

Illicit Discharge Detection and Elimination (IDDE) Plan

Town of Wilmington, MA

List of Updates:

December 20, 2019 (for Catchment Investigations Procedure and Guidelines)

August, 31, 2020 (for update to SSO Inventory)

April 15, 2021 (for update to outfall screening results)



This project has been financed with Funds from the Massachusetts Department of Environmental Protection (the Department). The contents do not necessarily reflect the views and policies of the Department, nor does the mention of trade names or commercial products constitute endorsement or recommendation for use.

Table of Contents

Illicit Discharge Detection and Elimination Plan Town of Wilmington, MA

1	Introduction	3
1.1	MS4 Program.....	3
1.2	Illicit Discharges	3
1.3	Allowable Non-Stormwater Discharges	4
1.4	Receiving Waters and Impairments	5
1.5	IDDE Program Goals, Framework, and Timeline.....	5
1.6	Work Completed to Date.....	7
2	Authority and Statement of IDDE Responsibilities	8
2.1	Legal Authority	8
2.2	Statement of Responsibilities	8
3	Stormwater System Mapping	9
3.1	Phase I Mapping	9
3.2	Phase II Mapping.....	9
3.3	Additional Recommended Mapping Elements	10
4	Sanitary Sewer Overflows (SSOs)	11
5	Assessment and Priority Ranking of Outfalls	11
5.1	Outfall Catchment Delineations	12
5.2	Outfall and Interconnection Inventory and Initial Ranking.....	12
6	Dry Weather Outfall Screening and Sampling.....	16
6.1	Weather Conditions.....	16
6.2	Dry Weather Screening/Sampling Procedure.....	16
6.2.1	General Procedure	16
6.2.2	Field Equipment	17
6.2.3	Sample Collection and Analysis.....	18
6.3	Interpreting Outfall Sampling Results	20
6.4	Follow-up Ranking of Outfalls and Interconnections	21
7	Catchment Investigations	21
7.1	System Vulnerability Factors.....	22
7.2	Dry Weather Manhole Inspections	24
7.2.1	What to Look For: Physical Characteristics.....	25
7.2.2	Interpreting Key Junction Inspection Results.....	27
7.3	Wet Weather Outfall Sampling.....	29

7.4	Source Isolation and Confirmation	29
7.4.1	Sandbagging	30
7.4.2	Smoke Testing.....	30
7.4.3	Dye Testing.....	30
7.4.4	CCTV/Video Inspection.....	31
7.4.5	Optical Brightener Monitoring.....	31
7.4.6	IDDE Canines.....	31
7.5	Illicit Discharge Removal.....	32
7.5.1	Confirmatory Outfall Screening	32
7.6	Ongoing Screening.....	32
8	Training.....	32
9	Progress Reporting	32

Tables

Table 1-1. Impaired Waters.....	5
Table 1-2. IDDE Program Implementation Timeline.....	6
Table 5-1. Outfall Inventory and Priority Ranking Matrix.....	14
Table 6-1. Field Equipment – Dry Weather Outfall Screening and Sampling	17
Table 6-2. Sampling Parameters and Analysis Methods.....	19
Table 6-3. Required Analytical Methods, Detection Limits, Hold Times, and Preservatives ⁴	19
Table 6-4. Benchmark Field Measurements for Select Parameters	21
Table 7-1. Outfall Catchment System Vulnerability Factor (SVF) Inventory.....	23
Table 7-2.1 Physical Observation Parameters and likely Flow Sources.....	25
Table 7-2.2 Key Junction Discharge Designation and Follow-up Action.....	27

Figures

Figure 1-1. IDDE Investigation Procedure Framework	6
Figure 7-2. Dry Weather Manhole Investigation Process.....	28

Appendices

Appendix A – Legal Authority (IDDE Bylaw or Ordinance)
Appendix B – Storm System Mapping
Appendix C – Field Forms
Appendix D – Water Quality Analysis Instructions, User’s Manuals and Standard Operating Procedures
Appendix E – IDDE Employee Training Record
Appendix F – Source Isolation and Confirmation Methods: Instructions, Manuals, and SOPs
Appendix G – Initial Outfall Priority Rankings – Spreadsheet with full breakdown of each Subarea
Appendix H – SSO Inventory
Appendix I – Dry Weather Screening Lab Test Results

1 Introduction

1.1 MS4 Program

This Illicit Discharge Detection and Elimination (IDDE) Plan has been developed by the Town of Wilmington 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 the Town of Wilmington’s regulated area based on the 2014 Massachusetts Integrated List of Waters produced by MassDEP every two years. Note, at the time of preparing this document the 2016 List of Waters was still in draft form however used to supplement the 2014 List of Waters where waterbody segments in Town were added to the list. 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
Town of Wilmington, Massachusetts

Water Body Name	Segment ID	Category	Impairment(s)	Associated Approved TMDL
Shawsheen River	MA83-18	5	E.Coli, Fecal Coliform	Yes; bacteria
Fosters Pond	MA83005	5	D.O.	
Maple Meadow Brook	MA92-04	5	D.O.	
Lubbers Brook	MA92-05	5	D.O., E.Coli	
Silver Lake	MA92059	5	D.O., E.Coli	
Ipswich River	MA92-06	5	D.O.	
Martins Brook	MA92-08	5	D.O., E.Coli, Fecal Colif.	
Aberjona River	MA71-01	5	D.O., E.Coli	

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.

As noted in Table 1-1, all impaired waterbody segments within the Town of Wilmington require a TMDL, however the TMDL has not been prepared. Five (5) of the eight (8) impaired waterbody segments listed above are impaired due to pollutants associated with a high potential for illicit discharges within the watershed. As such, outfalls that fall within these segments watersheds boundaries have been classified as “high priority outfalls”.

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
- Follow-up screening
- Employee training

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

Figure 1-1. IDDE Investigation Procedure Framework

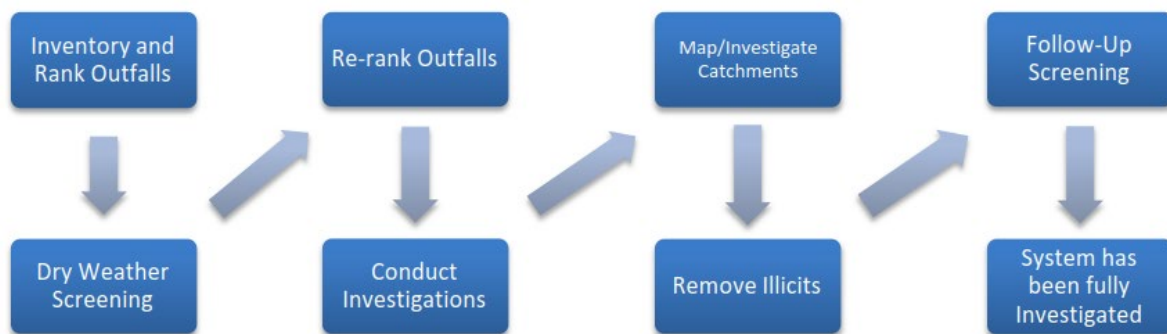


Table 1-2. IDDE Program Implementation Timeline

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

In accordance with the 2003 MS4 Permit requirements, the Town of Wilmington passed an Illicit Discharge Bylaw at Town Meeting during May of 2007. The Town of Wilmington has developed a complete Drainage System Master Plan, which includes the GPS mapping of the entire Town's drainage system. This includes topography, stormwater BMPs (i.e. existing retention basins, and infiltration basins), catch basins, drain manholes, and pipe network system. The Town has also mapped the entire sanitary sewer system, complete with rim and invert data based on record as-built drawings. Given the relatively young age of the Town's Sewer System (c.1970s to present), record information was found to be very accurate. In c.2008, outfalls were ranked by SEA Consultants, and testing performed of outfall discharges ranked as medium and high suspicion. The Town had located 35 potential Dry Weather Flows of which 5 had a high suspicion to be an illicit discharge. Samples were taken at all 35 locations and analyzed at Alpha Analytical Laboratories in Westborough Massachusetts for pollutants associated with illicit discharges. Only (1) outfall tested at a level exceeding sewer input indicator. This outfall off of Glen Road exceeded the range for Surfactants of >0.25 mg/l. The outfall was re-inspected in March of 2010 and reported to be of low suspicion of an illicit discharge. This outfall is ID# 17008-32, and is listed as a High Priority Outfall under the current 2019 ranking.

The Town Operations Manager of the DPW conducts an annual IDDE training course covering topics such as, "what to look for", exceptions not considered illicit discharges, permits required for legal sump pump connections, and enforcement/fines. The last training occurred on November 8, 2018 and included 32 DPW labor and operations personnel.

In addition, all suspicious illicit discharge connections are tracked through our GIS software and action thereby taken by the Town's Operation's Manager.

2 Authority and Statement of IDDE Responsibilities

2.1 Legal Authority

The Town of Wilmington adopted a Prohibition of Illicit Discharges to Storm Drain System bylaw on May 5, 2007. A copy of this bylaw is provided in **Appendix A**. The bylaw provides the Town of Wilmington 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 Wilmington will review its current bylaw and related land use regulations and policies for consistency with the 2016 MS4 Permit.

2.2 Statement of Responsibilities

The Wilmington Board of Health is the Authorized Enforcement Agency of the Bylaw and the Department of Public Works is the Authorized Adminstrating Agency responsible for implementing the IDDE program pursuant to the provisions of the bylaw. Other agencies or departments with responsibility for aspects of the program include:

- Department of Public Works (DPW) – tasks split per Division below
- Highway/Operations Division of DPW – Responsible for administering the IDDE bylaw
- Water/Sewer Division – Responsible for working with Highway/Operations to investigate illicit discharges.
- Licensed Plumbing Inspector – Responsible for working with DPW to investigate illicit discharges
- Health Department – As the administrative arm of the Board of Health, which is the Authorized Enforcement Agency.
- Engineering Department – Primary responsibility of coordinating compliance with the MS4 regulations, including wet/dry weather sampling, all mapping of the storm drain system, and sewer system. Also responsible for peer reviews for Planning/Conservation Land Use Permits, and site inspections of Stormwater BMPs.
- Director of Planning and Conservation – Assist in wet/dry weather sampling, and Erosion/Sediment Control Program, including inspections of erosion controls and good housekeeping practices at construction sites.
- Conservation Commission & Planning Board – Enforcement of Stormwater Management Permit Bylaw, and Erosion/Sediment Control Bylaw, and Site Plan Review Permits.

3 Stormwater System Mapping

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

The 2016 MS4 Permit requires the storm system map to be updated in two phases as outlined below. The Engineering Division of the Department of Public Works is responsible for updating the stormwater system mapping pursuant to the 2016 MS4 Permit. The Town of Wilmington 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 Wilmington has completed the following updates to its stormwater mapping to meet the Phase I requirements:

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

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

- Outfall spatial location (latitude and longitude with a minimum accuracy of +/-30 feet)
- Pipes
- Manholes
- Catch basins
- Municipal Sanitary Sewer System, including rims, inverts, and links to as-built record drawing PDFs.

The Town of Wilmington 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 has included the following recommended elements in its storm system mapping:

- Sanitary sewer system material, size (pipe diameter),
- Storm sewer material, size (pipe diameter)
- Privately owned stormwater treatment structures
- Topography
- Orthophotography

4 Sanitary Sewer Overflows (SSOs)

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

The Town of Wilmington has two (2) reported SSO incident over the previous 5 year period. A sewer manhole on Jewel Drive (Industrial use street in Town) was surcharged resulting in an estimated <50 gallons of effluent sanitary wastewater discharging to the ground surface. The system appeared to be blocked with an excess in grease; the blockage was cleared by DPW and the Health Department will investigate the facility where grease appeared to originate. The incident occurred on May 29, 2019. MassDEP, EPA, and the Board of Health were all contacted; and the required SSO Notification Form was completed. The minor volume of liquid discharge dissipated immediately, thus no cleanup action was necessary.

The second SSO incident was on August 31, 2021. A sewer forcemain in Lowell Street broke at a 45 degree bend joint. Less than 100 gallons of effluent was observed to drain directly into the roadway trench and dissipated into the sandy subgrade material. Overland discharge was not observed. The minor volume of liquid discharge dissipated immediately, thus no cleanup action was necessary.

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

The inventory in **Appendix H** will be updated by the Town when a new SSO is detected. The SSO inventory will be included in the annual report, including the status of mitigation and corrective measures to address each identified SSO.

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 outfall¹ 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 Town of Wilmington has completed an initial outfall and interconnection inventory and priority ranking to assess illicit discharge potential based on existing information. An updated inventory and ranking will be provided in each annual report thereafter. The inventory will be updated annually to include data collected in connection with dry weather screening and other relevant inspections.

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

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

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

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

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.

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

Table 5-1 provides an overview of the Town's outfall inventory and priority ranking matrix for each Outfall Subarea. Appendix G offers a complete spreadsheet with a breakdown of each outfall in all Subareas.

Table 5-1. Outfall Inventory and Priority Ranking Matrix

Town of Wilmington, Massachusetts

Revision Date: April 15, 2021

Outfall ID Subarea ⁽¹⁾	Receiving Water	Discharging to Area of Concern ³	Receiving Water Quality ⁴	Aging Septic? ⁵	Industrial Area	Score	Priority Ranking
Information Source		GIS Maps	Impaired Waters List	Land Use, Town Staff	Land Use, Zoning Maps, GIS Maps, Town Staff		
Scoring Criteria		Yes = 3 No = 0	Poor = 3 Fair = 2 Good = 0	Yes = 3 No = 0	Yes = 3 No = 0		
15022 (7 outfalls)	Shawsheen River	3	3	0	0	6	H
15025 (6 outfalls)	Shawsheen River	3	3	0	0	6	H
15027 (8 outfalls)	Shawsheen River	3	3	0	0	6	H
15041 (16 outfalls)	Shawsheen River	3	3	3	0	9	H
15043 (5 outfalls)	Fosters Pond	3	2	0	0	5	L
17001 (8 outfalls)	Mill Brook	0	2	0	0	2	L
17004 (19 outfalls)	Sawmill Brook	0	2	0	0	2	L
17005 (64 outfalls)	Mill Brook (Lower)	0	2	3	0	5	L
17006 (8 outfalls)	Maple Meadow Brook	0	2	3	0	5	L
17007 (75 outfalls)	Lubbers Brook (Upper)	3	2	0	0	5	L
17008 (77 outfalls)	Lubbers Brook (Lower)	3	2	3	0	8	H
17008 (5 outfalls)	Silver Lake	3	2	3	0	8	H
17012 (25 outfalls)	Ipswich River	0	2	3	0	5	L
17019 (61 outfalls)	Martins Brook	3	2	3	3	11	H
19104 (4 outfalls)	Aberjona River	0	2	0	3	5	L

Scoring Criteria:

¹ A complete breakdown of each outfall ID subarea, showing a breakdown of rankings within each subarea is available electronically (in spreadsheet format) at the Town's Engineering Division.

² 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

³ 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.

⁴ 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

⁵ Aging septic systems are septic systems 30 years or older in residential areas.

6 Dry Weather Outfall Screening and Sampling

Dry weather flow is a common indicator of potential illicit connections. The MS4 Permit requires all outfalls/interconnections (excluding Problem and excluded Outfalls) to be inspected for the presence of dry weather flow. The Engineering Division, with assistance from the Town's Conservation Agent, 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 Wilmington Weather Station (KMA WILMI 8). If this weather station is not available or not reporting current weather data, then Logan Airport, Boston, MA US Station (WBAN:14739) 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
Zip Ties/Duct Tape	For making field repairs
Rubber Boots/Waders	For accessing shallow streams/areas

Equipment	Use/Notes
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 parameters³ 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 qualified Laboratory (T.B.D.)
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: <i>E. coli</i> (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.

Table 6-3. Required Analytical Methods, Detection Limits, Hold Times, and Preservatives⁴

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

Analyte or Parameter	Analytical Method	Detection Limit	Max. Hold Time	Preservative
Ammonia	EPA: 350.2, SM: 4500-NH ₃ C	0.05 mg/L	28 days	Cool ≤6°C, H ₂ SO 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: <i>E. coli</i> Enterococcus	<i>E. coli</i> EPA: 1603 SM: 9221B, 9221F, 9223 B Other: Colilert®, Colilert-18® <i>Enterococcus</i> EPA: 1600 SM: 9230 C Other: Enterolert®	<i>E. coli</i> EPA: 1 cfu/100mL SM: 2 MPN/100mL Other: 1 MPN/100mL <i>Enterococcus</i> EPA: 1 cfu/100mL SM: 1 MPN/100mL Other: 1 MPN/100mL	8 hours	Cool ≤10°C, 0.0008% Na ₂ S ₂ O 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 ₂ SO 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 ₂ SO 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 μ S/cm
Surfactants	>0.25 mg/L
Chlorine	>0.02 mg/L (detectable levels per the 2016 MS4 Permit)
Indicator Bacteria ⁵ : <i>E.coli</i> <i>Enterococcus</i>	<i>E.coli</i> : 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 <i>Enterococcus</i> : 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 Wilmington 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 Engineering Division and Water/Sewer Division of the Department of Public Works will review relevant mapping and historic plans and records to identify areas within the catchment with higher potential for illicit connections. The following information will be reviewed:

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

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

- History of SSOs, including, but not limited to, those resulting from wet weather, high water table, or fat/oil/grease blockages
- Common or twin-invert manholes serving storm and sanitary sewer alignments
- Common trench construction serving both storm and sanitary sewer alignments
- Crossings of storm and sanitary sewer alignments where the sanitary system is shallower than the storm drain system
- Sanitary sewer alignments known or suspected to have been constructed with an underdrain system
- Inadequate sanitary sewer level of service (LOS) resulting in regular surcharging, customer back-ups, or frequent customer complaints
- Areas formerly served by combined sewer systems
- Sanitary sewer infrastructure defects such as leaking service laterals, cracked, broken, or offset sanitary infrastructure, directly piped connections between storm drain and sanitary sewer infrastructure, or other vulnerability factors identified through Inflow/Infiltration Analyses, Sanitary Sewer Evaluation Surveys, or other infrastructure investigations.
- Sanitary Sewers over 40 years old.
- Areas identified by the Health Department as having poorly functioning septic systems.

