Illicit Discharge Detection and Elimination (IDDE) Plan

Waltham, MA

June 2019

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1 Introduction

1.1 MS4 PROGRAM

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

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

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

Under Minimum Control Measure 3, the permittee is required to implement an IDDE program to systematically find and eliminate sources of non-stormwater discharges to its municipal separate storm sewer system and implement procedures to prevent such discharges. The IDDE program must also be recorded in a written (hardcopy or electronic) document. This IDDE Plan has been prepared to address this requirement.

1.2 ILLICIT DISCHARGES

An "illicit discharge" is any discharge to a drainage system that is not composed entirely of stormwater, with the exception of discharges pursuant to a NPDES permit (other than the NPDES permit for discharges from the MS4) and discharges resulting from fire-fighting activities.

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

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

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

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

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

1.3 ALLOWABLE NON-STORMWATER DISCHARGES

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

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

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

1.4 WALTHAM IDDE PROGRAM

The City of Waltham has separate stormwater and sewer systems. However, previous sampling campaigns at numerous manholes and outfalls within the city limits have shown the sanitary and wash waters are entering the stormwater collection network via illicit connections or overflows. These flows are subsequently discharged into various waterbodies or inter-municipal connections (IMC) which receive or discharge flow from/into the stormwater systems of surrounding towns. The discharge of undesired, untreated sewage in these waterbodies are of environmental concern and are important contributors of phosphorus and pathogens as indicated in their respective TMDL reports for Charles River.

As a consequence, the City of Waltham is currently under a United States Environmental Protection Agency (EPA) Administrative Order (dated November 9, 2004) to implement an IDDE Program in the next three years.

1.5 PROJECT AREA DESCRIPTION

The City of Waltham is located about 11 miles west of Boston and is bounded on the north by Lexington, on the east by Belmont and Watertown, on the south by Newton, and on the west by Weston and Lincoln. The topography of the City of Waltham is quite variable, ranging from a low elevation of 35 feet above sea level adjacent to the Charles River up to a high elevation of 485 feet at Prospect Hill Park near Route 128 and Totten Pond Road. As a result of these elevation drops, there are several streams and rivers which make their way through the City or form a boundary between Waltham and surrounding communities and ultimately discharge into the Charles River. These streams are described below:

Masters Brook North begins on the lower easterly slopes of Prospect Hill Park and flows southerly to its confluence with Masters Brook South which is fed by Sibley Brook which flows from west to east on the south side of Main Street. The confluence of Masters Brook North with Masters Brook South creates Master Brook, which flows from south of Vernon Street over to Prospect Street and south into the Charles River.

Chester Brook flows in from Lexington on the north and receives flows from Hardy Pond, Totten Pond Brook, and Wellington Brook. Its main tributary is the West Chester Brook, which has Plympton Brook as a sub-tributary. The confluence is located to the east of Lexington Street, between Dale and Emerson Street. After the confluence with West Chester Brook, the stream makes its way through the Lyman ponds and into Beaver Brook.

Clematis Brook is another tributary of Beaver Brook. It flows southerly from Bishop's Forest Drive to the confluence with Beaver Brook south of Waverly Oaks Road.

Beaver Brook forms the boundary between Belmont and Waltham, flowing north to south, then turns westerly and flows along the north side of the railroad, where it receives flows from Chester Brook before turning and flowing beneath the railroad, thence flowing in twin 6 x 10-foot concrete conduits to its discharge into the Charles River just downstream of the intersection of Newton and River Streets.

Cranberry Brook is the only named brook south of the Charles River which enters same just upstream of Watertown boundary.

The City of Waltham has a temperature climate similar to Boston, with average monthly temperatures ranging from 29 ° F in January to 74°F in July. Precipitation is fairly consistent at three to four inches per month with some snowfall during the winter months.

1.6 RECEIVING WATERS AND IMPAIRMENTS

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

Table 1-1. Impaired Waters
Waltham, Massachusetts

Water Body Name	Segment ID	Category	Impairment(s)	Associated Approved TMDL
Hardys Pond	MA72045	4a	• Non-Native Aquatic Plants • Excess Algal Growth • Phosphorus (Total) • Turbidity	40319 40319 40319
Unnamed Tributary	MA72-27	4c	• Low Flow Alterations • Other Flow Regime Alterations	
Beaver Brook	MA72-28	5	• Escherichia coli • Excess Algal Growth • Organic Enrichment (Sewage) Biological Indicators • Oxygen, Dissolved • Phosphorus (Total) • Sedimentation/Siltation • Taste and Odor • Turbidity	32379 40317 40317 40317 40317 40317
Charles River	MA72-07	5	• Eurasian Water Milfoil, Myriophyllum spicatum • Fish-Passage Barrier • Non-Native Aquatic Plants • Other Flow Regime Alterations • DDT • Escherichia coli • Fishes Bioassessments • Nutrient/Eutrophication Biological Indicators • PCB in Fish Tissue • Phosphorus (Total)	32370 40317 40317

Category 4a Waters – impaired water bodies with a completed Total Maximum Daily Load (TMDL).
Category 4c Waters – impaired water bodies where the impairment is not caused by a pollutant. No TMDL required.
Category 5 Waters – impaired water bodies that require a TMDL.
"Approved TMDLs" are those that have been approved by EPA as of the date of issuance of the 2016 MS4 Permit.

In order to comply with the 2016 MS4 Permit Appendix H Parts II and III, the City of Waltham must implement the illicit discharge program. Catchments draining to any water body impaired for phosphorus (Part II) and/or impaired for bacteria or pathogens (Part III) shall be designated either Problem Catchments or HIGH priority in implementation of the IDDE program.

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1.7 IDDE PROGRAM GOALS, FRAMEWORK, AND TIMELINE

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

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

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

Figure 1-1. IDDE Investigation Procedure Framework

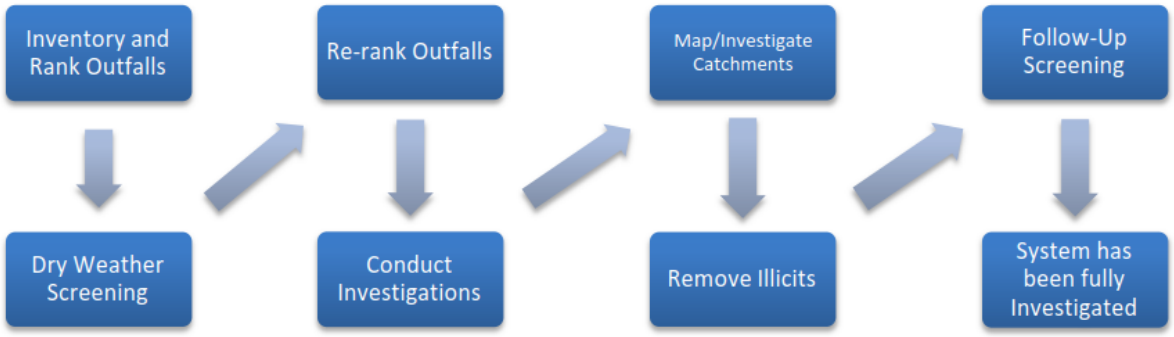

Table 1-2. IDDE Program Implementation Timeline

IDDE Program Requirement	Completion Date from Effective Date of Permit					
	1 Year	1.5 Years	2 Years	3 Years	7 Years	10 Years
Written IDDE Program Plan	X					
SSO Inventory	X					
Written Catchment Investigation Procedure		X				
Phase I Mapping			X			
Phase II Mapping						X
IDDE Regulatory Mechanism or By-law (if not already in place)				X		
Dry Weather Outfall Screening				X		

IDDE Program Requirement	Completion Date from Effective Date of Permit					
	1 Year	1.5 Years	2 Years	3 Years	7 Years	10 Years
Follow-up Ranking of Outfalls and Interconnections				***X***		
Catchment Investigations – Problem Outfalls					***X***	
Catchment Investigations – all Problem, High and Low Priority Outfalls						***X***

1.8 WORK COMPLETED TO DATE

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

The City of Waltham has completed the following IDDE program activities consistent with the 2003 MS4 Permit requirements:

- Developed a map of outfalls and receiving waters
- Adopted an IDDE bylaw or regulatory mechanism
- Developed procedures for locating illicit discharges (i.e., visual screening of outfalls for dry weather discharges, dye or smoke testing)
- Developed procedures for locating the source of the discharge
- Developed procedures for removal of the source of an illicit discharge
- Developed procedures for documenting actions and evaluating impacts on the storm sewer system subsequent to removal

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

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

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2 Authority and Statement of IDDE Responsibilities

2.1 LEGAL AUTHORITY

The City of Waltham has adopted a Chapter 25, Article II: Illicit Discharges to Storm Drainage System (June 23, 2008). A copy of the Illicit Discharges to Storm Drainage System bylaw is provided in **Appendix A**. The Illicit Discharges to Storm Drainage System provides the City of Waltham with adequate legal authority to:

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

The City of Waltham will review its current Illicit Discharges to Storm Drainage System bylaw and related land use regulations and policies for consistency with the 2016 MS4 Permit.

2.2 STATEMENT OF RESPONSIBILITIES

The Engineering Department is the lead municipal agency or department responsible for implementing the IDDE program pursuant to the provisions of the Illicit Discharges to Storm Drainage System. Other agencies or departments with responsibility for aspects of the program include:

- Engineering Department
- Public Works Department
- Building Department
- Health Department
- Conservation Commission
- Planning Department
- City Council
- City Mayor

3 Stormwater System Mapping

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

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

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3.1 PHASE I MAPPING

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

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

The City of Waltham has completed the following updates to its stormwater mapping to meet the Phase I requirements:

- Outfalls and receiving waters *(updated 2018)*
- Interconnections with other MS4s and other storm sewer systems
- Water bodies identified by name and indication of all use impairments as identified on the most recent EPA approved Massachusetts Integrated List of Waters report *(taken from USGS/MassDEP Hydrography data updated April 2017)*
- Initial catchment delineations. Any available system data and topographic information may be used to produce initial catchment delineations *(attached as Appendix C and further developed in Section 5.1)*

The City of Waltham will update its stormwater mapping by July 1, 2020 to include the remaining Phase I information:

- Open channel conveyances (swales, ditches, etc.)
- Municipally owned stormwater treatment structures

The following table contains information regarding the total number of drainage structures mapped within the MS4 Urbanized Area in Waltham. It has been compiled using data collected by the City.

Table 3-1. Summary of Mapped MS4 Structures

Structure Type	Number of Structures
Outfalls/Outlets	706
Inlets	211
Culverts	240
Catch Basins	7899
Drain Manholes	5949

3.2 PHASE II MAPPING

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

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

The City of Waltham has completed the following updates to its stormwater mapping to meet the Phase II requirements:

- Outfall spatial location (latitude and longitude with a minimum accuracy of +/-30 feet)
- Pipes
- Manholes
- Catch basins
- Municipal Sanitary Sewer system
- Municipal Combined Sewer system.

The City of Waltham will update its stormwater mapping by July 1, 2028 to include the remaining Phase II information.

3.3 ADDITIONAL RECOMMENDED MAPPING ELEMENTS

Although not a requirement of the 2016 MS4 Permit, the City of Waltham will consider the following recommended elements in its storm system mapping:

- Storm sewer material, size (pipe diameter), age
- Sanitary sewer system material, size (pipe diameter), age (if/when applicable)
- Privately owned stormwater treatment structures
- Area where the permittee's MS4 has received or could receive flow from septic system discharges
- Seasonal high water table elevations impacting sanitary alignments
- Topography
- Orthophotography
- Alignments, dates and representation of work completed of past illicit discharge investigations
- Locations of suspected confirmed and corrected illicit discharges with dates and flow estimates.

4 Sanitary Sewer Overflows (SSOs)

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

The City of Waltham has completed an inventory of SSOs that have discharged to the MS4 within the five (5) years prior to the effective date of the 2016 MS4 Permit, based on review of available documentation pertaining to SSOs. The inventory included all SSOs that occurred during wet or dry weather resulting from inadequate conveyance capacities or where interconnectivity of the storm and sanitary sewer infrastructure allows for transfer of flow between systems. **Table 4-1** provided below decribes all known SSOs between July 2014 and June 2019.

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

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

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Table 4-1. SSO Inventory
Waltham, Massachusetts
Revision Date: June 2019

Quantity in gallons	Cause	Occurence Date	Reporting Date	Street Location	Street Location	Time Noticed	Report By	Total(s)
10,000-50,000	Insufficient Capacity p.s.	12/10/14	12/30/14	Trapelo Road	1493-1531	1:21 PM	GS	1
300	Blockage	06/03/14	06/03/14	Totten Pond Road	511	11:30 AM	GS	2
<150	Contractor Hit Sewer Line	03/28/14	03/28/14	Totten Pond Road	455	11:46 AM	GS	3
<200	Gravel Blockage from Repair 3/28	03/31/14		Totten Pond Road @ Craig Lane		9:14 AM	EJ	4
<250	Blockage	12/16/14	12/16/14	South St @ Charles River Road		8:19 AM	GS	5
<50	Blockage	03/24/14	03/24/14	South St @ Charles River Road #713		9:17 AM	EJ	6
1,000	Offset Joint - Dig Repaired	09/15/14	09/15/14	South Street	225	7:08 AM	GS	7
>1,000	Roots, Offset Joints Replaced Sewer Main to Fix	03/21/14		Rockridge Road	63	8:00 PM	SAC	8
<200	Blockage	03/03/14	03/03/14	Rich St @ intersection w/ Columbus Ave		9:45 AM	EJ	9
<100	Manhole Defect Moved to Daily Check	09/18/14	09/19/14	Rich Street	73-75	11:57 AM	GS	10
400	Grease	06/03/14	06/03/14	Prospect Hill Lane		10:20 AM	GS	11
<500	Blockage	02/13/14	02/13/14	Prospect Ave	15	8:25 AM	EJ	12
<50*	Grease	04/01/14	04/01/14	Main St (KFC)	499-501	4:25 PM	EJ	13
<100	Paper & Solids	12/28/14	12/30/14	Lexington St - Lexington Terrace Apts		1:21 PM	GS	14
50-100,00	I/I	12/09/14	12/10/14	Lexington St @ Lake St		10;39 AM	GS	15
<50	Blockage	04/22/14	04/22/14	Keach Street	1st SMH	2:05 PM	EJ	16
<200	Blockage	03/31/14	04/01/14	Graymore Road	39	4:00 PM	SAC	17
<50	Grease	05/26/14	05/26/14	Gorham Street	33-35	12:29 PM	GS	18
<100	Blockage	06/21/14	06/21/14	Gilman Road	rear 21	12:43 PM	GS	19
<75	Blockage	05/03/14	05/05/14	Forest St	385 Veteran's Field	3:40 PM	GS	20
200	Grease	12/18/14	12/18/14	Charles St @ Williams St		11:05 AM	EJ	21
<50	Blockage	06/08/14	06/08/14	Charles Street	257	12:45 PM	EJ	**22**
Quantity in gallons	**Cause**	**Occurance Date**	**Reporting Date**	**Street Location**	**Street Location**	**Time Noticed**	**Report By**	**Total(s)**
25	Brick in Invert	01/02/15	01/05/15	Parkview Road	81	9:30 AM	GS	1

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< 100	Paper(s)	02/06/15	02/11/15	Winter Street	First Avenue	10:17 AM	GS	2
30-50	Unknown	02/18/15	02/24/15	Wamsutta Avenue	25	8:19 AM	GS	3
< 500	Unknown	02/23/15	02/24/15	Prospect Hill Road	Prentice Street	8:00 AM	EJ	4
< 50	Unknown	02/23/15	02/24/15	Totten Pond Road	455	11:00 AM	EJ	5
< 50	Paper/Rags	03/02/15	03/05/15	Totten Pond Road	455	9:45 AM	GS	6
< 200	Unknown	03/10/15	03/12/15	Prospect Hill Road	Prentice Street	7:30 AM	EJ	7
6,300	Root Intrusion	03/10/15	03/12/15	Trapelo Road	1631	9:00 AM	GS	8
< 50	Unknown	03/11/15	03/12/15	Lexington Street	Lake Street	8:30 AM	EJ	9
100	Unknown	03/17/15	03/19/15	Prospect Hill Road	Elson Road	12:00 AM	EJ	10
< 20	Unknown	03/18/15	03/19/15	Chesterbrook Road	3	8:45 AM	EJ	11
< 750	Grease	03/26/15	04/02/15	Prospect Hill Avenue	Columbus Avenue	11:00 AM	GS	12
<100	Unknown	04/20/15	04/24/15	Trapelo Road	1393	12:09 AM	GS	13
<200	Unknown	04/22/15	04/24/15	Hickory Drive	63	2:58 PM	GS	14
100	Solids	04/29/15	05/01/15	South Street	Charlesbank Way	10:18 AM	GS	15
<1200	Grease	07/01/15	07/06/15	Totten Pond Road	477/380 Winter	No Time Noted	GS	16
<50,000	Rain Event	09/30/15	09/30/15	Trapelo Road	1531-Pump St.	11:44 AM	GS	17
150,000	Grease	11/02/15	11/05/15	Prospect St.-203	Mt. Feake-South St	4:30 PM	SC	18
None Reported	Grease	11/24/15	11/24/15	South Street	Brandeis-Ctr for Studies	8:00 AM	EJ	**19**
Quantity in gallons	**Cause**	**Occurance Date**	**Reporting Date**	**Street Location**	**Street Location**	**Time Noticed**	**Report By**	**Total(s)**
1200	Root Intrusion	03/16/16	03/17/16	Rockridge Road-67	Sewer Outlet	3:30 PM	EJ	1
<75	Blockage	03/22/16	03/22/16	School Street	Liberty Street	7:30 AM	EJ	2
5	Blockage	04/14/16	04/15/16	Bacon Street	No. 322	7:30 AM	EJ	3
1.5 gal.	Blockage	07/07/16	07/07/16	Main Street	No. 1440	10:45 AM	GS	4
300-400 gal.	Blockage	08/31/16	08/31/16	South Street	No. 218	8:30 AM	EJ	5
<500	Blockage	10/10/16	10/11/16	South Street	Highland Street	7:00 AM	EJ	6
<150	Blockage	11/08/16	11/10/16	Winter Street	First Avenue	8:30 AM	GS	7
<100	Blockage	11/15/16	11/16/16	South Street	Shakespeare Rd	10:08 AM	EJ	8

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<300	Blockage	11/18/19	11/21/16	South Street	Up from No. 217	1:00 PM	GS	9
<100	Blockage	11/22/16	11/22/16	Totten Pond Road	No. 440	11:50 AM	EJ	**10**
Quantity in gallons	**Cause**	**Occurance Date**	**Reporting Date**	**Street Location**	**Street Location**	**Time Noticed**	**Report By**	**Total(s)**
<50	Blockage	01/03/17	01/03/16	South Street	Charles River Rd.	9:00 AM	EJ	1
<150	Blockage	01/14/17	01/17/17	Trapelo Road	Forest Street	9:30 AM	EJ	2
300	Blockage	04/07/17	04/07/17	Easement Behind 1393 Trapelo Rd		10:00 AM	EJ	3
<150	Blockage	05/17/17	05/18/17	South Street @	Shakespeare Rd	4:00 PM	GS	4
<100	Grease	06/13/17	06/13/17	Cherry St @	Crescent St	8:39 AM	EJ	5
<50	Blockage	06/13/17	06/13/17	Easement 120 Totten Pond Rd		10:30 AM	EJ	6
<250	Root Intrusion	08/30/17	08/30/17	Winter Street @ Cedarcroft and Smart		12:25 PM	EJ	7
300	Blockage	12/24/17	12/26/17	Propect Hill Ave @ Prospect Hill Rd		4:30 PM	IM	**8**
*	*	*	*	*	*	*	*	*
6000	Grease	02/03/18	02/03/18	Totten Pond Rd	295	6:00 PM	GS	1
3800	Blockage	03/18/18	03/19/18	Totten Pond Rd	295	12:45 PM	GS	2
10000	Blockage	03/23/18	03/26/18	Prospect Hill Ave @ Prospect Hill Rd		6:30 PM	GS	3
1000	Grease	05/27/18	05/28/18	Keach St		1:30 PM	GS	4
600	Blockage	06/10/18	06/11/18	Prospect Hill Ave @ Columbus Ave		12:15 PM	GS	5
1500	Blockage	07/16/18	07/16/18	Prospect Hill Ave @ Prospect Hill Rd		2:10 PM	GS	6
225	Roots from upstream Root Control	09/28/18	10/01/18	Easement	1088 Trapelo	2:30 PM	GS	7
2300	Paper build up in invert	09/28/18	10/01/18	Easement	1393 Trapelo	2:00 PM	GS	8
3100	Paper in invert	10/06/18	10/06/18	15 Prospect Hill Ave		11:00 AM	GS	**9**
Quantity in gallons	**Cause**	**Occurance Date**	**Reporting Date**	**Street Location**	**Street Location**	**Time Noticed**	**Report By**	**Total(s)**
150	Paper in invert	03/07/19	03/07/19	Intersection First Ave & Winter St		9:30 AM	GS	**1**

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5 Assessment and Priority Ranking of Outfalls

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

5.1 OUTFALL CATCHMENT DELINEATIONS

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

5.2 OUTFALL AND INTERCONNECTION INVENTORY AND INITIAL RANKING

The Engineering Department will complete an initial outfall and interconnection inventory and priority ranking to assess illicit discharge potential based on existing information. The initial inventory and ranking will be completed within one (1) year from the effective date of the permit. An updated inventory and ranking will be provided in each annual report thereafter. The inventory will be updated annually to include data collected in connection with dry weather screening and other relevant inspections.

The outfall and interconnection inventory will identify each outfall and interconnection discharging from the MS4, record its location and condition, and provide a framework for tracking inspections, screenings and other IDDE program activities.

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

1. **Problem Outfalls**: Outfalls/interconnections with known or suspected contributions of illicit discharges based on existing information shall be designated as Problem Outfalls. This shall include any outfalls/interconnections where previous screening indicates likely sewer input. Likely sewer input indicators are any of the following:
    - Olfactory or visual evidence of sewage,
    - Ammonia ≥ 0.5 mg/L, surfactants ≥ 0.25 mg/L, and bacteria levels greater than the water quality criteria applicable to the receiving water, or
    - Ammonia ≥ 0.5 mg/L, surfactants ≥ 0.25 mg/L, and detectable levels of chlorine.

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

2. **High Priority Outfalls**: Outfalls/interconnections that have not been classified as Problem Outfalls and that are:

    - Discharging to an area of concern to public health due to proximity of public beaches, recreational areas, drinking water supplies or shellfish beds
    - Determined by the permittee as high priority based on the characteristics listed below or other available information.

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

4. **Excluded outfalls**: Outfalls/interconnections with no potential for illicit discharges may be excluded from the IDDE program. This category is limited to roadway drainage in undeveloped areas with no dwellings and no sanitary sewers; drainage for athletic fields, parks or undeveloped green space and associated parking without services; cross-country drainage alignments (that neither cross nor are in proximity to sanitary sewer alignments) through undeveloped land.

Outfalls will be ranked into the above priority categories (<u>except for excluded outfalls, which may be excluded from the IDDE program</u>) based on the following characteristics of the defined initial catchment areas, where information is available. Additional relevant characteristics, including location-specific characteristics, may be considered but must be documented in this IDDE Plan. The initial ranking is based upon response provided by the City of Waltham in May 2019.

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

- **Past discharge complaints and reports.**

- **Poor receiving water quality** – the following guidelines are recommended to identify waters as having a high illicit discharge potential:
    - Exceeding water quality standards for bacteria
    - Ammonia levels above 0.5 mg/l
    - Surfactants levels greater than or equal to 0.25 mg/l

- **Density of generating sites** – Generating sites are those places, including institutional, municipal, commercial, or industrial sites, with a potential to generate pollutants that could contribute to illicit discharges. Examples of these sites include, but are not limited to, car dealers; car washes; gas stations; garden centers; and industrial manufacturing areas.

- **Age of development and infrastructure** – Industrial areas greater than 40 years old and areas where the sanitary sewer system is more than 40 years old will probably have a high illicit discharge potential. Developments 20 years or younger will probably have a low illicit discharge potential.

- **Sewer conversion** – Contributing catchment areas that were once serviced by septic systems, but have been converted to sewer connections may have a high illicit discharge potential.

- **Historic combined sewer systems** – Contributing areas that were once serviced by a combined sewer system, but have been separated may have a high illicit discharge potential.

- **Surrounding density of aging septic systems** – Septic systems thirty years or older in residential land use areas are prone to have failures and may have a high illicit discharge potential.

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- **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.

Appendix C contains the initial outfall priority ranking matrix and catchment delineation mapping completed for the City. Based on this initial ranking, the highest ranking catchments are associated with the Charles River and Beaver Brook.

6 Dry Weather Outfall Screening and Sampling

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

6.1 WEATHER CONDITIONS

Dry weather outfall screening and sampling may occur when no more than 0.1 inches of rainfall has occurred in the previous 24-hour period and no significant snow melt is occurring. For purposes of determining dry weather conditions, program staff will use precipitation data from the North Waltham Weather Station (Station ID KMAWALTH41) If the North Waltham Weather Station is not available or not reporting current weather data, then the Waltham MA Weather Station (Station ID KMAWALTHAM26) will be used as a back-up.

6.2 DRY WEATHER SCREENING/SAMPLING PROCEDURE

6.2.1 General Procedure

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

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

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5. If no flow is observed, but evidence of illicit flow exists (illicit discharges are often intermittent or transitory), revisit the outfall during dry weather within one week of the initial observation, if practicable, to perform a second dry weather screening and sample any observed flow. Other techniques can be used to detect intermittent or transitory flows including conducting inspections during evenings or weekends and using optical brighteners.
6. Input results from screening and sampling into spreadsheet/database. Include pertinent information in the outfall/interconnection inventory and priority ranking.
7. Include all screening data in the annual report.

Previous outfall screening/sampling conducted under the 2003 MS4 Permit may be used to satisfy the dry weather outfall/screening requirements of the 2016 MS4 Permit only if the previous screening and sampling was substantially equivalent to that required by the 2016 MS4 Permit, including the list of analytes outlined in Section 2.3.4.7.b.iii.4 of the 2016 permit.

