Town of Southborough

Illicit Discharge Detection and Elimination (IDDE) Plan

June 30, 2019

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Illicit Discharge Detection and Elimination Plan

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1 Introduction

1.1 MS4 Program

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

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

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

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

1.2 Illicit Discharges

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

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

Some illicit discharges are intentional, such as dumping used oil (or other pollutant) into catch basins, a resident or contractor illegally tapping a new sewer lateral into a storm drain pipe to avoid the costs of a sewer connection fee and service, and illegal dumping of yard wastes into surface waters.
Some illicit discharges are related to the unsuitability of original infrastructure to the modern regulatory environment. Examples of illicit discharges in this category include connected floor drains in old buildings, as well as sanitary sewer overflows that enter the drainage system. Sump pumps

legally connected to the storm drain system may be used inappropriately, such as for the disposal of floor washwater or old household products, in many cases due to a lack of understanding on the part of the homeowner.

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

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

1.3 Allowable Non-Stormwater Discharges

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

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

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

1.4 Receiving Waters and Impairments

Table 1-1 lists the "impaired waters" within the boundaries of Southborough's regulated area based on the 2016 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

Southborough, Massachusetts

Water Body Name	Segment ID	Category	Impairment(s)	Associated Approved TMDL
Sudbury Reservoir	MA82106	4a	Mercury in fish tissue	33880
Sudbury River	MA82A-25	5	E. coli; Mercury in fish tissue	

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.

The TMDL for the Sudbury Reservoir pertains to mercury found in fish tissue and therefore does not contain requirements relating to illicit discharges.

1.5 IDDE Program Goals, Framework, and Timeline

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

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

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

Figure 1-1. IDDE Investigation Procedure Framework

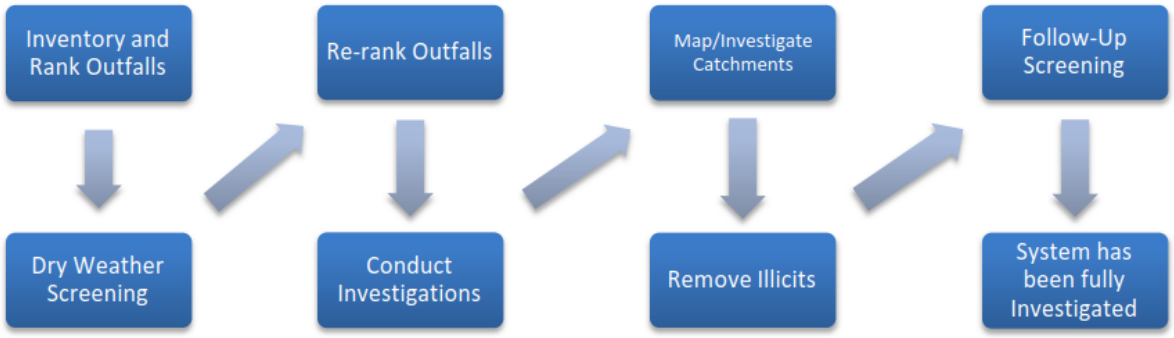


Table 1-2. IDDE Program Implementation Timeline

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

1.6 Work Completed to Date

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

The Town of Southborough 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
- Completed Initial Outfall Inspections in September 2007
- Completed Dry-Weather Inspections of Priority Outfalls identified as part of the initial inspection in October 2009

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

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

2 Authority and Statement of IDDE Responsibilities

2.1 Legal Authority

The Town of Southborough has adopted an Illicit Discharge Bylaw (4-10-2006). A copy of the Illicit Discharge Bylaw is provided in **Appendix A**. The Illicit Discharge Bylaw provides the Town of Southborough with adequate legal authority to:

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

The Town of Southborough will review its current Illicit Discharge Bylaw and related land use regulations and policies for consistency with the 2016 MS4 Permit.

2.2 Statement of Responsibilities

The Board of Health is the lead municipal agency or department responsible for implementing the IDDE program pursuant to the provisions of the Illicit Discharge Bylaw. Other agencies or departments with responsibility for aspects of the program include:

3 Stormwater System Mapping

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

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

3.1 Phase I Mapping

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

- Outfalls and receiving waters (previously required by the MS4-2003 permit)
- Open channel conveyances (swales, ditches, etc.)

- Interconnections with other MS4s and other storm sewer systems
- Municipally owned stormwater treatment structures
- Water bodies identified by name and indication of all use impairments as identified on the most recent EPA approved Massachusetts Integrated List of Waters report
- Initial catchment delineations. Topographic contours and drainage system information may be used to produce initial catchment delineations.

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

- Outfalls and receiving waters
- Municipally owned stormwater treatment structures

The Town of Southborough will update its stormwater mapping by July 1, 2020 to include the remaining Phase I information.

3.2 Phase II Mapping

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

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

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

- Pipes
- Manholes
- Catch basins

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

3.3 Additional Recommended Mapping Elements

Although not a requirement of the 2016 MS4 Permit, the Town of Southborough will include the following recommended elements in its storm system mapping:

- Privately owned stormwater treatment structures
- Topography
- Orthophotography
- 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 Town of Southborough does not have a sanitary sewer system in town and therefore has no SSOs.

5 Assessment and Priority Ranking of Outfalls

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

5.1 Outfall Catchment Delineations

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

[1] **Outfall** means a point source as defined by 40 CFR § 122.2 as the point where the municipal separate storm sewer discharges to waters of the United States. An outfall does not include open conveyances connecting two municipal separate storm sewers or pipes, tunnels or other conveyances that connect segments of the same stream or other waters of the United States and that are used to convey waters of the United States. Culverts longer than a simple road crossing shall be included in the inventory unless the permittee can confirm that they are free of any connections and simply convey waters of the United States.

[2] **Interconnection** means the point (excluding sheet flow over impervious surfaces) where the permittee's MS4 discharges to another MS4 or other storm sewer system, through which the discharge is conveyed to waters of the United States or to another storm sewer system and eventually to a water of the United States.

include any outfalls/interconnections where previous screening indicates likely sewer input. Likely sewer input indicators are any of the following:

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

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

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

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

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

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

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

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

- **Past discharge complaints and reports.**

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

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

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

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

- **Culverted streams** – Any river or stream that is culverted for distances greater than a simple roadway crossing may have a high illicit discharge potential.

- **Water quality limited waterbodies** that receive a discharge from the MS4 or waters with approved TMDLs applicable to the permittee, where illicit discharges have the potential to contain the pollutant identified as the cause of the water quality impairment.

- **Outfall size** indicating a large capacity of stormwater exiting the outfall

Table 5-1 provides a sample format for an outfall inventory and priority ranking matrix.

Table 5-1. Outfall Inventory and Priority Ranking Matrix

Town of Southborough, Massachusetts
Revision Date: June 3, 2019

Outfall ID	Receiving Water	Previous Screening Results Indicate Likely Sewer Input? [1]	Discharging to Area of Concern to Public Health? [2]	Frequency of Past Discharge Complaints	Receiving Water Quality [3]	Density of Generating Sites [4]	Age of Development/ Infrastructure [5]	Historic Combined Sewers or Septic? [6]	Aging Septic? [7]	Culverted Streams? [8]	Score	Priority Ranking
Information Source		Outfall inspections and sample results	GIS Maps	Town Staff	Impaired Waters List	Land Use/GIS Maps, Aerial Photography	Land Use Information, Visual Observation	Town Staff, GIS Maps	Land Use, Town Staff	GIS and Storm System Maps		
Scoring Criteria		Yes = 3 (Problem Outfall) No = 0	Yes = 3 No = 0	Frequent = 3 Occasional = 2 None = 0	Poor = 3 Fair = 2 Good = 0	High = 3 Medium = 2 Low = 1	High = 3 Medium = 2 Low = 1	Yes = 3 No = 0	Yes = 3 No = 0	Yes = 3 No = 0		
OF04C	Sudbury River	0	3	0	2	1	3	0	3	0	9	High
OF93	Sudbury River	0	3	0	2	1	3	0	3	0	9	High
OF01A	wetland	0	3	0	0	1	3	0	3	0	7	High
OF02A	wetland	0	3	0	0	1	3	0	3	0	7	High
OF03A	Sudbury Reservoir	0	3	0	0	1	3	0	3	0	7	High
OF04A	Sudbury Reservoir	0	3	0	0	1	3	0	3	0	7	High
OF128	Sudbury Reservoir	0	3	0	0	1	3	0	3	0	7	High
OF129	Sudbury Reservoir	0	3	0	0	1	3	0	3	0	7	High
OF174	upland	0	3	0	0	1	3	0	3	0	7	High
OF175	wetland	0	3	0	0	1	3	0	3	0	7	High
OF194	upland	0	3	0	0	1	3	0	3	0	7	High
OF19C	unnamed stream	0	3	0	0	1	3	0	3	0	7	High
OF20A	Wetland to Sudbury Reservoir	0	3	0	0	1	3	0	3	0	7	High
OF22B	unnamed stream	0	3	0	0	1	3	0	3	0	7	High
OF27A	wetland	0	3	0	0	1	3	0	3	0	7	High
OF28A	Sudbury Reservoir	0	3	0	0	1	3	0	3	0	7	High
OF30A	Wetland to Sudbury Reservoir	0	3	0	0	1	3	0	3	0	7	High
OF32A	Wetland to Sudbury Reservoir	0	3	0	0	1	3	0	3	0	7	High
OF33A	Wetland to Sudbury Reservoir	0	3	0	0	1	3	0	3	0	7	High
OF34A	Wetland to Sudbury Reservoir	0	3	0	0	1	3	0	3	0	7	High
OF35A	Wetland to Sudbury Reservoir	0	3	0	0	1	3	0	3	0	7	High
OF36A	Wetland to Sudbury Reservoir	0	3	0	0	1	3	0	3	0	7	High
OF38D	wetland	0	3	0	0	1	3	0	3	0	7	High
OF39D	wetland	0	3	0	0	1	3	0	3	0	7	High
OF40A	wetland	0	3	0	0	1	3	0	3	0	7	High
OF44A	Wetland to Sudbury Reservoir	0	3	0	0	1	3	0	3	0	7	High
OF49B	upland	0	3	0	0	1	3	0	3	0	7	High
OF50B	wetland	0	3	0	0	1	3	0	3	0	7	High
OF54B	wetland	0	3	0	0	1	3	0	3	0	7	High

