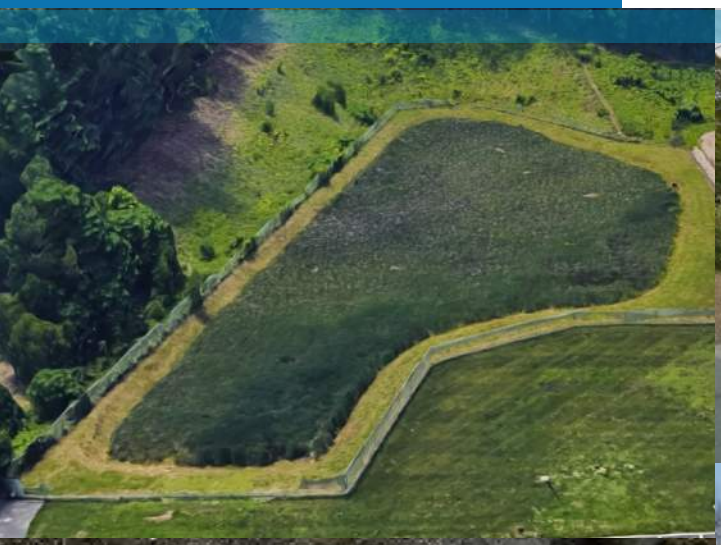

Town of Wilbraham, Massachusetts

STORMWATER MANAGEMENT PLAN

NPDES Permit # MAR041025

June 2019

Tighe&Bond
Engineers | Environmental Specialists

Tighe&Bond

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

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SECTION 1

Section 1
Introduction

The Town of Wilbraham is located in Hampden County in the City of Springfield Metropolitan Statistical Area within the Pioneer Valley region of southwest Massachusetts. The Town of Wilbraham is abutted by the City of Springfield to the west, and the Towns of Ludlow to the north, Palmer to the northeast, Monson to the east, Hampden to the south, and East Longmeadow to the southwest.

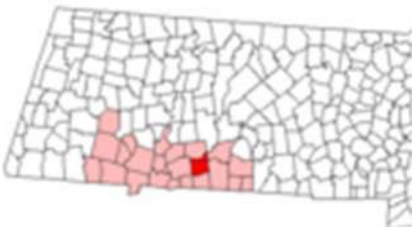

Figure 1.1 Location of Wilbraham, Hampden County, Massachusetts

Wilbraham, which has a total area of 22.4 square miles, of which 22.2 square miles is land and 0.2 square miles is water, is home to 14,868 residents as of the 2010 Census.[1] The Town is made up of several neighborhoods: Wilbraham Center, North Wilbraham, East Wilbraham, Wilbraham Mountain, South Wilbraham, Boston Road Corridor and the Pines.

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

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

[1] https://www.census.gov/quickfacts/wilbrahamtownhampdencountymassachusetts

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.

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 Wilbraham to discharge stormwater in 2003 under a *NPDES General Permit for Storm Water Discharges from Small Municipal Separate Storm Sewer Systems*, known as the "2003 Small MS4 General Permit."

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

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

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

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

1.2.2 Wilbraham's Regulated Area

The Town of Wilbraham 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 Wilbraham is charged by the EPA with operating and maintaining its MS4 to manage stormwater runoff, as well as to protect public health and safety, preserve environmental resources, and safeguard town character.

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

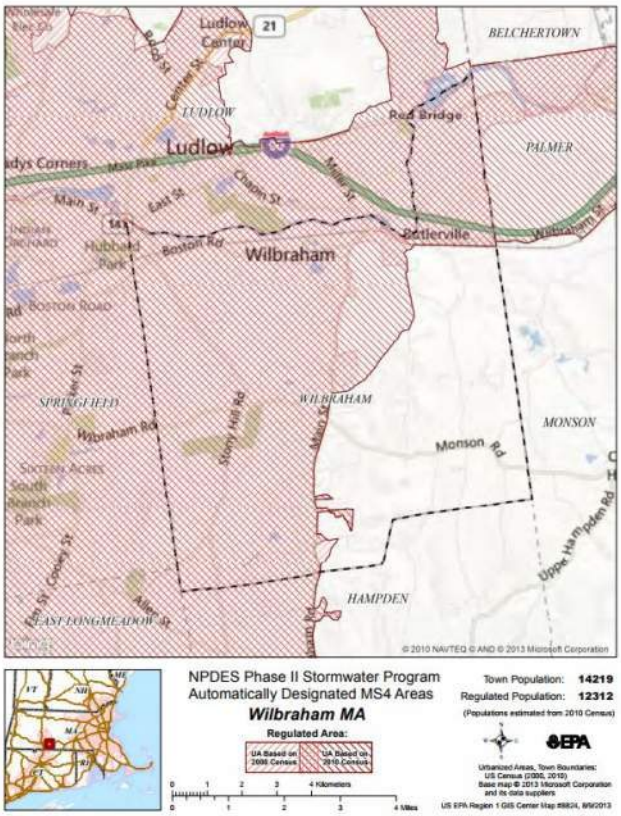

Figure 1.2. Wilbraham's Urbanized Area based on the 2000 and 2010 Census data.

According to EPA Region 1, the area covered by the 2000 census and the 2010 census are regulated by EPA under the MS4 program. Figure 1.2[3] shows Wilbraham's Urbanized Area based on the 2000 and 2010 census listings as indicated by the red hatching. The portion of Wilbraham considered to be urbanized area regulated under the MS4 program is north of Route 20 in the northeast section of Town, and west of Main Street. The southeast section of Town in not considered to be part of the MS4 regulated area.

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

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

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

Wilbraham'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 Board of Selectmen, Town Administrator, Planning Board, Board of Health, Conservation Commission, Building Department, and Stormwater Committee.

The Town of Wilbraham 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 has been able to provide a multi-media public education program related to nonpoint source pollution and stormwater management targeted at multiple audiences. Wilbraham continues to maintain an active page on the town's website dedicated to updating citizens on stormwater related information and displaying annual stormwater reports. Annually, stormwater quality videos are aired on public access broadcast. In addition, the town has provided stormwater information to schools through updated curriculum, presentations, and hands-on displays. The Town also provides targeted educational information, such as providing information on proper pet waste disposal, when issues are identified in specific areas.

Additionally, the Town belongs to the Pioneer Valley Planning Commission (PVPC) Connecticut River Stormwater Committee (CRSWC), a coalition of 17 communities in the Pioneer Valley whose goal is to promote education and outreach about stormwater impacts on the Connecticut River.

The PVPC CRSWC sponsored public service announcements (PSAs) on three local radio stations (93.9 The River, WHMP, and Lazer 99.3) to educate the public about problems associated with stormwater and ways to reduce stormwater pollution impacts. The announcements were 30 seconds each and ran from April 2, 2018 through April 19, 2018, airing a total of airing a total of 183 times (http://www.pvpc.org/content/psa-educating-valley-residents-stormwater-hit-local-ariwaves).

The PSA provided information on stormwater's role in transporting fertilizer, oil, pesticides, dirt, animal waste, and other pollutants into catch basins and pipes, then into local ponds, lakes, streams, and rivers. The PSA directed listeners to a website (http://soakuptherain.pvpc.org/) that provides information on how community members can reduce stormwater impacts through the construction of rain gardens, directing downspouts toward lawns, installing rain barrels and rain gardens, as well as using porous pavement. Fact sheets on rainwater harvesting and rain garden bioretention are available on the PVPC Soak Up the Rain website. Other resources available through the site are links to:

- EPA Soak up the Rain (http://www.epa.gov/region1/soakuptherain/),
- CT Nonpoint Education for Municipal Officials (NEMO) (http://nemo.uconn.edu/),
- Stormwater Center at University of New Hampshire (www.unh.edu/unhsc/),

- Northeast Regional Climate Center (http://www.nrcc.cornell.edu/), and
- Extreme Precipitation in New York and New England: An Interactive Web Tool for Extreme Precipitation Analysis (http://precip.eas.cornell.edu/).

The Town has taken innovative approaches to meet the requirements of this MCM.

1.3.2 MCM 2 - Public Involvement and Participation

The Town of Wilbraham meets the requirements for the 2003 EPA General Permit. The Town complies with State and Local public meeting notice requirements, and there are opportunities for residents of all ages to participate in Wilbraham's stormwater program and overall environmental stewardship, such as through the town Stormwater Committee and Hazardous Waste Collection Day. The Town has joined the Pioneer Valley Planning Commission (PVPC) Connecticut River Stormwater Committee and actively discusses Town's compliance and regulatory changes through informal Stormwater Committee meetings.

1.3.3 MCM 3 - Illicit Discharge and Detection Elimination

The Town has satisfied the mapping requirements of the 2003 General Permit by completing the mapping of their stormwater system including outfall locations, catchbasins, storm drain pipes, sanitary sewer systems, and culverts.

Wilbraham incorporated regulations to control the adverse impacts associated with stormwater runoff (Article VI, Section 634: Stormwater Phase II Comprehensive By-Law) into the Town of Wilbraham By-Laws in 2007. The Department of Public Works serves as the enforcement agency. The Town continues to log each failed Title 5 system in order to maintain failing septic records.

In addition, the Town has conducted a comprehensive outfall inspection and dry weather inspections of ¾ of the Town's outfalls. If dry weather flow is observed, the Town's initiates its internal IDDE procedure, which follows the procedures used for sewer connection investigations, and includes investigation with a camera to track the outfall to the source, and working with the property owner to disconnect any illegal connections.

1.3.4 MCM 4 - Construction Site Stormwater Runoff Control and MCM 5 - Post Construction Stormwater Management in New Development and Redevelopment

Wilbraham incorporated erosion and sediment control measures (Article VI, Section 634: Stormwater Phase II Comprehensive By-Law) into the Town of Wilbraham By-Laws in 2007. The regulations require that all land disturbing activities obtain a stormwater permit from the DPW, meet federal stormwater standards and develop a stormwater management plan. The By-law includes monetary penalties, requirements for restoration of lands, long term operation and maintenance of the BMPs considerations, and inspection procedures.

Procedures for site plan inspections are enforced via the Town of Wilbraham DPW. Inspections include observation of installation of erosion and sediment control measures, site clearing, stormwater structures and construction competition. The DPW conducts routine site inspections and also inspects sites for post-construction stormwater management.

1.3.5 MCM 6 - Pollution Prevention and Good Housekeeping

Wilbraham implements numerous actions to reduce pollutant runoff from municipal operations, including annual catch basin cleaning, street sweeping, minimal sand application for snow removal/deicing, and ongoing infiltration and inflow (I/I) inspections. Annual stormwater pollution prevention training is provided to DPW employees to reinforce good housekeeping BMPs. Wilbraham participates in an annual multi-town household hazardous waste collection day to collect oil-based paint and other wastes that cannot be disposed of as municipal solid waste.

1.3.6 Additional Permit Requirements

Groundwater Recharge and Infiltration

Through implementation of the local Stormwater Phase II Comprehensive By-law through associated Town Boards (Conservation Commission, Planning Board, and Zoning Board of Appeals), the Town evaluates site conditions and design and promotes infiltration BMPs. Land development activities that require a stormwater management permit must submit a Stormwater Report to document compliance with the MassDEPMassachusetts Stormwater Management Standards. The Town also requires that site plans and landscape plans for all proposed projects must take appropriate steps to prevent pollution of surface or groundwater, and to maximize groundwater recharge.

Public Drinking Water Supply Requirements

The Massachusetts Water Resource Authority (MWRA) supplies potable water to the Town of Wilbraham. The Wilbraham Water Department is responsible for distributing water to its customers. There are limited drinking water resources within the Town limits. The Water Department Rules and Regulations were established to ensure adequate drinking water quality and quantity, and prevent contamination of the drinking water supply. The Rules and Regulations require approval for connection, protection arising from cross-connections, and to provide maintenance to effectively prevent the contamination or pollution of all potable water systems. The Town has inventoried outfalls through GIS and, where appropriate, takes into consideration water supply sources and their protection for stormwater management.

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

The Massachusetts Year 2014 Integrated List of Waters[4] identifies three impaired waterbodies within the Town of Wilbraham: Spectacle Pond, which is subject to a phosphorus TMDL, and two segments of the Chicopee River (MA36-22 and MA36-24), which are impaired due to bacteria and pathogens and require a TMDL. In addition, Wilbraham is located within the Connecticut River watershed, which is within the Long Island Sound basin, and is therefore subject to the out-of-state Long Island Sound nitrogen TMDL. Through implementation of its current stormwater program and in meeting the other 6 MCMs, the Town is meeting TMDL requirements and has implemented pretreatment mechanisms to address the pollutants of concern from the municipal MS4.

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

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, and had an effective date of July 1, 2017. The EPA postponed the effective date for one year to July 1, 2018. The MassDEP also adopted this delayed effective date. A Notice of Intent (NOI) must be submitted within 90 days of the effective date of the permit. A Stormwater Management Plan must be submitted within one year of the effective date of the permit.

The 2016 Small MS4 General Permit[5] 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. A few of the major differences for each minimum control measure are summarized in the following points:

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

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

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

1.5 Authorization for Wilbraham to Discharge Stormwater

A copy of the NOI submitted to EPA on September 24, 2018[6] for coverage under the 2016 Small MS4 General Permit is included in **Appendix A**. Documentation of the Town of Wilbraham's Authorization to Discharge issued by EPA on June 4, 2019[7] is also provided in **Appendix A**.

1.6 General Eligibility Determination

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

- *Small MS4 within the Commonwealth of Massachusetts*
- *Not a large or medium MS4 as defined in 40 CFR 122.26(b)(4) or (7)*
- *Located either fully or partially within an urbanized area as determined by the 2010 Census or located in a geographic area designated by EPA as requiring a permit*

The Town of Wilbraham is located within Hampden County, Massachusetts. The population of the Town of Wilbraham was 14,868 according to the 2010 Census, the MS4 is not within a designated County, and the Town has not been designated by the Director as part of a large or medium MS4. As shown on Figure 1.2, based on 2000 and 2010 census listings, Wilbraham is partially located within an urbanized area.

1.7 Special Eligibility Determinations

1.7.1 Endangered Species Act

On behalf of the Town of Wilbraham, Tighe & Bond completed the National Endangered Species Eligibility Determination screening process in accordance with Part 1.9.1 and Appendix C of the 2016 Small MS4 General Permit. 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.

[6] https://www3.epa.gov/region1/npdes/stormwater/ma/tms4noi/wilbraham.pdf

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

The Town of Wilbraham meets Criterion C, where it has been determined that the Town's stormwater discharges and discharge related activities will have "no affect" on any federally threatened or endangered listed species or designated critical habitat under the jurisdiction of the US Fish and Wildlife Service (USFWS).

1.7.2 National Historic Preservation Act

On behalf of the Town of Wilbraham, Tighe & Bond completed the National Historic Preservation Act Eligibility Determination screening process in accordance with Part 1.9.2 and Appendix D of the 2016 Small MS4 General Permit, and determined that the Town of Wilbraham 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 Wilbraham's regulated area downloaded from the Massachusetts Cultural Resource Information System (MACRIS) and the National Register of Historic Places.

1.8 SWMP Program Implementation

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

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

Name	Title	Department	Contact Information	Role / Responsibilities
Edmond W. Miga, Jr., P.E.	DPW Director / Town Engineer	DPW	EMiga@Wilbraham-MA.gov (413) 596-2800, Ext. 208	Manages the Town's SWMP and compliance with the MS4 Permit. Oversees stormwater operations, including outfall screening, IDDE training, and Good Housekeeping
Tonya Basch, P.E.	Assistant DPW Director / Assistant Town Engineer	DPW	TBasch@Wilbraham-MA.gov (413) 596-2800, Ext. 208	Assists with management of the Town's SWMP and compliance with the MS4 Permit
Robert Boilard	Chairman	Board of Selectmen	(413) 596-2800	Assists with development of construction and post-construction regulations, retrofit inventory, green infrastructure report,

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

Name	Title	Department	Contact Information	Role / Responsibilities
				low impact design report
Nick Breault	Town Administrator	Town Administrator	NBreault@Wilbraham-MA.gov (413) 596-2800, Ext. 103	Assists with development of construction and post-construction regulations, retrofit inventory, green infrastructure report, low impact design report
John Pearsall	Planning Director	Planning Department	JPearsall@Wilbraham-MA.gov (413) 596-2800, Ext. 203	Assists with development of construction and post-construction regulations, retrofit inventory, green infrastructure report, low impact design report
Christopher Brown	Chairman	Conservation Commission	cbrown@mulberrylawgroup.com (413) 596-2800, Ext. 204	Assists with development of construction and post-construction regulations, site inspections, and enforcement

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SECTION 2

Section 2
Watershed Resources

2.1 Watershed Inventory

The Town of Wilbraham is located within the Connecticut River and Chicopee 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).

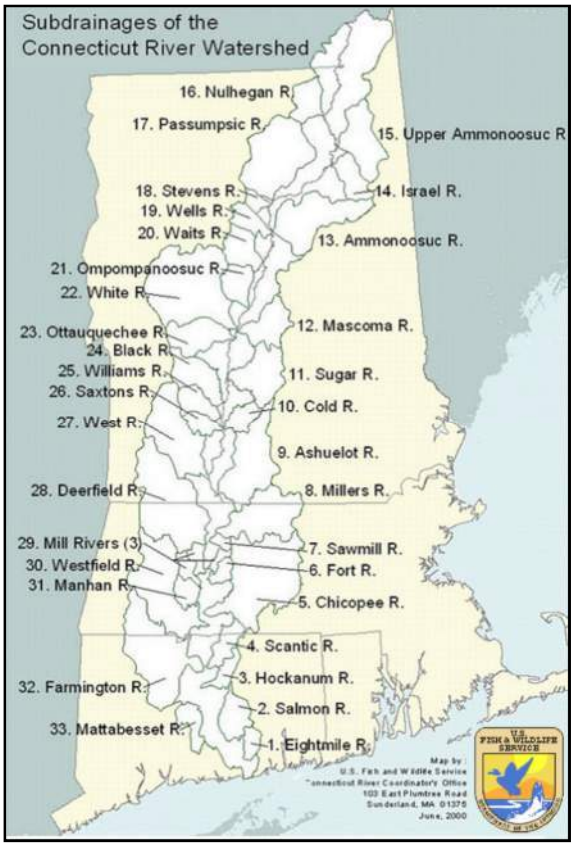


Figure 2.1. Subdrainage basins of the Connecticut River Watershed; the Chicopee River subdrainage is number 5.

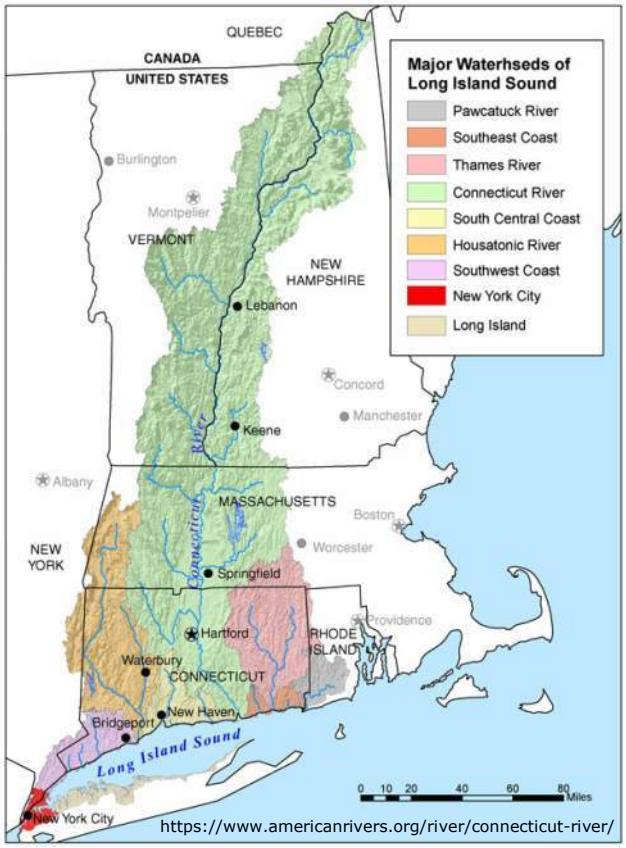


Figure 2.2 Major watersheds of the Long Island Sound Drainage Basin; the Connecticut River is shown in green.

The primary water resources for the Town of Wilbraham include the Chicopee River, North Branch Mill River, South Branch Mill River, Twelve Mile Brook, Nine Mile Pond, and Spectacle Pond. The Wilbraham stretch of the Chicopee River is impounded by three dams, Red Bridge, Cottage Street, and Putts Bridge. The Mill River Watershed has been designated as an area of critical environmental concern by the Wilbraham Conservation Commission.

Flood hazard areas are located primarily along the Chicopee River and North and South Branches of the Mill River.[8] Nine Mile Pond and Spectacle Pond (also known as Spec Pond), are recreational facilities, with a small public beach accessible from Boston Road.

Wetland resources in Wilbraham are primarily associated with areas adjacent to upland streams, with some isolated wetlands. The White Cedar Swamp in Wilbraham has been identified as the most inland extent of Atlantic White Cedar in Massachusetts.

The drinking water for the majority of the residents of the Town of Wilbraham is supplied by the Quabbin Reservoir through the Metropolitan Water Resources Authority (MWRA). Water is transferred from the Chicopee Valley Aqueduct and Quabbin Reservoir to the Wachusett Reservoir in Clinton via the Quabbin Aqueduct, and is stored in a 2.1 million gallon concrete water tank in Wilbraham prior to distribution.[9] Town residents that are not connected to the municipal water supply are served by private drinking water wells. There are no identified aquifer recharge areas or public wells in Wilbraham. There is a transient non-community well, with an associated Interim Wellhead Protection Area, at Frankie B's off Boston Road.

2.2 Receiving Waters

The following table lists all receiving waters and number of outfalls discharging to each waterbody segment. Receiving waters and outfalls are also shown on the map provided with the NOI in **Appendix A**.

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
North Branch Mill River	7	None listed
Wetland/Tributary to North Branch Mill River	19	None listed
South Branch Mill River	3	None listed
Wetland/Tributary to South Branch Mill River	16	None listed
Chicopee River (MA36-24)	7	Fecal coliform
Wetland/Tributary to Chicopee River (MA36-24)	5	Fecal coliform
Chicopee River (MA36-23)	9	None listed
Wetland/Tributary to Chicopee River (MA36-23)	6	None listed
Nine Mile Pond	1	None listed
Wetland/Tributary to Nine Mile Pond	6	None listed
Spectacle Pond (MA36142)	1	Nutrient / Eutrophication Biological Indicators

[8] https://www.wilbraham-ma.gov/DocumentCenter/View/1534/OSRP-2014-2021

[9] https://www.wilbraham-ma.gov/194/Water

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
Cedar Swamp	6	None listed
Wetland/Tributary to Bennet Pond	25	None listed
Wetland/Tributary to Calkins Brook	2	None listed
Wetland/Tributary to Chicopee River (MA36-22)	1	*Escherichia coli* Mercury in Fish Tissue
Wetland/Tributary to Spear Brook	1	None listed
Isolated Wetland Boston Street	1	None listed
Isolated Wetland	3	None listed
Isolated Wetland	1	None listed
Isolated Wetland	1	None listed
Outside Receiving Water	125	Not applicable
Total	**246**	

2.3 Water Quality

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., non-native aquatic plants)
- Category 5: TMDL required

Waterbodies classified as Category 4a (waterbodies with a TMDL) and Category 5 ("water quality limited" waterbodies) do not meet CWA designated uses, and stormwater pollutants of concern will need to be addressed. Figure 2.3 shows the 2010 TMDL status of waterbodies within the Town of Wilbraham.

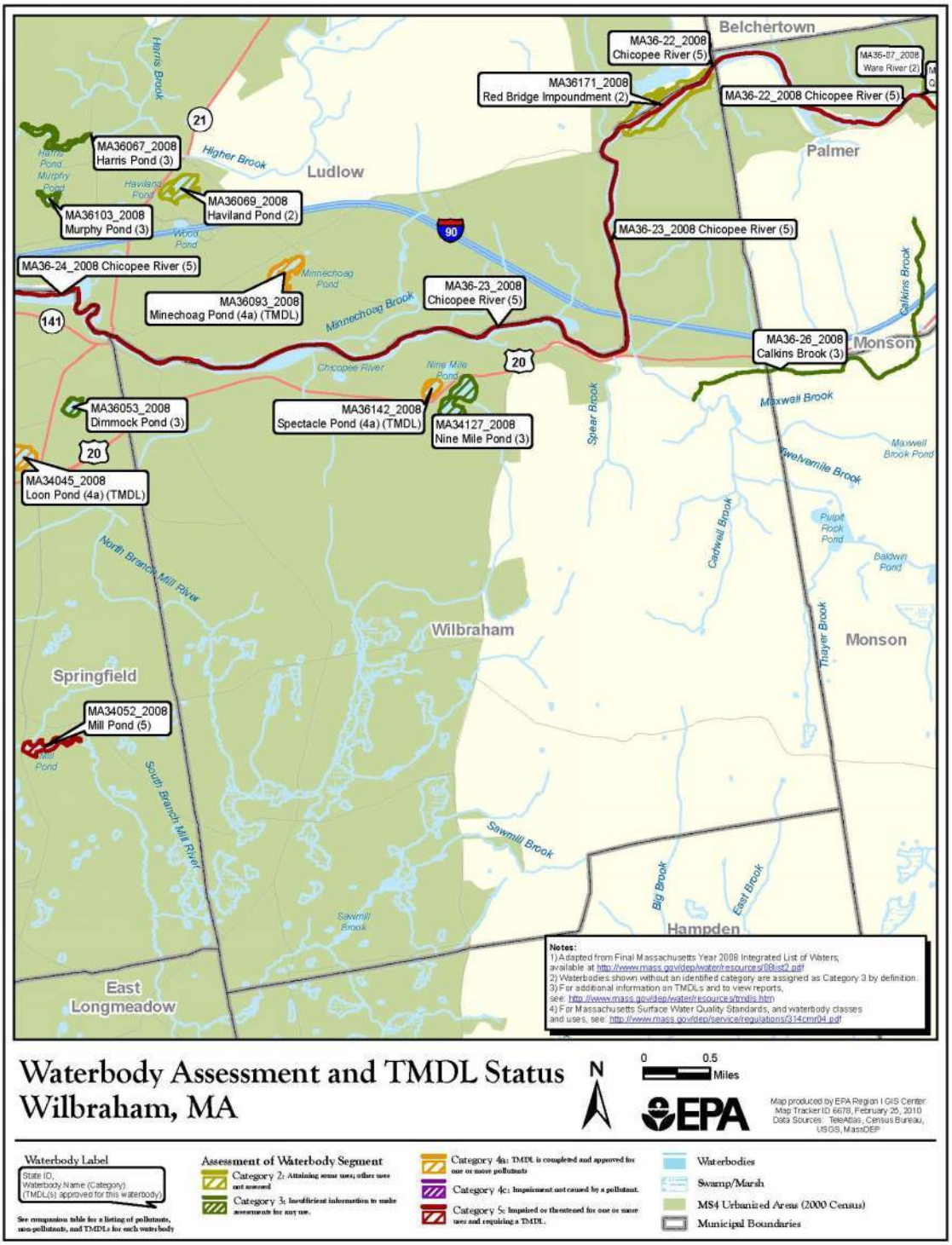


Figure 2.3. 2010 Waterbody Assessment and TMDL Status Map of Wilbraham.

The 2016 Small MS4 General Permit includes additional requirements for discharges to certain water quality limited waterbodies where nutrients and/or bacteria are the cause of the impairment(s) as outlined in Appendices F and H of the 2016 Small MS4 General Permit and discussed in further detail in Section 4.

2.3.1 2014 Integrated List of Waters

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.[10] Waterbodies identified on the Integrated List within Wilbraham are listed in Table 2-2.

Table 2-2
Massachusetts Year 2014 Integrated List of Waters Impairments in Chicopee, MA

Category 2 Waters: Attaining Some Uses; Other Uses Not Assessed						
Waterbody Segment	**Uses Attained**					
	Aesthetic	Fish, other Aquatic Life and Wildlife	Primary Contact Recreation	Secondary Contact Recreation	Shellfish Harvesting	
Chicopee River (MA36-23)	X	X	X	X		

Category 3 Waters: No Uses Assessed	
Waterbody Segment	**Location Description**
Calkins Brook (MA36-26)	Headwaters, southeast of Baptist Hill, Palmer to confluence with Twelve Mile Brook, Wilbraham
Nine Mile Pond (MA34127)	Wilbraham

Category 4a Waters: TMDL is Completed		
Waterbody Segment	**Pollutants Addressed by TMDL**	**TMDL Name**
Spectacle Pond (MA36142)	Nutrient/Eutrophication Biological Indicators	Total Maximum Daily Loads of Phosphorus for Selected Chicopee Basin Lakes[11]

Category 5 Waters: Waters Requiring a TMDL		
Waterbody Segment	**Location Description**	**Impairment Cause**
Chicopee River (MA36-22)	Source, confluence of Ware River and Quaboag River, Palmer to Red Bridge Impoundment Dam, Wilbraham / Ludlow.	*Escherichia coli* Mercury in Fish Tissue
Chicopee River (MA36-24)	Wilbraham Pumping Station (old WWTP), Wilbraham / Ludlow to Chicopee Falls Dam, Chicopee.	Fecal Coliform

[10] MassDEP, Bureau of Water Resources, *Final Massachusetts Year 2014 Integrated List of Waters*, December 2015, accessed online at: http://www.mass.gov/eea/docs/dep/water/resources/07v5/14list2.pdf.

[11] https://www.mass.gov/files/documents/2016/08/og/chicopee_0.pdf

2.3.2 Draft 2016 Integrated List of Waters

A draft 2016 Integrated List of Waters is available from MassDEP,[12] which revises Calkins Brook (MA36-26) from a Category 3 water ("no uses assessed") to a Category 2 water with aesthetic, primary contact recreation, and secondary contact recreation uses attained, and adds an *E. coli* impairment to the MA36-24 segment of the Chicopee River.

The 2016 Integrated List of Waters has not been finalized as of the date of this SWMP and is not yet the official EPA 303(d) list.

2.3.3 Stormwater Pollutants of Concern

Based on the 2014 Integrated List of Waters, the stormwater-related pollutants of concern for Wilbraham's impaired waters include bacteria, pathogens, and nutrient concentrations. More information about these pollutants and their potential sources are included in **Appendix E**.

2.3.4 Applicable TMDLs

Several segments of the Chicopee River within Wilbraham are identified as Category 5 waters (impaired and requiring a TMDL), as described in Section 2.2.1, but approved TMDLs have not yet been developed for that waterbody.

Spectacle Pond is subject to the Total Maximum Daily Loads of Phosphorus for Selected Chicopee Basin Lakes, and 2016 Small MS4 General Permit Appendix F, Part A., subpart II. Lake and Pond Phosphorus TMDL Requirements, as further discussed in Section 4.

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

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

Tighe&Bond

SECTION 3

Section 3
BMPs to Address the 2016 MA Small MS4 General Permit MCMs

3.1 MCM 1: Public Education and Outreach

Objective: *The permittee shall implement an education program that includes educational goals based on stormwater issues of significance within the MS4 area. The ultimate objective of a public education program is to increase knowledge and change behavior of the public so that pollutants in stormwater are reduced.*

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

3.1.1 MCM 1 BMPs from NOI

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

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

3.1.2 MCM 1 Implementation Plan

BMP 1A Education and Outreach to Residents

Education and outreach goals for BMP 1A include:

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

Wilbraham 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

Wilbraham 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

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

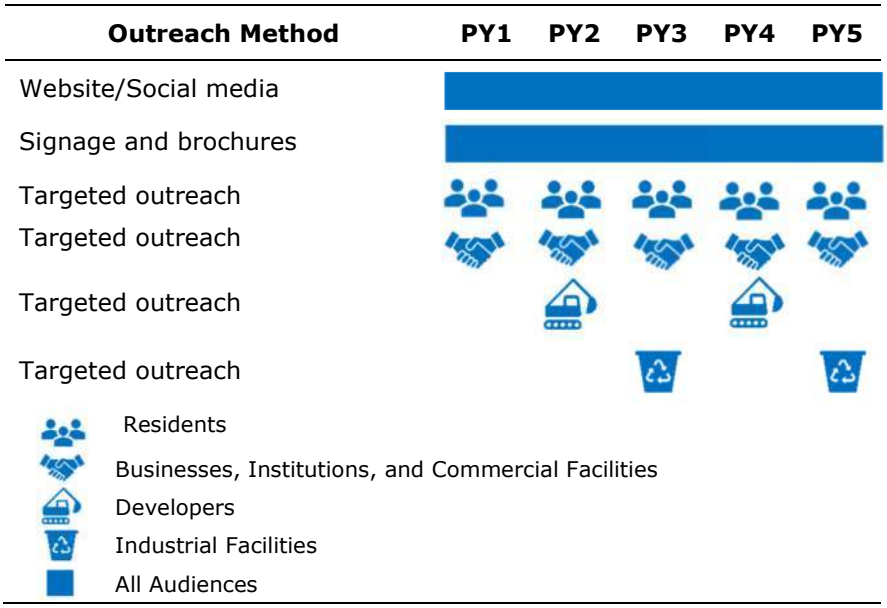
Wilbraham will provide educational materials and general outreach to industrial facilities within Town for stormwater management topics relevant to Wilbraham. Topics may include:

- 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 Wilbraham can use to supplement the Public Education program.

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

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

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

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

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

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

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

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

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

3.1.6 MCM 1 Checklist of Key Documentation

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

- ☐ All educational materials provided to target audiences
- ☐ Distribution lists for target audiences
- ☐ Dates of distribution of educational materials
- ☐ Annually track changes in social media subscription and use

Note educational goals and opinion on effectiveness based on results tracked; modify education and outreach program if necessary

3.2 MCM 2: Public Involvement and Participation

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

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

3.2.1 MCM 2 BMPs from NOI

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

3.2.2 MCM 2 Implementation Plan

BMP 2A Stormwater Management Plan Public Review

Wilbraham 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 20, 2019 to solicit input from the general public. Additionally, the SWMP is available to the public for review and comment at the Highway Department office.

BMP 2B Public Participation in Stormwater Management Program

Public involvement and participation goals for BMP 2B include:

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

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

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

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

Appendix E includes a document with helpful tips for organizing and conducting volunteer clean-up events that Wilbraham 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 Wilbraham can use to supplement the Public Involvement program.

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

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

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

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

3.2.5 MCM 2 Checklist of Key Documentation

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

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

3.3 MCM 3: Illicit Discharge Detection and Elimination (IDDE) Program

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

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

3.3.1 MCM 3 BMPs from NOI

BMP ID	BMP Category	BMP Description	Responsible Department/ Parties	Measurable Goal	Beginning Year of BMP Implementation
3A	Inventory of All Identified Sanitary Sewer Overflows (SSOs) within Previous 5 Years	Develop SSO inventory in accordance with permit conditions	DPW	Complete within 1 year of effective date of permit. Track # of SSOs identified and removed annually	2018
3B	Storm sewer system map	Outfall Inventory Complete. Improve map as new data is collected. Add data to GIS map as required by Section 2.3.4.5, including interconnections with other MS4 systems, waterbody use impairments, and catchment delineations.	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
3C	Written IDDE program	Develop written IDDE program Identify key locations for wet weather water quality sampling	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
3D	Dry Weather Outfall and Interconnection Screening and Sampling	Utilize existing dry weather monitoring and sampling data, perform additional dry weather outfall and interconnection screening and sampling as needed in accordance with outfall screening procedure and permit conditions	DPW	Complete 3 years after effective date of permit. Track number of illicit discharges identified and volume removed. Summarize sampling results	2018
3E	Catchment Investigations	Develop investigation procedures and priority ranking of catchments based on System Vulnerability Factors and evaluate catchments according to ranking, IDDE Program, and permit conditions	DPW	Complete 10 years after effective date of permit. Track number and percentage of MS4 catchments evaluated. Track number of illicit discharges identified and volume removed. Summarize screening / sampling results	2019
3F	Employee training	Provide internal training to employees involved in IDDE program and utilize PVPC CRSWC training	DPW, PVPC CRSWC	Train annually, report on the frequency and type of employee training in each annual report	2018
3G	Ongoing Screening	Reprioritize each outfall or interconnection, schedule ongoing dry and wet weather screening	DPW	Complete ongoing outfall screening upon completion of IDDE Program	2018

3.3.2 MCM 3 Implementation Plan

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

IDDE Bylaw

The IDDE program shall include adequate legal authority to prohibit, investigate, and eliminate illicit discharges and implement enforcement procedures and actions. Wilbraham has met this requirement by adopting *Stormwater Phase II Comprehensive By-law* (Section 634 of the Town of Wilbraham's By-laws) in May of 2007. This by-law prohibits illicit discharges to the Town's drainage system. The DPW, its employees or its designated agents serve as the authorized enforcement agency for the by-law. See Section 4 of the IDDE Plan for additional information.

BMP 3A SSO Inventory

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

- Location (approximate street crossing/address and receiving water, if any)
- Date(s) and time(s) of each known SSO occurrence
- Estimated volume(s) of each known SSO occurrence
- Description of the occurrence indicating known or suspected cause(s)
- Mitigation and corrective measures completed, with dates implemented
- Mitigation and correction measures planned, with implementation schedules

This BMP is currently not applicable, as the Town of Wilbraham has not had any SSO events to date. Should an SSO event occur, an SSO inventory would be developed in accordance with permit conditions. See Section 2 of the IDDE Plan for additional information.

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

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

BMP 3B Storm Sewer System Map

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

BMP 3C Written IDDE Program

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

The IDDE Plan will include outfall screening on High and Low Priority Outfalls within 3 years of the permit's effective date, catchment investigations for 100% of the Problem Outfalls within 7 years of the permit's effective date, and 100% of all catchment investigations within 10 years of the permit's effective date.

The outfall/interconnection inventory and initial ranking and the dry weather outfall and interconnection screening and sampling results will be included in the IDDE Plan. See the IDDE Plan in **Appendix I** for additional information.

BMP 3D Dry Weather Outfall/Interconnection Screening and Sampling

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

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

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

BMP 3E Catchment Investigations

Catchment investigation procedures are described in Section 7 of the IDDE Plan included in **Appendix I**. 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 3C.

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

BMP 3F Employee Training

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

BMP 3G Ongoing Screening

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

3.3.3 MCM 3 Implementation Schedule

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

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

✓ = 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 Wilbraham can use to supplement the IDDE program. The Town-specific procedures in the IDDE Plan were developed using the IDDE Guidance Manual and New England Source Tracking Protocol linked below. A link to the Town's *Stormwater Management Bylaw* is also provided below.

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

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

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

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

Wilbraham Town By-laws (Section 634: Stormwater Phase II Comprehensive By-law)
https://www.wilbraham-ma.gov/DocumentCenter/View/190/Town-Bylaws

3.3.5 MCM 3 Checklist of Key Documentation

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

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

3.4 MCM 4: Construction Site Stormwater Runoff Control

Objective: *To minimize or eliminate erosion and maintain sediment on site so that it is not transported in stormwater and allowed to discharge to a water of the U.S. through the permittee's MS4.*

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

3.4.1 MCM 4 BMPs from NOI

BMP ID	BMP Category	BMP Description	Responsible Department/ Parties	Measurable Goal	Beginning Year of BMP Implementation
4A	Site Inspection and Enforcement of Erosion and Sediment Control (ESC) measures	Continue to implement and enforce the existing Stormwater Phase II Comprehensive by-law site inspection procedures	DPW, Board of Selectmen, Town Adminstrator, Planning Department, Conservation Commission, Town Counsel	Review current procedures and modify if necessary within 1 year of permit effective date	2018

BMP ID	BMP Category	BMP Description	Responsible Department/ Parties	Measurable Goal	Beginning Year of BMP Implementation
4B	Site Plan Review	Modify the existing by-law to include evaluation of opportunities for use of low impact design and green infrastructure	DPW, Board of Selectmen, Town Adminstrator, Planning Department, Conservation Commission, Town Counsel	Complete modifications within 1 year of permit effective date. Include tracking information regarding the number of site reviews, inspections, and enforcement actions in the annual report	2018
4C	Erosion and Sediment Control	Continue to implement and enforce the existing Stormwater Phase II Comprehensive by-law requirements for construction site operators to implement an ESC program	DPW, Board of Selectmen, Town Adminstrator, Planning Department, Conservation Commission, Town Counsel	Review current procedures and modify if necessary within 1 year of the effective date of permit	2018
4D	Waste Control	Incorporate requirements to control wastes into the existing Stormwater Phase II Comprehensive by-law	DPW, Board of Selectmen, Town Adminstrator, Planning Department, Conservation Commission, Town Counsel	Complete within 1 year of the effective date of permit	2018

3.4.2 MCM 4 Implementation Plan

Per the 2016 Small MS4 General Permit, Wilbraham must develop and implement the following items, which will be adopted as regulation modifications or a formalized procedure. Note that while Wilbraham can choose to implement these items Town-wide, they are only required for disturbances within the regulated area that are greater than or equal to one acre or less than one acre if that disturbance is part of a larger common plan of development or sale that would disturb one or more acres.

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

- Requirements for construction site operators performing land disturbance activities within the MS4 jurisdiction that result in stormwater discharges to the MS4 to implement a sediment and erosion control program that includes BMPs appropriate for the conditions at the construction site
- Requirements for construction site operators within the MS4 jurisdiction to control wastes, including but not limited to, discarded building materials, concrete truck wash out, chemicals, litter, and sanitary wastes
- Written procedures for site plan review and inspection and enforcement, due within one year of the effective date of the permit

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

The Town implements and enforces a program to reduce pollutants in stormwater runoff discharged to the MS4 system from construction activities, including use of sediment and erosion control practices, at sites greater than one acre. The Town adopted a bylaw entitled *Stormwater Phase II Comprehensive By-law* (Section 634 of the Town Bylaws) in 2007 that provides guidance for site planning and stormwater runoff control during construction and post-construction to protect local water resources from discharges, with the Board of Selectmen serving as the enforcement agency.

Section G of the by-law requires that applicants contact the DPW within 48 hours prior to installation of erosion and sediment control measures, site clearing, installation of permanent stormwater structures prior to backfilling, installation of stormwater conveyance structures, and construction completion, for initial, erosion control, bury, and final inspections. Refer to **Appendix E** for standard operating procedures (SOPs) and inspection forms developed by the Central Massachusetts Stormwater Coalition (CMRSWC) for site inspections, inspections of erosion and sediment controls, and constructed stormwater BMPs.

BMP 4B Site Plan Review

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

BMP 4C Erosion and Sediment Control

Wilbraham shall continue to implement and enforce the existing *Stormwater Phase II Comprehensive By-law* (Section 634 of the Town General Bylaws) requirements for construction site operators to implement an erosion and sediment control (ESC) program on-site. Current procedures will be reviewed and modified if necessary to comply with the requirements of the 2016 Small MS4 General Permit.

BMP 4D Waste Control

The existing *Stormwater Phase II Comprehensive By-law* definition of "pollutant" already incorporates specific language requiring the control of waste materials, including but not limited to construction wastes, litter, sewage, chemicals, and other discarded objects.

3.4.3 MCM 4 Implementation Schedule

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

● = year due

3.4.4 MCM 4 Guidelines and Resources

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

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

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

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

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

3.4.5 MCM 4 Checklist of Key Documentation

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

- ☐ Number of site reviews, inspections, and enforcement actions
- ☐ Site inspection forms
- ☐ Modifications to Wilbraham'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	As-built Plans for On-Site Stormwater Control	Continue to implement and enforce the existing Stormwater Phase II Comprehensive By-law requirements for Local Stormwater Management Permit applicants to submit as-built plans for stormwater controls and to submit an O&M agreement	DPW	Continue to implement and enforce the existing by-law	2018
5B	Inventory and Priority Ranking of MS4-Owned Properties for BMP Retrofits	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, Board of Selectmen, Planning Department	Complete report no later than 4 years of permit effective date. Beginning in year 5 keep running list of at least 5 retrofit sites	2020
5C	Assess Allowing Green Infrastructure	Develop a report assessing existing local regulations to determine the feasibility of making green infrastructure practices allowable when appropriate site conditions exist	Board of Selectmen, Town Counsel, Planning Department, PVPC CRSWC	Complete 4 years after permit effective date and implement recommendations of report	2020
5D	Assess Street Design and Parking Lot Guidelines	Develop a report assessing existing local regulations to determine the feasibility of making green infrastructure practices allowable when appropriate site conditions exist	Board of Selectmen, Town Counsel, Planning Department, PVPC CRSWC	Complete 4 years after permit effective date and implement recommendations of report	2020
5E	Post-Construction Bylaw and Regulations	Modify the Town's existing Stormwater Phase II Comprehensive By-law to contain new provisions related to low impact development, new development, and redevelopment per section 2.3.6.a.	DPW	Modify existing by-law and/or regulations if necessary within 2 years of permit effective date	2019

3.5.2 MCM 5 Implementation Plan

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

The Town shall continue to implement and enforce the existing *Stormwater Phase II Comprehensive By-law* (Section 634 of the Town's General Bylaws), passed in 2007, which requires that Local Stormwater Management Permit applicants submit as-built plans for stormwater controls and to submit an operation, maintenance, and inspection agreement. A requirement for as-built plans to be submitted no later than two years after completion of construction projects has been added to the Local Stormwater Management Permit application.

BMP 5B Retrofit Feasibility Assessment

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

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

BMP 5C Assess Allowing Green Infrastructure

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

BMP 5D Assess Street Design and Parking Lot Guidelines

In accordance with General Permit Section 2.3.6.b, Wilbraham shall develop a report assessing current street design and parking lot guidelines and other local requirements that affect the creation of impervious cover. This assessment shall be used to provide information to allow the Town to determine if changes to design standards for streets and parking lots can be made to support low impact design (LID) options. Input will be gathered from multiple Town departments. The final report will be appended to this SWMP once completed, and report recommendations will be implemented by Permit Year 9 with progress reported annually.

BMP 5E Post-Construction By-Law and Regulations

Wilbraham has met the requirement to implement and enforce a program to reduce pollutants in stormwater runoff discharged to the municipal drainage system from post-construction activities for all new development and redevelopment sites greater than one acre by adopting a bylaw entitled *Stormwater Phase II Comprehensive By-law* (Section 634 of the Town's General Bylaws) in 2007. These by-laws provide guidance for site planning and stormwater runoff control during construction and post-construction to protect local water resources from discharges. The DPW serves as the enforcement agency for the bylaw. The Town will need to review the existing by-law and associated regulations with respect to the 2016 Small MS4 General Permit and modify as needed.

3.5.3 MCM 5 Implementation Schedule

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

● = year due

3.5.4 MCM 5 Guidelines and Resources

The following links include free or low-cost resources Wilbraham 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 Wilbraham's by-laws, regulations, policies, and/or procedures as necessary

- ☐ Status of BMP 5C and 5D assessments, including any planned or completed changes to local regulations and guidelines (BMP 5C) and findings and progress towards making the practices allowable (BMP 5D)
- ☐ Retrofit inventory, including all sites that have been modified or retrofitted (BMP 5B). Sites should include town-owned sites identified in the inventory as well as non-municipal property modified or retrofitted to mitigate impervious area

3.6 MCM 6: Good Housekeeping and Pollution Prevention

Objective: *The permittee shall implement an operations and maintenance program for permittee-owned operations that has a goal of preventing or reducing pollutant runoff and protecting water quality from all permittee-owned operations.*

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

3.6.1 MCM 6 BMPs from NOI

BMP ID	BMP Category	BMP Description	Responsible Department/ Parties	Measurable Goal	Beginning Year of BMP Implementation
6A	Operation & Maintenance (O&M) & Inventory	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	Complete and implement 2 years after permit effective date	2019
6B	MS4 Infrastructure O&M Program	Establish and implement program for repair and rehabilitation of MS4 infrastructure	DPW	Complete and implement 2 years after permit effective date	2019
6C	Stormwater Pollution Prevention Plan (SWPPP)	Create SWPPPs for maintenance garages, transfer stations, and other waste handling facilities	DPW	Complete 2 years after effective date of permit	2019

BMP ID	BMP Category	BMP Description	Responsible Department/ Parties	Measurable Goal	Beginning Year of BMP Implementation
6D	Catch Basin Cleaning Program	Implement procedures and schedule to optimize catch basin cleaning such that each catch basin is no more than 50% full	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	2018
6E	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
6F	Winter Road Maintenance Program	Minimize use of sand in deicing operations, and evaluate opportunities for use of alternative materials to sodium chloride and other salts during winter maintenance	DPW	Implement salt use optimization during deicing season, include description of efforts in annual report	2018
6G	Inspection and Maintenance of Stormwater Treatment Structures	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

3.6.2 MCM 6 Implementation Plan

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

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

BMP 6B MS4 Infrastructure O&M Procedures

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

BMP 6C Stormwater Pollution Prevention Plan (SWPPP)

In accordance with General Permit Section 2.3.7.b, Wilbraham must develop and implement SWPPPs for Town-owned or operated waste handling facilities where pollutants are exposed to stormwater.

The Town-owned waste-handling facilities, including the transfer station and former landfill site, are connected to a closed stormwater system that discharges to a retention basin and does not discharge to a receiving water. If the facility has received a conditional "no exposure" exclusion under the Multi-Sector General Permit, it is assumed that a SWPPP under the 2016 MS4 General Permit will not be required.

SWPPP requirements include "regular" employee training for all members of the Pollution Prevention Team (at a minimum). Additionally, quarterly site inspections are required at these sites according to 2016 Small MS4 General Permit Section 2.3.7.b.iii.

BMP 6D Catch Basin Cleaning Program

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

BMP 6E Street Sweeping Program

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

BMP 6F Winter Road Maintenance Program

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

BMP 6G Stormwater Treatment Structures Inspection and Maintenance Procedures

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

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

3.6.3 MCM 6 Implementation Schedule

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

● = annual requirement or year due
↔ = ongoing requirement

3.6.4 MCM 6 Guidelines and Resources

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

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

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

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

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

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

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

3.6.5 MCM 6 Checklist of Key Documentation

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

- ☐ O&M procedures for municipal facilities and equipment
- ☐ Inventory of municipal facilities and equipment

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

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SECTION 4

Section 4
BMPs to Address Specific Waterbody Requirements

4.1 Impaired Waters with an Approved TMDL

4.1.1 Long Island Sound Nitrogen TMDL

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

4.1.1.1 Enhanced BMPs

MCM 1: Public Education and Outreach

Enhanced MCM 1 Objectives	BMPs
Education and outreach to Residential and Business / Commercial / Institutional stakeholders will be supplemented with annual timed messages on specific topics (grass clippings, fertilizers, pet waste, and leaf litter)	Continue to distribute targeted educational information, such as proper pet waste disposal brochure, at targeted areas. Distribute PVPC CRSC-developed enhanced educational materials for distribution to required stakeholders.

MCM 3: IDDE Program

Enhanced MCM 3 Objectives	BMPs
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 City 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.

MCM 5: Stormwater Management in New Development and Redevelopment

Enhanced MCM 5 Objectives	BMPs
Nitrogen Removal BMPs in Stormwater Bylaw	Modify the Town's existing Stormwater Phase II Comprehensive By-law to contain new provisions related to optimization of stormwater management BMPs for nitrogen removal.
Nitrogen Reduction BMPs in Inventory and Priority Ranking of MS4-Owned Properties for BMP Retrofits	Include options for nitrogen-reducing BMPs in the report containing a detailed inventory of MS4-owned properties and a running list of at least 5 sites that have potential for retrofits required to be developed.

MCM 6: Good Housekeeping and Pollution Prevention

Enhanced MCM 6 Objectives	BMPs
Slow Release Fertilizer and Grass Cuttings Management Requirements in O&M Procedures	Include procedures for proper management of grass cuttings, leaf litter, and slow-release fertilizer use on permittee-owned property in written O&M procedures.
Increased Street Sweeping Frequency	Include a schedule for twice-yearly sweeping into the street sweeping program. For rural uncurbed roadways with no catch basins, the permittee shall either meet the minimum street sweeping frequency, or develop and implement an inspection, documentation and targeted sweeping plan within two years of the effective date of the permit, and submit such plan with the first annual report.

4.1.1.2 Nitrogen Source Identification Report

Develop and submit a Nitrogen Source Identification Report as part of the year 4 annual report, and required by Appendix F, part B.1 of the 2016 MA Small MS4 General Permit.

4.1.1.3 Structural BMPs

Include an evaluation of all properties identified either under MCM 5 as presenting retrofit opportunities or areas for structural BMP installation, or identified in the Nitrogen Source Identification Report as areas with potential for installation of nitrogen-reducing BMPs in the year 5 annual report, as required by Appendix F, part B.1 of the 2016 MA Small MS4 General Permit. The evaluation will include the next planned redevelopment activity or planned retrofit date, the estimated cost of redevelopment or retrofitting, the engineering and regulatory feasibility of redevelopment or installing retrofit BMPs, and a schedule for implementation of planned structural BMP installation.

One structural BMP is required to be installed as a demonstration project within six years of the permit effective date. Annual reports will include a summary of structural BMPs installed in the urbanized area, and estimates of the amount of nitrogen removed per the methodology described in Appendix H, Attachment 1 of the 2016 Small MS4 General Permit.

4.1.2 TMDLs of Phosphorus for Selected Chicopee Basin Lakes

Spectacle Pond in Wilbraham (segment ID MA36142) is identified in the Massachusetts Year 2014 Integrated List of Waters as a Category 4A water impaired due to Nutrient/Eutrophication Biological Indicators, with a completed TMDL. Spectacle Pond is subject to the TMDLs of Phosphorus for Selected Chicopee Basin Lakes, TMDL Report MA36025-2002-2[13].

It should be noted that Spectacle Pond was included in the TMDL as a protective phosphorus load. Appendix F, part A.II of the 2016 MA Small MS4 General Permit identifies additional requirements for lake and ponds with a phosphorus TMDL.

[13]Commonwealth of Massachusetts, Executive Office of Environmental Affairs, Department of Environmental Protection, Bureau of Resource Protection, Division of Watershed Management. *Total Maximum Daily Loads of Phosphorus for Selected Chicopee Basin Lakes, DEP, DWM TMDL Report MA36025-2002-2*. January 2002. http://www.mass.gov/eea/docs/dep/water/resources/a-thru-m/chicopee.pdf

Residences in the vicinity of Spectacle Pond that previously were utilized on-site septic systems are now connected to Town Sewer. The Town of Wilbraham has previously implemented an aquatic vegetation management program consisting of hydro-raking, benthic barriers, and mechanical harvesting, and is in the process of developing a long range master plan for the health of the pond.[14]

4.1.2.1 Lake Phosphorus Control Plan (Spectacle Pond)

Wilbraham is required to develop a Lake Phosphorus Control Plan (LPCP) designed to reduce the amount of phosphorus in stormwater discharges from its MS4 to the impaired waterbody by 45%. The LPCP must be completed and fully implemented as soon as possible but no later than 15 years after the effective date of the permit (July 1, 2033).

The LPCP will include a legal analysis; funding source assessment; calculations of baseline phosphorus load, allowable phosphorus load, and the phosphorus reduction requirement; a description of planned non-structural and structural controls; a priority ranking of areas and infrastructure within the municipality for potential implementation of phosphorus control practices; an O&M Program for all structural BMPs being claimed for phosphorus reduction credit.

A progress report on the planning and implementation of the LPCP must be included in each annual report, including an estimate of yearly phosphorus export rate, certification that all structural BMPs are being inspected and maintained per the O&M program, and certification that fertilizer use on municipally owned and maintained turf grass areas are being managed in accordance with 331 CMR 31.

4.2 Water Quality Impaired Waterbodies

Two segments of the Chicopee River within the Town of Wilbraham were identified in the Massachusetts Year 2014 Integrated List of Waters as being Category 5 waters, in need of but not currently under a TMDL, for the following impairments:

Waterbody	Segment	Location	Impairment(s)
Chicopee River	MA36-22	Source, confluence of Ware River and Quaboag River, Palmer to Red Bridge Impoundment Dam, Wilbraham/Ludlow	*E. Coli* Mercury in Fish Tissue
Chicopee River	MA36-24	Wilbraham Pumping Station (old WWTP), Wilbraham/Ludlow to Chicopee Falls Dam, Chicopee	Fecal Coliform

[14] Desmarais, Danielle L. *Hydro-Raking As A Management Option For Aquatic Non-Native Invasive And Native Nuisance Plants In Freshwater Ponds And Lakes: Case Studies In Massachusetts*. 2016. International Development, Community and Environment (IDCE). Paper 38.

4.2.1 Chicopee River (MA34-22 and MA34-24): Bacteria & Pathogens

Appendix H part III of the 2016 MA Small MS4 General Permit identifies additional requirements for stormwater discharges to waterbodies that are water quality limited due to bacteria or pathogens, without an EPA approved TMDL.

4.2.0.1 Additional or Enhanced BMPs

MCM 1: Public Education and Outreach

2016 MA Small MS4 Enhanced MCM 1 Objectives	BMPs
Education and outreach to Residential stakeholders will be supplemented with annual timed messages on specific topics (pet waste and maintenance of septic systems)	Will be combined with the requirements of Appendix F part B.I described in Section 5.1.1.1.

MCM 3: Illicit Discharge Detection and Elimination

2016 MA Small MS4 Enhanced MCM 3 Objectives	BMPs
Enhanced Catchment Investigations	Catchments draining to the waterbodies impaired for E. Coli will be designated either Problem Catchments or High priority

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SECTION 5

Section 5
Program Evaluation, Record Keeping, and Reporting

5.1 Program Evaluation

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

5.2 Record Keeping

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

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

Checklists of record keeping items Wilbraham should maintain are also included under each BMP in Section 3 of the SWMP. Records relating to the 2016 Small MS4 General Permit, including the SWMP, will be made available to the public, as required by Section 4.2.c of the 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 Small MS4 General Permit shall also cover the period from May 1, 2018 to the permit effective date, July 1, 2018.

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

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

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

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

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

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

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

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

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

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

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

5.4 SWMP Modifications

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

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

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

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

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

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

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

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

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

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

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

Tighe&Bond

SECTION 6

Section 6
Stormwater Management Plan 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: _____

Tighe&Bond

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 Wilbraham | State: MA

EPA NPDES Permit Number (if applicable): MAR041025

Primary MS4 Program Manager Contact Information

Name: Edmond W. Miga, Jr., P.E. | Title: Director, Department of Public Works

Street Address Line 1: 240 Springfield Street

Street Address Line 2:

City: Wilbraham | State: MA | Zip Code: 01095

Email: EMiga@Wilbraham-MA.gov | Phone Number: (413) 596-2800

Fax Number:

Other Information

Stormwater Management Program (SWMP) Location (web address or physical location, if already completed): Physical location: DPW Office, 240 Springfield Street, Wilbraham, MA 01095

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): Paper copy 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): 05/14/07

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): 05/14/07

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): 05/14/07

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
North Branch Mill River	7	☐	☐	☐	☐	☐	☐	☐	☐	☐	
Wetland/Tributary to North Branch Mill River	19	☐	☐	☐	☐	☐	☐	☐	☐	☐	
South Branch Mill River	3	☐	☐	☐	☐	☐	☐	☐	☐	☐	
Wetland/Tributary to South Branch Mill River	16	☐	☐	☐	☐	☐	☐	☐	☐	☐	
Chicopee River (MA36-24)	7	☐	☐	☐	☐	☐	☐	☐	☐	☐	Fecal Coliform
Wetland/Tributary to Chicopee River (MA36-24)	5	☐	☐	☐	☐	☐	☐	☐	☐	☐	Fecal Coliform
Chicopee River (MA36-23)	9	☐	☐	☐	☐	☐	☐	☐	☐	☐	
Wetland/Tributary to Chicopee River (MA36-23)	6	☐	☐	☐	☐	☐	☐	☐	☐	☐	
Ninemile Pond	1	☐	☐	☐	☐	☐	☐	☐	☐	☐	
Wetland/Tributary to Ninemile Pond	6	☐	☐	☐	☐	☐	☐	☐	☐	☐	
Spectacle Pond (MA36142)	1	☐	☐	☐	☐	☐	☐	☐	☐	☐	Nutrient/Eutrophication Biological Indictor
Cedar Swamp	6	☐	☐	☐	☐	☐	☐	☐	☐	☐	
Wetland/Tributary to Bennet Pond	25	☐	☐	☐	☐	☐	☐	☐	☐	☐	
Wetland/Tributary to Calkins Brook	2	☐	☐	☐	☐	☐	☐	☐	☐	☐	
Wetland/Tributary to Chicopee River (MA36-22)	1	☐	☐	☐	☐	☐	☐	☐	☒	☐	Mercury in Fish Tissue
Wetland/Tributary to Spear Brook	1	☐	☐	☐	☐	☐	☐	☐	☐	☐	
Isolated Wetland Boston Street	1	☐	☐	☐	☐	☐	☐	☐	☐	☐	
Isolated Wetland Dipping Hole Road	3	☐	☐	☐	☐	☐	☐	☐	☐	☐	

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
Isolated Wetland Springfield Street	1	☐	☐	☐	☐	☐	☐	☐	☐	☐	
Isolated Wetland Wilbraham & Monson Academy	1	☐	☐	☐	☐	☐	☐	☐	☐	☐	
Outside Receiving Waterbody	125	☐	☐	☐	☐	☐	☐	☐	☐	☐	
		☐	☐	☐	☐	☐	☐	☐	☐	☐	
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Click to lengthen table

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

Part III: Stormwater Management Program Summary

Identify the Best Management Practices (BMPs) that will be employed to address each of the six Minimum Control Measures (MCMs). For municipalities/organizations whose MS4 discharges into a receiving water with an approved Total Maximum Daily Load (TMDL) and an applicable waste load allocation (WLA), identify any additional BMPs employed to specifically support the achievement of the WLA in the TMDL section at the end of part III.

For each MCM, list each existing or proposed BMP by category and provide a brief description, responsible parties/departments, measurable goals, and the year the BMP will be employed (public education and outreach BMPs also requires a target audience). **Use the drop-down menus in each table or enter your own text to override the drop down menu.**

MCM 1: Public Education and Outreach

BMP Media/Category (enter your own text to override the drop down menu)	**BMP Description**	**Targeted Audience**	**Responsible Department/Parties** (enter your own text to override the drop down menu)	**Measurable Goal**	**Beginning Year of BMP Imple-mentation**
Multi-media methods	Distribute an annual message in the spring (Apr/May) that encourages proper use and disposal of grass clippings and encourages use of slow-release fertilizers Distribute an annual message in the summer (Jun/Jul) that encourages proper management of pet waste Distribute an annual message in the fall (Aug/Sept/Oct) that encourages proper disposal of leaf litter	1A - Residents	PVPC CRSWC, DPW	Distribute a minimum of three (3) timed messages annually on specific Nitrogen TMDL related topics.	2018

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

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

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

Part III: Stormwater Management Program Summary (continued)

MCM 2: Public Involvement and Participation

BMP Categorization	Brief BMP Description (enter your own text to override the drop down menu)	Responsible Department/Parties (enter your own text to override the drop down menu)	Additional Description/ Measurable Goal	Beginning Year of BMP Imple-mentation
2A - Public Review	SWMP available for public review at DPW office and on website	DPW	Allow annual review of stormwater management plan and posting of stormwater management plan on website	2018
2B - Public Participation	Provide public participation opportunities through annual meeting, po	All Town Departments, Boards, and Committees	Allow public to comment on stormwater management plan annually	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 - Inventory of All Identified Sanitary Sewer Overflows (SSOs) within Previous 5 Years	Develop SSO inventory in accordance with permit conditions	DPW	Complete within 1 year of effective date of permit. Track # of SSOs identified and removed annually	2018
3B - Storm Sewer System Map	Outfall inventory complete. Improve map as new data is collected. Add data to GIS map as required by Section 2.3.4.5, including interconnections with other MS4 systems, waterbody use impairments, and catchment delineations	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
3C - Written IDDE program	Develop written IDDE program Identify key locations for wet weather water quality sampling	DPW	Complete written IDDE program within 1 year of the effective date of permit, update components annually as needed	2018
3D - Dry Weather Outfall and Interconnection Screening and Sampling	Utilize existing dry weather monitoring and sampling data, perform additional dry weather outfall and interconnection screening and sampling as needed in accordance with outfall screening procedure and permit conditions	DPW	Complete 3 years after permit effective date. Track # of illicit discharges identified & volume removed. Summarize sampling results	2018

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

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

Part III: Stormwater Management Program Summary (continued)

MCM 4: Construction Site Stormwater Runoff Control

BMP Categorization (enter your own text to override the drop down menu or entered text)	**BMP Description**	**Responsible Department/Parties** (enter your own text to override the drop down menu)	**Measurable Goal** (all text can be overwritten)	**Beginning Year of BMP Imple-mentation**
4A - Site Inspection and Enforcement of Erosion and Sediment Control (ESC) Measures	Continue to implement and enforce the existing Stormwater Phase II Comprehensive by-law site inspection procedures	DPW, Bd. of Selectmen, Town Adminstrator, Planning Dept., ConCom, Town Cour	Review current procedures and modify if necessary within 1 year of permit effective date	2018
4B - Site Plan Review	Modify the existing by-law to include evaluation of opportunities for use of low impact design and green infrastructure	DPW, Bd. of Selectmen, Town Adminstrator, Planning Dept., ConCom, Town Cour	Complete modifications within 1 year of permit effective date. Include tracking information regarding the number of site reviews, inspections, and enforcement actions in the annual report	2018
4D - Erosion and Sediment Control (ESC) Program for Construction Operators	Continue to implement and enforce the existing Stormwater Phase II Comprehensive by-law requirements for construction site operators to implement an ESC program	DPW, Bd. of Selectmen, Town Adminstrator, Planning Dept., ConCom, Town Cour	Review current procedures and modify if necessary within 1 year of permit effective date	2018
4E - Waste Control	Incorporate requirements to control wastes into the existing Stormwater Phase II Comprehensive by-law	DPW, Bd. of Selectmen, Town Adminstrator, Planning Dept., ConCom, Town Cour	Complete within 1 year of the effective date of permit	2018

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

Part III: Stormwater Management Program Summary (continued)

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

BMP Categorization (enter your own text to override the drop down menu or entered text)	**BMP Description**	**Responsible Department/Parties** (enter your own text to override the drop down menu)	**Measurable Goal** (all text can be overwritten)	**Beginning Year of BMP Implementation**
5A - As-Built Plans for On-Site Stormwater Control	Continue to implement and enforce the existing Stormwater Phase II Comprehensive By-law requirements for Local Stormwater Management Permit applicants to submit as-built plans for stormwater controls and to submit an O&M agreement	DPW	Continue to implement and enforce the existing by-law	2018
5B - Inventory and Priority Ranking of MS4-Owned Properties for BMP Retrofits	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, Board of Selectmen, Planning Dept.	Complete report no later than 4 years of permit effective date. Beginning in year 5 keep running list of at least 5 retrofit sites	2020
5C - Assess Allowing Green Infrastructure	Develop a report assessing existing local regulations to determine the feasibility of making green infrastructure practices allowable when appropriate site conditions exist	Board of Selectmen, Town Counsel, Planning Dept., PVPC CRSWC	Complete 4 years after effective date of permit and implement recommendations of report	2020

5D - Assess Street Design and Parking Lot Guidelines	Develop a report assessing requirements that affect the creation of impervious cover to help determine if changes to design standards for streets and parking lots can be modified to support low impact design options.	Board of Selectmen, Town Counsel, Planning Dept., PVPC CRSWC	Complete 4 years after effective date of permit and implement recommendations of report	2020
5E - Post-Construction Bylaw and Regulations	Modify the Town's existing Stormwater Phase II Comprehensive By-law to contain new provisions related to low impact development, new development, and redevelopment per section 2.3.6.a. r	DPW	Modify existing bylaw and/or regulations if necessary within 2 years of permit effective date	2019

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

Part III: Stormwater Management Program Summary (continued)

MCM 6: Municipal Good Housekeeping and Pollution Prevention

BMP Categorization (enter your own text to override the drop down menu or entered text)	**BMP Description**	**Responsible Department/Parties** (enter your own text to override the drop down menu)	**Measurable Goal** (all text can be overwritten)	**Beginning Year of BMP Imple-mentation**
6A - Operations & Maintenance (O&M) Procedures & Inventory	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	Complete and implement 2 years after effective date of permit	2019
6B - MS4 Infrastructure O&M Program	Establish and implement program for repair and rehabilitation of MS4 infrastructure	DPW	Complete and implement 2 years after effective date of permit	2019
6C - Stormwater Pollution Prevention Plan (SWPPP)	Create SWPPPs for maintenance garages, transfer stations, and other waste-handling facilities (see additional information in Part IV)	DPW	Complete and implement 2 years after effective date of permit	2019
6D - Catch Basin Cleaning Program	Implement procedures and schedule to optimize catch basin cleaning such that each catch basin is no more than 50% full	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	2018

6E - 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
6F - Winter Road Maintenance Program	Continue to minimize use of sand in deicing operations, and evaluate opportunities for use of alternative materials to sodium chloride and other salts during winter maintenance	DPW	Implement salt use optimization during deicing season, include description of efforts in annual report	2018
6G - Inspection and Maintenance of Stormwater Treatment Structures	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

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	DPW
Chicopee Lakes (Phosphorus)	Adhere to requirements in part A.II of Appendix F	DPW

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)
E. Coli	Chicopee River (MA36-22)	Adhere to requirements in part III of Appendix H	DPW
Fecal Coliform	Chicopee River (MA36-24)	Adhere to requirements in part III of Appendix H	DPW

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

2. SWPPP - the Town-owned waste-handling facilities, including the transfer station and former landfill site, are connected to a closed stormwater system that discharges to a retention basin and does not discharge to a receiving water. If the facility has received a conditional "no exposure" exclusion under the Multi-Sector General Permit, it is assumed that a SWPPP under the 2016 MS4 General Permit will not be required.

3. Spectacle Pond in Wilbraham (segment ID MA36142) is identified in the Massachusetts Year 2014 Integrated List of Waters as a Category 4A water impaired due to Nutrient/Eutrophication Biological Indicators, subject to the TMDLs of Phosphorus for Selected Chicopee Basin Lakes, TMDL Report MA36025-2002-2. It is noted in the TMDL that Spectacle Pond was included in the TMDL as a protective phosphorus load. Residences in the vicinity of Spectacle Pond that previously were utilized on-site septic systems are now connected to Town Sewer. The Town of Wilbraham has previously implemented an aquatic vegetation management program consisting of hydro-raking, benthic barriers, and mechanical harvesting, and is in the process of developing a long range master plan for the health of the pond.

4. The Federal Endangered Species Eligibility Determination screening process has been completed and the Town of Wilbraham 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.

5. The National Historic Preservation Act Eligibility Determination screening process has been completed and the Town of Wilbraham 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.

6. 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.

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: NICK BREAULT

Title: TOWN ADMINISTRATOR

Signature: Nick Breault

Date: 9/24/18

[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

Outfalls
Receiving Waterbody

- Chicopee River (MA36-23)
- Wetland/Tributary to Chicopee River (MA36-23)
- Chicopee River (MA36-24)
- Wetland/Tributary to Chicopee River (MA36-24)
- North Branch Mill River
- Wetland/Tributary to North Branch Mill River
- South Branch Mill River
- Wetland/Tributary to South Branch Mill River
- Ninemile Pond
- Wetland/Tributary to Ninemile Pond
- Cedar Swamp
- Spectacle Pond (MA36142)
- Wetland/Tributary to Bennett Pond
- Wetland/Tributary to Calkins Brook
- Wetland/Tributary to Chicopee River (MA36-22)
- Wetland/Tributary to Spear Brook
- Isolated Wetland Boston Street
- Isolated Wetland Dipping Hole Road
- Isolated Wetland Springfield Street
- Isolated Wetland Wilbraham & Monson Academy
- Outside Receiving Waterbody

BELCHERTOWN
PALMER
LUDLOW
MONSON
SPRINGFIELD
EAST LONGMEADOW
HAMPDEN

Legend

- Town Boundary

Water Body Segments - Rivers

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

Water Body Segments - Lakes, Estuaries

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

- Major Basins
- Subbasins

National Wetlands Inventory

- Estuarine and Marine Wetland
- Freshwater Emergent Wetland
- Freshwater Forested/Shrub Wetland
- Estuarine and Marine Deepwater
- Freshwater Pond
- Lake
- Riverine
- Other
- NWI Rivers and Streams

MassDEP Hydrology

MassDEP

- Public Surface Water Supply (PSWS)
- Water Bodies
- Hydrology

MassDEP Wetlands

- Inland Wetlands

MassDOT Major Roads

Road Type

- Limited Access Highway
- Multi-lane Hwy, not limited access
- Other Numbered Highway
- Major Road, Collector

- 100-Year Floodplain (FEMA)
- Urbanized Area 2000
- Urbanized Area 2010

1. Based on USGS Topo Map Hampden, 1979 (10 ft) and Ludlow, 1975 (10 ft)
2. MassGIS: 2014 Integrated List Data (2016), Major Drainage Basins (2003), Subbasins (2007) Community Boundary (2017), National Wetlands Inventory (2007), FEMA National Flood Hazard (2017), MassDOT Major Roads (2014), Urban Area (2000 and 2010)
3. Wilbraham: Outfalls

N

0 1,000 2,000 4,000 Feet

1:15,000

OUTFALLS AND RECEIVING WATERBODIES

Notice of Intent
Wilbraham, Massachusetts

September 2018

Tighe&Bond
Engineers | Environmental Specialists

J:\W\W1929 Wilbraham\010B MS4 NOI\Permitting\NOI\GIS\MXD\24x36_NOI_Rec_Waters_Wilbraham.mxd

W-1929

Vuto, Michelle

From: Grochmal, Dena <dgrochmal@wilbraham-ma.gov>
Sent: Tuesday, April 16, 2019 3:15 PM
To: Vuto, Michelle
Cc: Tonya Basch; TJAdamski
Subject: Re: Small MS4 NOI submission - additional or corrected information required

Michelle,

The Town of Wilbraham will complete items noted in your attachment under the MCM4 for written procedures for site inspection, ESC measures, enforcement and site plan review process.

Under the MCM5, we will require submission of As-built drawings and ensure long term operation and maintenance will be part of the SWMP.

The Town of Wilbraham has always been proactive in our the Phase II Stormwater Requirements. Most of the information requested is currently being enforced by our Stormwater Phase II Comprehensive By-Law (Section 634 of the Town of Wilbraham's By-Laws) and our Stormwater permitting process.

Any further comments or questions, please feel free to contact me.

Thank You.

Dena Grochmal
Town of Wilbraham
Engineering Dept
240 Springfield St
Wilbraham, MA 01095
413-596-2800 x208

----- Original Message -----
From: "Vuto, Michelle" <Vuto.Michelle@epa.gov>
To: "Edmond Miga" <emiga@wilbraham-ma.gov>, "Dena Grochmal" <dgrochmal@wilbraham-ma.gov>
Cc: "Reports Stormwater" <Stormwater.Reports@epa.gov>
Sent: Wednesday, April 3, 2019 9:13:58 AM
Subject: Small MS4 NOI submission - additional or corrected information required

Hi Edmond,

EPA requires additional or corrected information to receive a complete NOI submission for your MS4 and continue the review process.

Please respond to this email with the requested details in the attached report. You do not need to resubmit your entire NOI form. Please respond with the requested information as soon as you can. If the additional information is not received within 30 days of the date on this email EPA may initiate the process to deny your NOI, unless additional time is granted by EPA for such submission.

Let me know if you have any questions.

Best,
Michelle

Michelle Vuto
Stormwater & Construction Permits
U.S. EPA Region 1
5 Post Office Square-OEP06-4
Boston, MA 02109-3912
617-918-1222

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

VIA EMAIL

June 4, 2019

Nick Breault
Town Administrator

And;

Edmond W. Miga, Jr., P.E.
Director, Department of Public Works
240 Springfield Street
Wilbraham, MA. 01095
Emiga@Wilbraham-MA.gov

Re: National Pollutant Discharge Elimination System Permit ID #: MAR041025, Town of Wilbraham

Dear Edmond W. Miga, Jr., P.E.:

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

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

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

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

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

Sincerely,

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

and;

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

Tighe&Bond

APPENDIX B

Appendix B
Summary of 2003 and 2016 MS4 General Permit BMPs

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

MCM 1: Public Education and Outreach

1.1 – Stormwater Website – now under BMP 1 (A-D)
1.2 – Public Access Television – now under BMP 1 (A-D)
1.3 – Stormwater Education in Schools – now under BMP 1A and 2B
1.4 – Annual Stormwater Report – now under BMPs 1 (A-D) and 2B
1.5 – Importance of Septic System Maintenance – now under BMPs 1A, 2B, and 3C

MCM 2: Public Involvement and Participation

2.6 – Earth Day – now under BMP 2B
2.7 – Stormwater Committee – now under BMP 2B
2.7a – Hazardous Waste Collection Day – now under BMP 2B

MCM 3: Illicit Discharge Detection and Elimination

3.8 –Bylaw – now under BMP 3C
3.8a –Stormwater Phase II Comprehensive By-law – now under BMP 3C
3.9 – Map Drainage System – now under BMP 3B
3.10 – IDDE Plan – now under BMP 3C
3.11 – Septic System Inventory – now under BMP 3C

MCM 4: Construction Site Stormwater Runoff Control

4.11 – Bylaw – now under BMP 4A
4.11a – Stormwater Phase II Comprehensive By-law – now under BMP 4 (A–E)
4.12 – Site Plan Approval for Greater than 1 Acre – now under BMP 4B
4.13 – Establish Permitting Process for Small Construction – now under BMP 4A, 4D, 4E
4.14 – Inspections and Penalties – now under BMPs 4A and 4D

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

5.15 – Subdivision Regulations – now under BMP 5E
5.15a – Stormwater Phase II Comprehensive By-law – now under BMPs 5A and 5E
5.16 – Tracking, Inspection and Penalties Plan– now under BMP 5E

MCM 6: Pollution Prevention and Good Housekeeping in Municipal Operations

6.17 – Clean Catch Basins – now under BMP 6D
6.18 –Sweep Streets – now under BMP 6E
6.19 – Paint Shed – now under BMP 6A
6.20 – Reduce Sand/Salt – now under BMP 6F
6.21 – Spill Prevention and Control Plan – now under BMP 6A
6.21 – Community Emergency Management Plan – now under BMP 2B, 6A
6.22 – Employee Training – now under BMP 3F
6.23 – Reduction of Infiltration and Inflow from Sewers – now under BMP 3C, 6B

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

7A – Long Island Sound TMDL for Nitrogen, BMPs under MCMs 1-6– 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 Wilbraham Stormwater Management Program Files

FROM: Tighe & Bond

COPY: Tonya Basch, P.E., Assistant DPW Director/Engineer, Town of Wilbraham

DATE: September 7, 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 Wilbraham** 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 Wilbraham.

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

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

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

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

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

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

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

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

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 Wilbraham 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 Wilbraham's IPaC action area potentially contains a federally listed species, the Northern Long-eared Bat.

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

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

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

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

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

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

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

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

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

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

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

Yes, if during the course of the permit term the Town of Wilbraham plans to install a structural BMP not identified in the NOI, the Town agrees to conduct an endangered species screening for the proposed site and contact USFWS if it is determined that the new activity "may affect" or is "not likely to adversely affect" listed species or critical habitat under the jurisdiction of the USFWS.