6.2.2 Field Equipment

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

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

Equipment	Use/Notes
Clipboard	For organization of field sheets and writing surface
Field Sheets	Field sheets for both dry weather inspection and Dry weather sampling should be available with extras
Chain of Custody Forms	To ensure proper handling of all samples
Pens/Pencils/Permanent Markers	For proper labeling
Nitrile Gloves	To protect the sampler as well as the sample from contamination
Flashlight/headlamp w/batteries	For looking in outfalls or manholes, helpful in early mornings as well
Cooler with Ice	For transporting samples to the laboratory
Digital Camera	For documenting field conditions at time of inspection
Personal Protective Equipment (PPE)	Reflective vest, Safety glasses and boots at a minimum
GPS Receiver	For taking spatial location data
Water Quality Sonde	If needed, for sampling conductivity, temperature, pH
Water Quality Meter	Hand held meter, if available, for testing for various water quality parameters such as ammonia, surfactants and chlorine
Test Kits	Have extra kits on hand to sample more outfalls than are anticipated to be screened in a single day
Label Tape	For labeling sample containers
Sample Containers	Make sure all sample containers are clean. Keep extra sample containers on hand at all times. Make sure there are proper sample containers for what is being sampled for (i.e., bacteria requires sterile containers).
Pry Bar or Pick	For opening catch basins and manholes when necessary
Sandbags	For damming low flows in order to take samples

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Equipment	Use/Notes
Small Mallet or Hammer	Helping to free stuck manhole and catch basin covers
Utility Knife	Multiple uses
Measuring Tape	Measuring distances and depth of flow
Safety Cones	Safety
Hand Sanitizer	Disinfectant/decontaminant
Zip Ties/Duct Tape	For making field repairs
Rubber Boots/Waders	For accessing shallow streams/areas
Sampling Pole/Dipper/Sampling Cage	For accessing hard to reach outfalls and manholes

6.2.3 Sample Collection and Analysis

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

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

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

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

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Table 6-2. Field Screening Parameters and Analysis Methods

Analyte or Parameter	Instrumentation (Portable Meter)	Field Test Kit
Ammonia	CHEMetrics™ V-2000 Colorimeter Hach™ DR/890 Colorimeter Hach™ Pocket Colorimeter™ II	CHEMetrics™ K-1410 CHEMetrics™ K-1510 (series) Hach™ NI-SA Hach™ Ammonia Test Strips
Surfactants (Detergents)	CHEMetrics™ I-2017	CHEMetrics™ K-9400 and K-9404 Hach™ DE-2
Chlorine	CHEMetrics™ V-2000, K-2513 Hach™ Pocket Colorimeter™ II	NA
Conductivity	CHEMetrics™ I-1200 YSI Pro30 YSI EC300A Oakton 450	NA
Temperature	YSI Pro30 YSI EC300A Oakton 450	NA
Salinity	YSI Pro30 YSI EC300A Oakton 450	NA
Dissolved Oxygen	YSI Pro30 YSI EC300A Oakton 450	NA
Turbidity	Hach™ 2100Q Portable Turbidimeter Oakton CON 150	NA

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

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

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

Analyte or Parameter	Analytical Method	Detection Limit	Max. Hold Time	Preservative
Ammonia	**EPA**: 350.2, **SM**: 4500-NH3C	0.05 mg/L	28 days	Cool ≤6°C, H_2SO_4 to pH <2, No preservative required if analyzed immediately

Analyte or Parameter	Analytical Method	Detection Limit	Max. Hold Time	Preservative
Surfactants	**SM**: 5540-C	0.01 mg/L	48 hours	Cool ≤6°C
Chlorine	**SM**: 4500-Cl G	0.02 mg/L	Analyze within 15 minutes	None Required
Temperature	**SM**: 2550B	*NA*	Immediate	None Required
Specific Conductance	**EPA**: 120.1, **SM**: 2510B	0.2 µs/cm	28 days	Cool ≤6°C
Salinity	**SM**: 2520	-	28 days	Cool ≤6°C
Biochemical Oxygen Demand (BOD)	**EPA:** 360.1	**EPA:** 3 mg/L	48 hours	Cool ≤6°C
Dissolved Oxygen	**EPA:** 365.1	**EPA:** 1 mg/L	Immediate	Cool ≤6°C
Turbidity	**EPA:** 160.2	**EPA:** 1 NTU	48 hours	Cool ≤6°C
Indicator Bacteria: *E.coli* *Enterococcus* *Fecal Coliform*	*E.coli* **EPA**: 1603 **SM**: 9221B, 9221F , 9223 B **Other**: Colilert ®, Colilert-18® *Enterococcus* **EPA**: 1600 **SM**: 9230 C **Other**: Enterolert® *Fecal Coliform* **EPA:** 1680	*E.coli* **EPA**: 1 cfu/100mL **SM**: 2 MPN/100mL **Other**: 1 MPN/100mL *Enterococcus* **EPA**: 1 cfu/100mL **SM**: 1 MPN/100mL **Other**: 1 MPN/100mL *Fecal Coliform* **EPA:** 1 ctu	8 hours	Cool ≤10°C, 0.0008% $Na_2S_2O_3$
Total Phosphorus	**EPA**: Manual-365.3, Automated Ascorbic acid digestion-365.1 Rev. 2, ICP/AES4-200.7 Rev. 4.4 **SM**: 4500-P E-F	**EPA**: 0.01 mg/L **SM** : 0.01 mg/L	28 days	Cool ≤6°C, H_2SO_4 to pH <2
Total Nitrogen (Ammonia + Nitrate/Nitrite, methods are for Nitrate-Nitrite and need to be combined with Ammonia listed above.)	**EPA**: Cadmium reduction (automated)-353.2 Rev. 2.0, **SM**: 4500-NO_3 E-F	**EPA**: 0.05 mg/L **SM** : 0.05 mg/L	28 days	Cool ≤6°C, H_2SO_4 to pH <2

SM = Standard Methods

6.3 INTERPRETING OUTFALL SAMPLING RESULTS

Outfall analytical data from dry weather sampling can be used to help identify the major type or source of discharge. **Table 6-4** shows values identified by the U.S. EPA and the Center for Watershed Protection

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as typical screening values for select parameters. These represent the typical concentration (or value) of each parameter expected to be found in stormwater. Screening values that exceed these benchmarks may be indicative of pollution and/or illicit discharges.

Table 6-4. Benchmark Field Measurements for Select Parameters

Analyte or Parameter	Benchmark
Ammonia	>0.5 mg/L
Conductivity	>2,000 µS/cm
Surfactants	>0.25 mg/L
Chlorine	>0.02 mg/L (detectable levels per the 2016 MS4 Permit)
Indicator Bacteria[1]: *E.coli* *Enterococcus*	*E.coli*: the geometric mean of the five most recent samples taken during the same bathing season shall not exceed 126 colonies per 100 ml and no single sample taken during the bathing season shall exceed 235 colonies per 100 ml *Enterococcus:* the geometric mean of the five most recent samples taken during the same bathing season shall not exceed 33 colonies per 100 ml and no single sample taken during the bathing season shall exceed 61 colonies per 100 ml

6.4 FOLLOW-UP RANKING OF OUTFALLS AND INTERCONNECTIONS

The City of Waltham will update and re-prioritize the initial outfall and interconnection rankings based on information gathered during dry weather screening. The rankings will be updated periodically as dry weather screening information becomes available, but will be completed within three (3) years of the effective date of the permit (July 1, 2021).

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

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

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

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7 Catchment Investigations

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

7.1 SYSTEM VULNERABILITY FACTORS

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

- Plans related to the construction of the drainage network
- Plans related to the construction of the sewer network
- Prior work on storm drains or sewer lines
- Board of Health or other municipal data on septic systems
- Complaint records related to SSOs
- Septic system breakouts.

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

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

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infrastructure, or other vulnerability factors identified through Inflow/Infiltration Analyses, Sanitary Sewer Evaluation Surveys, or other infrastructure investigations
- Sewer pump/lift stations, siphons, or known sanitary sewer restrictions where power/equipment failures or blockages could readily result in SSOs
- Any sanitary sewer infrastructure greater than 40 years old.

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

7.2 DRY WEATHER MANHOLE INSPECTIONS

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

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

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

- **Junction Manhole** is a manhole or structure with two or more inlets accepting flow from two or more MS4 alignments. Manholes with inlets solely from private storm drains, individual catch basins, or both are not considered junction manholes for these purposes.

- **Key Junction Manholes** are those junction manholes that can represent one or more junction manholes without compromising adequate implementation of the illicit discharge program. Adequate implementation of the illicit discharge program would not be compromised if the exclusion of a particular junction manhole as a key junction manhole would not affect the permittee's ability to determine the possible presence of an upstream illicit discharge. A permittee may exclude a junction manhole located upstream from another located in the immediate vicinity or that is serving a drainage alignment with no potential for illicit connections.

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

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

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

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

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

Inspection of key junction manholes will proceed as follows:

1. Manholes will be opened and inspected for visual and olfactory evidence of illicit connections. A sample field inspection form is provided in **Appendix D**.

2. If flow is observed, a sample will be collected and analyzed at a minimum for ammonia, chlorine, and surfactants. Field kits can be used for these analyses. Sampling and analysis will be in accordance with procedures outlined in **Section 6**. Additional indicator sampling may assist in determining potential sources (e.g., bacteria for sanitary flows, conductivity to detect tidal backwater, etc.).

3. Where sampling results or visual or olfactory evidence indicate potential illicit discharges or SSOs, the area draining to the junction manhole will be flagged for further upstream manhole investigation and/or isolation and confirmation of sources.

4. Subsequent key junction manhole inspections will proceed until the location of suspected illicit discharges or SSOs can be isolated to a pipe segment between two manholes.

5. If no evidence of an illicit discharge is found, catchment investigations will be considered complete upon completion of key junction manhole sampling.

7.3 WET WEATHER OUTFALL SAMPLING

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

Outfalls will be inspected and sampled under wet weather conditions, to the extent necessary, to determine whether wet weather-induced high flows in sanitary sewers or high groundwater in areas served by septic systems result in discharges of sanitary flow to the MS4.

Wet weather outfall sampling will proceed as follows:

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

2. Wet weather sampling will occur during or after a storm event of sufficient depth or intensity to produce a stormwater discharge at the outfall. There is no specific rainfall amount that will trigger sampling, although minimum storm event intensities that are likely to trigger sanitary sewer

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interconnections are preferred. To the extent feasible, sampling should occur during the spring (March through June) when groundwater levels are relatively high.

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

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

7.4 SOURCE ISOLATION AND CONFIRMATION

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

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

These methods are described in the sections below. Instructions for these and other IDDE methods are provided in **Appendix F**.

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

7.4.1 Sandbagging

This technique can be particularly useful when attempting to isolate intermittent illicit discharges or those with very little perceptible flow. The technique involves placing sandbags or similar barriers (e.g., caulking, weirs/plates, or other temporary barriers) within outlets to manholes to form a temporary dam that collects any intermittent flows that may occur. Sandbags are typically left in place for 48 hours, and should only be installed when dry weather is forecast. If flow has collected behind the sandbags/barriers after 48 hours it can be assessed using visual observations or by sampling. If no flow collects behind the sandbag, the upstream pipe network can be ruled out as a source of the intermittent discharge. Finding appropriate durations of dry weather and the need for multiple trips to each manhole makes this method both time-consuming and somewhat limiting.

7.4.2 Smoke Testing

Smoke testing involves injecting non-toxic smoke into drain lines and noting the emergence of smoke from sanitary sewer vents in illegally connected buildings or from cracks and leaks in the system itself. Typically a smoke bomb or smoke generator is used to inject the smoke into the system at a catch basin

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or manhole and air is then forced through the system. Test personnel are place in areas where there are suspected illegal connections or cracks/leaks, noting any escape of smoke (indicating an illicit connection or damaged storm drain infrastructure). It is important when using this technique to make proper notifications to area residents and business owners as well as local police and fire departments.

If the initial test of the storm drain system is unsuccessful then a more thorough smoke-test of the sanitary sewer lines can also be performed. Unlike storm drain smoke tests, buildings that do not emit smoke during sanitary sewer smoke tests may have problem connections and may also have sewer gas venting inside, which is hazardous.

It should be noted that smoke may cause minor irritation of respiratory passages. Residents with respiratory conditions may need to be monitored or evacuated from the area of testing altogether to ensure safety during testing.

7.4.3 Dye Testing

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

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

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

7.4.4 CCTV/Video Inspection

Another method of source isolation involves the use of mobile video cameras that are guided remotely through stormwater drain lines to observe possible illicit discharges. IDDE program staff can review the videos and note any visible illicit discharges. While this tool is both effective and usually definitive, it can be costly and time consuming when compared to other source isolation techniques.

7.4.5 Optical Brightener Monitoring

Optical brighteners are fluorescent dyes that are used in detergents and paper products to enhance their appearance. The presence of optical brighteners in surface waters or dry weather discharges suggests there is a possible illicit discharge or insufficient removal through adsorption in nearby septic systems or wastewater treatment. Optical brightener monitoring can be done in two ways. The most common, and least expensive, methodology involves placing a cotton pad in a wire cage and securing it in a pipe, manhole, catch basin, or inlet to capture intermittent dry weather flows. The pad is retrieved at a later date and placed under UV light to determine the presence/absence of brighteners during the monitoring

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

7.4.6 IDDE Canines

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

7.5 ILLICIT DISCHARGE REMOVAL

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

- The location of the discharge and its source(s)
- A description of the discharge
- The method of discovery
- Date of discovery
- Date of elimination, mitigation or enforcement action OR planned corrective measures and a schedule for completing the illicit discharge removal
- Estimate of the volume of flow removed.

7.5.1 Confirmatory Outfall Screening

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

7.6 ONGOING SCREENING

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

8 Training

Annual IDDE training will be made available to all employees involved in the IDDE program. This training will at a minimum include information on how to identify illicit discharges and SSOs and may also include additional training specific to the functions of particular personnel and their function within the

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framework of the IDDE program. Training records will be maintained in **Appendix G**. The frequency and type of training will be included in the annual report.

9 Progress Reporting

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

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

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

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Appendix A

Legal Authority (IDDE Bylaw or Ordinance)

ARTICLE II
Illicit Discharges To Storm Drainage System

Sec. 25-16. Purpose. [Ord. No. 30917, 6-23-2008]

A. Increased and contaminated stormwater runoff is a major cause of impairment of water quality and flow into waterways; contamination of drinking water supplies; alteration or destruction of aquatic and wildlife habitat; and flooding.

B. Regulation of illicit connections and discharges to the municipal storm drainage system is necessary for the protection of the City's water bodies and groundwater and to safeguard the public health, safety, welfare and the environment.

C. The objectives of this article are:

(1) To prevent pollutants from entering the City's municipal separate storm sewer system (MS4);

(2) To prohibit illicit connections and unauthorized discharges to the MS4;

(3) To require the removal of all such illicit connections;

(4) To comply with state and federal statutes and regulations relating to stormwater discharges; and

(5) To establish the legal authority to ensure compliance with the provisions of this article through inspection, monitoring, and enforcement.

Sec. 25-17. Definitions. [Ord. No. 30917, 6-23-2008]

CFR — Code of Federal Regulations.

CLEAN WATER ACT — The Federal Water Pollution Control Act (33 U.S.C. § 1251 et seq.) as hereafter amended.

CMR — Code of Massachusetts Regulations.

DISCHARGE OF POLLUTANTS — The addition from any source of any pollutant or combination of pollutants into the municipal storm drainage system or into the waters of the United States or Commonwealth of Massachusetts from any source.

GROUNDWATER — Water beneath the surface of the ground.

ILLICIT CONNECTION — A surface or subsurface drain or conveyance which allows an illicit discharge into the municipal storm drainage system, including, without limitation, sewage, process

wastewater, or wash water and any connections from indoor drains, sinks, or toilets, regardless of whether said connection was previously allowed, permitted, or approved before the effective date of this article.

ILLICIT DISCHARGE — Direct or indirect discharge to the municipal storm drainage system that is not composed entirely of stormwater, except as exempted in § 25-23 of this article.

IMPERVIOUS SURFACE — Any material or structure on or above the ground that prevents water infiltrating the underlying soil. "Impervious surface" includes, without limitation, roads, paved parking lots, sidewalks and rooftops.

MUNICIPAL SEPARATE STORM SEWER SYSTEM (MS4) or MUNICIPAL STORM DRAINAGE SYSTEM — 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 City.

NATIONAL POLLUTANT DISCHARGE ELIMINATION SYSTEM (NPDES) STORMWATER DISCHARGE PERMIT — A permit issued by the United States Environmental Protection Agency or jointly with the Commonwealth of Massachusetts that authorizes the discharge of pollutants to waters of the United States.

NONSTORMWATER DISCHARGE — Discharge to the municipal storm drainage system not composed entirely of stormwater.

OWNER — A person with a legal or equitable interest in property.

PERSON — An individual, partnership, association, firm, company, trust, corporation, agency, authority, department or political subdivision of the Commonwealth of Massachusetts or the federal government, to the extent permitted by law, and any officer, employee, or agent of such person.

POLLUTANT — Any element or property of sewage, agricultural, industrial or commercial waste, runoff, leachate, heated effluent, or other matter, whether originating at a point or nonpoint source, that is or may be introduced into any sewage treatment works or waters of the Commonwealth of Massachusetts. Pollutants shall include, without limitation:

A. Paints, varnishes, and solvents;

B. Oil and other automotive fluids;

C. Nonhazardous liquid and solid wastes and yard wastes;

D. Refuse, rubbish, garbage, litter, or other discarded or abandoned objects, ordinances, accumulations and floatables;

E. Pesticides, herbicides, and fertilizers;

F. Hazardous materials and wastes; sewage, fecal coliform and pathogens;

G. Dissolved and particulate metals;

H. Animal wastes;

I. Rock, sand, salt, soils;

J. Construction wastes and residues; and

K. Noxious or offensive matter of any kind.

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.

STORMWATER — Stormwater runoff, snowmelt runoff and surface water runoff and drainage.

STORMWATER ENFORCEMENT AGENT — The Mayor shall designate the Stormwater Enforcement Agent(s) to enforce this article and notify the City Council of the designated agent(s).

SURFACE WATER DISCHARGE PERMIT — A permit issued by the Department of Environmental Protection (DEP) pursuant to 314 CMR 3.00 that authorizes the discharge of pollutants to waters of the Commonwealth of Massachusetts.

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, or welfare or to the environment. Toxic or hazardous materials include any synthetic organic chemical, petroleum product, heavy metal, radioactive or infectious waste, acid and alkali, and any substance defined as "toxic" or "hazardous" under MGL c. 21C and c. 21E and the regulations at 310 CMR 30.00 and 310 CMR 40.00 et seq.

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.

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 OF MASSACHUSETTS — All waters within the jurisdiction of the Commonwealth of Massachusetts, including, without limitation, rivers, streams, lakes, ponds, springs, impoundments, estuaries, wetlands, costal waters, and groundwater.

WETLANDS — Coastal and freshwater wetlands, including wet meadows, marshes, swamps, and bogs, as defined and determined pursuant to MGL c. 131, § 40, and 310 CMR 10.00 et seq.

Sec. 25-18. Applicability. [Ord. No. 30917, 6-23-2008]

This article shall apply to flows entering the municipal storm drainage system. The provisions of this article shall take precedence over any conflicting provisions of the General Ordinances.

Sec. 25-19. Authority. [Ord. No. 30917, 6-23-2008]

This article is adopted under the authority granted by the Home Rule Amendment of the Massachusetts Constitution and the Home Rule Procedures Act and pursuant to MGL c. 83, §§ 1, 10, and 16, as amended by St. 2004, c. 149, §§ 135 to 140, and the regulations of the federal Clean Water Act found at 40 CFR 122.34.

Sec. 25-20. Responsibility for administration. [Ord. No. 30917, 6-23-2008]

The Stormwater Enforcement Agent shall administer, implement and enforce this article and any rules and regulations adopted thereunder. Any powers granted to or duties imposed upon the Stormwater Enforcement Agent may be delegated in writing by the Stormwater Enforcement Agent to employees or agents of the Stormwater Enforcement Agent.

Sec. 25-21. Regulations. [Ord. No. 30917, 6-23-2008]

After public hearing and public notice, the Stormwater Enforcement Agent may promulgate rules and regulations to effectuate the purposes of this article. Failure by the Stormwater Enforcement Agent to promulgate such rules and regulations shall not have the effect of suspending or invalidating this article.

Sec. 25-22. Prohibited activities. [Ord. No. 30917, 6-23-2008]

A person is considered to be in violation of this article if he connects a line conveying sewage and/or wastewater to the municipal storm drain system or, once detected, allows such a connection to continue.

A. Illicit discharges. No person shall dump, discharge, cause or allow to be discharged any pollutant or nonstormwater discharge into the municipal separate storm sewer system (MS4), into a watercourse, or into the waters of the Commonwealth of Massachusetts.

B. Illicit connections. No person shall construct, use, allow, maintain or continue any illicit connection to the municipal storm drainage system, regardless of whether the connection was permissible under applicable law, regulation or custom at the time of connection.

C. Obstruction of municipal storm drainage system. No person shall obstruct or interfere with the normal flow of stormwater into or out of the municipal storm drainage system without prior written approval from the Stormwater Enforcement Agent.

Sec. 25-23. Exemptions. [Ord. No. 30917, 6-23-2008]

The following nonstormwater discharges or flows are exempt from the prohibition of nonstormwaters, provided that the source is not a significant contributor of a pollutant to the municipal storm drainage system:

A. Municipal water line flushing;

B. Uncontaminated groundwater or uncontaminated pumped groundwater;

C. Water from exterior foundation drains, footing drains, crawl space pumps or airconditioning condensation;

D. Water from sump pumps and other pumps that remove floodwaters from basements, except that this provision excludes water contaminated by sewage;

E. Water discharge from irrigation or watering of lawns, trees, landscaping and gardens;

F. Water from property management activities, including washing walkways, patios, house siding, windows or similar property management activities, provided that no detergents are used in conducting such activities;

G. Discharge from dechlorinated swimming pool water (less than one ppm of chlorine or bromine), provided that the pool is not drained in a manner designed to flood or otherwise adversely affect neighboring or downstream properties;

H. Discharge from washing vehicles garaged at a single-family or two-family dwelling;

I. Consolidated public works ice, snow and street sweeping management operations;

J. Flow resulting from fire-fighting activities;

K. Dye testing, provided that written notification is given to the Engineering Department two business days prior to the time of the test;

L. Maintenance or replacement of existing landscaping, gardens or lawn areas;

M. Construction of fencing that will not substantially alter existing terrain or drainage patterns;

N. Construction of utilities other than drainage (gas, water, electric, telephone, etc.) which will not alter terrain or drainage patterns;

O. Projects that commenced prior to the effective date of this article, provided that they are completed within one year from such effective date;

P. Natural flow from riparian habitats and wetlands;

Q. Springs;

R. Diverted stream flow;

S. Rising groundwater;

T. Nonstormwater discharge permitted under an NPDES permit or a surface water discharge permit, waiver, or waste discharge order administered under the authority of the United States Environmental Protection Agency or the Department of Environmental Protection, provided that the discharge is in full compliance with the requirements of the permit, waiver, or order and applicable laws and regulations; and

U. Discharge for which advanced written approval is received from the Stormwater Enforcement Agent as necessary to protect public health, safety, welfare or the environment.

Sec. 25-24. Emergency suspension of municipal stormwater drain access. [Ord. No. 30917, 6-23-2008]

A. The Stormwater Enforcement Agent may suspend municipal storm drainage 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 the public health, safety, welfare or the environment.

B. No person shall reinstate municipal storm drain system access to premises terminated pursuant to this section without the prior inspection and approval of the Engineering Department. An unapproved reinstatement shall constitute a violation of this section.

C. In the event any person fails to comply with an emergency suspension order or reinstates access in violation of this section, the Stormwater Enforcement Agent may take all reasonable steps to prevent or minimize harm to the public health, safety, welfare or the environment.

Sec. 25-25. Notification of spills. [Ord. No. 30917, 6-23-2008]

Notwithstanding other requirements of local, state or federal law, as soon as a person responsible for a property or responsible for emergency response for a facility or operation has information of any known or suspected release of materials which may result in discharge of pollutants to the municipal drainage system or waters of the Commonwealth of Massachusetts or United States, said person shall take necessary steps to ensure the discovery, containment and cleanup of the release. In the event of such a release of hazardous materials, said person shall also immediately notify emergency response officials of the occurrence by calling E911. In the event of a release of nonhazardous materials, said person shall notify the Engineering Department in person, by phone or by facsimile no later than 4:30 p.m. of the next business day.

Sec. 25-26. Enforcement. [Ord. No. 30917, 6-23-2008]

The Stormwater Enforcement Agent or appointed designee shall enforce this article and any regulations promulgated hereunder and may issue and prosecute violation notices and enforcement orders and may pursue all civil and criminal remedies for violations hereunder.

A. Civil relief. The Stormwater Enforcement Agent may seek injunctive relief in a court of competent jurisdiction to restrain a person from continued violations of the provisions of this article and the regulations promulgated hereunder or of any notices, order or written approvals or to compel said person to abate or remediate the violation(s).

B. Orders.

(1) The Stormwater Enforcement Agent or an authorized agent of the Stormwater Enforcement Agent may issue a written order to enforce the provisions of this article or the regulations thereunder, which may include:

(a) Elimination of illicit connections or discharges to the MS4;

(b) Performance of monitoring, analyses, and reporting;

(c) That unlawful discharges, practices, or operations shall cease and desist; and

(d) Remediation of contamination in connection therewith.

(2) If the Stormwater Enforcement Agent determines that abatement or remediation of contamination is required, 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 City may, at its option, undertake such work, and expenses thereof shall be charged to the violator.

(3) Within 30 days after completion by the City of 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 City, including administrative costs. The violator or property owner may file a written protest objecting to the amount or basis of costs with the Stormwater Enforcement Agent within 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 30 days following a decision of the Stormwater Enforcement Agent 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 MGL c. 59, § 57, after the 31st day at which the costs first become due.

C. Criminal penalty. Any person who violates any provision of this article, regulation, order or permit issued thereunder shall be punished by a fine of not more than $200. Each day or part thereof that such violation occurs or continues shall constitute a separate offense.

D. Noncriminal disposition. In addition to the other means of enforcement otherwise available for violations of this article, violations may be penalized, as provided by MGL c. 40, § 21D, pursuant to the noncriminal disposition provisions of Section 1-13(b) of the General Ordinances.

E. Entry to perform duties under this article. To the extent permitted by state law, or if authorized by the owner or other party in control of the property, the Stormwater Enforcement Agent, its agents, officers, and employees may enter upon privately owned property for the purpose of performing their duties under this article and associated regulations and may make or cause to be made such examinations, surveys or sampling as the Stormwater Enforcement Agent deems reasonably necessary.

F. Appeals. The decisions or orders of the Stormwater Enforcement Agent shall be final. Further relief shall be to a court of competent jurisdiction.

G. Remedies not exclusive. The remedies listed in this article are not exclusive of any other remedies available under any applicable federal, state or local law.

Sec. 25-27. Severability. [Ord. No. 30917, 6-23-2008]

The provisions of this article are hereby declared to be severable. If any provision, paragraph, sentence, or clause of this article or the application thereof to any person, establishment, or circumstances shall be held invalid, such invalidity shall not affect the other provisions or application of this article.

