finalized in 2019, which includes procedures and timelines developed in accordance with the final 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, which will be available at the DPW Office, located at 60 Center Square in East Longmeadow. See the IDDE Plan in **Appendix J** for additional information.

BMP 3E 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. See Section 9 of the IDDE Plan for additional information.

BMP 3F-1 Dry Weather Outfall/Interconnection Screening and Sampling

Dry weather outfall screening and sampling methods are described in Section 6 of the IDDE Plan included in **Appendix J**. 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 discharged identified, corrective measures planned and implemented, estimated volume removed, and a summary of screening and sampling results. See Section 6.4 of the IDDE Plan for additional information.

BMP 3F-2 Outfall/Interconnection Catchment Investigations

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. At the conclusion of field work for this BMP, the outfall/interconnection inventory should be updated and reprioritized for ongoing screening once every five years. See Section 7.6 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 IDDE By-Law	✓				
3B SSO Inventory	✓	●	●	●	●
3C Storm Sewer System Map	↔	●	↔	↔	↔
3D Written IDDE Program	✓				
3E Employee Training	●	●	●	●	●
3F-1 Dry Weather Screening and Sampling	↔	↔	↔		
3F-2 Catchment Investigations		↔	↔	↔	↔

✓ = 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 East Longmeadow 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 By-Law 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

East Longmeadow General By-Laws (Section 8.070: Stormwater Management)
https://www.eastlongmeadowma.gov/DocumentCenter/View/87/StormWater-Management-By-Law

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 9 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
- ☐ 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 in previous 48 hours, field screening results, and results of all analyses (summarize on an annual basis and for the entire permit term)
- ☐ Number and percent of total outfall catchments served by the MS4 evaluated using the catchment investigation procedure
- ☐ Presence or absence of System Vulnerability Factors for each catchment
- ☐ Data collected during key junction manhole investigations
- ☐ Inspection and maintenance records
- ☐ 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	Construction By-Law and Regulations, Site Plan Review Procedures	Modify local by-law and regulations, if necessary, to contain new MS4 provisions per section 2.3.5.	Planning Board, ConCom, Town Manager, Town Council, Town Counsel, DPW	Adopt modified by-law and regulations within 1 year of permit effective date	2018
4B	Site Inspections and Enforcement Procedures	Develop and implement written procedures for site inspections and sediment and erosion control measures enforcement procedures per section 2.3.5.	Planning Board, ConCom, Town Manager, Town Council, Town Counsel, DPW	Inspect 100% of construction sites as outlined in the document and take enforcement actions as needed	2018

3.4.2 MCM 4 Implementation Plan

Per the 2016 Small MS4 General Permit, East Longmeadow must develop and implement the following items, which will be adopted as regulation modifications or a formalized procedure. Note that while East Longmeadow 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 Construction By-Law and Regulations, Site Plan Review Procedures

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 by-law entitled *Stormwater Management By-Law* (Section 8.070 of the Town By-Laws) in 2010 that provides guidance for site planning and stormwater runoff control during construction and post-construction to protect local water resources from discharges, with the Town Manager serving as the enforcement agency. The Town has Stormwater Rules and Regulations[16] and an Inspection Checklist available for public review on their website.

BMP 4B Site Inspections and Enforcement Procedures

East Longmeadow shall modify the written procedures for site inspections and enforcement of sediment and erosion control measures within the existing Rules and Regulations. The modified Rules and Regulations will 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.

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	●				
● = year due					

3.4.4 MCM 4 Guidelines and Resources

The following links include East Longmeadow specific regulatory documents and free or low-cost resources East Longmeadow can use to supplement the Construction program. Links to the Town's *Stormwater Management By-law*, Rules and Regulations, and Inspection Checklist are also provided below.

[16] https://www.eastlongmeadowma.gov/DocumentCenter/View/139/SW-Rules-and-Regulations

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

East Longmeadow *Stormwater Management By-Law*
https://www.eastlongmeadowma.gov/DocumentCenter/View/87/StormWater-Management-By-Law

East Longmeadow Rules and Regulations for the Management of Stormwater
https://www.eastlongmeadowma.gov/DocumentCenter/View/139/SW-Rules-and-Regulations

East Longmeadow Stormwater Inspection Checklist
https://www.eastlongmeadowma.gov/DocumentCenter/View/137/Stormwater-Inspection-Checklist

CMRSWC SOP 5: Construction Site Inspection
https://www.centralmastormwater.org/sites/centralmastormwater/files/uploads/construction_inspection_sop_final.pdf

CMRSWC SOP 6: Erosion and Sedimentation Control
https://www.centralmastormwater.org/sites/centralmastormwater/files/uploads/erosion_and_sedimentation_control_sop_final.pdf

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 East Longmeadow's by-laws, 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	Post-Construction By-Law and Regulations	Modify local by-law and regulations to contain new MS4 provisions per section 2.3.6.a.	DPW, Town Manager, Town Counsel	Adopt modified by-law and regulations within 2 years of permit effective date	2019
5B	Assess street and parking lot guidelines	Develop a report assessing requirements that affect the creation of impervious cover to help determine if changes to design standards for streets and parking lots can be modified to support low impact design options	DPW, Planning Board, Town Council, Town Counsel, PVPC CRSWC	Complete report no later than 4 years of permit effective date	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	DPW, Planning Board, Town Council, Town Counsel, PVPC CRSWC	Complete report no later than 4 years of permit effective date	2020
5D	Retrofit Feasibility Assessment	Conduct detailed inventory of Town-owned properties and rank for retrofit potential, identify at least 5 sites owned by the Town with potential for modifications or retrofits	DPW, Town Manager, Town Council, Planning Board	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

3.5.2 MCM 5 Implementation Plan

<u>BMP 5A Post-Construction By-Law and Regulations</u>

The Town shall 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. East Longmeadow has met this requirement by adopting a by-law entitled *Stormwater Management By-Law* (Section 8.070 of the Town's By-Laws) in 2010 and associated *Stormwater Management Rules and Regulations*. This by-law provides guidance for site planning and stormwater runoff control during construction and post-construction to protect local water resources from discharges. The Town Manager serves as the enforcement agency for the by-law.

The Town will modify the permit application for Stormwater Management Permits to specify that as-built plans must be submitted to the DPW no later than two years after completion of construction projects.

BMP 5B Assess Street and Parking Lot Guidelines

In accordance with General Permit Section 2.3.6.b, East Longmeadow 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 5C Assess Feasibility of Allowing Green Infrastructure

As detailed in General Permit Section 2.3.6.c, East Longmeadow 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 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.

Long-term tracking of O&M should be recorded in the Town's GIS database for recent drainage improvement projects and going forward.

3.5.3 MCM 5 Implementation Schedule

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

● = year due

3.5.4 MCM 5 Guidelines and Resources

The following links include free or low-cost resources East Longmeadow 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 East Longmeadow's by-laws, regulations, policies, and/or procedures as necessary
- ☐ Status of BMP 5B and 5C assessments, including any planned or completed changes to local regulations and guidelines (BMP 5B) and findings and progress towards making the practices allowable (BMP 5C)
- ☐ Retrofit inventory, including all sites that have been modified or retrofitted. Sites should include town-owned sites identified in the inventory as well as non-municipal property modified or retrofitted to mitigate impervious area

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 Procedures – Parks and Open Space	Develop an inventory of and O&M procedures for parks and open spaces, buildings and facilities within the Urbanized Area where pollutants are exposed to stormwater runoff, and locations where vehicles and equipment are stored	DPW, Recreation Department	Complete and implement 2 years after permit effective date	2018
6B	O&M Procedures – MS4 Infrastructure	Establish and implement program for repair and rehabilitation of MS4 infrastructure	DPW	Complete and implement 2 years after permit effective date	2018
6C	Catch Basin Cleaning Program	Implement procedures and schedule to optimize catch basin cleaning such that each catch basin is no more than 50% full	DPW	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	2019
6D	Street Sweeping Program	Sweep all streets and permittee-owned parking lots in accordance with permit conditions	DPW	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	2018

BMP ID	BMP Category	BMP Description	Responsible Department/ Parties	Measurable Goal	Beginning Year of BMP Implementation
6E	Winter Road Maintenance Program	Establish and implement procedures for winter road maintenance, including the use and storage of salt and sand	DPW	Implement salt use optimization during deicing season, include description of program and program modifications in annual reports	2018
6F	Stormwater Treatment Structures Inspection and Maintenance Procedures	Develop inspection and maintenance procedures and frequencies for all stormwater treatment structures	DPW	Inspect and maintain 100% of treatment structures to ensure proper function	2018
6G	Stormwater Pollution Prevention Plan (SWPPP)	Create SWPPPs for transfer station, DPW service building, and other waste handling facilities where pollutants are exposed to stormwater	DPW	Complete SWPPPs within 2 years of permit effective date, implement in following years	2018

3.6.2 MCM 6 Implementation Plan

BMP 6A Operation & Maintenance Procedures – Parks and Open Space

East Longmeadow must develop a written Town-Wide Operation and Maintenance (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 O&M Procedures – MS4 Infrastructure

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 once completed.

BMP 6C Catch Basin Cleaning Program

The Town must clean and inspect catch basins to make sure that catch basins are no more than 50% full. 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. The Town-Wide O&M Program referred to under BMP 6A will include additional recommendations and guidance for this BMP.

BMP 6D 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 once per year in the spring (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. Store and dispose/reuse street sweepings 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. The Town-Wide O&M Program plan referred to under BMPs 6A will include additional recommendations and guidance for this BMP.

BMP 6E 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. The Town-Wide O&M Program plan referred to under BMP 6A will include additional recommendations and guidance.

BMP 6F 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, per Section 2.3.4.5.a of the General Permit.

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 6C).

BMP 6G Stormwater Pollution Prevention Plans (SWPPPs)

In accordance with General Permit Section 2.3.7.b, East Longmeadow 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 DPW service building. 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 General Permit Section 2.3.7.b.iii.

3.6.3 MCM 6 Implementation Schedule

BMP	PY1	PY2	PY3	PY4	PY5
6A O&M Program for Municipal Facilities and Equipment		●			
6B O&M Program for MS4 Infrastructure		●			
6C Catch Basin Cleaning Program	●	→	→	→	→
6D Street Sweeping Program	←	●	→	→	→

BMP	PY1	PY2	PY3	PY4	PY5
6E Winter Road Maintenance Program	↔	↔	↔	↔	↔
6F Stormwater Treatment Structures Inspection and Maintenance Procedures	●	●	●	●	●
6G Stormwater Pollution Prevention Plans (SWPPPs)		●			

● = annual requirement or year due
↔ = ongoing requirement

3.6.4 MCM 6 Guidelines and Resources

The following links include free or low-cost resources East Longmeadow 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

Center for Watershed Protection - *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 and number of catch basins, quantity cleaned and inspected, total volume of material removed from all catch basins
- ☐ 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 East Longmeadow 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 Appendix F, part B.1. of the 2016 MA Small MS4 General Permit.

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/Institution 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 By-law* 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 MA 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. To date, there are no public surface drinking water supply sources or their tributaries within the Town of Southampton's regulated area.

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SECTION 5

Section 5
Program Evaluation, Record Keeping, and Reporting

5.1 Program Evaluation

The Town of East Longmeadow 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 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 East Longmeadow should maintain are also included under each BMP in Section 3 of the SWMP. Records relating to the 2016 General Permit, including the SWMP, will be made available to the public, as required by Section 4.2.c of the Permit.

5.3 Annual Reports

The Town will submit annual reports each year of the Small MS4 permit term, due ninety 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 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 a simple update provided to EPA and more robust documentation included in Appendix F of this SWMP.

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

i. *A self-assessment review of compliance with the permit terms and conditions.*
ii. *An assessment of the appropriateness of the selected BMPs.*
iii. *The status of any plans or activities required by part 2.1 and/ or part 2.2, including:*

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

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

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

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

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

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

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

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 H**.

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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: _____ Title: _____

Signature: _____ Date: _____

A letter that authorizes the Town of East Longmeadow Director of Public Works to sign and certify certain documents prepared under the Small MS4 General Permit is included in **Appendix I**.

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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 East Longmeadow State: MA

EPA NPDES Permit Number (if applicable): MA041005

Primary MS4 Program Manager Contact Information

Name: Bruce Fenney Title: DPW Superintendent

Street Address Line 1: 60 Center Square

Street Address Line 2:

City: East Longmeadow State: MA Zip Code: 01028

Email: bruce.fenney@eastlongmeadowma.gov Phone Number: (413) 525-5400

Fax Number:

Other Information

Stormwater Management Program (SWMP) Location (web address or physical location, if already completed): Physical location: DPW Office, 60 Center Square, East Longmeadow

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): 05/17/10

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): 05/17/10

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): 05/17/10

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
Freshwater Brook	5	☐	☐	☐	☐	☐	☐	☐	☐	☐	
Wetland/Tributary to Freshwater Brook	1	☐	☐	☐	☐	☐	☐	☐	☐	☐	
Pecousic Brook	25	☐	☐	☐	☐	☐	☐	☐	☐	☐	
Wetland/Tributary to Pecousic Brook	7	☐	☐	☐	☐	☐	☐	☐	☐	☐	
Schnelock Brook	3	☐	☐	☐	☐	☐	☐	☐	☐	☐	
Wetland/Tributary to Schnelock Brook	2	☐	☐	☐	☐	☐	☐	☐	☐	☐	
South Branch Mill River	7	☐	☐	☐	☐	☐	☐	☐	☐	☐	
Wetland/Tributary to South Branch Mill River	23	☐	☐	☐	☐	☐	☐	☐	☐	☐	
Watchuag Brook	1	☐	☐	☐	☐	☐	☐	☐	☐	☐	
Wetland/Tributary to Watchuag Brook	34	☐	☐	☐	☐	☐	☐	☐	☐	☐	
Wetland/Tributary to Jawbuck Brook Reservoir	3	☐	☐	☐	☐	☐	☐	☐	☐	☐	
Wetland/Tributary to Unnamed Pond on Somers Road	1	☐	☐	☐	☐	☐	☐	☐	☐	☐	
Isolated Wetland Chestnut Street	3	☐	☐	☐	☐	☐	☐	☐	☐	☐	
Isolated Wetland Evergreen Drive	4	☐	☐	☐	☐	☐	☐	☐	☐	☐	
Isolated Wetland Melvin Avenue	1	☐	☐	☐	☐	☐	☐	☐	☐	☐	
Isolated Wetland Pease Road	3	☐	☐	☐	☐	☐	☐	☐	☐	☐	
Isolated Wetland Prospect Street	1	☐	☐	☐	☐	☐	☐	☐	☐	☐	
Isolated Wetland Shaker Road	2	☐	☐	☐	☐	☐	☐	☐	☐	☐	

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
Outside Receiving Waterbody	193	☐	☐	☐	☐	☐	☐	☐	☐	☐	
		☐	☐	☐	☐	☐	☐	☐	☐	☐	
		☐	☐	☐	☐	☐	☐	☐	☐	☐	
		☐	☐	☐	☐	☐	☐	☐	☐	☐	
		☐	☐	☐	☐	☐	☐	☐	☐	☐	
		☐	☐	☐	☐	☐	☐	☐	☐	☐	
		☐	☐	☐	☐	☐	☐	☐	☐	☐	
		☐	☐	☐	☐	☐	☐	☐	☐	☐	
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		☐	☐	☐	☐	☐	☐	☐	☐	☐	
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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 (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	1A - Residents	DPW, Planning Board, PVPC CRSWC	Distribute a minimum of three (3) timed messages annually on specific Nitrogen TMDL related topics	2018

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	1B - Businesses, Institutions and Commercial Facilities	DPW, Planning Board, PVPC CRSWC	Distribute a minimum of three (3) timed messages annually on specific Nitrogen TMDL related topics	2018
Multi-media (print and web materials)	Education and outreach on stormwater management topics of significance in East Longmeadow (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)	DPW, Planning Board, PVPC CRSWC	Distribute a minimum of 2 educational messages spaced at least a year apart	2019

Multi-media (print and web materials)	Education and outreach on stormwater management topics of significance in East Longmeadow (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	DPW, Planning Board, PVPC CRSWC	Distribute a minimum of 2 educational messages spaced at least a year apart	2020

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

Part III: Stormwater Management Program Summary (continued)

MCM 2: Public Involvement and Participation

BMP Categorization	Brief BMP Description (enter your own text to override the drop down menu)	Responsible Department/Parties (enter your own text to override the drop down menu)	Additional Description/ Measurable Goal	Beginning Year of BMP Imple-mentation
2A - Public Review	SWMP review (Plan and reports available at public meetings)	DPW	Allow annual review of stormwater management plan and posting of stormwater management plan on website	2018
2B - Public Participation	Provide public participation opportunities (e.g,. clean-up events)	All Town Departments, Boards, and Committees	Ongoing compliance	2018

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

Part III: Stormwater Management Program Summary (continued)

MCM 3: Illicit Discharge Detection and Elimination (IDDE)

BMP Categorization (enter your own text to override the drop down menu)	**BMP Description**	**Responsible Department/Parties** (enter your own text to override the drop down menu)	**Measurable Goal** (all text can be overwritten)	**Beginning Year of BMP Imple-mentation**
3A - IDDE Ordinance/Bylaw	Complete. Continue to enforce and update as necessary	DPW	Review current procedures and modify if necessary within 1 year of permit effective date	2018
3B - SSO inventory	Develop SSO inventory in accordance of permit conditions	DPW	Complete within 1 year of effective date of permit. Track # of SSOs identified and corrective measures planned and completed	2018
3C - Storm sewer system map	Outfall inventory complete. Improve map during IDDE program implementation 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	DPW	Update existing GIS 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	Create written IDDE program	DPW	Complete written IDDE program within 1 year of the effective date of permit, update components annually as needed	2018
3E - Employee training	Provide internal training to employees involved in IDDE program and utilize PVPC CRSWC sponsored training	DPW, PVPC CRSWC	Train annually. Track employees trained, training topic, date/time, and materials presented, include details in annual report	2018

3F - Assessment and Priority Ranking of Outfalls & Interconnections	1. Dry Weather Outfall Screening & Sampling in accordance with IDDE Plan and permit conditions	DPW	Complete 3 years after effective date of permit. Track # of illicit discharges identified & volume removed, sampling results	2018
3F - Assessment and Priority Ranking of Outfalls & Interconnections	2. Catchment Investigations according to IDDE Program and permit conditions	DPW	Complete 10 years after effective date of permit. Track # and percentage of MS4 catchments evaluated. Track # of illicit discharges identified & volume removed. Summarize screening/sampling results	2019

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

Part III: Stormwater Management Program Summary (continued)

MCM 4: Construction Site Stormwater Runoff Control

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 - Construction Bylaw and Regulations, Site Plan Review Procedures	Modify local bylaw and regulations, if necessary, to contain new MS4 provisions per section 2.3.5.	Planning Board, ConCom, Town Manager, Town Council, Town Counsel, DPW	Adopt modified bylaw and regulations within 1 year of permit effective date	2018
4B - Site Inspections and Enforcement Procedures	Develop and implement written procedures for site inspections and sediment and erosion control measures enforcement procedures per section 2.3.5.	Planning Board, ConCom, Town Manager, Town Council, Town Counsel, DPW	Inspect 100% of construction sites as outlined in the document and take enforcement actions as needed	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 - Post-Construction Bylaw and Regulations	Modify local bylaw and regulations to contain new MS4 provisions per section 2.3.6.a.	DPW, Town Manager, Town Counsel	Adopt modified bylaw and regulations within 2 years of permit effective date	2019
5B - Assess street and parking lot guidelines	Develop a report assessing requirements that affect the creation of impervious cover to help determine if changes to design standards for streets and parking lots can be modified to support low impact design options	DPW, Planning Board, Town Council, Town Manager, Town Counsel, PVPC CRSWC	Complete report no later than 4 years of permit effective date	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	DPW, Planning Board, Town Council, Town Manager, Town Counsel, PVPC CRSWC	Complete report no later than 4 years of permit effective date	2020

5D - Retrofit Feasibility Assessment	Conduct detailed inventory of Town-owned properties and rank for retrofit potential, identify at least 5 sites owned by the Town with potential for modifications or retrofits	DPW, Town Manager, Town Council, Planning Board	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

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 - Operation & Maintenance (O&M) Procedures - Parks and Open Space	Develop an inventory of and O&M procedures for parks and open space, buildings and facilities within the Urbanized Area where pollutants are exposed to stormwater runoff, and locations where vehicles and equipment are stored	DPW, Recreation Department	Complete and implement 2 years after effective date of permit	2018
6B - O&M Procedures - MS4 Infrastructure	Establish and implement program for repair and rehabilitation of MS4 infrastructure	DPW	Complete and implement 2 years after effective date of permit	2018
6C - Catch Basin Cleaning Program	Implement procedures and schedule to optimize catch basin cleaning such that each catch basin is no more than 50% full	DPW	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	2019
6D - Street Sweeping Program	Sweep all streets and permittee-owned parking lots in accordance with permit conditions	DPW	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	2018

6E - Winter Road Maintenance Program	Establish and implement procedures for winter road maintenance, including the use and storage of salt and sand	DPW	Implement salt use optimization during deicing season, include description of program and program modifications in annual reports	2018
6F - Stormwater Treatment Structures Inspection and Maintenance Procedures	Develop inspection and maintenance procedures and frequencies for all stormwater treatment structures	DPW	Inspect and maintain 100% of treatment structures to ensure proper function	2018
6G - Stormwater Pollution Prevention Plan (SWPPP)	Create SWPPPs for transfer station, DPW service building, and and other waste handling facilities where pollutants are exposed to stormwater	DPW	Complete SWPPPs within 2 years of permit effective date, implement in following years	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	All Town Departments, Boards, and Committees

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. Per the Massachusetts Year 2014 Integrated List of Waters, there are no impaired waterbodies located within the Town of East Longmeadow.

2. The Federal Endangered Species Eligibility Determination screening process has been completed and the Town of East Longmeadow 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.

3. The National Historic Preservation Act Eligibility Determination screening process has been completed and the Town of East Longmeadow 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.

4. 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 Management 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 are included in the Town's Stormwater Management Plan.

Part V: Certification

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

Name:	Denise Menard	Title:	Town Manager
Signature:		Date:	09/24/18

[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

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

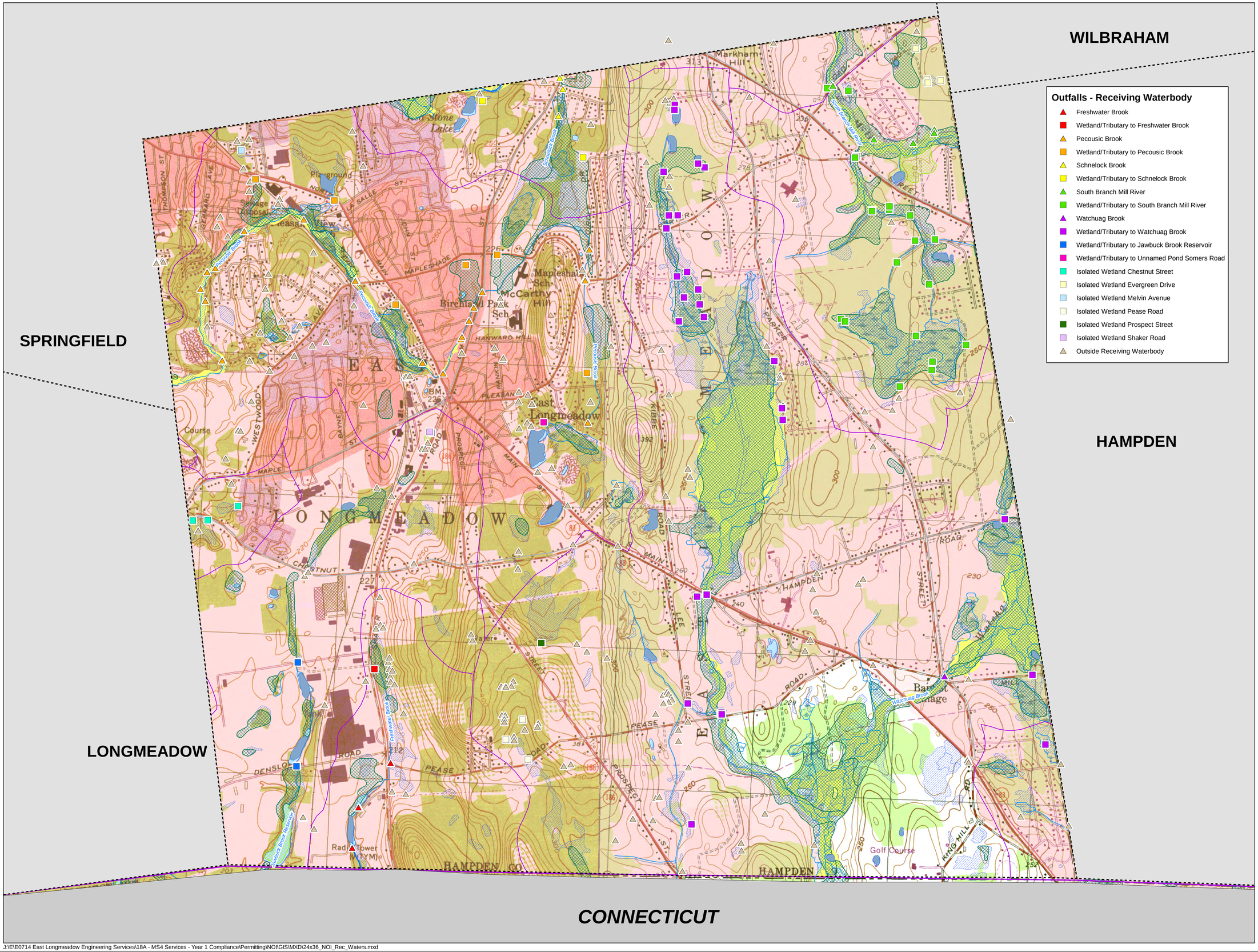
Part V: Certification

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:	DENISE MEWARD	Title:	Town Manager
Signature:	Denise Meward	Date:	9/24/2018

[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



NOTES

1. Based on USGS Topo Map: Springfield South, 1979 (10 ft), Hampden, 1979 (10 ft)
2. MassGIS: 2014 Integrated List Data (2016), Major Drainage Basins (2003), Subbasins (2007), Community Boundary (2017), National Wetland Inventory (2007), FEMA National Flood Hazard (2017), MassDOT Major Roads (2014), Urban Area (2000 and 2010)
3. Town of East Longmeadow: Outfalls

OUTFALLS AND RECEIVING WATERBODIES

Notice of Intent
East Longmeadow, Massachusetts

September 2018

Tighe&Bond
Engineers | Environmental Specialists

J:\E\E0714 East Longmeadow Engineering Services\18A - MS4 Services - Year 1 Compliance\Permitting\NOI\GIS\MXD\24x36_NOI_Rec_Waters.mxd

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

VIA EMAIL

May 30, 2019

Denise Menard
Town Manager

And;

Bruce Fenney
DPW Superintendent
60 Center Square
East Longmeadow, MA. 01028
bruce.fenney@eastlongmeadowma.gov

Re: National Pollutant Discharge Elimination System Permit ID #: MAR041005, Town of East Longmeadow

Dear Bruce Fenney:

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 proposed 2016 General Permit BMPs per the NOI:

MCM 1: Public Education and Outreach

1A - Classroom Education – now under BMPs 1A and 2B

1B – Educational Displays – now under BMP 1 (A-D)

1C – Newspaper Press Releases – now under BMP 1 (A-D)

1D – Informational Pamphlets – now under BMP 1 (A-D)

1E – Hazardous Waste Collection Day – now under BMPs 1A and 2B

1F – Local Cable Access – now under BMP 1 (A-D)

1G (addition) – Environmental Services Guide Booklet – now under BMP 1 (A-D)

MCM 2: Public Involvement and Participation

2A – Adopt-a-Stream Program – now under BMP 2B

2B – Water Quality Monitoring – now under BMP 2B

2C – Attitude Surveys – now under BMPs 1 (A-D) and 2B

2D – Community Hotline – now under BMPs 1A and 2B

2E (addition) – Catch Basin Marking Program – now under BMP 2B

MCM 3: Illicit Discharge Detection and Elimination

3A – Mapping Stormwater Outfalls – now under BMP 3C

3B – Development of Illicit Discharge Plan – now under BMP 3D

3C – Non-Stormwater Discharge Ordinance – now under BMP 3A

3D – Inform Employees, Businesses, Public – now under BMPs 6E, 1A, and 1B

3E – Failing Septic Systems – now under BMP 3F

3F – Industrial / Business Connections – now under BMPs 1C and 1D

3G (addition) – Inspections of Stormwater Lines for Illicit Connections – now under BMP 3F

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)

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 Maintenance Plan (replaced with Inspection Reporting)– now under BMPs 6B and 6F

5C (addition)– Homeowners Association Involvement– now under BMPs 1A and 1B

Appendix B
Summary of 2003 and 2016 MS4 General Permit BMPs

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 – Pest Control – now under BMP 6F

6E – Catch Basin Cleaning Program – now under BMP 6C

6F – Street Sweeping Program – now under BMP 6D

6G – Used Oil Recycling – now under BMPs 1 (A-D), 2B, and 6A

6H – Hazardous Waste Collection – now under BMP 2B

6I – Road Salt Application – now under BMP 6E

6J – Illegal Dumping – now under BMPs 1 (A-D) and 2B

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

7A – Not Applicable – 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 East Longmeadow Stormwater Management Program Files

FROM: Tighe & Bond

COPY: Bruce Fenney, Superintendent Public Works; Denise Menard, Town Manager

DATE: August 31, 2018

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 East Longmeadow** 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 East Longmeadow.

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, the Northern Long-eared Bat is listed 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].

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 known Northern Long-eared Bat winter hibernacula or maternity roost trees within or near the Town of East Longmeadow.

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[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

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 East Longmeadow 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 East Longmeadow's IPaC action area contains the Northern Long-eared Bat.

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

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

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

   No, the Town of East Longmeadow's action area does not contain any of the above listed species.

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 East Longmeadow's action area contains the Northern Long-eared Bat, but none of the other subsequent species.

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

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

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

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

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

J:\E\E0714 East Longmeadow Engineering Services\18A - MS4 Services - Year 1 Compliance\Permitting\Eligibility Determinations\ESA Memo\Draft East Longmeadow ESA Eligibility Criterion C Memo Text_August 2018.docx

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

East Longmeadow
IPaC Official Species List

United States Department of the Interior

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

In Reply Refer To: August 14, 2018
Consultation Code: 05E1NE00-2018-SLI-2714
Event Code: 05E1NE00-2018-E-06348
Project Name: East Longmeadow MS4

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

To Whom It May Concern:

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

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

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

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

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

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

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

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

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

Attachment(s):

- Official Species List

Official Species List

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

This species list is provided by:

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

Project Summary

Consultation Code: 05E1NE00-2018-SLI-2714

Event Code: 05E1NE00-2018-E-06348

Project Name: East Longmeadow MS4

Project Type: Regulation Promulgation

Project Description: This project is applying for coverage under the 2016 MS4 General Permit. The project consists of the Town of East Longmeadow'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 East Longmeadow 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/42.062032321061764N72.500428063842W

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

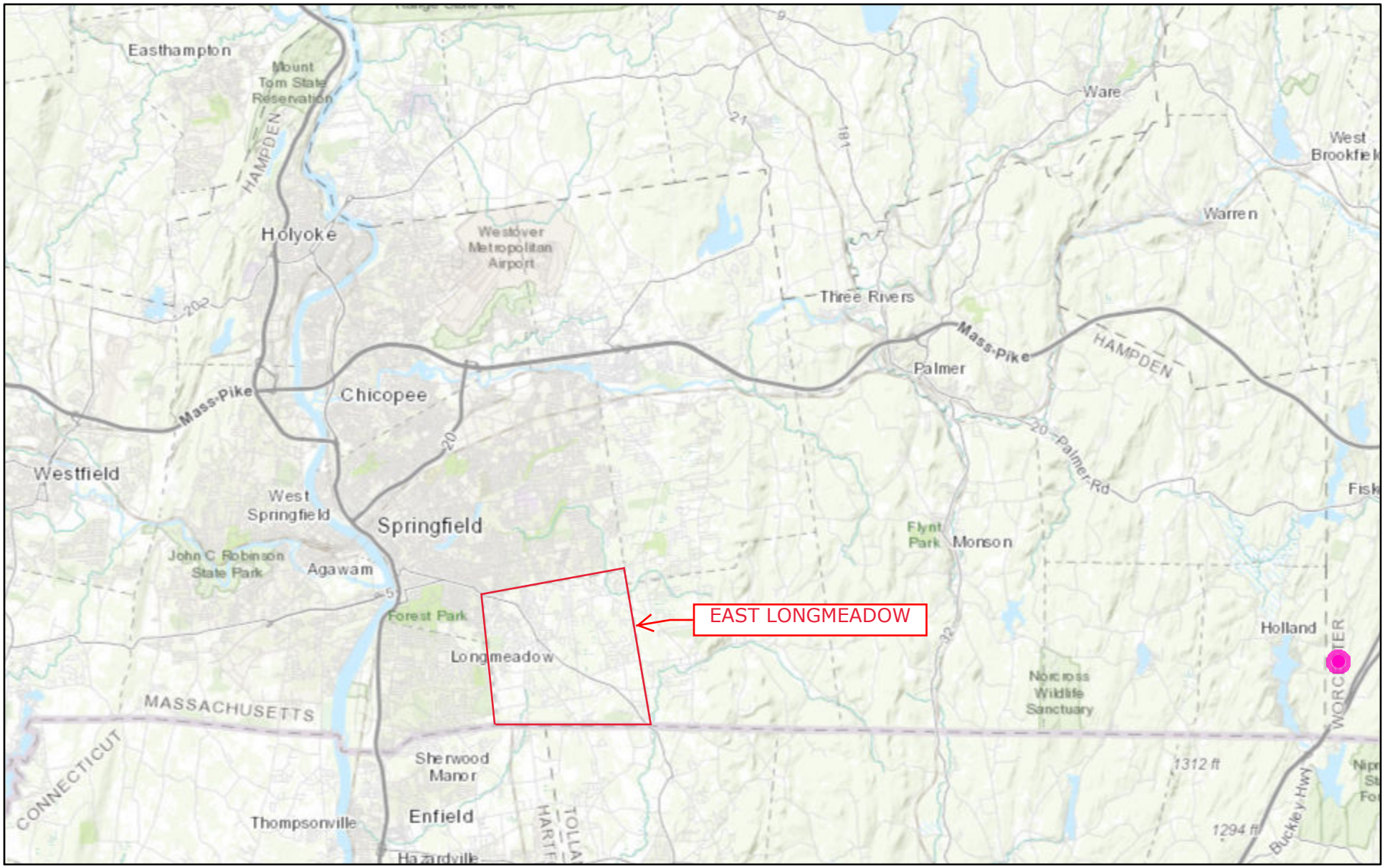
-Eastern cougar and gray wolf are considered extirpated in Massachusetts.
-Endangered gray wolves are not known to be present in Massachusetts, but dispersing individuals from source populations in Canada may occur statewide.
-Critical habitat for the Northern Red-bellied Cooter is present in Plymouth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

Updated 02/05/2016

Attachment D

NHESP Northern Long-eared Bat Hibernacula Map and Fact Sheet

East Longmeadow NHESP NLEB



August 14, 2018

Statewide NLEB Symbology

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

1:288,895

0 1.75 3.5 7 mi

0 2.75 5.5 11 km

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

Natural Heritage
& Endangered Species
Program
Massachusetts Division of Fisheries & Wildlife
1 Rabbit Hill Road, Westborough, MA 01581
tel: (508) 389-6360, fax: (508) 389-7891
www.nhesp.org

Northern Long-eared Bat

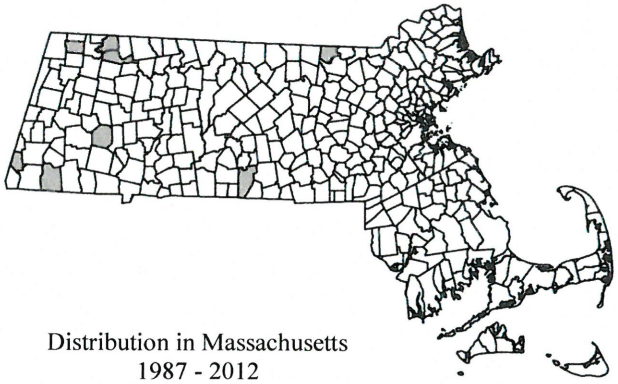
Myotis septentrionalis

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

Description: The Northern Long-eared Bat 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 Long-eared Bat 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 Long-eared Bat from other species in Massachusetts is its long ears. The Little Brown Myotis and rare Indiana Myotis are similar in appearance, but have shorter ears which typically do not extend beyond their nose when pushed forward. 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 Long-eared Bat 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).

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 Long-eared Bats 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 Long-eared Bats 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 of 14 counties. In winter, Northern Long-eared Bats 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 Long-eared Bat 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.

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.

Life Cycle/Behavior: In the summer months, Northern Long-eared Bats 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 Long-eared Bats 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 Long-eared Bats 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 Long-eared Bat is 18 years.

Population status in Massachusetts, including Threats: The Northern Long-eared Bat 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 Long-eared Bat 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 *Geomyces destructans*, a species new to science, but closely related to fungi that naturally grow in caves. 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 Long-eared Bat, 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 2012
Map Updated 2012

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.

Attachment E

USFWS New England Field Office
"No Species Present" Letter

United States Department of the Interior

FISH AND WILDLIFE SERVICE

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

January 8, 2018

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 2018)

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

Tighe&Bond

APPENDIX D

National Historic Preservation Act Eligibility Certification

TO: Town of East Longmeadow Stormwater Management Program Files

FROM: Tighe & Bond

COPY: Bruce Fenney, Superintendent Public Works; Denise Menard, Town Manager

DATE: August 31, 2018

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[1], and determined that the **Town of East Longmeadow** meets **Criterion A,** wherein the discharges do not have the potential to cause effects on historic properties.

Tighe & Bond followed EPA's screening process included in Appendix D of the 2016 Small MS4 General Permit by answering the screening questions as follows:

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 Town of East Longmeadow is a an existing facility authorized under the 2003 Massachusetts Small MS4 General 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 East Longmeadow'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 Places (NRHP), meeting **Criterion A**, and no further action is necessary at this time.

Attachment B to this memorandum includes a list of the inventoried 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 August 14, 2018. As of August 14, 2018, there are three properties in the Town that are listed in the NRHP.

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) and Tribal Historic Preservation Officers (THPOs) as needed 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.