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 Wilmington, Massachusetts
Revision Date:

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	10 Sanitary Infrastructure >40 years Old	11 Septic with Poor Soils or Water Table Separation
Sample 1	XYZ River	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 than 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 than poor owner maintenance)

7.2 Dry Weather Manhole Inspections

The Town of Wilmington 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. Manhole Inspection forms are found in Appendix “C”.

The Engineering Division of the Department of Public Works, with the assistance of the Town’s Conservation Agent 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.

7.2.1 What to Look For: Physical Characteristics

Each identified key junction manhole must be opened and inspected systematically for visual and olfactory evidence of illicit connections (e.g., excrement, toilet paper, gray filamentous bacterial growth, or sanitary products present). The same observations made for outfalls can also be applied to key junction manhole investigations. Refer to **Table 7-2.1** below for the parameters and what they mean.

Table 7-2.1. Physical Observation Parameters and Likely Flow Sources

Parameter	Observations	Interpretation
Odor	Sewage	Stale sanitary wastewater, especially in pools near outfall
	Sulfur (rotten eggs)	Industries that discharge sulfide compounds or organics (meat packers, canneries, dairies, etc.). Also, could be petroleum related “high – sulfur” fuels
	Rancid-sour	Food preparation facilities (restaurants, hotels, etc.)
	Oil and gas	Petroleum refineries or many facilities associated with vehicle maintenance or petroleum product storage
	Chlorine	Pool discharges, washing activities
	Sweet / Fruity	Washing activities
	Sharp, pungent (chemicals)	Hazardous waste
Color	Yellow	Chemical plants, textile and tanning plants
	Brown	Meat packers, printing plants, metal works, stone and concrete, fertilizers, petroleum refining facilities, construction sites, and glass cutting

	Green	Chemical plants, textile facilities, algae/plankton bloom, antifreeze (fluorescent green), fertilizer
	Red	Meat packers, metal works, iron floc (bacterium)
	Gray	Dairies, food processing, sewage, concrete wash-out
	Red, Purple, Blue, Black	Fabric dyes, inks from paper and cardboard manufacturers

Turbidity	Cloudy	Sanitary wastewater, concrete or stone operations, fertilizer facilities, automotive dealers
	Opaque	Food processors, lumber mills, metal operations, pigment plants
Floatable Matter	Oil sheen, grease	Petroleum refineries or storage facilities and vehicle service facilities, restaurants
	Sewage	Sanitary wastewater
Deposits & Stains	Sediment	Construction site erosion
	Oily	Sanitary wastewater
Vegetation	Excessive growth	Food product facilities, fertilizers, farming agricultural use
	Inhibited growth, stressed vegetation	High stormwater flows, beverage facilities, printing plants, metal product facilities, drug manufacturing, petroleum facilities, vehicle service facilities and automobile dealers
Pipe Benthic Growth	Brown	Elevated nutrient level, possibly from sewage or fertilizers
	Orange/Red	High iron and manganese concentration, not typically associated with illicit discharges
	Green	Elevated nutrient level, possibly from sewage or fertilizers
Damage to Outfall Structures	Concrete cracking	Industrial flows, chemicals
	Concrete spalling ¹	
	Peeling paint	
	Metal corrosion	

¹Concrete spalling: minor cracks and bulges in concrete caused by corrosion of the steel reinforcement inside the concrete.

Key junction manholes within the same catchment area can be inspected working from the outfall upstream or working from the most upstream key junction manholes down towards the outfall.

If flow is observed in any manhole, a sample must be collected and analyzed for:

- Ammonia
- Chlorine
- Surfactants

Field kits or instrumentation can be used for these analyses. Where sampling results or visual or olfactory evidence indicate potential illicit discharges or SSOs, the area draining to the junction manhole must be flagged for further upstream investigation to isolate and confirm sources of illicit discharges in accordance with **Section 7.6**. Key junction and subsequent manhole investigations will proceed until the location of suspected illicit discharges or SSOs can be isolated to a pipe segment between two manholes.

Manhole inspections in all areas will also include identifying System Vulnerability Factors including common (twin invert) manholes, directly piped connection between storm drains and sanitary sewer infrastructure, common weir walls, sanitary sewer underdrain connections and other structural vulnerabilities where sanitary discharges could enter the storm drain system during wet weather.

7.2.2 Interpreting Key Junction Inspection Results

Where sampling results or visual or olfactory evidence indicate potential illicit discharges or SSOs as described in **Table 7.2.2 below**, the area draining to the junction manhole must be flagged for further upstream investigation to isolate and confirm sources of illicit discharges in accordance with **Section 7.4**. Key junction and subsequent manhole investigations will proceed until the location of suspected illicit discharges or SSOs can be isolated to a pipe segment between two manholes.

Screening procedures should be implemented beginning with High Priority Catchments and ending with Low Priority Catchments. Problem Outfalls do not require screening and should instead proceed right to source investigations (refer to Section 8).

Table 7.2.2 Key Junction Discharge Designation and Follow-Up Action

Type	Description	Action
Obvious Discharge	Key junction manholes where there is an illicit discharge that do not require sample collection for confirmation (e.g., strong sewage odors, gray sewage water, toilet paper, etc.)	Full source investigation
Suspect Discharge	Flowing key junction manholes with: 1) high severity on one or more physical indicators and 2) ammonia >0.5 mg/L, surfactants >0.25 mg/L, & detectable levels of chlorine	Full source investigation
Potential Discharge	Flowing or non-flowing key junction manholes with presence of two or more physical indicators	Intermittent flow source investigation
Unlikely Discharge	Non-flowing key junction manholes with no physical indicators of an illicit discharge	No further action

The following flow chart (**Figure 7.2.1**) demonstrates the dry weather manhole investigation procedure:

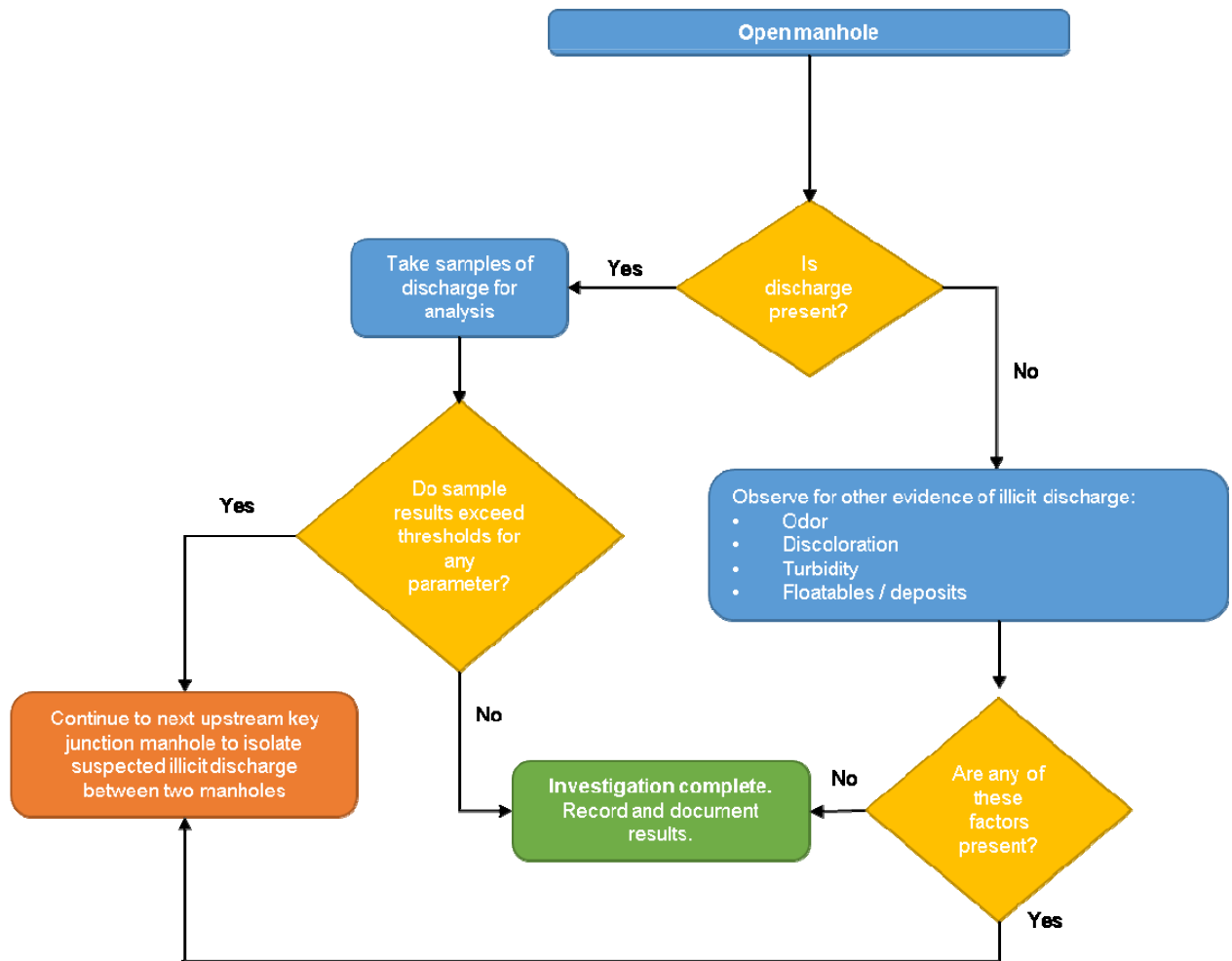


Figure 7.2.1. Dry weather manhole investigation process

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 Engineering Division of the Department of Public Works, with assistance from the Town's Conservation Agent, will be responsible for implementing the wet weather outfall sampling program and making updates as necessary. A wet weather outfall sampling inspection form is located in Appendix "C".

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 Engineering Division of the Department of Public Works will notify property owners in the affected area. Smoke testing notification will include letter notifications and personnel visit 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 placed in areas where there are suspected illegal connections or cracks/leaks, noting any escape of smoke (indicating an illicit connection or damaged storm drain infrastructure). 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 fluorimeters 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 Wilmington 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 is 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 includes additional training specific to the functions of particular personnel and their function within the framework of the IDDE program. Training records are 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)

Section 49 Prohibition of Illicit Discharges to Storm Drain System (New Subsection- (Adopted 5/5/07)

49.1 PURPOSE

The purpose of this section is to eliminate non-stormwater discharges to the Town of Wilmington's Municipal Storm Drain System. Non-stormwater discharges contain contaminants and supply additional flows to the Town's storm drain system. Increased and contaminated stormwater runoff is a major cause of:

- (1) impairment of water quality and flow in lakes, ponds, streams, rivers, wetlands and groundwater;
- (2) contamination of drinking water supplies;
- (3) contamination of clam flats and other coastal areas;
- (4) alteration or destruction of aquatic and wildlife habitat; and
- (5) flooding.

Regulation of illicit connections and discharges to the municipal storm drain system is necessary for the protection of the Town of Wilmington's natural resources, municipal facilities, and to safeguard the public health, safety, welfare and the environment.

49.2 OBJECTIVES

The objectives of this section are:

- (1) To prevent pollutants from entering the Town'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 existing illicit connections, regardless of whether such connections were permitted or otherwise acknowledged prior to the implementation of this by-law;
- (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 by-law through inspection, monitoring, and enforcement.

49.3 DEFINITIONS

Unless a different definition is indicated in other sections of this Section 49, the

following definitions and provisions shall apply throughout this Section 49, also referred to as this by-law or Section.

AUTHORIZED ENFORCEMENT AGENCY: The Wilmington Board of Health (hereafter “the BOH”), its employees or agents designated to enforce this by-law.

AUTHORIZED ADMINISTERING AGENCY: The Wilmington Department of Public Works (hereafter “the Department” or “DPW”), its employees or agents designated to administer and implement this by-law.

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 by-law.

ILLICIT DISCHARGE: Direct or indirect discharge to the municipal storm drain system that is not composed entirely of stormwater, except as exempted in Section 6. The term does not include a discharge in compliance with an NPDES Storm Water Discharge Permit or resulting from fire fighting activities exempted pursuant to Part G (4)(B), of this by-law.

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

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 manmade or altered drainage channel, reservoir, and other drainage structure that together comprise the storm drainage system owned or operated by the Town of Wilmington.

NATIONAL POLLUTANT DISCHARGE ELIMINATION SYSTEM (NPDES)
STORM WATER DISCHARGE PERMIT: A permit issued by United States Environmental Protection Agency or jointly with the Commonwealth of Massachusetts 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: An individual, partnership, association, firm, company, trust, corporation, agency, authority, department or political subdivision of the Commonwealth or the federal government, to the extent permitted by law, and any officer, employee, or agent of such person.

POLLUTANT: Any element or property of sewage, 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 without limitation:

- (1) paints, varnishes, and solvents;
- (2) oil and other automotive fluids;
- (3) non-hazardous liquid and solid wastes and yard wastes;
- (4) refuse, rubbish, garbage, litter, or other discarded or abandoned objects, ordnances, accumulations and floatables;
- (5) pesticides, herbicides, and fertilizers;
- (6) hazardous materials and wastes; sewage, fecal coliform and pathogens;
- (7) dissolved and particulate metals;
- (8) animal wastes;
- (9) rock; sand; salt, soils;
- (10) construction wastes and residues;
- (11) and 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 process by which groundwater is replenished by precipitation through the percolation of runoff and surface water through the soil.

STORMWATER: Runoff from precipitation or snow melt.

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 G.L. Ch.21C and Ch.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.

WATERS OF THE COMMONWEALTH: all waters within the jurisdiction of the Commonwealth, including, without limitation, rivers, streams, lakes, ponds, springs, impoundments, estuaries, wetlands, coastal waters, and groundwater.

WASTEWATER: any sanitary waste, sludge, or septic tank or cesspool overflow, and water that during manufacturing, cleaning or processing, comes into direct contact with or results from the production or use of any raw material, intermediate product, finished product, byproduct or waste product.

49.4 APPLICABILITY

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

49.5 AUTHORITY

This Article is adopted under authority granted by the Home Rule Amendment of the Massachusetts Constitution, the Home Rule statutes, and the regulations of the federal Clean Water Act found at 40 CFR 122.34.

49.6 RESPONSIBILITY FOR ADMINISTRATION

The BOH shall enforce this by-law. The BOH will work with the Department of Public Works ("DPW") to administer and implement this by-law. Any powers granted to or duties imposed upon the BOH may be delegated in writing by the BOH to employees or agents of the BOH and/or the DPW. References to the BOH, Department or DPW within this by-law are understood to denote either or both of these agencies.

49.7 REGULATIONS

The Department may promulgate rules and regulations to effectuate the purposes of this by-law. Failure by the Department to promulgate such rules and regulations shall not have the effect of suspending or invalidating this by-law.

49.8 PROHIBITED ACTIVITIES

(1) 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, or into the waters of the Commonwealth.

(2) 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.

(3) 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 consent from the Department. No person shall dump or dispose of yard waste (leaves, grass clippings, etc.) into the open watercourses (swales, brooks and streams) that make up the stormwater system.

(4) Exemptions

A. Discharge or flow resulting from fire fighting activities;

B. The following non-stormwater discharges or flows are exempt from the prohibition of non-stormwaters provided that the source is not a significant contributor of a pollutant to the municipal storm drain system:

(1) Waterline flushing;

(2) Flow from potable water sources;

(3) Springs;

(4) Natural flow from riparian habitats and wetlands;

(5) Diverted stream flow;

(6) Rising groundwater;

(7) Uncontaminated groundwater infiltration as defined in 40 CFR 35.2005(20), or uncontaminated pumped groundwater (e.g. sump pump), provided that where a pump intake exists inside a structure, the operator seeks a permit from the Department prior to discharge, and thereafter discharges in accordance with the requirements of the permit and applicable laws and regulations to be issued by the Department;

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

(9) Discharge from landscape irrigation or lawn watering;

(10) Water from individual residential car washing;

(11) Discharge from dechlorinated swimming pool water (less than one ppm chlorine) provided the water is allowed to stand for one week prior to draining and the pool is drained in such a way as not to cause a nuisance;

(12) Discharge from street sweeping;

(13) Dye testing, provided verbal notification is given to the Department prior to the time of the test;

(14) Non-stormwater discharge permitted under an NPDES permit, waiver, or waste discharge order administered under the authority of the United States Environmental Protection Agency, provided that the discharge is in full compliance with the requirements of the permit, waiver, or order and applicable laws and regulations; and

(15) Discharge for which advanced written approval is received from the Department as necessary to protect public health, safety, welfare or the environment.

(5) Other Prohibited Activities

No person shall discharge, or cause to be discharged, water or any other liquid, on to the streets, sidewalks or ways of the Town in such a manner as to cause an obstruction of traffic or to endanger travel by freezing or otherwise.

Drains – No one shall tie any pump, cellar, yard, roof or area drain directly into the storm water drainage system without a permit from the Department of Public Works.

Catch Basins – No person shall directly or indirectly dump, discharge or cause or allow to be discharged into any catchbasin, any solid waste, construction debris, paint or paint product, antifreeze, hazardous waste, oil, gasoline, grease and all other automotive and petroleum products, solvents and degreasers, drain cleaners, commercial and household cleaners, soap, detergent, ammonia, food and food waste, grease or yard waste, animal feces, dirt, sand gravel or other pollutant. Any person determined by the DPW to be responsible for the discharge of any of the above substances to a catchbasin may be held responsible for cleaning the catchbasin and any other portions of the storm water system impacted, paying the cost for such cleaning or for paying any penalties assessed by the Town.

Septage – No person shall discharge or cause or allow to be discharged any

septage, or septage tank or cesspool overflow into the Town's storm water drainage system.

Storage & Disposal of Hazardous Material – No one shall dispose of anything other than clear water into the Town's storm drainage system. The disposal of waste, gasoline or any other hazardous material into the storm drainage system is strictly prohibited and is in violation of various state and federal pollution laws.

Private drainage systems – It is prohibited for anyone with a private drainage system from tying into the public storm water disposal system without a permit from the Department of Public Works. The maintenance of any and all private drainage systems shall be the responsibility of the owners.

49.9 EMERGENCY SUSPENSION OF STORM DRAINAGE SYSTEM ACCESS

The Department 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 Authorized Enforcement Agency may take all reasonable steps to prevent or minimize harm to the public health, safety, welfare or the environment.