Sec. 25-28. Transitional provisions. [Ord. No. 30917, 6-23-2008]

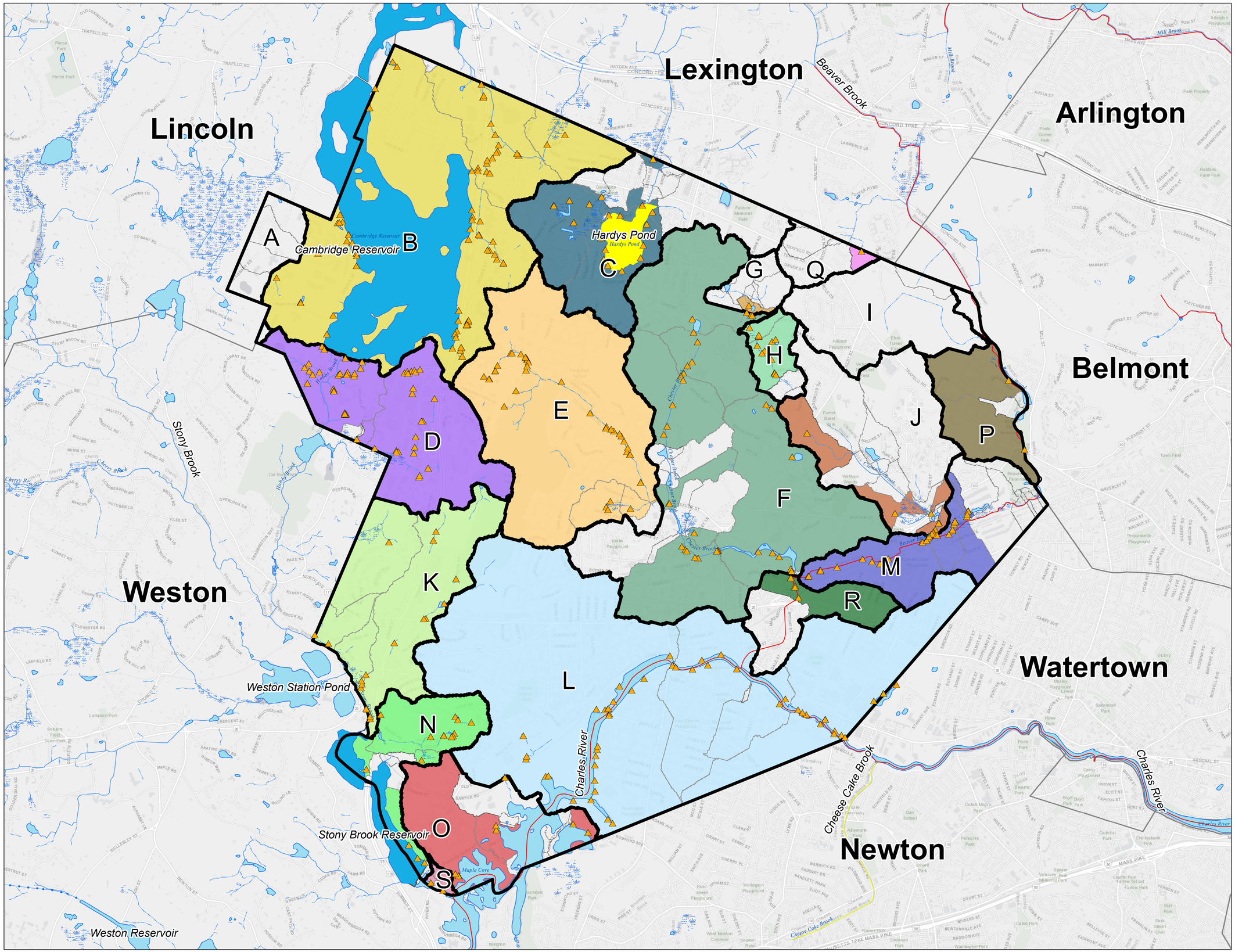
Residential property owners shall have 90 days from the effective date of this article to comply with its provisions, provided that good cause is shown for the failure to comply during that period.

Appendix B

Storm System Mapping

Appendix C

Catchment Delineation Mapping and Ranking Matrix



MS4 Outfalls (379)

Catchments (17 with MS4 OFs)

Subcatchments (55 with MS4 OFs)

2014 Integrated Waters

4A -Impaired - TMDL is completed

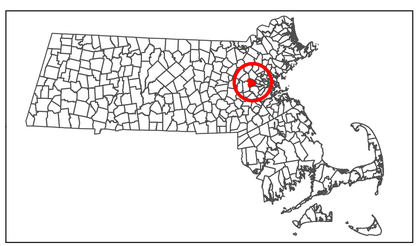
5 - Impaired - TMDL required

Stormwater Catchment Delineation
Waltham, Massachusetts
Spring 2019

Environmental Partners

N
W E
S

0 0.25 0.5 1 Miles



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				Catchment Scores				Outfall Scores									
Catchment ID	Subcatchment ID	Receiving Water	Outfall ID	Density of Generating Sites [4]	Age of Development/ Infrastructure [5]	Historic Combined Sewers or Septic? [6]	Aging Septic? [7]	Previous Screening Results Indicate Likely Sewer Input? [1]	Receiving Water Quality [3]	Discharging to Area of Concern to Public Health? [2]	Frequency of Past Discharge Complaints	Culverted Streams? [8]	Additional Characteristics	Catchment Score	OF Score	Total Score	Priority Ranking
Information Source				Land Use/GIS Maps, Aerial Photography	Land Use Information, Visual Observation	Town Staff, GIS Maps	Land Use, Town Staff	Outfall inspections and sample results	Impaired Waters List	GIS Maps, Town Staff	Town Staff	GIS and Storm System Maps	Other				
Scoring Criteria				*TBD High = 2 Medium = 1 Low = 0	High = 2 Medium = 1 Low = 0	Yes = 2 No = 0 No Data = 1	Yes = 2 No = 0 No Data = 1	Poor = 2 Fair = 1 Good = 0	Category 5 = 2 Category 4a = 1 Others = 0	Yes = 2 No = 0	Frequent = 2 Occasional = 1 None = 0	Yes = 2 TBD = 1 No = 0	TBD				
B	74	Cambridge Reservoir	OF-23	0	1	1	1	1	0	1	1	1	None	3	4	7	Low Priority
B	74	Cambridge Reservoir	OF-29	0	1	1	1	1	0	1	1	1	None	3	4	7	Low Priority
B	74	Cambridge Reservoir	OF-31	0	1	1	1	1	0	1	1	1	None	3	4	7	Low Priority
B	74	Cambridge Reservoir	OF-36	0	1	1	1	1	0	1	1	1	None	3	4	7	Low Priority
B	74	Cambridge Reservoir	OF-390	0	1	1	1	1	0	1	1	1	None	3	4	7	Low Priority
B	74	Cambridge Reservoir	OF-391	0	1	1	1	1	0	1	1	1	None	3	4	7	Low Priority
B	74	Cambridge Reservoir	OF-434	0	1	1	1	1	0	1	1	1	None	3	4	7	Low Priority
B	74	Cambridge Reservoir	OF-435	0	1	1	1	1	0	1	1	1	None	3	4	7	Low Priority
B	74	Cambridge Reservoir	OF-436	0	1	1	1	1	0	1	1	1	None	3	4	7	Low Priority
B	74	Cambridge Reservoir	OF-438	0	1	1	1	1	0	1	1	1	None	3	4	7	Low Priority
B	74	Cambridge Reservoir	OF-439	0	1	1	1	1	0	1	1	1	None	3	4	7	Low Priority
B	74	Cambridge Reservoir	OF-440	0	1	1	1	1	0	1	1	1	None	3	4	7	Low Priority
B	74	Cambridge Reservoir	OF-681	0	1	1	1	1	0	1	1	1	None	3	4	7	Low Priority
B	74	Cambridge Reservoir	OF-684	0	1	1	1	1	0	1	1	1	None	3	4	7	Low Priority
B	74	Cambridge Reservoir	OF-687	0	1	1	1	1	0	1	1	1	None	3	4	7	Low Priority
B	74	Cambridge Reservoir	OF-688	0	1	1	1	1	0	1	1	1	None	3	4	7	Low Priority
B	74	Cambridge Reservoir	OF-689	0	1	1	1	1	0	1	1	1	None	3	4	7	Low Priority
B	74	Cambridge Reservoir	OF-690	0	1	1	1	1	0	1	1	1	None	3	4	7	Low Priority
B	74	Cambridge Reservoir	OF-691	0	1	1	1	1	0	1	1	1	None	3	4	7	Low Priority
B	74	Cambridge Reservoir	OF-692	0	1	1	1	1	0	1	1	1	None	3	4	7	Low Priority
B	74	Cambridge Reservoir	OF-693	0	1	1	1	1	0	1	1	1	None	3	4	7	Low Priority
B	74	Cambridge Reservoir	OF-694	0	1	1	1	1	0	1	1	1	None	3	4	7	Low Priority
B	74	Cambridge Reservoir	OF-695	0	1	1	1	1	0	1	1	1	None	3	4	7	Low Priority
B	74	Cambridge Reservoir	OF-696	0	1	1	1	1	0	1	1	1	None	3	4	7	Low Priority
B	74	Cambridge Reservoir	OF-697	0	1	1	1	1	0	1	1	1	None	3	4	7	Low Priority
B	74	Cambridge Reservoir	OF-698	0	1	1	1	1	0	1	1	1	None	3	4	7	Low Priority
B	74	Cambridge Reservoir	OF-532	0	1	1	1	1	0	1	1	1	None	3	4	7	Low Priority
B	74	Cambridge Reservoir	OF-533	0	1	1	1	1	0	1	1	1	None	3	4	7	Low Priority
B	74	Cambridge Reservoir	OF-534	0	1	1	1	1	0	1	1	1	None	3	4	7	Low Priority
B	74	Cambridge Reservoir	OF-544	0	1	1	1	1	0	1	1	1	None	3	4	7	Low Priority
B	74	Cambridge Reservoir	OF-545	0	1	1	1	1	0	1	1	1	None	3	4	7	Low Priority
B	74	Cambridge Reservoir	OF-546	0	1	1	1	1	0	1	1	1	None	3	4	7	Low Priority
B	74	Cambridge Reservoir	OF-547	0	1	1	1	1	0	1	1	1	None	3	4	7	Low Priority
B	74	Cambridge Reservoir	OF-568	0	1	1	1	1	0	1	1	1	None	3	4	7	Low Priority
B	74	Cambridge Reservoir	OF-570	0	1	1	1	1	0	1	1	1	None	3	4	7	Low Priority
B	74	Cambridge Reservoir	OF-571	0	1	1	1	1	0	1	1	1	None	3	4	7	Low Priority
B	74	Cambridge Reservoir	OF-572	0	1	1	1	1	0	1	1	1	None	3	4	7	Low Priority
B	74	Cambridge Reservoir	OF-1	0	1	1	1	1	0	1	1	1	None	3	4	7	Low Priority
B	74	Cambridge Reservoir	OF-2	0	1	1	1	1	0	1	1	1	None	3	4	7	Low Priority
B	133	Unnamed Tributary to Cambridge Reservoir	OF-3	0	1	1	1	1	0	1	1	1	None	3	4	7	Low Priority
B	74	Cambridge Reservoir	OF-5	0	1	1	1	1	0	1	1	1	None	3	4	7	Low Priority
B	98	Unnamed Tributary to Cambridge Reservoir	OF-7	0	1	1	1	1	0	1	1	1	None	3	4	7	Low Priority
B	133	Unnamed Tributary to Cambridge Reservoir	OF-13	0	1	1	1	1	0	1	1	1	None	3	4	7	Low Priority
B	133	Unnamed Tributary to Cambridge Reservoir	OF-15	0	1	1	1	1	0	1	1	1	None	3	4	7	Low Priority
B	133	Unnamed Tributary to Cambridge Reservoir	OF-16	0	1	1	1	1	0	1	1	1	None	3	4	7	Low Priority
B	74	Unnamed Tributary to Cambridge Reservoir	OF-37	0	1	1	1	1	0	1	1	1	None	3	4	7	Low Priority
B	74	Unnamed Tributary to Cambridge Reservoir	OF-41	0	1	1	1	1	0	1	1	1	None	3	4	7	Low Priority
B	74	Unnamed Pond near Cambridge Reservoir	OF-274	0	1	1	1	1	0	1	1	1	None	3	4	7	Low Priority
B	74	Unnamed Tributary near Cambridge Reservoir	OF-275	0	1	1	1	1	0	1	1	1	None	3	4	7	Low Priority
B	98	Unnamed Tributary to Cambridge Reservoir	OF-279	0	1	1	1	1	0	1	1	1	None	3	4	7	Low Priority
B	133	Unnamed Tributary to Cambridge Reservoir	OF-280	0	1	1	1	1	0	1	1	1	None	3	4	7	Low Priority
B	133	Unnamed Tributary to Cambridge Reservoir	OF-281	0	1	1	1	1	0	1	1	1	None	3	4	7	Low Priority
B	133	Unnamed Tributary to Cambridge Reservoir	OF-282	0	1	1	1	1	0	1	1	1	None	3	4	7	Low Priority
B	74	Cambridge Reservoir	OF-286	0	1	1	1	1	0	1	1	1	None	3	4	7	Low Priority
B	74	Unnamed Tributary to Cambridge Reservoir	OF-342	0	1	1	1	1	0	1	1	1	None	3	4	7	Low Priority
B	74	Unnamed Tributary to Cambridge Reservoir	OF-343	0	1	1	1	1	0	1	1	1	None	3	4	7	Low Priority
B	74	Unnamed Tributary to Cambridge Reservoir	OF-344	0	1	1	1	1	0	1	1	1	None	3	4	7	Low Priority
B	74	Unnamed Tributary to Cambridge Reservoir	OF-345	0	1	1	1	1	0	1	1	1	None	3	4	7	Low Priority
B	74	Unnamed Pond near Cambridge Reservoir	OF-364	0	1	1	1	1	0	1	1	1	None	3	4	7	Low Priority
B	74	Unnamed Tributary to Cambridge Reservoir	OF-676	0	1	1	1	1	0	1	1	1	None	3	4	7	Low Priority
B	74	Unnamed Tributary to Cambridge Reservoir	OF-677	0	1	1	1	1	0	1	1	1	None	3	4	7	Low Priority
B	74	Unnamed Tributary to Cambridge Reservoir	OF-678	0	1	1	1	1	0	1	1	1	None	3	4	7	Low Priority

				Catchment Scores				Outfall Scores									
Catchment ID	Subcatchment ID	Receiving Water	Outfall ID	Density of Generating Sites [4]	Age of Development/ Infrastructure [5]	Historic Combined Sewers or Septic? [6]	Aging Septic? [7]	Previous Screening Results Indicate Likely Sewer Input? [1]	Receiving Water Quality [3]	Discharging to Area of Concern to Public Health? [2]	Frequency of Past Discharge Complaints	Culverted Streams? [8]	Additional Characteristics	Catchment Score	OF Score	Total Score	Priority Ranking
Information Source				Land Use/GIS Maps, Aerial Photography	Land Use Information, Visual Observation	Town Staff, GIS Maps	Land Use, Town Staff	Outfall inspections and sample results	Impaired Waters List	GIS Maps, Town Staff	Town Staff	GIS and Storm System Maps	Other				
Scoring Criteria				*TBD High = 2 Medium = 1 Low = 0	High = 2 Medium = 1 Low = 0	Yes = 2 No = 0 No Data = 1	Yes = 2 No = 0 No Data = 1	Poor = 2 Fair = 1 Good = 0	Category 5 = 2 Category 4a = 1 Others = 0	Yes = 2 No = 0	Frequent = 2 Occasional = 1 None = 0	Yes = 2 TBD = 1 No = 0	TBD				
B	74	Unnamed Tributary to Cambridge Reservoir	OF-680	0	1	1	1	1	0	1	1	1	None	3	4	7	Low Priority
B	74	Unnamed Pond near Cambridge Reservoir	OF-682	0	1	1	1	1	0	1	1	1	None	3	4	7	Low Priority
B	74	Unnamed Pond near Cambridge Reservoir	OF-683	0	1	1	1	1	0	1	1	1	None	3	4	7	Low Priority
B	74	Cambridge Reservoir	OF-522	0	1	1	1	1	0	1	1	1	None	3	4	7	Low Priority
B	133	Cambridge Reservoir	OF-526	0	1	1	1	1	0	1	1	1	None	3	4	7	Low Priority
B	133	Cambridge Reservoir	OF-527	0	1	1	1	1	0	1	1	1	None	3	4	7	Low Priority
B	133	Unnamed Tributary to Cambridge Reservoir	OF-577	0	1	1	1	1	0	1	1	1	None	3	4	7	Low Priority
B	133	Unnamed Tributary to Cambridge Reservoir	OF-578	0	1	1	1	1	0	1	1	1	None	3	4	7	Low Priority
B	133	Unnamed Tributary to Cambridge Reservoir	OF-579	0	1	1	1	1	0	1	1	1	None	3	4	7	Low Priority
B	133	Unnamed Tributary to Cambridge Reservoir	OF-580	0	1	1	1	1	0	1	1	1	None	3	4	7	Low Priority
B	133	Unnamed Tributary to Cambridge Reservoir	OF-581	0	1	1	1	1	0	1	1	1	None	3	4	7	Low Priority
B	133	Unnamed Tributary to Cambridge Reservoir	OF-582	0	1	1	1	1	0	1	1	1	None	3	4	7	Low Priority
B	133	Unnamed Tributary to Cambridge Reservoir	OF-584	0	1	1	1	1	0	1	1	1	None	3	4	7	Low Priority
B	133	Unnamed Tributary to Cambridge Reservoir	OF-586	0	1	1	1	1	0	1	1	1	None	3	4	7	Low Priority
B	133	Unnamed Tributary to Cambridge Reservoir	OF-589	0	1	1	1	1	0	1	1	1	None	3	4	7	Low Priority
B	133	Unnamed Tributary to Cambridge Reservoir	OF-590	0	1	1	1	1	0	1	1	1	None	3	4	7	Low Priority
C	120	Unnamed Wetlands to Hardys Pond	OF-18	1	1	1	1	1	0	1	1	1	None	4	4	8	Medium Priority
C	81	Unnamed Wetlands to Hardys Pond	OF-19	1	1	1	1	1	0	1	1	1	None	4	4	8	Medium Priority
C	81	Unnamed Wetlands to Hardys Pond	OF-20	1	1	1	1	1	0	1	1	1	None	4	4	8	Medium Priority
C	81	Unnamed Wetlands to Hardys Pond	OF-21	1	1	1	1	1	0	1	1	1	None	4	4	8	Medium Priority
C	81	Unnamed Wetlands to Hardys Pond	OF-22	1	1	1	1	1	0	1	1	1	None	4	4	8	Medium Priority
C	45	Hardys Pond	OF-27	1	1	1	1	1	1	1	1	1	None	4	5	9	Medium Priority
C	45	Hardys Pond	OF-28	1	1	1	1	1	1	1	1	1	None	4	5	9	Medium Priority
C	81	Unnamed Wetlands to Hardys Pond	OF-30	1	1	1	1	1	0	1	1	1	None	4	4	8	Medium Priority
C	45	Hardys Pond	OF-34	1	1	1	1	1	1	1	1	1	None	4	5	9	Medium Priority
C	45	Hardys Pond	OF-40	1	1	1	1	1	1	1	1	1	None	4	5	9	Medium Priority
C	45	Hardys Pond	OF-43	1	1	1	1	1	1	1	1	1	None	4	5	9	Medium Priority
C	45	Hardys Pond	OF-44	1	1	1	1	1	1	1	1	1	None	4	5	9	Medium Priority
C	45	Hardys Pond	OF-49	1	1	1	1	1	1	1	1	1	None	4	5	9	Medium Priority
C	125	Unnamed Wetlands to Hardys Pond	OF-272	1	1	1	1	1	0	1	1	1	None	4	4	8	Medium Priority
C	132	Hardys Pond	OF-288	1	1	1	1	1	1	1	1	1	None	4	5	9	Medium Priority
C	45	Hardys Pond	OF-317	1	1	1	1	1	1	1	1	1	None	4	5	9	Medium Priority
C	52	Hardys Pond	OF-470	1	1	1	1	1	1	1	1	1	None	4	5	9	Medium Priority
C	45	Hardys Pond	OF-471	1	1	1	1	1	1	1	1	1	None	4	5	9	Medium Priority
C	45	Hardys Pond	OF-472	1	1	1	1	1	1	1	1	1	None	4	5	9	Medium Priority
C	132	Hardys Pond	OF-639	1	1	1	1	1	1	1	1	1	None	4	5	9	Medium Priority
D	134	Cambridge Reservoir	OF-699	1	1	1	1	1	0	1	1	1	None	4	4	8	Medium Priority
D	134	Cambridge Reservoir	OF-700	1	1	1	1	1	0	1	1	1	None	4	4	8	Medium Priority
D	134	Cambridge Reservoir	OF-702	1	1	1	1	1	0	1	1	1	None	4	4	8	Medium Priority
D	134	Cambridge Reservoir	OF-704	1	1	1	1	1	0	1	1	1	None	4	4	8	Medium Priority
D	134	Unnamed Wetlands to Hobbs Brook Pond	OF-227	1	1	1	1	1	0	1	1	1	None	4	4	8	Medium Priority
D	134	Unnamed Wetlands to Hobbs Brook Pond	OF-228	1	1	1	1	1	0	1	1	1	None	4	4	8	Medium Priority
D	134	Unnamed Wetlands to Hobbs Brook Pond	OF-230	1	1	1	1	1	0	1	1	1	None	4	4	8	Medium Priority
D	134	Unnamed Wetlands to Hobbs Brook Pond	OF-232	1	1	1	1	1	0	1	1	1	None	4	4	8	Medium Priority
D	134	Unnamed Wetlands to Hobbs Brook Pond	OF-233	1	1	1	1	1	0	1	1	1	None	4	4	8	Medium Priority
D	50	Unnamed Wetlands near Cambridge Reservoir	OF-267	1	1	1	1	1	0	1	1	1	None	4	4	8	Medium Priority
D	56	Unnamed Wetlands near Cambridge Reservoir	OF-270	1	1	1	1	1	0	1	1	1	None	4	4	8	Medium Priority
D	50	Unnamed Wetlands near Cambridge Reservoir	OF-332	1	1	1	1	1	0	1	1	1	None	4	4	8	Medium Priority
D	134	Unnamed Wetlands to Hobbs Brook Pond	OF-367	1	1	1	1	1	0	1	1	1	None	4	4	8	Medium Priority
D	134	Unnamed Wetlands to Hobbs Brook Pond	OF-368	1	1	1	1	1	0	1	1	1	None	4	4	8	Medium Priority
D	50	Unnamed Wetlands near Cambridge Reservoir	OF-394	1	1	1	1	1	0	1	1	1	None	4	4	8	Medium Priority
D	50	Unnamed Tributary near Cambridge Reservoir	OF-396	1	1	1	1	1	0	1	1	1	None	4	4	8	Medium Priority
D	50	Unnamed Tributary near Cambridge Reservoir	OF-397	1	1	1	1	1	0	1	1	1	None	4	4	8	Medium Priority
D	134	Unnamed Wetlands to Hobbs Brook Pond	OF-403	1	1	1	1	1	0	1	1	1	None	4	4	8	Medium Priority
D	134	Unnamed Wetlands to Hobbs Brook Pond	OF-404	1	1	1	1	1	0	1	1	1	None	4	4	8	Medium Priority
D	134	Unnamed Wetlands to Hobbs Brook Pond	OF-405	1	1	1	1	1	0	1	1	1	None	4	4	8	Medium Priority
D	134	Unnamed Wetlands to Hobbs Brook Pond	OF-406	1	1	1	1	1	0	1	1	1	None	4	4	8	Medium Priority
D	134	Unnamed Wetlands to Hobbs Brook Pond	OF-407	1	1	1	1	1	0	1	1	1	None	4	4	8	Medium Priority
D	134	Unnamed Wetlands to Hobbs Brook Pond	OF-408	1	1	1	1	1	0	1	1	1	None	4	4	8	Medium Priority
D	134	Unnamed Wetlands to Hobbs Brook Pond	OF-409	1	1	1	1	1	0	1	1	1	None	4	4	8	Medium Priority
D	134	Unnamed Wetlands to Hobbs Brook Pond	OF-411	1	1	1	1	1	0	1	1	1	None	4	4	8	Medium Priority
D	134	Unnamed Wetlands to Hobbs Brook Pond	OF-412	1	1	1	1	1	0	1	1	1	None	4	4	8	Medium Priority