OF65B	Sudbury Reservoir	0	3	0	0	1	3	0	3	0	7	High
OF66B	Sudbury Reservoir	0	3	0	0	1	3	0	3	0	7	High
OF66B1	Sudbury Reservoir	0	3	0	0	1	3	0	3	0	7	High
OF67B	Sudbury Reservoir	0	3	0	0	1	3	0	3	0	7	High
OF68B	Sudbury Reservoir	0	3	0	0	1	3	0	3	0	7	High
OF69B	Sudbury Reservoir	0	3	0	0	1	3	0	3	0	7	High
OF72B	Sudbury Reservoir	0	3	0	0	1	3	0	3	0	7	High
OF02B	detention basin	0	3	2	0	1	2	0	0	0	6	High
OF03C	tributary to Sudbury River	0	0	0	2	1	3	0	3	0	6	High
OF33B	unnamed stream	0	0	2	0	1	3	0	3	0	6	High
OF48B	upland	0	0	2	0	1	3	0	3	0	6	High
OF02D	unnamed stream	0	0	0	0	1	3	0	3	0	4	Low
OF03D	wetland	0	0	0	0	1	3	0	3	0	4	Low
OF05B	unnamed stream	0	0	0	0	1	3	0	3	0	4	Low
OF05C	unnamed stream	0	0	0	0	1	3	0	3	0	4	Low
OF05D	wetland	0	0	0	0	1	3	0	3	0	4	Low
OF06B	detention basin	0	3	0	0	1	2	0	0	0	4	Low
OF06C	unnamed stream	0	0	0	0	1	3	0	3	0	4	Low
OF06D	wetland	0	0	0	0	1	3	0	3	0	4	Low
OF07C	wetland	0	0	0	0	1	3	0	3	0	4	Low
OF08B	wetland	0	0	0	0	1	3	0	3	0	4	Low
OF08C	detention basin	0	0	0	0	1	3	0	3	0	4	Low
OF09B	wetland	0	0	0	0	1	3	0	3	0	4	Low
OF09C	wetland	0	0	0	0	1	3	0	3	0	4	Low
OF100	detention basin	0	0	0	0	1	3	0	3	0	4	Low
OF101	detention basin	0	0	0	0	1	3	0	3	0	4	Low
OF102	detention basin	0	0	0	0	1	3	0	3	0	4	Low
OF103	detention basin	0	0	0	0	1	3	0	3	0	4	Low
OF104	detention basin	0	0	0	0	1	3	0	3	0	4	Low
OF109	unnamed stream	0	0	0	0	1	3	0	3	0	4	Low
OF10B	wetland	0	0	0	0	1	3	0	3	0	4	Low
OF112	detention basin	0	0	0	0	1	3	0	3	0	4	Low
OF113	detention basin	0	0	0	0	1	3	0	3	0	4	Low
OF114	detention basin	0	0	0	0	1	3	0	3	0	4	Low
OF115	wetland	0	0	0	0	1	3	0	3	0	4	Low
OF11B	Wetland to Sudbury Reservoir	0	0	0	0	1	3	0	3	0	4	Low
OF11C	unnamed stream	0	0	0	0	1	3	0	3	0	4	Low
OF121	detention basin	0	0	0	0	1	3	0	3	0	4	Low
OF122	detention basin	0	0	0	0	1	3	0	3	0	4	Low
OF125	detention basin	0	0	0	0	1	3	0	3	0	4	Low
OF126	unnamed stream	0	0	0	0	1	3	0	3	0	4	Low

OF127	unnamed stream	0	0	0	0	1	3	0	3	0	4	Low
OF133	upland	0	0	0	0	1	3	0	3	0	4	Low
OF138	Sudbury Reservoir	0	3	0	0	1	2	0	0	0	4	Low
OF146	detention basin	0	0	0	0	1	3	0	3	0	4	Low
OF147	upland	0	0	0	0	1	3	0	3	0	4	Low
OF148	wetland	0	0	0	0	1	3	0	3	0	4	Low
OF149	wetland	0	0	0	0	1	3	0	3	0	4	Low
OF14B	upland	0	0	0	0	1	3	0	3	0	4	Low
OF14C	wetland	0	0	0	0	1	3	0	3	0	4	Low
OF153	upland	0	0	0	0	1	3	0	3	0	4	Low
OF154	tributary to Sudbury Reservoir	0	0	0	0	1	3	0	3	0	4	Low
OF155	wetland	0	0	0	0	1	3	0	3	0	4	Low
OF15B	upland	0	0	0	0	1	3	0	3	0	4	Low
OF15C	wetland	0	0	0	0	1	3	0	3	0	4	Low
OF166	upland	0	0	0	0	1	3	0	3	0	4	Low
OF168	wetland	0	0	0	0	1	3	0	3	0	4	Low
OF16B	upland	0	0	0	0	1	3	0	3	0	4	Low
OF16C	wetland	0	0	0	0	1	3	0	3	0	4	Low
OF172	upland	0	0	0	0	1	3	0	3	0	4	Low
OF173	upland	0	0	0	0	1	3	0	3	0	4	Low
OF179	wetland	0	0	0	0	1	3	0	3	0	4	Low
OF17B	unnamed stream	0	0	0	0	1	3	0	3	0	4	Low
OF17C	wetland	0	0	0	0	1	3	0	3	0	4	Low
OF182	detention basin	0	0	0	0	1	3	0	3	0	4	Low
OF183	upland	0	0	0	0	1	3	0	3	0	4	Low
OF184	upland	0	0	0	0	1	3	0	3	0	4	Low
OF185	detention basin	0	0	0	0	1	3	0	3	0	4	Low
OF186	detention basin	0	0	0	0	1	3	0	3	0	4	Low
OF187	unnamed stream	0	0	0	0	1	3	0	3	0	4	Low
OF188	detention basin	0	0	0	0	1	3	0	3	0	4	Low
OF18A	wetland	0	0	0	0	1	3	0	3	0	4	Low
OF18B	wetland	0	0	0	0	1	3	0	3	0	4	Low
OF18C	wetland	0	0	0	0	1	3	0	3	0	4	Low
OF192	upland	0	0	0	0	1	3	0	3	0	4	Low
OF193	upland	0	0	0	0	1	3	0	3	0	4	Low
OF195	upland	0	0	0	0	1	3	0	3	0	4	Low
OF196	upland	0	0	0	0	1	3	0	3	0	4	Low
OF197	detention basin	0	0	0	0	1	3	0	3	0	4	Low
OF198	detention basin	0	0	0	0	1	3	0	3	0	4	Low
OF199	upland	0	0	0	0	1	3	0	3	0	4	Low
OF19A	Upland	0	0	0	0	1	3	0	3	0	4	Low
OF19A1	Wetland to Sudbury Reservoir	0	0	0	0	1	3	0	3	0	4	Low
OF19B	unnamed stream	0	0	0	0	1	3	0	3	0	4	Low

OF200	wetland	0	0	0	0	1	3	0	3	0	4	Low
OF201	detention basin	0	0	0	0	1	3	0	3	0	4	Low
OF203	wetland	0	0	0	0	1	3	0	3	0	4	Low
OF204	upland	0	0	0	0	1	3	0	3	0	4	Low
OF205	Sudbury Reservoir	0	0	0	0	1	3	0	3	0	4	Low
OF206	upland	0	0	0	0	1	3	0	3	0	4	Low
OF20B	wetland	0	0	0	0	1	3	0	3	0	4	Low
OF20C	unnamed stream	0	0	0	0	1	3	0	3	0	4	Low
OF21A	wetland	0	0	0	0	1	3	0	3	0	4	Low
OF21B	unnamed stream	0	0	0	0	1	3	0	3	0	4	Low
OF21C	unnamed stream	0	0	0	0	1	3	0	3	0	4	Low
OF22A	wetland	0	0	0	0	1	3	0	3	0	4	Low
OF22C	unnamed stream	0	0	0	0	1	3	0	3	0	4	Low
OF23A	wetland	0	0	0	0	1	3	0	3	0	4	Low
OF23B	unnamed stream	0	0	0	0	1	3	0	3	0	4	Low
OF24A	upland	0	0	0	0	1	3	0	3	0	4	Low
OF24B	wetland	0	0	0	0	1	3	0	3	0	4	Low
OF25A	upland	0	0	0	0	1	3	0	3	0	4	Low
OF26B	detention basin	0	0	0	0	1	3	0	3	0	4	Low
OF26D	upland	0	0	0	0	1	3	0	3	0	4	Low
OF27D	upland	0	0	0	0	1	3	0	3	0	4	Low
OF28B	wetland	0	0	0	0	1	3	0	3	0	4	Low
OF28D	wetland	0	0	0	0	1	3	0	3	0	4	Low
OF29A	wetland	0	0	0	0	1	3	0	3	0	4	Low
OF29B	wetland	0	0	0	0	1	3	0	3	0	4	Low
OF30B	wetland	0	0	0	0	1	3	0	3	0	4	Low
OF30D	wetland	0	0	0	0	1	3	0	3	0	4	Low
OF31A	Wetland to Sudbury Reservoir	0	0	0	0	1	3	0	3	0	4	Low
OF31B	wetland	0	0	0	0	1	3	0	3	0	4	Low
OF32B	unnamed stream	0	0	0	0	1	3	0	3	0	4	Low
OF32D	wetland	0	0	0	0	1	3	0	3	0	4	Low
OF34B	unnamed stream	0	0	0	0	1	3	0	3	0	4	Low
OF36D	Sudbury Reservoir	0	0	0	0	1	3	0	3	0	4	Low
OF37A	wetland	0	0	0	0	1	3	0	3	0	4	Low
OF37D	wetland	0	0	0	0	1	3	0	3	0	4	Low
OF39B	wetland	0	0	0	0	1	3	0	3	0	4	Low
OF40B	wetland	0	0	0	0	1	3	0	3	0	4	Low
OF40D	wetland	0	0	0	0	1	3	0	3	0	4	Low
OF41A	wetland	0	0	0	0	1	3	0	3	0	4	Low
OF41B	wetland	0	0	0	0	1	3	0	3	0	4	Low
OF42A	Wetland to Sudbury Reservoir	0	0	0	0	1	3	0	3	0	4	Low
OF42B	wetland	0	0	0	0	1	3	0	3	0	4	Low
OF43A	wetland	0	0	0	0	1	3	0	3	0	4	Low