49.10 INDUSTRIAL OR CONSTRUCTION ACTIVITY DISCHARGES

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

49.11 MONITORING OF DISCHARGES

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

1) Access to Facilities – The BOH and DPW (or other enforcement agency/delegated enforcement partner) shall be permitted to enter and inspect facilities subject to regulation under this by-law as often as may be necessary to determine compliance with this by-law, subject to applicable law. If a discharger has security measures in force which require proper identification and clearance before entry into its premises, the discharger shall make the necessary arrangements to allow access to representatives of the authorized enforcement agency.

2) Facility operators shall allow the BOH and DPW ready access to all parts of the premises for the purposes of inspection, sampling, examination and copying of records that must be kept under the conditions of an NPDES permit to discharge

storm water, and the performance of any additional duties as defined by state and federal laws.

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

4) The BOH and DPW have the right to require the discharger to install monitoring equipment as necessary. The facility's sampling and monitoring equipment shall be maintained at all times in a safe and proper operating condition by the discharger at its own expense. All devices used to measure storm water flow and quality shall be calibrated to ensure they are accurate.

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

6) Unreasonable delay in allowing the BOH or DPW access to a permitted facility constitutes a violation of a storm water discharge permit and of this by-law. A person who is the operator of a facility with a NPDES permit to discharge storm water associated with industrial activity violates this Section 49 if the person denies the authorized enforcement agency reasonable access to the permitted facility for the purpose of conducting any activity authorized or required by this by-law.

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

49.12 WATERCOURSE PROTECTION

Every person owning property through which a watercourse passes, or such person's lessee, shall keep and maintain that part of the watercourse within the property free of trash, debris, excessive vegetation, and other obstacles that would pollute, contaminate, or significantly retard the flow of water through the watercourse. In addition, the owner or lessee shall maintain existing privately owned structures within or adjacent to a watercourse so that such structures will not become a hazard to the use, function, or physical integrity of the watercourse. Compliance with this by-law does not waive the responsibility of the property owner or lessee for applying for and receiving any other required Town, State or Federal permits associated with activities or uses otherwise

regulated under other regulatory jurisdiction (e.g. Wetlands Protection Act).

49.13 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 to the municipal drainage system or 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 municipal fire and police departments. In the event of a release of non-hazardous material, the reporting person shall notify the Authorized Enforcement Agency no later than the next business day. The reporting person shall provide to the Authorized Enforcement Agency 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.

49.14 ENFORCEMENT

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

49.14.1. Civil Relief

If a person violates the provisions of this Section 49, regulations, permit, notice, or order issued thereunder, the BOH may seek injunctive relief in a court of competent jurisdiction restraining the person from activities which would create further violations or compelling the person to perform abatement or remediation of the violation.

49.14.2. Orders

The BOH or an authorized agent of the BOH may issue a written order to enforce the provisions of this section 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.

A. 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.

B. Within thirty (30) days after completing all measures necessary to abate the violation or to perform remediation, the violator and the property owner will be notified of the costs incurred by the Town, including administrative costs. The violator or property owner may file a written protest objecting to the amount or basis of costs with the Department within thirty (30) days of receipt of the notification of the costs incurred. If the amount due is not received by the expiration of the time in which to file a protest or within thirty (30) days following a decision of the Department 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 pursuant to M.G.L. Ch. 40, §58. Interest shall begin to accrue on any unpaid costs at the statutory rate provided in G.L. Ch. 59, § 57 after the thirty-first day at which the costs first become due.

49.14.3. Non-Criminal Disposition

As an alternative to criminal prosecution or civil action, the Town may elect to utilize the non-criminal disposition procedure set forth in G.L. Ch. 40, §21D and in which case the Health Director and DPW Director of the Town shall be the enforcing person. The penalty for the 1st and all subsequent violations shall be \$300.00. Each day or part thereof that such violation occurs or continues shall constitute a separate offense.

49.14.4. Criminal Penalty

Any person who violates any provision of this by-law, regulation, order or permit issued thereunder, shall be punished by a fine of \$300.00. Each day or part thereof that such violation occurs or continues shall constitute a separate offense.

49.14.5. Entry to Perform Duties Under this Section

To the extent permitted by applicable law, or if authorized by the owner or other party in control of the property, the BOH and DPW, its agents,

officers, and employees may enter upon privately owned property for the purpose of performing their duties under this by-law and regulations and may make or cause to be made such examinations, surveys or sampling as the BOH and DPW deems reasonably necessary.

49.14.6. Appeals

The decisions or orders of the BOH and DPW shall be final. Further relief shall be to a court of competent jurisdiction.

49.14.7. Remedies Not Exclusive

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

49.15 SEVERABILITY

The provisions of this section are hereby declared to be severable. If any provision, paragraph, sentence, or clause, of this section 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 section or by-law.

Appendix B

Storm System Mapping

<https://www.mapsonline.net/wilmingtonma/ms4>

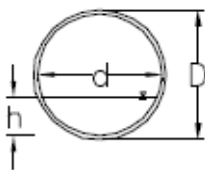
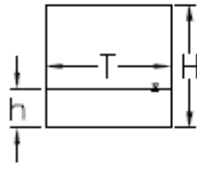
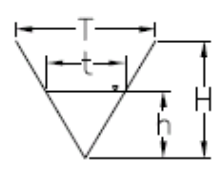
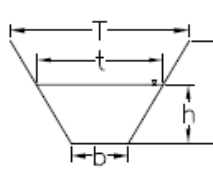
Appendix C

Field Forms for Dry/Wet Weather Inspections & Manhole Inspections

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	☐	Pipe Condition:	Good	☐	Poor	☐
	Corrugated metal	☐		Fair	☐	Crumbling	☐
	Clay Tile	☐					
	Plastic	☐					
	Other: _____	☐					
Swale Material:	Paved (asphalt)	☐	Swale Condition:	Good	☐	Poor	☐
	Concrete	☐		Fair	☐	Crumbling	☐
	Earthen	☐					
	Stone	☐					
	Other: _____	☐					
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 ☐			
Pipe Height (in): H= _____		Flow Height (in): h= _____*		Fair ☐ Crumbling ☐			
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	
Required Maintenance:		Tree Work		Remove Trash/Debris		Orange Staining	
Ditch Work		Blocked Pipe		Erosion at Structure		Excessive Vegetation	
Structural Corrosion		Other					
N/A							
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 _____			

Sample Parameters	Analytical Test Method	Benchmark*	Field Screening Result	Full Analytical?
Ammonia ¹	EPA 350.2/SM4500-NH3C	>50.0 mg/L		☐ Yes ☐ No
Specific Conductance ¹	SM 2510B	>2,000		☐ Yes ☐ No
Detergents & Surfactants ²	EPA 425.1/SM5540C	> 0.25 mg/L		☐ Yes ☐ No
Fluoride ²	EPA 300.0	>0.25 mg/L		☐ Yes ☐ No
pH ¹	EPA 150.1/SM 4500H	<5		☐ Yes ☐ No
Potassium ¹	EPA 200.7	>20 mg/L		☐ 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 – *Appendix I – Field Measurements, Benchmarks and Instrumentation*, Draft Massachusetts North Coastal Small MS4 General Permit, 2009.

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		> 50.0 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.

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.

Dry Weather Key Junction Manhole Inspection Form

Form 1: Key Junction Structure Description and Condition Inventory

Inspection Information					
Junction ID					
Associated Outfall ID					
Inspector's Name					
Date of Inspection					
Rainfall (in)	Last 24 hours:	Last 48 hours:			
Description of Key Junction Structure					
Type of Structure	Manhole	Catch Basin	Other: _____		
Condition of Structure	Good	Fair	Poor	Comments	Construction Material
Cover					
Frame					
Corbel					
Walls					
Floor					
Key Junction Damage (circle)	Spalling Cracking/Chipping Corrosion Other: _____				
Comments or any other non-illicit discharge concerns (e.g., trash or needed infrastructure repairs?):					

Dry Weather Key Junction Screening

Form 2: Illicit Discharge Detection Inspection

Junction ID:				Date:			
Associated Outfall ID:				Inspector's Name:			
Flow Description							
Flow in Inlet Pipes? Yes No				Notes:			
List all inlet pipes with flow (if more space is required, use back of form)							
Pipe ID		Flow Description (circle): Trickle Moderate Substantial					
		Depth in Center of Flow (in.)		Width (in.)			
Pipe ID		Flow Description (circle): Trickle Moderate Substantial					
		Depth in Center of Flow (in.)		Width (in.)			
Physical Indicators (all key structures)							
Indicator		Description					
☐ Deposits and Stains (circle)		Oily Flow Line Paint Other:					
☐ Pipe Benthic Growth (circle)		Brown Orange Green Other:					
Physical Indicators (flowing structures/pipes only)							
Indicator	Description		Severity		Notes		
Odor	☐ Sewage ☐ Petroleum/Gas ☐ Sulfide ☐ Rancid/Sour Other:		☐ 1 – Faint ☐ 2 – Easily detected ☐ 3 – Noticeable from a distance		Confirm the odor is coming from the discharge location and water and not the surrounding area. Avoid deeply inhaling odors as they may potentially be harmful vapors.		
Color	☐ Clear ☐ Brown ☐ Gray ☐ Yellow ☐ Green ☐ Orange ☐ Red ☐ Other:		☐ 1 – Faint colors in sample bottle ☐ 2 – Clearly visible in sample bottle ☐ 3 – Clearly visible in the flow		Color is defined by the tint or intensity of color observed		
Turbidity/Cloudiness			☐ 1 – Slight ☐ 2 – Cloudy ☐ 3 – Opaque		Turbidity or cloudiness is a measure of how easily light can penetrate through the sample.		
Floatables (other than trash)	☐ Sewage (toilet paper, etc.) ☐ Suds ☐ Petroleum/oil sheen Other:		☐ 1 – Few/slight; origin not obvious ☐ 2 – Some; indications of origin ☐ 3 – Some; origin clear		- In some cases, surface sheens may be created by in-stream processes. A thick or swirling sheen with a gas-like odor may indicate an oil discharge. - Suds that break up quickly may simply indicate water turbulence. Suds with a strong organic/sewage odor may indicate sewage. Suds with a fragrant odor may indicate laundry water.		
Possibility of Illicit Discharge			Sum of Severity Indicators: _____				
☐ Unlikely	☐ Potential (two or more indicators)		☐ Suspect (one or more indicators with severity 3)			☐ Obvious	
Comments/Possible Sources:							

Wet Weather Outfall Sampling

Form 1: Illicit Discharge Detection Inspection

Outfall ID:		Date:	
Outfall Location:		Inspector's Name:	
Indicators (all outfalls with indicators)			
Indicator	Description (circle all that apply)		
☐ Deposits and Stains	Oily Flow Line Paint Other:		
☐ Poor Pool Quality (circle)	Odors Colors Oil Sheen Suds Algae Floatables Other:		
☐ Pipe Benthic Growth (circle)	Brown Orange Green Other:		
Flow Description			
Flow Present: Yes No		Notes:	
Flow Description: Trickle Moderate Substantial			Flow Depth:
Physical Indicators (flowing outfalls)			
Indicator	Description	Severity Indicators	Notes
Odor	☐ Sewage ☐ Petroleum/Gas ☐ Sulfide ☐ Rancid/Sour ☐ Other: _____	☐ 1 – Faint (unclear source) ☐ 2 – Easily detected ☐ 3 – Noticeable from a distance	Confirm the odor is coming from the discharge location and water and not the surrounding area. Avoid deeply inhaling odors as they may potentially be harmful vapors.
Color	☐ Clear ☐ Brown ☐ Gray ☐ Yellow ☐ Green ☐ Orange ☐ Red ☐ Other: _____	☐ 1 – Faint colors in sample bottle ☐ 2 – Clearly visible in sample bottle ☐ 3 – Clearly visible in the flow	Color is defined by the tint or intensity of color observed.
Turbidity/Cloudiness		☐ 1 – Slight ☐ 2 – Cloudy ☐ 3 – Opaque	Turbidity or cloudiness is a measure of how easily light can penetrate through the sample.
Floatables (other than trash)	☐ Sewage (toilet paper, etc.) ☐ Suds ☐ Petroleum/oil sheen ☐ Other: _____	☐ 1 – Few/slight; origin not obvious ☐ 2 – Some; indications of origin ☐ 3 – Some; origin clear	- In some cases, surface sheens may be created by in-stream processes. A thick or swirling sheen with a gas-like odor may indicate an oil discharge. - Suds that break up quickly may simply indicate water turbulence. Suds with a strong organic/sewage odor may indicate sewage. Suds with a fragrant odor may indicate laundry water.
Possibility of Illicit Discharge			Sum of Severity Indicators: _____
☐ Unlikely	☐ Potential (two or more indicators)	☐ Suspect (one or more indicators at severity 3)	☐ Obvious
Comments/Possible Sources:			

Appendix D

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

Instructions: Include copies of water quality analysis instructions, procedures, and SOPs for all sample parameters and all meters or field test kits that are used for analysis. This includes the manufacturer's instructions for how to use field test kits as well as the manufacturer's instructions or user's manual for any field instrumentation.

DRY WEATHER OUTFALL INSPECTION

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 from these outfalls under both dry weather and wet weather conditions. This Standard Operation Procedure (SOP) discusses the dry weather inspection objectives, and how they differ from wet weather inspection objectives.

During a dry weather period, it is anticipated that minimal flow from stormwater outfalls will be observed. Therefore, dry weather inspections aim to characterize any/all flow observed during a dry weather period and identify potential source(s) of an illicit discharge through qualitative testing; further described in SOP for “Water Quality Screening in the Field”.

Objectives of Dry Weather Inspections

A dry weather period is a time interval during which less than 0.1 inch of rain is observed across a minimum of 72 hours. Unlike wet weather sampling, dry weather inspections are not intended to capture a “first flush” of stormwater discharge, rather they are intended to identify any/all discharges from a stormwater outfall during a period without recorded rainfall. The objective of inspections during a dry weather period is to characterize observed discharges and facilitate detection of illicit discharges.

Visual Condition Assessment

The attached Dry Weather Outfall Inspection Survey is a tool to assist in documenting observations related to the both quantitative and qualitative characteristics of any/all flows conveyed by the structure during a dry period.

For any visual observation discharge from a stormwater outfall, an investigation into the pollution source should occur, but the following are often true:

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): indicators of illicit discharge.
7. Orange staining: indicator of high mineral concentrations.

Standard Operating Procedures for Dry Weather Outfall Inspections
Town of Wilmington

Both bacteria and petroleum can create a sheen on the water surface. The source of the sheen can be differentiated by disturbing it, such as with a pole. A sheen caused by oil will remain intact and move in a swirl pattern; a sheen caused by bacteria will separate and appear “blocky”. Bacterial or naturally occurring sheens are usually silver or relatively dull in color and will break up into a number of small patches of sheen. The cause may be presence of iron, decomposition of organic material or presence of certain bacteria. Bacterial sheen is not a pollutant but should be noted.

Many of these observations are indicators of an illicit discharge. Examples of illicit discharges include: 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). Additional guidelines for illicit discharge investigations are included in SOP 10, “Locating Illicit Discharges”. If dry weather flow is present at the outfall, and the flow does not appear to be an obvious illicit discharge (e.g. flow is clear, odorless, etc.) attempt to identify the source of flow (e.g. intermittent stream, wetlands drainage, etc.) and document the discharge for future comparison.

Although many of the observations are indicators of illicit discharge it should be noted that several of these indicators may also occur naturally. Orange staining may be the result of naturally occurring iron, and thus unrelated to pollution. Foam can be formed when the physical characteristics of water are altered by the presence of organic materials. Foam is typically found in waters with high organic content such as bog lakes, streams that originate from bog lakes, productive lakes, wetlands, or woody areas. To determine the difference between natural foam and foam cause by pollution, consider the following:

1. Wind direction or turbulence: natural foam occurrences on the beach coincide with onshore winds. Often, foam can be found along a shoreline and/or on open waters during windy days. Natural occurrences in rivers can be found downstream of a turbulent site.
2. Proximity to a potential pollution source: some entities including the textile industry, paper production facilities, oil industries, and fire fighting activities work with materials that cause foaming in water. If these materials are released to a water body in large quantities, they can cause foaming. Also, the presence of silt in water, such as from a construction site can cause foam.
3. Feeling: natural foam is typically persistent, light, not slimy to the touch.
4. Presence of decomposing plants or organic material in the water.

Optical enhancers, fluorescent dyes added to laundry detergent, are typically detected through the use of clean, white cotton pads placed within the discharge for several days, dried then viewed under a UV light. If the cotton pad displays fluorescent patches, optical enhancers are present. Optical enhancers are occasionally visible as a bluish-purple haze on the water surface; however the testing method should be used to confirm the presence of optical enhancers.

The Dry Weather Outfall Inspection Survey includes fields where these and other specific observations can be noted. The inspector shall indicate the presence of a specific water quality indicator or parameter by marking “Yes”. If “Yes” is marked, provide additional details in the comments section. If the indicator in question is not present, mark “No”.

Within the comments section, provide additional information with regard to recorded precipitation totals, or more detailed descriptions of observations made during the inspection and corrective actions taken.

Measuring Water Quality

Based on the results of the Visual Condition Assessment, it may be necessary to collect additional data about water quality. Water quality samples can be in the form of screening using field test kits and instrumentation, or by discrete analytical samples processed by a laboratory.

Information on selecting and using field test kits and instrumentation is included in SOP 13, “Water Quality Screening in the Field.” The Inspection Survey also provides values for what can be considered an appropriate benchmark for a variety of parameters that can be evaluated in the field.

If the results of screening using field test kits indicate that the outfall’s water quality exceeds the benchmarks provided, collection of discrete analytical samples should be considered.

Analytical Sample Collection

Sample collection methods may vary based on specific outfall limitations, but shall follow test procedures outlined in 40 CFR 136. A discrete manual or grab sample can classify water at a distinct point in time. These samples are easily collected and used primarily when the water quality of the discharge is expected to be homogeneous, or unchanging, in nature. A flow-weighted composite sample will classify water quality over a measured period of time. These samples are used when the water quality of the discharge is expected to be heterogeneous, or fluctuating, in nature. Grab samples are more common for dry weather outfall inspections due to the time-sensitive nature of the process.