				Catchment Scores				Outfall Scores									
Catchment ID	Subcatchment ID	Receiving Water	Outfall ID	Density of Generating Sites [4]	Age of Development/ Infrastructure [5]	Historic Combined Sewers or Septic? [6]	Aging Septic? [7]	Previous Screening Results Indicate Likely Sewer Input? [1]	Receiving Water Quality [3]	Discharging to Area of Concern to Public Health? [2]	Frequency of Past Discharge Complaints	Culverted Streams? [8]	Additional Characteristics	Catchment Score	OF Score	Total Score	Priority Ranking
Information Source				Land Use/GIS Maps, Aerial Photography	Land Use Information, Visual Observation	Town Staff, GIS Maps	Land Use, Town Staff	Outfall inspections and sample results	Impaired Waters List	GIS Maps, Town Staff	Town Staff	GIS and Storm System Maps	Other				
Scoring Criteria				*TBD High = 2 Medium = 1 Low = 0	High = 2 Medium = 1 Low = 0	Yes = 2 No = 0 No Data = 1	Yes = 2 No = 0 No Data = 1	Poor = 2 Fair = 1 Good = 0	Category 5 = 2 Category 4a = 1 Others = 0	Yes = 2 No = 0	Frequent = 2 Occasional = 1 None = 0	Yes = 2 TBD = 1 No = 0	TBD				
D	134	Unnamed Wetlands to Hobbs Brook Pond	OF-419	1	1	1	1	1	0	1	1	1	None	4	4	8	Medium Priority
D	134	Unnamed Wetlands to Hobbs Brook Pond	OF-420	1	1	1	1	1	0	1	1	1	None	4	4	8	Medium Priority
D	134	Unnamed Wetlands to Hobbs Brook Pond	OF-421	1	1	1	1	1	0	1	1	1	None	4	4	8	Medium Priority
D	134	Unnamed Wetlands to Hobbs Brook Pond	OF-422	1	1	1	1	1	0	1	1	1	None	4	4	8	Medium Priority
D	134	Unnamed Wetlands to Hobbs Brook Pond	OF-423	1	1	1	1	1	0	1	1	1	None	4	4	8	Medium Priority
D	50	Unnamed Pond near Cambridge Reservoir	OF-465	1	1	1	1	1	0	1	1	1	None	4	4	8	Medium Priority
D	50	Unnamed Pond near Cambridge Reservoir	OF-466	1	1	1	1	1	0	1	1	1	None	4	4	8	Medium Priority
D	50	Unnamed Pond near Cambridge Reservoir	OF-467	1	1	1	1	1	0	1	1	1	None	4	4	8	Medium Priority
D	50	Unnamed Pond near Cambridge Reservoir	OF-468	1	1	1	1	1	0	1	1	1	None	4	4	8	Medium Priority
D	134	Unnamed Wetlands to Hobbs Brook Pond	OF-469	1	1	1	1	1	0	1	1	1	None	4	4	8	Medium Priority
D	50	Unnamed Tributary near Cambridge Reservoir	OF-474	1	1	1	1	1	0	1	1	1	None	4	4	8	Medium Priority
D	50	Unnamed Tributary near Cambridge Reservoir	OF-475	1	1	1	1	1	0	1	1	1	None	4	4	8	Medium Priority
D	50	Unnamed Pond near Cambridge Reservoir	OF-476	1	1	1	1	1	0	1	1	1	None	4	4	8	Medium Priority
D	50	Unnamed Pond near Cambridge Reservoir	OF-477	1	1	1	1	1	0	1	1	1	None	4	4	8	Medium Priority
D	50	Unnamed Pond near Cambridge Reservoir	OF-478	1	1	1	1	1	0	1	1	1	None	4	4	8	Medium Priority
D	50	Unnamed Wetlands near Cambridge Reservoir	OF-479	1	1	1	1	1	0	1	1	1	None	4	4	8	Medium Priority
D	50	Unnamed Wetlands near Cambridge Reservoir	OF-482	1	1	1	1	1	0	1	1	1	None	4	4	8	Medium Priority
D	50	Unnamed Wetlands near Cambridge Reservoir	OF-483	1	1	1	1	1	0	1	1	1	None	4	4	8	Medium Priority
D	50	Unnamed Wetlands near Cambridge Reservoir	OF-484	1	1	1	1	1	0	1	1	1	None	4	4	8	Medium Priority
D	50	Unnamed Wetlands near Cambridge Reservoir	OF-485	1	1	1	1	1	0	1	1	1	None	4	4	8	Medium Priority
D	50	Unnamed Wetlands near Cambridge Reservoir	OF-486	1	1	1	1	1	0	1	1	1	None	4	4	8	Medium Priority
D	50	Unnamed Wetlands near Cambridge Reservoir	OF-675	1	1	1	1	1	0	1	1	1	None	4	4	8	Medium Priority
D	134	Unnamed Wetlands to Hobbs Brook Pond	OF-519	1	1	1	1	1	0	1	1	1	None	4	4	8	Medium Priority
D	134	Unnamed Wetlands to Hobbs Brook Pond	OF-520	1	1	1	1	1	0	1	1	1	None	4	4	8	Medium Priority
D	134	Unnamed Wetlands to Hobbs Brook Pond	OF-521	1	1	1	1	1	0	1	1	1	None	4	4	8	Medium Priority
D	134	Unnamed Wetlands to Hobbs Brook Pond	OF-600	1	1	1	1	1	0	1	1	1	None	4	4	8	Medium Priority
D	50	Unnamed Tributary near Cambridge Reservoir	OF-607	1	1	1	1	1	0	1	1	1	None	4	4	8	Medium Priority
E	44	Unnamed Tributary to Lyman Pond	OF-73	1	1	1	1	1	0	1	1	1	None	4	4	8	Medium Priority
E	44	Unnamed Tributary to Lyman Pond	OF-81	1	1	1	1	1	0	1	1	1	None	4	4	8	Medium Priority
E	44	Unnamed Tributary to Lyman Pond	OF-83	1	1	1	1	1	0	1	1	1	None	4	4	8	Medium Priority
E	44	Unnamed Tributary to Lyman Pond	OF-84	1	1	1	1	1	0	1	1	1	None	4	4	8	Medium Priority
E	44	Unnamed Tributary to Lyman Pond	OF-86	1	1	1	1	1	0	1	1	1	None	4	4	8	Medium Priority
E	44	Unnamed Tributary to Lyman Pond	OF-89	1	1	1	1	1	0	1	1	1	None	4	4	8	Medium Priority
E	44	Unnamed Tributary to Lyman Pond	OF-90	1	1	1	1	1	0	1	1	1	None	4	4	8	Medium Priority
E	44	Unnamed Tributary to Lyman Pond	OF-91	1	1	1	1	1	0	1	1	1	None	4	4	8	Medium Priority
E	61	Unnamed Tributary to Lyman Pond	OF-98	1	1	1	1	1	0	1	1	1	None	4	4	8	Medium Priority
E	61	Unnamed Tributary to Lyman Pond	OF-99	1	1	1	1	1	0	1	1	1	None	4	4	8	Medium Priority
E	61	Unnamed Tributary to Lyman Pond	OF-102	1	1	1	1	1	0	1	1	1	None	4	4	8	Medium Priority
E	44	Unnamed Tributary to Lyman Pond	OF-174	1	1	1	1	1	0	1	1	1	None	4	4	8	Medium Priority
E	44	Unnamed Tributary to Lyman Pond	OF-175	1	1	1	1	1	0	1	1	1	None	4	4	8	Medium Priority
E	44	Unnamed Tributary to Lyman Pond	OF-176	1	1	1	1	1	0	1	1	1	None	4	4	8	Medium Priority
E	44	Unnamed Tributary to Lyman Pond	OF-177	1	1	1	1	1	0	1	1	1	None	4	4	8	Medium Priority
E	44	Unnamed Tributary to Lyman Pond	OF-178	1	1	1	1	1	0	1	1	1	None	4	4	8	Medium Priority
E	44	Unnamed Tributary to Lyman Pond	OF-225	1	1	1	1	1	0	1	1	1	None	4	4	8	Medium Priority
E	44	Unnamed Tributary to Lyman Pond	OF-262	1	1	1	1	1	0	1	1	1	None	4	4	8	Medium Priority
E	44	Unnamed Tributary to Lyman Pond	OF-263	1	1	1	1	1	0	1	1	1	None	4	4	8	Medium Priority
E	106	Unnamed Tributary to Lyman Pond	OF-350	1	1	1	1	1	0	1	1	1	None	4	4	8	Medium Priority
E	44	Unnamed Tributary to Lyman Pond	OF-380	1	1	1	1	1	0	1	1	1	None	4	4	8	Medium Priority
E	44	Unnamed Tributary to Lyman Pond	OF-381	1	1	1	1	1	0	1	1	1	None	4	4	8	Medium Priority
E	44	Unnamed Tributary to Lyman Pond	OF-382	1	1	1	1	1	0	1	1	1	None	4	4	8	Medium Priority
E	44	Unnamed Tributary to Lyman Pond	OF-383	1	1	1	1	1	0	1	1	1	None	4	4	8	Medium Priority
E	44	Unnamed Tributary to Lyman Pond	OF-384	1	1	1	1	1	0	1	1	1	None	4	4	8	Medium Priority
E	44	Unnamed Tributary to Lyman Pond	OF-385	1	1	1	1	1	0	1	1	1	None	4	4	8	Medium Priority
E	44	Unnamed Tributary to Lyman Pond	OF-386	1	1	1	1	1	0	1	1	1	None	4	4	8	Medium Priority
E	44	Unnamed Tributary to Lyman Pond	OF-387	1	1	1	1	1	0	1	1	1	None	4	4	8	Medium Priority
E	44	Unnamed Tributary to Lyman Pond	OF-389	1	1	1	1	1	0	1	1	1	None	4	4	8	Medium Priority
E	44	Unnamed Tributary to Lyman Pond	OF-392	1	1	1	1	1	0	1	1	1	None	4	4	8	Medium Priority
E	44	Unnamed Tributary to Lyman Pond	OF-426	1	1	1	1	1	0	1	1	1	None	4	4	8	Medium Priority
E	44	Unnamed Tributary to Lyman Pond	OF-488	1	1	1	1	1	0	1	1	1	None	4	4	8	Medium Priority
E	44	Unnamed Tributary to Lyman Pond	OF-489	1	1	1	1	1	0	1	1	1	None	4	4	8	Medium Priority
E	44	Unnamed Tributary to Lyman Pond	OF-490	1	1	1	1	1	0	1	1	1	None	4	4	8	Medium Priority
E	44	Unnamed Tributary to Lyman Pond	OF-491	1	1	1	1	1	0	1	1	1	None	4	4	8	Medium Priority

				Catchment Scores				Outfall Scores									
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E	44	Unnamed Tributary to Lyman Pond	OF-621	1	1	1	1	1	0	1	1	1	None	4	4	8	Medium Priority
E	44	Unnamed Tributary to Lyman Pond	OF-622	1	1	1	1	1	0	1	1	1	None	4	4	8	Medium Priority
F	130	Unnamed Tributary to Lyman Pond	OF-26	2	1	1	1	1	0	1	1	1	None	5	4	9	Medium Priority
F	130	Unnamed Tributary to Lyman Pond	OF-58	2	1	1	1	1	0	1	1	1	None	5	4	9	Medium Priority
F	130	Unnamed Tributary to Lyman Pond	OF-61	2	1	1	1	1	0	1	1	1	None	5	4	9	Medium Priority
F	130	Unnamed Tributary to Lyman Pond	OF-62	2	1	1	1	1	0	1	1	1	None	5	4	9	Medium Priority
F	130	Unnamed Tributary to Lyman Pond	OF-67	2	1	1	1	1	0	1	1	1	None	5	4	9	Medium Priority
F	34	Unnamed Tributary to Lyman Pond	OF-68	2	1	1	1	1	0	1	1	1	None	5	4	9	Medium Priority
F	92	Unnamed Tributary to Beaver Brook	OF-78	2	1	1	1	1	0	1	1	1	None	5	4	9	Medium Priority
F	92	Unnamed Tributary to Beaver Brook	OF-79	2	1	1	1	1	0	1	1	1	None	5	4	9	Medium Priority
F	34	Unnamed Tributary to Lyman Pond	OF-85	2	1	1	1	1	0	1	1	1	None	5	4	9	Medium Priority
F	92	Unnamed Tributary to Beaver Brook	OF-92	2	1	1	1	1	0	1	1	1	None	5	4	9	Medium Priority
F	97	Unnamed Tributary to Lyman Pond	OF-97	2	1	1	1	1	0	1	1	1	None	5	4	9	Medium Priority
F	97	Unnamed Tributary to Lyman Pond	OF-103	2	1	1	1	1	0	1	1	1	None	5	4	9	Medium Priority
F	113	Unnamed Tributary to Lyman Pond	OF-104	2	1	1	1	1	0	1	1	1	None	5	4	9	Medium Priority
F	113	Lyman Pond	OF-105	2	1	1	1	1	0	1	1	1	None	5	4	9	Medium Priority
F	113	Lyman Pond	OF-106	2	1	1	1	1	0	1	1	1	None	5	4	9	Medium Priority
F	113	Lyman Pond	OF-107	2	1	1	1	1	0	1	1	1	None	5	4	9	Medium Priority
F	113	Lyman Pond	OF-108	2	1	1	1	1	0	1	1	1	None	5	4	9	Medium Priority
F	113	Unnamed Tributary to Lyman Pond	OF-112	2	1	1	1	1	0	1	1	1	None	5	4	9	Medium Priority
F	64	Unnamed Tributary to Lyman Pond	OF-173	2	1	1	1	1	0	1	1	1	None	5	4	9	Medium Priority
F	34	Unnamed Tributary to Lyman Pond	OF-201	2	1	1	1	1	0	1	1	1	None	5	4	9	Medium Priority
F	113	Unnamed Tributary to Lyman Pond	OF-204	2	1	1	1	1	0	1	1	1	None	5	4	9	Medium Priority
F	113	Unnamed Tributary to Lyman Pond	OF-205	2	1	1	1	1	0	1	1	1	None	5	4	9	Medium Priority
F	64	Unnamed Tributary to Beaver Brook	OF-297	2	1	1	1	1	0	1	1	1	None	5	4	9	Medium Priority
F	64	Unnamed Tributary to Beaver Brook	OF-298	2	1	1	1	1	0	1	1	1	None	5	4	9	Medium Priority
F	34	Unnamed Tributary to Lyman Pond	OF-321	2	1	1	1	1	0	1	1	1	None	5	4	9	Medium Priority
F	34	Unnamed Tributary to Lyman Pond	OF-347	2	1	1	1	1	0	1	1	1	None	5	4	9	Medium Priority
F	113	Unnamed Tributary to Lyman Pond	OF-360	2	1	1	1	1	0	1	1	1	None	5	4	9	Medium Priority
F	57	Unnamed Tributary to Lyman Pond	OF-463	2	1	1	1	1	0	1	1	1	None	5	4	9	Medium Priority
F	92	Lyman Pond	OF-601	2	1	1	1	1	0	1	1	1	None	5	4	9	Medium Priority
F	92	Lyman Pond	OF-650	2	1	1	1	1	0	1	1	1	None	5	4	9	Medium Priority
F	92	Lyman Pond	OF-651	2	1	1	1	1	0	1	1	1	None	5	4	9	Medium Priority
F	92	Lyman Pond	OF-652	2	1	1	1	1	0	1	1	1	None	5	4	9	Medium Priority
F	92	Lyman Pond	OF-653	2	1	1	1	1	0	1	1	1	None	5	4	9	Medium Priority
G	39	Unnamed Tributary to Beaver Brook	OF-296	0	1	1	1	1	0	1	1	1	None	3	4	7	Low Priority
G	37	Unnamed Tributary to Beaver Brook	OF-304	0	1	1	1	1	0	1	1	1	None	3	4	7	Low Priority
H	46	Unnamed Tributary to Beaver Brook	OF-65	0	1	1	1	1	0	0	1	1	None	3	3	6	Low Priority
H	46	Unnamed Tributary to Beaver Brook	OF-66	0	1	1	1	1	0	0	1	1	None	3	3	6	Low Priority
H	46	Unnamed Tributary to Beaver Brook	OF-247	0	1	1	1	1	0	0	1	1	None	3	3	6	Low Priority
H	46	Unnamed Tributary to Beaver Brook	OF-248	0	1	1	1	1	0	0	1	1	None	3	3	6	Low Priority
H	46	Unnamed Tributary to Beaver Brook	OF-249	0	1	1	1	1	0	0	1	1	None	3	3	6	Low Priority
H	83	Unnamed Tributary to Beaver Brook	OF-250	0	1	1	1	1	0	0	1	1	None	3	3	6	Low Priority
H	46	Unnamed Tributary to Beaver Brook	OF-251	0	1	1	1	1	0	0	1	1	None	3	3	6	Low Priority
H	46	Unnamed Tributary to Beaver Brook	OF-253	0	1	1	1	1	0	0	1	1	None	3	3	6	Low Priority
H	46	Unnamed Tributary to Beaver Brook	OF-254	0	1	1	1	1	0	0	1	1	None	3	3	6	Low Priority
H	83	Unnamed Tributary to Beaver Brook	OF-294	0	1	1	1	1	0	0	1	1	None	3	3	6	Low Priority
H	83	Unnamed Tributary to Beaver Brook	OF-300	0	1	1	1	1	0	0	1	1	None	3	3	6	Low Priority
H	83	Unnamed Tributary to Beaver Brook	OF-301	0	1	1	1	1	0	0	1	1	None	3	3	6	Low Priority
H	46	Unnamed Tributary to Beaver Brook	OF-400	0	1	1	1	1	0	0	1	1	None	3	3	6	Low Priority
H	46	Unnamed Tributary to Beaver Brook	OF-401	0	1	1	1	1	0	0	1	1	None	3	3	6	Low Priority
H	46	Unnamed Tributary to Beaver Brook	OF-402	0	1	1	1	1	0	0	1	1	None	3	3	6	Low Priority
J	21	Beaver Brook	OF-620	0	1	1	1	1	2	1	1	1	None	3	6	9	Medium Priority
J	109	Unnamed Tributary to Beaver Brook	OF-101	0	1	1	1	1	0	1	1	1	None	3	4	7	Low Priority
J	33	Beaver Brook	OF-269	0	1	1	1	1	2	1	1	1	None	3	6	9	Medium Priority
J	27	Unnamed Tributary to Beaver Brook	OF-376	0	1	1	1	1	0	1	1	1	None	3	4	7	Low Priority
J	21	Beaver Brook	OF-506	0	1	1	1	1	2	1	1	1	None	3	6	9	Medium Priority
J	21	Beaver Brook	OF-507	0	1	1	1	1	2	1	1	1	None	3	6	9	Medium Priority
J	21	Beaver Brook	OF-508	0	1	1	1	1	2	1	1	1	None	3	6	9	Medium Priority
J	21	Beaver Brook	OF-509	0	1	1	1	1	2	1	1	1	None	3	6	9	Medium Priority
J	21	Beaver Brook	OF-510	0	1	1	1	1	2	1	1	1	None	3	6	9	Medium Priority
J	21	Beaver Brook	OF-615	0	1	1	1	1	2	1	1	1	None	3	6	9	Medium Priority

				Catchment Scores				Outfall Scores									
Catchment ID	Subcatchment ID	Receiving Water	Outfall ID	Density of Generating Sites [4]	Age of Development/ Infrastructure [5]	Historic Combined Sewers or Septic? [6]	Aging Septic? [7]	Previous Screening Results Indicate Likely Sewer Input? [1]	Receiving Water Quality [3]	Discharging to Area of Concern to Public Health? [2]	Frequency of Past Discharge Complaints	Culverted Streams? [8]	Additional Characteristics	Catchment Score	OF Score	Total Score	Priority Ranking
Information Source				Land Use/GIS Maps, Aerial Photography	Land Use Information, Visual Observation	Town Staff, GIS Maps	Land Use, Town Staff	Outfall inspections and sample results	Impaired Waters List	GIS Maps, Town Staff	Town Staff	GIS and Storm System Maps	Other				
Scoring Criteria				*TBD High = 2 Medium = 1 Low = 0	High = 2 Medium = 1 Low = 0	Yes = 2 No = 0 No Data = 1	Yes = 2 No = 0 No Data = 1	Poor = 2 Fair = 1 Good = 0	Category 5 = 2 Category 4a = 1 Others = 0	Yes = 2 No = 0	Frequent = 2 Occasional = 1 None = 0	Yes = 2 TBD = 1 No = 0	TBD				
J	21	Beaver Brook	OF-616	0	1	1	1	1	2	1	1	1	None	3	6	9	Medium Priority
K	4	Stony Brook	OF-143	1	1	1	1	1	0	1	1	1	None	4	4	8	Medium Priority
K	4	Stony Brook	OF-145	1	1	1	1	1	0	1	1	1	None	4	4	8	Medium Priority
K	122	Stony Brook	OF-451	1	1	1	1	1	0	1	1	1	None	4	4	8	Medium Priority
K	4	Stony Brook	OF-536	1	1	1	1	1	0	1	1	1	None	4	4	8	Medium Priority
K	4	Stony Brook	OF-557	1	1	1	1	1	0	1	1	1	None	4	4	8	Medium Priority
K	4	Unnamed Tributary near Stony Brook	OF-124	1	1	1	1	1	0	1	1	1	None	4	4	8	Medium Priority
K	49	Unnamed Tributary near Stony Brook	OF-235	1	1	1	1	1	0	1	1	1	None	4	4	8	Medium Priority
K	122	Stony Brook	OF-446	1	1	1	1	1	0	1	1	1	None	4	4	8	Medium Priority
K	5	Stony Brook	OF-558	1	1	1	1	1	0	1	1	1	None	4	4	8	Medium Priority
K	5	Stony Brook	OF-559	1	1	1	1	1	0	1	1	1	None	4	4	8	Medium Priority
K	5	Stony Brook	OF-560	1	1	1	1	1	0	1	1	1	None	4	4	8	Medium Priority
K	5	Stony Brook	OF-561	1	1	1	1	1	0	1	1	1	None	4	4	8	Medium Priority
K	4	Unnamed Tributary near Stony Brook	OF-563	1	1	1	1	1	0	1	1	1	None	4	4	8	Medium Priority
K	4	Unnamed Tributary near Stony Brook	OF-564	1	1	1	1	1	0	1	1	1	None	4	4	8	Medium Priority
K	4	Unnamed Tributary near Stony Brook	OF-643	1	1	1	1	1	0	1	1	1	None	4	4	8	Medium Priority
K	4	Unnamed Tributary near Stony Brook	OF-646	1	1	1	1	1	0	1	1	1	None	4	4	8	Medium Priority
K	4	Unnamed Tributary near Stony Brook	OF-648	1	1	1	1	1	0	1	1	1	None	4	4	8	Medium Priority
K	4	Unnamed Tributary near Stony Brook	OF-649	1	1	1	1	1	0	1	1	1	None	4	4	8	Medium Priority
L	110	Charles River	OF-127	2	1	2	1	1	2	1	1	1	None	6	6	12	High Priority
L	110	Charles River	OF-131	2	1	2	1	1	2	1	1	1	None	6	6	12	High Priority
L	90	Charles River	OF-135	2	1	2	1	1	2	1	1	1	None	6	6	12	High Priority
L	13	Charles River	OF-139	2	1	2	1	1	2	1	1	1	None	6	6	12	High Priority
L	13	Charles River	OF-141	2	1	2	1	1	2	1	1	1	None	6	6	12	High Priority
L	114	Charles River	OF-146	2	1	2	1	1	2	1	1	1	None	6	6	12	High Priority
L	114	Charles River	OF-147	2	1	2	1	1	2	1	1	1	None	6	6	12	High Priority
L	114	Charles River	OF-149	2	1	2	1	1	2	1	1	1	None	6	6	12	High Priority
L	13	Charles River	OF-189	2	1	2	1	1	2	1	1	1	None	6	6	12	High Priority
L	13	Charles River	OF-190	2	1	2	1	1	2	1	1	1	None	6	6	12	High Priority
L	13	Charles River	OF-191	2	1	2	1	1	2	1	1	1	None	6	6	12	High Priority
L	114	Charles River	OF-215	2	1	2	1	1	2	1	1	1	None	6	6	12	High Priority
L	110	Charles River	OF-315	2	1	2	1	1	2	1	1	1	None	6	6	12	High Priority
L	110	Charles River	OF-316	2	1	2	1	1	2	1	1	1	None	6	6	12	High Priority
L	114	Charles River	OF-514	2	1	2	1	1	2	1	1	1	None	6	6	12	High Priority
L	110	Charles River	OF-602	2	1	2	1	1	2	1	1	1	None	6	6	12	High Priority
L	114	Charles River	OF-613	2	1	2	1	1	2	1	1	1	None	6	6	12	High Priority
L	114	Charles River	OF-614	2	1	2	1	1	2	1	1	1	None	6	6	12	High Priority
L	13	Charles River	OF-128	2	1	2	1	1	2	1	1	1	None	6	6	12	High Priority
L	110	Charles River	OF-129	2	1	2	1	1	2	1	1	1	None	6	6	12	High Priority
L	13	Charles River	OF-133	2	1	2	1	1	2	1	1	1	None	6	6	12	High Priority
L	90	Charles River	OF-134	2	1	2	1	1	2	1	1	1	None	6	6	12	High Priority
L	13	Charles River	OF-137	2	1	2	1	1	2	1	1	1	None	6	6	12	High Priority
L	13	Charles River	OF-138	2	1	2	1	1	2	1	1	1	None	6	6	12	High Priority
L	13	Unnamed Tributary to Charles River	OF-150	2	1	2	1	1	0	1	1	1	None	6	4	10	High Priority
L	13	Charles River	OF-153	2	1	2	1	1	2	1	1	1	None	6	6	12	High Priority
L	13	Charles River	OF-157	2	1	2	1	1	2	1	1	1	None	6	6	12	High Priority
L	13	Unnamed Tributary to Charles River	OF-158	2	1	2	1	1	0	1	1	1	None	6	4	10	High Priority
L	13	Unnamed Tributary to Charles River	OF-159	2	1	2	1	1	0	1	1	1	None	6	4	10	High Priority
L	13	Charles River	OF-160	2	1	2	1	1	2	1	1	1	None	6	6	12	High Priority
L	13	Charles River	OF-161	2	1	2	1	1	2	1	1	1	None	6	6	12	High Priority
L	13	Charles River	OF-162	2	1	2	1	1	2	1	1	1	None	6	6	12	High Priority
L	13	Charles River	OF-163	2	1	2	1	1	2	1	1	1	None	6	6	12	High Priority
L	13	Charles River	OF-164	2	1	2	1	1	2	1	1	1	None	6	6	12	High Priority
L	13	Charles River	OF-192	2	1	2	1	1	2	1	1	1	None	6	6	12	High Priority
L	114	Charles River	OF-216	2	1	2	1	1	2	1	1	1	None	6	6	12	High Priority
L	114	Unnamed Pond near Charles River	OF-309	2	1	2	1	1	0	1	1	1	None	6	4	10	High Priority
L	110	Charles River	OF-312	2	1	2	1	1	2	1	1	1	None	6	6	12	High Priority
L	114	Unnamed Pond near Charles River	OF-352	2	1	2	1	1	0	1	1	1	None	6	4	10	High Priority
L	114	Unnamed Pond near Charles River	OF-353	2	1	2	1	1	0	1	1	1	None	6	4	10	High Priority
L	114	Unnamed Pond near Charles River	OF-354	2	1	2	1	1	0	1	1	1	None	6	4	10	High Priority
L	13	Unnamed Tributary to Charles River	OF-455	2	1	2	1	1	0	1	1	1	None	6	4	10	High Priority
L	13	Unnamed Tributary to Charles River	OF-456	2	1	2	1	1	0	1	1	1	None	6	4	10	High Priority

				Catchment Scores				Outfall Scores									
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L	13	Charles River	OF-512	2	1	2	1	1	2	1	1	1	None	6	6	12	High Priority
L	13	Charles River	OF-513	2	1	2	1	1	2	1	1	1	None	6	6	12	High Priority
L	114	Charles River	OF-609	2	1	2	1	1	2	1	1	1	None	6	6	12	High Priority
L	114	Charles River	OF-610	2	1	2	1	1	2	1	1	1	None	6	6	12	High Priority
L	114	Charles River	OF-611	2	1	2	1	1	2	1	1	1	None	6	6	12	High Priority
L	114	Charles River	OF-612	2	1	2	1	1	2	1	1	1	None	6	6	12	High Priority
L	13	Charles River	OF-629	2	1	2	1	1	2	1	1	1	None	6	6	12	High Priority
L	13	Charles River	OF-630	2	1	2	1	1	2	1	1	1	None	6	6	12	High Priority
L	13	Charles River	OF-631	2	1	2	1	1	2	1	1	1	None	6	6	12	High Priority
L	13	Charles River	OF-632	2	1	2	1	1	2	1	1	1	None	6	6	12	High Priority
M	91	Beaver Brook	OF-110	2	1	1	1	1	2	1	1	1	None	5	6	11	High Priority
M	91	Beaver Brook	OF-111	2	1	1	1	1	2	1	1	1	None	5	6	11	High Priority
M	91	Beaver Brook	OF-115	2	1	1	1	1	2	1	1	1	None	5	6	11	High Priority
M	91	Beaver Brook	OF-116	2	1	1	1	1	2	1	1	1	None	5	6	11	High Priority
M	91	Beaver Brook	OF-117	2	1	1	1	1	2	1	1	1	None	5	6	11	High Priority
M	91	Beaver Brook	OF-118	2	1	1	1	1	2	1	1	1	None	5	6	11	High Priority
M	91	Beaver Brook	OF-119	2	1	1	1	1	2	1	1	1	None	5	6	11	High Priority
M	91	Beaver Brook	OF-256	2	1	1	1	1	2	1	1	1	None	5	6	11	High Priority
M	112	Beaver Brook	OF-257	2	1	1	1	1	2	1	1	1	None	5	6	11	High Priority
M	112	Beaver Brook	OF-258	2	1	1	1	1	2	1	1	1	None	5	6	11	High Priority
M	112	Beaver Brook	OF-259	2	1	1	1	1	2	1	1	1	None	5	6	11	High Priority
M	91	Beaver Brook	OF-260	2	1	1	1	1	2	1	1	1	None	5	6	11	High Priority
M	91	Beaver Brook	OF-261	2	1	1	1	1	2	1	1	1	None	5	6	11	High Priority
M	91	Beaver Brook	OF-377	2	1	1	1	1	2	1	1	1	None	5	6	11	High Priority
M	91	Beaver Brook	OF-378	2	1	1	1	1	2	1	1	1	None	5	6	11	High Priority
M	112	Beaver Brook	OF-495	2	1	1	1	1	2	1	1	1	None	5	6	11	High Priority
M	112	Beaver Brook	OF-511	2	1	1	1	1	2	1	1	1	None	5	6	11	High Priority
M	91	Beaver Brook	OF-617	2	1	1	1	1	2	1	1	1	None	5	6	11	High Priority
M	91	Beaver Brook	OF-618	2	1	1	1	1	2	1	1	1	None	5	6	11	High Priority
M	91	Beaver Brook	OF-619	2	1	1	1	1	2	1	1	1	None	5	6	11	High Priority
M	127	Beaver Brook	OF-496	2	1	1	1	1	2	1	1	1	None	5	6	11	High Priority
M	127	Beaver Brook	OF-497	2	1	1	1	1	2	1	1	1	None	5	6	11	High Priority
M	127	Beaver Brook	OF-498	2	1	1	1	1	2	1	1	1	None	5	6	11	High Priority
M	127	Beaver Brook	OF-499	2	1	1	1	1	2	1	1	1	None	5	6	11	High Priority
M	31	Beaver Brook	OF-500	2	1	1	1	1	2	1	1	1	None	5	6	11	High Priority
M	31	Beaver Brook	OF-501	2	1	1	1	1	2	1	1	1	None	5	6	11	High Priority
M	31	Beaver Brook	OF-503	2	1	1	1	1	2	1	1	1	None	5	6	11	High Priority
M	31	Beaver Brook	OF-504	2	1	1	1	1	2	1	1	1	None	5	6	11	High Priority
N	1	Unnamed Tributary to Stony Brook Reservoir	OF-142	0	1	1	1	1	0	1	1	1	None	3	4	7	Low Priority
N	1	Unnamed Tributary to Stony Brook Reservoir	OF-144	0	1	1	1	1	0	1	1	1	None	3	4	7	Low Priority
N	1	Unnamed Tributary to Stony Brook Reservoir	OF-148	0	1	1	1	1	0	1	1	1	None	3	4	7	Low Priority
N	1	Unnamed Tributary to Stony Brook Reservoir	OF-151	0	1	1	1	1	0	1	1	1	None	3	4	7	Low Priority
N	1	Unnamed Tributary to Stony Brook Reservoir	OF-152	0	1	1	1	1	0	1	1	1	None	3	4	7	Low Priority
N	101	Stony Brook Reservoir	OF-168	0	1	1	1	1	0	1	1	1	None	3	4	7	Low Priority
N	101	Stony Brook Reservoir	OF-169	0	1	1	1	1	0	1	1	1	None	3	4	7	Low Priority
N	11	Stony Brook Reservoir	OF-170	0	1	1	1	1	0	1	1	1	None	3	4	7	Low Priority
N	100	Stony Brook Reservoir	OF-554	0	1	1	1	1	0	1	1	1	None	3	4	7	Low Priority
N	1	Stony Brook	OF-556	0	1	1	1	1	0	1	1	1	None	3	4	7	Low Priority
N	1	Unnamed Tributary to Stony Brook Reservoir	OF-591	0	1	1	1	1	0	1	1	1	None	3	4	7	Low Priority
N	1	Unnamed Tributary to Stony Brook Reservoir	OF-592	0	1	1	1	1	0	1	1	1	None	3	4	7	Low Priority
N	1	Unnamed Tributary to Stony Brook Reservoir	OF-593	0	1	1	1	1	0	1	1	1	None	3	4	7	Low Priority
N	2	Unnamed Tributary to Stony Brook Reservoir	OF-608	0	1	1	1	1	0	1	1	1	None	3	4	7	Low Priority
N	1	Unnamed Tributary to Stony Brook Reservoir	OF-635	0	1	1	1	1	0	1	1	1	None	3	4	7	Low Priority
O	128	Charles River	OF-165	1	1	1	1	1	2	1	1	1	None	4	6	10	High Priority
O	99	Charles River	OF-166	1	1	1	1	1	2	1	1	1	None	4	6	10	High Priority
O	128	Charles River	OF-167	1	1	1	1	1	2	1	1	1	None	4	6	10	High Priority
O	8	Charles River	OF-171	1	1	1	1	1	2	1	1	1	None	4	6	10	High Priority
O	8	Charles River	OF-172	1	1	1	1	1	2	1	1	1	None	4	6	10	High Priority
O	99	Charles River	OF-628	1	1	1	1	1	2	1	1	1	None	4	6	10	High Priority
O	8	Charles River	OF-633	1	1	1	1	1	2	1	1	1	None	4	6	10	High Priority
P	41	Beaver Brook	OF-69	0	1	1	1	1	2	1	1	1	None	3	6	9	Medium Priority
P	29	Beaver Brook	OF-88	0	1	1	1	1	2	1	1	1	None	3	6	9	Medium Priority