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

Attachment A

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

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

Town of East Longmeadow
MACRIS Database of Inventoried and State-Listed
Properties and Districts

Massachusetts Cultural Resource Information System
MACRIS

MACRIS Search Results

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

Inv. No.	Property Name	Street	Town	Year
ELG.A	Baptist Village		East Longmeadow	
ELG.901	East Longmeadow - Hampden Boundary Marker		East Longmeadow	1906
ELG.911	East Longmeadow - Connecticut Boundary Marker		East Longmeadow	1906
ELG.915	East Longmeadow - Longmeadow Boundary Marker		East Longmeadow	c 1894
ELG.903	East Longmeadow - Hampden Boundary Marker	Allen St	East Longmeadow	c 1894
ELG.918	East Longmeadow - Springfield Boundary Marker	Allen St	East Longmeadow	c 1894
ELG.4	Hall, William Henry Store and Post Office	38 Center Sq	East Longmeadow	c 1830
ELG.1	East Longmeadow Town Hall and Library	60 Center Sq	East Longmeadow	1882
ELG.921	East Longmeadow 75th Anniversary Monument	60 Center Sq	East Longmeadow	1969
ELG.913	East Longmeadow - Longmeadow Boundary Marker	Chestnut St	East Longmeadow	c 1894
ELG.15	Brown, Francis House	137 Chestnut St	East Longmeadow	c 1810
ELG.14 *	Burt, Elijah House	201 Chestnut St	East Longmeadow	1720
ELG.912	East Longmeadow - Longmeadow Boundary Marker	Denslow Rd	East Longmeadow	c 1894
ELG.917	East Longmeadow - Springfield Boundary Marker	Elm St	East Longmeadow	c 1894
ELG.19	Burt, Lucius Colton House	28 Elm St	East Longmeadow	c 1831
ELG.18	Cooley, Joseph House	197 Elm St	East Longmeadow	r 1800
ELG.17	Cooley, Clark Jr. House	354 Elm St	East Longmeadow	c 1810
ELG.902	East Longmeadow - Hampden Boundary Marker	Hampden Rd	East Longmeadow	1882
ELG.43	McGregory, Ebenezer House	112 Hampden Rd	East Longmeadow	r 1865
ELG.44	Fuller, Dea. Henry Clinton House	210 Hampden Rd	East Longmeadow	1812
ELG.22	Kibbe House	251 Kibbe Rd	East Longmeadow	c 1800
ELG.914	East Longmeadow - Longmeadow Boundary Marker	Maple St	East Longmeadow	c 1894
ELG.5	Peaseley, John House	87 Maple St	East Longmeadow	1852

Inv. No.	Property Name	Street	Town	Year
ELG.46	Norcross, James Franklin House	89 Maple St	East Longmeadow	c 1879
ELG.21	Moody, Serva House	74 Mapleshade Ave	East Longmeadow	1783
ELG.20	Birchland Park Junior High School	175 Mapleshade Ave	East Longmeadow	1951
ELG.38	McIntosh, Andrew House and Grist Mill Office	82 Meadowbrook Rd	East Longmeadow	c 1820
ELG.40	East Longmeadow First Baptist Church	89 Meadowbrook Rd	East Longmeadow	r 1820
ELG.37	Hills, Lucy House	116 Meadowbrook Rd	East Longmeadow	1866
ELG.36	Dwight, Daniel House	126 Meadowbrook Rd	East Longmeadow	c 1865
ELG.35	Dwight, Daniel Barn	138 Meadowbrook Rd	East Longmeadow	
ELG.39	Dwight, Oliver House	141 Meadowbrook Rd	East Longmeadow	c 1830
ELG.900	East Longmeadow - Hampden Boundary Marker	Mill Rd	East Longmeadow	c 1894
ELG.916	East Longmeadow - Springfield Boundary Marker	North Main St	East Longmeadow	c 1894
ELG.922	North Main Street Bridge over Conrail	North Main St	East Longmeadow	1964
ELG.10	Pleasant View Grade School	328 North Main St	East Longmeadow	1915
ELG.802	Baptist Village Cemetery	Parker St	East Longmeadow	1783
ELG.33	East Longmeadow First Baptist Church	48 Parker St	East Longmeadow	1970
ELG.32	Pease, Chester House	97 Parker St	East Longmeadow	c 1820
ELG.31	Eaast Longmeadow First Baptist Church Parsonage	135 Parker St	East Longmeadow	c 1888
ELG.30	Braley, William II House	164 Parker St	East Longmeadow	1828
ELG.25	Chapman, Elijah House	309 Parker St	East Longmeadow	c 1830
ELG.26	Eaton, Daniel House	498 Parker St	East Longmeadow	c 1750
ELG.42	First Baptist Church Meeting House and School	54 Pease Rd	East Longmeadow	1807
ELG.41 *	Swetland - Pease House	191 Pease Rd	East Longmeadow	c 1793
ELG.28	East Longmeadow District #5 Schoolhouse	285 Pease Rd	East Longmeadow	1871
ELG.803	Greenlawn Cemetery	Pleasant St	East Longmeadow	1817
ELG.801	Brookside Cemetery	Porter Rd	East Longmeadow	1803
ELG.904	East Longmeadow - Hampden Boundary Marker	Porter Rd	East Longmeadow	c 1894
ELG.919	East Longmeadow - Springfield Boundary Marker	Porter Rd	East Longmeadow	c 1894
ELG.27	Ashley, Stephen House	22 Porter Rd	East Longmeadow	c 1805
ELG.905	East Longmeadow - Wilbraham Boundary Marker	168 Porter Rd	East Longmeadow	1894
ELG.23	East Longmeadow District #6 Schoolhouse	208 Porter Rd	East Longmeadow	1872
ELG.24	Hancock, John House	222 Porter Rd	East Longmeadow	c 1795
ELG.800	Billings Hill Cemetery	Prospect St	East Longmeadow	1803
ELG.909	East Longmeadow - Connecticut Boundary Marker	Prospect St	East Longmeadow	1906
ELG.9	Green, Pownal - Page, W. W. House	79 Prospect St	East Longmeadow	c 1830
ELG.8	Foote, Calvin House	107 Prospect St	East Longmeadow	1831
ELG.7	Rankin, James H. House	125 Prospect St	East Longmeadow	r 1870

Inv. No.	Property Name	Street	Town	Year
ELG.6	Webster, Amos House	165 Prospect St	East Longmeadow	c 1830
ELG.16	East Longmeadow Distrit #4 Schoolhouse	232 Prospect St	East Longmeadow	1792
ELG.923	Quarryman, The	School St	East Longmeadow	1994
ELG.11	East Longmeadow District #4 Schoolhouse	35 School St	East Longmeadow	1868
ELG.910	East Longmeadow - Connecticut Boundary Marker	Shaker Rd	East Longmeadow	1906
ELG.47	East Longmeadow Fire Station	35 Shaker Rd	East Longmeadow	1924
ELG.29	Hunn, Ephraim Jr. House	463 Shaker Rd	East Longmeadow	1822
ELG.907	East Longmeadow - Connecticut Boundary Marker	Somers Rd	East Longmeadow	1906
ELG.3 *	First Congregational Church of East Longmeadow	7 Somers Rd	East Longmeadow	1828
ELG.2	Adolphus Swedish Evangelical Lutheran Church	30 Somers Rd	East Longmeadow	1891
ELG.908	East Longmeadow - Connecticut Boundary Marker	Somersville Rd	East Longmeadow	1906
ELG.34	Ellis, Jerusha House	56 Somersville Rd	East Longmeadow	c 1830
ELG.45	McGregory, Ebenezer House	43 South Bend Ln	East Longmeadow	1790
ELG.12	Frost, Warren House	203 Westwood Ave	East Longmeadow	c 1830
ELG.13	Hale, John House	245 Westwood Ave	East Longmeadow	1792

* Listed in the National Register of Historic Places

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

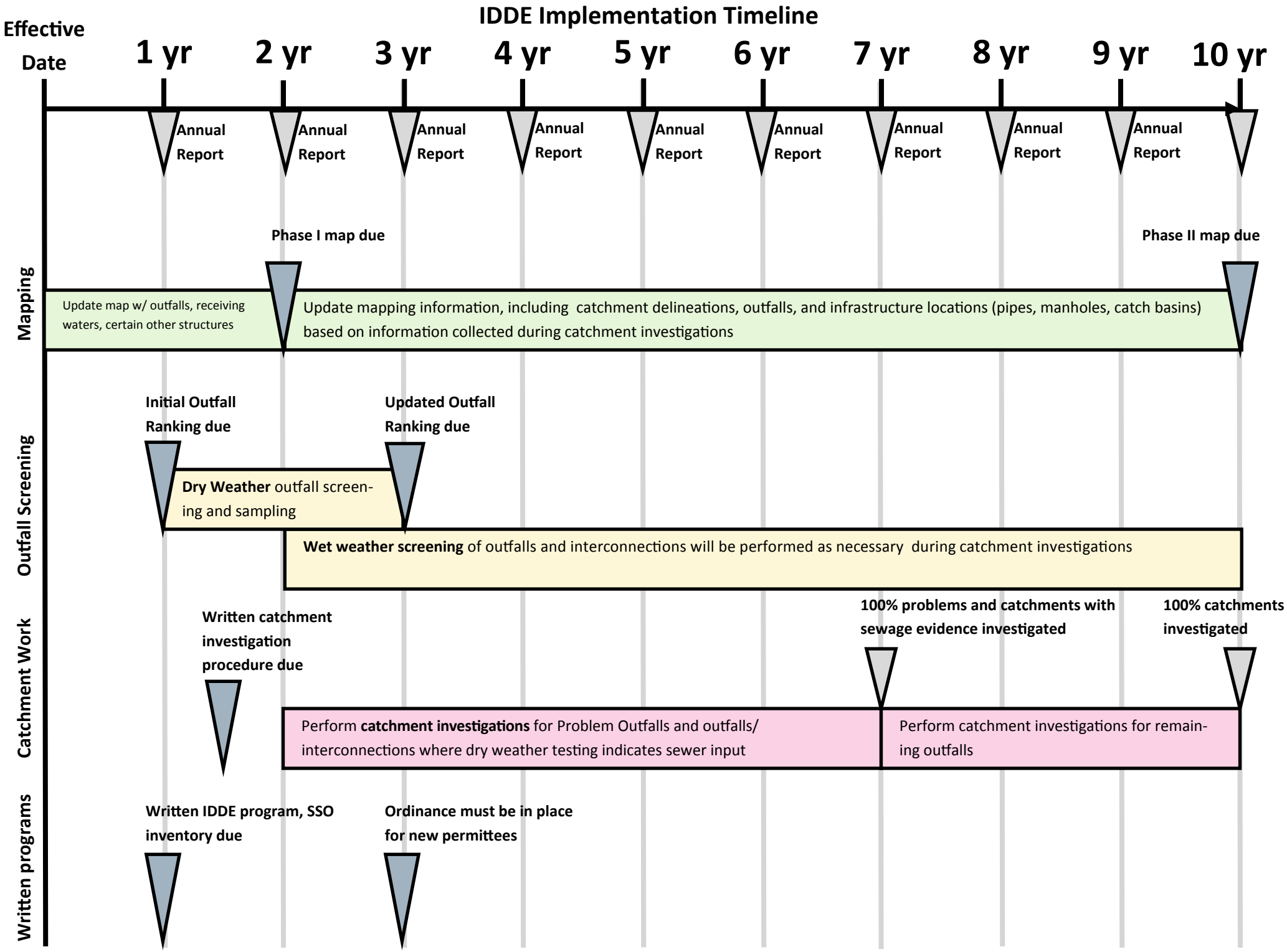
☐ Catch basin cleaning program

☐ 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
Outfall Screening
Initial Outfall Ranking due
Updated Outfall Ranking due
Dry Weather outfall screening and sampling
Wet weather screening of outfalls and interconnections will be performed as necessary during catchment investigations
Catchment Work
Written catchment investigation procedure due
100% problems and catchments with sewage evidence investigated
100% catchments investigated
Perform catchment investigations for Problem Outfalls and outfalls/ interconnections where dry weather testing indicates sewer input
Perform catchment investigations for remaining outfalls
Written programs
Written IDDE program, SSO inventory due
Ordinance must be in place for new permittees

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

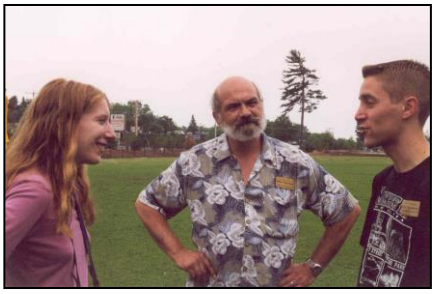
Tips for Organizing and Conducting Volunteer Clean-up Events

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.

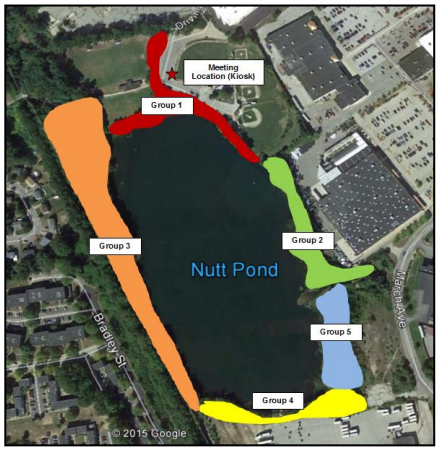
E. Determine the Most Appropriate Age(s) of Your Volunteers: Based upon the task(s) at hand, determine the most appropriate age(s) of your volunteers. Are you seeking adults only? Children? Both? Do you have tasks that all can partake in, or are the tasks age-specific?

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.

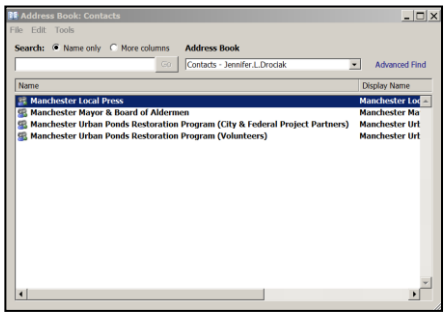
The UPRP has partnered with the Student Conservation Association, local high school ecology clubs, local boy-scout troops, trout-fishing clubs, geo-cashing groups, and others in the past. This has helped garner additional / new volunteers.

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).

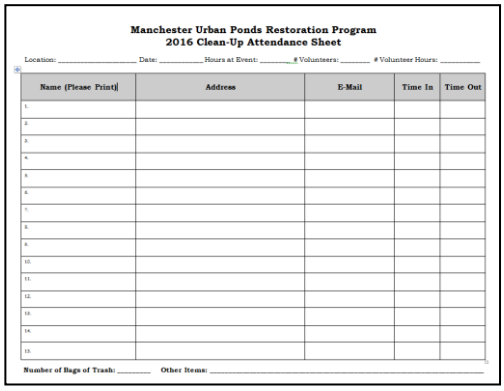
For Example: Seeking volunteers of all ages to assist in an annual trash clean-up at Black Brook and Blodget Park in Manchester on Saturday, April 23, 2016 from 9:00AM – 11:00AM. Volunteers will partner to clean the park and skirt the edges of the brook and wetland complex to remove accumulated trash. 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
City of Manchester Environmental Protection Division
200 Winston Street - Manchester NH 03103 (603) 645-6099
www.manchesterurban.org/urbanponds

Nutts Pond Facts

- **Namesake:** Named after a local circus performer, "Commodore" George Washington Nutt
- **Location:** Driving Park Road, off of South Willow Street in south Manchester
- **Type of Waterbody:** Natural Pond fed by Tannery Brook
- **Inlet/Outlet:** Tannery Brook, flowing into Nutts Pond to the south of Home Depot, and emptying into the Merrimack River near the Riverwalk in downtown Manchester
- **Watershed Area:** 635 acres
- **Waterbody Size:** 16.1 acres
- **Volume of Water:** 240,500 m^3
- **Mean/Average Water Depth:** 13.12 feet
- **Maximum Water Depth:** 30.10 feet
- **Shoreline Length:** 3,116 feet
- **Elevation:** 237 feet
- **Uses:** Paddling, fishing
- **Public Boat Launch:** Gravel, trailer or car-top
- **Amenities:** Precourt Park athletic fields
- **Local Legend:** "Commodore" Nutt the circus performer who toured with the P.T. Barnum Circus show with Tom Thumb

Manchester Urban Ponds Restoration Program
City of Manchester Environmental Protection Division
200 Winston Street - Manchester NH 03103 (603) 645-6099
www.manchesterurban.org/urbanponds

The History of Nutts Pond

Since colonial times Nutts Pond has been known by several names. In the mid-1800's, it was known as Fort Pond, but "in ancient time(s) was known as Sangaa's Fort" (Potter, 1856). It came to be known as Nutts Pond shortly thereafter, named for a popular local circus performer, "Commodore" Nutt. At that time, the Nutt family farm was situated near the pond.

"Commodore" Nutt

"Commodore" George Washington Morrison Nutt was born in Manchester in 1844 and was the son of a New Hampshire farmer. He stood 29 inches tall and weighed 24 pounds; like Tom Thumb, he was discovered by P.T. Barnum, and in fact because of the resemblance between the two, many people suspected that Nutt was in fact Thumb posing under a different name. To exploit the situation, Barnum began to exhibit the two together, billing them as "The Two Smallest Men and Greatest Curiosities Living."

Commodore Nutt
(Courtesy Strafford County Historical Society)

Barnum first placed them on exhibit in New York and made them rich and famous. Tom Thumb and Nutt undertook a three-year tour of Europe during the 1860s where they appeared before almost all of the crowned heads in the continent. After the completion of their European tour, they toured the United States.

They were reported as being graceful, intelligent, witty, educated and refined, exhibiting the most polished manners, and yet only the size of three year old children. They performed songs, duets, dances, pantomimes, orations and military exercises (Historical Society of Cheshire County, New Hampshire)

Commodore Nutt and Miss Minnie Warren
(Courtesy Strafford County Historical Society)

Manchester Urban Ponds Restoration Program
Gary Lin Old Place, Lincoln NH 03251 (603) 323-5207
www.manchesterurban.org/urbanponds

Nutts Pond Stormwater Best Management Practices (BMP) Summary

Tannery Brook Inlet Stormwater BMP Engineering & Construction

Comprehensive Environmental Inc (CEI) has worked with the City of Manchester to provide engineering and construction certain for drainage improvement, stormwater treatment and pollution control at Nutts Pond. Tannery Brook is a free or 2 foot wood drainage culvert. The drainage system previously fixed outstanding wetlands and Grove Trail with enhanced stormwater with large parking areas and roadways. The system discharges into Nutts Pond at the Home Depot. The enhanced Grove and street upgrades provide a type of regional enhancement drainage to drainage into the wetland area. A total quantity was assisted to guard stormwater flow around through three gradient wetland cells. The Grove and street upgrades were completed in December 2008 and has already suppressed a year's worth of sediment and debris which is a significant improvement. The project cost including engineering and construction was $130,000

Nutts Pond Stormwater Improvements

CEI assisted a "first flush" stormwater detention structure, stormwater filtration and wet pond to provide enhanced and sediment removal for urban runoff from Tannery Brook. The "first flush" is a stormwater detention structure that stores first flush flow in BMP's while allowing larger volume volume to pass through the existing drainage system. The enhanced filtration and wet pond system is a series of cells that allow water to pass through a series of cells in order to prevent the growth of a sediment delta. Stormwater was diverted from a 42 inch pipe using a power structure and discharged twice into the wetland system. The wetland system is a series of cells that allow water to pass through with over 50 inch pipe using to prevent stormwater under structure and deep water. The wetland structure is also designed to sustain wetland area, which exposed specialized serious control planning and temporary water handling techniques. The feature wet pond and power structure were completed in June of 2007. The total over-for design and construction was $120,000

Tannery Brook Inlet Wetland Cleanup, Restoration & Replication Project

As part of the Grove Pond BMP construction, CEI also designed and oversaw construction of the wetland restoration and cleanup of the surrounding damaged wetlands. The cleanup consisted of removing approximately 300 cubic yards of sediment and debris from the wetland area and restoring the wetland area to a natural state. The cleanup and wetland restoration occupied two capital construction techniques and coordination to wash around excavator entering wetland plant and bottom. The proposed design consisted of replanting and restoring approximately 10,000 square feet of forested wetlands. The surrounding wetland area was also enhanced with additional plantings and wetland restoration to provide and encouraging free flow regional cedar and hemlocks that assisted around the existing vegetation. A combination of mature mature woody vegetation with specialized wetland plant mature was installed in the wetland restoration area. A total of 10 small and region shrubs with 10 small and region trees were planted in the region shrub. The wetland area was then sub replication for completed in July of 2007. The total over-for design and wetland restoration was $44,000

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

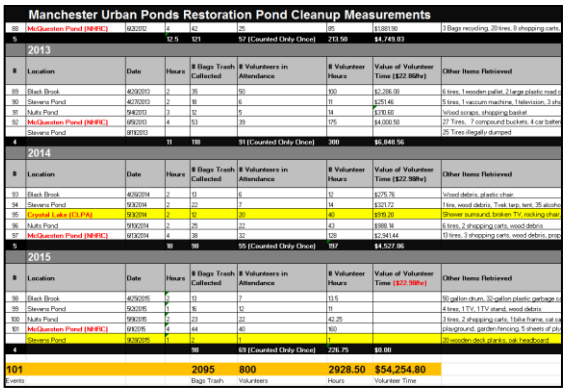
Above Right: Cake served to volunteers at the 100th official cleanup of the Manchester Urban Ponds Restoration Program .

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

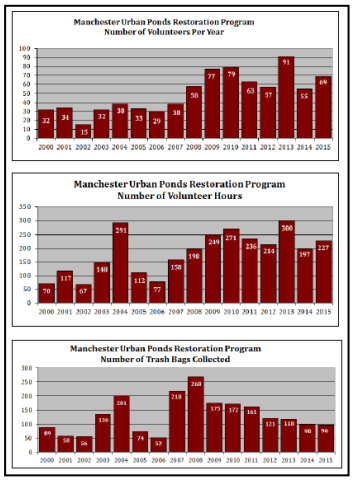
Step 7: Follow Up After the Clean-Up Event

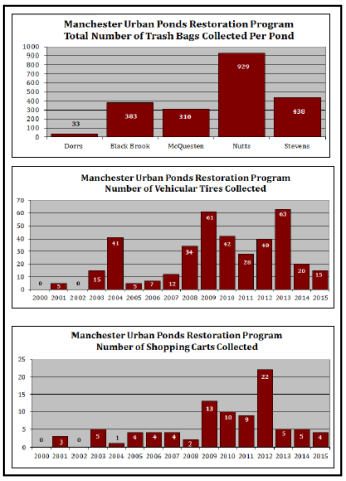
A. Update Your Electronic Records: Now is the time to transpose the information collected on the "Clean-Up Attendance Sheet" into an electronic record-retention system if you have access to one. Perhaps you have access to a database. If not, consider using a Microsoft Excel workbook / spreadsheet system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

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



Manchester Urban Ponds Restoration Pond Cleanup Measurements								
88	McQuesten Pond (NHFIC)	9/3/2012	4	42	25	85	$1,188.18	3 Bags recycling, 20 tires, 8 shopping carts
5			12.5	121	57 (Counted Only Once)	213.50	$4,749.03	
2013								
#	Location	Date	Hours	# Bags Trash Collected	# Volunteers in Attendance	# Volunteer Hours	Value of Volunteer Time ($22.86/hr)	Other Items Retrieved
89	Black Brook	4/20/2013	2	35	50	100	$2,286.00	6 tires, 1 wooden pallet, 2 large plastic road c
90	Stevens Pond	4/20/2013	2	18	6	11	$251.46	5 tires, 1 vacuum machine, 1 television, 3 sho
91	Nutts Pond	5/4/2013	3	12	5	14	$320.58	Wood scraps, shopping basket
92	McQuesten Pond (NHFIC)	6/5/2013	4	53	39	175	$4,000.50	27 Tires, 7 compound buckets, 4 car batter
	Stevens Pond	8/18/2013						25 Tires illegally dumped
4			11	118	91 (Counted Only Once)	300	$6,860.56	
2014								
#	Location	Date	Hours	# Bags Trash Collected	# Volunteers in Attendance	# Volunteer Hours	Value of Volunteer Time ($22.86/hr)	Other Items Retrieved
93	Black Brook	4/26/2014	2	13	6	12	$275.76	Wood debris, plastic chair
94	Stevens Pond	5/3/2014	2	22	7	14	$321.72	1 tire, wood debris, Tyek tarp, tent, 35 alcoho
95	Crystal Lake (CLPA)	5/3/2014	2	12	20	40	$915.20	Shower surround, broken TV, rocking chair
96	Nutts Pond	5/10/2014	2	25	22	43	$983.14	6 tires, 2 shopping carts, wood debris
97	McQuesten Pond (NHFIC)	6/13/2014	4	36	32	128	$2,924.44	13 tires, 3 shopping carts, wood debris, prop
5			10	98	95 (Counted Only Once)	197	$4,527.06	
2015								
#	Location	Date	Hours	# Bags Trash Collected	# Volunteers in Attendance	# Volunteer Hours	Value of Volunteer Time ($22.86/hr)	Other Items Retrieved
98	Black Brook	4/25/2015	1	13	7	13.5		50 gallon drum, 32 gallon plastic garbage c
99	Stevens Pond	5/2/2015	1	16	12	11		4 tires, 1 TV, 1 TV stand, wood debris
100	Nutts Pond	5/9/2015	1	23	22	42.25		3 tires, 2 shopping carts, 1 bike frame, cat ca
101	McQuesten Pond (NHFIC)	6/1/2015	1	44	40	160		playground, garden fencing, 5 sheets of pla
	Stevens Pond	10/3/2015	1	2	1	1		10 wooden deck planks, oak headboard
4			5	98	69 (Counted Only Once)	226.75	$0.00	
101				2095	800	2928.50	$54,254.80	
Events				Bags Trash	Volunteers	Hours	Volunteer Time	





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

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

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

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

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

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

Tighe&Bond

APPENDIX F

Record Keeping

Tighe&Bond

APPENDIX G

Table 4-1. SSO Inventory

East Longmeadow, Massachusetts
Revision Date: June 30, 2019

SSO Location[1]	Discharge Statement[2]	Date[3]	Time Start[3]	Time End[3]	Estimated Volume[4]	Description[5]	Mitigation Completed[6]	Mitigation Planned[7]
24 Franconia Circle	Direct to Receiving Water	2-29-16	11:00	11:30	1500 gallons	Sewer Blockage	Line jetted to remove blockage	Annual Inspection
66 Smith Avenue	Ground surface	4-1-19	10:55	11:45	500 Gallons	Sewer Blockage	Line jetted to remove blockage	

[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
[7] Mitigation and corrective measures planned with implementation schedules

Tighe&Bond

APPENDIX H

AMENDMENT LOG

Tighe&Bond

Amend. No.	Description of the Amendment	Date of Amendment	Amendment Prepared by (Name/Signature)
1			
2			
3			
4			
5			
6			
7			
8			
9			
10			

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: _____ Title: _____

Signature: _____ Date: _____

A letter that authorizes the Town of East Longmeadow Director of Public Works to sign and certify certain documents prepared under the Small MS4 General Permit is included in Appendix I.

J:\E\E0714 East Longmeadow Engineering Services\18A - MS4 Services - Year 1 Compliance\Permitting\SWMP\Draft East Longmeadow SWMP.docx

Tighe&Bond

APPENDIX I

TOWN OF EAST LONGMEADOW
60 CENTER SQUARE
EAST LONGMEADOW, MA 01028

Denise Menard, Town Manager

Denise.Menard@eastlongmeadowma.gov
(413) 525-5400 ext. 1100

June 4, 2019

Thelma Murphy
Chief, Stormwater and Construction Permits Section
Office of Ecosystem Protection
U.S. Environmental Protection Agency, Region 1
5 Post Office Square, Suite 100 (OEP06-1)
Boston, MA 02109-3912

Re: 2016 Massachusetts Small Municipal Separate Storm Sewer System General Permit
Delegating an "Authorized Representative"

Dear Ms. Murphy:

This letter serves to designate the Town of East Longmeadow Department of Public Works Superintendent, Bruce Fenney as an authorized person for signing all reports including but not limited to the Stormwater Management Plan (SWMP), Stormwater Pollution Prevention Plans (SWPPPs), inspection reports, annual reports, monitoring reports, reports on training, and other information required by the Small MS4 General Permit. This authorization cannot be used for signing an NPDES permit application (e.g., Notice of Intent (NOI)) in accordance with 40 CFR 122.22.

By signing this authorization, I confirm that I meet the following requirements to make such a designation as set forth in Part B.11 of Appendix B of the Small MS4 General Permit:

> *For a municipality, state, federal, or other public agency: By either a principal executive officer or ranking elected official. For purposes of this subsection, a principal executive officer of a federal agency includes (i) the chief executive officer of the agency, or (ii) a senior executive officer having responsibility for the overall operations of a principal geographic unit of the agency (e.g., Regional Administrator of EPA).*

"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."

Sincerely,

Denise Menard

Denise Menard
East Longmeadow Town Manager

Tighe&Bond

APPENDIX J

Illicit Discharge Detection and Elimination (IDDE) Plan

DRAFT

Town of East Longmeadow

June 30, 2019

Table of Contents

Illicit Discharge Detection and Elimination Plan

Town of East Longmeadow

1 Introduction 4

1.1 MS4 Program 4

1.2 Illicit Discharges 4

1.3 Allowable Non-Stormwater Discharges 5

1.4 Receiving Waters and Impairments 6

1.5 IDDE Program Goals, Framework, and Timeline 7

1.6 Work Completed to Date 10

2 Authority and Statement of IDDE Responsibilities 11

2.1 Legal Authority 11

2.2 Statement of Responsibilities 11

3 Stormwater System Mapping 13

3.1 Phase I Mapping 13

3.2 Phase II Mapping 14

3.3 Additional Recommended Mapping Elements 15

4 Sanitary Sewer Overflows (SSOs) 15

5 Assessment and Priority Ranking of Outfalls 19

5.1 Outfall Catchment Delineations 19

5.2 Outfall and Interconnection Inventory and Initial Ranking 19

6 Dry Weather Outfall Screening and Sampling 39

6.1 Weather Conditions 39

6.2 Dry Weather Screening/Sampling Procedure 39

6.2.1 General Procedure 39

6.2.2 Field Equipment 40

6.2.3 Sample Collection and Analysis 42

6.3 Interpreting Outfall Sampling Results 45

6.4 Follow-up Ranking of Outfalls and Interconnections 46

7 Catchment Investigations 47

7.1 System Vulnerability Factors 47

7.2 Dry Weather Manhole Inspections 65

7.3 Wet Weather Outfall Sampling 67

7.4 Source Isolation and Confirmation 68

7.4.1 Sandbagging 68

7.4.2 Smoke Testing 69

7.4.3 Dye Testing 69

7.4.4 CCTV/Video Inspection 70

7.4.5 Optical Brightener Monitoring 70

7.4.6 IDDE Canines 71

7.5 Illicit Discharge Removal 71

7.5.1 Confirmatory Outfall Screening 71

7.6 Ongoing Screening 71

8 Training 73

9 Progress Reporting 73

Tables

Table 1-1. Impaired Waters 6

Table 1-2. IDDE Program Implementation Timeline 8

Table 4-1. SSO Inventory 17

Table 5-1. Outfall Inventory and Priority Ranking Matrix 23

Table 6-1. Field Equipment – Dry Weather Outfall Screening and Sampling 40

Table 6-2. Sampling Parameters and Analysis Methods 43

Table 6-3. Required Analytical Methods, Detection Limits, Hold Times, and Preservatives[4] 44

Table 6-4. Benchmark Field Measurements for Select Parameters 46

Table 7-1. Outfall Catchment System Vulnerability Factor (SVF) Inventory 49

Figures

Figure 1-1. IDDE Investigation Procedure Framework 8

Appendices

Appendix A – Legal Authority (IDDE Bylaw or Ordinance)
Appendix B – Storm System Mapping
Appendix C – Field Forms, Sample Bottle Labels, and Chain of Custody Forms
Appendix D – Water Quality Analysis Instructions, User's Manuals and Standard Operating Procedures
Appendix E – IDDE Employee Training Record
Appendix F – Source Isolation and Confirmation Methods: Instructions, Manuals, and SOPs

1 Introduction

1.1 MS4 Program

This Illicit Discharge Detection and Elimination (IDDE) Plan has been developed by East Longmeadow's Department of Public Works to address the requirements of the United States Environmental Protection Agency's (USEPA's) 2016 National Pollutant Discharge Elimination System (NPDES) General Permit for Stormwater Discharges from Small Municipal Separate Storm Sewer Systems (MS4) in Massachusetts, hereafter referred to as the "2016 Massachusetts MS4 Permit" or "MS4 Permit."

The 2016 Massachusetts MS4 Permit requires that each permittee, or regulated community, address six Minimum Control Measures. These measures include the following:

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

Under Minimum Control Measure 3, the permittee is required to 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. The IDDE program must also be recorded in a written (hardcopy or electronic) document. This IDDE Plan has been prepared to address this requirement.

1.2 Illicit Discharges

An "illicit discharge" is any discharge to a drainage system that is not composed entirely of stormwater, with the exception of discharges pursuant to a NPDES permit (other

than the NPDES permit for discharges from the MS4) and discharges resulting from fire-fighting activities.

Illicit discharges may take a variety of forms. Illicit discharges may enter the drainage system through direct or indirect connections. Direct connections may be relatively obvious, such as cross-connections of sewer services to the storm drain system. Indirect illicit discharges may be more difficult to detect or address, such as failing septic systems that discharge untreated sewage to a ditch within the MS4, or a sump pump that discharges contaminated water on an intermittent basis.

Some illicit discharges are intentional, such as dumping used oil (or other pollutant) into catch basins, a resident or contractor illegally tapping a new sewer lateral into a storm drain pipe to avoid the costs of a sewer connection fee and service, and illegal dumping of yard wastes into surface waters.

Some illicit discharges are related to the unsuitability of original infrastructure to the modern regulatory environment. Examples of illicit discharges in this category include connected floor drains in old buildings, as well as sanitary sewer overflows that enter the drainage system. Sump pumps legally connected to the storm drain system may be used inappropriately, such as for the disposal of floor washwater or old household products, in many cases due to a lack of understanding on the part of the homeowner.

Elimination of some discharges may require substantial costs and efforts, such as funding and designing a project to reconnect sanitary sewer laterals. Others, such as improving self-policing of dog waste management, can be accomplished by outreach in conjunction with the minimal additional cost of dog waste bins and the municipal commitment to disposal of collected materials on a regular basis.

Regardless of the intention, when not addressed, illicit discharges can contribute high levels of pollutants, such as heavy metals, toxics, oil, grease, solvents, nutrients, and pathogens to surface waters.

1.3 Allowable Non-Stormwater Discharges

The following categories of non-storm water discharges are allowed under the MS4 Permit unless the permittee, USEPA or Massachusetts Department of Environmental Protection (MassDEP) identifies any category or individual discharge of non-stormwater discharge as a significant contributor of pollutants to the MS4:

- Water line flushing
- Landscape irrigation
- Diverted stream flows
- Rising ground water
- Uncontaminated ground water infiltration (as defined at 40 CFR 35.2005(20))
- Uncontaminated pumped groundwater
- Discharge from potable water sources
- Foundation drains
- Air conditioning condensation
- Irrigation water, springs
- Water from crawl space pumps
- Footing drains
- Lawn watering
- Individual resident car washing
- De-chlorinated swimming pool discharges
- Street wash waters
- Residential building wash waters without detergents

If these discharges are identified as significant contributors to the MS4, they must be considered an "illicit discharge" and addressed in the IDDE Plan (i.e., control these sources so they are no longer significant contributors of pollutants, and/or eliminate them entirely).

1.4 Receiving Waters and Impairments

Table 1-1 lists the "impaired waters" within the boundaries of Town of East Longmeadow regulated area based on the 2014 Massachusetts Integrated List of Waters produced by MassDEP every two years. Impaired waters are water bodies that do not meet water quality standards for one or more designated use(s) such as recreation or aquatic habitat.

Table 1-1. Impaired Waters

East Longmeadow, Massachusetts

Water Body Name	Segment ID	Category	Impairment(s)	Associated Approved TMDL

Category 4a Waters – impaired water bodies with a completed Total Maximum Daily Load (TMDL).

Category 4c Waters – impaired water bodies where the impairment is not caused by a pollutant. No TMDL required.

Category 5 Waters – impaired water bodies that require a TMDL.

"Approved TMDLs" are those that have been approved by EPA as of the date of issuance of the 2016 MS4 Permit.

There are currently no listed "impaired waters" within the Town of East Longmeadow town limits

1.5 IDDE Program Goals, Framework, and Timeline

The goals of the IDDE program are to find and eliminate illicit discharges to municipal separate storm sewer system and to prevent illicit discharges from happening in the future. The program consists of the following major components as outlined in the MS4 Permit:

- Legal authority and regulatory mechanism to prohibit illicit discharges and enforce this prohibition
- Storm system mapping
- Inventory and ranking of outfalls
- Dry weather outfall screening
- Catchment investigations
- Identification/confirmation of illicit sources
- Illicit discharge removal
- Followup screening
- Employee training

The IDDE investigation procedure framework is shown in **Figure 1-1.** The required timeline for implementing the IDDE program is shown in **Table 1-2**.

Figure 1-1. IDDE Investigation Procedure Framework

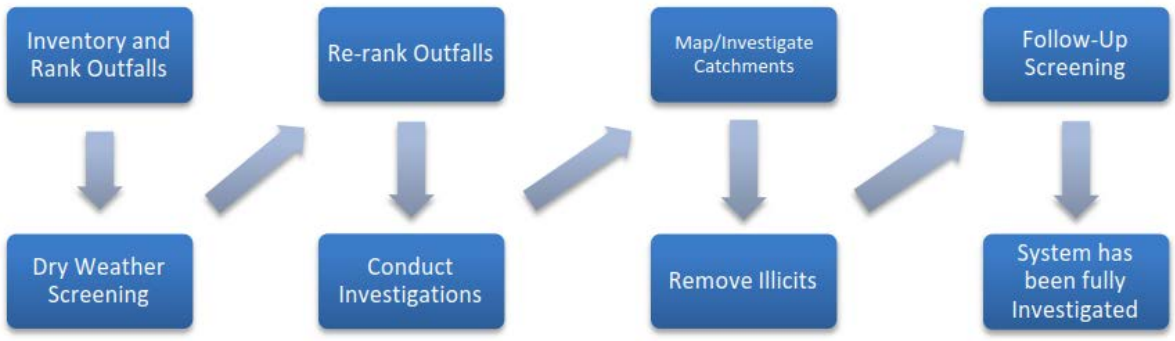


Table 1-2. IDDE Program Implementation Timeline

IDDE Program Requirement	Completion Date from Effective Date of Permit					
	1 Year	1.5 Years	2 Years	3 Years	7 Years	10 Years
Written IDDE Program Plan	*X*					
SSO Inventory	*X*					
Written Catchment Investigation Procedure		*X*				

IDDE Program Requirement	Completion Date from Effective Date of Permit					
	1 Year	1.5 Years	2 Years	3 Years	7 Years	10 Years
Phase I Mapping			***X***			
Phase II Mapping						***X***
IDDE Regulatory Mechanism or By-law (if not already in place)				***X***		
Dry Weather Outfall Screening				***X***		
Follow-up Ranking of Outfalls and Interconnections				***X***		
Catchment Investigations – Problem Outfalls					***X***	
Catchment Investigations – all Problem, High and Low Priority Outfalls						***X***

1.6 Work Completed to Date

The 2003 MS4 Permit required each MS4 community to develop a plan to detect illicit discharges using a combination of storm system mapping, adopting a regulatory mechanism to prohibit illicit discharges and enforce this prohibition, and identifying tools and methods to investigate suspected illicit discharges. Each MS4 community was also required to define how confirmed discharges would be eliminated and how the removal would be documented.

The Town of East Longmeadow has completed the following IDDE program activities consistent with the 2003 MS4 Permit requirements:

- Developed a map of outfalls and receiving waters
- Adopted an IDDE bylaw or regulatory mechanism
- Developed procedures for locating illicit discharges (i.e., visual screening of outfalls for dry weather discharges, dye or smoke testing)

In addition to the 2003 MS4 Permit requirements, other IDDE-related activities that have been completed include:

- SSO inventory
- Outfall sampling
- Additional storm system mapping, including the locations of catch basins, manholes and pipe connectivity

2 Authority and Statement of IDDE Responsibilities

2.1 Legal Authority

The Town of East Longmeadow has adopted a Stormwater Management By-Law (Revised 2018). A copy of the Stormwater Management By-Law is provided in **Appendix A**. The Stormwater Management By-Law provides the Town of East Longmeadow with 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
- Implement appropriate enforcement procedures and actions.

The Town of East Longmeadow will review its current Stormwater Management By-Law and related land use regulations and policies for consistency with the 2016 MS4 Permit.

2.2 Statement of Responsibilities

The Department of Public Works is the lead municipal agency or department responsible for implementing the IDDE program pursuant to the provisions of the Stormwater Management By-Law. Other agencies or departments with responsibility for aspects of the program include:

- **Department of Public Works**
  - Has primary responsibility for coordinating compliance with the Phase II NPDES MS4 Stormwater Permit
  - Has primary responsibility for documenting suspected illicit discharges and providing for appropriate investigation, including but not limited to water quality monitoring, closed-circuit television inspection, smoke testing and dye testing
  - Coordinates with GIS Coordinator to maintain a current and accurate map of the storm drain system, updating as necessary
  - Responsible for Stormwater inspections during construction
  - Ensures that staff receives training in illicit discharge detection and elimination

  - Explains, justifies and defends Department programs, policies and activities; negotiates and resolves sensitive and controversial issues
  - Provides for effective management and financing of the Town's stormwater system
  - Coordinates with other Departments for new utility connections
- **Building Commissioner/Code Enforcement Officer**
  - Reviews and inspects all building construction projects in accordance with local, state and federal codes
  - Ensures public health, safety and welfare is secured
  - Enforces codes adopted by the Town of East Longmeadow
  - Performs on-site inspections and field investigations to verify that building codes are met
  - Responds to concerns regarding possible infractions of building codes and permit procedures
  - Issues stop work orders to perpetrators who are conducting unauthorized work
  - Reviews proposed construction plans or submissions and coordinates utility connections
  - Maintains records or database of onsite subsurface wastewater disposal systems and reviews records on a regular basis
- **Licensed Plumbing Inspector**
  - Reviews and inspects all building construction projects in accordance with local, state and federal codes
  - Investigates complaints of possible code violations, including building, sanitations and zoning violations and initiate appropriate remedial action to ensure compliance
- **Health Department**
  - Investigates and reports on all health hazards, complaints and nuisances
  - Issues cease and desist orders for violations of sanitation code
  - Conducts health inspections of public places
- **Planning & Community Development Director**
  - Responds to complaints, investigates potential violations and takes/recommends appropriate action/remediation
  - Coordinates with other departments, including the Department of Public Works for new utility connections
  - Ensures projects in front of the Planning Board follow the rules and regulations of the Town of East Longmeadow

3 Stormwater System Mapping

The Town of East Longmeadow originally developed mapping of its stormwater system to meet the mapping requirements of the 2003 MS4 Permit. A copy of the existing storm system map is provided in **Appendix B**. The 2016 MS4 Permit requires a more detailed storm system map than was required by the 2003 MS4 Permit. The revised mapping is intended to facilitate the identification of key infrastructure, factors influencing proper system operation, and the potential for illicit discharges.

The 2016 MS4 Permit requires the storm system map to be updated in two phases as outlined below. The Department of Public Works is responsible for updating the stormwater system mapping pursuant to the 2016 MS4 Permit. The Town of East Longmeadow will report on the progress towards completion of the storm system map in each annual report. Updates to the stormwater mapping will be included in **Appendix B**.

3.1 Phase I Mapping

Phase I mapping must be completed within two (2) years of the effective date of the permit (July 1, 2020) and include the following information:

- Outfalls and receiving waters (previously required by the MS4-2003 permit)
- Open channel conveyances (swales, ditches, etc.)
- Interconnections with other MS4s and other storm sewer systems
- Municipally owned stormwater treatment structures
- Water bodies identified by name and indication of all use impairments as identified on the most recent EPA approved Massachusetts Integrated List of Waters report
- Initial catchment delineations. Topographic contours and drainage system information may be used to produce initial catchment delineations.

The Town of East Longmeadow has completed the following updates to its stormwater mapping to meet the Phase I requirements:

- Outfalls and receiving waters (previously required by the MS4-2003 permit)
- Open channel conveyances (swales, ditches, etc.)
- Interconnections with other MS4s and other storm sewer systems

- Municipally owned stormwater treatment structures
- Water bodies identified by name and indication of all use impairments as identified on the most recent EPA approved Massachusetts Integrated List of Waters report
- Initial catchment delineations

The Town of East Longmeadow will update its stormwater mapping by July 1, 2019 to include the remaining Phase I information.

3.2 Phase II Mapping

Phase II mapping must be completed within ten (10) years of the effective date of the permit (July 1, 2028) and include the following information:

- Outfall spatial location (latitude and longitude with a minimum accuracy of +/-30 feet)
- Pipes
- Manholes
- Catch basins
- Refined catchment delineations. Catchment delineations must be updated to reflect information collected during catchment investigations.
- Municipal Sanitary Sewer system

The Town of East Longmeadow has completed the following updates to its stormwater mapping to meet the Phase II requirements:

- Outfall spatial location (latitude and longitude with a minimum accuracy of +/-30 feet)
- Pipes
- Manholes
- Catch basins

- Refined catchment delineations. Catchment delineations must be updated to reflect information collected during catchment investigations.
- Municipal Sanitary Sewer system

The Town of East Longmeadow will update its stormwater mapping by July 1, 2028 to include the remaining following Phase II information.

3.3 Additional Recommended Mapping Elements

Although not a requirement of the 2016 MS4 Permit, the Town of East Longmeadow has included the following recommended elements in its storm system mapping:

- Storm sewer material, size (pipe diameter), age
- Sanitary sewer system material, size (pipe diameter), age
- Topography
- Orthophotography

4 Sanitary Sewer Overflows (SSOs)

The 2016 MS4 Permit requires municipalities to prohibit illicit discharges, including sanitary sewer overflows (SSOs), to the separate storm sewer system. SSOs are discharges of untreated sanitary wastewater from a municipal sanitary sewer that can contaminate surface waters, cause serious water quality problems and property damage, and threaten public health. SSOs can be caused by blockages, line breaks, sewer defects that allow stormwater and groundwater to overload the system, power failures, improper sewer design, and vandalism.

The Town of East Longmeadow has completed an inventory of SSOs that have discharged to the MS4 within the five (5) years prior to the effective date of the 2016 MS4 Permit, based on review of available documentation pertaining to SSOs (**Table 4-**

1). The inventory includes all SSOs that occurred during wet or dry weather resulting from inadequate conveyance capacities or where interconnectivity of the storm and sanitary sewer infrastructure allows for transfer of flow between systems.

Upon detection of an SSO, the Town of East Longmeadow will eliminate it as expeditiously as possible and take interim measures to minimize the discharge of pollutants to and from its MS4 until the SSO is eliminated. Upon becoming aware of an SSO to the MS4, the Town of East Longmeadow will provide oral notice to EPA within 24 hours and written notice to EPA and MassDEP within five (5) days of becoming aware of the SSO occurrence.

The inventory in **Table 4-1** will be updated by the Department of Public Works when new SSOs are detected. The SSO inventory will be included in the annual report, including the status of mitigation and corrective measures to address each identified SSO.