Protocols for collecting a grab sample shall include the following:

1. Do not eat, drink or smoke during sample collection and processing.
2. Do not collect or process samples near a running vehicle.
3. Do not park vehicles in the immediate sample collection area, including both running and non-running vehicles.
4. Always wear clean, powder-free nitrile gloves when handling sample containers and lids.
5. Never touch the inside surface of a sample container or lid, even with gloved hands.
6. Never allow the inner surface of a sample container or lid to be contacted by any material other than the sample water.
7. Collect samples while facing upstream and so as not to disturb water or sediments in the outfall pipe or ditch.
8. Do not overfill sample containers, and do not dump out any liquid in them. Liquids are often added to sample containers intentionally by the analytical laboratory as a preservative or for pH adjustment.
9. Slowly lower the bottle into the water to avoid bottom disturbance and stirring up sediment.
10. Do not allow any object or material to fall into or contact the collected water sample.

Standard Operating Procedures for Dry Weather Outfall Inspections
Town of Wilmington

11. Do not allow rainwater to drip from rain gear or other surfaces into sample containers.
12. Replace and tighten sample container lids immediately after sample collection.
13. Accurately label the sample with the time and location.
14. Document on the Wet Weather Outfall Inspection Survey that analytical samples were collected, specify parameters, and note the sample time on the Inspection Survey. This creates a reference point for samples.

Analytical Sample Quality Control and Assurance

Upon completion of successful sample collection, the samples must be sent or delivered to a MassDEP-approved laboratory for analytical testing. Quality control and assurance are important to ensuring accurate analytical test results.

Sample preservation is required to prevent contaminate degradation between sampling and analysis, and should be completed in accordance with 40 CFR 136.3.

Maximum acceptable holding times are also specified for each analytical method in 40 CFR 136.3. Holding time is defined as the period of time between sample collection and extraction for analysis of the sample at the laboratory. Holding time is important because prompt laboratory analysis allows the laboratory to review the data and if analytical problems are found, re-analyze the affected samples within the holding times.

Chain of custody forms are designed to provide sample submittal information and document transfers of sample custody. The forms are typically provided by the laboratory and must be completed by the field sampling personnel for each sample submitted to the lab for analysis. The document must be signed by both the person releasing the sample and the person receiving the sample every time the sample changes hands. The sampling personnel shall keep one copy of the form and send the remaining copies to the laboratory with the samples. Custody seals, which are dated, signed and affixed to the sample container, may be used if the samples are shipped in a cooler via courier or commercial overnight shipping.

WET WEATHER OUTFALL INSPECTION

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 from these outfalls under both dry weather and wet weather conditions. The SOP for “Dry Weather Outfall Inspection”, covers the objectives of that type of inspection. This SOP discusses wet weather inspection objectives and how they differ from dry weather inspection objectives. The primary difference is that wet weather inspection aims to describe and evaluate the first flush of stormwater discharged from an outfall during a storm, representing the maximum pollutant load managed by receiving water.

Definition of Wet Weather

A storm is considered a representative wet weather event if greater than 0.1 inch of rain falls and occurs at least 72 hours after the previously measurable (greater than 0.1 inch of rainfall) storm event. In some watersheds, based on the amount of impervious surface present, increased discharge from an outfall may not result from 0.1 inch of rain. An understanding of how outfalls respond to different events will develop as the inspection process proceeds over several months, allowing the inspectors to refine an approach for inspections.

Ideally, the evaluation and any samples collected should occur within the first 30 minutes of discharge to reflect the first flush or maximum pollutant load.

Typical practice is to prepare for a wet weather inspection event when weather forecasts show a 40% chance of rain or greater. If the inspector intends to collect analytical samples, coordination with the laboratory for bottleware and for sample drop-off needs to occur in advance.

Visual Condition Assessment

The attached Wet Weather Outfall Inspection Survey should be used to document observations related to the quality of stormwater conveyed by the structure. Observations such as the following can indicate sources of pollution within the storm drain system:

- Oil sheen
- Discoloration
- Trash and debris

For any visual observation of pollution in a stormwater outfall discharge, an investigation into the pollution source should occur, but the following are often true:

1. Foam: indicator of upstream vehicle washing activities, or an illicit discharge.

Standard Operating Procedures for Wet Weather Outfall Inspections
Town of Wilmington

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): indicators of illicit discharge.
7. Orange staining: indicator of high mineral concentrations.

Many of these observations are indicators of an illicit discharge. Examples of illicit discharges include: 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). Additional guidelines for illicit discharge investigations are included in SOP 10, “Locating Illicit Discharges”.

Although many of the observations are indicators of illicit discharge it should be noted that several of these indicators may also occur naturally. Orange staining may be the result of naturally occurring iron, and thus unrelated to pollution. Foam can be formed when the physical characteristics of water are altered by the presence of organic materials. Foam is typically found in waters with high organic content such as bog lakes, streams that originate from bog lakes, productive lakes, wetlands, or woody areas. To determine the difference between natural foam and foam cause by pollution, consider the following:

1. Wind direction or turbulence: natural foam occurrences on the beach coincide with onshore winds. Often, foam can be found along a shoreline and/or on open waters during windy days. Natural occurrences in rivers can be found downstream of a turbulent site.
2. Proximity to a potential pollution source: some entities including the textile industry, paper production facilities, oil industries, and fire fighting activities work with materials that cause foaming in water. If these materials are released to a water body in large quantities, they can cause foaming. Also, the presence of silt in water, such as from a construction site can cause foam.
3. Feeling: natural foam is typically persistent, light, not slimy to the touch.
4. Presence of decomposing plants or organic material in the water.

Both bacteria and petroleum can create a sheen on the water surface. The source of the sheen can be differentiated by disturbing it, such as with a pole. A sheen caused by oil will remain intact and move in a swirl pattern; a sheen caused by bacteria will separate and appear “blocky”. Bacterial or naturally occurring sheens are usually silver or relatively dull in color and will break up into a number of small patches of sheen. The cause may be presence of iron, decomposition of organic material or presence of certain bacteria. Bacterial sheen is not a pollutant but should be noted.

Optical enhancers, fluorescent dyes added to laundry detergent, are typically detected through the use of clean, white cotton pads placed within the discharge for several days, dried then viewed under a UV light. If the cotton pad displays fluorescent patches, optical enhancers are present. Optical enhancers are

occasionally visible as a bluish-purple haze on the water surface; however the testing method should be used to confirm the presence of optical enhancers.

The Wet Weather Outfall Inspection Survey includes fields where these and other specific observations can be noted. The inspector shall indicate the presence of a specific water quality indicator or parameter by marking “Yes”. If “Yes” is marked, provide additional details in the comments section. If the indicator in question is not present mark “No”.

Within the comments section, provide additional information with regard to recorded precipitation totals, or more detailed descriptions of observations made during the inspection and corrective actions taken.

Measuring Water Quality

Based on the results of the Visual Condition Assessment, it may be necessary to collect additional data about water quality. Water quality samples can be in the form of screening using field test kits or by discrete analytical samples processed by a laboratory.

Information on how to use field test kits is included in SOP 13, “Water Quality Screening with Field Test Kits”, and the Wet Weather Outfall Inspection Survey includes fields to document the results of such screening. The Inspection Survey also provides values for what can be considered an appropriate benchmark for a variety of parameters that can be evaluated with field test kits.

If the results of screening using field test kits indicate that the outfall’s water quality exceeds the benchmarks provided, collection of discrete analytical samples should be considered.

Analytical Sample Collection

Sample collection methods may vary based on specific outfall limitations but shall follow test procedures outlined in 40 CFR 136. A discrete manual or grab sample can classify water at a distinct point in time. These samples are easily collected and used primarily when the water quality of the discharge is expected to be homogeneous, or unchanging, in nature. A flow-weighted composite sample will classify water quality over a measured period of time. These samples are used when the water quality of the discharge is expected to be heterogeneous, or fluctuating, in nature. Grab samples are more common for wet weather outfall inspections due to the time-sensitive nature of the process.

Protocols for collecting a grab sample shall include the following:

1. Do not eat, drink or smoke during sample collection and processing.
2. Do not collect or process samples near a running vehicle.
3. Do not park vehicles in the immediate sample collection area, including both running and non-running vehicles.
4. Always wear clean, powder-free nitrile gloves when handling sample containers and lids.
5. Never touch the inside surface of a sample container or lid, even with gloved hands.

6. Never allow the inner surface of a sample container or lid to be contacted by any material other than the sample water.
7. Collect samples while facing upstream and so as not to disturb water or sediments in the outfall pipe or ditch.
8. Do not overfill sample containers, and do not dump out any liquid in them. Liquids are often added to sample containers intentionally by the analytical laboratory as a preservative or for pH adjustment.
9. Slowly lower the bottle into the water to avoid bottom disturbance and stirring up sediment.
10. Do not allow any object or material to fall into or contact the collected water sample.
11. Do not allow rainwater to drip from rain gear or other surfaces into sample containers.
12. Replace and tighten sample container lids immediately after sample collection.
13. Accurately label the sample with the time and location.
14. Document on the Wet Weather Outfall Inspection Survey that analytical samples were collected, specify parameters, and note the sample time on the Inspection Survey. This creates a reference point for samples.

Analytical Sample Quality Control and Assurance

Upon completion of successful sample collection, the samples must be sent or delivered to a MassDEP-approved laboratory for analytical testing. Quality control and assurance are important to ensuring accurate analytical test results.

Sample preservation is required to prevent contaminant degradation between sampling and analysis and should be completed in accordance with 40 CFR 136.3.

Maximum acceptable holding times are also specified for each analytical method in 40 CFR 136.3. Holding time is defined as the period of time between sample collection and extraction for analysis of the sample at the laboratory. Holding time is important because prompt laboratory analysis allows the laboratory to review the data and if analytical problems are found, re-analyze the affected samples within the holding times.

Chain of custody forms are designed to provide sample submittal information and document transfers of sample custody. The forms are typically provided by the laboratory and must be completed by the field sampling personnel for each sample submitted to the lab for analysis. The document must be signed by both the person releasing the sample and the person receiving the sample every time the sample changes hands. The sampling personnel shall keep one copy of the form and send the remaining copies to the laboratory with the samples. Custody seals, which are dated, signed and affixed to the sample container, may be used if the samples are shipped in a cooler via courier or commercial overnight shipping.

Attachments

1. Wet Weather Outfall Inspection Survey

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	>50.0 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

Appendix E

IDDE Employee Training Record

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

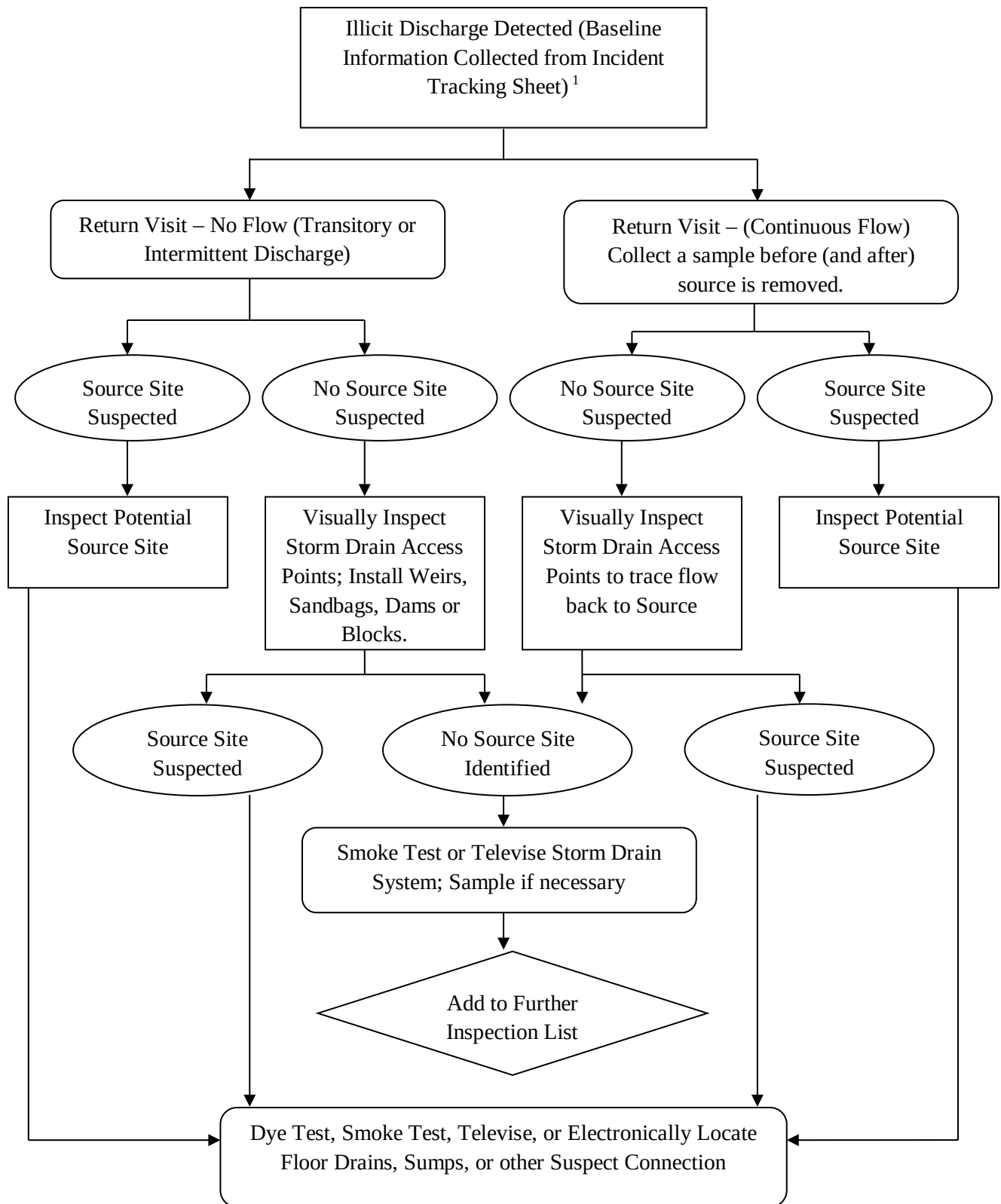
Related Standard Operating Procedures

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
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 3 rd Party	Any	USEPA	• Notify exempt third party and USEPA of illicit discharge



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
	☐ Sulfide (rotten eggs); natural gas	☐ Other: Describe in "Narrative" section	
Appearance	☐ "Normal"	☐ Oil Sheen	☐ Cloudy
	☐ Optical enhancers	☐ Discolored	
	☐ Other: Describe in "Narrative" section		
Floatables	☐ None	☐ Sewage (toilet paper, etc)	☐ Algae
	☐ Other: Describe in "Narrative" section		
Narrative description of problem indicators:			
Suspected Source (name, personal or vehicle description, license plate #, address, etc.):			



Appendix G

Initial Outfall Priority Rankings

Outfall ID	Watershed	Water-body	MS4 Eligible	Comment	Initial Score	Priority Ranking (initial)
15022-1	Shawsheen	Shawsheen River	yes	Dorchester Street	6	High
15022-2	Shawsheen	Shawsheen River	yes	Harold Ave	6	High
15022-3	Shawsheen	Shawsheen River	yes	Harold Ave	6	High
15022-4	Shawsheen	Shawsheen River	yes	Pouliout Place	6	High
15022-5	Shawsheen	Shawsheen River	yes	Pouliout Place	6	High
15022-6	Shawsheen	Shawsheen River	yes	Pouliout Place	6	High
15022-7	Shawsheen	Shawsheen River	yes	Pouliout Place	6	High

Score based on the following:

3 Discharge to Zone II
3 Discharge to Impaired Water
0 Industrial Land Use
0 Area with Aging Septics
6

Outfall ID	Watershed	Water-body	MS4 Eligible	Comment	Initial Score	Priority Ranking (initial)
15025-1	Shawsheen	Shawsheen River	yes	Shawsheen Ave	6	High
15025-2	Shawsheen	Shawsheen River	yes	Fairmeadow Road	6	High
15025-3	Shawsheen	Shawsheen River	yes	Shawsheen Ave	6	High
15025-4	Shawsheen	Shawsheen River	yes	Grace Drive	6	High
15025-5	Shawsheen	Shawsheen River	yes	Jere Road	6	High
15025-6	Shawsheen	Shawsheen River	yes	Nichols Street	6	High

Score based on the following:

- 3 Discharge to Zone II
- 3 Discharge to Impaired Water
- 0 Industrial Land Use
- 0 Area with Aging Septics
- 6

Outfall ID	Watershed	Water-body	MS4 Eligible	Comment	Initial Score	Priority Ranking (initial)
15027-1	Shawsheen	Shawsheen River	yes	Flagstaff Road	6	High
15027-2	Shawsheen	Shawsheen River	yes	Aspen Drive	6	High
15027-3	Shawsheen	Shawsheen River	yes	Kansas Road	6	High
15027-4	Shawsheen	Shawsheen River	yes	New Hampshire Road	6	High
15027-5	Shawsheen	Shawsheen River	yes	Rhode Island Road	6	High
15027-6	Shawsheen	Shawsheen River	yes	Benson Road	6	High
15027-7	Shawsheen	Shawsheen River	yes	Benson Road	6	High
15027-8	Shawsheen	Shawsheen River	yes	South Street	6	High

Score based on the following:

- 3 Discharge to Zone II
- 3 Discharge to Impaired Water
- 0 Industrial Land Use
- 0 Area with Aging Septics
- 6

Outfall ID	Watershed	Water-body	MS4 Eligible	Comment	Initial Score	Priority Ranking (initial)
15041-1	Shawsheen	Shawsheen River	Yes	Upton Drive	9	High
15041-2	Shawsheen	Shawsheen River	Yes	Valyn Lane	9	High
15041-3	Shawsheen	Shawsheen River	Yes	Research Drive	9	High
15041-4	Shawsheen	Shawsheen River	Yes	Research Drive	9	High
15041-5	Shawsheen	Shawsheen River	Yes	Fiorenza Drive	9	High
15041-6	Shawsheen	Shawsheen River	Yes	Fiorenza Drive	9	High
15041-7	Shawsheen	Shawsheen River	Yes	Ballardvale	9	High
15041-8	Shawsheen	Shawsheen River	Yes	Ballardvale	9	High
15041-9	Shawsheen	Shawsheen River	Yes	Ballardvale	9	High
15041-10	Shawsheen	Shawsheen River	Yes	Jonspin Road	9	High
15041-11	Shawsheen	Shawsheen River	Yes	Ashwood	9	High
15041-12	Shawsheen	Shawsheen River	yes	Ashwood	9	High
15041-13	Shawsheen	Shawsheen River	Yes	Cottonwood	9	High
15041-14	Shawsheen	Shawsheen River	yes	Blueberry	9	High
15041-15	Shawsheen	Shawsheen River	Yes	McDonald Road	9	High
15041-16	Shawsheen	Shawsheen River	Yes	McDonald Road	9	High