OF43B	wetland	0	0	0	0	1	3	0	3	0	4	Low
OF45A	upland	0	0	0	0	1	3	0	3	0	4	Low
OF45B	upland	0	0	0	0	1	3	0	3	0	4	Low
OF46A	wetland	0	0	0	0	1	3	0	3	0	4	Low
OF47A	wetland	0	0	0	0	1	3	0	3	0	4	Low
OF48A	upland	0	0	0	0	1	3	0	3	0	4	Low
OF49A	upland	0	0	0	0	1	3	0	3	0	4	Low
OF51B	unnamed stream	0	0	0	0	1	3	0	3	0	4	Low
OF52B	upland	0	0	0	0	1	3	0	3	0	4	Low
OF53B	upland	0	0	0	0	1	3	0	3	0	4	Low
OF58B	wetland	0	0	0	0	1	3	0	3	0	4	Low
OF59B	upland	0	0	0	0	1	3	0	3	0	4	Low
OF60B	wetland	0	0	0	0	1	3	0	3	0	4	Low
OF61B	Upland	0	0	0	0	1	3	0	3	0	4	Low
OF62B	Wetland	0	0	0	0	1	3	0	3	0	4	Low
OF63B	wetland	0	0	0	0	1	3	0	3	0	4	Low
OF65B1	Sudbury Reservoir	0	0	0	0	1	3	0	3	0	4	Low
OF67B1	Sudbury Reservoir	0	0	0	0	1	3	0	3	0	4	Low
OF70B	Sudbury Reservoir	0	0	0	0	1	3	0	3	0	4	Low
OF71B	Sudbury Reservoir	0	0	0	0	1	3	0	3	0	4	Low
OF73	upland	0	0	0	0	1	3	0	3	0	4	Low
OF91	upland	0	0	0	0	1	3	0	3	0	4	Low
OF92	upland	0	0	0	0	1	3	0	3	0	4	Low
OF94	upland	0	0	0	0	1	3	0	3	0	4	Low
OF95	upland	0	0	0	0	1	3	0	3	0	4	Low
OF96	detention basin	0	0	0	0	1	3	0	3	0	4	Low
OF97	detention basin	0	0	0	0	1	3	0	3	0	4	Low
OF98	detention basin	0	0	0	0	1	3	0	3	0	4	Low
OF99	detention basin	0	0	0	0	1	3	0	3	0	4	Low
OF03B	tributary to Sudbury River	0	0	0	2	1	2	0	0	0	3	Low
OF14A	Wetland to Sudbury Reservoir	0	0	2	0	1	2	0	0	0	3	Low
OF01B	upland	0	0	0	0	1	2	0	0	0	1	Low
OF01C	wetland	0	0	0	0	1	2	0	0	0	1	Low
OF02C	detention basin	0	0	0	0	1	2	0	0	0	1	Low
OF04B	wetland	0	0	0	0	1	2	0	0	0	1	Low
OF04D	wetland	0	0	0	0	1	2	0	0	0	1	Low
OF05A	wetland	0	0	0	0	1	2	0	0	0	1	Low
OF06A	Upland to Sudbury Reservoir	0	0	0	0	1	2	0	0	0	1	Low
OF07A	detention basin	0	0	0	0	1	2	0	0	0	1	Low
OF07B	unnamed stream	0	0	0	0	1	2	0	0	0	1	Low
OF07D	detention basin	0	0	0	0	1	2	0	0	0	1	Low
OF08A	detention basin	0	0	0	0	1	2	0	0	0	1	Low
OF08C	wetland	0	0	0	0	1	2	0	0	0	1	Low

OF08D	detention basin	0	0	0	0	1	2	0	0	0	1	Low
OF09A	Wetland to Sudbury Reservoir	0	0	0	0	1	2	0	0	0	1	Low
OF09D	wetland	0	0	0	0	1	2	0	0	0	1	Low
OF105	detention basin	0	0	0	0	1	2	0	0	0	1	Low
OF106	detention basin	0	0	0	0	1	2	0	0	0	1	Low
OF107	wetland	0	0	0	0	1	2	0	0	0	1	Low
OF108	upland	0	0	0	0	1	2	0	0	0	1	Low
OF10A	Wetland to Sudbury Reservoir	0	0	0	0	1	2	0	0	0	1	Low
OF10C	detention basin	0	0	0	0	1	2	0	0	0	1	Low
OF10D	wetland	0	0	0	0	1	2	0	0	0	1	Low
OF110	detention basin	0	0	0	0	1	2	0	0	0	1	Low
OF111	upland	0	0	0	0	1	2	0	0	0	1	Low
OF116	detention basin	0	0	0	0	1	2	0	0	0	1	Low
OF117	detention basin	0	0	0	0	1	2	0	0	0	1	Low
OF118	upland	0	0	0	0	1	1	0	0	0	1	Low
OF119	upland	0	0	0	0	1	1	0	0	0	1	Low
OF11A	wetland	0	0	0	0	1	2	0	0	0	1	Low
OF11D	wetland	0	0	0	0	1	2	0	0	0	1	Low
OF120	upland	0	0	0	0	1	1	0	0	0	1	Low
OF123	detention basin	0	0	0	0	1	2	0	0	0	1	Low
OF124	upland	0	0	0	0	1	2	0	0	0	1	Low
OF12A	Angelica Brook	0	0	0	0	1	2	0	0	0	1	Low
OF12B	detention basin	0	0	0	0	1	2	0	0	0	1	Low
OF12C	wetland	0	0	0	0	1	2	0	0	0	1	Low
OF12D	Wetland to Sudbury Reservoir	0	0	0	0	1	2	0	0	0	1	Low
OF130	detention basin	0	0	0	0	1	2	0	0	0	1	Low
OF131	detention basin	0	0	0	0	1	2	0	0	0	1	Low
OF132	detention basin	0	0	0	0	1	2	0	0	0	1	Low
OF134	detention basin	0	0	0	0	1	2	0	0	0	1	Low
OF135	wetland	0	0	0	0	1	2	0	0	0	1	Low
OF136	detention basin	0	0	0	0	1	2	0	0	0	1	Low
OF137	detention basin	0	0	0	0	1	2	0	0	0	1	Low
OF139	detention basin	0	0	0	0	1	2	0	0	0	1	Low
OF13A	detention basin	0	0	0	0	1	2	0	0	0	1	Low
OF13C	detention basin	0	0	0	0	1	2	0	0	0	1	Low
OF13D	wetland	0	0	0	0	1	2	0	0	0	1	Low
OF140	wetland	0	0	0	0	1	2	0	0	0	1	Low
OF141	wetland	0	0	0	0	1	2	0	0	0	1	Low
OF142	wetland	0	0	0	0	1	2	0	0	0	1	Low
OF143	Angelica Brook	0	0	0	0	1	2	0	0	0	1	Low
OF144	detention basin	0	0	0	0	1	2	0	0	0	1	Low
OF145	upland	0	0	0	0	1	2	0	0	0	1	Low
OF14D	wetland	0	0	0	0	1	2	0	0	0	1	Low

OF150	detention basin	0	0	0	0	1	2	0	0	0	1	Low
OF151	detention basin	0	0	0	0	1	2	0	0	0	1	Low
OF152	detention basin	0	0	0	0	1	2	0	0	0	1	Low
OF156	wetland	0	0	0	0	1	2	0	0	0	1	Low
OF157	wetland	0	0	0	0	1	2	0	0	0	1	Low
OF158	wetland	0	0	0	0	1	2	0	0	0	1	Low
OF159	detention basin	0	0	0	0	1	2	0	0	0	1	Low
OF15A	detention basin	0	0	0	0	1	2	0	0	0	1	Low
OF15D	wetland	0	0	0	0	1	2	0	0	0	1	Low
OF160	detention basin	0	0	0	0	1	2	0	0	0	1	Low
OF161	upland	0	0	0	0	1	2	0	0	0	1	Low
OF162	detention basin	0	0	0	0	1	2	0	0	0	1	Low
OF163	detention basin	0	0	0	0	1	2	0	0	0	1	Low
OF164	detention basin	0	0	0	0	1	2	0	0	0	1	Low
OF165	detention basin	0	0	0	0	1	2	0	0	0	1	Low
OF167	detention basin	0	0	0	0	1	2	0	0	0	1	Low
OF169	upland	0	0	0	0	1	2	0	0	0	1	Low
OF16A	Wetland to Sudbury Reservoir	0	0	0	0	1	2	0	0	0	1	Low
OF16D	wetland	0	0	0	0	1	2	0	0	0	1	Low
OF170	upland	0	0	0	0	1	2	0	0	0	1	Low
OF171	upland	0	0	0	0	1	2	0	0	0	1	Low
OF176	detention basin	0	0	0	0	1	2	0	0	0	1	Low
OF177	upland	0	0	0	0	1	2	0	0	0	1	Low
OF178	detention basin	0	0	0	0	1	1	0	0	0	1	Low
OF17A	detention basin	0	0	0	0	1	2	0	0	0	1	Low
OF17D	wetland	0	0	0	0	1	2	0	0	0	1	Low
OF180	detention basin	0	0	0	0	1	1	0	0	0	1	Low
OF181	wetland	0	0	0	0	1	1	0	0	0	1	Low
OF189	wetland	0	0	0	0	1	2	0	0	0	1	Low
OF18D	wetland	0	0	0	0	1	2	0	0	0	1	Low
OF190	detention basin	0	0	0	0	1	2	0	0	0	1	Low
OF191	detention basin	0	0	0	0	1	2	0	0	0	1	Low
OF19D	wetland	0	0	0	0	1	2	0	0	0	1	Low
OF202	wetland	0	0	0	0	1	2	0	0	0	1	Low
OF20D	wetland	0	0	0	0	1	2	0	0	0	1	Low
OF21D	wetland	0	0	0	0	1	2	0	0	0	1	Low
OF22D	wetland	0	0	0	0	1	2	0	0	0	1	Low
OF23C	wetland	0	0	0	0	1	2	0	0	0	1	Low
OF23D	wetland	0	0	0	0	1	2	0	0	0	1	Low
OF24C	wetland	0	0	0	0	1	2	0	0	0	1	Low
OF24D	wetland	0	0	0	0	1	2	0	0	0	1	Low
OF25B	detention basin	0	0	0	0	1	2	0	0	0	1	Low
OF25D	wetland	0	0	0	0	1	2	0	0	0	1	Low