				Catchment Scores				Outfall Scores									
Catchment ID	Subcatchment ID	Receiving Water	Outfall ID	Density of Generating Sites [4]	Age of Development/ Infrastructure [5]	Historic Combined Sewers or Septic? [6]	Aging Septic? [7]	Previous Screening Results Indicate Likely Sewer Input? [1]	Receiving Water Quality [3]	Discharging to Area of Concern to Public Health? [2]	Frequency of Past Discharge Complaints	Culverted Streams? [8]	Additional Characteristics	Catchment Score	OF Score	Total Score	Priority Ranking
Information Source				Land Use/GIS Maps, Aerial Photography	Land Use Information, Visual Observation	Town Staff, GIS Maps	Land Use, Town Staff	Outfall inspections and sample results	Impaired Waters List	GIS Maps, Town Staff	Town Staff	GIS and Storm System Maps	Other				
Scoring Criteria				*TBD High = 2 Medium = 1 Low = 0	High = 2 Medium = 1 Low = 0	Yes = 2 No = 0 No Data = 1	Yes = 2 No = 0 No Data = 1	Poor = 2 Fair = 1 Good = 0	Category 5 = 2 Category 4a = 1 Others = 0	Yes = 2 No = 0	Frequent = 2 Occasional = 1 None = 0	Yes = 2 TBD = 1 No = 0	TBD				
Q	95	Unnamed Tributary to Beaver Brook	OF-42	0	1	1	1	1	0	1	1	1	None	3	4	7	Low Priority
R	51	Beaver Brook	OF-113	1	1	1	1	1	2	1	1	1	None	4	6	10	High Priority
R	51	Beaver Brook	OF-114	1	1	1	1	1	2	1	1	1	None	4	6	10	High Priority
R	51	Beaver Brook	OF-120	1	1	1	1	1	2	1	1	1	None	4	6	10	High Priority
R	51	Beaver Brook	OF-121	1	1	1	1	1	2	1	1	1	None	4	6	10	High Priority
S	12	Unnamed Tributary	OF-217	0	1	1	1	1	0	0	1	1	None	3	3	6	Low Priority
S	12	Unnamed Tributary	OF-457	0	1	1	1	1	0	0	1	1	None	3	3	6	Low Priority

Appendix D

Field Forms and Hyperlinks to Laboratories and Field Services Companies

Date: _____

Weather Observations: _____

Staff Onsite: _____

Photos: _____

Waltham Storm Drain Mapping Form

Structure #:_____

Map #: _____

Street Name: _____

Nearest Structure: _____
(address, bldg, utility pole, etc)

Type of Structure: _____
(outfall, culvert, inlet, etc)

Headwall?: _____
(Y/N; concrete, stone, rip rap, none)

Material: _____
(concrete, concrete FES, corrugated metal, plastic, pvc, clay, cast iron, etc)

Size & Shape of Structure: _____
_____
(diameter, width/height)

Invert (top of headwall to bottom inside of pipe): _____
_____

Pipe Condition/headwall condition: _____
_____

Connectivity: _____
(from MH, CB, culvert, other)

Date: _____

Structure Number: _____

Is Crown (top inside of pipe) Above or Below Surface Water?: _____

Dry Weather Flow Conditions: _____
(weather, ground condition, flowing?)

Description of Visual Characteristics or Odors: _____

_____
(aesthetics, deposits/stains, erosion, vegetation)

<u>Field Screening Data:</u>

pH: _____
Temperature: _____
Sp. Conduct.: _____
Turbidity: _____

Flag as Future Sample Location? (Y/N): _____

Sample collected for lab analysis? ** (Y/N): _____

Lab Sample ID: _____
Analyses: _____
Sampling Date/Time: _____
**** (ensure SOP for stormwater grab sampling has been followed, see Appendix F of IDDE Plan)**

<u>Additional comments/Sketch:</u>

Appendix D – Links to Relevant Laboratories and Field Services Companies

Local Massachusetts State Certified Laboratories:

- ESS Laboratory; Cranston, RI http://www.esslaboratory.com/
- Alpha Analytical Labs; Westborough, MA https://alphalab.com/
- G&L Laboratories; Quincy, MA http://www.gllab.com/
- MassDEP Searchable Laboratory Certification Listing https://eeaonline.eea.state.ma.us/DEP/Labcert/Labcert.aspx

Local Field Equipment Suppliers

- U.S. Environmental; Waltham, MA https://usenvironmental.com/
- Pine Environmental; Woburn, MA http://www.pine-environmental.com/locations/?list
- Hach Company Analytical Instruments https://www.hach.com/

CCTV/Video Inspection Companies

- National Water Main Cleaning Co.; Canton, MA https://nwmcc.com/
- BMC Corp.; Billerica, MA https://pipejetter.com/cctv-inspection.html
- Inland Waters Inc.; Johnston, RI http://www.inlandwatersinc.com/

Appendix E

Outfall Catchment System Vulnerability Factor (SVF) Inventory

Appendix E – Outfall Catchment System Vulnerability Factor (SVF) Inventory
Waltham, Massachusetts
Revision Date: June 2019

Outfall ID	Receiving Water	1 History of SSOs	2 Common or Twin Invert Manholes	3 Common Trench Construction	4 Storm/Sanitary Crossings (Sanitary Above)	5 Sanitary Lines with Underdrains	6 Inadequate Sanitary Level of Service	7 Areas Formerly Served by Combined Sewers	8 Sanitary Infrastructure Defects	9 SSO Potential In Event of System Failures	10 Sanitary and Storm Drain Infrastructure >40 years Old	11 Septic with Poor Soils or Water Table Separation	12 History of BOH Actions Addressing Septic Failure
Sample 1	XYZ River	Yes/No	Yes/No	Yes/No	Yes/No	Yes/No	Yes/No	Yes/No	Yes/No	Yes/No	Yes/No	Yes/No	Yes/No

Presence/Absence Evaluation Criteria:

1. History of SSOs, including, but not limited to, those resulting from wet weather, high water table, or fat/oil/grease blockages
2. Common or twin-invert manholes serving storm and sanitary sewer alignments
3. Common trench construction serving both storm and sanitary sewer alignments
4. Crossings of storm and sanitary sewer alignments where the sanitary system is shallower than the storm drain system
5. Sanitary sewer alignments known or suspected to have been constructed with an underdrain system
6. Inadequate sanitary sewer level of service (LOS) resulting in regular surcharging, customer back-ups, or frequent customer complaints
7. Areas formerly served by combined sewer systems
8. Sanitary sewer infrastructure defects such as leaking service laterals, cracked, broken, or offset sanitary infrastructure, directly piped connections between storm drain and sanitary sewer infrastructure, or other vulnerability factors identified through Inflow/Infiltration Analyses, Sanitary Sewer Evaluation Surveys, or other infrastructure investigations
9. Sewer pump/lift stations, siphons, or known sanitary sewer restrictions where power/equipment failures or blockages could readily result in SSOs
10. Any sanitary sewer and storm drain infrastructure greater than 40 years old
11. Widespread code-required septic system upgrades required at property transfers (indicative of inadequate soils, water table separation, or other physical constraints of the area rather that poor owner maintenance)
12. History of multiple Board of Health actions addressing widespread septic system failures (indicative of inadequate soils, water table separation, or other physical constraints of the area rather that poor owner maintenance)

Appendix F

New England Interstate Water Pollution Control Commission IDDE Manual

ILLICIT DISCHARGE DETECTION AND ELIMINATION MANUAL

A Handbook for Municipalities

NEW ENGLAND INTERSTATE WATER POLLUTION CONTROL COMMISSION

January 2003

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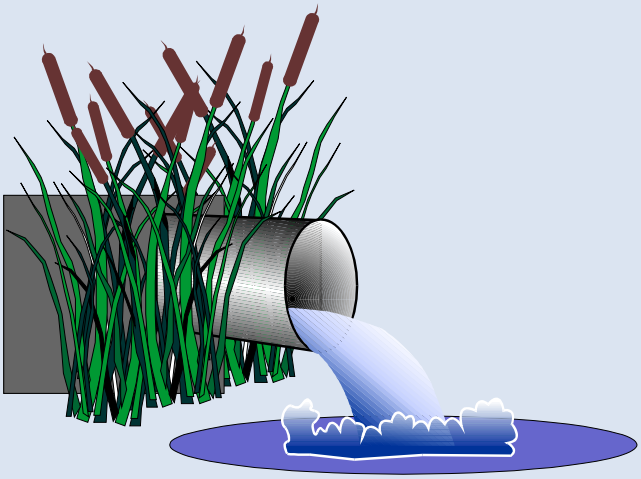
ILLICIT DISCHARGE DETECTION AND ELIMINATION MANUAL

A Handbook for Municipalities



Prepared by the

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COMPACT MEMBER STATES

Connecticut
Maine
Massachusetts
New Hampshire
New York
Rhode Island
Vermont

Copies of this document may be downloaded from *www.neiwpcc.org.*

January 2003

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This project was initiated by NEIWPCC's Storm Water Workgroup, which is composed of state and federal environmental agency staff. The group perceived a need for resources to help municipalities in NEIWPCC-member states that are regulated under the U.S. Environmental Protection Agency's (EPA's) Phase II storm water program comply with regulatory requirements. This manual is intended to help municipalities develop illicit discharge detection and elimination programs—one of the six minimum control measures under Phase II.

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ACRONYMS

BMP	Best Management Practice
BWSC	Boston Water and Sewer Commission
GIS	Geographic Information System
GPS	Global Positioning System
IDDE	Illicit Discharge Detection and Elimination
MS4	Municipal Separate Storm Sewer System
NPDES	National Pollutant Discharge Elimination System
NOV	Notice of Violation
SIC	Standard Industrial Classification

EPA	U.S. Environmental Protection Agency
CTDEP	Connecticut Department of Environmental Protection
MEDEP	Maine Department of Environmental Protection
MADEP	Massachusetts Department of Environmental Protection
NHDES	New Hampshire Department of Environmental Services
NYSDEC	New York State Department of Environmental Conservation
RIDEM	Rhode Island Department of Environmental Management
VTDEC	Vermont Department of Environmental Conservation

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INTRODUCTION

Although the quality of the nation's waters has improved greatly since the passage of the Clean Water Act in 1972, many water bodies are still impaired by pollution. According to the U.S. Environmental Protection Agency's (EPA's) 2000 National Water Quality Inventory, 39 percent of assessed river and stream miles, 46 percent of assessed lake acres, and 51 percent of assessed estuarine square miles do not meet water quality standards. The top causes of impairment include siltation, nutrients, bacteria, metals (primarily mercury), and oxygen-depleting substances. Polluted storm water runoff, including runoff from urban/suburban areas and construction sites, is a leading source of this impairment. To address this problem, EPA has put into place a program that regulates certain storm water discharges.

Polluted storm water runoff, including runoff from urban/suburban areas and construction sites, is a leading source of water quality impairment. To address this problem, EPA has put into place a program that regulates certain storm water discharges.

In 1990, EPA promulgated Phase I of its storm water program under the National Pollutant Discharge Elimination System (NPDES) permit provisions of the Clean Water Act. Phase I addressed storm water runoff from "medium" and "large" municipal separate storm sewer systems (MS4s) generally serving populations of 100,000 or greater, construction activity that would disturb five or more acres of land, and 10 categories of industrial activity. To further reduce the adverse effects of storm water runoff, EPA instituted its Storm Water Phase II Final Rule on December 8, 1999.

WHO ADMINISTERS THE PHASE II STORM WATER PROGRAM?

The Phase II storm water program is part of EPA's NPDES program, which in many states is delegated to state authorities to administer. Connecticut, Maine, New York, Rhode Island, and Vermont are authorized to serve as NPDES permitting authorities. EPA Region 1 serves as the permitting authority for Massachusetts and New Hampshire. EPA is also the permitting authority for all federally recognized Indian Country lands and for federal facilities in Massachusetts, New Hampshire, and Vermont.

WHAT IS REGULATED UNDER PHASE II?

Phase II regulates discharges from small MS4s located in "urbanized areas" (as delineated by the Census Bureau in the most recent census) and from additional small MS4s designated by the permitting authority. Phase II also regulates construction activities that would disturb between one and five acres of land. In addition, the Phase II Final Rule ends the temporary exemption from Phase I requirements for some municipally operated industrial activities[1] and revises the "no exposure" provision for Phase I-regulated industrial activities.

MS4s are typically operated by municipalities, but the Phase II definition of "municipal separate storm sewer systems" includes storm sewer systems owned or operated by other public bodies (e.g., states, counties, Indian tribes, departments of transportation, universities). EPA also notes that an MS4 is not always just a system of underground pipes; it can include roads with drainage systems, gutters, and ditches.

[1] This temporary exemption was provided by the Intermodal Surface Transportation Act (ISTEA) of 1991.

The rules for determining which small MS4s are regulated under Phase II are somewhat complex; MS4 operators should consult the NPDES permitting authority for their state to determine whether their MS4s are regulated. Note also that requirements may be different if a municipality is located only partially within an urbanized area.

WHERE DOES IDDE FIT IN?

EPA's Phase II rule specifies that permitting authorities must issue general permits for "automatically designated" small MS4s by December 9, 2002. The rule requires that operators of these automatically designated small MS4s apply for NPDES permit coverage within 90 days of permit issuance, and no later than March 10, 2003[2]. To obtain this coverage, an MS4 operator must develop, implement, and enforce a storm water management program that is designed to reduce the discharge of pollutants to the maximum extent practicable, protect water quality, and satisfy the applicable water quality requirements of the Clean Water Act. EPA's Storm Water Phase II Final Rule states that this storm water management program must include the following six minimum control measures:

- Public education and outreach on storm water impacts
- Public involvement and participation
- ➤ **Illicit discharge detection and elimination (IDDE)**
- Construction site storm water runoff control
- Post-construction storm water management in new development and redevelopment
- Pollution prevention and good housekeeping for municipal operations

As part of their applications for permit coverage, MS4 operators must identify the best management practices they will use to comply with each of the six minimum control measures and the measurable goals they have set for each measure.

ABOUT THIS MANUAL

This manual is intended to help municipalities in the New England states and New York develop illicit discharge detection and elimination (IDDE) programs required by EPA's Phase II storm water program. EPA's Phase II storm water regulations provide guidelines that are used by permitting authorities in writing their permits. This manual provides general information based on EPA's Phase II storm water regulations; it is important to consult the permitting authority in your state (see Chapter 10) to find out about state-specific requirements.

Chapter 1 explains the IDDE requirement of EPA's Phase II regulations. Chapters 2 through 8 describe the required elements of an IDDE program and provide information to help municipalities execute each of these elements. Chapter 9 provides information on best management practices and measurable goals for IDDEs. Chapter 10 lists additional resources and contacts that may be helpful in developing an IDDE program.

EPA's Phase II storm water regulations provide guidelines that are used by permitting authorities in writing their permits. This manual provides general information based on EPA's Phase II storm water regulations; it is important to consult the permitting authority in your state to find out about state-specific requirements.

[2] There are some exceptions to this deadline; contact the permitting authority in your state for up-to-date official information.

1 GETTING STARTED WITH YOUR IDDE PROGRAM

As you set out to develop your illicit discharge detection and elimination (IDDE) program, you will need to start by making sure that you know the answers to two key questions: (1) What is an illicit discharge? and (2) What are the required elements of an IDDE program? In this chapter we'll review the answers to these questions; we'll provide supporting information and details in subsequent chapters.

WHAT IS AN ILLICIT DISCHARGE?

The term "illicit discharge" is defined in EPA's Phase II storm water regulations as "any discharge to a municipal separate storm sewer that is not composed entirely of storm water, except discharges pursuant to an NPDES permit and discharges resulting from fire-fighting activities."

Illicit discharges can be categorized as either direct or indirect.

- Examples of direct illicit discharges:
  - sanitary wastewater piping that is directly connected from a home to the storm sewer
  - materials (e.g., used motor oil) that have been dumped illegally into a storm drain catch basin
  - a shop floor drain that is connected to the storm sewer
  - a cross-connection between the municipal sewer and storm sewer systems
- Examples of indirect illicit discharges:
  - an old and damaged sanitary sewer line that is leaking fluids into a cracked storm sewer line
  - a failing septic system that is leaking into a cracked storm sewer line or causing surface discharge into the storm sewer

Illicit discharge
Any discharge to a municipal separate storm sewer that is not composed entirely of storm water, except discharges pursuant to an NPDES permit and discharges resulting from fire-fighting activities.

WHAT ARE THE ELEMENTS OF AN IDDE PROGRAM?

EPA's Phase II regulations state that an IDDE program must incorporate the following four elements.

- Develop (if not already completed) a storm sewer system map showing the location of all outfalls, and the names and location of all waters of the United States that receive discharges from those outfalls.

NON-STORM WATER DISCHARGES THAT YOUR IDDE PROGRAM MAY NOT NEED TO ADDRESS

According to EPA's Phase II storm water regulations, an illicit discharge detection and elimination program need only address the following categories of non-storm water discharges if the operator of a small MS4 identifies them as significant contributors of pollutants to the MS4:

- water line flushing
- landscape irrigation
- diverted stream flows
- rising ground waters
- uncontaminated ground water infiltration
- uncontaminated pumped ground water
- discharges from potable water sources
- foundation drains
- air conditioning condensation
- irrigation water
- springs
- water from crawl space pumps
- footing drains
- lawn watering
- individual residential car washing
- flows from riparian habitats and wetlands
- dechlorinated swimming pool discharges
- street wash water

- To the extent allowable under state, tribal, or local law, effectively prohibit through ordinance, or other regulatory mechanism, illicit discharges into the separate storm sewer system and implement appropriate enforcement procedures and actions as needed.
- Develop and implement a plan to detect and address illicit discharges, including illegal dumping, to the system.
- Inform public employees, businesses, and the general public of hazards associated with illegal discharges and improper disposal of waste.

For each of these mandatory elements, EPA suggests a variety of approaches that can help in creating a successful IDDE program. The mandatory elements and the suggested approaches will be discussed further in the next seven chapters.

REFERENCES: CHAPTER 1

USEPA. 1999. National Pollutant Discharge Elimination System – Regulations for Revision of the Water Pollution Control Program Addressing Storm Water Discharges; Final Rule. *Federal Register* Vol. 64 No. 235 (December 8, 1999), pp. 68722-68851. *http://www.epa.gov/npdes/regulations/phase2.pdf*

USEPA. 2000. EPA Storm Water Phase II Final Rule Fact Sheet 2.5: *Illicit Discharge Detection and Elimination Minimum Control Measure.* EPA 833-F-00-007. January 2000. *http://cfpub.epa.gov/npdes/stormwater/swfinal.cfm*

2 DEVELOPING A STORM SEWER MAP

The creation of a storm sewer map is the first mandatory element of an IDDE program. Phase II requires that the operator of a regulated MS4 develop a map of the MS4 that shows, at a minimum, the location of all outfalls and the names and locations of all waters of the United States that receive discharges from those outfalls. While many municipalities in the Northeast already have detailed maps of their storm sewer systems, others, typically those in older or more rural areas, have the information scattered in different locations. These municipalities will have the most work to do to comply with this requirement. If you need to develop a map, begin by collecting any existing information on outfall locations (e.g., review city records, drainage maps, storm drain maps, state or federal storm water permit files, state transportation maintenance maps), and then conduct field surveys to verify the locations.

CONDUCTING A FIELD SURVEY

A field survey of outfall locations will often be necessary to create a map or verify and update an existing map. The References section at the end of the chapter provides a Web link for a sample guide for conducting a storm drain mapping survey (MA DFWELE, 2002). Field outfall surveys generally include the following basic steps:

- Survey receiving waters on foot or by boat to look for all outfalls (i.e., wade small receiving waters or use a boat for larger receiving waters).
- Note the locations of outfalls on a map. The map scale should be such that outfalls can be located accurately.
- Assign a code or label to each outfall. Adopt a logical, easy-to-understand system (e.g., distance along the stream).
- Fill out a survey sheet for each outfall, noting characteristics such as dry weather discharge and deposits or stains.

MAPPING OPTIONS

For municipalities that do not already have a storm sewer map, it is important to determine the type of map (e.g., topographic, hand or computer drafted) that best fits your needs. Because there is no specific mapping standard in the Phase II rule, the goal of a mapping program should be functionality—find a way to map outfalls such that you

The goal of a mapping program should be functionality—find a way to map outfalls such that you (and the permitting authority) can locate any specific outfall to check on discharges.

CAN A DITCH BE AN OUTFALL?

The paragraph below is an excerpt from EPA's Storm Water Phase II Final Rule (USEPA, 1999).

The term "outfall" is defined in 40 CFR 122.26(b)(9) as "a point source at the point where a municipal separate storm sewer discharges to waters of the United States." The term "municipal separate storm sewer" is defined at 40 CFR 122.26(b)(8) as "a conveyance or system of conveyances (including roads with drainage systems, municipal streets, catch basins, curbs, gutters, ditches, man-made channels, or storm drains)." Following the logic of these definitions, a "ditch" may be part of the municipal separate storm sewer, and at the point where the ditch discharges to waters of the United States, it is an outfall. As with any determination about jurisdictional provisions of the CWA, however, final decisions require case-specific evaluations of fact.

(and the permitting authority) can locate any specific outfall to check on discharges. The most basic way to meet the mapping requirement is to use an existing map (e.g., a topographic map) that shows receiving waters. You can then mark outfall locations on the map by hand (using existing information augmented by a field survey). Make sure the names of receiving waters are shown on the map; for receiving waters that don't have names, it is helpful to indicate the nearest named water body downstream. The graphic at the beginning of this chapter shows an example of a marked-up United States Geological Survey map (markings do not represent actual outfalls). The next step up is a more sophisticated paper map (e.g., blueprint-style). Figure 1 presents an example of a simple paper map showing outfalls and other key features of the storm sewer system.

In many municipalities, a paper map may be completely adequate for carrying out an IDDE program. However, if your MS4 has the resources, or if your municipality has a complex storm sewer system, you may want to make use of available computer technology in making your map.

Global Positioning System (GPS) technology can be used to obtain the coordinates (longitude and latitude) for each outfall. A GPS unit, which uses data from the U.S. Department of Defense's constellation of GPS satellites to constantly update position, can be carried with you on your field survey. A particular position can be recorded and later downloaded into a Geographic Information System (GIS) database. Using GIS, the coordinates can be linked with other site-specific information, such as a picture and history of the outfall. GPS units can be purchased or rented.

There are various computerized mapping programs. A GIS program (e.g., ArcGIS) combines a georeferenced database with mapping capability, so that different geographical attributes (e.g., streets, outfalls, land use, monitoring data) can be mapped as

"layers" and displayed either separately or together. AutoCAD®, a design/drafting platform, is another program commonly used for storm sewer mapping.

If you plan to map via computer, decide if you want to make the mapping system compatible with other departments within your municipality and/or with other data sources (e.g., state agencies that provide GIS layers). Since storm sewer systems are often constructed in roadways, the use of the GIS road line data layer can be helpful in developing a map. If this layer is available, it is usually very accurate and frequently updated by state or regional agencies. Local or regional planning commissions may be able to provide assistance with GIS technology and map development. Once a particular software system has been chosen, it is helpful to require developers to submit compatible electronic updates for subsequent development to ensure that the map and data remain current after the initial mapping effort is finished.