Table 4-1. SSO Inventory

East Longmeadow, Massachusetts

Revision Date: June 30, 2019

SSO Location[1]	Discharge Statement[2]	Date[3]	Time Start[3]	Time End[3]	Estimated Volume[4]	Description[5]	Mitigation Completed[6]	Mitigation Planned[7]
24 Franconia Circle	Direct to Receiving Water (Pecousic Brook)	2-29-16	11:00	11:30	1500 gallons	Sewer Blockage	Line jetted to remove blockage	Monthly Inspection
66 Smith Avenue	Ground surface	4-1-19	10:55	11:45	500 Gallons	Sewer Blockage	Line jetted to remove blockage	Monthly Inspection

[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

[7] Mitigation and corrective measures planned with implementation schedules

5 Assessment and Priority Ranking of Outfalls

The 2016 MS4 Permit requires an assessment and priority ranking of outfalls in terms of their potential to have illicit discharges and SSOs and the related public health significance. The ranking helps determine the priority order for performing IDDE investigations and meeting permit milestones.

5.1 Outfall Catchment Delineations

A catchment is the area that drains to an individual outfall[1] or interconnection.[2] The catchments for each of the MS4 outfalls will be delineated to define contributing areas for investigation of potential sources of illicit discharges. Catchments are typically delineated based on topographic contours and mapped drainage infrastructure, where available. As described in **Section 3**, initial catchment delineations will be completed as part of the Phase I mapping, and refined catchment delineations have been completed as part of the Phase II mapping to reflect information collected during catchment investigations

5.2 Outfall and Interconnection Inventory and Initial Ranking

The Department of Public Works will complete an initial outfall and interconnection inventory and priority ranking to assess illicit discharge potential based on existing information. The initial inventory and ranking will be completed within one (1) year

---

[1] **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. 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.

[2] **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.

from the effective date of the permit. An updated inventory and ranking will be provided in each annual report thereafter. The inventory will be updated annually to include data collected in connection with dry weather screening and other relevant inspections.

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 IDDE program activities.

Outfalls and interconnections will be classified into one of the following categories:

1. **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. 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.

    Dry weather screening and sampling, as described in **Section 6** of this IDDE Plan and Part 2.3.4.7.b of the MS4 Permit, is not required for Problem Outfalls.

2. **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.

3. **Low Priority Outfalls**: Outfalls/interconnections determined by the permittee as low priority based on the characteristics listed below or other available information.

4. **Excluded outfalls**: Outfalls/interconnections with no potential for illicit discharges may be 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.

Outfalls will be ranked into the above priority categories (except for excluded outfalls, which may be excluded from the IDDE program) based on the following characteristics of the defined initial catchment areas, where information is available. Additional relevant characteristics, including location-specific characteristics, may be considered but must be documented in this IDDE Plan.

- **Previous screening results** – previous screening/sampling results indicate likely sewer input (see criteria above for Problem Outfalls).
- **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.

Table 5-1 contains the initial outfall inventory and priority ranking matrix.

NOTE: Per Section 2.3.4.7.a.iii. of the 2016 Small MS4 General Permit, outfalls to receiving waters associates 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 outfalls within the Town as High Priority does not allow for differentiation or priority use of resources on the IDDE Program. Therefore, upon the development of the final Notrogen Source Identification Report in permit year four, potential catchments determined to have high nitrogen loading will be reassessed as High Priority Catchments

Table 5-1. Outfall Inventory and Priority Ranking Matrix

East Longmeadow, Massachusetts

Revision Date: January 22, 2019

Outfall ID	Receiving Water	Previous Screening Results Indicate Likely Sewer Input? [1]	Discharging to Area of Concern to Public Health? [2]	Frequency of Past Discharge Complaints	Receiving Water Quality [3]	Density of Generating Sites [4]	Age of Development/ Infrastructure [5]	Historic Combined Sewers or Septic? [6]	Aging Septic? [7]	Culverted Streams? [8]	Additional Characteristics	Score	Priority Ranking
Information Source		Outfall inspections and sample results	GIS Maps	Town Staff	Impaired Waters List	Land Use/GIS Maps, Aerial Photography	Land Use Information, Visual Observation	Town Staff, GIS Maps	Land Use, Town Staff	GIS and Storm System Maps	Other		
Scoring Criteria		Yes = 3 (Problem Outfall) No = 0	Yes = 3 No = 0	Frequent = 3 Occasional = 2 None = 0	Poor = 3 Fair = 2 Good = 0	High = 3 Medium = 2 Low = 1	High = 3 Medium = 2 Low = 1	Yes = 3 No = 0	Yes = 3 No = 0	Yes = 3 No = 0	TBD		
WB-038	Watchaug Brook	0	0	0	0	1	2	0	0	0	0	3	LOW
WB-037	Watchaug Brook	0	0	0	0	1	2	0	0	0	0	3	LOW
WB-036	Watchaug Brook	0	0	0	0	1	2	0	0	0	0	3	LOW
MRD-002	Mill Road Conservation	0	0	0	0	1	2	0	3	0	0	6	HIGH
MRD-001	Mill Road Conservation	0	0	0	0	1	2	0	0	0	0	3	LOW
MRD-004	Mill Road Conservation	0	0	0	0	1	2	0	3	0	0	6	HIGH
WB-035	Watchaug Brook	0	0	0	0	2	2	0	3	0	0	7	HIGH
WB-054	Watchaug Brook	0	0	0	0	1	2	0	0	0	0	3	LOW
WB-053	Watchaug Brook	0	0	0	0	1	2	0	3	0	0	6	HIGH
WB-052	Watchaug Brook	0	0	0	0	1	2	0	3	0	0	6	HIGH
WB-051	Watchaug Brook	0	0	0	0	1	2	0	3	0	0	6	HIGH
MR-008	Mill River	0	0	0	0	1	2	0	3	0	0	6	HIGH

MR-007	Mill River	0	0	0	0	1	2	0	0	0	0	3	LOW
MR-006	Mill River	0	0	0	0	1	2	0	0	0	0	3	LOW
MR-005	Mill River	0	0	0	0	1	2	0	0	0	0	3	LOW
WB-050	Watchaug Brook	0	0	0	0	1	2	0	0	0	0	3	LOW
MR-004	Mill River	0	0	0	0	1	2	0	0	0	0	3	LOW
MR-003	Mill River	0	0	0	0	1	2	0	0	0	0	3	LOW
MR-002	Mill River	0	0	0	0	1	2	0	0	0	0	3	LOW
MR-001	Mill River	0	0	0	0	1	2	0	0	0	0	3	LOW
MR-024	Mill River	0	0	0	0	1	2	0	0	0	0	3	LOW
MR-023	Mill River	0	0	0	0	1	2	0	0	0	0	3	LOW
MR-022	Mill River	0	0	0	0	1	2	0	0	0	0	3	LOW
MR-021	Mill River	0	0	0	0	1	2	0	0	0	0	3	LOW
MR-020	Mill River	0	0	0	0	1	2	0	3	0	0	6	HIGH
MR-019	Mill River	0	0	0	0	1	2	0	0	0	0	3	LOW
MR-018	Mill River	0	0	0	0	1	2	0	0	0	0	3	LOW
MR-017	Mill River	0	0	0	0	1	2	0	3	0	0	6	HIGH
MR-016	Mill River	0	0	0	0	1	2	0	0	0	0	3	LOW
MR-015	Mill River	0	0	0	0	1	2	0	0	0	0	3	LOW
MR-014	Mill River	0	0	0	0	1	2	0	0	0	0	3	LOW
MR-013	Mill River	0	0	0	0	1	2	0	0	0	0	3	LOW
MR-012	Mill River	0	0	0	0	1	2	0	0	0	0	3	LOW
MR-011	Mill River	0	0	0	0	1	2	0	3	0	0	6	HIGH
MR-010	Mill River	0	0	0	0	1	2	0	0	0	0	3	LOW

MR-009	Mill River	0	0	0	0	1	2	0	0	0	0	3	LOW
MR-038	Mill River	0	0	0	0	1	2	0	0	0	0	3	LOW
MR-037	Mill River	0	0	0	0	1	2	0	0	0	0	3	LOW
MR-036	Mill River	0	0	0	0	1	2	0	0	0	0	3	LOW
MR-035	Mill River	0	0	0	0	1	2	0	0	0	0	3	LOW
PRD-004	Mill River	0	3	0	0	1	2	0	0	0	0	6	HIGH
PRD-003	Mill River	0	0	0	0	1	2	0	0	0	0	3	LOW
PRD-002	Mill River	0	3	0	0	1	2	0	0	0	0	6	HIGH
MR-034	Mill River	0	0	0	0	1	2	0	3	0	0	6	HIGH
WB-049	Watchaug Brook	0	0	0	0	1	2	0	0	0	0	3	LOW
WB-048	Watchaug Brook	0	0	0	0	1	2	0	0	0	0	3	LOW
WB-047	Watchaug Brook	0	0	0	0	1	2	0	0	0	0	3	LOW
WB-046	Watchaug Brook	0	0	0	0	1	2	0	0	0	0	3	LOW
WB-045	Watchaug Brook	0	0	0	0	1	2	0	0	0	0	3	LOW
WB-044	Watchaug Brook	0	0	0	0	1	2	0	0	0	0	3	LOW
WB-043	Watchaug Brook	0	0	0	0	1	2	0	0	0	0	3	LOW
WB-042	Watchaug Brook	0	0	0	0	1	2	0	0	0	0	3	LOW
WB-041	Watchaug Brook	0	0	0	0	1	2	0	0	0	0	3	LOW
WB-040	Watchaug Brook	0	0	0	0	1	2	0	0	0	0	3	LOW
WB-039	Watchaug Brook	0	0	0	0	1	2	0	0	0	0	3	LOW
WB-070	Watchaug Brook	0	0	0	0	1	2	0	0	0	0	3	LOW
WB-069	Watchaug Brook	0	0	0	0	1	2	0	0	0	0	3	LOW
MR-033	Mill River	0	0	0	0	1	2	0	0	0	0	3	LOW

WB-067	Watchaug Brook	0	0	0	0	1	2	0	0	0	0	3	LOW
WB-066	Watchaug Brook	0	0	0	0	1	2	0	0	0	0	3	LOW
WB-065	Watchaug Brook	0	0	0	0	1	2	0	0	0	0	3	LOW
WB-064	Watchaug Brook	0	0	0	0	1	2	0	0	0	0	3	LOW
WB-063	Watchaug Brook	0	0	0	0	1	2	0	0	0	0	3	LOW
WB-062	Watchaug Brook	0	0	0	0	1	2	0	0	0	0	3	LOW
WB-061	Watchaug Brook	0	0	0	0	1	2	0	0	0	0	3	LOW
WB-060	Watchaug Brook	0	0	0	0	1	2	0	0	0	0	3	LOW
MR-032	Mill River	0	0	0	0	1	2	0	0	0	0	3	LOW
MR-031	Mill River	0	0	0	0	1	2	0	0	0	0	3	LOW
WB-059	Watchaug Brook	0	0	0	0	1	2	0	0	0	0	3	LOW
WB-058	Watchaug Brook	0	0	0	0	1	2	0	0	0	0	3	LOW
WB-057	Watchaug Brook	0	0	0	0	1	2	0	0	0	0	3	LOW
WB-056	Watchaug Brook	0	0	0	0	1	2	0	0	0	0	3	LOW
MR-028	Mill River	0	0	0	0	1	2	0	0	0	0	3	LOW
WB-055	Watchaug Brook	0	0	0	0	1	2	0	0	0	0	3	LOW
WB-086	Watchaug Brook	0	0	0	0	1	2	0	0	0	0	3	LOW
WB-085	Watchaug Brook	0	0	0	0	1	2	0	0	0	0	3	LOW
WB-084	Watchaug Brook	0	0	0	0	1	2	0	0	0	0	3	LOW
WB-083	Watchaug Brook	0	0	0	0	1	2	0	0	0	0	3	LOW
WB-082	Watchaug Brook	0	0	0	0	1	2	0	3	0	0	6	HIGH
WB-081	Watchaug Brook	0	0	0	0	1	2	0	3	0	0	6	HIGH
WB-080	Watchaug Brook	0	0	0	0	1	2	0	3	0	0	6	HIGH

WB-079	Watchaug Brook	0	0	0	0	1	2	0	3	0	0	6	HIGH
WB-078	Watchaug Brook	0	0	0	0	1	2	0	0	0	0	3	LOW
WB-077	Watchaug Brook	0	0	0	0	1	2	0	3	0	0	6	HIGH
WB-076	Watchaug Brook	0	0	0	0	1	2	0	3	0	0	6	HIGH
WB-075	Watchaug Brook	0	0	0	0	2	2	0	3	0	0	7	HIGH
WB-074	Watchaug Brook	0	0	0	0	1	2	0	3	0	0	6	HIGH
WB-073	Watchaug Brook	0	0	0	0	2	2	0	3	0	0	7	HIGH
WB-072	Watchaug Brook	0	0	0	0	1	2	0	0	0	0	3	LOW
WB-071	Watchaug Brook	0	0	0	0	1	2	0	0	0	0	3	LOW
WB-102	Watchaug Brook	0	0	0	0	2	2	0	0	0	0	4	LOW
WB-101	Watchaug Brook	0	0	0	0	1	2	0	0	0	0	3	LOW
WB-100	Watchaug Brook	0	0	0	0	1	2	0	0	0	0	3	LOW
WB-099	Watchaug Brook	0	0	0	0	1	2	0	0	0	0	3	LOW
WB-098	Watchaug Brook	0	0	0	0	1	2	0	0	0	0	3	LOW
WB-097	Watchaug Brook	0	0	0	0	1	2	0	0	0	0	3	LOW
WB-096	Watchaug Brook	0	0	0	0	1	2	0	0	0	0	3	LOW
WB-095	Watchaug Brook	0	0	0	0	1	2	0	0	0	0	3	LOW
WB-094	Watchaug Brook	0	0	0	0	1	2	0	0	0	0	3	LOW
WB-093	Watchaug Brook	0	0	0	0	1	2	0	0	0	0	3	LOW
WB-092	Watchaug Brook	0	0	0	0	1	2	0	0	0	0	3	LOW
WB-091	Watchaug Brook	0	0	0	0	1	2	0	0	0	0	3	LOW
WB-090	Watchaug Brook	0	0	0	0	1	2	0	0	0	0	3	LOW
WB-089	Watchaug Brook	0	0	0	0	1	2	0	0	0	0	3	LOW

WB-088	Watchaug Brook	0	0	0	0	1	2	0	0	0	0	3	LOW
WB-087	Watchaug Brook	0	0	0	0	1	2	0	0	0	0	3	LOW
WB-118	Watchaug Brook	0	0	0	0	1	2	0	3	0	0	6	HIGH
WB-117	Watchaug Brook	0	0	0	0	1	2	0	0	0	0	3	LOW
WB-116	Watchaug Brook	0	0	0	0	1	2	0	0	0	0	3	LOW
WB-115	Watchaug Brook	0	0	0	0	1	2	0	0	0	0	3	LOW
WB-114	Watchaug Brook	0	0	0	0	1	2	0	0	0	0	3	LOW
PB-014	Pecousic Brook	0	0	0	0	1	2	0	0	0	0	3	LOW
WB-113	Watchaug Brook	0	0	0	0	1	2	0	3	0	0	6	HIGH
WB-112	Watchaug Brook	0	0	0	0	1	2	0	3	0	0	6	HIGH
WB-111	Watchaug Brook	0	0	0	0	1	2	0	0	0	0	3	LOW
WB-110	Watchaug Brook	0	0	0	0	2	2	0	3	0	0	7	HIGH
MR-027	Mill River	0	0	0	0	1	2	0	0	0	0	3	LOW
MR-026	Mill River	0	0	0	0	1	2	0	3	0	0	6	HIGH
WB-109	Watchaug Brook	0	0	0	0	2	2	0	3	0	0	7	HIGH
WB-108	Watchaug Brook	0	0	0	0	2	2	0	0	0	0	4	LOW
WB-107	Watchaug Brook	0	0	0	0	2	2	0	0	0	0	4	LOW
WB-106	Watchaug Brook	0	0	0	0	2	2	0	0	0	0	4	LOW
WB-105	Watchaug Brook	0	0	0	0	2	2	0	0	0	0	4	LOW
WB-104	Watchaug Brook	0	0	0	0	2	2	0	0	0	0	4	LOW
WB-103	Watchaug Brook	0	0	0	0	2	2	0	0	0	0	4	LOW
PB-013	Pecousic Brook	0	0	0	0	1	2	0	0	0	0	3	LOW
WB-016	Watchaug Brook	0	0	0	0	1	2	0	3	0	0	6	HIGH

WB-015	Watchaug Brook	0	0	0	0	1	2	0	0	0	0	3	LOW
PB-012	Pecousic Brook	0	0	0	0	1	2	0	0	0	0	3	LOW
PB-011	Pecousic Brook	0	0	0	0	1	2	0	0	0	0	3	LOW
PB-010	Pecousic Brook	0	0	0	0	1	2	0	0	0	0	3	LOW
PB-009	Pecousic Brook	0	0	0	0	1	2	0	3	0	0	6	HIGH
PB-008	Pecousic Brook	0	0	0	0	1	2	0	0	0	0	3	LOW
PB-007	Pecousic Brook	0	0	0	0	1	2	0	0	0	0	3	LOW
PB-006	Pecousic Brook	0	0	0	0	1	2	0	0	0	0	3	LOW
PB-005	Pecousic Brook	0	0	0	0	1	2	0	3	0	0	6	HIGH
PB-004	Pecousic Brook	0	0	0	0	1	2	0	0	0	0	3	LOW
PB-003	Pecousic Brook	0	0	0	0	1	2	0	3	0	0	6	HIGH
WB-014	Watchaug Brook	0	0	0	0	1	2	0	0	0	0	3	LOW
PB-002	Pecousic Brook	0	0	0	0	1	2	0	0	0	0	3	LOW
SB-008	Schnelock Brook	0	0	0	0	1	2	0	3	0	0	6	HIGH
SB-007	Schnelock Brook	0	0	0	0	1	2	0	0	0	0	3	LOW
SB-006	Schnelock Brook	0	0	0	0	1	2	0	0	0	0	3	LOW
SB-005	Schnelock Brook	0	0	0	0	1	2	0	0	0	0	3	LOW
SB-004	Schnelock Brook	0	0	0	0	1	2	0	0	0	0	3	LOW
SB-003	Schnelock Brook	0	0	0	0	1	2	0	3	0	0	6	HIGH
PB-001	Pecousic Brook	0	0	0	0	1	2	0	0	3	0	6	HIGH
PB-030	Pecousic Brook	0	0	0	0	1	2	0	0	0	0	3	LOW
PB-029	Pecousic Brook	0	0	0	0	1	2	0	0	0	0	3	LOW
PB-028	Pecousic Brook	0	0	0	0	1	2	0	0	0	0	3	LOW

PB-027	Pecousic Brook	0	0	0	0	1	2	0	0	0	0	3	LOW
PB-026	Pecousic Brook	0	0	0	0	1	2	0	0	0	0	3	LOW
PB-024	Pecousic Brook	0	0	0	0	1	2	0	0	0	0	3	LOW
PB-023	Pecousic Brook	0	0	0	0	1	2	0	0	0	0	3	LOW
PB-022	Pecousic Brook	0	0	0	0	1	2	0	0	0	0	3	LOW
PB-020	Pecousic Brook	0	0	0	0	1	2	0	0	0	0	3	LOW
PB-019	Pecousic Brook	0	0	0	0	1	2	0	0	0	0	3	LOW
PB-018	Pecousic Brook	0	0	0	0	1	2	0	0	0	0	3	LOW
PB-017	Pecousic Brook	0	0	0	0	1	2	0	0	0	0	3	LOW
PB-016	Pecousic Brook	0	0	0	0	1	2	0	0	0	0	3	LOW
PB-015	Pecousic Brook	0	0	0	0	1	2	0	0	0	0	3	LOW
JB-011	Jawbuck Brook	0	0	0	0	1	2	0	0	0	0	3	LOW
WB-013	Watchaug Brook	0	0	0	0	1	2	0	0	0	0	3	LOW
WB-012	Watchaug Brook	0	0	0	0	1	2	0	0	0	0	3	LOW
WB-011	Watchaug Brook	0	0	0	0	1	2	0	0	0	0	3	LOW
WB-010	Watchaug Brook	0	0	0	0	1	2	0	0	0	0	3	LOW
WB-009	Watchaug Brook	0	0	0	0	1	2	0	0	0	0	3	LOW
WB-008	Watchaug Brook	0	0	0	0	1	2	0	0	0	0	3	LOW
WB-007	Watchaug Brook	0	0	0	0	1	2	0	0	0	0	3	LOW
WB-006	Watchaug Brook	0	0	0	0	1	2	0	0	0	0	3	LOW
JB-010	Jawbuck Brook	0	3	0	0	2	2	0	0	0	0	4	HIGH
JB-009	Jawbuck Brook	0	3	0	0	2	2	0	0	0	0	4	HIGH
JB-008	Jawbuck Brook	0	3	0	0	2	2	0	0	0	0	4	HIGH

FB-012	Freshwater Brook	0	0	0	0	1	2	0	0	0	0	3	LOW
WB-005	Watchaug Brook	0	0	0	0	1	2	0	0	0	0	3	LOW
WB-004	Watchaug Brook	0	0	0	0	1	2	0	0	0	0	3	LOW
WB-003	Watchaug Brook	0	0	0	0	1	2	0	0	0	0	3	LOW
JB-007	Jawbuck Brook	0	0	0	0	3	2	0	0	0	0	5	HIGH
JB-006	Jawbuck Brook	0	0	0	0	3	2	0	0	0	0	5	HIGH
WB-002	Watchaug Brook	0	0	0	0	1	2	0	3	0	0	6	HIGH
WB-001	Watchaug Brook	0	0	0	0	1	2	0	3	0	0	6	HIGH
JB-005	Jawbuck Brook	0	0	0	0	3	2	0	0	0	0	5	HIGH
JB-004	Jawbuck Brook	0	0	0	0	3	2	0	0	0	0	5	HIGH
JB-003	Jawbuck Brook	0	0	0	0	3	2	0	0	0	0	5	HIGH
PB-046	Pecousic Brook	0	0	0	0	1	2	0	0	0	0	3	LOW
PB-045	Pecousic Brook	0	0	0	0	1	2	0	0	0	0	3	LOW
PB-044	Pecousic Brook	0	0	0	0	1	2	0	0	0	0	3	LOW
PB-043	Pecousic Brook	0	3	0	0	1	2	0	0	0	0	6	HIGH
PB-042	Pecousic Brook	0	3	0	0	1	2	0	0	0	0	6	HIGH
PB-041	Pecousic Brook	0	3	0	0	1	2	0	3	0	0	9	HIGH
PB-040	Pecousic Brook	0	0	0	0	1	2	0	0	0	0	3	LOW
PB-039	Pecousic Brook	0	0	0	0	1	2	0	0	0	0	3	LOW
PB-038	Pecousic Brook	0	0	0	0	1	2	0	3	0	0	6	HIGH
PB-037	Pecousic Brook	0	0	0	0	1	2	0	0	0	0	3	LOW
PB-036	Pecousic Brook	0	0	0	0	1	2	0	0	0	0	3	LOW
PB-035	Pecousic Brook	0	0	0	0	1	2	0	3	0	0	6	HIGH

PB-034	Pecousic Brook	0	0	0	0	1	2	0	0	0	0	3	LOW
WB-032	Watchaug Brook	0	0	0	0	1	2	0	0	0	0	3	LOW
WB-031	Watchaug Brook	0	0	0	0	1	2	0	0	0	0	3	LOW
WB-030	Watchaug Brook	0	0	0	0	1	2	0	0	0	0	3	LOW
WB-029	Watchaug Brook	0	0	0	0	1	2	0	0	0	0	3	LOW
WB-028	Watchaug Brook	0	0	0	0	1	2	0	0	0	0	3	LOW
WB-027	Watchaug Brook	0	0	0	0	1	2	0	0	0	0	3	LOW
WB-026	Watchaug Brook	0	0	0	0	1	2	0	0	0	0	3	LOW
WB-025	Watchaug Brook	0	0	0	0	1	2	0	0	0	0	3	LOW
WB-024	Watchaug Brook	0	0	0	0	1	2	0	0	0	0	3	LOW
FB-011	Freshwater Brook	0	0	0	0	1	2	0	0	0	0	3	LOW
FB-010	Freshwater Brook	0	0	0	0	1	2	0	0	0	0	3	LOW
FB-009	Freshwater Brook	0	0	0	0	1	2	0	0	0	0	3	LOW
FB-008	Freshwater Brook	0	0	0	0	2	2	0	0	0	0	4	LOW
FB-007	Freshwater Brook	0	0	0	0	1	2	0	0	0	0	3	LOW
FB-006	Freshwater Brook	0	0	0	0	1	2	0	0	0	0	3	LOW
FB-005	Freshwater Brook	0	0	0	0	1	2	0	0	0	0	3	LOW
FB-003	Freshwater Brook	0	0	0	0	2	2	0	0	0	0	4	LOW
FB-002	Freshwater Brook	0	0	0	0	2	2	0	0	0	0	4	LOW
FB-001	Freshwater Brook	0	0	0	0	2	2	0	0	0	0	4	LOW
PB-033	Pecousic Brook	0	0	0	0	3	2	0	0	0	0	5	HIGH
PB-032	Pecousic Brook	0	0	0	0	3	2	0	0	0	0	5	HIGH
PB-031	Pecousic Brook	0	0	0	0	1	2	0	3	0	0	6	HIGH

WB-023	Watchaug Brook	0	0	0	0	1	2	0	0	0	0	3	LOW
WB-022	Watchaug Brook	0	0	0	0	1	2	0	0	0	0	3	LOW
WB-021	Watchaug Brook	0	0	0	0	1	2	0	0	0	0	3	LOW
SB-002	Schnelock Brook	0	0	0	0	1	2	0	0	0	0	3	LOW
PB-062	Pecousic Brook	0	0	0	0	3	2	0	0	0	0	5	HIGH
PB-061	Pecousic Brook	0	0	0	0	1	2	0	3	0	0	6	HIGH
PB-060	Pecousic Brook	0	0	0	0	2	2	0	0	0	0	4	LOW
PB-059	Pecousic Brook	0	0	0	0	3	2	0	0	0	0	5	HIGH
PB-058	Pecousic Brook	0	0	0	0	2	2	0	0	0	0	4	LOW
PB-057	Pecousic Brook	0	0	0	0	1	2	0	0	0	0	3	LOW
FB-017	Freshwater Brook	0	0	0	0	3	2	0	0	0	0	5	HIGH
FB-016	Freshwater Brook	0	0	0	0	3	2	0	0	0	0	5	HIGH
JB-002	Jawbuck Brook	0	0	0	0	3	2	0	0	0	0	5	HIGH
JB-001	Jawbuck Brook	0	0	0	0	3	2	0	0	0	0	5	HIGH
JB-015	Jawbuck Brook	0	0	0	0	3	2	0	0	0	0	5	HIGH
PB-056	Pecousic Brook	0	0	0	0	1	2	0	3	0	0	6	HIGH
PB-055	Pecousic Brook	0	0	0	0	1	2	0	0	0	0	3	LOW
PB-054	Pecousic Brook	0	0	0	0	1	2	0	3	0	0	6	HIGH
PB-053	Pecousic Brook	0	3	0	0	1	2	0	0	0	0	6	HIGH
PB-052	Pecousic Brook	0	3	0	0	1	2	0	0	0	0	6	HIGH
PB-051	Pecousic Brook	0	3	0	0	1	2	0	0	0	0	6	HIGH
L-004	Town of Longmeadow	0	0	0	0	1	2	0	3	0	0	6	HIGH
PB-050	Pecousic Brook	0	0	0	0	1	2	0	0	0	0	3	LOW

L-003	Town of Longmeadow	0	0	0	0	1	2	0	3	0	0	6	HIGH
L-002	Town of Longmeadow	0	0	0	0	1	2	0	0	0	0	3	LOW
L-001	Town of Longmeadow	0	0	0	0	1	2	0	0	0	0	3	LOW
MRD-003	Mill Road Conservation	0	0	0	0	1	2	0	3	0	0	6	HIGH
FB-015	Freshwater Brook	0	0	0	0	1	2	0	0	0	0	3	LOW
WB-020	Watchaug Brook	0	0	0	0	1	2	0	0	0	0	3	LOW
MR-025	Mill River	0	0	0	0	1	2	0	3	0	0	6	HIGH
PRD-001	Mill River	0	3	0	0	1	2	0	0	0	0	6	HIGH
PB-049	Pecousic Brook	0	0	0	0	1	2	0	0	0	0	3	LOW
PB-047	Pecousic Brook	0	0	0	0	1	2	0	0	0	0	3	LOW
PB-078	Pecousic Brook	0	0	0	0	1	2	0	0	0	0	3	LOW
PB-077	Pecousic Brook	0	0	0	0	1	2	0	0	0	0	3	LOW
PB-076	Pecousic Brook	0	0	0	0	1	2	0	0	0	0	3	LOW
PB-075	Pecousic Brook	0	0	0	0	1	2	0	0	0	0	3	LOW
PB-074	Pecousic Brook	0	0	0	0	1	2	0	0	0	0	3	LOW
PB-073	Pecousic Brook	0	0	0	0	1	2	0	0	0	0	3	LOW
WB-019	Watchaug Brook	0	0	0	0	1	2	0	3	0	0	6	HIGH
PB-072	Pecousic Brook	0	0	0	0	1	2	0	0	0	0	3	LOW
PB-071	Pecousic Brook	0	0	0	0	1	2	0	0	0	0	3	LOW
FB-014	Freshwater Brook	0	0	0	0	2	2	0	3	0	0	7	HIGH
WB-018	Watchaug Brook	0	3	0	0	1	2	0	0	0	0	6	HIGH
WB-017	Watchaug Brook	0	0	0	0	1	2	0	0	0	0	3	LOW
WB-034	Watchaug Brook	0	0	0	0	1	2	0	0	0	0	3	LOW

SB-001	Schnelock Brook	0	0	0	0	1	2	0	3	0	0	6	HIGH
PB-070	Pecousic Brook	0	0	0	0	1	2	0	3	0	0	6	HIGH
PB-069	Pecousic Brook	0	0	0	0	1	2	0	0	0	0	3	LOW
PB-068	Pecousic Brook	0	0	0	0	1	2	0	0	0	0	3	LOW
JB-013	Jawbuck Brook	0	0	0	0	2	2	0	3	0	0	7	HIGH
JB-012	Jawbuck Brook	0	0	0	0	1	2	0	3	0	0	6	HIGH
PB-067	Pecousic Brook	0	0	0	0	1	2	0	0	0	0	3	LOW
PB-066	Pecousic Brook	0	0	0	0	1	2	0	3	0	0	6	HIGH
PB-065	Pecousic Brook	0	3	0	0	1	2	0	0	0	0	6	HIGH
DRD-004	City of Springfield	0	0	0	0	1	2	0	0	0	0	3	LOW
DRD-003	City of Springfield	0	0	0	0	1	2	0	0	0	0	3	LOW
DRD-002	City of Springfield	0	0	0	0	1	2	0	0	0	0	3	LOW
DRD-001	City of Springfield	0	0	0	0	1	2	0	0	0	0	3	LOW
PB-064	Pecousic Brook	0	0	0	0	1	2	0	0	0	0	3	LOW
PB-063	Pecousic Brook	0	0	0	0	1	2	0	0	0	0	3	LOW
PB-094	Pecousic Brook	0	0	0	0	1	2	0	0	0	0	3	LOW
PB-093	Pecousic Brook	0	0	0	0	3	2	0	0	0	0	5	HIGH
PB-092	Pecousic Brook	0	0	0	0	1	2	0	0	0	0	3	LOW
PB-091	Pecousic Brook	0	0	0	0	3	2	0	0	0	0	5	HIGH
PB-090	Pecousic Brook	0	0	0	0	3	2	0	0	0	0	5	HIGH
PB-089	Pecousic Brook	0	0	0	0	3	2	0	0	0	0	5	HIGH
PB-088	Pecousic Brook	0	0	0	0	3	2	0	0	0	0	5	HIGH
PB-087	Pecousic Brook	0	0	0	0	1	2	0	0	0	0	3	LOW

PB-086	Pecousic Brook	0	0	0	0	3	2	0	0	0	0	5	HIGH
FB-013	Freshwater Brook	0	0	0	0	1	2	0	0	0	0	3	LOW
PB-084	Pecousic Brook	0	0	0	0	3	2	0	3	0	0	8	HIGH
PB-083	Pecousic Brook	0	0	0	0	3	2	0	0	0	0	5	HIGH
PB-082	Pecousic Brook	0	0	0	0	3	2	0	0	0	0	5	HIGH
PB-081	Pecousic Brook	0	0	0	0	1	2	0	0	0	0	3	LOW
WB-033	Watchaug Brook	0	0	0	0	1	2	0	0	0	0	3	LOW
PB-080	Pecousic Brook	0	0	0	0	3	2	0	0	0	0	5	HIGH
PB-079	Pecousic Brook	0	0	0	0	2	2	0	0	0	0	4	LOW
PB-095	Pecousic Brook	0	0	0	0	1	2	0	0	0	0	3	LOW
WB-119	Watchaug Brook	0	0	0	0	1	2	0	3	0	0	6	HIGH
L-005	Town of Longmeadow	0	0	0	0	1	2	0	0	0	0	3	LOW
FB-018	Freshwater Brook	0	0	0	0	3	2	0	0	0	0	5	HIGH
FB-019	Freshwater Brook	0	0	0	0	3	2	0	0	0	0	5	HIGH
JB-019	Jawbuck Brook	0	0	0	0	3	2	0	0	0	0	5	HIGH
FB-022	Freshwater Brook	0	0	0	0	2	2	0	0	0	0	4	LOW
PB-096	Pecousic Brook	0	0	0	0	1	2	0	0	0	0	3	LOW
PB-097	Pecousic Brook	0	0	0	0	1	2	0	0	0	0	3	LOW
JB-020	Jawbuck Brook	0	0	0	0	3	2	0	0	0	0	5	HIGH
PB-098	Pecousic Brook	0	0	0	0	3	2	0	0	0	0	5	HIGH
WB-120	Watchaug Brook	0	0	0	0	1	2	0	0	0	0	3	LOW
PRD-005	Mill River	0	0	0	0	1	2	0	0	0	0	3	LOW
PB-099	Pecousic Brook	0	0	0	0	1	2	0	0	0	0	3	LOW

WB-121	Watchaug Brook	0	0	0	0	1	2	0	0	0	0	3	LOW
MR-039	Mill River	0	0	0	0	1	2	0	0	0	0	3	LOW
WB-122	Watchaug Brook	0	0	0	0	1	2	0	0	0	0	3	LOW
WB-123	Watchaug Brook	0	0	0	0	1	2	0	0	0	0	3	LOW
JB-016	Jawbuck Brook	0	0	0	0	3	2	0	0	0	0	5	HIGH
FB-023	Freshwater Brook	0	0	0	0	2	2	0	0	0	0	4	LOW
MR-040	Mill River	0	0	0	0	1	2	0	0	0	0	3	LOW
JB-017	Jawbuck Brook	0	0	0	0	1	2	0	0	0	0	3	LOW
JB-018	Jawbuck Brook	0	0	0	0	1	2	0	0	0	0	3	LOW
FB-024	Freshwater Brook	0	0	0	0	1	2	0	0	0	0	3	LOW
FB-025	Freshwater Brook	0	0	0	0	1	2	0	0	0	0	3	LOW
PRD-006	Mill River	0	0	0	0	1	2	0	0	0	0	3	LOW
JB-022	Jawbuck Brook	0	3	0	0	2	2	0	0	0	0	7	HIGH
WB-126	Watchaug Brook	0	0	0	0	1	2	0	0	0	0	3	LOW
JB-021	Jawbuck Brook	0	3	0	0	2	2	0	0	0	0	7	HIGH
PB-100	Pecousic Brook	0	0	0	0	1	2	0	0	0	0	3	LOW
WB-124	Watchaug Brook	0	0	0	0	1	2	0	0	0	0	3	LOW
WB-125	Watchaug Brook	0	0	0	0	1	2	0	0	0	0	3	LOW

Scoring Criteria:

[1] Previous screening results indicate likely sewer input if any of the following are true:

- 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

[2] Outfalls/interconnections that discharge to or in the vicinity of any of the following areas: public beaches, recreational areas, drinking water supplies, or shellfish beds

[3] Receiving water quality based on latest version of MassDEP Integrated List of Waters.

- Poor = Waters with approved TMDLs (Category 4a Waters) where illicit discharges have the potential to contain the pollutant identified as the cause of the impairment
- Fair = Water quality limited waterbodies that receive a discharge from the MS4 (Category 5 Waters)
- Good = No water quality impairments

[4] Generating sites are institutional, municipal, commercial, or industrial sites with a potential to contribute to illicit discharges (e.g., car dealers, car washes, gas stations, garden centers, industrial manufacturing, etc.)

[5] Age of development and infrastructure:

- High = Industrial areas greater than 40 years old and areas where the sanitary sewer system is more than 40 years old
- Medium = Developments 20-40 years old
- Low = Developments less than 20 years old

[6] Areas once served by combined sewers and but have been separated, or areas once served by septic systems but have been converted to sanitary sewers.

[7] Aging septic systems are septic systems 30 years or older in residential areas.

[8] Any river or stream that is culverted for distance greater than a simple roadway crossing.

6 Dry Weather Outfall Screening and Sampling

Dry weather flow is a common indicator of potential illicit connections. The MS4 Permit requires all outfalls/interconnections (excluding Problem and excluded Outfalls) to be inspected for the presence of dry weather flow. The Department of Public Works is responsible for conducting dry weather outfall screening, starting with High Priority outfalls, followed by Low Priority outfalls, based on the initial priority rankings described in the previous section.

6.1 Weather Conditions

Dry weather outfall screening and sampling may occur when no more than 0.1 inches of rainfall has occurred in the previous 24-hour period and no significant snow melt is occurring. For purposes of determining dry weather conditions, program staff will use precipitation data from a municipal rain gage located at the Chestnut Street Pump Station.

6.2 Dry Weather Screening/Sampling Procedure

6.2.1 General Procedure

The dry weather outfall inspection and sampling procedure consists of the following general steps:

1. Identify outfall(s) to be screened/sampled based on initial outfall inventory and priority ranking
2. Acquire the necessary staff, mapping, and field equipment (see **Table 6-1** for list of potential field equipment)
3. Conduct the outfall inspection during dry weather:
    a. Mark and photograph the outfall
    b. Record the inspection information and outfall characteristics (using paper forms or digital form using a tablet or similar device) (see form in **Appendix C**)
    c. Look for and record visual/olfactory evidence of pollutants in flowing outfalls including odor, color, turbidity, and floatable matter (suds, bubbles, excrement, toilet paper or sanitary products). Also observe

outfalls for deposits and stains, vegetation, and damage to outfall structures.

4. If flow is observed, sample and test the flow following the procedures described in the following sections.
5. If no flow is observed, but evidence of illicit flow exists (illicit discharges are often intermittent or transitory), 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. Other techniques can be used to detect intermittent or transitory flows including conducting inspections during evenings or weekends and using optical brighteners.
6. Input results from screening and sampling into spreadsheet/database. Include pertinent information in the outfall/interconnection inventory and priority ranking.
7. Include all screening data in the annual report.

Previous outfall screening/sampling conducted under the 2013 MS4 Permit may be used to satisfy the dry weather outfall/screening requirements of the 2016 MS4 Permit only if the previous screening and sampling was substantially equivalent to that required by the 2016 MS4 Permit, including the list of analytes outlined in Section 2.3.4.7.b.iii.4 of the 2016 permit.

6.2.2 Field Equipment

Table 6-1 lists field equipment commonly used for dry weather outfall screening and sampling.

Table 6-1. Field Equipment – Dry Weather Outfall Screening and Sampling

Equipment	Use/Notes
Samsung Tablet	For data input, photographs and mapping
Chain of Custody Forms	To ensure proper handling of all samples
Pens/Pencils/Permanent Markers	For proper labeling
Nitrile Gloves	To protect the sampler as well as the sample from contamination
Flashlight/headlamp w/batteries	For looking in outfalls or manholes, helpful in early mornings as well

Equipment	Use/Notes
Cooler with Ice	For transporting samples to the laboratory
Personal Protective Equipment (PPE)	Reflective vest, Safety glasses and boots at a minimum
GPS Receiver	For taking spatial location data
Water Quality Meter	Hand held meter, if available, for testing for various water quality parameters such as ammonia, chlorine, conductivity, temp and pH
Test Kits	Have extra kits on hand to sample more outfalls than are anticipated to be screened in a single day
Label Tape	For labeling sample containers
Sample Containers	Make sure all sample containers are clean. Keep extra sample containers on hand at all times. Make sure there are proper sample containers for what is being sampled for (i.e., bacteria requires sterile containers).
Pry Bar or Pick	For opening catch basins and manholes when necessary
Sandbags	For damming low flows in order to take samples
Small Mallet or Hammer	Helping to free stuck manhole and catch basin covers
Utility Knife	Multiple uses
Measuring Tape	Measuring distances and depth of flow
Safety Cones	Safety
Hand Sanitizer	Disinfectant/decontaminant
Zip Ties/Duct Tape	For making field repairs
Rubber Boots/Waders	For accessing shallow streams/areas
Sampling Pole/Dipper/Sampling Cage	For accessing hard to reach outfalls and manholes

6.2.3 Sample Collection and Analysis

If flow is present during a dry weather outfall inspection, a sample will be collected and analyzed for the required permit parameters[3] listed in **Table 6-2**. The general procedure for collection of outfall samples is as follows:

1. Fill out all sample information on sample bottles and field sheets (see **Appendix C** for Sample Labels and Field Sheets)
2. Put on protective gloves (nitrile/latex/other) before sampling
3. Collect sample with dipper or directly in sample containers. If possible, collect water from the flow directly in the sample bottle. Be careful not to disturb sediments.
4. If using a dipper or other device, triple rinse the device with distilled water and then in water to be sampled (not for bacteria sampling)
5. Use test strips, test kits, and field meters (rinse similar to dipper) for most parameters (see **Table 6-2**)
6. Place laboratory samples on ice for analysis of bacteria and pollutants of concern
7. Fill out chain-of-custody form (**Appendix C**) for laboratory samples
8. Deliver samples to ConTest
9. Dispose of used test strips and test kit ampules properly
10. Decontaminate all testing personnel and equipment

In the event that an outfall is submerged, either partially or completely, or inaccessible, field staff will proceed to the first accessible upstream manhole or structure for the observation and sampling and report the location with the screening results. Field staff will continue to the next upstream structure until there is no longer an influence from the receiving water on the visual inspection or sampling.

Field test kits or field instrumentation are permitted for all parameters except indicator bacteria and any pollutants of concern. Field kits need to have appropriate detection limits and ranges. **Table 6-2** lists various field test kits and field instruments that can be used for outfall sampling associated with the 2016 MS4 Permit parameters, other

[3] Other potentially useful parameters, although not required by the MS4 Permit, include **fluoride** (indicator of potable water sources in areas where water supplies are fluoridated), **potassium** (high levels may indicate the presence of sanitary wastewater), and **optical brighteners** (indicative of laundry detergents).

than indicator bacteria and any pollutants of concern. Analytic procedures and user's manuals for field test kits and field instrumentation are provided in **Appendix D**.