OF26C	wetland	0	0	0	0	1	2	0	0	0	1	Low
OF27C	upland	0	0	0	0	1	2	0	0	0	1	Low
OF31D	wetland	0	0	0	0	1	2	0	0	0	1	Low
OF33D	detention basin	0	0	0	0	1	2	0	0	0	1	Low
OF34D	wetland	0	0	0	0	1	2	0	0	0	1	Low
OF35B	wetland	0	0	0	0	1	2	0	0	0	1	Low
OF35D	wetland	0	0	0	0	1	2	0	0	0	1	Low
OF36B	wetland	0	0	0	0	1	2	0	0	0	1	Low
OF37B	wetland	0	0	0	0	1	2	0	0	0	1	Low
OF38B	wetland	0	0	0	0	1	2	0	0	0	1	Low
OF44B	detention basin	0	0	0	0	1	2	0	0	0	1	Low
OF46B	unnamed stream	0	0	0	0	1	2	0	0	0	1	Low
OF47B	wetland	0	0	0	0	1	2	0	0	0	1	Low
OF55B	wetland	0	0	0	0	1	2	0	0	0	1	Low
OF56B	detention basin	0	0	0	0	1	2	0	0	0	1	Low
OF57B	wetland	0	0	0	0	1	2	0	0	0	1	Low
OF63B	detention basin	0	0	0	0	1	1	0	0	0	1	Low
OF64B	detention basin	0	0	0	0	1	2	0	0	0	1	Low
OF74	upland	0	0	0	0	1	2	0	0	0	1	Low
OF75	detention basin	0	0	0	0	1	2	0	0	0	1	Low
OF76	detention basin	0	0	0	0	1	2	0	0	0	1	Low
OF77	detention basin	0	0	0	0	1	2	0	0	0	1	Low
OF78	upland	0	0	0	0	1	2	0	0	0	1	Low
OF79	upland	0	0	0	0	1	2	0	0	0	1	Low
OF80	wetland	0	0	0	0	1	2	0	0	0	1	Low
OF81	upland	0	0	0	0	1	2	0	0	0	1	Low
OF82	wetland	0	0	0	0	1	2	0	0	0	1	Low
OF83	wetland	0	0	0	0	1	2	0	0	0	1	Low
OF84	upland	0	0	0	0	1	2	0	0	0	1	Low
OF85	upland	0	0	0	0	1	2	0	0	0	1	Low
OF86	upland	0	0	0	0	1	2	0	0	0	1	Low
OF87	upland	0	0	0	0	1	2	0	0	0	1	Low
OF88	wetland	0	0	0	0	1	2	0	0	0	1	Low
OF89	upland	0	0	0	0	1	2	0	0	0	1	Low
OF90	unnamed stream	0	0	0	0	1	2	0	0	0	1	Low

Scoring Criteria:

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

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

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

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

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

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

[5] Age of development and infrastructure:

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

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

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

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

6 Dry Weather Outfall Screening and Sampling

Dry weather flow is a common indicator of potential illicit connections. The MS4 Permit requires all outfalls/interconnections (excluding Problem and excluded Outfalls) to be inspected for the presence of dry weather flow. The Department of Public Works (DPW) 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 Southborough weather station. If the Southborough weather station is not available or not reporting current weather data, then the Westborough weather station 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 C**)
    c. Look for and record visual/olfactory evidence of pollutants in flowing outfalls including odor, color, turbidity, and floatable matter (suds, bubbles, excrement, toilet paper or sanitary products). Also observe outfalls for deposits and stains, vegetation, and damage to outfall structures.
4. If flow is observed, sample and test the flow following the procedures described in the following sections.
5. If no flow is observed, but evidence of illicit flow exists (illicit discharges are often intermittent or transitory), revisit the outfall during dry weather within one week of the initial observation, if practicable, to perform a second dry weather screening and sample any observed flow. Other techniques can be used to detect intermittent or transitory flows including conducting inspections during evenings or weekends and using optical brighteners.
6. Input results from screening and sampling into spreadsheet/database. Include pertinent information in the outfall/interconnection inventory and priority ranking.

7. Include all screening data in the annual report.

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

6.2.2 Field Equipment

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

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

Equipment	Use/Notes
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
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

Equipment	Use/Notes
Zip Ties/Duct Tape	For making field repairs
Rubber Boots/Waders	For accessing shallow streams/areas
Sampling Pole/Dipper/Sampling Cage	For accessing hard to reach outfalls and manholes

6.2.3 Sample Collection and Analysis

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

1. Fill out all sample information on sample bottles and field sheets (see **Appendix C** for Sample Labels and Field Sheets)
2. Put on protective gloves (nitrile/latex/other) before sampling
3. Collect sample with dipper or directly in sample containers. If possible, collect water from the flow directly in the sample bottle. Be careful not to disturb sediments.
4. If using a dipper or other device, triple rinse the device with distilled water and then in water to be sampled (not for bacteria sampling)
5. Use test strips, test kits, and field meters (rinse similar to dipper) for most parameters (see **Table 6-2**)
6. Place laboratory samples on ice for analysis of bacteria and pollutants of concern
7. Fill out chain-of-custody form (**Appendix C**) for laboratory samples
8. Deliver samples to ##NAME OF LABORATORY(s)
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. Analytic procedures and user's manuals for field test kits and field instrumentation are provided in **Appendix D**.

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

Table 6-2. Sampling 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
Temperature	YSI Pro30 YSI EC300A Oakton 450	NA
Indicator Bacteria: *E. coli* (freshwater) or Enterococcus (saline water)	EPA certified laboratory procedure (40 CFR § 136)	NA
Pollutants of Concern[1]	EPA certified laboratory procedure (40 CFR § 136)	NA

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

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

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

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

Analyte or Parameter	Analytical Method	Detection Limit	Max. Hold Time	Preservative
Ammonia	**EPA**: 350.2, **SM**: 4500-NH3C	0.05 mg/L	28 days	Cool ≤6°C, H_2SO_4 to pH <2, No preservative required if analyzed immediately
Surfactants	**SM**: 5540-C	0.01 mg/L	48 hours	Cool ≤6°C
Chlorine	**SM**: 4500-Cl G	0.02 mg/L	Analyze within 15 minutes	None Required
Temperature	**SM**: 2550B	*NA*	Immediate	None Required
Specific Conductance	**EPA**: 120.1, **SM**: 2510B	0.2 µs/cm	28 days	Cool ≤6°C
Salinity	**SM**: 2520	-	28 days	Cool ≤6°C
Indicator Bacteria: *E.coli* Enterococcus	*E.coli* **EPA**: 1603 **SM**: 9221B, 9221F , 9223 B **Other**: Colilert ®, Colilert-18® *Enterococcus* **EPA**: 1600 **SM**: 9230 C **Other**: Enterolert®	*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	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 as typical screening values for select parameters. These represent the typical concentration (or value) of each parameter expected to be found in stormwater. Screening values that exceed these benchmarks may be indicative of pollution and/or illicit discharges.

Table 6-4. Benchmark Field Measurements for Select Parameters

Analyte or Parameter	Benchmark
Ammonia	>0.5 mg/L
Conductivity	>2,000 µS/cm
Surfactants	>0.25 mg/L
Chlorine	>0.02 mg/L (detectable levels per the 2016 MS4 Permit)
Indicator Bacteria[5]: *E.coli* *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 Town of Southborough 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.

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.

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

7.1 System Vulnerability Factors

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

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

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

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

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

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

Town of Southborough, Massachusetts
Revision Date: ##DATE OF LAST UPDATE

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)

7.2 Dry Weather Manhole Inspections

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

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

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

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

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

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

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

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

For most catchments, manhole inspections will proceed from the outfall moving up into the system. However, the decision to move up or down the system depends on the nature of the drainage system and the surrounding land use and the availability of information on the catchment and drainage system. Moving up the system can begin immediately when an illicit discharge is detected at an outfall, and only a map of the storm drain system is required. Moving down the system requires more

advance preparation and reliable drainage system information on the upstream segments of the storm drain system, but may be more efficient if the sources of illicit discharges are believed to be located in the upstream portions of the catchment area. Once a manhole inspection methodology has been selected, investigations will continue systematically through the catchment.

Inspection of key junction manholes will proceed as follows:

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

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

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

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

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

7.3 Wet Weather Outfall Sampling

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

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

Wet weather outfall sampling will proceed as follows:

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

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

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

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

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

7.4 Source Isolation and Confirmation

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

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

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

Public notification is an important aspect of a detailed source investigation program. Prior to smoke testing, dye testing, or TV inspections, the Department of Public Works (DPW) 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 or manhole and air is then forced through the system. Test personnel are place in areas where there are suspected illegal connections or cracks/leaks, noting any escape of smoke (indicating an illicit connection or damaged storm drain infrastructure). It is important when using this technique to make proper notifications to area residents and business owners as well as local police and fire departments.

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

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

7.4.3 Dye Testing

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

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

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

7.4.4 CCTV/Video Inspection

Another method of source isolation involves the use of mobile video cameras that are guided remotely through stormwater drain lines to observe possible illicit discharges. IDDE program staff

can review the videos and note any visible illicit discharges. While this tool is both effective and usually definitive, it can be costly and time consuming when compared to other source isolation techniques.

7.4.5 Optical Brightener Monitoring

Optical brighteners are fluorescent dyes that are used in detergents and paper products to enhance their appearance. The presence of optical brighteners in surface waters or dry weather discharges suggests there is a possible illicit discharge or insufficient removal through adsorption in nearby septic systems or wastewater treatment. Optical brightener monitoring can be done in two ways. The most common, and least expensive, methodology involves placing a cotton pad in a wire cage and securing it in a pipe, manhole, catch basin, or inlet to capture intermittent dry weather flows. The pad is retrieved at a later date and placed under UV light to determine the presence/absence of brighteners during the monitoring period. A second methodology uses handheld fluorometers to detect optical brighteners in water sample collected from outfalls or ambient surface waters. Use of a fluorometer, while more quantitative, is typically more costly and is not as effective at isolating intermittent discharges as other source isolation techniques.

7.4.6 IDDE Canines

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

7.5 Illicit Discharge Removal

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

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

7.5.1 Confirmatory Outfall Screening

Within one (1) year of removal of all identified illicit discharges within a catchment area, confirmatory outfall or interconnection screening will be conducted. The confirmatory screening will be conducted in dry weather unless System Vulnerability Factors have been identified, in which case

both dry weather and wet weather confirmatory screening will be conducted. If confirmatory screening indicates evidence of additional illicit discharges, the catchment will be scheduled for additional investigation.

7.6 Ongoing Screening

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

8 Training

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

9 Progress Reporting

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

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

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

Appendix A

Legal Authority (IDDE Bylaw or Ordinance)

Town of Southborough, MA
Monday, April 15, 2019

Chapter 225. Illicit Discharge

[HISTORY: Adopted by the Town Meeting of the Town of Southborough 4-10-2006 ATM by Art. 45. Amendments noted where applicable.]

GENERAL REFERENCES
Building construction — See Ch. **62**.
Wetlands protection — See Ch. **170**.
Zoning — See Ch. **174**.
Subdivision of land — See Ch. **244**.

§ 225-1. Purpose.

A. Increased and contaminated stormwater runoff is a major cause of impairment of water quality and flow in lakes, ponds, streams, rivers, wetlands and groundwater; contamination of drinking water supplies; alteration or destruction of aquatic and wildlife habitat; and flooding. Regulation of illicit connections and discharges to the Town of Southborough municipal storm drain system is necessary for the protection of the Town's water bodies and groundwater, and to safeguard the public health, safety, welfare and the environment.

B. The objectives of this bylaw are:

(1) To prevent illicit discharge of pollutants from entering Southborough'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 bylaw through inspection, monitoring, and enforcement.

§ 225-2. Definitions.

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

AUTHORIZED ENFORCEMENT AGENCY
The Board of Health (hereafter the Board), its employees or agents designated to enforce this bylaw.