Score based on the following:

- 3 Discharge to Zone II
- 3 Discharge to Impaired Water
- 0 Industrial Land Use
- 3 Area with Aging Septics
- 9

Outfall ID	Watershed	Water-body	MS4 Eligible	Comment	Initial Score	Priority Ranking (initial)
15043-1	Shawsheen	Fosters Pond & Shawsheen	Yes	Fiorenza Drive	5	Low
15043-2	Shawsheen	Fosters Pond & Shawsheen	Yes	Fiorenza Drive	5	Low
15043-3	Shawsheen	Fosters Pond & Shawsheen	Yes	Andover Street	5	Low
15043-4	Shawsheen	Fosters Pond & Shawsheen	Yes	Ashwood Ave	5	Low
15043-5	Shawsheen	Fosters Pond & Shawsheen	Yes	Ashwood Ave	5	Low

Score based on the following:

- 3 Discharge to Zone II
- 2 Discharge to Impaired Water
- 0 Industrial Land Use
- 0 Area with Aging Septics
- 5

Outfall ID	Watershed	Water-body	MS4 Eligible	Comment	Initial Score	Priority Ranking (initial)
17001-1	Ipswich	Upper Mill Brook	Yes	Roberts Road	2	Low
17001-2	Ipswich	Upper Mill Brook	Yes	Roberts Road	2	Low
17001-3	Ipswich	Upper Mill Brook	Yes	Dell Drive	2	Low
17001-4	Ipswich	Upper Mill Brook	Yes	Dell Drive	2	Low
17001-5	Ipswich	Upper Mill Brook	Yes	Marion Street	2	Low
17001-6	Ipswich	Upper Mill Brook	Yes	Marion Street (Need to check suspect BMP - may just be an outfall location)	2	Low
17001-7	Ipswich	Upper Mill Brook	Yes	Eleanor Drive (Murray Hills Subdivision - need to add in BMP)	2	Low
17001-8	Ipswich	Upper Mill Brook	Yes	investigate pipe from ID2816057 - Marcy Map shows inlet to ID2816058 on other side of roadway)	2	Low

Score based on the following:

- 0 Discharge to Zone II
- 2 Discharge to Impaired Water
- 0 Industrial Land Use
- 0 Area with Aging Septics
- 2

Outfall ID	Watershed	Water-body	MS4 Eligible	Comment	Initial Score	Priority Ranking (initial)
17004-1	Ipswich	Sawmill Brook & Upper Maple Meadow	Yes	Elizabeth Drive (Check GIS - need to add BMP)	2	Low
17004-2	Ipswich	Sawmill Brook & Upper Maple Meadow	Yes	Fernbanks Road	2	Low
17004-3	Ipswich	Sawmill Brook & Upper Maple Meadow	Yes	Fernbanks Road	2	Low
17004-4	Ipswich	Sawmill Brook & Upper Maple Meadow	Yes	Marion Street	2	Low
17004-5	Ipswich	Sawmill Brook & Upper Maple Meadow	Yes	Marion Street	2	Low
17004-6	Ipswich	Sawmill Brook & Upper Maple Meadow	Yes	Marion Street	2	Low
17004-7	Ipswich	Sawmill Brook & Upper Maple Meadow	Yes	Marion Street	2	Low
17004-8	Ipswich	Sawmill Brook & Upper Maple Meadow	Yes	Marion Street	2	Low
17004-9	Ipswich	Sawmill Brook & Upper Maple Meadow	Yes	Mill Road	2	Low
17004-10	Ipswich	Sawmill Brook & Upper Maple Meadow	Yes	Mill Road	2	Low
17004-11	Ipswich	Sawmill Brook & Upper Maple Meadow	Yes	Mill Road	2	Low
17004-12	Ipswich	Sawmill Brook & Upper Maple Meadow	Yes	Mill Road	2	Low
17004-13	Ipswich	Sawmill Brook & Upper Maple Meadow	Yes	Sachem Circle (check GIS - Likely drains to BMP - so outfall would be out of BMP not into it)	2	Low
17004-14	Ipswich	Sawmill Brook & Upper Maple Meadow	Yes	Between 404 & 406 Chestnut Street	2	Low
17004-15	Ipswich	Sawmill Brook & Upper Maple Meadow	Yes	Navajo Drive (Check GIS - drains to BMP so outfall would be out of BMP not into it)	2	Low
17004-16	Ipswich	Sawmill Brook & Upper Maple Meadow	Yes	Eleanor Drive (Original)	2	Low
17004-17	Ipswich	Sawmill Brook & Upper Maple Meadow	Yes	at the Town Line along Chestnut Street	2	Low
17004-18	Ipswich	Sawmill Brook & Upper Maple Meadow	Yes	at corner of Chestnut and Butters Row - switch ID 287026 to 17004-19	2	Low

Score based on the following:

- 0 Discharge to Zone II
- 2 Discharge to Impaired Water
- 0 Industrial Land Use
- 0 Area with Aging Septics
- 2

Outfall ID	Watershed	Water-body	MS4 Eligible	Comment	Initial Score	Priority Ranking (Initial)
17005-1	Ipswich	Lower Mill Brook & Mid Maple Meadow	Yes	Lawrence Court	5	Low
17005-2	Ipswich	Lower Mill Brook & Mid Maple Meadow	Yes	Denault Drive	5	Low
17005-3	Ipswich	Lower Mill Brook & Mid Maple Meadow	Yes	Fairview Ave to Lime Street	5	Low
17005-4	Ipswich	Lower Mill Brook & Mid Maple Meadow	Yes	Kirk Street	5	Low
17005-5	Ipswich	Lower Mill Brook & Mid Maple Meadow	Yes	Adelaide Street	5	Low
17005-6	Ipswich	Lower Mill Brook & Mid Maple Meadow	Yes	Kelly Road	5	Low
17005-7	Ipswich	Lower Mill Brook & Mid Maple Meadow	Yes	Adams Street	5	Low
17005-8	Ipswich	Lower Mill Brook & Mid Maple Meadow	Yes	Adams Street	5	Low
17005-9	Ipswich	Lower Mill Brook & Mid Maple Meadow	Yes	Adams Street	5	Low
17005-10	Ipswich	Lower Mill Brook & Mid Maple Meadow	Yes	Thurston Street	5	Low
17005-11	Ipswich	Lower Mill Brook & Mid Maple Meadow	Yes	Church Street	5	Low
17005-12	Ipswich	Lower Mill Brook & Mid Maple Meadow	Yes	Church Street	5	Low
17005-13	Ipswich	Lower Mill Brook & Mid Maple Meadow	Yes	Middlesex Ave	5	Low
17005-14	Ipswich	Lower Mill Brook & Mid Maple Meadow	Yes	Fairview Ave	5	Low
17005-15	Ipswich	Lower Mill Brook & Mid Maple Meadow	Yes	Apache Way	5	Low
17005-16	Ipswich	Lower Mill Brook & Mid Maple Meadow	Yes	Dunton Road	5	Low
17005-17	Ipswich	Lower Mill Brook & Mid Maple Meadow	Yes	Lorin Drive	5	Low
17005-18	Ipswich	Lower Mill Brook & Mid Maple Meadow	Yes	Boutwell Street	5	Low
17005-19	Ipswich	Lower Mill Brook & Mid Maple Meadow	Yes	Presidential Drive	5	Low
17005-20	Ipswich	Lower Mill Brook & Mid Maple Meadow	Yes	Presidential Drive	5	Low
17005-21	Ipswich	Lower Mill Brook & Mid Maple Meadow	Yes	Stonehedge Drive	5	Low
17005-22	Ipswich	Lower Mill Brook & Mid Maple Meadow	Yes	Swain Road	5	Low
17005-23	Ipswich	Lower Mill Brook & Mid Maple Meadow	Yes	Swain Road	5	Low
17005-24	Ipswich	Lower Mill Brook & Mid Maple Meadow	Yes	Boutwell Street	5	Low
17005-25	Ipswich	Lower Mill Brook & Mid Maple Meadow	Yes	Boutwell Street	5	Low
17005-26	Ipswich	Lower Mill Brook & Mid Maple Meadow	Yes	Canal Street	5	Low
17005-27	Ipswich	Lower Mill Brook & Mid Maple Meadow	Yes	Castle Drive	5	Low
17005-28	Ipswich	Lower Mill Brook & Mid Maple Meadow	Yes	Cleveland Ave	5	Low
17005-29	Ipswich	Lower Mill Brook & Mid Maple Meadow	Yes	Butters Row	5	Low
17005-30	Ipswich	Lower Mill Brook & Mid Maple Meadow	Yes	Floradale Ave	5	Low
17005-31	Ipswich	Lower Mill Brook & Mid Maple Meadow	Yes	Patch's Pond	5	Low
17005-32	Ipswich	Lower Mill Brook & Mid Maple Meadow	Yes	Towpath Drive	5	Low
17005-33	Ipswich	Lower Mill Brook & Mid Maple Meadow	Yes	Towpath Drive	5	Low
17005-34	Ipswich	Lower Mill Brook & Mid Maple Meadow	Yes	Towpath Drive	5	Low
17005-35	Ipswich	Lower Mill Brook & Mid Maple Meadow	Yes	Towpath Drive	5	Low
17005-36	Ipswich	Lower Mill Brook & Mid Maple Meadow	Yes	Towpath Drive	5	Low
17005-37	Ipswich	Lower Mill Brook & Mid Maple Meadow	Yes	Webber Street	5	Low
17005-38	Ipswich	Lower Mill Brook & Mid Maple Meadow	Yes	Burt Road	5	Low
17005-39	Ipswich	Lower Mill Brook & Mid Maple Meadow	Yes	Deming Way	5	Low
17005-40	Ipswich	Lower Mill Brook & Mid Maple Meadow	Yes	Deming Way	5	Low
17005-41	Ipswich	Lower Mill Brook & Mid Maple Meadow	Yes	Burlington Ave at Safford Street	5	Low
17005-42	Ipswich	Lower Mill Brook & Mid Maple Meadow	Yes	Burlington Ave at Safford Street	5	Low
17005-43	Ipswich	Lower Mill Brook & Mid Maple Meadow	Yes	Allen Park Drive	5	Low
17005-44	Ipswich	Lower Mill Brook & Mid Maple Meadow	Yes	Fairmont Avenue	5	Low
17005-45	Ipswich	Lower Mill Brook & Mid Maple Meadow	Yes	Allenhurst Way	5	Low
17005-46	Ipswich	Lower Mill Brook & Mid Maple Meadow	Yes	Nathan Road	5	Low
17005-47	Ipswich	Lower Mill Brook & Mid Maple Meadow	Yes	Nathan Road	5	Low
17005-48	Ipswich	Lower Mill Brook & Mid Maple Meadow	Yes	Nathan Road	5	Low
17005-49	Ipswich	Lower Mill Brook & Mid Maple Meadow	Yes	Woodside Ave - need to check configuration of drain network. Doesn't look correct	5	Low
17005-50	Ipswich	Lower Mill Brook & Mid Maple Meadow	Yes	Eames Street	5	Low
17005-51	Ipswich	Lower Mill Brook & Mid Maple Meadow	Yes	Burlington Ave	5	Low
17005-52	Ipswich	Lower Mill Brook & Mid Maple Meadow	Yes	Burlington Ave	5	Low
17005-53	Ipswich	Lower Mill Brook & Mid Maple Meadow	Yes	Railroad Ave	5	Low
17005-54	Ipswich	Lower Mill Brook & Mid Maple Meadow	Yes	Burlington Ave across from 40 Burlington Ave	5	Low
17005-55	Ipswich	Lower Mill Brook & Mid Maple Meadow	Yes	Adams Street Across from No. 27 from ID 2326050	5	Low
17005-56	Ipswich	Lower Mill Brook & Mid Maple Meadow	Yes	Adams Street Across from No. 27 from ID 2326054 (there's a double culvert)	5	Low
17005-57	Ipswich	Lower Mill Brook & Mid Maple Meadow	Yes	Church Street at Thurston from ID 2327030	5	Low
17005-58	Ipswich	Lower Mill Brook & Mid Maple Meadow	Yes	Church Street at Thurston from ID 2327029	5	Low
17005-59	Ipswich	Lower Mill Brook & Mid Maple Meadow	Yes	Middlesex Ave at Central Street - from structure 2328014 (across from outfall 17005-27	5	Low
17005-60	Ipswich	Lower Mill Brook & Mid Maple Meadow	Yes	Middlesex Ave at Rotary - from structure 2328045	5	Low
17005-61	Ipswich	Lower Mill Brook & Mid Maple Meadow	Yes	Towpath Drive	5	Low
17005-62	Ipswich	Lower Mill Brook & Mid Maple Meadow	Yes	Nottingham Drive - Map BMP	5	Low
17005-63	Ipswich	Lower Mill Brook & Mid Maple Meadow	Yes	Birch Road	5	Low
17005-64	Ipswich	Lower Mill Brook & Mid Maple Meadow	Yes	Swain Road	5	Low

Score based on the following:

- 0 Discharge to Zone II
- 2 Discharge to Impaired Water
- 0 Industrial Land Use
- 3 Area with Aging Septics
- 5

Outfall ID	Watershed	Water-body	MS4 Eligible	Comment	Initial Score	Priority Ranking (initial)
17006-1	Ipswich	Lower Maple Meadow Brook	Yes	Concord Street	5	Low
17006-2	Ipswich	Lower Maple Meadow Brook	Yes	Flynn Way	5	Low
17006-3	Ipswich	Lower Maple Meadow Brook	Yes	Federal Street	5	Low
17006-4	Ipswich	Lower Maple Meadow Brook	Yes	Woburn Street	5	Low
17006-5	Ipswich	Lower Maple Meadow Brook	Yes	Federal Street	5	Low
17006-6	Ipswich	Lower Maple Meadow Brook	Yes	Concord at Federal Street	5	Low
17006-7	Ipswich	Lower Maple Meadow Brook	Yes	Middlesex across from Colonial Drive - from ID 2327054	5	Low
17006-8	Ipswich	Lower Maple Meadow Brook	Yes	Colonial Drive	5	Low

Score based on the following:

- 0 Discharge to Zone II
- 2 Discharge to Impaired Water
- 0 Industrial Land Use
- 3 Area with Aging Septics
- 5

Outfall ID	Watershed	Water-body	MS4 Eligible	Comment	Initial Score	Priority Ranking (initial)
17007-1	Ipswich	Upper Lubbers Brook	yes	Boutwell Street	5	Low
17007-2	Ipswich	Upper Lubbers Brook	yes	Grove Ave	5	Low
17007-3	Ipswich	Upper Lubbers Brook	yes	Randolph Road	5	Low
17007-4	Ipswich	Upper Lubbers Brook	yes	Amerherst Road (Need to add an outfall potentiall from Carter Lane from ID 2640041)	5	Low
17007-5	Ipswich	Upper Lubbers Brook	yes	Baker Street	5	Low
17007-6	Ipswich	Upper Lubbers Brook	yes	Winston Ave	5	Low
17007-7	Ipswich	Upper Lubbers Brook	yes	Shawsheen Ave at Blanchard Road	5	Low
17007-8	Ipswich	Upper Lubbers Brook	yes	Shawsheen Ave at Blanchard Road	5	Low
17007-9	Ipswich	Upper Lubbers Brook	yes	Cottage Street	5	Low
17007-10	Ipswich	Upper Lubbers Brook	yes	Cushing Drive	5	Low
17007-11	Ipswich	Upper Lubbers Brook	yes	Manning Street	5	Low
17007-12	Ipswich	Upper Lubbers Brook	yes	Moore Street	5	Low
17007-13	Ipswich	Upper Lubbers Brook	yes	Nichols Street	5	Low
17007-14	Ipswich	Upper Lubbers Brook	yes	Nichols Street	5	Low
17007-15	Ipswich	Upper Lubbers Brook	yes	From Ohio Street (under MBTA Tracks)	5	Low
17007-16	Ipswich	Upper Lubbers Brook	yes	Sarafina's Way	5	Low
17007-17	Ipswich	Upper Lubbers Brook	yes	Lake Street at Jacques Lane	5	Low
17007-18	Ipswich	Upper Lubbers Brook	yes	Lake Street at Jacques Lane	5	Low
17007-19	Ipswich	Upper Lubbers Brook	yes	Hopkins Street	5	Low
17007-20	Ipswich	Upper Lubbers Brook	yes	Hopkins Street	5	Low
17007-21	Ipswich	Upper Lubbers Brook	yes	Hopkins Street	5	Low
17007-22	Ipswich	Upper Lubbers Brook	yes	Andrew Street	5	Low
17007-23	Ipswich	Upper Lubbers Brook	yes	Avon Street	5	Low
17007-24	Ipswich	Upper Lubbers Brook	yes	Avery Street	5	Low
17007-25	Ipswich	Upper Lubbers Brook	yes	Elwood Road	5	Low
17007-26	Ipswich	Upper Lubbers Brook	yes	Forest Street at Sherwood Road	5	Low
17007-27	Ipswich	Upper Lubbers Brook	yes	Congress Street	5	Low
17007-28	Ipswich	Upper Lubbers Brook	yes	Blanchard Road	5	Low
17007-29	Ipswich	Upper Lubbers Brook	yes	Apache Way	5	Low
17007-30	Ipswich	Upper Lubbers Brook	yes	Apache Way	5	Low
17007-31	Ipswich	Upper Lubbers Brook	yes	Ferguson Road	5	Low
17007-32	Ipswich	Upper Lubbers Brook	yes	Ferguson Road	5	Low
17007-33	Ipswich	Upper Lubbers Brook	yes	Amherst Road	5	Low
17007-34	Ipswich	Upper Lubbers Brook	yes	Bridge Lane	5	Low
17007-35	Ipswich	Upper Lubbers Brook	yes	Sherburn Place	5	Low
17007-36	Ipswich	Upper Lubbers Brook	yes	Phillips Avenue	5	Low
17007-37	Ipswich	Upper Lubbers Brook	yes	Wisser Street	5	Low
17007-38	Ipswich	Upper Lubbers Brook	yes	Magazine Road	5	Low
17007-39	Ipswich	Upper Lubbers Brook	yes	Edwards Road	5	Low
17007-40	Ipswich	Upper Lubbers Brook	yes	Forest Street	5	Low
17007-41	Ipswich	Upper Lubbers Brook	yes	Forest Street	5	Low
17007-42	Ipswich	Upper Lubbers Brook	yes	Forest Street	5	Low
17007-43	Ipswich	Upper Lubbers Brook	yes	Forest Street	5	Low
17007-44	Ipswich	Upper Lubbers Brook	yes	Aldrich Road	5	Low
17007-45	Ipswich	Upper Lubbers Brook	yes	Aldrich Road	5	Low
17007-46	Ipswich	Upper Lubbers Brook	yes	Shawsheen Ave	5	Low
17007-47	Ipswich	Upper Lubbers Brook	yes	Shawsheen Ave	5	Low
17007-48	Ipswich	Upper Lubbers Brook	yes	Shawsheen Ave	5	Low
17007-49	Ipswich	Upper Lubbers Brook	yes	Shawsheen Ave	5	Low
17007-50	Ipswich	Upper Lubbers Brook	yes	Richmond Street	5	Low
17007-51	Ipswich	Upper Lubbers Brook	yes	Richmond Street	5	Low
17007-52	Ipswich	Upper Lubbers Brook	yes	Richmond Street	5	Low
17007-53	Ipswich	Upper Lubbers Brook	yes	Richmond Street	5	Low
17007-54	Ipswich	Upper Lubbers Brook	yes	Medford Ave	5	Low
17007-55	Ipswich	Upper Lubbers Brook	yes	Alice Ave	5	Low
17007-56	Ipswich	Upper Lubbers Brook	yes	Forest Street	5	Low
17007-57	Ipswich	Upper Lubbers Brook	yes	Roosevelt Ave	5	Low
17007-58	Ipswich	Upper Lubbers Brook	yes	Marrietta Avenue	5	Low
17007-59	Ipswich	Upper Lubbers Brook	yes	Grove Ave	5	Low
17007-60	Ipswich	Upper Lubbers Brook	yes	Lt. Buck Drive	5	Low
17007-61	Ipswich	Upper Lubbers Brook	yes	Leonard Lane	5	Low
17007-62	Ipswich	Upper Lubbers Brook	Yes	Need to add at end of Revere Avenue - probably at structure 268005	5	Low
17007-63	Ipswich	Upper Lubbers Brook	Yes	Mink Run Road	5	Low
17007-64	Ipswich	Upper Lubbers Brook	yes	Mink Run Road	5	Low
17007-65	Ipswich	Upper Lubbers Brook	yes	Chisolm Way	5	Low
17007-66	Ipswich	Upper Lubbers Brook	yes	Lords Court	5	Low
17007-67	Ipswich	Upper Lubbers Brook	yes	Pouliout Place	5	Low
17007-68	Ipswich	Upper Lubbers Brook	yes	Pouliout Place	5	Low
17007-69	Ipswich	Upper Lubbers Brook	yes	Shawsheen Ave out to the Middlesex Canal - Structure id 211022	5	Low
17007-70	Ipswich	Upper Lubbers Brook	yes	Wilton Drive - Structure 2134004	5	Low
17007-71	Ipswich	Upper Lubbers Brook	yes	Wedgewood Ave - structure ID 2133005	5	Low
17007-72	Ipswich	Upper Lubbers Brook	yes	Moore Street - structure ID 2120028	5	Low
17007-73	Ipswich	Upper Lubbers Brook	yes	Blanchard Road - structure ID 2629011	5	Low
17007-74	Ipswich	Upper Lubbers Brook	yes	Ferguson Road & Amherst - Structure ID 2658039	5	Low
17007-75	Ipswich	Upper Lubbers Brook	yes	Washington Avenue	5	Low