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

J:\W\W1929 Wilbraham\010B MS4 NOI\Permitting\NOI\ESA Eligibility\Draft Wilbraham ESA Eligibility Criterion C Memo Text_Sept 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

Wilbraham Designated MS4 Area USFWS New England Ecological Services Field Office 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:
Consultation Code: 05E1NE00-2018-SLI-2975
Event Code: 05E1NE00-2018-E-07021
Project Name: Wilbraham MS4

September 06, 2018

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

To Whom It May Concern:

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

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

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

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

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

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

Please be aware that bald and golden eagles are protected under the Bald and Golden Eagle Protection Act (16 U.S.C. 668 *et seq.*), and projects affecting these species may require development of an eagle conservation plan (http://www.fws.gov/windenergy/eagle_guidance.html). 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-2975

Event Code: 05E1NE00-2018-E-07021

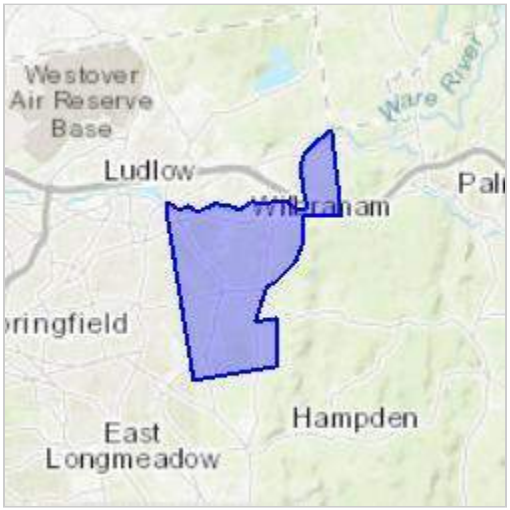
Project Name: Wilbraham MS4

Project Type: Regulation Promulgation

Project Description: This project is applying for coverage under the 2016 MS4 General Permit. The project consists of the portion of the Town of Wilbraham'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 Wilbraham 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/42.1350025232635N72.44659745522343W



Counties: Hampden, MA

Endangered Species Act Species

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

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

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

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

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

Mammals

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

Critical habitats

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

Attachment C

Federally Listed Endangered and Threatened Species in Massachusetts

FEDERALLY LISTED ENDANGERED AND THREATENED SPECIES IN MASSACHUSETTS

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

Updated 02/05/2016

FEDERALLY LISTED ENDANGERED AND THREATENED SPECIES IN MASSACHUSETTS

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

Updated 02/05/2016

FEDERALLY LISTED ENDANGERED AND THREATENED SPECIES IN MASSACHUSETTS

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

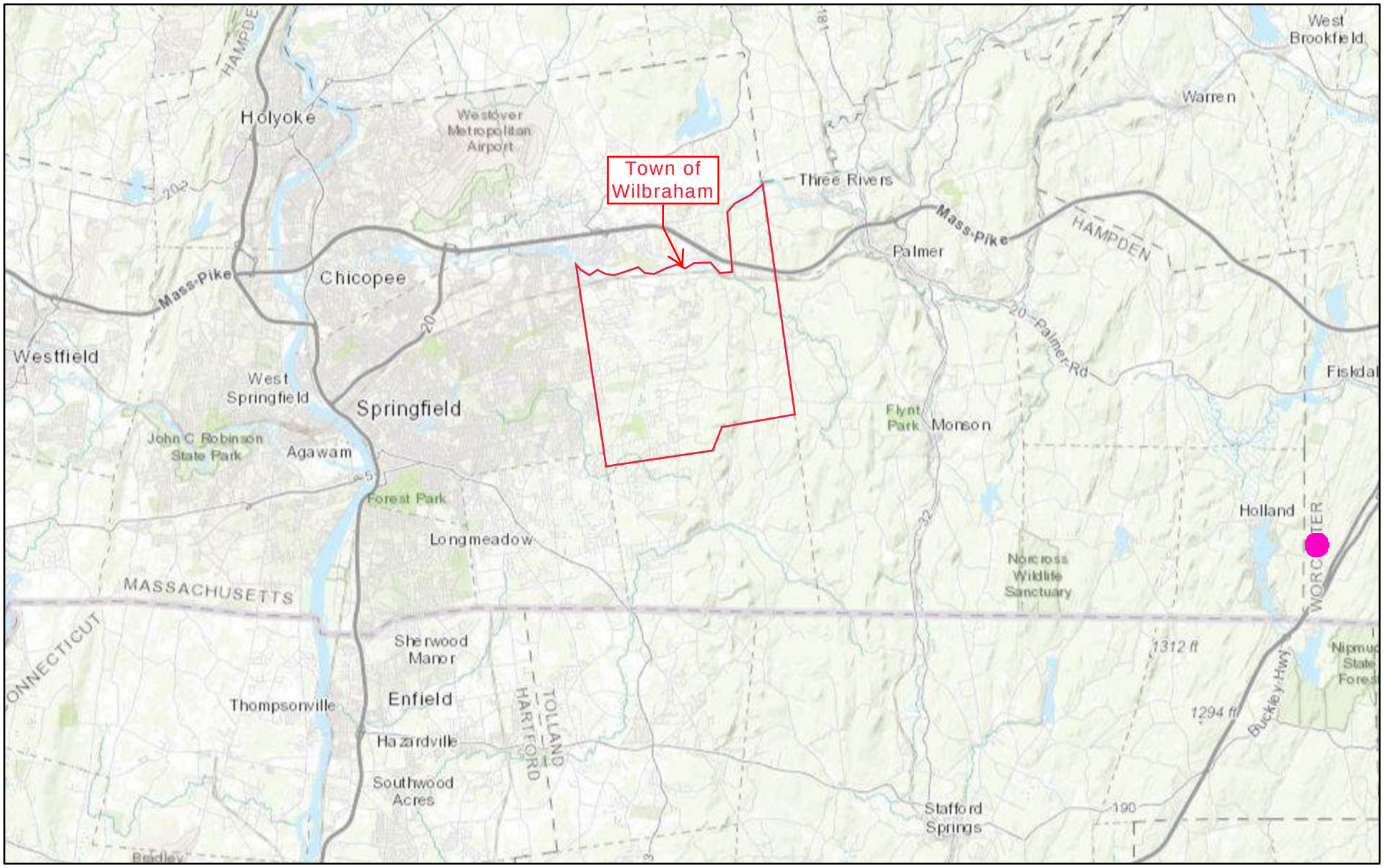
[1]Migratory only, scattered along the coast in small numbers

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

Updated 02/05/2016

Attachment D

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


Town of Wilbraham
Holyoke
Westover Metropolitan Airport
Three Rivers
Warren
West Brookfield
Mass-Pike
HAMPDEN
Palmer
Chicopee
Westfield
West Springfield
Springfield
John C Robinson State Park
Agawam
Forest Park
Longmeadow
Flynt Park
Monson
Holland
Norcross Wildlife Sanctuary
MASSACHUSETTS
Sherwood Manor
Enfield
Thompsonville
Hazardville
Southwood Acres
Stafford Springs
TOLLAND
HARTFORD
WORCESTER
Buckley Hwy
1312 ft
1294 ft
Nipmuc State Forest
Fiskdale
20-Palmer-Rd
0 1 3 5 7 mi
0 2 5 1 km

Natural Heritage & Endangered Species Program

www.mass.gov/nhesp

Massachusetts Division of Fisheries & Wildlife

Northern Myotis
Myotis septentrionalis

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

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

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

Photo: Tammy Ciesla, MassWildlife

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

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

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

Massachusetts Division of Fisheries & Wildlife

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

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

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

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

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

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

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

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

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

REFERENCES:

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

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

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

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

Updated 2015

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

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

Attachment E

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

United States Department of the Interior

FISH AND WILDLIFE SERVICE

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

January 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 Wilbraham Stormwater Management Program Files

FROM: Tighe & Bond

COPY: Tonya Basch, P.E., Assistant DPW Director/Engineer, Town of Wilbraham

DATE: September 7, 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, 2017, and determined that the **Town of Wilbraham** meets **Criterion A: The discharges do not have the potential to cause effects on historic properties.**

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

Attachment B to this memorandum includes a list of the federal- and state-listed historic areas, buildings, burial grounds, objects, and structures downloaded from the Massachusetts Cultural Resource Information System (MACRIS) that is current as of September 6, 2018. If the Town undertakes construction on or around a property that is listed or eligible for listing, the Town will coordinate with the State Historic Preservation Officer (SHPO) (i.e. the Massachusetts Historical Commission) by submitting a Project Notification Form and associated documentation for the project. As applicable for each project, the Town will implement measures to avoid or minimize adverse impacts on places listed, or eligible for listing, on the NRHP, including any conditions imposed by the SHPO or THPO. If the Town fails to document and implement such measures, those discharges are ineligible for coverage under EPA's Small MS4 General Permit.

Attachment A

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

Appendix D
National Historic Preservation Act Guidance

Background

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

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

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

Activities with No Potential to Have an Effect on Historic Properties

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

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

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

Activities with Potential to Have an Effect on Historic Properties

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

Examples of Control Measures Which Involve Subsurface Disturbance

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

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

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

Certification

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

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

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

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

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

Screening Process

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

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

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

NO- Go to Question 2.

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

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

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

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

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

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

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

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

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

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

Attachment B

MACRIS Database Inventoried and State-Listed Properties and Districts in the Town of Wilbraham

Massachusetts Cultural Resource Information System

MACRIS

MACRIS Search Results

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

Inv. No.	Property Name	Street	Town	Year
WIL.A	Main Street Area		Wilbraham	
WIL.B	North Wilbraham		Wilbraham	
WIL.C	Red Bridge Generating Station		Wilbraham	
WIL.D	Academy Historic District *		Wilbraham	
WIL.E	Ludlow Village Historic District		Wilbraham	
WIL.F	Wilbraham Old Meetinghouse and Hearse House		Wilbraham	
WIL.G	Phelps, Loren Farm - Massachusetts State Game Farm		Wilbraham	
WIL.H	Oaks Farm		Wilbraham	
WIL.I	Rice Farm		Wilbraham	
WIL.182	Ludlow Manufacturing Associates Worker Housing	4 Acton St	Wilbraham	c 1910
WIL.183	Polish American Veterans Club	4 Acton St	Wilbraham	1910
WIL.185	Ludlow Manufacturing Associates Worker Housing	5 Acton St	Wilbraham	c 1908
WIL.184	Ludlow Manufacturing Associates Worker Housing	6 Acton St	Wilbraham	c 1912
WIL.110	Chappel, Daniel - Mack, Nathan House	48 Beebe Rd	Wilbraham	c 1785
WIL.111	Friendly Ice Cream Office and Plant	1855 Boston Rd	Wilbraham	1961
WIL.112	Friendly Ice Cream Complex Manufacturing Building	1855 Boston Rd	Wilbraham	1961
WIL.113	Friendly Ice Cream Complex Gatehouse	1855 Boston Rd	Wilbraham	1961
WIL.114	Friendly Ice Cream Complex Warehouse	1855 Boston Rd	Wilbraham	1961
WIL.911	Radiological Fallout Shelter	2770 Boston Rd	Wilbraham	1958
WIL.51	Hollister, F. - Hulbert, T. Commercial Block	2801-2805 Boston Rd	Wilbraham	r 1895
WIL.50	Collins, W. L. House	2821 Boston Rd	Wilbraham	1874
WIL.117	Smith, S. - Butler, Benjamin House	3113 Boston Rd	Wilbraham	c 1785
WIL.804	East Wilbraham Cemetery	3244R Boston Rd	Wilbraham	1779

* Listed in the National Register of Historic Places

Inv. No.	Property Name	Street	Town	Year
WIL.120	Jones, Jason House	3281 Boston Rd	Wilbraham	c 1800
WIL.186	Potter, Philip P. - Coote, John R. House	2 Bulkley Rd	Wilbraham	c 1878
WIL.187	Potter, Philip P. Garage	2 Bulkley Rd	Wilbraham	
WIL.45	Collins, W. Lee Livery Stable	3 Burt Ln	Wilbraham	1877
WIL.908	Putts Bridge Dam	Center St	Wilbraham	1918
WIL.122	Gates, Erasmus B. House	3 Chapel St	Wilbraham	1879
WIL.123	Gates, Erasmus B. Barn	3 Chapel St	Wilbraham	c 1879
WIL.54	Collins Paper Mill Superintendent House	4 Chapel St	Wilbraham	c 1872
WIL.53	Stacy, Charles E. - Garvin, Charles House	6 Chapel St	Wilbraham	1878
WIL.55	Grace Union Church	8 Chapel St	Wilbraham	1877
WIL.124	Collins Paper Company Mill #1	176 Cottage Ave	Wilbraham	1888
WIL.125	Collins Paper Company Mill #2	176 Cottage Ave	Wilbraham	1888
WIL.93		68 Crane Hill Rd	Wilbraham	c 1830
WIL.80	Bussell, William H. House	25 Faculty St	Wilbraham	c 1850
WIL.81	Smith, Capt. Albert House	29 Faculty St	Wilbraham	c 1865
WIL.82	Marcy, Prof. Oliver House	33 Faculty St	Wilbraham	c 1850
WIL.83	Noble, Rev. Charles House	39 Faculty St	Wilbraham	c 1850
WIL.84	Plumley, I. H. House	43 Faculty St	Wilbraham	c 1850
WIL.803	Glendale Cemetery	376V Glendale Rd	Wilbraham	1787
WIL.904	Glendale Memorial Boulder	376 Glendale Rd	Wilbraham	1911
WIL.129	Rindge, Royal R. House	471 Glendale Rd	Wilbraham	r 1830
WIL.131	Cadwell, Stephen - Benedict, Oscar F. House	655-657 Glendale Rd	Wilbraham	r 1800
WIL.134	Knowlton, Francis - Seaver, A. Delos House	694 Glendale Rd	Wilbraham	r 1830
WIL.5	Stebbins, Jason House	742 Glendale Rd	Wilbraham	c 1850
WIL.2	Glendale District Schoolhouse	884 Glendale Rd	Wilbraham	1872
WIL.24	Wilbraham Methodist Episcopal Church	940 Glendale Rd	Wilbraham	1868
WIL.52	Collins, Caroline House	8 Maiden Ln	Wilbraham	1861
WIL.900	First Wilbraham Church Marker	Main St	Wilbraham	
WIL.61	Wilbraham Town Hall - Police Station	16 Main St	Wilbraham	c 1905
WIL.188	Cutler Grain Company Worker Housing	39-41 Main St	Wilbraham	c 1880
WIL.190	Ellis, Robert House	43 Main St	Wilbraham	c 1926
WIL.191	Ellis, Robert Garage	43 Main St	Wilbraham	c 1926
WIL.192	Parker, Joseph A. - Ridge, Frank House	79 Main St	Wilbraham	1886
WIL.94	Cooley, Merrick H. House	83 Main St	Wilbraham	1886
WIL.22	Bliss, Levi House	87 Main St	Wilbraham	c 1772
WIL.37	Merrill, Rev. Joseph A. - Welch, Rose M. House	171 Main St	Wilbraham	c 1830
WIL.194	Merrill, Joseph Jr. House	172 Main St	Wilbraham	1850
WIL.95	Jones, William B. - Havens, David M. House	187 Main St	Wilbraham	c 1840

Inv. No.	Property Name	Street	Town	Year
WIL.135	Jones, Rufus - Rice House	200 Main St	Wilbraham	r 1790
WIL.136	Jones, Rufus Shop	200 Main St	Wilbraham	
WIL.137	Avery, Abraham - Gilman, Stutson S. House	239 Main St	Wilbraham	r 1820
WIL.33	Avery, Abraham Harness and Saddle Shop	267 Main St	Wilbraham	c 1820
WIL.19	Bliss, Abel Jr. House	288 Main St	Wilbraham	c 1820
WIL.902	Wilbraham Civil War Memorial	322 Main St	Wilbraham	1894
WIL.196	Eustis, Joseph - McGuire, William H. Sr. House	369 Main St	Wilbraham	r 1865
WIL.96	Peck, Chauncey E. House	381 Main St	Wilbraham	1888
WIL.97	Wilbraham District Schoolhouse	388 Main St	Wilbraham	1871
WIL.18	Peck, Chauncey E. House	389 Main St	Wilbraham	1891
WIL.43	Lane - Wright, Robert R. House	392 Main St	Wilbraham	c 1868
WIL.98	Bliss, Abel House	393 Main St	Wilbraham	c 1846
WIL.17	Bliss, Nancy House	399 Main St	Wilbraham	1846
WIL.30	Wesleyan Academy Headmaster's House	399-421 Main St	Wilbraham	1854
WIL.39	Buel, William - Brewer House	399-421 Main St	Wilbraham	c 1814
WIL.40	Parker, Charles - Winchester House	399-421 Main St	Wilbraham	1878
WIL.41	Luke, James House	399-421 Main St	Wilbraham	c 1850
WIL.42	Pickering, Samuel House	399-421 Main St	Wilbraham	c 1855
WIL.46	Wesleyan Academy Headmaster's House	399-421 Main St	Wilbraham	1827
WIL.79	Bushill, A. House	399-421 Main St	Wilbraham	1855
WIL.16	Luke, James House	400 Main St	Wilbraham	c 1850
WIL.47	Rice, James A. - McGregory, Emory House	404 Main St	Wilbraham	1854
WIL.69	Wilbraham - Monson Academy Alumni Memorial Chapel	404 Main St	Wilbraham	1867
WIL.70	Wilbraham - Monson Academy - Smith Hall	404 Main St	Wilbraham	1896
WIL.71	Wilbraham - Monson Academy - Binney Hall	404 Main St	Wilbraham	1854
WIL.72	Wesleyan Academy - Fisk Hall	404 Main St	Wilbraham	1851
WIL.73	Wilbraham - Monson Academy - Old Academy Building	404 Main St	Wilbraham	1825
WIL.74	Wilbraham - Monson Academy - Mattern Hall	404 Main St	Wilbraham	1969
WIL.75	Wilbraham - Monson Academy - Wallace Hall	404 Main St	Wilbraham	c 1970
WIL.48	Wilbraham - Monson Academy - Rich Hall	439 Main St	Wilbraham	c 1860
WIL.76	Wilbraham - Monson Academy - Chamberlain Building	439 Main St	Wilbraham	1962
WIL.77	Wesleyan Academy - Horse Barn and Carriage House	439 Main St	Wilbraham	r 1865
WIL.78	Wilbraham - Monson Academy - Lak House	439 Main St	Wilbraham	1956
WIL.85	Wilbraham - Monson Academy - Greenhalgh Gymnasium	439 Main St	Wilbraham	1951

Inv. No.	Property Name	Street	Town	Year
WIL.66	Warriner, Charles House	447 Main St	Wilbraham	r 1855
WIL.14	Wilbraham Old Methodist Meeting House	450 Main St	Wilbraham	1793
WIL.44	Wilbraham Hearse House	450 Main St	Wilbraham	c 1835
WIL.67	Pickering, Samuel F. House	451 Main St	Wilbraham	1852
WIL.198	Hardy, Rev. John W. - Brewer, Charles Jr. House	456-458 Main St	Wilbraham	1836
WIL.13	Brewer, Isaac House	473 Main St	Wilbraham	c 1748
WIL.200	Brewer, Isaac - Hall House	477 Main St	Wilbraham	c 1857
WIL.12	Work, Elijah House	481 Main St	Wilbraham	r 1790
WIL.25	Foskit Memorial Wilbraham Grange Hall #153	485 Main St	Wilbraham	c 1900
WIL.202	Bliss, Luther B. - Pease, Harriet E. House	488 Main St	Wilbraham	c 1850
WIL.203	Bliss, Luther B. - Pease, Harriet Carriage House	488 Main St	Wilbraham	
WIL.204	Bliss, Luther House and Store	492 Main St	Wilbraham	c 1855
WIL.138	Clark, Horace House	493-495 Main St	Wilbraham	c 1870
WIL.140	Jones, Edmund - Webber, Dr. Horace House	499 Main St	Wilbraham	r 1850
WIL.11	Merrick, Dea. David House	515 Main St	Wilbraham	c 1740
WIL.99	Twing, Rufus House	520 Main St	Wilbraham	c 1845
WIL.100		528 Main St	Wilbraham	c 1840
WIL.10	Bruuer, Dr. Luther House and Office	540 Main St	Wilbraham	1820
WIL.206	Moulton, Roswell - Bliss, Rowena House	548 Main St	Wilbraham	c 1857
WIL.101	Brewer, H. Bridgman House	560 Main St	Wilbraham	1856
WIL.208	Bowers, John - Hudson, Mary House	563 Main St	Wilbraham	c 1830
WIL.209	Bowers, John - Hudson, Mary Carriage Barn	563 Main St	Wilbraham	
WIL.9	Kibbe, Capt. Gideon House	568 Main St	Wilbraham	c 1810
WIL.102	McGregory, Joseph House	582 Main St	Wilbraham	1856
WIL.8	Witter, Rev. Ezra House	583 Main St	Wilbraham	1797
WIL.103	Wilbraham District Schoolhouse #12	593 Main St	Wilbraham	c 1842
WIL.212	Tilley, Harry W. House	594 Main St	Wilbraham	c 1920
WIL.213	Tilley, Harry W. Carriage House	594 Main St	Wilbraham	c 1920
WIL.141	Warriner, Dea. Nathaniel - Merrick, Mary House	599 Main St	Wilbraham	r 1740
WIL.142	Bennett, Frank E. Farm Produce Store	601 Main St	Wilbraham	c 1920
WIL.215	Pease, Reuben House	614 Main St	Wilbraham	c 1855
WIL.218	Hunter, John House	615 Main St	Wilbraham	c 1916
WIL.7	Burt, Henry - McGregory, Joseph House	648 Main St	Wilbraham	1856
WIL.6	Burt, Moses House	651 Main St	Wilbraham	1832
WIL.220	Cadwell, Henry House	674 Main St	Wilbraham	c 1850
WIL.35	Mileoak Corner District Schoolhouse	678 Main St	Wilbraham	1880
WIL.143	Adams, Dea. John - Adams, Dea. David House	685 Main St	Wilbraham	1794
WIL.28		717 Main St	Wilbraham	c 1835

Inv. No.	Property Name	Street	Town	Year
WIL.4	Merrick, Noah II House	744 Main St	Wilbraham	c 1810
WIL.104		751-753 Main St	Wilbraham	
WIL.105	Rice, Lee W. Farm - Holman, John House	757 Main St	Wilbraham	c 1850
WIL.106	Rice, Lee W. House	757 Main St	Wilbraham	1912
WIL.107		868 Main St	Wilbraham	c 1850
WIL.32	Cross, Porter - Bliss, Ethelbert House	1003 Main St	Wilbraham	1852
WIL.60	Perry Barn	6 Maple St	Wilbraham	c 1918
WIL.903	Knox, Gen. Henry Marker	6 Maple St	Wilbraham	1927
WIL.144	Baldwin, William V. House	7 Maple St	Wilbraham	1922
WIL.36	Baldwin, John Tavern	8-10 Maple St	Wilbraham	c 1836
WIL.146	Perry, Joseph M. House	15 Maple St	Wilbraham	1886
WIL.147	Perry, Joseph M. Garage	15 Maple St	Wilbraham	c 1915
WIL.86	Fuller, Frank A. House	16 Maple St	Wilbraham	1894
WIL.90	Danks, Hiram House	19 Maple St	Wilbraham	1877
WIL.87	Grace Union Church Parsonage	24 Maple St	Wilbraham	
WIL.148	Baldwin, Joseph J. House	31 Maple St	Wilbraham	1914
WIL.23	Cutler, Henry N. House	36 Maple St	Wilbraham	1877
WIL.88	Cutler, Henry W. House	40 Maple St	Wilbraham	1877
WIL.89	Baldwin, Joseph House	43 Maple St	Wilbraham	r 1875
WIL.913	Collins Bridge	Miller St	Wilbraham	1939
WIL.905	Wilbraham Tri-town Boundary Marker	Monson Rd	Wilbraham	c 1860
WIL.150	Brewer, Brainard T. - Beebe, Charles House	182 Monson Rd	Wilbraham	r 1850
WIL.153	Calkins, Luke House	745 Monson Rd	Wilbraham	c 1828
WIL.154	Mixter, George Store and Tavern - Maplehurst	782 Monson Rd	Wilbraham	1832
WIL.155	Plumley, Elijah New England Hay Barn	782 Monson Rd	Wilbraham	c 1850
WIL.156	Revolutionary Blacksmith Shop	51 Mountain Rd	Wilbraham	r 1795
WIL.157	Danks, Hiram House	51 Mountain Rd	Wilbraham	1877
WIL.158	Danks, Hiram Garage	51 Mountain Rd	Wilbraham	
WIL.159	Strickland, Frank H. House	58 Mountain Rd	Wilbraham	1898
WIL.161	Weeks, Clair W. House	82 Mountain Rd	Wilbraham	c 1920
WIL.21	Bliss, Ens. Abel House	182 Mountain Rd	Wilbraham	1745
WIL.20	Bliss, Silas - Woodward, Dea. Aaron House	218 Mountain Rd	Wilbraham	1769
WIL.91	Bliss, Samuel M. - Thayer, John House	299 Mountain Rd	Wilbraham	r 1825
WIL.92	Rindge House	307 Mountain Rd	Wilbraham	c 1855
WIL.162	Collins, Warren - Tupper, William House	383 Mountain Rd	Wilbraham	c 1830
WIL.68	Wilbraham - Monson Academy - Deans House	404 Mountain Rd	Wilbraham	1965
WIL.164	Ely, Jonathan House	404 Mountain Rd	Wilbraham	c 1830
WIL.906	Old Boston Road Bridge over Penn Central	Old Boston Rd	Wilbraham	1945

Inv. No.	Property Name	Street	Town	Year
WIL.222	Mitchell, Frank House	3 Orlando St	Wilbraham	1940
WIL.223	Johnson, William House	6 Orlando St	Wilbraham	c 1940
WIL.109	Red Bridge Hydroelectric Station - Gate House	Red Bridge Rd	Wilbraham	c 1901
WIL.909	Red Bridge Dam	Red Bridge Rd	Wilbraham	1901
WIL.910	Red Bridge Canal	Red Bridge Rd	Wilbraham	1901
WIL.912	Canal Bridge	Red Bridge Rd	Wilbraham	1954
WIL.108	Red Bridge Hydroelectric Station	5V Red Bridge Rd	Wilbraham	1900
WIL.907	Boston Post Road - Hartford Stagecoach Extension	Ridge Rd	Wilbraham	
WIL.224	Barnes, Wilbur House	8 Ripley St	Wilbraham	1921
WIL.225	Hill, James House	10 Ripley St	Wilbraham	1943
WIL.226	Cummings, Chester House	22 Ripley St	Wilbraham	1941
WIL.227	Peck, Anna A. - Childs, Elvira House	5 Springfield St	Wilbraham	1893
WIL.228	Steele, Aletta House	6 Springfield St	Wilbraham	r 1935
WIL.230	Kent, William - Foster, Dr. James House	8 Springfield St	Wilbraham	r 1865
WIL.231	Wright, Robert R. - Moody, James C. House	9 Springfield St	Wilbraham	c 1857
WIL.232	Wright, Robert R. Carriage Barn	9 Springfield St	Wilbraham	c 1857
WIL.233	Kent, William - Moody, Lucinda House	10-10 1/2 Springfield St	Wilbraham	c 1857
WIL.235	Pease, Charles M. - Bosworth, Juliet House	25-27 Springfield St	Wilbraham	c 1893
WIL.34	Wilbraham Little Red Schoolhouse	28 Springfield St	Wilbraham	1905
WIL.236	Kent, William - Alexander, Catherine House	35 Springfield St	Wilbraham	c 1857
WIL.237	Fay, Larkin - Rice, Dr. Jesse House	41 Springfield St	Wilbraham	c 1826
WIL.238	Fay, Larkin Carriage Barn	41 Springfield St	Wilbraham	
WIL.239	Barker House	47 Springfield St	Wilbraham	c 1850
WIL.240	Hyde, Eleanor House	62 Springfield St	Wilbraham	1930
WIL.242	Wellman, Victor House	96 Springfield St	Wilbraham	c 1938
WIL.245	Newell, Howe House	104 Springfield St	Wilbraham	c 1925
WIL.247	Gleason, Alton E. House	547 Springfield St	Wilbraham	c 1960
WIL.249	Brewer, Charles A. House	655 Springfield St	Wilbraham	r 1895
WIL.250	Langdon, Albertus B. - Stone, Joseph House	171 Stony Hill Rd	Wilbraham	c 1850
WIL.252	Trask, John - Manahan, John House	172 Stony Hill Rd	Wilbraham	c 1850
WIL.254	Wilbraham District Schoolhouse No. 11	215 Stony Hill Rd	Wilbraham	r 1815
WIL.255	Trask, Henry J. - Frederick, Joseph House	299 Stony Hill Rd	Wilbraham	r 1840
WIL.168	Oaks Farm Dairy Barn - Horse Barn Complex	388 Stony Hill Rd	Wilbraham	c 1895
WIL.167		392 Stony Hill Rd	Wilbraham	1933
WIL.166	Pease, Monroe - Butterfield, Edward M. House	396 Stony Hill Rd	Wilbraham	c 1895
WIL.256	Rice, Lee - Brewer, Hiram House	515 Stony Hill Rd	Wilbraham	r 1845
WIL.170	Fuller, Henry - Kent, Harvey House	559 Stony Hill Rd	Wilbraham	r 1820

Inv. No.	Property Name	Street	Town	Year
WIL.31	Bliss, Samuel M. - Hitchcock, Charles B. House	615 Stony Hill Rd	Wilbraham	c 1847
WIL.172	Barker, Ezra - Warriner, Ethan House	664 Stony Hill Rd	Wilbraham	r 1771
WIL.174	Atchinson, Benoni - Richards, James House	687 Stony Hill Rd	Wilbraham	r 1772
WIL.257	Atchinson, Benoni House	707 Stony Hill Rd	Wilbraham	r 1830
WIL.176	Brewer, Gaius House	717-719 Stony Hill Rd	Wilbraham	r 1783
WIL.178	Atchinson House	720 Stony Hill Rd	Wilbraham	c 1850
WIL.259	Warner, Vashni - Jones, Reuben House	725 Stony Hill Rd	Wilbraham	r 1810
WIL.260	Bemis, Albert H. House	750 Stony Hill Rd	Wilbraham	1937
WIL.179	Warner, Samuel - Blodgett, M. S. House	859 Stony Hill Rd	Wilbraham	r 1800
WIL.3		875 Stony Hill Rd	Wilbraham	c 1770
WIL.180	Alden - Clark, Dea. Francis E. House	875 Stony Hill Rd	Wilbraham	r 1820
WIL.1	Vinning, William - Clark, Dea. Horace House	951 Stony Hill Rd	Wilbraham	r 1810
WIL.901	Wilbraham First Meeting House Marker	Tinkham Rd	Wilbraham	r 1825
WIL.801	Adams Cemetery - Center Cemetery	153 Tinkham Rd	Wilbraham	1741
WIL.261	Phelps, Loren House	883 Tinkham Rd	Wilbraham	c 1840
WIL.262	Massachusetts State Game Farm Barn	883 Tinkham Rd	Wilbraham	c 1917
WIL.263	Massachusetts State Game Farm Garage	883 Tinkham Rd	Wilbraham	c 1940
WIL.264	Massachusetts State Game Farm Office	883 Tinkham Rd	Wilbraham	r 1920
WIL.265	Massachusetts State Game Farm Office	883 Tinkham Rd	Wilbraham	
WIL.266	Massachusetts State Game Farm Animal Shed #1	883 Tinkham Rd	Wilbraham	
WIL.267	Massachusetts State Game Farm Animal Shed #2	883 Tinkham Rd	Wilbraham	
WIL.914	Fountain, Laurence R. Park Gazebo	883 Tinkham Rd	Wilbraham	
WIL.268	Allen, Albert - Hammer, Carl House	916 Tinkham Rd	Wilbraham	c 1870
WIL.270	Ludlow Manufacturing Association Worker Housing	22-36 Weston St	Wilbraham	c 1905
WIL.271	Gleason, Donald R. House	4 Wilton Dr	Wilbraham	1957
WIL.802	Woodland Dell Cemetery	17V Woodland Dell Rd	Wilbraham	1851

Tighe&Bond

APPENDIX E

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

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

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

SMALL MS4 AUTHORIZATION

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

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

RECEIVING WATERS

☐ Identify all receiving waters and impairments to waterbodies

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

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

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

☐ The Criterion used to certify ESA eligibility

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

ELIGIBILITY DETERMINATION UNDER THE NATIONAL HISTORIC PRESERVATION ACT (NHPA)

(Attach and reference your NOI)

☐ Appendix D property screening determination

☐ The Criterion used to certify NHPA eligibility

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

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

MCM 1: PUBLIC EDUCATION AND OUTREACH

☐ Identify all planned BMPs

☐ Identify the locations of applicable materials for each BMP

☐ Identify the target audience(s)

☐ Identify the measurable goals

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

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

MCM 2: PUBLIC INVOLVEMENT AND PARTICIPATION

☐ The location of the SWMP for public access

☐ Provisions for public participation in SWMP development

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

MCM 3: ILLICIT DISCHARGE DETECTION AND ELIMINATION (IDDE)

☐ Reference legal authority

☐ Identify the department responsible for illicit connection enforcement

☐ Annual Sanitary Sewer Overflow (SSO) Inventory

☐ MS4 system map

☐ IDDE Program Document

☐ Outfall/interconnection inventory and ranking

☐ Employee training content and dates

MCM 4: CONSTRUCTION SITE STORMWATER RUNOFF CONTROL

☐ Reference legal authority

☐ Site plan review procedures

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

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

☐ Reference legal authority

☐ Green infrastructure report

☐ List of municipal retrofit opportunities

☐ Guidelines for street design and parking lots

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

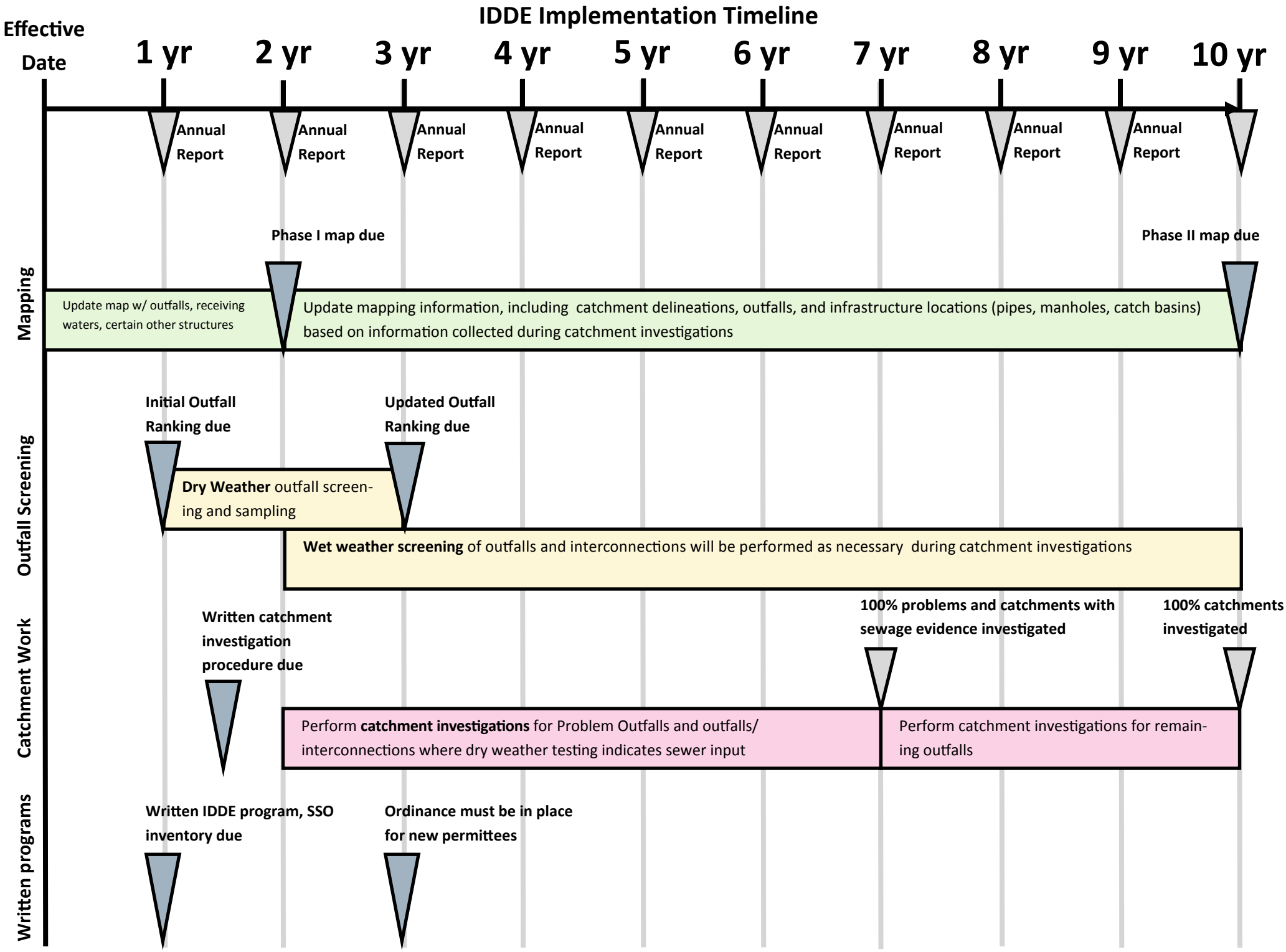
☐ Catch basin cleaning program

☐ Street sweeping program

☐ Stormwater treatment structure inspection and maintenance procedures

☐ Winter road maintenance program

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


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

Potential Pollutants Associated with Municipal Activities, California Stormwater BMP Handbook

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

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

Potential pollutants likely associated with specific *municipal facilities*

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

Potential pollutants likely associated with *municipal activities*

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

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

Tips for Organizing and Conducting Volunteer Clean-up Events

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

Step 1: Plan Your Clean-Up Event

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

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

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

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

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

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

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

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

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

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

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

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

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

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

Step 2: Schedule Your Clean-Up Event

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

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

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

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

Step 3: Determine and Obtain Necessary Supplies

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

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

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

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

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

The UPRP has one First-Aid kit for use.

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

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

Step 4: Determine Your Waste Disposal Options

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

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

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

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

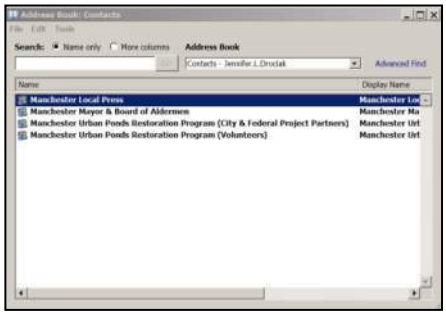
The UPRP has partnered with the Student Conservation Association, local high school ecology clubs, local boy-scout troops, trout-fishing clubs, geo-cashing groups, and others in the past. This has helped garner additional / new volunteers.

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

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

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

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



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

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

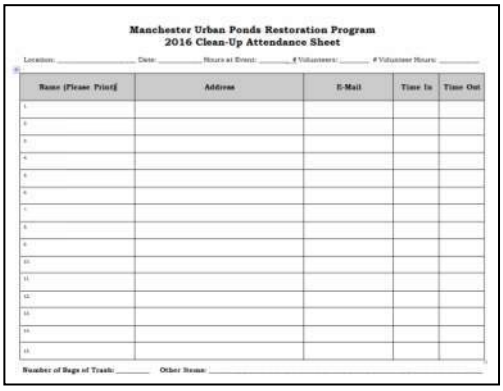
For Example: Seeking volunteers of all ages to assist in an annual trash clean-up at Black Brook and Blodget Park in Manchester on Saturday, April 23, 2016 from 9:00AM – 11:00AM. Volunteers will partner to clean the park and skirt the edges of the brook and wetland complex to remove accumulated trash.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

Step 6: Conduct Your Clean-Up Event

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

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

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



Manchester Urban Ponds Restoration Program
2016 Clean-Up Attendance Sheet

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

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

Number of Bags of Trash: _____ Other Items: _____

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

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

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

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

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

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

Manchester Urban Ponds Restoration Program

Nutts Pond Facts

Manchester Urban Ponds Restoration Program

The History of Nutts Pond

Manchester Urban Ponds Restoration Program

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

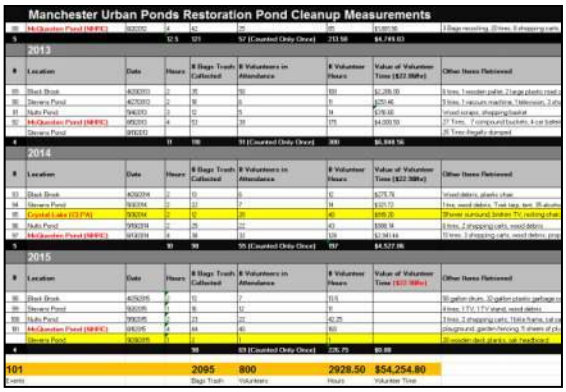
Above Right: Cake served to volunteers at the 100th official cleanup of the Manchester Urban Ponds Restoration Program .

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

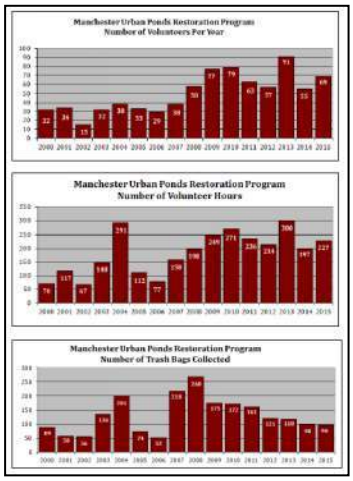
Step 7: Follow Up After the Clean-Up Event

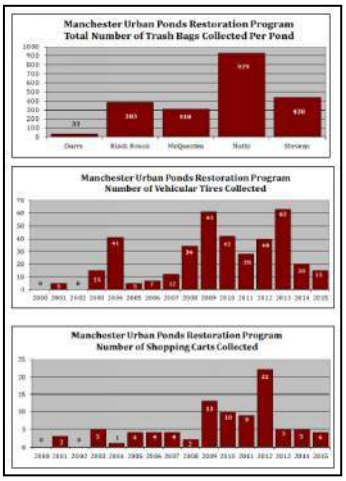
A. Update Your Electronic Records: Now is the time to transpose the information collected on the "Clean-Up Attendance Sheet" into an electronic record-retention system if you have access to one. Perhaps you have access to a database. If not, consider using a Microsoft Excel workbook / spreadsheet system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

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


Manchester Urban Ponds Restoration Pond Cleanup Measurements

	Location	Date	Hours	# Bags Trash Collected	# Volunteers in Attendance	# Volunteer Hours	Value of Volunteer Time ($22.36/hr)	Other Items Retrieved
			12.5	121	57 (Counted Only Once)	213.50	$4,749.83	
	2013							
30	Black Brook	4/20/2013	2	35	30	60	$1,336.50	5 tires, 1 wooden pallet, 2 large plastic roadway signs
35	Stevens Pond	4/27/2013	2	16	6	11	$250.46	3 tires, 1 vacuum, 1 mattress, 1 television, 2 shopping carts
31	Nutts Pond	5/4/2013	3	12	5	14	$318.60	mixed scraps, shopping basket
32	McQuesten Pond (MRPC)	9/5/2013	4	51	20	175	$4,000.50	37 Tires, 7 compound buckets, 4 car batteries
	Stevens Pond	9/18/2013						35 Tires illegally dumped
4			11	100	51 (Counted Only Once)	300	$6,888.56	
	2014							
33	Location	Date	Hours	# Bags Trash Collected	# Volunteers in Attendance	# Volunteer Hours	Value of Volunteer Time ($22.36/hr)	Other Items Retrieved
33	Black Brook	4/26/2014	2	15	6	12	$275.76	mixed debris, plastic chair
34	Stevens Pond	5/3/2014	2	22	7	14	$321.72	1 tire, wood debris, Tool bag, text: 35 plastic bags of trash
35	Crystal Lake (CLFTA)	5/3/2014	2	10	20	40	$895.20	Phone surround, broken TV, nothing else
36	Nutts Pond	5/5/2014	2	25	22	43	$988.34	6 tires, 2 shopping carts, wood debris
37	McQuesten Pond (MRPC)	9/3/2014	4	36	33	129	$2,941.44	10 tires, 3 shopping carts, wood debris, pool
5			10	99	55 (Counted Only Once)	197	$4,527.06	
	2015							
38	Location	Date	Hours	# Bags Trash Collected	# Volunteers in Attendance	# Volunteer Hours	Value of Volunteer Time ($22.36/hr)	Other Items Retrieved
38	Black Brook	4/25/2015	2	10	7	15.5		30 gallon drum, 32 gallon plastic garbage can
39	Stevens Pond	5/2/2015	2	8	12	9		4 tires, 1 TV, 1 TV stand, wood debris
310	Nutts Pond	5/9/2015	3	23	21	42.25		3 tires, 2 shopping carts, 1 bike frame, tub of toys
311	McQuesten Pond (MRPC)	9/5/2015	4	44	40	160		playground, garden fencing, 5 sheets of plywood
	Stevens Pond	9/26/2015	1	1	1	1		30 wooden deck planks, oak hardwood
4			10		69 (Counted Only Once)	226.75	$5,08	
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.

Standard Operating Procedures for
Construction Site Stormwater Runoff Control, CMRSWC

SOP 22: Construction Site Stormwater Runoff Control

Introduction

Construction sites that lack adequate stormwater controls can contribute a significant amount of sediment to nearby bodies of water. This Standard Operating Procedure (SOP) describes procedures for evaluating compliance of stormwater controls at construction sites to minimize or eliminate erosion and sediment transport.

These procedures address Minimum Control Measure 4, Construction Site Stormwater Runoff Control, by documenting the processes that ##MUNICIPALITY will use for inspection and enforcement of sediment and erosion control measures and review, inspection and enforcement of site plans. These procedures are part of ##MUNICIPALITY's Construction Site Stormwater Runoff Control Program.

In addition to the inspection and enforcement procedures detailed in this program it is important to note that construction site operators within the MS4 jurisdiction are required to control construction wastes, including but not limited to, discarded building materials, concrete truck wash out, chemicals, litter, and sanitary wastes. These wastes may not be discharged to the MS4.

Attached are erosion and sediment control inspection and construction site inspection forms.

Instructions: Describe the municipality's current construction site inspection procedures, as well as any applicable zoning codes or municipal regulations relating to this SOP.

Procedures: Site Inspection and Enforcement of Sediment and Erosion Control Measures

The ##AGENCY OR DEPARTMENT performs routine inspections of sediment and erosion control measures for construction activities that result in a land disturbance of greater than or equal to one acre within the regulated area and construction activities that disturb less than one acre when that disturbance is part of a larger common plan of development or sale that would disturb one or more acres. Under the ##MUNICIPALITY'S BYLAW, the ##AGENCY OR DEPARTMENT has the authority to enforce sediment and erosion control procedures and/or impose sanctions to ensure compliance when necessary.

Controlling Erosion and Sediment on Construction Sites

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

- Active construction sites should be inspected bi-weekly or monthly to check the status of erosion and sedimentation controls. Inspections should also be conducted after incidents of heavy rainfall (0.25 inches or more in 24 hours).
- Erosion and sediment control features should be constructed before initiating activities that remove vegetated cover or otherwise disturb the site. These should be installed consistent with the approved site plans and with manufacturer's instructions.
- Erosion and sediment control devices should be inspected by the contractor regularly, and

maintained as needed to ensure function.

- In the SWPPP or other document, the contractor should clearly identify the party responsible for maintaining erosion and sediment control devices.
- Existing vegetation should be maintained on site as long as possible.
- Construction should proceed progressively on the site in order to minimize exposed soil, and disturbed areas should be restored as soon as possible after work has been completed.
- Stockpiles should be stabilized by seeding or mulching if they are to remain for more than two weeks.
- Disturbed areas should be protected from stormwater runoff by using protective Best Management Practices (BMPs).
- Clean water should be diverted away from disturbed areas on construction sites to prevent erosion and sedimentation.
- Sediment traps and sediment barriers should be cleaned out regularly to reduce clogging and maintain design function.
- Vegetated and wooded buffers should be protected.
- Soils should be stabilized by mulching and/or seeding when they would be exposed for more than one week during the dry season, or more than two days during the rainy season.
- Vegetation should be allowed to establish before introducing flows to channels.
- Regular light watering should be used for dust control, as this is more effective than infrequent heavy watering.
- Excessive soil compaction with heavy machinery should be avoided, to the extent possible.
- Construction activities during months with higher runoff rates should be limited, to the extent possible.

Controlling Erosion and Sediment by Proper Maintenance of Permanent BMPs

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

- Responsibility for maintaining erosion and sediment control devices should be clearly identified.
- Erosion and sediment control devices should be inspected following heavy rainfall events to ensure they are working properly.
- Erosion control blankets should be utilized when seeding slopes.
- Vegetated and wooded buffers should be protected, and left undisturbed to the extent possible.
- Runoff should not be diverted into a sensitive area unless this has been specifically approved.
- Sedimentation basins should be cleaned out once sediment reaches 50% of the basin's design capacity.
- Snow should not be plowed into, or stored within, retention basins, rain gardens, or other BMPs.
- Easements and service routes should be maintained, to enable maintenance equipment to access BMPs for regular cleaning.

Inspection Procedures

Construction sites will be inspected to ensure that sediment and erosion control measures are in place consistent with approved site plans. Inspections will be conducted by the ##AGENCY OR DEPARTMENT or a qualified member of the site crew. Inspections will be conducted in accordance with the Massachusetts Stormwater Handbook. Inspections may include, but are not limited to:

- Inspection during or immediately following initial installation of sediment controls.
- Inspection following severe rainstorms to check for damage to controls.
- Inspection prior to seeding deadlines, particularly in fall.
- Final inspection of projects nearing completion to ensure that temporary controls have been removed, stabilization is complete, drainage ways are in proper condition, and the final contours agree with the proposed contours on the approved plan.

All inspections will be completed using the Sediment and Erosion Control Inspection form, included in the attachments. All completed inspection forms will be maintained on file by ##MUNICIPALITY in the ##AGENCY OR DEPARTMENT office. During inspection, the inspector will verify that sediment and erosion control measures are functioning as intended and are being maintained properly. Specific sediment and erosion control measures that will be assessed during inspection are detailed on the Inspection Form.

Enforcement Procedures

In the event that a non-compliance issue is discovered during pre-construction or routine inspection, the ##AGENCY OR DEPARTMENT will document the occurrence and inform the site operator of the violation and the required corrective action. The ##AGENCY OR DEPARTMENT will provide the site operator with a copy of the inspection form, noting the non-compliance and the required corrective action. The site operator will have ##NUMBER OF DAYS from the receipt of notice to perform the corrective action. The ##AGENCY OR DEPARTMENT will revisit the site for inspection after ##NUMBER OF DAYS to verify that the corrective action was performed and that the site has achieved compliance.

Reporting

The following information will be included in each annual report:

- Number of site inspections conducted
- Number of violations issued
- Record of enforcement actions

Employee Training

- Employees who inspect applicable construction sites are trained ##NUMBER times per year on these procedures.
- Employees are also trained on stormwater pollution prevention, illicit discharge detection and elimination (IDDE) procedures, and spill and response procedures.

Procedures: Site Plan Review, Inspection, and Enforcement

Under the authority of the ##MUNICIPALITY's BYLAW, the ##AGENCIES OR DEPARTMENTS have the authority to perform construction site plan review, inspection and enforcement. ##MUNICIPALITY will implement the following construction site plan review, inspection and enforcement procedures:

Controlling Erosion and Sediment through Design and Planning

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

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

Site Plan Review Procedure

- The applicant will submit site plans to the ##AGENCY OR DEPARTMENT for pre-construction review. Review will be conducted by ##LIST ALL INVOLVED AGENCIES OR DEPARTMENTS. The ##AGENCY OR DEPARTMENT will make the final decision to approve, reject, or request modifications to the site plan.
- Site plan review will be completed within ##NUMBER OF DAYS, taking into consideration the following standards with regard to water quality protection and stormwater management:
    - General site design will include appropriate stormwater drainage system details and calculations.
    - Planned construction operations will include adequate Best Management Practices (BMPs) and Sediment and Erosion Control Measures to reduce water quality impacts.
    - Planned BMPs must be designed to the standards found in the Massachusetts Stormwater Handbook. When possible BMPs should promote on-site infiltration of stormwater runoff from impervious surfaces.
    - For sites located in areas subject to Total Maximum Daily Load (TMDL) requirements, BMPs will be selected and prioritized to address the pollutant identified as the cause of the impairment.
    - When possible, low impact designs (LID) and/or Green Infrastructure (GI) should be included in site design. If LID/GI are not included in the site plan, the ##AGENCY OR DEPARTMENT will require that the applicant review opportunities for the use of LID/GI.
- Upon completion of Site Plan Review the ##AGENCY OR DEPARTMENT will make the site plans and review findings available for public review and comment for a period of ##NUMBER OF

DAYS. The ##AGENCY OR DEPARTMENT will review and consider all public comments prior to issuing or denying a permit.
- The ##AGENCY OR DEPARTMENT may require the applicant to revise the site plan as necessary before issuing or denying a permit.

Site Inspection Procedures

Inspections will be conducted, at a minimum, during BMP construction as well as after construction of BMPs to ensure they are working as described in the approved plans. Inspection will be completed by a Professional Engineer or other qualified person with sufficient training, experience, and/or education to be able to adequately read site plans and assess the installation, operation and maintenance of BMPs in accordance with approved plans. An inspection form will be filled out for each site inspection and stored in the ##AGENCY OR DEPARTMENT office. A copy of the Inspection Form is available in the attachments.

Inspection Guidelines

- The inspection should begin at a low point and work uphill, observing all discharge points and any off-site support activities.
- Written and photographic records should be maintained for each site visit.
- During the inspection, the inspector should ask questions to the contractor. Understanding the selection, implementation, and maintenance of BMPs is an important goal of the inspection process and require site-specific input.
- The inspector should not recommend or endorse solutions or products. The inspector may offer appropriate advice but all decisions must be made by the contractor.
- The inspector should always wear personal protective equipment (PPE) appropriate for the site.
- The inspector should abide by the contractor's site-specific safety requirements.
- The inspector has legal authority to enter the site. However, if denied permission to enter the site, the inspector should never force entry.

Prior to planning a site visit, the inspector should determine if the project is subject to USEPA's 2017 Construction General Permit., which replaces USEPA's 2012 Construction General Permit (for more information, visit: https://www.epa.gov/sites/production/files/2019-05/documents/final_2017_cgp.pdf). Operators of sites that required coverage under the USEPA's 2012 Construction General Permit that continue to be active should have submitted a new Notice of Intent (NOI) under the 2017 Permit.

If the site requires this coverage, the inspector should visit the USEPA Region 1 eNOI website to determine if the contractor filed for coverage under the 2017 and/or 2012 Construction General Permit. Print a copy of the project's NOI.

If the project disturbs one or more acres and is under construction but does not show up in the database, the project is in violation of the Construction General Permit. Call the contractor to determine if the NOI process has been started. If not, notify the contractor verbally of his requirement and the violation. Work cannot proceed on the site until a NOI for coverage under the 2017 Permit has been approved by the USEPA. The inspector may choose to print instructions on how to file an NOI and meet with the contractor to review these. Issue a written Stop Work Order until the NOI has been approved by the USEPA.

Once it has been determined that the site is in compliance with the 2017 Construction General Permit, site inspection can continue.

Inspection Process

1. Pre-inspection review
    - Obtain and review permits, site plans, previous inspection reports, and any other applicable information.
    - Print the approved NOI from the USEPA 2017 Construction General Permit website.
    - Inform the contractor of the planned site visit.
2. Meet with site contractor
    - Review the construction Stormwater Pollution Prevention Plan (SWPPP) (if the site includes over one acre of disturbance) or other documents, as required by the municipality's legal authority. Compare BMPs in the approved site plans with those shown in the SWPPP.
    - Review the project's approved NOI and confirm that information shown continues to be accurate.
    - Get a general overview of the project from the contractor.
    - Review inspections done by the contactor.
    - Review the status of any issues or corrective actions noted in previous inspection reports.
    - Discuss any complaints or incidents since the last meeting.
3. Inspect perimeter controls
    - Examine perimeter controls to determine if they are adequate, properly installed, and properly maintained.
    - For each structural BMP, check structural integrity to determine if any portion of the BMP needs to be replaced or requires maintenance.
4. Inspect slopes and temporary stockpiles
    - Determine if sediment and erosion controls are effective.
    - Look for slumps rills, and tracking of stockpiled materials around the site.
5. Compare BMPs in the site plan with the construction site conditions
    - Determine whether BMPs are in place as specified in the site plan, and if the BMPs have been adequately installed and maintained.
    - Note any areas where additional BMPs may be needed that are not specified in the site plans.
    - Inspect BMPs prior to and after construction.
6. Inspect site entrances/exits
    - Determine if there has been excessive tracking of sediment from the site.
    - Look for evidence of additional entrances/exist which are not on the site plan and are not properly stabilized.
7. Inspect sediment basins
    - Look for signs that sediment has accumulated beyond 50% of the original capacity of the basin.
8. Inspect pollution prevention and good housekeeping practices
    - Inspect trash areas and material storage/staging areas to ensure that materials are properly maintained and that pollutant sources are not exposed to rainfall or runoff.
    - Inspect vehicles/equipment fueling and maintenance areas for the presence of spill control measure sand for evidence of leaks or spills.
9. Inspect discharge points and downstream, off-site areas

- Walk down the street and/or in other directions of-site to determine if erosion and sedimentation control measures are effective in preventing off-site impacts.
- Inspect down-slope catch basins to determine if they are protected, and identify whether sediment buildup has occurred.

10. Meet with the contactor again prior to leaving
    - Discuss the effectiveness of current controls and whether modifications are needed.
    - Discuss possible violations or concerns noted during the site inspection, including discrepancies between approved site plans, the SWPPP, and/or the implementation of stormwater controls.
    - Agree on a schedule for addressing all discrepancies and schedule a follow-up inspection.
11. Provide a written copy of the inspection report to the contractor.
12. Follow up, as determined, and provide copies of subsequent inspections to the contractor.
13. Use Stop Work orders, as needed, until compliance with the 2017 General Construction Permit can be achieved.

Enforcement Procedure

In the event that a non-compliance issue is discovered during inspections, the ##AGENCY OR DEPARTMENT will document the occurrence and inform the site operator of the violation and the required corrective action. The ##AGENCY OR DEPARTMENT will provide the site operator with a copy of the inspection form, noting the non-compliance and the required corrective action. The site operator will have ##NUMBER OF DAYS from the receipt of notice to perform the corrective action. The ##AGENCY OR DEPARTMENT will revisit the site for inspection to verify that the corrective action was performed and that the site has achieved

The number of site reviews, inspections and enforcement actions will be tracked ##ELECTRONICALLY/ON PAPER. Records will be maintained and included in the annual report.

Employee Training

- Employees who inspect applicable construction sites are trained ##NUMBER times per year on these procedures.
- Employees are also trained on stormwater pollution prevention, illicit discharge detection and elimination (IDDE) procedures, and spill and response procedures.

Reporting

The following information will be included in each annual report:

- Number of site reviews conducted
- Number of site inspections conducted
- Number of violations issued
- Record of enforcement actions

Attachments

1. Erosion and Sedimentation Control Inspection Report
2. Construction Site Stormwater Inspection Report

Related Standard Operating Procedures

1. SOP 9: Inspection and Maintenance of Structural Stormwater Best Management Practices (BMPs)

EROSION AND SEDIMENTATION CONTROL INSPECTION REPORT

General Information

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

Erosion and Sediment Control (ESC) on Construction Sites

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

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

(continued)

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

Non-Compliance Actions

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

CONSTRUCTION SITE STORMWATER INSPECTION REPORT

General Information

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

Site-Specific BMPs

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

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

Erosion and Sedimentation Control

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

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

(continued)

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

Overall Site Conditions

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

Issue	Status	Corrective Action Needed
Are slopes and disturbed areas not being actively worked properly stabilized?	Yes ☐ No ☐	
Are material stockpiles covered or protected when not in use?	Yes ☐ No ☐	
Are natural resource areas protected with sediment barriers or other BMPs?	Yes ☐ No ☐	
Are perimeter controls and sediment barriers installed and maintained?	Yes ☐ No ☐	
Are discharge points and receiving waters free of sediment deposits and turbidity?	Yes ☐ No ☐	
Are storm drain inlets properly protected?	Yes ☐ No ☐	
Is there evidence of sediment being tracked into streets?	Yes ☐ No ☐	
Is trash/litter from the construction site collected and placed in dumpsters?	Yes ☐ No ☐	
Are vehicle/equipment fueling and maintenance areas free of spills and leaks?	Yes ☐ No ☐	
Are potential stormwater contaminants protected inside or under cover?	Yes ☐ No ☐	
Is dewatering from site properly controlled?	Yes ☐ No ☐	
Are portable restroom facilities properly sited and maintained?	Yes ☐ No ☐	
Are all hazardous materials and wastes stored in accordance with local regulations?	Yes ☐ No ☐	

Non-Compliance Actions

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

Tighe&Bond

APPENDIX F

Record Keeping

Tighe&Bond

APPENDIX G

SSO Inventory

Tighe&Bond

APPENDIX H

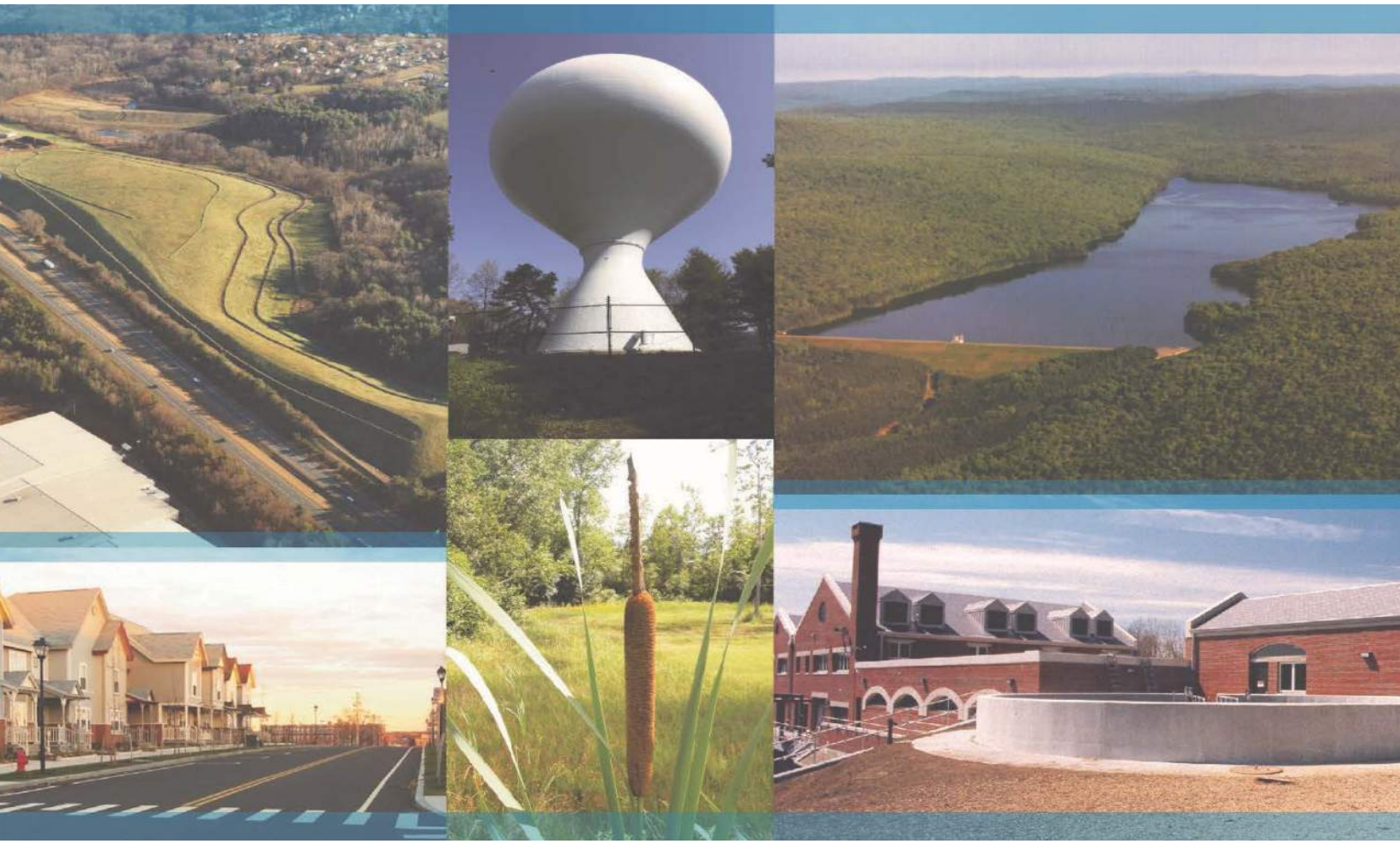
AMENDMENT LOG

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			

Tighe&Bond

APPENDIX I



Town of Wilbraham, Massachusetts

Illicit Discharge Detection and Elimination Program

NPDES Permit # MAR041025

June 2019

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Commonly Used Abbreviations	Definitions
CFR	Code of Federal Regulations
CMRSWC	Central Massachusetts Regional Stormwater Coalition
EPA	Environmental Protection Agency
GIS	Geographic Information System
GPS	Global Positioning System
IDDE	Illicit Discharge Detection and Elimination
MassDEP	Massachusetts Department of Environmental Protection
MCM	Minimum Control Measure
MS4	Municipal Separate Storm Sewer System
NPDES	National Pollutant Discharge Elimination System
SOP	Standard Operating Procedure
SSO	Sanitary Sewer Overflow
SWMP	Stormwater Management Program
TMDL	Total Maximum Daily Load

Section 1
Introduction

1.1 Background

The Environmental Protection Agency (EPA) nationally regulates the discharge of stormwater runoff that is transported into local waterbodies through Municipal Separate Storm Sewer Systems (MS4) that are located in Urbanized Areas (also known as "Regulated Areas"). The Town of Wilbraham meets EPA's regulatory threshold, and therefore is required to obtain coverage under a National Pollutant Discharge Elimination System (NPDES) permit for its stormwater discharges from the MS4 in its Urbanized Area.

In Massachusetts, the EPA Region 1 and the Massachusetts Department of Environmental Protection (MassDEP) jointly administer the municipal stormwater program and authorize Wilbraham to discharge stormwater under the *NPDES General Permit for Storm Water Discharges from Small Municipal Separate Storm Sewer Systems*, known as the "Small MS4 General Permit." The permit was first issued in 2003 and an updated permit was issued in 2016. Under this program, the Town has developed and implemented a Stormwater Management Program (SWMP) to reduce the contamination of stormwater runoff and prohibit illicit discharges.

The Small MS4 Program contains six elements called *minimum control measures* (MCMs) that, when implemented, should result in a significant reduction in pollutants discharged into receiving waters. The MCMs are:

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

Once implemented, the IDDE Program described herein will satisfy the requirements under the third MCM and is one part of Wilbraham's overall SWMP for compliance under the Small MS4 General Permit.

1.2 Plan Applicability

This IDDE Plan should be implemented throughout the MS4 in Wilbraham's Regulated Area. Regulated Areas are defined by the latest Urbanized Area delineated in the United States decennial census. Figure 1.1, below, includes EPA's map showing Wilbraham's Regulated Area (in red hatching) based on the 2000 and 2010 censuses.[1]

[1] https://www3.epa.gov/region1/npdes/stormwater/ma/ram/wilbraham.pdf

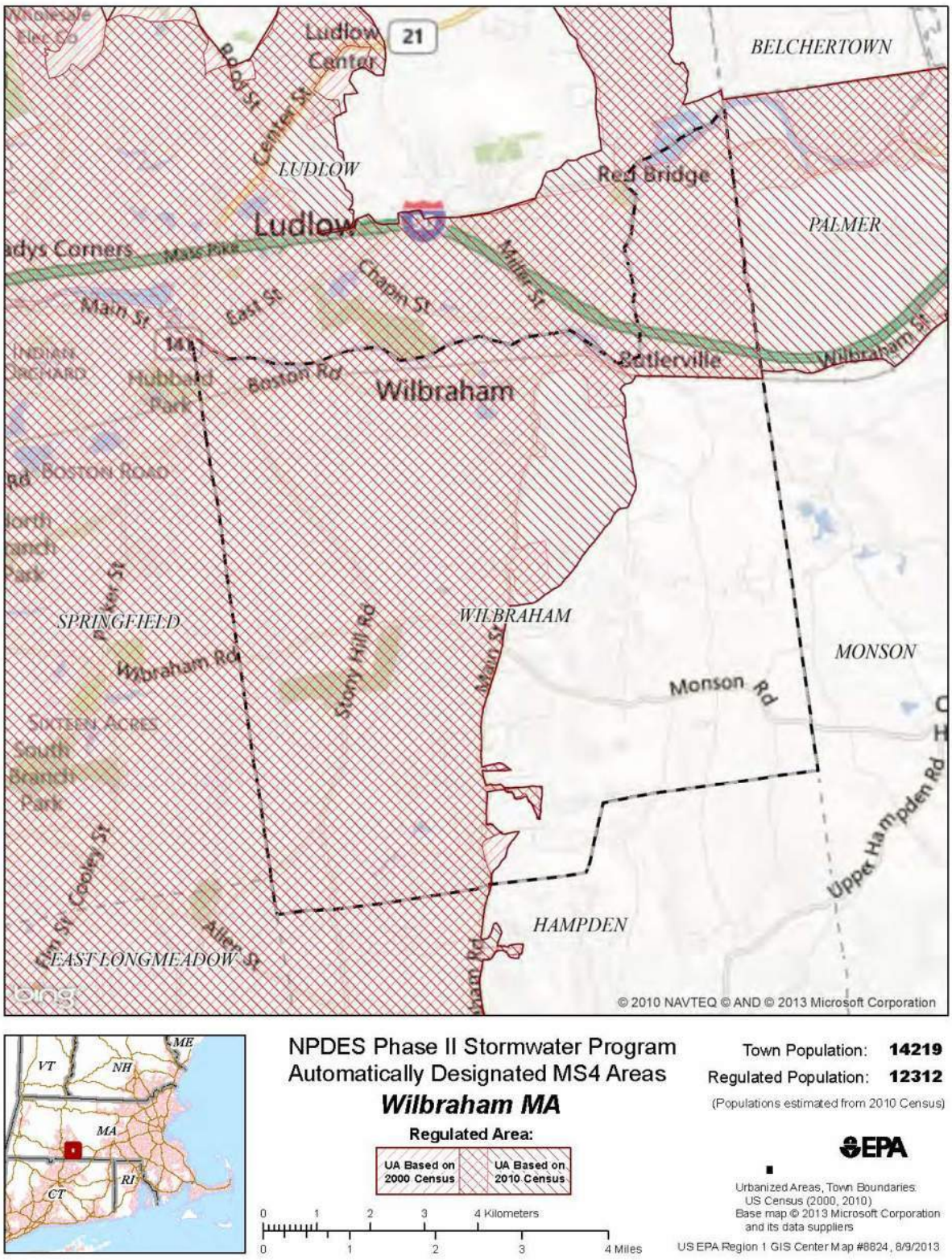


Figure 1.1. Wilbraham's Urbanized Area under the NPDES program based on the 2000 and 2010 censuses.

1.3 Definition of an Illicit Discharge

An "illicit discharge" is defined by 40 CFR 122.26(b)(2) as **any discharge to a MS4 that is not composed entirely of stormwater**. Exceptions include allowable discharges pursuant to a NPDES permit and discharges that are not anticipated to introduce pollutants into the storm drain system. Under the 2016 Small MS4 General Permit and Wilbraham's *Stormwater Phase II Comprehensive By-Law, Part II: Illicit Discharges to the Municipal Storm Drain System*, the following discharges are considered exempt provided that the source is not a significant contributor of pollution to the municipal storm drain system:

Sump pump discharges may discharge to the MS4 provided the flow is "uncontaminated pumped groundwater."

- Discharge or flow from firefighting activities
- Waterline flushing
- Flow from potable water sources
- Springs
- Natural flow from riparian habitats and wetlands
- Diverted stream flow
- Rising groundwater
- Uncontaminated groundwater infiltrating as defined in 40 CFR 35.2005(20), or uncontaminated pumped groundwater
- Water from exterior foundation drains, footing drains (not including active groundwater dewatering systems), crawl space pumps or air conditioning condensation
- Discharge from landscape irrigation or lawn watering
- Water from individual residential car washing
- Discharge from dechlorinated swimming pool water (less than 1 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 to not cause a nuisance
- Discharge from street sweeping
- Discharge or flow resulting from DPW ice and snow control operations
- Dye testing, provided verbal notification is given to the DPW prior to the time of the test
- Non-stormwater discharge permitted under an NPDES permit, waiver, or waste discharge order administered under the authority of the EPA, provided that the discharge is in full compliance with the requirements of the permit, waiver, or order and applicable laws and regulations
- Discharge for which advanced written approval is received from the DPW as necessary to protect public health, safety, welfare, and the environment

A copy of the Town's *Stormwater Phase II Comprehensive By-Law* is provided in **Appendix A**.

Illicit discharges can enter the drainage system through direct connections or indirect sources. A direct connection is any non-stormwater pipe connected to the storm drain system, such as pipe from a washing machine or floor drain or a sewer line from a house.

An indirect discharge may come from a wide variety of sources, such as sanitary sewer overflows (SSOs), infiltration into the drainage system from failed septic systems, or hazardous waste spills collected by storm drains. Grass clippings, leaf litter, and other solid material dumped or otherwise deposited in the storm drain system are also considered illicit discharges.

Direct discharge from a straight pipe (from IDDE Guidance Manual, CWP, 2004).

1.4 Illicit Discharges and Water Quality

Illicit discharges contribute elevated levels of pollutants to surface waterbodies and can potentially enter groundwater. These pollutants can include:

- Heavy metals
- Toxics
- Oil and grease
- Solvents
- Nutrients such as nitrogen and phosphorus
- Pesticides and fertilizers from lawns
- Sediment from construction sites
- Viruses and bacteria

When these pollutants enter waterbodies, they can contaminate drinking water supplies, hinder recreation activities, and harm aquatic and other wildlife habitats.

1.5 Summary of EPA Requirements

As part of the 2003 Small MS4 General Permit, the Town of Wilbraham was required to develop, implement, and enforce a program to detect and eliminate illicit discharges. As required by Part II.B.3 of the 2003 Small MS4 General Permit, this illicit discharge program must contain the following elements:

1. If not already existing, the Town must develop a **storm sewer system map**. At a minimum, the map must show the location of all outfalls and the names of all waters that receive discharges from those outfalls. Additional elements may be included on the map, such as, location of catch basins, location of manholes, and location of pipes within the system. Initial mapping should be based on all existing information available to the Town including project plans, city records and drainage maps. Field surveys may be necessary to verify existing records and locate all outfalls.

2. To the extent allowable under state law, the Town must effectively prohibit, through a **regulatory mechanism** (such as a local bylaw or ordinance), non-stormwater discharges into the system and implement appropriate enforcement procedures and actions. If a regulatory mechanism does not exist, development and adoption of such a mechanism must be included as part of the SWMP.
3. The Town must develop and implement a plan to **detect and address non-stormwater discharges**, including illegal dumping, into the system. The illicit discharge plan must contain the following elements:
    a. Procedures to identify priority areas. This includes areas suspected of having illicit discharges, for example: older areas of the city, areas of high public complaints and areas of high recreational value or high environmental value such as beaches and drinking water sources.
    b. Procedures for locating illicit discharges (visual screening of outfalls for dry weather discharges, dye or smoke testing).
    c. Procedures for locating the source of the discharge and procedures for the removal of the source.
    d. Procedures for documenting actions and evaluating impacts on the storm sewer system subsequent to the removal.
4. The Town must **inform users of the system and the general public** of hazards associated with illegal discharges and improper waste disposal. The Town must train field inspectors to recognize illicit discharges.
5. The **non-stormwater discharges** listed in Section 1.3 of this IDDE Plan must be addressed if they are identified as being significant contributors of pollutants.

Wilbraham met the IDDE requirements of the 2003 Small MS4 General Permit.

The 2003 Small MS4 General Permit expired in April 2008, but it was administratively continued and remained in force and in effect until July 1, 2018. On April 13, 2016, the U.S. EPA published the final *NPDES General Permits for Stormwater Discharges from Small Municipal Separate Storm Sewer Systems in Massachusetts*. The 2016 Small MS4 General Permit substantially increases stormwater management requirements relative to the 2003 Small MS4 General Permit, and mandates specific timelines for compliance.

The new IDDE requirements in the 2016 Small MS4 General Permit include the following elements that build on the 2003 Small MS4 General Permit IDDE requirements, as fully described in the 2016 Small MS4 General Permit Section 2.3.4. The elements listed below build on the 2003 IDDE requirements:

1. The Town must develop an **inventory of known locations of SSOs** that occurred within the previous five years within 120 days of the effective date of the General Permit, and document and summarize SSOs in the Annual Report. Wilbraham does not currently have a municipal sewer system, and this requirement is therefore currently not applicable.
2. An **inventory of all MS4 outfalls and interconnections** must be developed within one year of the effective date of the General Permit.
3. The existing **stormwater map** must be built upon by including all outfalls, interconnections with other MS4s, catch basins, manholes, pipes, flow direction, catchment delineations, and public and private BMPs. This additional mapping must be complete within two years of the effective date of the permit.

Additional items must be added for all outfalls within ten years of the effective date of the permit: latitude and longitude for all outfalls, pipes, manholes, catch basins, refined catchment delineations, and municipal sanitary/combined sewer system (if applicable at that time).

4. A **written IDDE Plan** must be developed within one year of the effective date of the permit. This document was prepared to meet this requirement.
5. The Town must **sample during dry weather**[2] **at all outfalls where flow is present**, and test the flow for signs of illicit discharges within three years of the permit effective date.
6. Based on the results of sampling and characteristics of the catchment areas, the Town must **rank all MS4 catchments for potential of illicit discharges** into the following categories: "Problem", "High Priority", "Low Priority", and "Excluded".
7. A **catchment investigation procedure** that includes a systematic investigation of prioritized catchments, screening of key junction manholes, and wet weather outfall screening in catchments with system vulnerability factors must be developed and implemented.
8. An **annual training** must be provided for all employees involved in the IDDE Program on how to recognize illicit discharges (and, if applicable, SSOs).
9. **Program progress and effectiveness** must be evaluated and reported on yearly in the Annual Report.

Appendix B includes applicable excerpts from the 2016 Small MS4 General Permit.

1.6 Purpose of the IDDE Program Plan

The IDDE Program described herein establishes a proactive, written program to address illicit discharges to the MS4. The IDDE Program includes activities for compliance with the 2016 Small MS4 General Permit, under which the Town of Wilbraham is currently authorized to discharge stormwater.[3]

[2] Per section 2.3.4.7 b.ii of the 2016 Small MS4 General Permit, dry weather screening and sampling shall proceed only when no more than 0.1 inches of rainfall has occurred in the previous 24-hour period and no significant snow melt is occurring.

[3] The authorization to discharge for NPDES Permit ID # MAR041025, Town of Wilbraham, was received on June 4, 2019: https://www3.epa.gov/region1/npdes/stormwater/ma/tms4noi/wilbraham-auth.pdf

Section 2
Sanitary Sewer and Septic Systems

Sanitary sewage can be linked to significant indirect illicit discharges in the form of sewage infiltration to the storm drain. According to section 2.3.4.4.c of the 2016 Small MS4 General Permit, the Town must provide oral notice of an SSO to EPA within 24 hours upon becoming aware of the SSO occurrence. Additionally, the Town must provide written notice to EPA and MassDEP within five (5) days of becoming aware of the SSO occurrence. The MassDEP SSO Reporting form is included in **Appendix C**.

2.1 Sanitary Sewer System Management

Wilbraham's public sewer system serves 1,000 customers, approximately 7% of the Town's population. All wastewater is collected and send to the Springfield Regional Wastewater Treatment Facility on Bondi's Island in Agawam, a 67 million gallons per day capacity wastewater treatment facility that discharges to the Connecticut River. The Town's collection system includes approximately 24 miles of sewer main, as well as 8 municipal pump stations.[4]

The Town does not have interconnected storm and sanitary sewer infrastructure, and therefore has not experienced any overflows due to storm events. The Town must track future SSOs and update the SSO Inventory included in **Appendix C** and the Town's written Stormwater Management Plan.

2.2 Septic System Management

Incorrectly managed or malfunctioning septic systems have the potential to discharge improperly treated or excess quantities of wastewater to the MS4, either due to infiltration via groundwater or through septic system breakouts over land, resulting in a discharge of sanitary sewage from the MS4 to receiving waters. Typical pollutants found in septic systems are nutrients, pathogens, dissolved metals, detergents, and solvents. However, the Town mitigates this potential pollution source by implementing Title 5 of the State Environmental Code through its Board of Health.

The majority of the Town of Wilbraham's population, approximately 70%, is served by septic systems. Like most New England communities, there are areas with high groundwater and poor soils in Wilbraham, and these factors combined with densely populated neighborhoods and steep hills could increase the likelihood of septic system challenges. In Wilbraham, areas of the Town with shallow bedrock and/or thick till east of Main Street have been identified as having difficulty in providing sufficient subsurface treatment from traditional on-site wastewater systems.[5]

[4] https://www.wilbraham-ma.gov/192/Wastewater

[5] https://www.wilbraham-ma.gov/DocumentCenter/View/1534/OSRP-2014-2021

2.3 Action Plan

Action Items: Illicit Discharge Bylaw	
1. Track and maintain an SSO inventory.	Create and update the SSO inventory annually as needed, update the SWMP and IDDE Plan, and summarize in Annual Reports. Provide oral notice to EPA within 24 hours of identifying an SSO. Provide written notice to EPA and MassDEP within five days.
2. Coordinate with Board of Health	The Board of Health should be trained on the IDDE Program to help identify incidences of illicit discharges, particularly when a septic system has failed. Continue to support the Board of Health programs to promote proper maintenance of septic systems.

Section 3
Stormwater System Mapping

3.1 2016 Small MS4 General Permit Requirements

Storm drain system mapping is an essential tool in identifying illicit discharges. Minimum mapping elements required by the 2016 Small MS4 General Permit are broken into two phases:

Phase I (required within two years of the effective date of the permit):

- Outfalls and receiving waters (required by 2003 Small MS4 General Permit)
- Open channel conveyances (swales, ditches, etc.)
- Interconnections with other MS4s and other storm drain systems
- Municipally-owned stormwater treatment structures (e.g., detention and retention basins, infiltration systems, bioretention areas, water quality swales, gross particle separators, oil/water separators, or other proprietary systems)
- Waterbodies identified by name and indication of all use impairments as identified on the most recent EPA approved Massachusetts Integrated List of waters report pursuant to Clean Water Act Section 303(d) and 305(b)
- Initial catchment delineations. A catchment is the area that drains to an individual outfall or interconnection

Phase II (required within ten years of the effective date of the permit):

- Outfall spatial location (latitude and longitude, minimum accuracy of ± 30 feet)
- Pipes
- Catch basins
- Manholes
- Refined catchment delineations
- Municipal sanitary sewer system (not applicable)
- Municipal combined sewer system (not applicable)

The following mapping elements are not required, but are **recommended**:

- Storm sewer material, size and age
- Sanitary sewer system material, size, and age
- Privately owned stormwater treatment structures
- Properties known or suspected to be served by a septic system, especially in high-density urban areas
- Area where the Town's MS4 has been or could be influenced by septic system discharges (e.g., areas with poor soils, or high ground water elevations unsuitable for conventional subsurface disposal systems)
- Seasonal high groundwater table elevations impacting sanitary alignments

- Topography
- Orthophotography
- Alignments, dates and representation of work completed (with legend) of past illicit discharge investigations (e.g., closed circuit television (CCTV), flow isolation, dye testing)
- Locations of suspected, confirmed and corrected illicit discharges (with dates and flow estimates)

3.2 Wilbraham's MS4 Mapping Status

The Town of Wilbraham has completed initial mapping of the MS4 using existing plans and field work to obtain locations of drainage system elements using Global Positioning System (GPS). A working draft of the drainage system map is included in **Appendix D**. Up-to-date mapping is available from the Wilbraham DPW. As of the date of this report, the following elements are mapped within the urbanized area:

- Receiving waterbodies
- 241 known outfalls
- Approximately 55 miles of storm drainage pipe
- Initial catchment delineations
- All sub-watersheds

The mapping requirements of the 2003 Small MS4 General Permit have been met, and many of the requirements of the 2016 Small MS4 General Permit have been completed or are underway. The mapping element totals listed above are subject to change as the Town completes ongoing mapping improvement efforts. Additional mapping is needed to confirm the connectivity of the system and number of outfalls, as well as add attribute data to the structures. As the mapping effort progresses, **Appendix D** should be updated to reflect changes and additions to the system mapping and MS4 inventory.