Table 6-2. Sampling Parameters and Analysis Methods

Analyte or Parameter	Instrumentation (Portable Meter)	Field Test Kit
Ammonia		Hach™ Ammonia Test Strips
Surfactants (Detergents)		K-9404 Hach™ DE-2
Chlorine		Hach™ Chlorine Test Strips
Conductivity	Hach™ Model HQd	NA
Temperature	Hach™ Model HQd	NA
Salinity	Hach™ Model HQd	NA
Indicator Bacteria: *E. coli* (freshwater) or Enterococcus (saline water)	EPA certified laboratory procedure (40 CFR § 136)	NA
Total Nitrogen	EPA certified laboratory procedure (40 CFR § 136)	NA

[1] Where the discharge is directly into a water quality limited water or a water subject to an approved TMDL, the sample must be analyzed for the pollutant(s) of concern identified as the cause of the water quality impairment.

Testing for indicator bacteria and any pollutants of concern must be conducted using analytical methods and procedures found in 40 CFR § 136.[4] Samples for laboratory

[4] 40 CFR § 136: http://www.ecfr.gov/cgi-bin/text-idx?SID=b3b41fdea0b7b0b8cd6c4304d86271b7&mc=true&node=pt40.25.136&rgn=div5

analysis must also be stored and preserved in accordance with procedures found in 40 CFR § 136. **Table 6-3** lists analytical methods, detection limits, hold times, and preservatives for laboratory analysis of dry weather sampling parameters.

Table 6-3. Required Analytical Methods, Detection Limits, Hold Times, and Preservatives[4]

Analyte or Parameter	Analytical Method	Detection Limit	Max. Hold Time	Preservative
Ammonia	**EPA**: 350.2, **SM**: 4500-NH3C	0.05 mg/L	28 days	Cool ≤6°C, H_2SO_4 to pH <2, No preservative required if analyzed immediately
Surfactants	**SM**: 5540-C	0.01 mg/L	48 hours	Cool ≤6°C
Chlorine	**SM**: 4500-Cl G	0.02 mg/L	Analyze within 15 minutes	None Required
Temperature	**SM**: 2550B	*NA*	Immediate	None Required
Specific Conductance	**EPA**: 120.1, **SM**: 2510B	0.2 µs/cm	28 days	Cool ≤6°C
Salinity	**SM**: 2520	-	28 days	Cool ≤6°C
Indicator Bacteria: *E.coli*	*E.coli* **EPA**: 1603 **SM**: 9221B, 9221F , 9223 B **Other**: Colilert®, Colilert-18®	*E.coli* **EPA**: 1 cfu/100mL **SM**: 2 MPN/100mL **Other**: 1 MPN/100mL	8 hours	Cool ≤10°C, 0.0008% $Na_2S_2O_3$

Analyte or Parameter	Analytical Method	Detection Limit	Max. Hold Time	Preservative
Total Nitrogen	SM 4500 NH3-C	40 CFR 136	40 CFR 136	40 CFR 136

SM = Standard Methods

6.3 Interpreting Outfall Sampling Results

Outfall analytical data from dry weather sampling can be used to help identify the major type or source of discharge. **Table 6-4** shows values identified by the U.S. EPA and the Center for Watershed Protection as typical screening values for select parameters. These represent the typical concentration (or value) of each parameter expected to be found in stormwater. Screening values that exceed these benchmarks may be indicative of pollution and/or illicit discharges.

Table 6-4. Benchmark Field Measurements for Select Parameters

Analyte or Parameter	Benchmark
Ammonia	>0.5 mg/L
Conductivity	>2,000 µS/cm
Surfactants	>0.25 mg/L
Chlorine	>0.02 mg/L (detectable levels per the 2016 MS4 Permit)
Indicator Bacteria[5]: *E.coli*	*E.coli*: the geometric mean of the five most recent samples taken during the same bathing season shall not exceed 126 colonies per 100 ml and no single sample taken during the bathing season shall exceed 235 colonies per 100 ml
Total Nitrogen	As per 40 CFR 136

6.4 Follow-up Ranking of Outfalls and Interconnections

The Town of East Longmeadow will update and re-prioritize the initial outfall and interconnection rankings based on information gathered during dry weather screening. The rankings will be updated periodically as dry weather screening information becomes available, but will be completed within three (3) years of the effective date of the permit (July 1, 2020).

[5] Massachusetts Water Quality Standards: http://www.mass.gov/eea/docs/dep/service/regulations/314cmr04.pdf

Outfalls/interconnections where relevant information was found indicating sewer input to the MS4 or sampling results indicating sewer input are highly likely to contain illicit discharges from sanitary sources.

Such outfalls/interconnections will be ranked at the top of the High Priority Outfalls category for investigation. Other outfalls and interconnections may be re-ranked based on any new information from the dry weather screening.

7 Catchment Investigations

Once stormwater outfalls with evidence of illicit discharges have been identified, various methods can be used to trace the source of the potential discharge within the outfall catchment area. Catchment investigation techniques include but are not limited to review of maps, historic plans, and records; manhole observation; dry and wet weather sampling; video inspection; smoke testing; and dye testing. This section outlines a systematic procedure to investigate outfall catchments to trace the source of potential illicit discharges. All data collected as part of the catchment investigations will be recorded and reported in each annual report.

7.1 System Vulnerability Factors

The Department of Public Works will review relevant mapping and historic plans and records to identify areas within the catchment with higher potential for illicit connections. The following information will be reviewed:

- Plans related to the construction of the drainage network
- Plans related to the construction of the sewer drainage network
- Prior work on storm drains or sewer lines

- Board of Health or other municipal data on septic systems
- Complaint records related to SSOs
- Septic system breakouts.

Based on the review of this information, the presence of any of the following **System Vulnerability Factors (SVFs)** will be identified for each catchment:

- 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
- 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 that 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 that poor owner maintenance).

A SVF inventory will be documented for each catchment (see **Table 7-1**), retained as part of this IDDE Plan, and included in the annual report.

Table 7-1. Outfall Catchment System Vulnerability Factor (SVF) Inventory

East Longmeadow, Massachusetts

Revision Date: June 18, 2019

Outfall ID	Receiving Water	1 History of SSOs	2 Common or Twin Invert Manholes	3 Common Trench Construction	4 Storm/Sanitary Crossings (Sanitary Above)	5 Sanitary Lines with Underdrains	6 Inadequate Sanitary Level of Service	7 Areas Formerly Served by Combined Sewers	8 Sanitary Infrastructure Defects	9 SSO Potential In Event of System Failures	10 Sanitary and Storm Drain Infrastructure >40 years Old	11 Septic with Poor Soils or Water Table Separation	12 History of BOH Actions Addressing Septic Failure
WB-038	Watchaug Brook	No	No	No	No	No	No	No	No	No	No	No	No
WB-037	Watchaug Brook	No	No	No	No	No	No	No	No	No	No	No	No
WB-036	Watchaug Brook	No	No	No	No	No	No	No	No	No	Yes	No	No
MRD-002	Mill Road Conservation	No	No	No	No	No	No	No	No	Yes	Yes	No	No
MRD-001	Mill Road Conservation	No	No	No	No	No	No	No	No	No	Yes	No	No
MRD-004	Mill Road Conservation	No	No	No	No	No	No	No	No	Yes	Yes	No	No
WB-035	Watchaug Brook	No	No	No	No	No	No	No	No	No	No	No	No
WB-054	Watchaug Brook	No	No	No	No	No	No	No	No	No	Yes	No	No
WB-053	Watchaug Brook	No	No	No	No	No	No	No	No	No	Yes	No	No
WB-052	Watchaug Brook	No	No	No	No	No	No	No	No	No	Yes	No	No
WB-051	Watchaug Brook	No	No	No	No	No	No	No	No	No	Yes	No	No
MR-008	Mill River	No	No	No	No	No	No	No	No	No	Yes	No	No
MR-007	Mill River	No	No	No	No	No	No	No	No	No	Yes	No	No
MR-006	Mill River	No	No	No	No	No	No	No	No	No	No	No	No
MR-005	Mill River	No	No	No	No	No	No	No	No	No	No	No	No
WB-050	Watchaug Brook	No	No	No	No	No	No	No	No	No	No	No	No
MR-004	Mill River	No	No	No	No	No	No	No	No	No	Yes	No	No

MR-003	Mill River	No	No	No	No	No	No	No	No	No	No	No	No
MR-002	Mill River	No	No	No	No	No	No	No	No	No	No	No	No
MR-001	Mill River	No	No	No	No	No	No	No	No	No	No	No	No
MR-024	Mill River	No	No	No	No	No	No	No	No	No	Yes	No	No
MR-023	Mill River	No	No	No	No	No	No	No	No	No	Yes	No	No
MR-022	Mill River	No	No	No	No	No	No	No	No	No	Yes	No	No
MR-021	Mill River	No	No	No	No	No	No	No	No	No	Yes	No	No
MR-020	Mill River	No	No	No	No	No	No	No	No	No	Yes	No	No
MR-019	Mill River	No	No	No	No	No	No	No	No	No	Yes	No	No
MR-018	Mill River	No	No	No	No	No	No	No	No	No	Yes	No	No
MR-017	Mill River	No	No	No	No	No	No	No	No	No	Yes	No	No
MR-016	Mill River	No	No	No	No	No	No	No	No	Yes	No	No	No
MR-015	Mill River	No	No	No	No	No	No	No	No	No	No	No	No
MR-014	Mill River	No	No	No	No	No	No	No	No	No	No	No	No
MR-013	Mill River	No	No	No	No	No	No	No	No	No	No	No	No
MR-012	Mill River	No	No	No	No	No	No	No	No	No	No	No	No
MR-011	Mill River	No	No	No	No	No	No	No	No	No	Yes	No	No
MR-010	Mill River	No	No	No	No	No	No	No	No	No	Yes	No	No
MR-009	Mill River	No	No	No	No	No	No	No	No	No	Yes	No	No
MR-038	Mill River	No	No	No	No	No	No	No	No	No	Yes	No	No
MR-037	Mill River	No	No	No	No	No	No	No	No	No	Yes	No	No
MR-036	Mill River	No	No	No	No	No	No	No	No	Yes	Yes	No	No
MR-035	Mill River	No	No	No	No	No	No	No	No	No	Yes	No	No

PRD-004	Mill River	No	No	No	No	No	No	No	No	No	Yes	No	No
PRD-003	Mill River	No	No	No	No	No	No	No	No	No	Yes	No	No
PRD-002	Mill River	No	No	No	No	No	No	No	No	No	Yes	No	No
MR-034	Mill River	No	No	No	No	No	No	No	No	No	Yes	No	No
WB-049	Watchaug Brook	No	No	No	No	No	No	No	No	Yes	No	No	No
WB-048	Watchaug Brook	No	No	No	No	No	No	No	No	No	No	No	No
WB-047	Watchaug Brook	No	No	No	No	No	No	No	No	No	No	No	No
WB-046	Watchaug Brook	No	No	No	No	No	No	No	No	No	No	No	No
WB-045	Watchaug Brook	No	No	No	No	No	No	No	No	No	No	No	No
WB-044	Watchaug Brook	No	No	No	No	No	No	No	No	No	No	No	No
WB-043	Watchaug Brook	No	No	No	No	No	No	No	No	No	No	No	No
WB-042	Watchaug Brook	No	No	No	No	No	No	No	No	No	No	No	No
WB-041	Watchaug Brook	No	No	No	No	No	No	No	No	No	No	No	No
WB-040	Watchaug Brook	No	No	No	No	No	No	No	No	No	No	No	No
WB-039	Watchaug Brook	No	No	No	No	No	No	No	No	No	Yes	No	No
WB-070	Watchaug Brook	No	No	No	No	No	No	No	No	No	No	No	No
WB-069	Watchaug Brook	No	No	No	No	No	No	No	No	No	No	No	No
MR-033	Mill River	No	No	No	No	No	No	No	No	No	Yes	No	No
WB-067	Watchaug Brook	No	No	No	No	No	No	No	No	No	Yes	No	No
WB-066	Watchaug Brook	No	No	No	No	No	No	No	No	No	Yes	No	No
WB-065	Watchaug Brook	No	No	No	No	No	No	No	No	No	Yes	No	No
WB-064	Watchaug Brook	No	No	No	No	No	No	No	No	No	Yes	No	No
WB-063	Watchaug Brook	No	No	No	No	No	No	No	No	No	Yes	No	No

WB-062	Watchaug Brook	No	No	No	No	No	No	No	No	No	Yes	No	No
WB-061	Watchaug Brook	No	No	No	No	No	No	No	No	No	Yes	No	No
WB-060	Watchaug Brook	No	No	No	No	No	No	No	No	No	Yes	No	No
MR-032	Mill River	No	No	No	No	No	No	No	No	No	Yes	No	No
MR-031	Mill River	No	No	No	No	No	No	No	No	No	Yes	No	No
WB-059	Watchaug Brook	No	No	No	No	No	No	No	No	No	Yes	No	No
WB-058	Watchaug Brook	No	No	No	No	No	No	No	No	No	Yes	No	No
WB-057	Watchaug Brook	No	No	No	No	No	No	No	No	No	Yes	No	No
WB-056	Watchaug Brook	No	No	No	No	No	No	No	No	No	Yes	No	No
MR-028	Mill River	No	No	No	No	No	No	No	No	No	Yes	No	No
WB-055	Watchaug Brook	No	No	No	No	No	No	No	No	No	Yes	No	No
WB-086	Watchaug Brook	No	No	No	No	No	No	No	No	No	Yes	No	No
WB-085	Watchaug Brook	No	No	No	No	No	No	No	No	No	Yes	No	No
WB-084	Watchaug Brook	No	No	No	No	No	No	No	No	No	Yes	No	No
WB-083	Watchaug Brook	No	No	No	No	No	No	No	No	No	No	No	No
WB-082	Watchaug Brook	No	No	No	No	No	No	No	No	No	Yes	No	No
WB-081	Watchaug Brook	No	No	No	No	No	No	No	No	No	Yes	No	No
WB-080	Watchaug Brook	No	No	No	No	No	No	No	No	No	Yes	No	No
WB-079	Watchaug Brook	No	No	No	No	No	No	No	No	No	Yes	No	No
WB-078	Watchaug Brook	No	No	No	No	No	No	No	No	No	No	No	No
WB-077	Watchaug Brook	No	No	No	No	No	No	No	No	No	Yes	No	No
WB-076	Watchaug Brook	No	No	No	No	No	No	No	No	No	Yes	No	No
WB-075	Watchaug Brook	No	No	No	No	No	No	No	No	No	Yes	No	No

WB-074	Watchaug Brook	No	No	No	No	No	No	No	No	No	Yes	No	No
WB-073	Watchaug Brook	No	No	No	No	No	No	No	No	No	Yes	No	No
WB-072	Watchaug Brook	No	No	No	No	No	No	No	No	No	No	No	No
WB-071	Watchaug Brook	No	No	No	No	No	No	No	No	No	No	No	No
WB-102	Watchaug Brook	No	No	No	No	No	No	No	No	No	No	No	No
WB-101	Watchaug Brook	No	No	No	No	No	No	No	No	No	Yes	No	No
WB-100	Watchaug Brook	No	No	No	No	No	No	No	No	No	No	No	No
WB-099	Watchaug Brook	No	No	No	No	No	No	No	No	Yes	No	No	No
WB-098	Watchaug Brook	No	No	No	No	No	No	No	No	No	No	No	No
WB-097	Watchaug Brook	No	No	No	No	No	No	No	No	No	No	No	No
WB-096	Watchaug Brook	No	No	No	No	No	No	No	No	No	No	No	No
WB-095	Watchaug Brook	No	No	No	No	No	No	No	No	No	No	No	No
WB-094	Watchaug Brook	No	No	No	No	No	No	No	No	No	No	No	No
WB-093	Watchaug Brook	No	No	No	No	No	No	No	No	No	No	No	No
WB-092	Watchaug Brook	No	No	No	No	No	No	No	No	No	No	No	No
WB-091	Watchaug Brook	No	No	No	No	No	No	No	No	No	No	No	No
WB-090	Watchaug Brook	No	No	No	No	No	No	No	No	No	No	No	No
WB-089	Watchaug Brook	No	No	No	No	No	No	No	No	No	No	No	No
WB-088	Watchaug Brook	No	No	No	No	No	No	No	No	No	No	No	No
WB-087	Watchaug Brook	No	No	No	No	No	No	No	No	No	Yes	No	No
WB-118	Watchaug Brook	No	No	No	No	No	No	No	No	No	Yes	No	No
WB-117	Watchaug Brook	No	No	No	No	No	No	No	No	No	No	No	No
WB-116	Watchaug Brook	No	No	No	No	No	No	No	No	No	Yes	No	No

WB-115	Watchaug Brook	No	No	No	No	No	No	No	No	No	No	No	No
WB-114	Watchaug Brook	No	No	No	No	No	No	No	No	No	Yes	No	No
PB-014	Pecousic Brook	No	No	No	No	No	No	No	No	Yes	Yes	No	No
WB-113	Watchaug Brook	No	No	No	No	No	No	No	No	No	Yes	No	No
WB-112	Watchaug Brook	No	No	No	No	No	No	No	No	No	Yes	No	No
WB-111	Watchaug Brook	No	No	No	No	No	No	No	No	No	Yes	No	No
WB-110	Watchaug Brook	No	No	No	No	No	No	No	No	No	No	No	No
MR-027	Mill River	No	No	No	No	No	No	No	No	No	Yes	No	No
MR-026	Mill River	No	No	No	No	No	No	No	No	No	No	No	No
WB-109	Watchaug Brook	No	No	No	No	No	No	No	No	No	No	No	No
WB-108	Watchaug Brook	No	No	No	No	No	No	No	No	No	No	No	No
WB-107	Watchaug Brook	No	No	No	No	No	No	No	No	No	No	No	No
WB-106	Watchaug Brook	No	No	No	No	No	No	No	No	No	No	No	No
WB-105	Watchaug Brook	No	No	No	No	No	No	No	No	No	No	No	No
WB-104	Watchaug Brook	No	No	No	No	No	No	No	No	No	No	No	No
WB-103	Watchaug Brook	No	No	No	No	No	No	No	No	No	No	No	No
PB-013	Pecousic Brook	No	No	No	No	No	No	No	No	No	Yes	No	No
WB-016	Watchaug Brook	No	No	No	No	No	No	No	No	No	Yes	No	No
WB-015	Watchaug Brook	No	No	No	No	No	No	No	No	No	Yes	No	No
PB-012	Pecousic Brook	No	No	No	No	No	No	No	No	No	Yes	No	No
PB-011	Pecousic Brook	No	No	No	No	No	No	No	No	No	Yes	No	No
PB-010	Pecousic Brook	No	No	No	No	No	No	No	No	No	Yes	No	No
PB-009	Pecousic Brook	No	No	No	No	No	No	No	No	No	Yes	No	No

PB-008	Pecousic Brook	No	No	No	No	No	No	No	No	No	Yes	No	No
PB-007	Pecousic Brook	No	No	No	No	No	No	No	No	No	Yes	No	No
PB-006	Pecousic Brook	No	No	No	No	No	No	No	No	No	Yes	No	No
PB-005	Pecousic Brook	No	No	No	No	No	No	No	No	No	Yes	No	No
PB-004	Pecousic Brook	No	No	No	No	No	No	No	No	No	Yes	No	No
PB-003	Pecousic Brook	No	No	No	No	No	No	No	No	No	Yes	No	No
WB-014	Watchaug Brook	No	No	No	No	No	No	No	No	No	Yes	No	No
PB-002	Pecousic Brook	No	No	No	No	No	No	No	No	No	Yes	No	No
SB-008	Schnelock Brook	No	No	No	No	No	No	No	No	Yes	Yes	No	No
SB-007	Schnelock Brook	No	No	No	No	No	No	No	No	No	Yes	No	No
SB-006	Schnelock Brook	No	No	No	No	No	No	No	No	No	Yes	No	No
SB-005	Schnelock Brook	No	No	No	No	No	No	No	No	Yes	No	No	No
SB-004	Schnelock Brook	No	No	No	No	No	No	No	No	No	Yes	No	No
SB-003	Schnelock Brook	No	No	No	No	No	No	No	No	No	Yes	No	No
PB-001	Pecousic Brook	No	No	No	No	No	No	No	No	No	Yes	No	No
PB-030	Pecousic Brook	No	No	No	No	No	No	No	No	No	Yes	No	No
PB-029	Pecousic Brook	No	No	No	No	No	No	No	No	No	Yes	No	No
PB-028	Pecousic Brook	No	No	No	No	No	No	No	No	No	Yes	No	No
PB-027	Pecousic Brook	No	No	No	No	No	No	No	No	No	Yes	No	No
PB-026	Pecousic Brook	No	No	No	No	No	No	No	No	No	Yes	No	No
PB-024	Pecousic Brook	No	No	No	No	No	No	No	No	No	Yes	No	No
PB-023	Pecousic Brook	No	No	No	No	No	No	No	No	No	Yes	No	No
PB-022	Pecousic Brook	No	No	No	No	No	No	No	No	No	Yes	No	No

PB-020	Pecousic Brook	No	No	No	No	No	No	No	No	No	Yes	No	No
PB-019	Pecousic Brook	No	No	No	No	No	No	No	No	No	Yes	No	No
PB-018	Pecousic Brook	No	No	No	No	No	No	No	No	No	Yes	No	No
PB-017	Pecousic Brook	No	No	No	No	No	No	No	No	No	Yes	No	No
PB-016	Pecousic Brook	No	No	No	No	No	No	No	No	No	Yes	No	No
PB-015	Pecousic Brook	No	No	No	No	No	No	No	No	No	Yes	No	No
JB-011	Jawbuck Brook	No	No	No	No	No	No	No	No	No	Yes	No	No
WB-013	Watchaug Brook	No	No	No	No	No	No	No	No	No	No	No	No
WB-012	Watchaug Brook	No	No	No	No	No	No	No	No	No	No	No	No
WB-011	Watchaug Brook	No	No	No	No	No	No	No	No	No	Yes	No	No
WB-010	Watchaug Brook	No	No	No	No	No	No	No	No	No	Yes	No	No
WB-009	Watchaug Brook	No	No	No	No	No	No	No	No	No	No	No	No
WB-008	Watchaug Brook	No	No	No	No	No	No	No	No	No	No	No	No
WB-007	Watchaug Brook	No	No	No	No	No	No	No	No	No	No	No	No
WB-006	Watchaug Brook	No	No	No	No	No	No	No	No	No	No	No	No
JB-010	Jawbuck Brook	No	No	No	No	No	No	No	No	No	Yes	No	No
JB-009	Jawbuck Brook	No	No	No	No	No	No	No	No	No	Yes	No	No
JB-008	Jawbuck Brook	No	No	No	No	No	No	No	No	No	Yes	No	No
FB-012	Freshwater Brook	No	No	No	No	No	No	No	No	No	Yes	No	No
WB-005	Watchaug Brook	No	No	No	No	No	No	No	No	No	Yes	No	No
WB-004	Watchaug Brook	No	No	No	No	No	No	No	No	No	No	No	No
WB-003	Watchaug Brook	No	No	No	No	No	No	No	No	No	No	No	No
JB-007	Jawbuck Brook	No	No	No	No	No	No	No	No	Yes	Yes	No	No

JB-006	Jawbuck Brook	No	No	No	No	No	No	No	No	No	Yes	No	No
WB-002	Watchaug Brook	No	No	No	No	No	No	No	No	No	Yes	No	No
WB-001	Watchaug Brook	No	No	No	No	No	No	No	No	No	Yes	No	No
JB-005	Jawbuck Brook	No	No	No	No	No	No	No	No	No	Yes	No	No
JB-004	Jawbuck Brook	No	No	No	No	No	No	No	No	No	Yes	No	No
JB-003	Jawbuck Brook	No	No	No	No	No	No	No	No	No	Yes	No	No
PB-046	Pecousic Brook	No	No	No	No	No	No	No	No	No	Yes	No	No
PB-045	Pecousic Brook	No	No	No	No	No	No	No	No	No	No	No	No
PB-044	Pecousic Brook	No	No	No	No	No	No	No	No	No	No	No	No
PB-043	Pecousic Brook	No	No	No	No	No	No	No	No	No	No	No	No
PB-042	Pecousic Brook	No	No	No	No	No	No	No	No	No	Yes	No	No
PB-041	Pecousic Brook	No	No	No	No	No	No	No	No	No	Yes	No	No
PB-040	Pecousic Brook	No	No	No	No	No	No	No	No	No	Yes	No	No
PB-039	Pecousic Brook	No	No	No	No	No	No	No	No	No	Yes	No	No
PB-038	Pecousic Brook	No	No	No	No	No	No	No	No	No	Yes	No	No
PB-037	Pecousic Brook	No	No	No	No	No	No	No	No	No	Yes	No	No
PB-036	Pecousic Brook	No	No	No	No	No	No	No	No	No	Yes	No	No
PB-035	Pecousic Brook	No	No	No	No	No	No	No	No	No	Yes	No	No
PB-034	Pecousic Brook	Yes	No	No	No	No	No	No	No	No	Yes	No	No
WB-032	Watchaug Brook	No	No	No	No	No	No	No	No	No	No	No	No
WB-031	Watchaug Brook	No	No	No	No	No	No	No	No	No	No	No	No
WB-030	Watchaug Brook	No	No	No	No	No	No	No	No	No	Yes	No	No
WB-029	Watchaug Brook	No	No	No	No	No	No	No	No	No	Yes	No	No

WB-028	Watchaug Brook	No	No	No	No	No	No	No	No	No	Yes	No	No
WB-027	Watchaug Brook	No	No	No	No	No	No	No	No	No	No	No	No
WB-026	Watchaug Brook	No	No	No	No	No	No	No	No	No	No	No	No
WB-025	Watchaug Brook	No	No	No	No	No	No	No	No	No	Yes	No	No
WB-024	Watchaug Brook	No	No	No	No	No	No	No	No	No	No	No	No
FB-011	Freshwater Brook	No	No	No	No	No	No	No	No	No	No	No	No
FB-010	Freshwater Brook	No	No	No	No	No	No	No	No	No	No	No	No
FB-009	Freshwater Brook	No	No	No	No	No	No	No	No	No	No	No	No
FB-008	Freshwater Brook	No	No	No	No	No	No	No	No	No	No	No	No
FB-007	Freshwater Brook	No	No	No	No	No	No	No	No	No	No	No	No
FB-006	Freshwater Brook	No	No	No	No	No	No	No	No	No	No	No	No
FB-005	Freshwater Brook	No	No	No	No	No	No	No	No	No	No	No	No
FB-003	Freshwater Brook	No	No	No	No	No	No	No	No	No	No	No	No
FB-002	Freshwater Brook	No	No	No	No	No	No	No	No	No	No	No	No
FB-001	Freshwater Brook	No	No	No	No	No	No	No	No	No	No	No	No
PB-033	Pecousic Brook	No	No	No	No	No	No	No	No	No	Yes	No	No
PB-032	Pecousic Brook	No	No	No	No	No	No	No	No	No	Yes	No	No
PB-031	Pecousic Brook	No	No	No	No	No	No	No	No	No	Yes	No	No
WB-023	Watchaug Brook	No	No	No	No	No	No	No	No	No	No	No	No
WB-022	Watchaug Brook	No	No	No	No	No	No	No	No	No	No	No	No
WB-021	Watchaug Brook	No	No	No	No	No	No	No	No	No	No	No	No
SB-002	Schnelock Brook	No	No	No	No	No	No	No	No	No	No	No	No
PB-062	Pecousic Brook	No	No	No	No	No	No	No	No	No	Yes	No	No

PB-061	Pecousic Brook	No	No	No	No	No	No	No	No	No	Yes	No	No
PB-060	Pecousic Brook	No	No	No	No	No	No	No	No	No	Yes	No	No
PB-059	Pecousic Brook	No	No	No	No	No	No	No	No	No	Yes	No	No
PB-058	Pecousic Brook	No	No	No	No	No	No	No	No	No	Yes	No	No
PB-057	Pecousic Brook	No	No	No	No	No	No	No	No	No	Yes	No	No
FB-017	Freshwater Brook	No	No	No	No	No	No	No	No	No	Yes	No	No
FB-016	Freshwater Brook	No	No	No	No	No	No	No	No	No	Yes	No	No
JB-002	Jawbuck Brook	No	No	No	No	No	No	No	No	No	Yes	No	No
JB-001	Jawbuck Brook	No	No	No	No	No	No	No	No	No	Yes	No	No
JB-015	Jawbuck Brook	No	No	No	No	No	No	No	No	No	Yes	No	No
PB-056	Pecousic Brook	No	No	No	No	No	No	No	No	No	Yes	No	No
PB-055	Pecousic Brook	No	No	No	No	No	No	No	No	No	Yes	No	No
PB-054	Pecousic Brook	No	No	No	No	No	No	No	No	No	Yes	No	No
PB-053	Pecousic Brook	No	No	No	No	No	No	No	No	No	Yes	No	No
PB-052	Pecousic Brook	Yes	No	No	No	No	No	No	No	No	Yes	No	No
PB-051	Pecousic Brook	Yes	No	No	No	No	No	No	No	No	Yes	No	No
L-004	Town of Longmeadow	No	No	No	No	No	No	No	No	No	Yes	No	No
PB-050	Pecousic Brook	No	No	No	No	No	No	No	No	No	Yes	No	No
L-003	Town of Longmeadow	No	No	No	No	No	No	No	No	No	Yes	No	No
L-002	Town of Longmeadow	No	No	No	No	No	No	No	No	No	Yes	No	No
L-001	Town of Longmeadow	No	No	No	No	No	No	No	No	No	Yes	No	No
MRD-003	Mill Road Conservation	No	No	No	No	No	No	No	No	No	Yes	No	No
FB-015	Freshwater Brook	No	No	No	No	No	No	No	No	No	Yes	No	No

WB-020	Watchaug Brook	No	No	No	No	No	No	No	No	No	Yes	No	No
MR-025	Mill River	No	No	No	No	No	No	No	No	No	Yes	No	No
PRD-001	Mill River	No	No	No	No	No	No	No	No	No	Yes	No	No
PB-049	Pecousic Brook	No	No	No	No	No	No	No	No	No	Yes	No	No
PB-047	Pecousic Brook	No	No	No	No	No	No	No	No	No	Yes	No	No
PB-078	Pecousic Brook	No	No	No	No	No	No	No	No	No	Yes	No	No
PB-077	Pecousic Brook	No	No	No	No	No	No	No	No	No	Yes	No	No
PB-076	Pecousic Brook	No	No	No	No	No	No	No	No	No	Yes	No	No
PB-075	Pecousic Brook	No	No	No	No	No	No	No	No	No	Yes	No	No
PB-074	Pecousic Brook	No	No	No	No	No	No	No	No	No	Yes	No	No
PB-073	Pecousic Brook	No	No	No	No	No	No	No	No	No	Yes	No	No
WB-019	Watchaug Brook	No	No	No	No	No	No	No	No	No	Yes	No	No
PB-072	Pecousic Brook	No	No	No	No	No	No	No	No	No	Yes	No	No
PB-071	Pecousic Brook	No	No	No	No	No	No	No	No	No	Yes	No	No
FB-014	Freshwater Brook	No	No	No	No	No	No	No	No	No	Yes	No	No
WB-018	Watchaug Brook	No	No	No	No	No	No	No	No	No	Yes	No	No
WB-017	Watchaug Brook	No	No	No	No	No	No	No	No	No	Yes	No	No
WB-034	Watchaug Brook	No	No	No	No	No	No	No	No	No	Yes	No	No
SB-001	Schnelock Brook	No	No	No	No	No	No	No	No	No	Yes	No	No
PB-070	Pecousic Brook	No	No	No	No	No	No	No	No	No	Yes	No	No
PB-069	Pecousic Brook	No	No	No	No	No	No	No	No	No	Yes	No	No
PB-068	Pecousic Brook	No	No	No	No	No	No	No	No	No	Yes	No	No
JB-013	Jawbuck Brook	No	No	No	No	No	No	No	No	No	Yes	No	No

JB-012	Jawbuck Brook	No	No	No	No	No	No	No	No	No	Yes	No	No
PB-067	Pecousic Brook	No	No	No	No	No	No	No	No	No	Yes	No	No
PB-066	Pecousic Brook	No	No	No	No	No	No	No	No	No	Yes	No	No
PB-065	Pecousic Brook	No	No	No	No	No	No	No	No	No	Yes	No	No
DRD-004	City of Springfield	No	No	No	No	No	No	No	No	No	Yes	No	No
DRD-003	City of Springfield	No	No	No	No	No	No	No	No	No	Yes	No	No
DRD-002	City of Springfield	No	No	No	No	No	No	No	No	No	Yes	No	No
DRD-001	City of Springfield	No	No	No	No	No	No	No	No	No	Yes	No	No
PB-064	Pecousic Brook	No	No	No	No	No	No	No	No	No	Yes	No	No
PB-063	Pecousic Brook	No	No	No	No	No	No	No	No	No	Yes	No	No
PB-094	Pecousic Brook	No	No	No	No	No	No	No	No	No	Yes	No	No
PB-093	Pecousic Brook	No	No	No	No	No	No	No	No	No	Yes	No	No
PB-092	Pecousic Brook	No	No	No	No	No	No	No	No	No	Yes	No	No
PB-091	Pecousic Brook	No	No	No	No	No	No	No	No	Yes	Yes	No	No
PB-090	Pecousic Brook	No	No	No	No	No	No	No	No	No	Yes	No	No
PB-089	Pecousic Brook	No	No	No	No	No	No	No	No	No	Yes	No	No
PB-088	Pecousic Brook	No	No	No	No	No	No	No	No	No	Yes	No	No
PB-087	Pecousic Brook	No	No	No	No	No	No	No	No	No	Yes	No	No
PB-086	Pecousic Brook	No	No	No	No	No	No	No	No	No	Yes	No	No
FB-013	Freshwater Brook	No	No	No	No	No	No	No	No	No	Yes	No	No
PB-084	Pecousic Brook	No	No	No	No	No	No	No	No	No	Yes	No	No
PB-083	Pecousic Brook	No	No	No	No	No	No	No	No	No	Yes	No	No
PB-082	Pecousic Brook	No	No	No	No	No	No	No	No	Yes	Yes	No	No

PB-081	Pecousic Brook	No	No	No	No	No	No	No	No	No	Yes	No	No
WB-033	Watchaug Brook	No	No	No	No	No	No	No	No	No	Yes	No	No
PB-080	Pecousic Brook	No	No	No	No	No	No	No	No	No	Yes	No	No
PB-079	Pecousic Brook	No	No	No	No	No	No	No	No	No	Yes	No	No
PB-095	Pecousic Brook	No	No	No	No	No	No	No	No	No	Yes	No	No
WB-119	Watchaug Brook	No	No	No	No	No	No	No	No	No	Yes	No	No
L-005	Town of Longmeadow	No	No	No	No	No	No	No	No	No	Yes	No	No
FB-018	Freshwater Brook	No	No	No	No	No	No	No	No	No	Yes	No	No
FB-019	Freshwater Brook	No	No	No	No	No	No	No	No	No	Yes	No	No
JB-019	Jawbuck Brook	No	No	No	No	No	No	No	No	No	Yes	No	No
FB-022	Freshwater Brook	No	No	No	No	No	No	No	No	No	Yes	No	No
PB-096	Pecousic Brook	No	No	No	No	No	No	No	No	No	Yes	No	No
PB-097	Pecousic Brook	No	No	No	No	No	No	No	No	No	Yes	No	No
JB-020	Jawbuck Brook	No	No	No	No	No	No	No	No	No	Yes	No	No
PB-098	Pecousic Brook	No	No	No	No	No	No	No	No	No	Yes	No	No
WB-120	Watchaug Brook	No	No	No	No	No	No	No	No	No	Yes	No	No
PRD-005	Mill River	No	No	No	No	No	No	No	No	No	Yes	No	No
PB-099	Pecousic Brook	No	No	No	No	No	No	No	No	No	Yes	No	No
WB-121	Watchaug Brook	No	No	No	No	No	No	No	No	No	No	No	No
MR-039	Mill River	No	No	No	No	No	No	No	No	Yes	No	No	No
WB-122	Watchaug Brook	No	No	No	No	No	No	No	No	No	No	No	No
WB-123	Watchaug Brook	No	No	No	No	No	No	No	No	No	No	No	No
JB-016	Jawbuck Brook	No	No	No	No	No	No	No	No	No	Yes	No	No

FB-023	Freshwater Brook	No	No	No	No	No	No	No	No	No	No	No	No
MR-040	Mill River	No	No	No	No	No	No	No	No	No	No	No	No
JB-017	Jawbuck Brook	No	No	No	No	No	No	No	No	No	Yes	No	No
JB-018	Jawbuck Brook	No	No	No	No	No	No	No	No	No	Yes	No	No
FB-024	Freshwater Brook	No	No	No	No	No	No	No	No	No	Yes	No	No
FB-025	Freshwater Brook	No	No	No	No	No	No	No	No	No	Yes	No	No
PRD-006	Mill River	No	No	No	No	No	No	No	No	No	Yes	No	No
JB-022	Jawbuck Brook	No	No	No	No	No	No	No	No	No	Yes	No	No
WB-126	Watchaug Brook	No	No	No	No	No	No	No	No	No	No	No	No
JB-021	Jawbuck Brook	No	No	No	No	No	No	No	No	No	Yes	No	No
PB-100	Pecousic Brook	No	No	No	No	No	No	No	No	No	Yes	No	No
WB-124	Watchaug Brook	No	No	No	No	No	No	No	No	No	No	No	No
WB-125	Watchaug Brook	No	No	No	No	No	No	No	No	No	No	No	No

Presence/Absence Evaluation Criteria:

1. History of SSOs, including, but not limited to, those resulting from wet weather, high water table, or fat/oil/grease blockages
2. Common or twin-invert manholes serving storm and sanitary sewer alignments
3. Common trench construction serving both storm and sanitary sewer alignments
4. Crossings of storm and sanitary sewer alignments where the sanitary system is shallower than the storm drain system
5. Sanitary sewer alignments known or suspected to have been constructed with an underdrain system
6. Inadequate sanitary sewer level of service (LOS) resulting in regular surcharging, customer back-ups, or frequent customer complaints
7. Areas formerly served by combined sewer systems
8. 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
9. Sewer pump/lift stations, siphons, or known sanitary sewer restrictions where power/equipment failures or blockages could readily result in SSOs
10. Any sanitary sewer and storm drain infrastructure greater than 40 years old

11. 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 that poor owner maintenance)
12. 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 that poor owner maintenance)

7.2 Dry Weather Manhole Inspections

The Town of East Longmeadow will implement a dry weather storm drain network investigation that involves systematically and progressively observing, sampling and evaluating key junction manholes in the MS4 to determine the approximate location of suspected illicit discharges or SSOs.

The Department of Public Works will be responsible for implementing the dry weather manhole inspection program and making updates as necessary. Infrastructure information will be incorporated into the storm system map, and catchment delineations will be refined based on the field investigation, where necessary. The SVF inventory will also be updated based on information obtained during the field investigations, where necessary.

Several important terms related to the dry weather manhole inspection program are defined by the MS4 Permit as follows:

- **Junction Manhole** is a manhole or structure with two or more inlets accepting flow from two or more MS4 alignments. Manholes with inlets solely from private storm drains, individual catch basins, or both are not considered junction manholes for these purposes.
- **Key Junction Manholes** are those junction manholes that can represent one or more junction manholes without compromising adequate implementation of the illicit discharge program. Adequate implementation of the illicit discharge program would not be compromised if the exclusion of a particular junction manhole as a key junction manhole would not affect the permittee's ability to determine the possible presence of an upstream illicit discharge. A permittee may exclude a junction manhole located upstream from another located in the immediate vicinity or that is serving a drainage alignment with no potential for illicit connections.

For all catchments identified for investigation, during dry weather, field crews will systematically inspect **key junction manholes** for evidence of illicit discharges. This program involves progressive inspection and sampling at manholes in the storm drain network to isolate and eliminate illicit discharges.

The manhole inspection methodology will be conducted in one of two ways (or a combination of both):

- By working progressively up from the outfall and inspecting key junction manholes along the way, or
- By working progressively down from the upper parts of the catchment toward the outfall.

For most catchments, manhole inspections will proceed from the outfall moving up into the system.

However, the decision to move up or down the system depends on the nature of the drainage system and the surrounding land use and the availability of information on the catchment and drainage system. Moving up the system can begin immediately when an illicit discharge is detected at an outfall, and only a map of the storm drain system is required. Moving down the system requires more advance preparation and reliable drainage system information on the upstream segments of the storm drain system, but may be more efficient if the sources of illicit discharges are believed to be located in the upstream portions of the catchment area. Once a manhole inspection methodology has been selected, investigations will continue systematically through the catchment.

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 provided in **Appendix C**.

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. Sampling and analysis will be in accordance with procedures outlined in **Section 6**. Additional indicator sampling may assist in determining potential sources (e.g., bacteria for sanitary flows, conductivity to detect tidal backwater, etc.).

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.

7.3 Wet Weather Outfall Sampling

Where a minimum of one (1) System Vulnerability Factor (SVF) is identified based on previous information or the catchment investigation, a wet weather investigation must also be conducted at the associated outfall. The Department of Public Works will be responsible for implementing the wet weather outfall sampling program and making updates as necessary.

Outfalls will be inspected and sampled 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.

Wet weather outfall sampling will proceed as follows:

1. At least one wet weather sample will be collected at the outfall for the same parameters required during dry weather screening.

2. Wet weather sampling will occur during or after a storm event of sufficient depth or intensity to produce a stormwater discharge at the outfall. There is no specific rainfall amount that will trigger sampling, although minimum storm event intensities that are likely to trigger sanitary sewer interconnections are preferred. To the extent feasible, sampling should occur during the spring (March through June) when groundwater levels are relatively high.

3. If wet weather outfall sampling indicates a potential illicit discharge, then additional wet weather source sampling will be performed, as warranted, or source isolation and confirmation procedures will be followed as described in **Section 7.4**.

4. If wet weather outfall sampling does not identify evidence of illicit discharges, and no evidence of an illicit discharge is found during dry weather manhole inspections, catchment investigations will be considered complete.

7.4 Source Isolation and Confirmation

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

- Sandbagging
- Smoke Testing
- Dye Testing
- CCTV/Video Inspections
- Optical Brightener Monitoring
- IDDE Canines

These methods are described in the sections below. Instructions and Standard Operating Procedures (SOPs) for these and other IDDE methods are provided in **Appendix F**.

Public notification is an important aspect of a detailed source investigation program. Prior to smoke testing, dye testing, or TV inspections, the Department of Public Works will notify property owners in the affected area. Smoke testing notification will include robocalls and hanging notifications for single family homes, businesses and building lobbies for multi-family dwellings.

7.4.1 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. 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.

7.4.2 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. Typically 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 place 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). 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.

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.

7.4.3 Dye Testing

Dye testing involves flushing non-toxic 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.

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.

7.4.4 CCTV/Video Inspection

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. While this tool is both effective and usually definitive, it can be costly and time consuming when compared to other source isolation techniques.

7.4.5 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 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. The pad is retrieved at a later date and placed under UV light to determine the presence/absence of brighteners during the monitoring period. 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.

7.4.6 IDDE Canines

Dogs specifically trained to smell human related sewage are becoming a cost-effective way to isolate and identify sources of illicit discharges. While not widespread at the moment, the use of IDDE canines is growing as is their accuracy. The use of IDDE canines is not recommended as a standalone practice for source identification; rather it is recommended as a tool to supplement other conventional methods, such as dye testing, in order to fully verify sources of illicit discharges.