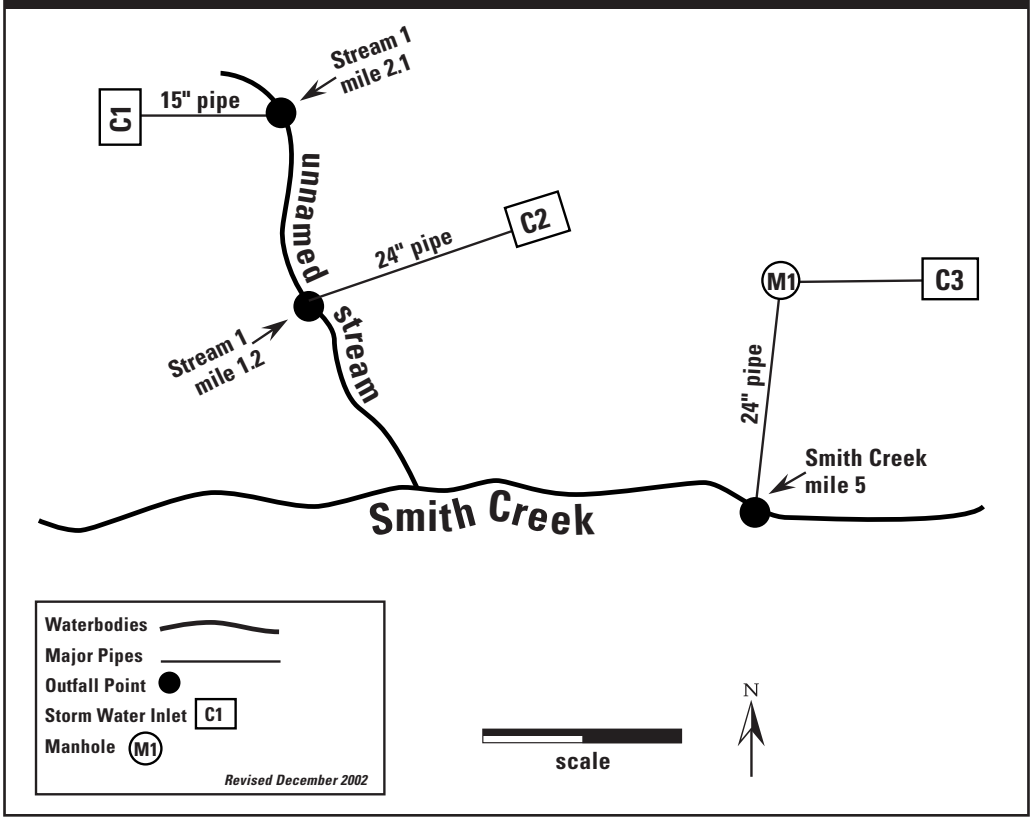
PRIORITIZING AREAS TO BE MAPPED

You may find that practical considerations will dictate the need to conduct mapping in phases. In this case, it is best to prioritize your mapping agenda. For example, older developed areas are more likely to have illicit discharges than newer areas for various reasons (e.g., many municipalities have imposed inspection requirements on new construction that help to prevent illegal connections). Therefore, if your community has limited resources, you would benefit from mapping the older areas first to ensure that priority areas are mapped.

You may find that practical considerations will dictate the need to conduct mapping in phases. In this case, it is best to prioritize your mapping agenda.

Other considerations in setting mapping priorities include land uses, reports of illicit discharges, and other information specific to each MS4. Although EPA's Phase II regulations require that only outfalls be mapped, once an illicit discharge is detected at an outfall, it may be necessary to map the portion of the storm sewer system leading to the outfall so that you are able to locate the source of the discharge. If possible, mapping the entire storm sewer system may prove very helpful to your IDDE program.

Figure 1 SAMPLE MAP



REFERENCES: CHAPTER 2

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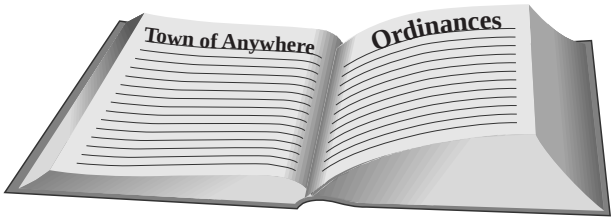
3 PROHIBITING ILLICIT DISCHARGES

The second mandatory element of a Phase II IDDE program requires that MS4 operators "to the extent allowable under State, Tribal, or local law, effectively prohibit through ordinance, or other regulatory mechanism, illicit discharges into the separate storm sewer system and implement appropriate enforcement procedures and actions as needed."



ILLICIT DISCHARGE ORDINANCES

As EPA's guidance specifies, a municipal ordinance created to comply with Phase II regulations must include a *prohibition* of illicit discharges and an *enforcement* mechanism. Note that it is also essential for the municipality to establish legal authority to inspect properties suspected of releasing contaminated discharges into the storm sewer system. Your municipality may already have a sewer use ordinance or similar bylaw that meets Phase II requirements, or that can be amended to meet the requirements. Consult with your town counsel and other municipal authorities to review your town's existing bylaws and regulations and determine what changes or additions are needed and what the procedure is for making those changes. If you need to make changes, you may want to review the model bylaws and other guidance discussed below.

EPA's nonpoint source pollution program Web site offers several examples of local ordinances for illicit discharges (USEPA, 2002). Appendix A of this manual presents EPA's general model ordinance, which synthesizes a number of existing municipal ordinances. In using any of these ordinances as a model, a community should take into account the legal authority granted to it under state law, the Phase II permit requirements in that state, the enforcement methods it deems appropriate, and any other locality-specific considerations.

A municipal ordinance created to comply with Phase II regulations must include a prohibition of illicit discharges and an enforcement mechanism.

A workgroup chaired by Massachusetts Department of Environmental Protection (MADEP) staff has been working on developing model bylaws that municipalities in the state can use to help them comply with Phase II regulations. The products of this group's work (model bylaws and associated guidance) are expected to be available on the MADEP Web site (see Chapter 10) by the time this manual is published. This group found that many of the available model ordinances did not fit well with the structure of Massachusetts government and, therefore, developed models that would work for towns in the state. The group also found that entry onto private property can be a tricky legal issue and should be treated carefully in any new or amended bylaws.

The Boston Water and Sewer Commission's (BWSC's) *Regulations Governing the Use of Sanitary and Combined Sewers and Storm Drains* are available on the Web (*http://*www.bwsc.org; click on "Engineering" then "Regulations") and may serve as a useful local model. The regulations specify certain conditions under which BWSC

representatives must be granted access to property; denial of access may lead to termination of water service.

Note that illicit discharges to *storm* sewers should be addressed hand-in-hand with the issue of illegal connections of extraneous water to *sanitary* sewers (typically referred to as infiltration/inflow or I/I programs); bylaws or regulations should make clear which discharges belong in which system.

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4 DEVELOPING AND IMPLEMENTING AN IDDE PLAN: LOCATING PRIORITY AREAS

Developing and implementing a plan to detect and address illicit discharges is the third mandatory element of a Phase II IDDE program. EPA recommends that the plan include the following four components: locating priority areas; tracing the source of an illicit discharge; removing the source of an illicit discharge; and program evaluation and assessment. The first component, locating priority areas, is the subject of this chapter. Each of the other three components will be discussed in chapters five, six, and seven respectively.

THE IDDE PLAN

- ➤ **Locating priority areas**
- **Tracing the source of an illicit discharge**
- **Removing the source of an illicit discharge**
- **Program evaluation and assessment**

The process of identifying "priority areas" can be broken down into three steps:

- ➤ ***Use available information to identify potential hot spots***
- ➤ ***Conduct dry-weather field screening to look for non-storm water discharges***
- ➤ ***Conduct water quality tests to see if these non-storm water discharges seem to be illicit discharges***

The following sections focus on each of these approaches.

IDENTIFYING POSSIBLE HOT SPOTS

"Hot spots" are areas that are considered to be likely sources of illicit discharges, based on available information. The following list provides examples of potential hot spots.

Commercial/ industrial areas These areas have been found in some communities' IDDE programs to (a) have significant numbers of illicit connections and/or (b) have discharges with a high potential to affect water quality (Tuomari, 1999 and Pitt et al., 1993). Specific business sectors can be prioritized (e.g., businesses subject to waste water pretreatment rules, businesses falling under certain Standard Industrial Classification [SIC] codes, or business sectors with a record of enforcement actions).

Older areas of town Older development may predate more stringent construction codes regarding illegal connections and may have deteriorating sewer and/or storm sewer infrastructure that can lead to infiltration problems.

Hot spots
Areas that are considered to be likely sources of illicit discharges, based on available information.

Areas where there have been repeated complaints Areas where illegal dumping or apparently contaminated discharges have been reported are obvious priority targets. Geographic Information System (GIS) mapping can be useful for visualizing complaint locations. These maps can be overlain with other pertinent resource information (e.g., locations of facilities that have had compliance violations, water quality data for receiving waters).

Locations identified from ambient water quality sampling data The locations of high levels of particular contaminants (e.g., bacteria) can help to target priority outfalls. Good resources for this information are the periodic water quality assessment reports ("305(b) reports") and lists of impaired waters ("303(d) lists") that the Clean Water Act requires each state to prepare and submit to EPA. These reports are prepared by each state's environmental agency and are available to the public, often on the state's Web site. Also, local watershed groups monitor many water bodies, particularly those in more developed areas. In addition to providing sampling data, these groups can often serve as valuable resources for information about a particular water body and potential problem areas. Other possible sources of water quality data include local Boards of Health (in Massachusetts, they must test at beaches) and water districts or departments.

CONDUCTING DRY-WEATHER OUTFALL/MANHOLE SURVEYS

Once your general geographic priority areas have been determined, dry-weather surveys of outfalls and/or manholes can be undertaken to look for non-storm water flows.

EPA recommends that you make visual observations of outfalls during dry weather. Some operators have found that dry-weather manhole inspections can also be useful. The presence of flow in a storm sewer outfall or manhole during dry weather indicates a likely illicit discharge. (Other explanations for the presence of such flow include infiltrating ground water or the diversion of a surface stream into the storm sewer system.) Because illicit discharges are often intermittent, you should ideally check for discharges multiple times in a given location (particularly in a priority location). Please note that only those with confined-space training should enter a manhole or outfall. The observation and sampling strategies described below can typically be conducted without entering manholes or outfalls.

IMPORTANT NOTE:
Only those with confined-space training should enter a manhole or outfall.

In implementing your dry-weather survey, consider adopting the following strategies.

- Combine this survey with the outfall mapping field survey (see Chapter 2) and/or water quality sampling of the discharges (discussed in the next section of this chapter).
- Enlist a watershed association or other volunteer organization to help with the outfall survey.
- Notify the public that the survey will be taking place (e.g., send notices to property owners in the area). Note that while it is desirable to keep the public informed

about the presence of survey-takers to prevent undue alarm, notification may also tip off an illegal discharger to curtail discharges; use your judgment as to the most appropriate course of action. For example, you might just specify a very general time frame during which the survey will take place.

- Keep safety considerations at the forefront of survey procedures at all times. Likely hazards should be anticipated and discussed with the individuals carrying out the survey, and individuals should be instructed to use their judgment and err on the side of caution as they conduct the survey. The survey should be conducted in groups of two or more. If manholes are opened for inspection as part of the survey, staff should wear high-visibility safety vests and block off their work area with traffic cones; police presence can be helpful for safety and to allay public concerns that can be created by individuals opening manholes.

- Determine your criterion for "dry weather." The working definition of dry weather used for sampling programs can vary depending on location-specific factors. Pitt et al. (1993) suggest that storm-runoff drainage ends in most urban areas no more than 12 hours after a storm event, but many programs (e.g., Boston, NH DES, San Diego) use a longer time period, such as no rain or no more than 1/10 inch of rain in the last 48 or 72 hours.

- Observe dry-weather flows for odor, color, turbidity, and floatable matter. Observe outfalls for deposits and stains, vegetation, and damage to outfall structures. This information can help identify contaminants present in the discharge and/or the likely nature of the discharge (e.g., sanitary, industrial). Some of the resources listed in Chapter 10 provide examples of data and observation sheets to be filled out for each outfall.

- Look up some of the resources listed in the references for this chapter for more detailed instructions for conducting dry-weather field surveys (e.g., MA DFWELE, 2002).

CASE STUDY: BOSTON WATER AND SEWER COMMISSION

USING SANDBAGS TO DETECT ILLICIT DISCHARGES

The Boston Water and Sewer Commission has had success using sandbags to help detect illicit discharges. Sandbags are placed in storm drain outlets that empty into manholes and/or water bodies. The sandbags are small enough that they do not block the storm drain outlet. They must be placed in the outlet after 48 hours of dry weather (1/10 inch of rain or less). After the bag is placed in the outlet, another 48 hours of dry weather is needed (total of 96 hours of dry weather). The outlet is then observed, and any water buildup behind the sandbag is sampled. This method is very effective in narrowing down the manhole junctures that contain illicit discharges. Sandbags cost approximately $60 each and can be reused. The main difficulty in using this method is the need for 96-hour periods of dry weather.

Information from an interview with Paul Barden, Deputy Director of Engineering Services, and Charlie Jewell, Project Director, Boston Water and Sewer Commission, August 15, 2002.

CONDUCTING WATER QUALITY TESTS

When dry-weather flow is observed, visual or odor observations (e.g., observation of pieces of toilet paper, strongly colored or very muddy discharge, or the odor of sewage or chemicals) may provide enough information to determine that the discharge is illicit and to identify the likely source. If not, water quality sampling can be used to determine whether the flow is likely to have resulted from an illicit discharge.

Certain water quality parameters can serve as indicators of the likely presence or absence of a specific type of discharge. Some of these parameters can be measured in the field with probes or test kits; others must be analyzed for in the laboratory. A wide variety of water quality parameters can be measured in an IDDE program, and many references exist that describe these parameters. Some of the more commonly used and useful parameters are summarized in Table 1, which focuses on parameters suggested in Pitt et al. (1993) and the subset of those recommended in EPA's Phase II regulations.

CASE STUDY: WINOOSKI, VERMONT

USE OF OPTICAL BRIGHTENERS

The city of Winooski, Vermont has found that testing for optical brighteners is an efficient, cheap way to determine the presence of a non-storm water discharge in a particular outfall. Optical brighteners are used in laundry detergents and thus serve as a marker for household or commercial laundry discharges. These tests are extremely sensitive to the presence of detergents.

To perform an optical-brightener test, an untreated cotton pad ($9/100 pads) surrounded by a mesh bag or a suet cage is placed in a storm drain outlet, manhole, or catch basin that has been found to have dry-weather discharge and left for a certain period of time (i.e., 5-7 days). The cotton pad is then brought back to the lab and placed under a UV lamp (approximately $200) in a dark room. A blue color indicates the presence of detergents, signifying either illegal dumping, a direct illicit connection, a leaking sewer, or leakage from a failed septic system. If the test is positive for detergents, further tests need to be performed to determine the source.

Information from an interview with Tim Grover, Water Pollution Control Facility Superintendent, City of Winooski, August 9, 2002.

TABLE 1 **WATER QUALITY TEST PARAMETERS AND USES**

Water Quality Test	Use of Water Quality Test	Comments
Conductivity	Used as an indicator of dissolved solids	- Pitt et al. 1993 suggested parameter; EPA Phase II regulations recommended parameter - Typically measured in the field with a probe
Ammonia	High levels can be an indicator of the presence of sanitary wastewater	- Pitt et al. 1993 suggested parameter; EPA Phase II regulations recommended parameter - Used very often and equipment is readily available; Boston, MA uses a field test kit (see case example)
Surfactants	Indicate the presence of detergent (e.g., laundry, car washing)	- Pitt et al. 1993 suggested parameter; EPA Phase II regulations recommended parameter - Boston, MA uses a field test kit (see case example)
pH	Extreme pH values (low or high) may indicate commercial or industrial flows; not useful in determining the presence of sanitary wastewater (which, like uncontaminated baseflows, tends to have a neutral pH, i.e., close to 7)	- Pitt et al. 1993 suggested parameter; EPA Phase II regulations recommended parameter - Typically measured in the field or lab with a probe
Temperature	Sanitary wastewater and industrial cooling water can substantially influence outfall discharge temperatures. This measurement is most useful during cold weather.	- Pitt et al. 1993 suggested parameter - Measured in the field with a thermometer or probe
Hardness	Used to distinguish between natural and treated waters	- Pitt et al. 1993 suggested parameter
Total Chlorine	Used to indicate inflow from potable water sources; not a good indicator of sanitary wastewater because chlorine will not exist in a "free" state in water for long (it will combine with organic compounds)	- Pitt et al. 1993 suggested parameter
Fluoride	Used to indicate potable water sources in areas where water supplies are fluoridated	- Pitt et al. 1993 suggested parameter
Potassium	High levels may indicate the presence of sanitary wastewater	- Pitt et al. 1993 suggested parameter
Optical Brighteners (Fluorescence)	Used to indicate presence of laundry detergents (which often contain fabric whiteners, which cause substantial fluorescence)	-Pitt et al. 1993 suggested parameter -Used by City of Winooski, VT (see case example)
Bacteria (fecal coliform, *E. coli,* and/or *enterococci)*	Used to indicate the presence of sanitary wastewater	- Used by NHDES (see case example in chapter 5)

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Interview with Andrea Donlon, NHDES, July 29, 2002.

Interview with Tim Grover, City of Winooski, VT, August 9, 2002.

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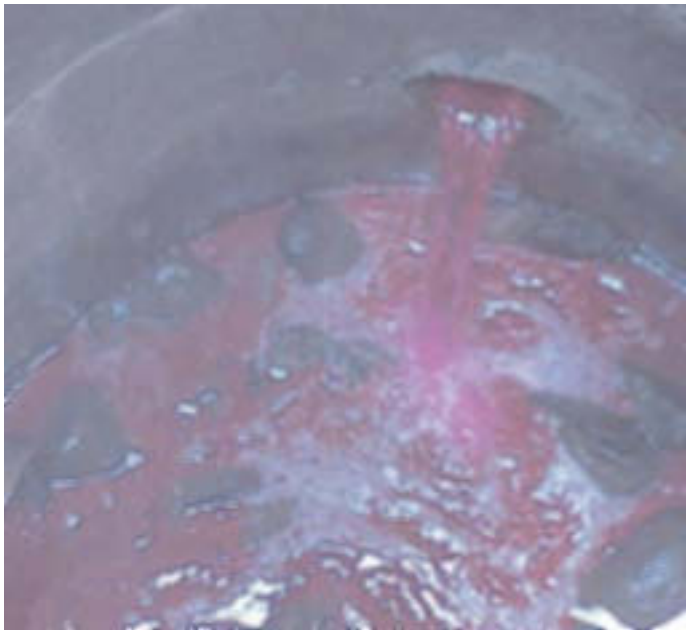
5 DEVELOPING AND IMPLEMENTING AN IDDE PLAN: TRACING THE SOURCE OF AN ILLICIT DISCHARGE

Developing and implementing a plan to detect and address illicit discharges is the third mandatory element of a Phase II IDDE program. EPA recommends that the plan include the following four components: (1) locating priority areas; (2) tracing the source of an illicit discharge; (3) removing the source of an illicit discharge; and (4) program evaluation and assessment. The second component, tracing the source of an illicit discharge, is the subject of this chapter.

THE IDDE PLAN

- Locating priority areas
- ➤ Tracing the source of an illicit discharge
- Removing the source of an illicit discharge
- Program evaluation and assessment

Once storm drain outlets with evidence of illicit discharges have been located, various methods can be used to pinpoint the exact source of the discharge. These techniques, many of which are already used by municipal sewer departments, include manhole observation, video inspection, smoke testing, dye testing, aerial infrared and thermal photography, and tracking illegal dumping.



MANHOLE OBSERVATIONS

A key tracing technique is to follow dry-weather flows upstream along the conveyance system to bracket the location of the source. This can be accomplished by taking the following steps:

- ➤ Consult the drainage system map.
- ➤ Check the next "upstream" manhole with a junction to see if there is evidence of discharge. You may wish to sample each manhole that has a discharge.
- ➤ Repeat these steps until a junction is found with no evidence of discharge; the discharge source is likely to be located between the junction with no evidence of discharge and the next downstream junction.
- ➤ Be aware of the surrounding areas and look for water in gutters and streets.

A key tracing technique is to follow dry-weather flows upstream along the conveyance system to bracket the location of the source.

Note that the Boston Water and Sewer Commission has had success working in the opposite direction (i.e., upstream to downstream) (Jewell 2001). Manhole observations can be time-consuming, but they are generally a necessary step before conducting other tests.

VIDEO INSPECTION

Mobile video cameras can be guided remotely through storm sewer lines to observe possible illegal connections into storm sewer systems and record observations on a videocassette or DVD. Public works staff can observe the videos and note any visible illegal connections. This technique is time-consuming and expensive but thorough and usually definitive, and it does not require the intrusion on members of the public that some of the other methods do.

SMOKE TESTING

This technique involves injecting non-toxic smoke into storm sewer lines and then noting the emergence of smoke from sanitary sewer vents in illegally connected buildings or from cracks and leaks in the storm sewer lines. The injection is accomplished by placing a smoke bomb in the storm sewer manhole below ground and forcing air in after it. Smoke-generating machines can also be used. Test personnel should be stationed at points of suspected illegal connections or cracks/leaks, noting any escape of smoke (indicating an illicit connection or damaged storm sewer infrastructure). Prior to performing this test, it is necessary to inform building owners and occupants in the area in advance. It is also advisable to inform the police and fire departments.

Smoke testing involves injecting non-toxic smoke into storm sewer lines and then noting the emergence of smoke from sanitary sewer vents in illegally connected buildings or from cracks and leaks in the storm sewer lines.

For a more thorough smoke-test program, the sanitary sewer lines can also be smoked. For houses that do not emit smoke during either the sanitary sewer or the storm sewer system tests, sewer gas may be venting inside, which is hazardous. Interviews with various IDDE program staff suggest that the smoke-test method is more effective in infiltration/inflow investigations of the sanitary sewer system than in detecting illegal connections to the storm sewer system.

Smoke may cause minor irritation of respiratory passages; residents with respiratory conditions should receive special attention to determine if it is safe for them to be present for the testing. Smoke testing is typically used to survey an area all at once, in contrast to dye testing, which tests one building at a time.

DYE TESTING

This technique involves flushing non-toxic dye into toilets and sinks and observing storm sewer and sanitary sewer manholes and storm sewer outfalls for the presence of the dye. Prior to performing this test, it is necessary to inform building owners and occupants in advance and gain permission for entry. Local public health and state water quality staff should also be notified so that they will be prepared to respond to citizens calling about any dye observed in surface waters.

To perform the test, you need a crew of two or more people (ideally, all with two-way radios). One person is inside the building; the others are stationed at the appropriate storm sewer and sanitary sewer manholes (which

CASE STUDY: NEW HAMPSHIRE DEPARTMENT OF ENVIRONMENTAL SERVICES

LOCATING AND TRACING ILLICIT DISCHARGES IN NEW HAMPSHIRE COASTAL COMMUNITIES

In 1996, the New Hampshire Department of Environmental Services (NHDES) began a program of investigating and eliminating illicit connections to storm drainage systems in coastal communities to reduce bacterial contamination in coastal waters. The following excerpt from the NHDES report on the first phase of the project describes the process used to detect and trace illicit discharges.

Beginning in the summer of 1996, the coastal shorelines were surveyed by foot or canoe at low tide for potential pollution sources. All pipes, seeps, streams, and swales with flow were sampled for bacteria. In addition, temperature was measured, and observations related to the condition of the pipe (stained or structurally damaged), odor, evidence of untreated wastewater (e.g., toilet paper), turbidity, color, debris, estimated flow, and any other observations were noted. Dry pipes were rechecked on several occasions for intermittent flow. Evidence indicating the presence of wastewater and/or elevated bacteria levels prompted further investigation of these locations.

Upstream catch basins and manholes associated with the outfall pipes that were identified by the screening process were surveyed for evidence of wastewater and sampled for bacteria. Smoke testing (using non-toxic smoke blown into catch basins) was then used to identify buildings connected to the storm drainage system by canvassing the neighborhood for vents emitting smoke. Final confirmation of an illicit connection from the buildings that emitted smoke was accomplished by dye testing indoor plumbing and observing the storm drainage and sewer systems for the presence or absence of the dye.

Feeder streams were surveyed for outfall pipes with dry-weather flow. Other potential bacteriological sources (e.g., pigeon roosting sites on bridges) were bracketed with water quality sampling stations. Where contaminated seeps and swales were suspected, the drainage area was surveyed for potential sources, such as broken sewer mains.

Landry, N. 1999. Elimination of Illicit Connections in Coastal New Hampshire Spurs Cooperation and Controversy: A Final Report to the New Hampshire Estuaries Project. New Hampshire Department of Environmental Services.

should be opened) and/or outfalls. The inside person drops dye into a plumbing fixture (i.e., toilet or sink) and runs a sufficient amount of water to move the dye through the plumbing system. The inside person then radios to the outside crew that the dye has been dropped, and the outside crew watches for the dye in the storm sewer and sanitary sewer, recording the presence or absence of the dye.

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

AERIAL INFRARED AND THERMAL PHOTOGRAPHY

Aerial infrared and/or thermal photography can be used to locate illicit discharges from outfalls and failing septic systems using temperature and vegetation as markers. This technique requires knowledge of aerial photo interpretation. Using aerial infrared or thermal photographs, do the following:

- For outfalls
  - Note if discharge has a higher temperature than that of the stream
  - Note if algae growth is concentrated near an outfall
- For potentially failing septic systems
  - Note evidence of increased moisture in surrounding soil
  - Observe vegetation located close to the potentially failing septic system, and note any increase in vegetation compared to the surrounding area
  - Observe any increase in temperature readings at the septic system location

Aerial infrared and/or thermal photography can be used to locate illicit discharges from outfalls and failing septic systems using temperature and vegetation as markers.

This is still a developing technology and not commonly used for IDDE programs. You may still need further tests to determine specific houses/businesses with illegal connections. This technique has been used primarily for the detection of failing septic systems, which are only considered "illicit discharges" under the Phase II Storm Water program if they discharge into the storm sewer system.

TRACKING ILLEGAL DUMPING

Developing a coordinated system for collecting and tracking reports of illegal dumping can help pinpoint this difficult-to-find source of illicit discharges. Suggestions for tracking illegal dumping include the following:

- Create a hotline that can be used to report any illegal-dumping behavior (i.e., who illegally dumped and where illegal dumping occurred).
- Observe the materials that have been illegally dumped and trace the potential sources of the materials.
- Note where dumping occurs most often, record patterns of time of day and day of the week, and note common responsible parties.

Developing a coordinated system for collecting and tracking reports of illegal dumping can help pinpoint this difficult-to-find source of illicit discharges.

Challenges in addressing illegal dumping include the difficulty of catching dumpers in the act and the significant staff time needed to receive, respond to, and track complaints.

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6 DEVELOPING AND IMPLEMENTING AN IDDE PLAN: REMOVING THE SOURCE OF AN ILLICIT DISCHARGE

Developing and implementing a plan to detect and address illicit discharges is the third mandatory element of a Phase II IDDE program. EPA recommends that the plan include the following four components: (1) locating priority areas; (2) tracing the source of an illicit discharge; (3) removing the source of an illicit discharge; and (4) program evaluation and assessment. The third component, removing the source of an illicit discharge, is the subject of this chapter.

THE IDDE PLAN

- Locating priority areas
- Tracing the source of an illicit discharge
- ➤ Removing the source of an illicit discharge
- Program evaluation and assessment

Because there are various sources of illicit discharges to the storm sewer system, there are different kinds of actions municipalities may have to take to remove those sources and prevent future illicit discharges. This section groups those actions into three categories: compliance assistance and enforcement for illegal connections to homes and businesses; proper construction and maintenance of MS4s; and responding to and preventing illegal dumping.

COMPLIANCE ASSISTANCE AND ENFORCEMENT FOR ILLEGAL CONNECTIONS TO HOMES AND BUSINESSES

There is a range of ways in which municipalities may wish to handle the removal of illegal connections between homes or businesses and the storm sewer system. Enforcement measures should be spelled out in the required IDDE ordinance (see Chapter 3), but the MS4 operator will normally be allowed to use judgment about what mix of compliance assistance and enforcement actions is appropriate in a given situation. Typically, a municipality responds to the discovery of an illegal connection in a graduated manner, beginning with efforts to obtain voluntary compliance and escalating to increasingly severe enforcement actions if compliance is not obtained.

Voluntary Compliance

Often, home or business owners are not aware of the existence of illegal connections between their buildings and the storm sewer systems. In these cases, providing the responsible party with information about the connection, its environmental consequences, the applicable regulations, and how to remedy it may be enough to secure vol-

untary compliance. The cost of removing the connection and reconnecting it to the sanitary sewer system can be an obstacle. Recognizing this, some localities (e.g., Boston and coastal New Hampshire) have chosen to provide assistance with these costs, using municipal public works funds or state or federal grants.