3.3 Outfall Inventory

The Town must develop and maintain an inventory of all of the Town's outfalls and interconnections. This inventory identifies each outfall discharging from the MS4, records its location and condition, and provides a framework for tracking inspections, screenings, and other activities under the Town's IDDE Program. Refer to **Appendix D** for the initial outfall/interconnection inventory and priority ranking, initial catchment delineations, and working copies of associated drainage system maps.

Per Section 2.3.4.7.b.iii of the 2016 Small MS4 General Permit, the outfall/interconnection inventory shall include the following information:

- Unique identifier
- Receiving water
- Date of most recent inspection
- Dimensions

- Shape
- Material (concrete, PVC)
- Spatial location (latitude and longitude with a minimum accuracy of ± 30 feet)
- Physical condition
- Indicators of potential non-stormwater discharges (including presence or evidence of suspect flow and sensory observations such as odor, color, turbidity, floatables, or oil sheen) as of the most recent inspection.

The initial inventory in **Appendix D** was created from the existing GIS data and supplemented with record drawings and field measurements and observations. Tighe & Bond also created an application with ArcGIS online for mobile data collection with the Town's iPad, using the outfall investigation form in **Appendix F**. Location information was collected with a handheld GPS and input into a GIS database. GPS accuracy of a smart phone or tablet is sufficient to meet permit requirements. The Town's Sampling Protocol and relevant SOPs for sampling and analysis are available in **Appendix F**.

3.4 Action Plan

Action Items: Stormwater System Mapping	
1. Maintain Outfall Inventory	The inventory shall be updated annually to include data collected in connection with the dry weather screening and other relevant inspections conducted by the Town or consultants. The inventory shall be included with each Annual Report.
2. Continue to Improve Drainage Mapping and Asset Inventory	Phase 1 mapping must be completed within two years of the effective date of the permit. The next priority will be identifying Town-owned BMPs and open channel conveyance systems. Phase 2 mapping will be completed within 10 years of the permit effective date and includes catchment delineations, pipes, manholes, and catch basins. Throughout the permit term, the map will be updated as necessary to reflect newly discovered information, corrections or modifications, significant changes, and progress made. Updated maps may be added to **Appendix D** annually or kept electronically. When Annual Reports are prepared, the Town should print or save a pdf of the most up-to-date system map to document progress.
3. Map Availability and Data Management	The MS4 map is critical for the IDDE Program, outfall monitoring program, MS4 maintenance activities, and spill response and should be made accessible to Town personnel in a usable format (e.g., paper field maps or electronic on handheld device). All personnel should be encouraged to report mapping errors, omissions, or other updates to the DPW.

Section 4
Non-Stormwater Discharge Bylaw

4.1 Stormwater Phase II Comprehensive By-Law

The Town of Wilbraham has developed a by-law to regulate non-stormwater discharges to the MS4. The *Stormwater Phase II Comprehensive By-Law* was approved as Section 634 of the General By-Laws of the Town of Wilbraham at the Annual Town Meeting on May 14, 2007. A complete copy of the *Stormwater Phase II Comprehensive By-Law* is included as part of this plan in **Appendix A**. The DPW or its designated agent is designated to administer, implement, and enforce this bylaw, which meets the requirements of the 2016 Small MS4 General Permit.

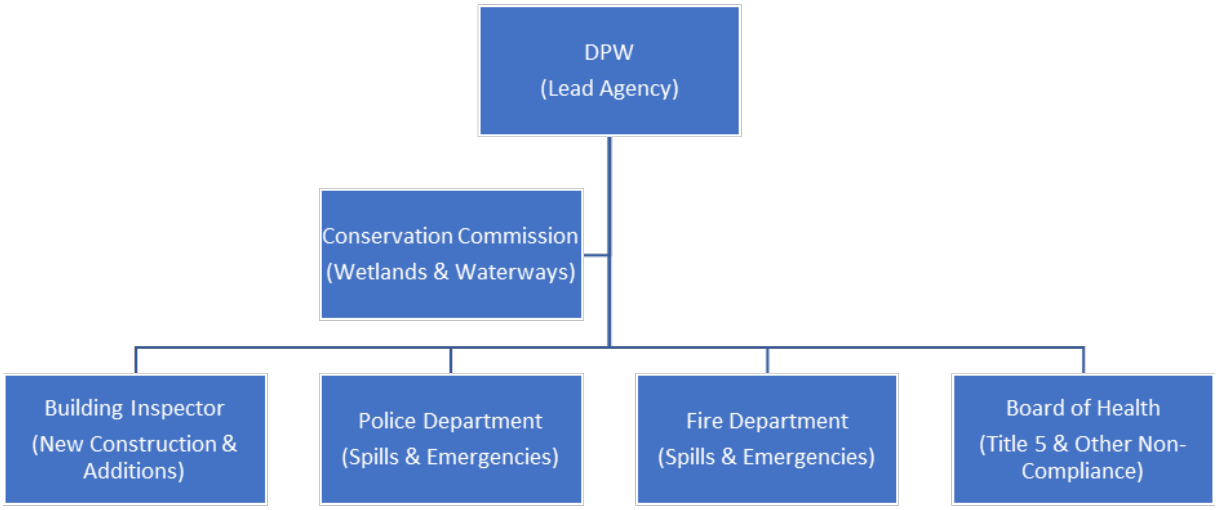
4.2 Action Plan

Action Items: Illicit Discharge Bylaw	
1. Implement Bylaw.	The Town's *Stormwater Phase II Comprehensive By-Law* shall be enforced when necessary for illicit discharges, illegal connections, and illegal dumping. Recommended procedures to require a private property owner to remove an illicit discharge are provided in **Appendix E**.

Section 5
Statement of IDDE Program Responsibilities

5.1 Protocol for IDDE Program Responsibilities

The DPW is responsible for overseeing and implementing the IDDE Program, including enforcement of the prohibition of illicit discharges, connections, and obstructions to the MS4. Additional authority for prohibition of illicit discharges and illegal dumping to the MS4 and water bodies in Wilbraham is granted to the Conservation Commission through the Massachusetts Wetlands Protection Act and Regulations.



Establishing procedures to coordinate Town personnel and departments is an important component of the IDDE Program and is required under Section 2.3.4.6.b of the 2016 Small MS4 General Permit. Wilbraham's protocol for IDDE Program responsibilities is provided in **Appendix E**. This statement is written in accordance with the requirements of the 2016 Small MS4 General Permit, and includes an explanation of specific areas of responsibility and a process for coordination and data sharing among various Town departments and personnel.

The following provides additional detail on responsibilities with regard to finding and removing illicit discharges:

- The **DPW** has the authority to enforce the prohibition of illicit discharges, connections, and obstructions to the MS4, and is designated to administer and implement the IDDE Program. The DPW serves as the lead local agency to manage the Town's IDDE Program and address EPA's permit requirements.

- The **Fire and Police Departments** are generally the first responders to accidents on roadways that would lead to an emergency spill that would affect the Town's storm drain infrastructure. When public utilities are affected, the DPW is notified via a phone call to the DPW Director.

- The **Health Department**, as the Public Health Agent for the Town, is responsible for overseeing Title 5 inspection results. Any septic related problems or complaints are handled by the Board of Selectmen, who notifies the DPW if any action is required on the part of the DPW.

- The **Building Inspector** notifies the Fire Department or the DPW, depending on the size of the spill, with a phone call when any spills are identified in the course of building inspections.

5.2 Action Plan

Action Items: Statement of IDDE Program Responsibilities	
1. Update Protocol for IDDE Program Responsibilities as Needed	The DPW, with assistance from other relevant staff, may update or amend the written statement that identifies responsibilities with regard to eliminating illicit discharges. The most up-to-date Protocol for IDDE Program Responsibilities should be maintained in **Appendix E**. See also Section 8.
2. Employee Training (see Section 9.2)	Train responsible Town personnel on the written IDDE protocol as part of the Annual Employee Trainings.

Section 6
Assessment and Priority Ranking of Outfalls and Interconnections

In assessing the storm drain system for illicit connections and discharges, prioritization helps focus energies on areas of greatest concern or where the greatest impact would be achieved. Since 2003, the Town of Wilbraham has generally prioritized areas discharging to impaired waters, Spectacle Pond and Chicopee River; industrial areas; and recreational areas. Under the 2016 Small MS4 General Permit, EPA requires a more rigorous assessment of illicit discharge potential and related public health significance. Additionally, per the 2016 Small MS4 General Permit, "the ranking will determine the priority order for the screening of outfalls and interconnections pursuant to part 2.3.4.7.b", and the compliance schedule for catchment investigations is based on this ranking.

6.1 Priority Ranking

Outfalls and interconnections, and their associated catchments must be assessed in terms of their potential to have illicit discharges and/or SSOs, and the related public health significance. The illicit discharge potential assessment and priority ranking will determine the order of outfall and interconnection screening and schedule for catchment investigations for evidence of illicit discharges and SSOs. This assessment also provides the basis for determining IDDE program milestones.

Outfalls and their associated catchments were ranked into the following categories based on potential for illicit discharges:

- **Excluded Outfalls**: this category is limited to roadway drainage in undeveloped areas with no dwellings and no sanitary sewers; drainage for athletic fields, parks or undeveloped green space and associated parking without services; cross-country drainage alignments (that neither cross nor are in proximity to sanitary sewer alignments) through undeveloped land.
- **Problem Outfalls**: outfalls/interconnections with known or suspected contributions of illicit discharges based on existing information are designated as Problem Outfalls, including any outfalls/interconnections where previous screening indicates likely sewer input.
- **High Priority Outfalls**: outfalls/interconnections that have not been classified as Problem Outfalls and that are: 1) discharging to an area of concern to public health due to proximity of public beaches, recreational areas, drinking water supplies or shellfish beds; or 2) determined by the permittee as high priority based on the characteristics listed in the permit or other available information.
- **Low Priority Outfalls**: outfalls/interconnections determined by the permittee as low priority based on the characteristics listed in the permit or other available information.

The characteristics of each of these categories have been defined by EPA in the 2016 Small MS4 General Permit Section 2.3.4.7.a.ii and iii.

Within each of these four ranking categories, the catchments will also be ranked based on screening factors. Per section 2.3.4.7.a.iii. of the 2016 Small MS4 General Permit, EPA's **minimum screening factors** include:

- Past discharge complaints and reports.
- Poor dry weather receiving water quality – the following guidelines are recommended to identify waters as having a high illicit discharge potential:
    - Exceeding water quality standards for bacteria
    - Ammonia levels above 0.50 mg/L
    - Surfactants levels greater than or equal to 0.25 mg/L.
- Density of generating sites – Generating sites are those places, including institutional, municipal, commercial, or industrial sites, with a potential to generate pollutants that could contribute to illicit discharges. Examples of these sites include, but are not limited to: car dealers, car washes, gas stations, garden centers, and industrial manufacturing areas.
- Age of surrounding development and infrastructure – Industrial areas greater than 40 years old and areas where the sanitary sewer system is more than 40 years old will probably have a high illicit discharge potential. Developments 20 years or younger will probably have a low illicit discharge potential.
- Sewer conversion – Catchments that were once serviced by septic systems, but have been converted to sewer connections may have a high illicit discharge potential.
- Density of aging septic systems – Septic systems thirty years or older in residential land use areas are prone to have failures and may have a high illicit discharge potential.
- Culverted streams – Any river or stream that is culverted for distances greater than a simple roadway crossing may be considered "high."
- Water quality limited waterbodies that receive a discharge from the MS4 or waters with approved TMDLs applicable to the permittee, where illicit discharges have the potential to contain the pollutant identified as the cause of the water quality impairment.

An initial priority ranking of outfall/interconnections and the associated catchment areas using the screening criteria presented above, in addition to Town-specific criteria such as proximity to recreational areas. **Appendix D** contains the ranking methodology and assumptions, a summary table of preliminary outfall ranking, a summary table of preliminary catchment ranking, an initial outfall inventory, and a map of outfalls, preliminary catchment delineations, and preliminary rankings.

6.2 Action Plan

Action Items: Assessment and Priority Ranking of Outfalls/ Interconnections	
1. Update Illicit Discharge Potential Assessment and Priority Ranking	An initial illicit discharge potential assessment and priority ranking based on existing information was completed as part of this Program and is located in **Appendix D**. The Town shall update its assessment and priority ranking continuously based on catchment delineations, the results of screening, and other new relevant information. The updated ranking shall be complete within three years of the effective date of the permit per section 2.3.4.7.c of the 2016 Small MS4 General Permit.

Section 7
Identification of Illicit Discharges

A key component of the IDDE Program is written procedures for screening and sampling outfalls and interconnections from the MS4 in dry and wet weather for evidence of illicit discharges and SSOs. This section summarizes the written procedures that the Town should use to identify illicit discharges and makes recommendations for prioritizing catchment investigations. These procedures heavily rely on the January 2012 Draft EPA New England Bacterial Source Tracking Protocol as well as guidelines from the Center for Watershed Protection.

Note that certain discharges are permitted through the EPA and MassDEP via other NPDES permitting programs, including the Municipal Wastewater and Industrial Wastewater permit programs. Outfalls permitted through these programs are not part of the Town's MS4 because they have different requirements and individual permits and plans. They do not need to be inventoried or monitored as part of the IDDE investigations. In Wilbraham, the following facilities are excluded from Wilbraham's outfall monitoring program:

- Friendly's Ice Cream Plant (Permit No. MAR054037), 1855 Boston Road
- Red Bridge Project Hydropower Station (Permit No. MAG360021), Red Bridge Road

Additional information on these facilities is available on EPA's Enforcement and Compliance History Online (ECHO) website: https://echo.epa.gov/.

7.1 Dry Weather Outfall and Interconnection Screening and Sampling

7.1.1 Procedures and Guidance

The Town will screen and sample outfalls and interconnections in accordance with the requirements in the 2016 Small MS4 General Permit. Per the 2016 Small MS4 General Permit, all outfalls (excluding Problem and Excluded outfalls) are required to be inspected for the presence of dry weather flow (when no more than 0.1 inches of rainfall has occurred within the previous 24-hour period and no significant snow melt is occurring) within three years of the effective permit date.

The following procedures and guidance are included in **Appendix F** and should be referenced during dry weather outfall/interconnection screening and sampling:

- Outfall Field Sheet, Adapted from Center for Watershed Protection's IDDE Manual
- Wilbraham Sampling Protocol and Field Equipment Checklist
- Chapter 11 of the Center for Watershed Protection's IDDE Manual, "Outfall Reconnaissance Inventory"
- Chapter 13 of the Center for Watershed Protection's IDDE Manual, "Tracking Discharges to a Source"
- EPA New England Bacterial Source Tracking Protocol, Draft 2012

7.1.2 Impaired Waterbodies

Some waterbodies within Wilbraham are impaired for various stormwater pollutants, such as bacteria, nutrients, and pathogens. Other impairments, such as Mercury in Fish Tissue, are not related to stormwater pollutants and are not addressed by the Small MS4 Program.

Specific impairments are compiled for Massachusetts's waterbodies in an Integrated List of Waters, which becomes the EPA's 303(d) list once finalized. The most recent 303(d) list is from 2014, which states that the Wilbraham waterbodies with stormwater pollutants include two segments of the Chicopee River (MA36-22, impaired by *Escherichia coli* and Mercury in Fish Tissue, and MA-36-24, impaired by Fecal Coliform) and Spectacle Pond (MA36142, impaired by Nutrient/Eutrophication Biological Indicators and subject to the TMDLs of Phosphorus for Selected Chicopee Basin Lakes.[6]

Where a discharge is directly to an impaired water or water subject to an approved TMDL, the sample should be analyzed for the pollutants identified as the cause of the impairment. These impairments and associated sampling requirements are included in the Dry Weather Sampling Procedure, located in **Appendix F**.

Note that a draft 2016 Integrated List of Waters is available from MassDEP, which adds an *Escherichia coli* impairment to the MA36-24 segment of the Chicopee River. However, the 2016 Integrated List of Waters has not been finalized and is not the official EPA 303(d) list; therefore, the Dry Weather Sampling Procedure has been developed based on the 2014 Integrated List. Excerpts from the final 2014 and draft 2016 Integrated Lists are included in **Appendix G**, with notes about the differences between the Lists.

7.2 Catchment Investigation Procedure

The Town's IDDE Program must include a written, systematic procedure for catchment investigation that includes:

1. A review of mapping and historic plans and records for the catchment;
2. A manhole inspection methodology; and
3. Procedures to isolate and confirm sources of illicit discharges.

Wilbraham will use the following procedure to develop a written procedure to evaluate and investigate each catchment according to section 2.3.4.8 of the 2016 Small MS4 General Permit.

7.2.1 Review of Mapping and Historic Plans

Based on relevant mapping and historic plans and records (to the extent available), the Town must identify and record the presence of any System Vulnerability Factors within each catchment. System Vulnerability Factors, as defined by Section 2.3.4.8.c.i of the 2016 Small MS4 General Permit, include the following situations:

- History of SSOs, including, but not limited to, those resulting from wet weather, high water table, or fat/oil/grease blockages

[6] https://www.mass.gov/files/documents/2016/08/og/chicopee_0.pdf

- Common or twin-invert manholes serving both storm and sanitary sewer alignments
- Common trench construction serving both storm and sanitary sewer alignments
- Crossings of storm and sanitary sewer alignments where the sanitary system is shallower than the storm drain system
- Sanitary sewer alignments known or suspected to have been constructed with an underdrain system
- Inadequate sanitary sewer level of service (LOS) resulting in regular surcharging, customer back-ups, or frequent customer complaints
- Areas formerly served by combined sewer systems
- Sanitary sewer infrastructure defects such as leaking service laterals, cracked, broken, or offset sanitary infrastructure, directly piped connections between storm drain and sanitary sewer infrastructure, or other vulnerability factors identified through Inflow/Infiltration Analyses, Sanitary Sewer Evaluation Surveys, or other infrastructure investigations.

EPA also recommends including the following items as System Vulnerability Factors, although not required:

- Sewer pump/lift stations, siphons, or known sanitary sewer restrictions where power/equipment failures or blockages could readily result in SSOs
- Any sanitary sewer and storm drain infrastructure greater than 40 years old
- Widespread code-required septic system upgrades required at property transfers
- History of multiple Board of Health actions addressing widespread septic system failures

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

7.2.2 Manhole Inspection Methodology

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

The Town will begin at the most downstream key junction manhole (nearest to the outfall) and work upstream. Catchment investigations will be done in dry weather. Outfalls will only be screened during wet weather per Section 2.3.4.8.c.ii.2 where System Vulnerability Factors (see Section 7.2.1) have been identified. For manhole inspections, the Town will rely on in situ water quality screening such that a sample will be collected for laboratory analysis only if in situ field screening indicates a possible illicit discharge. Refer to Wilbraham's Sampling Protocol and Chapter 13 of the Center for Watershed Protection IDDE Manual in **Appendix F** for additional information regarding laboratory analysis parameters for Wilbraham's receiving waters.

Where water quality screening, sampling results, and/or visual and olfactory observations indicate a potential illicit discharge, the upstream area will be flagged for additional investigation and/or isolation and confirmation of sources (see Section 7.2.3).

The schedule to complete catchment investigations depends on the catchment priority ranking as updated after dry weather screening (see Action Item 1 in Section 6). Program milestones are in Section 7.3.

7.2.3 Procedures to Isolate and Confirm Sources

Chapter 13 of the Center for Watershed Protection IDDE Manual, "Tracking Discharges to a Source" is included in **Appendix F**. The Town will use this chapter as a guide for isolating and confirming sources of illicit discharges.

7.3 Catchment Investigation Timeline

According to the 2016 Small MS4 General Permit section 2.3.4.8.a, the following schedule is applicable to the Town of Wilbraham's investigation of catchments by Permit Year (PY).

Catchment Investigation Requirement	PY 1	PY 1.5	PY 2	PY 3	PY 4	PY 5	PY 6	PY 7	PY 8	PY 9	PY 10
Develop written catchment investigation procedure		●									
Investigations of catchments associated with Problem Outfalls			■	→	→	→	→	●			
Investigations of catchments with likely sewer input				■	→	→	→	●			
Investigations of catchments associated with High and Low Priority Outfalls				■	→	→	→	→	→	→	●

■ Year investigations required to begin
→ Ongoing investigations
● Year due

7.4 Action Plan

Action Items: Identification of Illicit Discharges	
1. Outfall and Interconnection Dry Weather Screening	The Town shall complete dry weather screening and sampling (where flowing) of every MS4 outfall and interconnection no later than three years from the effective date of the permit. Catchments where screening indicates a possible sanitary sewer input shall be ranked as **High Priority** for catchment investigations (see Section 6).

Action Items: Identification of Illicit Discharges	
2. Identify Key Junction Manholes	The Town must identify key junction manholes, as defined in the 2016 Small MS4 General Permit, within each catchment area beginning with Problem and High Priority catchments identified according to Section 6. To the extent allowed, the Town should minimize the number of key junction manholes. Key junction manholes should be included in the Catchment Investigation Procedure, due within 18 months of the effective date of the permit.
3. Develop and Implement Catchment Investigation Procedure	The Town will develop and implement the Catchment Investigation Procedure described in Section 7.2 according to the schedule in Section 7.3. Documentation that tracks progress towards these goals should be kept in **Appendix I;** large reports may be filed separately.
4. System Vulnerability Factors and Wet Weather Screening	EPA guidance will be used to determine whether one or more System Vulnerability Factors are present in catchment areas (refer to Section 7.2, Catchment Investigation Procedure, and the Initial Catchment Ranking in **Appendix D**). System Vulnerability Factors focus on potential for sanitary wastewater to discharge into the MS4 or environment. They must be recorded and reported annually for each catchment. For catchments with one or more System Vulnerability Factors, wet weather screening is required by the 2016 Small MS4 General Permit.
5. Ongoing Manhole Investigations and Outfall Monitoring Program	The Town will continue to perform dry and wet weather outfall and interconnection screening required in the 2016 Small MS4 General Permit in conjunction with the Catchment Investigation Procedure, such as confirmatory screenings and follow-up screenings. Documentation of outfall Screening and sampling should be added to **Appendix I** as it is available.

Section 8
Removal and Confirmation

8.1 Removal of Illicit Discharges

Most corrective actions for an illicit discharge, once isolated, will involve some kind of infrastructure modification or repair. Structural repairs can range from simple plumbing projects to excavation and replacement of sewer lines, and can be used to eliminate a wide variety of direct discharges such as sewage, industrial, and commercial cross-connections. Structural repairs may also be necessary for indirect discharges, such as discharges from a failing septic system or washwater discharged outdoors, when the discharge enters an MS4 inlet or flows directly into receiving waters. Most transitory discharges, such as a liquid or oil spill or illegal dumping, are corrected simply with spill containment and clean-up procedures.

Recommended procedures to require a property owner to remove an illicit discharge are provided in **Appendix E**. This section discusses additional requirements and considerations for Wilbraham.[7]

8.2 Compliance Schedule and Reporting to EPA

Per Section 2.3.4.2 of the 2016 Small MS4 General Permit, the Town of Wilbraham must eliminate all illicit discharges to the MS4 or establish a schedule for elimination within 60 days of detection:

> **2.3.4.2 Elimination of Illicit Discharges**
>
> a. Upon detection of an illicit discharge, the Town shall locate, identify, and eliminate the illicit discharge as expeditiously as possible. Upon identification of the illicit source the Town shall notify all responsible parties for any such discharge and require immediate cessation of improper disposal practices in accordance with the Town bylaw. Where elimination of an illicit discharge within 60 days of its identification as an illicit discharge is not possible, the Town shall establish an expeditious schedule for its elimination and report the dates of identification and schedules for removal in the Town's annual reports. The Town shall immediately commence actions necessary for elimination. The Town shall diligently pursue elimination of all illicit discharges. In the interim, the Town shall take all reasonable and prudent measures to minimize the discharge of pollutants to and from its MS4.
>
> b. The period between identification and elimination of an illicit discharge is not a grace period. Discharges from an MS4 that are mixed with an illicit discharge are not authorized by the General Permit and remain unlawful until eliminated.

[7] Section 8.1 text is adapted from the Center for Watershed Protection's 2004 IDDE Manual, available online at https://www3.epa.gov/npdes/pubs/idde_manualwithappendices.pdf.

The Town shall include the following information in the Annual Report for each confirmed source:

- The location of the discharge and its source(s)
- A description of the discharge
- The date and method of discovery
- The date of elimination or planned corrective measures and a schedule for completing the illicit discharge removal
- Mitigation or enforcement action
- An estimate of the volume of flow removed

This information and additional reporting requirements will be used in evaluating IDDE Program progress and is further described in Section 10.

8.3 Confirmation Screening

Within one year of removal of all identified illicit discharge sources, confirmatory outfall or interconnection screening shall be conducted according to the 2016 Small MS4 General Permit requirements. The confirmatory screening shall be conducted in dry weather unless System Vulnerability Factors have been identified in the catchment as described in Section 7.2, in which case both dry weather and wet weather confirmatory screening shall be conducted.

If confirmatory screening indicates evidence of additional illicit discharges, the catchment shall be scheduled for additional investigation. Confirmatory screening is not required in catchments where no illicit discharges or System Vulnerability Factors have been identified and no previous screening indicated suspicious flows. Refer to the Flow Chart for Corrective Action in **Appendix E** for additional information about the process for eliminating an illicit discharge.

8.4 Ongoing Screening

Upon completion of catchment investigation according to the procedures in Section 7.2, and illicit discharge removal and confirmation (if necessary) pursuant to this Section, part 2.3.4.8.a of the 2016 Small MS4 General Permit requires that each outfall or interconnection be reprioritized for screening and scheduled for ongoing screening once every five years. Follow-up screening shall consist of dry weather screening and sampling, and wet weather screening and sampling is also required in catchments where wet weather screening was previously required.

8.5 Action Plan

Action Items: Removal and Confirmation	
1. Follow Protocol and Document Actions	If an illicit connection or discharge is discovered, it is critical that the Town carefully adhere to protocol for removal, enforcement, and documentation described in this section and in the 2016 Small MS4 General Permit. If an illicit connection or discharge cannot be removed within 60 days, the Town must establish a schedule for elimination and include the schedule as well as the date the connection or discharge was identified in Annual Reports.
2. Formalize Illicit Discharge Tracking	Formalize the tracking methodology for illicit discharge and connection discoveries, removal, and confirmation. Store data in a common repository so multiple Town departments can access and update as needed.

Section 9
Illicit Discharge Prevention

Elimination and ongoing prevention are the ultimate goals of the IDDE Program. The following Section provides options for the Town of Wilbraham to educate the public about illicit discharges and train municipal employees on the identification and elimination of known illicit discharges.

9.1 Public Education

Education is a useful tool in preventing illicit discharges. The 2003 Small MS4 General Permit required that the Town inform public employees, businesses, and the general public of hazards associated with illegal discharge and improper waste disposal. The 2016 Small MS4 General Permit requirements for Wilbraham public education include the following:

- Over the course of the permit term, Wilbraham must distribute a minimum of two messages to each of four audiences (residential, business/institutions, developers, and industrial).
- As an MS4 located within the Connecticut River watershed and subject to the Long Island Sound Nitrogen TMDL requirements outlined in Appendix F, Section B.1 of the 2016 Small MS4 General Permit, specific timed messages to residents and businesses/institutions/commercial facilities are required:
    - Annual message in the spring (Apr/May) that encourages proper use and disposal of grass clippings and encourages use of slow-release fertilizers
    - Annual message in the summer (Jun/Jul) that encourages proper management of pet waste
    - Annual message in the fall (Aug/Sept/Oct) that encourages proper disposal of leaf litter

Wilbraham may incorporate various educational activities into the Public Education Program with the goal of preventing illicit discharges to the drainage systems.

- Educate the public on illicit discharges and the impacts to the human health and the environment.
- Encourage awareness and promote stewardship of the storm drain system in neighborhoods. This may be accomplished through catch basin stencils or markers.
- Educate the public about the IDDE Program, Wilbraham's *Stormwater Management* Bylaw, and the consequences of violations.
- Post "No Dumping" signs at key locations to discourage illegal dumping by threatening fine or imprisonment.

Providing IDDE training to DPW staff and contractors that clean catch basins is a cost-efficient way to identify and report illicit discharges.

The target audience for education on illicit discharges and illegal dumping should include residents, businesses, institutions, commercial facilities, developers, and industrial facilities. Materials for public outreach can be obtained from the Pioneer Valley Planning Commission's Connecticut Stormwater Committee, the Massachusetts Think Blue website (https://www.thinkbluemassachusetts.org/), EPA Region 1's Stormwater Tools in New England website (https://www.epa.gov/npdes-permits/stormwater-tools-new-england) or other state and regional groups.

9.2 Annual Employee Training

The Town shall, at a minimum, annually provide training to employees involved in the IDDE Program, including how to recognize illicit discharges and procedures to find and eliminate illicit discharges in accordance with this Plan. Town employees, particularly those that spend time doing site visits and drain system inspections, should be trained. Town departments/boards that should receive training include, but are not limited to, the DPW, Conservation Commission, and the Boards of Selectmen, Planning, and Health. The Town shall report on the frequency and type of employee training in the Annual Report. Trainings can be either conducted for Wilbraham staff only or key Town personnel may attend outside training to meet this requirement.

9.3 Action Plan

Action Items: Illicit Discharge Prevention Procedures	
1. Develop an IDDE Training Program	The Town of Wilbraham must develop an employee training program, to be conducted annually, as described in section 9.2. The training program outline, presentations and materials, and sign-in sheets should be added to **Appendix I**. The IDDE training can be periodically combined with other required training topics, such as good housekeeping and pollution prevention. The Town may rely on EPA or MassDEP sponsored training events as well as regional training sponsored by the Pioneer Valley Regional Planning Commission's Connecticut River Stormwater Committee or a similar group. Maintain the training date, topic and attendees in **Appendix I** for the Annual Report.
2. Continue Public Education	The 2003 Small MS4 General Permit requirements have been satisfied. When developing Wilbraham's Stormwater Management Program under the 2016 Small MS4 General Permit, include messaging to all four target audiences about illicit discharges and illegal dumping.
3. Follow Spill Prevention and Response Procedures	The Protocol for IDDE Program Responsibilities in **Appendix E** should be followed. Maintain the Oil Spill Prevention, Control, and Countermeasure (SPCC) Plan at the Fire Department. Coordinate with the Fire Department regarding spills and emergencies per the protocol established in the SPCC Plan. Update mapping and procedures as necessary.

Section 10
Evaluation of IDDE Program Progress and Reporting

The Town shall define or describe indicators for tracking program success. At a minimum, indicators shall include measures that demonstrate efforts to locate illicit discharges, the number of illicit discharges identified and removed, the number and percent of total outfall catchments served by the MS4 evaluated using the catchment investigation procedure, all dry and wet weather screening and sampling results and the volume of sewage removed. The Town shall evaluate and report the overall effectiveness of the program based on the tracking indicators in the Annual Report.

Section 2.3.4.9 of the 2016 Small MS4 General Permit includes the minimum indicators for tracking of program success. These indicators are as follows:

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

In addition to the above measures of success, the Town will decide additional tracking indicators on a case by case basis and include in the SWMP.

Records must be kept for at least five years per Section 4.2.a of the Permit. Records under the IDDE Program include information used in the development of the written (hardcopy or electronic) IDDE Program, any monitoring results, copies of reports, records of screening, follow-up and elimination of illicit discharges; maintenance records; and inspection records.

10.1 Reporting

All outfall results shall be documented and reported on annually in the Annual Reports. Outfall monitoring results shall include the date, outfall or interconnection identifier, location, weather conditions at time of sampling, precipitation in previous 48 hours, field screening parameter results and results of all analyses. Results of any other stormwater or receiving water quality monitoring or studies conducted during the reporting period where that data is being used by the Town to inform permit compliance or program effectiveness shall also be reported on in the Annual Report per Section 4.3 of the GP.

In addition, the Town must report on the activities related to implementation of the IDDE Program in their Annual Reports according to section 4.4.b.iv of the Massachusetts Small MS4 GP. These activities include:

- Status of the map
- Status and results of the illicit discharge potential ranking and assessment
- Identification of Problem Catchments

- Status of all protocols described in part 2.3.4 of the permit (program responsibilities and systematic procedure)
- Number and identifier of catchments evaluated
- Number and identifier of outfalls screened
- Number of illicit discharges located
- Number of illicit discharges removed
- Gallons of flow removed
- Identification of tracking indicators and measures of progress based on those indicators
- Employee training

10.2 Action Plan

Action Items: Evaluation of IDDE Program	
1. Track Indicators of Program Success	The Town will track the indicators of IDDE Program Success, as listed above and report on them annually. The Town may include additional tracking indicators to aid in the annual evaluation.
2. Record Keeping	The Town will keep records of all IDDE activities in the DPW office. The majority of IDDE records will be maintained electronically and in **Appendix H** to this Plan, though large reports may be filed separately. Record keeping requirements are described in this Plan, and will include: • Outfall Inventory updates: dates, outfall location/ID, field observations. • Outfall Monitoring: dates, outfall location/ID, field observations, in situ and laboratory results, precipitation previous 48 hours. • Location, structure ID, pollutant of concern for suspected illicit discharges. • Log of follow-up activities to confirm and then locate illicit discharge – dates, locations, personnel, actions. • A log of phone calls and complaints received regarding suspected illicit connections and other storm drain issues. Note actions taken and dates. • Employee Training: dates, attendance sheet, and topics (include handouts or visuals if used). • Information used in the development of the Plan. • Inspection and maintenance records.
3. Annual Evaluation of Program Effectiveness	The Town will annually summarize and evaluate IDDE Program progress based on the EPA's requirements and tracking indicators in the Annual Report to the EPA and MassDEP.

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Town of Wilbraham IDDE Program

Appendix A

Stormwater Bylaw

GENERAL BY-LAWS

OF THE

TOWN OF WILBRAHAM

Revised May 15, 2017

Adopted at the Annual Town Meeting of May 15, 2017
Approved by the Attorney General on August 31, 2017

Amended: May 14, 2018

Section 4: Policy Statement

"It is the policy of the Town, a Right to Farm community, to conserve, protect and encourage the maintenance and improvement of agricultural land for the production of food and other agricultural products, and also for its natural, recreational and ecological value."

The Agricultural Commission shall submit this policy statement as part of its Annual Report to the Town, and shall cause copies of said policy to be posted in various Town offices dealing with land use, including, but not limited to the Board of Assessors, Zoning Board of Appeals, Planning Board, and Conservation Commission.

Section 5: Procedure for Mediation

Any person having a complaint about a farm or farming activity or practice is encouraged to seek an amicable solution, including talking directly with the involved participant. Such person may, pursuit of other available remedies notwithstanding, request assistance from the Board of Selectmen. The Board of Selectmen may appoint a panel of at least three individuals, including a farmer and a member of the Agricultural Commission, to review and facilitate the resolution of the grievance, and to report its recommendations to the Board of Selectmen within an agreed-upon time frame.

Section 6: Severability Clause

If any part of this By-Law is for any reason found to be invalid, such decision shall not affect the remainder of this By-Law.

SECTION 634 STORMWATER PHASE II COMPREHENSIVE BY-LAW

(ATM, 5/14/07, Art. 43)

PART I LOCAL STORMWATER MANAGEMENT

SECTION A. PURPOSE AND AUTHORITY

1. Purpose

a. The purpose of this By-Law is to better manage land alteration and development in order to protect, maintain, and enhance the public health, safety, and general welfare of the citizens of Wilbraham by establishing minimum requirements and procedures to control the **adverse impacts** associated with **stormwater runoff**. (Bolded words and phrases are defined under the definition section B).

b. The proper management of stormwater runoff will meet the following objectives:

1. Reduce the adverse water quality impacts of stormwater discharges to rivers, lakes, reservoirs and streams in order to meet federal water quality standards;
2. Prevent the discharge of pollutants, including hazardous chemicals, into stormwater runoff;

3. Minimize the volume and rate of storm water, which is discharged to rivers, streams, reservoirs, lakes and storm sewers, that flows from any site during and following development;
4. Prevent erosion and sedimentation from land development, and reduce stream channel erosion caused by increased runoff;
5. Provide for the non-polluted recharge of groundwater aquifers and maintain the base flow of streams;
6. Provide storm water facilities that are attractive, maintain the natural integrity of the environment, and are designed to protect public safety;
7. Maintain or reduce pre-development runoff characteristics after development to the extent feasible;
8. Minimize damage to public and private property from flooding;
9. Ensure that these management controls are properly maintained; and
10. Comply with state and federal statutes and regulations relating to storm water discharges.

2. Authority

This By-Law is adopted under the authority granted by the Home Rule Amendment of the Massachusetts Constitution, the Home Rule statutes, and the regulations of the federal Clean Water Act found at Title 33 U.S.C. §§ 1252 1387 and 40 CFR 122.34.

3. Responsibility for Administration

The Town Department of Public Works (Wilbraham DPW) shall be the Permitting Authority/**Authorized Enforcement Agency** and shall administer, implement and enforce this By-Law. Any powers granted to or duties imposed upon the Wilbraham DPW to promulgate such rules and regulations shall not have the effect of suspending or invalidating this By-Law.

SECTION B. DEFINITIONS

1. Definitions

Unless otherwise expressly stated, the following definitions describe the meaning of the terms used in this By-Law:

Applicant - a person with the duty to apply for a permit hereunder

Authorized Enforcement Agency - The Town Department of Public Works (Wilbraham DPW), and its employees or agents designated to enforce this By-Law. Also see permitting authority below.

Adverse Impact - Any deleterious effect on waters or wetlands, including their quality, quantity, surface area, species composition, aesthetics or usefulness for human or natural uses which are or may potentially be harmful or injurious to human health, welfare, safety or property, to biological productivity, diversity, or stability or which unreasonably interfere with the enjoyment of life or property, including outdoor recreation.

Best Management Practices (BMP) - An activity, procedure, restraint, or structural improvement that helps reduces the quantity or improve quality of stormwater runoff. Some examples of BMPs are described in a stormwater design manual, Stormwater Management, Volume Two: Stormwater Technical Handbook (March, 1997, MA Department of Environmental Protection and MA Office of Coastal Zone Management, as updated or amended). Best Management Practices may include:

- Detention basins
- Deep sump catch basins
- Water quality swales
- Oil/sediment separators
- Vortex separators

Certificate of Completion - A written determination by the Wilbraham DPW that work has been completed in accordance with a Local Stormwater Management Permit. For major projects, a Certificate of Completion will be issued only after a Notice of Termination has been submitted to United States Environmental Protection Agency for termination of coverage under **NPDES**.

Construction Activity - The disturbance of the ground by removal of vegetative surface cover or topsoil, 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.

Detention - The temporary storage of storm runoff which is used to control the Peak Discharge rates, and which provides gravity settling of pollutants.

Disturbance - Any activity which changes the volume or peak flow discharge rate of rainfall runoff from the land surface. This may include the clearing, grading, digging, scraping, or excavating of soil, placement of fill materials, paving, construction, substantial removal of vegetation, or any activity which bares soil or rock or involves the diversion or piping of any natural man-made watercourse.

Drainage Area - That area contributing runoff to a consolidated flow of water as measured in a horizontal plane.

Easement - A grant or reservation by the owner of land for the use of such land by others for a specific purpose or purposes, and which must be included in the conveyance of land affected by such easement.

Impervious Surfaces – Any material or structure on or above the ground that prevents water from infiltrating the underlying soil. Impervious surfaces include roads, pavement, building rooftops, sidewalks, and driveways.

Infiltration - The process of percolating water from the surface into the subsoil.

Local Stormwater Management Permit - A document issued by the Wilbraham DPW, including conditions, which regulates stormwater controls associated with land disturbance.

Operation and Maintenance Plan – A plan setting up the functional, financial and organizational mechanisms for the ongoing operation and maintenance of a stormwater management system to insure that it continues to function as designed.

Nonpoint Source Pollution - The Pollution from any source other than from any discernible, confined, and discrete conveyances, and shall include, but not be limited to, pollutants from agricultural, mining, construction, subsurface disposal and urban runoff sources.

National Pollutant Discharge Elimination System (NPDES) - As authorized by the Clean Water Act, is a permit program governed by the U.S. Environmental Protection Agency (EPA) that controls water pollution by regulating point sources that discharge pollutants into waters of the United States. A Notice of Intent is the mechanism used to "register" for coverage under a general permit. A Notice of Termination is the mechanism used to close out coverage under a general permit after construction completion.

NRCS - The United States Department of Agriculture Natural Resources Conservation Service.

Owners - The person owning the subject property at the time the application for the permit is made and the also subsequent owners and assignees.

Outfall - The terminus of a storm drain or other stormwater structure where the contents are released.

Peak Discharge - The maximum instantaneous rate of flow during a storm, usually in reference to a specific design storm event.

Permeable Soils - Soil materials with a sufficiently rapid infiltration rate so as to greatly reduce or eliminate surface and stormwater runoff. These soils are generally classified as NRCS hydrologic soil types A and B.

Permit - A **Local Stormwater Management** permit (see above)

Permitting Authority - The Wilbraham DPW, to which a person must apply for a permit under this By-Law.

Person - Any individual, group of individuals, association, partnership, corporation, company, business, organization, trust, estate, administrative agency, public or quasi-public corporation or body, the Commonwealth or political subdivision thereof.

Phasing - The disturbance of a parcel of land in distinct phases, with the stabilization of each phase completed before the disturbance of the next.

Recharge - The replenishment of underground water reserves.

Responsible Party - Transferees and assignees of this original owner/applicant

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

Stormwater Management Permit - See **Local Stormwater Management Permit**

Stormwater Runoff - The flow on the surface of the ground, resulting from precipitation.

Stormwater Pollution Prevention Plan (SWPPP) – Plan including minimum information as required for coverage under the EPA NPDES General Permit and with additional information as required by this By-Law.

Swale - A natural depression or wide shallow ditch used to temporarily store, route, or filter runoff.

2. Reference Documents

Stormwater Management Policy (March, 1997, Massachusetts Department of Environmental Protection).

Stormwater Management, Volume One: Stormwater Policy Handbook (March, 1997, Massachusetts Department of Environmental Protection and Massachusetts Office of Coastal Zone Management).

Stormwater Management, Volume Two: Stormwater Technical Handbook (March, 1997, Massachusetts Department of Environmental Protection and Office of Coastal Zone Management).

SECTION C. APPLICABILITY

1. Prior to the issuance of any Special Permit, Site Plan Approval, Building Permit for any proposed development listed below, a **Local Stormwater Management Permit**, must be approved by the Wilbraham DPW. No **person** shall, on or after the effective date of the By-Law, initiate any vegetation clearing, land grading, earth moving or development activities without first complying with this By-Law. The following uses and activities shall be regulated under this By-Law:

a. Minor Projects: any proposed development **disturbing** an area of less than 43,560 square feet (1 Acre)

b. Major Projects:

(1) Subdivisions and construction activities of any kind **disturbing** an area equal to or greater than 43,560 square feet (1 Acre); and

(2) Development or redevelopment involving multiple separate activities in discontinuous locations or on different schedules if the activities are part of a larger common plan of development that all together disturbs an area equal to or greater than 43,560 square feet (1Acre).

SECTION D. EXEMPTIONS

1. To prevent the adverse impacts of stormwater runoff, the Wilbraham DPW has adopted the MA DEP Stormwater Management Policy as the set of performance standards that must be met at new development sites. These standards apply to construction activities as described under Section C. The following activities are exempt from these stormwater performance standards:

a. Any agricultural activity which is consistent with an approved soil conservation plan prepared or approved by the **NRCS**;
b. Any logging which is consistent with a timber management plan already approved under the Forest Cutting Practices Act by the Massachusetts Department of Conservation and Recreation;
c. Additions or modifications to existing single family structures where there is no proposed change in impervious area;
d. Any emergency activity that is immediately necessary for the protection of life, property or the environment, as determined by the Wilbraham DPW; and
e. Work undertaken by the Wilbraham DPW.

SECTION E. PERMIT PROCEDURES AND REQUIREMENTS

1. Approval of Local Stormwater Management Permit Required

No landowner shall receive a building, grading, or other land development permits required, or commence land **disturbance** activities, without approval of the Local Stormwater Management Permit and meeting the requirements of this By-Law. Approval by the Wilbraham DPW under this By-Law does not exempt the applicant from meeting the requirements of the federal **National Pollutant Discharge Elimination System (NPDES)** program, which requires a Notice of Intent be filed with the EPA and a **Stormwater Pollution Prevention Plan (SWPPP)** be prepared and maintained on site nor does it supersede compliance with the requirements of the Wilbraham Conservation Commission and the Massachusetts Department of Environmental Protection.

2. Application and SWPPP Requirements

a. Minor Projects

Applicants for a Local Stormwater Management Permit for Minor Projects are required to submit the non-refundable permit review fee with the Local Stormwater Management Permit Application and a site plan depicting the following information.

1. Name, address and telephone number of owner, professional engineer (if applicable) and contractor (if applicable)
2. Property lines
3. Existing zoning and land use at the site
4. Proposed land use
5. Location(s) of existing and proposed **easements**
6. Location of existing and proposed buildings and **impervious surfaces**
7. Location of existing and proposed Stormwater utilities, including dry wells, rain gardens or **swales** within 100' of the property line
8. Proposed driveway location and slope (not to exceed 2% within the first 20 feet measured from the paved road)
9. Septic system or sewer location
10. Well or water location
11. Limits of tree clearing
12. Limits of grading
13. Proposed erosion controls
14. Average slope of disturbed area as a percentage (%)
15. Delineation of 100 year flood plain if applicable

Every person disturbing a site with an average slope equal to or greater than 5% must post a bond or other approved means of security in an amount agreeable to Wilbraham DPW until the project is completed. The Wilbraham DPW may promulgate regulations setting forth the elements comprising the amount of and terms and conditions of the bond or other financial security required by this or other sections of this By-Law. Wilbraham DPW may require a SWPPP.

If a project is shown on a plan as part of a larger plan of development that is covered under an existing NPDES (NOI), but is, in actual fact, considered a separate development on a unique lot, as determined by the Wilbraham DPW, then Local Stormwater Management Permit coverage is required for both activities. This may apply to a residential or commercial subdivision, where one person is responsible for roadway construction and a separate person is responsible for building construction on subdivided lots.

b. Major Projects

Applicants for a Local Stormwater Management Permit for Major Projects are required to submit the non-refundable permit review fee along with the Local Stormwater Management Application, a copy of the following information that was sent to EPA:

1. NPDES Notice of Intent
2. SWPPP, including additional information as described in section E.(3)
3. An Operation and Maintenance Plan and Agreement.

All major projects must post a five hundred dollars ($500) per acre of disturbed area bond.

3. Contents of the SWPPP for Major Projects - Every person applying for a Local Stormwater Management Permit for a major project shall submit a copy of the NPDES (NOI) and the SWPPP that was sent to the EPA. The SWPPP 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 SWPPP shall be designed to meet the Massachusetts Stormwater Management Standards as set forth in the DEP/CZM Stormwater Management Handbook Volumes I and II. The applicant shall certify on the drawings that all clearing, grading, drainage, construction, and development shall be conducted in accordance with the SWPPP.

The SWPPP shall be designed and stamped by a professional engineer. Prior to submission to the Town the SWPPP shall include the following minimum information:

a. Name, address and telephone number of owner, professional engineer and **person** responsible for implementation of the plan
b. Locus map
c. Property lines
d. Existing zoning and land use at the site
e. Proposed land use
f. Location(s) of existing and proposed easements
g. Location of existing and proposed utilities
h. Location of all existing and proposed buildings and impervious surfaces
i. Erosion and sediment control provisions to minimize on-site erosion and prevent off-site sediment transport, including provisions to preserve topsoil and limit disturbance
j. Design details for adequate access (i.e. easement, gravel roads, gates) for operation and maintenance of the **best management practices (BMPs)**
k. Site's existing and proposed topography with contours at 2 foot intervals on the MA State Plane Coordinate System
l. Existing and proposed vegetation and ground surfaces
m. Clear and definite delineation of any areas of vegetation or trees. Specify vegetation that is to be removed and vegetation that is to be saved.
n. Description and delineation of existing stormwater conveyances, impoundments, and wetlands on or adjacent to the site or into which storm water flows or impacts
o. Delineation of 100-year flood plains, if applicable
p. Estimated seasonal high groundwater elevation in areas to be used for storm water **retention**, **detention**, or **infiltration**
q. **Drainage area** map showing pre- and post-construction watershed boundaries and stormwater conveyances.
    1. Subcatchment areas for specific design points must include pre- and post-design drawings, report, and a summary table for 2, 10, 50, 100 year **design storms** based on accepted engineering standards.
r. A description and drawings of the proposed drainage system including:

1. locations, cross sections, and profiles of drainage swales and their method of stabilization
2. measures for the detention, retention or infiltration of water
3. measures for the protection of water quality
4. the structural details for the components of the proposed drainage systems and stormwater management facilities
5. notes on drawings specifying materials to be used and construction specifications
6. expected hydrology with supporting calculations
7. Proposed improvements including location of buildings or other structures, impervious surfaces, and drainage facilities, if applicable

s. A description of construction and waste materials expected to be stored on-site, and a description of controls to reduce pollutants from these materials including storage practices to minimize exposure of the materials to storm water, and spill prevention and response consistent with those allowed in zoning district
t. Timing, schedules, **phasing**, and sequence of development including clearing, stripping, rough grading, construction, final grading, and vegetative stabilization
u. An inspection and maintenance schedule, including but not limited to replacement of compromised hay bales or silt fence, catch basin cleaning, or cleaning of sedimentation basins, for the period of construction, routine updates to the Wilbraham DPW may be required.
v. Description of how project meets the Standards of the Massachusetts DEP Stormwater Management Policy as updated or amended, including back-up materials such as hydraulic calculations and detailed plans
w. An **operation and maintenance plan and agreement** for continued operation and maintenance of each component of the stormwater management system, refer to Section H.

4. Additional Information for the SWPPP

The Wilbraham DPW may require any additional information or data deemed appropriate and may impose such conditions as may be deemed necessary to ensure compliance with the provisions of this By-Law, or to protect public health and safety.

5. Application Review Fees

The fee for review of any Local Stormwater Management Permit application shall be based on the amount of land to be disturbed at the site and the fee structure established by the Wilbraham DPW.

SECTION F. STORMWATER MANAGEMENT PERFORMANCE STANDARDS

In addition to other criteria used by the Wilbraham DPW in making permit decisions, for the uses specified in this By-Law, the Wilbraham DPW must also find that the Stormwater Pollution Prevention Plan submitted with the permit application meets the following criteria:

1. Minimum Control Standards

Projects must meet the Standards of the Massachusetts Stormwater Management Policy as updated or amended. These Standards are:

a. No new stormwater conveyances (e.g. **outfalls**) may discharge untreated stormwater directly to or cause erosion in wetlands or water of the Commonwealth.
b. Stormwater management systems must be designed so that post-development **peak discharge** rates do not exceed pre-development peak discharge rates.
c. Loss of annual recharge to groundwater should be minimized through the use of infiltration measures to the maximum extent practicable. The annual recharge from the post-development site should approximate the annual recharge rate from the pre-development or existing site conditions, based on soil types.
d. For new development, stormwater management systems must be designed to remove 80% of the average annual load (post-development conditions) of Total Suspended Solids (TSS). It is presumed that this standard is met when:
   (1) suitable nonstructural practices for source control and pollution prevention are implemented;
   (2) stormwater management BMPs are sized to capture the prescribed runoff volume; and
   (3) stormwater management BMPs are maintained as designed.
e. Stormwater discharges from areas with higher potential pollutant loads require the use of specific stormwater management BMPs (Stormwater Management Volume I: Stormwater Policy Handbook, as updated or amended). The use of infiltration practices without pretreatment is prohibited.
f. Stormwater discharges to critical areas must utilize certain stormwater management BMPs approved for critical areas (Stormwater Management Volume I: Stormwater Policy Handbook, as updated or amended). Critical areas are Outstanding Resource Waters (ORWs), shellfish beds, swimming beaches, cold water fisheries and recharge areas for public water supplies.
g. Redevelopment of previously developed sites must meet the Stormwater Management Standards to the maximum extent practicable. However, if it is not practicable to meet all the Standards, new (retrofitted or expanded) stormwater management systems must be designed to improve existing conditions.
h. Erosion and sediment controls must be implemented to prevent impacts during disturbance and construction activities.
i. All stormwater management systems must have an operation and maintenance plan to ensure that systems function as designed.

When the proposed discharge may have an impact upon a sensitive receptor, including streams, storm sewers, and/or combined sewers, the Wilbraham DPW may require an increase in these minimum requirements, based on existing stormwater system capacity.

2. Erosion Control Performance Standards

Projects must address the following design requirements for erosion and sediment control.

a. Minimize total area of disturbance;
b. Sequence activities to minimize simultaneous areas of disturbance;
c. Minimize peak rate of runoff in accordance with the MA Stormwater Management Policy;
d. Minimize soil erosion and control sedimentation during construction; prevention of erosion is preferred over sedimentation control;
e. Divert uncontaminated water around disturbed areas;
f. Maximize groundwater recharge;
g. Install, and maintain all erosion and sediment control measures in accordance with the manufacturer's specifications and good engineering practices;
h. Prevent off-site transport of sediment;
i. Protect and manage on and off-site material storage areas (overburden and stockpiles of dirt, borrow areas, or other areas used solely by the permitted project are considered a part of the project);
j. Comply with all applicable Federal, State and local laws and regulations, including but not limited to, waste disposal, sanitary sewer or septic system regulations, and air quality requirements, including dust control;
k. Prevent adverse impact from the proposed activities to habitats mapped by the Massachusetts Natural Heritage & Endangered Species Program as Estimated Habitats of Rare Wildlife and Certified Vernal Pools, and Priority Habitats of Rare Species;
l. Institute interim and permanent stabilization measures. The stabilization measures shall be instituted on a disturbed area as soon as practicable but no more than 14 days after **construction activity** has temporarily or permanently ceased on that portion of the site;
m. Properly manage on-site construction and waste materials; and
n. Prevent off-site vehicle tracking of sediments.

3. Criteria for Review of Local Stormwater Management Permit Applications

The Wilbraham DPW shall review each application to determine its conformance with the provisions of this section. The Wilbraham DPW shall review the permit application and issue a decision within 21 municipal business days after receiving an application. This timeframe may be extended at the sole discretion of the Wilbraham DPW if it requires additional information. Upon completion of the review, the Wilbraham DPW shall issue, in writing:

1) The Local Stormwater Management Permit based upon determination that the proposed plan meets the purposes in Section A and the standards in Section F and will adequately protect the water resources of the community and is in compliance with the requirements set forth in this By-Law;
2) Approval of the Local Stormwater Management Permit subject to any conditions, modifications or restrictions required by the Wilbraham DPW to meet the purposes in Section A and the standards in Section F to adequately protect water resources, set forth in this By-Law; and
3) Disapproval of the Local Stormwater Management Permit based upon a determination that the proposed plan, as submitted, does not meet the purposes in Section A and the standards in Section F or adequately protect water resources, as set forth in this By-Law.

SECTION G. INSPECTIONS

When any new drainage control facility is installed on private property, or when any new connection is made between private property and a public drainage control system or sanitary sewer, the filing of an application shall be deemed as the property owner's permission to the Wilbraham DPW, or their agents for the right to enter the property at reasonable times and in a reasonable manner for the purpose of the inspection. This includes the right to enter a property when the Wilbraham DPW 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.

The applicant shall notify the Wilbraham DPW within 48 hours prior to the following activities. At its discretion, the Wilbraham DPW may enter the property to observe these activities:

a) Installation of erosion and sediment control measures;
b) Site clearing;
c) Installation of permanent stormwater structures prior to backfilling of any underground drainage
d) or stormwater conveyance structures; and
e) Construction completion: Contractor shall notify Wilbraham DPW in writing when all work, including construction of stormwater management facilities and landscaping, has been completed and the site is stabilized. For all major projects, the NPDES Notice of Termination must also be filed with EPA and a copy provided to the Wilbraham DPW prior to final inspection or issuance of **Certificate of Completion.**

The applicant shall submit an "as-built" plan for the stormwater controls after the final construction is completed. The plan must show the final design specifications of all stormwater management controls and Wilbraham DPW may require the plan be prepared by a professional engineer. The as-built plan shall be submitted digitally in accordance with Wilbraham Engineering Department standards, or a conversion fee shall be required. Wilbraham DPW shall issue a Certificate of Completion once all requirements have been met.

The person responsible for implementation of the plan shall make regular inspections of all control measures in accordance with the inspection schedule outlined in the approved SWPPP. The purpose of such inspections shall be to determine the overall effectiveness of the control plan and the need for additional control measures. All inspections shall be documented in written form, maintained on site, and made available at the Wilbraham DPW's request. Such records shall be maintained by the applicant for at least 3 years from the day of final inspection.

SECTION H. MAINTENANCE REQUIREMENTS

1. Operation, Maintenance and Inspection Agreement

a. 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 Wilbraham DPW, or its designated representative, and for regular or special assessments to property owners after costs of operation, maintenance and inspection to ensure that the facility is maintained in proper working condition to meet design standards and any conditions set forth in the permit. The agreement shall include:

1. The name(s) of the owner(s) for all components of the system
2. Maintenance agreements that specify
    a. the names and addresses of the person(s) responsible for operation and maintenance;
    b. the person(s) responsible for financing maintenance and emergency repairs;
    c. a maintenance schedule for all drainage structures, including swales and ponds;
    d. a list of easements with the purpose and location of each; and
    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; and
    c. direct maintenance access by heavy equipment to structures requiring regular cleanout.
4. Stormwater management easement requirements
    a. The purpose of each easement shall be specified in the maintenance agreement signed by the property owner.
    b. Stormwater management easements are required for all areas used for off-site stormwater control, unless a waiver is granted by the Town.
    c. Easements shall be recorded with the Registry of Deeds prior to issuance of a Certificate of Completion.
5. Changes to Operation and Maintenance Plans
    a. The owner(s) of the stormwater management system must notify the Wilbraham DPW of changes in ownership or assignment of financial responsibility.

b. The maintenance schedule in the Maintenance Agreement may be amended to achieve the purposes of this By-Law by mutual agreement of the Wilbraham DPW and the Responsible Parties. Amendments must be in writing and signed by all Responsible Parties. Responsible Parties must include owner(s), persons with financial responsibility, and persons with operational responsibility.

b. The agreement shall also provide that, if satisfactory corrections are not made by the owner(s) within thirty days of notice by the Wilbraham DPW, or designated representative, to correct a violation requiring maintenance work, the Town may perform or contract all necessary work to place the facility in proper working condition. The owner(s) of the facility shall be assessed the cost of the work and any penalties. If the costs are not paid, the Town may place a lien on the property or use available secured funds from bond provided.

2. Maintenance Responsibility

a) The owner of the property on which work has been done pursuant to this By-Law for private stormwater management facilities, or any other person or agent in control of such property, shall maintain in good condition and promptly repair and restore all grade surfaces, walls, drains, dams and structures, vegetation, erosion and sediment control measures and other protective devices. Such repairs or restoration and maintenance shall be in accordance with approved plans.
b) A maintenance schedule shall be developed for any stormwater management facility and shall state the maintenance to be completed, the time period for completion, and who shall be legally responsible to perform the maintenance. This maintenance schedule shall be printed on the stormwater management plan.
c) Records of installation and maintenance shall be maintained by the property owner and shall be made available to Town officials by request. These records shall be stored by the property owner for a minimum of three years.
d) Failure to maintain any stormwater management facility shall be subject to the enforcement and penalties identified in Section J herein.

SECTION I. PERFORMANCE BOND

The Town or its agents may require from the developer a surety or cash bond or other means of security acceptable to the Town prior to the issuance of any building permit for the construction of a development requiring a 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 company providing the performance bond to the developer shall submit a bond of the highest grade as rated by Moody's or Standard and Poor's.

A Certificate of Completion signed by the Town, submission of "as-built" plans, and the Town's final inspection is required prior to full release of the bond.

SECTION J. ENFORCEMENT AND PENALTIES

1. Violations

Any development activity that has commenced or is conducted contrary to this By-Law may be restrained by injunction or otherwise abated in a manner provided by law.

2. Notice of Violation

When the Town determines that an activity is not being carried out in accordance with the requirements of this By-Law, it shall issue a written notice of violation to the owner of the property. Failure to maintain proper maintenance and installation records shall constitute a violation of this By-Law.

The notice of violation shall contain:

a. the name and address of the owner applicant;
b. the address when available or the description of the building, structure, or land upon which the violation is occurring;
c. a statement specifying the nature of the violation;
d. a description of the remedial measures necessary to bring the development activity into compliance with this By-law and a time schedule for the completion of such remedial action; and
e. a statement of the penalty or penalties that shall or may be assessed against the person to whom the notice of violation is directed.

3. Stop Work Orders

Persons receiving a notice of violations will be required to halt all construction activities. This "stop work order" will be in effect until the Town confirms that the development activity is in compliance and the violation has been satisfactorily addressed. Failure to address a notice of violation in a timely manner can result in civil, criminal, or monetary penalties in accordance with the enforcement measures authorized in this By-Law.

4. Non-Criminal Disposition

As an alternative to criminal prosecution or civil action, the Town may elect to utilize the non-criminal disposition procedure set forth in the non-criminal disposition procedure in Mass. Gen. Laws, Chapter 40, Section 21D or in the Town General By-laws § 103A. The Wilbraham DPW shall be the enforcing entity. The penalty shall be three hundred ($300.00) dollars per day. Each day or part thereof that such violation occurs or continues shall constitute a separate offense. If action is not taken by the property owner within seven days, this shall become a civil or criminal penalty.

5. Criminal and Civil Penalties

Notwithstanding anything to the contrary in the foregoing sections of this By-Law any person who violates any provision of this By-Law, valid regulation, or the terms or conditions in any permit or order prescribed or issued thereunder, *shall be subject to a fine for each day* such violation occurs or continues or subject to a civil penalty which may be assessed in an action brought on behalf of the Town in any court of competent jurisdiction.

6. Restoration of Lands

Any violator may be required to restore land to its undisturbed condition. In the event that restoration is not undertaken within a reasonable time after notice, the Town will take necessary corrective action, the cost of which shall become a lien upon the property until paid.

7. Severability

If any provision, paragraph, sentence, or clause, of this By-Law shall be held invalid for any reason, all other provisions shall continue in full force and effect.

STORMWATER PHASE II COMPREHENSIVE BY-LAW
PART II ILLICIT DISCHARGES TO THE MUNICIPAL STORM DRAIN SYSTEM

SECTION A. PURPOSE AND AUTHORITY

1. Purpose

The purpose of this By-Law is to eliminate non-stormwater discharges to the Town's Municipal Storm Drain System (storm drain). Non-stormwater discharges contain contaminants and supply additional flows to the Town's Storm Drain System. Non-stormwater discharges are major causes of:

a. impairment of water quality and flow in lakes, ponds, streams, rivers, wetlands, and groundwater;
b. contamination of drinking water supplies;
c. alteration or destruction of aquatic and wildlife habitat; and
d. flooding.

Regulation of illicit connections and discharges to the storm drain system is necessary for the protection of the Town's natural resources, municipal facilities, general health, safety, welfare, and the environment.

The objectives of this section are:

a. to prevent pollutants from entering the storm drain;
b. to prohibit illicit connections and unauthorized discharges to the storm drain;
c. to remove all such illicit connections;
d. to comply with state and federal statutes and regulations relating to stormwater discharges; and

e. to establish the legal authority to ensure compliance with the provisions of this section through inspection, monitoring, and enforcement.

2. Authority

This By-Law is adopted under the authority granted by the Home Rule Amendment of the Massachusetts Constitution, the Home Rule statutes, and the regulations of the federal Clean Water Act found at 40 CFR 122.34.

3. Responsibility for Administration

The Town Department of Public Works (DPW) shall administer, implement and enforce this By-Law. Any powers granted to or duties imposed upon the DPW to promulgate such rules and regulations shall not have the effect of suspending or invalidating this By-Law.

SECTION B. DEFINITIONS

1. Definitions

Authorized Enforcement Agency – The Town Department of Public Works (DPW), its employees and agents designated to enforce this By-Law.

Best Management Practice (BMP) – An activity, procedure, restraint, or structural improvement that helps reduces the quantity or improve quality of stormwater runoff.

Clean Water Act – The Federal Water Pollution Control Act (33 U.S.C. section 1251 *et seq.*) and as it is amended from time to time.

Discharge of Pollutants - The addition from any source of any pollutant or combination of pollutants into the storm drain or into waters of the United States of America (United States) or the Commonwealth of Massachusetts (Commonwealth) from any source.

Groundwater - Water beneath the surface of the ground, except where the water under the ground is the result of a perched water table.

Illicit Connection - A surface or subsurface drain or conveyance, which allows an illicit discharge into the storm drain, including without limitation sewage, process wastewater, or gray water and any connections from indoor drains, sinks, or toilets, regardless of whether said connection was previously allowed, permitted, or approved before the effective date of this By-Law.

Illicit Discharge - Direct or indirect discharge to the storm drain that is not composed entirely of stormwater, except as exempted in Section 8. The term does not include a discharge in compliance with an NPDES Storm Water Discharge Permit or resulting from firefighting activities.

Impervious Surface - Any material or structure on or above the ground that prevents water infiltrating the underlying soil. Impervious surface includes without limitation roads, paved parking lots, sidewalks, and rooftops.

Municipal Storm Drain System (storm drain) or **Municipal Separate Storm Sewer System (MS4)** - The system of conveyances designed or used for collecting or conveying stormwater, including any road with a drainage system, street, gutter, curb, inlet, piped storm drain, pumping facility, retention or detention basin, natural or man-made or altered drainage channel, reservoir, and other drainage structure that together comprise the storm drainage system owned or operated by the Town.

National Pollutant Discharge Elimination System (NPDES) Storm Water Discharge Permit - A permit issued by the United States Environmental Protection Agency or jointly with the State of Massaehusetts that authorizes the discharge of pollutants to waters of the United States or Commonwealth.

Non-Stormwater Discharge - Discharge to the storm drain not comprised entirely of stormwater.

Person - An individual, partnership, association, firm, company, trust, corporation, agency, authority, department or political subdivision of the United States or Commonwealth or, to the extent permitted by law, and any officer, employee, or agent of such person.

Pollutant - Any element or property of sewage, residential, agricultural, industrial, or commercial waste, runoff, leachate, heated effluent, or other matter whether originating at a point or non-point source, that is or may be introduced into any storm drain system, waters of the United States, and/or Commonwealth. Pollutants shall include without limitation:

a. paints, varnishes, solvents:
b. oil, grease, antifreeze, other automotive fluids and/or products;
c. non-hazardous liquid and solid wastes;
d. refuse, garbage, litter, rubbish, yard wastes, or other discarded or abandoned objects, ordnances, accumulations and floatables;
e. pesticides, herbicides, and fertilizers;
f. hazardous materials and wastes;
g. sewage;
h. dissolved and particulate metals;
i. metal objects or materials;
j. animal wastes;
k. rock, sand, salt, soils, or other products/materials that mobilize in surface water runoff; and
l. construction wastes and/or residues.

Process Wastewater - Water which, during manufacturing or processing, comes into direct contact with or results from the production or use of any material, intermediate product, finished product, or waste product.

Recharge - The process by which groundwater is replenished by precipitation through the percolation of runoff and surface water through the soil.

Stormwater - Runoff from precipitation or snowmelt.

Toxic or Hazardous Material or **Waste** - Any material, which because of its quantity, concentration, chemical, corrosive, flammable, reactive, toxic, infectious or radioactive characteristics, either separately or in combination with any substance or substances, constitutes a present or potential threat to human health, safety, welfare or to the environment. Toxic or hazardous material includes without limitation:

a. any synthetic organic chemical;
b. petroleum products;
c. heavy metals;
d. radioactive or infectious waste;
e. acid and alkali substances;
f. any substance defined as Toxic or Hazardous under Mass. Gen. Laws, Chapter 21C and Chapter 21E, and the regulations at 310 CMR 30.000 and 310 CMR 40.000; and
g. any substance listed as hazardous under 40 CFR 261.

Watercourse - A natural or man-made channel through which water flows or a stream of water, including a river, brook or underground stream.

Waters of the Commonwealth - All waters within the jurisdiction of the Commonwealth, including, without limitation, rivers, streams, lakes, ponds, springs, impoundments, estuaries, wetlands, coastal waters, and groundwater.

Wastewater - Any sanitary waste, sludge, or septic tank or cesspool overflow, and water that during manufacturing, cleaning or processing, comes into direct contact with or results from the production or use of any raw material, intermediate product, finished product, byproduct or waste product.

SECTION C. APPLICABILITY

1. Applicability

This section shall apply to flows entering the municipally owner storm and/or operated storm drain system, a watercourse, or into waters of the United States and/or Commonwealth.

2. Regulations

The DPW may promulgate rules and regulations to effectuate the purpose of this By-Law. Failure by the DPW to promulgate such rules and regulations shall not have the effect of suspending or invalidating this By-Law.

3. Prohibited Activities

Illicit Discharges – No person shall dump, discharge, cause or allow to be discharged any pollutant or non-stormwater discharge into the storm drain system, into a watercourse, or into waters of the United States and/or Commonwealth.

Illicit Connections – No person shall construct, use, allow, maintain or continue any illicit connection to the municipal storm drain system, regardless of whether the connection was permissible under applicable law, regulation or custom at the time of connection.

Obstruction of the Municipal Storm Drain System – No person shall obstruct or interfere with the normal flow of stormwater into or out of the municipal storm drain system without prior approval from the DPW.

SECTION D. EXEMPTIONS

1. Exemptions

Discharge or flow resulting from firefighting activities and DPW ice and snow control operations shall not constitute illicit discharge within the meaning of this By-Law or pertinent federal, state, or local laws.

The following non-stormwater discharges or flows are considered exempt provided that the source is not a significant contributor of pollution to the municipal storm drain system:

a. waterline flushing;
b. flow from potable water sources;
c. springs;
d. natural flow from riparian habitats and wetlands;
e. diverted stream flow;
f. rising groundwater;
g. uncontaminated groundwater infiltrating as defined in 40 CFR 35.2005(20), or uncontaminated pumped groundwater;
h. water from exterior foundation drains, footing drains (not including active groundwater dewatering systems), crawl space pumps, or air conditioning condensation;
i. discharge from landscape irrigation or lawn watering;
j. water from individual residential car washing;
k. 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;
l. discharge from street sweeping;
m. discharge or flow resulting DPW ice and snow control operations
n. dye testing, provided verbal notification is given to the DPW prior to the time of the test;
o. discharge or flow resulting from firefighting activities

p. 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; and
q. discharge for which advanced written approval is received from the DPW as necessary to protect public health, safety, welfare, and the environment.

SECTION F. ENFORCEMENT AND PENALTIES

1. Emergency Suspension of Storm Drainage System Access

The DPW may suspend municipal storm drain system access to any person or property without prior written notice when such suspension is necessary to stop an actual or threatened discharge of pollutants that presents imminent risk of harm to public health, safety, welfare or the environment. In the event any person fails to comply with an emergency suspension order, the Authorized Enforcement Agency may take all reasonable steps to prevent or minimize harm to the public health, safety, welfare, or the environment.

2. Notification of Spills

Any spills or releases that require notification under local, state or federal law will be the responsibility of the person responsible for a facility or operation, or for an emergency response for a facility or operation (e.g., construction). In the event of a spill or release which may result in a discharge of pollutants or non-stormwater discharge to the municipal storm drain system, waters of the United States, and/or waters of the Commonwealth, the responsible parties, potentially responsible parties, or any person or persons managing a site or facility shall take all necessary steps to ensure containment, and remediate any municipal storm drains that have been impacted. However, if in the opinion of DPW, there is an excessive amount of pollutants in the stormdrain system, the DPW can require remediation by the responsible party regardless of other state or federal regulations. If the discharge of prohibited materials is from a commercial or industrial facility, the facility owner or operator of the facility shall take all necessary steps to ensure containment, clean-up of the release, retain on-site a written record of the discharge, and the actions taken to prevent its recurrence. Such records shall be retained for at least three years.

3. Enforcement

Non-Criminal Disposition

A. As an alternative to criminal prosecution or civil action, the Town may elect to utilize the non-criminal disposition procedure set forth in the non-criminal disposition procedure in Mass. Gen. Laws, Chapter 40, Section 21D or in the Town General By-laws 103A. The Wilbraham DPW shall be the enforcing entity. The penalty will be three hundred dollars ($300) per day each day or part thereof that such violation occurs or continues shall constitute a separate offense. If action is not taken by the property owner within seven days, this shall become a civil or criminal penalty.

Criminal and Civil Penalties

B. Notwithstanding anything to the contrary in the foregoing sections of this By-Law any person who violates any provision of this By-Law, valid regulation, or the terms or conditions in any permit or order prescribed or issued thereunder, shall be subject to a fine for each day such violation occurs or continues or subject to a civil penalty which may be assessed in an action brought on behalf of the Town in any court of competent jurisdiction.

C. The DPW or an authorized agent of the DPW shall enforce this By-Law, regulations, orders, violation notices, and enforcement orders, and may pursue all civil and criminal remedies for such violations.

a. **Civil Relief** – If a person violates the provisions of this By-Law, regulations, permit, notice, or order issued thereunder, the DPW may seek injunctive relief in a court of competent jurisdiction restraining the person from activities which would create further violations or compelling the person to perform abatement or remediation of the violation.

b. **Orders** – The DPW or an authorized agent of the DPW may issue a written order to enforce the provisions of this By-Law or the regulations thereunder, which may include:

D. elimination of illicit connections or discharges to the MS4;

E. performance of monitoring, analyses, and reporting;

F. cessation of unlawful discharges, practices, or operations;

G. remediation of contamination in connection therewith.

H. If the authorized enforcement agency determines that abatement or remediation of contamination is required and is the responsibility of the property owner, the order shall set forth a deadline by which such abatement or remediation must be completed. Said order shall further advise that, should the violator or property owner fail to abate or perform remediation within the specified deadline, the Town may, at its option, undertake such work, and expenses, trebled, shall be charged to the violator.

I. Within thirty (30) days after completing all measures necessary to abate the violation or to perform remediation, the violator and the property owner will be notified of the costs incurred by the Town, including administrative costs. The violator or property owner may file a written protest objecting to the amount or basis of costs with the DPW within thirty (30) days of receipt of the notification of the costs incurred. If the amount due is not received by the expiration of the time in which to file a protest or within thirty (30) days following a decision of the DPW affirming or reducing the costs, or from a final decision of a court of competent jurisdiction, the costs shall become a special assessment against the property owner and shall constitute a lien on the owner's property for the amount of said costs. Interest shall begin to accrue on any unpaid costs at the statutory rate provided in Mass. Gen. Laws, Chapter 59, Section 57 after the thirty-first day at which the costs first become due.

a. **Entry to Perform Duties under this By-Law** – To the extent permitted by state law, or if authorized by the owner or other party in control of the property, the Wilbraham DPW, its agents, officers, and employees may enter upon privately owned property for the purpose of performing their duties under this By-Law and may make or cause to be made such examinations, surveys or sampling as the DPW deems reasonably necessary.

b. **Appeals** – The decision or orders of the Wilbraham DPW shall be final. Further relief shall be to a court of competent jurisdiction.

c. **Remedies not Exclusive** – The remedies listed in this By-Law are not exclusive of any other remedies available under any applicable federal, state or local law.

4. Severability

If any provision, paragraph, sentence, or clause, of this By-Law shall be held invalid for any reason, all other provisions shall continue in full force and effect.

SECTION 635 LITTER (ATM, 5/16/16, Art. 50)

For the purposes of this section, the following definitions shall be applicable:

Garbage – includes, but is not limited to putrescible animal and vegetable wastes resulting from the handling, preparation, cooking, and consumption of food.

Litter – includes, but is not limited to 'garbage', 'refuse' and 'rubbish' as defined herein and all other waste materials which, if thrown or deposited as prohibited in this article, tends to create a danger to public health, safety, and welfare.

Refuse – includes but is not limited to all putrescible and non-putrescible solid wastes (except bodily wastes) including garbage, rubbish, ashes, street cleanings, dead animals, and solid market and industrial wastes.

Town of Wilbraham IDDE Program

Appendix B

2016 Small MS4 General Permit Excerpts

c. The permittee shall report on the activities undertaken to provide public participation opportunities including compliance with part 2.3.3.a. Public participation opportunities pursuant to part 2.3.3.b may include, but are not limited to, websites; hotlines; clean-up teams; monitoring teams; or an advisory committee.

2.3.4. Illicit Discharge Detection and Elimination (IDDE) Program

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

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

2.3.4.1. Definitions and Prohibitions

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

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

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

2.3.4.2. Elimination of Illicit Discharges

a. Upon detection of an illicit discharge, the permittee shall locate, identify and eliminate the illicit discharge as expeditiously as possible. Upon identification of the illicit source the MS4 notify all responsible parties for any such discharge and require immediate cessation of improper disposal practices in accordance with its legal authorities. Where elimination of an illicit discharge within 60 days of its identification as an illicit discharge is not possible, the permittee shall establish an expeditious schedule for its elimination and report the dates of identification and schedules for removal in the permittee's annual reports. The permittee shall immediately commence actions necessary for elimination. The permittee shall diligently pursue elimination of all illicit discharges. In the interim, the permittee shall take all reasonable and prudent measures to minimize the discharge of pollutants to and from its MS4.

b. The period between identification and elimination of an illicit discharge is not a grace period. Discharges from an MS4 that are mixed with an illicit discharge are not authorized by this Permit (part 1.3.a) and remain unlawful until eliminated.

2.3.4.3. Non-Stormwater Discharges

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

2.3.4.4. Sanitary Sewer Overflows

a. Upon detection of an SSO the permittee shall eliminate it as expeditiously as possible and take interim mitigation measures to minimize the discharge of pollutants to and from its MS4 until elimination is completed.

b. The permittee shall identify all known locations where SSOs have discharged to the MS4 within the previous five (5) years. This shall include SSOs resulting, during dry or wet weather, from inadequate conveyance capacities, or where interconnectivity of the storm and sanitary sewer infrastructure allows for communication of flow between the systems. Within one (1) year of the effective date of the permit, the permittee shall develop an inventory of all identified SSOs indicating the following information, if available:

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

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

c. In accordance with Paragraph B.12 of Appendix B of this permit, upon becoming aware of an SSO to the MS4, the permittee shall provide oral notice to EPA within 24 hours. Additionally, the permittee shall provide written notice to EPA and MassDEP within five (5) days of becoming aware of the SSO occurrence and shall include the information in the updated inventory. The notice shall contain all of the information listed in part 2.3.4.4.b. Where common notification requirements for SSOs are included in multiple NPDES permits issued to a permittee, a single notification may be made to EPA as directed in the permittee's wastewater or CSO NPDES permit and constitutes compliance with this part.

d. The permittee shall include and update the SSO inventory in its annual report, including the status of mitigation and corrective measures implemented by the permittee to address each SSO identified pursuant to this part.

e. The period between detection and elimination of a discharge from the SSO to the MS4 is not a grace period. Discharges from an MS4 that are mixed with an SSO are not authorized by this Permit (part 1.3.a) and remain unlawful until eliminated.

2.3.4.5. System mapping

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

a. Phase I: The system map shall be updated within two (2) years of the permit effective date to include the following information:

- Outfalls and receiving waters (required by MS4-2003 permit)
- Open channel conveyances (swales, ditches, etc.)
- Interconnections with other MS4s and other storm sewer systems
- Municipally-owned stormwater treatment structures (e.g., detention and retention basins, infiltration systems , bioretention areas, water quality swales, gross particle separators, oil/water separators, or other proprietary systems)
- Waterbodies identified by name and indication of all use impairments as identified on the most recent EPA approved Massachusetts Integrated List of waters report pursuant to Clean Water Act section 303(d) and 305(b)
- Initial catchment delineations. Any available system data and topographic information may be used to produce initial catchment delineations. For the purpose of this permit, a catchment is the area that drains to an individual outfall or interconnection.

b. Phase II: The system map shall be updated annually as the following information becomes available during implementation of catchment investigation procedures in part 2.3.4.8. This information must be included in the map for all outfalls within ten (10) years of the permit effective date:
- Outfall spatial location (latitude and longitude with a minimum accuracy of +/-30 feet)
- Pipes
- Manholes
- Catch basins
- Refined catchment delineations. Catchment delineations shall be updated to reflect information collected during catchment investigations
- Municipal sanitary sewer system (if available)
- Municipal combined sewer system (if applicable).

c. Recommended elements to be included in the system map as information becomes available:
- Storm sewer material, size (pipe diameter) and age
- Sanitary sewer system material, size (pipe diameter) and age
- Privately-owned stormwater treatment structures
- Where a municipal sanitary sewer system exists, properties known or suspected to be served by a septic system, especially in high-density urban areas
- Area where the permittee's MS4 has received or could receive flow from septic system discharges (e.g., areas with poor soils, or high ground water elevations unsuitable for conventional subsurface disposal systems)
- Seasonal high water table elevations impacting sanitary alignments
- Topography
- Orthophotography

- Alignments, dates and representation of work completed (with legend) of past illicit discharge investigations (e.g., flow isolation, dye testing, CCTV)
- Locations of suspected, confirmed and corrected illicit discharges (with dates and flow estimates).

d. The mapping may be produced by hand or through computer-aided methods (e.g. GIS). The required scale and detail of the map shall be appropriate to facilitate a rapid understanding of the system by the permittee, EPA and the state. In addition, the mapping shall serve as a planning tool for the implementation and phasing of the IDDE program and demonstration of the extent of complete and planned investigations and corrections. The permittee shall update the mapping as necessary to reflect newly discovered information and required corrections or modifications.

e. The permittee shall report on the progress towards the completion of the system map in each annual report.