Score based on the following:

- 3 Discharge to Zone II
- 2 Discharge to Impaired Water
- 0 Industrial Land Use
- 0 Area with Aging Septics
- 5

Outfall ID	Watershed	Water-body	MS4 Eligible	Comment	Initial Score	Priority Ranking (initial)
17008-1	lpswich	Lower Lubbers	Yes	Lopez Road	8	High
17008-2	lpswich	Lower Lubbers	Yes	Biggar Ave	8	High
17008-3	lpswich	Lower Lubbers	Yes	Salem Street	8	High
17008-4	lpswich	Lower Lubbers	Yes	Salem Street	8	High
17008-5	lpswich	Lower Lubbers	Yes	Scaltrito Drive	8	High
17008-6	lpswich	Lower Lubbers	Yes	Pilcher Drive	8	High
17008-7	lpswich	Lower Lubbers	Yes	Morningside Drive	8	High
17008-8	lpswich	Lower Lubbers	Yes	Morningside Drive	8	High
17008-9	lpswich	Lower Lubbers	Yes	Cunningham at new Culvert	8	High
17008-10	lpswich	Lower Lubbers	Yes	Ring Ave	8	High
17008-11	lpswich	Lower Lubbers	Yes	Miller Road - From Faulkner	8	High
17008-12	lpswich	Lower Lubbers	Yes	Lloyd Road	8	High
17008-13	lpswich	Lower Lubbers	Yes	Marjorie Road	8	High
17008-14	lpswich	Lower Lubbers	Yes	Marjorie Road	8	High
17008-15	lpswich	Lower Lubbers	Yes	Beeching Ave	8	High
17008-16	lpswich	Lower Lubbers	Yes	Faulkner Ave	8	High
17008-17	lpswich	Lower Lubbers	Yes	Town Hall - ID 139038 - investigate connection from 139014	8	High
17008-18	lpswich	Lower Lubbers	Yes	from Gandalf Way - ID 227018	8	High
17008-19	lpswich	Lower Lubbers	Yes	Christine Drive - from ID 224010	8	High
17008-20	lpswich	Lower Lubbers	Yes	Reading Ave	8	High
17008-21	lpswich	Lower Lubbers	Yes	Wicks Circle	8	High
17008-22	lpswich	Lower Lubbers	Yes	Gloria Way	8	High
17008-23	lpswich	Lower Lubbers	Yes	Broad Street	8	High
17008-24	lpswich	Lower Lubbers	yes	King Street	8	High
17008-25	lpswich	Lower Lubbers	yes	Harnden Street	8	High
17008-26	lpswich	Lower Lubbers	Yes	Seneca Lane	8	High
17008-27	lpswich	Lower Lubbers	Yes	Seneca Lane	8	High
17008-28	lpswich	Lower Lubbers	Yes	Seneca Lane	8	High
17008-29	lpswich	Lower Lubbers	Yes	Tacoma Drive	8	High
17008-30	lpswich	Lower Lubbers	Yes	Tacoma Drive	8	High
17008-31	lpswich	Lower Lubbers	Yes	Brattle Street (North)	8	High
17008-32	lpswich	Lower Lubbers	Yes	Glen Road	8	High
17008-33	lpswich	Lower Lubbers	Yes	Frederick Drive	8	High
17008-34	lpswich	Lower Lubbers	Yes	Glendale Circle	8	High
17008-35	lpswich	Lower Lubbers	Yes	Hamlin Lane	8	High
17008-36	lpswich	Lower Lubbers	Yes	Lawrence Street	8	High
17008-37	lpswich	Lower Lubbers	Yes	Middlesex Ave	8	High
17008-38	lpswich	Lower Lubbers	Yes	Oakdale Road	8	High
17008-39	lpswich	Lower Lubbers	Yes	Palmer Way	8	High
17008-40	lpswich	Lower Lubbers	Yes	Palmer Way	8	High
17008-41	lpswich	Lower Lubbers	Yes	Palmer Way	8	High
17008-42	lpswich	Lower Lubbers	Yes	Pinewood Road	8	High
17008-43	lpswich	Lower Lubbers	Yes	Salem Street	8	High
17008-44	lpswich	Lower Lubbers	Yes	Somerset Place	8	High
17008-45	lpswich	Lower Lubbers	Yes	Somerset Place	8	High
17008-46	lpswich	Lower Lubbers	Yes	Cedarcrest Road	8	High
17008-47	lpswich	Lower Lubbers	Yes	Concord Street	8	High
17008-48	lpswich	Lower Lubbers	Yes	Middlesex Ave	8	High
17008-49	lpswich	Lower Lubbers	Yes	Middlesex Ave	8	High
17008-50	lpswich	Lower Lubbers	Yes	Allgrove Lane	8	High
17008-51	lpswich	Lower Lubbers	YES	Marcia Road	8	High
17008-52	lpswich	Lower Lubbers	Yes	North Street	8	High
17008-53	lpswich	Lower Lubbers	Yes	North Street	8	High
17008-54	lpswich	Lower Lubbers	yes	North Street	8	High
17008-55	lpswich	Lower Lubbers	yes	North Street	8	High
17008-56	lpswich	Lower Lubbers	Yes	Woburn Street	8	High
17008-57	lpswich	Lower Lubbers	Yes	Woburn Street at Concord	8	High
17008-58	lpswich	Lower Lubbers	Yes	Woburn Street at Concord	8	High
17008-59	lpswich	Lower Lubbers	Yes	Woburn Street at Concord	8	High
17008-60	lpswich	Lower Lubbers	YES	Concord Street	8	High
17008-61	lpswich	Lower Lubbers	Yes	Marcia Road	8	High
17008-62	lpswich	Lower Lubbers	Yes	Dadant Drive	8	High
17008-63	lpswich	Lower Lubbers	Yes	Great Neck Drive	8	High
17008-64	lpswich	Lower Lubbers	Yes	Serenoa Road	8	High
17008-65	lpswich	Lower Lubbers	yes	Serenoa Road	8	High
17008-66	lpswich	Lower Lubbers	yes	Cary Street	8	High
17008-67	lpswich	Lower Lubbers	Yes	Cunningham at Allston	8	High
17008-68	lpswich	Lower Lubbers	Yes	Cunningham at Beeching	8	High
17008-69	lpswich	Lower Lubbers	Yes	Lexington Street	8	High
17008-70	lpswich	Lower Lubbers	Yes	Woburn Street	8	High
17008-71	lpswich	Lower Lubbers	Yes	River Street from ID 229001	8	High
17008-72	lpswich	Lower Lubbers	Yes	Gloria Way from structure 1310017	8	High
17008-73	lpswich	Lower Lubbers	Yes	Lawrence Street from ID 1419013	8	High
17008-74	lpswich	Lower Lubbers	Yes	Lawrence Street from ID 1419015	8	High
17008-75	lpswich	Lower Lubbers	Yes	Douglas Ave - structure ID 1423015	8	High
17008-76	lpswich	Lower Lubbers	yes	Park Street	8	High
17008-77	lpswich	Lower Lubbers	yes	Need to switch 17019-20	8	High
17008-78	lpswich	Lower Lubbers	yes	Silver Lake outfall from Fitz Terrace - from ID 1236003	8	High
17008-79	lpswich	Lower Lubbers	yes	Silver Lake (From Grove Ave)	8	High
17008-80	lpswich	Lower Lubbers	yes	Silver Lake (From Pond Street)	8	High
17008-81	lpswich	Lower Lubbers	yes	Silver Lake (From Lake Street)	8	High
17008-82	lpswich	Lower Lubbers	Yes	Silver Lake (From Burnap Street)	8	High

Score based on the following:

3 Discharge to Zone II
2 Discharge to Impaired Water
0 Industrial Land Use
3 Area with Aging Septics
8

Outfall ID	Watershed	Water-body	MS4 Eligible	Comment	Initial Score	Priority Ranking (initial)
17012-1	Ipswich	Ipswich River	Yes	Cornell Place	5	Low
17012-2	Ipswich	Ipswich River	No	Private - 226 Lowell Street	5	Low
17012-3	Ipswich	Ipswich River	No	Private - 230 Lowell Street	5	Low
17012-4	Ipswich	Ipswich River	Yes	Suncrest Ave	5	Low
17012-5	Ipswich	Ipswich River	Yes	Suncrest Ave	5	Low
17012-6	Ipswich	Ipswich River	Yes	Leslie Street	5	Low
17012-7	Ipswich	Ipswich River	Yes	Tracy Circle	5	Low
17012-8	Ipswich	Ipswich River	Yes	Crystal Road	5	Low
17012-9	Ipswich	Ipswich River	Yes	Crystal Road	5	Low
17012-10	Ipswich	Ipswich River	Yes	Foley Farm Road	5	Low
17012-11	Ipswich	Ipswich River	Yes	Quail Run	5	Low
17012-12	Ipswich	Ipswich River	Yes	Sequoia Drive	5	Low
17012-13	Ipswich	Ipswich River	Yes	Sequoia Drive	5	Low
17012-14	Ipswich	Ipswich River	Yes	Westdale Ave	5	Low
17012-15	Ipswich	Ipswich River	Yes	Cherokee Lane	5	Low
17012-16	Ipswich	Ipswich River	Yes	Cherokee Lane	5	Low
17012-17	Ipswich	Ipswich River	Yes	Oxbow Drive	5	Low
17012-18	Ipswich	Ipswich River	Yes	Oxbow Drive	5	Low
17012-19	Ipswich	Ipswich River	Yes	Oxbow Drive	5	Low
17012-20	Ipswich	Ipswich River	Yes	Oxbow Drive	5	Low
17012-21	Ipswich	Ipswich River	Yes	Henry Drive	5	Low
17012-22	Ipswich	Ipswich River	Yes	West Street	5	Low
17012-23	Ipswich	Ipswich River	Yes	West Street	5	Low
17012-24	Ipswich	Ipswich River	Yes	Isabella Way	5	Low
17012-25	Ipswich	Ipswich River	Yes	Tracey Circle at Structure 3120008	5	Low

Score based on the following:

- 0 Discharge to Zone II
- 2 Discharge to Impaired Water
- 0 Industrial Land Use
- 3 Area with Aging Septics
- 5

Outfall ID	Watershed	Water-body	MS4 Eligible	Comment	Initial Score	Priority Ranking (initial)	
17019-1	Ipswich	Martins Brook	Yes	Carson Avenue	11	High	
17019-2	Ipswich	Martins Brook	Yes	Evans Drive	11	High	
17019-3	Ipswich	Martins Brook	Yes	Marie Drive	11	High	
17019-4	Ipswich	Martins Brook	Yes	Charlotte Road	11	High	
17019-5	Ipswich	Martins Brook	Yes	Draper Drive	11	High	
17019-6	Ipswich	Martins Brook	Yes	Gunderson Road	11	High	
17019-7	Ipswich	Martins Brook	Yes	Evans Drive	11	High	
17019-8	Ipswich	Martins Brook	Yes	Evans Drive	11	High	
17019-9	Ipswich	Martins Brook	Yes	Lucaya Circle	11	High	
17019-10	Ipswich	Martins Brook	Yes	Lucaya Circle	11	High	
17019-11	Ipswich	Martins Brook	Yes	Lucaya Circle	11	High	
17019-12	Ipswich	Martins Brook	Yes	Sheridan Road	11	High	
17019-13	Ipswich	Martins Brook	Yes	Freeport Drive	11	High	
17019-14	Ipswich	Martins Brook	Yes	Freeport Drive	11	High	
17019-15	Ipswich	Martins Brook	Yes	Freeport Drive	11	High	
17019-16	Ipswich	Martins Brook	Yes	Fox Run Drive	11	High	
17019-17	Ipswich	Martins Brook	Yes	High Street	Need to Change Eligibility from MassDOT to Town	11	High
17019-18	Ipswich	Martins Brook	Yes	High Street		11	High
17019-19	Ipswich	Martins Brook	Yes	Park Street	11	High	
17019-20	Ipswich	Martins Brook	Yes	Woburn Street	11	High	
17019-21	Ipswich	Martins Brook	Yes	Woburn Street	11	High	
17019-22	Ipswich	Martins Brook	Yes	Salem Street - Route 62 - Need to change eligibility from MassDOT to Town	11	High	
17019-23	Ipswich	Martins Brook	Yes	Salem Street - Route 62	11	High	
17019-24	Ipswich	Martins Brook	Yes	Salem Street - Route 62	11	High	
17019-25	Ipswich	Martins Brook	Yes	Woburn Street	11	High	
17019-26	Ipswich	Martins Brook	Yes	Coolidge Road	11	PROBLEM OUTFALL	
17019-27	Ipswich	Martins Brook	Yes	Hawthorne Road	11	High	
17019-28	Ipswich	Martins Brook	Yes	Ella Ave	11	High	
17019-29	Ipswich	Martins Brook	Yes	Arlene Ave	11	High	
17019-30	Ipswich	Martins Brook	Yes	Arlene Ave	11	High	
17019-31	Ipswich	Martins Brook	Yes	Arlene Ave	11	High	
17019-32	Ipswich	Martins Brook	Yes	Barbara Ave	11	High	
17019-33	Ipswich	Martins Brook	Yes	Park Street	11	High	
17019-34	Ipswich	Martins Brook	Yes	Andover Street	11	High	
17019-35	Ipswich	Martins Brook	Yes	Andover Street	11	High	
17019-36	Ipswich	Martins Brook	Yes	Andover Street	11	High	
17019-37	Ipswich	Martins Brook	Yes	Upton Drive	11	High	
17019-38	Ipswich	Martins Brook	Yes	Upton Drive	11	High	
17019-39	Ipswich	Martins Brook	Yes	Upton Drive	11	High	
17019-40	Ipswich	Martins Brook	Yes	Treasure Hill Road	11	High	
17019-41	Ipswich	Martins Brook	Yes	Treasure Hill Road	11	High	
17019-42	Ipswich	Martins Brook	Yes	Andover Street	11	High	
17019-43	Ipswich	Martins Brook	Yes	Andover Street	11	High	
17019-44	Ipswich	Martins Brook	Yes	Andover Street	11	High	
17019-45	Ipswich	Martins Brook	Yes	Baland Road	11	High	
17019-46	Ipswich	Martins Brook	Yes	Earles Row	11	High	
17019-47	Ipswich	Martins Brook	Yes	Earles Row	11	High	
17019-48	Ipswich	Martins Brook	Yes	Earles Row	11	High	
17019-49	Ipswich	Martins Brook	Yes	Emerald Ave	11	High	
17019-50	Ipswich	Martins Brook	Yes	Nelson Way	11	High	
17019-51	Ipswich	Martins Brook	Yes	Lockwood Road	11	High	
17019-52	Ipswich	Martins Brook	Yes	Freeport Drive	11	High	
17019-53	Ipswich	Martins Brook	Yes	need to add - Chapman Ave from ID 103006	11	High	
17019-54	Ipswich	Martins Brook	yes	need to add - Sherian Road from ID 102018	11	High	
17019-55	Ipswich	Martins Brook	Yes	need to add - from 471 Salem Street	11	High	
17019-56	Ipswich	Martins Brook	Yes	need to add 17012-3	11	High	
17019-57	Ipswich	Martins Brook	Yes	need to add 17012-4	11	High	
17019-58	Ipswich	Martins Brook	Yes	need to add 17012-8	11	High	
17019-59	Ipswich	Martins Brook	Yes	need to add 17012-9	11	High	
17019-60	Ipswich	Martins Brook	Yes	need to add 17012-10	11	High	
17019-61	Ipswich	Martins Brook	Yes	need to add 17012-12	11	High	

Score based on the following:

- 3 Discharge to Zone II
- 2 Discharge to Impaired Water
- 3 Industrial Land Use
- 3 Area with Aging Septics

Outfall ID	Watershed	Water-body	MS4 Eligible	Comment	Initial Score	Priority Ranking (initial)
19104-1	Boston Harbor	Aberjona	Yes	Jewel Drive	5	Low
19104-2	Boston Harbor	Aberjona	Yes	Jewel Drive	5	Low
19104-3	Boston Harbor	Aberjona	Yes	Industrial Way	5	Low
19104-4	Boston Harbor	Aberjona	Yes	Industrial Way	5	Low

Score based on the following:

- 0 Discharge to Zone II
- 2 Discharge to Impaired Water
- 3 Industrial Land Use
- 0 Area with Aging Septics
- 5

Appendix H

SSO Inventory

SSO Location ¹	Discharge Statement ²	Date ³	Time Start ³	Time End ³	Estimated Volume ⁴	Description	Mitigation Completed ⁶	Mitigation Planned ⁷
Jewel Drive	Discharge likely entered the MS4.	5/29/19	11:45	12:15	<50 gallons	Effluent discharge from apparent grease buildup.	No action necessary.	Board of Health to contact business owner regarding excessive grease discharges to sewer.
Lowell Street	Discharge unlikely to have entered the MS4	08/31/20	3:00 pm	3:20 pm	<100 gallons	Effluent discharge from broken forcemain	No action Necessary.	Na – pump station was shutdown after 20 mins and septic vac truck stationed at wetwell. Effluent discharge is from a grinder pump so infiltrated into sand/gravel subgrade.