BEST MANAGEMENT PRACTICE (BMP)

An activity, procedure, restraint, or structural improvement that helps to reduce the quantity or improve the quality of stormwater runoff.

CLEAN WATER ACT

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

DISCHARGE OF POLLUTANTS

The addition from any source of any pollutant or combination of pollutants into the municipal storm drain system or into the waters of the United States or commonwealth 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 drain 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 bylaw.

ILLICIT DISCHARGE

Direct or indirect discharge to the municipal storm drain system that is not composed entirely of stormwater, except as exempted in § **225-7**. The term does not include a discharge in compliance with an NPDES Stormwater Discharge Permit or a Surface Water Discharge Permit, or resulting from fire fighting activities exempted pursuant to § **225-8** of this bylaw.

MUNICIPAL SEPARATE STORM SEWER SYSTEM (MS4) or MUNICIPAL STORM DRAIN 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 Town of Southborough.

NATIONAL POLLUTANT DISCHARGE ELIMINATION SYSTEM (NPDES) STORMWATER DISCHARGE PERMIT

A permit issued by United States Environmental Protection Agency or jointly with the state that authorizes the discharge of pollutants to waters of the United States.

NON-STORMWATER DISCHARGE

Discharge to the municipal storm drain system not composed entirely of stormwater.

PERSON

Any individual, group of individuals, association, partnership, corporation, company, business organization, trust, estate, the commonwealth or political subdivision thereof to the extent subject to Town bylaws, administrative agency, public or quasi-public corporation or body, the Town of Southborough, and any other legal entity, its legal representatives, agents, or assigns.

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. Pollutants shall include, but not be limited to, the following:

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, ordnances, 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.

RECHARGE

The replenishment of underground water reserves.

STORMWATER

Stormwater runoff, snow melt runoff, and surface water runoff and drainage.

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, 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 30.000 and 310 CMR 40.0000.

WATERCOURSE

A natural or man-made channel through which water flows or a stream of water, including a river, brook or underground stream.

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.

WATERS OF THE COMMONWEALTH

All waters within the jurisdiction of the commonwealth, including, without limitation, rivers, streams, lakes, ponds, springs, impoundments, estuaries, wetlands, coastal waters, and groundwater.

§ 225-3. Applicability.

This bylaw shall apply to flows entering the municipally owned storm drainage system.

§ 225-4. Authority.

This bylaw is adopted under the authority granted by the Home Rule Amendment of the Massachusetts Constitution and the Home Rule Procedures Act, and pursuant to the regulations of the Federal Clean Water Act found at 40 CFR 122.34.

§ 225-5. Administration.

The Board of Health shall administer, implement and enforce this bylaw. Any powers granted to or duties imposed upon the Board may be delegated in writing by the Board to employees or agents of the Board or the Town of Southborough.

§ 225-6. Regulations.

The Board shall promulgate rules and regulations to effectuate the purposes of this bylaw. Failure by the Board to promulgate such rules and regulations shall not have the effect of suspending or invalidating this bylaw.

§ 225-7. Prohibited activities.

A. Illicit discharges. No person shall dump, discharge, cause or allow to be discharged any pollutant or non-stormwater discharge into the municipal separate storm sewer system (MS4), into a watercourse, into a wetland resource area, or into the waters of the commonwealth.

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

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

§ 225-8. Exemptions.

Discharge or flow resulting from fire fighting activities are exempt. The following non-stormwater discharges or flows are also exempt from the prohibition of non-stormwaters, provided that the source will not damage or threaten public health and the environment:

A. Waterline flushing and flow from potable water sources;

B. Springs, natural flow from riparian habitats and wetlands, diverted stream flow and rising groundwater;

C. Uncontaminated groundwater infiltration as defined in 40 CFR 35.2005(20), or uncontaminated pumped groundwater;

D. Water from exterior foundation drains, footing drains (not including active groundwater dewatering systems), crawl space pumps, sump pumps or air conditioning condensation;

E. Discharge from landscape irrigation or lawn watering;

F. Water from noncommercial car washing;

G. Discharge from dechlorinated swimming pool or hot tub water (less than one ppm chlorine), provided the pool or hot tub is drained in such a way as not to cause a nuisance;

H. Discharge from street sweeping, discharge of sand and deicers used for public safety purposes;

I. Emergency repairs to the municipal storm drain system, and any stormwater management structure or practice that poses a threat to public health or safety, or as deemed necessary by the Board;

J. Dye testing, provided verbal notification is given to the Board prior to the time of the test;

K. 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

L. Discharge for which advanced written approval is received from the Board as necessary to protect public health, safety, welfare or the environment.

§ 225-9. Emergency suspension of storm drainage system access.

The Board may suspend municipal storm drain system access to any person or property without prior written notice when such suspension is necessary to stop an actual or threatened discharge of pollutants that presents imminent risk of harm to the public health, safety, welfare or the environment. In the event any person fails to comply with an

emergency suspension order, the Board of Health and Health Agent may take all reasonable steps to prevent or minimize harm to the public health, safety, welfare or the environment.

§ 225-10. Notification of spills.

Notwithstanding other requirements of local, state or federal law, as soon as a person responsible for a facility or operation, or responsible for emergency response for a facility or operation has information of or suspects a release of materials at that facility or operation resulting in or which may result in discharge of pollutants into the municipal drainage system, a wetland resource area or the waters of the Commonwealth, the person shall take all necessary steps to ensure containment, and cleanup of the release. In the event of a release of oil or hazardous materials, the person shall immediately notify the Southborough Fire and Police Departments and the Board of Health and Health Agent. In the event of a release of nonhazardous material, the reporting person shall notify the Board of Health and Health Agent no later than the next business day. The reporting person shall provide to the Board of Health written confirmation of all telephone, facsimile or in-person notifications within three business days thereafter. If the discharge of prohibited materials is from a commercial or industrial facility, the facility owner or operator of the facility shall retain on-site a written record of the discharge and the actions taken to prevent its recurrence. Such records shall be retained for at least three years.

§ 225-11. Enforcement.

The Board or an authorized agent of the Board shall enforce this bylaw, regulations, orders, violation notices, and enforcement orders, and may pursue all civil and criminal remedies for such violations.

A. Orders. The Board or an authorized agent of the Board may issue a written order to enforce the provisions of this bylaw 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.

   (1) If the enforcing person 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 Town may, at its option, undertake such work, and expenses thereof shall be charged to the violator.

   (2) Within 30 days after completing all measures necessary to abate the violation or to perform remediation, the violator and the property owner will be notified of the costs incurred by the Town, including administrative costs. The violator or property owner may file a written protest objecting to the amount or basis of costs with the Board 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 Board 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.

B. Penalties. Any person who violates any provision of this bylaw, regulation, or permit issued hereunder, shall be subject to fines, civil action, criminal prosecution, and tax liens, as appropriate and as lawfully established by the Town of Southborough.

C. Noncriminal disposition. As an alternative to criminal prosecution or civil action, the town may utilize the noncriminal disposition procedure set forth in MGL c. 40, § 21D, in which case the Health Agent or other authorized agent of the town shall be the enforcing person.

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

E. Appeals. Further relief shall be to a court of competent jurisdiction.

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

§ 225-12. Severability.

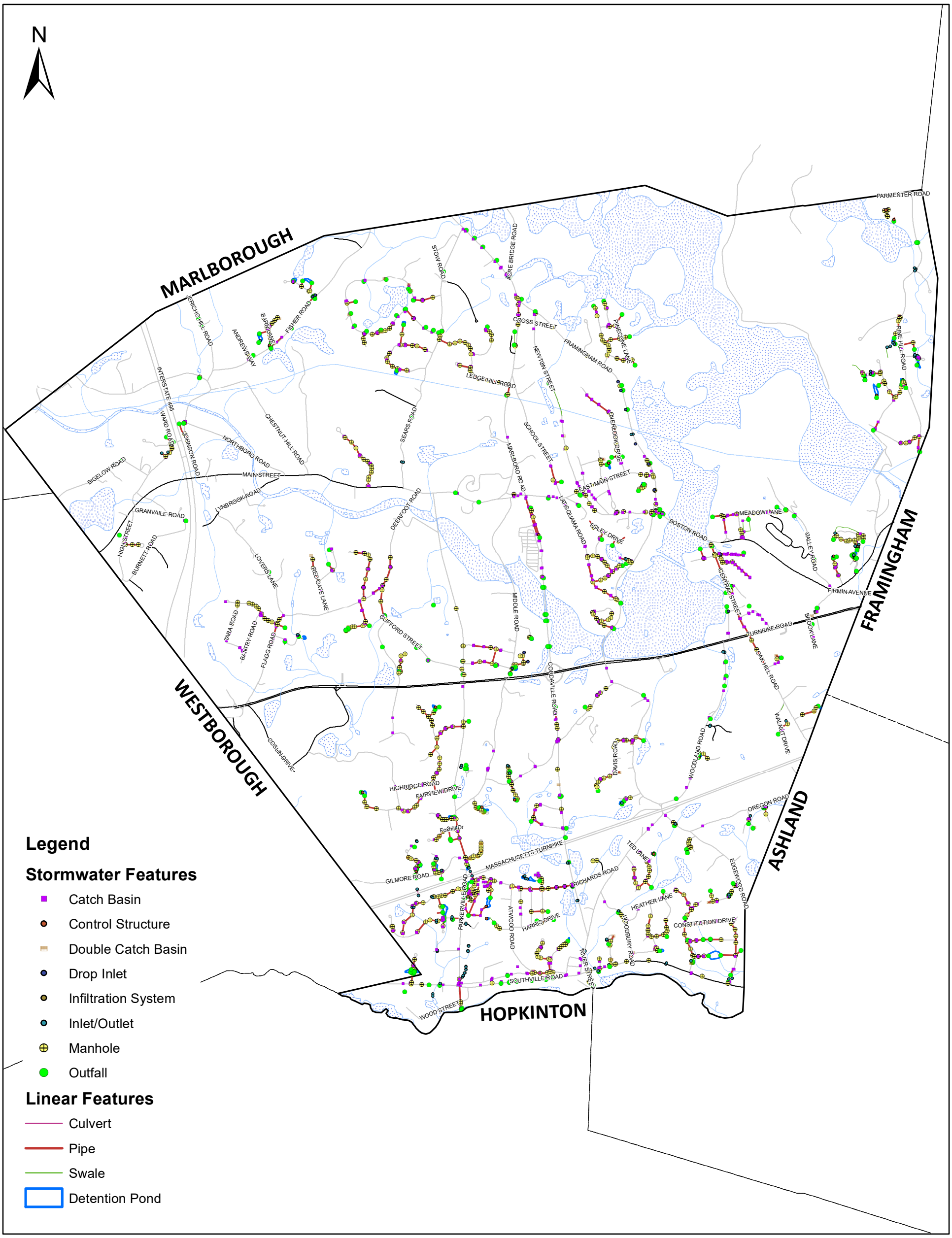
The provisions of this bylaw are hereby declared to be severable. If any provision, paragraph, sentence, or clause, of this bylaw or the application thereof to any person, establishment, or circumstances shall be held invalid, such invalidity shall not affect the other provisions or application of this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

§ 225-13. Transitional provisions.