7.5 Illicit Discharge Removal

When the specific source of an illicit discharge is identified, the Town of East Longmeadow will exercise its authority as necessary to require its removal. The annual report will include the status of IDDE investigation and removal activities including the following information for each confirmed source:

- 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
- Estimate of the volume of flow removed.

7.5.1 Confirmatory Outfall Screening

Within one (1) year of removal of all identified illicit discharges within a catchment area, confirmatory outfall or interconnection screening will be conducted. The confirmatory screening will be conducted in dry weather unless System Vulnerability Factors have been identified, in which case both dry weather and wet weather confirmatory screening will be conducted. If confirmatory screening indicates evidence of additional illicit discharges, the catchment will be scheduled for additional investigation.

7.6 Ongoing Screening

Upon completion of all catchment investigations and illicit discharge removal and confirmation (if necessary), each outfall or interconnection will be re-prioritized for screening and scheduled for ongoing screening once every five (5) years. Ongoing screening will consist of dry weather screening and sampling consistent with the procedures described in **Section 6** of this plan. Ongoing wet weather screening and sampling will also be conducted at outfalls where wet weather screening was required due to System Vulnerability Factors and will be conducted in accordance with the procedures described in **Section 7.3**. All sampling results will be reported in the annual report.

8 Training

Annual IDDE training will be made available to all employees involved in the IDDE program. This training will at a minimum include information on how to identify illicit discharges and SSOs and may also include additional training specific to the functions of particular personnel and their function within the framework of the IDDE program. Training records will be maintained in **Appendix E**. The frequency and type of training will be included in the annual report.

9 Progress Reporting

The progress and success of the IDDE program will be evaluated on an annual basis. The evaluation will be documented in the annual report and will include the following indicators of program progress:

- Number of SSOs and illicit discharges identified and removed
- Number and percent of total outfall catchments served by the MS4 evaluated using the catchment investigation procedure
- Number of dry weather outfall inspections/screenings
- Number of wet weather outfall inspections/sampling events
- Number of enforcement notices issued
- All dry weather and wet weather screening and sampling results
- Estimate of the volume of sewage removed, as applicable
- Number of employees trained annually.

The success of the IDDE program will be measured by the IDDE activities completed within the required permit timelines.

Appendix A

Legal Authority

Section 8.070 STORMWATER MANAGEMENT

8.070.010 Definitions

The following definitions describe the meaning of the terms used in this by-law:

Adverse Impact: Harmful 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): Structural or biological devices that temporarily store or treat stormwater runoff to reduce flooding, remove pollutants, and provide other amenities. They can also be nonstructural practices that reduce pollutants at their source. Examples of BMPs are described in the Massachusetts Department of Environmental Protection's (MassDEP) stormwater design manual: Stormwater Management Handbook, Volume 2: Chapter 2: Structural BMP Specifications for the Massachusetts Stormwater Handbook (February 2008, MassDEP, as updated or amended).

Board of Public Works: The permitting and enforcement agency.

Construction Activity: Disturbance of the ground by removal of surface cover, grading, excavation, clearing or filling.

Detention: 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.

Discharge of Pollutants: The addition of a pollutant or combination of pollutants into a Municipal Separate Storm Sewer System (MS4) or into the waters of the Commonwealth from any source.

Groundwater: Water beneath the surface of the ground.

Illicit Discharge: Direct or indirect non-stormwater discharge to an MS4, except as specifically exempted in Illicit Stormwater Section 8.07.100. (D). The term does not include a discharge in compliance with a National Pollutant Discharge and Elimination System (NPDES) stormwater discharge permit or resulting from fire fighting or other municipal activities, not including Construction Activities.

Illicit Connection: Surface or subsurface drain or conveyance, which allows an illicit discharge into an MS4. Illicit connections include conveyances which allow a non-stormwater discharge to an MS4 including sewage, process wastewater or wash water and 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.

Infiltration: The downward movement of water from the surface to the subsoil.

Municipal Separate Storm Sewer System (MS4): The system of conveyances designed or used for collecting or conveying stormwater, including road or street with a drainage system, gutter, curb, inlet, piped storm drain, pumping facility, retention or detention basin, drain channel, reservoir, and other drainage owned or operated by the Town of East Longmeadow.

National Pollutant Discharge Elimination System (NPDES) stormwater discharge permit: A permit issued by the United States Environmental Protection Agency or jointly with the state that authorizes the discharge of pollutants to waters of the United States.

Non-Stormwater Discharges: Discharge to the MS4 not composed entirely of stormwater.

Peak Discharge: The maximum rate of flow during a storm.

Permeable soils: Soil materials with a sufficiently rapid infiltration rate so as to greatly reduce or eliminate surface and stormwater runoff.

Person: An individual, group of individuals, association, partnership, corporation, company, business, organization, trust, estate, administrative agency, public or quasi-public entity, the commonwealth or political subdivision thereof or the federal government, to the extent permitted by law and an officer, employee or agent of such person.

Pollutant: Any element or property of sewage, agricultural, industrial, commercial or residential waste, runoff, leachate, heated effluent, or other matter whether originating at a point or nonpoint source, that is introduced into the MS4 or waters of the Commonwealth. Pollutants shall include, but not be limited to: dredged spoil, solid waste, filter backwash, sewage, garbage, sewage sludge, munitions, chemical wastes, biological materials, radioactive materials, hot fluids, wrecked or discarded equipment, rock, sand, and industrial, municipal, agricultural and residential waste discharged into water.

Retention: The holding of runoff in a basin without release except by means of evaporation, infiltration, or emergency bypass.

Runoff: Rainfall, snowmelt, or irrigation water flowing over the ground surface.

Stormwater: Runoff from precipitation or snow melt.

Stormwater Management Facility: A structural stormwater management measure, including stormwater management basins and filtration or other treatment systems.

Uncontaminated Water: Water containing no pollutants.

Uncontaminated Groundwater: Groundwater containing no pollutants.

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: Sanitary waste or sludge and water used during manufacturing, cleaning or processing of materials that enters the MS4 or waters of the Commonwealth.

8.070.020 Purpose

(A) The purpose of this section is to better manage land development in order to protect, maintain, and enhance the public health, safety, and general welfare of the citizens of East Longmeadow by establishing minimum requirements and procedures to control the adverse impacts associated with stormwater runoff.

8.070.030 Authority

The Board of Public Works or its designee shall administer, enforce and implement this section. The Board of Public Works shall promulgate rules, regulations and a permitting process to effectuate the purposes of this section. Failure by the Board of Public Works to promulgate such rules and regulations shall not have the effect of suspending or invalidating this section.

8.070.040 Applicability

(A) *Applicability.* This by-law shall apply to activities that result in disturbance of one or more acres (43,560+ square feet) of land. In determining whether an activity is subject to jurisdiction under this by-law, the Board of Public Works or its designee and applicant shall consider the entirety of the project, including any likely future expansion, and not separate phases or segments thereof. The applicant shall not phase or segment a project to evade, defer or curtail review under this by-law. Except as authorized by the Board of Public Works

or its designee, no person shall perform an activity that results in disturbance of one or more acres of land.

(B) *Exemptions.* The following uses and activities are exempt from compliance with this by-law:

1. Stormwater discharges resulting from land disturbance activities that are subject to an Order of Conditions issued by the Conservation Commission under the Wetlands Protection Act;

2. An agricultural activity which is in compliance with an approved soil conservation plan prepared or approved by the United States Natural Resource Conservation Service;

3. Logging which is in compliance with a timber management plan approved under the Forest Cutting Practices Act by Massachusetts Department of Conservation and Recreation;

4. Activities that do not disturb more than one acre (43,560 square feet) of land;

5. Construction of municipal utilities;

6. In-kind repairs to a stormwater treatment system deemed necessary by the East Longmeadow Board of Public Works; and

7. An emergency activity that is immediately necessary for the protection of life, property or the environment, as determined by the Board of Public Works.

(C) *Waivers.* The Board of Public Works may waive strict compliance with any requirement of this by-law or the rules and regulations promulgated hereunder upon written findings of fact setting forth the basis for the waiver by the Board of Public Works.

8.070.050 Permit Requirements

(A) *Permit required.* Prior to the approval of a Special Permit, Site Plan or waiver thereof or Building Permit for an activity regulated hereunder, a Stormwater Management Permit must be approved by the Board of Public Works or its designee.

(B) *Permit fees.* For Stormwater Management Permit fee shall be based on the amount of land to be disturbed at the site and the fee structure shall be established by the Board of Public Works by regulation. If, in the judgment of the Board of Public Works, or its designee consulting services are necessary or appropriate, the applicant shall, prior to a determination on an application, deposit with the Town, an amount determined by the Board of Public Works or its designee to be sufficient to cover the full costs of such services. All such consultants shall be selected by the Board of Public Works or its designee and paid out of said deposit. The Town will reimburse the applicant for any credits remaining after a consultant has been paid within thirty (30) days of said payment. In the event the deposit is insufficient to cover consultant services, the outstanding balance is to be paid by the applicant within 30 days of receipt of invoice for the outstanding balance.

(C) *Stormwater and erosion control plan.* The application for a stormwater management permit shall consist of submittal of a stormwater management and erosion control plan prepared in accordance with the rules and regulations.

(D) *Stormwater Management Performance Standards.* Projects that require a permit under this by-law must meet the Massachusetts Stormwater Management Standards.

8.070.060 Performance Bond

The Board of Public Works shall require from the developer a cash bond prior to the submittal of a building permit application 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 including the applicable

prevailing wage cost for the project. The bond shall be forfeited for failure to complete work specified in the approved stormwater management permit, compliance with all of the provisions of this by-law and other applicable laws and rules and regulations, and any time limitations. No portion of the bond shall be released without an inspection of the work by the Board of Public Works or its designee. The bond shall not be fully released without submission to the Board of Public Works or its designee of acceptable "as-built" plans and certification of completion that the stormwater management facilities are in compliance with the permit and plans approved thereunder.

8.070.070 Certificate of Completion

The Board of Public Works or its designee shall issue a letter certifying completion upon receipt and approval of the final inspection reports, final plans, including evidence of recording of permanent easements, and/or upon otherwise determining that all work of the permit has been satisfactorily completed in conformance with this by-law.

8.070.080 Illicit Discharges Purpose

The purpose of this portion of the by-law is to regulate illicit connections and discharges to the MS4,, to protect East Longmeadow's water bodies and groundwater, and to safeguard the public health, safety, welfare and the environment, by:

(a) preventing pollutants from entering East Longmeadow's MS4;

(b) prohibiting illicit connections and unauthorized discharges to the MS4;

(c) requiring the removal of all such illicit connections;

(d) establishing the legal authority to ensure compliance with the provisions of this by-law through inspection, monitoring, and enforcement.

8.070.090 Illicit Discharges Applicability

This section shall apply to flows entering the MS4.

8.070.100 Illicit Discharges Prohibited Activities

(A) *Illicit discharges.* No person shall dump, discharge, cause or allow to be discharged a pollutant or non-stormwater discharge into MS4s or into waters of the Commonwealth.

(B) *Illicit connections.* No person shall construct, use, allow, maintain or continue an illicit connection to an MS4, regardless of whether the connection was permissible under applicable law, regulation or custom at the time of connection.

(C) *Obstruction of storm drain systems.* No person shall obstruct or interfere with the normal flow of stormwater into or out of an MS4 without prior approval from the Board of Public Works or its designee.

(D) *Exemptions.* This section shall not apply to the following non-stormwater discharges or flows provided that the source is not a significant contributor of a pollutant to MS4s:

1. waterline flushing;
2. flow from potable water sources;
3. springs;
4. natural flow from riparian habitats and wetlands;
5. diverted stream flow;
6. rising groundwater;
7. uncontaminated groundwater infiltrating (entering the MS4 from the ground through such means as defective pipes, pipe joints, connections, or manholes), or uncontaminated pumped groundwater;

8. water from exterior foundation drains, footing drains (not including active groundwater dewatering systems), sump pumps, or air conditioning condensation;
9. discharge from landscape irrigation or lawn watering;
10. water from individual residential car washing;
11. 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;
12. discharge from street sweeping;
13. discharge or flow resulting from ice and snow control operations
14. dye testing, provided verbal notification is given to the Board of Public Works or its designee prior to the time of the test;
15. discharge or flow resulting from fire fighting activities
16. 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;
17. discharge for which advanced written approval is received from the Board of Public Works or its designee as necessary to protect public health, safety, welfare, and the environment; and
18. incidental discharge (e.g., dust, drops of fluids) from maintenance and normal activities related to allowed uses, which results in de minimus levels of pollution entering the MS4 or Waters of the Commonwealth in East Longmeadow. This by-law does not supersede any other local, state or federal requirements.

8.070.110 Notification of Spills

Notwithstanding any other requirements of local, state or federal law, as soon as a person responsible for a facility or operation, or responsible for emergency response for a facility or operation has information of a known or suspected release of materials at that facility operation which is resulting or may result in illicit discharge of pollutants that person shall take the necessary steps to ensure containment, and cleanup of the release. In the event of a release enters the MS4 or Waters of the Commonwealth in East Longmeadow, the person shall immediately notify the East Longmeadow Board of Public Works. Written confirmation of telephone, facsimile or in-person notifications shall be provided to the Board of Public Works or its designee within three business days thereafter. If the discharge of prohibited materials is from a commercial or industrial facility, the facility owner or operator of the facility shall retain on-site a written record of the discharge and the actions taken to prevent its recurrence. Such records shall be retained by said facility owner or operator for at least three years.

8.070.120 Enforcement

Any officer, employee, person or entity observing or having actual knowledge of a violation of this by-law or a rule or regulation adopted hereunder that he is responsible for enforcing may, as an alternative to seeking a criminal penalty for violation of this by-law, give the offender a ticket in a form in compliance with the requirements of and in the manner established in G.L. c. 40, §21D and Section 8.130 of the East Longmeadow General By-laws. The Board of Public Works shall designate the person or persons responsible for enforcement.

The Penalty for each violation of this stormwater management portion of the by-law and the rules and regulations adopted hereunder shall be $200.00 and each day or part thereof shall constitute a separate violation.

The Board of Public Works, in addition to issuing said tickets, may enforce the provisions of this by-law by injunctive relief if it determines that the health, safety or welfare of any resident or member of the public or that the well being of the community is or will be endangered by the violation(s).

Any permit issued pursuant to this by-law shall contain language requiring the applicant to pay any and all costs, including attorney fees and expert witness fees, incurred by the town in seeking court action regarding the enforcement of this by-law and the rules and regulations adopted hereunder.

The prior provisions of this by-law notwithstanding, the Board of Public Works or its designee may enter onto a person's land to inspect any work performed under a permit issued pursuant to this by-law. The Board of Public Works may also enter any property to determine if such property is in violation of this by-law or rules and regulations if it has a good faith basis to believe an activity requiring a permit is being performed on the property without such a permit.

The Board of Public Works may, for cause shown, suspend or terminate a person's connection to the MS4 and any permit issued pursuant to this by-law.

Notice of the intent to suspend or terminate a person's connection to the MS4 or a permit shall be given in writing to the owner of the property and the permit holder, if different, by delivering, to the owner to the address listed for taxation purposes in the Assessor's Office, and the permit holder at the address listed in the application; a copy of the notice of hearing shall be delivered at least ten (10) business days before said hearing date and shall, in addition, be mailed by 1st class mail, postage prepaid at least fourteen (14) days before said hearing.

The notice shall contain the:

1. Name and address of the owner of the property;
2. The name and address of the permit holder if different than the owner;
3. The action contemplated;
4. Statement of violations believed to exist; and
5. A statement that the owner and permit holder may present evidence regarding alleged violations.

If the Board of Public Works or its designee determines in writing that the public health, safety or welfare requires immediate action, it may suspend or terminate MS4 service and any permit immediately. However, in such a case, notice as set forth above, shall be delivered and mailed to the owner and permit holder, if different, informing them that they have fifteen (15) days from the date of the suspension or termination to appeal said action of the Board of Public Works.

8.070.130 Transitional Provisions

Property owners shall comply with the illicit discharges sections of this by-law, but such property owners shall in no case have more than six months from the effective date of the by-law to comply with its provisions, unless good cause is shown for the failure to comply with the by-law during that period.

RULES AND REGULATIONS
FOR THE
MANAGEMENT OF STORMWATER

EAST LONGMEADOW, MASSACHUSETTS

Town of East Longmeadow

Department of Public Works

January 23, 2012

Adopted by the East Longmeadow Board of Public Works at a Public Meeting on January 23, 2012.

Executive Summary

Section 1 General

1.1 Authority 1-1
1.2 Purpose 1-1
1.3 Applicability 1-1
1.4 Exemptions 1-1
1.5 Amendments 1-1
1.6 Coordination with Municipal Departments and Other Agencies 1-1
1.7 Effective Date 1-1

Section 2 Definitions

Section 3 Permit Application Submission

3.1 Administrative Procedures and Requirements 3-1
3.2 Waivers 3-1
3.3 Stormwater Management and Erosion Control Plan Contents 3-1
3.4 Performance Guarantee 3-1
3.5 Review Procedures 3-1
3.6 Plan Changes 3-1
3.7 Permit Extensions 3-1

Section 4 Performance Standards and Design Requirements

4.1 Basic Requirements 4-1
4.2 Stormwater Management Performance Standards 4-1
4.3 Erosion and Sediment Control Performance Standards 4-1

Section 5 Inspections, Operation and Maintenance

5.1 Basic Requirements 5-1
5.2 Inspections of Improvements 5-1
5.3 Post-Construction and Operation and Maintenance 5-1

Section 6 Enforcement and Penalties

6.1 Violations 6-1
6.2 Stop Work Orders 6-1
6.3 Penalties 6-1
6.4 Restoration of Lands 6-1
6.5 Holds on Occupancy Permits 6-1
6.6 Severability 6-1

Appendix A **Application Form**

Appendix B **Inspection Checklist**

Section 1
General

1.1 Authority

These Rules and Regulations are adopted by the Board of Public Works as the Stormwater permitting and enforcement agency pursuant to the Town of East Longmeadow General Bylaws Section 4.090(B) and Section 8.070. The Board of Public Works authorizes the Department of Public Works to act as its agent in implementing and enforcing these regulations.

1.2 Purpose

The purpose of these Stormwater Management Rules and Regulations is to better manage land development in order to protect, maintain, and enhance the public health, safety, and general welfare of the citizens of East Longmeadow by establishing minimum requirements and procedures to control the Adverse Impacts associated with Stormwater Runoff.

1.3 Applicability

This by-law shall apply to activities that result in disturbance of one or more acres (43,560+ square feet) of land. In determining whether an activity is subject to jurisdiction under this by-law, the Department of Public Works and Applicant shall consider the entirety of the project, including any likely future expansion, and not separate phases or segments thereof. The Applicant shall not phase or segment a project to evade, defer or curtail review under this by-law. Except as authorized by the Department of Public Works pursuant to these regulations, no Person shall perform an activity that results in disturbance of one or more acres of land.

1.4 Exemptions

The following uses and activities are exempt from compliance with this by-law:

1. Storm water discharges resulting from land disturbance activities that are subject to an Order of Conditions issued by the Conservation Commission under the Wetlands Protection Act;

2. An agricultural activity which is in compliance with an approved soil conservation plan prepared or approved by the United States Natural Resource Conservation Service;

3. Logging which is in compliance with a timber management plan approved under the Forest Cutting Practices Act by Massachusetts Department of Conservation and Recreation;

4. Activities that do not disturb more than one acre (43,560 square feet) of land;

5. Construction of municipal utilities;

6. In-kind repairs to a Stormwater treatment system deemed necessary by the East Longmeadow Board of Public Works or Department of Public Works; and

7. An emergency activity that is immediately necessary for the protection of life, property or the environment, as determined by the Board of Public Works or the Department of Public Works.

1.5 Amendments

These Rules and Regulations or any portion thereof may be amended from time to time in accordance with the General Bylaws Section 4.090 (B) and Section 8.070.030.

The Application for Stormwater Management Permit shall be governed by the Stormwater Rules and Regulations in effect at the time of submission of such application.

1.6 Coordination with Municipal Departments and Other Agencies

Compliance with these Rules and Regulations does not preclude the need to comply with other local, state and federal regulations.

1.7 Effective Date

These regulations become effective after approval by the Board of Public Works and publication.

Section 2
Definitions

As used in these Rules and Regulations, the following terms shall mean:

Adverse Impact: Harmful 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.

Applicant - A Person, as hereinafter defined, who applies for the approval of a plan of a Paper Street Development. Applicant shall include an owner, his/her agent, representative or assigns.

Best Management Practices (BMP): Structural or biological devices that temporarily store or treat Stormwater Runoff to reduce flooding, remove Pollutants, and provide other amenities. They can also be nonstructural practices that reduce Pollutants at their source. Examples of BMPs are described in the Massachusetts Department of Environmental Protection's (MassDEP) stormwater design manual: Stormwater Management Handbook, Volume 2: Chapter 2: Structural BMP Specifications for the Massachusetts Stormwater Handbook (February 2008, MassDEP, as updated or amended).

Board of Public Works: The permitting and enforcement agency.

Construction Activity: Disturbance of the ground by removal of surface cover, grading, excavation, clearing or filling.

Design Storm: A rainfall event of specified size and return frequency that is used to calculate the Runoff volume and Peak Discharge rate to a BMP.

Detention: The temporary storage of Stormwater Runoff in a BMP, which is used to control the Peak Discharge rates, and which provides gravity settling of Pollutants.

Discharge of Pollutants: The addition of a Pollutant or combination of Pollutants into a Municipal Separate Storm Sewer System (MS4) or into the Waters of the Commonwealth from any source.

Drainage Area: That area contributing Runoff to a single point measured in a horizontal plane, which is enclosed by a Ridgeline.

Groundwater: Water beneath the surface of the ground.

Illicit Discharge: Direct or indirect Non-Stormwater Discharge to an MS4, except as specifically exempted in Illicit Stormwater Section 8.07.100. (D). The term does not include a discharge in compliance with a National Pollutant Discharge and Elimination System (NPDES) Stormwater discharge permit or resulting from fire fighting or other municipal activities, not including Construction Activities.

Illicit Connection: Surface or subsurface drain or conveyance, which allows an Illicit Discharge into an MS4. Illicit Connections include conveyances which allow a Non-Stormwater Discharge to an MS4 including sewage, process Wastewater or wash water and 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.

Impervious Surfaces: Material or structure on or above the ground that prevents water infiltrating the underlying soil. Impervious Surfaces include paved roads, paved parking lots, sidewalks, and rooftops.

Infiltration: The downward movement of water from the surface to the subsoil.

Municipal Separate Storm Sewer System (MS4): The system of conveyances designed or used for collecting or conveying Stormwater, including road or street with a drainage system, gutter, curb, inlet, piped storm drain, pumping facility, Retention or Detention basin, drain channel, reservoir, and other drainage owned or operated by the Town of East Longmeadow.

National Pollutant Discharge Elimination System (NPDES) Stormwater discharge permit: A permit issued by the United States Environmental Protection Agency or jointly with the state that authorizes the Discharge of Pollutants to waters of the United States.

Non-Stormwater Discharges: Discharge to the MS4 not composed entirely of stormwater.

Outfall: The part of a storm drain or other Stormwater structure where the contents are released.

Peak Discharge: The maximum rate of flow during a storm.

Permeable Soils: Soil materials with a sufficiently rapid Infiltration rate so as to greatly reduce or eliminate surface and Stormwater Runoff.

Person: An individual, group of individuals, association, partnership, corporation, company, business, organization, trust, estate, administrative agency, public or quasi-public entity, the commonwealth or political subdivision thereof or the federal government, to the extent permitted by law and an officer, employee or agent of such Person.

Pollutant: Any element or property of sewage, agricultural, industrial, commercial or residential waste, Runoff, leachate, heated effluent, or other matter whether originating at a point or nonpoint source, that is introduced into the MS4 or Waters of the Commonwealth. Pollutants shall include, but not be limited to: dredged spoil, solid waste, filter backwash, sewage, garbage, sewage sludge, munitions, chemical wastes, biological materials, radioactive materials, hot fluids, wrecked or discarded equipment, rock, sand, and industrial, municipal, agricultural and residential waste discharged into water.

Recharge: The process by which Groundwater is replenished by precipitation through the percolation of Runoff and surface water through the soil.

Retention: The holding of Runoff in a basin without release except by means of evaporation, Infiltration, or emergency bypass.

Ridgeline: The maximum elevation that connects the upper boundary of a watershed.

Runoff: Rainfall, snowmelt, or irrigation water flowing over the ground surface.

Stormwater: Runoff from precipitation or snow melt.

Stormwater Management Facility: A structural Stormwater management measure, including Stormwater management basins and filtration or other treatment systems.

Swale: A depression or wide shallow ditch used to temporarily store, route, or filter Runoff.

Uncontaminated Water: Water containing no Pollutants.

Uncontaminated Groundwater: Groundwater containing no Pollutants.

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: Sanitary waste or sludge and water used during manufacturing, cleaning or processing of materials that enter the MS4 or waters of the Commonwealth.

Section 3
Permit Application Submission

3.1 Administrative Procedures and Requirements

Unless exempt under Section 1.4 of these Rules and Regulations, prior to disturbance of one or more acres (43,560+ square feet) of land, an Applicant shall file five (5) copies of a completed application package for a Stormwater Management Permit to the Department of Public Works. The Stormwater Management Application shall consist of the following:

1. A properly executed Application Form signed by the Applicant and all other owners of record, and providing all information requested. See Application Form in Appendix A.

2. A Stormwater Management and Erosion Control Plan, which shall be prepared and signed by a professional engineer licensed by the Commonwealth and which shall contain sufficient information to describe the nature and purpose of the proposed development. The plan, with contents as described in Section 3.3, shall serve as the basis for subsequent construction.

3. Supporting computations, drawings, and sufficient information describing the manner, location, and type of measures in which Stormwater Runoff shall be managed for the entire development.

4. Ongoing maintenance agreement.

5. A list of requested waivers, if applicable. Such a request shall be accompanied by an explanation or documentation supporting the waiver request and demonstrate that strict compliance with the Bylaw or Rules and Regulations is not necessary to meet the purposes or objectives of the bylaw.

6. A non-refundable application fee, payable to the Town of East Longmeadow, in the amount calculated as follows:

Project Type	**Permit Review and Inspection Fee**
Minor Project – Single or Multifamily Residential	$100
Minor Project – Commercial or Residential Subdivision (less than 5 acre disturbed)	$500
Major Project – Commercial or Residential Subdivision (greater than 5 acre disturbed)	$500 + $100 per acre above 5 acres

If, in the judgment of the Department of Public Works, consulting services are necessary or appropriate, the Applicant shall, prior to a determination on an application, deposit with the Town, an amount determined by the Department of Public Works to be sufficient to cover the full costs of such services. All such consultants shall be selected by the Department of Public Works and paid out of said deposit. The Town will reimburse the Applicant for any credits remaining after a consultant has been paid within thirty (30) days of said payment. In the event the deposit is insufficient to cover consultant services, the outstanding balance is to be paid by the Applicant pursuant to procedures

outlined in paragraphs 5.1 of these Rules and Regulations within 30 days of receipt of invoice for the outstanding balance.

3.2 Waivers

The Board of Public Works may waive strict compliance with any requirement of these rules and regulations upon written findings of fact setting forth the basis for the waiver by the Board of Public Works or the Department of Public Works. Any request for a waiver shall be made in writing at the time of the application.

3.3 Stormwater Management and Erosion Control Plan Contents

The Stormwater Management and Erosion Control Plan shall be prepared and signed by a professional engineer licensed by the Commonwealth which meets the design requirements provided by this by-law. 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 4.2, and the erosion and sediment control performance standards in Section 4.3, and the Stormwater Management Handbook (February 2008, MassDEP, as updated or amended). 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 and Erosion Control Plan shall be as follows:

1. A project narrative including a brief description of the project, amount and type of existing and proposed Impervious Surfaces, and how and where Stormwater will be controlled,
2. A locus map,
3. The existing zoning, and land use at the site,
4. The proposed land use,
5. The location(s) of existing and proposed easements,
6. The location of existing and proposed utilities,
7. The site's existing and proposed topography with contours at two-foot intervals,
8. The existing site hydrology,
9. A description and delineation of existing Stormwater conveyances, impoundments, and wetlands on or adjacent to the site or into which storm water flows,
10. A delineation of 100-year flood plains, if applicable,
11. Estimated seasonal high Groundwater elevation (November to April) in areas to be used for Stormwater Retention, Detention, or Infiltration,
12. The existing and proposed vegetation and ground surfaces with Runoff coefficient for each,
13. A Drainage Area map showing pre and postconstruction watershed boundaries, Drainage Area and storm water flow paths,
14. A description and drawings of the components of the proposed drainage system including:

a. Locations, cross sections, and profiles of brooks, streams, drainage Swales and their method of stabilization,

b. All measures for the Detention, Retention or Infiltration of water,

c. All measures for the protection of water quality,

d. The structural details for all components of the proposed drainage systems and storm water management facilities,

e. Notes on drawings specifying materials to be used, construction specifications, and typicals,

14. Expected hydrology with supporting calculations,

15. Proposed improvements including location of buildings or other structures, Impervious Surfaces, and drainage facilities, if applicable,

16. Location and details of erosion and sediment control measures with a narrative of the construction sequence/phasing of the project, including both operation and maintenance for structural and non-structural measures, clearing, stripping, interim grading, construction, final grading, material stockpiling areas and vegetative stabilization,

17. 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 Stormwater, and spill prevention and response,

18. Location and description of and implementation schedule for temporary and permanent seeding, vegetative controls, and other stabilization measures, and

19. A maintenance schedule for the period of construction.

3.4 Performance Guarantee

The Applicant shall file performance guarantee in the form of a cash bond prior to the submittal of a building permit application for the construction of a development requiring a Stormwater Management Facility. A performance guarantee for the project under the Subdivision Control Law will meet this criterion. 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 by-law 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 Department of Public Works, submission of "as-built" plans, and certification of completion by the authorized permitting agency of the Stormwater Management Facilities being in compliance with the approved plan and the provisions of this by-law.

3.5 Review Procedures

Review of Applications for Stormwater Management Permits shall follow the procedures provided below.

1. A Stormwater Management and Erosion Control Plan (or an application for waiver) shall be submitted to the Department of Public Works for review and approval. Five (5) clearly labeled copies of the Stormwater Management Plan shall be submitted.

2. The Department of Public Works shall have seven days from the receipt of the application to review the application for administrative completeness. If found incomplete, it shall be returned by First Class Mail to the Applicant within 10 (ten) business days of filing, with written notice of the deficiencies.
3. The Department of Public Works as authorized permitting agency shall distribute copies of the Stormwater Management Permit application to the Planning Department and the Conservation Commission for review, as deemed appropriate, and shall consider comments submitted by said departments during the review period.
4. The Department of Public Works shall take final action within 28 days of the determination the application is a complete application unless such time is extended by agreement between the Applicant and the Department of Public Works.
5. The authorized permitting agency must find that the Stormwater Management and Erosion Control Plan submitted with the permit application meets the following criteria:
   a. The Stormwater Management and Erosion Control Plan is consistent with the purposes and objectives of these Rules and Regulations;
   b. The Stormwater Management and Erosion Control Plan meets the performance standards described in Section 4.
6. The authorized permitting agency'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 1.2 and the standards in Section 4 of these rules and regulations, and shall 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 conditions, modifications or restrictions required by the Board of Public Works which shall ensure that the project meets the purposes in Section 1.2 and the standards in Section 4 of these rules and regulations, 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 1.2 and the standards in Sections 4 or adequately protect water resources, as set forth in these rules and regulations.
   d. If the Department of Public Works modifies or disapproves such a plan, it shall state in writing its reasons for its action and shall rescind such disapproval when the plan has been amended to conform to the Rules and Regulations of the Department of Public Works
7. Failure of the authorized permitting agency to take final action upon an application within the time specified above shall be deemed to be an approval of said application.

3.6 Plan Changes

The Applicant must notify the Department of Public Works in writing of any changes in the project authorized in a Stormwater Management Permit before any change or

alteration is made. The Department of Public Works may approve changes, or if the DPW determines that the change or alteration is significant, based on the Stormwater Management requirements of these Rules and Regulations and accepted construction practices, the DPW may require that an amended Application be filed and reviewed. If any change or alteration from the Stormwater Management Permit occurs during construction activities, the DPW may require the installation of interim measures before approving the change or alteration.

3.7 Permit Extensions

A Stormwater Management Permit shall be valid for three years from the date the permit is issued, except that compliance with the Operation and Maintenance Plan shall be a continuing and ongoing requirement. The Department of Public Works may grant extensions for additional time upon written request submitted no later than 30 days prior to the extension of the permit.

Section 4
Performance Standards and Design Requirements

4.1 Basic Requirements

The basic design criteria methodologies and construction specifications, subject to the review and approval of the Department of Public Works, shall be consistent with those generally found in the most current edition of the Stormwater Management Handbook, Volume 2: Chapter 2: Structural BMP Specifications for the Massachusetts Stormwater Handbook (February 2008, MassDEP, as updated or amended), unless the Department's regulations modify or alter said methodologies or specifications.

4.2 Stormwater Management Performance Standards

Projects that require a Stormwater Management Permit must meet the standards of the Massachusetts Stormwater Management Policy. These standards are:

1. No new Stormwater conveyances (e.g. Outfalls) shall discharge untreated Stormwater directly to or cause erosion in wetlands or Water of the Commonwealth.
2. Stormwater Management Facilities must be designed so that post-development Peak Discharge rates do not exceed predevelopment Peak Discharge rates.
3. 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 predevelopment or existing site conditions, based on soil types.
4. For new development, Stormwater Management Facilities must be designed to remove 80 percent of the average annual load (post development conditions) of total suspended solids (TSS). It is presumed that this standard is met when:
   a. Suitable nonstructural practices for source control and pollution prevention are implemented;
   b. Stormwater management Best Management Practices (BMPs) are sized to capture the prescribed Runoff volume; and
   c. Stormwater management BMPs are maintained as designed.
5. Stormwater discharges from areas with higher potential Pollutant loads require the use of specific Stormwater management BMPs (see Stormwater Management Handbook, February 2008, MassDEP, as updated or amended). The use of Infiltration practices without pretreatment is prohibited.
6. Stormwater discharges to critical areas must utilize certain Stormwater management BMPs approved for critical areas (see Stormwater Management Handbook, February 2008, MassDEP, as updated or amended). Critical areas are outstanding resource waters (ORWs), cold-water fisheries, vernal pools and Recharge areas for public water supplies.
7. Redevelopment of previously developed sites must meet the Stormwater management standards to the maximum extent practicable, as determined by the Board of Public Works. However, if it is not practicable to meet all the standards,

new (retrofitted or expanded) Stormwater Management Facilities must be designed to improve existing conditions.

8. Erosion and sediment controls must be implemented to prevent impacts during disturbance and construction activities.
9. All Stormwater Management Facilities must have an operation and maintenance plan to ensure that systems function as designed. The operation and maintenance plan must be implemented for the life of the system.
10. All Illicit Discharges to the Stormwater Management Facilities are prohibited.

When the proposed discharge may have an impact upon a sensitive receptor, including streams, wetlands, vernal pools, and/or storm sewers, the authorized permitting agency may require an increase in these minimum requirements, based on existing Stormwater Management Facility capacity.

4.3 Erosion and Sediment Control Performance Standards

The erosion and sediment control plan should be designed to meet the following performance standards:

1. Minimize total area of disturbance.
2. Sequence activities to minimize simultaneous areas of disturbance.
3. Minimize peak rate of Runoff in accordance with the MassDEP Stormwater Policy.
4. Minimize soil erosion and control sedimentation during construction. Prevention of erosion is preferred over sedimentation control.
5. Divert Uncontaminated Water around disturbed areas.
6. Maximize Groundwater Recharge.
7. Install and maintain all erosion and sediment control measures in accordance with the manufacturers' specifications and good engineering practices
8. Prevent off-site transport of sediment.
9. Protect and manage on- and off-site material storage areas (overburden and stockpiles of dirt, borrow areas, or other areas used solely by the permitted project are considered a part of the project).
10. Comply with applicable federal, state and local laws and regulations including waste disposal, sanitary sewer or septic system regulations, and air quality requirements, including dust control.
11. Prevent Adverse Impact from the proposed activities to habitats mapped by the Massachusetts Natural Heritage and Endangered Species Program as estimated habitats of rare wildlife and certified vernal pools, and priority habitats of rare species.
12. 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.
13. Properly manage on-site construction and waste materials.
14. Prevent off-site vehicle tracking of sediments.

Section 5
Inspections, Operation and Maintenance

5.1 Basic Requirements

Inspection shall be carried out at appropriate times during the development of the Stormwater Management Facility as described in Section 5.2. The Applicant shall notify the Town Engineer/Superintendent of Public Works or his/her designee, at least 48 hours before carrying out each operation to be inspected.

The Town Engineer/Superintendent of Public Works or his/her designee may make arrangements with consultants to carry out such inspections and/or provide consulting services with regard to the project, on behalf of the Town.

The costs of inspection shall be born by the Applicant and paid to the Town of East Longmeadow by certified check or money order within thirty (30) business days of the inspection. Inspection costs shall include but not be limited to: on-site inspections, "portal-to-portal" travel, off-site analysis of plans, water testing, and soil testing. In the case of consultant services, a deposit shall be made to the Town as described in Section 3.1.

Failure to pay for such services as referenced above within thirty (30) days following the mailing of an invoice shall be sufficient grounds for the Department of Public Works to deny a plan or rescind its approval of a Stormwater Management Permit.

The Applicant has the responsibility to ensure that the approved construction plans are implemented. Use of qualified Persons to furnish adequate and timely engineering supervision during construction is required. Surveillance and field revisions by Town officials or consultants appointed by the Department of Public Works cannot be construed as fulfilling this responsibility.

A cash deposit shall be required and shall be used by the Town to pay for any additional consultants which it finds necessary to hire in order to carry out an effective review of the proposed improvements.

Failure to comply with the inspection procedure may necessitate removal of improvements at the expense of the Applicant or rescission of the permit.

5.2 Inspections of Improvements

Filing an application for a permit grants the Department of Public Works, or its agent, permission to enter the site to verify the information in the application and to inspect for compliance with the resulting permit. Inspections during the work shall be arranged with the Department of Public Works prior to starting construction. The Department of Public Works will provide the Applicant with a checklist covering these inspections and the Department of Public Works will sign this checklist after satisfactory completion of each step by the Applicant. Inspections shall be requested at least 48 hours in advance of each inspection by notice to the Town's inspector. See Appendix B for the Stormwater Management Inspection Checklist. The Applicant shall arrange for scheduling the following inspections:

Initial inspection. Prior to approval of a plan

Erosion control inspections. After erosion control installation, site clearing, rough grading and final grading to ensure erosion control practices are in accordance with the plan.

Bury inspection. Prior to backfilling of underground drainage or Stormwater conveyance structures;

Final inspection. When all site work, including construction of Stormwater Management Facilities and landscaping have been completed.

The Department of Public Works or its 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 shall be subject to the penalty provisions of Section 6.3. The town may conduct random inspections to ensure effective control of erosion and sedimentation during all phases of construction, when it has a reasonable basis to believe that a violation of this by-law is occurring or has occurred, and to enter when necessary for abatement of a public nuisance or correction of a violation of this by-law.

5.3 Post-Construction and Operation and Maintenance

Prior to issuance of a building permit for a site on which Stormwater management is required, the authorized permitting agency 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. The agreement shall include:

1. *Names of land owners.* The name(s) of the land owner(s) for all components of the system.
2. *Maintenance agreements.* 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 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.*

Section 6
Enforcement and Penalties

6.1 Violations

The Department of Public Works agent or employee having actual knowledge or information of a violation of these rules and regulations that he is responsible for enforcing may, as an alternative to seeking a criminal penalty for violation of this by-law, give the offender a ticket in a form in compliance with the requirements of and in the manner established in G.L. c. 40, §21D and Section 8.130 of the East Longmeadow General By-laws.

The Department of Public Works or its agent may enter onto a Person's land to inspect any work performed under a permit issued pursuant to these rules and regulations or to determine if such property is in violation of these rules and regulations if it has a good faith basis to believe an activity requiring a permit is being performed on the property without such a permit.

The Board of Public Works may, for cause shown, suspend or terminate a Person's connection to the MS4 and any permit issued pursuant to this by-law.

6.2 Stop Work Orders

Notice of the intent to suspend or terminate a Person's connection to the MS4 or a permit shall be given in writing to the owner of the property and the permit holder, if different, by delivering via hand delivery or certified mail, to the owner to the address listed for taxation purposes in the Assessor's Office, and the permit holder at the address listed in the application. A copy of the notice of hearing shall be delivered at least ten (10) business days before said hearing date and shall, in addition, be mailed by 1st class mail, postage prepaid at least fourteen (14) days before said hearing.

The notice shall contain the:

1. Name and address of the owner of the property;
2. The name and address of the permit holder if different than the owner;
3. The action contemplated;
4. Statement of violations believed to exist; and
5. A statement that the owner and permit holder may present evidence regarding alleged violations.

If the Board of Public Works or its designee determines in writing that the public health, safety or welfare requires immediate action, it may suspend or terminate MS4 service and any permit immediately. However, in such a case, notice as set forth above, shall be delivered and mailed to the owner and permit holder, if different, informing them that they have fifteen (15) days from the date of the suspension or termination to appeal said action of the Board of Public Works.

6.3 Penalties

The Penalty for each violation of this Stormwater management portion of the rules and regulations adopted hereunder shall be $200.00 and each day or part thereof shall constitute a separate violation.

The Board of Public Works, in addition to issuing said tickets, may enforce the provisions of this by-law by injunctive relief if it determines that the health, safety or welfare of any resident or member of the public or that the well being of the community is or will be endangered by the violation(s).

Any permit issued pursuant to these rules and regulations shall contain language requiring the Applicant to pay any and all costs, including attorney fees and expert witness fees, incurred by the town in seeking court action regarding the enforcement of this by-law and the rules and regulations adopted hereunder.

6.4 Restoration of Lands

A 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 East Longmeadow Board of Public Works shall take necessary corrective action, the cost of which shall become a lien upon the property until paid.

6.5 Holds on Occupancy Permits

Occupancy permits will not be granted unless corrections to all Stormwater management practices have been made and accepted by the Department of Pubic Works.

6.6 Severability

The invalidity of any section or provision of this section shall not invalidate any other section or provision thereof.