¹ Location (approximate street crossing/address and receiving water, if any)

² A clear statement of whether the discharge entered a surface water directly or entered the MS4

³ Date(s) and time(s) of each known SSO occurrence (i.e., beginning and end of any known discharge)

⁴ Estimated volume(s) of the occurrence

⁵ Description of the occurrence indicating known or suspected cause(s)

⁶ Mitigation and corrective measures completed with dates implemented

⁷ Mitigation and corrective measures planned with implementation schedules

Appendix I

Dry Weather Screening Lab Results

Wilmington Dry Weather Outfall Discharge Sampling Log

TOTAL COMPLETED	8
TOTAL ASSIGNED	8
TOTAL DRY WEATHER FLOW	8

Outfall ID	Street Name	Date Inspection	Inspector	TOTAL DRY WEATHER FLOW												8
				Ammonia		Chlorine	Conductivity	Salinity		E Coli.	Surfactants	Temperatu	Status	Date	Time	
15022-2	Harold Ave between 5 & 7	9/9/2019	RH	0.08	mg/l	0 mg/l	160 umhos/cm	0 SU	1 MPN/100ml	0 mg/l	38	collected	4/7/2021	11:15 AM	5/7/2021	9:00 AM
15022-5	Pouliot Pl #3703/#3901	1/4/2021	HL	0.06	mg/l	0 mg/l	230 umhos/cm	0 SU	<1 MPN/100ml	0 mg/l	45	collected	4/7/2021	9:45 AM	5/7/2021	9:15 AM
17004-14	Chestnut near 404/406	9/24/2019	HL	0.11	mg/l	0 mg/l	420 umhos/cm	0 SU	3.06 MPN/100ml	0 mg/l	45	collected	4/7/2021	10:40 AM	5/7/2021	9:45 AM
17005-35	Towpath Dr 11/13	3/11/2020	HL	0	mg/l	0 mg/l	880 umhos/cm	0 SU	18.49 MPN/100ml	0 mg/l	35	collected	4/7/2021	10:30 AM	5/7/2021	10:15 AM
17007-11	Moore Street near 31/33	1/28/2020	HL	0.12	mg/l	0 mg/l	980 umhos/cm	0 SU	<1 MPN/100ml	0 mg/l	45	collected	4/7/2021	9:30 AM	5/7/2021	10:30 AM
17007-63	Amherst Road	2/3/2020	HL	0.07	mg/l	0 mg/l	1200 umhos/cm	0 SU	3.04 MPN/100ml	0 mg/l	43	collected	4/7/2021	10:00 AM	5/7/2021	10:45 AM
17008-11	Miller Rd	8/20/2019	HL	0.08	mg/l	0 mg/l	830 umhos/cm	0 SU	<1 MPN/100ml	0 mg/l	45	collected	4/7/2021	11:30 AM	5/7/2021	11:15 AM
17019-26	Coolidge	7/9/2019	WGH/HL	0.77	mg/l	0 mg/l	920 umhos/cm	0 SU	9422 MPN/100ml	0 mg/l	45	collected	4/7/2021	12:00 PM	5/7/2021	11:30 AM
Not Sampled	Removed from list			Reason												
17005-94	Glen Road		WBH	no flow												
17007-69	Shawsheen #395/#397	2/3/2020	HL	no flow												
17019-9	35 Lucaya Circle	7/9/2019	WGH/HL	no flow												
17019-12	Sheridan Road (28&30)	7/18/2019	HL/JR	no flow												
17008-5	Scalistro drive	8/30/2019	HL	submerged												
17012-12	Opposite #2 Sequoia Drive	8/9/2019	HL	submerged												
17012-13	7 &9 Sequoia Dr	8/09/02019	HL	submerged												
17012-27	110 Fordham Road	7/31/2019	HL	submerged												
Ammonia testing		test strip	reader	blank	result											
15022-2		0.25	0.09	0.01	0.08											
15022-5		0.25	0.08	0.02	0.06											
17004-14		0.25	0.11	0	0.11											
17005-35		0.25	0	0	0											
17007-11		0.25	0.12	0	0.12											
17007-63		0.25	0.13	0.06	0.07											
17008-11		0.25	0.08	0	0.08											
17019-26		0.75	0.77	0	0.77											



Sample Receipt Summary

Client: Town of Wilmington DPW
135 Andover Street
Wilmington, MA 01887
ATTN: Anthony LiVerde

Lab Number: L2117405
Alpha PM: Nichole Hunt
508-439-5137
nhunt@alphalab.com

Project Name:
Project Number:

Receive Date: 04/07/21

Final Due Date: 04/15/21

Client ID	Lab Sample ID	Collection Date/Time	Sample Matrix	Location	Product Due Date	Analysis Description
17008-11	L2117405-01	04/07/21 11:00	WATER		04/15/21	E. Coli by Quanti Tray -SM 9223B Salinity-Chloride calculation - SM 2520 Specific Conductance - EPA 120.1 Surfactants-MBAS - SM 5540 Total Residual Chlorine - SM 4500 Sample Disposal Fee
15022-2	L2117405-02	04/07/21 11:00	WATER		04/15/21	E. Coli by Quanti Tray -SM 9223B Salinity-Chloride calculation - SM 2520 Specific Conductance - EPA 120.1 Surfactants-MBAS - SM 5540 Total Residual Chlorine - SM 4500 Sample Disposal Fee
17019-26	L2117405-03	04/07/21 12:00	WATER		04/15/21	E. Coli by Quanti Tray -SM 9223B Salinity-Chloride calculation - SM 2520 Specific Conductance - EPA 120.1



Sample Receipt Summary

Client ID	Lab Sample ID	Collection Date/Time	Sample Matrix	Location	Product Due Date	Analysis Description
						Surfactants-MBAS - SM 5540 Total Residual Chlorine - SM 4500 Sample Disposal Fee
17007-11	L2117405-04	04/07/21 09:30	WATER		04/15/21	E. Coli by Quanti Tray -SM 9223B Salinity-Chloride calculation - SM 2520 Specific Conductance - EPA 120.1 Surfactants-MBAS - SM 5540 Total Residual Chlorine - SM 4500 Sample Disposal Fee
15022-5	L2117405-05	04/07/21 10:00	WATER		04/15/21	E. Coli by Quanti Tray -SM 9223B Salinity-Chloride calculation - SM 2520 Specific Conductance - EPA 120.1 Surfactants-MBAS - SM 5540 Total Residual Chlorine - SM 4500 Sample Disposal Fee
17007-63	L2117405-06	04/07/21 10:30	WATER		04/15/21	E. Coli by Quanti Tray -SM 9223B Salinity-Chloride calculation - SM 2520 Specific Conductance - EPA 120.1 Surfactants-MBAS - SM 5540 Total Residual Chlorine - SM 4500 Sample Disposal Fee
17005-75	L2117405-07	04/07/21 10:15	WATER		04/15/21	E. Coli by Quanti Tray -SM 9223B Salinity-Chloride calculation - SM 2520 Specific Conductance - EPA 120.1 Surfactants-MBAS - SM 5540 Total Residual Chlorine - SM 4500 Sample Disposal Fee
17004-14	L2117405-08	04/07/21 10:40	WATER		04/15/21	E. Coli by Quanti Tray -SM 9223B



Sample Receipt Summary

Client ID	Lab Sample ID	Collection Date/Time	Sample Matrix	Location	Product Due Date	Analysis Description
						Salinity-Chloride calculation - SM 2520 Specific Conductance - EPA 120.1 Surfactants-MBAS - SM 5540 Total Residual Chlorine - SM 4500 Sample Disposal Fee



ANALYTICAL REPORT

Lab Number:	L2117405
Client:	Town of Wilmington DPW 135 Andover Street Wilmington, MA 01887
ATTN:	Anthony LiVerde
Phone:	(978) 658-4481
Project Name:	Not Specified
Project Number:	Not Specified
Report Date:	04/15/21

The original project report/data package is held by Alpha Analytical. This report/data package is paginated and should be reproduced only in its entirety. Alpha Analytical holds no responsibility for results and/or data that are not consistent with the original.

Certifications & Approvals: MA (M-MA086), NH NELAP (2064), CT (PH-0574), IL (200077), ME (MA00086), MD (348), NJ (MA935), NY (11148), NC (25700/666), PA (68-03671), RI (LAO00065), TX (T104704476), VT (VT-0935), VA (460195), USDA (Permit #P330-17-00196).

Eight Walkup Drive, Westborough, MA 01581-1019
508-898-9220 (Fax) 508-898-9193 800-624-9220 - www.alphalab.com



Project Name: Not Specified
Project Number: Not Specified

Lab Number: L2117405
Report Date: 04/15/21

Alpha Sample ID	Client ID	Matrix	Sample Location	Collection Date/Time	Receive Date
L2117405-01	17008-11	WATER	Not Specified	04/07/21 11:00	04/07/21
L2117405-02	15022-2	WATER	Not Specified	04/07/21 11:00	04/07/21
L2117405-03	17019-26	WATER	Not Specified	04/07/21 12:00	04/07/21
L2117405-04	17007-11	WATER	Not Specified	04/07/21 09:30	04/07/21
L2117405-05	15022-5	WATER	Not Specified	04/07/21 10:00	04/07/21
L2117405-06	17007-63	WATER	Not Specified	04/07/21 10:30	04/07/21
L2117405-07	17005-75	WATER	Not Specified	04/07/21 10:15	04/07/21
L2117405-08	17004-14	WATER	Not Specified	04/07/21 10:40	04/07/21

Project Name: Not Specified**Lab Number:** L2117405**Project Number:** Not Specified**Report Date:** 04/15/21

Case Narrative

The samples were received in accordance with the Chain of Custody and no significant deviations were encountered during the preparation or analysis unless otherwise noted. Sample Receipt, Container Information, and the Chain of Custody are located at the back of the report.

Results contained within this report relate only to the samples submitted under this Alpha Lab Number and meet NELAP requirements for all NELAP accredited parameters unless otherwise noted in the following narrative. The data presented in this report is organized by parameter (i.e. VOC, SVOC, etc.). Sample specific Quality Control data (i.e. Surrogate Spike Recovery) is reported at the end of the target analyte list for each individual sample, followed by the Laboratory Batch Quality Control at the end of each parameter. Tentatively Identified Compounds (TICs), if requested, are reported for compounds identified to be present and are not part of the method/program Target Compound List, even if only a subset of the TCL are being reported. If a sample was re-analyzed or re-extracted due to a required quality control corrective action and if both sets of data are reported, the Laboratory ID of the re-analysis or re-extraction is designated with an "R" or "RE", respectively.

When multiple Batch Quality Control elements are reported (e.g. more than one LCS), the associated samples for each element are noted in the grey shaded header line of each data table. Any Laboratory Batch, Sample Specific % recovery or RPD value that is outside the listed Acceptance Criteria is bolded in the report. In reference to questions H (CAM) or 4 (RCP) when "NO" is checked, the performance criteria for CAM and RCP methods allow for some quality control failures to occur and still be within method compliance. In these instances, the specific failure is not narrated but noted in the associated QC Outlier Summary Report, located directly after the Case Narrative. QC information is also incorporated in the Data Usability Assessment table (Format 11) of our Data Merger tool, where it can be reviewed in conjunction with the sample result, associated regulatory criteria and any associated data usability implications.

Soil/sediments, solids and tissues are reported on a dry weight basis unless otherwise noted. Definitions of all data qualifiers and acronyms used in this report are provided in the Glossary located at the back of the report.

HOLD POLICY - For samples submitted on hold, Alpha's policy is to hold samples (with the exception of Air canisters) free of charge for 21 calendar days from the date the project is completed. After 21 calendar days, we will dispose of all samples submitted including those put on hold unless you have contacted your Alpha Project Manager and made arrangements for Alpha to continue to hold the samples. Air canisters will be disposed after 3 business days from the date the project is completed.

Please contact Project Management at 800-624-9220 with any questions.

Project Name: Not Specified
Project Number: Not Specified

Lab Number: L2117405
Report Date: 04/15/21

Case Narrative (continued)

Sample Receipt

L2117405-01, -02, -03, -05, -06, and -08: At the client's request, the collection time was obtained from the container labels.

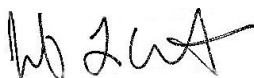
The samples were received at the laboratory above the required temperature range and were not on ice.

Chlorine, Total Residual

WG1483588: A Matrix Spike and Laboratory Duplicate could not be performed due to insufficient sample volume available for analysis.

I, the undersigned, attest under the pains and penalties of perjury that, to the best of my knowledge and belief and based upon my personal inquiry of those responsible for providing the information contained in this analytical report, such information is accurate and complete. This certificate of analysis is not complete unless this page accompanies any and all pages of this report.

Authorized Signature:



Jennifer L. Clements

Title: Technical Director/Representative

Date: 04/15/21

INORGANICS & MISCELLANEOUS

Project Name: Not Specified

Project Number: Not Specified

Lab Number: L2117405

Report Date: 04/15/21

SAMPLE RESULTS

Lab ID: L2117405-01

Client ID: 17008-11

Sample Location: Not Specified

Date Collected: 04/07/21 11:00

Date Received: 04/07/21

Field Prep: Not Specified

Sample Depth:

Matrix: Water

Parameter	Result	Qualifier	Units	RL	MDL	Dilution Factor	Date Prepared	Date Analyzed	Analytical Method	Analyst
Microbiological Analysis - Westborough Lab										
E. Coli (MPN)	<1		MPN/100ml	1	NA	1	-	04/07/21 17:14	121,9223B	SH
General Chemistry - Westborough Lab										
Specific Conductance	830		umhos/cm	10	--	1	-	04/07/21 17:06	4,120.1	AS
SALINITY	ND		SU	2.0	--	1	-	04/07/21 17:06	121,2520B	AS
Chlorine, Total Residual	ND		mg/l	0.02	--	1	-	04/07/21 18:58	121,4500CL-D	AS
Surfactants, MBAS	ND		mg/l	0.050	--	1	04/08/21 03:25	04/08/21 07:53	121,5540C	AW



Project Name: Not Specified
Project Number: Not Specified

Lab Number: L2117405
Report Date: 04/15/21

SAMPLE RESULTS

Lab ID: L2117405-02
Client ID: 15022-2
Sample Location: Not Specified

Date Collected: 04/07/21 11:00
Date Received: 04/07/21
Field Prep: Not Specified

Sample Depth:
Matrix: Water

Parameter	Result	Qualifier	Units	RL	MDL	Dilution Factor	Date Prepared	Date Analyzed	Analytical Method	Analyst
Microbiological Analysis - Westborough Lab										
E. Coli (MPN)	1		MPN/100ml	1	NA	1	-	04/07/21 17:14	121,9223B	SH
General Chemistry - Westborough Lab										
Specific Conductance	160		umhos/cm	10	--	1	-	04/07/21 17:06	4,120.1	AS
SALINITY	ND		SU	2.0	--	1	-	04/07/21 17:06	121,2520B	AS
Chlorine, Total Residual	ND		mg/l	0.02	--	1	-	04/07/21 18:58	121,4500CL-D	AS
Surfactants, MBAS	ND		mg/l	0.050	--	1	04/08/21 03:25	04/08/21 07:53	121,5540C	AW



Project Name: Not Specified
Project Number: Not Specified

Lab Number: L2117405
Report Date: 04/15/21

SAMPLE RESULTS

Lab ID: L2117405-03
Client ID: 17019-26
Sample Location: Not Specified

Date Collected: 04/07/21 12:00
Date Received: 04/07/21
Field Prep: Not Specified

Sample Depth:
Matrix: Water

Parameter	Result	Qualifier	Units	RL	MDL	Dilution Factor	Date Prepared	Date Analyzed	Analytical Method	Analyst
Microbiological Analysis - Westborough Lab										
E. Coli (MPN)	9422		MPN/100ml	200	NA	200	-	04/07/21 17:14	121,9223B	SH
General Chemistry - Westborough Lab										
Specific Conductance	920		umhos/cm	10	--	1	-	04/07/21 17:06	4,120.1	AS
SALINITY	ND		SU	2.0	--	1	-	04/07/21 17:06	121,2520B	AS
Chlorine, Total Residual	ND		mg/l	0.02	--	1	-	04/07/21 18:58	121,4500CL-D	AS
Surfactants, MBAS	ND		mg/l	0.050	--	1	04/08/21 03:25	04/08/21 07:54	121,5540C	AW