Residential property owners shall have 120 days from the effective date of the bylaw to comply with its provisions, provided good cause is shown for the failure to comply with the bylaw during that period.

Appendix B

Storm System Mapping



TOWN OF SOUTHBOROUGH · INCORPORATED JULY 6, 1727 · MASSACHUSETTS

TOWN OF SOUTHBOROUGH

STORM SYSTEM MAPPING

PARE CORPORATION
ENGINEERS - SCIENTISTS - PLANNERS
8 BLACKSTONE VALLEY PLACE
LICOLN, RI 02865
401-334-4100

Appendix C

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

Outfall ID: _____ **Town:** _____

Inspector: _____ **Date:** _____

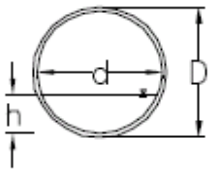
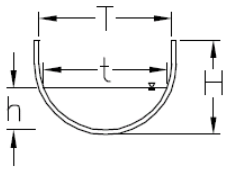
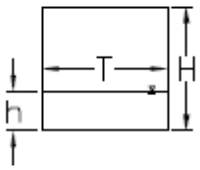
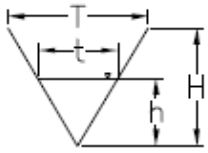
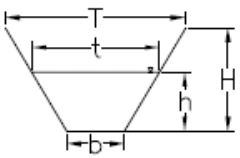
Street Name _____

Last rainfall event _____

DRY WEATHER OUTFALL INSPECTION SURVEY

Type of Outfall (check one):		**Pipe Outfall** ☐	**Open Swale Outfall** ☐
Outfall Label:	**Stencil** ☐ **Ground Inset** ☐ **Sign** ☐ **None** ☐ **Other**_____		
Pipe Material:	Concrete ☐ Corrugated metal ☐ Clay Tile ☐ Plastic ☐ Other: _____ ☐	**Pipe Condition:**	Good ☐ Poor ☐ Fair ☐ Crumbling ☐
Swale Material:	Paved (asphalt) ☐ Concrete ☐ Earthen ☐ Stone ☐ Other: _____ ☐	**Swale Condition:**	Good ☐ Poor ☐ Fair ☐ Crumbling ☐

Shape of Pipe/Swale (check one)

 ☐	 ☐	 ☐	 ☐	 ☐
Rounded Pipe/Swale		**Rectangular Pipe/Swale**	**Triangular Swale**	**Trapezoidal Swale**

Pipe Measurements:	**Swale Measurements:**	**Is there a headwall?**	**Location Sketch**
Inner Dia. (in): d= _____	Swale Width (in): T= _____	Yes ☐ No ☐	
Outer Dia. (in): D= _____	Flow Width (in): t = _____	**Condition:**	
Pipe Width (in): T= _____	Swale Height (in): H= _____	Good ☐ Poor ☐ Fair ☐ Crumbling ☐	
Pipe Height (in): H= _____	Flow Height (in): h= _____*		
Flow Width (in): h= _____*	Bottom Width (in): b=_____		

Description of Flow: Heavy ☐ Moderate ☐ Trickling ☐ Dry ☐

If the outlet is submerged check yes and indicate approximate height of water above the outlet invert. h above invert (in):

Circle All Materials Present:

Odor:	Yes ☐	No ☐	Rip rap / Sheen: Bacterial
Optical enhancers suspected?	Yes ☐	No ☐	Excessive sediment / Sheen: Petroleum
Has channelization occurred?	Yes ☐	No ☐	Foam / Floatables
Has scouring occurred below the outlet?	Yes ☐	No ☐	Sanitary Waste / Algae
			Orange Staining / Excessive Vegetation

Required Maintenance: Tree Work ☐ Remove Trash/Debris ☐ Ditch Work ☐ Blocked Pipe ☐ Structural Corrosion ☐ Erosion at Structure ☐ N/A ☐ Other ☐

Comments:

Outfall I.D.: _____ **Date:** _____

Inspector: _____

Time of Inspection: _____

Street Name _____

Last rainfall event _____

WET WEATHER OUTFALL INSPECTION SURVEY

Visual Inspection:	**Yes**	**No**	**Comments (Include probable source of observed contamination):**
Color	☐	☐	
Odor	☐	☐	
Turbidity	☐	☐	
Excessive Sediment	☐	☐	
Sanitary Waste	☐	☐	
Pet Waste	☐	☐	
Floatable Solids	☐	☐	
Oil Sheen	☐	☐	
Bacterial Sheen	☐	☐	
Foam	☐	☐	
Algae	☐	☐	
Orange Staining	☐	☐	
Excessive Vegetation	☐	☐	
Optical Enhancers	☐	☐	
Other _____			

WET WEATHER OUTFALL INSPECTION SURVEY

Sample Parameters	Analytical Test Method	Benchmark	Field Screening Result	Full Analytical?
Ammonia[1]	EPA 350.2/SM4500-NH3C	>50.0 mg/L		☐ Yes ☐ No
Boron[1]	EPA 212.3	>35.0 mg/L		☐ Yes ☐ No
Chloride[2]	EPA 300.0	230 mg/L		☐ Yes ☐ No
Color[1]	EPA 110.1/110.2	>500 units		☐ Yes ☐ No
Detergents & Surfactants[3]	EPA 425.1/SM5540C	>0.25 mg/L		☐ Yes ☐ No
Fluoride[3]	EPA 300.0	>0.25 mg/L		☐ Yes ☐ No
Hardness[1]	EPA 130.2	<10 mg/L or >2,000 mg/L		☐ Yes ☐ No
pH[1]	EPA 150.1/SM 4500H	<5		☐ Yes ☐ No
Potassium[1]	EPA 200.7	>20 mg/L		☐ Yes ☐ No
Specific Conductance[1]	SM 2510B	>2,000 µS/cm		☐ Yes ☐ No
Turbidity[1]	EPA 180.1	>1,000 NTU		☐ Yes ☐ No
Comments:				

[1] – *Illicit Discharge Detection and Elimination: A Guidance Manual for Program Development and Technical Assessments*, Center for Watershed Protection and Robert Pitt of University of Alabama, 2004, p. 134, Table 45.

[2] – *Env –Ws 1703.21Water Quality Criteria for Toxic Substances,* State of New Hampshire Department of Surface Water Quality Regulations.

[2] – *Appendix I – Field Measurements, Benchmarks and Instrumentation*, Draft Massachusetts North Coastal Small MS4 General Permit, 2009.

CHAIN OF CUSTODY

PAGE_____ OF _____

WESTBORO, MA
TEL: 508-898-9220
FAX: 508-898-9193

MANSFIELD, MA
TEL: 508-822-9300
FAX: 508-822-3288

Date Rec'd in Lab:

ALPHA Job #:

Client Information

Client:

Address:

Phone:

Fax:

Email:

❑ These samples have been previously analyzed by Alpha

Project Information

Project Name:

Project Location:

Project #:

Project Manager:

ALPHA Quote #:

Turn-Around Time

❑ Standard ❑ RUSH *(only confirmed if pre-approved!)*

Date Due: **Time:**

Report Information - Data Deliverables

❑ FAX ❑ EMAIL

❑ ADEx ❑ Add'l Deliverables

Billing Information

❑ Same as Client info PO #:

Regulatory Requirements/Report Limits

State /Fed Program	*Criteria*

Other Project Specific Requirements/Comments/Detection Limits:

ANALYSIS

SAMPLE HANDLING

*Filtration*_____
❑ Done
❑ Not needed
❑ Lab to do

Preservation
❑ Lab to do
(Please specify below)

TOTAL # BOTTLES

ALPHA Lab ID (Lab Use Only)	Sample ID	Collection Date	Collection Time	Sample Matrix	Sampler's Initials	Sample Specific Comments

Container Type	
Preservative	

Relinquished By:	Date/Time	Received By:	Date/Time

Please print clearly, legibly and completely. Samples can not be logged in and turnaround time clock will not start until any ambiguities are resolved. All samples submitted are subject to Alpha's Terms and Conditions. See reverse side.

FORM NO: 01-01 (rev. 14-OCT-07)

Appendix D

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

SOP 13: WATER QUALITY SCREENING IN THE FIELD

Introduction

Outfalls from an engineered storm drain system can be in the form of pipes or ditches. Under current and pending regulations, it is important to inspect and document water quality within the MS4 system under both dry weather and wet weather conditions. SOP 1, "Dry Weather Outfall Inspection" and SOP 2, "Wet Weather Outfall Inspection", cover the objectives of these activities and how water quality parameters can be collected during both types of inspections. SOP 3, "Catch Basin Inspection and Cleaning", describes how this operations and maintenance activity can serve as an additional opportunity to collect water quality data.

SOP 2 included detailed information on how to collect discrete analytical samples to be processed by a laboratory. In contrast, this SOP addresses screening-level measurements than can be collected at outfalls, catch basins, receiving waters, or other water bodies. The measurements can be collected with field test kits or with portable meters.

Water quality screening data collected in this manner can feed into an illicit discharge detection and elimination investigation, like the process described in SOP 10, "Locating Illicit Discharges".

Visual Condition Assessment

SOP 1, SOP 2, and SOP 3 describe a Visual Condition Assessment to collect observations related to the quality of stormwater conveyed by an engineered storm drain system. These observations may include such visual evidence and/or potential pollutants as:

- Foaming (detergents)
- Discoloration
- Evidence of sanitary waste
- Optical enhancers (fluorescent dyes added to laundry detergent); and
- Turbidity

If a Visual Condition Assessment indicates the presence of these pollutants, it may be necessary to quantify the extent of each, and gather data on other parameters that cannot be visually observed but can be measured using field kits or meters. These parameters include:

- Ammonia
- Chloride (present in treated drinking water but not groundwater)
- Conductivity
- Fluoride
- Hardness
- pH
- Potassium

Field Kits and Sampling Methods Available

In recent drafts of new MS4 Permits, U.S. EPA Region 1 has identified several test kits that are acceptable for use in the field, and other regulatory agencies have also completed similar reviews. The following table shows field test kits and portable meters that can be used for screening parameters.