2.3.4.6. Written Illicit Discharge Detection and Elimination Program

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

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

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

c. Program Procedures – The permittee shall include in the written IDDE program all written procedures developed in accordance with the requirements and timelines in parts 2.3.4.7 and 2.3.4.8 below. At a minimum this shall include the written procedures for dry weather outfall screening and sampling and for catchment investigations.

2.3.4.7. Assessment and Priority Ranking of Outfalls/Interconnections

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

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

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

i. The outfall and interconnection inventory will identify each outfall and interconnection discharging from the MS4, record its location and condition, and provide a framework for tracking inspections, screenings and other activities under the permittee's IDDE program.

- An outfall means a point source as defined by 40 CFR § 122.2 as the point where the municipal separate storm sewer discharges to waters of the United States. An outfall does not include open conveyances connecting two municipal separate storm sewers or pipes, tunnels or other conveyances that connect segments of the same stream or other waters of the United States and that are used to convey waters of the United States. (40 CFR § 122.26(b)(9)). However, it is strongly recommended that a permittee inspect all accessible portions of the system as part of this process. Culverts longer than a simple road crossing shall be included in the inventory unless the permittee can confirm that they are free of any connections and simply convey waters of the United States.
- An interconnection means the point (excluding sheet flow over impervious surfaces) where the permittee's MS4 discharges to another MS4 or other storm sewer system, through which the discharge is conveyed to waters of the United States or to another storm sewer system and eventually to a water of the United States.

ii. The permittee shall classify each of the permittee's outfalls and interconnections into one of the following categories:
- Problem Outfalls: outfalls/interconnections with known or suspected contributions of illicit discharges based on existing information shall be designated as Problem Outfalls. This shall include any outfalls/interconnections where previous screening indicates likely sewer input.[4] Problem Outfalls need not be screened pursuant to part 2.3.4.7.b.
- High Priority Outfalls: Outfalls/interconnections that have not been classified as Problem Outfalls and that are:
  - discharging to an area of concern to public health due to proximity of public beaches, recreational areas, drinking water supplies or shellfish beds;
  - determined by the permittee as high priority based on the characteristics listed below or other available information;
- Low Priority Outfalls: Outfalls/interconnections determined by the permittee as low priority based on the characteristics listed below or other available information.

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

- 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.

iii. The permittee shall priority rank outfalls into the categories above (except for excluded outfalls), based on the following characteristics of the defined initial catchment area where information is available:

- Past discharge complaints and reports.
- Poor receiving water quality- the following guidelines are recommended to identify waters as having a high illicit discharge potential: exceeding water quality standards for bacteria; ammonia levels above 0.5 mg/l; surfactants levels greater than or equal to 0.25 mg/l.
- Density of generating sites- Generating sites are those places, including institutional, municipal, commercial, or industrial sites, with a potential to generate pollutants that could contribute to illicit discharges. Examples of these sites include, but are not limited to, car dealers; car washes; gas stations; garden centers; and industrial manufacturing areas.
- Age of development and infrastructure – Industrial areas greater than 40 years old and areas where the sanitary sewer system is more than 40 years old will probably have a high illicit discharge potential. Developments 20 years or younger will probably have a low illicit discharge potential.
- Sewer conversion – contributing catchment areas that were once serviced by septic systems, but have been converted to sewer connections may have a high illicit discharge potential.
- Historic combined sewer systems – contributing areas that were once serviced by a combined sewer system, but have been separated may have a high illicit discharge potential.
- Surrounding density of aging septic systems – Septic systems thirty years or older in residential land use areas are prone to have failures and may have a high illicit discharge potential.
- Culverted streams – any river or stream that is culverted for distances greater than a simple roadway crossing may have a high illicit discharge potential.
- Water quality limited waterbodies that receive a discharge from the MS4 or waters with approved TMDLs applicable to the permittee, where illicit discharges have the potential to contain the pollutant identified as the cause of the water quality impairment.
- The permittee may also consider additional relevant characteristics, including location-specific characteristics; if so, the permittee shall include the additional characteristics in its written (hardcopy or electronic) IDDE program.

b. Dry Weather Outfall and Interconnection Screening and Sampling

All outfalls/interconnections (excluding Problem and excluded Outfalls) shall be inspected for the presence of dry weather flow within three (3) years of the permit effective date. The permittee shall screen all High and Low Priority Outfalls in accordance with their initial ranking developed at part 2.3.4.7.a.

i. Written procedure: The permittee shall develop an outfall and interconnection screening and sampling procedure to be included in the IDDE program within one (1) year of the permit effective date. This procedure shall include the following procedures for:

- sample collection,
- use of field kits,

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

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

ii. Weather conditions: Dry weather screening and sampling shall proceed only when no more than 0.1 inches of rainfall has occurred in the previous 24-hour period and no significant snow melt is occurring.

iii. Screening requirements: For each outfall/interconnection:

1. The permittee shall record all of the following information and include it in the outfall/interconnection inventory and priority ranking:
    - unique identifier,
    - receiving water,
    - date of most recent inspection,
    - dimensions,
    - shape,
    - material (concrete, PVC),
    - spatial location (latitude and longitude with a minimum accuracy of +/-30 feet,
    - physical condition,
    - indicators of potential non-stormwater discharges (including presence or evidence of suspect flow and sensory observations such as odor, color, turbidity, floatables, or oil sheen).
2. If an outfall/interconnection is inaccessible or submerged, the permittee shall proceed to the first accessible upstream manhole or structure for the observation and sampling and report the location with the screening results.
3. If no flow is observed, but evidence of illicit flow exists, the permittee shall revisit the outfall during dry weather within one week of the initial observation, if practicable, to perform a second dry weather screening and sample any observed flow (proceed as in iv. below).
4. Where dry weather flow is found at an outfall/interconnection, at least one (1) sample shall be collected, and:
    a) Samples shall be analyzed at a minimum for:
        - ammonia,
        - chlorine,
        - conductivity,
        - salinity,
        - *E. coli* (freshwater receiving water) or enterococcus (saline or brackish receiving water),
        - surfactants (such as MBAS),
        - temperature, and
        - pollutants of concern[5]
    b) All analyses with the exception of indicator bacteria and pollutants of concern can be performed with field test kits or field instrumentation and are not subject to 40

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

CFR part 136 requirements. Sampling for bacteria and pollutants of concern shall be conducted using the analytical methods found in 40 CFR §136, or alternative methods approved by EPA in accordance with the procedures in 40 CFR §136. Sampling for ammonia and surfactants must use sufficiently sensitive methods to detect those parameters at or below the threshold indicator concentrations of 0.5 mg/L for ammonia and 0.25 mg/L for surfactants. Sampling for residual chlorine must use a method with a detection limit of 0.02 mg/L or 20 ug/L.

iv. The permittee may rely on screening conducted under the MS4-2003 permit, pursuant to an EPA enforcement action, or by the state or EPA to the extent that it meets the requirements of part 2.3.4.7.b.iii.4. All data shall be reported in each annual report. Permittees that have conducted substantially equivalent monitoring to that required by part 2.3.4.7.b as part of an EPA enforcement action can request an exemption from the requirements of part 2.3.4.7.b by submitting a written request to EPA and retaining exemption approval from EPA as part of the SWMP. Until the permittee receives formal written approval of the exemption from part 2.3.4.7.b from EPA the permittee remains subject to all requirements of part 2.3.4.7.b.

v. The permittee shall submit all screening data used in compliance with this part in its Annual Report.

c. Follow-up ranking of outfalls and interconnections:

i. The permittee's outfall and interconnection ranking (2.3.4.7.a) shall be updated to reprioritize outfalls and interconnections based on information gathered during dry weather screening (part 2.3.4.7.b).

ii. Outfalls/interconnections where relevant information was found indicating sewer input to the MS4 or sampling results indicating sewer input[6] shall be considered highly likely to contain illicit discharges from sanitary sources, and such outfalls/interconnections shall be ranked at the top of the High Priority Outfalls category for investigation. At this time, permittees may choose to rank other outfalls and interconnections based on any new information from the dry weather screening.

iii. The ranking can be updated continuously as dry weather screening information becomes available, but shall be completed within three (3) years of the effective date of the permit.

2.3.4.8. Catchment Investigations

The permittee shall develop a systematic procedure to investigate each catchment associated with an outfall or interconnection within their MS4 system.

a. Timelines:

- A written catchment investigation procedure shall be developed within 18 months of the permit effective date in accordance with the requirements of part 2.3.4.8.b below.
- Investigations of catchments associated with Problem Outfalls shall begin no later than two (2)

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

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

years from the permit effective date.

- Investigations of catchments associated with High and Low Priority Outfalls shall follow the ranking of outfalls updated in part 2.3.4.7.c.
- Investigations of catchments associated with Problem Outfalls shall be completed with seven (7) years of the permit effective date
- Investigations of catchments where any information gathered on the outfall/interconnection identifies sewer input[7] shall be completed within seven (7) years of the permit effective date.
- Investigations of catchments associated with all Problem, High- and Low-Priority Outfalls shall be completed within ten (10) years of the permit effective date.

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

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

i. **Identifies maps, historic plans and records, and other sources of data**, including but not limited to plans related to the construction of the storm drain and of sanitary sewers, prior work performed on the storm drains or sanitary sewers, board of health or other municipal data on septic system failures or required upgrades, and complaint records related to SSOs, sanitary sewer surcharges, and septic system breakouts. These data sources will be used in identifying system vulnerability factors within each catchment.

ii. **Includes a manhole inspection methodology** that shall describe a storm drain network investigation that involves systematically and progressively observing, sampling (as required below) and evaluating key junction manholes (see definition in Appendix A) in the MS4 to determine the approximate location of suspected illicit discharges or SSOs. The manhole inspection methodology may either start from the outfall and work up the system or start from the upper parts of the catchment and work down the system or be a combination of both practices. Either method must, at a minimum, include an investigation of each key junction manhole within the MS4, even where no evidence of an illicit discharge is observed at the outfall. The manhole inspection methodology must describe the method the permittee will use. The manhole inspection methodology shall include procedures for dry and wet weather investigations.

iii. **Establishes procedures to isolate and confirm sources of illicit discharges** where manhole investigations or other physical evidence or screening has identified that MS4 alignments are influenced by illicit discharges or SSOs. These shall include isolation of the drainage area for implementation of more detailed investigations, inspection of additional manholes along the alignment to refine the location of potential contaminant sources, and methods such as sandbagging key junction manhole inlets, targeted internal plumbing inspections, dye testing, video inspections, or smoke testing to isolate and confirm the sources.

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

i. For each catchment being investigated, the permittee shall review relevant mapping and historic plans and records gathered in accordance with Part 2.3.4.8.b.i. This review shall be used to identify

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

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

areas within the catchment with higher potential for illicit connections. The permittee shall identify and record the presence of any of the following specific **System Vulnerability Factors (SVFs)**:

- History of SSOs, including, but not limited to, those resulting from wet weather, high water table, or fat/oil/grease blockages;
- Common or twin-invert manholes serving storm and sanitary sewer alignments;
- Common trench construction serving both storm and sanitary sewer alignments;
- Crossings of storm and sanitary sewer alignments where the sanitary system is shallower than the storm drain system;
- Sanitary sewer alignments known or suspected to have been constructed with an underdrain system;
- Inadequate sanitary sewer level of service (LOS) resulting in regular surcharging, customer back-ups, or frequent customer complaints;
- Areas formerly served by combined sewer systems;
- Sanitary sewer infrastructure defects such as leaking service laterals, cracked, broken, or offset sanitary infrastructure, directly piped connections between storm drain and sanitary sewer infrastructure, or other vulnerability factors identified through Inflow/Infiltration Analyses, Sanitary Sewer Evaluation Surveys, or other infrastructure investigations.

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

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

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

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

1. <u>For all catchments</u>
   a) Infrastructure information shall be incorporated into the permittee's mapping required at part 2.3.4.5; the permittee will refine their catchment delineation based on the field investigation where appropriate.
   b) The SVF inventory for the catchment will be updated based on information obtained during the inspection, including common (twin invert) manholes, directly piped connections between storm drains and sanitary sewer infrastructure, common weir walls, sanitary sewer underdrain connections and other structural vulnerabilities where sanitary discharges could enter the storm drain system during wet weather.
      1) **Where a minimum of one (1) SVF is identified based on previous information**

or the investigation, a wet weather investigation must be conducted at the associated outfall (see below).

c) During dry weather, key junction manholes[8] shall be opened and inspected systematically for visual and olfactory evidence of illicit connections (e.g., excrement, toilet paper, gray filamentous bacterial growth, or sanitary products present).
   1) If flow is observed, the permittee shall sample the flow at a minimum for ammonia, chlorine and surfactants and can use field kits for these analyses.
   2) Where sampling results or visual or olfactory evidence indicate potential illicit discharges or SSOs, the area draining to the junction manhole shall be flagged for further upstream investigation.

d) Key junction and subsequent manhole investigations will proceed until the location of suspected illicit discharges or SSOs can be isolated to a pipe segment between two manholes. If no evidence of an illicit discharge is found, catchment investigations will be considered complete upon completion of key junction manhole sampling.

2. <u>For all catchments with a minimum of one (1) SVF identified</u>
   a) The permittee shall meet the requirements above for dry weather screening
   b) The permittee shall inspect and sample under wet weather conditions to the extent necessary to determine whether wet weather-induced high flows in sanitary sewers or high groundwater in areas served by septic systems result in discharges of sanitary flow to the MS4.
      1) The permittee shall conduct at least one wet weather screening and sampling at the outfall that includes the same parameters required during dry weather screening, part 2.3.4.7.b.iii.4.
      2) Wet weather sampling and screening shall proceed during or after a storm event of sufficient depth or intensity to produce a stormwater discharge. EPA strongly recommends sampling during the spring (March through June) when groundwater levels are relatively high.
      3) The permit does not require a minimum rainfall event prior to wet weather screening. However, permittees may incorporate provisions that assist in targeting such discharges, including avoiding sampling during the initial period of discharge ("first flush") and/or identifying minimum storm event intensities likely to trigger sanitary sewer interconnections.
   c) This sampling can be done upon completion of any dry weather investigation but must be completed before the catchment investigation is marked as complete.

iii. All data collected as part of the dry and wet weather catchment investigations shall be recorded and reported in each annual report.

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

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

confirmation of all illicit sources.

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

i. For each confirmed source the permittee shall include in the annual report the following information:
- the location of the discharge and its source(s);
- a description of the discharge;
- the method of discovery;
- date of discovery;
- date of elimination, mitigation or enforcement action OR planned corrective measures and a schedule for completing the illicit discharge removal; and
- estimate of the volume of flow removed.

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

2.3.4.9. Indicators of IDDE Program Progress

The permittee shall define or describe indicators for tracking program success and evaluate and report on the overall effectiveness of the IDDE program in each annual report. At a minimum the permittee shall document in each annual report:
- the number of SSOs and illicit discharges identified and removed,
- the number and percent of total outfall catchments served by the MS4 evaluated using the catchment investigation procedure,
- all dry weather and wet weather screening and sampling results and
- the volume of sewage removed

2.3.4.10 Ongoing Screening

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

2.3.4.11 Training

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

Appendix G
Massachusetts Small MS4 Permit Monitoring Requirements
For Discharges into Impaired Waters – Parameters and Methods

Pollutant Causing Impairment	Monitoring Parameter	EPA or Approved Method No.
Aluminum	Aluminum, Total	200.7; 200.8; 200.9
Ammonia (Un-ionized)	Ammonia – Nitrogen	350.1
Arsenic	Arsenic, Total	200.7; 200.8; 200.9
Cadmium	Cadmium, Total	200.7; 200.8; 200.9
Chlordane	NMR	608; 625
Chloride	Chloride	300
Chromium (total)	Chromium, Total	200.7; 200.8; 200.9
Copper	Copper, Total	200.7; 200.8; 200.9
DDT	NMR	608; 625
DEHP (Di-sec-octyl phthalate)	NMR	---
Dioxin (including 2,3,7,8-TCDD)	NMR	613; 1613
Dioxin (2,3,7,8-Tetrachlorodibenzo-p-dioxin only)	NMR	613
Lead	Lead, Total	200.7; 200.8; 200.9
Mercury in Water Column	NMR unless potentially present such (e.g., salvage yards crushing vehicles with Hg switches)	200.7; 200.8; 200.9
Nitrogen (Total)	Nitrogen, Total	351.1/351.2 + 353.2
Pentachlorophenol (PCP)	NMR	---
Petroleum Hydrocarbons	Oil and Grease	1664
Phosphorus (Total)	Phosphorus, Total	365.1; 365.2; 365.3; SM 4500-P-E
Polychlorinated biphenyls	NMR	---
Polycyclic Aromatic Hydrocarbons (PAHs) (Aquatic Ecosystems)	PAHs	610; 1625
Sulfide-Hydrogen Sulfide	NMR	---
Mercury in Fish Tissue	NMR	---
PCB in Fish Tissue	NMR	---
Total Dissolved Solids	Total Dissolved Solids	160.1
Total Suspended Solids (TSS)	Total Suspended Solids	160.2, 180.1
Turbidity	Total Suspended Solids and Turbidity	160.2, 180.1
Secchi disk transparency	Total Suspended Solids	160.2
Sediment Screening Value (Exceedence)	Total Suspended Solids	160.2

Sedimentation/Siltation	Total Suspended Solids	160.2
Bottom Deposits	Total Suspended Solids	160.2
Color	NMR	---
pH, High	pH	150.2
pH, Low	pH	150.2
Taste and Odor	NMR	---
Temperature, water	NMR	---
Salinity	Specific Conductance	120.1
Enterococcus	Enterococcus	1106.1; 1600; Enterolert® 12 22.
Escherichia coli	E. coli	1103.1; 1603; Colilert® 12 16, Colilert-18® 12 15 16.; mColiBlue-24®17.
Fecal Coliform	Fecal Coliform	1680; 1681
Organic Enrichment (Sewage) Biological Indicators	Enterococcus (marine waters) or E. coli (freshwater)	1106.1; 1600
Debris/Floatables/Trash	NMR	or
Foam/Flocs/Scum/Oil Slicks	Contact MassDEP	1103.1; 1603
Oil and Grease	Oil and Grease	---
Chlorophyll-a	Total Phosphorus (freshwater)	---
	Total Nitrogen (marine waters)	1664
Nutrient/Eutrophication Biological Indicators	Total Phosphorus (freshwater)	365.1; 365.2; 365.3
	Total Nitrogen (marine waters)	351.1/351.2 + 353.2
Dissolved oxygen saturation / Oxygen, Dissolved	Dissolved Oxygen	365.1; 365.2; 365.3
	Temperature	351.1/351.2 + 353.2
	BOD_5	360.1; 360.2
	Total Phosphorus (freshwater)	SM-2550
	Total Nitrogen (marine waters)	SM-5210
Excess Algal Growth	Total Phosphorus (freshwater)	365.1; 365.2; 365.3
	Total Nitrogen (marine waters)	351.1/351.2 + 353.2
Aquatic Plants (Macrophytes)	NMR	---

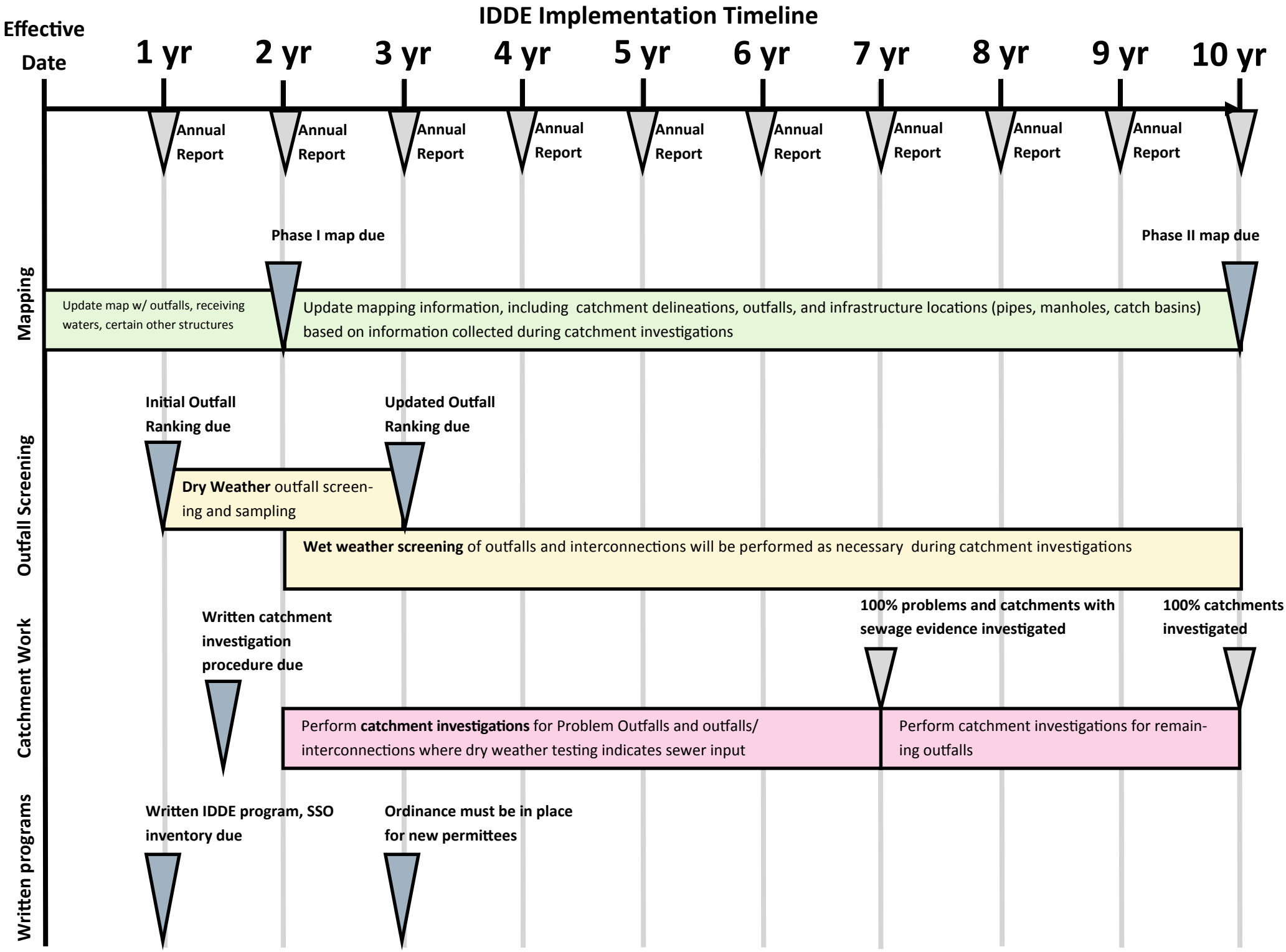
Abnormal Fish deformities, erosions, lesions, tumors (DELTS)	NMR	---
Abnormal Fish Histology (Lesions)	NMR	---
Estuarine Bioassessments	Contact MassDEP	---
Fishes Bioassessments	Contact MassDEP	---
Aquatic Macroinvertebrate Bioassessments	Contact MassDEP	---
Combined Biota/Habitat Bioassessments	Contact MassDEP	---
Habitat Assessment (Streams)	Contact MassDEP	---
Lack of a coldwater assemblage	Contact MassDEP	---
Fish Kills	Contact MassDEP	---
Whole Effluent Toxicity (WET)	Contact MassDEP	---
Ambient Bioassays -- Chronic Aquatic Toxicity	Contact MassDEP	---
Sediment Bioassays -- Acute Toxicity Freshwater	Contact MassDEP	---
Sediment Bioassays -- Chronic Toxicity Freshwater	Contact MassDEP	---
Fish-Passage Barrier	NMR	---
Alteration in stream-side or littoral vegetative covers	NMR	---
Low flow alterations	NMR	---
Other flow regime alterations	NMR	---
Physical substrate habitat alterations	NMR	---
Other anthropogenic substrate alterations	NMR	---
Non-Native Aquatic Plants	NMR	---
Eurasian Water Milfoil, Myriophyllum spicatum	NMR	---
Zebra mussel, Dreissena polymorph	NMR	---
Other	Contact MassDEP	---

Notes:

NMR" indicates no monitoring required

"Total Phosphorus (freshwater)" indicates monitoring required for total phosphorus where stormwater discharges to a water body that is freshwater

"Total Nitrogen (marine water)" indicates monitoring required for total nitrogen where stormwater discharges to a water body that is a marine or estuarine water


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

Town of Wilbraham IDDE Program

Appendix C

MassDEP SSO Reporting Instructions and Form

Massachusetts Department of Environmental Protection
Bureau of Water Resources

Wastewater Management Program

Sanitary Sewer Overflow(SSO)/Bypass Notification Form

Who must notify DEP about an overflow or bypass, and when?

Any owner or operator of the following facilities:

- Municipal, state, federal, regional, industrial or other private wastewater collection system;
- Wastewater utility;
- Wastewater treatment works;
- Facility with a groundwater discharge permit;
- Facility with a surface water discharge permit.

This requirement includes any owner or operator of a satellite municipal collection system or other collection system that is part of a larger POTW not under the same ownership and control.

The following situations require notification to DEP and submittal of the SSO Report Form:

- An un-permitted overflow or bypass;
- Backup of wastewater into public or private property when the event is caused by a condition of the system owned and operated by the sewer authority
- In a combined sewer system, an overflow or bypass during dry weather conditions or at a location not covered by a NPDES permit, or from a portion of the system that has a separate sanitary sewer.

Backups of wastewater into a property which are not caused by conditions in the system owned and operated by the sewer system are not required to be reported. These incidents normally occur due to blockages in service connections to a property or blockages in the internal plumbing system.

What are the procedures for reporting?

Step One:

Immediate Telephone and/or email notification to MassDEP, EPA, and other parties:

Notification to MassDEP and other regulatory authorities is a critical element of the SSO response plan. Notification must be made as soon as possible, and no later than 24 hours after discovery of the event. The agency notifications should include all responsible officials whose duties include management of resources which may be affected by the SSO discharge. A list of agencies, contact staff, phone numbers, and emails should be kept by the Sewer Authority and posted for easy access to responsible staff. A list of some relevant agencies follows:

Agency:	Contact	Requirements
MassDEP	During business hours: Northeast Region: (978) 694-3215 Central Region: (508) 792-7650 Southeast Region: (508) 946-2750	Report all SSO events to relevant regional office Report SSO's to emergency line during non-business hours

Sanitary Sewer Overflow(SSO)/Bypass Notification Form

Instructions

	Western Region: (413) 784-1100 24-hour Emergency Line: 1-888-304-1133 If you are not sure which Massachusetts DEP Regional Office oversees your facility, go to http://www.mass.gov/eea/agencies/massdep/about/contacts/.	
EPA	EPA New England: (617) 918-1510 OR Southeast Region: David Turin, (617) 918-1598 Northeast, Central and Western Regions: Douglas Koopman, (617) 918-1747	Report all SSO events
Local Board of Health	List of local BOH contact information available at http://www.mhoa.com/boh-roster/	Report all SSO events to local BOH(s) where impacts may occur
Department of Conservation and Recreation	State House Ranger Base 617-722-1188	Where DCR beaches or parks affected
MA Division of Marine Fisheries	Boston/Northeast: 617-727-3336 x 165 Southeast: 508-563-1779 x 122	Where shellfish resources may be affected
Drinking Water Resource Managers	List of Drinking Water Supply contacts available at http://www.mass.gov/eea/docs/dep/about/organization/pwscont.pdf	Where Drinking Water Resources may be affected

Hazardous Material Releases: If you believe an overflow, bypass, or any other discharge may have resulted in an oil or hazardous material release, report it to DEP at any time, 24 hours a day, at this toll free number: 1-888-304-1133.

MassDEP may require, on a case-by-case basis, more extensive reporting of the SSO event where determined necessary to protect users of resources affected by SSO discharges.

Step Two:
Submit a written report to DEP within five (5) calendar days of the time you become aware of the overflow, bypass or backup. DEP requires the use of the MassDEP Sanitary Sewer Overflow (SSO)/Bypass notification form, unless an alternative reporting form is authorized by MassDEP in writing.

Massachusetts Department of Environmental Protection
Bureau of Water Resources – Wastewater Management Program

Sanitary Sewer Overflow(SSO)/Bypass Notification Form

Instructions

The Notification form should be fully completed, and shall include a clear description of the overflow, or bypass and its causes, including the best approximation of the dates and times, and if the situation has not been corrected, the amount of time the overflow/bypass is expected to continue, and a description of the measures to be implemented to stop the discharge. The Form or attachments must also include steps taken or planned to reduce, eliminate, and prevent recurrence.

If you have a discharge permit, check the Monitoring and Reporting Section of your permit to determine if your *Notification Form* should be sent to the attention of DEP's regional Bureau of Waste Prevention (industrial facilities) or the regional Bureau of Water Resources (nonindustrial facilities). All municipal facilities shall submit their reports to the Bureau of Water Resources.

Fax the *Notification Form* to the attention of the Bureau of Water Resources in your DEP regional office and to the appropriate EPA personnel depending on your DEP region:

- Massachusetts Department of Environmental Protection, Northeast Regional Office, 205B Lowell Street, Wilmington, MA 01887. Fax: 978-694-3499.
- Massachusetts Department of Environmental Protection, Central Regional Office, 8 New Bond Street, Worcester, MA 01606. Fax: 508-792-7621.
- Massachusetts Department of Environmental Protection, Southeast Regional Office, 20 Riverside Drive, Lakeville, MA 02347. Fax: 508-947-6557.
- Massachusetts Department of Environmental Protection, Western Regional Office, 436 Dwight Street, Springfield, MA 01103. Fax: 413-784-1149.
- U.S. Environmental Protection Agency, Water Technical Unit (OES 04-4), 5 Post Office Square – Suite 100, Boston, MA 02109-3912
    - Southeast Region: David Turin, Fax 617-918-0598
    - Northeast, Central and Western Regions: Douglas Koopman, Fax (617) 918-0747

What should I do if I'm not sure of the information I am providing?
For required items such as time of occurrence, causes of incident, volume of overflow, etc., PROVIDE YOUR BEST ESTIMATE OR ASSESSMENT AT THE TIME OF THIS REPORT. You can submit any additions or corrections later.

What is the best way to report the exact location of the overflow, or bypass?
Include with your *Notification Form* a copy of a map indicating its location. Please use 8 ½ " by 11" paper at an appropriate scale between 1:5000 to 1:25000. Specifying the geographic location will help DEP determine the public health and water quality impacts associated with overflows and bypasses.

Why do I need to report backups into buildings?
DEP wants to ensure that sewage backups into buildings as a result of problems in the sewer system are properly repaired and measures are put in place to reduce the likelihood of recurrence. Owner/operators of sewer systems that caused a backup may need to repair, rehabilitate, or upgrade the hydraulic capacity of their system, or change their operations and maintenance procedures.

Are there some overflows or Bypass that are not subject to these reporting requirements?
DO NOT use the *Sanitary Sewer Overflow(SSO)/Bypass Notification* Form in the following situations:

Sanitary Sewer Overflow(SSO)/Bypass Notification Form

Instructions

- The overflow is from a properly permitted Combined Sewer Overflow structure. Follow the reporting requirements in your NPDES Permit.

- You are reporting an overflow or bypass of sewage for a collection system or treatment works that is not under your ownership and control. However, please assist DEP by immediately reporting to the appropriate DEP Regional Office by phone or fax any overflows or bypass incidences for facilities other than your own which involve a discharge of wastewater to the environment.

What are the state regulations that apply to this notification? Where can I get copies?

These regulations include, but are not limited to:

- Surface Water Discharge Regulations, 314 CMR 3.00
- Groundwater Discharge Regulations, 314 CMR 5.00
- Sewer Connection Regulations, 314 CMR 7.00
- Operation and Maintenance Regulations, 314 CMR 12.00

Official copies of the regulations may be purchased at:

State Bookstore
State House, Room 116
Boston, MA 02133
617-727-2834

State Bookstore
436 Dwight Street
Springfield, MA 01103
413-784-1376

Massachusetts Department of Environmental Protection
Bureau of Resource Protection – Wastewater Management Program

Sanitary Sewer Overflow(SSO)/Bypass Notification Form

Instructions

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EPA	EPA New England: (617) 918-1870	Report all SSO events
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Department of Conservation and Recreation	State House Ranger Base 617-722-1188	Where DCR beaches or parks affected
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MassDEP may require, on a case-by-case basis, more extensive reporting of the SSO event where determined necessary to protect users of resources affected by SSO discharges.

Step Two:
Submit a written report to DEP within five (5) calendar days of the time you become aware of the overflow, bypass or backup. DEP requires the use of the MassDEP Sanitary Sewer Overflow (SSO)/Bypass notification form, unless an alternative reporting form is authorized by MassDEP in writing.

The Notification form should be fully completed, and shall include a clear description of the overflow, or bypass and its causes, including the best approximation of the dates and times, and if the situation has not been corrected, the amount of time the overflow/bypass is expected to continue, and a description of the measures to be implemented to stop the discharge. The Form or attachments must also include steps taken or planned to reduce, eliminate, and prevent recurrence.

Sanitary Sewer Overflow(SSO)/Bypass Notification Form

Instructions

If you have a discharge permit, check the Monitoring and Reporting Section of your permit to determine if your *Notification Form* should be sent to the attention of DEP's regional Bureau of Waste Prevention (industrial facilities) or the regional Bureau of Resource Protection (nonindustrial facilities). All municipal facilities shall submit their reports to the Bureau of Resource Protection.

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- Massachusetts Department of Environmental Protection, Western Regional Office, 436 Dwight Street, Springfield, MA 01103. Fax: 413-784-1149.
- U.S. Environmental Protection Agency, Water Technical Unit (OES 04-4), 5 Post Office Square – Suite 100, Boston, MA 02109-3912 Fax: 617-918-0870

What should I do if I'm not sure of the information I am providing?
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Are there some overflows or Bypass that are not subject to these reporting requirements?
DO NOT use the *Sanitary Sewer Overflow(SSO)/Bypass Notification* Form in the following situations:

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Sanitary Sewer Overflow(SSO)/Bypass Notification Form

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617-727-2834

State Bookstore
436 Dwight Street
Springfield, MA 01103
413-784-1376

Massachusetts Department of Environmental Protection
Bureau of Resource Protection – Watershed Permitting Program

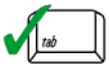
Sanitary Sewer Overflow (SSO)/Bypass Notification Form

FOR DEP USE ONLY

Tax Identification Number

A. Reporting Facility

Important: When filling out forms on the computer, use only the tab key to move your cursor - do not use the return key.



1. Facility Information

Reporting Sewer Authority _____ Permit # _____

2. Authorized Representative Transmitting Form:

First Name _____ Last Name _____ Telephone No. _____

Title _____ E-mail Address _____

B. Phone Notifications:

See DEP Regional Office telephone and fax numbers at the end of this form.

1. **MassDEP staff** contacted: first name _____ last name _____

   Date/Time contacted: Date _____ Time _____ ☐ am ☐ pm

2. **EPA staff** contacted: first name _____ last name _____

   Date/Time EPA contacted: Date _____ Time _____ ☐ am ☐ pm

3. Board of Health contacted: First Name _____ Last Name _____

   Date/Time contacted: Date _____ Time _____ ☐ am ☐ pm

4. Others notified (select all that apply); ☐ Conservation Commission

   ☐ Harbormaster ☐ Shellfish Warden ☐ Division of Marine Fisheries

   ☐ Downstream Drinking Water Supplier ☐ Watershed Association

   ☐ Beach Resource Manager ☐ Other: _____ (specify)

C. SSO Information

1. SSO Discovered: Date _____ Time _____ ☐ am ☐ pm

   By: _____

2. SSO Stopped: Date _____ Time _____ ☐ am ☐ pm

3. SSO Discharge from: ☐ Sanitary Sewer Manhole ☐ Pump Station

   ☐ Backup into Property ☐ Other: _____ (specify)

4. SSO Discharge to: ☐ Ground Surface (no release to surface water)

   ☐ Direct to Receiving Water _____ (surface water)

   ☐ Catch basin to Receiving Water _____ (surface water)

   ☐ Backup into Property Basement

Sanitary Sewer Overflow (SSO)/Bypass Notification Form

FOR DEP USE ONLY

Tax Identification Number

C. SSO Information (cont.)

Location: _____
(Description of discharge site or closest address)

5. Estimated SSO Volume at time of this Report: _____

   Method of Estimating Volume: _____

6. Cause of SSO Event:

   ☐ Rain Event ☐ Pump Station Failure ☐ Insufficient Capacity in System

   ☐ Treatment Unit failure

   ☐ Sewer System Blockage: ☐ Pipe Collapse ☐ Root Intrusion ☐ Grease Blockage

   ☐ Other: _____
   (Specify)

7. Corrective Actions Taken:

Impact Area cleaned and/or disinfected: ☐ Yes ☐ No

Corrective Actions Completed: ☐ Yes ☐ No

D. Comments/Attachments/Follow-up

I wish to provide (select all that apply):

☐ Attachment ☐ Additional comments below: ☐ No additional comments or attachments

Additional comments and planned actions:

Massachusetts Department of Environmental Protection
Bureau of Resource Protection – Watershed Permitting Program

Sanitary Sewer Overflow (SSO)/Bypass Notification Form

FOR DEP USE ONLY

Tax Identification Number

E. Certification Statement

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

Signature of Authorized Representative

Date Signed

Please keep a copy of this report for your records. When submitting additional information, include the MassDEP Incident Number from this report.

MassDEP Regional Office and EPA Telephone and Fax Numbers:

Northeast Region	Phone: 978-694-3215	Fax: 978-694-3499
Southeast Region	Phone: 508-946-2750	Fax: 508-947-6557
Central Region	Phone: 508-792-7650	Fax: 508-792-7621
Western Region	Phone: 413-784-1100	Fax: 413-784-1149
EPA Contact	Phone: 617-918-1870	Fax: 617-918-0870
DEP 24-hour emergency	Phone: 888-304-1133	

Town of Wilbraham IDDE Program

Appendix D

Preliminary Outfall Inventory, Outfall and Catchment Ranking, and Map

Town of Wilbraham MS4 Outfall and Interconnection Inventory, Initial Ranking, and Initial Catchment Delineations

TO: Tonya Basch, P.E., Assistant Town Engineer

FROM: Tracy J. Adamski, AICP, Tighe & Bond

DATE: June 27, 2019

Tighe & Bond has completed the **Town of Wilbraham's** initial outfall and interconnection inventory and ranking in accordance with Part 2.3.4.5 and 2.3.4.7 of the U.S. Environmental EPA's National Pollutant Discharge Elimination System (NPDES) General Permits for Stormwater Discharges from Small Municipal Separate Storm Sewer Systems (MS4s) in Massachusetts, effective July 1, 2018 (Small MS4 General Permit). The initial inventory and ranking determine the priority screening order for all outfalls and interconnections in accordance with Part 2.3.4.7.b of the Small MS4 General Permit and catchment investigations for evidence of illicit discharges and SSOs in accordance with Part 2.3.4.8 of the Small MS4 General Permit.

This memorandum and associated summary tables and map satisfy EPA's requirement to include initial catchment delineations on the Phase I system map (due within two years of the permit effective date) and to priority rank each outfall based on illicit discharge potential (due within one year of the permit effective date). The inventory and delineations will be updated as the Illicit Discharge Detection and Elimination (IDDE) Program is implemented and updates will be included in subsequent Annual Reports.

1. Outfall Inventory and Priority Ranking

Tighe & Bond followed EPA's ranking process outlined in Part 2.3.4.7.a of the Small MS4 General Permit for each of the known outfalls and interconnections in town. Based on the outfall ranking category definitions in Part 2.3.4.7.a.ii, outfalls were ranked into one of the four categories: Problem, High Priority, Low Priority, and Excluded outfalls. Descriptions of these categories can be found in Section 6 of the Town's IDDE Plan. At this time, there are no known interconnections. As of June 2019, the Town's stormwater GIS indicates that there are **351 outfalls** within the Town boundary and **241 outfalls** that fall inside the MS4 urbanized area and are regulated by the 2016 Small MS4 General Permit.

During the initial desktop screening, Tighe & Bond concluded that none of the known outfalls should be ranked as a Problem outfall because no known historic illicit connection or discharge problem areas existed within the Town. Additionally, none of the outfalls were classified as Excluded outfalls since all outfalls, at this time, have the *potential* for an illicit discharge. For this reason, each outfall was assigned either a Low or High Priority during the initial ranking.

The following criteria were used to classify the Town's MS4-regulated outfalls as High or Low Priority. Outfalls were classified as High Priority if they exhibited one or more of the determination factors described below. Outfalls that did not exhibit any of the determination factors were categorized as Low Priority. Several outfalls exhibited more than one criterion and are listed under multiple categories below. The attached Preliminary Outfall Inventory and Catchments Map illustrates where these areas of concern are within Wilbraham's regulated area and in relation to each outfall.

Proximity to Dense Development
Based on discussion with the Town, outfalls discharging in areas of dense residential development, particularly near water bodies, were ranked as High Priority for the greater potential to create illicit discharges. Within Wilbraham, the Pines neighborhood was identified in the Town of Wilbraham's Open Space and Recreation Plan as a relatively dense development adjacent to the Chicopee River, and the associated 7 outfalls were therefore considered as High Priority.

Industrial/Commercial Development
Outfalls discharging in areas of dense industrial/commercial development were also ranked as High Priority based on the greater potential to create illicit discharges. Within Wilbraham, the Route 20/Boston Road corridor was identified as an area with concentrated industrial/commercial development, and the associated 19 outfalls were therefore considered as High Priority.

Proximity to Floodplain
Outfalls located within the 100-year floodplain of a waterbody within the Town of Wilbraham were considered to be High Priority based on the potential for on-site wastewater disposal system functionality problems related to flooding and for pollution prevention. Based on MassGIS data, 51 outfalls within the 100-year floodplain are considered to be High Priority.

Poor Subsurface Conditions for On-Site Wastewater Treatment
Additionally, soils data was reviewed for trends of general areas with poor subsurface conditions (such as shallow bedrock or thick till) that could lead to untreated wastewater being introduced into groundwater or nearby streams and water bodies. Individual failures were not assessed, since failures may occur anywhere due to lapses in the regularly required inspection and maintenance. In Wilbraham, areas of shallow bedrock/abundant outcrops and/or thick till are primarily located east of Main Street per MassGIS, leading to ranking of 23 outfalls as a high priority.

Proximity to Public Beach/Recreational Areas
The Nine Mile Pond and Spectacle Pond area of Town has a public beach and recreational area. The 3 outfalls within this area are designated as High Priority outfalls due to pollution prevention concerns.

Proximity to Impaired Waters
All outfalls within 500 feet of an impaired waterbody listed as a Category 4A or Category 5 water in the Massachusetts 2014 Integrated List of Waters with a pollutant of concern associated with stormwater were considered high priority. Based on this criterion, 10 outfalls within 500 feet of the Chicopee River or 500 feet of Spectacle Pond were considered High Priority.

Summary
Based on the screening procedure described in Section 1 of this memorandum, the Town of Wilbraham's initial outfall and interconnection inventory includes **83 High Priority outfalls** and **158 Low Priority outfalls**.

2. Initial Catchment Delineation

Initial catchment delineations and rankings were completed based on the Metropolitan Area Planning Council's GIS-Based Catchment Delineation and Ranking Methodology available through the Neponset Stormwater Partnership.[1] Slight modifications to MAPC's delineation process were made to account for lack of connectivity in the entire stormwater system. These modifications included burning in polygon water features at -2.0 meters, polyline water features at -1.0 meters, right-of-way polylines at -1.0 meters and only class 1-4 road centerlines at 0.5 meters. Catch basins were snapped at 15 feet instead of the default 5 feet. Tighe & Bond was not able to delineate each of the outfalls where Wilbraham's stormwater GIS lacked connectivity because using topography alone may not represent the drainage area contributing to an outfall. This delineation produced **194 initial catchment delineations**. As Wilbraham's stormwater mapping and connectivity is updated during implementation of the IDDE Program, the catchments can be further refined.

A priority ranking was assigned to each delineated catchment based on the ranking of the associated outfall. For example, if an outfall was considered a High Priority because of proximity to the Chicopee River, the associated catchment would also be ranked as a High Priority catchment. For catchments with multiple outfalls, the catchment was ranked based on the outfall with the highest rank (i.e., if one outfall was ranked Low Priority and one outfall was ranked High Priority, the catchment was assigned a rank of High Priority). The initial catchment delineations and rankings are shown on the Preliminary Outfall Catchment map.

Summary

Based on the screening procedure described in Section 2 of this memorandum, the Town of Wilbraham's initial catchment inventory includes **66 High Priority catchments** and **128 Low Priority catchments**. 47 outfalls do not have a separate associated catchment area delineated as of the date of this memorandum and will need to be further refined as stormwater mapping is improved.

Attachments

Outfall and Interconnection Inventory and Initial Ranking Table

Preliminary Outfall Inventory and Catchments Map

J:\H\H1436 Wilbraham\011 - MS4 Year 1 NOI & GIS\Report_Evaluation\Written IDDE Plan\App E Catchment Map & Priority Ranking\Draft Wilbraham Outfall Prioritization Memo.docx

[1] MAPC. February 2015. *Neponset Outfall Catchment Analysis*. https://github.com/MAPC/stormwater-toolkit

Town of Wilbraham Outfall Inventory

Town Outfall ID	Pipe Size (inches)	Material	Condition	Location	Notes	Date of Last Inspection	Receiving Water
1	10			10 MAYNARD RD		2018	Chicopee River (MA36-23)
2				222 MAYNARD RD			Outside Receiving Waterbody
4				22 WARREN RD		2018	Wetland/Tributary to Calkins Brook
5				6 CIRCLE DR		2018	Outside Receiving Waterbody
6				2480 BOSTON RD		2017	Chicopee River (MA36-24)
7	24	CMP		15 HEMINGWAY RD		2018	Outside Receiving Waterbody
8	10	CONCRETE		8 LONGFELLOW DR			Outside Receiving Waterbody
9	24			21V CIRCLE DR	24 inch outfall to ditch	2018	Wetland/Tributary to Calkins Brook
10	24	RCP		12 DOLLAR AV	24 inch RCP outfall to 6-18 inch stone		Wetland/Tributary to Chicopee River (MA36-23)
11	15			4 POPLAR DR		2017	Outside Receiving Waterbody
19				6 LINWOOD DR		2018	Wetland/Tributary to Chicopee River (MA36-24)
20				8 OXFORD DR		2017	Wetland/Tributary to Chicopee River (MA36-24)
21				33 LINWOOD DR		2017	Wetland/Tributary to Chicopee River (MA36-24)
22	12			56 RIVER RD A			Chicopee River (MA36-24)
25	12			2540V BOSTON RD A		2017	Outside Receiving Waterbody
26				2720 BOSTON RD			Outside Receiving Waterbody
27				2780 BOSTON RD			Outside Receiving Waterbody
28				3I COTTAGE AV		2017	Wetland/Tributary to Chicopee River (MA36-23)
29				2830 BOSTON RD C			Outside Receiving Waterbody
30				2830 BOSTON RD B			Outside Receiving Waterbody
31				2830 BOSTON RD A			Chicopee River (MA36-23)
32				Across From 2835 BOSTON RD C			Chicopee River (MA36-23)
33				Across From 2835 BOSTON RD B			Chicopee River (MA36-23)
34				Across From 2835 BOSTON RD A			Chicopee River (MA36-23)
35				Across From 2960 BOSTON RD			Chicopee River (MA36-23)
36				2V MAYNARD RD		2018	Chicopee River (MA36-23)
37	15			115 MAIN ST			Wetland/Tributary to Nine Mile Pond
38	12			3VR MAPLEWOOD DR C		2017	Isolated Wetland Dipping Hole Road
39	12			3VR MAPLEWOOD DR A		2017	Outside Receiving Waterbody
40	12			3VR MAPLEWOOD DR B		2017	Outside Receiving Waterbody
41	12			3 SURREY LN		2017	Outside Receiving Waterbody
42	12			449V DIPPING HOLE RD A		2017	Outside Receiving Waterbody
43	12			17V PRIMROSE LN		2017	Isolated Wetland Dipping Hole Road
44	24			4V FOX HILL DR		2017	Outside Receiving Waterbody
45	36			318 MAIN ST C		2017	Wetland/Tributary to Nine Mile Pond
46	6			318 MAIN ST A			Wetland/Tributary to Nine Mile Pond
47	12			318 MAIN ST B			Wetland/Tributary to Nine Mile Pond
48	24			26V STIRLING DR A		2017	Outside Receiving Waterbody
49	12			39 BLACKSMITH RD			Isolated Wetland Dipping Hole Road
50	12			21 BITTERSWEET LN		2017	Wetland/Tributary to North Branch Mill River
51	12			9V BITTERSWEET LN			Wetland/Tributary to North Branch Mill River
52	12			7 BITTERSWEET LN			Outside Receiving Waterbody
53				21V MCINTOSH DR		2017	Wetland/Tributary to Bennett Pond
54	18			3 BELLOWS RD		2018	Outside Receiving Waterbody
55	12			13A-V OLDWOOD RD B		2018	Wetland/Tributary to South Branch Mill River
57	12			4V SOUTHWOOD DR B		2017	Wetland/Tributary to South Branch Mill River
58	12			13A-V OLDWOOD RD A		2017	Wetland/Tributary to South Branch Mill River
59	12			37V SHIRLEY ST		2017	North Branch Mill River
60	12			9 PARK DR		2017	Wetland/Tributary to Bennett Pond
61	12			21 WESTERN VIEW DR		2017	Wetland/Tributary to Bennett Pond
63	12			18 WOODSLEY RD		2017	Outside Receiving Waterbody
64	12			6 PHEASANT FARM RD		2017	Wetland/Tributary to South Branch Mill River
65	18			3 WARREN RD A		2018	Outside Receiving Waterbody
66	24			6 CHRISTOPHER CR		2018	Wetland/Tributary to Bennett Pond
67	12			6 JUDITH DR		2017	Wetland/Tributary to Bennett Pond
68	12			6 CATHERINE CR		2017	Wetland/Tributary to Bennett Pond
69	21			20V WRIGHT PL			Wetland/Tributary to North Branch Mill River
70	12			2 WRIGHT PL		2017	Wetland/Tributary to North Branch Mill River
71				10 MCINTOSH DR		2017	Wetland/Tributary to Bennett Pond
72	12			9 PEARL DR		2017	Wetland/Tributary to South Branch Mill River
73			FAIR	1228 STONY HILL RD		2018	Wetland/Tributary to South Branch Mill River
74				12 BONAIR DR		2018	Wetland/Tributary to South Branch Mill River
75				9 DEEPWOOD DR		2017	Wetland/Tributary to South Branch Mill River
76				257V SOULE RD		2017	Wetland/Tributary to South Branch Mill River
77	24			1 HEMLOCK CR		2017	Outside Receiving Waterbody
78				43 PLEASANT VIEW RD A			South Branch Mill River
79				43 PLEASANT VIEW RD B		2018	South Branch Mill River
82	24	RCP		7 TALL TIMBER DR	RCP FE with paved swale	2017	Outside Receiving Waterbody
85	24	RCP	FAIR	794V STONY HILL RD	24 RCP FE	2017	Outside Receiving Waterbody
86				14 WEST COLONIAL RD		2018	Outside Receiving Waterbody
87				4 MEMORY LN		2017	Outside Receiving Waterbody
88				22V OAKLAND ST			Outside Receiving Waterbody
89	12		DAMAGED	14 MEADOW VIEW RD	rusted pipe	2018	Outside Receiving Waterbody
90	24		GOOD	4 MIRICK LN		2018	Wetland/Tributary to Bennett Pond
92	12		GOOD	11 SYLVAN DR		2017	Wetland/Tributary to South Branch Mill River
93	12		GOOD	4 MEADOW VIEW RD		2017	Outside Receiving Waterbody

Town of Wilbraham Outfall Inventory

Town Outfall ID	Pipe Size (inches)	Material	Condition	Location	Notes	Date of Last Inspection	Receiving Water
94				14 WESTERN VIEW DR		2017	Wetland/Tributary to Bennett Pond
95				1 OAKLAND ST		2017	Outside Receiving Waterbody
96				1004 MAIN ST		2018	Wetland/Tributary to Bennett Pond
97				200 SOULE RD		2018	Outside Receiving Waterbody
99				28 LONGVIEW DR		2018	Wetland/Tributary to Bennett Pond
100	15		FAIR	22 LONGVIEW DR	cmp	2017	Wetland/Tributary to Bennett Pond
101				9V KATIE ST A			Outside Receiving Waterbody
102				5 JEFFREY LN		2017	Wetland/Tributary to Bennett Pond
103				35 MOUNTAINBROOK RD		2017	Outside Receiving Waterbody
104				29V BRENTWOOD DR A		2018	Wetland/Tributary to Bennett Pond
105				29V BRENTWOOD DR B		2018	Wetland/Tributary to Bennett Pond
106				1 SAWMILL DR			Outside Receiving Waterbody
107				651 MAIN ST			Wetland/Tributary to North Branch Mill River
108				875V TINKHAM RD A		2017	Wetland/Tributary to North Branch Mill River
109				11 OLD CARRIAGE DR		2018	Outside Receiving Waterbody
110				676V TINKHAM RD		2018	Wetland/Tributary to North Branch Mill River
111				19 BROOKSIDE CR		2017	North Branch Mill River
112				34 BROOKSIDE DR		2017	North Branch Mill River
113				6 WESTWOOD DR		2017	North Branch Mill River
114				14V INWOOD DR A			Outside Receiving Waterbody
115				10 COOLEY DR		2017	Outside Receiving Waterbody
116				359 SPRINGFIELD ST		2017	Wetland/Tributary to North Branch Mill River
117				649V STONY HILL RD A			Outside Receiving Waterbody
118				649V STONY HILL RD			Outside Receiving Waterbody
119	12			2 AMY LN			Outside Receiving Waterbody
120	18			16 BRIAR CLIFF DR			Outside Receiving Waterbody
121				29 BRIAR CLIFF DR		2017	Outside Receiving Waterbody
122				28 BRIAR CLIFF DR			Outside Receiving Waterbody
123				46V BROOKLAWN RD		2018	Outside Receiving Waterbody
124				451 DIPPING HOLE RD		2018	Outside Receiving Waterbody
125	10	CMP		5 MELIKIAN DR		2018	Outside Receiving Waterbody
126				10 MARK RD			Outside Receiving Waterbody
127				26 SUNNYSIDE TR		2017	Outside Receiving Waterbody
128				5 RED BRIDGE RD D		2017	Chicopee River (MA36-24)
129	8			8 STONY HILL RD		2018	Outside Receiving Waterbody
130	12			5 RED BRIDGE RD C			Chicopee River (MA36-24)
131	12			5 RED BRIDGE RD B			Chicopee River (MA36-24)
132	12			5 RED BRIDGE RD A			Chicopee River (MA36-24)
133				56 RIVER RD B		2018	Chicopee River (MA36-24)
134				73-75 OLD BOSTON RD		2018	Outside Receiving Waterbody
135				2343 BOSTON RD			Outside Receiving Waterbody
137				50 BRAINARD RD			Outside Receiving Waterbody
139				13 OLD FARM RD		2017	Outside Receiving Waterbody
140				2208 BOSTON RD B			Outside Receiving Waterbody
141				2208 BOSTON RD A			Outside Receiving Waterbody
142				2339 BOSTON RD			Outside Receiving Waterbody
143				225 MAIN ST			Outside Receiving Waterbody
144	12			28 MAPLE ST		2017	Outside Receiving Waterbody
145	15			10 BRIDLE PATH RD		2017	Wetland/Tributary to South Branch Mill River
146				188V STONY HILL RD			Wetland/Tributary to North Branch Mill River
147	24			1241 STONY HILL RD B		2018	South Branch Mill River
148				766 MAIN ST		2017	Wetland/Tributary to Bennett Pond
149				728 MAIN ST		2017	Outside Receiving Waterbody
156				21 WANDERING MEADOWS LN			Outside Receiving Waterbody
157				21 WANDERING MEADOWS LN			Outside Receiving Waterbody
158	24			4 DRUMLIN CR			Outside Receiving Waterbody
159	24			6 DRUMLIN CR			Outside Receiving Waterbody
160				4V SOUTHWOOD DR A		2017	Wetland/Tributary to South Branch Mill River
161				479 STONY HILL RD		2018	Outside Receiving Waterbody
162				176 COTTAGE AV			Wetland/Tributary to Chicopee River (MA36-23)
163				Contract 2 Main Street			Outside Receiving Waterbody
164	10			26V STIRLING DR B		2017	Outside Receiving Waterbody
165	15			9 VICTORIA LN		2018	Outside Receiving Waterbody
166				9V HITCHCOCK RD		2017	Outside Receiving Waterbody
167				12 OVERLOOK DR		2018	Outside Receiving Waterbody
168	24			198 MAIN ST		2017	Outside Receiving Waterbody
169	12			2372 BOSTON RD			Outside Receiving Waterbody
174	24			2 LODGE LN			Outside Receiving Waterbody
175	18	FES	DAMAGED	42V RED BRIDGE RD	NEEDS CLEANING	2018	Outside Receiving Waterbody
176	24	FES	GOOD	18 RED BRIDGE RD	FES to swale		Outside Receiving Waterbody
177	18		GOOD	30V RED BRIDGE RD		2018	Outside Receiving Waterbody
178	12			299 THREE RIVERS RD		2018	Outside Receiving Waterbody
179				127 THREE RIVERS RD		2018	Wetland/Tributary to Chicopee River (MA36-23)
180				80 MAYNARD RD		2018	Chicopee River (MA36-23)
181				42V MAYNARD RD			Outside Receiving Waterbody
194				404 MAIN ST		2017	Outside Receiving Waterbody

Town of Wilbraham Outfall Inventory

Town Outfall ID	Pipe Size (inches)	Material	Condition	Location	Notes	Date of Last Inspection	Receiving Water
197	12			449V DIPPING HOLE RD B		2017	Outside Receiving Waterbody
201				12V PEARL DR		2018	Wetland/Tributary to South Branch Mill River
202	12	CMP	GOOD	1241 STONY HILL RD A		2017	Wetland/Tributary to South Branch Mill River
204				480 MAIN ST			Outside Receiving Waterbody
205				621 MAIN ST A			Wetland/Tributary to North Branch Mill River
206				621 MAIN ST B		2018	Wetland/Tributary to North Branch Mill River
207	18			621 MAIN ST C		2018	Wetland/Tributary to North Branch Mill River
208	18			621 MAIN ST D		2018	Wetland/Tributary to North Branch Mill River
209	30			535V MAIN ST		2018	Wetland/Tributary to North Branch Mill River
210				2 HUNTING LN		2018	Wetland/Tributary to North Branch Mill River
211	12			2 MILES MORGAN CT		2017	Wetland/Tributary to North Branch Mill River
212				4 RAYMOND DR		2017	Outside Receiving Waterbody
213				24 RUTH DR		2017	Wetland/Tributary to Bennett Pond
214				16 OAKLAND ST		2017	Outside Receiving Waterbody
216				59 SOULE RD		2017	Wetland/Tributary to Bennett Pond
217				1 GARY DR		2017	Outside Receiving Waterbody
218				5 BURLEIGH RD B		2018	Outside Receiving Waterbody
220				19V MCINTOSH DR		2017	Wetland/Tributary to Bennett Pond
221				14 MOUNTAINBROOK RD		2017	Wetland/Tributary to Bennett Pond
222				180 SOULE RD		2017	Wetland/Tributary to Bennett Pond
223				17 MILL BROOK DR		2017	Wetland/Tributary to South Branch Mill River
224				9 MILL BROOK DR		2018	Wetland/Tributary to South Branch Mill River
225				9V KATIE ST B			Outside Receiving Waterbody
226				9V KATIE ST C			Outside Receiving Waterbody
227				7 LEE LN		2017	Outside Receiving Waterbody
228				1069 TINKHAM RD		2017	Outside Receiving Waterbody
229				1059 TINKHAM RD			Wetland/Tributary to Bennett Pond
230				32 EASTWOOD DR		2017	Outside Receiving Waterbody
231				14V INWOOD DR A		2017	North Branch Mill River
232				20 VICTORIA LN			Outside Receiving Waterbody
233				30 VICTORIA LN		2017	Outside Receiving Waterbody
234				2 BRUUER RD			Outside Receiving Waterbody
235				423-451 MAIN ST		2018	Isolated Wetland Wilbraham & Monson Academy
236				50 DECORIE DR		2017	Cedar Swamp
237				2 CEDAR OAK DR			Cedar Swamp
238				34 DECORIE DR		2017	Cedar Swamp
239				28 DECORIE DR			Cedar Swamp
240				47 DECORIE DR		2017	Cedar Swamp
241				21 HORSESHOE LN			Outside Receiving Waterbody
247				25 THREE RIVERS RD		2018	Outside Receiving Waterbody
252				2 OLD ORCHARD RD			Wetland/Tributary to Nine Mile Pond
253				4 ARBOR LN			Outside Receiving Waterbody
257				376 THREE RIVERS RD		2018	Outside Receiving Waterbody
260				307 MOUNTAIN RD		2018	Wetland/Tributary to Spear Brook
265				335V MAYNARD RD		2018	Wetland/Tributary to Chicopee River (MA36-23)
266				5 RED BRIDGE RD		2018	Wetland/Tributary to Chicopee River (MA36-22)
267				757 MAIN ST		2017	Wetland/Tributary to Bennett Pond
268				779 MAIN ST A			Outside Receiving Waterbody
269				779 MAIN ST B		2017	Wetland/Tributary to Bennett Pond
271				7 APPLE HILL RD		2017	Wetland/Tributary to Bennett Pond
274				9V CEDAR OAK DR			Cedar Swamp
275				138 MOUNTAIN RD		2017	Outside Receiving Waterbody
277				459 MOUNTAIN RD B			Outside Receiving Waterbody
278				459 MOUNTAIN RD A		2017	Outside Receiving Waterbody
279				12 BROOKLAWN RD		2017	North Branch Mill River
280				20 WESTWOOD DR		2017	Outside Receiving Waterbody
281				24 SUNNYSIDE TR		2018	Outside Receiving Waterbody
282				7 COOLEY DR		2017	Outside Receiving Waterbody
283		UNK		624 SPRINGFIELD ST			Outside Receiving Waterbody
284				16 BROOKSIDE DR	Could not find because a fence cut off part of the stream bank		North Branch Mill River
285			GOOD	8 COLONIAL RD		2018	Isolated Wetland Springfield Street
286				360 MAIN ST		2018	Wetland/Tributary to Nine Mile Pond
287				9 RUSSELL RD		2017	Outside Receiving Waterbody
289				19 WINTERBERRY DR			Outside Receiving Waterbody
290				14 BIRCH ST		2017	Outside Receiving Waterbody
291				2350 BOSTON RD A			Outside Receiving Waterbody
292	24			2350 BOSTON RD B			Wetland/Tributary to Chicopee River (MA36-24)
293				2350 BOSTON RD C			Outside Receiving Waterbody
294	15			269 STONY HILL RD A		2018	Wetland/Tributary to North Branch Mill River
295	18			269 STONY HILL RD B		2018	Wetland/Tributary to North Branch Mill River
296				11 LAKE DR		2017	Nine Mile Pond
297				7V NORTH HILLS LN		2018	Outside Receiving Waterbody
299				2048 BOSTON RD			Isolated Wetland Boston Street
300	20		FAIR	3 WARREN RD B	Poor, vegetative growth	2017	Outside Receiving Waterbody
301				84 THREE RIVERS RD		2018	Wetland/Tributary to Chicopee River (MA36-23)
302			FAIR	141 MANCHONIS RD	Clogged with debris	2017	Wetland/Tributary to Chicopee River (MA36-24)

Town of Wilbraham Outfall Inventory

Town Outfall ID	Pipe Size (inches)	Material	Condition	Location	Notes	Date of Last Inspection	Receiving Water
303			GOOD	75 POST OFFICE PK		2017	Outside Receiving Waterbody
304			GOOD	2540V BOSTON RD B		2017	Spectacle Pond
305				445V DIPPING HOLE RD		2017	Outside Receiving Waterbody
307				18 KENSINGTON DR		2018	Outside Receiving Waterbody
309				635 STONY HILL RD		2017	Outside Receiving Waterbody
311				717 MAIN ST		2018	Outside Receiving Waterbody
319	12	CMP	FAIR	6 HUNTING LN		2018	Wetland/Tributary to North Branch Mill River
320				388V THREE RIVERS RD			Outside Receiving Waterbody
321				42V MAYNARD RD			Outside Receiving Waterbody
322				10 MAYNARD RD		2018	Chicopee River (MA36-23)
323				42V MAYNARD RD		20110408	Outside Receiving Waterbody
328				23V RED BRIDGE RD		2018	Outside Receiving Waterbody
329				14 HERRICK PL		2018	Outside Receiving Waterbody

Town of Wilbraham Preliminary Outfall Ranking

Outfall ID	Initial Ranking	Proximity to Dense Development	Proximity to Industrial / Commerical Area	Located in 100 Year Floodplain	Proximity to Beach / Public Recreational Area	Proximity to Impaired Waters	Located in Area with Poor Conditions for Subsurface Wastewater Disposal	Receiving Water
1	High			Yes				Chicopee River (MA36-23)
2	Low							Outside Receiving Waterbody
4	Low							Wetland/Tributary to Calkins Brook
5	Low							Outside Receiving Waterbody
6	High					Yes		Chicopee River (MA36-24)
7	Low							Outside Receiving Waterbody
8	Low							Outside Receiving Waterbody
9	Low							Wetland/Tributary to Calkins Brook
10	High			Yes				Wetland/Tributary to Chicopee River (MA36-23)
11	High						Yes	Outside Receiving Waterbody
19	High			Yes				Wetland/Tributary to Chicopee River (MA36-24)
20	Low							Wetland/Tributary to Chicopee River (MA36-24)
21	Low							Wetland/Tributary to Chicopee River (MA36-24)
22	High	Yes		Yes		Yes		Chicopee River (MA36-24)
25	High		Yes		Yes	Yes		Outside Receiving Waterbody
26	High		Yes					Outside Receiving Waterbody
27	High		Yes					Outside Receiving Waterbody
28	High			Yes				Wetland/Tributary to Chicopee River (MA36-23)
29	High		Yes	Yes				Outside Receiving Waterbody
30	High		Yes	Yes				Outside Receiving Waterbody
31	High		Yes	Yes				Chicopee River (MA36-23)
32	High		Yes	Yes			Yes	Chicopee River (MA36-23)
33	High		Yes	Yes				Chicopee River (MA36-23)
34	High		Yes	Yes				Chicopee River (MA36-23)
35	High		Yes	Yes				Chicopee River (MA36-23)
36	High		Yes	Yes				Chicopee River (MA36-23)
37	Low							Wetland/Tributary to Nine Mile Pond
38	Low							Isolated Wetland Dipping Hole Road
39	Low							Outside Receiving Waterbody
40	Low							Outside Receiving Waterbody
41	Low							Outside Receiving Waterbody
42	Low							Outside Receiving Waterbody
43	Low							Isolated Wetland Dipping Hole Road
44	Low							Outside Receiving Waterbody
45	Low							Wetland/Tributary to Nine Mile Pond
46	Low							Wetland/Tributary to Nine Mile Pond
47	Low							Wetland/Tributary to Nine Mile Pond
48	High						Yes	Outside Receiving Waterbody
49	Low							Isolated Wetland Dipping Hole Road
50	Low							Wetland/Tributary to North Branch Mill River
51	Low							Wetland/Tributary to North Branch Mill River
52	Low							Outside Receiving Waterbody
53	High						Yes	Wetland/Tributary to Bennett Pond
54	Low							Outside Receiving Waterbody
55	Low							Wetland/Tributary to South Branch Mill River
57	Low							Wetland/Tributary to South Branch Mill River
58	Low							Wetland/Tributary to South Branch Mill River
59	High			Yes				North Branch Mill River
60	Low							Wetland/Tributary to Bennett Pond
61	Low							Wetland/Tributary to Bennett Pond
63	Low							Outside Receiving Waterbody
64	Low							Wetland/Tributary to South Branch Mill River
65	Low							Outside Receiving Waterbody
66	Low							Wetland/Tributary to Bennett Pond
67	High			Yes				Wetland/Tributary to Bennett Pond
68	Low							Wetland/Tributary to Bennett Pond
69	High			Yes				Wetland/Tributary to North Branch Mill River
70	High			Yes				Wetland/Tributary to North Branch Mill River
71	Low							Wetland/Tributary to Bennett Pond
72	Low							Wetland/Tributary to South Branch Mill River
73	Low							Wetland/Tributary to South Branch Mill River
74	Low							Wetland/Tributary to South Branch Mill River
75	High			Yes				Wetland/Tributary to South Branch Mill River
76	Low							Wetland/Tributary to South Branch Mill River
77	Low							Outside Receiving Waterbody
78	High			Yes				South Branch Mill River
79	High			Yes				South Branch Mill River
82	Low							Outside Receiving Waterbody
85	Low							Outside Receiving Waterbody
86	Low							Outside Receiving Waterbody
87	Low							Outside Receiving Waterbody
88	Low							Outside Receiving Waterbody
89	Low							Outside Receiving Waterbody
90	Low							Wetland/Tributary to Bennett Pond
92	Low							Wetland/Tributary to South Branch Mill River
93	Low							Outside Receiving Waterbody
94	Low							Wetland/Tributary to Bennett Pond
95	Low							Outside Receiving Waterbody
96	Low							Wetland/Tributary to Bennett Pond
97	Low							Outside Receiving Waterbody
99	Low							Wetland/Tributary to Bennett Pond
100	Low							Wetland/Tributary to Bennett Pond
101	Low							Outside Receiving Waterbody
102	High			Yes				Wetland/Tributary to Bennett Pond
103	Low							Outside Receiving Waterbody
104	Low							Wetland/Tributary to Bennett Pond
105	Low							Wetland/Tributary to Bennett Pond
106	Low							Outside Receiving Waterbody
107	Low							Wetland/Tributary to North Branch Mill River
108	Low							Wetland/Tributary to North Branch Mill River
109	Low							Outside Receiving Waterbody
110	Low							Wetland/Tributary to North Branch Mill River

Town of Wilbraham Preliminary Outfall Ranking

Outfall ID	Initial Ranking	Proximity to Dense Development	Proximity to Industrial / Commerical Area	Located in 100 Year Floodplain	Proximity to Beach / Public Recreational Area	Proximity to Impaired Waters	Located in Area with Poor Conditions for Subsurface Wastewater Disposal	Receiving Water
111	High			Yes				North Branch Mill River
112	High			Yes				North Branch Mill River
113	High			Yes				North Branch Mill River
114	Low							Outside Receiving Waterbody
115	Low							Outside Receiving Waterbody
116	Low							Wetland/Tributary to North Branch Mill River
117	Low							Outside Receiving Waterbody
118	Low							Outside Receiving Waterbody
119	Low							Outside Receiving Waterbody
120	High						Yes	Outside Receiving Waterbody
121	High						Yes	Outside Receiving Waterbody
122	High						Yes	Outside Receiving Waterbody
123	Low							Outside Receiving Waterbody
124	Low							Outside Receiving Waterbody
125	Low							Outside Receiving Waterbody
126	Low							Outside Receiving Waterbody
127	Low							Outside Receiving Waterbody
128	High	Yes		Yes		Yes	Yes	Chicopee River (MA36-24)
129	High	Yes				Yes		Outside Receiving Waterbody
130	High	Yes		Yes		Yes	Yes	Chicopee River (MA36-24)
131	High	Yes		Yes		Yes	Yes	Chicopee River (MA36-24)
132	High	Yes		Yes		Yes	Yes	Chicopee River (MA36-24)
133	High	Yes		Yes		Yes		Chicopee River (MA36-24)
134	Low							Outside Receiving Waterbody
135	Low							Outside Receiving Waterbody
137	Low							Outside Receiving Waterbody
139	Low							Outside Receiving Waterbody
140	High		Yes					Outside Receiving Waterbody
141	High		Yes					Outside Receiving Waterbody
142	High		Yes					Outside Receiving Waterbody
143	Low							Outside Receiving Waterbody
144	Low							Outside Receiving Waterbody
145	Low							Wetland/Tributary to South Branch Mill River
146	Low							Wetland/Tributary to North Branch Mill River
147	High			Yes				South Branch Mill River
148	Low							Wetland/Tributary to Bennett Pond
149	Low							Outside Receiving Waterbody
156	Low							Outside Receiving Waterbody
157	Low							Outside Receiving Waterbody
158	Low							Outside Receiving Waterbody
159	Low							Outside Receiving Waterbody
160	Low							Wetland/Tributary to South Branch Mill River
161	High						Yes	Outside Receiving Waterbody
162	High			Yes				Wetland/Tributary to Chicopee River (MA36-23)
163	Low							Outside Receiving Waterbody
164	High						Yes	Outside Receiving Waterbody
165	High						Yes	Outside Receiving Waterbody
166	Low							Outside Receiving Waterbody
167	Low							Outside Receiving Waterbody
168	Low							Outside Receiving Waterbody
169	High		Yes					Outside Receiving Waterbody
174	High						Yes	Outside Receiving Waterbody
175	High			Yes				Outside Receiving Waterbody
176	Low							Outside Receiving Waterbody
177	Low							Outside Receiving Waterbody
178	Low							Outside Receiving Waterbody
179	Low							Wetland/Tributary to Chicopee River (MA36-23)
180	High			Yes				Chicopee River (MA36-23)
181	High			Yes				Outside Receiving Waterbody
194	High						Yes	Outside Receiving Waterbody
197	Low							Outside Receiving Waterbody
201	Low							Wetland/Tributary to South Branch Mill River
202	Low							Wetland/Tributary to South Branch Mill River
204	Low							Outside Receiving Waterbody
205	High			Yes				Wetland/Tributary to North Branch Mill River
206	High			Yes				Wetland/Tributary to North Branch Mill River
207	High			Yes				Wetland/Tributary to North Branch Mill River
208	Low							Wetland/Tributary to North Branch Mill River
209	High			Yes				Wetland/Tributary to North Branch Mill River
210	High			Yes				Wetland/Tributary to North Branch Mill River
211	High			Yes				Wetland/Tributary to North Branch Mill River
212	Low							Outside Receiving Waterbody
213	Low							Wetland/Tributary to Bennett Pond
214	Low							Outside Receiving Waterbody
216	Low							Wetland/Tributary to Bennett Pond
217	Low							Outside Receiving Waterbody
218	Low							Outside Receiving Waterbody
220	High						Yes	Wetland/Tributary to Bennett Pond
221	Low							Wetland/Tributary to Bennett Pond
222	High			Yes				Wetland/Tributary to Bennett Pond
223	Low							Wetland/Tributary to South Branch Mill River
224	High			Yes				Wetland/Tributary to South Branch Mill River
225	Low							Outside Receiving Waterbody
226	Low							Outside Receiving Waterbody
227	Low							Outside Receiving Waterbody
228	Low							Outside Receiving Waterbody
229	Low							Wetland/Tributary to Bennett Pond
230	High						Yes	Outside Receiving Waterbody
231	High			Yes				North Branch Mill River
232	Low							Outside Receiving Waterbody
233	High						Yes	Outside Receiving Waterbody
234	Low							Outside Receiving Waterbody

Town of Wilbraham Preliminary Outfall Ranking

Outfall ID	Initial Ranking	Proximity to Dense Development	Proximity to Industrial / Commerical Area	Located in 100 Year Floodplain	Proximity to Beach / Public Recreational Area	Proximity to Impaired Waters	Located in Area with Poor Conditions for Subsurface Wastewater Disposal	Receiving Water
235	Low							Isolated Wetland Wilbraham & Monson Academy
236	Low							Cedar Swamp
237	Low							Cedar Swamp
238	Low							Cedar Swamp
239	Low							Cedar Swamp
240	Low							Cedar Swamp
241	High						Yes	Outside Receiving Waterbody
247	Low							Outside Receiving Waterbody
252	Low							Wetland/Tributary to Nine Mile Pond
253	Low							Outside Receiving Waterbody
257	Low							Outside Receiving Waterbody
260	Low							Wetland/Tributary to Spear Brook
265	Low							Wetland/Tributary to Chicopee River (MA36-23)
266	High			Yes				Wetland/Tributary to Chicopee River (MA36-22)
267	Low							Wetland/Tributary to Bennett Pond
268	Low							Outside Receiving Waterbody
269	Low							Wetland/Tributary to Bennett Pond
271	High						Yes	Wetland/Tributary to Bennett Pond
274	Low							Cedar Swamp
275	Low							Outside Receiving Waterbody
277	High						Yes	Outside Receiving Waterbody
278	High						Yes	Outside Receiving Waterbody
279	High			Yes				North Branch Mill River
280	Low							Outside Receiving Waterbody
281	Low							Outside Receiving Waterbody
282	Low							Outside Receiving Waterbody
283	Low							Outside Receiving Waterbody
284	High			Yes				North Branch Mill River
285	Low							Isolated Wetland Springfield Street
286	Low							Wetland/Tributary to Nine Mile Pond
287	Low							Outside Receiving Waterbody
289	Low							Outside Receiving Waterbody
290	Low							Outside Receiving Waterbody
291	High		Yes					Outside Receiving Waterbody
292	High		Yes					Wetland/Tributary to Chicopee River (MA36-24)
293	Low							Outside Receiving Waterbody
294	Low							Wetland/Tributary to North Branch Mill River
295	Low							Wetland/Tributary to North Branch Mill River
296	High			Yes	Yes			Nine Mile Pond
297	High		Yes					Outside Receiving Waterbody
299	High		Yes					Isolated Wetland Boston Street
300	Low							Outside Receiving Waterbody
301	Low							Wetland/Tributary to Chicopee River (MA36-23)
302	Low							Wetland/Tributary to Chicopee River (MA36-24)
303	Low							Outside Receiving Waterbody
304	High				Yes	Yes		Spectacle Pond
305	Low							Outside Receiving Waterbody
307	Low							Outside Receiving Waterbody
309	Low							Outside Receiving Waterbody
311	Low							Outside Receiving Waterbody
319	High			Yes				Wetland/Tributary to North Branch Mill River
320	Low							Outside Receiving Waterbody
321	High			Yes				Outside Receiving Waterbody
322	High			Yes				Chicopee River (MA36-23)
323	High			Yes				Outside Receiving Waterbody
328	Low							Outside Receiving Waterbody
329	Low							Outside Receiving Waterbody

Town of Wilbraham Preliminary Catchment Ranking

Catchment ID	Town ID	Preliminary Catchment Rank	Receiving Waterbody
1	1	High	Chicopee River (MA36-23)
2	2	Low	Outside Receiving Waterbody
4	4	Low	Wetland/Tributary to Calkins Brook
5	5	Low	Outside Receiving Waterbody
6	6	High	Chicopee River (MA36-24)
7	7	Low	Outside Receiving Waterbody
8	8	Low	Outside Receiving Waterbody
9	9	Low	Wetland/Tributary to Calkins Brook
11	11	High	Outside Receiving Waterbody
19	19	High	Wetland/Tributary to Chicopee River (MA36-24)
20	20	Low	Wetland/Tributary to Chicopee River (MA36-24)
21	21	Low	Wetland/Tributary to Chicopee River (MA36-24)
22	22	High	Chicopee River (MA36-24)
25	25	High	Outside Receiving Waterbody
26	26	High	Outside Receiving Waterbody
27	27	High	Outside Receiving Waterbody
28	28	High	Wetland/Tributary to Chicopee River (MA36-23)
36	36	High	Chicopee River (MA36-23)
37	37	Low	Wetland/Tributary to Nine Mile Pond
38	38	Low	Isolated Wetland Dipping Hole Road
39	39	Low	Outside Receiving Waterbody
40	40	Low	Outside Receiving Waterbody
41	41	Low	Outside Receiving Waterbody
42	42	Low	Outside Receiving Waterbody
43	43	Low	Isolated Wetland Dipping Hole Road
44	44	Low	Outside Receiving Waterbody
46	46	Low	Wetland/Tributary to Nine Mile Pond
48	48	High	Outside Receiving Waterbody
49	49	Low	Isolated Wetland Dipping Hole Road
50	50	Low	Wetland/Tributary to North Branch Mill River
51	51	Low	Wetland/Tributary to North Branch Mill River
52	52	Low	Outside Receiving Waterbody
53	53	High	Wetland/Tributary to Bennett Pond
54	54	Low	Outside Receiving Waterbody
55	55	Low	Wetland/Tributary to South Branch Mill River
57	57	Low	Wetland/Tributary to South Branch Mill River
58	58	Low	Wetland/Tributary to South Branch Mill River
59	59	High	North Branch Mill River
60	60	Low	Wetland/Tributary to Bennett Pond
61	61	Low	Wetland/Tributary to Bennett Pond
63	63	Low	Outside Receiving Waterbody
64	64	Low	Wetland/Tributary to South Branch Mill River
65	65	Low	Outside Receiving Waterbody
66	66	Low	Wetland/Tributary to Bennett Pond
67	67	High	Wetland/Tributary to Bennett Pond
68	68	Low	Wetland/Tributary to Bennett Pond
69	69	High	Wetland/Tributary to North Branch Mill River
70	70	High	Wetland/Tributary to North Branch Mill River
71	71	Low	Wetland/Tributary to Bennett Pond
72	72	Low	Wetland/Tributary to South Branch Mill River
73	73	Low	Wetland/Tributary to South Branch Mill River
74	74	Low	Wetland/Tributary to South Branch Mill River
75	75	High	Wetland/Tributary to South Branch Mill River
76	76	Low	Wetland/Tributary to South Branch Mill River
77	77	Low	Outside Receiving Waterbody
78	78	High	South Branch Mill River
79	79	High	South Branch Mill River
82	82	Low	Outside Receiving Waterbody