Appendix B

Storm System Mapping

Stormwater System
EAST LONGMEADOW, MA

11/16/2018

Catch Basin	Drain Line	Waterbodies
Undigitized Catch Basin	East Longmeadow Border	Roadway ROW
Drain Manholes	Grid Index	Structures
Outfalls	Town Borders	

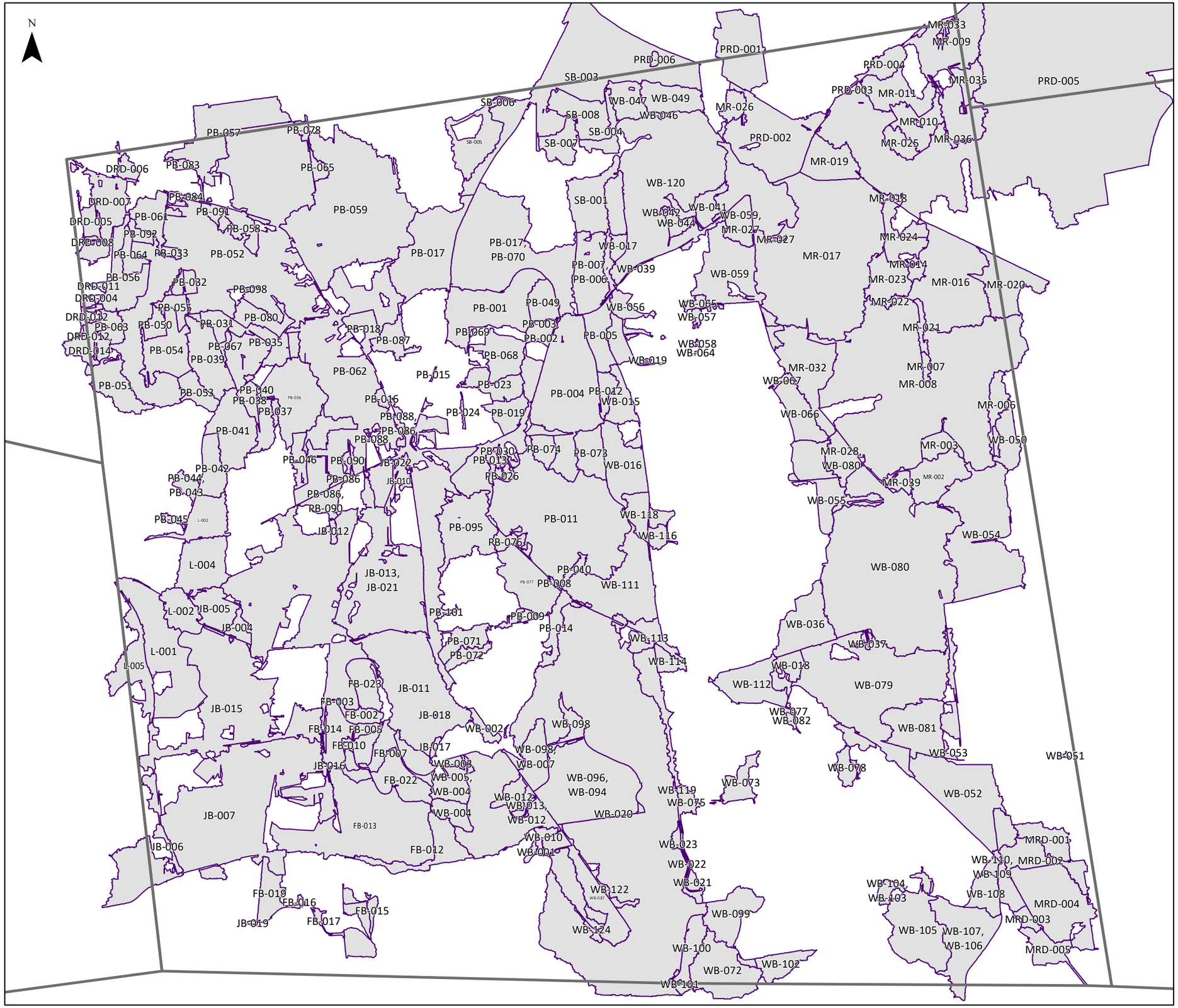
The information depicted on this map is for planning purposes only. It is not adequate for legal boundary definition, regulatory interpretation, or parcel-level analysis. Please use this information as a guide and confirm all locations before instituting any plan or policy.

These data are not suitable for engineering applications or site work nor can the data be used to determine absolute delineation. Instead, the data should be used to portray zones of uncertainty and possible risks.

Map created by East Longmeadow IT Department

ABBEY	H4	CORNING	D1	HIGH	F4	MORNINGSIDE	B1
ACORN	C2	COSGROVE	C3	HIGH MEADOW	H5	MOUNTAINVIEW	D6
ADMIRAL	C1	COUNTRY CLUB	J7	HIGH PINE	D8	MURRAY	D4
AINSLIE	J10	CRANE	E3	HIGHLANDVIEW	D2	NELSON	C1
ALANDALE	G2	CRESCENT HILL	F4	HIGHMORE	E6	NEPTUNE	D3
ALBANO	B5	CRESTVIEW	J7	HILLSIDE	D6	NEWBURY	D3
ALLEN	B8	CROSS	C1	HOLLAND	B9	NIAGARA	C1
ALLEN CREST	C9	DALE	C2	HOLLY	G2	NORDEN	F2
ALPINE	D3	DARTMOUTH	I4	HOLY CROSS	C1	NORTH	C3
ALTACREST	C1	DAWES	B4	HOME	C2	NOTTINGHAM	E9
ALVIN	C3	DAY	C4	HUNTING	C9	OAK	E2
AMALFI	J6	DEARBORN	B3	INDIAN SPRING	E5	OAK BLUFF	C5
AMARETTA	B1	DECELLES	B1	INDIANA	C3	OAK BROOK	A4
AMY	D8	DEER PARK	J3	INDUSTRIAL	H2	OAKWOOD	B4
ANGEL	B5	DEER RUN	H8	INWARD COMMONS*	F4	ODION	B1
ANGELA	F9	DEERFOOT	B9	JAMES	D2	OLD FARM	H6
ANNA MARIE	G8	DELL	D4	JAQUES	F4	OLD PASTURE	H5
ANNE	C3	DENSLOW	I2	JEFFERY	F5	ORANGE	C1
ANTHONY	B2	DEVONSHIRE	I5	JENNIFER	H1	ORCHARD	A6
APPLE BLOSSOM	B7	DEWEY	D3	JOHN	C3	ORPHEUM	B2
ARCH	D3	DONALD	D2	JUDY	A5	OVERBROOK	D6
ASH	D3	DONAMOR	E3	JUNIPER	A8	OVERLOOK	F9
ATHENS	C1	DORSET	B1	KELSEY	C1	OXFORD	F9
AUBURN	B3	EDGEWOOD	B5	KENNETH LUNDEN	F9	PALM	D2
AUTUMN RIDGE	I5	EDMUND	E3	KENSINGTON	C1	PANAMA	D3
AVERY	D1	EDWILL	F8	KIBBE	E6	PARK	E4
BALDWIN	E3	ELIZABETH	C3	KINGMAN	D1	PARKER	E8
BALMORAL	E9	ELM	C4	KINGSTON	C2	PATIENCE	F6
BARNUM	B1	ERICKA	B6	KNOLLWOOD	F3	PATTERSON	D2
BARRIE	F2	EUCLID	C1	KRONVALL	E2	PEACHTREE	D8
BARTLETT	D2	EVERGREEN	A9	LANTERN	D9	PEASE	I6
BAYMOR	E3	FAIRHAVEN	F2	LARK	E2	PECOUSIC	D1
BAYNE	E3	FAIRVIEW	C3	LASALLE	C3	PEMBROKE	H4
BELLA VISTA	I5	FAVORITE	I6	LAURENCE	G1	PHYLLIS	B5
BEND	H7	FEATHER REED*	G2	LAWSON	F4	PILGRIM	C7
BENJAMIN	B2	FENWAY	A7	LEE	H6	PINE	C1
BENT TREE	F8	FERN	D2	LEGION	E3	PINE GROVE	A6
BENTON	H1	FERN GLEN	D7	LENOX	C8	PINEHURST*	J9
BETTERLEY	G4	FERNWOOD	E8	LEO	E4	PINEYWOODS	I10
BETTSWOOD	H8	FIELD	D4	LESSARD	F2	PIONEER	D9
BIRCH	C2	FIELDS*	G2	LESTER	D3	PLEASANT	D5
BIRCHLAND	E5	FIFTH	E3	LEWIS	F4	PONDVIEW	B6
BLACK DOG	E6	FIRST	D3	LINDEN	D3	POPLAR	E4
BLUEGRASS*	G2	FISHER	D3	LINDENDALE	D2	PORTER	B7
BOND	F4	FLOWER	B3	LOMBARD	C1	POWDER HILL	E2
BOULDER	D1	FORBES HILL	J10	LONDERGAN	B1	PRINCETON	C1
BRAEBURN	C1	FOREST HILLS	A7	LONGVIEW	D9	PROSPECT	H5
BREEZY KNOLL	C5	FOX HEDGE	A9	LORI	F2	PROSPECT HILLS	H5
BRIER	I10	FRANCONIA	D1	LULL	C1	PURVES	C3
BROADLEAF*	G2	FRANKWYN	D4	LYNWOOD	A5	PUTTING GREEN	D1
BROOK	D4	FRASER	G8	LYRIC	C1	QUARRY HILL*	F5
BROOKHAVEN	A9	GARLAND	D1	MAIN	C2	RAMONA'S	D7
BRYNMAWR	I10	GASKELL	D3	MAPLE	F3	RANKIN	E4
BUNKER	D1	GATES	B3	MAPLEHURST	D2	REDIN	I4
BURT	F2	GERRARD	C1	MAPLESHADE	C4	REDSTONE	B4
CALKINS	D3	GLEN HEATHER	I10	MARCI	D8	REVERE	B4
CALLENDER	E4	GLENDALE	E3	MARDON	C3	RIDGE	C6
CANTERURY	G3	GLYNN FARMS	E6	MARKHAM	B8	RIDGEWOOD	J7
CAPRI	J5	GRANBY	B1	MARSHALL	F2	ROBIN	D2
CARA	A5	GREEN	C3	MARYLAND	B3	ROCKINGHAM	H4
CARVILL	F4	GREENACRE	D4	MAYFAIR	B3	RODERICK	B1
CEDAR HILL	D3	GREENWICH	B7	MAYFLOWER	D7	ROGERS	E2
CENTER SQUARE	E4	GROVE	D3	MAYNARD	B4	ROLLING MEADOWS	G9
CENTRAL	E4	HALON TR	J3	MEADOW	C5	ROLLINS	E8
CHADWYCK	A9	HAMLET	C1	MEADOWBROOK	H9	ROSE	A7
CHANNING	C1	HAMPDEN	G8	MEADOWLARK	J7	ROSEMONT	B1
CHATHAM	F6	HANWARD HILL	D4	MELODY	C4	RUFFINO	J6
CHESTNUT	G3	HARKNESS	B2	MELROSE	D2	RURAL	C7
CIRCLE	B6	HARMON	B2	MELVIN	B2	RUSKIN	D3
CLARESIDE	F9	HARRIS	G1	MELWOOD	E2	RYE*	G2
CLIFF	D3	HARVEST	D9	MERELINE	C1	S BROOK	J6
COBBLESTONE	G5	HARWICH	B4	MERRIAM	D4	SANFORD	F9
COLONY	C6	HAZELHURST	B2	MICHEL	G6	SAUGUS	D2
CONANT	D3	HEATHERSTONE	E5	MILES	D3	SAVOY	F2
CONCORD	A5	HEDGEROW	B3	MILL	H10	SCANTIC	J10
CONE	D3	HELEN	C3	MILLBROOK	C9	SCHOOL	E4
CONVERSE	C3	HERITAGE	C6	MOORE	D2	SCHUYLER	G1
COOLEY	D1	HICKORY	B3	MORELAND	B1	SECOND	E3

SENATOR	F9	SILVER FOX	G8
SENECAL	B7	SKYLINE	C8
SHAKER	H3	SLUMBER	A8
SHAW	C3	SMITH	D2
SHAWMUT	B3	SOMERS	H7
SHELBY	G8	SOMERSET	B3
SHERWOOD	E9	SOMERSVILLE	J9
SILVER FOX	G8	SPEIGHT ARDEN	D4
SKYLINE	C8	SPRING VALLEY	E5
SLUMBER	A8	SPRUCE	F4
SMITH	D2	SQUIRE	H8
SOMERS	H7	ST. JOSEPH	F5
SOMERSET	B3	STONEHILL	F8
SOMERSVILLE	J9	STURBRIDGE	F6
SPEIGHT ARDEN	D4	SUMMERFIELD	B1
SPRING VALLEY	E5	SUSAN	F2
SPRUCE	F4	SUTTON	B9
SQUIRE	H8	TAMARAK	A9
ST. JOSEPH	F5	TANGLEWOOD	C8
STONEHILL	F8	TAYLOR	E4
STURBRIDGE	F6	TERRACE	D3
SUMMERFIELD	B1	TERRY	F8
SUSAN	F2	THERESA	B5
SUTTON	B9	THOMPKINS	B3
TAMARAK	A9	THOMPSON	B1
TANGLEWOOD	C8	TIMBER	F8
TAYLOR	E4	TOWN VIEW	D1
TERRACE	D3	TRACEY	G4
TERRY	F8	TRINADAD	B3
THERESA	B5	TUFTS	C1
THOMPKINS	B3	TURNER	B1
THOMPSON	B1	Un-Named	B5
TIMBER	F8	VADNAIS	C4
TOWN VIEW	D1	VAN DYKE	B1
TRACEY	G4	VERANDA	D3
TRINADAD	B3	VILLAGE	C6
TUFTS	C1	VILLANOVA	D1
TURNER	B1	VINELAND	D2
Un-Named	B5	VIRGINIA	C4
VADNAIS	C4	VOYER	D2
VAN DYKE	B1	VREELAND	B2
VERANDA	D3	W ALLEN RIDGE	B2
VILLAGE	C6	WATERMAN	C2
VILLANOVA	D1	WELLINGTON	E9
VINELAND	D2	WENDOVER	F4
VIRGINIA	C4	WESTERN VIEW	F4
VOYER	D2	WESTMINSTER	B3
VREELAND	B2	WESTWOOD	E2
W ALLEN RIDGE	B2	WHITE	E4
WATERMAN	C2	WILDER	E5
WELLINGTON	E9	WILLIAM	E4
WENDOVER	F4	WINDHAM	E9
WESTERN VIEW	F4	WINDING BROOK	C9
WESTMINSTER	B3	WINDSOR	H3
WESTWOOD	E2	WINTERBERRY	A9
WHITE	E4	WISTERIA	G6
WILDER	E5	WOOD	C1
WILLIAM	E4	WOODBRIDGE	C9
WINDHAM	E9	WOODLAWN	F4
WINDING BROOK	C9	WORTHY	D1
WINDSOR	H3	WREN	C1
WINTERBERRY	A9	YETTO	B2
WISTERIA	G6	YORKSHIRE	H3
WOOD	C1	YOUNG	C2
WOODBRIDGE	C9		
WOODLAWN	F4		
WORTHY	D1		
WREN	C1		
YETTO	B2		
YORKSHIRE	H3		
YOUNG	C2		



EAST LONGMEADOW, MA

Preliminary Catchments

DPW

6/20/2019

Town Boundary

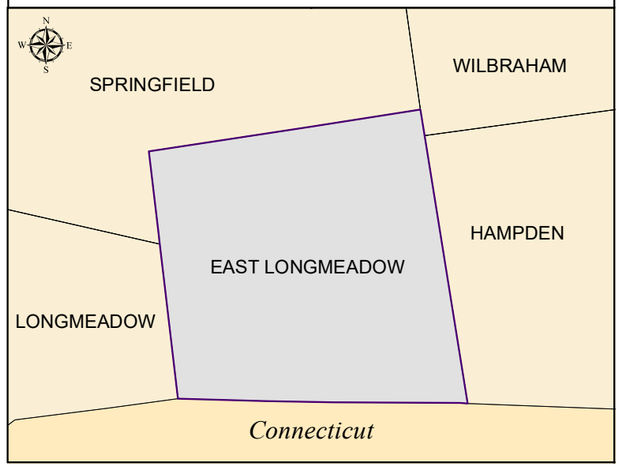
Catchments

The information depicted on this map is for planning purposes only. It is not adequate for legal boundary definition, regulatory interpretation, or parcel-level analysis. Please use this information as a guide and confirm all locations before instituting any plan or policy.

These data are not suitable for engineering applications or site work nor can the data be used to determine absolute delineation. Instead, the data should be used to portray zones of uncertainty and possible risks.

Map created by East Longmeadow IT Department
Orthophotography c/o MassGIS, ©Google

1 inch = 2,000 feet



Appendix C

Field Forms, Sample Bottle Labels, and Chain of Custody Forms

Outfall Water Quality Testing

Submitted By: Intern_EastLongmeadow

Submitted Time: Aug 2, 2018, 3:22:18 PM

Outfall_ID

WB-072

Subbasin_Abbr

WB

Date

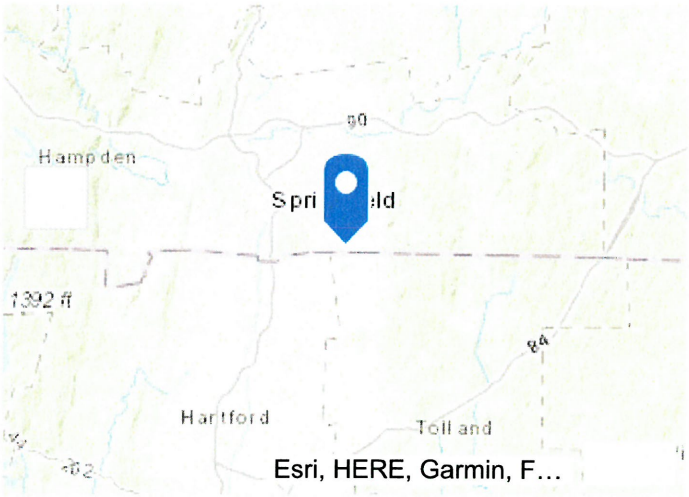
Aug 2, 2018

Time

15:18

Location

Lat: 42.03636 Lon: -72.48727



Inspector

cc ml

Rainfall Last 24 Hours

0

Rainfall Last 48 Hours

0

PipeSize

36

Pipe Material

RCP

Flow Description

Trickle

Flow Depth

0.2

Flow Width

6

Land Use In Area

Open Space

Odor Description

- **None**

Odor Severity

0 - None

Flow Color

- **Orange**

Flow Color Intensity

3 - Clearly Visible in Outfall Flow

Turbidity

2 - Cloudy

Floatables

- **Petroleum (Oil Sheen)**

Floatables Severity

0 - None

Outfall Damage

- **None**

Outfall Deposits and Stains

- **None**

Vegetation

- **Normal**

Pool Quality

- **Colors**
- **Excessive Algae**
- **Oil Sheen**

Pipe Henthic Growth

None

Ammonia (Nitrogen)

0.25

Chlorine

0.38

Conductivity

248

Salinity

0.28

Surfactants

0

Temperature

23.7

Photo

Photo-20180802-192204.jpg

con-test ANALYTICAL LABORATORY

http://www.contestlabs.com

Doc # 381 Rev 1_03242017

Phone: 413-525-2332
Fax: 413-525-6405
Email: info@contestlabs.com

CHAIN OF CUSTODY RECORD

39 Spruce Street
East Longmeadow, MA 01028

Requested Turnaround Time
7-Day ☐ 10-Day ☐
Due Date:

Rush-Approval Required
1-Day ☐ 3-Day ☐
2-Day ☐ 4-Day ☐

Data Delivery
Format: PDF ☐ EXCEL ☐
Other:
CLP Like Data Pkg Required: ☐
Email To:
Fax To #:

Company Name:
Address:
Phone:
Project Name:
Project Location:
Project Number:
Project Manager:
Con-Test Quote Name/Number:
Invoice Recipient:
Sampled By:

ANALYSIS REQUESTED

Con-Test Work Order#	Client Sample ID / Description	Beginning Date/Time	Ending Date/Time	Composite	Grab	[1]Matrix Code	Conc Code											# of Containers	[2] Preservation Code	[3] Container Code

Dissolved Metals Samples
○ Field Filtered
○ Lab to Filter

Orthophosphate Samples
○ Field Filtered
○ Lab to Filter

[1] **Matrix Codes:**
GW = Ground Water
WW = Waste Water
DW = Drinking Water
A = Air
S = Soil
SL = Sludge
SOL = Solid
O = Other (please define) _____

[2] **Preservation Codes:**
I = Iced
H = HCL
M = Methanol
N = Nitric Acid
S = Sulfuric Acid
B = Sodium Bisulfate
X = Sodium Hydroxide
T = Sodium Thiosulfate
O = Other (please define) _____

[3] **Container Codes:**
A = Amber Glass
G = Glass
P = Plastic
ST = Sterile
V = Vial
S = Summa Canister
T = Tedlar Bag
O = Other (please define) _____

Comments:

Please use the following codes to indicate possible sample concentration within the **Conc Code** column above:
H - High; M - Medium; L - Low; C - Clean; U - Unknown

Relinquished by: (signature)	Date/Time:	Detection Limit Requirements	Special Requirements
Received by: (signature)	Date/Time:	MA	☐ MA MCP Required
Relinquished by: (signature)	Date/Time:		MCP Certification Form Required
Received by: (signature)	Date/Time:		☐ CT RCP Required
Relinquished by: (signature)	Date/Time:	CT	RCP Certification Form Required
Received by: (signature)	Date/Time:		☐ MA State DW Required
		Other:	PWSID #

con-test ANALYTICAL LABORATORY
www.contestlabs.com
NELAC and AIHA-LAP, LLC Accredited

Project Entity
☐ Government ☐ Municipality ☐ MWRA ☐ WRTA
☐ Federal ☐ 21 J ☐ School
☐ City ☐ Brownfield ☐ MBTA

Other
☐ Chromatogram
☐ *AIHA-LAP,LLC*

PCB ONLY
☐ Soxhlet
☐ Non Soxhlet

SAMPLE ID.	PRESERVATIVE
ANALYSIS	DATE
	TIME
SITE NAME	con-test ANALYTICAL LABORATORY

SAMPLE ID.	PRESERVATIVE
ANALYSIS	DATE
	TIME
SITE NAME	con-test ANALYTICAL LABORATORY

SAMPLE ID.	PRESERVATIVE
ANALYSIS	DATE
	TIME
SITE NAME	con-test ANALYTICAL LABORATORY

SAMPLE ID.	PRESERVATIVE
ANALYSIS	DATE
	TIME
SITE NAME	con-test ANALYTICAL LABORATORY

Appendix D

Water Quality Analysis Instructions, User's Manuals and Standard Operating Procedures

Ammonia (Nitrogen) Test Strips, 0-6.0 mg/L

Product #:	**2755325**
USD Price:	$24.79
Available	

Suitable for both lab and field testing, Hach Test Strips are easy to use and easy to read. Ammonia (Nitrogen) is a product of microbiological decay of plant and animal protein. Its presence in raw surface waters usually indicates domestic or agricultural pollution. Above certain levels, it is toxic to fish. Contains 25 tests.

Easy to use, disposable, and inexpensive

A great way to obtain quick, quantitative answers in the field or in the lab

---

Specifications

Footnote:	*mg/L unless otherwise noted, ppb = µg/L, ppm = mg/L.; gpg = grains per gallon; 1 gpg = 17.1 mg/L or 17.1 ppm.
Model:	Test Strips
Number of tests:	25
Parameter:	Ammonia, Nitrogen, low range - As NH_3-N, For freshwater
Platform :	Test Strip
Range:	0 - 6 ppm
Ship Wt. (lbs):	0.25
Smallest Increment Steps:	Steps: 0, 0.25, 0.5, 1.0, 3.0, 6.0 ppm

Detergents Test Kit

DE-2 (143203)

DOC326.97.00058

Test preparation

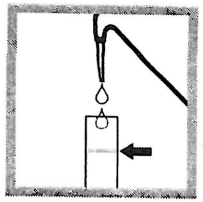
CAUTION:* ⚠ *Review the Safety Data Sheets (MSDS/SDS) for the chemicals that are used. Use the recommended personal protective equipment.

- Put the color disc on the center pin in the color comparator box (numbers to the front).
- Use sunlight or a lamp as a light source to find the color match with the color comparator box.
- Rinse the tubes with sample before the test. Rinse the tubes with deionized water after the test.
- If the color match is between two segments, use the value that is in the middle of the two segments.
- If the color disc becomes wet internally, pull apart the flat plastic sides to open the color disc. Remove the thin inner disc. Dry all parts with a soft cloth. Assemble when fully dry.
- Use the filtration procedure for samples that contain turbidity.
- If the test result is more than the maximum limit, dilute the sample as follows. Use the dropper to add 1 mL of sample to a tube. Dilute the sample to the 20-mL line with deionized water. Use the diluted sample in the test procedure. Multiply the value in the scale window by 20 to get the test result in mg/L.
- To use the included demineralizer bottle, fill the bottle with tap water and shake to mix. Use this water as deionized water in the test procedure. Fill the bottle again when empty. Replace the resin after the bottle is filled approximately 100 times.
- Dispose of reacted solutions according to local, state and federal regulations. Refer to the Safety Data Sheets for disposal information for unused reagents. Refer to the environmental, health and safety staff for your facility and/or local regulatory agencies for further disposal information.

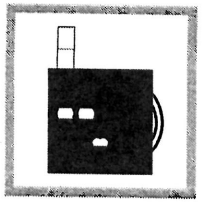
Replacement items

Description	Quantity	Item no.
Chloroform, ACS grade	500 mL	1445849
Detergents Reagent	100 mL MDB	105932
Wash Water Buffer Solution	500 mL	99949
Color comparator box	each	173200
Color disc, detergents, 0–1.2 mg/L	each	9265700
Demineralizer bottle, 177-mL capacity	each	1429900
Dropper, glass, 0.5- and 1.0-mL marks	5/pkg	1419705
Filter thimble	1	51200
Glass viewing tubes, 5-mL and 20-mL marks	6/pkg	173606
Glass wool	5 g	252074
Pipet bulb	1	178600
Stoppers for viewing tubes, No. 2 plastic	6/pkg	1448001
Test tube, 13 x 100 mm	10/pkg	56510
Transfer pipet	1	221800

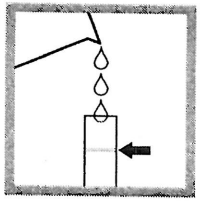
Test procedure—Detergents (0–1.2 mg/L as LAS (linear alkylate sulfonate) and/or ABS (alkyl benzene sulfonate)



1. Fill a tube to the top line (20 mL) with deionized water.

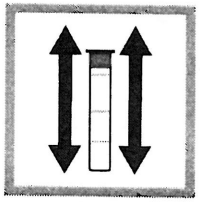


2. Put the tube into the left opening of the color comparator box.

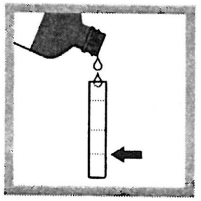


3. Fill a second tube to the top line (20 mL) with sample.

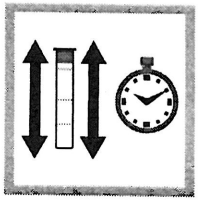
4. Add 12 drops of Detergents Reagent.



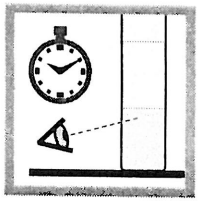
5. Put the stopper on the second tube. Shake to mix.



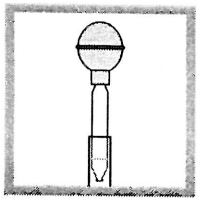
6. Add chloroform to the first line (5 mL). Chloroform is heavier than water and goes to the bottom of the tube.



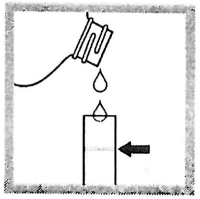
7. Put the stopper on the tube. Shake vigorously for 30 seconds.



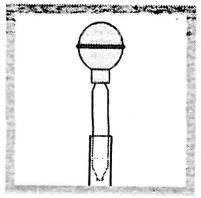
8. Do not touch the tube for 1 minute to let the chloroform separate from the sample.



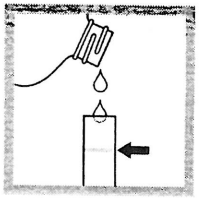
9. Use the transfer pipet to remove the top water layer from the tube. Discard the water.



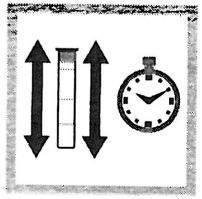
10. Add Wash Water Buffer Solution to the top mark (20 mL).



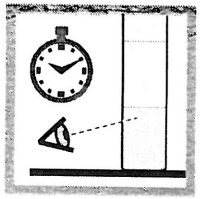
11. Use the transfer pipet to remove the Wash Water Buffer. Discard the buffer. This step removes the remaining water sample.



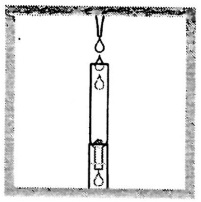
12. Add Wash Water Buffer to the top mark (20 mL).



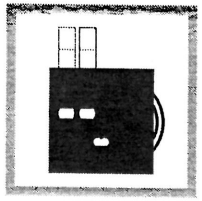
13. Put the stopper on the tube. Shake vigorously for 30 seconds.



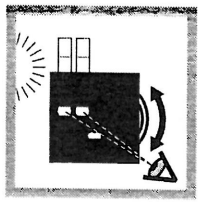
14. Do not touch the tube for 1 minute to let the chloroform separate.



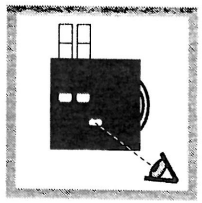
15. If the sample contains turbidity, complete the Filtration procedure for turbid samples on page 2.



16. Put the second tube into the color comparator box.



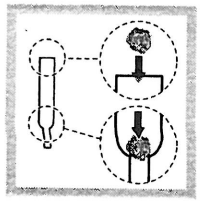
17. Hold the color comparator box in front of a light source. Turn the color disc to find the color match.



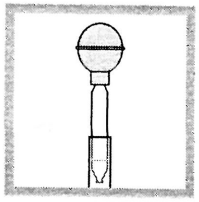
18. Read the result in mg/L in the scale window.

Filtration procedure for turbid samples

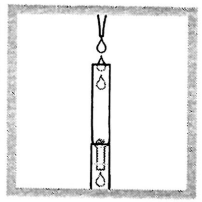
If the sample contains turbidity, pour the chloroform layer through a filter during the test procedure after step 15.



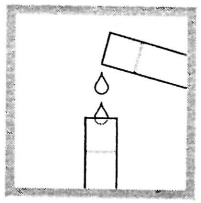
1. *Put a small ball* (the size of a large pea) of glass wool in the filter thimble.



2. Use the transfer pipet to remove the chloroform layer from the viewing tube.



3. Put the filter thimble on a clean test tube. Add the chloroform to the filter thimble.



4. Use the filtered chloroform to continue the test procedure after step 15.

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Chlorine Test Kit

CN-70 (1454200), CN-70F (1454201), CN-70T (1454202)

DOC326.98.00003

Test preparation

CAUTION: ⚠ ***Review the Safety Data Sheets (MSDS/SDS) for the chemicals that are used. Use the recommended personal protective equipment.***

NOTICE: This product has not been evaluated to test for chlorine and chloramines in medical applications in the United States.

- Analyze samples immediately after collection.
- Put the color disc on the center pin in the color comparator box (numbers to the front).
- Use sunlight or a lamp as a light source to find the color match with the color comparator box.
- Rinse the tubes with sample before the test. Rinse the tubes with deionized water after the test.
- If the color match is between two segments, use the value that is in the middle of the two segments.
- If the color disc becomes wet internally, pull apart the flat plastic sides to open the color disc. Remove the thin inner disc. Dry all parts with a soft cloth. Assemble when fully dry.
- The long-path adapter for the low range test shows the color in the tubes from top to bottom. Make sure the light source is above the tubes during the color match.
- Undissolved reagent does not have an effect on test accuracy.
- For free chlorine, read the result immediately after the reagent is added to prevent interference from monochloramine. If the sample contains 3.0 mg/L monochloramine, the free chlorine result increases each minute by 0.1 mg/L.
- If the low range test result is more than the maximum limit, use the mid range test procedure with a fresh sample.

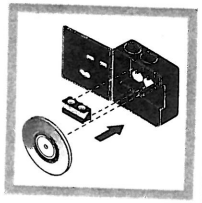
Replacement items

Description	Unit	Item no.
DPD Free Chlorine Reagent Powder Pillows, 25 mL	100/pkg	1407099
DPD Total Chlorine Reagent Powder Pillows, 25 mL	100/pkg	1406499
Bottle, square, with 25-mL mark	each	1704200
Color disc, DPD chlorine, 0–3.4 mg/L	each	990200
Color comparator box	each	173200
Long-path adapter	each	2412200
Plastic viewing tubes, 18 mm, with caps	4/pkg	4660004

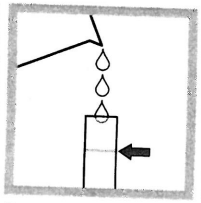
Optional items

Description	Unit	Item no.
Caps for plastic viewing tubes (4660004)	4/pkg	4660014
Glass viewing tubes, glass, 18 mm	6/pkg	173006
Stoppers for 18-mm glass tubes and AccuVac Ampuls	6/pkg	173106
Water, deionized	500 mL	27249

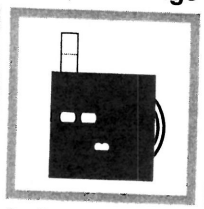
Test procedure—Free or total chlorine, low range (0–0.68 mg/L Cl_2)



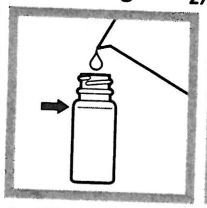
1. Install the long-path adapter in the color comparator box.



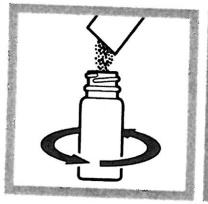
2. Fill a tube to the top line with sample.



3. Put the tube into the left opening of the color comparator box.

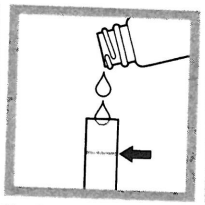


4. Fill the bottle to the 25-mL mark with sample.

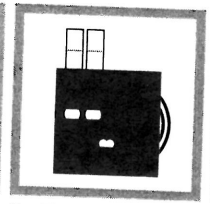


5. Add one DPD (Free or Total) Chlorine Powder Pillow. Swirl to mix.

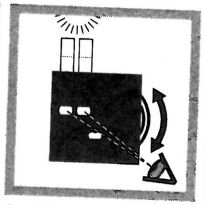
6. For free chlorine, read the result within 1 minute. For total chlorine, wait 3 minutes. Read the result within 6 minutes.



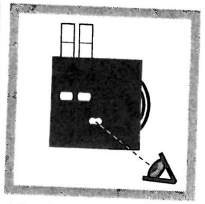
7. Fill a second tube to the top line with the prepared sample.



8. Put the second tube into the color comparator box.

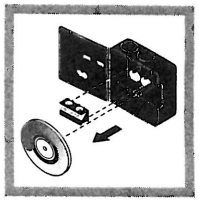


9. Hold the color comparator box below a light source. Turn the color disc to find the color match.

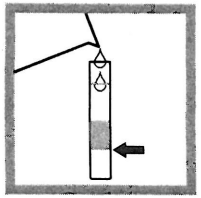


10. Read the value in the scale window. Divide the value by 5 to get the result in mg/L.

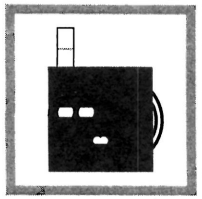
Test procedure—Free or total chlorine, mid range (0–3.4 mg/L Cl_2)



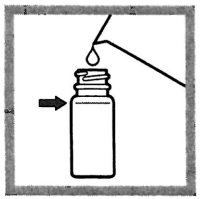
1. If installed, remove the long-path adapter.



2. Fill a tube to the first line (5 mL) with sample.



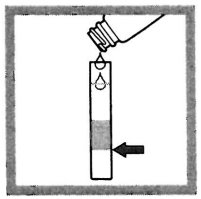
3. Put the tube into the left opening of the color comparator box.



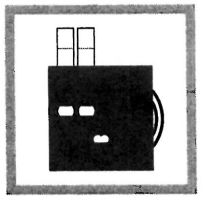
4. Fill the bottle to the 25-mL mark with sample.

5. Add one DPD (Free or Total) Chlorine Powder Pillow. Swirl to mix.

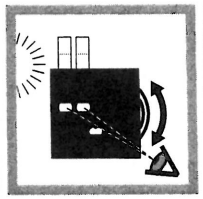
6. For free chlorine, read the result within 1 minute.
For total chlorine, wait 3 minutes. Read the result within 6 minutes.



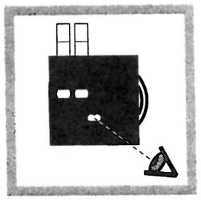
7. Fill a second tube to the first line (5 mL) with the prepared sample.



8. Put the second tube into the color comparator box.



9. Hold the color comparator box in front of a light source. Turn the color disc to find the color match.



10. Read the result in mg/L in the scale window.

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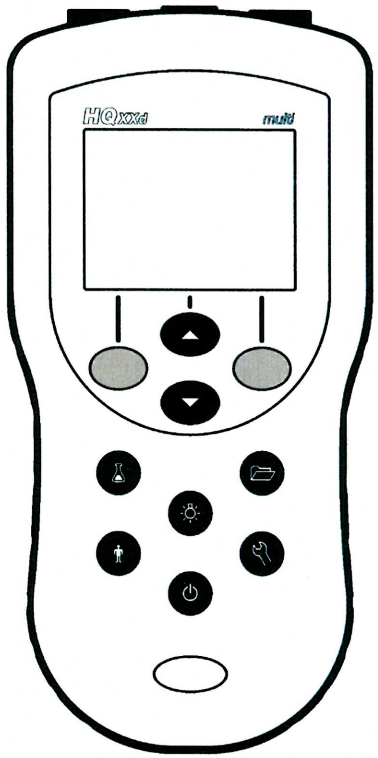
01/2016, Edition 4

DOC022.53.80017

HQd Portable Meter

10/2017, Edition 6

User Manual



Specifications 5
General information 5
Safety information 5
Use of hazard information 6
Precautionary labels 6
Product overview 6
Product components 6
Installation 7
Install the batteries 7
Connect to AC power 8
User interface and navigation 9
User interface 9
Display description 9
Navigation 11
Startup 11
Turn the meter on and off 11
Change the language 11
Change the date and time 11
Connect a probe 12
Standard operation 12
About calibration 12
About sample measurements 13
About check standards 13
Use a sample ID 13
Use an operator ID 13
Data management 13
About stored data 13
View stored data 14
View stored probe data 14

Print stored data 14
Change the report options 15
Send data to a USB storage device 15
Open data files on a PC 16
Data file description 16
Remove column headers 18
Send data directly to a computer 18
Advanced operation 18
Security options 18
Turn Security Options on 18
Full access options menu 19
Restricted operator access options menu 19
Set the display options 20
Set the sound options 20
Set the probe calibration reminder 21
Change the temperature units 21
Set the measurement mode 21
Set auto measurement intervals 21
Start interval measurements 21
Prevent data log overflow in interval mode 22
View instrument information 22
Update the meter software 22
Download software updates 23
Transfer method settings 23
Bi-directional Communication between the meter and a PC 23
About meter control 23
About meter configuration 24
Maintenance 24
Clean the meter 24
Replace the batteries 24
Troubleshooting 25

Replacement parts and accessories 26
Examples of printed reports 28

Specifications

Specifications are subject to change without notice.

Specification	Details
Dimensions	19.7 x 9.5 cm (7.75 x 3.75 in.)
Weight	335 g (0.75 lb) without batteries; 430 g (0.95 lb) with four AA alkaline batteries
Meter enclosure	IP67, waterproof to 1 meter for 30 minutes
Battery enclosure	Water resistant to 0.6 m (2 ft) for 15 seconds
Power requirements (internal)	AA Alkaline or rechargeable Nickel Metal Hydride (NiMH) batteries (4); battery life: up to 200 hours
Power requirements (external)	Class II, external power adapter: 100–240 VAC, 50/60 Hz input; 4.5 to 7.5 VDC (7 VA) output
Meter protection class	Class I
Storage temperature	–20 to +60 °C (–4 to +140 °F)
Operating temperature	0 to +60 °C (32 to 140 °F)
Operating humidity	90% (non-condensing)
5-pin input connector	M12 connector for IntelliCAL™ probes
8-pin input connector	The 8-pin connector enables USB and external AC power connectivity
USB/DC adapter	Peripheral and host
Data memory (internal)	500 results
Data storage	Automatic in Press to Read mode and Interval Mode. Manual in Continuous Read Mode.
Data export	USB connection to PC or USB storage device (limited to the storage device capacity). Transfer entire data log or as readings are taken.
Connections	Integrated USB type A (for USB flash memory device, printer, keyboard) and Integrated USB type B (for PC)
Temperature correction	Off, automatic and manual (parameter dependent)
Measurement display lock	Continuous measurement, Interval or Press to Read mode. Averaging function for LDO probes.
Keyboard	External PC keyboard connector via USB/DC adapter

General information

In no event will the manufacturer be liable for direct, indirect, special, incidental or consequential damages resulting from any defect or omission in this manual. The manufacturer reserves the right to make changes in this manual and the products it describes at any time, without notice or obligation. Revised editions are found on the manufacturer's website.

Safety information

NOTICE

The manufacturer is not responsible for any damages due to misapplication or misuse of this product including, without limitation, direct, incidental and consequential damages, and disclaims such damages to the full extent permitted under applicable law. The user is solely responsible to identify critical application risks and install appropriate mechanisms to protect processes during a possible equipment malfunction.

Please read this entire manual before unpacking, setting up or operating this equipment. Pay attention to all danger and caution statements. Failure to do so could result in serious injury to the operator or damage to the equipment.

Make sure that the protection provided by this equipment is not impaired. Do not use or install this equipment in any manner other than that specified in this manual.

Use of hazard information

⚠ DANGER
Indicates a potentially or imminently hazardous situation which, if not avoided, will result in death or serious injury.

⚠ WARNING
Indicates a potentially or imminently hazardous situation which, if not avoided, could result in death or serious injury.

⚠ CAUTION
Indicates a potentially hazardous situation that may result in minor or moderate injury.

NOTICE
Indicates a situation which, if not avoided, may cause damage to the instrument. Information that requires special emphasis.

Precautionary labels

Read all labels and tags attached to the instrument. Personal injury or damage to the instrument could occur if not observed. A symbol on the instrument is referenced in the manual with a precautionary statement.

	This symbol, if noted on the instrument, references the instruction manual for operation and/or safety information.
	This symbol indicates that the marked item can be hot and should not be touched without care.
	Electrical equipment marked with this symbol may not be disposed of in European domestic or public disposal systems. Return old or end-of-life equipment to the manufacturer for disposal at no charge to the user.

Product overview

The HQd series portable meters are used with digital IntelliCAL™ probes to measure various parameters in water. The meter automatically recognizes the type of probe that is connected to the meter. Measurement data can be stored and transferred to a printer, PC or USB storage device.