Table SOP 13-1
Field Measurements, Test Kits, and Instrumentation

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
Bacteria	Bacteria field test kits require 24-hour window	
Boron	N/A	Hanna™ HI 38074 Taylor™ K-1541
Chloride	CHEMetrics™ V-2000 Colorimeter Hach™ Pocket Colorimeter™ II LaMotte™ DC1200 Colorimeter	CHEMetrics™ K-2002 through K-2070 Hach™ CDS-DT Hach™ Chloride QuanTab® Test Strips
Color		Hach™ ColorDisc
Conductivity	CHEMetrics™ I-1200	N/A
Detergents (Surfactants)	CHEMetrics™ I-2017	CHEMetrics™ K-9400 and K-9404 Hach™ DE-2
Fluoride	CHEMetrics™ V-2000 Colorimeter Hach™ Pocket Colorimeter™ II	N/A
Hardness	N/A	CHEMetrics™ K-1705 and K-1710 CHEMetrics™ K-4502 through K-4530 Hach™ HA-DT Hach™ Hardness Test Strips
Optical enhancers	Field tests still under development	
pH	CHEMetrics™ I-1000	Hach™ 17J through 17N Hach™ pH Test Strips
Potassium	Horiba™ Cardy C-131	LaMotte™ 3138 KIW
Turbidity	CHEMetrics™ I-1300	N/A

Each field test kit will include instructions specific to that test kit, and most kits are available in configurations that detect different ranges of the parameter. For example, the CHEMetrics™ detergents kit K-9400 shown above detects concentrations of 0 to 3 milligrams per liter (mg/L) while the K-9404 kit detects concentrations of 0 to 1,400 mg/L.

The table below shows values identified by the U.S. EPA and the Center for Watershed Protection as typical screening values for select parameters. These represent the typical concentration (or value) of each parameter expected to be found in stormwater. Screening values that exceed these benchmarks may be indicative of pollution and/or illicit discharges.

Table SOP 13-2
Benchmark Field Measurements for Select Parameters

Analyte or Parameter	Benchmark
Ammonia	>0.5 mg/L
Conductivity	>2,000
Detergents (Surfactants)	> 0.25 mg/L
Fluoride	>0.25 mg/L
pH	<5
Potassium	>20 mg/L

If and when water quality screening samples, whether using field test kits or portable meters, exceed these benchmark concentrations, the inspector should consider collecting analytical samples for laboratory analysis.

Advantages and Disadvantages of Field Testing

Field test kits can be convenient for use as a screening tool, initial purchase costs are low (typically $0.50 to $5.00 for the kits included in Table SOP 13-1), and the costs are far less than full analyses at a laboratory. However, some disadvantages of this screening method include:

- Limited shelf life
- Labor cost associated with inspector's time
- Generation of wastes, including glass vials and used reagent
- Steps and processes for each kit can vary widely, resulting in errors
- Trained staff are required in order to effectively utilize kits
- Not all kits are accepted by all regulatory agencies
- Limited useful detection range

Portable instrumentation such as the colorimeters shown in Table SOP 13-1 have the benefit of providing accurate readings, measure to low detection limits, and can be purchased pre-programmed to measure concentrations of most parameters required. Disadvantages of portable instrumentation include:

- High initial purchase cost
- Requirement for ongoing calibration and maintenance
- Individual probes require periodic replacement
- Specific storage requirements to maintain calibration
- Trained staff are required in order to effectively utilize meters

Related Standard Operating Procedures

1. SOP 1, Dry Weather Outfall Inspection
2. SOP 2, Wet Weather Outfall Inspection
3. SOP 3, Catch Basin Cleaning and Inspection
4. SOP 10, Locating Illicit Discharges

WATER QUALITY SCREENING FORM

Outfall I.D.			
Outfall Location			
Inspector's Name			
Date of Inspection		Date of Last Inspection	
Start Time		End Time	
Type of Inspection: Regular ☐ Pre-Storm Event ☐ During Storm Event ☐ Post-Storm Event ☐			
Most Recent Storm Event			

FIELD WATER QUALITY SCREENING RESULTS

Sample Parameter	Field Test Kit or Portable Instrument Meter	Benchmark	Field Screening Result	Full Analytical Required?
Ammonia[1]		> 0.5 mg/L		☐ Yes ☐ No
Boron[1]		> 0.35 mg/L		☐ Yes ☐ No
Chloride[2]		230 mg/L		☐ Yes ☐ No
Color[1]		> 500 units		☐ Yes ☐ No
Specific Conductance[1]		> 2,000 µS/cm		☐ Yes ☐ No
Detergents & Surfactants[3]		> 0.25 mg/L		☐ Yes ☐ No
Fluoride[3]		> 0.25 mg/L		☐ Yes ☐ No
Hardness[1]		< 10 mg/L or > 2,000 mg/L		☐ Yes ☐ No
pH[1]		< 5		☐ Yes ☐ No
Potassium[1]		> 20 mg/L		☐ Yes ☐ No
Turbidity[1]		> 1,000 NTU		☐ Yes ☐ No

[1] – *Illicit Discharge Detection and Elimination: A Guidance Manual for Program Development and Technical Assessments*, Center for Watershed Protection and Robert Pitt of University of Alabama, 2004, p. 134, Table 45.

[2] –*Env-Ws 1703.21 Water Quality Criteria for Toxic Substances*, State of New Hampshire Department Surface Water Quality Regulations.

[3] – *Appendix I – Field Measurements, Benchmarks and Instrumentation*, Draft Massachusetts North Coastal Small MS4 General Permit, 2009.

CMRSWC

FULL ANALYTICAL TESTING WATER QUALITY RESULTS

Sample Parameter	Analytical Test Method	Sample Collection (Time/Date)	Testing Lab	Analytical Testing Result
Ammonia	EPA 350.2/SM4500-NH3C			
Bacteria	E coli: 1103.1; 1603 Enterococcus: 1106.1; 1600			
Boron	EPA 212.3			
Chloride	EPA 9251			
Color	EPA 110.2			
Specific Conductance	SM 2510B			
Detergents & Surfactants	EPA 425.1/SM5540C			
Fluoride	EPA 300.0			
Hardness	EPA 130.1/SM 2340B			
Optical Enhancers	N/A*			
pH	EPA 150.1/SM 4500H			
Potassium	EPA 200.7			
Turbidity	SM 2130B			

*- There is presently no USEPA Standard Method for analysis of optical enhancers. Typically, sample pads are described as with “Present” or “Not Present” for fluorescing dye when exposed to UV light or a fluorometer.

Appendix E

IDDE Employee Training Record

Illicit Discharge Detection and Elimination (IDDE)
Employee Training Record

Town of Southborough, Massachusetts

Date of Training: _____

Duration of Training: _____

Name	Title	Signature

Appendix F

Source Isolation and Confirmation Methods:
Instructions, Manuals, and SOPs

SOP 10: LOCATING ILLICIT DISCHARGES

Introduction

An "illicit discharge" is any discharge to an engineered storm drain system that is not composed entirely of stormwater unless the discharge is defined as an allowable non-stormwater discharge under the 2003 Massachusetts MS4 Permit. Illicit discharges may enter the engineered storm drain system through direct or indirect connections, such as: cross-connections of sewer services to engineered storm drain systems; leaking septic systems; intentional discharge of pollutants to catch basins; combined sewer overflows; connected floor drains; and sump pumps connected to the system (under some circumstances). Illicit discharges can contribute high levels of pollutants, such as heavy metals, toxics, oil, grease, solvents, nutrients, and pathogens to receiving streams.

Illicit discharges can be located by several methods, including routine dry weather outfall inspections and catch basin inspections, which are described in detail in SOP 1, "Dry Weather Outfall Inspection" and SOP 3, "Catch Basin Inspection and Cleaning", respectively, as well as from citizen reports.

This SOP assumes that the municipality has legal authority (i.e., a bylaw or ordinance) in place, per the requirements of the 2003 Massachusetts MS4 Permit, to prohibit the connection of non-stormwater discharges into the storm drain system. The authority or department for addressing illicit discharge reports would be clearly identified in the municipality's legal authority. In Massachusetts, this is typically a combination of the Board of Health, the Department of Public Works (or Highway Department), and the local sanitary sewer department or commission. In some communities, the Conservation Commission may also play a role. This SOP refers to "appropriate authority" generically to reflect differences in how municipalities have identified these roles.

Identifying Illicit Discharges

The following are often indicators of an illicit discharge from stormwater outfall:

1. Foam: indicator of upstream vehicle washing activities, or an illicit discharge.
2. Oil sheen: result of a leak or spill.
3. Cloudiness: indicator of suspended solids such as dust, ash, powdered chemicals and ground up materials.
4. Color or odor: Indicator of raw materials, chemicals, or sewage.
5. Excessive sediment: indicator of disturbed earth of other unpaved areas lacking adequate erosion control measures.
6. Sanitary waste and optical enhancers (fluorescent dyes added to laundry detergent): indicator of the cross-connection of a sewer service.
7. Orange staining: indicator of high mineral concentrations.

Both bacteria and petroleum can create a sheen on the water surface. The source of the sheen can be differentiated by disturbing it, such as with a pole. A sheen caused by oil will remain intact and move in

a swirl pattern; a sheen caused by bacteria will separate and appear "blocky". Bacterial sheen is not a pollutant but should be noted.

Citizen Call in Reports

Reports by residents and other users of a water body can be effective tools in identifying the presence of illicit discharges. Many communities have set up phone hotlines for this purpose, or have provided guidance to local police departments and dispatch centers to manage data reported in this manner. Municipal employees and the general public should receive education to help identify the signs of illicit discharges and should be informed how to report such incidents.

When a call is received about a suspected illicit discharge, the attached IDDE Incident Tracking Sheet shall be used to document appropriate information. Subsequent steps for taking action to trace, document, and eliminate the illicit discharge are described in the following sections.

Potential illicit discharges reported by citizens should be reviewed on an annual basis to locate patterns of illicit discharges, identify high-priority catchments, and evaluate the call-in inspection program.

Tracing Illicit Discharges

Whenever an illicit discharge is suspected, regardless of how it was identified, the attached IDDE Incident Tracking Sheet should be utilized. The Incident Tracking Sheet shall be provided to the appropriate authority (i.e., Board of Health, Department of Public Works, etc.), which shall promptly investigate the reported incident.

If the presence of an illicit discharge is confirmed by the authority, but its source is unidentified, additional procedures to determine the source of the illicit discharge should be completed.