Town of Wilbraham Preliminary Catchment Ranking

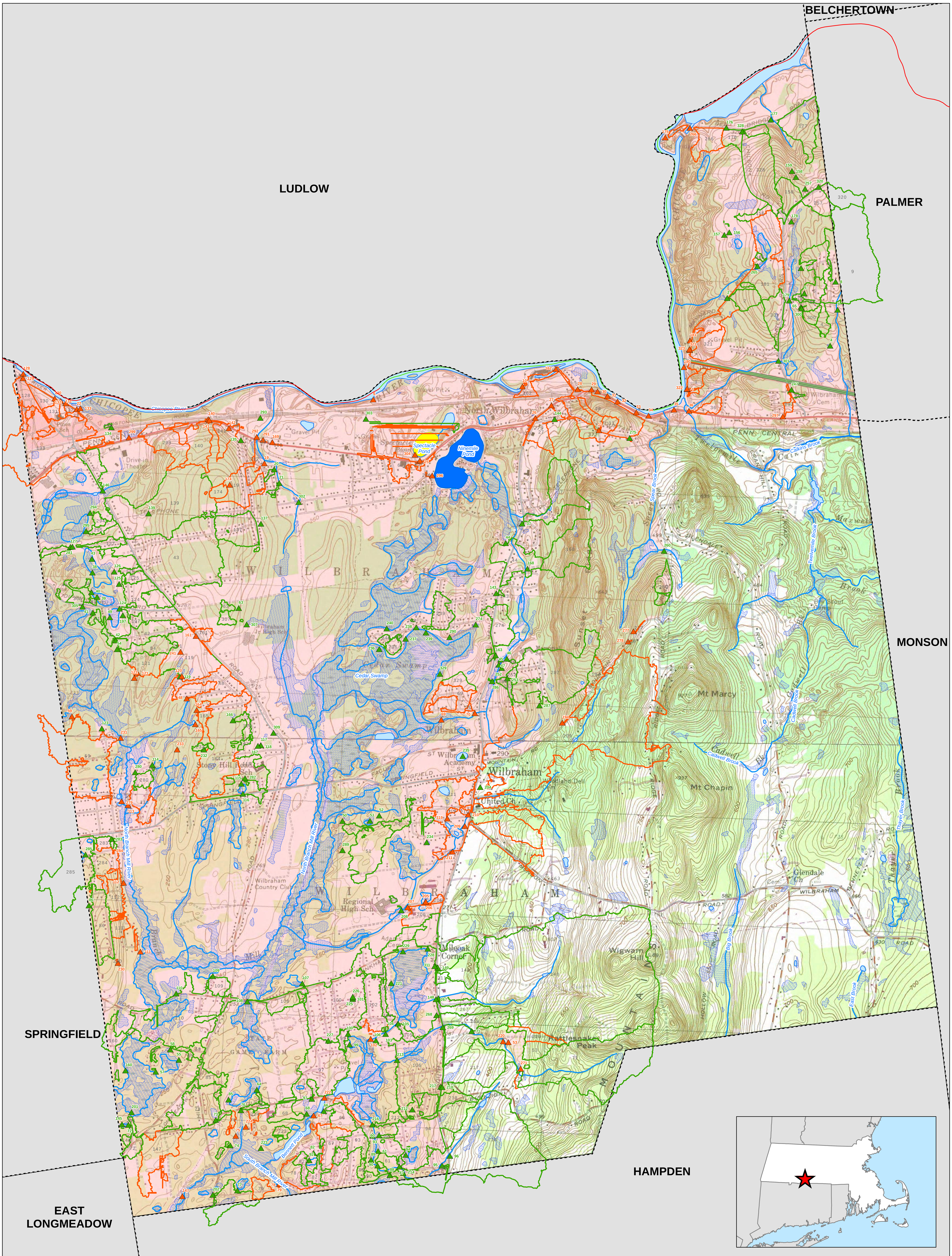
Catchment ID	Town ID	Preliminary Catchment Rank	Receiving Waterbody
85	85	Low	Outside Receiving Waterbody
86	86	Low	Outside Receiving Waterbody
87	87	Low	Outside Receiving Waterbody
88	88	Low	Outside Receiving Waterbody
89	89	Low	Outside Receiving Waterbody
90	90	Low	Wetland/Tributary to Bennett Pond
92	92	Low	Wetland/Tributary to South Branch Mill River
93	93	Low	Outside Receiving Waterbody
94	94	Low	Wetland/Tributary to Bennett Pond
95	95	Low	Outside Receiving Waterbody
97	97	Low	Outside Receiving Waterbody
99	99	Low	Wetland/Tributary to Bennett Pond
100	100	Low	Wetland/Tributary to Bennett Pond
102	102	High	Wetland/Tributary to Bennett Pond
103	103	Low	Outside Receiving Waterbody
104	104	Low	Wetland/Tributary to Bennett Pond
105	105	Low	Wetland/Tributary to Bennett Pond
106	106	Low	Outside Receiving Waterbody
108	108	Low	Wetland/Tributary to North Branch Mill River
109	109	Low	Outside Receiving Waterbody
110	110	Low	Wetland/Tributary to North Branch Mill River
111	111	High	North Branch Mill River
112	112	High	North Branch Mill River
113	113	High	North Branch Mill River
114	114	Low	Outside Receiving Waterbody
115	115	Low	Outside Receiving Waterbody
116	116	Low	Wetland/Tributary to North Branch Mill River
119	119	Low	Outside Receiving Waterbody
121	121	High	Outside Receiving Waterbody
124	124	Low	Outside Receiving Waterbody
125	125	Low	Outside Receiving Waterbody
126	126	Low	Outside Receiving Waterbody
127	127	Low	Outside Receiving Waterbody
128	128	High	Chicopee River (MA36-24)
129	129	High	Outside Receiving Waterbody
130	130	High	Chicopee River (MA36-24)
131	131	High	Chicopee River (MA36-24)
132	132	High	Chicopee River (MA36-24)
133	133	High	Chicopee River (MA36-24)
134	134	Low	Outside Receiving Waterbody
137	137	Low	Outside Receiving Waterbody
139	139	Low	Outside Receiving Waterbody
140	140	High	Outside Receiving Waterbody
142	142	High	Outside Receiving Waterbody
143	143	Low	Outside Receiving Waterbody
145	145	Low	Wetland/Tributary to South Branch Mill River
147	147	High	South Branch Mill River
148	148	Low	Wetland/Tributary to Bennett Pond
149	149	Low	Outside Receiving Waterbody
156	156	Low	Outside Receiving Waterbody
158	158	Low	Outside Receiving Waterbody
160	160	Low	Wetland/Tributary to South Branch Mill River
161	161	High	Outside Receiving Waterbody
162	162	High	Wetland/Tributary to Chicopee River (MA36-23)
163	163	Low	Outside Receiving Waterbody
164	164	High	Outside Receiving Waterbody
165	165	High	Outside Receiving Waterbody
166	166	Low	Outside Receiving Waterbody

Town of Wilbraham Preliminary Catchment Ranking

Catchment ID	Town ID	Preliminary Catchment Rank	Receiving Waterbody
167	167	Low	Outside Receiving Waterbody
168	168	Low	Outside Receiving Waterbody
169	169	High	Outside Receiving Waterbody
174	174	High	Outside Receiving Waterbody
175	175	High	Outside Receiving Waterbody
176	176	Low	Outside Receiving Waterbody
177	177	Low	Outside Receiving Waterbody
178	178	Low	Outside Receiving Waterbody
179	179	Low	Wetland/Tributary to Chicopee River (MA36-23)
180	180	High	Chicopee River (MA36-23)
181	181	High	Outside Receiving Waterbody
194	194	High	Outside Receiving Waterbody
197	197	Low	Outside Receiving Waterbody
201	201	Low	Wetland/Tributary to South Branch Mill River
202	202	Low	Wetland/Tributary to South Branch Mill River
205	205	High	Wetland/Tributary to North Branch Mill River
206	206	High	Wetland/Tributary to North Branch Mill River
208	208	Low	Wetland/Tributary to North Branch Mill River
209	209	High	Wetland/Tributary to North Branch Mill River
210	210	High	Wetland/Tributary to North Branch Mill River
211	211	High	Wetland/Tributary to North Branch Mill River
212	212	Low	Outside Receiving Waterbody
214	214	Low	Outside Receiving Waterbody
217	217	Low	Outside Receiving Waterbody
218	218	Low	Outside Receiving Waterbody
220	220	High	Wetland/Tributary to Bennett Pond
221	221	Low	Wetland/Tributary to Bennett Pond
222	222	High	Wetland/Tributary to Bennett Pond
223	223	Low	Wetland/Tributary to South Branch Mill River
224	224	High	Wetland/Tributary to South Branch Mill River
228	228	Low	Outside Receiving Waterbody
230	230	High	Outside Receiving Waterbody
232	232	Low	Outside Receiving Waterbody
234	234	Low	Outside Receiving Waterbody
236	236	Low	Cedar Swamp
237	237	Low	Cedar Swamp
238	238	Low	Cedar Swamp
239	239	Low	Cedar Swamp
240	240	Low	Cedar Swamp
241	241	High	Outside Receiving Waterbody
247	247	Low	Outside Receiving Waterbody
252	252	Low	Wetland/Tributary to Nine Mile Pond
253	253	Low	Outside Receiving Waterbody
257	257	Low	Outside Receiving Waterbody
260	260	Low	Wetland/Tributary to Spear Brook
265	265	Low	Wetland/Tributary to Chicopee River (MA36-23)
266	266	High	Wetland/Tributary to Chicopee River (MA36-22)
267	267	Low	Wetland/Tributary to Bennett Pond
268	268	Low	Outside Receiving Waterbody
271	271	High	Wetland/Tributary to Bennett Pond
274	274	Low	Cedar Swamp
277	277	High	Outside Receiving Waterbody
278	278	High	Outside Receiving Waterbody
279	279	High	North Branch Mill River
280	280	Low	Outside Receiving Waterbody
283	283	Low	Outside Receiving Waterbody
284	284	High	North Branch Mill River
285	285	Low	Isolated Wetland Springfield Street

Town of Wilbraham Preliminary Catchment Ranking

Catchment ID	Town ID	Preliminary Catchment Rank	Receiving Waterbody
286	286	Low	Wetland/Tributary to Nine Mile Pond
287	287	Low	Outside Receiving Waterbody
291	291	High	Outside Receiving Waterbody
292	292	High	Wetland/Tributary to Chicopee River (MA36-24)
294	294	Low	Wetland/Tributary to North Branch Mill River
295	295	Low	Wetland/Tributary to North Branch Mill River
296	296	High	Nine Mile Pond
297	297	High	Outside Receiving Waterbody
299	299	High	Isolated Wetland Boston Street
300	300	Low	Outside Receiving Waterbody
301	301	Low	Wetland/Tributary to Chicopee River (MA36-23)
303	303	Low	Outside Receiving Waterbody
305	305	Low	Outside Receiving Waterbody
307	307	Low	Outside Receiving Waterbody
311	311	Low	Outside Receiving Waterbody
319	319	High	Wetland/Tributary to North Branch Mill River
320	320	Low	Outside Receiving Waterbody
321	321	High	Outside Receiving Waterbody
328	328	Low	Outside Receiving Waterbody
329	329	Low	Outside Receiving Waterbody



Legend

PreRanking
- High
- Low

PreRanking
- High
- Low
- Town Boundary

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

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

MassDEP Hydrology

MassDEP
- Public Surface Water Supply (PSWS)
- Water Bodies
- Hydrology

MassDEP Wetlands
- Inland Wetlands

MassDOT Major Roads

Road Type
- Limited Access Highway
- Multi-lane Hwy, not limited access
- Other Numbered Highway
- Major Road, Collector
- Urbanized Area 2000
- Urbanized Area 2010

Notes
1. Based on USGS Topo Map Hampden, 1979 (10 ft) and Ludlow, 1975 (10 ft)
2. MassGIS
3. Wilbraham: Outfalls

N

0 1,000 2,000 4,000 Feet

1:15,000

PRELIMINARY OUTFALL CATCHMENTS

Illicit Discharge Detection and Elimination Plan Wilbraham, Massachusetts

June 2019

Tighe&Bond
Engineers | Environmental Specialists

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W-1929

Town of Wilbraham IDDE Program

Appendix E

Protocol for IDDE Program Responsibilities

This document establishes a written protocol that clearly identifies responsibilities with regard to eliminating illicit discharges, including:

1. Identification of a suspected illicit discharge to Wilbraham's MS4
1. Contact information to report suspected illicit discharges
2. Responsibility for elimination of identified illicit discharges
3. Standard operating procedures for enforcement
4. Appropriate methods for elimination of the illicit connection or identified problem
5. Process for documentation and verification of illicit connection or discharge removal

1. IDENTIFICATION OF A SUSPECTED ILLICIT DISCHARGE TO THE MS4

There are a variety of ways that an illicit discharge to Wilbraham's MS4 might be discovered and reported to the Town.

- **Residents and Businesses of Wilbraham.** Through the Town's public education and outreach efforts, residents and businesses of Wilbraham are becoming more aware that the municipal storm drain is different than the sanitary sewer and it drains directly into Wilbraham's waterbodies. The public may report illicit connections or illegal dumping by email or by phone to the Fire Department, DPW, Board of Selectmen (the local Public Health Authority) or Conservation Commission.
- **Maintenance Field Crews.** Both municipal staff and contractors that conduct Wilbraham's drainage and roadway operation and maintenance activities are some of the observers available to the Town to detect illicit discharges and illegal dumping activities.
- **Inspectors.** Both municipal staff and private inspectors may conduct inspections of construction sites, buildings, and other operations and maintenance on public or private properties and detect illicit discharges and illegal dumping activities.
- **Personnel Conducting Outfall and Stream Monitoring.** Through the Town's outfall monitoring program as well as in-stream monitoring conducted by the Town, pollutant concentrations may indicate the presence of an illicit discharge. In this case, a follow up investigation may be necessary to identify the source of the contamination.

As part of public education and outreach and employee training programs, people involved in these activities should be encouraged to report any signs of illegal dumping or a suspected illicit discharge. It is important that the information observed in the field is communicated to the appropriate staff for follow up and outreach.

2. CONTACT INFORMATION TO REPORT SUSPECTED ILLICIT DISCHARGES

The following contact information should be advertised on any educational materials regarding illicit discharges and illegal dumping, as well as on the Town website.

- For **Imminent Emergency Situations** where there is an immediate risk to public health and safety: **Call 911**.
- For **Urgent Situations**, where public health, safety, and/or the environment are at risk and there are possibly hazardous chemicals, call the Fire Department's non-emergency line at **413-596-3122**.

- For **Non-Emergency Situations**, call the Department of Public Works (DPW) at **413-596-2800 extension 208** .
- **When in doubt, call 911**.

3. RESPONSIBILITY FOR ELIMINATION OF IDENTIFIED ILLICIT DISCHARGES

This section defines the actions to take when an illicit discharge is identified and parties responsible for eliminating reported illicit discharges under three scenarios.

Imminent Emergency Situations

Take **immediate action** in the event of encountering one of the following situations:

- Individuals actively in the process of introducing possible illegal substances or materials into the MS4
- Presence of fumes or smoke emanating from the MS4
- Visible significant stream of a controlled chemical or petroleum product flowing in the storm drain system or in downstream waters
- Large chemical plume in stream or river downstream of a Town outfall
- Any condition that poses or could pose an immediate threat to property, human health or safety, or aquatic life

If one of the above situations is encountered, take the following steps:

1. Ensure the safety of municipal employees and/or the public by instructing people to stay away from the area.
2. **Call 911** to report active illegal dumping, a potential fire, or a significant chemical incident that has the potential to be hazardous to public health or the environment. 911 will receive the call and dispatch the Fire Department and/or Police Department. Fire and Police may coordinate with other Town Departments and Boards as necessary, such as the DPW, Planning Board, or Conservation Commission.
3. Be prepared to provide the following information to the Fire Department or other Emergency Responders:
    - Where is the emergency or spill?
    - What is the emergency or what spilled?
    - How much spilled?
    - Who spilled the material?
    - Is anyone cleaning up the material?
    - Are there resource damages (such as dead fish or oily birds)?
    - Who is reporting the emergency and/or spill?
    - Your contact information
4. Take detailed notes and photos for subsequent investigation by the Town or other agencies.

911 will receive the call and dispatch the Fire and/or Police Department. Fire and Police may coordinate with other Town Departments and Boards such as the DPW, Planning Board, or Conservation Commission, as necessary.

Urgent Situations

Take **immediate action** in the event of encountering one of the following situations:

- Very strong chemical odor emanating from the MS4
- Suspicion of hazardous chemicals in the MS4
- Public health and safety or the environment may be urgently at risk

If one of the above situations is encountered, take the following steps:

1. Notify your Foreman or call the Wilbraham Fire Department's non-emergency line: **413-596-3122**.
2. Be prepared tell the Fire Department or other Emergency Responders what the situation is, where the illicit discharge is, and any other relevant information. Take notes and photographs for subsequent investigation by the Town or other agencies.

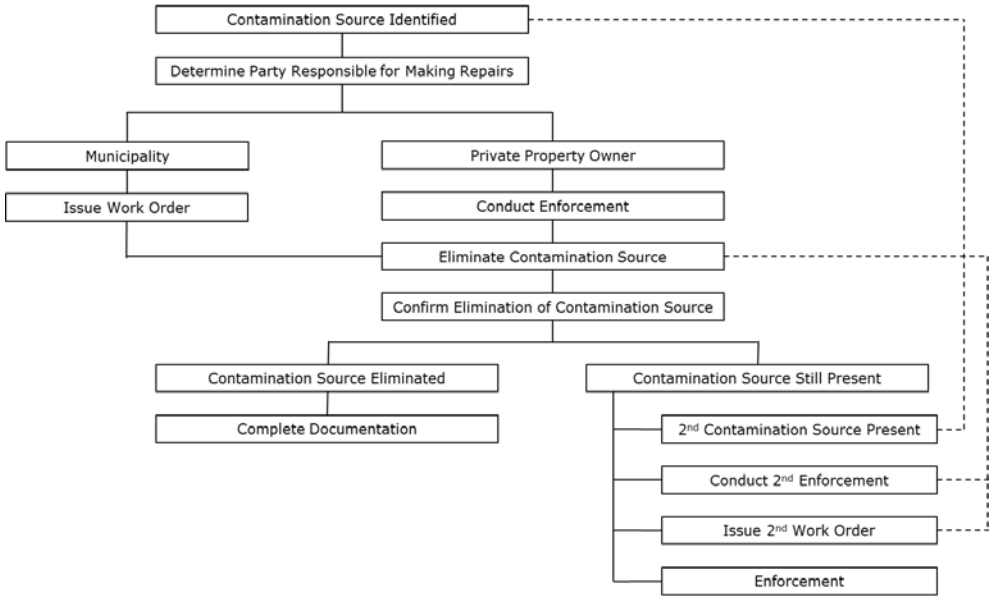
The Foreman will call the Fire Department's non-emergency line (**413-596-3122**), and may coordinate as necessary with other applicable Boards and Departments.

The Fire Department will respond to the situation and follow its Emergency Response Procedures and its Spill Response Procedures, including providing spill resources (i.e., booms, pads, storm drain covers, etc.) as needed. The Fire Department may coordinate as necessary with other Town Boards and Departments. Records of illicit discharges should be forwarded to the DPW.

Non-Emergency Situations

If a non-emergency situation is encountered, notify your Foreman or call the DPW (**413-596-2800 ext. 208**). The Foreman will report the situation to the DPW, if not already notified, and may coordinate with other applicable Town Departments and Boards as needed, such as the Planning Board, Conservation Commission, or Board of Health.

Once the report is received, Town staff may follow the Flow Chart for Non-Emergency Corrective Actions presented below.



4. STANDARD OPERATING PROCEDURES FOR ENFORCEMENT

The following Standard Operating Procedure (SOP) has been developed from requirements of Section 634 of the General By-Laws of the Town of Wilbraham, Part II (*Stormwater Phase II Comprehensive By-Law, Illicit Discharges to the Municipal Storm Drain System*).

When the DPW is notified of or discovers an illicit discharge, illicit connection, or obstruction of the municipal drain system, as listed as Prohibited Activities in Section C.3. of the By-Law, that are not explicitly exempt under Section D.1., it should use the following SOP to conduct enforcement action with adjustments as appropriate for the specific circumstances of each enforcement action. For simplicity, this SOP assumes that the property owner is the violator; make the necessary adjustments if they are different people or entities.

1. Start a file (hard copy or electronic) in which all relevant information regarding the enforcement action will be maintained. Log all communications with the property owner.
2. Compile existing information regarding the violation, such as:
    - Location and apparent source of the discharge
    - Description of the discharge
    - Date and method of discovery
    - Observations made by Town staff or contractors (when, where, and by whom)
    - Property address and owner
    - Log of physical evidence (e.g., photos, samples)
3. Contact the property owner in person or by telephone to discuss the situation and attempt to get voluntary compliance. If the property owner agrees to fix the situation, follow up with a letter memorializing the conversation and noting that failure to address the violation will result in enforcement action.
4. If the property owner cannot be contacted or if voluntary compliance is not obtained, send a "Notice of Violation and Order for Correction" letter detailing the apparent violation and asking the property owner to contact the DPW to discuss addressing the violation.
    - The order shall include the name and address of the alleged violator, the address at which the violation is occurring or has occurred, a statement specifying the nature of the violation, a description of the actions needed to resolve the violation and come into compliance, the deadline within which such actions must be completed, and a statement that, if the violator fails to come into compliance by the specified deadline, the Town may do the work necessary to resolve the violation at the expense of the violator.
    - The order may require, without limitation:
        i. Elimination of illicit connections or discharges to the MS4
        ii. Performance of monitoring, analyses, and reporting
        iii. Cessation of unlawful discharges, practices, or operations
        iv. Remediation of contamination caused by the illicit connection or discharge.
    - The decisions or orders of the DPW shall be final. Any further relief shall be to a court of competent jurisdiction.

5. If the Enforcement Order is not complied with, non-compliance fines will accrue per Wilbraham's *Stormwater Phase II Comprehensive By-Law*, and each day or part thereof that the violation occurs or continues will be considered a separate offense. If action is not taken by the property owner within seven days, the penalty shall become a civil or criminal penalty.

6. All hard copy written correspondence to the property owner should be sent both by first class mail and certified mail with return receipt requested. Certified mail provides proof of mailing; first class mail is a backup to ensure that the correspondence is received even if the property owner refuses the certified mail delivery. All such correspondence should be copied to the Board of Health, Town Administrator, and Town Counsel.

7. Consult Town Counsel if civil or criminal court action is required.

As an alternative to criminal prosecution or civil action, the DPW may elect to utilize the non-criminal disposition procedure set forth in Massachusetts General Laws Chapter 40, Section 21D or the Town General By-Laws 103A.

5. APPROPRIATE METHODS FOR ELIMINATION OF THE ILLICIT DISCHARGE

Type of Discharge	Source	Elimination Actions by Town
Sewage	• Pipe break within right of way	• Repair
	• Commercial or industrial direct connection	• Enforcement
	• Residential direct connection	• Enforcement
	• Infrequent/transient discharge (e.g., RV dumping)	• Enforcement, spill response
	• Septic	• Enforcement, incentive, or aid
	• Pet waste	• Warning, education, enforcement
Wash Water	• Commercial or industrial direct connection	• Enforcement
	• Residential direct connection	• Enforcement
	• Commercial car wash	• Enforcement
	• Household maintenance related activities	• Warning and education
Liquid Wastes	• Professional oil change / car maintenance	• Enforcement, spill response
	• Heating oil / solvent dumping	• Enforcement, spill response
	• Homeowner liquid waste disposal (e.g., oil, paint)	• Education, enforcement
	• Spill (trucking)	• Spill response
	• Other industrial wastes	• Spill response
Solid Waste or Obstructions	• Trash or garbage	• Enforcement
	• Erosion from construction	• Enforcement
	• Erosion from landscaping (e.g., mulch, loam)	• Warning, education, enforcement

6. PROCESS FOR DOCUMENTATION AND VERIFICATION OF REMOVAL OF THE CONNECTION OR DISCHARGE

At a minimum, documentation will include a description of the following:

- Discharge and source location
- Description of the discharge
- Date and method of discovery
- Date of elimination
- Repair or enforcement action or planned corrective measures and a schedule for completing the illicit discharge removal
- Date and method to confirm removal
- Estimate of flow volume removed

As described in Section 2.3.4.5.c of the General Permit, verification of removal of the connection must include water quality sampling for sanitary wastewater and may also include visual inspection, dye-testing, CCTV inspections, and/or damming techniques. Documentation will be kept in the Appendix H of the IDDE Plan.

Town of Wilbraham IDDE Program

Appendix F

Written Procedures and Forms

OUTFALL RECONNAISSANCE INVENTORY/SAMPLE COLLECTION FIELD SHEET

Section 1: Background Data

SUBWATERSHED:	Outfall ID:	**LOCATION:**
Today's date:	Time (Military):	
INVESTIGATORS:		
TEMPERATURE (°F):	**RAINFALL (IN.): LAST 72 HOURS:**	**LAST 24 HOURS:**
Photo #s and short description:		

Land Use in Drainage Area (Check all that apply):

- ☐ Industrial (Known Industries):_____)
- ☐ Residential
- ☐ Commercial/Institutional
- ☐ Open Space – Field
- ☐ Open Space – Wooded
- Other: _____

Notes (e.g., origin of outfall, if known):

Section 2: Outfall Description

MATERIAL		SHAPE		DIMENSIONS (IN.)	SUBMERGED
☐ RCP	☐ CMP	☐ Circular	☐ Single	Diameter/Dimensions: _____	In Water: ☐ No ☐ Partially ☐ Fully
☐ PVC	☐ HDPE	☐ Elliptical	☐ Double	**SLOPE (DEGREES)**	With Sediment: ☐ No ☐ Partially ☐ Fully
☐ DI/CI	☐ Clay	☐ Box	☐ Triple	☐ Flat ☐ Moderate ☐ Steep	
☐ Other: _____		☐ Other: _____	☐ Other: _____		

PIPE CONDITION	☐ Good ☐ Cracked ☐ Clogged with Debris ☐ Crushed ☐ Deteriorated (concrete) ☐ Corroded (metal) ☐ Other _____		
OUTLET STRUCTURE	☐ Headwall ☐ Riprap ☐ Flared End ☐ No Outfall Protection ☐ Other _____		
In-Stream *(applicable when collecting samples)*	☐ Yes ☐ No	**Maintenance/Repair Needed?**	☐ **No** ☐ **Yes** *(See Section 8 for more description)*
Flow Present?	☐ Yes ☐ No ***If No, Skip to Section 5***		
Flow Description	☐ Trickle ☐ Moderate ☐ Substantial **(If present)**		

Section 3: Quantitative Characterization

FIELD DATA FOR FLOWING OUTFALLS			
PARAMETER (Threshold Level)	**RESULT**	**UNIT**	**EQUIPMENT**
TEMPERATURE (>83 ºF)		°F	YSI Meter or Thermometer
CONDUCTIVITY (> 2,000 UMHOS/cm)		umhos/cm	YSI Meter
SALINITY (> 0.5 PPT)		ppt	YSI Meter
DISSOLVED OXYGEN (< 5.0 mg/L)		mg/l	YSI Meter
AMMONIA (≥ 0.5 mg/L)		mg/l	Test Strips
CHLORINE (> 0.02 mg/L)		mg/l	Hach Pocket Colorimeter II

OUTFALL RECONNAISSANCE INVENTORY/ SAMPLE COLLECTION FIELD SHEET

Section 4: Physical Indicators for Flowing Outfalls Only

Are Any Physical Indicators Present in the flow? ☐ Yes ☐ No *(If No, Skip to Section 5)*

INDICATOR	CHECK if Present	DESCRIPTION	RELATIVE SEVERITY INDEX (1-3)		
ODOR	☐	☐Sewage ☐Rancid/sour ☐Petroleum/gas ☐Sulfide ☐Other:	☐1 – Faint	☐2 – Easily detected	☐3 – Noticeable from a distance
COLOR	☐	☐Clear ☐Brown ☐Gray ☐Yellow ☐Green ☐Orange ☐Red ☐Other:	☐1 – Faint colors in sample bottle	☐2 – Clearly visible in sample bottle	☐3 – Clearly visible in outfall flow
TURBIDITY	☐	See severity	☐1 – Slight cloudiness	☐2 – Cloudy	☐3 – Opaque
FLOATABLES - DOES NOT INCLUDE TRASH!!	☐	☐Sewage (Toilet Paper, etc.) ☐Suds ☐Petroleum (oil sheen) ☐Other:	☐1 – Few/slight; origin not obvious	☐2 – Some; indications of origin (e.g., possible suds or oil sheen)	☐3 - Some; origin clear (e.g., obvious oil sheen, suds, or floating sanitary materials)

Section 5: Physical Indicators for Both Flowing and Non-Flowing Outfalls

Are physical indicators that are not related to flow present? ☐ Yes ☐ No *(If No, Skip to Section 6)*

INDICATOR	CHECK if Present	DESCRIPTION	COMMENTS
DEPOSITS/STAINS	☐	☐None ☐Grease/Oil ☐Paper/Trash ☐Foam ☐Heavy sedimentation deposits ☐Other _____	
SURROUNDING VEGETATION	☐	☐Little or No Distress ☐Moderate Distress ☐High Distress	
ABNORMAL VEGETATION IN OUTFALL	☐	☐Excessive ☐Inhibited	
ERODIBILITY	☐	☐Little or No Erosion ☐Small Areas of Erosion ☐Many Eroded Areas	
POOR POOL QUALITY	☐	☐Odors ☐Colors ☐Floatables ☐Oil Sheen ☐Suds ☐Excessive Algae ☐Other:	
PIPE BENTHIC GROWTH	☐	☐Brown ☐Orange ☐Green ☐Other:	

Section 6: OVERALL OUTFALL CHARACTERIZATION AS AN ILLICIT DISCHARGE

☐ Unlikely ☐ Potential (presence of two or more indicators) ☐ Suspect (one or more indicators with a severity of 3) ☐ Obvious

Section 7: Data Collection

1.	**SAMPLE FOR THE LAB**?	☐ Surfactants	☐ Ammonia	☐ E. Coli	☐ Fecal Coliform	☐ Total Phosphorus
		☐ BOD_5	☐ None			
2.	If yes, collected from:		☐ Flow	☐ Pool		
3.	Intermittent flow trap recommended?	☐	☐ Yes	☐	☐ No	

Section 8: Any Non-Illicit Discharge Concerns (e.g., trash or needed infrastructure repairs)? _____

The following document establishes procedures for sample collection, use of field kits, storage and conveyance of samples, and field data collection and storage requirements for dry weather sampling of outfalls in the Town of Wilbraham, MA in accordance with Section 2.3.4.7.b. of the EPA NPDES General Permits for Stormwater Discharges from Small Municipal Separate Storm Sewer Systems (MS4s) in Massachusetts (General Permit).

1) Review supplies of sampling bottles and test kits on a weekly basis and order as necessary for field sampling activities.

2) Notify the Town of Wilbraham Department of Public Works (DPW) of sampling schedule prior to going into the field (413-596-2800). They will notify the Police Department, as necessary.

3) Observe the physical attributes of each outfall or sampling location.

4) If dry weather flow is present, note flow volume, odor, and all other characteristics listed on the data collection form. If using an iPad, fill in form fields or drop-down menus as needed.

    a. In the event that the flow is too slow to sample, place a sandbag upstream of the outfall to capture flow and return to the site in 24 hours to obtain a sample.

    b. In the event that the outfall is submerged in the receiving water, record this information on the data sheet for the outfall and do not take a sample. An alternate sampling location at an upstream manhole should be located.

5) Take a photograph of the outfall with an iPad or camera. If possible, hold a piece of paper or a white board with the unique identifier written on it in the photograph. If using a GIS collection form, ensure the photograph is collected with the correct outfall identifier.

6) Sample storm drain outfalls as close to the outfall opening as possible, wearing a fresh pair of disposable gloves.

7) **Test Kits**. Using a sterile and pre-cleaned sampling bottle, collect the surface water with care to not disturb sediment materials or collect surface debris/scum as best possible. Use sampling pole if needed to safely reach the outfall. The collected water will be poured into the chlorine sample cell. Follow the manufacturer instructions for all test kit procedures. All waste from the field test kits should be retained and disposed of according to manufacturer instructions.

8) **Meters**. A properly calibrated meter should be used to record the following parameters directly from the stream or outfall:

    a. Conductivity

    b. Salinity

    c. Temperature

When flow volume or depth is insufficient to immerse the meter probe, a clean sample bottle may be used to collect a sufficient volume of water to immerse the probe. In such instances, meter readings should be taken immediately.

9) **Threshold Levels**. In situ readings will be compared to field thresholds as follows:

Parameter	Threshold Level	Source
Surfactants	≥ 0.25 mg/L	EPA New England Bacterial Source Tracking Protocol
Ammonia	≥ 0.5 mg/L	EPA New England Bacterial Source Tracking Protocol
Chlorine	≥ 0.02 mg/L	EPA 2016 General Permit
Conductivity	> 2,000 uS/cm	Center for Watershed Protection
Temperature (°F)	> 83 °F	314 CMR 4.00 for Class B Warm Water
Salinity	> 0.5 ppt Rivers	EPA Voluntary Estuary Monitoring Manual

10) **Water quality samples** will be taken for laboratory analysis according to the following table. Each bottle will be marked with time, date, and outfall identifier, and parameter to be analyzed.

All Flowing Outfalls	Impaired Waterbodies[1]	EPA Approved Method for Analysis
Collect E. coli samples first, in a separate sterile sample bottle.	**Chicopee River (MA36-22)** *E. coli*[2]	*E. coli: 1603 (preferred); 1103.1; Colilert® 12 16; Colilert-18® 12 15 16; mColiBlue-24®17*
	Chicopee River (MA36-24) Fecal coliform	Fecal Coliform:1680;1681
	Spectacle Pond (MA36142) Nutrient/Eutrophication Biological Indicators	Phosphorus (Total): 365.1;365.2; 365.3; SM 4500-P-E
	All outfalls – Long Island Sound TMDL Nitrogen (Total)	Nitrogen (Total): 351.1/351.2 + 353.2

Notes:

[1] Table is based on the most recent approved Massachusetts Integrated List of Waters (2014), and will need to be updated when Massachusetts Integrated Lists of Waters are finalized.

[z] Constituents that are in *blue italics* will already be analyzed as part of the 2016 Small MS4 General Permit sampling requirements, and do not require additional lab analysis.

Results should be recorded, custody forms completed, and samples placed in a cooler on ice. If using an iPad, fill in all form fields for sampling data, check parameter analysis box if a threshold was exceeded, and check outfall completed box when done. **Make note of the first bacteria sample time for determining the hold limit until lab analysis.**

Be sure to upload all data entry before leaving the site. If there is any doubt whether data was captured, duplicate information on paper forms.

Upon completion of sampling and return to the laboratory, all samples will be turned over to the appropriate sample custodian(s) and accompanied by an appropriate Chain-of-Custody ("COC") form.

11) **Equipment / Items Needed**

Field Equipment	Paperwork	Personal Gear
❑ Sample bottles (from lab with holding time and storage requirements)	❑ Signed Site Safety Plan	❑ Waders (or other appropriate footwear)
❑ Extra sample bottles in case of contamination, cracking, or loss	❑ Chain of Custody form filled out	❑ Insect repellant
❑ Sampling Pole	❑ Bottle Labels in Ziploc Bag	❑ Sunscreen
❑ Cooler with ice	❑ Field sheets	❑ Steel-toed boots (if opening manholes)
❑ Carry Caddy	❑ CWP Chapter 11	❑ Safety goggles
❑ Digital Camera or iPad	❑ Field maps	❑ Light colored long sleeve shirts and pants on-site
❑ Cell Phone or hand-held radio	❑ Sampling Plan & Locations	❑ Reflective safety vest
❑ First aid kit		❑ Business cards
❑ Flashlight or head lamp		
❑ Nitrile gloves		
❑ Tape measure		
❑ Water quality meter(s)		
❑ Chlorine Test Kit – use kits listed in EPA Bacteria Source Protocol 2012 Draft		
❑ 1 liter bottle		
❑ Watch with a second hand		
❑ Duct tape		
❑ Sharpies		
❑ Paper Towels		
❑ Glass Containers (3) for (1) surfactant kit liquid waste, (2) chloride kit liquid waste, and (3) surfactant kit glass ampules. All disposed of as hazardous waste.		
❑ Trash bag for gloves, etc.		
❑ White board/paper for unique outfall ID for photograph		

Chapter 11: The Outfall Reconnaissance Inventory

This chapter describes a simple field assessment known as the Outfall Reconnaissance Inventory (ORI). The ORI is designed to fix the geospatial location and record basic characteristics of individual storm drain outfalls, evaluate suspect outfalls, and assess the severity of illicit discharge problems in a community. Field crews should walk all natural and man-made streams channels with perennial and intermittent flow, even if they do not appear on available maps (Figure 19). The goal is to complete the ORI on every stream mile in the MS4 within the first permit cycle, starting with priority subwatersheds identified during the desktop analysis. The results of the ORI are then used to help guide future outfall monitoring and discharge prevention efforts.

11.1 Getting Started

The ORI requires modest mapping, field equipment, staffing and training resources. A complete list of the required and optional resources needed to perform an ORI is presented in Table 30. The ORI can be combined with other stream assessment tools, and may be supplemented by simple indicator monitoring. Ideally, a Phase II community should plan on surveying its entire drainage network at least once over the course of each five-year permit cycle. Experience suggests that it may take up to three stream walks to identify all outfalls.

Figure 19: Walk all streams and constructed open channels

Best Times to Start

Timing is important when scheduling ORI field work. In most regions of the country, spring and fall are the best seasons to perform the ORI. Other seasons typically have challenges such as over-grown vegetation or high groundwater that mask illicit discharges, or make ORI data hard to interpret[9].

Prolonged dry periods during the non-growing season with low groundwater levels are optimal conditions for performing an ORI. Table 31 summarizes some of the regional factors to consider when scheduling ORI surveys in your community. Daily weather patterns also determine whether ORI field work should proceed. In general, ORI field work should be conducted at least 48 hours after the last runoff-producing rain event.

Field Maps

The field maps needed for the ORI are normally generated during the desktop assessment phase of the IDDE program described in Chapter 5. This section

[9] Upon initial program start-up, the ORI should be conducted during periods of low groundwater to more easily identify likely illicit discharges. However, it should be noted that high water tables can increase sewage contamination in storm drain networks due to infiltration and inflow interactions. Therefore, in certain situations, seasonal ORI surveys may be useful at identifying these types of discharges. Diagnosis of this source of contamination, however, can be challenging.

Table 30: Resources Needed to Conduct the ORI		
Need Area	**Minimum Needed**	**Optional but Helpful**
Mapping	• Roads • Streams	• Known problem areas • Major land uses • Outfalls • Specific industries • Storm drain network • SIC-coded buildings • Septics
Field Equipment	• 5 one-liter sample bottles • Backpack • Camera (preferably digital) • Cell phones or hand-held radios • Clip boards and pencils • Field sheets • First aid kit • Flash light or head lamp • GPS unit • Spray paint (or other marker) • Surgical gloves • Tape measure • Temperature probe • Waders (snake proof where necessary) • Watch with a second hand	• Portable Spectrophotometer and reagents (can be shared among crews) • Insect repellant • Machete/clippers • Sanitary wipes or biodegradable soap • Wide-mouth container to measure flow • Test strips or probes (e.g., pH and ammonia)
Staff	• Basic training on field methodology • Minimum two staff per crew	• Ability to track discharges up the drainage system • Knowledge of drainage area, to identify probable sources. • Knowledge of basic chemistry and biology

Table 31: Preferred Climate/Weather Considerations for Conducting the ORI		
Preferred Condition	**Reason**	**Notes/Regional Factors**
Low groundwater (e.g., very few flowing outfalls)	High groundwater can confound results	In cold regions, do not conduct the ORI in the early spring, when the ground is saturated from snowmelt.
No runoff-producing rainfall within 48 hours	Reduces the confounding influence of storm water	The specific time frame may vary depending on the drainage system.
Dry Season	Allows for more days of field work	Applies in regions of the country with a “wet/ dry seasonal pattern.” This pattern is most pronounced in states bordering or slightly interior to the Gulf of Mexico or the Pacific Ocean.
Leaf Off	Dense vegetation makes finding outfalls difficult	Dense vegetation is most problematic in the southeastern United States. This criterion is helpful but not required.

provides guidance on the basic requirements for good field maps. First, ORI field maps do not need to be fancy. The scale and level of mapping detail will vary based on preferences and navigational skills of field crews. At a minimum, maps should have labeled streets and hydrologic features (USGS blue line streams, wetlands, and lakes), so field crews can orient themselves and record their findings spatially.

Field maps should delineate the contributing drainage area to major outfalls, but only if they are readily available. Urban landmarks such as land use, property boundaries, and storm drain infrastructure are also quite useful in the field. ORI field maps should be used to check the accuracy and quality of pre-existing mapping information, such as the location of outfalls and stream origins.

Basic street maps offer the advantage of simplicity, availability, and well-labeled road networks and urban landmarks. Supplemental maps such as a 1": 2000' scale USGS Quad sheet or finer scale aerial photograph are also recommended for the field. USGS Quad sheets are readily available and display major transportation networks and landmarks, "blue line" streams, wetlands, and topography. Quad maps may be adequate for less developed subwatersheds, but are not always accurate in more urban subwatersheds.

Recent aerial photographs may provide the best opportunity to navigate the subwatershed and assess existing land cover. Aerial photos, however, may lack topography and road names, can be costly, and are hard to record field notes on due to their darkness. GIS-ready aerial photos and USGS Quad sheets can be downloaded from the internet or obtained from local planning, parks, or public works agencies.

Field Sheets

ORI field sheets are used to record descriptive and quantitative information about each outfall inventoried in the field. Data from the field sheets represent the building blocks of an outfall tracking system allowing program managers to improve IDDE monitoring and management. A copy of the ORI field sheet is provided in Appendix D, and is also available as a Microsoft Word™ document. Program managers should modify the field sheet to meet the specific needs and unique conditions in their community.

Field crews should also carry an authorization letter and a list of emergency phone numbers to report any emergency leaks, spills, obvious illicit discharges or other water quality problems to the appropriate local authorities directly from the field. Local law enforcement agencies may also need to be made aware of the field work. Figure 20 shows an example of a water pollution emergency contact list developed by Montgomery County, MD.

Equipment

Basic field equipment needed for the ORI includes waders, a measuring tape, watch, camera, GPS unit, and surgical gloves (see Table 30). GPS units and digital cameras are usually the most expensive equipment items; however, some local agencies may already have them for other applications. Adequate ranging, water-resistant, downloadable GPS units can be purchased for less than $150. Digital cameras are preferred and can cost between $200 and $400, however, conventional or disposable cameras can also work, as long as they have flashes. Hand-held data recorders and customized software can be used to record text, photos, and GPS coordinates electronically in the field. While

these technologies can eliminate field sheets and data entry procedures, they can be quite expensive. Field crews should always carry basic safety items, such as cell phones, surgical gloves, and first aid kits.

Staffing

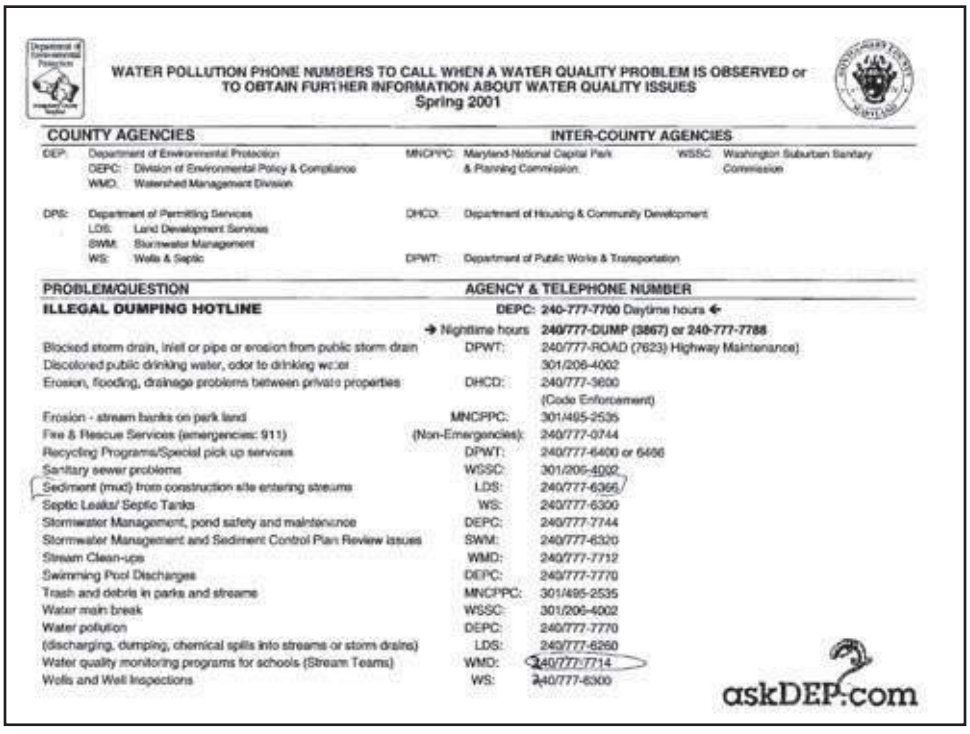
The ORI requires at least a two-person crew, for safety and logistics. Three person crews provide greater safety and flexibility, which helps divide tasks, allows one person to assess adjacent land uses, and facilitates tracing outfalls to their source. All crew members should be trained on how to complete the ORI and should have a basic understanding of illicit discharges and their water quality impact. ORI crews can be staffed by trained volunteers, watershed groups and college interns. Experienced crews can normally expect to cover two to three stream miles per day, depending on stream access and outfall density.

11.2 Desktop Analysis to Support the ORI

Two tasks need to be done in the office before heading out to the field. The major ORI preparation tasks include estimating the total stream and channel mileage in the subwatershed and generating field maps. The total mileage helps program managers scope out how long the ORI will take and how much it will cost. As discussed before, field maps are an indispensable navigational aid for field crews working in the subwatershed.

Delineating Survey Reaches

ORI field maps should contain a preliminary delineation of **survey reaches**. The stream network within your subwatershed should be delineated into discrete segments of relatively uniform character. Delineating survey reaches provides good stopping and starting points for field crews, which



WATER POLLUTION PHONE NUMBERS TO CALL WHEN A WATER QUALITY PROBLEM IS OBSERVED or TO OBTAIN FURTHER INFORMATION ABOUT WATER QUALITY ISSUES
Spring 2001

COUNTY AGENCIES

DEP: Department of Environmental Protection
DEPC: Division of Environmental Policy & Compliance
WMD: Watershed Management Division

DPS: Department of Permitting Services
LDS: Land Development Services
SWM: Stormwater Management
WS: Wells & Septic

INTER-COUNTY AGENCIES

MNCPPC: Maryland-National Capital Park & Planning Commission
WSSC: Washington Suburban Sanitary Commission
DHCD: Department of Housing & Community Development
DPWT: Department of Public Works & Transportation

PROBLEM/QUESTION	AGENCY & TELEPHONE NUMBER	
ILLEGAL DUMPING HOTLINE	DEPC:	**240-777-7700** Daytime hours ←
	→ Nighttime hours	**240/777-DUMP (3867) or 240-777-7788**
Blocked storm drain, inlet or pipe or erosion from public storm drain	DPWT:	240/777-ROAD (7623) Highway Maintenance)
Discolored public drinking water, odor to drinking water		301/206-4002
Erosion, flooding, drainage problems between private properties	DHCD:	240/777-3600 (Code Enforcement)
Erosion - stream banks on park land	MNCPPC:	301/495-2535
Fire & Rescue Services (emergencies: 911)	(Non-Emergencies):	240/777-0744
Recycling Programs/Special pick up services	DPWT:	240/777-6400 or 6456
Sanitary sewer problems	WSSC:	301/206-4002
Sediment (mud) from construction site entering streams	LDS:	240/777-6366
Septic Leaks/ Septic Tanks	WS:	240/777-6300
Stormwater Management, pond safety and maintenance	DEPC:	240/777-7744
Stormwater Management and Sediment Control Plan Review issues	SWM:	240/777-6320
Stream Clean-ups	WMD:	240/777-7712
Swimming Pool Discharges	DEPC:	240/777-7770
Trash and debris in parks and streams	MNCPPC:	301/495-2535
Water main break	WSSC:	301/206-4002
Water pollution	DEPC:	240/777-7770
(discharging, dumping, chemical spills into streams or storm drains)	LDS:	240/777-6260
Water quality monitoring programs for schools (Stream Teams)	WMD:	240/777-7714
Wells and Well Inspections	WS:	240/777-6300

askDEP.com

Figure 20: Example of a comprehensive emergency contact list for Montgomery County, MD

is useful from a data management and logistics standpoint. Each survey reach should have its own unique identifying number to facilitate ORI data analysis and interpretation. Figure 21 illustrates some tips for delineating survey reaches, and additional guidance is offered below:

- Survey reaches should be established above the confluence of streams and between road crossings that serve as a convenient access point.
- Survey reaches should be defined at the transition between major changes in land use in the stream corridor (e.g. forested land to commercial area).
- Survey reaches should generally be limited to a quarter mile or less in length. Survey reaches in lightly developed subwatersheds can be longer than those in more developed subwatersheds, particularly if uniform stream corridor conditions are expected throughout the survey reach.
- Access through private or public property should be considered when delineating survey reaches as permission may be required.

It should be noted that initial field maps are not always accurate, and changes may need to be made in the field to adjust survey reaches to account for conditions such as underground streams, missing streams or long culverts. Nevertheless, upfront time invested in delineating survey reaches makes it easier for field crews to perform the ORI.

Figure 21: Various physical factors control how survey reaches are delineated. (a) Survey reaches based on the confluence of stream tributaries. (b) A long tributary split into ¼ mile survey reaches. (c) Based on a major road crossing (include the culvert in the downstream reach). (d) Based on significant changes in land use (significant changes in stream features often occur at road crossings, and these crossings often define the breakpoints between survey reaches).

11.3 Completing the ORI

Field crews conduct an ORI by walking all streams and channels to find outfalls, record their location spatially with a GPS unit and physically mark them with spray paint or other permanent marker. Crews also photograph each outfall and characterize its dimensions, shape, and component material, and record observations on basic sensory and physical indicators. If dry weather flow occurs at the outfall, additional flow and water quality data are collected. Field crews may also use field probes or test strips to measure indicators such as temperature, pH, and ammonia at flowing outfalls.

The ORI field sheet is divided into eight sections that address both flowing and non-flowing outfalls (Appendix D). Guidance on completing each section of the ORI field sheet is presented below.

Outfalls to Survey

The ORI applies to **all** outfalls encountered during the stream walk, regardless of diameter, with a few exceptions noted in Table 32. Common outfall conditions seen in communities are illustrated in Figure 22 As a rule, crews should only omit an outfall if they can definitively conclude it has no potential to contribute to a transitory illicit discharge. While EPA's Phase I guidance only targeted major outfalls (diameter of 36 inches or greater), documenting all outfalls is recommended, since smaller pipes make up the majority of all outfalls and frequently have illicit discharges (Pitt *et al.*, 1993 and Lalor, 1994). A separate ORI field sheet should be completed for each outfall.

Table 32: Outfalls to Include in the Screening

Outfalls to Record	Outfalls to Skip
• Both large and small diameter pipes that appear to be part of the storm drain infrastructure • Outfalls that appear to be piped headwater streams • Field connections to culverts • Submerged or partially submerged outfalls • Outfalls that are blocked with debris or sediment deposits • Pipes that appear to be outfalls from storm water treatment practices • Small diameter ductile iron pipes • Pipes that appear to only drain roof downspouts but that are subsurface, preventing definitive confirmation	• Drop inlets from roads in culverts (unless evidence of illegal dumping, dumpster leaks, etc.) • Cross-drainage culverts in transportation right-of-way (i.e., can see daylight at other end) • Weep holes • Flexible HDPE pipes that are known to serve as slope drains • Pipes that are clearly connected to roof downspouts via above-ground connections

 Ductile iron round pipe	 4-6” HDPE; Check if roof leader connection (legal)	 Field connection to inside of culvert; Always mark and record.
 Small diameter (<2”) HDPE; Often a sump pump (legal), or may be used to discharge laundry water (illicit).	 Elliptical RCP; Measure both horizontal and vertical diameters.	 Double RCP round pipes; Mark as separate outfalls unless known to connect immediately up-pipe
 Culvert (can see to other side); Don’t mark as an outfall	 Open channel “chute” from commercial parking lot; Very unlikely illicit discharge. Mark, but do not return to sample (unless there is an obvious problem).	 Small diameter PVC pipe; Mark, and look up-pipe to find the origin.
 CMP outfall; Crews should also note upstream sewer crossing.	 Box shaped outfall	 CMP round pipe with two weep holes at bridge crossing. (Don’t mark weep holes)

Figure 22: Typical Outfall Types Found in the Field

Obvious Discharges

Field crews may occasionally encounter an obvious illicit discharge of sewage or other pollutants, typified by high turbidity, odors, floatables and unusual colors. When obvious discharges are encountered, field crews should STOP the ORI survey, track down the source of the discharge and immediately contact the appropriate water pollution agency for enforcement. Crews should photo-document the discharge, estimate its flow volume and collect a sample for water quality analysis (if this can be done safely). All three kinds of evidence are extremely helpful to support subsequent enforcement. Chapter 13 provides details on techniques to track down individual discharges.

11.4 ORI Section 1 - Background Data

The first section of the ORI field sheet is used to record basic data about the survey, including time of day, GPS coordinates for the outfall, field crew members, and current and past weather conditions (Figure 23). Much of the information in this section is self-explanatory, and is used to create an accurate record of when, where, and under what conditions ORI data were collected.

Every outfall should be photographed and marked by directly writing a unique identifying number on each outfall that serves as its subwatershed "address" (Figure 24). Crews can use spray paint or another temporary marker to mark outfalls, but may decide to replace temporary markings with permanent ones if the ORI is repeated later. Markings help crews confirm outfall locations during future investigations, and gives citizens a better way to report the location of spills or discharges when calling a water pollution hotline. Crews should mark the spatial location of all outfalls they encounter directly on field maps, and record the coordinates with a GPS unit that is accurate to within 10 feet. Crews should take a digital photo of each outfall, and record photo numbers in Section 1 of the field sheet.

Section 1: Background Data

Subwatershed:		Outfall ID:	
Today's date:		Time (Military):	
Investigators:		Form completed by:	
Temperature (°F):	Rainfall (in.): Last 24 hours: Last 48 hours:		
Latitude:	Longitude:	GPS Unit:	GPS LMK #:
Camera:		Photo #s:	
Land Use in Drainage Area (Check all that apply):			
☐ Industrial		☐ Open Space	
☐ Ultra-Urban Residential		☐ Institutional	
☐ Suburban Residential		Other: _____	
☐ Commercial		Known Industries: _____	
Notes (e.g., origin of outfall, if known):			

Figure 23: Section 1 of the ORI Field Sheet

Figure 24: Labeling an outfall (a variety of outfall naming conventions can be used)

The land use of the drainage area contributing to the outfall should also be recorded. This may not always be easy to characterize at large diameter outfalls that drain dozens or even hundreds of acres (unless you have aerial photographs). On the other hand, land use can be easily observed at smaller diameter outfalls, and in some cases, the specific origin can be found (e.g., a roof leader or a parking lot; Figure 25). The specific origin should be recorded in the "notes" portion of Section 1 on the field sheet.

11.5 ORI Section 2 - Outfall Description

This part of the ORI field sheet is where basic outfall characteristics are noted (Figure 26). These include material, and presence of flow at the outfall, as well as the pipe's dimensions (Figure 27). These measurements are used to confirm and supplement existing storm drain maps (if they are available). Many communities only map storm drain outfalls that exceed a given pipe diameter, and may not contain data on the material and condition of the pipe.

Figure 25: The origin of this corrugated plastic pipe was determined to be a roof leader from the house up the hill.

Section 2 of the field sheet also asks if the outfall is submerged in water or obstructed by sediment and the amount of flow, if present. Figure 28 provides some photos that illustrate how to characterize relative submergence, deposition and flow at outfalls. If no flow is observed at the outfall, you can skip the next two sections of the ORI field sheet and continue with Section 5.

Section 2: Outfall Description

LOCATION	MATERIAL	SHAPE		DIMENSIONS (IN.)	SUBMERGED
☐ **Closed Pipe**	☐ RCP ☐ CMP ☐ PVC ☐ HDPE ☐ Steel ☐ Other: _____	☐ Circular ☐ Eliptical ☐ Box ☐ Other: _____	☐ Single ☐ Double ☐ Triple ☐ Other: _____	Diameter/Dimensions: _____	In Water: ☐ No ☐ Partially ☐ Fully With Sediment: ☐ No ☐ Partially ☐ Fully
☐ **Open drainage**	☐ Concrete ☐ Earthen ☐ rip-rap ☐ Other: _____	☐ Trapezoid ☐ Parabolic ☐ Other: _____		Depth: _____ Top Width: _____ Bottom Width: _____	
☐ **In-Stream**	**(applicable when collecting samples)**				
Flow Present?	☐ Yes ☐ No *If No, Skip to Section 5*				
Flow Description (If present)	☐ Trickle ☐ Moderate ☐ Substantial				

Figure 26: Section 2 of the ORI Field Sheet

Figure 27: Measuring Outfall Diameter

Submerged: More than ½ below water

Partially submerged: Bottom is below water

Fully submerged: Can't see outfall

Outfall fully submerged by debris

Fully submerged from downstream trees trapping debris

Partially submerged by leaf debris "back water"

Trickle Flow: Very narrow stream of water

Moderate Flow: Steady stream, but very shallow depth

Significant flow (Source is a fire hydrant discharge)

Figure 28: Characterizing Submersion and Flow

11.6 ORI Section 3 - Quantitative Characterization for Flowing Outfalls

This section of the ORI records direct measurements of **flowing outfalls**, such as flow, temperature, pH and ammonia (Figure 29). If desired, additional water quality parameters can be added to this section. Chapter 12 discusses the range of water quality parameters that can be used.

Field crews measure the rate of flow using one of two techniques. The first technique simply records the time it takes to fill a container of a known volume, such as a one liter sample bottle. In the second technique,

Section 3: Quantitative Characterization

FIELD DATA FOR FLOWING OUTFALLS				
PARAMETER		**RESULT**	**UNIT**	**EQUIPMENT**
☐Flow #1	Volume		Liter	Bottle
	Time to fill		Sec	
☐Flow #2	Flow depth		In	Tape measure
	Flow width	____' ____"	Ft, In	Tape measure
	Measured length	____' ____"	Ft, In	Tape measure
	Time of travel		S	Stop watch
Temperature			°F	Thermometer
pH			pH Units	Test strip/Probe
Ammonia			mg/L	Test strip

Figure 29: Section 3 of the ORI Field Sheet

the crew measures the velocity of flow, and multiplies it by the estimated cross sectional area of the flow.

To use the flow volume technique, it may be necessary to use a "homemade" container to capture flow, such as a cut out plastic milk container that is marked to show a one liter volume. The shape and flexibility of plastic containers allows crews to capture relatively flat and shallow flow (Figure 30). The flow volume is determined as the volume of flow captured in the container per unit time.

The second technique measures flow rate based on velocity and cross sectional area, and is preferred for larger discharges where containers are too small to effectively capture the flow (Figure 31). The crew measures and marks off a fixed flow length (usually about five feet), crumbles leaves or other light material, and drops them into the discharge (crews can also carry peanuts or ping pong balls to use). The crew then measures the time it takes the marker to travel across the length. The velocity of flow is computed as the length of the flow path (in feet) divided by the travel time (in seconds). Next, the cross-sectional flow area is measured by taking multiple readings of the depth and width of flow. Lastly, cross-sectional area (in square feet) is multiplied by flow velocity (feet/second) to calculate the flow rate (in cubic feet/second).

Crews may also want to measure the quality of the discharge using relatively inexpensive probes and test strips (e.g., water temperature, pH, and ammonia). The choice of which indicator parameters to measure is usually governed by the overall IDDE monitoring framework developed by the community. Some communities have used probes or test strips to measure additional indicators such as conductivity, chlorine, and hardness. Research by Pitt (for this project) suggests that probes by Horiba for pH and conductivity are the most reliable and

Figure 30: Measuring flow (as volume per time)

accurate, and that test strips have limited value.

When probes or test strips are used, measurements should be made from a sample bottle that contains flow captured from the outfall. The exact measurement recorded by the field probe should be recorded in Section 3 of the field sheet. Some interpolation may be required for test strips, but do not interpolate further than the mid-range between two color points.

11.7 ORI Section 4 – Physical Indicators for Flowing Outfalls Only

This section of the ORI field sheet records data about four sensory indicators associated with **flowing outfalls**—odor, color, turbidity and floatables (Figure 32). Sensory indicators can be detected by smell or sight, and require no measurement equipment. Sensory indicators do not always reliably predict illicit discharge, since the senses can be fooled, and may result in a "false negative" (i.e., sensory indicators fail to detect an illicit discharge when one is actually present). Sensory indicators are important, however, in detecting the most severe or obvious discharges. Section 4 of the field sheet asks whether the sensory indicator is present, and if so, what is its severity, on a scale of one to three.

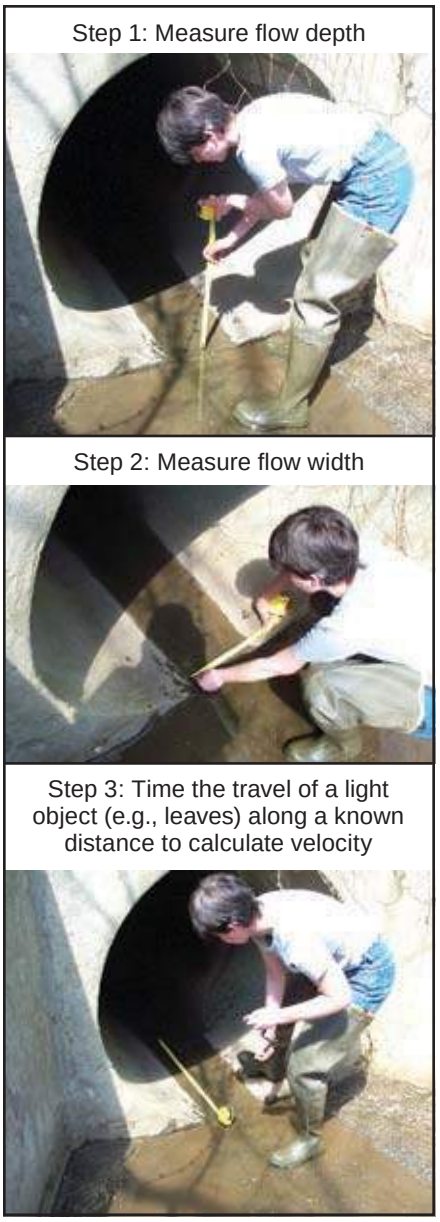


Figure 31: Measuring flow (as velocity times cross-sectional area)

Section 4: Physical Indicators for Flowing Outfalls Only

Are Any Physical Indicators Present in the flow? ☐ Yes ☐ No *(If No, Skip to Section 5)*

INDICATOR	CHECK if Present	DESCRIPTION	RELATIVE SEVERITY INDEX M(1-3)		
Odor	☐	☐ Sewage ☐ Rancid/sour ☐ Petroleum/gas ☐ Sulfide ☐ Other:	☐ 1 – Faint	☐ 2 – Easily detected	☐ 3 – Noticeable from a distance
Color	☐	☐ Clear ☐ Brown ☐ Gray ☐ Yellow ☐ Green ☐ Orange ☐ Red ☐ Other:	☐ 1 – Faint colors in sample bottle	☐ 2 – Clearly visible in sample bottle	☐ 3 – Clearly visible in outfall flow
Turbidity	☐	See severity	☐ 1 – Slight cloudiness	☐ 2 – Cloudy	☐ 3 – Opaque
Floatables -Does Not Include Trash!!	☐	☐ Sewage (Toilet Paper, etc.) ☐ Suds ☐ Petroleum (oil sheen) ☐ Other:	☐ 1 – Few/slight; origin not obvious	☐ 2 – Some; indications of origin (e.g., possible suds or oil sheen)	☐ 3 - Some; origin clear (e.g., obvious oil sheen, suds, or floating sanitary materials)

Figure 32: Section 4 of the ORI Field Sheet

Odor

Section 4 asks for a description of any odors that emanate from the outfall and an associated severity score. Since noses have different sensitivities, the entire field crew should reach consensus about whether an odor is present and how severe it is. A severity score of one means that the odor is faint or the crew cannot agree on its presence or origin. A score of two indicates a moderate odor within the pipe. A score of three is assigned if the odor is so strong that the crew smells it a considerable distance away from the outfall.

TIP

Make sure the origin of the odor is the outfall. Sometimes shrubs, trash or carrion, or even the spray paint used to mark the outfall can confuse the noses of field crews.

Color

The color of the discharge, which can be clear, slightly tinted, or intense is recorded next. Color can be quantitatively analyzed in the lab, but the ORI only asks for a visual assessment of the discharge color and its intensity. The best way to measure color is to collect the discharge in a clear sample bottle and hold it up to the light (Figure 33). Field crews should also look for downstream plumes of color that appear to be associated with the outfall. Figure 34 illustrates the spectrum of colors that may be encountered during an ORI survey, and offers insight on how to rank the relative intensity or strength of discharge color. Color often helps identify industrial discharges; Appendix K provides guidance on colors often associated with specific industrial operations.

Turbidity

The ORI asks for a visual estimate of the turbidity of the discharge, which is a measure of the cloudiness of the water. Like color, turbidity is best observed in a clear sample bottle, and can be quantitatively measured using field probes. Crews should also look for turbidity in the plunge pool below the outfall, and note any downstream turbidity plumes that appear to be related to the outfall. Field crews can sometimes confuse turbidity with color, which are related but are not the same. Remember, turbidity is a measure of how easily light can penetrate through the sample bottle, whereas color is defined by the tint or intensity of the color observed. Figure 34 provides some examples of how to distinguish turbidity from color, and how to rank its relative severity.

Figure 33: Using a sample bottle to estimate color and turbidity

Color: Brown; Severity: 2
Turbidity Severity: 2

Color: Blue-green; Severity: 3
Turbidity Severity: 2

Highly Turbid Discharge
Color: Brown; Severity: 3
Turbidity Severity: 3

Sewage Discharge
Color: 3
Turbidity: 3

Paint
Color: White; Severity: 3
Turbidity: 3

Industrial Discharge
Color: Green; Severity: 3
Turbidity Severity: 3

Blood
Color: Red; Severity: 3
Turbidity Severity: None

Failing Septic System:
Turbidity Severity: 3

Turbidity in Downstream Plume
Turbidity Severity: 2
(also confirm with sample bottle)

High Turbidity in Pool
Turbidity Severity: 2
(Confirm with sample bottle)

Iron Floc
Color: Reddish Orange; Severity: 3
(Often associated with a natural source)

Slight Turbidity
Turbidity: 1
(Difficult to interpret this observation; May be natural or an illicit discharge)

Construction Site Discharge
Turbidity Severity: 3

Discharge of Rinse from Floor Sanding
(Found during wet weather)
Turbidity Severity: 3

Figure 34: Interpreting Color and Turbidity

Floatables

The last sensory indicator is the presence of any floatable materials in the discharge or the plunge pool below. Sewage, oil sheen, and suds are all examples of floatable indicators; trash and debris are generally not in the context of the ORI. The presence of floatable materials is determined visually, and some guidelines for ranking their severity are provided in Figure 35, and described below.

If you think the floatable is sewage, you should automatically assign it a severity score of three since no other source looks quite like it. Surface oil sheens are ranked based on their thickness and coverage. In some cases, surface sheens may not be related to oil discharges, but instead are created by in-stream processes, such as shown in Figure 36. A thick or swirling sheen associated with a petroleum-like odor may be diagnostic of an oil discharge.

Suds are rated based on their foaminess and staying power. A severity score of three is designated for thick foam that travels many feet before breaking up. Suds that break up quickly may simply reflect water turbulence, and do not necessarily have an illicit origin. Indeed, some streams have naturally occurring foams due to the decay of organic matter. On the other hand, suds that are accompanied by a strong organic or sewage-like odor may indicate a sanitary sewer leak or connection. If the suds have a fragrant odor, they may indicate the presence of laundry water or similar wash waters.

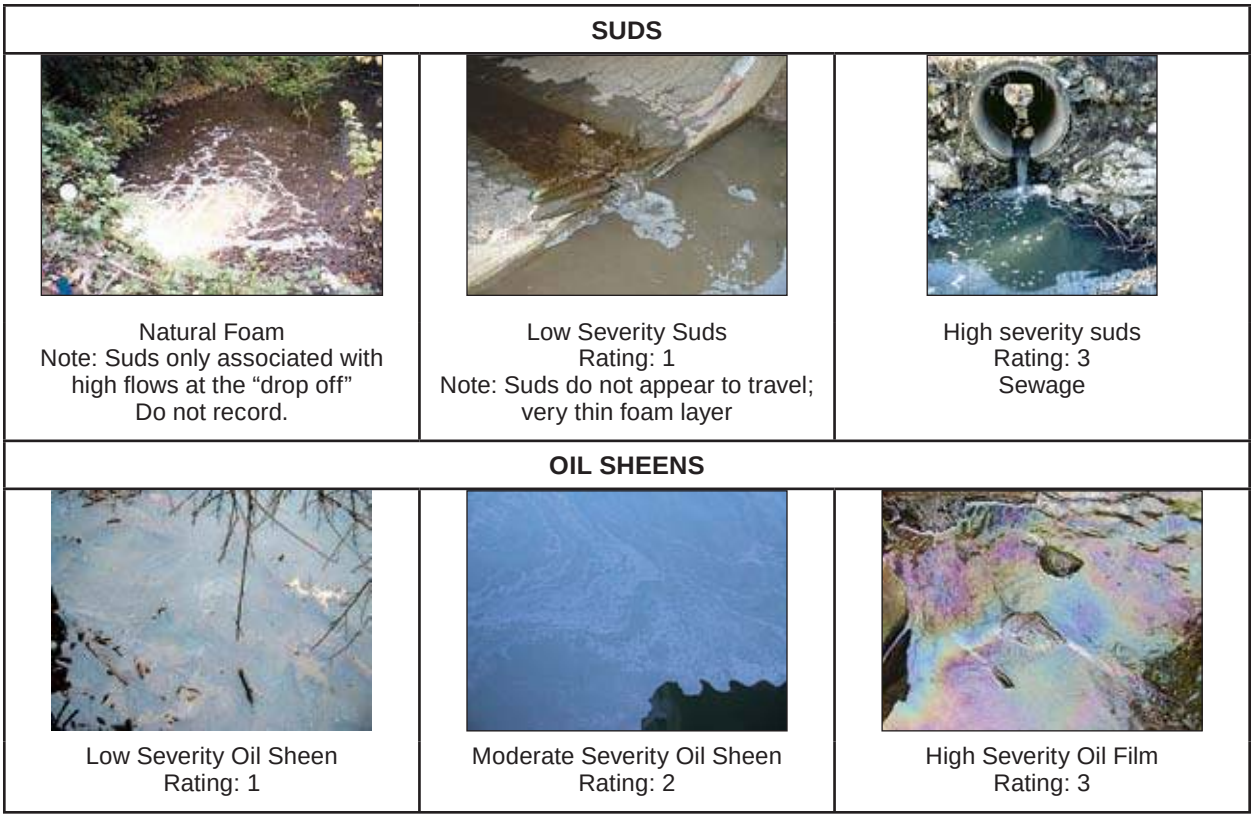


Figure 35: Determining the Severity of Floatables

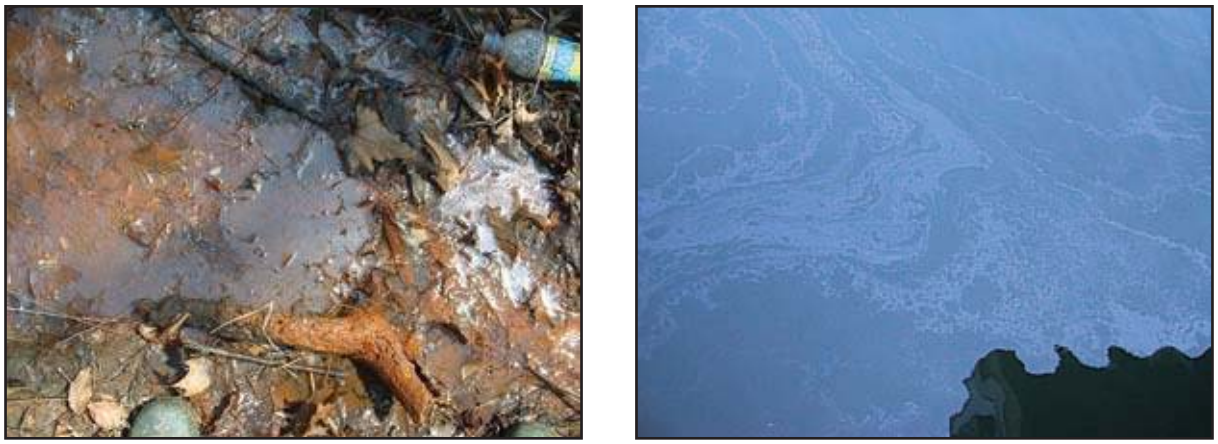


Figure 36: Synthetic versus Natural Sheen (a) Sheen from bacteria such as iron floc forms a sheet-like film that cracks if disturbed (b) Synthetic oil forms a swirling pattern

11.8 ORI Section 5 - Physical Indicators for Both Flowing and Non-Flowing Outfalls

Section 5 of the ORI field sheet examines physical indicators found at both **flowing and non-flowing** outfalls that can reveal the impact of past discharges (Figure 37). Physical indicators include outfall damage, outfall deposits or stains, abnormal vegetation growth, poor pool quality, and benthic growth on pipe surfaces. Common examples of physical indicators are portrayed in Figures 38 and 39. Many of these physical conditions can indicate that an intermittent or transitory discharge has occurred in the past, even if the pipe is not currently flowing. Physical indicators are not ranked according to their severity, because they are often subtle, difficult to interpret and could be caused by other sources. Still, physical indicators can provide strong clues about the discharge history of a storm water outfall, particularly if other discharge indicators accompany them.

Section 5: Physical Indicators for Both Flowing and Non-Flowing Outfalls
Are physical indicators that are not related to flow present? ☐ Yes ☐ No *(If No, Skip to Section 6)*

INDICATOR	CHECK if Present	DESCRIPTION	COMMENTS
Outfall Damage	☐	☐ Spalling, Cracking or Chipping ☐ Peeling Paint ☐ Corrosion	
Deposits/Stains	☐	☐ Oily ☐ Flow Line ☐ Paint ☐ Other:	
Abnormal Vegetation	☐	☐ Excessive ☐ Inhibited	
Poor pool quality	☐	☐ Odors ☐ Colors ☐ Floatables ☐ Oil Sheen ☐ Suds ☐ Excessive Algae ☐ Other:	
Pipe benthic growth	☐	☐ Brown ☐ Orange ☐ Green ☐ Other:	

Figure 37: Section 5 of the ORI Field Sheet

Bacterial growth at this outfall indicates nutrient enrichment and a likely sewage source.

This bright red bacterial growth often indicates high manganese and iron concentrations. Surprisingly, it is not typically associated with illicit discharges.

Sporalitis filamentous bacteria, also known as “sewage fungus” can be used to track down sanitary sewer leaks.

Algal mats on lakes indicate eutrophication. Several sources can cause this problem. Investigate potential illicit sources.

Illicit discharges or excessive nutrient application can lead to extreme algal growth on stream beds.

The drainage to this outfall most likely has a high nutrient concentration. The cause may be an illicit discharge, but may be excessive use of lawn chemicals.

This brownish algae indicates an elevated nutrient level.

Figure 38: Interpreting Benthic and Other Biotic Indicators

Reddish staining on the rocks below this outfall indicate high iron concentrations.

Toilet paper directly below the storm drain outlet.

Watershed Protection??

Trash is not an indicator of illicit discharges, but should be noted.

Staining at the base of the outfall may indicate a persistent, intermittent discharge.

Excessive vegetation may indicate enriched flows associated with sewage.

Brownish stain of unclear origin. May be from degradation of the brick infrastructure.

Cracked rock below the outfall may indicate an intermittent discharge.

Poor pool quality. Consider sampling from the pool to determine origin.

Figure 39: Typical Findings at Both Flowing and Non-Flowing Outfalls

11.9 ORI Sections 6-8 - Initial Outfall Designation and Actions

The last three sections of the ORI field sheet are where the crew designates the illicit discharge severity of the outfall and recommends appropriate management and monitoring actions (Figure 40). A discharge rating is designated as obvious, suspect, potential or unlikely, depending on the number and severity of discharge indicators checked in preceding sections.

It is important to understand that the ORI designation is only an initial determination of discharge potential. A more certain determination as to whether it actually is an illicit discharge is made using a more sophisticated indicator monitoring method. Nevertheless, the ORI outfall

designation gives program managers a better understanding of the distribution and severity of illicit discharge problems within a subwatershed.

Section 7 of the ORI field sheet records whether indicator samples were collected for laboratory analysis, or whether an intermittent flow trap was installed (e.g., an optical brightener trap or caulk dam described in Chapter 13). Field crews should record whether the sample was taken from a pool or directly from the outfall, and the type of intermittent flow trap used, if any. This section can also be used to recommend follow-up sampling, if the crew does not carry sample bottles or traps during the survey.

The last section of the ORI field sheet is used to note any unusual conditions near the outfall such as dumping, pipe failure, bank erosion or maintenance needs. While these maintenance conditions are not directly related to illicit discharge detection, they often are of interest to other agencies and utilities that maintain infrastructure.

11.10 Customizing the ORI for a Community

The ORI method is meant to be adaptable, and should be modified to reflect local conditions and field experience. Some indicators can be dropped, added or modified in the ORI form. This section looks at four of the most common adaptations to the ORI:

- Open Channels
- Submerged/Tidally Influenced Outfalls
- Cold Climates
- Use of Biological Indicators

In each case, it may be desirable to revise the ORI field sheet to collect data reflecting these conditions.

Open Channels

Field crews face special challenges in more rural communities that have extensive open channel drainage. The ditches and channels serve as the primary storm water conveyance system, and may lack storm drain and sewer pipes. The open channel network is often very long with only a few obvious outfalls that are located far apart. While the network can have illicit discharges from septic systems, they can typically only be detected in the ORI if a straight pipe is found. Some adaptations for open channel systems are suggested in Table 33.

Section 6: Overall Outfall Characterization

☐ Unlikely ☐ Potential (presence of two or more indicators) ☐ Suspect (one or more indicators with a severity of 3) ☐ Obvious

Section 7: Data Collection

1.	Sample for the lab?	☐ Yes	☐ No	
2.	If yes, collected from:	☐ Flow	☐ Pool	
3.	Intermittent flow trap set?	☐ Yes	☐ No	If Yes, type: ☐ OBM ☐ Caulk dam

Section 8: Any Non-Illicit Discharge Concerns (e.g., trash or needed infrastructure repairs)?

Figure 40: Sections 6-8 of the ORI Field Sheet

Submerged/Tidally Influenced Outfalls

The ORI can be problematic in coastal communities where outfalls are located along the waterfront and may be submerged at high tide. The ORI methods need to be significantly changed to address these constraints. Often, outfalls are initially located from offshore using canoes or boats, and then traced landward to the first manhole that is not tidally influenced. Field crews then access the storm drain pipe at the manhole and measure whatever indicators they can observe in the confined and dimly lit space. Table 33 recommends strategies to sample outfalls in the challenging environment of coastal communities.

Winter and Ice

Ice can be used as a discharge indicator in northern regions when ice forms in streams and pipes during the winter months (Figure 41). Because ice lasts for many weeks, and most illicit discharges are warm, astute field crews can interpret outfall history from ice melting patterns along pipes and streams. For example, exaggerated melting at a frozen or flowing outfall may indicate warm water from sewage or industrial discharge. Be careful, because groundwater is warm enough to cause some melting at below freezing temperatures. Also, ice acts like an intermittent flow trap, and literally freezes these discharges. Crews should also look for these traps to find any discolored ice within the pipe or below the outfall.

A final winter indicator is "rime ice," which forms when steam freezes. This beautiful ice formation is actually a good indicator of sewage or other relatively hot discharge that causes steam to form (Figure 41).