The HQd series meters are available in 4 models:

- HQ11d—pH/mV/ORP
- HQ14d—conductivity, salinity, total dissolved solids (TDS), resistivity
- HQ30d—all IntelliCAL probes, 1 probe connector
- HQ40d—all IntelliCAL probes, 2 probe connectors

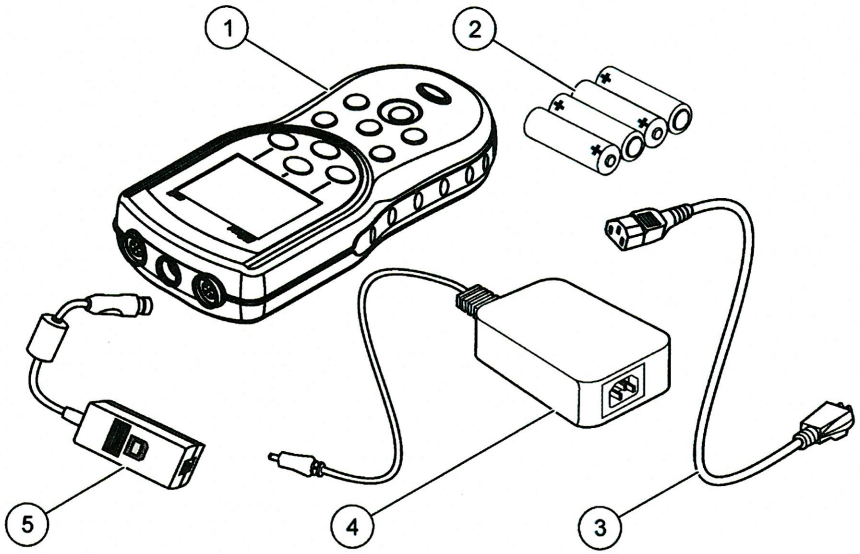
Features common to all models:

- Automatic probe and parameter recognition
- Instrument guided calibration procedures
- Calibration data stored in the probe
- Probe specific method settings for regulatory compliance and Good Laboratory Practice (GLP)
- Security Options
- Real-time data logging via USB connection
- USB connectivity to PC/printer/USB storage device/keyboard
- Bi-directional communication with PC-based systems via a virtual serial port connection
- Sample ID and Operator ID for data traceability
- Adjustable automatic shut-off

Product components

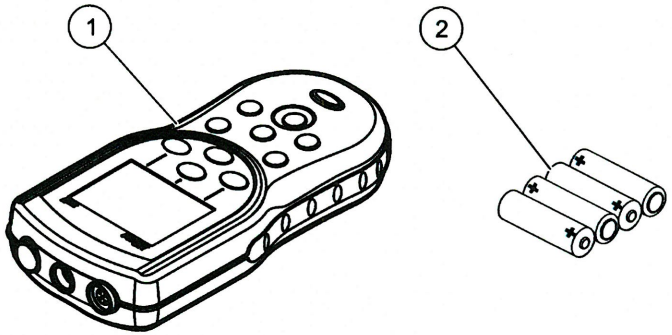
Refer to Figure 1 and Figure 2 to make sure that all components have been received. If any items are missing or damaged, contact the manufacturer or a sales representative immediately.

Figure 1 Meter components (HQ40d model)



1 Meter	**4** AC-DC power supply
2 AA batteries (pk/4)	**5** USB/DC adapter
3 AC power cord	

Figure 2 Meter components (HQ11d, HQ14d and HQ30d models)



1 Meter	**2** AA batteries (pk/4)

Installation

⚠ CAUTION

Multiple hazards. Only qualified personnel must conduct the tasks described in this section of the document.

Install the batteries

⚠ WARNING

Explosion hazard. Incorrect battery installation can cause the release of explosive gases. Be sure that the batteries are of the same approved chemical type and are inserted in the correct orientation. Do not mix new and used batteries.

NOTICE

The battery compartment is not waterproof. If the battery compartment becomes wet, remove and dry the batteries and dry the interior of the compartment. Check the battery contacts for corrosion and clean them if necessary.

NOTICE

When using nickel metal hydride (NiMH) batteries, the battery icon will not indicate a full charge after freshly charged batteries have been inserted (NiMH batteries are 1.2 V versus 1.5 V for alkaline batteries). Even though the icon does not indicate complete charge, 2300 mAH NiMH batteries will achieve 90% of instrument operation lifetime (before recharge) versus new alkaline batteries.

NOTICE

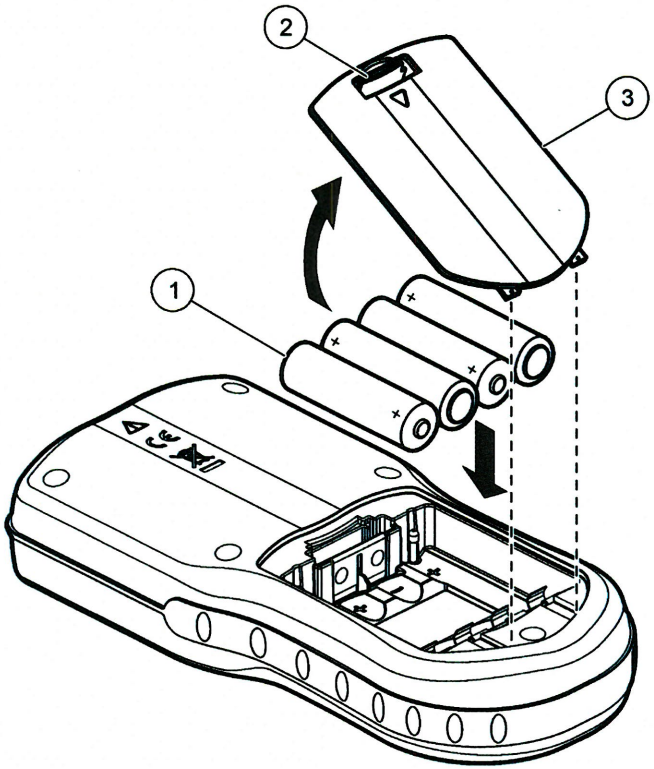
To avoid potential damage to the meter from battery leakage, remove the meter batteries prior to extended periods of non-use.

The meter can be powered with AA alkaline or rechargeable NiMH batteries. To conserve battery life, the meter will power off after 5 minutes of inactivity. This time can be changed in the Display Options menu.

For battery installation refer to Figure 3.

1. Pull the release tab on the battery cover and the remove the cover.
2. Install 4 AA alkaline or 4 AA nickel metal hydride (NiMH) batteries. Make sure that the batteries are installed in the correct polarity.
3. Replace the battery cover.

Figure 3 Battery installation



1 Batteries	**2** Release tab	**3** Battery cover

Connect to AC power

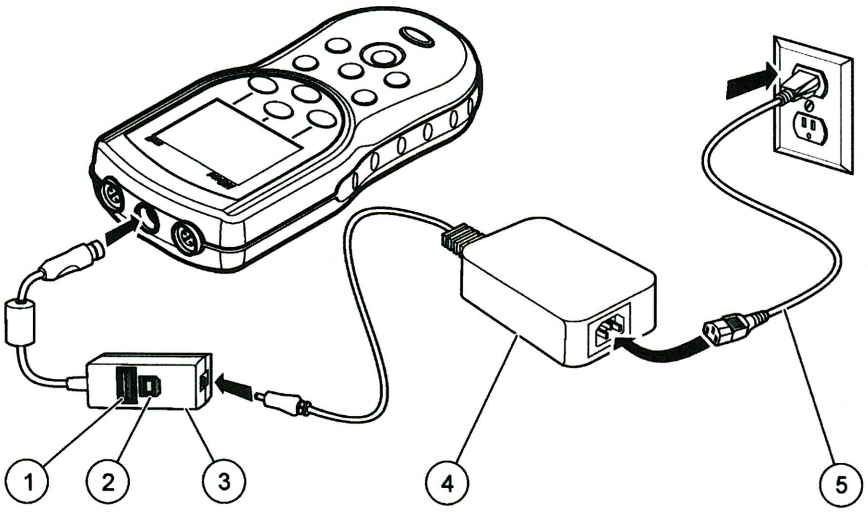
⚠ DANGER

Electrocution Hazard. AC power outlets in wet or potentially wet locations MUST ALWAYS be provided with a Ground Fault Circuit Interrupting (GFCI/GFI) circuit breaker. The AC-DC power adapter for this product is not sealed and must not be used on wet benches or in wet locations without GFCI protection.

The meter can be powered by AC power with an AC power adapter kit. The kit includes an AC-DC power supply, USB/DC adapter and AC power cord.

1. Turn the meter off.
2. Plug the AC power cord into the AC-DC power supply (Figure 4).
3. Connect the AC-DC power supply to the USB/DC adapter.
4. Connect the USB/DC adapter to the meter.
5. Plug the AC power cord into an AC receptacle.
6. Turn the meter on.

Figure 4 AC power connection

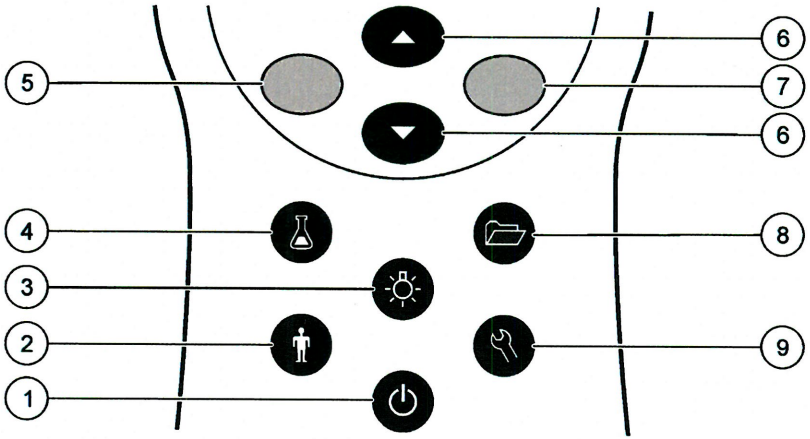


1 USB storage device/printer/Qwerty keyboard connection (USB peripheral)	**4** AC-DC power supply
2 Personal computer connection (USB host)	**5** AC power cord
3 USB/DC adapter	

User interface and navigation

User interface

Figure 5 Keypad description



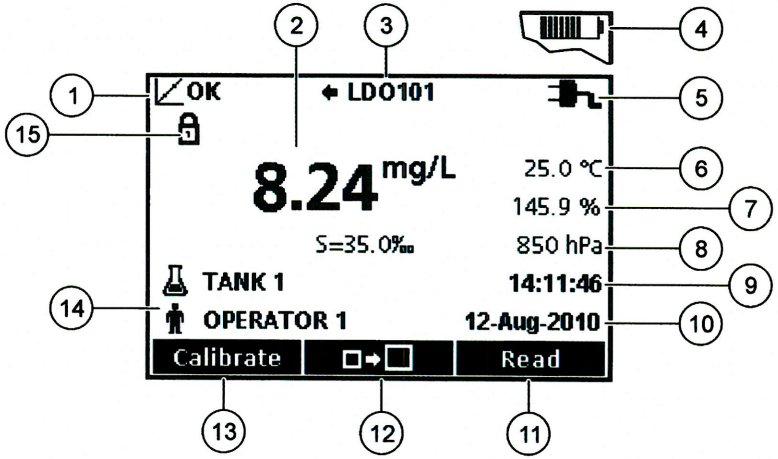
1 ON/OFF: turn on or turn off the meter	**6** UP and DOWN key: scroll through menus, enter numbers and letters or change the reading screen view
2 OPERATOR ID: associate data with an individual	**7** GREEN/RIGHT key: reads, selects, confirms or stores data
3 BACKLIGHT: illuminate the display screen	**8** DATA LOG: recall or transfer stored data
4 SAMPLE ID: associate data with a sample location	**9** METER OPTIONS: change settings, run check standards, view meter information
5 BLUE/LEFT key: calibrates, cancels or exits the current menu	

Display description

Measurement screen

The meter display shows the concentration, units, temperature, calibration status, operator ID, sample ID, date and time (Figure 6).

Figure 6 Single screen display



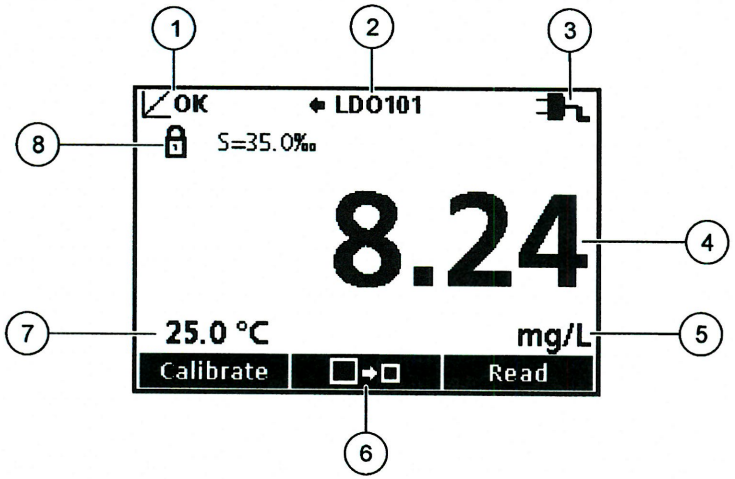
1	Calibration status indicator	**9**	Time
2	Main measurement value and unit	**10**	Date
3	IntelliCAL probe type and port indicator	**11**	Read (OK, Select)
4	Battery status	**12**	Display size icon
5	Power source	**13**	Calibrate (Cancel, Exit)
6	Sample temperature (°C or °F)	**14**	Sample and operator identification
7	Secondary measurement unit	**15**	Stability or display lock indicator
8	Tertiary units (for some probes)		

Big-screen mode

The font size of the sample reading can be increased or decreased with the △ key (Figure 7).

Note: *△ When two probes are connected, push and hold the key to select the big-screen mode. The big-screen mode can also be selected in the Display Options menu (Refer to* Set the display options *on page 20).*

Figure 7 Single-screen display—big-screen mode



1	Calibration status indicator	**5**	Main measurement unit
2	IntelliCAL probe type and port indicator	**6**	Display size icon
3	Power source or battery status	**7**	Sample temperature (°C or °F)
4	Main measurement value	**8**	Stability or display lock indicator

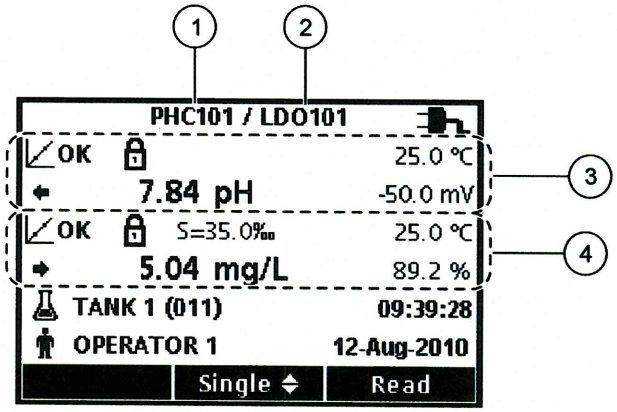
Dual-screen mode (HQ40d model only)

When two probes are connected to the HQ40d meter, the display can show the reading from both probes simultaneously or show just one probe (Figure 8).

Note: *For probe calibration, change the screen mode to the single screen mode.*

To change the screen mode to single or dual screen, use the △ and ▽ keys. In dual screen mode, the △ key will select the probe on the left and the ▽ key will select the probe on the right.

Figure 8 Dual-screen display



1	Probe that is connected to port on left	3	Measurement information for probe on left
2	Probe that is connected to port on right	4	Measurement information for probe on right

Navigation

The meter contains menus to change various options. Use the △ and ▽ keys to highlight different options. Push the GREEN/RIGHT key to select an option. There are two ways to change options:

1. Select an option from a list: Use the △ and ▽ keys to select an option. If check boxes are shown, more than one option can be selected. Push the BLUE/LEFT key under Select.

   Note: *To deselect check boxes, push the BLUE/LEFT key under Deselect.*
2. Enter an option value using the arrow keys:
   Push the △ and ▽ keys to enter or change a value.
3. Push the GREEN/RIGHT key to advance to the next space.
4. Push the GREEN/RIGHT key under OK to accept the value.

Startup

Turn the meter on and off

Push the ⏻ key to turn on or turn off the meter. If the meter does not turn on, make sure that the batteries are properly installed or that the AC power supply is properly connected to an electrical outlet.

Change the language

The display language is selected when the meter is powered on for the first time. The language can also be changed from the Meter Options menu.

Access to the language menu can be restricted with the Security Options. Refer to Security options on page 18.

1. Push the key and select Language.
2. Select a language from the list.

   Note: *While turning the meter on, the language can also be changed when the power key is pushed and held.*

Change the date and time

The date and time can be changed from the Date & Time menu.

1. Push the key and select Date & Time.
2. Update the time and date information:

Option	Description
Format	Select one of the formats below for the date and time. Use the △ and ▽ keys to select from the format options. dd-mm-yyyy 24h dd-mm-yyyy 12h mm/dd/yyyy 24h mm/dd/yyyy 12h dd-mmm-yyyy 24h dd-mmm-yyyy 12h yyyy-mm-dd 24h yyyy-mm-dd 12h
Date	Use the △ and ▽ keys to enter the current date.
Time	Use the △ and ▽ keys to enter the current time.

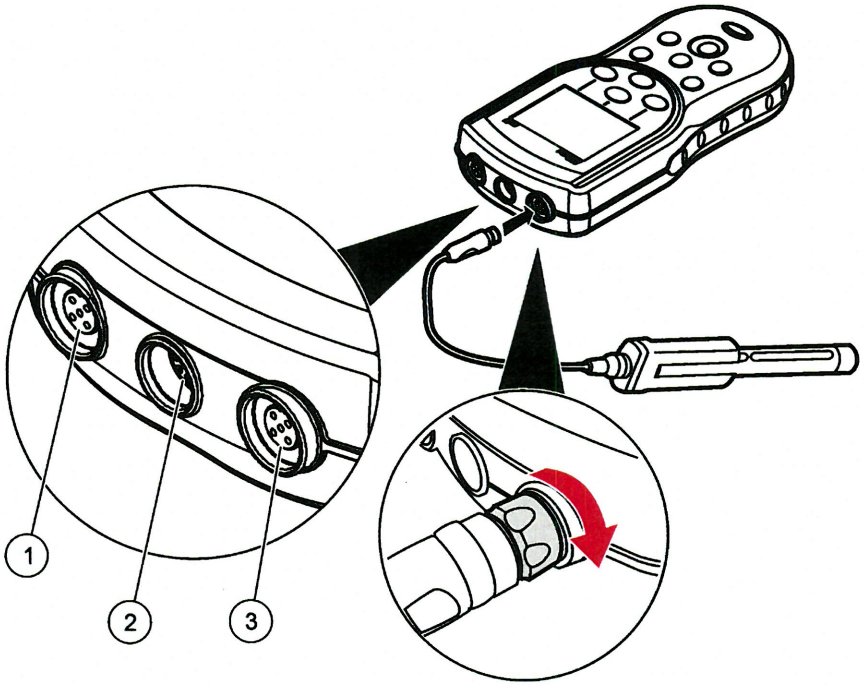
The current date and time will be shown on the display.

Connect a probe after the date and time setup, so that the meter is ready to take a measurement.

Connect a probe

1. Make sure that the display shows the current time and date.
   Note: *The time stamp for a probe is set when the probe is first connected to the meter. This time stamp makes it possible to record the probe history and record the time when measurements are made.*
2. Plug the probe into the meter (Figure 9).
3. Push and turn the locking nut to tighten.

Figure 9 Probe connection



1 Probe connection port (HQ40d only)	**2** USB/DC adapter port	**3** Probe connection port

Standard operation

About calibration

Each probe uses a different type of calibration solution. Make sure to calibrate the probes frequently to maintain the highest level of accuracy.

Note: *For step-by-step instructions, refer to the documents that are included with each probe.*

The calibration icon ? can indicate that:

- the calibration timer has expired
- the LDO sensor cap should be replaced

- the calibration is out of range
- the calibration results are outside acceptance criteria settings

About sample measurements

Each probe has specific preparation steps and procedures for taking sample measurements. For step-by-step instructions, refer to the documents that are included with the probe.

About check standards

Run Check Standards verifies equipment accuracy by measuring a solution of a known value. The meter will indicate if the Check Standard passed or failed. If the Check Standard fails, the calibration icon ? is shown until the probe is calibrated.

The meter can be set to automatically show a reminder for check standard measurement at a specified interval with a specified acceptance criteria. The reminder, value of the check standard, and acceptance criteria can be changed. For step-by-step instructions, refer to the documents that are included with the probe.

Use a sample ID

The sample ID tag is used to associate measurements with a particular sample location. If assigned, stored data will include the sample ID.

1. Push the key.
2. Select, create or delete a sample ID:

Option	Description
Current ID	Select an ID from a list. The current ID will be associated with sample data until a different ID is selected.
Create a New Sample ID	Enter a name for a new sample ID.
Delete Sample ID	Delete an existing sample ID.

Use an operator ID

The operator ID tag associates measurements with an individual operator. All stored data will include the operator ID.

1. Push the key.
2. Select, create or delete an operator ID:

Option	Description
Current ID	Select an ID from a list. The current ID will be associated with sample data until a different ID is selected.
Create a New Operator ID	Enter a name for a new operator ID (maximum 10 names can be entered).
Delete Operator ID	Delete an existing operator ID.

Data management

About stored data

The following types of data are stored in the data log:

- Sample measurements: stored automatically each time a sample is measured in the Press to Read or Interval Mode. When the continuous measurement mode is used, data is stored only when Store is selected.
- Calibrations: stored only when Store is selected at the end of a calibration. Calibration data is also stored in the IntelliCAL (R) probe.
- Check standard measurements: stored automatically each time a check standard is measured (in the Press to Read or Interval Mode).

When the data log becomes full (500 data points), the oldest data point is deleted when a new data point is added. The entire data log can be deleted to remove data that has already been sent to a printer or PC (key > Delete Data Log). To prevent deletion of the data log by a user, use the Security Options menu.

View stored data

The data log contains sample, calibration and check standard data. The most recent data point in the data log is tagged as Data Point 001.

1. Push the key.
2. Select View Data Log to view the stored data. The most recent data point is shown. The top of the screen shows whether the data is from a sample reading, a calibration or a check standard. Push the key to view the next most recent data point.

Option	Description
Reading Log	Reading Log—shows sample measurements including the time, date, operator and sample ID. Select Details to view the associated calibration data.
Calibration Log	Calibration Log—shows calibration data. Select Details to view additional information about the calibration.
Check Standard Log	Check Standard Log—shows check standard measurements. Select Details to view the calibration data that was associated with the measurement.

View stored probe data

Make sure that a probe is connected to the meter. If two probes are connected, select the appropriate probe when prompted.

1. To view the calibration data that is stored in a probe, push the key and select View Probe Data. The current calibration and calibration history for the probe can be viewed.

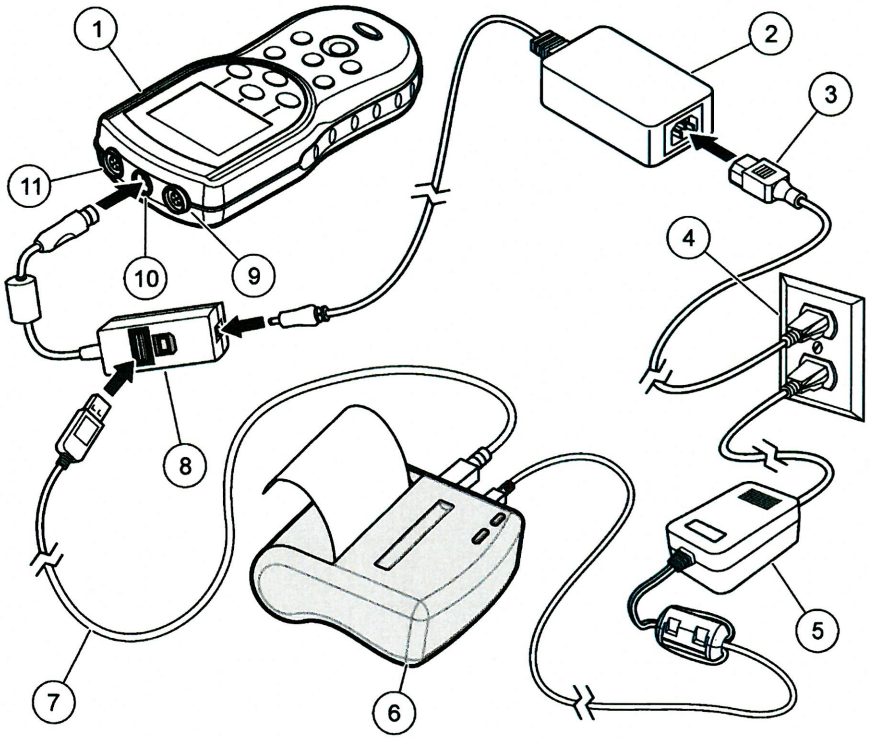
Option	Description
View Current Calibration	The current calibration information shows the calibration details for the most recent calibration. If the probe has not been calibrated by the user, the factory calibration data is shown.
View Calibration History	The calibration history shows a list of the times when the probe was calibrated. Select a date and time to view a summary of the calibration data.

Print stored data

The meter must connect to AC power to start the USB connection. Make sure that the connection to AC power is made before the meter is powered on.
All data can be sent to a printer. Compatible printers should support a minimum of 72 columns of data, be capable of printing up to 500 continuous data-stream events in 1, 2 and 3 lines of text and fully support code page 437 and code page 850.

1. Turn off the meter. Make sure that the meter is connected to AC power. Refer to Connect to AC power on page 8.
2. Connect the printer to the meter with a USB cable type A. Refer to Figure 10.
3. Turn on the meter.
4. Push the key.
5. Select Send Data Log. Wait for the display to show “Transfer Complete” and wait for the printer to stop printing. Disconnect the printer.

Figure 10 Connection to the printer



1 Meter	**7** USB cable
2 AC-DC power supply	**8** USB/DC adapter
3 AC power cord	**9** Port for probe connection
4 AC power outlet	**10** Port for USB/DC adapter
5 Power supply for printer (optional)	**11** Port for probe connection
6 Printer, FCC Part 15B, Class B compliant	

Change the report options

Printed reports for sample data can contain 1, 2 or 3 lines of information. Refer to Examples of printed reports on page 28 for further information.

1. Push the 🗁 key. Select Report Options.
2. Select Report Type and select one of the options.

Option	Description
Basic report	One line of data.
Advanced report	Two lines of data. The first line contains the same information as in the basic report.
Total report	Three lines of data. The first two lines contain the same information as in the advanced report.

Send data to a USB storage device

NOTICE

The transfer of a large number of data points will take some time. DO NOT disconnect the USB storage device until the transfer is complete.

Data can be transferred to a USB storage device for storage or transfer to a computer.

1. Turn off the meter. Make sure that the meter is connected to AC power.
2. Plug the USB storage device into the meter before the meter is powered on.
3. Turn on the meter.
4. Push the 🗁 key.
5. Select Send Data Log. Wait for the display to show "Transfer Complete" and for any lights on the USB storage device to stop flashing. Then remove the USB device.

   Note: *If the data transfer is slow, reformat the USB storage device to use the file allocation table (FAT) format for the next use.*

Open data files on a PC

Data that has been downloaded to a USB storage device can be transferred to a computer. The data is sent in a text (.txt) file format.

1. Plug the USB storage device into the computer.
2. Find the data file. The file will have the following format: "Meter Serial Number-Data File Type-Date Time". Example: 9999NN000000-SENDDATA-0603131624.TXT
3. Save the data file to a location on the computer.
4. Open a spreadsheet program such as Microsoft® Excel® spreadsheet software.
5. Open the data file from the spreadsheet program. Select the delimited option with comma as the delimiter.
   The data will be shown in the spreadsheet program.
   Note: *If an application is used that is not compatible with column headings, the headings can be omitted. Refer to* Remove column headers *on page 18.*

Data file description

Data that is saved to a USB storage device and then opened in a spreadsheet application will have multiple columns of data. A description for each of the columns is shown in Table 1.

Table 1 Spreadsheet column descriptions

Column header name	Data description and example values
Type	Type of data: RD = Reading; CL = Calibration; CK = Check Standard; CH = Calibration History; IC = Current Calibration
Parameter	Type Parameter: LDO, pH, CD (conductivity), ORP, ISE
Date	Date of reading: stored in user-defined date format
Time	Time of reading: stored in user-defined format
Operator ID	Operator ID that was used when the data was recorded. Shows "- - -" if no operator ID is used.

Table 1 Spreadsheet column descriptions (continued)

Column header name	Data description and example values
Probe Model	Model number of probe, for example pHC101, CDC401, LDO101
Probe SN	Probe serial number If two probes are connected to the HQ40d meter, the serial number shows "<" or ">" to identify the port (left or right) the probe was connected to during the reading.
Method name	User-defined name of the probe settings that were used for the reading.
Sample ID	Sample ID that was used when the data was recorded. Shows "Sample ID" if the default sample ID is used.
Primary Reading Value	Measured value. Shows "—" if the value was out of range.
Primary Reading Units	Measurement units, for example pH or µS/cm
Supp Reading 1	First supplemental reading (example: temperature), if applicable
Supp Units 1	Units for first supplemental reading, if applicable.
Supp Reading 2	Second supplemental reading (example: "mV" for pH), if applicable
Supp Units 2	Units for second supplemental reading, if applicable
Supp Reading 3	Third supplemental reading, if applicable
Supp Units 3	Units for third supplemental reading, if applicable.
Reading Setting 1–4	Any settings that affect the reading, for example "NaCl/Non-Linear"
Any settings that affect the reading, for example "NaCl/Non-Linear"	Reading Message 1–4 Any message that was shown during the measurement, for example "Out of limits".

Table 1 Spreadsheet column descriptions (continued)

Column header name	Data description and example values
Check Std Value	Value of the check standard that was used to verify accuracy, for example: 7.00 pH–25 °C (pH, temp-compensated); 7.01 pH (pH, custom)
Check Std Units	Check standard units, for example µS/cm. ***Note:*** *pH is not displayed here as it is included in the previous column.*
Check Std Graph	Bar-graph showing the measurement in relation to the acceptance limits. Example: "6.901 <—|—> 7.101".
Check Std Status	Status of the check standard reading. Example: "Reading within limits", "Reading outside limits"
Calibration Status	Status of the calibration that is in use. OK = current calibration is valid; ? = calibration has expired.
Cal Date	Date of calibration reading: stored in user-defined date format
Cal Time	Time of calibration reading: stored in user-defined time format
Cal Operator ID	The operator ID specified when the probe was calibrated. Shows "- - -" if undefined.
Cal Slope Name	Slope (pH or LDO) or cell constant (conductivity)
Cal Slope	The slope value for the calibration
Cal Slope Aux	Used by pH to give the percent of nominal slope
Cal Slope Units	Units of the calibration slope. Example: "mV/pH" for pH
Cal Offset	Calibration offset value
Cal Offset Units	Calibration offset units. Example: "mV" for pH.
Cal r^2	Calibration correlation coefficient without a unit (may be blank)

Table 1 Spreadsheet column descriptions (continued)

Column header name	Data description and example values
Cal Number of Std's	Number of standards used during calibration, for example 5. May be blank depending on record type, parameter type, and method settings.
Cal Std 1	Known value of the first calibration standard
Cal Std 1 Units	Units of the first calibration standard
Cal Std 1 Primary Value	Measured value of the first calibration standard
Cal Std 1 Primary Units	Associated units for the calibration measurement
Cal Std 1 Supp Value	Value of supplemental measurement, for example temperature
Cal Std 2–7	Known value of additional calibration standards, if used
Cal Std 2–7 Units	Units of additional calibration standards, if used
Cal Std 2–7 Primary Value	Measured values of additional calibration standards, if used
Cal Std 2–7 Primary Units	Associated units for additional calibration measurements, if used
Cal Std 2–7 Supp Value	Value of supplemental measurement, for example temperature
Cal Std Supp Units	Units applicable to all secondary calibration readings. Example: "°C" or "°F" for temperature
Cal Message 1–4	Any messages about the calibration
Date/Time POSIX	Date and time of reading stored in POSIX format (number of seconds from January 1, 1970) Example: 1149234913
Cal Date/Time POSIX	Date and time of calibration stored in POSIX format (number of seconds from January 1, 1970). Example: 1111320348
Meter SN	Meter serial number used to take the measurement

Remove column headers

When transferred data is viewed in a spreadsheet program, the first row of data contains headings to identify the type of data in each column. If an application or post-processing method is used that is incompatible with the headers, the column headers can be omitted.

1. Push the key.
2. Select Column Headers.
3. Set the column headers to off.

Send data directly to a computer

Data can be transferred from any HQd series meter directly to a computer when the HQ40d PC Application is installed. The data can be sent in real time during data collection, or the entire data log can be transferred.

To download the most current version of the software, refer to the applicable product page on the manufacturer's website.

1. Install the HQ40d PC Application on the computer.
2. Turn off the meter. Make sure that the meter is connected to AC power.
3. Connect the PC to the meter with a USB type B cable.
4. Turn on the meter.
5. Open the HQ40d PC Application on the computer. Click on the green triangle in the menu bar to start a connection.
6. Collect the data in real time or transfer the data from the data log:

   - Real time—when a data point is stored in the meter, the result is sent simultaneously to the PC Application (refer to Set the measurement mode on page 21).
   - Data log—push the key and select Send Data Log. Wait for the display to show "Transfer Complete." The data is sent as a comma separated values (.csv) file.

   The data is shown in the HQ40d PC Application window.

Advanced operation

Security options

The Security Options menu is used to protect the meter setup and method settings from unwanted changes. This menu is available in the Full Access Options menu.

The Setup Measurement Mode, Date and Time, Temperature Units, Language, Probe settings, Delete data log and Security Options screens are disabled in the Operator Access Options menu. All menu options are enabled in the Full Access Options menu.

Note: *The Full Access Options menu is shown when the key is pushed when Security Options is OFF, whether or not a password has been set.*

When the meter is powered on for the first time and Security Options is selected, the display prompts the user to set a password. Until the meter is shut off, pushing the key will still display the Full Access Options menu, even after Security Options is turned on and a password has been set. After the meter is shut off and powered on again with Security Options on, the Operator Access Options menu is displayed until a valid password is entered.

Store the password in a safe and accessible place. If the specified password is forgotten and Security Options is turned on, the operator is locked out of the restricted menus. Contact technical support if the password is lost.

Turn Security Options on

The Security Options and the Set Password options are used together to prevent access to restricted menus.

1. Push the key and select Security Options.
2. Change the settings as needed to allow or prevent menu access.

Option	Description
Security Options	When Security Options is on, and a password has been specified, the password is required to enable the Full Access Options menu. If the meter is turned off while Security Options is on, the password is required to enable the Full Access Options menu again when the meter is turned on.
Set Password	Set a password that must be entered to enable the Full Access Options menu. The requirement for password entry is controlled by setting Security Options on or off.

Full access options menu

The Full Access Options menu is displayed when Security Options is OFF or when Security Options is ON and a valid password is entered (Table 2). These options do not need to be changed if the factory default settings are used.

Table 2 Full Access Options

Option	Description
(Probe model) settings	Settings such as measurement options, calibration options, check standard options, units and resolution. Refer to the probe documentation for more information. ***Note:*** *A probe must be connected to the meter.*
Run check standard	Measure standard solution (available for pH, conductivity, ORP and ISE probes)
Measurement mode	Press to Read
	Interval: Duration and Interval
	Continuous
Instrument information	Probe information
	Meter information

Table 2 Full Access Options (continued)

Option	Description
Security options	ON or OFF
	Set password
Display options	Contrast
	Auto shutoff
	Backlight
	Mode
Sounds	Key press
	Stability alert
	Calibration reminder
Date and time	Format
	Date
	Time
Temperature units	Set temperature units
Language	Select language

Restricted operator access options menu

The Operator Access Options menu is shown at meter startup when Security Options is ON (Table 3). When a valid password is entered, the menu changes to Full Access Options.

Table 3 Operator access options

Option	Description
(Probe model) settings	Only methods (if methods exist) can be selected. Refer to the probe documentation. ***Note:*** *A probe must be connected to the meter.*
Run check standard	Measure standard solution (available for pH, conductivity, ORP and ISE probes) ***Note:*** *A probe must be connected to use this option.*
Instrument information	Probe information
	Meter information
Access password	Enter password
Display options	Contrast
	Auto shutoff
	Backlight
	Mode
Sounds	Key press
	Stability alert
	Calibration reminder

Set the display options

Use Display Options to change the display contrast, battery saving auto-shutoff options, the backlight option or the detailed or big reading screen mode.

1. Push the key and select Display Options.
2. Select which display option to change.

Option	Description
Contrast	Adjust the contrast of the display. The lightest setting is 0 and the darkest setting is 9.
Auto-shutoff	To maximize battery life, set a time period after which the meter will automatically power off if no key is pushed (1, 2, 5, 10, 30 min, 1 h, 2 h or never). Auto-shutoff is not active when the meter is connected to AC power or in the Interval Reading Mode.
Backlight	The display backlight is turned off when the key is pushed. Is it possible to set a time period after which the backlight will automatically power off if no key is pushed.
Mode	Select Detailed or Big screen size. Detailed will show more information with smaller numbers and text. Big will show less information with larger numbers and text. ***Note:*** *The screen size can also be selected from the measure mode (refer to* Display description *on page 9).*

Set the sound options

The meter can make an audible sound when a key is pushed, when stability is reached or when the calibration reminder is due. The meter also makes an audible sound when it begins transferring data to a USB storage device and again when the data transfer is complete.

1. Push the key and select Sound.
2. Choose which events will produce an audible sound. Multiple items can be selected.

Option	Description
Key Press	The meter will make an audible sound whenever a key is pushed.
Stability Alert	The meter will make an audible sound whenever measurement stability is reached.
Cal reminder	The meter will make an audible sound when calibration is due. ***Note:*** *Refer to* Set the probe calibration reminder *on page 21 to set the calibration reminder to on or off.*

Set the probe calibration reminder

Make sure that a probe is connected to the meter.

1. Push the key and select the probe settings.
2. Select Modify Current Settings.
3. Select Calibration Options.
4. Select Calibration Reminder.

Option	Description
Calibration reminder	Reminder repeat: Off, 2 h, 4 h, 8 h, 2 d, 5 d, 7d Expires: Immediately, Reminder + 30 min, Reminder + 1 hr, Reminder + 2 hr, Continue Reading The meter can be set to make an audible sound when calibration is due. Calibration expires after a specified time set by the user. ***Note:*** *The meter cannot be used to read samples after calibration has expired unless Continue Reading is selected.*

Change the temperature units

To select degrees Celsius or Fahrenheit:

1. Push the key and select Temperature Units.
2. Select the Celsius or Fahrenheit option.

Set the measurement mode

One of three modes can be used to specify when measurements are taken and how the data is stored. When a data point is stored, the result is sent simultaneously to any device (PC/printer/ USB storage device) that is connected to the meter.

1. Push the key and select Measurement Mode.
2. Select Mode.
3. Select one of the measurement modes.

Option	Description
Press to Read	The sample is measured only when the GREEN/RIGHT key under Read is pushed. Data is stored in the data log automatically when the stability criteria are met.
Interval	The sample is measured at regular intervals for a specified duration (refer to Set auto measurement intervals on page 21). Data is stored in the data log automatically.
Continuous	The sample is measured continuously. Data is stored in the data log only when the GREEN/RIGHT key under Store is pushed.

Set auto measurement intervals

When the measurement mode is set to Interval, the time intervals and duration must be specified. Measurements are stored at the user-defined intervals whether or not stability criteria are met.

Note: *Use of an external USB storage device or direct printer connection while in Interval Measurement mode prevents data from being over-written in the data log. Data points are over-written on a First In/First Out basis. Refer to* Prevent data log overflow in interval mode *on page 22.*

1. Push the key and select Measurement Mode.
2. Select Mode.
3. Select Interval as the Measurement Mode.
4. Select Duration and select the total time that measurements will be taken for (15 min, 30 min, 1 h, 4 h, 8 h, 24 h, 48 h or no limit).
5. Select Interval and select how often measurements will be taken (every 10 s, 30 s, 1 min, 5 min, 15 min or 30 min).

Start interval measurements

During interval measurements, the meter goes into a standby state between readings to conserve power. The auto-shutoff option is disabled. Measurements stop when the selected interval duration has passed. The auto-shutoff option then becomes active.

Interval measurements are suspended for calibrations, check standard measurements or when the key is pushed. Interval measurements resume when returning to the measurement screen.

1. From the Main Measurement screen, select Start to begin interval measurements. The screen will show "Recording" and the remaining time of the duration. The sample number automatically advances when each reading is taken.
2. To stop interval measurements, select Stop.
3. To repeat the interval measurement after it has been stopped or completed, select Start.

Prevent data log overflow in interval mode

When measurements are taken at specified intervals (Table 4), each result is automatically stored. The meter can store up to 500 data records. When 500 records have been stored, data is replaced on a first-in, first-out basis. To prevent loss of data, connect the meter to a PC/printer/USB storage device.
Note: *Stop interval measurements before changes are made to a method or to meter settings.*

Table 4 Recommended interval/duration pairs

Interval	Duration
10 seconds	1 hour
30 seconds	4 hours
1 minute	8 hours
5 minutes	24 hours

Note: *When 2 probes are connected to the meter, use the next lowest recommended duration time. For example, for a 30-second interval, set the duration to 1 hour to prevent data log overload with 2 probes.*

View instrument information

The instrument information menu shows specific information such as the serial number for the meter or IntelliCAL (R) probe(s).

1. Push the key and select Instrument Information.
2. Select (Probe model) Information or Meter Information.

Option	Description
Probe information	The Probe Information screen shows the probe model number, serial number, software version and date of first use. For LDO and LBOD probes, the lot code for the sensor cap and the remaining time before sensor cap replacement is shown. ***Note:*** *A probe must be connected to the meter.*
Meter information	The Meter Information screen shows the meter model number, serial number, software version and memory information. The amount of memory used and the number of available user method settings, operator IDs and sample IDs is shown.

Update the meter software

A USB storage device that contains software update files is used to update the meter software.
Note: *The meter must be turned off and then on again before the software update will begin. The software update initiates upon meter startup after the USB device is correctly inserted.*

NOTICE

Do not remove the USB device until the "Update complete" message is shown. The meter can become damaged if the USB device is removed before the update process is complete.

1. Save stored data from the data log to a USB storage device or to a PC. Refer to Send data to a USB storage device on page 15 and Send data directly to a computer on page 18.
2. Turn off the meter.
3. Connect the USB/DC adapter, AC-DC power supply and cord (Figure 4 on page 9).

4. Insert the USB storage device that contains the software update files into the USB/DC adapter.
5. Turn on the meter.
   The update process starts. The display will show “Updating meter to <firmware version>”. After an interval, the display changes to “Updating files, please wait...” In addition, the display will show a rotating flask and emit a periodic audio signal during the update process.
   Note: *A large capacity USB storage device increases the time required for completion of the update process, even if most of the device memory is empty.*
6. Wait for the meter to finish the software update. When the update process is complete, the message “Update complete. Remove USB device” is shown. The meter will turn off after the USB device has been removed.
7. Repeat steps 1 through 6 to update the software in other HQd meters as necessary.

Download software updates

To download the most current version of the software, refer to the applicable product page on the manufacturer's website.

1. Transfer the update files to a USB storage device.
2. Follow the instructions in Update the meter software on page 22 to update the software in the meter.

Transfer method settings

Probe settings that have been changed by the user for measurements, calibrations or check standards (Meter Options > (Probe Model) Settings > Modify Current Settings) can be copied to a USB storage device. The USB device can then be used to transfer the method settings to other HQd meters that accept the same probes.

NOTICE

Make sure the USB storage device does not contain HQd meter software update files to prevent unintentional updates.