1. Review and consider information collected when illicit discharge was initially identified, for example, the time of day and the weather conditions for the previous 72 hours. Also consider and review past reports or investigations of similar illicit discharges in the area.
2. Obtain storm drain mapping for the area of the reported illicit discharge. If possible, use a tracking system that can be linked to your system map, such as GIS.
3. Document current conditions at the location of the observed illicit discharge point, including odors, water appearance, estimated flow, presence of floatables, and other pertinent information. Photograph relevant evidence.
4. If there continues to be evidence of the illicit discharge, collect water quality data using the methods described in SOP 13, "Water Quality Screening in the Field". This may include using field test kits or instrumentation, or collecting analytical samples for full laboratory analysis.
5. Move upstream from the point of observation to identify the source of the discharge, using the system mapping to determine infrastructure, tributary pipes, and drainage areas that contribute. At each point, survey the general area and surrounding properties to identify potential sources of the illicit discharge. Document observations at each point on the IDDE Incident Tracking Sheet as well as with photographs.
6. Continue this process until the illicit discharge is no longer observed, which will define the boundaries of the likely source. For example if the illicit discharge is present in catch basin 137

but not the next upstream catch basin, 138, the source of the illicit discharge is between these two structures.

If the source of the illicit discharge could not be determined by this survey, consider using dye testing, smoke testing, or closed-circuit television inspection (CCTV) to locate the illicit discharge.

Dye Testing

Dye testing is used to confirm a suspected illicit connection to a storm drain system. Prior to testing, permission to access the site should be obtained. Dye is discharged into the suspected fixture, and nearby storm drain structures and sanitary sewer manholes observed for presence of the dye. Each fixture, such as sinks, toilets, and sump pumps, should be tested separately. A third-party contractor may be required to perform this testing activity.

Smoke Testing

Smoke testing is a useful method of locating the source of illicit discharges when there is no obvious potential source. Smoke testing is an appropriate tracing technique for short sections of pipe and for pipes with small diameters. Smoke added to the storm drain system will emerge in connected locations. A third-party contractor may be required to perform this testing activity.

Closed Circuit Television Inspection (CCTV)

Televised video inspection can be used to locate illicit connections and infiltration from sanitary sewers. In CCTV, cameras are used to record the interior of the storm drain pipes. They can be manually pushed with a stiff cable or guided remotely on treads or wheels. A third-party contractor may be required to perform this testing activity.

If the source is located, follow steps for removing the illicit discharge. Document repairs, new sanitary sewer connections, and other corrective actions required to accomplish this objective. If the source still cannot be located, add the pipe segment to a future inspection program.

This process is demonstrated visually on the last page of this SOP.

Removing Illicit Discharges

Proper removal of an illicit discharge will ensure it does not recur. Refer to Table SOP 10-1, attached for, for examples of the notification process.

In any scenario, conduct a follow up inspection to confirm that the illicit discharge has been removed. Suspend access to the storm drain system if an “imminent and substantial danger” exists or if there is a threat of serious physical harm to humans or the environment.

Attachments

1. Illicit Discharge Incident Tracking Sheet

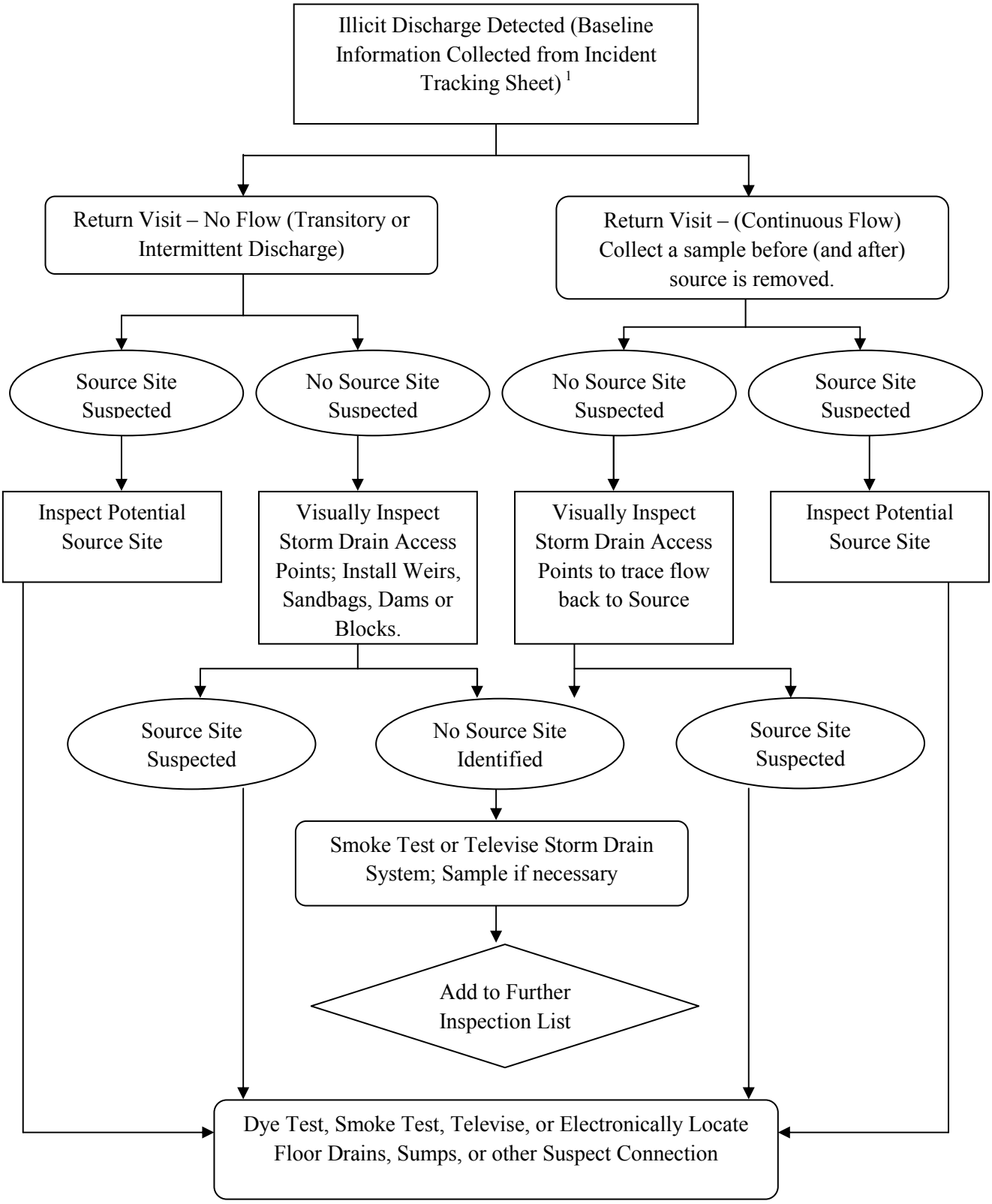
Related Standard Operating Procedures

1. SOP 1: Dry Weather Outfall Inspection
2. SOP 2: Wet Weather Outfall Inspection
3. SOP 3: Catch Basin Inspection
4. SOP 13: Using Field Test Kits For Outfall Screening
5. SOP 15: Private Drainage Connections

Table SOP 10-1

Notification and Removal Procedures for Illicit Discharges into the Municipal Separate Storm Sewer System

Financially Responsible	Source Identified	Enforcement Authority	Procedure to Follow
Private Property Owner	One-time illicit discharge (e.g. spill, dumping, etc.)	Ordinance enforcement authority (e.g. Code Enforcement Officer)	• Contact Owner • Issue Notice of Violation • Issue fine
Private Property Owner	Intermittent or continuous illicit discharge from legal connection	Ordinance enforcement authority (e.g. Code Enforcement Officer)	• Contact Owner • Issue Notice of Violation • Determine schedule for removal • Confirm removal
Private Property Owner	Intermittent or continuous illicit discharge from illegal connection or indirect (e.g. infiltration or failed septic)	Plumbing Inspector or ordinance enforcement authority	• Notify Plumbing Inspector or ordinance enforcement authority
Municipal	Intermittent or continuous illicit discharge from illegal connection or indirect (e.g. failed sewer line)	Ordinance enforcement authority (e.g. Code Enforcement Officer)	• Issue work order • Schedule removal • Remove connection • Confirm removal
Exempt 3rd Party	Any	USEPA	• Notify exempt third party and USEPA of illicit discharge


Illicit Discharge Detected (Baseline Information Collected from Incident Tracking Sheet) [1]
Return Visit – No Flow (Transitory or Intermittent Discharge)
Return Visit – (Continuous Flow) Collect a sample before (and after) source is removed.
Source Site Suspected
No Source Site Suspected
No Source Site Suspected
Source Site Suspected
Inspect Potential Source Site
Visually Inspect Storm Drain Access Points; Install Weirs, Sandbags, Dams or Blocks.
Visually Inspect Storm Drain Access Points to trace flow back to Source
Inspect Potential Source Site
Source Site Suspected
No Source Site Identified
Source Site Suspected
Smoke Test or Televise Storm Drain System; Sample if necessary
Add to Further Inspection List
Dye Test, Smoke Test, Televise, or Electronically Locate Floor Drains, Sumps, or other Suspect Connection

[1] – *Guidelines and Standard Operating Procedures: Illicit Discharge Detection and Elimination and Pollution Prevention/Good Housekeeping for Stormwater Phase II Communities in New Hampshire,* New Hampshire Estuary Project, 2006, p. 25, Figure 2-1.

Illicit Discharge Incident Tracking Sheet

Incident ID:				
Responder Information (for Citizen-Reported issues)				
Call Taken By:		Call Date:		
Call Time:		Precipitation (inches) in past 24-48 hours:		
Observer Information				
Date and Time of Observation:		Observed During Regular Maintenance or Inspections? ☐ Yes ☐ No		
Caller Contact Information (optional) or Municipal Employee Information:				
Observation Location: (complete one or more below)				
Latitude and Longitude:				
Stream Address or Outfall #:				
Closest Street Address:				
Nearby Landmark:				
Primary Location Description	**Secondary Location Description:**			
☐Stream Corridor (In or adjacent to stream)	☐Outfall	☐In-stream Flow	☐Along Banks	
☐Upland Area (Land not adjacent to stream)	☐Near Storm Drain	☐Near other water source (stormwater pond, wetland, ect.):		
Narrative description of location:				
Upland Problem Indicator Description				
☐Dumping	☐Oil/Solvents/Chemicals	☐Sewage		
☐Detergent, suds, etc.	☐Other:_____			
Stream Corridor Problem Indicator Description				
Odor	☐None	☐Sewage	☐Rancid/Sour	☐Petroleum (gas)
	☐Sulfide (rotten eggs); natural gas	☐Other: Describe in "Narrative" section		
Appearance	☐"Normal"	☐Oil Sheen	☐Cloudy	☐Foam
	☐Optical enhancers	☐ Discolored		
	☐Other: Describe in "Narrative" section			
Floatables	☐None	☐Sewage (toilet paper, etc)	☐Algae	☐Trash or debris
	☐Other: Describe in "Narrative" section			
Narrative description of problem indicators:				
Suspected Source (name, personal or vehicle description, license plate #, address, etc.):				

CMRSWC