Biological Indicators

The diversity and pollution tolerance of various species of aquatic life are widely used as an indicator of overall stream health, and has sometimes been used to detect illicit discharges. One notable example is the presence of the red-eared slider turtle, which is used in Galveston, Texas to find sewage discharges, as they have a propensity for the nutrient rich waters associated with sewage (Figure 42).

Table 33: Special Considerations for Open Channels/Submerged Outfalls

OPEN CHANNELS	
Challenge	**Suggested Modification**
Too many miles of channel to walk	Stop walking at a given channel size or drainage area
Difficulty marking them	Mark on concrete or adjacent to earth channel
Interpreting physical indicators	For open channels with mild physical indicators, progress up the system to investigate further.
SUBMERGED/TIDALLY INFLUENCED OUTFALLS	
Challenge	**Suggested Modification**
Access for ORI – Tidal Influence	Access during low tide
Access for ORI – Always submerged	Access by boat or by shore walking
Interpreting physical indicators	For outfalls with mild physical indicators, also inspect from the nearest manhole that is not influenced by tides
Sampling (if necessary)	Sample "up pipe"

Figure 41: Cold climate indicators of illicit discharges

Figure 42: One biological indicator is this red-eared slider turtle

11.11 Interpreting ORI Data

The ORI generates a wealth of information that can provide managers with valuable insights about their illicit discharge problems, if the data are managed and analyzed effectively. The ORI can quickly define whether problems are clustered in a particular area or spread across the community. This section presents a series of methods to compile, organize and interpret ORI data, including:

1. Basic Data Management and Quality Control
2. Outfall Classification
3. Simple Suspect Outfall Counts
4. Mapping ORI Data
5. Subwatershed and Reach Screening
6. Characterizing IDDE Problems at the Community Level

The level of detail for each analysis method should be calibrated to local resources, program goals, and the actual discharge problems discovered in the stream corridor. In general, the most common conditions and problems will shape your initial monitoring strategy, which prioritizes the subwatersheds or reaches that will be targeted for more intensive investigations.

Program managers should analyze ORI data well before every stream mile is walked in the community, and use initial results to modify field methods. For example, if initial results reveal widespread potential problems, program managers may want to add more indicator monitoring to the ORI to track down individual discharge sources (see Chapter 12). Alternatively, if the same kind of discharge problem is repeatedly found, it may be wise to investigate whether there is a common source or activity generating it (e.g., high turbidity observed at many flowing outfalls as a result of equipment washing at active construction sites).

Basic Data Management and Quality Control

The ORI produces an enormous amount of raw data to characterize outfall conditions. It is not uncommon to compile dozens of individual ORI forms in a single subwatershed. The challenge is to devise a system to organize, process, and translate this data into simpler outputs and formats that can guide illicit discharge elimination efforts. The system starts with effective quality control procedures in the field.

Field sheets should be managed using either a three-ring binder or a clipboard. A small field binder offers the ability to quickly flip back and forth among the outfall forms. Authorization letters, emergency contact lists, and extra forms can also be tucked inside.

At the end of each day, field crews should regroup at a predetermined location to compare notes. The crew leader should confirm that all survey reaches and outfalls of interest have been surveyed, discuss initial findings, and deal with any logistical problems. This is also a good time to check whether field crews are measuring and recording outfall data in the same way, and are consistent in what they are (or are not) recording. Crew leaders should also use this time to review field forms for accuracy and thoroughness. Illegible handwriting should be neatened and details added to notes and any sketches. The crew leader should also organize the forms together into a single master binder or folder for future analysis.

Once crews return from the field, data should be entered into a spreadsheet or database. A Microsoft Access database is provided with this Manual as part of Appendix D (Figure 43), and is supplied on a compact disc with each hard copy. It can also be downloaded with Appendix D from http://www.stormwatercenter.net. Information stored in this database can easily be imported into a GIS for mapping purposes. The GIS can generate its own database table that allows the user to create subwatershed maps showing outfall characteristics and problem areas.

Once data entry is complete, be sure to check the quality of the data. This can be done quickly by randomly spot-checking 10% of the entered data. For example, if 50 field sheets were completed, check five of the spreadsheet or database entries. When transferring data into GIS, quality control maps that display labeled problem outfalls should be created. Each survey crew is responsible for reviewing the accuracy of these maps.

Outfall Classification

A simple outfall designation system has been developed to summarize the discharge potential for individual ORI field sheets. Table 34 presents the four outfall designations that can be made.

Table 34: Outfall Designation System Using ORI Data

Designation	Description
1. Obvious Discharge	Outfalls where there is an illicit discharge that doesn't even require sample collection for confirmation
2. Suspect Discharge	Flowing outfalls with high severity on one or more physical indicators
3. Potential Discharge	Flowing or non-flowing outfalls with presence of two or more physical indicators
4. Unlikely Discharge	Non-flowing outfalls with no physical indicators of an illicit discharge

Simple Suspect Outfall Counts

The first priority is to count the frequency of each outfall designation in the subwatershed or the community as a whole. This simple screening analysis counts the number of problem outfalls per stream mile (i.e., the sum of outfalls designated as having potential, suspected or obvious illicit discharge potential). The density of problem outfalls per stream mile is an important metric to target and screen subwatersheds.

Based on problem outfall counts, program managers may discover that a particular monitoring strategy may not apply to the community. For example, if few problem outfalls are found, an extensive follow-up monitoring program may not be needed, so that program resources can be shifted to pollution hotlines to report and control transitory discharges such as illegal dumping. The key point of this method is to avoid getting lost in the raw data, but look instead to find patterns that can shape a cost-effective IDDE program.

Mapping ORI Data

Maps are an excellent way to portray outfall data. If a GIS system is linked to the ORI database, maps that show the spatial distribution of problem outfalls, locations of dumping, and overall reach conditions can be easily generated. Moreover, GIS provides flexibility that allows for rapid updates to maps as new data are collected and compiled. The sophistication and detail of maps will depend on the initial findings, program goals, available software, and GIS capability.

Subwatershed maps are also an effective and important communication and education tool to engage stakeholders (e.g., public officials, businesses and community residents), as they can visually depict reach quality and the location of problem outfalls. The key point to remember is that maps are tools for understanding data. Try to map with a purpose in mind. A large number of cluttered maps may only confuse, while a smaller number with select data may stimulate ideas for the follow-up monitoring strategy.

Subwatershed and Survey Reach Screening

Problem outfall metrics are particularly valuable to screen or rank priority subwatersheds or survey reaches. The basic approach is simple: select the outfall metrics that are most important to IDDE program goals, and then see how individual subwatersheds or reaches rank in the process. This screening process can help determine which subwatersheds will be priorities for initial follow-up monitoring efforts. When feasible, the screening process should incorporate non-ORI data, such as existing dry weather water quality data, citizen complaints, permitted facilities, and habitat or biological stream indicators.

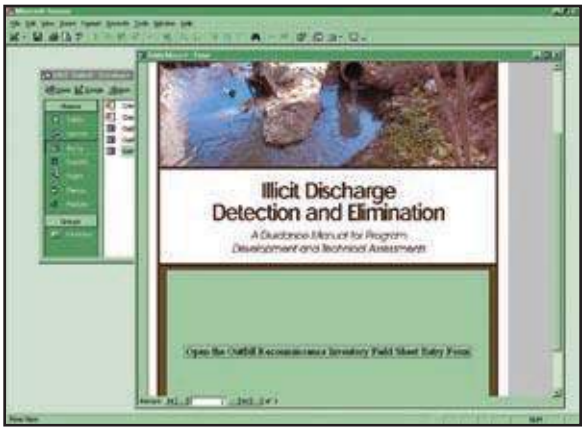


Figure 43: Sample screen from ORI Microsoft Access database

An example of how outfall metrics can screen subwatersheds is provided in Table 35. In this hypothetical example, four metrics were used to screen three subwatersheds within a community: number of suspect discharges, subwatershed population as a percent of the total community, number of industrial discharge permits, and number of outfalls per stream mile. Given these screening criteria, subwatershed C was selected for the next phase of detailed investigation.

Characterizing the IDDE Problem at the Community Level

ORI data should be used to continuously revisit and revise the IDDE program as more is learned about the nature and distribution of illicit discharge problems in the community. For example, ORI discharge designation should be compared against illicit discharge potential (IDP) predictions made during the original desktop analysis (Chapter 5) to refine discharge screening factors, and formulate new monitoring strategies.

In general, community illicit discharge problem can be characterized as minimal, clustered, or severe (Table 36). In the minimal scenario, very few and scattered problems exist; in the clustered scenario, problems are located in isolated subwatersheds; and in the severe scenario, problems are widespread.

Table 35: An Example of ORI Data Being Used to Compare Across Subwatersheds

	# of suspect discharges	Population as % of total community	# of industrial discharge permits	# of outfalls per stream/ conveyance mile
Subwatershed A	2	30	4	6
Subwatershed B	1	10	0	3
Subwatershed C	8	60	2	12

Table 36: Using Stream and ORI Data to Categorize IDDE Problems

Extent	ORI Support Data
Minimal	• Less than 10% of total outfalls are flowing • Less than 20% of total outfalls with obvious, suspect or potential designation
Clustered	• Two thirds of the flowing outfalls are located within one third of the subwatersheds • More than 20% of the communities subwatersheds have greater than 20% of outfalls with obvious, suspect or potential designation
Severe	• More than 10% of total outfalls are flowing • More than 50% of total outfalls with obvious, suspect or potential designation • More than 20% of total outfalls with obvious or suspect designation

11.12 Budgeting and Scoping the ORI

Many different factors come into play when budgeting and scoping an ORI survey: equipment needs, crew size and the stream miles that must be covered. This section presents some simple rules of thumb for ORI budgeting.

Equipment costs for the ORI are relatively minor, with basic equipment to outfit one team of three people totaling about $800 (Table 37). This cost includes one-time expenses to acquire waders, a digital camera and a GPS unit, as well as disposable supplies.

The majority of the budget for an ORI is for staffing the desktop analysis, field crews and data analysis. Field crews can consist of two or three members, and cover about two to three miles of stream (or open channel) per day. Three staff-days should be allocated for pre- and post-field work for each day spent in the field.

Table 38 presents example costs for two hypothetical communities that conduct the ORI. Community A has 10 miles of open channel to investigate, while Community B has 20 miles. In addition, Community A has fewer staff resources available and therefore uses two-person field crews, while Community B uses three-person field crews. Total costs are presented as annual costs, assuming that each community is able to conduct the ORI for all miles in one year.

Table 37: Typical Field Equipment Costs for the ORI

Item	Cost
100 Latex Disposable Gloves	$25
5 Wide Mouth Sample Bottles (1 Liter)	$20
Large Cooler	$25
3 Pairs of Waders	$150
Digital Camera	$200
20 Cans of Spray Paint	$50
Test Kits or Probes	$100-$500
1 GPS Unit	$150
1 Measuring Tape	$10
1 First Aid Kit	$30
Flashlights, Batteries, Labeling tape, Clipboards	$25
Total	**$785-$1185**

Table 38: Example ORI Costs		
Item	**Community A**	**Community B**
Field Equipment[1]	$700	$785
Staff Field Time[2]	$2,000	$6,000
Staff Office Time[3]	$3,000	$6,000
Total	**$5,700**	**$12,785**

[1] From Table 44
[2] Assumes $25/hour salary (2 person teams in Community A and three- person teams in Community B) and two miles of stream per day.
[3] Assumes three staff days for each day in field.

Chapter 13: Tracking Discharges To A Source

Once an illicit discharge is found, a combination of methods is used to isolate its specific source. This chapter describes the four investigation options that are introduced below.

Storm Drain Network Investigation

Field crews strategically inspect manholes within the storm drain network system to measure chemical or physical indicators that can isolate discharges to a specific segment of the network. Once the pipe segment has been identified, on-site investigations are used to find the specific discharge or improper connection.

Drainage Area Investigation

This method relies on an analysis of land use or other characteristics of the drainage area that is producing the illicit discharge. The investigation can be as simple as a "windshield" survey of the drainage area or a more complex mapping analysis of the storm drain network and potential generating sites. Drainage area investigations work best when prior indicator monitoring reveals strong clues as to the likely generating site producing the discharge.

On-site Investigation

On-site methods are used to trace the source of an illicit discharge in a pipe segment, and may involve dye, video or smoke testing within isolated segments of the storm drain network.

Septic System Investigation

Low-density residential watersheds may require special investigation methods if they are not served by sanitary sewers and/or storm water is conveyed in ditches or swales. The major illicit discharges found in low-density development are failing septic systems and illegal dumping. Homeowner surveys, surface inspections and infrared photography have all been effectively used to find failing septic systems in low-density watersheds.

13.1 Storm Drain Network Investigations

This method involves progressive sampling at manholes in the storm drain network to narrow the discharge to an isolated pipe segment between two manholes. Field crews need to make two key decisions when conducting a storm drain network investigation—where to start sampling in the network and what indicators will be used to determine whether a manhole is considered clean or dirty.

Where to Sample in the Storm Drain Network

The field crew should decide how to attack the pipe network that contributes to a problem outfall. Three options can be used:

- Crews can work progressively up the trunk from the outfall and test manholes along the way.
- Crews can split the trunk into equal segments and test manholes at strategic junctions in the storm drain system.
- Crews can work progressively down from the upper parts of the storm drain network toward the problem outfall.

The decision to move up, split, or move down the trunk depends on the nature and land use of the contributing drainage area. Some guidance for making this decision is provided in Table 53. Each option requires different levels of advance preparation. Moving up the trunk can begin immediately when an illicit discharge is detected at the outfall, and only requires a map of the storm drain system. Splitting the trunk and moving down the system require a little more preparation to analyze the storm drain map to find the critical branches to strategically sample manholes. Accurate storm drain maps are needed for all three options. If good mapping is not available, dye tracing can help identify manholes, pipes and junctions, and establish a new map of the storm drain network.

Option 1: Move up the Trunk

Moving up the trunk of the storm drain network is effective for illicit discharge problems in relatively small drainage areas. Field crews start with the manhole closest to the outfall, and progressively move up the network, inspecting manholes until indicators reveal that the discharge is no longer present (Figure 50). The goal is to isolate the discharge between two storm drain manholes.

Table 53: Methods to Attack the Storm Drain Network

Method	Nature of Investigation	Drainage System	Advance Prep Required
Follow the discharge up	Narrow source of an individual discharge	Small diameter outfall (< 36”) Simple drainage network	No
Split into segments	Narrow source of a discharge identified at outfall	Large diameter outfall (> 36”), Complex drainage Logistical or traffic issues may make sampling difficult.	Yes
Move down the storm drain	Multiple types of pollution, many suspected problems—possibly due to old plumbing practices or number of NPDES permits	Very large drainage area (> one square mile).	Yes

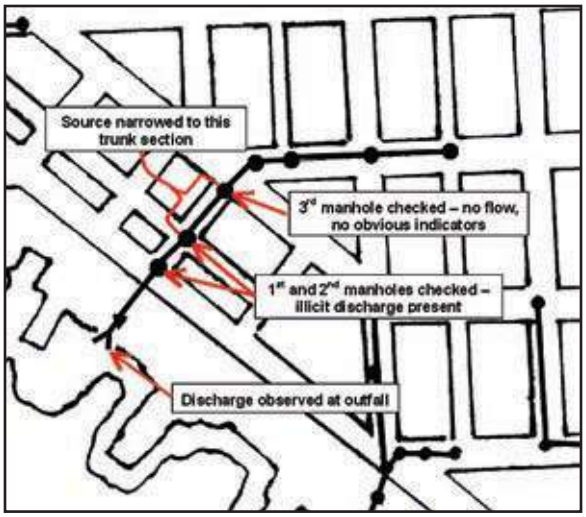


Figure 50: Example investigation following the source up the storm drain system

Option 2: Split the storm drain network

When splitting the storm drain network, field crews select strategic manholes at junctions in the storm drain network to isolate discharges. This option is particularly suited in larger and more complex drainage areas since it can limit the total number of manholes to inspect, and it can avoid locations where access and traffic are problematic.

The method for splitting the trunk is as follows:

1. Review a map of the storm drain network leading to the suspect outfall.
2. Identify major contributing branches to the trunk. The trunk is defined as the largest diameter pipe in the storm drain network that leads directly to the outfall. The "branches" are networks of smaller pipes that contribute to the trunk.
3. Identify manholes to inspect at the farthest downstream node of each contributing branch and one immediately upstream (Figure 51).
4. Working up the network, investigate manholes on each contributing branch and trunk, until the source is narrowed to a specific section of the trunk or contributing branch.
5. Once the discharge is narrowed to a specific section of trunk, select the appropriate on-site investigation method to trace the exact source.
6. If narrowed to a contributing branch, move up or split the branch until a specific pipe segment is isolated, and commence the appropriate on-site investigation to determine the source.

Option 3: Move down the storm drain network

In this option, crews start by inspecting manholes at the "headwaters" of the storm drain network, and progressively move down pipe. This approach works best in very large drainage areas that have many potential continuous and/or intermittent discharges. The Boston Water and Sewer Commission has employed the headwater option to investigate intermittent discharges in complex drainage areas up to three square miles (Jewell, 2001). Field crews certify that each upstream branch of the storm drain network has no contributing discharges before moving down pipe to a "junction manhole" (Figure 52). If discharges are found, the crew performs dye testing to pinpoint the discharge. The crew then confirms that the discharge is removed before moving farther down the pipe network. Figure 53 presents a detailed flow chart that describes this option for analyzing the storm drain network.

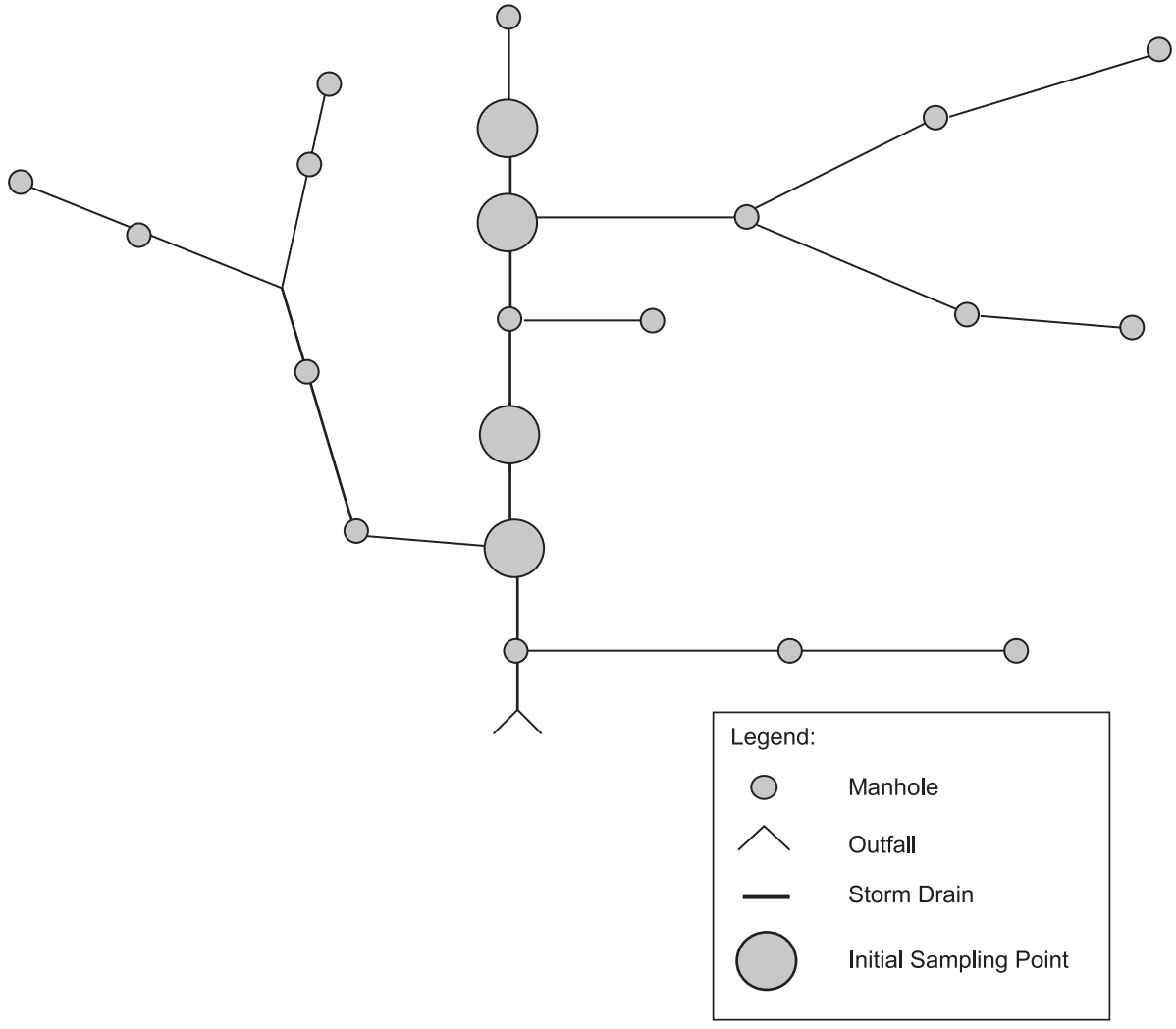


Figure 51: Key initial sampling points along the trunk of the storm drain

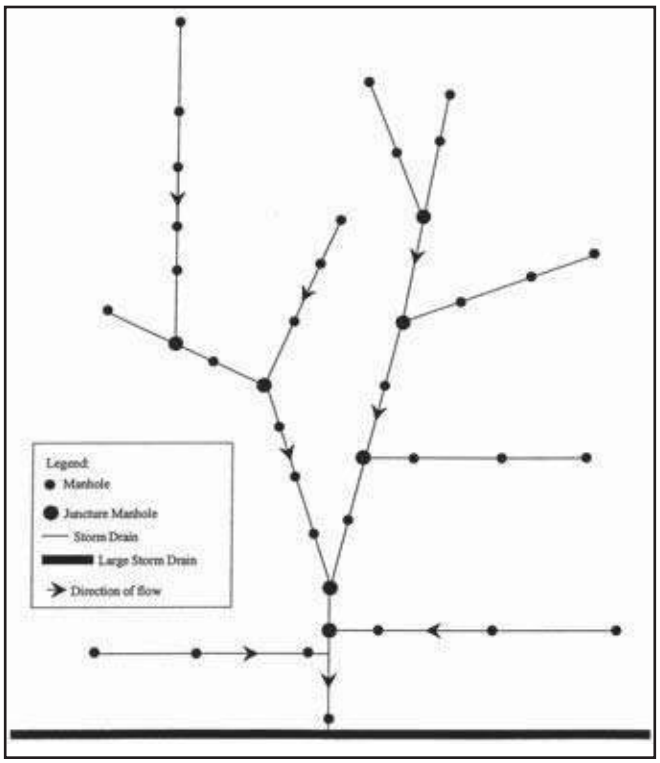


Figure 52: Storm Drain Schematic Identifying "Juncture Manholes" (Source: Jewell, 2001)

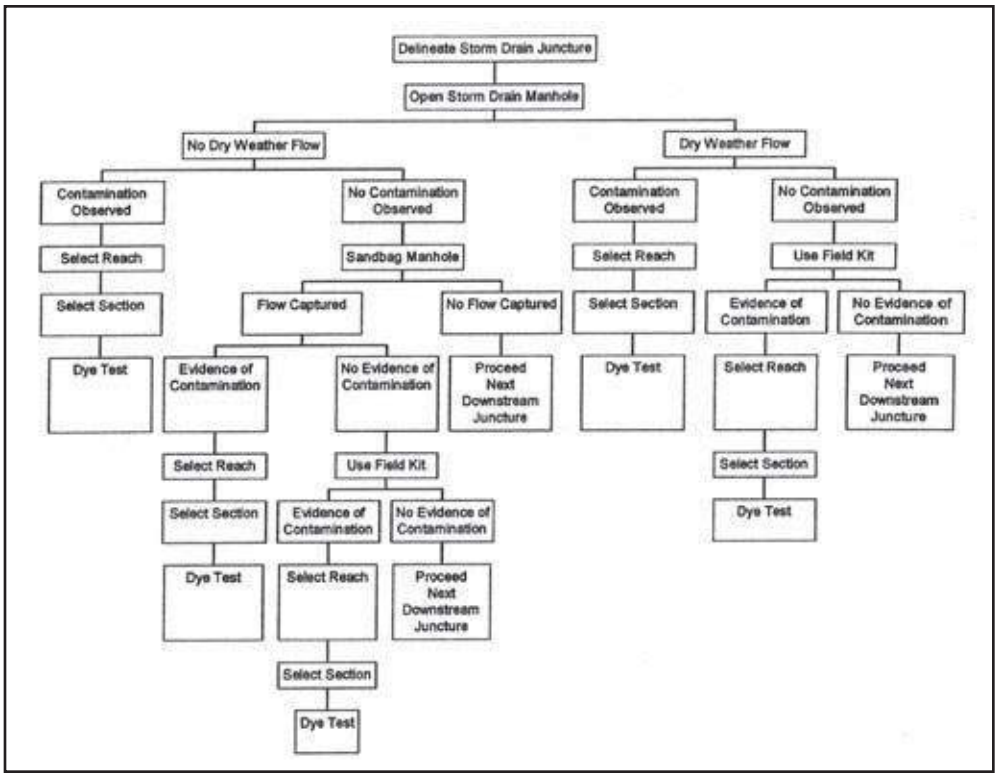


Figure 53: A Process for Following Discharges Down the Pipe (Source: Jewell, 2001)

Dye Testing to Create a Storm Drain Map

As noted earlier, storm drain network investigations are extremely difficult to perform if accurate storm drain maps are not available. In these situations, field crews may need to resort to dye testing to determine the flowpath within the storm drain network. Fluorescent dye is introduced into the storm drain network and suspected manholes are then inspected to trace the path of flow through the network (U.S. EPA, 1990). Two or three member crews are needed for dye testing. One person drops the dye into the trunk while the other(s) looks for evidence of the dye down pipe.

To conduct the investigation, a point of interest or down pipe "stopping point" is identified. Dye is then introduced into manholes upstream of the stopping point to determine if they are connected. The process continues in a systematic manner until an upstream manhole can no longer be determined, whereby a branch or trunk of the system can be defined, updated or corrected. More information on dye testing methods is provided in Section 13.3.

Manhole Inspection: Visual Observations and Indicator Sampling

Two primary methods are used to characterize discharges observed during manhole inspections—visual observations and indicator sampling. In both methods, field crews must first open the manhole to determine whether an illicit discharge is present. Manhole inspections require a crew of two and should be conducted during dry weather conditions.

Basic field equipment and safety procedures required for manhole inspections are outlined in Table 54. In particular, field crews need to be careful about how they will safely divert traffic (Figure 54). Other safety considerations include proper lifting of manhole covers to reduce the potential for back injuries, and testing whether any toxic or flammable fumes exist within the manhole before the cover is removed. Wayne County, MI has developed some useful operational procedures for inspecting manholes, which are summarized in Table 55.

Table 54: Basic Field Equipment Checklist

- Camera and film or digital camera
- Clipboards
- Field sheets
- Field vehicle
- First aid kit
- Flashlight or spotlight
- Gas monitor and probe
- Manhole hook/crow bar
- Mirror
- Storm drain, stream, and street maps
- Reflective safety vests
- Rubber / latex gloves
- Sledgehammer
- Spray paint
- Tape measures
- Traffic cones
- Two-way radios
- Waterproof marker/ pen
- Hand held global positioning satellite (GPS) system receiver (best resolution available within budget, at least 6' accuracy)

Figure 54: Traffic cones divert traffic from manhole inspection area

Table 55: Field Procedure for Removal of Manhole Covers
(Adapted from: Pomeroy et al., 1996)

Field Procedures:

1. Locate the manhole cover to be removed.
2. Divert road and foot traffic away from the manhole using traffic cones.
3. Use the tip of a crowbar to lift the manhole cover up high enough to insert the gas monitor probe. Take care to avoid creating a spark that could ignite explosive gases that may have accumulated under the lid. Follow procedures outlined for the gas monitor to test for accumulated gases.
4. If the gas monitor alarm sounds, close the manhole immediately. Do not attempt to open the manhole until some time is allowed for gases to dissipate.
5. If the gas monitor indicates the area is clear of hazards, remove the monitor probe and position the manhole hook under the flange. Remove the crowbar. Pull the lid off with the hook.
6. When testing is completed and the manhole is no longer needed, use the manhole hook to pull the cover back in place. Make sure the lid is settled in the flange securely.
7. Check the area to ensure that all equipment is removed from the area prior to leaving.

Safety Considerations:

1. Do not lift the manhole cover with your back muscles.
2. Wear steel-toed boots or safety shoes to protect feet from possible crushing injuries that could occur while handling manhole covers.
3. Do not move manhole covers with hands or fingers.
4. Wear safety vests or reflective clothing so that the field crew will be visible to traffic.
5. Manholes may only be entered by properly trained and equipped personnel and when all OSHA and local rules a.

Visual Observations During Manhole Inspection

Visual observations are used to observe conditions in the manhole and look for any signs of sewage or dry weather flow. Visual observations work best for obvious illicit discharges that are not masked by groundwater or other "clean" discharges, as shown in Figure 55. Typically, crews progressively inspect manholes in the storm drain network to look for contaminated flows. Key visual observations that are made during manhole inspections include:

- Presence of flow
- Colors
- Odors
- Floatable materials
- Deposits or stains (intermittent flows)

Figure 55: Manhole observation (left) indicates a sewage discharge. Source is identified at an adjacent sewer manhole that overflowed into the storm drain system (right).

Indicator Sampling

If dry weather flow is observed in the manhole, the field crew can collect a sample by attaching a bucket or bottle to a tape measure/rope and lowering it into the manhole (Figure 56). The sample is then immediately analyzed in the field using probes or other tests to get fast results as to whether the flow is clean or dirty. The most common indicator parameter is ammonia, although other potential indicators are described in Chapter 12.

Manhole indicator data is analyzed by looking for "hits," which are individual samples that exceed a benchmark concentration. In addition, trends in indicator concentrations are also examined throughout the storm drain network.

Figure 56: Techniques to sample from the storm drain

Figure 57 profiles a storm drain network investigation that used ammonia as the indicator parameter and a benchmark concentration of 1.0 mg/L. At both the outfall and the first manhole up the trunk, field crews recorded finding "hits" for ammonia of 2.2 mg/L and 2.3 mg/L, respectively. Subsequent manhole inspections further up the network revealed one manhole with no flow, and a second with a hit for ammonia (2.4 mg/L). The crew then tracked the discharge upstream of the second manhole, and found a third manhole with a low ammonia reading (0.05 mg/L) and a fourth with a much higher reading (4.3 mg/L). The crew then redirected its effort to sample above the fourth manhole with the 4.3 mg/L concentration, only to find another low reading. Based on this pattern, the crew concluded the discharge source was located between these two manholes, as nothing else could explain this sudden increase in concentration over this length of pipe.

The results of storm drain network investigations should be systematically documented to guide future discharge investigations, and describe any infrastructure maintenance problems encountered. An example of a sample manhole inspection field log is displayed in Figure 58.

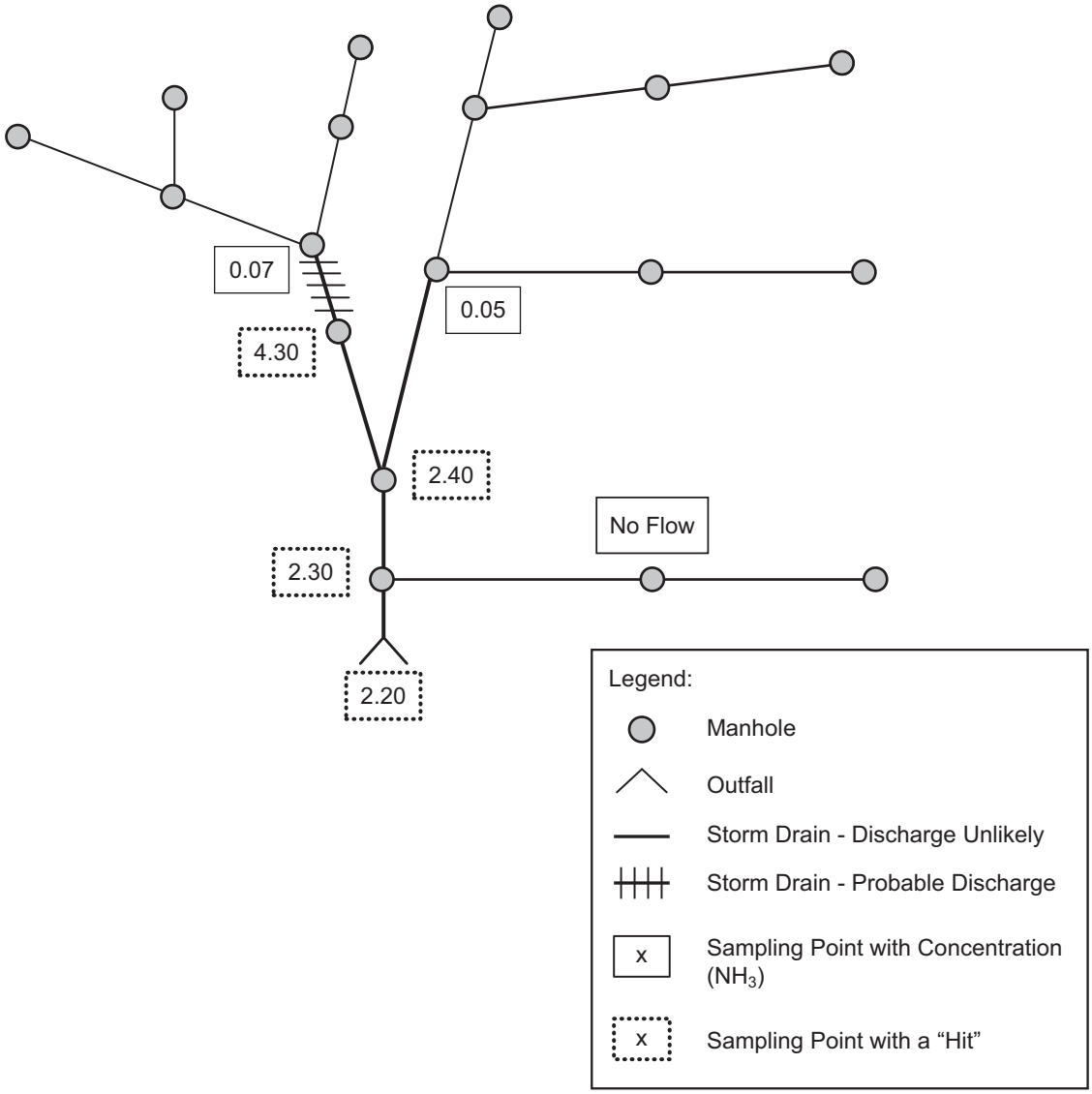
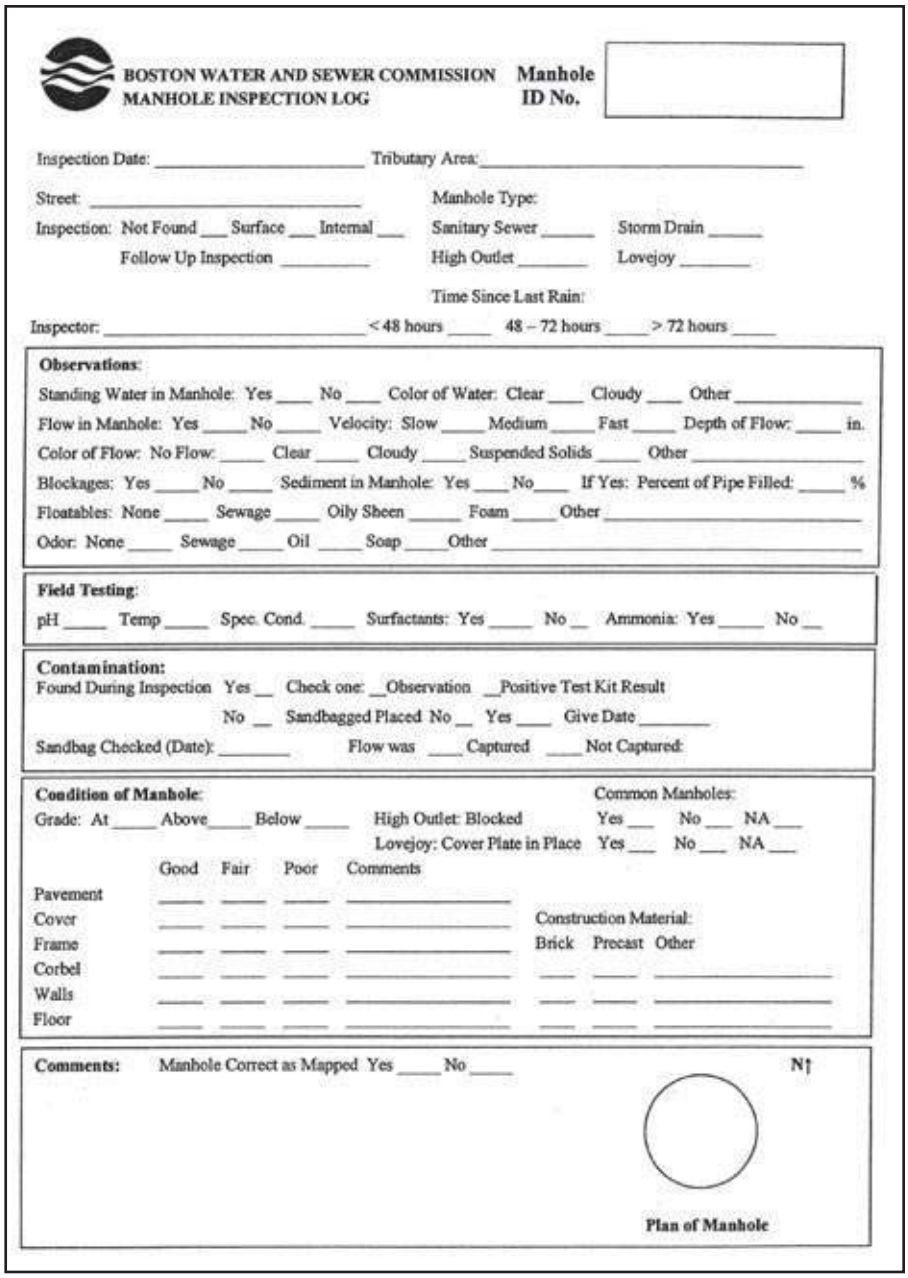


Figure 57: Use of ammonia as a trace parameter to identify illicit discharges



BOSTON WATER AND SEWER COMMISSION
MANHOLE INSPECTION LOG

Manhole ID No. _____

Inspection Date: _____ Tributary Area: _____

Street: _____ Manhole Type:

Inspection: Not Found ___ Surface ___ Internal ___ Sanitary Sewer _____ Storm Drain _____

Follow Up Inspection _____ High Outlet _____ Lovejoy _____

Time Since Last Rain:

Inspector: _____ < 48 hours _____ 48 – 72 hours _____ > 72 hours _____

Observations:

Standing Water in Manhole: Yes ____ No ____ Color of Water: Clear ____ Cloudy ____ Other _____

Flow in Manhole: Yes _____ No _____ Velocity: Slow _____ Medium _____ Fast _____ Depth of Flow: _____ in.

Color of Flow: No Flow: _____ Clear _____ Cloudy _____ Suspended Solids _____ Other _____

Blockages: Yes _____ No _____ Sediment in Manhole: Yes ____ No____ If Yes: Percent of Pipe Filled: _____ %

Floatables: None _____ Sewage _____ Oily Sheen _____ Foam _____ Other _____

Odor: None _____ Sewage _____ Oil _____ Soap _____ Other _____

Field Testing:

pH _____ Temp _____ Spec. Cond. _____ Surfactants: Yes _____ No __ Ammonia: Yes _____ No __

Contamination:

Found During Inspection Yes __ Check one: __Observation __Positive Test Kit Result

No __ Sandbagged Placed No __ Yes ____ Give Date _____

Sandbag Checked (Date): _____ Flow was ____ Captured ____ Not Captured:

Condition of Manhole: Common Manholes:

Grade: At _____ Above _____ Below _____ High Outlet: Blocked Yes ___ No ___ NA ___

Lovejoy: Cover Plate in Place Yes ___ No ___ NA ___

	Good	Fair	Poor	Comments	Construction Material: Brick	Precast	Other
Pavement	____	____	____	_____			
Cover	____	____	____	_____			
Frame	____	____	____	_____			
Corbel	____	____	____	_____	____	____	_____
Walls	____	____	____	_____	____	____	_____
Floor	____	____	____	_____	____	____	_____

Comments: Manhole Correct as Mapped Yes _____ No _____

N↑

Plan of Manhole

Figure 58: Boston Water and Sewer Commission Manhole Inspection Log (Source: Jewell, 2001)

Methods to isolate intermittent discharges in the storm drain network

Intermittent discharges are often challenging to trace in the storm drain network, although four techniques have been used with some success.

Sandbags

This technique involves placement of sandbags or similar barriers within strategic manholes in the storm drain network to form a temporary dam that collects any intermittent flows that may occur. Any flow collected behind the sandbag is then assessed using visual observations or by indicator sampling. Sandbags are lowered on a rope through the manhole to form a dam along the bottom of the storm drain, taking care not to fully block the pipe (in case it rains before the sandbag is retrieved). Sandbags are typically installed at junctions in the network to eliminate contributing branches from further consideration (Figure 59). If no flow collects behind the sandbag, the upstream pipe network can be ruled out as a source of the intermittent discharge.

Sandbags are typically left in place for no more than 48 hours, and should only be installed when dry weather is forecast. Sandbags should not be left in place during a heavy rainstorm. They may cause a blockage in the storm drain, or, they may be washed downstream and lost. The biggest downside to sandbagging is that it requires at least two trips to each manhole.

Optical Brightener Monitoring (OBM) Traps

Optical brightener monitoring (OBM) traps, profiled in Chapter 12, can also be used to detect intermittent flows at manhole junctions. When these absorbent pads are anchored in the pipe to capture dry weather flows, they can be used to determine the presence of flow and/or detergents. These OBM traps are frequently installed by lowering them into an open-grate drop inlet or storm drain inlet, as shown in Figure 60. The pads are then retrieved after 48 hours and are observed under a fluorescent light (this method is most reliable for undiluted washwaters).

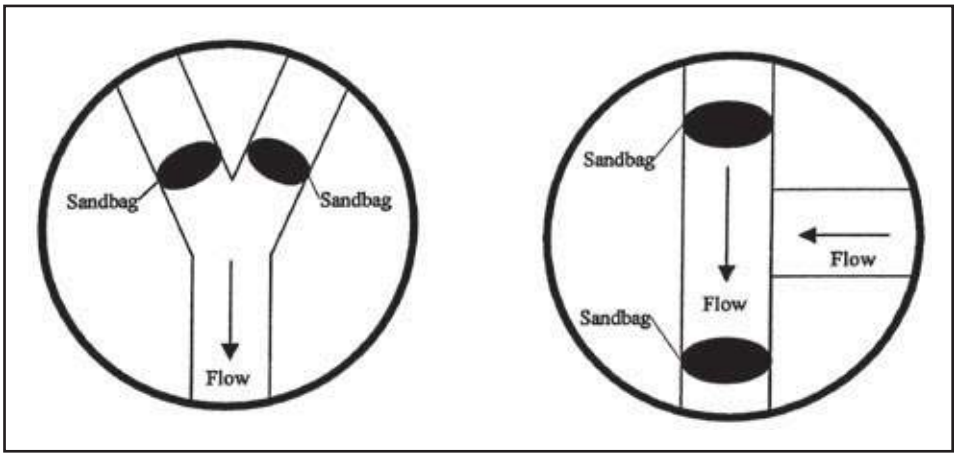


Figure 59: Example sandbag placement (Source: Jewell, 2001)

Figure 60: Optical Brightener Placement in the Storm Drain
(Source: Sargent and Castonguay, 1998)

Automatic Samplers

A few communities have installed automated samplers at strategic points within the storm drain network system that are triggered by small dry weather flows and collect water quality samples of intermittent discharges. Automated sampling can be extremely expensive, and is primarily used in very complex drainage areas that have severe intermittent discharge problems. Automated samplers can pinpoint the specific date and hours when discharges occur, and characterize its chemical composition, which can help crews fingerprint the generating source.

Observation of Deposits or Stains

Intermittent discharges often leave deposits or stains within the storm drain pipe or manhole after they have passed. Thus, crews should note whether any deposits or stains are present in the manhole, even if no dry weather flow is observed. In some cases, the origin of the discharge can be surmised by collecting indicator samples in the water ponded within the manhole sump. Stains and deposits, however, are not always a conclusive way to trace intermittent discharges in the storm drain network.

13.2 Drainage Area Investigations

The source of some illicit discharges can be determined through a survey or analysis of the drainage area of the problem outfall. The simplest approach is a rapid windshield survey of the drainage area to find the potential discharger or generating sites. A more sophisticated approach relies on an analysis of available GIS data and permit databases to identify industrial or other generating sites. In both cases, drainage area investigations are only effective if the discharge observed at an outfall has distinct or unique characteristics that allow crews to quickly ascertain the probable operation or business that is generating it. Often, discharges with a unique color, smell, or off-the-chart indicator sample reading may point to a specific industrial or commercial source. Drainage area investigations are not helpful in tracing sewage discharges, since they are often not always related to specific land uses or generating sites.

Rapid Windshield Survey

A rapid drive-by survey works well in small drainage areas, particularly if field crews are already familiar with its business operations. Field crews try to match the characteristics of the discharge to the most likely type of generating site, and then inspect all of the sites of the same type within the drainage area until the culprit is found. For example, if fuel is observed at an outfall, crews might quickly check every business operation in the catchment that stores or dispenses fuel. Another example is illustrated in Figure 61 where extremely dense algal growth was observed in a small stream during the winter. Field crews were aware of a fertilizer storage site in the drainage area, and a quick inspection identified it as the culprit.

Figure 61: Symptom (left): Discoloration of stream; Diagnosis: Extra hydroseed leftover from an upstream application (middle) was dumped into a storm drain by municipal officials (right).

A third example of the windshield survey approach is shown in Figure 62, where a very thick, sudsy and fragrant discharge was noted at a small outfall. The discharge appeared to consist of wash water, and the only commercial laundromat found upstream was confirmed to be the source. On-site testing may still be needed to identify the specific plumbing or connection generating the discharge.

Detailed Drainage Area Investigations

In larger or more complex drainage areas, GIS data can be analyzed to pinpoint the source of a discharge. If only general land use data exist, maps can at least highlight suspected industrial areas. If more detailed SIC code data are available digitally, the GIS can be used to pull up specific hotspot operations or generating sites that could be potential dischargers. Some of the key discharge indicators that are associated with hotspots and specific industries are reviewed in Appendix K.

13.3 On-site Investigations

On-site investigations are used to pinpoint the exact source or connection producing a discharge within the storm drain network. The three basic approaches are dye, video and smoke testing. While each approach can determine the actual source of a discharge, each needs to be applied under the right conditions and test limitations (see Table 56). It should be noted that on-site investigations are not particularly effective in finding *indirect* discharges to the storm drain network.

Figure 62: The sudsy, fragrant discharge (left) indicates that the laundromat is the more likely culprit than the florist (right).

Table 56: Techniques to Locate the Discharge		
Technique	**Best Applications**	**Limitations**
Dye Testing	• Discharge limited to a very small drainage area (<10 properties is ideal) • Discharge probably caused by a connection from an individual property • Commercial or industrial land use	• May be difficult to gain access to some properties
Video Testing	• Continuous discharges • Discharge limited to a single pipe segment • Communities who own equipment for other investigations	• Relatively expensive equipment • Cannot capture non-flowing discharges • Often cannot capture discharges from pipes submerged in the storm drain
Smoke Testing	• Cross-connection with the sanitary sewer • Identifying other underground sources (e.g., leaking storage techniques) caused by damage to the storm drain	• Poor notification to public can cause alarm • Cannot detect all illicit discharges

TIP

The Wayne County Department of the Environment provides excellent training materials on on-site investigations, as well as other illicit discharge techniques. More information about this training can be accessed from their website: http://www.wcdoe.org/Watershed/Programs___Srvcs_/IDEP/idep.htm.

Figure 63: Dye Testing Plumbing (NEIWPCC, 2003)

Dye Testing

Dye testing is an excellent indicator of illicit connections and is conducted by introducing non-toxic dye into toilets, sinks, shop drains and other plumbing fixtures (see Figure 63). The discovery of dye in the storm drain, rather than the sanitary sewer, conclusively determines that the illicit connection exists.

Before commencing dye tests, crews should review storm drain and sewer maps to identify lateral sewer connections and how they can be accessed. In addition, property owners must be notified to obtain entry permission. For industrial or commercial properties, crews should carry a letter to document their legal authority to gain access to the property. If time permits, the letter can be sent in advance of the dye testing. For residential properties, communication can be more challenging. Unlike commercial properties, crews are not guaranteed access to homes, and should call ahead to ensure that the owner will be home on the day of testing.

Communication with other local agencies is also important since any dye released to the storm drain could be mistaken for a spill or pollution episode. To avoid a costly and embarrassing response to a false alarm,

crews should contact key spill response agencies using a "quick fax" that describes when and where dye testing is occurring (Tuomari and Thomson, 2002). In addition, crews should carry a list of phone numbers to call spill response agencies in the event dye is released to a stream.

At least two staff are needed to conduct dye tests – one to flush dye down the plumbing fixtures and one to look for dye in the downstream manhole(s). In some cases, three staff may be preferred, with two staff entering the private residence or building for both safety and liability purposes.

The basic equipment to conduct dye tests is listed in Table 57 and is not highly specialized. Often, the key choice is the type of dye to use for testing. Several options are profiled in Table 58. In most cases, liquid dye is used, although solid dye tablets can also be placed in a mesh bag and lowered into the manhole on a rope (Figure 64). If a

Table 57: Key Field Equipment for Dye Testing
(Source: Wayne County, MI, 2000)

Maps, Documents
- Sewer and storm drain maps (sufficient detail to locate manholes)
- Site plan and building diagram
- Letter describing the investigation
- Identification (e.g., badge or ID card)
- Educational materials (to supplement pollution prevention efforts)
- List of agencies to contact if the dye discharges to a stream.
- Name of contact at the facility

Equipment to Find and Lift the Manhole Safely (small manhole often in a lawn)
- Probe
- Metal detector
- Crow bar
- Safety equipment (hard hats, eye protection, gloves, safety vests, steel-toed boots, traffic control equipment, protective clothing, gas monitor)

Equipment for Actual Dye Testing and Communications
- 2-way radio
- Dye (liquid or "test strips")
- High powered lamps or flashlights
- Water hoses
- Camera

Figure 64: Dye in a mesh bag is placed into an upstream manhole (left); Dye observed at a downstream manhole traces the path of the storm drain (right)

longer pipe network is being tested, and dye is not expected to appear for several hours, charcoal packets can be used to detect the dye (GCHD, 2002). Charcoal packets can be secured and left in place for a week or two, and then analyzed for the presence of dye. Instructions for using charcoal packets in dye testing can be accessed at the following website: http://bayinfo.tamug.tamu.edu/gbeppubs/ms4.pdf.

The basic drill for dye tests consists of three simple steps. First, flush or wash dye down the drain, fixture or manhole. Second, pop open downgradient sanitary sewer manholes and check to see if any dye appears. If none is detected in the sewer manhole after an hour or so, check downgradient storm drain manholes or outfalls for the presence of dye. Although dye testing is fairly straightforward, some tips to make testing go more smoothly are offered in Table 59.

Table 58: Dye Testing Options

Product	Applications
Dye Tablets	• Compressed powder, useful for releasing dye over time • Less messy than powder form • Easy to handle, no mess, quick dissolve • Flow mapping and tracing in storm and sewer drains • Plumbing system tracing • Septic system analysis • Leak detection
Liquid Concentrate	• Very concentrated, disperses quickly • Works well in all volumes of flow • Recommended when metering of input is required • Flow mapping and tracing in storm and sewer drains • Plumbing system tracing • Septic system analysis • Leak detection
Dye Strips	• Similar to liquid but less messy
Powder	• Can be very messy and must dissolve in liquid to reach full potential • Recommended for very small applications or for very large applications where liquid is undesirable • Leak detection
Dye Wax Cakes	• Recommended for moderate-sized bodies of water • Flow mapping and tracing in storm and sewer drains
Dye Wax Donuts	• Recommended for large sized bodies of water (lakes, rivers, ponds) • Flow mapping and tracing in storm and sewer drains • Leak detection

Table 59: Tips for Successful Dye Testing
(Adapted from Tuomari and Thompson, 2002)

Dye Selection
- Green and liquid dyes are the easiest to see.
- Dye test strips can be a good alternative for residential or some commercial applications. (Liquid can leave a permanent stain).
- Check the sanitary sewer before using dyes to get a "base color." In some cases, (e.g., a print shop with a permitted discharge to the sanitary sewer), the sewage may have an existing color that would mask a dye.
- Choose two dye colors, and alternate between them when testing multiple fixtures.

Selecting Fixtures to Test
- Check the plumbing plan for the site to isolate fixtures that are separately connected.
- For industrial facilities, check most floor drains (these are often misdirected).
- For plumbing fixtures, test a representative fixture (e.g., a bathroom sink).
- Test some locations separately (e.g., washing machines and floor drains), which may be misdirected.
- If conducting dye investigations on multiple floors, start from the basement and work your way up.
- At all fixtures, make sure to flush with plenty of water to ensure that the dye moves through the system.

Selecting a Sewer Manhole for Observations
- Pick the closest manhole possible to make observations (typically a sewer lateral).
- If this is not possible, choose the nearest downstream manhole.

Communications Between Crew Members
- The individual conducting the dye testing calls in to the field person to report the color dye used, and when it is dropped into the system.
- The field person then calls back when dye is observed in the manhole.
- If dye is not observed (e.g., after two separate flushes have occurred), dye testing is halted until the dye appears.

Locating Missing Dye
- The investigation is not complete until the dye is found. Some reasons for dye not appearing include:
- The building is actually hooked up to a septic system.
- The sewer line is clogged.
- There is a leak in the sewer line or lateral pipe.

Video Testing

Video testing works by guiding a mobile video camera through the storm drain pipe to locate the actual connection producing an illicit discharge. Video testing shows flows and leaks within the pipe that may indicate an illicit discharge, and can show cracks and other pipe damage that enable sewage or contaminated water to flow into the storm drain pipe.

Video testing is useful when access to properties is constrained, such as residential neighborhoods. Video testing can also be expensive, unless the community already owns and uses the equipment for sewer inspections. This technique will not detect all types of discharges, particularly when the illicit connection is not flowing at the time of the video survey.

Different types of video camera equipment are used, depending on the diameter and condition of the storm sewer being tested.

Field crews should review storm drain maps, and preferably visit the site before selecting the video equipment for the test. A field visit helps determine the camera size needed to fit into the pipe, and if the storm drain has standing water.

In addition to standard safety equipment required for all manhole inspections, video testing requires a Closed-Circuit Television (CCTV) and supporting items. Many commercially available camera systems are specifically adapted to televise storm sewers, ranging from large truck or van-mounted systems to much smaller portable cameras. Cameras can be self-propelled or towed. Some specifications to look for include:

- The camera should be capable of radial view for inspection of the top, bottom, and sides of the pipe and for looking up lateral connections.
- The camera should be color.
- Lighting should be supplied by a lamp on the camera that can light the entire periphery of the pipe.

When inspecting the storm sewer, the CCTV is oriented to keep the lens as close as possible to the center of the pipe. The camera can be self-propelled through the pipe using a tractor or crawler unit or it may be towed through on a skid unit (see Figures 65 and 66). If the storm drain has ponded water, the camera should be attached to a raft, which floats through the storm sewer from one manhole to the next. To see details of the sewer, the camera and lights should be able to swivel both horizontally and vertically. A video record of the inspection should be made for future reference and repairs (see Figure 67).

Figure 65: Camera being towed

Smoke Testing

Smoke testing is another "bottom up" approach to isolate illicit discharges. It works by introducing smoke into the storm drain system and observing where the smoke surfaces. The use of smoke testing to detect illicit discharges is a relatively new application, although many communities have used it to check for infiltration and inflow into their sanitary sewer network. Smoke testing can find improper

Figure 66: Tractor-mounted camera

Figure 67: Review of an inspection video

connections, or damage to the storm drain system (Figure 68). This technique works best when the discharge is confined to the upper reaches of the storm drain network, where pipe diameters are to small for video testing and gaining access to multiple properties renders dye testing infeasible.

Notifying the public about the date and purpose of smoke testing before starting is critical. The smoke used is non-toxic, but can cause respiratory irritation, which can be a problem for some residents. Residents should be notified at least two weeks prior to testing, and should be provided the following information (Hurco Technologies, Inc., 2003):

- Date testing will occur
- Reason for smoke testing
- Precautions they can take to prevent smoke from entering their homes or businesses
- What they need to do if smoke enters their home or business, and any health concerns associated with the smoke
- A number residents can call to relay any particular health concerns (e.g., chronic respiratory problems)

Program managers should also notify local media to get the word out if extensive smoke testing is planned (e.g., television, newspaper, and radio). On the actual day of testing, local fire, police departments and 911 call centers should be notified to handle any calls from the public (Hurco Technologies, Inc., 2003).

The basic equipment needed for smoke testing includes manhole safety equipment, a smoke source, smoke blower, and sewer plugs. Two smoke sources can be used for smoke testing. The first is a smoke "bomb," or "candle" that burns at a controlled rate and releases very white smoke visible at relatively low concentrations (Figure 69). Smoke bombs are suspended beneath a blower in a manhole. Candles are available in 30 second to three minute sizes. Once opened, smoke bombs should be kept in a dry location and should be used within one year.

The second smoke source is liquid smoke, which is a petroleum-based product that is injected into the hot exhaust of a blower where it is heated and vaporized (Figure 70). The length of smoke production can vary depending on the length of the pipe being

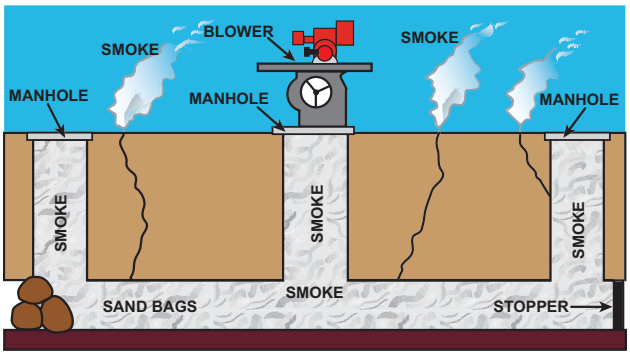


Figure 68: Smoke Testing System Schematic

Figure 69: Smoke Candles

Figure 70: Smoke blower

tested. In general, liquid smoke is not as consistently visible and does not travel as far as smoke from bombs (USA Blue Book).

Smoke blowers provide a high volume of air that forces smoke through the storm drain pipe. Two types of blowers are commonly used: "squirrel cage" blowers and direct-drive propeller blowers. Squirrel cage blowers are large and may weigh more than 100 pounds, but allow the operator to generate more controlled smoke output. Direct-drive propeller blowers are considerably lighter and more compact, which allows for easier transport and positioning.

Three basic steps are involved in smoke testing. First, the storm drain is sealed off by plugging storm drain inlets. Next, the smoke is released and forced by the blower through the storm drain system. Lastly, the crew looks for any escape of smoke above-ground to find potential leaks.

One of three methods can be used to seal off the storm drain. Sandbags can be lowered into place with a rope from the street surface. Alternatively, beach balls that have a diameter slightly larger than the drain can be inserted into the pipe. The beach ball is then placed in a mesh bag with a rope attached to it so it can be secured and retrieved. If the beach ball gets stuck in the pipe, it can simply be punctured, deflated and removed. Finally, expandable plugs are available, and may be inserted from the ground surface.

Blowers should be set up next to the open manhole after the smoke is started. Only one manhole is tested at a time. If smoke candles are used, crews simply light the candle, place it in a bucket, and lower it in the manhole. The crew then watches to see where smoke escapes from the pipe. The two most common situations that indicate an illicit discharge are when smoke is seen rising from internal plumbing fixtures (typically reported by residents) or from sewer vents. Sewer vents extend upward from the sewer lateral to release gas buildup, and are not supposed to be connected to the storm drain system.

13.4 Septic System Investigations

The techniques for tracing illicit discharges are different in rural or low-density residential watersheds. Often, these watersheds lack sanitary sewer service and storm water is conveyed through ditches or swales, rather than enclosed pipes. Consequently, many illicit discharges enter the stream as indirect discharges, through surface breakouts of septic fields or through straight pipe discharges from bypassed septic systems.

The two broad techniques used to find individual septic systems—on-site investigations and infrared imagery—are described in this section.

On-Site Septic Investigations

Three kinds of on-site investigations can be performed at individual properties to determine if the septic system is failing, including homeowner survey, surface condition analysis and a detailed system inspection. The first two investigations are rapid and relatively simple assessments typically conducted in targeted watershed areas. Detailed system inspections are a much more thorough investigation of the functioning of the septic system that is conducted by a certified professional. Detailed system inspections may occur at time of sale of a property, or be triggered by poor scores on the rapid homeowner survey or surface condition analysis.

Homeowner Survey

The homeowner survey consists of a brief interview with the property owner to determine the potential for current or future failure of the septic system, and is often done in conjunction with a surface condition analysis.

Table 60 highlights some common questions to ask in the survey, which inquire about resident behaviors, system performance and maintenance activity.

Surface Condition Analysis

The surface condition analysis is a rapid site assessment where field crews look for obvious indicators that point to current or potential production of illicit discharges by the septic system (Figure 71). Some of the key surface conditions to analyze have been described by Andrews *et al*., (1997) and are described below:

- Foul odors in the yard
- Wet, spongy ground; lush plant growth; or burnt grass near the drain field
- Algal blooms or excessive weed growth in adjacent ditches, ponds and streams
- Shrubs or trees with root damage within 10 feet of the system
- Cars, boats, or other heavy objects located over the field that could crush lateral pipes
- Storm water flowing over the drain field
- Cave-ins or exposed system components
- Visible liquid on the surface of the drain field (e.g., surface breakouts)
- Obvious system bypasses (e.g., straight pipe discharges)

Table 60: Septic System Homeowner Survey Questions
(Adapted from Andrews et al., 1997 and Holmes Inspection Services)

- How many people live in the house?[1]
- What is the septic tank capacity?[2]
- Do drains in the house empty slowly or not at all?
- When was the last time the system was inspected or maintained?
- Does sewage back up into the house through drain lines?
- Are there any wet, smelly spots in the yard?
- Is the septic tank effluent piped so it drains to a road ditch, a storm sewer, a stream, or is it connected to a farm drain tile?

[1] Water usage ranges from 50 to 100 gallons per day per person. This information can be used to estimate the wastewater load from the house (Andrews et. al, 1997).
[2] The septic tank should be large enough to hold two days' worth of wastewater (Andrews et. al, 1997).

a.  b. 

Figure 71: (a) Straight pipe discharge to nearby stream. (b) Algal bloom in a nearby pond.
(Sources: a- Snohomish County, WA, b- King County, WA)

Detailed System Inspection

The detailed system inspection is a much more thorough inspection of the performance and function of the septic system, and must be completed by a certified professional. The inspector certifies the structural integrity of all components of the system, and checks the depth of solids in the septic tank to determine if the system needs to be pumped out. The inspector also sketches the system, and estimates distance to groundwater, surface water, and drinking water sources. An example septic system inspection form from Massachusetts can be found at http://www.state.ma.us/dep/brp/wwm/soilsys.htm.

Although not always incorporated into the inspection, dye testing can sometimes point to leaks from broken pipes, or direct discharges through straight pipes that might be missed during routine inspection. Dye can be introduced into plumbing fixtures in the home, and flushed with sufficient running water. The inspector then watches the septic field, nearby ditches, watercourses and manholes for any signs of the dye. The dye may take several hours to appear, so crews may want to place charcoal packets in adjacent waters to capture dye until they can return later to retrieve them.

Infrared Imagery

Infrared imagery is a special type of photography with gray or color scales that represent differences in temperature and emissivity of objects in the image (www.stocktoninfrared.com), and can be used to locate sewage discharges. Several different infrared imagery techniques can be used to identify illicit discharges. The following discussion highlights two of these: aerial infrared thermography[13] and color infrared aerial photography.

Infrared Thermography

Infrared thermography is increasingly being used to detect illicit discharges and failing septic systems. The technique uses the temperature difference of sewage as a marker to locate these illicit discharges. Figure 72 illustrates the thermal difference

[13] Infrared thermography is also being used by communities such as Mecklenburg County and the City of Charlotte in NC to detect illicit discharges at outfalls.

between an outfall discharge (with a higher temperature) and a stream.

The equipment needed to conduct aerial infrared thermography includes an aircraft (plane or helicopter); a high-resolution, large format, infrared camera with appropriate mount; a GPS unit; and digital recording equipment. If a plane is used, a higher resolution camera is required since it must operate at higher altitudes. Pilots should be experienced since flights take place at night, slowly, and at a low altitude. The camera may be handheld, but a mounted camera will provide significantly clearer results for a larger area. The GPS can be combined with a mobile mapping program and a video encoder-decoder that encodes and displays the coordinates, date, and time (Stockton, 2000). The infrared data are analyzed after the flight by trained analysts to locate suspected discharges, and field crews then inspect the ground-truthed sites to confirm the presence of a failing septic system.

Late fall, winter, and early spring are typically the best times of year to conduct these investigations in most regions of the country. This allows for a bigger difference between receiving water and discharge temperatures, and interference from vegetation is minimized (Stockton, 2004b). In addition, flights should take place at night to minimize reflected and direct daylight solar radiation that may adversely affect the imagery (Stockton, 2004b).

Figure 72: Aerial thermography showing sewage leak

Color Infrared Aerial Photography

Color infrared aerial photography looks for changes in plant growth, differences in soil moisture content, and the presence of standing water on the ground to primarily identify failing septic systems (Figure 73).

The Tennessee Valley Authority (TVA) uses color infrared aerial photography to detect failing septic systems in reservoir watersheds. Local health departments conduct follow-up ground-truthing surveys to determine if a system is actually failing (Sagona, 1986). Similar to thermography, it is recommended that flights take place at night, during leaf-off conditions, or when the water table is at a seasonal high (which is when most failures typically occur (U.S. EPA, 1999).

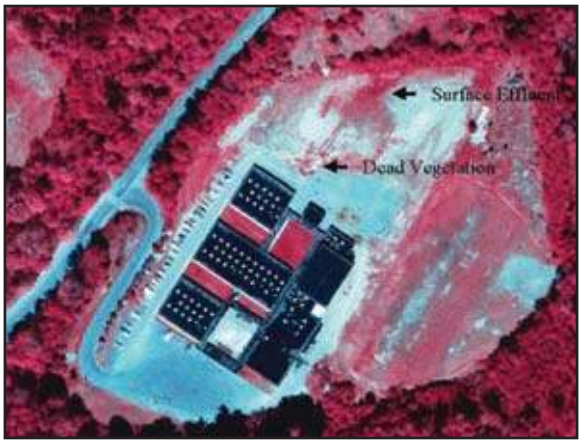


Figure 73: Dead vegetation and surface effluent are evidence of a septic system surface failure.
(Source: U.S. EPA, 1999)

13.5 The Cost to Trace Illicit Discharge Sources

Tracing illicit discharges to their source can be an elusive and complex process, and precise staffing and budget data are difficult to estimate. Experience of Phase I NPDES communities that have done these investigations in the past can shed some light on cost estimates. Some details on unit costs for common illicit discharge investigations are provided below.

Costs for Dye, Video, and Smoke Testing

The cost of smoke, dye, and video testing can be substantial and staff intensive, and often depend on investigation specific factors, such as the complexity of the drainage network, density and age of buildings, and complexity of land use. Wayne County, MI, has estimated the cost of dye testing at $900 per facility. Video testing costs range from $1.50 to $2.00 per foot, although this increases by $1.00 per foot if pipe cleaning is needed prior to testing.

Table 61 summarizes the costs of start-up equipment for basic manhole entry and inspection, which is needed regardless of which type of test is performed. Tables 62 through 64 provide specific equipment costs for dye, video and smoke testing, respectively.

Table 61: Common Field Equipment Needed for Dye, Video, and Smoke Testing

Item	Cost
1 Digital Camera	$200
Clipboards, Pens, Batteries	$25
1 Field vehicle	$15,000 - $35,000
1 First aid kit	$30
1 Spotlight	$40
1 Gas monitor and probe	$900 - $2,100
1 Hand-held GPS Unit	$150
2 Two-way radios	$250 - $750
1 Manhole hook	$80 - $130
1 Mirror	$70 - $130
2 Reflective safety vests	$40
Rubber/latex gloves (box of 100)	$25
1 Can of Spray Paint	$5
4 Traffic Cones	$50

Table 62: Equipment Costs for Dye Testing		
Product	**Water Volume**	**Cost**
Dye Strips	1 strip/500 gallons	$75 – $94 per 100 strips
Dye Tablets	0 – 50,000 gallons	$40 per 200 tablets
Liquid Concentrate (Rhodamine WT)	0 – 50,000 gallons	$80 – $90 per gallon $15 – $20 per pint
Powder	50,000 + gallons	$77 per lb
Dye Wax Cakes	20,000 – 50,000 gallons	$12 per one 1.25 ounce cake
Dye Wax Donuts	50,000 + gallons	$104 – $132 per 42 oz. donut
Price Sources: *Aquatic Eco-Systems http://www.aquaticeco.com/* *Cole Parmer http:/www.coleparmer.com* *USA Blue Book http:/www.usabluebook.com*		

Table 63: Equipment Costs for Video Testing	
Equipment	**Cost**
GEN-EYE 2™ B&W Sewer Camera with VCR & 200' Push Cable	$5,800
100' Push Rod and Reel Camera for 2" – 10" Pipes	$5,300
200' Push Rod and Reel Camera for 8" – 24" Pipes	$5,800
Custom Saturn III Inspection System 500' cable for 6-16" Lines	$32,000 ($33,000 with 1000 foot cable)
OUTPOST • Box with build-out • Generator • Washdown system	 $6,000 $2,000 $1,000
Video Inspection Trailer • 7'x10' trailer & build-out • Hardware and software package • Incidentals	 $18,500 $15,000 $5,000
Sprinter Chassis Inspection Vehicle • Van (with build-out for inspecting 6" – 24" pipes) • Crawler (needed to inspect pipes >24") • Software upgrade (optional but helpful for extensive pipe systems)	 $130,000 $18,000 $8,000
Sources: USA Blue Book and Envirotech	

Table 64: Equipment Costs for Smoke Testing	
Equipment	**Cost**
Smoke Blower	$1,000 to $2,000 each
Liquid Smoke	$38 to $45 per gallon
Smoke Candles, 30 second (4,000 cubic feet)	$27.50 per dozen
Smoke Candles, 60 Second (8,000 cubic feet)	$30.50 per dozen
Smoke Candles, 3 Minute (40,000 cubic feet)	$60.00 per dozen
Sources: Hurco Tech, 2003 and Cherne Industries, 2003	

Costs for Septic System Investigations

Most septic system investigations are relatively low cost, but factors such as private property access, notification, and the total number of sites investigated can increase costs. Unit costs for the three major septic system investigations are described below.

Homeowner Survey and Surface Condition Analysis

Both the homeowner survey and the surface condition analysis are relatively low cost investigation techniques. Assuming that a staff person can investigate one home per hour, the average cost per inspection is approximately $25. A substantial cost savings can be realized by using interns or volunteers to conduct these simple investigations.

Detailed System Inspection

Septic system inspections are more expensive, but a typical unit cost is about $250, and may also include an additional cost of pumping the system, at roughly $150, if pumping is required to complete the inspection (Wayne County, 2003). This cost is typically charged to the homeowner as part of a home inspection.

Aerial Infrared Thermography

The equipment needed to conduct aerial infrared thermography is expensive; cameras alone may range from $250,000 to $500,000 (Stockton, 2004a). However, private contractors provide this service. In general, the cost to contract an aerial infrared thermography investigation depends on the length of the flight (flights typically follow streams or rivers); how difficult it will be to fly the route; the number of heat anomalies expected to be encountered; the expected post-flight processing time (typically, four to five hours of analysis for every hour flown); and the distance of the site from the plane's "home" (Stockton, 2004a). The cost range is typically $150 to $400 per mile of stream or river flown, which includes the flight and post-flight analyses (Stockton, 2004a).

As an alternative, local police departments may already own an infrared imaging system that may be used. For instance, the Arkansas Department of Health used a state police helicopter with a Forward Looking Infrared (FLIR) imaging system, GPS, video equipment, and maps (Eddy, 2000). The disadvantage to this is that the equipment may not be available at optimal times to conduct the investigation. In addition, infrared imaging equipment used by police departments may not be sensitive enough to detect the narrow range of temperature difference (only a few degrees) often expected for sewage flows (Stockton, 2004a).

EPA New England Bacterial Source Tracking Protocol
Draft – January 2012

Purpose

This document provides a common framework for EPA New England ("EPA-NE") staff to develop and implement bacterial source tracking sample events, and provides a recommended approach to watershed association, municipal, and State personnel. Adopted from Boston Water and Sewer Commission ("BWSC") (2004), Pitt (2004), and based upon fieldwork conducted and data collected by EPA-NE, the protocol relies primarily on visual observations and the use of field test kits and portable instrumentation during dry and wet weather to complete a screening-level investigation of stormwater outfall discharges or flows within the drainage system. When necessary, the addition of more conclusive chemical markers may be included. The protocol is applicable to most typical Municipal Separate Storm Sewer Systems ("MS4s") and smaller tributary streams. The smaller the upstream catchment area and/or more concentrated the flow, the greater the likelihood of identifying an upstream wastewater source.

Introduction

The protocol is structured into several phases of work that progress through investigation planning and design, laboratory coordination, sample collection, and data evaluation. The protocol involves the concurrent collection and analyses of water samples for surfactants, ammonia, total chlorine, and bacteria. When more precise confirmation regarding the presence or absence of human sanitary sewage is necessary, and laboratory capacity is available, the additional concurrent collection of samples for select Pharmaceutical and Personal Care Product ("PPCP") analysis is advised. When presented with a medium to large watershed or numerous stormwater outfalls, the recommended protocol is the screening of all outfalls using the surfactant, ammonia, total chlorine, and bacterial analyses, in addition to a thorough visual assessment. The resulting data and information should then be used to prioritize and sample a subset of outfalls for all parameters, including PPCP compounds and additional analyses as appropriate. Ideally, screening-level analyses can be conducted by state, municipal, or local watershed association personnel, and a prioritized sub-set of outfalls can be sampled through a commercial laboratory or by EPA-NE using more advanced confirmatory techniques.

Step I – Reconnaissance and Investigation Design

Each sample event should be designed to answer a specific problem statement and work to identify the source of contamination. Any relevant data or reports from State, municipal, or local watershed associations should be reviewed when selecting sample locations. Aerial photography, mapping services, or satellite imagery resources are available free to the public through the internet, and offer an ideal way to pre-select locations for either field verification or sampling.

Sample locations should be selected to segregate outfall sub-catchment areas or surface waters into meaningful sections. A common investigative approach would be the identification of a

specific reach of a surface water body that is known to be impaired for bacteria. Within this specific reach, stormwater outfalls and smaller tributary streams would be identified by desktop reconnaissance, municipal outfall mapping, and field investigation when necessary. Priority outfalls or areas to field verify the presence of outfalls should be selected based on a number of factors, including but not limited to the following: those areas with direct discharges to critical or impaired waters (e.g. water supplies, swimming beaches); areas served by common/twin-invert manholes or underdrains; areas with inadequate levels of sanitary sewer service, Sanitary Sewer Overflows ("SSOs") or the subject of numerous/chronic sanitary sewer customer complaints; formerly combined sewer areas that have been separated; culverted streams, and; outfalls in densely populated areas with older infrastructure. Pitt (2004) provides additional detailed guidance.

When investigating an area for the first time, the examination of outfalls in dry-weather is recommended to identify those with dry-weather flow, odor, and the presence of white or gray filamentous bacterial growth that is common (but not exclusively present) in outfalls contaminated with sanitary. For those outfalls with dry-weather flow and no obvious signs of contamination, one should never assume the discharge is uncontaminated. Sampling by EPA-NE staff has identified a number of outfalls with clear, odorless discharges that upon sampling and analyses were quite contaminated. Local physical and chemical conditions, in addition to the numerous causes of illicit discharges, create outfall discharges that can be quite variable in appearance. Outfalls with no dry-weather flow should be documented, and examined for staining or the presence of any obvious signs of past wastewater discharges downstream of the outfall.

As discussed in BWSC (2004), the protocol may be used to sample discreet portions of an MS4 sub-catchment area by collecting samples from selected junction manholes within the stormwater system. This protocol expands on the BWSC process and recommends the concurrent collection of bacteria, surfactant, ammonia, and chlorine samples at each location to better identify and prioritize contributing sources of illicit discharges, and the collection of PPCP compounds when more conclusive source identification is necessary.

Finally, as discussed further in Step IV, application of this sampling protocol in wet-weather is recommended for most outfalls, as wet-weather sampling data may indicate a number of illicit discharge situations that may not be identified in dry weather.

Step II – Laboratory Coordination

All sampling should be conducted in accordance with a Quality Assurance Project Plan ("QAPP"). A model QAPP is included as Attachment 1. While the QAPP details sample collection, preservation, and quality control requirements, detailed coordination with the appropriate laboratory staff will be necessary. Often sample events will need to be scheduled well in advance. In addition, the sampling team must be aware of the strict holding time requirements for bacterial samples – typically samples analysis must begin within 6 hours of sample collection. For sample analyses conducted by a commercial laboratory, appropriate coordination must occur to determine each facilities respective procedures and requirements.

The recommendations in this protocol are based on the use of a currently unpublished EPA-NE modification to *EPA Method 1694 – Pharmaceuticals and Personal Care Products in Water, Soil, Sediment, and Biosolids by HPLC/MS/MS*. Several commercial laboratories may offer Method 1694 capability. EPA-NE recommends those entities wishing to utilize a contract laboratory for PPCP analyses ensure that the laboratory will provide quantitative analyses for acetaminophen, caffeine, cotinine, carbamazepine, and 1,7-dimethylexanthine, at Reporting Limits similar to those used by EPA-NE (See Attachment 2). Currently, the EPA-NE laboratory has limited capacity for PPCP sampling, and any proposed EPA-NE PPCP sample events must be coordinated well in advance with the appropriate staff.

Step III – Sample Collection

Once a targeted set of outfalls has been selected, concurrent sampling and analyses for surfactants, ammonia, and total chlorine (which can all be done through the use of field kits), in addition to bacteria (via laboratory analysis) should be conducted. When numerous outfalls with dry-weather flow exist, sample locations should be prioritized according to the criteria mentioned above. In addition, field screening using only the field kits may occur during the field reconnaissance. However, it must be emphasized that the concurrent sampling and analyses of bacteria, surfactant, ammonia, and total chlorine parameters is the most efficient and cost-effective screening method.

When first observed, the physical attributes of each outfall or sampling location should be noted for construction materials, size, flow volume, odor, and all other characteristics listed on the data collection form (Attachment 3). In addition, GPS coordinates should be collected and a photograph of the sample location taken. Whenever possible, the sampling of storm drain outfalls should be conducted as close to the outfall opening as possible. Bacterial samples should be collected first, with care to not disturb sediment materials or collect surface debris/scum as best possible. A separate bottle is used to collect a single water sample from which aliquots will be analyzed for surfactants, ammonia, and total chlorine. A sample for PPCP analysis is recommended to be collected last, as the larger volume required and larger bottle size may cause some sediment disturbance in smaller outfalls or streams. If necessary, a second smaller, sterile and pre-cleaned sampling bottle may be used to collect the surface water which can then be poured into the larger PPCP bottle. Last, a properly calibrated temperature/specific conductance/salinity meter should be used to record all three parameters directly from the stream or outfall. When flow volume or depth is insufficient to immerse the meter probe, a clean sample bottle may be utilized to collect a sufficient volume of water to immerse the probe. In such instances, meter readings should be taken immediately.

As soon as reasonably possible, sample aliquots from the field kit bottle should be analyzed. When concurrent analyses are not possible, ammonia and chlorine samples should be processed first, followed by surfactant analysis, according to each respective Standard Operating Procedure as appropriate based on the particular brand and type of field test kit being used. All waste from the field test kits should be retained and disposed of according to manufacture instructions. Where waste disposal issues would otherwise limit the use of field kits, EPA-NE recommends

that, at a minimum, ammonia test strips with a Reporting Limit below 0.5 mg/L be utilized. Such test strips typically are inexpensive and have no liquid reagents associated with their use. Results should be recorded, samples placed in a cooler on ice, and staff should proceed to the next sample location.

Upon completion of sampling and return to the laboratory, all samples will be turned over to the appropriate sample custodian(s) and accompanied by an appropriate Chain-of-Custody ("COC") form.

Step IV – Data Evaluation

Bacterial results should be compared to the applicable water quality standards. Surfactant and ammonia concentrations should be compared to the thresholds listed in Table 1. Evaluation of the data should include a review for potential positive results due to sources other than human wastewater, and for false negative results due to chemical action or interferences. In the EPA-NE region, field sampling has indicated that the biological breakdown of organic material in historically filled tidal wetlands may cause elevated ammonia readings, as can the discharge from many landfills. In addition, salinity levels greater than 1 part per thousand may cause elevated surfactant readings, the presence of oil may likewise indicate elevated levels, and fine suspended particulate matter may cause inconclusive surfactant readings (for example, the indicator ampule may turn green instead of a shade of blue). Finally, elevated chlorine from leaking drinking water infrastructure or contained in the illicit wastewater discharge may inhibit bacterial growth and cause very low bacterial concentrations. Any detection of total chlorine above the instrument Reporting Limit should be noted.