Typically, a municipality responds to the discovery of an illegal connection in a graduated manner, beginning with efforts to obtain voluntary compliance and escalating to increasingly severe enforcement actions if compliance is not obtained.

Enforcement

EPA's model illicit discharge ordinance (Appendix A) provides an example of the enforcement steps that might be specified in a typical local ordinance. These steps are summarized below.

- The authorized enforcement agency sends the property owner a Notice of Violation (NOV), which may require the violator to take steps such as monitoring, elimination of an illicit connection or discharge, or payment of a fine.
- The person receiving the NOV may appeal it.
- If the person receiving the NOV does not appeal or loses the appeal and fails to correct the violation, the enforcement agency may "take any and all measures necessary to abate the violation and/or restore the property." The agency then may require reimbursement from the violator for the cost of the abatement, including administrative costs.
- The authorized enforcement agency also has the ability to seek an injunction against the violator "restraining the person from activities which would create further violations or compelling the person to perform abatement or remediation of the violation."

If the municipality has not yet obtained enforcement authority (e.g., because a local ordinance has not yet been passed), it may be possible for the municipality to seek enforcement action from state or federal authorities. Involvement of state or federal

CASE STUDY: WAYNE COUNTY, MICHIGAN

ENFORCEMENT PROCEDURE

Wayne County, Michigan, began its illicit discharge detection and elimination program by targeting certain industrial and commercial facilities for site inspections—starting at the other end of the pipe from the outfall survey approach. County personnel visited the facilities, dye tested a representative number of plumbing fixtures, and observed general "housekeeping" practices.

If no violations were found, a thank you letter was sent to the facility acknowledging staff participation and closing the file. If a facility was found to have an illicit connection, a violation letter was sent, giving the facility 30 to 90 days to correct it. If a facility failed to comply with the request, the municipal plumbing inspector or building department became involved. If the municipality was not able to gain compliance, the facility was referred to the Michigan Department of Environmental Quality. When an illicit connection was eliminated, the county provided confirmation. Once a correction was confirmed, a confirmation/thank you letter was sent to facility management, thanking them for their participation and closing the file.

Information from Tuomari, D. 1999. Dos and Don'ts on Implementing a Successful Illicit Connection Program. *Technical Report of the Rouge River Demonstration Project.* ***http://www.rougeriver.com/proddata***

CASE STUDY: ST. LOUIS, MISSOURI

ENFORCEMENT PROCEDURE

The Metropolitan St. Louis Sewer District has a comprehensive ordinance regulating users who discharge into the sanitary sewer and storm sewer systems. Upon discovery of a violation of this ordinance, the Sewer District notifies the user of the nature of the violation and directs that actions be taken to remedy the non-compliance. Within 30 days of receipt of the notice, the user must submit a plan for correction of the violation to the Sewer District. If a violation is found within the house or business that appears to present an immediate danger to human health or welfare, a verbal notification is given immediately by telephone or visit, directing the user to take immediate action to discontinue or reduce the discharge to safe levels. A written notice is sent within five days of the verbal notification.

The Sewer District has the power to issue the following Administrative Orders: Cease and Desist Order (directing the user to stop the violating action), Compliance Order (directing the user take action to correct violation), Show Cause Order (directing the user to show cause why a proposed enforcement action should not be taken), and Consent Order (establishing an agreement with a user to correct a violation).

If the violator does not take action within the time allotted, the Sewer District has the right to eliminate the illicit discharge at the expense of the violator. Legal actions can be taken against, and penalties imposed on, any violator that does not comply.

Information from Metropolitan St. Louis Sewer District Ordinance No. 8472, on EPA's nonpoint source pollution Web site at ***http://www.epa.gov/owow/nps/ordinance/discharges.htm***

authorities may also be necessary if the source of an illicit discharge is located outside of the municipality's boundaries. Examples of enforcement procedures implemented in Wayne County, Michigan, and St. Louis, Missouri, are included in this section.

PROPER CONSTRUCTION AND MAINTENANCE OF MS4s

Some illicit discharge problems may be the responsibility of the MS4 operator. These problems include cross-connections between the sanitary sewer and storm sewer systems and infiltration into damaged or deteriorating storm sewer pipes.

Cross-connections between a municipality's sanitary sewer and storm sewer systems may exist by mistake, because of deterioration over time, or as part of the design in an antiquated system. Complete and accurate maps of the sewer and storm sewer systems can help identify these cross-connections and prevent them during any new construction that takes place.

Contamination can infiltrate into a cracked or leaking MS4 from leaking sanitary sewer pipes, failing septic systems, or contaminated groundwater. To help prevent this, both MS4s and sanitary sewer systems should be inspected periodically and maintained properly to keep them in good repair.

PREVENTING AND RESPONDING TO ILLEGAL DUMPING

It is often difficult to identify and locate the individuals responsible for illegal dumping; therefore, a program to address illegal dumping should focus on prevention, backed up by enforcement to the extent possible.

EPA Region 5 has prepared an *Illegal Dumping Prevention Guidebook* that suggests the following key strategies that can be used to prevent illegal dumping.

- **Site maintenance and controls** Measures should be taken to clean up areas where illegal dumping has taken place, and controls such as signs or access restrictions should be used, as appropriate, to prevent further dumping.
- **Community outreach and involvement** Outreach is the linchpin of an illegal-dumping prevention program and can include the following components:
  - Educating businesses, municipal employees, and the general public about the environmental and legal consequences of illegally disposing of waste into the storm sewer system
  - Providing and publicizing ways for citizens to properly dispose of waste
  - Providing opportunities for citizens to get involved in preventing and reporting illegal dumping
- **Targeted enforcement** This strategy should include a prohibition against illegal dumping via ordinance or another similar measure, backed up by trained law-enforcement personnel and possibly field operations.
- **Program measurement** Tracking and evaluation methods should be used to measure the impact of illegal-dumping prevention efforts and determine whether goals are being met.

Although the EPA Region 5 guidebook is targeted more to land dumping of solid waste, these strategies can also be applied to illegal dumping into the storm drain system. Some specific methods that municipalities can use to implement these strategies include the following:

- **Site maintenance and controls**
  - Storm-drain stenciling program
  - Spill-response plans for hazardous-waste spills
- **Community outreach and involvement**
  - An illegal-dumping reporting hotline
  - Outreach to business sectors that handle hazardous materials and/or have a history of illegal-dumping problems; outreach should include information on Best Management Practices for spill prevention and proper waste disposal

- Printed outreach materials for the public
- Publicizing of waste-disposal options, such as used oil recycling and household hazardous waste collections

➤ **Targeted enforcement**

- An illegal-dumping ordinance (or section of IDDE ordinance)
- Surveillance of known illegal-dumping locations
- Business facility inspections
- Training of municipal employees, police officers, and other local entities to be on lookout

➤ **Program measurement**

- Tracking of incident locations
- Compilation of statistics (e.g., annual cleanup costs, facility compliance, arrests, convictions, fines, complaints)

REFERENCES: CHAPTER 6

California Coastal Commission. 2002. *Model Urban Runoff Program: A How-To Guide for Developing Urban Runoff Programs for Small Municipalities.* http://www.coastal.ca.gov/la/murp.html

Center for Watershed Protection. *Pollution Prevention Fact Sheet: Illegal Dumping Control.* http://www.stormwatercenter.net/Pollution_Prevention_Factsheets/IllegalDumpingControl.htm

Interview with Paul Barden and Charlie Jewell, BWSC, August 15, 2002.

Interview with Andrea Donlon, NHDES, July 29, 2002.

North Central Texas Council of Governments. 2002. *Storm Water Management in North Central Texas: Illicit Discharge Detection and Elimination.* http://www.dfwstormwater.com/Storm_Water_BMPs/illicit.html

San Diego Stormwater Copermittees Jurisdictional Urban Runoff Management Program. 2001. *Illicit Connection/Illicit Discharge (IC/ID) Detection and Elimination Model Program Guidance.* http://www.projectcleanwater.org/html/model_programs.html

USEPA. 1997. *Guidance Manual for Implementing Municipal Storm Water Management Programs – Volume 1: Planning and Administration* (Draft). Office of Wastewater Management and Office of Research and Development. http://www.epa.gov/npdes/pubs/owm0233.pdf

USEPA. 1999. National Pollutant Discharge Elimination System – Regulations for Revision of the Water Pollution Control Program Addressing Storm Water Discharges; Final Rule. *Federal Register* Vol. 64 No. 235 (December 8, 1999), pp. 68722-68851. http://www.epa.gov/npdes/regulations/phase2.pdf

USEPA. 2002. Storm Water Phase II Menu of BMPs - *Illicit Discharge Detection and Elimination: Illegal Dumping.* http://cfpub.epa.gov/npdes/stormwater/menuofbmps/illi_3.cfm

USEPA. 2002. *Model Ordinances to Protect Local Resources: Illicit Discharges.* http://www.epa.gov/owow/nps/ordinance/discharges.htm

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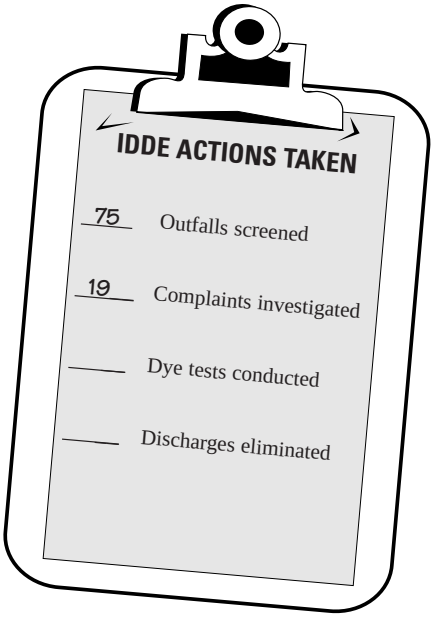
7 DEVELOPING AND IMPLEMENTING AN IDDE PLAN: EVALUATION OF THE IDDE PROGRAM

Developing and implementing a plan to detect and address illicit discharges is the third mandatory element of a Phase II IDDE program. EPA recommends that the plan include the following four components: (1) locating priority areas; (2) tracing the source of an illicit discharge; (3) removing the source of an illicit discharge; and (4) program evaluation and assessment. The fourth component, program evaluation and assessment, is the subject of this chapter.

THE IDDE PLAN

- **Locating priority areas**
- **Tracing the source of an illicit discharge**
- **Removing the source of an illicit discharge**
- ➤ **Program evaluation and assessment**

EPA recommends that the IDDE plan include procedures for program evaluation and assessment. Program evaluation is the time to step back, look at what has been done, determine what worked and what didn't, and make adjustments to planned future actions as appropriate. In this final component of your IDDE plan, you outline how you will go about evaluating your program.



EVALUATION STRATEGY

Evaluation procedures should include documentation of actions taken to locate and eliminate illicit discharges. Such documentation might include numbers of outfalls screened, complaints taken and investigated, feet of storm sewers videotaped, numbers of discharges eliminated, or number of dye or smoke tests conducted. Note that this component of the IDDE plan fits in with the overall Phase II requirements for identifying measurable goals for each Best Management Practice (BMP) and reporting on progress toward achieving those goals. (Chapter 9 discusses BMPs and measurable goals in more detail.) Annual reports are necessary during the first permit term (typically five years), and in years two and four in subsequent terms. (For more information on reporting requirements, see EPA's Fact Sheet 2.9.)

Evaluation procedures should include documentation of actions taken to locate and eliminate illicit discharges.

Determining the impact of these actions is more of a challenge, but it is an important part of the overall process because EPA allows for adjustments to the storm water management program over the life of the permit. Assessment of what worked and what didn't provides the information needed to make these adjustments to your IDDE program. EPA's Phase II regulations do not specify exactly how to evaluate your IDDE program, so check whether your permitting authority has made any particular specifications, and brainstorm from there.

Here are few suggestions for assessing the effectiveness of various IDDE strategies:

- Evaluate the number of possible illicit discharges that were detected using different detection methods. This can help you determine which detection methods are most effective.
- Evaluate the number of discharges and/or quantity of discharges eliminated using different possible enforcement and compliance measures.
- If you have access to monitoring data for receiving waters, evaluate changes in the water quality of receiving waters.
- Program evaluation might also include procedures for considering efficiency and feasibility. Questions you might want to ask include:
  - How much staff time and expense did it take to achieve a given result?
  - Were practical difficulties encountered with this approach? What were they, and how much of a problem did they present?

The strategies listed above are only suggestions. Because you are allowed a great deal of flexibility in determining what procedures you will use for program evaluation and assessment, you can decide what procedures will be most helpful in providing the information that you will need to move forward with your IDDE program.

REFERENCES: CHAPTER 7

USEPA. 1999. National Pollutant Discharge Elimination System – Regulations for Revision of the Water Pollution Control Program Addressing Storm Water Discharges; Final Rule. *Federal Register* Vol. 64 No. 235 (December 8, 1999), pp. 68722-68851. *http://www.epa.gov/npdes/regulations/phase2.pdf*

USEPA. 2000. EPA Storm Water Phase II Final Rule Fact Sheet 2.9: *Permitting and Reporting: The Process and Requirements.* EPA 833-F-011. January 2000. *http://cfpub.epa.gov/npdes/stormwater/swfinal.cfm*

USEPA New England. 2002. *NPDES General Permit for Storm Water Discharges from Regulated Small Municipal Separate Storm Sewer Systems (MS4s*) (Draft). September 27, 2002. *http://www.epa.gov/region01/npdes/ms4.html*

8 OUTREACH TO EMPLOYEES, BUSINESSES, AND THE GENERAL PUBLIC

The fourth mandatory element of an IDDE program calls for the MS4 operator to "inform public employees, businesses, and the general public of hazards associated with illegal discharges and improper disposal of waste." As noted in the Introduction, the requirement for public education and outreach on storm water impacts is also one of the six minimum control measures in the storm water management program. Therefore, fulfilling the outreach requirement for IDDE helps the MS4 to comply with this mandatory element; IDDE outreach can be integrated into the broader storm water outreach program.

Some suggestions for conducting IDDE outreach to the different community sectors are presented below. Many examples of storm water outreach materials, including some that are intended to be modified and used by anyone, are available on the Web; some useful Web sites are listed in Chapter 10. Operators of regulated small MS4s may want to work together with other operators in their area in developing outreach materials and campaigns to share ideas and save money.

PUBLIC EMPLOYEES

While it is clear that public works employees should receive specific technical training on the requirements of the IDDE program and the techniques that will be used to carry it out, other municipal departments should also be targeted for training.

A training program for municipal employees on pollution prevention techniques is required under the "Pollution Prevention/Good Housekeeping for Municipal Operations" minimum control measure. Preventing non-storm water discharges into the storm sewer system from municipal operations can be one part of this training.

Many public employees can play an important role as partners in the detection and/or prevention of illicit discharges.

Many public employees can play an important role as partners in the detection and/or prevention of illicit discharges. For example, highway department staff who maintain catch basins can look for signs of illicit discharges. Municipal building inspectors can help ensure that illegal connections to the storm sewer system do not take place in construction and renovation projects. Police officers, public works employees, and other municipal staff whose jobs keep them outside and mobile can help spot illegal dumpers. Fire and police department personnel who respond to hazardous material spills can help keep these spills out of the storm sewer system and adjacent water bodies.

BUSINESSES

Most businesses are willing to comply with environmental requirements and take proactive steps to prevent pollution if they understand the issues and the possible solutions. Here are some steps you can take to reach out to businesses.

Most businesses are willing to comply with environmental requirements and take proactive steps to prevent pollution if they understand the issues and the possible solutions.

- Create a general brochure and presentation to inform businesses about the IDDE program. This information can be presented and/or made available at Chamber of Commerce meetings and other business forums.
- Conduct compliance assistance outreach (e.g., visits, group training, and/or printed materials) for specific business types (e.g., auto repair shops, mobile carpet cleaning, restaurants).
- Provide contractors and developers with information on preventing illegal connections (in coordination with training on construction and post-construction storm water requirements).

GENERAL PUBLIC

There are many ways in which the general public can be made aware of environmental issues and the things they can do to help mitigate or prevent problems. Here are some things you can do to inform and involve the public.

- Work with citizen groups to conduct storm-drain stenciling (e.g., "Don't Dump – Drains to River") and outfall surveys.
  - In conducting these activities, you should:
    - Educate the groups about their activity (either informally or via a video or other presentation)
    - Make sure volunteers understand constraints associated with storm-drain stenciling activities (e.g., heavy traffic use areas, historic districts)
    - Have volunteers sign liability forms, if necessary
  - You may also wish to:
    - Publicize the activities through the media
    - Give volunteers brochures to hand out to the public with who they interact
    - Repeat stenciling periodically (due to paint wear off), unless placards are used—stenciling on curbs lasts longer than on street surfaces
    - See Chapter 10 for information on storm-drain stenciling resources

If made aware of environmental issues, the general public can help mitigate or prevent problems.

- Create a program to promote, publicize, and facilitate public reporting of illicit connections or discharges (e.g., a hotline). Some considerations in running a hotline include:
  - Callers should be able to at least leave a message at any time of day
  - It may be helpful to have the hotline staffed during business hours
  - A system should be created for monitoring the hotline so that staff can follow up quickly on reports of discharges

- The municipality may wish to offer a small reward for callers that provide information leading to the detection of an illicit discharge source

➤ Distribute (by mail and by making available at various locations and events) printed outreach materials. A general flyer about illicit discharges might include information on the following:

- Background information on water pollution
- A definition of what constitutes an illicit discharge
- Measures to prevent illicit discharges
- Information about the municipality's illicit discharge ordinance

➤ Create Public Service Announcements for radio and/or television.

➤ Work with the local access cable station and local newspapers to develop features on illicit discharge prevention.

➤ Create and publicize a household hazardous waste disposal/recycling program.

➤ Provide classroom speakers and/or printed information for schools.

REFERENCES: CHAPTER 8

Chesterfield County (VA). Undated. *Household Guide to Chesterfield County's Illicit Discharge Ordinance.* *http://www.chesterfield.gov/CommunityDevelopment/Engineering/HouseholdFactSheet.pdf*

North Central Texas Council of Governments. 2002. *Storm Water Management in North Central Texas: Illicit Discharge Detection and Elimination.* *http://www.dfwstormwater.com/Storm_Water_BMPs/illicit.html*

USEPA. 1999. National Pollutant Discharge Elimination System – Regulations for Revision of the Water Pollution Control Program Addressing Storm Water Discharges; Final Rule. *Federal Register* Vol. 64 No. 235 (December 8, 1999), pp. 68722-68851. *http://www.epa.gov/npdes/regulations/phase2.pdf*

USEPA. 2000. *Storm Water Phase II Compliance Assistance Guide.* EPA 833-R-00-002. Office of Water. *http://www.epa.gov/npdes/pubs/comguide.pdf*

USEPA. 2000. EPA Storm Water Phase II Final Rule Fact Sheet 2.3: *Public Education and Outreach Minimum Control Measure.* EPA 833-F-00-005. January 2000. *http://cfpub.epa.gov/npdes/stormwater/swfinal.cfm*

USEPA. 2000. EPA Storm Water Phase II Final Rule Fact Sheet 2.8: *Pollution Prevention/Good Housekeeping Minimum Control Measure*. EPA 833-F-00-010. January 2000. *http://cfpub.epa.gov/npdes/stormwater/swfinal.cfm*

USEPA. 2002. Storm Water Phase II Menu of BMPs – *Public Education and Outreach on Storm Water Impacts.* *http://cfpub.epa.gov/npdes/stormwater/menuofbmps/pub_ed.cfm*

USEPA. 2002. Storm Water Phase II Menu of BMPs – *Public Education and Outreach on Storm Water Impacts: Proper Disposal of Household Hazardous Wastes.* *http://cfpub.epa.gov/npdes/stormwater/menuofbmps/edu_5.cfm*

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9 BMPS AND MEASURABLE GOALS FOR IDDE

As mentioned in the Introduction, operators of regulated small MS4s generally must submit applications for Phase II storm water general permits by March 10, 2003. As part of their application, they must identify best management practices (BMPs) that they will use to comply with each of the six minimum control measures, and the measurable goals that they will use to demonstrate BMP implementation. Within the first permit term, the operators have to fully implement their storm water management programs.

GETTING STARTED

EPA allows MS4 operators a great deal of flexibility in determining what BMPs are most appropriate for their storm water programs. The agency has developed the following materials to assist operators in identifying appropriate BMPs:

- A *National Menu of Best Management Practices for Storm Water Phase II*, which includes a toolkit of example BMPs for each of the Phase II minimum control measures (available on the Web)
- *Measurable Goals Guidance for Small MS4s*
- A *Storm Water Phase II Compliance Guide*, which offers examples of BMPs and measurable goals for each of the six minimum measures

EPA allows MS4 operators a great deal of flexibility in determining what BMPs are most appropriate for their storm water programs.

Others, including states, regional agencies, trade associations, and non-profit organizations have also developed BMP information.

A sample list of IDDE BMPs and measurable goals is presented below. This list draws from BMP and measurable goal recommendations that have been offered by EPA and others. The list has not been officially endorsed by EPA or state agencies; it is intended to serve as a starting point to help municipalities think about the BMPs and measurable goals that are appropriate to their IDDE programs. BMPs are listed in bold, followed by the measurable goals for each BMP. (The BMPs are organized according to the four elements required in an IDDE program.)

STORM SEWER MAP

- **Create a storm sewer map**
  - Map a certain percentage of outfalls (adding up to 100% by the end of the permit term) or of the area of the town

ORDINANCE

Pass an illicit discharge ordinance

- Draft an IDDE ordinance (or storm water ordinance with IDDE component) or an amendment to existing bylaws
- Pass an ordinance or amendment

IDDE PLAN

Prepare an IDDE plan

- Complete a final plan and obtain the signature of the person overseeing the plan

Conduct dry weather field screening of outfalls

- Screen a certain percentage of outfalls (adding up to 100% by the end of the permit term)

Trace the source of potential illicit discharges

- Trace the source of a certain percentage of continuous flows (adding up to 100% by the end of the permit term)
- Trace the source of a certain percentage of intermittent flows and illegal dumping reports (100% may never be an achievable goal in this case)

Eliminate illicit discharges

- Eliminate a certain number of discharges and/or a certain volume of flow, or a certain percentage of discharges whose source is identified (adding up to 100% by the end of the permit term)

OUTREACH

Implement and publicize a household hazardous waste collection program

- Hold a periodic (e.g., annual) hazardous waste collection day
- Mail flyers about the hazardous waste collection program to all town residences

Create and distribute an informational flyer for homeowners about IDDE

- Mail the flyer to town residences
- Print the flyer as a doorknob hanger and have water-meter readers distribute it

Create and distribute an informational flyer for businesses about IDDE

- Mail the flyer to targeted businesses

Work with community groups to stencil storm drains

- Stencil a certain percentage of drains

➤ **Create and publicize an illicit discharge reporting hotline**

- Put the hotline in place
- Include an announcement of the hotline in sewer bills
- Follow up on all hotline reports within 48 hours

REFERENCES: CHAPTER 9

North Central Texas Council of Governments. 2002. *Storm Water Management in North Central Texas: Illicit Discharge Detection and Elimination.* *http://www.dfwstormwater.com/Storm_Water_BMPs/illicit.html*

USEPA. 1999. National Pollutant Discharge Elimination System – Regulations for Revision of the Water Pollution Control Program Addressing Storm Water Discharges; Final Rule. *Federal Register* Vol. 64 No. 235 (December 8, 1999), pp. 68722-68851. *http://www.epa.gov/npdes/regulations/phase2.pdf*

USEPA. 2000. *Storm Water Phase II Compliance Assistance Guide.* EPA 833-R-00-002. Office of Water. *http://www.epa.gov/npdes/pubs/comguide.pdf*

USEPA. 2000. EPA Storm Water Phase II Final Rule Fact Sheet 2.9: *Permitting and Reporting: The Process and Requirements.* EPA 833-F-011. January 2000. *http://cfpub.epa.gov/npdes/stormwater/swfinal.cfm*

USEPA. 2002. *National Menu of Best Management Practices for Storm Water Phase II.* *http://cfpub.epa.gov/npdes/stormwater/menuofbmps/menu.cfm*

USEPA. 2002. *Measurable Goals Guidance for Phase II Small MS4s.* *http://cfpub.epa.gov/npdes/stormwater/measurablegoals/index.cfm*

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10 RESOURCES

WEB SITES AND PUBLICATIONS

Key Information Available on EPA's Storm Water Web Site

Entry Point and General Information
http://www.epa.gov/npdes
→ click on "Storm Water"
→ click on "Municipal Separate Storm Sewer Systems" or "Phase II"

Storm Water Phase II Final Rule
http://www.epa.gov/npdes/regulations/phase2.pdf
IDDE section of the Phase II Final Rule: see section II(H)(3)(b)(iii), pp. 68756-68758.

EPA's Fact Sheet Series
http://cfpub.epa.gov/npdes/stormwater/swfinal.cfm

Overview
1.0 *Storm Water Phase II Final Rule: An Overview*

Small MS4 Program
2.0 *Small MS4 Storm Water Program Overview*
2.1 *Who's Covered? Designation and Waivers of Small Regulated MS4s*
2.2 *Urbanized Areas: Definition and Description*

Minimum Control Measures
2.3 *Public Education and Outreach*
2.4 *Public Participation/Involvement*
2.5 *Illicit Discharge Detection and Elimination*
2.6 *Construction Site Runoff Control*
2.7 *Post-Construction Runoff Control*
2.8 *Pollution Prevention/Good Housekeeping*

2.9 *Permitting and Reporting: The Process and Requirements*
2.10 *Federal and State-Operated MS4s: Program Implementation*

Construction Program
3.0 *Construction Program Overview*
3.1 *Construction Rainfall Erosivity Waiver*

Industrial "No Exposure"
4.0 *Conditional No Exposure Exclusion for Industrial Activity*

Documents
Storm Water Phase II Compliance Assistance Guide
http://www.epa.gov/npdes/pubs/comguide.pdf

National Menu of BMPs for Storm Water Phase II
http://cfpub.epa.gov/npdes/stormwater/menuofbmps/menu.cfm

Measurable Goals Guidance for Phase II Small MS4s
http://cfpub.epa.gov/npdes/stormwater/measurablegoals/index.cfm

Storm Water Web Sites

The Rouge River National Wet Weather Demonstration Project
http://www.rougeriver.com
(See specific information on IDDE at http://www.rougeriver.com/techtop/illicit/overview.html .)

Center for Watershed Protection's Storm Water Manager's Resource Center
http://www.stormwatercenter.net

The University of Tennessee's Municipal Technical Advisory Service NPDES Phase II Storm Water Management BMP Toolkit
http://www.mtas.utk.edu/bmptoolkit.htm
The Illicit Discharge section provides a number of useful web links and downloadable PDFs.