1. Turn off the meter.
2. Connect the meter to AC power (Figure 4 on page 9).
3. Plug the USB storage device into the USB/DC adapter before the meter is powered on.
4. Turn on the meter.
5. Push the 🗁 key and select Transfer Methods. If the USB device already contains a method settings file, an option to export or import methods is shown. Select Export Methods.
6. In the Select Methods to Export screen, select one or more methods to copy to the USB device. A check mark is shown next to each selected method.
7. Select OK. The settings are copied to the USB storage device. When complete, the Transfer Summary screen is shown.
8. Connect the AC power and USB device to a meter that will receive the method settings. Turn the meter on.
9. Push the 🗁 key and select Transfer Methods. If the USB device already contains a method settings file, an option to export or import methods is shown. Select Import Methods.
10. In the Select Methods to Import screen, select one or more methods to transfer to the meter. A check mark is shown next to each selected method.
11. Select OK. The user method settings are transferred from the USB storage device to the meter. When complete, the Transfer Summary screen is shown. Select details to view additional information about the transfer.
12. Disconnect the USB storage device from the meter.

Bi-directional Communication between the meter and a PC

For measurement automation the meter can be used to implement a command set for meter remote control or automated data transfer. The command set can be used to perform minimal configuration and to control the meter. To set up the meter for communication and control, refer to About meter configuration on page 24. For additional information and the command set contact Technical Support.

About meter control

The virtual serial connection can be used to control meter functions from a PC. For example, the functions include starting a measurement cycle,

turning off the meter and sending the entire measurement (including calibrations) to the PC or other information management system.

About meter configuration

To use the meter communication and control from the PC, an INF file must be installed.

1. The meter software must be version 2.0.0.710 or higher.
   To download the most current version of the software, refer to the applicable product page on the manufacturer's website.
2. Open the Zip file.
3. Copy the INF file from the software upgrade package to a convenient location on the PC.

   Note: *The INF file must be installed to use the meter manual control from a PC.*
4. Turn on the meter.
5. Push the key and select Instrument Information.
6. Select USB Device Type and then select Virtual Serial to use the virtual serial port on the meter.
7. Push OK. The meter will automatically restart to complete the setting change.
8. Connect the meter with the USB cable to the PC and turn on the meter.
   Windows XP starts the "Found New Hardware Wizard".
9. Select "No, not at this time" to the query "Can Windows connect to Windows Update to search for software?"
10. Click Next. The next wizard screen will prompt.
11. Select "Install from a list or specific location (Advanced)" to the query "What do you want the wizard to do?"
12. Click Next. The next wizard screen will prompt.
13. Select the option "Search for the best driver in these locations."
14. Uncheck the "Search removable media (floppy, CD-ROM)" option and select the "Include this location in the search:" and click the "Browse" button.
15. Select the INF folder or location and click OK.
16. Click Next. The new software will be installed.
17. Click Finish to complete the Found New Hardware Wizard for: HQd Meter - Virtual Serial Port.
18. To make sure that the installation succeeded, go to Computer Management>Device Manager>Ports. The new installed port is listed as HQd Meter - Virtual Serial Port (COM#).
19. The meter is now ready for communication with PC-based systems using the Virtual Serial port. A program interface must be developed by the user for the command set used to control the meter functions from the PC. Contact Technical Support for more information and command set documentation.

Maintenance

⚠ CAUTION

Multiple hazards. Only qualified personnel must conduct the tasks described in this section of the document.

Clean the meter

The meter is designed to be maintenance-free and does not require regular cleaning for normal operation. Exterior surfaces of the meter may be cleaned as necessary.

1. Wipe the surface of the meter with a damp cloth.
2. Use a cotton-tipped applicator to clean or dry the connectors.

Replace the batteries

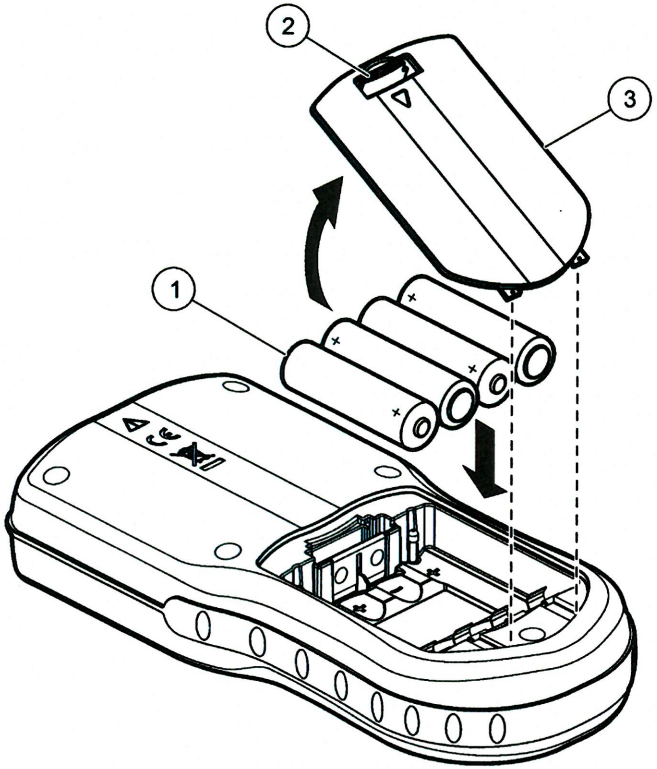
⚠ WARNING

Explosion hazard. Incorrect battery installation can cause the release of explosive gases. Be sure that the batteries are of the same approved chemical type and are inserted in the correct orientation. Do not mix new and used batteries.

For battery replacement, refer to Figure 11. Make sure that the cover is tightly closed to maintain the IP67 enclosure rating.

1. Pull the release tab on the battery cover and the remove the cover.
2. Remove the batteries.
3. Install 4 AA alkaline or 4 AA nickel metal hydride (NiMH) batteries. Make sure that the batteries are installed in the correct polarity.
4. Replace the battery cover.

Figure 11 Battery replacement



1 Batteries	**2** Release tab	**3** Battery cover

Troubleshooting

Refer to the following table for common problem messages or symptoms, possible causes and corrective actions.

Error/Warning	Description	Solution
Connect a Probe	Probe disconnected or connected improperly	Tighten the locking nut on the probe connector.
		Disconnect the probe and then connect the probe again
	Software not updated to most current version	To download the most current version of the software, refer to the applicable product page on the manufacturer's website.
	Problem with probe	Connect a different IntelliCAL probe to verify if problem is with probe or meter
Probe Not Supported	Probe disconnected or connected improperly	Tighten the locking nut on the probe connector.
		Disconnect the probe and then connect the probe again.
	Software not updated to most current version	To download the most current version of the software, refer to the applicable product page on the manufacturer's website.
	Problem with probe	Connect a different IntelliCAL probe to the meter to verify if problem is with the meter or the probe.
	HQd meter does not support IntelliCAL probe	Contact Technical Support.
Bootloader X.X.XX.XX error	Software not updated to most current version.	To download the most current version of the software, refer to the applicable product page on the manufacturer's website.

Error/Warning	Description	Solution
0 days remaining message (For LDO and LBOD only)	LDO or LBOD sensor cap used for 365 days	Replace the LDO or LBOD sensor cap and iButton®.
	There are 0 days remaining in the life of the LDO sensor cap.	Replace the LDO sensor cap. Calibration will be allowed. However, the calibration icon and question mark will appear on the measurement screen even if the calibration has passed.
	Meter set to incorrect date and time	**1.** Disconnect the probe from the meter. **2.** Remove the meter batteries. **3.** Install the meter batteries properly. Follow the polarity makings. **4.** Set correct date and time in the meter. **5.** Connect the probe and verify that message has been removed.
	Software not updated to most current version	To download the most current version of the software, refer to the applicable product page on the manufacturer's website.
Meter not configured	Software error(s)	If the meter starts up correctly, back up the Data Log and Method files. To download the most current version of the software, refer to the applicable product page on the manufacturer's website.

Error/Warning	Description	Solution
Meter will not power on or powers on intermittently	Batteries are not installed correctly	Examine battery orientation to make sure the batteries follow the polarity markings. Test again.
		Clean the battery terminals, then install new batteries.
		Connect AC power adapter and test again.
	Software not updated to most current version	To download the most current version of the software, refer to the applicable product page on the manufacturer's website.
	Damaged meter	Contact Technical Support.
Unable to access Full Access Options screen	Correct password has not been entered	Contact Technical Support.
Unable to access Full or Operator Access Options screen	Software not updated to most current version	To download the most current version of the software, refer to the applicable product page on the manufacturer's website.

Replacement parts and accessories

Note: *Product and Article numbers may vary for some selling regions. Contact the appropriate distributor or refer to the company website for contact information.*

Replacement parts

Description	Item no.
AC Power/USB Adapter Kit, 115 VAC	5826300
AC Power/USB Adapter Kit, 230 VAC	5834100
Batteries, Alkaline AA	1938004
Battery cover	9245500
Battery Contact, dual fixed	5188400

Replacement parts (continued)

Description	Item no.
Battery Contact, dual spring	5188800
Cable, USB 6 ft (1.8 m), Type A male, Type B male	5924000
Field Kit (includes Protective Glove Kit for meter and five 120-mL sample cups)	5825800
Field Case for 2 probes with up to 5 m cables (10 m total). Includes empty case, insert for meter and probe storage, 4 containers for sample collection.	8505500
Field Case for 3 probes with up to 5 m cables (15 m total). Includes empty case, insert for meter and probe storage, 4 containers for sample collection.	8505501
Field Case for 2 probes with greater than 5 m cables (30 m total). Includes empty case, insert for meter with protective glove.	8505600
Keyboard (QWERTY), USB type	LZV582
Printer, USB Thermal Printer Kit, DPU-S445, 100 - 240 V AC	**US:** LQV161.53.10000 **EU:** LQV161.99.10000
Printer Paper for DPU-S445, thermal, 5/pk	5836000
Probe Clips, color coded (5 colors, 2 clips of each color), 10/pk	5818400
Probe Depth Marker (rugged cables)	5828610
Probe Holder, standard (fits on protective glove)	5829400
Protective Glove Kit for meter	5828700
Universal Probe Stand for standard IntelliCAL Probes	8508850

Examples of printed reports

Printed reports contain a report header and all stored data for samples, check standards and calibrations.

Report header

The first line of a report shows the report header (Figure 12).

Figure 12 Report header

```
9999RV123456-SENDDATA-0512131618.TXT
RD LDO 16:14:32 12-08-10 6.59      mg/L    NORTH TANK    -05 JOSEPH L
```

1 Meter serial number[1]	**3** Date and time, 24 h (YYMMDDhhmm)
2 Report label	**4** File type extension

Data reports

Sample data can be printed in a basic, advanced or total report format.

- Total report—refer to Figure 13.
- Advanced report—refer to Figure 14.
- Basic report—refer to Figure 15.

[1] The probe serial number is shown on calibration history and current calibration reports.

Figure 13 Basic report for sample data—1 line

```
9999RV123456-SENDDATA-0512131618.TXT
RD LDO 16:14:32 12-08-10 6.59     mg/L   NORTH TANK   -05 JOSEPH L
```

1 Data type (RD=reading)	**6** Units
2 Parameter (pH, LDO, etc.)	**7** Sample ID: user-defined; shows “SAMPLE ID” if undefined
3 Time (hh:mm:ss in 24 h or user-defined format)	**8** Sample ID counter
4 Date (DD-MM-YY or user-defined format)	**9** Operator ID: user-defined; shows “- - -” if undefined
5 Measured value	

Figure 14 Advanced report for sample data—2 lines

```
9999RV123456-SENDDATA-0512131618.TXT
RD LDO 16:14:32 12-08-10 6.59     mg/L   PLATTE BDGE2022 JULIE
   LDO101     >52040259 24.1°C,96.2%,831hPa      S = 0.0%
   Out of limits
```

1 Probe model	**4** Additional units: shows all additional units associated with the reading.
2 Error message (if applicable)	**5** Probe settings: shows the highest-priority setting associated with the reading
3 Probe serial number (a “<“ or “>” on the HQ40d meter indicates the probe position)	

Figure 15 Total report for sample data—3 lines

```
9999RV123456-SENDDATA-0512131618.TXT
RD pH   07:52:47 12-08-10 3.95     pH      PLATTE BDGE2046 JULIE
   pHC301     <06047527 21.8°C,167.0mV
   Default      CAL12:52 12-08-10 58.36mV/pH  -9.3mV  MICHAEL
```

1	Method name for probe settings	4	Calibration slope/ratio/constant
2	Time of calibration, prefaced by “CAL” and displayed as hh:mm in 24 h (or user-defined) format	5	Offset—contents vary depending on type of parameter and user settings. May be blank.
3	Date of calibration (DD-MM-YY or user-defined format)	6	Operator ID: user-defined; shows “- - -” if undefined

Check standard reports

Check standard data is printed with 1 line of information (Figure 16)

Figure 16 Check standard report

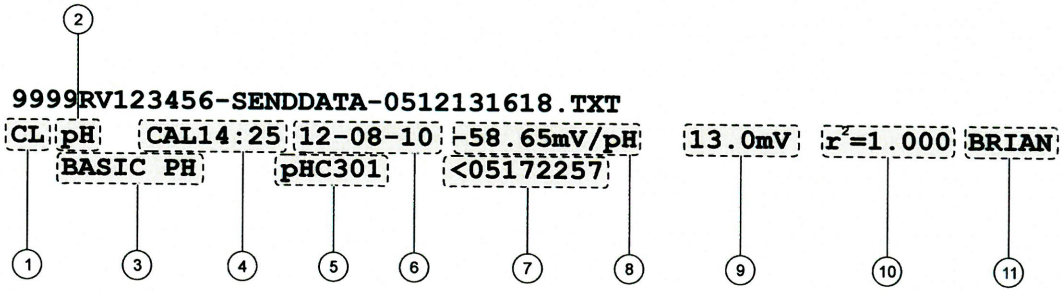
```
9999RV123456-SENDDATA-0512131618.TXT
ST pH   15:24:07 12-08-10 5.71    pH     Fail          GEORGE
```

1	Report type (ST = check standard)	5	Measured value
2	Report type (ST = check standard)	6	Units
3	Time (hh:mm:ss in 24 h or user-defined format)	7	Check standard status: Pass/Fail based on the acceptance criteria
4	Date (DD-MM-YY or user-defined format)	8	Operator ID: user-defined; shows “- - -” if undefined

Calibration reports

Calibration data is printed when the data log is sent to the printer or when probe data is sent to the printer. Calibration data is printed with 2 lines of information (Figure 17).

Figure 17 Calibration report



1 Report type (CL = calibration, IC = current calibration)	**7** Probe serial number (a "<" or ">" on the HQ440d meter indicates the probe position)
2 Parameter (pH, LDO, etc.)	**8** Calibration slope/ratio/constant
3 Method name for probe settings	**9** Offset—contents vary depending on type of parameter and user settings. May be blank.
4 Time of calibration, prefaced by "CAL" and displayed as hh:mm in 24 h (or user-defined) format	**10** r^2: contents vary depending on type of parameter being read, configuration of specific method and number of calibration standards used. May be blank.
5 Probe model	**11** Operator ID: user-defined; shows "- - -" if undefined
6 Date of calibration (DD-MM-YY or user-defined format)	

The calibration history can be printed from the probe data menu. Refer to Figure 18.

Figure 18 Calibration history report

```
05172257-SENDCALH-0512131618.TXT
CH pH   CAL14:25 12-08-10 -58.65mV/pH   13.0mV
         pHC301   05172257
```

1	Report type (CH=calibration history)	5	Date of calibration (DD-MM-YY or user-defined format)
2	Parameter (pH, LDO, etc.)	6	Probe serial number (a “<“ or “>” on the HQ40d meter indicates the probe position).
3	Time of calibration, prefaced by “CAL” and displayed as hh:mm in 24 h (or user-defined) format	7	Calibration slope/ratio/constant
4	Probe model	8	Offset—contents vary depending on type of parameter and user settings. May be blank.

Appendix E

IDDE Employee Training Record

Illicit Discharge Detection and Elimination (IDDE)

Employee Training Record

East Longmeadow, Massachusetts

Date of Training: _____

Duration of Training: _____

Name	Title	Signature

Name	Title	Signature

Appendix F

Source Isolation and Confirmation Methods:

Instructions, Manuals, and SOPs

Draft Bacterial Source Tracking Protocol, EPA New England, 2012

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

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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

Illicit Discharge Detection and Elimination: A Guidance Manual for Program Development and Technical Assessments, Center for Watershed Protection, 2004

Chapter 13: Tracking Discharges to a Source

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

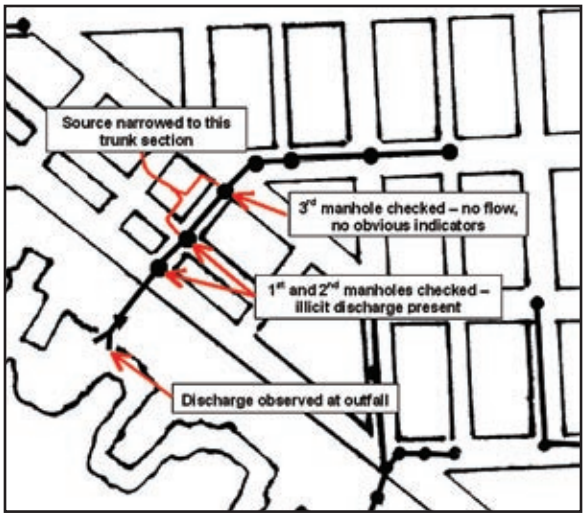


Figure 50: Example investigation following the source up the storm drain system

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.

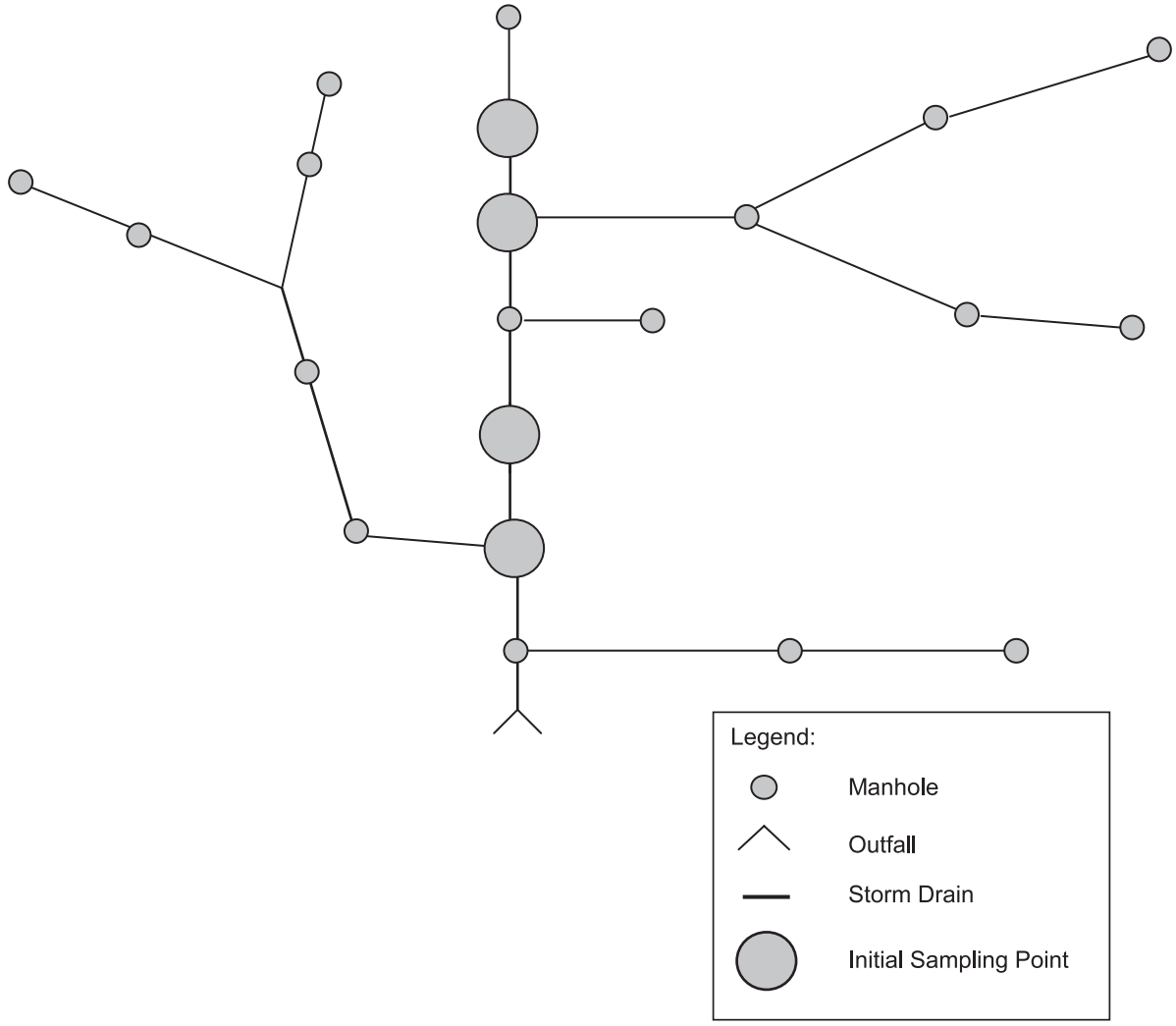


Figure 51: Key initial sampling points along the trunk of the storm drain

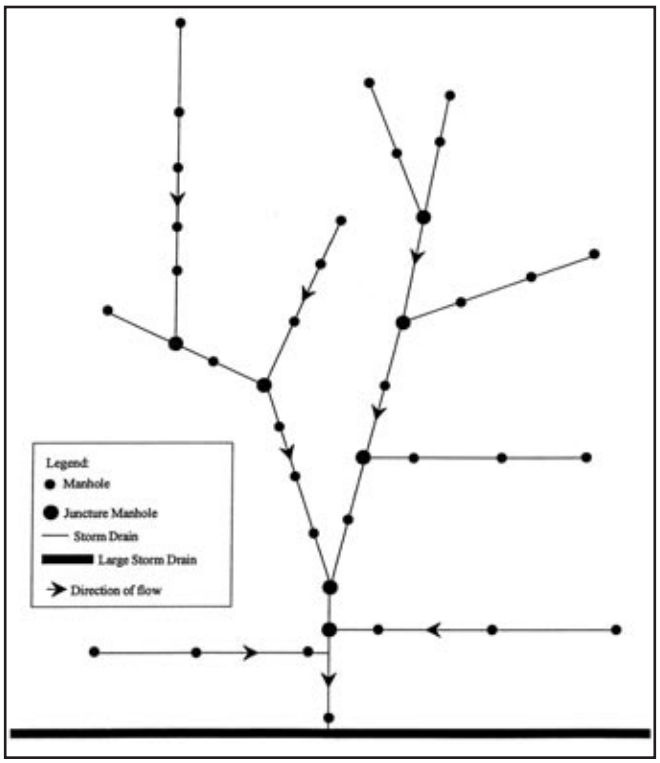


Figure 52: Storm Drain Schematic Identifying "Juncture Manholes" (Source: Jewell, 2001)

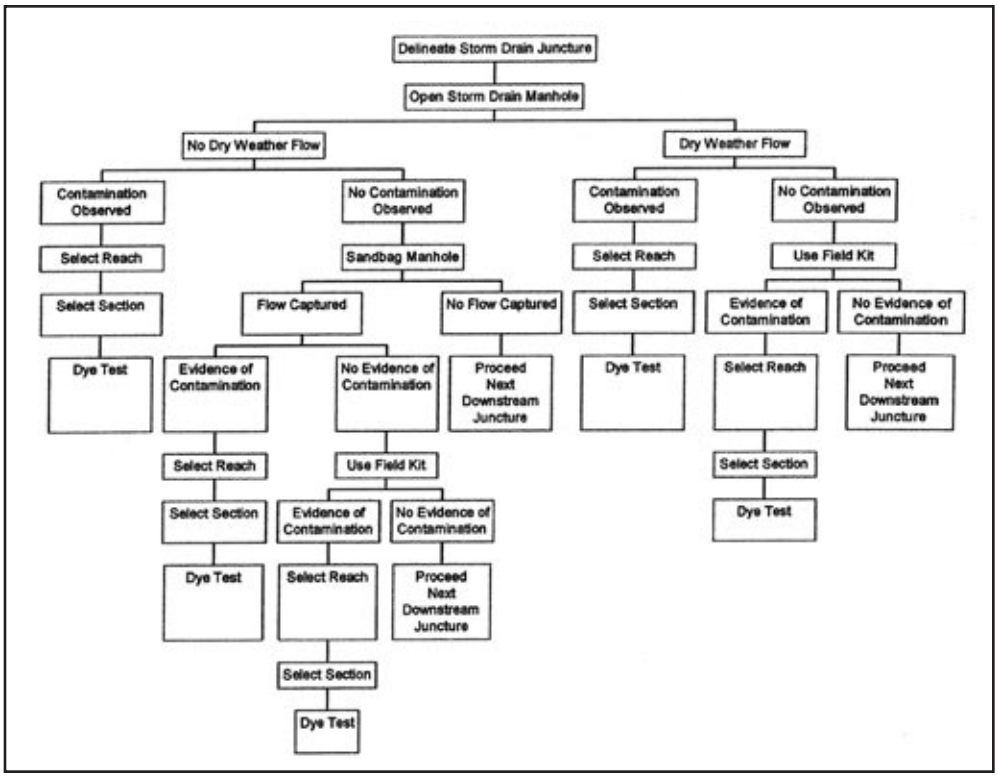


Figure 53: A Process for Following Discharges Down the Pipe (Source: Jewell, 2001)

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.

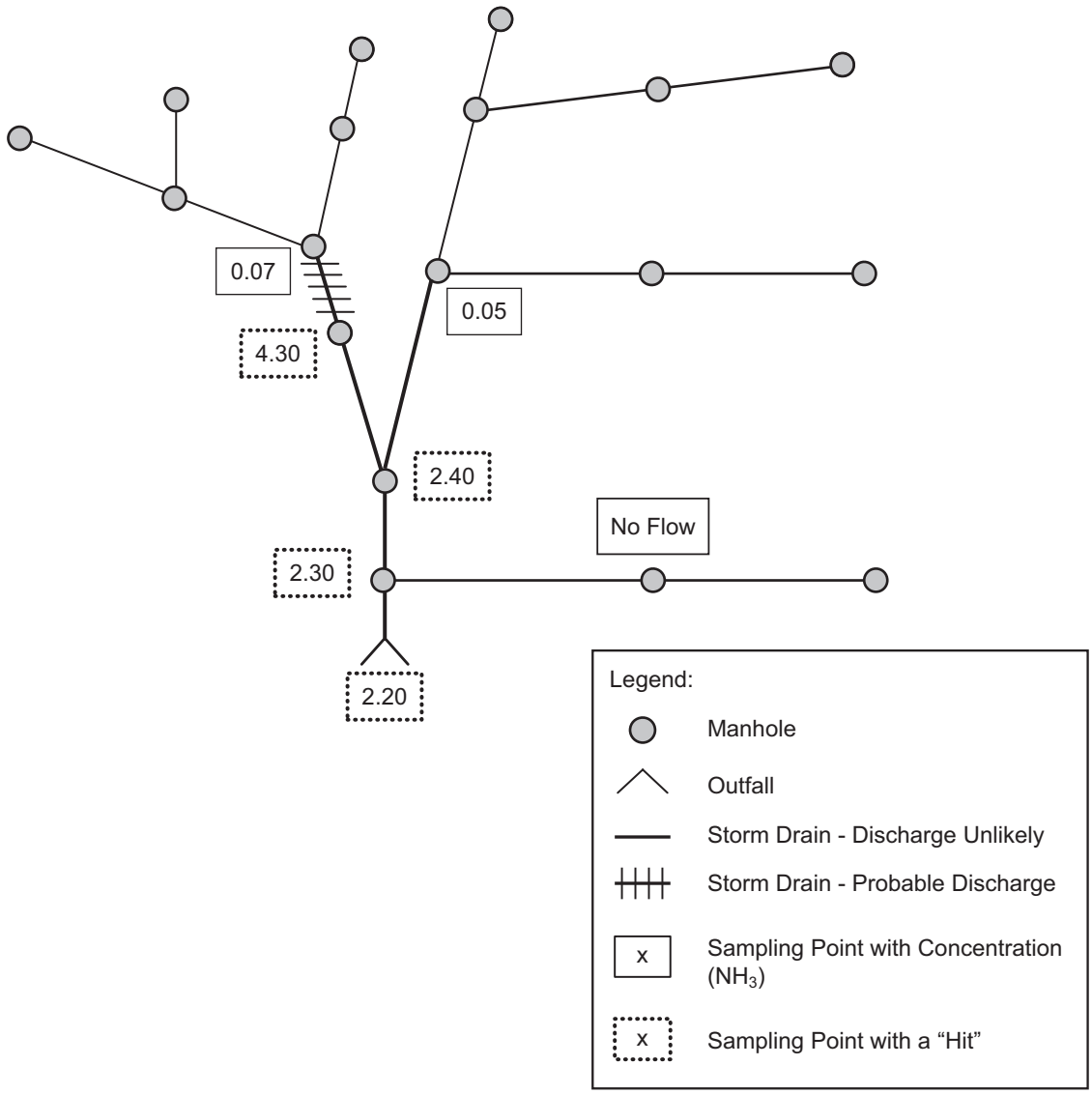


Figure 57: Use of ammonia as a trace parameter to identify illicit discharges

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:

Grade: At _____ Above_____ Below _____ High Outlet: Blocked Yes ___ No ___ NA ___

Lovejoy: Cover Plate in Place Yes ___ No ___ NA ___

Common Manholes:

	Good	Fair	Poor	Comments
Pavement	____	____	____	_____
Cover	____	____	____	_____
Frame	____	____	____	_____
Corbel	____	____	____	_____
Walls	____	____	____	_____
Floor	____	____	____	_____

Construction Material:

Brick	Precast	Other
____	____	_____
____	____	_____
____	____	_____

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).

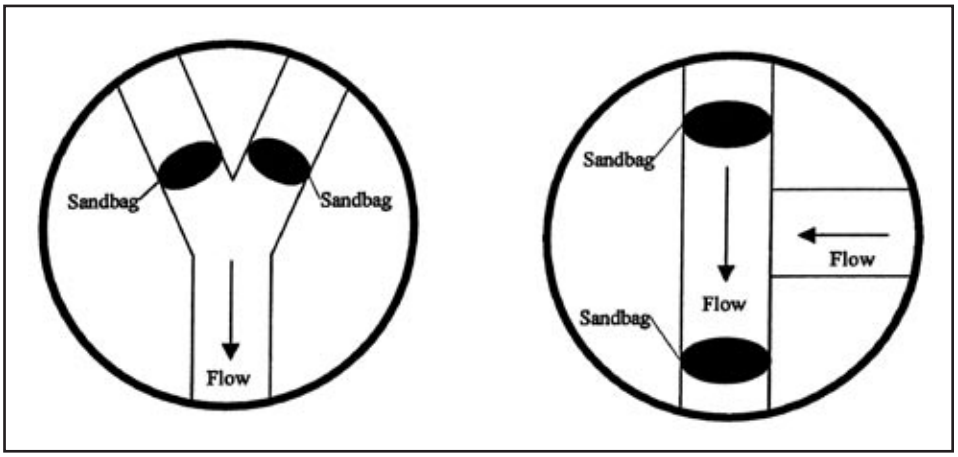


Figure 59: Example sandbag placement (Source: Jewell, 2001)

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).

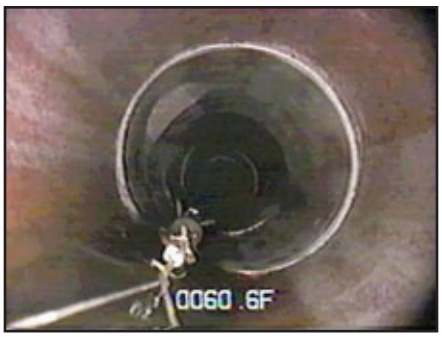


Figure 65: Camera being towed

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

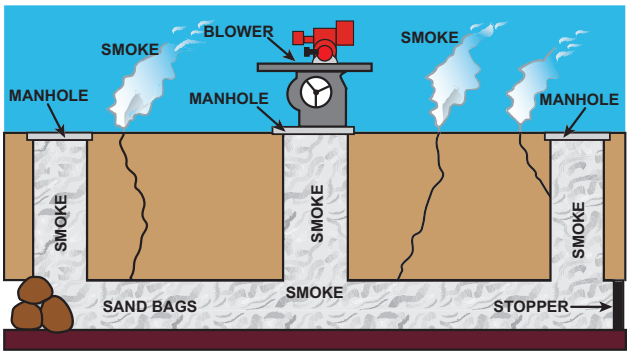


Figure 68: Smoke Testing System Schematic

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).

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 72: Aerial thermography showing sewage leak

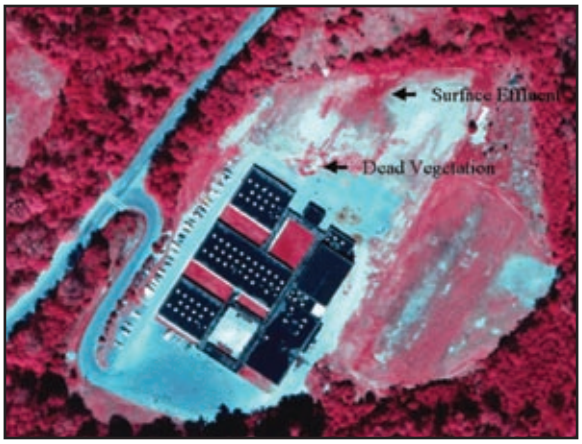


Figure 73: Dead vegetation and surface effluent are evidence of a septic system surface failure.
(Source: U.S. EPA, 1999)

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).

Illicit Discharge Detection and Elimination Manual: A Handbook for Municipalities, New England Interstate Water Pollution Control Commission, 2003

Chapter 5: Tracing the Source of an Illicit Discharge

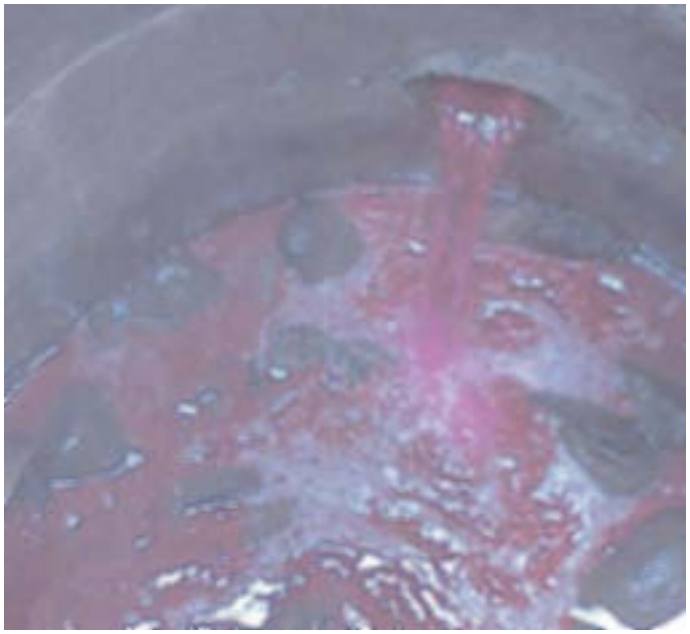
5 DEVELOPING AND IMPLEMENTING AN IDDE PLAN: TRACING THE SOURCE OF AN ILLICIT DISCHARGE

Developing and implementing a plan to detect and address illicit discharges is the third mandatory element of a Phase II IDDE program. EPA recommends that the plan include the following four components: (1) locating priority areas; (2) tracing the source of an illicit discharge; (3) removing the source of an illicit discharge; and (4) program evaluation and assessment. The second component, tracing the source of an illicit discharge, is the subject of this chapter.

THE IDDE PLAN

- Locating priority areas
- ➤ Tracing the source of an illicit discharge
- Removing the source of an illicit discharge
- Program evaluation and assessment

Once storm drain outlets with evidence of illicit discharges have been located, various methods can be used to pinpoint the exact source of the discharge. These techniques, many of which are already used by municipal sewer departments, include manhole observation, video inspection, smoke testing, dye testing, aerial infrared and thermal photography, and tracking illegal dumping.



MANHOLE OBSERVATIONS

A key tracing technique is to follow dry-weather flows upstream along the conveyance system to bracket the location of the source. This can be accomplished by taking the following steps:

- ➤ Consult the drainage system map.
- ➤ Check the next "upstream" manhole with a junction to see if there is evidence of discharge. You may wish to sample each manhole that has a discharge.
- ➤ Repeat these steps until a junction is found with no evidence of discharge; the discharge source is likely to be located between the junction with no evidence of discharge and the next downstream junction.
- ➤ Be aware of the surrounding areas and look for water in gutters and streets.

A key tracing technique is to follow dry-weather flows upstream along the conveyance system to bracket the location of the source.

Note that the Boston Water and Sewer Commission has had success working in the opposite direction (i.e., upstream to downstream) (Jewell 2001). Manhole observations can be time-consuming, but they are generally a necessary step before conducting other tests.

VIDEO INSPECTION

Mobile video cameras can be guided remotely through storm sewer lines to observe possible illegal connections into storm sewer systems and record observations on a videocassette or DVD. Public works staff can observe the videos and note any visible illegal connections. This technique is time-consuming and expensive but thorough and usually definitive, and it does not require the intrusion on members of the public that some of the other methods do.

SMOKE TESTING

This technique involves injecting non-toxic smoke into storm sewer lines and then noting the emergence of smoke from sanitary sewer vents in illegally connected buildings or from cracks and leaks in the storm sewer lines. The injection is accomplished by placing a smoke bomb in the storm sewer manhole below ground and forcing air in after it. Smoke-generating machines can also be used. Test personnel should be stationed at points of suspected illegal connections or cracks/leaks, noting any escape of smoke (indicating an illicit connection or damaged storm sewer infrastructure). Prior to performing this test, it is necessary to inform building owners and occupants in the area in advance. It is also advisable to inform the police and fire departments.

Smoke testing involves injecting non-toxic smoke into storm sewer lines and then noting the emergence of smoke from sanitary sewer vents in illegally connected buildings or from cracks and leaks in the storm sewer lines.

For a more thorough smoke-test program, the sanitary sewer lines can also be smoked. For houses that do not emit smoke during either the sanitary sewer or the storm sewer system tests, sewer gas may be venting inside, which is hazardous. Interviews with various IDDE program staff suggest that the smoke-test method is more effective in infiltration/inflow investigations of the sanitary sewer system than in detecting illegal connections to the storm sewer system.

Smoke may cause minor irritation of respiratory passages; residents with respiratory conditions should receive special attention to determine if it is safe for them to be present for the testing. Smoke testing is typically used to survey an area all at once, in contrast to dye testing, which tests one building at a time.

DYE TESTING

This technique involves flushing non-toxic dye into toilets and sinks and observing storm sewer and sanitary sewer manholes and storm sewer outfalls for the presence of the dye. Prior to performing this test, it is necessary to inform building owners and occupants in advance and gain permission for entry. Local public health and state water quality staff should also be notified so that they will be prepared to respond to citizens calling about any dye observed in surface waters.

To perform the test, you need a crew of two or more people (ideally, all with two-way radios). One person is inside the building; the others are stationed at the appropriate storm sewer and sanitary sewer manholes (which

CASE STUDY: NEW HAMPSHIRE DEPARTMENT OF ENVIRONMENTAL SERVICES

LOCATING AND TRACING ILLICIT DISCHARGES IN NEW HAMPSHIRE COASTAL COMMUNITIES

In 1996, the New Hampshire Department of Environmental Services (NHDES) began a program of investigating and eliminating illicit connections to storm drainage systems in coastal communities to reduce bacterial contamination in coastal waters. The following excerpt from the NHDES report on the first phase of the project describes the process used to detect and trace illicit discharges.

Beginning in the summer of 1996, the coastal shorelines were surveyed by foot or canoe at low tide for potential pollution sources. All pipes, seeps, streams, and swales with flow were sampled for bacteria. In addition, temperature was measured, and observations related to the condition of the pipe (stained or structurally damaged), odor, evidence of untreated wastewater (e.g., toilet paper), turbidity, color, debris, estimated flow, and any other observations were noted. Dry pipes were rechecked on several occasions for intermittent flow. Evidence indicating the presence of wastewater and/or elevated bacteria levels prompted further investigation of these locations.

Upstream catch basins and manholes associated with the outfall pipes that were identified by the screening process were surveyed for evidence of wastewater and sampled for bacteria. Smoke testing (using non-toxic smoke blown into catch basins) was then used to identify buildings connected to the storm drainage system by canvassing the neighborhood for vents emitting smoke. Final confirmation of an illicit connection from the buildings that emitted smoke was accomplished by dye testing indoor plumbing and observing the storm drainage and sewer systems for the presence or absence of the dye.

Feeder streams were surveyed for outfall pipes with dry-weather flow. Other potential bacteriological sources (e.g., pigeon roosting sites on bridges) were bracketed with water quality sampling stations. Where contaminated seeps and swales were suspected, the drainage area was surveyed for potential sources, such as broken sewer mains.

Landry, N. 1999. Elimination of Illicit Connections in Coastal New Hampshire Spurs Cooperation and Controversy: A Final Report to the New Hampshire Estuaries Project. New Hampshire Department of Environmental Services.

should be opened) and/or outfalls. The inside person drops 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 inside person 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.

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

AERIAL INFRARED AND THERMAL PHOTOGRAPHY

Aerial infrared and/or thermal photography can be used to locate illicit discharges from outfalls and failing septic systems using temperature and vegetation as markers. This technique requires knowledge of aerial photo interpretation. Using aerial infrared or thermal photographs, do the following:

- For outfalls
  - Note if discharge has a higher temperature than that of the stream
  - Note if algae growth is concentrated near an outfall
- For potentially failing septic systems
  - Note evidence of increased moisture in surrounding soil
  - Observe vegetation located close to the potentially failing septic system, and note any increase in vegetation compared to the surrounding area
  - Observe any increase in temperature readings at the septic system location

Aerial infrared and/or thermal photography can be used to locate illicit discharges from outfalls and failing septic systems using temperature and vegetation as markers.

This is still a developing technology and not commonly used for IDDE programs. You may still need further tests to determine specific houses/businesses with illegal connections. This technique has been used primarily for the detection of failing septic systems, which are only considered "illicit discharges" under the Phase II Storm Water program if they discharge into the storm sewer system.

TRACKING ILLEGAL DUMPING

Developing a coordinated system for collecting and tracking reports of illegal dumping can help pinpoint this difficult-to-find source of illicit discharges. Suggestions for tracking illegal dumping include the following:

- Create a hotline that can be used to report any illegal-dumping behavior (i.e., who illegally dumped and where illegal dumping occurred).
- Observe the materials that have been illegally dumped and trace the potential sources of the materials.
- Note where dumping occurs most often, record patterns of time of day and day of the week, and note common responsible parties.

Developing a coordinated system for collecting and tracking reports of illegal dumping can help pinpoint this difficult-to-find source of illicit discharges.

Challenges in addressing illegal dumping include the difficulty of catching dumpers in the act and the significant staff time needed to receive, respond to, and track complaints.

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