Table 1 – Freshwater Water Quality Criteria, Threshold Levels, and Example Instrumentation [1]

Analyte/ Indicator	Threshold Levels/ Single Sample[3]	Instrumentation
E. coli [2]	235 cfu/100ml	Laboratory via approved method
Enterococci [2]	61 cfu/100ml	Laboratory via approved method
Surfactants (as MBAS)	$\geq$ 0.25 mg/l	MBAS Test Kit (e.g. CHEMetrics K-9400)
Ammonia (NH_3)	$\geq$ 0 .5 mg/l	Ammonia Test Strips (e.g. Hach brand)
Chlorine	> Reporting Limit	Field Meter (e.g. Hach Pocket Colorimeter II)
Temperature	See Respective State Regulations	Temperature/Conductivity/Salinity Meter (e.g. YSI Model 30)

[1] The mention of trade names or commercial products does not constitute endorsement or recommendation for use by the U.S. EPA

[2] 314 CMR 4.00 MA - Surface Water Quality Standards - Class B Waters.

[3] Levels that may be indicative of potential wastewater or washwater contamination

Once dry-weather data has been examined and compared to the appropriate threshold values, outfalls or more discreet reaches of surface water can be selected for sampling or further investigation. Wet-weather sampling is also recommended for all outfalls, in particular for those that did not have flow in dry weather or those with dry-weather flow that passed screening thresholds. Wet-weather sampling will identify a number of situations that would otherwise pass unnoticed in dry weather. These wet-weather situations include, but are not limited to the following: elevated groundwater that can now cause an exchange of wastewater between cracked or broken sanitary sewers, failed septic systems, underdrains, and storm drains; increased sewer volume that can exfiltrate through cracks in the sanitary piping; increased sewer volume that can enter the storm drain system in common manholes or directly-piped connections to storm drains; areas subject to capacity-related SSO discharges, and; illicit connections that are not carried through the storm drain system in dry-weather.

Step V – Costs

Use of field test kits and field instruments for a majority of the analytical parameters allows for a significantly reduced analytical cost. Estimated instrument costs and pro-rated costs per 100 samples are included in Table 2. The cost per 100 samples metric allows averaged costs to account for reagent refills that are typically less expensive as they do not include the instrument cost, and to average out the initial capital cost for an instrument such as a temperature/ conductivity/salinity meter. For such capital costs as the meters, the cost over time will continue to decrease.

Table 2 – Estimated Field Screening Analytical Costs [1]

Analyte/ Indicator	Instrument or Meter [2]	Instrument or Meter Cost/No. of Samples	Cost per Sample (Based on 100 Samples) [3]
Surfactants (as MBAS)	Chemetrics K-9400	$77.35/20 samples ($58.08/20 sample refill)	$3.09
Ammonia (NH_3)	Hach brand 0 – 6 mg/l	$18.59/25 samples	$0.74
Total Chlorine	Hach Pocket Colorimeter II	$389/100 samples ($21.89 per 100 sample refill)	$3.89
Temperature/ Conductivity/ Salinity	YSI	$490 (meter and cable probe)	$4.90

1 Estimated costs as of February 2011

2 The mention of trade names or commercial products does not constitute endorsement or recommendation for use by the U.S. EPA

3 One-time meter costs and/or refill kits will reduce sample costs over time

From Table 2, the field analytical cost is approximately $13 per outfall. Typical bacterial analyses costs can vary depending on the analyte, method, and total number of samples to be

performed by the laboratory. These bacterial analyses costs can range from $20 to $60. Therefore, the analytical cost for a single outfall, based on the cost per 100 samples, ranges from $33 to $73. As indicated above, these costs will decrease slightly over time due to one-time capitals costs for the chlorine and temperature/conductivity/salinity meters.

Step VI – Follow-Up

Once all laboratory data has been reviewed and determined final in accordance with appropriate quality assurance controls, results should be reviewed with appropriate stakeholders to determine next steps. Those outfalls or surface water segments that fail to meet the appropriate water quality standard, and meet or exceed the surfactant and ammonia threshold values, in the absence of potential interferences mentioned in Step IV, indicate a high likelihood for the presence of illicit connections upstream in the drainage system or surface water. Whereas illicit discharges are quite variable in nature, the exceedance of the applicable water quality standard and only the ammonia or surfactant threshold value may well indicate the presence of an illicit connection. When available, the concurrent collection and analyses of PPCP data can greatly assist in confirming the presence of human wastewater. However, such data will not be available in all instances, and the collective data set and information regarding the physical characteristics of each sub-catchment or surface water reach should be used to prioritize outfalls for further investigation. As warranted, data may be released to the appropriate stakeholders, and should be accompanied by an explanation of preliminary findings. Release of EPA data should be fully discussed with the case team or other appropriate EPA staff.

References Cited

Boston Water & Sewer Commission, 2004, *A systematic Methodology for the Identification and Remediation of Illegal Connections.* 2003 Stormwater Management Report, chap. 2.1.

Pitt, R. 2004 *Methods for Detection of Inappropriate Discharge to Storm Drain Systems. Internal Project Files*. Tuscaloosa, AL, *in* The Center for Watershed Protection and Pitt, R., *Illicit Discharge Detection and Elimination: A Guidance Manual for Program Development and Technical Assessments*: Cooperative Agreement X82907801-0, U.S. Environmental Protection Agency, variously paged. Available at: http://www.cwp.org.

Instrumentation Cited (Manufacturer URLs)

MBAS Test Kit - CHEMetrics K-9400: http://www.chemetrics.com/Products/Deterg.htm

Portable Colorimeter – Hach Pocket Colorimeter II: http://www.hach.com/

Ammonia (Nitrogen) Test Strips: http://www.hach.com/

Portable Temperature/Conductivity/Salinity Meter: YSI Model 30: http://www.ysi.com/productsdetail.php?30-28

Disclaimer: The mention of trade names or commercial products in this protocol does not constitute endorsement or recommendation for use by the U.S. EPA.

Stormwater Monitoring Quality Assurance Project Plan
2012-2017

RFA #

Sampling Plan Acceptance

EPA OES Enforcement and Project Manager/Coordinator **Signature:**	**Date:**
EPA OEME Project Managers/Coordinator **Signature:**	**Date:**
EPA OEME QA Officer **Signature:**	**Date:**
EPA Chemistry Team Lead **Signature:**	**Date:**

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

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

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

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

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.

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

EPA United States Environmental Protection Agency

Target Compounds, Uses, and Reporting Limits

Target Compound	Major Use	RL (ng/L)	Daily Dose (ng)
Caffeine	Natural Stimulant	5.0	200,000,000
1,7-DMX	Metabolite of caffeine	2.5	N/A
Acetaminophen	Pain Reliever	2.5	650,000,000
Carbamazepine	Anti- depressant / bi-polar Anti-convulsant (epilepsy)	0.5	100,000,000
Primidone	Anti- epilepsy drug (AED)	5.0	100,000,000
Atenolol	Beta Blocker High Blood Pressure	2.5	50,000,000
Cotinine	Metabolite of Nicotine	0.5	3,500-7,200 (ng/mL)
Urobilin	By-product of hemoglobin breakdown (mammals)	5.0	1,300,000 ng/g in feces
Azithromycin	Antibiotic	1.6	200,000,000

Attachment 3

STORMWATER MONITORING

Field Collection Requirements (To be recorded at each site)

Sample-
Site Name _____

Time collected_____

Date collected_____

Inspection-
****Take picture at site****
Outfall diameter_____('na' if open stream)

Flow estimate_____('na' if open stream)

Odor_____

Color_____

Turbidity_____

Floatables_____

Other observations_____

_____

YSI Meter (calibrate in lab)-
Salinity_____

Temp_____

Conductivity (give both #'s)

_____

Location information-
Short description of where sample was collected at site_____

_____

_____

GPS_____

_____

Field Kits listed in the order they should be conducted in, include any applicable notes-

NH3 strip_____

Cl2 kit_____
Hach meter – (3 min wait)

Surfactant_____
Chemetrics K-9400 Blue box/detergent test kit

Additional Notes:

(Note any changes in weather conditions)_____

_____

_____

_____

_____

Attachment 3

STORMWATER MONITORING (PAGE 2)

Field Equipment List

Waste Containers (2 total – clearly labeled):

1 liter amber plastic for surfactants/detergents kit waste
1 liter amber plastic for Cl2 kit waste

Sample Bottles (3 total for each sample location)-
120ml sterile – E.coli/entero
1 Liter amber glass: PPCP, *EPA* (Peter Philbrook)
120ml-250ml plastic – Field Kit Bottle – to be used on site for kits listed above

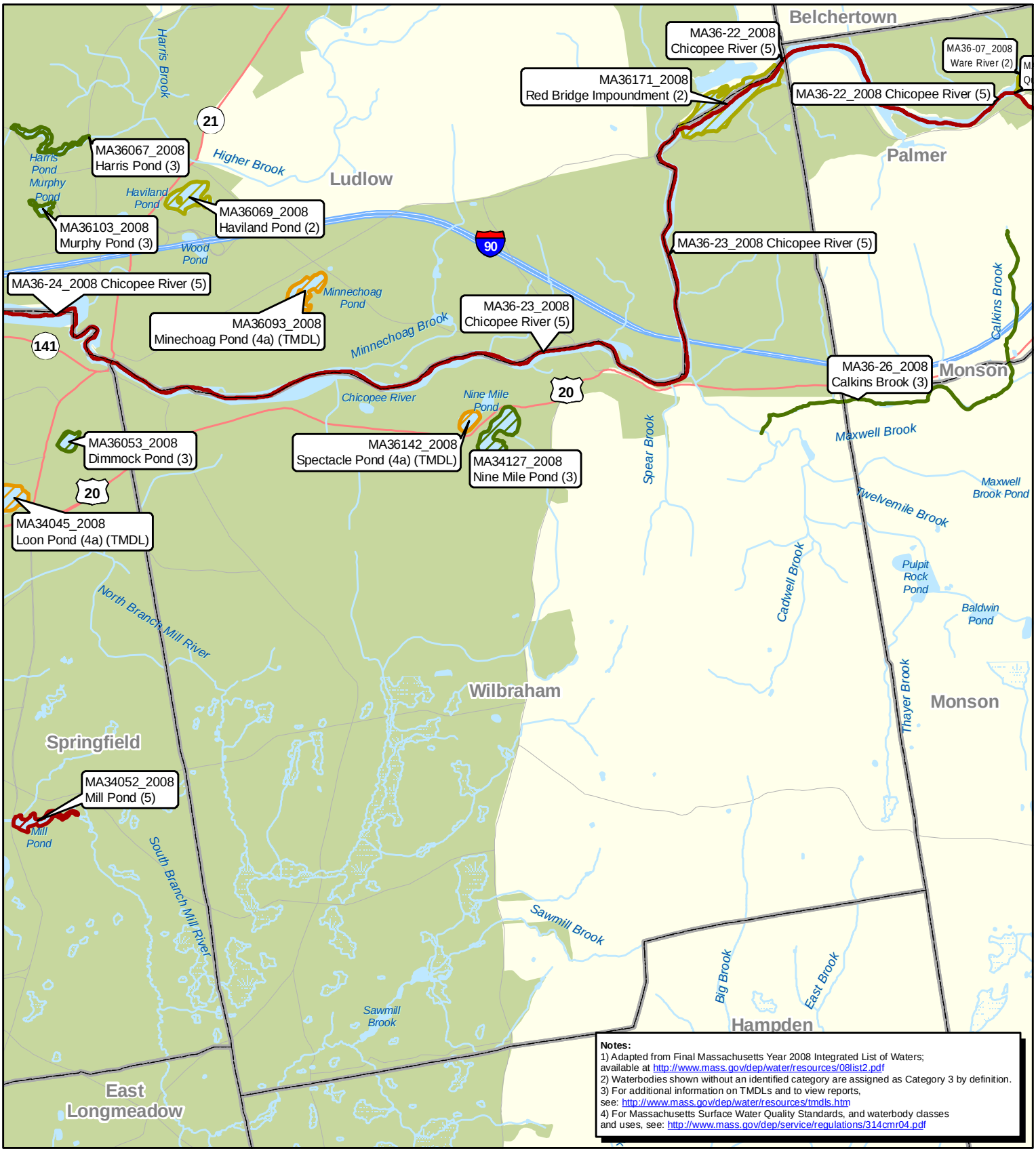
***Fill out chain of custody

In Carboy Container
☐Log book
☐COC forms
☐Extra sample bottles
☐Colored tape
☐Sharpies
☐Write-On-Rain Pens
☐Paper towels
☐GPS
☐Sampling plan & GPS locations
☐Regular length Powder Free Gloves
☐Squirt bottle of DI Water
☐Coolers with Ice
☐Waders/Boots
☐YSI multi parameter Meter

Town of Wilbraham IDDE Program

Appendix G

Impaired Waters and TMDLs



Notes:
1) Adapted from Final Massachusetts Year 2008 Integrated List of Waters; available at http://www.mass.gov/dep/water/resources/08list2.pdf
2) Waterbodies shown without an identified category are assigned as Category 3 by definition.
3) For additional information on TMDLs and to view reports, see: http://www.mass.gov/dep/water/resources/tmdls.htm
4) For Massachusetts Surface Water Quality Standards, and waterbody classes and uses, see: http://www.mass.gov/dep/service/regulations/314cmr04.pdf

Waterbody Assessment and TMDL Status
Wilbraham, MA

N

0 0.5 Miles

EPA

Map produced by EPA Region I GIS Center
Map Tracker ID 6678, February 25, 2010
Data Sources: TeleAtlas, Census Bureau, USGS, MassDEP

Waterbody Label

State ID,
Waterbody Name (Category)
(TMDL(s) approved for this waterbody)

See companion table for a listing of pollutants, non-pollutants, and TMDLs for each waterbody

Assessment of Waterbody Segment

- **Category 2:** Attaining some uses; other uses not assessed
- **Category 3:** Insufficient information to make assessments for any use.
- **Category 4a:** TMDL is completed and approved for one or more pollutants
- **Category 4c:** Impairment not caused by a pollutant.
- **Category 5:** Impaired or threatened for one or more uses and requiring a TMDL.

- Waterbodies
- Swamp/Marsh
- MS4 Urbanized Areas (2000 Census)
- Municipal Boundaries

Massachusetts Year 2014 Integrated List of Waters

Final Listing of the Condition of Massachusetts' Waters Pursuant to Sections 305(b), 314 and 303(d) of the Clean Water Act

CN 450.1

Commonwealth of Massachusetts
Executive Office of Energy and Environmental Affairs
Matthew A. Beaton, Secretary
Massachusetts Department of Environmental Protection
Martin Suuberg, Commissioner
Bureau of Water Resources
Douglas E. Fine, Assistant Commissioner

Massachusetts Category 2 Waters
"Attaining some uses; other uses not assessed"

NAME	SEGMENT ID	DESCRIPTION	SIZE	UNITS	USES ATTAINED*				
					Aesthetic	Fish, other Aquatic Life and Wildlife	Primary Contact Recreation	Secondary Contact Recreation	Shellfish Harvesting
Chicopee River	MA36-23	Red Bridge Impoundment Dam, Wilbraham/Ludlow to Wilbraham Pumping Station (old WWTP), Wilbraham/Ludlow.	3.8	MILES	X	X	X	X	
Conant Brook Reservoir	MA36038	Monson	4	ACRES	X				
Cooley Brook	MA36-38	From the outlet of Chicopee Reservoir, Chicopee to the confluence with the Chicopee River, Chicopee. (segment includes "braid" that confluences with the Chicopee River upstream of the mouth of Cooley Brook)	1.2	MILES	X	X	X	X	
Cranberry River	MA36-20	Source, outlet Cranberry Meadow Pond, Spencer to confluence with Sevenmile River, Spencer. (through Howe Pond formerly segment MA36073)	3.6	MILES	X	X	X	X	
Dunn Brook	MA36-19	From confluence with Forget-Me-Not Brook, East Brookfield/Brookfield to confluence with Quaboag River, Brookfield.	2.4	MILES	X		X	X	
East Branch Swift River	MA36-35	Headwaters at the confluence of Shattuck and Popple Camp Brooks, Phillipston to mouth at Pottapaug Pond, Petersham. (through Connor Pond formerly segment MA36039)	9.8	MILES	X	X			
Forget-Me-Not Brook	MA36-18	Headwaters, North Brookfield to North Brookfield WWTP discharge, North Brookfield.	1.7	MILES	X	X	X	X	
Higher Brook	MA36-42	Headwaters south of Route 21, Ludlow through Harris Pond (formely reported as segment MA36067) to the Ludlow/Chicopee corporate boundary where the stream name changes to Fuller Brook.	6.3	MILES	X	X	X	X	
Hop Brook	MA36-32	Headwaters upstream of West Street, New Salem to mouth at Quabbin Reservoir, New Salem.	3.7	MILES	X				
Middle Branch Swift River	MA36-33	Headwaters just north of Wendell and New Salem State Forests (south of the Swift River School), Wendell to mouth at Quabbin Reservoir, New Salem.	6.9	MILES	X				
Quaboag River	MA36-14	Outlet of Quaboag Pond, Brookfield to Route 67 bridge, West Brookfield.	6.1	MILES	X	X	X	X	

Massachusetts Category 3 Waters
"No uses assessed"

NAME	SEGMENT ID	DESCRIPTION	SIZE	UNITS
Brigham Pond	MA36020	Hubbardston	45	ACRES
Brooks Pond	MA36022	Petersham	86	ACRES
Calkins Brook	MA36-26	Headwaters, southeast of Baptist Hill, Palmer to confluence with Twelvemile Brook, Wilbraham.	2.7	MILES
Carter Pond	MA36029	Petersham	44	ACRES
Chicopee Brook	MA36-21	Headwaters, east of Peaked Mountain, Monson (through Chicopee Brook Pond, formerly segment MA36031) to confluence with Quaboag River, Monson.	9.9	MILES
Chicopee Reservoir	MA36033	Chicopee	22	ACRES
Cloverdale Street Pond	MA36036	Rutland	19	ACRES
Comins Pond	MA36037	Warren	26	ACRES
Cranberry Meadow Pond	MA36040	Spencer/Charlton	69	ACRES
Crystal Lake	MA36043	Palmer	16	ACRES
Cunningham Pond	MA36044	Hubbardston	27	ACRES
Cusky Pond	MA36045	New Braintree	28	ACRES
Demond Pond	MA36051	Rutland	120	ACRES
Dimmock Pond	MA36053	Springfield	9	ACRES
Edson Pond	MA36180	Rutland	36	ACRES
Fivemile Pond	MA36061	Springfield	36	ACRES
Fivemile Pond South	MA36182	Springfield	4	ACRES
Gaston Pond	MA36065	Barre	15	ACRES
Haviland Pond	MA36069	Ludlow	25	ACRES
Horse Pond	MA36072	North Brookfield	63	ACRES
Knights Pond	MA36077	Belchertown	36	ACRES
Lovewell Pond	MA36085	Hubbardston	82	ACRES
Mare Meadow Reservoir	MA36090	Westminster/Hubbardston	240	ACRES
Mare Meadow Reservoir North	MA36178	Westminster	38	ACRES
Moose Hill Reservoir	MA36179	Spencer/Leicester	52	ACRES
Moulton Pond	MA36098	Rutland	65	ACRES
Muddy Pond	MA36102	Oakham/Rutland	23	ACRES
Murphy Pond	MA36103	Ludlow	6	ACRES
Palmer Reservoir	MA36115	Palmer	8	ACRES
Paradise Lake	MA36116	Monson	17	ACRES
Pattaquattic Pond	MA36117	Palmer	18	ACRES
Peppers Mill Pond	MA36121	Ware	11	ACRES
Perry Hill Pond	MA36122	Hubbardston	23	ACRES
Prince River	MA36-08	Source, outlet Hemingway Pond, Barre to confluence with Ware River, Barre (excluding approximately 0.6 miles through Old Reservoir, segment MA36114).	7.1	MILES

Massachusetts Category 3 Waters
"No uses assessed"

NAME	SEGMENT ID	DESCRIPTION	SIZE	UNITS
Spencer Brook	MA82B-15	From the outlet of an unnamed pond north of Bellows Hill, Carlisle to the inlet of Angiers Pond, Concord.	3.794	MILES
Sudbury River	MA82A-01	From the source at the outlet of Cedar Swamp Pond, Westborough to the Fruit Street Bridge, Hopkinton/Westborough.	1.895	MILES
Tripp Pond	MA82107	Hudson	3.501	ACRES
Westborough Reservoir	MA82114	Westborough	41.007	ACRES
White Pond	MA82118	Concord	36.112	ACRES
White Pond	MA82119	Hudson/Stow	48.837	ACRES
Whitehall Brook	MA82A-11	From the outlet of Whitehall Reservoir, Hopkinton to confluence with the Sudbury River, Westborough.	3.485	MILES
Williams Lake	MA82121	Marlborough	69.316	ACRES
Connecticut				
Atkins Reservoir	MA34006	Shutesbury	46.468	ACRES
Brickyard Brook	MA34-13	Headwaters, Westfield to confluence with Manhan River, Westfield.	1.616	MILES
Cooley Brook	MA34-20	Headwaters, Longmeadow to confluence with Connecticut River, Longmeadow.	1.44	MILES
Danks Pond	MA34019	Northampton/Easthampton	2.796	ACRES
Factory Hollow Pond	MA34021	Amherst	11.89	ACRES
Green Pond	MA34028	Montague	14.727	ACRES
Lake Pleasant	MA34070	Montague	54.006	ACRES
Long Plain Brook	MA34-09	Headwaters, Leveret/Sunderland town line (in Mt. Toby State Forest) to confluence with Russellville Brook at Route 116, Sunderland.	5.012	MILES
Longmeadow Brook	MA34-21	Headwaters, outlet Turner Park Pond, Longmeadow to confluence with Connecticut River, Longmeadow.	4.454	MILES
Lower Highland Lake	MA34047	Goshen	90.731	ACRES
Manhan River	MA34-10	Headwaters, northeast of Norwich Pond, Huntington to inlet Tighe Carmody Reservoir, Southampton (thru White Reservoir formely segment MA34100).	6.551	MILES
Mill River Diversion	MA34-32	Headwaters, outlet Paradise Pond to confluence with Oxbow (east of Old Springfield Road), Northampton (thru Hulberts Pond formely segment MA34036).	2.538	MILES
Mountain Street Reservoir	MA34056	Williamsburg/Hatfield/Whately	66.673	ACRES
Nine Mile Pond	MA34127	Wilbraham (PALIS/Segment changed from 36107 to 34127, TRD 6/21/02)	32.531	ACRES
Northampton Reservoir	MA34059	Whately	80.365	ACRES
Northfield Mountain Reservoir	MA34061	Erving	237.269	ACRES
Pine Island Lake	MA34069	Westhampton	55.096	ACRES
Plympton Brook Pond	MA34071	Wendell	4.894	ACRES
Potash Brook	MA34-12	Headwaters to confluence with Manhan River, Southampton.	0.96	MILES
Raspberry Brook	MA34-22	From Massachusetts/Connecticut border to confluence with Connecticut River, Longmeadow.	1.794	MILES
Roberts Meadow Reservoir	MA34076	Northampton	22.421	ACRES
Sawmill River	MA34-40	Headwaters, outlet Lake Wyola, Shutesbury to Dudleyville Road, Leverett (formerly part of MA34-26).	2.032	MILES

Massachusetts Category 4a Waters
"TMDL is completed"

NAME	SEGMENT ID	DESCRIPTION	SIZE	UNITS	POLLUTANTS ADDRESSED BY TMDL	EPA TMDL NUMBER
Uncas Pond	MA72122	Franklin	17.3	ACRES	(Non-Native Aquatic Plants*)	
					Oxygen, Dissolved	40319
Unnamed Tributary	MA72-32	Locally known as Sawins Brook - emerges east of Elm Street, Watertown to confluence with the Charles River, Watertown (sections culverted).	0.539	MILES	Escherichia coli	32382
Chicopee						
Lake Lashaway	MA36079	North Brookfield/East Brookfield	274	ACRES	(Non-Native Aquatic Plants*)	
					Mercury in Fish Tissue	33880
Long Pond	MA36083	Springfield	14	ACRES	Nutrient/Eutrophication Biological Indicators	722
Minechoag Pond	MA36093	Ludlow	21	ACRES	Nutrient/Eutrophication Biological Indicators	3629
Mona Lake	MA36094	Springfield	11	ACRES	Nutrient/Eutrophication Biological Indicators	3630
Pottapaug Pond	MA36125	Petersham/Hardwick	568	ACRES	(Non-Native Aquatic Plants*)	
					Mercury in Fish Tissue	33880
Quabbin Reservoir	MA36129	Petersham/Pelham/Ware/Hardwick/Shutesbury/Belchertown/New Salem	24012	ACRES	(Non-Native Aquatic Plants*)	
					Mercury in Fish Tissue	33880
Quacumquasit Pond	MA36131	Brookfield/East Brookfield/Sturbridge	223	ACRES	(Eurasian Water Milfoil, Myriophyllum spicatum*)	
					(Non-Native Aquatic Plants*)	
					Mercury in Fish Tissue	33880
Spectacle Pond	MA36142	Wilbraham	9	ACRES	Nutrient/Eutrophication Biological Indicators	3631
Sugden Reservoir	MA36150	Spencer	85	ACRES	Nutrient/Eutrophication Biological Indicators	3633
Wickaboag Pond	MA36166	West Brookfield	315	ACRES	Aquatic Plants (Macrophytes)	1332
					Turbidity	1332
Concord (SuAsCo)						
Ashland Reservoir	MA82003	Ashland	167.961	ACRES	(Non-Native Aquatic Plants*)	
					Mercury in Fish Tissue	42396
Boons Pond	MA82011	Stow/Hudson	173.442	ACRES	(Non-Native Aquatic Plants*)	
					Excess Algal Growth	2353
					Mercury in Fish Tissue	33880
Nutting Lake	MA82124	[West Basin] Billerica	51.408	ACRES	Mercury in Fish Tissue	33880
Sudbury Reservoir	MA82106	Southborough/Marlborough	1177.986	ACRES	Mercury in Fish Tissue	33880
Walden Pond	MA82109	Concord	62.946	ACRES	Mercury in Fish Tissue	33880

Massachusetts Category 5 Waters
"Waters requiring a TMDL"

NAME	SEGMENT ID	DESCRIPTION	SIZE	UNITS	IMPAIRMENT CAUSE	EPA TMDL NO.
Browning Pond	MA36025	Oakham/Spencer	106	ACRES	(Non-Native Aquatic Plants*)	
					Mercury in Fish Tissue	
					Nutrient/Eutrophication Biological Indicators	3626
Chicopee River	MA36-22	Source, confluence of Ware River and Quaboag River, Palmer (through Red Bridge Impoundment formerly segment MA36171) to Red Bridge Impoundment Dam, Wilbraham/Ludlow.	2.8	MILES	Escherichia coli	
					Mercury in Fish Tissue	
Chicopee River	MA36-24	Wilbraham Pumping Station (old WWTP), Wilbraham/Ludlow to Chicopee Falls Dam, Chicopee.	9.1	MILES	Fecal Coliform	
Chicopee River	MA36-25	Chicopee Falls Dam, Chicopee to confluence with Connecticut River, Chicopee.	3	MILES	Escherichia coli	
Dean Pond	MA36050	Oakham	64	ACRES	Excess Algal Growth	
					Turbidity	
Doane Pond	MA36054	North Brookfield	28	ACRES	Aquatic Plants (Macrophytes)	
Eames Pond	MA36056	Paxton	58	ACRES	Oxygen, Dissolved	
East Branch Ware River	MA36-01	Outlet Bickford Pond, Hubbardston to confluence with the West Branch Ware River, Barre.	12.4	MILES	Oxygen, Dissolved	
East Brookfield River	MA36-13	Outlet Lake Lashaway, East Brookfield to Quaboag Pond, East Brookfield.	2.4	MILES	(Non-Native Aquatic Plants*)	
					Oxygen, Dissolved	
Forget-Me-Not Brook	MA36-28	North Brookfield WWTP discharge, North Brookfield to confluence with Dunn Brook, East Brookfield/Brookfield.	1.3	MILES	Aquatic Macroinvertebrate Bioassessments	
					Escherichia coli	
					Taste and Odor	
					Whole Effluent Toxicity (WET)	
Fuller Brook	MA36-41	From the Ludlow/Chicopee corporate boundary where the stream name changes from Higher Brook, to the confluence with the Chicopee River, Chicopee.	1.9	MILES	Escherichia coli	
Lake Whittemore	MA36165	Spencer	52	ACRES	Turbidity	
Quaboag Pond	MA36130	Brookfield/East Brookfield	544	ACRES	(Eurasian Water Milfoil, Myriophyllum spicatum*)	
					(Non-Native Aquatic Plants*)	
					Excess Algal Growth	33846
					Mercury in Fish Tissue	
					Phosphorus (Total)	33846
Quaboag River	MA36-16	Warren WWTP discharge, Warren to Route 32 bridge, Palmer/Monson.	8.7	MILES	Fecal Coliform	

Massachusetts Year 2016 Integrated List of Waters

Proposed Listing of the Condition of Massachusetts' Waters Pursuant to Sections 305(b), 314 and 303(d) of the Clean Water Act

CN 470.0

Commonwealth of Massachusetts
Executive Office of Energy and Environmental Affairs
Matthew A. Beaton, Secretary
Massachusetts Department of Environmental Protection
Martin Suuberg, Commissioner
Bureau of Water Resources
Douglas E. Fine, Assistant Commissioner

Category 2 waters listed alphabetically by major watershed
"Attaining some uses; other uses not assessed"

WATER BODY	SEGMENT ID	Description	SIZE	UNITS	Uses Attained*				
					Aesthetic	Fish, other Aquatic Life and Wildlife	Primary Contact Recreation	Secondary Contact Recreation	Shellfish Harvesting
BOTTLE BROOK	MA36-46	Headwaters, perennial portion, east of Dunhamtown Brimfield Road, Brimfield to mouth at confluence with Quaboag River, Brimfield.	2	MILES	X		X	X	
Burnshirt River	MA36-37	Headwaters, outlet Stone Bridge Pond, Templeton/Phillipston ence with Canesto Brook, Barre (through formerly segment MA36167).	8.6	MILES	X		X	X	
Cadwell Creek		f Route 202 and northwest of Dodge Hill, t inlet Quabbin Reservoir, Belchertown	3.2	MILES		X			
Calkins Brook	MA36-26	Headwaters, perennial portion, southeast of Baptist Hill, Palmer to mouth at confluence with Twelvemile Brook, Wilbraham.	2.7	MILES	X		X	X	
Chicopee Reservoir	MA36033	Chicopee	22	ACRES			X	X	
Chicopee River	MA36-23	Red Bridge Impoundment Dam (NATID: MA00723), Wilbraham/Ludlow to Wilbraham Pumping Station (old WWTP) Wilbraham/Ludlow.	3.8	MILES	X	X	X	X	
CONANT BROOK	MA36-45	Headwaters, outlet Conant Brook Reservoir dam (NATID: MA00965), Monson to mouth at confluence with Chicopee Brook, Monson.					X	X	
Cooley Brook	MA36-38	From the outlet of Chicopee Reservoir, Chicopee to mouth at confluence with the Chicopee River, Chicopee (segment includes "braid" that confluences with the Chicopee River upstream of the mouth of Cooley Brook).	1.2	MILES		X			
Cranberry River	MA36-20	Headwaters, outlet Cranberry Meadow Pond, Spencer to mouth at confluence with Sevenmile River, Spencer (through Howe Pond formerly segment MA36073).	3.6	MILES		X			
Dunn Brook	MA36-19	From confluence with Forget-Me-Not Brook, East Brookfield/Brookfield to mouth at confluence with Quaboag River, Brookfield.	2.4	MILES	X		X	X	
East Branch Swift River	MA36-35	Headwaters, confluence of Shattuck and Popple Camp brooks, Phillipston to mouth at inlet Pottapaug Pond, Petersham (through Connor Pond formerly segment MA36039).	9.8	MILES		X			
Higher Brook	MA36-42	Headwaters, perennial portion, south of Route 21, Ludlow through Harris Pond (formely reported as segment MA36067) to mouth at Ludlow/Chicopee corporate boundary where the stream name changes to Fuller Brook.	6.3	MILES		X			

Change from listing as Category 3 water in Massachusetts Year 2014 Integrated List of Waters

No change from Massachusetts Year 2014 Integrated List of Waters

Category 3 waters listed alphabetically by major watershed
"No uses assessed"

WATER BODY	SEGMENT ID	Description	SIZE	UNITS
White Pond	MA82119	Hudson/Stow.	49	ACRES
Whitehall Brook	MA82A-11	Headwaters, outlet Whitehall Reservoir, Hopkinton to mouth at confluence with the Sudbury River, Westborough.	3.5	MILES
Williams Lake	MA82121	Marlborough.	69	ACRES
Connecticut				
Atkins Reservoir	MA34006	Shutesbury/Amherst.	46	ACRES
Brickyard Brook	MA34-13	Headwaters, perennial portion, Westfield to mouth at confluence with Manhan River, Westfield.	1.6	MILES
BUFFUM BROOK	MA34-49	Headwaters, west of West Pelham Road, Shutesbury to mouth at confluence with Harris Brook, (forming headwaters Amethyst Brook), Pelham.	3.1	MILES
Cooley Brook	MA34-20	Headwaters, Longmeadow to mouth at confluence with Connecticut River, Longmeadow.	1.4	MILES
Danks Pond	MA34019	Northampton/Easthampton.	3	ACRES
DEAN BROOK	MA34-50	Headwaters, east of West Pelham Road (at mouth of Baker Brook), Shutesbury to mouth at confluence with Adams Brook (in small "diversion pool" for Atkins Reservoir), Shutesbury.	2.4	MILES
Factory Hollow Pond	MA34021	Amherst.	12	ACRES
Green Pond	MA34028	Montague.	15	ACRES
HARRIS BROOK	MA34-48	Headwaters, northeast of Enfield Road, Pelham to Intake Reservoir Dam (NATID: MA01270) outlet, Pelham (excluding approximately 0.2 miles through Hawley Reservoir, Pelham).	1.2	MILES
JOE WRIGHT BROOK	MA34-52	Headwaters south of Hemenway Trail, Williamsburg to mouth at confluence with Mill River, Williamsburg.	3.3	MILES
Lake Pleasant	MA34070	Montague.	54	ACRES
Loon Pond	MA34045	Springfield.	26	ACRES
Lower Highland Lake	MA34047	Goshen.	91	ACRES
Manhan River	MA34-10	Headwaters, northeast of Norwich Pond, Huntington to inlet Tighe Carmody Reservoir, Southampton (thru White Reservoir formely segment MA34100).	6.6	MILES
MILL BROOK	MA34-55	Headwaters, outlet Stevens Swamp, Warwick to mouth at confluence with Connecticut River, Northfield.	7.7	MILES
Mill River Diversion	MA34-32	Headwaters, outlet Paradise Pond, Northampton to mouth at confluence with Oxbow (east of Old Springfield Road), Northampton (thru Hulberts Pond formely segment MA34036).	2.5	MILES
Mountain Street Reservoir	MA34056	Williamsburg/Hatfield/Whately.	67	ACRES
Nine Mile Pond	MA34127	Wilbraham (PALIS/Segment changed from 36107 to 34127, TRD 6/21/02).	33	ACRES
Northampton Reservoir	MA34059	Whately.		
Northfield Mountain Reservoir	MA34061	Erving.		
NURSE BROOK	MA34-59	Headwaters, west of Pratt Corner Road, Shutesbury to mouth at confluence with Adams Brook (in small "diversion pool" for Atkins Reservoir), Shutesbury.	1.2	MILES
Pine Island Lake	MA34069	Westhampton.	55	ACRES
Plympton Brook Pond	MA34071	Wendell.	5	ACRES
Potash Brook	MA34-12	Headwaters, perennial portion, Southampton to confluence with Manhan River, Southampton.	1	MILES
Raspberry Brook	MA34-22	From Massachusetts/Connecticut border to mouth at confluence with Connecticut River, Longmeadow.	1.8	MILES
RICE BROOK	MA34-47	Headwaters, perennial portion, south of Burt Road, Westhampton to mouth at confluence with Sodom Brook, Westhampton.	1.1	MILES
Roberts Meadow Reservoir	MA34076	Northampton.	22	ACRES
ROGERS BROOK	MA34-51	Headwaters east of Oak Hill Road near the Goshen/Ashfield border to mouth at confluence with West Branch Mill River, Goshen.	2.6	MILES
SACKET BROOK	MA34-45	Headwaters, perennial portion, north of Southampton Road, Montgomery to mouth at confluence with Manhan River, Southampton.	2.1	MILES

No change from Massachusetts Year 2014 Integrated List of Waters

Category 4a waters listed alphabetically by major watershed
"TMDL is completed"

WATER BODY	SEGMENT ID	DESCRIPTION	SIZE	UNITS	POLLUTANTS ADDRESSED BY TMDL	EPA TMDL NO.
					Turbidity	40319
Lymans Pond	MA72070	Dover.	4	ACRES	Aquatic Plants (Macrophytes)	40319
					Turbidity	40319
Mirror Lake	MA72078	Wrentham/Norfolk.	62	ACRES	(Non-Native Aquatic Plants*)	
					Nutrient/Eutrophication Biological Indicators	40319
					Phosphorus (Total)	40319
					Secchi disk transparency	40319
Rosemary Brook	MA72-25	Headwaters, outlet Rosemary Lake, Needham to mouth at confluence with the Charles River, Wellesley.	3.3	MILES	Oxygen, Dissolved	40317
					Phosphorus (Total)	40317
South Meadow Brook	MA72-24	From emergence west of Parker Street, Newton to mouth at confluence with the Charles River, Newton (three culverted portions totaling approximately 2870 feet (0.54mile)).	1.7	MILES	(Bottom Deposits*)	
					(Debris/Floatables/Trash*)	
					(Physical substrate habitat alterations*)	
					Escherichia coli	32377
					Oxygen, Dissolved	40317
					Phosphorus (Total)	40317
					Turbidity	40317
Uncas Pond	MA72122	Franklin.	17	ACRES	(Non-Native Aquatic Plants*)	
					Oxygen, Dissolved	40319
Unnamed Tributary	MA72-32	Locally known as "Sawins Brook" - emerges east of Elm Street, Watertown to mouth at confluence with the Charles River, Watertown (one culverted portion approximately 360 feet (0.07mile)).	0.5	MILES	Escherichia coli	32382
Chicopee						
Lake Lashaway	MA36079	North Brookfield/East Brookfield.	274	ACRES	(Non-Native Aquatic Plants*)	
					Mercury in Fish Tissue	33880
Long Pond	MA36083	Springfield.	14	ACRES	Nutrient/Eutrophication Biological Indicators	722
Minechoag Pond	MA36093	Ludlow.	21	ACRES	Nutrient/Eutrophication Biological Indicators	3629
Mona Lake	MA36094	Springfield.	11	ACRES	Nutrient/Eutrophication Biological Indicators	3630
Pottapaug Pond	MA36125	Petersham/Hardwick.	568	ACRES	(Non-Native Aquatic Plants*)	
					Mercury in Fish Tissue	33880
Quabbin Reservoir	MA36129	Petersham/Pelham/Ware/Hardwick/Shutesbury/Belchertown/New Salem.	24012	ACRES	(Non-Native Aquatic Plants*)	
					Mercury in Fish Tissue	33880
Quacumquasit Pond	MA36131	Brookfield/East Brookfield/Sturbridge.	223	ACRES	(Eurasian Water Milfoil, Myriophyllum spicatum*)	
					(Non-Native Aquatic Plants*)	
					Mercury in Fish Tissue	33880
Spectacle Pond	MA36142	Wilbraham.	9	ACRES	Nutrient/Eutrophication Biological Indicators	3631
Sugden Reservoir	MA36150	Spencer.		ACRES	Nutrient/Eutrophication Biological Indicators	3633
Wickaboag Pond	MA36166	West Brookfield.	316	ACRES	Turbidity	1332

No change from Massachusetts Year 2014 Integrated List of Waters

Category 5 waters listed alphabetically by major watershed
The 303(d) List – "Waters requiring a TMDL"

WATER BODY	SEGMENT ID	DESCRIPTION	SIZE	UNITS	IMPAIRMENT	EPA TMDL NO.
Unnamed Tributary	MA72-30	Locally known as "Laundry Brook" - emerges north of California Street, Watertown to mouth at confluence with the Charles River, Watertown (stream not depicted on 1987 Newton USGS map).	0.02	MILES	(Physical substrate habitat alterations*)	
					Enterococcus	32381
					Escherichia coli	32381
					Phosphorus (Total)	
					Taste and Odor	
					Total Suspended Solids (TSS)	
					Turbidity	
Unnamed Tributary	MA72-31	Locally known as "Millers River" - from emergence near Route 93, Cambridge/Boston to mouth at confluence with the Charles River, Cambridge.	0.2	MILES	(Bottom Deposits*)	
					(Debris/Floatables/Trash*)	
					(Habitat Assessment (Streams)*)	
					Foam/Flocs/Scum/Oil Slicks	
					Other (Unspecified Metals)	
					Petroleum Hydrocarbons	
					Polychlorinated biphenyls	
					Polycyclic Aromatic Hydrocarbons (PAHs) (Aquatic Ecosystems)	
					Sedimentation/Siltation	
					Taste and Odor	
					Turbidity	
Unnamed Tributary	MA72-41	Unnamed tributary to the Charles River, outlet Lymans Pond, Dover to mouth at confluence with the Charles River, Dover.	0.5	MILES	Escherichia coli	
Unnamed Tributary	MA72-43	Unnamed tributary to Morses Pond, headwaters outlet Reeds Pond, Wellesley to mouth at confluence with Morses Pond, Wellesley.	0.2	MILES	Escherichia coli	
Waban Brook	MA72-17	Headwaters, outlet Lake Waban, Wellesley to mouth at confluence with the Charles River, Wellesley.	0.7	MILES	Temperature, water	
Chicopee						
Abbey Brook	MA36-40	Headwaters west of Saint James Avenue, Springfield through Bemis Pond (formely reported as segment MA36011) to mouth at confluence with the Chicopee River, Chicopee.	1.5	MILES	Escherichia coli	
					Total Suspended Solids (TSS)	
Alden Pond	MA36003	Ludlow.	4	ACRES	Nutrient/Eutrophication Biological Indicators	
Brookhaven Lake	MA36021	West Brookfield.	34	ACRES	Turbidity	
Browning Pond	MA36025	Oakham/Spencer.	106	ACRES	(Non-Native Aquatic Plants*)	
					Mercury in Fish Tissue	
					Nutrient/Eutrophication Biological Indicators	3626
Chicopee Brook	MA36-21	Headwaters, east of Peaked Mountain, Monson (through Chicopee Brook Pond, formerly segment MA36031) to mouth at confluence with Quaboag River, Monson.	9.9	MILES	Escherichia coli	
Chicopee River	MA36-22	Source, confluence of Ware River and Quaboag River, Palmer	2.8	MILES	Escherichia coli	

No change from Massachusetts Year 2014 Integrated List of Waters

Category 5 waters listed alphabetically by major watershed
The 303(d) List – "Waters requiring a TMDL"

No change from Massachusetts Year 2014 Integrated List of Waters

Addition of E. Coli since Massachusetts Year 2014 Integrated List of Waters

WATER BODY	SEGMENT ID	DESCRIPTION	SIZE	UNITS	IMPAIRMENT	
		(through Red Bridge Impoundment formerly segment MA36171) to Red Bridge Impoundment Dam (NATID: MA00723), Wilbraham/Ludlow.			Mercury in Fish Tissue	
Chicopee River	MA36-24	Wilbraham Pumping Station (old WWTP), Wilbraham/Ludlow to Chicopee Falls Dam (NATID: MA00719), Chicopee.	8.8	MILES	Escherichia coli	
					Fecal Coliform	
Chicopee River	MA36-25	Chicopee Falls Dam (NATID: MA00719), Chicopee to mouth at confluence with Connecticut River, Chicopee.	3	MILES	Escherichia coli	
DANFORTH BROOK	MA36-50	Headwaters, east of Charity Road, Hardwick to mouth at confluence with Ware River, Hardwick.	5.8	MILES	Escherichia coli	
Dean Pond	MA36050	Oakham.	64	ACRES	Excess Algal Growth	
					Turbidity	
Doane Pond	MA36054	North Brookfield.	28	ACRES	Aquatic Plants (Macrophytes)	
Eames Pond	MA36056	Paxton.	58	ACRES	Oxygen, Dissolved	
East Branch Ware River	MA36-01	Headwaters, outlet Bickford Pond, Hubbardston to mouth at confluence with West Branch Ware River (forming headwaters of Ware River), Barre.	12.4	MILES	Oxygen, Dissolved	
East Brookfield River	MA36-13	Headwaters, outlet Lake Lashaway, East Brookfield to mouth at inlet Quaboag Pond, East Brookfield.	2.4	MILES	(Non-Native Aquatic Plants*)	
					Oxygen, Dissolved	
Forget-Me-Not Brook	MA36-18	Headwaters, North Brookfield to North Brookfield WWTP discharge (NPDES: MA0101061), North Brookfield.	1.2	MILES	Escherichia coli	
Forget-Me-Not Brook	MA36-28	North Brookfield WWTP discharge (NPDES: MA0101061), North Brookfield to mouth at confluence with Dunn Brook, East Brookfield/Brookfield.	1.3	MILES	Aquatic Macroinvertebrate Bioassessments	
					Whole Effluent Toxicity (WET)	
Fuller Brook	MA36-41	From the Ludlow/Chicopee corporate boundary where the stream name changes from Higher Brook, to mouth at confluence with the Chicopee River, Chicopee.	1.9	MILES	Escherichia coli	
Lake Lorraine	MA36084	Springfield.	28	ACRES	(Non-Native Aquatic Plants*)	
					Enterococcus	
Lake Whittemore	MA36165	Spencer.	52	ACRES	Turbidity	
Prince River	MA36-08	Headwaters, outlet Hemingway Pond, Barre to mouth at confluence with Ware River, Barre (excluding approximately 0.6 miles through Old Reservoir, segment MA36114).	7.1	MILES	Escherichia coli	
Quaboag Pond	MA36130	Brookfield/East Brookfield.	544	ACRES	(Eurasian Water Milfoil, Myriophyllum spicatum*)	
					(Non-Native Aquatic Plants*)	
					Excess Algal Growth	33846
					Mercury in Fish Tissue	
					Phosphorus (Total)	33846
Quaboag River	MA36-15	Route 67 bridge, West Brookfield to Warren WWTP discharge (NPDES: MA0101567), Warren.	6.2	MILES	Escherichia coli	
Quaboag River	MA36-16	Warren WWTP discharge (NPDES: MA0101567), Warren to Route 32 bridge, Palmer/Monson.	8.7	MILES	Escherichia coli	
					Fecal Coliform	
Quaboag River	MA36-17	Route 32 bridge, Palmer/Monson to mouth at confluence with Ware River (forming headwaters of Chicopee River), Palmer.	5.3	MILES	Escherichia coli	

APPENDIX F
Requirements for Discharges to Impaired Waters with an Approved TMDL

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II. Lake and Pond Phosphorus TMDL Requirements

Between 1999 and 2010 EPA has approved 13 Lake TMDLs[10] completed by MassDEP covering 78 lakes and ponds within the Commonwealth of Massachusetts. Any permittee (traditional or non-traditional) that discharges to a waterbody segment in Table F-6 is subject to the requirements of this part.

1. Permittees that operate regulated MS4s (traditional and non-traditional) that discharge to the identified impaired waters or their tributaries must reduce phosphorus discharges to support achievement of phosphorus load reductions identified in the TMDLs. To address phosphorus, all permittees with a phosphorus reduction requirement greater than 0% shall develop a Lake Phosphorus Control Plan (LPCP) designed to reduce the amount of phosphorus in stormwater discharges from its MS4 to the impaired waterbody or its tributaries in accordance with the phosphorus load reduction requirements set forth in Table F-6 below. Permittees discharging to waterbodies in Table F-6 with an associated 0% Phosphorus Required Percent Reduction are subject to Appendix F part II.2.f and are relieved of the requirements of Appendix F part II.1.i through Appendix F part II.2.e Table F-6 identifies the primary municipalities[11] located within the watershed of the respective lake or pond and the percent phosphorus reductions necessary from urban stormwater sources. Any permittee (traditional or non-traditional) that discharges to a lake or pond listed in Table F-6 or its tributaries is subject to the same phosphorus percent reduction requirements associated with that lake or pond.

Primary Municipality	Waterbody Name	Required Percent Reduction
Auburn	Leesville Pond	31%
	Auburn Pond	24%
	Eddy Pond	0%
	Pondville Pond	8%
	Stoneville Pond	3%
Charlton	Buffumville Lake	28%
	Dresser Hill Pond	17%
	Gore Pond	14%
	Granite Reservoir	11%
	Jones Pond	13%
	Pierpoint Meadow Pond	27%
	Pikes Pond	38%
Dudley	Gore Pond	14%

[10] Final TMDLs for lakes and ponds in the Northern Blackstone River Watershed, Chicopee Basin, Connecticut Basin, French Basin, Millers Basin and Bare Hill Pond, Flint Pond, Indian Lake, Lake Boon, Leesville Pond, Salisbury Pond, White Island Pond, Quaboag Pond and Quacumquasit Pond can be found here: http://www.mass.gov/eea/agencies/massdep/water/watersheds/total-maximum-daily-loads-tmdls.html

[11] Primary municipalities indicate the municipality in which the majority of the lake or pond is located but does not necessarily indicate each municipality that has urbanized area that discharges to the lake or pond or its tributaries.

Primary Municipality	Waterbody Name	Required Percent Reduction
	Larner Pond	55%
	New Pond	56%
	Pierpoint Meadow Pond	27%
	Shepherd Pond	25%
	Tobins Pond	62%
	Wallis Pond	54%
Gardner	Hilchey Pond	27%
	Parker Pond	47%
	Bents Pond	52%
	Ramsdall Pond	49%
Grafton	Flint Pond/Lake Quinsigamond	59%
Granby	Aldrich Lake East	0%
Hadley	Lake Warner	24%
Harvard	Bare Hill Pond	2%
Hudson	Lake Boon	28%
Leicester	Smiths Pond	30%
	Southwick Pond	64%
	Cedar Meadow Pond	17%
	Dutton Pond	23%
	Greenville Pond	14%
	Rochdale Pond	8%
Ludlow	Minechoag Pond	48%
Millbury	Brierly Pond	14%
	Dorothy Pond	1%
	Howe Reservoir	48%
Oxford	Buffumville Lake	28%
	Hudson Pond	37%
	Lowes Pond	51%
	McKinstry Pond	79%
	Robinson Pond	8%
	Texas Pond	21%
Shrewsbury	Flint Pond/Lake Quinsigamond	49%
	Jordan Pond	60%
	Mill Pond	43%
	Newton Pond	19%
	Shirley Street Pond	30%
Spencer	Quaboag Pond	29%

Primary Municipality	Waterbody Name	Required Percent Reduction
	Quacumquasit Pond	2%
	Jones Pond	13%
	Sugden Reservoir	31%
Springfield	Loon Pond	10%
	Long Pond	56%
	Mona Lake	57%
Stow	Lake Boon	28%
Templeton	Brazell Pond	62%
	Depot Pond	50%
	Bourn-Hadley Pond	49%
	Greenwood Pond 2	56%
Wilbraham	Spectacle Pond	45%
Winchendon	Lake Denison	22%
	Stoddard Pond	24%
	Whitney Pond	16%
	Whites Mill Pond	21%

Table F-6: Phosphorus impaired Lakes or Ponds subject to a TMDL along with primary municipality and required percent reduction of phosphorus from urban stormwater sources

i. The LPCP shall be implemented in accordance with the following schedule and contain the following elements:

a. LPCP Implementation Schedule – The permittee shall complete its LPCP and fully implement all of the control measures in its LPCP as soon as possible but no later than 15 years after the effective date of the permit.

b. The LPCP shall be implemented in accordance with the following schedule and contain the following elements:

Number	LPCP Component and Milestones	Completion Date
1	Legal Analysis	2 years after permit effective date
2	Funding source assessment	3 years after permit effective date
3	Define LPCP scope (LPCP Area)	4 years after permit effective date
4	Calculate Baseline Phosphorus, Allowable Phosphorus Load and Phosphorus Reduction Requirement	4 years after permit effective date

5	Description of planned nonstructural and structural controls	5 years after permit effective date
6	Description of Operation and Maintenance (O&M) Program	5 years after permit effective date
7	Implementation schedule	5 years after permit effective date
8	Cost and Funding Source Assessment	5 years after permit effective date
9	Complete written LPCP	5 years after permit effective date
10	Full implementation of nonstructural controls.	6 years after permit effective date
11	Performance Evaluation.	6 and 7 years after permit effective date
12	1. Performance Evaluation. 2. Full implementation of all structural controls used to demonstrate that the total phosphorus export rate (P_{exp}) from the LPCP Area in mass/yr is equal to or less than the applicable Allowable Phosphorus Load(P_{allow}) plus the applicable Phosphorus Reduction Requirement (P_{RR}) multiplied by 0.80 $P_{exp} \leq P_{allow} + (P_{RR}\ X\ 0.80)$	8 years after permit effective date
13	Performance Evaluation	9 years after permit effective date
14	1. Performance Evaluation. 2. Update LPCP 3. Full implementation of all structural controls used to demonstrate that the total phosphorus export rate (P_{exp}) from the LPCP Area in mass/yr is equal to or less than the applicable Allowable Phosphorus Load(P_{allow}) plus the applicable Phosphorus Reduction Requirement (P_{RR}) multiplied by 0.60 $P_{exp} \leq P_{allow} + (P_{RR}\ X\ 0.60)$ OR that the permittee has reduced their phosphorus export rate by 30kg/year (whichever is greater, unless full Phosphorus Reduction Requirement has been met)	10years after permit effective date
15	Performance Evaluation	11 and 12 years after permit effective date
16	1. Performance Evaluation. 2. Full implementation of all structural controls used to demonstrate that the total phosphorus export rate (P_{exp}) from the LPCP Area in mass/yr is equal to or less than the applicable Allowable	13years after permit effective date

	Phosphorus Load(P_{allow}) plus the applicable Phosphorus Reduction Requirement (P_{RR}) multiplied by 0.30 $P_{exp} \leq P_{allow} + (P_{RR}\ X\ 0.30)$	
17	Performance Evaluation	14 years after permit effective date
18	1. Performance Evaluation. 2. Full implementation of all structural controls used to demonstrate that the total phosphorus export rate (P_{exp}) from the LPCP Area in mass/yr is equal to or less than the applicable Allowable Phosphorus Load(P_{allow}) $P_{exp} \leq P_{allow}$	15years after permit effective date

Table F-7: LPCP components and milestones

c. Description of LPCP Components:

Legal Analysis- The permittee shall develop and implement an analysis that identifies existing regulatory mechanisms available to the MS4 such as by-laws and ordinances and describes any changes to these regulatory mechanisms that may be necessary to effectively implement the LPCP. This may include the creation or amendment of financial and regulatory authorities. The permittee shall adopt necessary regulatory changes by the end of the permit term.

Scope of the LPCP (LPCP Area) - The permittee shall indicate the area in which the permittee plans to implement the LPCP, this area is known as the "LPCP Area". The permittee must choose one of the following: 1) to implement its LPCP in the entire area within its jurisdiction discharging to the impaired waterbody (for a municipality this would be the municipal boundary) or 2) to implement its LPCP in only the urbanized area portion of its jurisdiction discharging to the impaired waterbody. If the permittee chooses to implement the LPCP in its entire jurisdiction discharging to the impaired waterbody, the permittee may demonstrate compliance with the Phosphorus Reduction Requirement and Allowable Phosphorus Load requirements applicable to it through structural and non-structural controls on discharges that occur both inside and outside the urbanized area. If the permittee chooses to implement the LPCP in its urbanized area only discharging to the impaired waterbody, the permittee must demonstrate compliance with the Phosphorus Reduction Requirement and Allowable Phosphorus Load requirements applicable to it through structural and non-structural controls on discharges that occur within the urbanized area only.

Calculate Baseline Phosphorus Load (P_{base}), Phosphorus Reduction Requirement (P_{RR}) and Allowable Phosphorus Load (P_{allow}) –Permittees shall calculate their numerical Allowable Phosphorus Load and Phosphorus Reduction Requirement in mass/yr by first estimating their Baseline Phosphorus Load in mass/yr from its LPCP Area consistent with the methodology in Attachment 1 to Appendix F, the baseline shall only be estimated using land use phosphorus export coefficients in Attachment 1 to Appendix F and not account for phosphorus reductions resulting from implemented structural BMPs completed to date. Table F-6 contains the

percent phosphorus reduction required from urban stormwater consistent with the TMDL of each impaired waterbody. The permittee shall apply the applicable required percent reduction in Table F-6 to the calculated Baseline Phosphorus Load to obtain the permittee specific Allowable Phosphorus Load. The Allowable Phosphorus Load shall then be subtracted from the Baseline Phosphorus Load to obtain the permittee specific Phosphorus Reduction Requirement in mass/yr.

Description of planned non-structural controls – The permittee shall describe the non-structural stormwater control measures to be implemented to support the achievement of the milestones in Table F-7. The description of non-structural controls shall include the planned measures, the areas where the measures will be implemented, and the annual phosphorus reductions that are expected to result from their implementation. Annual phosphorus reduction from non-structural BMPs shall be calculated consistent with Attachment 2 to Appendix F. The permittee shall update the description of planned non-structural controls as needed to support the achievement of the milestones in Table F-7, including an update in the updated written LPCP 10 years after the permit effective date.

Description of planned structural controls – The permittee shall develop a priority ranking of areas and infrastructure within the municipality for potential implementation of phosphorus control practices. The ranking shall be developed through the use of available screening and monitoring results collected during the permit term either by the permittee or another entity and the mapping required pursuant to part 2.3.4.6 of the Permit. The permittee shall also include in this prioritization a detailed assessment of site suitability for potential phosphorus control measures based on soil types and other factors. The permittee shall coordinate this activity with the requirements of part 2.3.6.8.b of the Permit. A description and the result of this priority ranking shall be included in the LPCP. The permittee shall describe the structural stormwater control measures necessary to support achievement of the milestones in Table F-7. The description of structural controls shall include the planned measures, the areas where the measures will be implemented, and the annual phosphorus reductions in units of mass/yr that are expected to result from their implementation. Structural measures to be implemented by a third party may be included in the LPCP. Annual phosphorus reduction from structural BMPs shall be calculated consistent with Attachment 3 to Appendix F. The permittee shall update the description of planned structural controls as needed to support the achievement of the milestones in Table F-7, including an update in the updated written LPCP 10 years after the permit effective date.

Description of Operation and Maintenance (O&M) Program for all planned and existing structural BMPs – The permittee shall establish an Operation and Maintenance Program for all structural BMPs being claimed for phosphorus reduction credit as part of Phase 1 and 2 of the PCP. This includes BMPs implemented to date as well as BMPs to be implemented during Phase 2 of the PCP. The Operation and Maintenance Program shall become part of the PCP and include: (1) inspection and maintenance schedule for each BMP according to BMP design or manufacturer specification and (2) program or department responsible for BMP maintenance.

Implementation Schedule – An initial schedule for implementing the BMPs, including, as appropriate: funding, training, purchasing, construction, inspections, monitoring, O&M and other assessment and evaluation components of implementation. Implementation of planned BMPs must begin upon completion of the LPCP, and all non-structural BMPs shall be fully implemented within six years of the permit effective date. Where planned structural BMP retrofits or major drainage infrastructure projects are expected to take additional time to construct, the permittee shall within four years of the effective date of the permit have a schedule for completion of construction consistent with the reduction requirements in Table F-7. The permittee shall complete the implementation of its LPCP as soon as possible or at a minimum in accordance with the milestones set forth in Table F-7. The implementation schedule shall be updated as needed to support the achievement of the milestones in Table F-7, including an update in the updated written LPCP 10 years after the permit effective date.

Cost and funding source assessment – The permittee shall estimate the cost for implementing its LPCP and describe known and anticipated funding mechanisms. The permittee shall describe the steps it will take to implement its funding plan. This may include but is not limited to conceptual development, outreach to affected parties, and development of legal authorities.

Complete written LPCP – The permittee must complete the written LPCP 5 years after permit effective date. The complete LPCP shall include item numbers 1-8 in Table F-7. The permittee shall make the LPCP available to the public for public comment during the LPCP development. EPA encourages the permittee to post the LPCP online to facilitate public involvement. The LPCP shall be updated as needed with an update 10 years after the permit effective date at a minimum to reflect changes in BMP implementation to support achievement of the phosphorus export milestones in Table F-7. The updated LPCP shall build upon the original LPCP and include additional or new BMPs the permittee will use to support the achievement of the milestones in Table F-7.

Performance Evaluation – The permittee shall evaluate the effectiveness of the LPCP by tracking the phosphorus reductions achieved through implementation of structural and non-structural BMPs[12] and tracking increases in phosphorus loading from the LPCP Area beginning six years after the effective date of the permit. Phosphorus reductions shall be calculated consistent with Attachment 2 (non-structural BMP performance), Attachment 3 (structural BMP performance) and Attachment 1 (reductions through land use change), to Appendix F for all BMPs implemented to date[13]. Phosphorus load increases resulting from development shall be calculated consistent with Attachment 1 to Appendix F. Phosphorus

[12] In meeting its phosphorus reduction requirements a permittee may quantify phosphorus reductions by actions undertaken by another entity, except where those actions are credited to MassDOT or another permittee identified in Appendix F Table F-7

[13] Annual phosphorus reductions from structural BMPs installed in the LPCP Area prior to the effective date of this permit shall be calculated consistent with Attachment 3 to Appendix F. Phosphorus Reduction Credit for previously installed BMPs will only be given if the Permittee demonstrates that the BMP is performing up to design specifications and certifies that the BMP is properly maintained and inspected according to manufacturer design or specifications. This certification shall be part of the annual performance evaluation during the year credit is claimed for the previously installed BMP.

loading increases and reductions in units of mass/yr shall be added or subtracted from the calculated Baseline Phosphorus Load to estimate the yearly phosphorous export rate from the LPCP Area in mass/yr. The permittee shall also include all information required in part II.2 of this Appendix in each performance evaluation.

2. Reporting

Beginning 1 year after the permit effective date, the permittee shall include a progress report in each annual report on the planning and implementation of the LPCP.

Beginning five (5) years after the permit effective date, the permittee shall include the following in each annual report submitted pursuant to part 4.4 of the Permit:

a. All non-structural control measures implemented during the reporting year along with the phosphorus reduction in mass/yr (P_{NSred}) calculated consistent with Attachment 2 to Appendix F
b. Structural controls implemented during the reporting year and all previous years including:
    a. Location information of structural BMPs (GPS coordinates or street address)
    b. Phosphorus reduction from all structural BMPs implemented to date in mass/yr (P_{Sred}) calculated consistent with Attachment 3 to Appendix F
    c. Date of last completed maintenance for each Structural control
c. Phosphorus load increases due to development over the previous reporting period and incurred to date (P_{DEVinc}) calculated consistent with Attachment 1 to Appendix F.
d. Estimated yearly phosphorus export rate (P_{exp}) from the LPCP Area calculated using Equation 2. Equation2 calculates the yearly phosphorus export rate by subtracting yearly phosphorus reductions through implemented nonstructural controls and structural controls to date from the Baseline Phosphorus Load and adding loading increases incurred through development to date. This equation shall be used to demonstrate compliance with the phosphorus reduction milestones required as part of each phase of the LPCP.

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

Equation 2. Equation used to calculate yearly phosphorus export rate from the chosen LPCP Area. P_{exp}=Current phosphorus export rate from the LPCP Area in mass/year. P_{base}=baseline phosphorus export rate from LPCP Area in mass/year. P_{Sred}= yearly phosphorus reduction from implemented structural controls in the LPCP Area in mass/year. P_{NSred}= yearly phosphorus reduction from implemented non-structural controls in the LPCP Area in mass/year. Area in mass/year. P_{DEVinc}= yearly phosphorus increase resulting from development since the year baseline loading was calculated in the LPCP Area in mass/year.

e. Certification that all structural BMPs are being inspected and maintained according to the O&M program specified as part of the PCP. The certification statement shall be:

I certify under penalty of law that all source control and treatment Best Management Practices being claimed for phosphorus reduction credit have been inspected, maintained and repaired in accordance with manufacturer or design specification. I certify that, to the best of my knowledge, all Best Management

Practices being claimed for a phosphorus reduction credit are performing as originally designed.

f. Certification that all municipally owned and maintained turf grass areas are being managed in accordance with Massachusetts Regulation 331 CMR 31 pertaining to proper use of fertilizers on turf grasses (see http://www.mass.gov/courts/docs/lawlib/300-399cmr/330cmr31.pdf).

3. At any time during the permit term the permittee may be relieved of additional requirements in Appendix F part A.II.1. as follows:
   a. The permittee is relieved of its additional requirements as of the date when the following conditions are met:
      i. The applicable TMDL has been modified, revised or withdrawn and EPA has approved a new TMDL applicable for the receiving water that indicates that no additional stormwater controls for the control of phosphorus are necessary for the permittee's discharge based on wasteload allocations in the newly approved TMDL
   b. In such a case, the permittee shall document the date of the approved TMDL in its SWMP and is relieved of any additional remaining requirements of Appendix F part A.II.1 as of that date and the permittee shall comply with the following:
      i. The permittee shall identify in its SWMP all activities implemented in accordance with the requirements of Appendix F part A.II.1 to date to reduce phosphorus in their discharges including implementation schedules for non-structural BMPs and any maintenance requirements for structural BMPs
      ii. The permittee shall continue to implement all requirements of Appendix F part A.I.1 required to be implemented prior to the date of the newly approved TMDL, including ongoing implementation of identified non-structural BMPs and routine maintenance and replacement of all structural BMPs in accordance with manufacturer or design specifications, and the reporting requirements of Appendix F part A.II.2. remain in place.

B. Requirements for Discharges to Impaired Waters with an Approved Out of State TMDL

I. Nitrogen TMDL Requirements

Discharges from MS4s in Massachusetts to waters that are tributaries to the Long Island Sound, which has an approved TMDL for nitrogen[17], are subject to the requirements of this part.

1. The operators of traditional and non-traditional MS4s located in municipalities listed in Table F-11 shall comply with the following BMPs in addition to the requirements of part 2.3 of the Permit, as described below:

    a. Enhanced BMPs

        i. Enhancement of BMPs required by part 2.3 of the permit that shall be implemented during this permit term:

            1. part 2.3.2, Public education and outreach: The permittee shall supplement its Residential and Business/Commercial/Institution program with annual timed messages on specific topics. The permittee shall distribute an annual message in the spring (April/May) timeframe that encourages the proper use and disposal of grass clippings and encourages the proper use of slow-release fertilizers. The permittee shall distribute an annual message in the summer (June/July) timeframe encouraging the proper management of pet waste, including noting any existing ordinances where appropriate. The permittee shall distribute an annual message in the Fall (August/September/October) timeframe encouraging the proper disposal of leaf litter. The permittee shall deliver an annual message on each of these topics, unless the permittee determines that one or more of these issues is not a significant contributor of nitrogen to discharges from the MS4 and the permittee retains documentation of this finding in the SWMP. All public education messages can be combined with requirements of Appendix H part I, II and III as well as Appendix F part A.III, A.IV, A.V, B.II and B.III where appropriate.

            2. part 2.3.6, Stormwater Management in New Development and Redevelopment: the requirement for adoption/amendment of the permittee's ordinance or other regulatory mechanism shall include a requirement that new development and redevelopment stormwater management BMPs be optimized for nitrogen removal; retrofit inventory and priority ranking under 2.3.6.1.b shall include consideration of BMPs to reduce nitrogen discharges.

            3. part 2.3.7, Good House Keeping and Pollution Prevention for Permittee Owned Operations: establish requirements for use of

[17] Connecticut Department of Environmental Protection. 2000. *A Total Maximum Daily Load Analysis to Achieve Water Quality Standards for Dissolved Oxygen in Long Island Sound*

slow release fertilizers on permittee owned property currently using fertilizer, in addition to reducing and managing fertilizer use as provided in in part 2.3.7.1; establish procedures to properly manage grass cuttings and leaf litter on permittee property, including prohibiting blowing organic waste materials onto adjacent impervious surfaces; increased street sweeping frequency of all municipal owned streets and parking lots subject to Permit part 2.3.7.a.iii.(c) to a minimum of two (2) times per year, once in the spring (following winter activities such as sanding) and at least once in the fall (Sept 1 – Dec 1; following leaf fall).

b. Nitrogen Source Identification Report

i. Within four years of the permit effective date the permittee shall complete a Nitrogen Source Identification Report. The report shall include the following elements:

1. Calculation of total urbanized area within the permittee's jurisdiction that is within the Connecticut River Watershed, the Housatonic River Watershed, or the Thames River Watershed, incorporating updated mapping of the MS4 and catchment delineations produced pursuant to part 2.3.4.6,
2. All screening and monitoring results pursuant to part 2.3.4.7.d., targeting the receiving water segment(s)
3. Impervious area and DCIA for the target catchment
4. Identification, delineation and prioritization of potential catchments with high nitrogen loading
5. Identification of potential retrofit opportunities or opportunities for the installation of structural BMPs during re-development

ii. The final Nitrogen Source Identification Report shall be submitted to EPA as part of the year 4 annual report.

c. Structural BMPs

i. Within five years of the permit effective date, the permittee shall evaluate all properties identified as presenting retrofit opportunities or areas for structural BMP installation under permit part 2.3.6.d.ii. or identified in the Nitrogen Source Identification Report. The evaluation shall include:

1. The next planned infrastructure, resurfacing or redevelopment activity planned for the property (if applicable) OR planned retrofit date;
2. The estimated cost of redevelopment or retrofit BMPs; and
3. The engineering and regulatory feasibility of redevelopment or retrofit BMPs.

ii. The permittee shall provide a listing of planned structural BMPs and a plan and schedule for implementation in the year 5 annual

report. The permittee shall plan and install a minimum of one structural BMP as a demonstration project within six years of the permit effective date. The demonstration project shall be installed targeting a catchment with high nitrogen load potential. The permittee shall install the remainder of the structural BMPs in accordance with the plan and schedule provided in the year 5 annual report.

iii. Any structural BMPs listed in Table 4-3 of Attachment 1 to Appendix H installed in the urbanized area by the permittee or its agents shall be tracked and the permittee shall estimate the nitrogen removal by the BMP consistent with Attachment 1 to Appendix H. The permittee shall document the BMP type, total area treated by the BMP, the design storage volume of the BMP and the estimated nitrogen removed in mass per year by the BMP in each annual report.

Adams	North Adams
Agawam	Northampton
Amherst	Oxford
Ashburnham	Palmer
Ashby	Paxton
Auburn	Pelham
Belchertown	Pittsfield
Charlton	Richmond
Cheshire	Russell
Chicopee	Rutland
Dalton	South Hadley
Douglas	Southampton
Dudley	Southbridge
East Longmeadow	Southwick
Easthampton	Spencer
Gardner	Springfield
Granby	Sturbridge
Hadley	Sutton
Hampden	Templeton
Hatfield	Ware
Hinsdale	Webster
Holyoke	West Springfield
Lanesborough	Westfield
Leicester	Westhampton
Lenox	Westminster
Longmeadow	Wilbraham
Ludlow	Williamsburg
Millbury	Winchendon

Monson	

Table F-11: Massachusetts municipalities in which MS4 discharges are within the Connecticut River Watershed, the Housatonic River Watershed, or the Thames River Watershed.

2. At any time during the permit term the permittee may be relieved of additional requirements in Appendix F part B.I.1. as follows:
    a. The permittee is relieved of its additional requirements as of the date when the following conditions are met:
        i. The applicable TMDL has been modified, revised or withdrawn and EPA has approved a new TMDL applicable for the receiving water that indicates that no additional stormwater controls for the control of nitrogen are necessary for the permittee's discharge based on wasteload allocations in the newly approved TMDL
    b. In such a case, the permittee shall document the date of the approved TMDL in its SWMP and is relieved of any remaining requirements of Appendix F part B.I.1 as of that date and the permittee shall comply with the following:
        i. The permittee shall identify in its SWMP all activities implemented in accordance with the requirements of Appendix F part B.I.1 to date to reduce nitrogen in their discharges including implementation schedules for non-structural BMPs and any maintenance requirements for structural BMPs
        ii. The permittee shall continue to implement all requirements of Appendix F part B.I.1 required to be implemented prior to the date of the newly approved TMDL, including ongoing implementation of identified non-structural BMPs and routine maintenance and replacement of all structural BMPs in accordance with manufacturer or design specifications.

APPENDIX H

Requirements Related to Discharges to Certain Water Quality Limited Waterbodies

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I. Discharges to water quality limited waterbodies and their tributaries where nitrogen is the cause of the impairment

1. Part 2.2.2.a.i. of the permit identifies the permittees subject to additional requirements to address nitrogen in their stormwater discharges because they discharge to waterbodies that are water quality limited due to nitrogen, or their tributaries, without an EPA approved TMDL. Permittees identified in part 2.2.2.a.i of the permit must identify and implement BMPs designed to reduce nitrogen discharges in the impaired catchment(s). To address nitrogen discharges each permittee shall comply with the following requirements:

    a. Additional or Enhanced BMPs

        i. The permittee remains subject to all the requirements of part 2.3. of the permit and shall include the following enhancements to the BMPs required by part 2.3 of the permit:

            1. Part 2.3.2, Public education and outreach: The permittee shall supplement its Residential and Business/Commercial/Institution program with annual timed messages on specific topics. The permittee shall distribute an annual message in the spring (April/May) timeframe that encourages the proper use and disposal of grass clippings and encourages the proper use of slow-release fertilizers. The permittee shall distribute an annual message in the summer (June/July) timeframe encouraging the proper management of pet waste, including noting any existing ordinances where appropriate. The permittee shall distribute an annual message in the Fall (August/September/October) timeframe encouraging the proper disposal of leaf litter. The permittee shall deliver an annual

III. Discharges to water quality limited waterbodies where bacteria or pathogens is the cause of the impairment

1. Consistent with part 2.2.2.c.i. of the permit, permittees that discharge to waterbodies that are water quality limited due to bacteria or pathogens, without an EPA approved TMDL, are subject to the following additional requirements to address bacteria or pathogens in their stormwater discharges.

2. Additional or Enhanced BMPs

    a. The permittee remains subject to the requirements of part 2.3. of the permit and shall include the following enhancements to the BMPs required by part 2.3 of the permit:

        i. Part 2.3.2. Public Education and outreach: The permittee shall supplement its Residential program with an annual message encouraging the proper management of pet waste, including noting any existing ordinances where appropriate. The permittee or its agents shall disseminate educational materials to dog owners at the time of issuance or renewal of a dog license, or other appropriate time. Education materials shall describe the detrimental impacts of improper management of pet waste, requirements for waste collection and disposal, and penalties for non-compliance. The permittee shall also provide information to owners of septic systems about proper maintenance in any catchment that discharges to a water body impaired for bacteria or pathogens. All public education messages can be combined with requirements of Appendix H part I and II as well as Appendix F part A.III, A.IV, A.V, B.I, B.II and B.III where appropriate.

        ii. Part 2.3.4 Illicit Discharge: The permittee shall implement the illicit discharge program required by this permit. Catchments draining to any waterbody impaired for bacteria or pathogens shall be designated either Problem Catchments or HIGH priority in implementation of the IDDE program.

3. At any time during the permit term the permittee may be relieved of additional requirements in Appendix H part III.2. applicable to it when in compliance with this part.

    a. The permittee is relieved of its additional requirements as of the date when one of the following criteria are met:
        i. The receiving water is determined to be no longer impaired due to bacteria or pathogens by MassDEP and EPA concurs with such a determination.
        ii. An EPA approved TMDL for the receiving water indicates that no additional stormwater controls are necessary for the control of bacteria or pathogens from the permittee's discharge based on wasteload allocations as part of the approved TMDL.
        iii. The permittee's discharge is determined to be below applicable water quality criteria[1] and EPA agrees with such a determination. The permittee shall submit data to EPA that accurately characterizes the concentration of bacteria or pathogens in their discharge. The characterization shall include water quality

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

and flow data sufficient to accurately assess the concentration of bacteria or pathogens in all seasons during storm events of multiple sizes and for the duration of the storm events including the first flush, peak storm flow and return to baseflow.

b. In such a case, the permittee shall document the date of the determination, date of approved TMDL or date of EPA concurrence that the discharge meets water quality criteria in its SWMP and is relieved of any additional requirements of Appendix H part III.2. as of that date and the permittee shall comply with the following:
    i. The permittee shall identify in its SWMP all activities implemented in accordance with the requirements of Appendix H part III.2. to date to reduce bacteria or pathogens in its discharges, including implementation schedules for non-structural BMPs and any maintenance requirements for structural BMPs
    ii. The permittee shall continue to implement all requirements of Appendix H part III.3. required to be done prior to the date of determination date, date of approved TMDL, or date of EPA concurrence that the discharge meets water quality criteria, including ongoing implementation of identified non-structural BMPs and routine maintenance and replacement of all structural BMPs in accordance with manufacturer or design specifications

ATTACHMENT 1 TO APPENDIX H

The estimates of nitrogen load reductions resulting from BMP installation are intended for informational purposes only and there is no associated permittee-specific required nitrogen load reduction in the Draft Permit. Nitrogen load reduction estimates calculated consistent with the methodologies below may be used by the permittee to comply with future permit requirements providing the EPA determines the calculated reductions are appropriate for demonstrating compliance with future permit requirements. This attachment provides the method and an example to calculate the BMP nitrogen load as well as methods to calculate nitrogen load reductions for structural BMPs in an impaired watershed.

BMP N Load:

The **BMP N Load** is the annual nitrogen load from the drainage area to each proposed or existing BMP used by permittee. This measure is used to estimate the amount of annual nitrogen load that the BMP will receive or treat (BMP N Load).

To calculate the BMP N Load for a given BMP:

1) Determine the total drainage area to the BMP and sort the total drainage area into two categories: total impervious area (IA) and total pervious area (PA);

2) Calculate the nitrogen load associated with impervious area (N Load $_{IA}$) and the pervious area (N Load $_{PA}$) by multiplying the IA and PA by the appropriate land use-based nitrogen load export rate provided in Table 1; and

3) Determine the total nitrogen load to the BMP by summing the calculated impervious and pervious subarea nitrogen loads.

Table 1: Annual nitrogen load export rates

Nitrogen Source Category by Land Use	Land Surface Cover	Nitrogen Load Export Rate, lbs/ac/yr	Nitrogen Load Export Rate, kg/ha/yr
All Impervious Cover	Impervious	14.1	15.8
*Developed Land Pervious (DevPERV)- HSG A	Pervious	0.3	0.3
*Developed Land Pervious (DevPERV)- HSG B	Pervious	1.2	1.3
*Developed Land Pervious (DevPERV) – HSG C	Pervious	2.4	2.7
*Developed Land Pervious (DevPERV) - HSG C/D	Pervious	3.0	3.4
*Developed Land Pervious (DevPERV) - HSG D	Pervious	3.7	4.1
Notes: For pervious areas, if the hydrologic soil group (HSG) is known, use the appropriate value from this table. If the HSG is not known, assume HSG C/D conditions for the nitrogen load export rate.			

Example 1 to determine nitrogen load to a proposed BMP when the contributing drainage area is 100% impervious: A permittee is proposing a storm water infiltration system that will treat runoff from 1.49 acres of impervious area.