Organization Web Sites

Water Environment Federation
http://www.wef.org

American Public Works Association
http://www.apwa.net

Local Government Environmental Assistance Network
http://www.lgean.org

Center for Watershed Protection
http://www.cwp.org

The Boston Water and Sewer Commission
(the Web site includes the BWSC's regulations, outreach information, and other useful items)
http://www.bwsc.org

Storm Water Manuals

California Coastal Commission. 2002. *Model Urban Runoff Program: A How-To Guide for Developing Urban Runoff Programs for Small Municipalities.* *http://www.coastal.ca.gov/la/murp.html*

Colorado Department of Public Health and Environment, Water Quality Control Division. October 2001. *Colorado's Phase II Municipal Guidance: A guide to application requirements and program development for coverage under Colorado's Phase II municipal stormwater discharge permit.*
http://www.cdphe.state.co.us/wq/PermitsUnit/wqcdpmt.html

IDDE Manuals

San Diego Stormwater Copermittees Jurisdictional Urban Runoff Management Program. 2001. *Illicit Connection/Illicit Discharge (IC/ID) Detection and Elimination Model Program Guidance.*
http://www.projectcleanwater.org/html/model_programs.html

Pitt, R., M. Lalor, R. Field, D.D. Adrian, and D. Barbe. 1993. *Investigation of Inappropriate Pollutant Entries into Storm Drainage Systems: A User's Guide.* USEPA Office of Research and Development. EPA/600/R-92/238. (Available on the Web via EPA's National Environmental Publications Information System, *http://www.epa.gov/clariton*.)

North Central Texas Council of Governments. 2002. *Storm Water Management in North Central Texas: Illicit Discharge Detection and Elimination.*
http://www.dfwstormwater.com/Storm_Water_BMPs/illicit.html

Information on Specific Topics

Ordinances
USEPA's Model Ordinances to Protect Local Resources: Illicit Discharges.
http://www.epa.gov/owow/nps/ordinance/discharges.htm
(The same information can be found at *http://www.stormwatercenter.net.*)

Boston Water and Sewer Commission's *Regulations Governing the Use of Sanitary and Combined Sewers and Storm Drains. http://www.bwsc.org*

The Massachusetts Citizen Planner Training Collaborative offers "Tips on Drafting Bylaws" for Massachusetts municipalities: *http://www.umass.edu/masscptc/Tips_on_Drafting.html*

Optical Brighteners
Sargent, D. and W. Castonguay. 1998. *An Optical Brightener Handbook.* Available at:
http://www.mvpc.org/services_sec/mass_bays/optical_handbook.htm and
http://www.naturecompass.org/8tb/sampling/

Dye Testing
Dye supplier used by a reviewer of this manual: NORLAB, Inc., Amherst, OH. 1-800-247-9422;
http://www.norlabdyes.com

Smoke Testing
Smoke testing equipment supplier used by a reviewer of this manual: Hurco Technologies, Inc., 1-800-888-1436;
http://www.hurcotech.com

Outfall/Manhole Surveys
Massachusetts Division of Fisheries, Wildlife, and Environmental Law Enforcement. Storm Drain Mapping Project Field Manual (Draft). January 2002. *http://www.state.ma.us/dfwele/River/pdf/rivstormdrainmanual.pdf*

Jewell, C. 2001. A Systematic Methodology for Identification and Remediation of Illegal Connections. Presented at the Water Environment Federation Specialty Conference *2001 A Collection Systems Odyssey: Combining Wet Weather and O&M Solutions.* (Available for purchase via the WEF Web site, *http://www.wef.org*.)

Outreach

- **Household Hazardous Waste Collection**
  Household hazardous waste collection days in New Hampshire can be viewed online at
  http://www.des.state.nh.us/hhw/hhwevent.htm.

  Environmental Depot, Burlington VT. *http://www.cswd.net/facilities/hazardous_waste.shtml*

- **Storm-Drain Stenciling**
  Earthwater Stencils, an organization that does storm drain stenciling: *http://www.earthwater-stencils.com/*

  The Ocean Conservancy's Storm Drain Sentries program has a goal of having volunteers stencil one million storm drains with educational pollution prevention messages. The Ocean Conservancy supplies volunteers with a fact sheet about nonpoint source pollution, tips on conducting a stenciling project, and stencils for volunteer organizations to use. In return, stenciling project leaders are asked to submit data about the number of storm drains they stenciled, the types of pollutants found near the storm drains, and potential pollutant sources. This information is added to a growing database maintained by the Ocean Conservancy. Contact the Ocean Conservancy's Office of Pollution Prevention and Monitoring at 757-496-0920 or *stormdrain@oceanconservancyva.org.*
  http://www.oceanconservancy.org/dynamic/getInvolved/events/sentries/sentries.htm

  Resources for storm drain stenciling programs in New Hampshire:

  - Coordinated by Julia Peterson of UNH-Cooperative Extension in the coastal watershed *http://ceinfo.unh.edu/Common/Documents/gsc5401.htm*. Also described at *http://www.seagrant.unh.edu/extension.htm*
  - Coordinated by the NH Coastal Program (part of the Office of State Planning) *http://www.state.nh.us/coastal/CoastalEducation/marinedebris.htm*
  - Description of Manchester's storm drain stenciling on EPA's Web site describing the SEPP *http://www.epa.gov/region1/eco/csoman/sepp.html* (See #1 and #6)

- **Outreach Materials**
  EPA is preparing educational materials on different water topics each month as part of the year-long celebration of the 30th anniversary of the Clean Water Act. April 2003 will be Storm Water Month. The public education kit is expected to include:

  - General Storm Water Awareness brochure
  - Homeowner Guide (car washing, vehicle fluids changing, lawn & garden care, pet waste, septic system management)
  - Small Construction Guide poster
  - Press release
  - Public service announcement for the radio
  - Stickers
  - Door hanger with illicit discharge message
  - PowerPoint presentation

  These items will be available for download or order on EPA's Year of Clean Water Web site, *http://www.epa.gov/water/yearofcleanwater/month.html*. Before the materials are available on the Web site, you can contact EPA's contractor, TetraTech, to be on the mailing list for the materials.
  Email Kathryn Phillips at *tetratech1@earthlink.net* or *kathryn.phillips@tetratech-ffx.com.*

CONTACTS

USEPA-New England is the NPDES permitting authority for Massachusetts and New Hampshire. The other five NEIWPCC member states serve as NPDES permitting authorities for the storm water program. Contact information below was taken from the EPA-New England Web site *http://www.epa.gov/region01/npdes/stormwater/administration.html*, the EPA NPDES Web site *http://www.epa.gov/npdes*, and the New York State Department of Environmental Conservation Web site *http://www.dec.state.ny.us*.

U.S. EPA

EPA Region 1, New England
Regional Storm Water Coordinator
Thelma Murphy 617-918-1615; *murphy.thelma@epa.gov*

Regional Storm Water Assistance Team
Ann Herrick 617-918-1560; *herrick.ann@epa.gov*
Shelly Puleo 617-918-1545; *puleo.shelly@epa.gov*
Olga Vergara 617-918-1519, *vergara.olga@epa.gov*

Massachusetts Assistance
Dave Gray 617-918-1577; *gray.davidj@epa.gov*

EPA Region 2
Regional Storm Water Coordinator
Karen O'Brien 212-637-3717; *obrien.karen@epa.gov*

STATES

Connecticut
Connecticut Department of Environmental Protection
Bureau of Water Management
Permitting, Enforcement, and Remediation Division
http://www.dep.state.ct.us

Contact: Chris Stone 860-424-3850; *chris.stone@po.state.ct.us*

Maine
Maine Department of Environmental Protection
Bureau of Land and Water Quality
http://www.state.me.us/dep/blwq/stormwtr/index.htm

Contact: David Ladd 207-287-5404; *david.ladd@state.me.us*

Massachusetts
Massachusetts Department of Environmental Protection
Division of Watershed Management
http://www.state.ma.us/dep/brp/stormwtr/stormhom.htm

Contacts: Ginny Scarlet 508-767-2797; *ginny.scarlet@state.ma.us*
Linda Domizio 508-849-4005; *linda.domizio@state.ma.us*

New Hampshire
New Hampshire Department of Environmental Services
Storm Water Fact Sheet: *http://www.des.state.nh.us/factsheets/wwt/web-8.htm*
Storm Water Web Site: *http://www.des.state.nh.us/StormWater*

Contacts: Jeff Andrews 603-271-2984
Public Information and Permitting Office 603-271-2975

New York
New York State Department of Environmental Conservation
Division of Water
http://www.dec.state.ny.us/website/dow/mainpage.htm

Contact: Mike Rafferty 518-402-8094; *mrraffer@gw.dec.state.ny.us*

Rhode Island
Rhode Island Department of Environmental Management
Water Resources – Permitting
http://www.state.ri.us/dem/programs/benviron/water/permits/ripdes/stwater/index.htm

Contacts: Margarita Chatterton 401-222-4700 x7605; *mchatter@dem.state.ri.us*
Greg Goblick 401-222-4700 x7265; *ggoblick@dem.state.ri.us*

Vermont
Vermont Department of Environmental Conservation
Water Quality Division
http://www.anr.state.vt.us/dec/waterq/stormwater.htm

Contact: Peter LaFlamme 802-241-3765; *petel@dec.anr.state.vt.us*

APPENDIX A

Model Illicit Discharge and Connection Stormwater Ordinance[1]

ORDINANCE NO. _____

SECTION 1. PURPOSE/INTENT.

The purpose of this ordinance is to provide for the health, safety, and general welfare of the citizens of (_____) through the regulation of non-storm water discharges to the storm drainage system to the maximum extent practicable as required by federal and state law. This ordinance establishes methods for controlling the introduction of pollutants into the municipal separate storm sewer system (MS4) in order to comply with requirements of the National Pollutant Discharge Elimination System (NPDES) permit process. The objectives of this ordinance are:

1)To regulate the contribution of pollutants to the municipal separate storm sewer system (MS4) by stormwater discharges by any user

(2) To prohibit Illicit Connections and Discharges to the municipal separate storm sewer system

(3) To establish legal authority to carry out all inspection, surveillance and monitoring procedures necessary to ensure compliance with this ordinance

SECTION 2. DEFINITIONS.

For the purposes of this ordinance, the following shall mean:

Authorized Enforcement Agency: employees or designees of the director of the municipal agency designated to enforce this ordinance.

Best Management Practices (BMPs): schedules of activities, prohibitions of practices, general good house keeping practices, pollution prevention and educational practices, maintenance procedures, and other management practices to prevent or reduce the discharge of pollutants directly or indirectly to stormwater, receiving waters, or stormwater conveyance systems. BMPs also include treatment practices, operating procedures, and practices to control site runoff, spillage or leaks, sludge or water disposal, or drainage from raw materials storage.

Clean Water Act. The federal Water Pollution Control Act (33 U.S.C. § 1251 et seq.), and any subsequent amendments thereto.

Construction Activity. Activities subject to NPDES Construction Permits. Currently these include construction projects resulting in land disturbance of 5 acres or more. Beginning in March 2003, NPDES Storm Water Phase II permits will be required for construction projects resulting in land disturbance of 1 acre or more. Such activities include but are not limited to clearing and grubbing, grading, excavating, and demolition.

Hazardous Materials. Any material, including any substance, waste, or combination thereof, which because of its quantity, concentration, or physical, chemical, or infectious characteristics may cause, or significantly contribute to, a substantial present or potential hazard to human health, safety, property, or the environment when improperly treated, stored, transported, disposed of, or otherwise managed.

Illegal Discharge. Any direct or indirect non-storm water discharge to the storm drain system, except as exempted in Section X of this ordinance.

Illicit Connections. An illicit connection is defined as either of the following:

[1] USEPA. 2002. *Model Ordinances to Protect Local Resources: Illicit Discharges.* http://www.epa.gov/owow/nps/ordinance/discharges.htm

Any drain or conveyance, whether on the surface or subsurface, which allows an illegal discharge to enter the storm drain system including but not limited to any conveyances which allow any non-storm water discharge including sewage, process wastewater, and wash water to enter the storm drain system and any connections to the storm drain system from indoor drains and sinks, regardless of whether said drain or connection had been previously allowed, permitted, or approved by an authorized enforcement agency or,

Any drain or conveyance connected from a commercial or industrial land use to the storm drain system which has not been documented in plans, maps, or equivalent records and approved by an authorized enforcement agency.

Industrial Activity. Activities subject to NPDES Industrial Permits as defined in 40 CFR, Section 122.26 (b)(14).

National Pollutant Discharge Elimination System (NPDES) Storm Water Discharge Permit. means a permit issued by EPA (or by a State under authority delegated pursuant to 33 USC § 1342(b)) that authorizes the discharge of pollutants to waters of the United States, whether the permit is applicable on an individual, group, or general area-wide basis.

Non-Storm Water Discharge. Any discharge to the storm drain system that is not composed entirely of storm water.

Person. means any individual, association, organization, partnership, firm, corporation or other entity recognized by law and acting as either the owner or as the owner's agent.

Pollutant. Anything which causes or contributes to pollution. Pollutants may include, but are not limited to: paints, varnishes, and solvents; oil and other automotive fluids; non-hazardous liquid and solid wastes and yard wastes; refuse, rubbish, garbage, litter, or other discarded or abandoned objects, ordinances, and accumulations, so that same may cause or contribute to pollution; floatables; pesticides, herbicides, and fertilizers; hazardous substances and wastes; sewage, fecal coliform and pathogens; dissolved and particulate metals; animal wastes; wastes and residues that result from constructing a building or structure; and noxious or offensive matter of any kind.

Premises. Any building, lot, parcel of land, or portion of land whether improved or unimproved including adjacent sidewalks and parking strips.

Storm Drainage System. Publicly-owned facilities by which storm water is collected and/or conveyed, including but not limited to any roads with drainage systems, municipal streets, gutters, curbs, inlets, piped storm drains, pumping facilities, retention and detention basins, natural and human-made or altered drainage channels, reservoirs, and other drainage structures.

Storm Water. Any surface flow, runoff, and drainage consisting entirely of water from any form of natural precipitation, and resulting from such precipitation.

Stormwater Pollution Prevention Plan. A document which describes the Best Management Practices and activities to be implemented by a person or business to identify sources of pollution or contamination at a site and the actions to eliminate or reduce pollutant discharges to Stormwater, Stormwater Conveyance Systems, and/or Receiving Waters to the Maximum Extent Practicable.

Wastewater means any water or other liquid, other than uncontaminated storm water, discharged from a facility.

SECTION 3. APPLICABILITY.

This ordinance shall apply to all water entering the storm drain system generated on any developed and undeveloped lands unless explicitly exempted by an authorized enforcement agency.

SECTION 4. RESPONSIBILITY FOR ADMINISTRATION.

The_____ [authorized enforcement agency] shall administer, implement, and enforce the provisions of this ordinance. Any powers granted or duties imposed upon the authorized enforcement agency may be delegated in writing by the Director of the authorized enforcement agency to persons or entities acting in the beneficial interest of or in the employ of the agency.

SECTION 5. SEVERABILITY.

The provisions of this ordinance are hereby declared to be severable. If any provision, clause, sentence, or paragraph of this Ordinance or the application thereof to any person, establishment, or circumstances shall be held invalid, such invalidity shall not affect the other provisions or application of this Ordinance.

SECTION 6. ULTIMATE RESPONSIBILITY.

The standards set forth herein and promulgated pursuant to this ordinance are minimum standards; therefore this ordinance does not intend nor imply that compliance by any person will ensure that there will be no contamination, pollution, nor unauthorized discharge of pollutants.

SECTION 7. DISCHARGE PROHIBITIONS.

Prohibition of Illegal Discharges.

No person shall discharge or cause to be discharged into the municipal storm drain system or watercourses any materials, including but not limited to pollutants or waters containing any pollutants that cause or contribute to a violation of applicable water quality standards, other than storm water.

The commencement, conduct or continuance of any illegal discharge to the storm drain system is prohibited except as described as follows:

(1) The following discharges are exempt from discharge prohibitions established by this ordinance: water line flushing or other potable water sources, landscape irrigation or lawn watering, diverted stream flows, rising ground water, ground water infiltration to storm drains, uncontaminated pumped ground water, foundation or footing drains (not including active groundwater dewatering systems), crawl space pumps, air conditioning condensation, springs, non-commercial washing of vehicles, natural riparian habitat or wetland flows, swimming pools (if dechlorinated - typically less than one PPM chlorine), fire fighting activities, and any other water source not containing Pollutants.

(2) Discharges specified in writing by the authorized enforcement agency as being necessary to protect public health and safety.

(3) Dye testing is an allowable discharge, but requires a verbal notification to the authorized enforcement agency prior to the time of the test.

(4) The prohibition shall not apply to any non-storm water discharge permitted under an NPDES permit, waiver, or waste discharge order issued to the discharger and administered under the authority of the Federal Environmental Protection Agency, provided that the discharger is in full compliance with all requirements of the permit, waiver, or order and other applicable laws and regulations, and provided that written approval has been granted for any discharge to the storm drain system.

Prohibition of Illicit Connections.

(1) The construction, use, maintenance or continued existence of illicit connections to the storm drain system is prohibited.

(2) This prohibition expressly includes, without limitation, illicit connections made in the past, regardless of whether the connection was permissible under law or practices applicable or prevailing at the time of connection.

(3) A person is considered to be in violation of this ordinance if the person connects a line conveying sewage to the MS4, or allows such a connection to continue.

SECTION 8. SUSPENSION OF MS4 ACCESS.

Suspension due to Illicit Discharges in Emergency Situations

The _____ [authorized enforcement agency] may, without prior notice, suspend MS4 discharge access to a person when such suspension is necessary to stop an actual or threatened discharge which presents or may present imminent and substantial danger to the environment, or to the health or welfare of persons, or to the MS4 or Waters of the United States. If the violator fails to comply with a suspension order issued in an emergency, the authorized enforcement agency may take such steps as deemed necessary to prevent or minimize damage to the MS4 or Waters of the United States, or to minimize danger to persons.

Suspension due to the Detection of Illicit Discharge

Any person discharging to the MS4 in violation of this ordinance may have their MS4 access terminated if such

termination would abate or reduce an illicit discharge. The authorized enforcement agency will notify a violator of the proposed termination of its MS4 access. The violator may petition the authorized enforcement agency for a reconsideration and hearing.

A person commits an offense if the person reinstates MS4 access to premises terminated pursuant to this Section, without the prior approval of the authorized enforcement agency.

SECTION 9. INDUSTRIAL OR CONSTRUCTION ACTIVITY DISCHARGES.

Any person subject to an industrial or construction activity NPDES storm water discharge permit shall comply with all provisions of such permit. Proof of compliance with said permit may be required in a form acceptable to the _____ [authorized enforcement agency] prior to the allowing of discharges to the MS4.

SECTION 10. MONITORING OF DISCHARGES.

1. Applicability.
   This section applies to all facilities that have storm water discharges associated with industrial activity, including construction activity.

2. Access to Facilities.

(1) The_____ [authorized enforcement agency] shall be permitted to enter and inspect facilities subject to regulation under this ordinance as often as may be necessary to determine compliance with this ordinance. If a discharger has security measures in force which require proper identification and clearance before entry into its premises, the discharger shall make the necessary arrangements to allow access to representatives of the authorized enforcement agency.

(3) Facility operators shall allow the _____[authorized enforcement agency] ready access to all parts of the premises for the purposes of inspection, sampling, examination and copying of records that must be kept under the conditions of an NPDES permit to discharge storm water, and the performance of any additional duties as defined by state and federal law.

(3) The _____ [authorized enforcement agency] shall have the right to set up on any permitted facility such devices as are necessary in the opinion of the authorized enforcement agency to conduct monitoring and/or sampling of the facility's storm water discharge.

(4) The _____ [authorized enforcement agency] has the right to require the discharger to install monitoring equipment as necessary. The facility's sampling and monitoring equipment shall be maintained at all times in a safe and proper operating condition by the discharger at its own expense. All devices used to measure stormwater flow and quality shall be calibrated to ensure their accuracy.

(5) Any temporary or permanent obstruction to safe and easy access to the facility to be inspected and/or sampled shall be promptly removed by the operator at the written or oral request of the [authorized enforcement agency] and shall not be replaced. The costs of clearing such access shall be borne by the operator.

(6) Unreasonable delays in allowing the _____ [authorized enforcement agency] access to a permitted facility is a violation of a storm water discharge permit and of this ordinance. A person who is the operator of a facility with a NPDES permit to discharge storm water associated with industrial activity commits an offense if the person denies the authorized enforcement agency reasonable access to the permitted facility for the purpose of conducting any activity authorized or required by this ordinance.

(7) If the _____ [authorized enforcement agency] has been refused access to any part of the premises from which stormwater is discharged, and he/she is able to demonstrate probable cause to believe that there may be a violation of this ordinance, or that there is a need to inspect and/or sample as part of a routine inspection and sampling program designed to verify compliance with this ordinance or any order issued hereunder, or to protect the overall public health, safety, and welfare of the community, then the authorized enforcement agency may seek issuance of a search warrant from any court of competent jurisdiction.

SECTION 11. REQUIREMENT TO PREVENT, CONTROL, AND REDUCE STORM WATER POLLUTANTS BY THE USE OF BEST MANAGEMENT PRACTICES.

[Authorized enforcement agency] will adopt requirements identifying Best Management Practices for any activity, operation, or facility which may cause or contribute to pollution or contamination of storm water, the storm drain system, or waters of the U.S. The owner or operator of a commercial or industrial establishment shall provide, at their own expense, reasonable protection from accidental discharge of prohibited materials or other wastes into the municipal storm drain system or watercourses through the use of these structural and non-structural BMPs. Further, any person responsible for a property or premise, which is, or may be, the source of an illicit discharge, may be required to implement, at said person's expense, additional structural and non-structural BMPs to prevent the further discharge of pollutants to the municipal separate storm sewer system. Compliance with all terms and conditions of a valid NPDES permit authorizing the discharge of storm water associated with industrial activity, to the extent practicable, shall be deemed compliance with the provisions of this section. These BMPs shall be part of a stormwater pollution prevention plan (SWPP) as necessary for compliance with requirements of the NPDES permit.

SECTION 12. WATERCOURSE PROTECTION.

Every person owning property through which a watercourse passes, or such person's lessee, shall keep and maintain that part of the watercourse within the property free of trash, debris, excessive vegetation, and other obstacles that would pollute, contaminate, or significantly retard the flow of water through the watercourse. In addition, the owner or lessee shall maintain existing privately owned structures within or adjacent to a watercourse, so that such structures will not become a hazard to the use, function, or physical integrity of the watercourse.

SECTION 13. NOTIFICATION OF SPILLS.

Notwithstanding other requirements of law, as soon as any person responsible for a facility or operation, or responsible for emergency response for a facility or operation has information of any known or suspected release of materials which are resulting or may result in illegal discharges or pollutants discharging into storm water, the storm drain system, or water of the U.S. said person shall take all necessary steps to ensure the discovery, containment, and cleanup of such release. In the event of such a release of hazardous materials said person shall immediately notify emergency response agencies of the occurrence via emergency dispatch services. In the event of a release of non-hazardous materials, said person shall notify the authorized enforcement agency in person or by phone or facsimile no later than the next business day. Notifications in person or by phone shall be confirmed by written notice addressed and mailed to the _____ [authorized enforcement agency] within three business days of the phone notice. If the discharge of prohibited materials emanates from a commercial or industrial establishment, the owner or operator of such establishment shall also retain an on-site written record of the discharge and the actions taken to prevent its recurrence. Such records shall be retained for at least three years.

SECTION 14. ENFORCEMENT.

1. Notice of Violation.
   Whenever the _____ [authorized enforcement agency] finds that a

person has violated a prohibition or failed to meet a requirement of this Ordinance, the authorized enforcement agency may order compliance by written notice of violation to the responsible person. Such notice may require without limitation:
(a) The performance of monitoring, analyses, and reporting;
(b) The elimination of illicit connections or discharges;
(c) That violating discharges, practices, or operations shall cease and desist;
(d) The abatement or remediation of storm water pollution or contamination hazards and the restoration of any affected property; and
(e) Payment of a fine to cover administrative and remediation costs; and
(f) The implementation of source control or treatment BMPs.
If abatement of a violation and/or restoration of affected property is required, the notice shall set forth a deadline within which such remediation or restoration must be completed. Said notice shall further advise that, should the violator fail to remediate or restore within the established deadline, the work will be done by a designated governmental agency or a contractor and the expense thereof shall be charged to the violator.

SECTION 15. APPEAL OF NOTICE OF VIOLATION.
Any person receiving a Notice of Violation may appeal the determination of the authorized enforcement agency. The notice of appeal must be received within _ days from the date of the Notice of Violation. Hearing on the appeal before the appropriate authority or his/her designee shall take place within 15 days from the date of receipt of the notice of appeal. The decision of the municipal authority or their designee shall be final.

SECTION 16. ENFORCEMENT MEASURES AFTER APPEAL.
If the violation has not been corrected pursuant to the requirements set forth in the Notice of Violation, or , in the event of an appeal, within __ days of the decision of the municipal authority upholding the decision of the authorized enforcement agency, then representatives of the authorized enforcement agency shall enter upon the subject private property and are authorized to take any and all measures necessary to abate the violation and/or restore the property. It shall be unlawful for any person, owner, agent or person in possession of any premises to refuse to allow the government agency or designated contractor to enter upon the premises for the purposes set forth above.

SECTION 17. COST OF ABATEMENT OF THE VIOLATION.
Within __ days after abatement of the violation, the owner of the property will be notified of the cost of abatement, including administrative costs. The property owner may file a written protest objecting to the amount of the assessment within __ days. If the amount due is not paid within a timely manner as determined by the decision of the municipal authority or by the expiration of the time in which to file an appeal, the charges shall become a special assessment against the property and shall constitute a lien on the property for the amount of the assessment.
Any person violating any of the provisions of this article shall become liable to the city by reason of such violation. The liability shall be paid in not more than 12 equal payments. Interest at the rate of __ percent per annum shall be assessed on the balance beginning on the _st day following discovery of the violation.

SECTION 18. INJUNCTIVE RELIEF.
It shall be unlawful for any person to violate any provision or fail to comply with any of the requirements of this Ordinance. If a person has violated or continues to violate the provisions of this ordinance, the authorized enforcement agency may petition for a preliminary or permanent injunction restraining the person from activities which would create further violations or compelling the person to perform abatement or remediation of the violation.

SECTION 19. COMPENSATORY ACTION.
In lieu of enforcement proceedings, penalties, and remedies authorized by this Ordinance, the authorized enforcement agency may impose upon a violator alternative compensatory actions, such as storm drain stenciling, attendance at compliance workshops, creek cleanup, etc.

SECTION 20. VIOLATIONS DEEMED A PUBLIC NUISANCE.
In addition to the enforcement processes and penalties provided, any condition caused or permitted to exist in violation of any of the provisions of this Ordinance is a threat to public health, safety, and welfare, and is declared and deemed a nuisance, and may be summarily abated or restored at the violator's expense, and/or a civil action to abate, enjoin, or otherwise compel the cessation of such nuisance may be taken.

SECTION 21. CRIMINAL PROSECUTION.
Any person that has violated or continues to violate this ordinance shall be liable to criminal prosecution to the fullest extent of the law, and shall be subject to a criminal penalty of _____ dollars per violation per day and/or imprisonment for a period of time not to exceed ____ days.
The authorized enforcement agency may recover all attorney's fees court costs and other expenses associated with enforcement of this ordinance, including sampling and monitoring expenses.

SECTION 22. REMEDIES NOT EXCLUSIVE.
The remedies listed in this ordinance are not exclusive of any other remedies available under any applicable federal, state or local law and it is within the discretion of the authorized enforcement agency to seek cumulative remedies.

SECTION 23. ADOPTION OF ORDINANCE.
This ordinance shall be in full force and effect __ days after its final passage and adoption. All prior ordinances and parts of ordinances in conflict with this ordinance are hereby repealed.

PASSED AND ADOPTED this ____ day of _____, 19__, by the following vote:

Appendix G

IDDE Employee Training Record

Illicit Discharge Detection and Elimination (IDDE)
Employee Training Record

Waltham, Massachusetts

Date of Training: _____

Duration of Training: _____

Name	Title	Signature