Table 1-1: Design parameters for Bio-filtration w/ ISR systems for Example 1

Components of representation	Parameters	Value
Ponding	Maximum depth	0.33 ft
	Surface area	645 ft^2
Soil mix	Depth	2.0 ft
	Porosity	0.24
	Hydraulic conductivity	2.5 inches/hour
Stone Reservoir (ISR)	Depth	2.50 ft
	Porosity	0.42
	Hydraulic conductivity	500 inches/hour
ISR Volume: System Storage Volume	Ratio	0.56
Orifices	Diameter	12 in
		Installed 2.5 above impermeable soil layer

Determine:

A) Percent nitrogen load reduction (BMP Reduction $_{\%\text{-}N}$) for the specified bio-filtration w/ISR system and contributing impervious drainage area; and

B) Nitrogen reduction in pounds that would be accomplished by the bio-filtration w/ISR system (BMP-Reduction $_{lbs\text{-}N}$)

Solution:

1) The BMP is a bio-filtration w/ISR system that will treat runoff from 1.49 acres of impervious area (IA = 1.49 acre);

2) The available storage volume capacity (ft^3) of the bio-filtration w/ISR system (BMP-Volume $_{BMP\text{-}ft^3}$) is determined using the surface area of the system, depth of ponding, the porosity of the filter media and the porosity of the stone reservoir:

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

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

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

Example 1 Continued:

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

4) Using the Regional Performance Curve shown in Figure 1 for a bio-filtration w/ ISR system, a **61%** nitrogen load reduction (BMP Reduction %-N) is determined for a bio-filtration w/ ISR systems sized for 0.22 in of runoff from 1.49 acres of impervious area; and

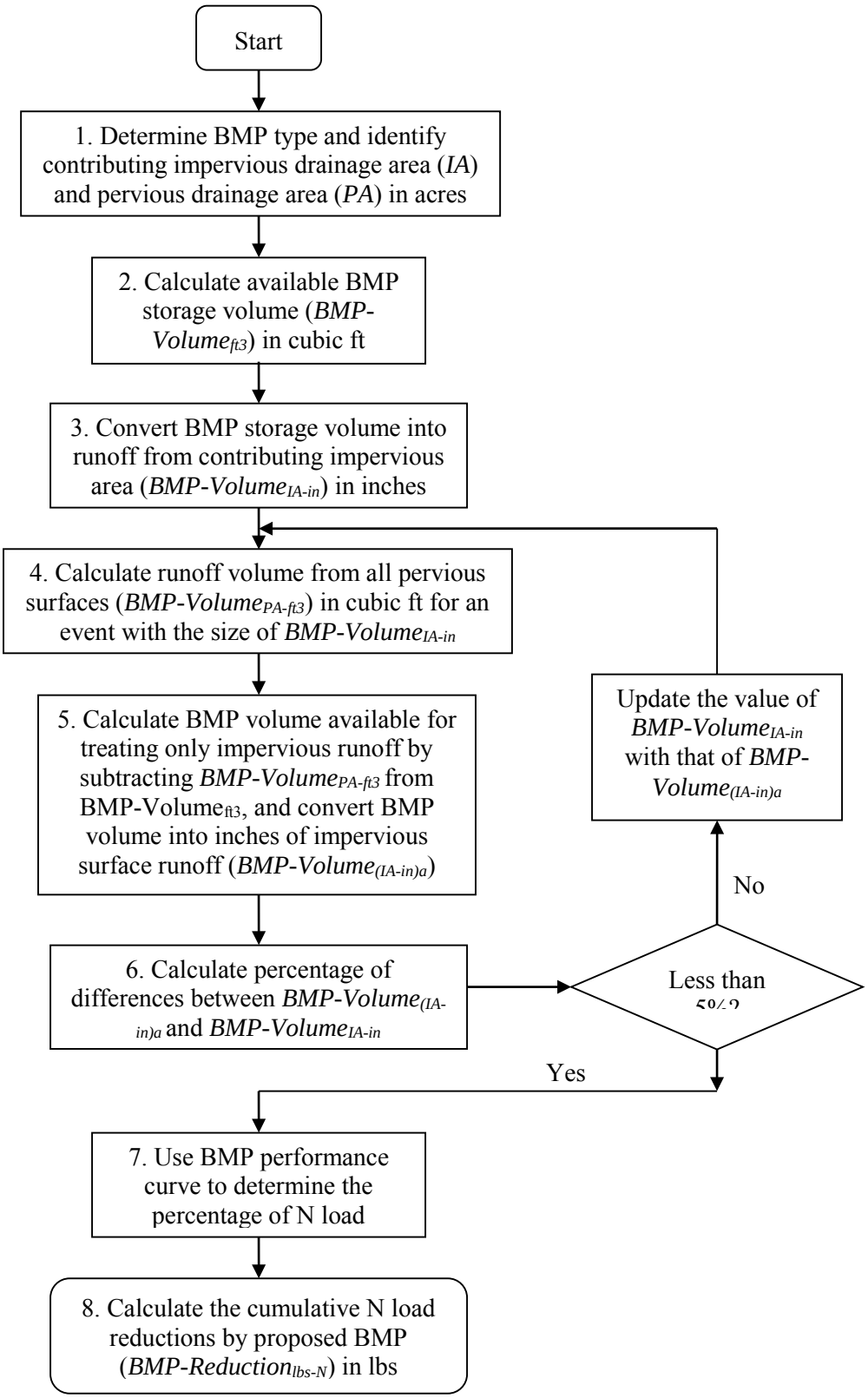
5) Calculate the nitrogen load reduction in pounds of nitrogen for the bio-filtration w/ISR system (BMP Reduction $_{lbs\text{-}N}$) using the BMP Load calculation method shown above in Example 1 and the BMP Reduction $_{\%\text{-}N}$ determined in step 4 by using equation 2.

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

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

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

Method to determine the nitrogen load reduction for a structural BMP with a known storage volume when the contributing drainage area has impervious and pervious surfaces



Flow Chart 2 (previous page). Method to determine the nitrogen load reduction for a BMP with known storage volume when both pervious and impervious drainage areas are present.

1) Identify the type of structural BMP and characterize the contributing drainage area to the structural BMP by identifying the following information for the impervious and pervious surfaces:

Impervious area (IA) – Area (acre) and export rate (Table 1)

Pervious area (PA) – Area (acre) and runoff depth based on hydrologic soil group (HSG) and size of rainfall event. Table 2 provides values of runoff depth for various rainfall depths and HSGs. Soils are assigned to an HSG based on their permeability. HSG categories for pervious areas in the Watershed shall be estimated by consulting local soil surveys prepared by the National Resource Conservation Service (NRCS) or by a storm water professional evaluating soil testing results from the Watershed. If the HSG condition is not known, a HSG D soil condition should be assumed.

Table 2: Developed Land Pervious Area Runoff Depths based on Precipitation depth and Hydrological Soil Groups (HSGs)

Rainfall Depth, Inches	Runoff Depth, inches		
	Pervious HSG A/B	Pervious HSG C	Pervious HSG D
0.10	0.00	0.00	0.00
0.20	0.00	0.01	0.02
0.40	0.00	0.03	0.06
0.50	0.00	0.05	0.09
0.60	0.01	0.06	0.11
0.80	0.02	0.09	0.16
1.00	0.03	0.12	0.21
1.20	0.04	0.14	0.39
1.50	0.11	0.39	0.72
2.00	0.24	0.69	1.08

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

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

3) To estimate the nitrogen load reduction of a BMP with a known storage volume capacity, it is first necessary to determine the portion of available BMP storage capacity (BMP-Volume $_{ft^3}$) that would treat the runoff volume generated from the contributing impervious area (IA) for a rainfall event with a depth of *i* inches (in). This will require knowing the corresponding amount of runoff volume that would be generated from the contributing pervious area (PA) for the same rainfall event (depth of *i* inches). Using equation 3 below, solve for the BMP capacity that would be available to treat runoff from the contributing imperious area for the unknown rainfall depth of *i* inches (see equation 4):

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

Where:

BMP-Volume $_{ft^3}$	= the available storage volume of the BMP
BMP-Volume $_{(IA\text{-}ft^3)i}$	= the available storage volume of the BMP that would fully treat runoff generated from the contributing impervious area for a rainfall event of size *i* inches
BMP-Volume $_{(PA\text{-}ft^3)i}$	= the available storage volume of the BMP that would fully treat runoff generated from the contributing pervious area for a rainfall event of size *i* inches

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

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

To determine BMP-Volume $_{(IA\text{-}ft^3)i}$, requires performing an iterative process of refining estimates of the rainfall depth used to calculate runoff volumes until the rainfall depth used results in the sum of runoff volumes from the contributing IA and PA equaling the available BMP storage capacity (BMP-Volume $_{ft^3}$). For the purpose of estimating BMP performance, it will be considered adequate when the IA runoff depth (in) is within 5% IA runoff depth used in the previous iteration.

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

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

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

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

4) For 1 to n iterations, use the pervious runoff depth information from Table 2 and equation 7 to determine the total volume of runoff (ft^3) from the contributing PA (BMP Volume

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

BMP Volume $_{(PA\text{-}ft^3)1...n} = \sum$ ((PA x (runoff depth)$_{(PA1, PA2..PAn)}$ x (3,630 ft^3/acre-in) **(Equation 7)**

5) For iteration 1, estimate the portion of BMP Volume that is available to treat runoff from only the IA by subtracting BMP-Volume $_{PA\text{-}ft^3}$, determined in step 4, from BMP-Volume $_{ft^3}$, determined in step 2, and convert to inches of runoff from IA (see equations 8 and 9):

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

BMP-Volume $_{(IA\text{-}in)2}$ = (BMP-Volume $_{(IA\text{-}ft^3)2}$/IA (acre)) x (12 in/ft x 1 acre/43,560 ft^2) **(Equation 9)**

If additional iterations (i.e., 2 through n) are needed, estimate the portion of BMP volume that is available to treat runoff from only the IA (BMP-Volume $_{(IA\text{-}in)3..n+1}$) by subtracting BMP Volume $_{(PA\text{-}ft^3)2..n}$, determined in step 4, from BMP Volume $_{(IA\text{-}ft^3)3..n+1}$, determined in step 5, and by converting to inches of runoff from IA using equation 9):

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

7) Determine the % nitrogen load reduction for the structural BMP (BMP Reduction $_{\%\text{-}N}$) using the appropriate BMP curve on Figure 1 or 2 and the BMP-Volume $_{(IA\text{-}in)n}$ calculated in the final iteration of step 5; and

8) Calculate the nitrogen load reduction in pounds of nitrogen for the structural BMP (BMP Reduction $_{lbs\text{-}N}$) using the BMP Load as calculated above in Example 1 and the percent nitrogen load reduction (BMP Reduction $_{\%\text{-}N}$) determined in step 7 by using equation 10:

BMP Reduction $_{lbs\text{-}N}$ = BMP Load x (BMP Reduction $_{\%\text{-}N}$/100) **(Equation 10)**

Example 2: Determine the nitrogen load reduction for a structural BMP with a known design volume when the contributing drainage area has impervious and pervious surfaces

A permittee is considering an infiltration basin to capture and treat runoff from a portion of the Watershed draining to the impaired waterbody. The contributing drainage area is 16.55 acres and is 71% impervious. The pervious drainage area (PA) is 80% HSG D and 20% HSG C. An infiltration basin with the following specifications can be placed at the down-gradient end of the contributing drainage area where soil testing results indicates an infiltration rate (IR) of 0.28 in/hr:

Example continued:

Structure	Bottom area (acre)	Top surface area (acre)	Maximum pond depth (ft)	Design storage volume (ft^3)	Infiltration Rate (in/hr)
Infiltration basin	0.65	0.69	1.65	48,155	0.28

Determine the:

A) Percent nitrogen load reduction (BMP Reduction $_{\%\text{-}N}$) for the specified infiltration basin and the contributing impervious and pervious drainage area; and

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

Solution:

1) A surface infiltration basin is being considered. Information for the contributing impervious (IA) and pervious (PA) areas are summarized in below.

Impervious area characteristics

ID	% Impervious	Area (acre)
IA1	100	11.75

Pervious area characteristics

ID	Area (acre)	Hydrologic Soil Group (HSG)
PA1	3.84	D
PA2	0.96	C

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

3) To determine what the BMP design storage volume is in terms of runoff depth (in) from IA, an iterative process is undertaken:

Solution Iteration 1

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

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

Solution Continued:

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

for each distinct pervious area using the information from Table 2 and equation 7. Interpolation was used to determine runoff depths.

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

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

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

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

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

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

Solution Iteration 2

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

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

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

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

The difference of 4% is acceptable.

Solution Continued:

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

9) The nitrogen load reduction in pounds of nitrogen (BMP-Reduction $_{\text{lbs-N}}$) for the proposed infiltration basin is calculated by using equation 11 with the BMP Load (as determined by the procedure in Example 4-1) and the N $_{\text{target}}$ of 56%.

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

Following example 1, the BMP load is calculated:

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

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

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

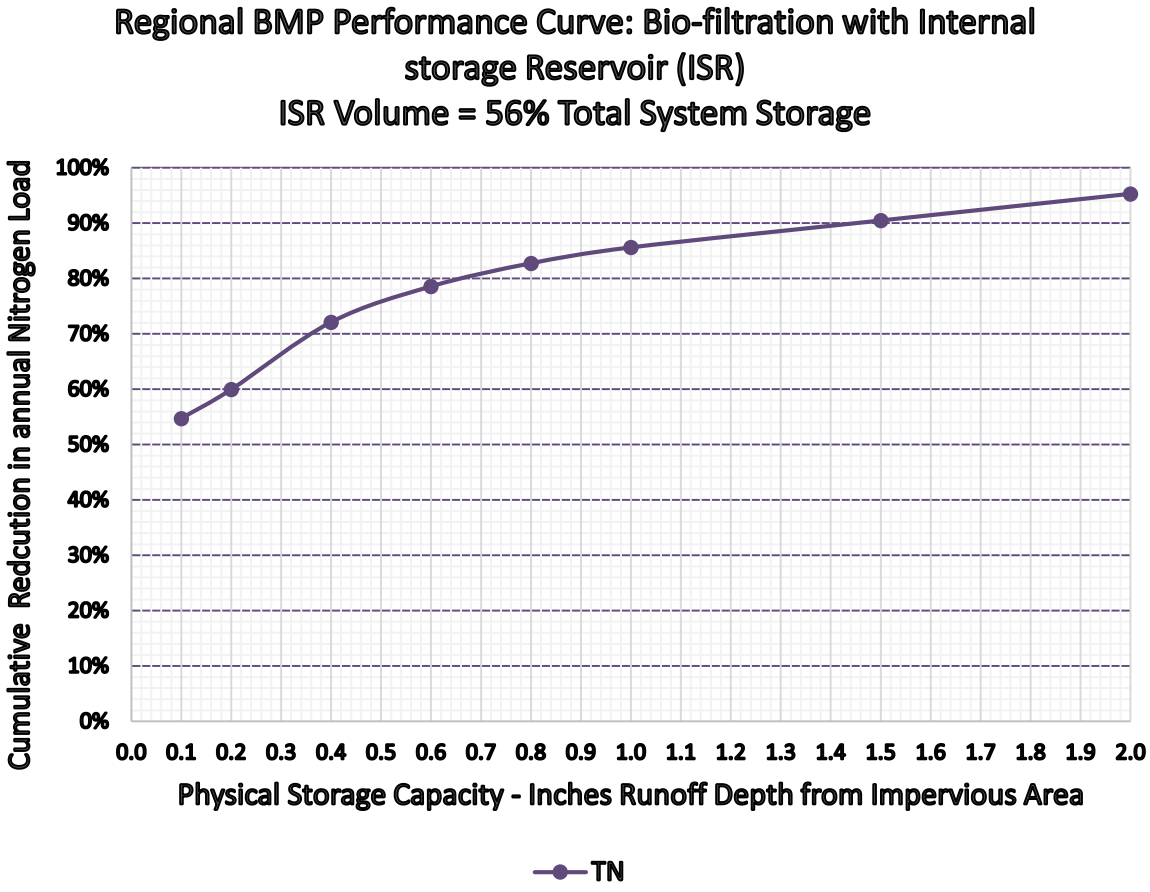
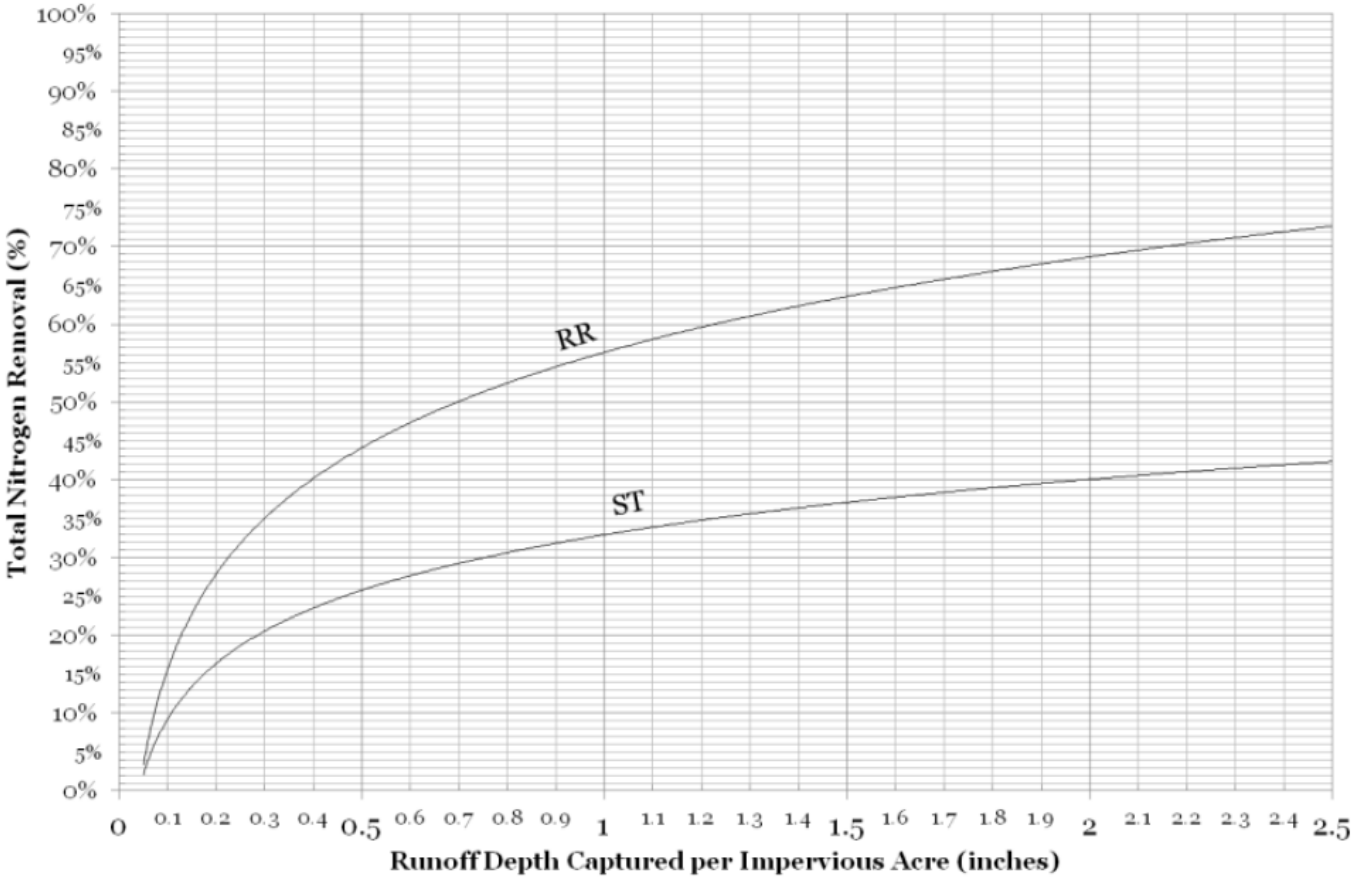


Table 3. Classification of BMP to Determine Nitrogen Reduction[1]

Structural BMP	Classification
Infiltration Trench	Runoff Reduction (RR)
Infiltration Basin or other surface infiltration practice	Runoff Reduction (RR)
Bioretention Practice	Runoff Reduction (RR)
Gravel Wetland System	Stormwater Treatment (ST)
Porous Pavement	Runoff Reduction (RR)
Wet Pond or wet detention basin	Stormwater Treatment (ST)
Dry Pond or detention basin	Runoff Reduction (RR)
Water Quality Swale	Runoff Reduction (RR)

[1]**Recommendations of the Expert Panel to Define Removal Rates for New State Stormwater Performance Standards** http://chesapeakestormwater.net/wp-content/plugins/download-monitor/download.php?id=25, Retrieved 12/14/2012

Figure 2: Total Nitrogen Removal for RR and ST Practices



Adopted from: Final CBP Approved Expert Panel Report on Stormwater Retrofits http://chesapeakestormwater.net/wp-content/plugins/download-monitor/download.php?id=25, Retrieved 12/14/2012

Town of Wilbraham IDDE Program

Appendix H

Tracking Implementation Goals

Town of Wilbraham IDDE Program

Appendix I

IDDE Training Program Log

EMPLOYEE TRAINING LOG

Training date:	
Title of Training:	
Training Duration (minutes):	
Subject(s) covered during Training: (Attach copy of training materials, if applicable)	
Employee(s) Trained:	**Signature:**

Tighe&Bond

APPENDIX J

STANDARD OPERATING PROCEDURE 1: CATCH BASIN CLEANING
TOWN OF WILBRAHAM DEPARTMENT OF PUBLIC WORKS

DESCRIPTION: Procedures for catch basin inspection and cleaning, and disposal of screenings. Catch basins help minimize flooding and protect water quality by removing trash, sediment, decaying debris, and other solids from stormwater runoff. These materials are retained in a sump below the invert of the outlet pipe (older catch basins may not have a sump). Catch basin cleaning reduces foul odors, prevents clogs in the storm drain system, and reduces the loading of suspended solids, nutrients, and bacteria to receiving waters.

This SOP can also be used for inspection of catch basins or manholes for the purpose of conducting catchment investigations as part of Wilbraham's Illicit Discharge Detection and Elimination program.

TARGETED CONSTITUENTS:

- Sediment
- Nutrients
- Trash
- Metals
- Oil & Grease
- Organics

Wilbraham DPW performs routine inspections, cleaning, and maintenance of the approximately [840] catch basins that are located within the MS4 regulated area.

STRUCTURAL CONTROLS:

- Install hoods if catch basins do not have them.
- Repair damaged catch basins including outlet traps.
- Repair damaged catch basins timely manner.

OPERATIONAL BEST MANAGEMENT PRACTICES:

- Each catch basin should be cleaned and inspected at least annually. Target cleaning for early Spring or late Fall.
- Street sweeping performed on an appropriate schedule will reduce the amount of sediment, debris, and organic matter entering the catch basins, which will in turn reduce the frequency with which they need to be swept.
- Inspect catch basins, grates, and ditches at least once per year. Inspections should be incorporated during routine cleaning, as part of reconstruction contracts, after significant storm events, and through requests made by residents or other Town departments.
- Prioritize inspection and maintenance of catch basins near construction sites (roadway construction, residential, commercial, or industrial development or redevelopment) or high-use areas. Catch basins that accumulate a significant amount of sediment should be prioritized for more frequent inspection and cleaning.
- Catch basins should be cleaned to ensure that they are no more than 50% full at any time.
- If a catch basin sump is more than 50% full during two consecutive routine inspections/cleaning events, document the findings, investigate the contributing drainage area for sources of excessive sediment loading, and to the extent practicable, abate contributing sources. If no contributing sources are found, increase the inspection and cleaning frequencies of the sump.
- Describe any actions taken relevant to investigating and abating areas of high sediment loading in the stormwater annual report.
- Note problem areas accumulating heavy loads of leaf litter, trash or pet waste bags that may warrant targeted educational outreach or enforcement efforts.

- Properly dispose of catch basin material or store until contractor picks up cleanings (Massachusetts DEP and EPA requires chemical analysis to determine if substance is hazardous waste).
- Inform employees that catch basins are part of the stormwater drainage system and not the sanitary sewer system.
- Maintain a log of cleaning activities. Information should include the amount of cleanings removed and areas with heavily filled basins.
- Maintain a log of cleaning activities carried out in parking lots. Information should include the amount of cleanings removed, heavily filled catch basins, and dates cleaned.

DATA GATHERING

Catch basin inspection and cleaning procedures should address both the grate opening and the catch basin structure, including the sump and any inlet and outlet pipes. Document any and all observations about the condition of the catch basin structure and water quality (an inspection form and log of catch basins cleaned or inspected are included in the attachments). During regular cleaning and inspection procedures, data can be gathered related to the condition of the physical basin structure and its frame and grate and the quality of stormwater conveyed by the structure. Observations such as the following can indicate sources of pollution within the storm drain system:

- Oil sheen
- Discoloration
- Trash and debris

Both oil and bacteria can create a sheen on the surface of the water. The source of the sheen can be differentiated by disturbing it, such as with a pole. A sheen caused by oil will remain intact and move in a swirl pattern; a sheen caused by bacteria will separate and appear “blocky”. Bacterial sheen is caused by naturally occurring iron bacteria and is not considered a pollutant, but its presence should be noted. Other types of bacteria, such as fecal bacteria, are considered pollutants and their discovery should be recorded.

Observations such as the following can indicate a potential connection of a sanitary sewer to the storm drain system, which is an illicit discharge.

- Indications of sanitary sewage, including fecal matter or sewage odors
- Foaming, such as from detergent
- Optical enhancers, fluorescent dye added to laundry detergent

Each catch basin should be cleaned and inspected at least annually. Catch basins in high-use areas may require more frequent cleaning. Performing street sweeping on an appropriate schedule will reduce the amount of sediment, debris, and organic matter entering the catch basins, which will in turn reduce the frequency with which structures need to be cleaned.

CLEANING PROCEDURE

In general, adhere to the following procedures when inspecting and cleaning catch basins. Record the findings in the log in the attachments:

1. Implement appropriate traffic safety procedures (e.g., traffic cones) prior to and during the catch basin inspection and cleaning process.
2. Work upstream to downstream in a given drainage network.
3. Clean sediment and trash off of the grate.
4. Visually inspect the outside of the grate.
5. Remove the grate and visually inspect the inside of the catch basin to determine cleaning needs.
6. Inspect catch basin for structural integrity.
7. Determine the most appropriate equipment and method for cleaning each catch basin.
    a. Manually use a shovel to remove accumulated sediments, or
    b. Use a bucket loader to remove accumulated sediments, or
    c. Use a high-pressure washer to clean any remaining material while capturing the slurry with a vacuum.
    d. If necessary, after the catch basin is clean, use the rodder of the vacuum truck to clean downstream pipe and pull back sediment that might have entered downstream pipe.
8. If contamination is suspected, chemical analysis will be required to determine if the materials comply with the Massachusetts Department of Environmental Protection (MassDEP) Hazardous Waste Regulations, 310 CMR 30.000. Chemical analysis required will depend on suspected contaminants. Note the identification number of the catch basin on the sample label, and note sample collection on the Catch Basin Inspection Form.
9. Properly dispose of collected sediments and catch basin cleanings (solid material, such as leaves, sand, and twigs removed from the stormwater collection system during cleaning operations). See following section for guidance.
10. If fluids collected during catch basin cleaning are not being handled and disposed of by a third party, dispose of these fluids to a sanitary sewer system, with permission of the system operator.
11. If illicit discharges are observed or suspected, notify the DPW Director.
12. At the end of each day, document location and number of catch basins cleaned, amount of waste collected, and disposal method for all screenings (see Documentation and Record Keeping section for additional information).
13. Report additional maintenance or repair needs to the appropriate Department.

DISPOSAL OF CATCH BASIN CLEANINGS/SCREENINGS

- Catch basin cleanings from stormwater-only drainage systems may be disposed at any landfill that is permitted by MassDEP to accept solid waste. MassDEP does not routinely require stormwater-only catch basin cleanings to be tested before disposal, unless there is evidence that they have been contaminated (e.g., by a spill).
- Screenings may need to be placed in a drying bed to allow water to evaporate before proper disposal. In this case, ensure that the screenings are managed to prevent pollution.

- Catch basin cleanings must be handled and disposed of in accordance with the attached MassDEP Policy Document, *Management of Catch Basin Cleanings.*

DOCUMENTATION AND RECORD KEEPING

- Records are kept at the ***DPW Office*** at ***240 Springfield Street in Wilbraham, MA***.
- Records shall include a log of catch basins cleaned or inspected, the total number of catch basins, number inspected, number cleaned, and the total volume or mass of material removed from all catch basins.
- Include catch basin records in the municipality's annual report – use the catch basin inspection log provided in the attachments to document the information to include in the report.

TRAINING

Employees are trained ***once per year*** on this procedure and the proper operation of equipment. Employees are also trained on stormwater pollution prevention, spill and response, and illicit discharge detection and elimination procedures.

REVISING THE SOP

These procedures are reviewed ***once per year*** and updated as needed.

ATTACHMENTS

- Catch Basin Inspection Form and Cleaning Log
- Mass DEP Policy document, *Management of Catch Basin Cleanings*

Catch Basin Inspection Form
Wilbraham, Massachusetts

Date		**Name of Inspector**	
Catch Basin I.D.	_____	**Final Discharge from Structure?** Yes ☐ No ☐ **If Yes, Discharge to Outfall No:**_____	
Catch Basin Label:	**Stencil** ☐ **Ground Inset** ☐ **Sign** ☐ **None** ☐ **Other**_____		
Basin Material:	Concrete ☐ Corrugated metal ☐ Stone ☐ Brick ☐ Other: _____ ☐	**Catch Basin Condition:**	Good ☐ Poor ☐ Fair ☐ Crumbling ☐
Pipe Material:	Concrete ☐ HDPE ☐ PVC ☐ Clay Tile ☐ Other:_____	**Pipe Measurements:**	Inlet Dia. (in): d= ____ Outlet Dia. (in): D= ____

Required Maintenance/ Problems (check all that apply):

- ☐ Tree Work Required
- ☐ New Grate is Required
- ☐ Pipe is Blocked
- ☐ Frame Maintenance is Required
- ☐ Remove Accumulated Sediment
- ☐ Pipe Maintenance is Required
- ☐ Basin Undermined or Bypassed
- ☐ Cannot Remove Cover
- ☐ Ditch Work
- ☐ Corrosion at Structure
- ☐ Erosion around Structure
- ☐ Remove Trash & Debris
- ☐ Need Cement around Grate

Other: _____

Catch Basin Grate Type :	**Sediment Buildup Depth :**	**Description of Flow:**	**Street Name/ Structure Location:**
Bar: ☐ Cascade: ☐ Other:_____ Properly Aligned: Yes ☐ No ☐	0-6 (in): _____ 6-12(in): _____ 12-18 (in): _____ 18-24 (in): _____ 24 + (in): _____	Heavy ☐ Moderate ☐ Slight ☐ Trickling ☐	

***If the outlet is submerged check yes and indicate approximate height of water above the outlet invert.** h above invert (in):___ Yes ☐ No ☐

☐ **Flow**
☐ **Standing Water**
(check one or both)

Observations:

Color:	
Odor:	

Weather Conditions : Dry > 24 hours ☐ Wet ☐

Sample of Screenings Collected for Analysis? Yes ☐ No ☐

Comments:

Circle those present:

Foam	Oil Sheen
Sanitary Waste	Bacterial Sheen
Orange Staining	Floatables
Excessive sediment	Pet Waste
Other:_____	Optical Enhancers

Catch Basin Inspection and Cleaning Log
Wilbraham, Massachusetts

Date	Inspector	Weather Conditions	Number of Catch Basins Inspected/Cleaned	Amount of Material Removed	Catch Basins More Than 50% Full	Corrective Action Taken/Recommended if More Than 50% Full

Commonwealth of Massachusetts
Executive Office of Energy & Environmental Affairs
Department of Environmental Protection
One Winter Street Boston, MA 02108 • 617-292-5500

Management of Catch Basin Cleanings

Catch basin cleanings - solid materials such as leaves, sand and twigs removed from storm water collection systems during cleaning operations - are typically classified as a solid waste by the Department of Environmental Protection (MassDEP). Catch basin cleanings must be handled and disposed in accordance with the agency's applicable regulations, policies and guidance.

Handling & Disposal

Except as explained below, catch basin cleanings from storm water-only drainage systems may be disposed at any landfill that is permitted by MassDEP to accept solid waste.

MassDEP does not routinely require storm water only catch basin cleanings to be tested before disposal, unless there is evidence that they have been contaminated by a spill or some other means. Contaminated catch basin cleanings must be evaluated in accordance with 310 CR 30.000: Hazardous Waste Regulations and handled as hazardous waste if appropriate.

Systems that collect storm water run-off into sanitary sewers are called "combined sewers." MassDEP may require cleanings from combined sewer catch basins to be tested before disposal.

Landfill Restrictions

The MassDEP 310 CMR 19.000: Solid Waste Management Facility Regulations (specifically see Section 19.130(7)) prohibit Massachusetts landfills from accepting materials that contain free draining liquids. When there is no free water in a truck used to transport catch basin cleanings, the agency will generally be satisfied that the material is sufficiently dry. Otherwise, the material will need to undergo a Paint Filter Liquids Test.

One way to remove liquids is to use a hydraulic lift truck during catch basin cleaning operations so that the material can be decanted at the site. After material from several catch basins along the same system is loaded, the truck may be elevated so that any free draining liquid is allowed to flow back into the drainage structure.

MassDEP may approve catch basin cleanings for use as grading and shaping material at landfills undergoing closure (see the agency's Revised Guidelines for Determining Closure Activities at Inactive Unlined Landfill Sites for additional information). Catch basin cleanings may be used as daily cover or grading material at active landfills only with specific MassDEP approval of the proposed use.

Consult with the Solid Waste Section Chief in the appropriate MassDEP Regional Office for information about applying for an approval and/or a Beneficial Use Determination (see Section 19.060 for other uses, including non-landfill uses).

STANDARD OPERATING PROCEDURE 2: SWEEPING STREETS AND PARKING LOTS
TOWN OF WILBRAHAM DEPARTMENT OF PUBLIC WORKS

DESCRIPTION: Procedures for the operation and maintenance of street sweepers, frequency of sweeping, disposal of debris, and recordkeeping to prevent coarse particles, leaves, and trash from entering the stormwater sewer system. Sweeping is most effective for removing coarse particles, leaves, and trash. Regularly sweeping reduces catch basin cleaning.

The Town sweeps streets with curbing and/or catch basins between the months of ***April*** and ***June*** in the spring and ***September*** and ***November*** in the fall in compliance with the requirements of by the Long Island Sound Nitrogen TMDL enhanced best management practices described in Appendix F of the 2016 Massachusetts Small MS4 General Permit.

Rural, uncurbed roadways with no catch basins and limited access highways – sweeping twice per year or developing and implementing a targeted sweeping plan?

Equipment used – type, whether is owned and operated by Town or contractor

TARGETED CONSTITUENTS:

- Sediment
- Nutrients
- Salt
- Organics
- Trash
- Metals
- Oil & Grease

STRUCTURAL CONTROLS:

- Maintain cleaning equipment in good working condition. Routinely inspect and perform maintenance on sweeping equipment to reduce the potential for leaks.
- Purchase replacement equipment as needed with sweepers that maximize pollutant removal (i.e., regenerative air sweepers).
- Stabilize exposed soil areas on unpaved roads to prevent soil from eroding during rain events.

OPERATIONAL BEST MANAGEMENT PRACTICES:

- Adhere to the Town's cleaning schedule – every roadway with catch basins swept twice annually. Additional sweeping as needed.
- Sweep as soon as possible after snow melt and following winter activities such as sanding to capture sand and debris before it is washed into the storm drainage system.
- Town parking lots should be checked regularly by DPW personnel and swept when needed, and at a minimum annually.
- Consider more frequent sweeping for targeted areas based on pollutant load reduction potential, inspections, pollutant loads, catch basin cleaning or inspection results, land use, impaired waters, or other factors.
- Street sweeping should be conducted in dry weather. Sweeping should not be conducted during or immediately after rain storms.
- Avoid wet cleaning or flushing of street- utilize dry methods where possible, with the exception of very fine water spray for dust control.
- Before sweeping, manually rake sand from any turf areas on surfaces to be swept.
- Sweep in pattern to keep spilled material from being pushed into catch basins.

- Sweeping equipment (mechanical, regenerative air, vacuum filter, tandem sweeping) should be selected depending on the level of debris. Brush alignment, sweeper speed, rotation rate, and sweeping pattern should be set to optimal levels to manage debris.
- Use hand-held tools to assist with mechanical equipment.
- Adjust broom frequently to maximize efficiency of sweeping operations. Do not use kick brooms or sweeper attachments that tend to spread dirt.
- When necessary, enact parking bans to facilitate sweeping on busy streets.
- After sweeping is finished, properly dispose of sweeper wastes.
- Any visible sediment should be swept up (including sand/salt mixtures and granular material).
- Keep accurate logs of the number of curb-miles swept and the amount of waste collected, and note heavily sedimented areas.
- Continue Fall leaf pickup and composting.

TARGETED SWEEPING PLAN

Identify streets and parking lots for prioritized sweeping – areas where there are high amounts of debris accumulation, like locations where large amounts of sand are used in the winter, high traffic areas, streets with considerable leaf fall, downward sloping areas where debris accumulates.

STORAGE AND DISPOSAL OF SWEEPINGS

- Temporary storage of solid sweeping debris is on an impervious surface or in a truck/dumpster that is protected from runoff. The storage location is at ***the Highway Department yard in Wilbraham, MA***.
- If applicable, solid sweeping debris will be reused following the MassDEP Reuse and Disposal of Street Sweepings Policy (attached).
- If street sweepings are reused (e.g., as anti-skid material or fill in parking lots), they should be properly filtered to remove solid waste, such as paper or trash, in accordance with their intended reuse.
- Sweepings intended for reuse can be stored for up to one year in approved temporary storage areas. Storage areas should be protected to prevent erosion and runoff and should be located away from wetland resource areas and buffer zones, surface water, or groundwater.
- Sweepings are classified as solid waste. If not reused, they should be disposed of at solid waste disposal sites. Street sweepings that are not reused by the ***Wilbraham DPW*** are disposed of at ***location***.

TRAINING

Employees are trained ***once per year*** on this procedure and the proper operation of equipment. Employees are also trained on stormwater pollution prevention, spill and response, and illicit discharge detection and elimination procedures.

RECORD KEEPING

- Records are kept at the ***DPW Office at 240 Springfield Street in Wilbraham, MA***.
- ***Mass of material removed and/or number of miles swept*** are recorded after each sweeping.

- The number of curb miles swept is calculated ***per sweeping event***.
- A list of employees implementing the SOP and the completion of their training(s) can be found at the ***DPW Office at 240 Springfield Street in Wilbraham, MA***.

REVISING THE SOP

These procedures are reviewed ***once per year*** and updated as needed.

ATTACHMENTS

1. Street and Parking Lot Sweeping Log
2. MassDEP Guidance Document, *Reuse and Disposal of Street Sweepings, Department of Environmental Protection Policy #BAW-18-001* (May 14, 2018).

Street Sweeping Log
Wilbraham, Massachusetts

Date	Operator	Weather Condition	Sweeping Method	Streets and/or Parking Lots Swept	Number of Miles Swept	Volume / Mass of Material Removed	Corrective Action Taken/Recommended

Commonwealth of Massachusetts
Executive Office of Energy & Environmental Affairs

Department of Environmental Protection
One Winter Street Boston, MA 02108 • 617-292-5500

Charles D. Baker
Governor

Karyn E. Polito
Lieutenant Governor

Matthew A. Beaton
Secretary

Martin Suuberg
Commissioner

REUSE AND DISPOSAL OF STREET SWEEPINGS

DEPARTMENT OF ENVIRONMENTAL PROTECTION

POLICY # BAW-18-001

(SUPERSEDES POLICY # BWP-94-092)

This Policy provides guidance to the regulated community about the Department of Environmental Protection's requirements, standards, and approvals for handling reuse or disposal of street sweepings. This Policy supersedes Department Policy BWP-94-092.

5/14/18
Date

Christine Kirby
Assistant Commissioner

POLICY #BAW-18-001
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1. Policy Statement and Scope

This Policy explains MassDEP requirements for managing Street Sweepings. Street Sweepings are "solid waste" subject to the Massachusetts solid waste regulations. The options for managing Street Sweepings are as follows.

- Use the Street Sweepings in accordance with the preapproved uses described in Section 4 of this policy.
- Use the Street Sweepings for a beneficial use not included in the list of preapproved uses after obtaining a permit from MassDEP under the provisions of the solid waste regulations, 310 CMR 19.060, Beneficial Use of Solid Wastes.
- Dispose of Street Sweepings at a permitted solid waste landfill.

2. Applicability

This policy applies to the reuse or disposal of Street Sweepings that are generated in the ordinary and customary cleaning of roadways and parking lots. This policy does not apply to catch basin cleanings or Street Sweepings mixed with catch basin cleanings or any other type of wastes. The disposal and reuse of catch basin cleanings is discussed in the "Management of Catch Basin Cleanings" Fact Sheet issued by the MassDEP (https://www.mass.gov/lists/massdep-solid-waste-policies-guidance-fact-sheets).

This policy does not apply to the material generated as the result of the clean-up of an oil or hazardous material spill. However, Street Sweepings that are generated in the ordinary and customary maintenance of roadways and parking lots are not exempt from the Hazardous Waste Regulations, 310 CMR 30.000, and must be handled as hazardous waste when they exhibit any of the characteristics of a hazardous waste. If there is no evidence of unusual contamination, MassDEP does not require Street Sweepings to be routinely tested, but, as is the case with any waste, the generator has the ultimate responsibility for determining whether the waste is a hazardous waste.

Although Street Sweepings are not considered soil, they may be managed under Policy #COMM-97-001, "Reuse and Disposal of Contaminated Soil at Massachusetts Landfills", in accordance with Section 5.5 of this policy.

3. Definitions

This section contains definitions of the important terms used in this Policy.

Department or *MassDEP* means the Massachusetts Department of Environmental Protection.

Parking lots mean publicly or privately owned paved areas that provide access for the general public to park their car while patronizing retail or service businesses. Parking lots also include the paved areas used by the employees at office parks and businesses.

Private way means the strip of land over and under a privately owned, paved road or highway.

Public way means the strip of land over and under a publicly owned, paved road or highway and includes the publicly owned land adjacent to the road or highway.

Street Sweepings means materials consisting primarily of sand and soil generated during the routine cleaning of roadways or parking lots but may also contain some leaves and other miscellaneous solid wastes collected during street sweeping. Street Sweepings do not include the material generated during the clean-up of a spill or material from other structures associated with a roadway such as catch basins.

Urban center roads mean local roads in central commercial and retail business districts and industrial and manufacturing areas.

4. Handling

4.1 Collection of Street Sweepings

Although MassDEP does not regulate the collection of Street Sweepings, collection practices should be compatible with intended uses. Keeping sweepings from Urban Center Roads separate from sweepings from other areas will provide the generator of the Street Sweepings with the most options under this policy.

This policy does not cover sweepings known to be contaminated by spills, and such sweepings should be collected separately and kept segregated. Depending on the contamination and circumstances, the handling of contaminated sweepings may be governed by the Massachusetts Contingency Plan, 310 CMR 40.0000, the Massachusetts Hazardous Waste Regulations, 310 CMR 30.000, the Massachusetts Site Assignment Regulations for Solid Waste Facilities, 310 CMR 16.00 or the Massachusetts Solid Waste Management Facility Regulations, 310 CMR 19.000.

4.2 Storage

Street Sweepings shall be temporarily stored prior to use, only when the following conditions are satisfied:

- Storage must be:
    - at the site where the sweepings are generated (e.g. at a parking area that was swept);
    - at a location, such as a Department of Public Works (DPW) yard, that is under the control of the governmental entity doing the sweeping or has contracted for the sweeping; or,

  - at other locations with prior written approval from the appropriate MassDEP Regional Office.
- The Street Sweepings shall be protected from wind and rain to the extent necessary to prevent dust, erosion, and off-site migration;
- The Street Sweepings shall not be stored within the 100 foot buffer zone of a wetland or within wetland resource areas including bordering vegetative wetlands and riverfront areas;
- The Street Sweepings shall not be stored within 500 feet of a ground or surface drinking water supply;
- Storage of the Street Sweepings shall incorporate good management practice and result in no public nuisance; and
- Storage of the Street Sweepings must be temporary. Street Sweepings shall be used within one year of collection unless the MassDEP Regional Office where the Street Sweepings are stored grants a written extension. An extension may be granted when it is demonstrated that all storage conditions will continue to be satisfied and the stored Street Sweepings will be put to a specific identified use prior to the expiration of the extension period.

4.3 Preparation Prior to Use

Solid waste, such as paper, auto parts and other trash, shall be removed from all Street Sweepings prior to use. Solid waste screened from the Street Sweepings shall be disposed of at a permitted solid waste facility. Leaves, twigs and other organic matter should also be removed when good engineering practice indicates this is necessary to produce a material that is suitable for the intended use.

5. Approved Uses, Restrictions & Conditions-No Prior Approval Needed from MassDEP

This policy allows Street Sweepings to be used in several applications. An approval from MassDEP is not required when the restrictions and conditions are adhered to as identified in this policy. However, Street Sweepings shall not be used unless prior approval is obtained from the owner of the location where the sweepings are to be used.

5.1 Use at Landfills

Street Sweepings may be used for daily cover at permitted lined solid waste landfills and need no prior MassDEP approval if the Street Sweepings satisfy the requirements for daily cover material specified at 310 CMR 19.130(15). A list of active permitted solid waste landfills can be found on the MassDEP website.

5.2 Use as Fill in Public or Private Ways and Parking Lots

Street Sweepings may be used for fill in public and private ways and parking lots without prior approval from MassDEP only when the following additional restrictions and conditions are observed:

- The Street Sweepings have not been collected from Urban Center Roads (see definition);
- Any collection, storage, or preparation for use of the Street Sweepings shall be in accordance with Sections 4.1 and 4.2 of this policy.
- The Street sweepings have been screened to remove all debris and solid waste and all debris/solid waste screened from the sweepings shall be disposed at a permitted solid waste facility (see Section 8);
- The Street Sweepings are kept above the level of the groundwater;
- The Street Sweepings are not used in designated "No Salt Areas";

- The Street Sweepings are not used within the 100 foot buffer zone of a wetland or within wetland resource areas including bordering vegetative wetlands and riverfront areas;
- The Street Sweepings are not used within 500 feet of a ground or surface drinking water supply;
- In public ways the Street Sweepings are used under the paved road surface or, except in residential areas, as fill along the side of the road within the public way;
- In private roadways or in residential areas the Street Sweepings are used only under the paved road surface; and
- In parking lots the Street Sweepings are used only under the paved parking surface.

5.3 Use As an Additive to Restricted Use Compost

Street Sweepings may be used as an additive to compost without prior written approval from MassDEP only when the following additional restrictions and conditions are observed:

- The Street Sweepings have not been collected from Urban Center Roads (see definition);
- Any collection, storage, or preparation for use of the Street Sweepings shall be in accordance with Sections 4.1 and 4.2 of this policy.
- The Street Sweepings have been screened to remove all debris and solid waste and all debris and solid waste screened from the sweepings is disposed at a permitted solid waste facility (see Section 8);
- The compost is used only along public ways and parking lot areas;
- The compost is not used in residential areas;
- The compost is kept above the level of the groundwater;
- The compost is not used in designated "No Salt Areas";
- The compost is not used within the 100 foot buffer zone of a wetland or within wetland resource areas including bordering vegetative wetlands and riverfront areas; and
- The compost is not used within 500 feet of a ground or surface drinking water supply.

5.4 Reuse as Anti-Skid Material

Street Sweepings may be used as a component to anti-skid material (e.g. street sanding material) without prior written approval from MassDEP only when the following additional restrictions and conditions are observed:

- The Street Sweepings have not been collected from Urban Center Roads (see definition);
- Any collection, storage, or preparation for use of the Street Sweepings shall be in accordance with Sections 4.1 and 4.2 of this policy;
- The Street Sweepings have been screened to remove all debris and solid waste and all debris and solid waste screened from the Street Sweepings is disposed at a permitted solid waste facility (see Sections 8);
- The anti-skid material/Street Sweepings are not used in designated "No Salt Areas";
- The anti-skid material/Street Sweepings are not used within the 100 foot buffer zone of a wetland or within wetland resource areas including bordering vegetative wetlands and riverfront areas; and
- The anti-skid material/Street Sweepings are not used within 500 feet of a ground or surface drinking water supply.

The use of Street Sweepings as anti-skid material in accordance with this policy is not a determination of the efficacy of the material for this purpose. Proper engineering review should be done to ensure the material works as intended.

5.5 Reuse at Landfills Regulated Under MassDEP Policy #COMM-97-001

Street Sweepings may be reused at a permitted Massachusetts landfill and need no prior written MassDEP approval if the sweepings have been adequately characterized pursuant to the MassDEP Policy #COMM-97-001 and the Street Sweepings have been screened to remove debris and solid waste.

All screened debris and solid waste removed from Street Sweepings shall be disposed of at a permitted solid waste facility. Street Sweepings for use at the landfill may contain only incidental, randomly dispersed, de minimis quantities of ash and/or Solid Waste as defined in 310 CMR 16.000 and 310 CMR 19.000, which collectively shall comprise less than 1% by volume of the Street Sweeping materials, as determined by visual inspections. Any Street Sweeping materials approved and brought onto the landfill property for use at the landfill shall contain no more than 5% (by volume) of Asphalt Pavement, Brick, and Concrete ("ABC") material (as defined in 310 CMR 19.000), as determined by visual inspection. Any such material must measure less than 6 inches in any dimension.

Persons who wish to send Street Sweepings to a landfill must comply with MassDEP Policy #COMM-97-001 which requires sampling of the Street Sweepings to demonstrate that the Street Sweepings meet the standards listed in the Policy.

5.6 Use at Reclamation Soil Facilities Regulated Under MassDEP Policy # COMM-15-01

Street Sweepings may be used for fill at a permitted Reclamation Soil Facility (the Facility) and need no prior written MassDEP approval if the Street Sweepings have been adequately characterized pursuant to the Facility-specific Soil/Fill Management Plan and the Street Sweepings have been screened to remove debris and solid waste.

All screened debris and solid waste removed from Street Sweepings shall be disposed of at a permitted solid waste facility. Street Sweepings for use at the Facility may contain only incidental, randomly dispersed, de minimis quantities of ash and/or Solid Waste as defined in 310 CMR 16.000 and 310 CMR 19.000, which collectively shall comprise less than 1% by volume of the Street Sweeping materials, as determined by visual inspections. Any Street Sweeping materials approved and brought onto the property for use at the Facility shall contain no more than 5% (by volume) of ABC material, as determined by visual inspection. Any such material must measure less than 6 inches in any dimension.

Pursuant to Policy # COMM-15-01, persons who wish to send Street Sweepings to a Facility must sample and analyze the Street Sweepings as required by the Facility's Soil/Fill Management Plan and demonstrate that the Street Sweepings meets the Facility's acceptance criteria. Unless specifically addressed in a Facility's Soil/Fill Management Plan, a minimum sampling frequency of 1 sample per 100 cubic yards is required for characterization of Street Sweepings originating from Urban Center Roads. Street Sweepings originating from non-Urban Center Roads may be sampled at a minimum of 1 sample per 500 cubic yards. Regardless of its point of origin, if the total quantity of Street Sweepings is less than 100 cubic yards, a minimum of one composite sample is required for characterization of the material. A list of active permitted Reclamation Soil facilities may be found at https://www.mass.gov/soil-transport-re-use-and-disposal.

6. Approved Use, Restrictions & Conditions- Prior Approval Needed from MassDEP

This policy allows Street Sweepings to be used in several applications. Prior written approval from MassDEP is required when using the Street Sweepings as identified in this section of the policy. In addition, Street Sweepings shall not be used at a location until prior written approval is obtained from the owner of the location where the Street Sweepings are to be used.

6.1 Use as a Bulking Agent for Wastewater Sludge or Septage Disposal

Street Sweepings may be used as a bulking material for wastewater treatment plant sludge or septage when the mixed material will be disposed in a permitted lined or unlined sludge or septage landfill in compliance with MGL Chapter 21, Sections 26-53 and MGL Chapter 83 Sections 6 & 7 provided that the appropriate MassDEP Regional Office's Bureau of Water Resources has granted prior written approval.

7. Other Uses

Any use not approved in this policy requires a MassDEP permit under the Beneficial Use provisions of the Solid Waste Management Facility Regulations at 310 CMR 19.060. A "Beneficial Use Determination" (BUD) can be issued only after the submission of an application characterizing the waste and describing the proposed beneficial use.

8. Disposal

While the beneficial use of Street Sweepings is strongly encouraged, MassDEP does not prohibit the disposal of Street Sweepings. Street Sweepings may be disposed in permitted solid waste landfills without prior approval from the Department.

9. Record Keeping

Any entity using Street Sweeping for any use listed under sections 5.3 or 5.4 shall keep records for a period of three years of the source of the sweepings, the location of use and the amount of sweepings used.

10. Additional Information

For additional copies of this policy, permit application forms or other MassDEP documents, call any MassDEP Regional Office and ask for the Service Center or visit http://www.mass.gov/dep. The permit application numbers for Beneficial Use Determinations are BWP SW 39, 40, 41 and 42.

Copies of all Massachusetts regulations, including the solid waste regulations, are available at the MassDEP website and may also be purchased from the State House Bookstore at 617-727-2834. The solid waste regulations are:

- 310 CMR 16.000, Site Assignment Regulations for Solid Waste Facilities: and,
- 310 CMR 19.000, Solid Waste Management Facility Regulations.

If you have technical questions about the policy, please call any MassDEP Regional Office and ask to speak with a staff member in the solid waste program

STANDARD OPERATING PROCEDURE 3: ROAD SALT/SALT APPLICATION & STORAGE
TOWN OF WILBRAHAM DEPARTMENT OF PUBLIC WORKS

DESCRIPTION: Procedures for the proper storage, use, and disposal of salt and sand/salt mixtures during de-icing activities, and procedures for proper snow management in order to prevent or minimize runoff and pollutant loading impacts.

On an annual basis, the Town of Wilbraham Highway Department, a division of the DPW, uses a mixture of ***magnesium chloride salt (MgCl2) and sand*** in de-icing operations. The Town currently stores salt and sand in a covered structure at the ***Highway Department yard***. Spreaders are calibrated every fall.

Proper road salt and sand applications and storage are necessary to prevent contamination to surface and groundwater supplies. Salts are very soluble—once in contact with water there is no way to remove salt. The major reasons for keeping salt covered and controlling use are that salt:

- Kills vegetation
- Corrodes infrastructure
- Blocks storm drains and swales
- Increases sedimentation to streams and rivers
- Some salts contain phosphorus, nitrogen, copper, and cyanide

TARGETED CONSTITUENTS:

- Salt
- Sediment
- Nutrients
- Metals
- Trash
- Oil & grease
- Organics
- Low Dissolved Oxygen

STRUCTURAL CONTROLS:

Prevent exposure of deicing product (salt, sand, or alternative products) storage piles to precipitation by enclosing or covering the storage piles. Implement good housekeeping, diversions, containment or other measures to minimize exposure resulting from adding to or removing materials from the pile. Store piles in such a manner as not to impact surface water resources, groundwater resources, recharge areas, and wells.

- Store materials under covered or enclosed areas and on impervious surfaces.
- Ensure that there are adequate drainage controls in storage areas to prevent runoff from entering the stormwater system.
- Follow appropriate loading and unloading procedures.
- Frequently sweep near the storage/loading areas to reduce the amount of salt, sand, or other materials that is tracked out.
- For liquid deicing chemicals, provide secondary storage containment.
- Do not store road salt near drinking water supplies, surface water resources, groundwater resources, recharge areas, and wells. Follow proper storage guidelines from MassDEP.

OPERATIONAL BEST MANAGEMENT PRACTICES:

- Establish a low salt area near any water bodies or water supply areas.
- Educate and train operators on hazards of over-salting to roads and environment at the beginning of the snow season as part of meetings with supervisors and drivers.
- Regulate the amount of road salt applied to prevent over-salting of motorways and increasing runoff concentrations.
- Calibrate equipment to reduce and optimize salt use and ensure deicing agents are being used efficiently. Provide employee training on proper calibration procedures.

- Do not overfill trucks with deicing materials as it may lead to spills.
- Consider using automated application equipment like zero velocity spreaders, or retrofitting vehicles to include equipment such as on-board application regulators, temperature sensors for air and pavement, and anti-icing and pre-wetting equipment.
- When using deicers, use pre-wetting agents (e.g., salt brine) to help them work more efficiently and to reduce road salt scatter and bounce.
- Salt brine solution used for anti-icing and pre-wetting can be stored for up to a year –concentration should be tested before use. If temperatures fall below 0° F, use a circulator pump to prevent the brine from freezing before deicing to reduce the need for road salt or other deicing chemicals.
- When possible, use anti-icing practices to prevent ice formation and reduce the need for deicers.
- Apply anti-icing agents 1-2 hours before winter weather events to ensure optimal performance (can be applied up to 24 hours prior).
- Only apply road salt when the pavement temperature is above 15° F.
- Minimize the use of and optimize the application of sodium chloride and salts (chloride-containing materials used to treat paved surfaces for deicing, including calcium chloride, magnesium chloride, and brine solutions) while maintaining public safety.
- Consider opportunities for the use of alternative deicing materials, such as calcium magnesium acetate.
- Avoid mixing road salt and sand. Doing so makes both the salt and sand work less efficiently and leads to over-application.
- Only apply enough deicer so that plows can remove the snow and ice. Adjust the application rate of deicers based on the type of storm, type of agent used, and anti-icing and pre-wetting techniques used.
- Perform unloading/loading of trucks on impervious surfaces whenever possible. These areas should be frequently cleaned and swept to reduce the tracking and runoff of salt and to capture any spills.
- Track the amount of deicer used and maintain records of the application of sand, anti-icing and/or de-icing chemicals to document the reduction of chemicals to meet established goals.
- Inspect salt storage shed for leaks on a regular basis including Fall and Spring – look for salt stains in ground near and around the salt storage shed, loading area, or downslope. Repair any salt leaks.
- Inspect salt regularly for lumping or water contamination.
- Wash equipment using proper procedures to prevent pollutants from entering the stormwater system. Dry clean-up procedures should be used when possible.

The major materials used in snow and ice control are coarse sand and coarse salt. These materials are stockpiled in advance of an event and are immediately available when needed and stocks are replenished between events.

Sand

Sand is used as an abrasive for traction on slick roadways. The Town continues to implement a reduced sand-use policy when public safety permits during the deicing season. Sand is stored in the covered facility located at: ***Highway Department yard at 2721 Boston Road in Wilbraham, MA***. Loading areas and yards are swept ***after loading*** to prevent sand build-up and run-off.

Salt

STANDARD OPERATING PROCEDURE 3: ROAD SALT/SALT APPLICATION & STORAGE
TOWN OF WILBRAHAM DEPARTMENT OF PUBLIC WORKS

Salt is used to expedite the melting of snow and ice from the street surface and also to keep the ice from forming a bond to the street surface. Salt is stored in the covered facility located at: ***Highway Department at 2721 Boston Road in Wilbraham, MA***. Loading areas and yards are swept ***after loading*** to prevent salt build-up and run-off.

PROCEDURES

Salt Application

1. Whenever conditions warrant, salt is applied to the roadway prior to accumulation of snow to prevent compacted snow from bonding to the roadway surface. ***The Highway Superintendent*** will instruct staff when salt application is appropriate.
2. Prior to salt application, equipment will be checked to ensure proper working order and ensure proper calibration of equipment. All fluid levels will be checked and filled to proper levels, all lights must be in working order. A visual walk-around inspection of the truck or equipment must be made. Any repairs must be made and reported to a supervisor or mechanic before leaving the yard.
3. Follow the prioritized route or schedule. This schedule is located at the ***Highway Department at 2721 Boston Road in Wilbraham, MA***.
4. Before parking any truck or equipment after use, all fluid levels will be checked and filled. All minor repairs will be done by the operator. Any repairs the operator cannot perform will be written up on the proper forms and turned in to ***the Highway Superintendent. The Highway Superintendent*** will determine importance and will assign the repairs according to schedule. All deicing chemical will be washed from equipment at the wash bay or designated wash area.

Sand Application

1. Whenever conditions warrant, sand is applied to the roadway to increase traction. ***The Highway Superintendent*** will instruct staff when sand application is appropriate.
2. Prior to sand application, equipment will be checked to ensure proper working order and ensure proper calibration of equipment. All fluid levels will be checked and filled to proper levels, all lights must be in working order. A visual walk-around inspection of the truck or equipment must be made. Any repairs must be made and reported to a supervisor or mechanic before leaving the yard.
3. Follow the prioritized route or schedule. This schedule is located at the ***Highway Department at 2721 Boston Road in Wilbraham, MA***.
4. Before parking any truck or equipment after use, all fluid levels will be checked and filled. Blades or bolts, which need replacing, will be taken care of unless told to do otherwise. Chains that need repairs will be repaired. All minor repairs will be done by the operator. Any repairs the operator cannot perform will be written up on the proper forms and turned in to ***the Highway Superintendent. The Highway Superintendent*** will determine importance and will assign the repairs according to schedule.

TRAINING

Employees are trained ***once per year*** on this procedure and the proper operation of equipment. Employees are also trained on stormwater pollution prevention, spill and response, and illicit discharge detection and elimination procedures.

RECORD KEEPING

1. Maintain a master schedule of prioritized snow and sanding routes and the miles or roads plowed or sanded at the ***Highway Department at 2721 Boston Road in Wilbraham, MA***.
2. Keep copies of manufacturer's recommendations for equipment calibration, plowing speed and salt/sand application rates at the ***Highway Department at 2721 Boston Road in Wilbraham, MA***.
3. Keep records of the amounts of salt, sand, liquid deicer, and salt alternatives applied per season at the ***Highway Department at 2721 Boston Road in Wilbraham, MA***.
4. Keep a list of all employees trained in the facility's Stormwater Pollution Prevention Plan (SWPPP).

REVISING THE SOP

These procedures are reviewed ***once per year*** and updated as needed.

MASSDEP GUIDELINES

- https://www.mass.gov/guides/guidelines-on-road-salt-storage

STANDARD OPERATING PROCEDURE 4: SNOW REMOVAL AND STOCKPILING
TOWN OF WILBRAHAM DEPARTMENT OF PUBLIC WORKS

DESCRIPTION: Procedures for proper snow management in order to prevent or minimize runoff and pollutant loading impacts. Proper snow management in terms of stockpiling and removal can prevent or minimize runoff and pollutant loading impacts. Snow piles can contain trash, nutrients, sediments, salt, sand, and vehicle pollutants (petroleum, antifreeze, and oil) that can directly be carried into surface waters during snowmelt.

The Highway Division of the Town of Wilbraham DPW provides snow removal for 240 lane miles of roadway as well as parking lots for municipal buildings including schools. When necessary, the Wilbraham DPW stockpiles snow in municipal parking lots.

TARGETED CONSTITUENTS:

- Salt
- Sediment
- Nutrients
- Trash
- Oil & grease

MassDEP has published Snow Disposal Guidance online with an interactive map to assist with designation of appropriate upland snow disposal sites: https://www.mass.gov/guides/snow-disposal-guidance#snow-disposal-guidance. MassDEP's emergency contact phone number for inquiries and authorizations during declared statewide snow emergency events is **1-888-304-1133**. For non-emergency information about MassDEP's Snow Disposal Guidance, the MassDEP Western Regional Office's phone number is **1-413-755-2214**.

SNOW STOCKPILE SITE SELECTION:

Locate snow stockpile sites adjacent to or on pervious surfaces in upland areas or upland locations on impervious surfaces that have functioning and maintained storm water management systems away from water resources and drinking water wells. At these locations, the snow meltwater can filter in to the soil, leaving behind sand and debris which can be removed in the springtime.

- Avoid dumping of snow into any waterbody, including rivers, reservoirs, ponds, or wetlands.
- Avoid dumping snow in sanitary landfills and gravel pits. Snow meltwater will create more contaminated leachate in landfills posing a greater risk to groundwater, and in gravel pits, there is little opportunity for pollutants to be filtered out of the meltwater because groundwater is close to the land surface.
- Avoid disposing of snow on top of storm drain catch basins or in stormwater drainage swales or ditches. Snow combined with sand and debris may block a storm drainage system, causing localized flooding.
- Avoid storing snow in areas that are unstable, areas of potential erosion, or high points where snow may melt and collect debris as runoff before it enters the stormwater system.
- Consider sun exposure when storing snow. Snow in areas with higher sun exposure will melt faster but may require deicers if the snowmelt refreezes.

SNOW STOCKPILE SITE PREPARATION AND MAINTENANCE:

- Securely place a silt fence or equivalent barrier on the downgradient side of the snow disposal site. Consider using a living snow fence to contain snow piles and reduce snow drifting.
- To filter pollutants out of the meltwater, wherever possible maintain a 50-foot vegetative buffer strip -during the growth season between the disposal site and adjacent waterbodies.
- Debris should be cleared from the site prior to use for snow disposal.
- Debris should be cleared from the site and properly disposed of at the end of the snow season and no later than May 15.

STANDARD OPERATING PROCEDURE 4: SNOW REMOVAL AND STOCKPILING
TOWN OF WILBRAHAM DEPARTMENT OF PUBLIC WORKS

SNOW PLOWING PROCEDURES

1. All main arterial streets, cross-Town connectors, and roads with documented high-volume traffic are maintained continuously throughout storm events. Secondary roads are cleared as the storm develops and ***3 inches of snow*** has accumulated, or when safety concerns require immediate attention as determined by the Superintendent of Operations or his designee. Private way roads will be plowed last.

   Refer to the Town's Snow Plowing Policy for additional information, attached and location online: https://www.wilbraham-ma.gov/DocumentCenter/View/2064/2017-snowplow-policy.

2. Prior to plowing operations, equipment will be checked to ensure proper working order. All fluid levels will be checked and filled to proper levels, all lights must be in working order. A visual walk-around inspection of the truck or equipment must be made. Any repairs must be made and reported to a supervisor or mechanic before leaving the yard.

3. Avoid plowing, pushing, blowing or storing excess snow, deicer, or other debris in or near creeks, watercourses or storm drainage systems.

4. Reduce plowing speed in sensitive areas (near creeks, wetlands or other water courses) to prevent snow and deicing materials from entering waterways.

5. Follow the prioritized route or schedule. This schedule is located at the ***Highway Department at 2721 Boston Road in Wilbraham, MA.***

6. Before parking any truck or equipment after use, all fluid levels will be checked and filled. Blades or bolts, which need replacing, will be taken care of unless told to do otherwise. Chains that need repairs will be repaired. All minor repairs will be done by the operator. Any repairs the operator cannot perform will be written up on the proper forms and turned in to ***the Highway Superintendent of Operations. The Highway Superintendent*** will determine importance and will assign the repairs according to schedule.

RECORD KEEPING

A master schedule of prioritized snow plowing routes and the miles or roads plowed is kept at the ***Highway Department at 2721 Boston Road in Wilbraham, MA***.

REVISING THE SOP

These procedures are reviewed ***once per year*** and updated as needed.

ATTACHMENTS

- Town of Wilbraham, Massachusetts, *Wilbraham Snowplowing Policy*

MASSDEP GUIDANCE

- https://www.mass.gov/guides/snow-disposal-guidance

TOWN OF WILBRAHAM

DEPARTMENT OF PUBLIC WORKS

HIGHWAY DIVISION

The Highway Department, a division of the Wilbraham Department of Public Works, is responsible for snow and ice removal on Wilbraham public roads. The following is a summary of Highway response to snow and ice conditions.

SEASONAL PREPARATION

Prior to any winter storm event, all vehicles and apparatus equipment are inspected and made ready for service. All vehicles are fueled and salt is stored with enough in supply to cover the entire town through at least one storm event. The person assigned to each route will drive that route and make note of all damaged or unsecured mail boxes and the placement of basketball hoops and sprinkler heads on Town property. No repairs will be made by the Town to any of the above on this list. If a basketball hoop or other recreational device is located in a way that will impede snow removal, or damage our equipment, it will be removed without notice.

PROCEDURE

All main arterial streets and cross town connectors, as well as those roads with documented high volume traffic, will be maintained continuously throughout a storm event. All secondary roads will be cleared as their snow accumulation approaches 3" or when topography, physical conditions, ice or other safety concerns require immediate attention as determined by the Superintendent of Operations or his designee. Selective use of chemically formulated products is indicated when road temperatures fall below 30 degrees Fahrenheit and will allow for a more effective treatment. Cautious use of a liquid product preserves the roadways and allows for a cost-effective alternative in colder weather.

Public safety is the number one objective and will supersede all other issues.

Eighteen (18) D.P.W. personnel are available to plow and treat 240 lane miles of roadway creating a total of 11 organized routes. A snowplow route is assigned to each employee, and each route must be completed before an employee will be reassigned to assist on other routes. Snow plowing detail may be divided into shifts if the storm event is expected to last several days.

It can be anticipated that at least one piece of equipment will need to be taken out of service during a storm event for repair or maintenance. As breakdowns occur, plow routes will be altered slightly with a minimum of service disruption.

All private way roads will be plowed last, providing that there are two or more homes on the private way, in order to allow for the safe passage of emergency vehicles and equipment.. If it is determined by the Highway Division that the icy condition needs to be taken care of, it will be done only during normal working hours. [See Section 631 of the Town By-Law]

During heavy storms, the DRC (Disposal and Recycling Center) may not be open because the personnel and equipment at the DRC will be plowing roads. If the posted schedule of DRC operations is to change during snow events, notice will be posted on Public TV.

Please be reminded, for public safety purposes, that highway personnel are out on the roadways during extreme road and weather conditions, and resident cooperation is sincerely appreciated during this time. Please don't travel the roadways during heaviest cleanup efforts if at all possible, and adhere to Town enforced parking restrictions. (Please see attached: Town By-Law Section 706 – parking restrictions, Section 701 b. - prohibited parking during snow emergencies, and Section 611 – sidewalk snow). Any vehicle left on the roadway during removal operations seriously impedes plowing and sanding and will be reported to the Police Department.
The Town will only plow sidewalks abutting main roads which are used by children going to schools. Sidewalks other than those listed are the responsibility of the homeowner.

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** Note: Faculty Street will be plowed by the Academy.

As a safety precaution, residents are asked not to follow Town trucks any closer than 300 feet.

Highway Division personnel will not argue over the ownership of fallen snow after it falls onto the roadway. Snow will be removed or plowed onto private property if it is necessary for " #$% &

It is expected that all fire hydrants located near a person's property be shoveled out by the resident after a snow event. It should be further understood that the Town is not responsible for privately owned irrigation sprinkler heads located within the Town's right of way.

Parking Regulations that were adopted at Town Meeting will be strictly enforced in order that we can plow and make safe roadways more efficiently.

Any outside contractor hired by a resident for private property snow removal will not be permitted to place any snow in the roadway. The homeowner will be held responsible for any private contractor negligence, and the contractor will be reported to the police if the snow is left in the roadway.

Homeowners will be cited and fined for placing snow from their property on public ways.

In order to comply with Storm water Phase II Federal Rules and Regulations, we will no longer be using sand. The Town does not provide sand to the public.

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Highway personnel are unavailable to receive telephone calls during a storm event because all available personnel are clearing roadways. Requests or complaints can be directed to the department's business office during regular business hours Monday through Friday, 8:30 a.m. to 4:30 p.m., at 596-2800 x208.

Depending on the intensity and duration of a snow storm event it can take anywhere from 4 to 8 hours after the last snowflake falls to completely plow all roads. Please allow time in getting your road plowed before reporting potentially unplowed roads.

Emergency calls will be responded to immediately as they are received from residents or Town personnel. Residents who are in trouble can call Central Dispatch personnel in the Wilbraham Police Department at 596-3837. Highway personnel and/or emergency services will be dispatched to the emergency location.

Damage to resident vehicles or property caused by Town equipment during a winter storm event should be reported directly to the Selectmen's Office during regular business hours. The Town will request that the resident provide his concern in writing, and the Town will file the claim according to the usual protocol with the Town's insurance carrier.

Highway Department personnel will never be dispatched to salt or plow private residence property, or shovel/plow out around resident mailboxes. Residents are expected to maintain post and mailboxes to withstand New England winter weather and should repair/replace as needed. The mailbox should be installed per USPS guidelines (https://www.usps.com/manage/know-mailbox-guidelines.htm). The Town will repair/replace any mailbox damaged by town plow equipment when evidence indicates that such equipment made physical contact with the mailbox.

SECTION 706 PARKING PROHIBITED (Reg., Art V, Sec. 1)(ATM, Art.24, 5-17-04)

a) Violations -no person shall park a vehicle and/or trailer (hereinafter "vehicle") or be the registered or unregistered owner of vehicle parked upon a street or highway or way as defined in M.G.L. C.90 s.1, as defined in section 700 of this general By-law, or in any of the following places or in a manner in violation of the provisions of this section. Enforcement shall be pursuant to M.G.L. C.90 s.20A1/2, accepted by the Town of Wilbraham, Annual Town Meeting, 1988.

1) Within a designated no parking zone

2) Within a designated no passing zone

3) So as to obstruct snow or ice removal

4) So as to obstruct a sidewalk

5) So as to obstruct a driveway or private way

6) So as to obstruct a crosswalk

7) Over (1) foot from the curb or edge of the way
8) Within an intersection

9) Within (20) feet of an intersecting way

10) With the left wheels to the curb or edge of the way

11) Within (15) feet of a bus stop sign

12) So as to leave less than ten (10) feet wide unobstructed lane to the curb, edge or solid center line(s) of a street, highway or way

13) Which is unregistered on a street, highway or way
14) Within a restricted area during a winter parking ban

15) Within a restricted area during an emergency parking ban

16) Within any grassed, lawn, landscaped or maintained area on the grounds of any municipal or school building, park or playground, or other tree belt or landscaped buffer area

17) While displaying a temporary sign advertising the sale of the vehicle or any other service or product

18) An unattended or unattached trailer as defined by M.G.L. C.90 s.1

19) Within a fire lane

20) On any street, highway or way for a period of time longer than one (1) hour between the hours of 1:00 am and 7:00 am of any day

21) On town property, except as a business or social invitee

22) On school district property without a current parking sticker or except as a business or social invitee

23) Impeding traffic within a school zone

24) Impeding traffic within a designated parade route

25) Within ten (10) feet of a fire hydrant

26) So as to obstruct or occupy a designated disabled veterans or handicap ramp, cross hatch area (as defined by M.G.L. C.40 s.22a and/or 521 CMR, as amended from time to time) or parking area without proper plate or permit

b) Exemptions.

1) Official Town, State, Federal, Diplomatic or Consular vehicles exempt from the application of Sec. (e 1), (e 2), (f 2), (f 3), (g 2) and (g 3) of this By-law while on official business or otherwise within applicable immunities. See M.G.L. C.40 s.22d.

2) The Chief Of Police, his designee, or the board of selectmen may waive enforcement of this section on any street, highway, or way, place or violation as appropriate for cause, including without limitation, a bona fide emergency.

c) Fines. The following shall be the established schedule of fines for the above vehicle referenced parking offenses:

1) Pursuant to M.G.L. C.90 s.20 A1/2, the penalty for offenses in Subsections (a. 1 through 24) shall be a fine in the amount of fifteen dollars ($15) if paid within twenty one (21) days; the fine shall increase to twenty five ($25) dollars if paid thereafter. If not paid within sixty days (60) Registry of Motor Vehicles is notified and additional penalties will be added as prescribed by law.

2) Pursuant to MGL C90 S 20 A ½, the penalty for offense in Subsection (a. 25)(Fire Hydrant) shall be a fine in the amount of fifty dollars ($50) if paid within twenty one (21) days, the fine shall increase to sixty dollars ($60) if paid thereafter. If not paid within sixty days (60) Registry of Motor Vehicles is notified and additional penalties will be added as prescribed by law.

3) Pursuant to MGL C 40 S 22A the penalty for the offenses in Subsection (a. 26) (Disabled Veterans/Handicap Persons, etc.) shall be a fine in the amount of one hundred dollars $100 if paid within twenty-one (21) days; the fine shall increase to one hundred twenty five dollars ($125) if paid thereafter. Subsequent offenses shall be a fine in the amount of two hundred dollars ($ 200), if paid within twenty-one days (21); the fine shall increase to two hundred fifty dollars ($250) if paid thereafter. If not paid within sixty days (60) the Registry Of Motor Vehicles is notified and additional penalties will be added as prescribed by law.

d) Hearing. A hearing, with the parking clerk, may be obtained upon written request of the registered owner of the vehicle within twenty-one days (21) of the issue date of the violation(s), pursuant to M.G.L. C.90 s.20 A1/2.

e) Removal of vehicle parked in violation; fine

1) The Chief of Police or his designee may remove or cause to be removed any vehicle parked in violation of this section.

2) Any person whose vehicle is removed shall be subject to additional charge of twenty-five ($25) and is fully responsible for all charges and expenses incurred for removal and storage of such vehicle.

f) Winter parking ban; fine

1) The Superintendent of the Department of Public Works, or his designee may declare a limited parking ban on any street, highway or way within the town during the period beginning November 1 through April 30 for the purposes of snow and ice removal. The superintendent or his designee shall announce all such limited parking bans to the press prior to their enforcement.

2) The Superintendent of Public Works or his designee may remove or cause to be removed any vehicle parked in violation of the winter ban.

3) Any person whose vehicle is removed shall be subject to additional charge of twenty-five ($25) and is fully responsible for all charges and expenses incurred for removal and storage of such vehicle.

g) Emergency parking ban; fines

1) The Chief of Police or his designee may declare an emergency limited parking ban on any street, highway or way within the town during the period of any emergency. The Chief or his designee shall announce all such limited parking bans to the press if their duration shall exceed twenty-four (24) hours.

2) The Chief of Police or his designee may remove or cause to be removed any vehicle parked in violation of the emergency parking ban.

3) Any person whose vehicle is removed shall be subject to additional charge of twenty-five ($25) and is fully responsible for all charges and expenses incurred for removal and storage of such vehicle.

SECTION 611 SIDEWALK SNOW (Art. V, Sec. 17)

Within twenty-four (24) hours after a snowfall, snow shall be removed from sidewalk(s) abutting street(s) by the tenant or occupant, and if no tenant or occupant, by the owner.

SECTION 701b TEMPORARY CLOSING OF STREETS

a). The Board of Selectmen is hereby authorized to close temporarily any street or highway in an impending or existing emergency, or for any lawful assemblage, demonstration or procession provided there is a reasonable justification for the closing of such street. (Reg. Art. II, Sec. 2)

b.) The Board of Selectmen is hereby authorized to prohibit, temporarily, parking on any street or highway or part thereof in an impending or existing emergency, or for a lawful assemblage, demonstration or procession provided there is a reasonable justification for such prohibition. Vehicles parked in places where parking is prohibited temporarily may be moved by or under the direction of an officer. (Art. 2, Sec. 3)

c.) The provisions of this By-Law shall not apply to persons actually engaged in work upon a street closed to travel, under construction or repair, to officers when engaged in the performance of public duties, nor to drivers of emergency vehicles acting in the performance of their public duties when the nature of the work of any of these person necessitates a departure from any part of these By-Laws. These exemptions shall not, however, protect the driver of any vehicle from the consequences of a reckless disregard of the safety of others. (Reg., Art. II, Sec. 4)

STANDARD OPERATING PROCEDURE 5: STRUCTURAL STORMWATER BEST MANAGEMENT PRACTICES INSPECTIONS AND MAINTENANCE
WILBRAHAM DEPARTMENT OF PUBLIC WORKS

DESCRIPTION: Procedures for inspecting eight common types of constructed stormwater best management practices (BMPs). Constructed BMPs are permanent site features designed to treat stormwater before infiltrating it to the subsurface or discharging it to a surface water body.

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

TARGETED CONSTITUENTS:

- Sediment
- Nutrients
- Trash
- Invasive species

BIORETENTION AREAS AND RAIN GARDENS:

Description

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

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

Inspection & Maintenance

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

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

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

Maintenance Schedule

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

CONSTRUCTED STORMWATER WETLANDS:

Description

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

Inspection & Maintenance

Regular inspection and maintenance are important for the health of constructed stormwater wetlands. Regular inspection and maintenance of pretreatment devices, such as forebays, should check for sediment buildup, structural damage and standing water and for the constructed stormwater wetlands should address health of the vegetation, presence of invasive species and identify the need to replace vegetation or media. Never store snow within a constructed stormwater wetland. This would prevent required water quality treatment and the recharge of groundwater.

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

Maintenance Schedule – Years 0—3

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

Maintenance Schedule – Years 4+

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

WET BASINS

Description

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

Inspection & Maintenance

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

Maintenance Schedule

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

EXTENDED DRY DETENTION BASINS:

Description

Extended dry detention basins are designed to control both stormwater quantity and quality. These BMPs are designed to hold stormwater for at least 24 hours, allowing solids to settle and to reduce local and downstream flooding. Pretreatment is required to reduce the potential for overflow clogging. The outflow may be designed as either fixed or adjustable. Additional nutrient removal may be achieved by a micropool or shallow marsh.

Inspection & Maintenance

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

Maintenance Schedule

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

INFILTRATION BASINS

Description

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

Inspection & Maintenance

Regular maintenance is required to prevent clogging, which results in infiltration basin failure. Clogging may be due to upland sediment erosion, excessive soil compaction or low spots.

Inspections should include:

- signs of differential settlement
- cracking
- erosion
- leakage in the embankments
- tree growth on the embankments
- rip-rap condition
- sediment accumulation
- turf health

Maintenance Schedule

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

PROPRIETARY MEDIA FILTERS

Description

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

Inspection & Maintenance

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

Maintenance Schedule

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

SAND AND ORGANIC FILTERS

Description

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

Inspection & Maintenance

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

Maintenance Schedule

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

DRY WELLS

Description

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

Inspection & Maintenance

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

Maintenance Schedule

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

TRAINING

Employees are trained once per year on this procedure and the proper operation of stormwater BMPs. Employees are also trained on stormwater pollution prevention, spill and response, and illicit discharge detection and elimination procedures.

If services are contracted, the contractor should be given a copy of this and any applicable SOPs to ensure compliance with MS4 regulations.

RECORD KEEPING

1. Records are kept at the Department of Public Works at 240 Springfield Street in Wilbraham, MA.
2. Records shall include an inventory of municipally-owned stormwater treatment BMPs and inspection forms.

REVISING THE SOP

These procedures are reviewed once per year and updated as needed.

INSPECTION OF BIORETENTION AREAS / RAIN GARDENS

General Information

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

Specific Information

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

INSPECTION OF CONSTRUCTED STORMWATER WETLANDS
Years 0-3 of Operation

General Information

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

Specific Information

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

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

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

INSPECTION OF CONSTRUCTED STORMWATER WETLANDS
Year 4 - Lifetime of Operation

General Information

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

Specific Information

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

INSPECTION OF EXTENDED DRY DETENTION BASINS

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

General Information

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

Specific Information

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

INSPECTION OF PROPRIETARY MEDIA FILTERS

General Information

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

Specific Information

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

INSPECTION OF SAND AND ORGANIC FILTERS

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

General Information

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

Specific Information

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

INSPECTION OF DRY WELLS

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

General Information

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

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

INSPECTION OF WET BASINS

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

General Information

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

Specific Information

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

INSPECTION OF OTHER BMP

General Information

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

Specific Information

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

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