Project Name: Not Specified

Project Number: Not Specified

Lab Number: L2117405

Report Date: 04/15/21

SAMPLE RESULTS

Lab ID: L2117405-04

Client ID: 17007-11

Sample Location: Not Specified

Date Collected: 04/07/21 09:30

Date Received: 04/07/21

Field Prep: Not Specified

Sample Depth:

Matrix: Water

Parameter	Result	Qualifier	Units	RL	MDL	Dilution Factor	Date Prepared	Date Analyzed	Analytical Method	Analyst
Microbiological Analysis - Westborough Lab										
E. Coli (MPN)	<1		MPN/100ml	1	NA	1	-	04/07/21 17:14	121,9223B	SH
General Chemistry - Westborough Lab										
Specific Conductance	980		umhos/cm	10	--	1	-	04/07/21 17:06	4,120.1	AS
SALINITY	ND		SU	2.0	--	1	-	04/07/21 17:06	121,2520B	AS
Chlorine, Total Residual	ND		mg/l	0.02	--	1	-	04/07/21 18:58	121,4500CL-D	AS
Surfactants, MBAS	ND		mg/l	0.050	--	1	04/08/21 03:25	04/08/21 07:56	121,5540C	AW



Project Name: Not Specified
Project Number: Not Specified

Lab Number: L2117405
Report Date: 04/15/21

SAMPLE RESULTS

Lab ID: L2117405-05
Client ID: 15022-5
Sample Location: Not Specified

Date Collected: 04/07/21 10:00
Date Received: 04/07/21
Field Prep: Not Specified

Sample Depth:
Matrix: Water

Parameter	Result	Qualifier	Units	RL	MDL	Dilution Factor	Date Prepared	Date Analyzed	Analytical Method	Analyst
Microbiological Analysis - Westborough Lab										
E. Coli (MPN)	<1		MPN/100ml	1	NA	1	-	04/07/21 17:14	121,9223B	SH
General Chemistry - Westborough Lab										
Specific Conductance	230		umhos/cm	10	--	1	-	04/07/21 17:06	4,120.1	AS
SALINITY	ND		SU	2.0	--	1	-	04/07/21 17:06	121,2520B	AS
Chlorine, Total Residual	ND		mg/l	0.02	--	1	-	04/07/21 18:58	121,4500CL-D	AS
Surfactants, MBAS	ND		mg/l	0.050	--	1	04/08/21 03:25	04/08/21 07:56	121,5540C	AW



Project Name: Not Specified
Project Number: Not Specified

Lab Number: L2117405
Report Date: 04/15/21

SAMPLE RESULTS

Lab ID: L2117405-06
Client ID: 17007-63
Sample Location: Not Specified

Date Collected: 04/07/21 10:30
Date Received: 04/07/21
Field Prep: Not Specified

Sample Depth:
Matrix: Water

Parameter	Result	Qualifier	Units	RL	MDL	Dilution Factor	Date Prepared	Date Analyzed	Analytical Method	Analyst
Microbiological Analysis - Westborough Lab										
E. Coli (MPN)	3.04		MPN/100ml	1	NA	1	-	04/07/21 17:14	121,9223B	SH
General Chemistry - Westborough Lab										
Specific Conductance	1200		umhos/cm	10	--	1	-	04/07/21 17:06	4,120.1	AS
SALINITY	ND		SU	2.0	--	1	-	04/07/21 17:06	121,2520B	AS
Chlorine, Total Residual	ND		mg/l	0.02	--	1	-	04/07/21 18:58	121,4500CL-D	AS
Surfactants, MBAS	ND		mg/l	0.050	--	1	04/08/21 03:25	04/08/21 07:57	121,5540C	AW



Project Name: Not Specified
Project Number: Not Specified

Lab Number: L2117405
Report Date: 04/15/21

SAMPLE RESULTS

Lab ID: L2117405-07
Client ID: 17005-75
Sample Location: Not Specified

Date Collected: 04/07/21 10:15
Date Received: 04/07/21
Field Prep: Not Specified

Sample Depth:
Matrix: Water

Parameter	Result	Qualifier	Units	RL	MDL	Dilution Factor	Date Prepared	Date Analyzed	Analytical Method	Analyst
Microbiological Analysis - Westborough Lab										
E. Coli (MPN)	18.49		MPN/100ml	1	NA	1	-	04/07/21 17:14	121,9223B	SH
General Chemistry - Westborough Lab										
Specific Conductance	880		umhos/cm	10	--	1	-	04/07/21 17:06	4,120.1	AS
SALINITY	ND		SU	2.0	--	1	-	04/07/21 17:06	121,2520B	AS
Chlorine, Total Residual	ND		mg/l	0.02	--	1	-	04/07/21 18:58	121,4500CL-D	AS
Surfactants, MBAS	ND		mg/l	0.050	--	1	04/08/21 03:25	04/08/21 07:57	121,5540C	AW



Project Name: Not Specified
Project Number: Not Specified

Lab Number: L2117405
Report Date: 04/15/21

SAMPLE RESULTS

Lab ID: L2117405-08
Client ID: 17004-14
Sample Location: Not Specified

Date Collected: 04/07/21 10:40
Date Received: 04/07/21
Field Prep: Not Specified

Sample Depth:
Matrix: Water

Parameter	Result	Qualifier	Units	RL	MDL	Dilution Factor	Date Prepared	Date Analyzed	Analytical Method	Analyst
Microbiological Analysis - Westborough Lab										
E. Coli (MPN)	3.06		MPN/100ml	1	NA	1	-	04/07/21 17:14	121,9223B	SH
General Chemistry - Westborough Lab										
Specific Conductance	420		umhos/cm	10	--	1	-	04/07/21 17:06	4,120.1	AS
SALINITY	ND		SU	2.0	--	1	-	04/07/21 17:06	121,2520B	AS
Chlorine, Total Residual	ND		mg/l	0.02	--	1	-	04/07/21 18:58	121,4500CL-D	AS
Surfactants, MBAS	ND		mg/l	0.050	--	1	04/08/21 03:25	04/08/21 07:57	121,5540C	AW



Project Name:

Lab Number: L2117405

Project Number: Not Specified

Report Date: 04/15/21

Method Blank Analysis Batch Quality Control

Parameter	Result	Qualifier	Units	RL	MDL	Dilution Factor	Date Prepared	Date Analyzed	Analytical Method	Analyst
General Chemistry - Westborough Lab for sample(s): 01-08 Batch: WG1483588-1										
Chlorine, Total Residual	ND		mg/l	0.02	--	1	-	04/07/21 18:58	121,4500CL-D	AS
Microbiological Analysis - Westborough Lab for sample(s): 01-08 Batch: WG1483618-1										
E. Coli (MPN)	<1		MPN/100ml	1	NA	1	-	04/07/21 17:14	121,9223B	SH
General Chemistry - Westborough Lab for sample(s): 01-08 Batch: WG1483661-1										
Surfactants, MBAS	ND		mg/l	0.050	--	1	04/08/21 03:25	04/08/21 07:49	121,5540C	AW

Lab Control Sample Analysis

Batch Quality Control

Project Name: Not Specified

Project Number: Not Specified

Lab Number: L2117405

Report Date: 04/15/21

Parameter	LCS %Recovery	Qual	LCSD %Recovery	Qual	%Recovery Limits	RPD	Qual	RPD Limits
General Chemistry - Westborough Lab Associated sample(s): 01-08 Batch: WG1483579-1								
SALINITY	100		-			-		
General Chemistry - Westborough Lab Associated sample(s): 01-08 Batch: WG1483581-1								
Specific Conductance	101		-		99-101	-		
General Chemistry - Westborough Lab Associated sample(s): 01-08 Batch: WG1483588-2								
Chlorine, Total Residual	104		-		90-110	-		
General Chemistry - Westborough Lab Associated sample(s): 01-08 Batch: WG1483661-2								
Surfactants, MBAS	96		-		90-110	-		

Matrix Spike Analysis

Batch Quality Control

Project Name: Not Specified

Lab Number: L2117405

Project Number: Not Specified

Report Date: 04/15/21

Parameter	Native Sample	MS Added	MS Found	MS %Recovery	Qual	MSD Found	MSD %Recovery	Qual	Recovery Limits	RPD	Qual	RPD Limits
General Chemistry - Westborough Lab Associated sample(s): 01-08 QC Batch ID: WG1483661-4 QC Sample: L2117303-01 Client ID: MS Sample												
Surfactants, MBAS	ND	0.4	0.410	102		-	-		52-157	-		32

Lab Duplicate Analysis

Batch Quality Control

Project Name: Not Specified

Project Number: Not Specified

Lab Number: L2117405

Report Date: 04/15/21

Parameter	Native Sample	Duplicate Sample	Units	RPD	Qual	RPD Limits
General Chemistry - Westborough Lab Associated sample(s): 01-08 QC Batch ID: WG1483579-2 QC Sample: L2117281-01 Client ID: DUP Sample						
SALINITY	2.4	2.4	SU	0		
General Chemistry - Westborough Lab Associated sample(s): 01-08 QC Batch ID: WG1483581-2 QC Sample: L2116521-34 Client ID: DUP Sample						
Specific Conductance	4500	4600	umhos/cm	2		20
General Chemistry - Westborough Lab Associated sample(s): 01-08 QC Batch ID: WG1483661-3 QC Sample: L2117303-01 Client ID: DUP Sample						
Surfactants, MBAS	ND	ND	mg/l	NC		32

Project Name: Not Specified**Lab Number:** L2117405**Project Number:** Not Specified**Report Date:** 04/15/21**Sample Receipt and Container Information**

Were project specific reporting limits specified?

YES

Cooler Information

Cooler	Custody Seal
A	Absent

Container Information

Container ID	Container Type	Cooler	Initial pH	Final pH	Temp deg C	Pres	Seal	Frozen Date/Time	Analysis(*)
L2117405-01A	Bacteria Cup Na2S2O3 preserved	A	NA		16.6	Y	Absent		E-COLI-QT(.33)
L2117405-01B	Plastic 950ml unpreserved	A	7	7	16.6	Y	Absent		SALINITY(28),COND-120(1),TRC-4500(1),MBAS-5540(2)
L2117405-02A	Bacteria Cup Na2S2O3 preserved	A	NA		16.6	Y	Absent		E-COLI-QT(.33)
L2117405-02B	Plastic 950ml unpreserved	A	7	7	16.6	Y	Absent		SALINITY(28),COND-120(1),TRC-4500(1),MBAS-5540(2)
L2117405-03A	Bacteria Cup Na2S2O3 preserved	A	NA		16.6	Y	Absent		E-COLI-QT(.33)
L2117405-03B	Plastic 950ml unpreserved	A	7	7	16.6	Y	Absent		SALINITY(28),TRC-4500(1),COND-120(1),MBAS-5540(2)
L2117405-04A	Bacteria Cup Na2S2O3 preserved	A	NA		16.6	Y	Absent		E-COLI-QT(.33)
L2117405-04B	Plastic 950ml unpreserved	A	7	7	16.6	Y	Absent		SALINITY(28),TRC-4500(1),COND-120(1),MBAS-5540(2)
L2117405-05A	Bacteria Cup Na2S2O3 preserved	A	NA		16.6	Y	Absent		E-COLI-QT(.33)
L2117405-05B	Plastic 950ml unpreserved	A	7	7	16.6	Y	Absent		SALINITY(28),TRC-4500(1),COND-120(1),MBAS-5540(2)
L2117405-06A	Bacteria Cup Na2S2O3 preserved	A	NA		16.6	Y	Absent		E-COLI-QT(.33)
L2117405-06B	Plastic 950ml unpreserved	A	7	7	16.6	Y	Absent		SALINITY(28),TRC-4500(1),COND-120(1),MBAS-5540(2)
L2117405-07A	Bacteria Cup Na2S2O3 preserved	A	NA		16.6	Y	Absent		E-COLI-QT(.33)
L2117405-07B	Plastic 950ml unpreserved	A	7	7	16.6	Y	Absent		SALINITY(28),COND-120(1),TRC-4500(1),MBAS-5540(2)
L2117405-08A	Bacteria Cup Na2S2O3 preserved	A	NA		16.6	Y	Absent		E-COLI-QT(.33)
L2117405-08B	Plastic 950ml unpreserved	A	7	7	16.6	Y	Absent		SALINITY(28),COND-120(1),TRC-4500(1),MBAS-5540(2)

Project Name: Not Specified

Lab Number: L2117405

Project Number: Not Specified

Report Date: 04/15/21

GLOSSARY

Acronyms

DL	- Detection Limit: This value represents the level to which target analyte concentrations are reported as estimated values, when those target analyte concentrations are quantified below the limit of quantitation (LOQ). The DL includes any adjustments from dilutions, concentrations or moisture content, where applicable. (DoD report formats only.)
EDL	- Estimated Detection Limit: This value represents the level to which target analyte concentrations are reported as estimated values, when those target analyte concentrations are quantified below the reporting limit (RL). The EDL includes any adjustments from dilutions, concentrations or moisture content, where applicable. The use of EDLs is specific to the analysis of PAHs using Solid-Phase Microextraction (SPME).
EMPC	- Estimated Maximum Possible Concentration: The concentration that results from the signal present at the retention time of an analyte when the ions meet all of the identification criteria except the ion abundance ratio criteria. An EMPC is a worst-case estimate of the concentration.
EPA	- Environmental Protection Agency.
LCS	- Laboratory Control Sample: A sample matrix, free from the analytes of interest, spiked with verified known amounts of analytes or a material containing known and verified amounts of analytes.
LCSD	- Laboratory Control Sample Duplicate: Refer to LCS.
LFB	- Laboratory Fortified Blank: A sample matrix, free from the analytes of interest, spiked with verified known amounts of analytes or a material containing known and verified amounts of analytes.
LOD	- Limit of Detection: This value represents the level to which a target analyte can reliably be detected for a specific analyte in a specific matrix by a specific method. The LOD includes any adjustments from dilutions, concentrations or moisture content, where applicable. (DoD report formats only.)
LOQ	- Limit of Quantitation: The value at which an instrument can accurately measure an analyte at a specific concentration. The LOQ includes any adjustments from dilutions, concentrations or moisture content, where applicable. (DoD report formats only.) Limit of Quantitation: The value at which an instrument can accurately measure an analyte at a specific concentration. The LOQ includes any adjustments from dilutions, concentrations or moisture content, where applicable. (DoD report formats only.)
MDL	- Method Detection Limit: This value represents the level to which target analyte concentrations are reported as estimated values, when those target analyte concentrations are quantified below the reporting limit (RL). The MDL includes any adjustments from dilutions, concentrations or moisture content, where applicable.
MS	- Matrix Spike Sample: A sample prepared by adding a known mass of target analyte to a specified amount of matrix sample for which an independent estimate of target analyte concentration is available. For Method 332.0, the spike recovery is calculated using the native concentration, including estimated values.
MSD	- Matrix Spike Sample Duplicate: Refer to MS.
NA	- Not Applicable.
NC	- Not Calculated: Term is utilized when one or more of the results utilized in the calculation are non-detect at the parameter's reporting unit.
NDPA/DPA	- N-Nitrosodiphenylamine/Diphenylamine.
NI	- Not Ignitable.
NP	- Non-Plastic: Term is utilized for the analysis of Atterberg Limits in soil.
NR	- No Results: Term is utilized when 'No Target Compounds Requested' is reported for the analysis of Volatile or Semivolatile Organic TIC only requests.
RL	- Reporting Limit: The value at which an instrument can accurately measure an analyte at a specific concentration. The RL includes any adjustments from dilutions, concentrations or moisture content, where applicable.
RPD	- Relative Percent Difference: The results from matrix and/or matrix spike duplicates are primarily designed to assess the precision of analytical results in a given matrix and are expressed as relative percent difference (RPD). Values which are less than five times the reporting limit for any individual parameter are evaluated by utilizing the absolute difference between the values; although the RPD value will be provided in the report.
SRM	- Standard Reference Material: A reference sample of a known or certified value that is of the same or similar matrix as the associated field samples.
STLP	- Semi-dynamic Tank Leaching Procedure per EPA Method 1315.
TEF	- Toxic Equivalency Factors: The values assigned to each dioxin and furan to evaluate their toxicity relative to 2,3,7,8-TCDD.
TEQ	- Toxic Equivalent: The measure of a sample's toxicity derived by multiplying each dioxin and furan by its corresponding TEF and then summing the resulting values.
TIC	- Tentatively Identified Compound: A compound that has been identified to be present and is not part of the target compound list (TCL) for the method and/or program. All TICs are qualitatively identified and reported as estimated concentrations.

Report Format: Data Usability Report



Project Name: Not Specified**Lab Number:** L2117405**Project Number:** Not Specified**Report Date:** 04/15/21**Footnotes**

- 1 - The reference for this analyte should be considered modified since this analyte is absent from the target analyte list of the original method.

Terms

Analytical Method: Both the document from which the method originates and the analytical reference method. (Example: EPA 8260B is shown as 1,8260B.) The codes for the reference method documents are provided in the References section of the Addendum.

Difference: With respect to Total Oxidizable Precursor (TOP) Assay analysis, the difference is defined as the Post-Treatment value minus the Pre-Treatment value.

Final pH: As it pertains to Sample Receipt & Container Information section of the report, Final pH reflects pH of container determined after adjustment at the laboratory, if applicable. If no adjustment required, value reflects Initial pH.

Frozen Date/Time: With respect to Volatile Organics in soil, Frozen Date/Time reflects the date/time at which associated Reagent Water-preserved vials were initially frozen. Note: If frozen date/time is beyond 48 hours from sample collection, value will be reflected in 'bold'.

Initial pH: As it pertains to Sample Receipt & Container Information section of the report, Initial pH reflects pH of container determined upon receipt, if applicable.

PAH Total: With respect to Alkylated PAH analyses, the 'PAHs, Total' result is defined as the summation of results for all or a subset of the following compounds: Naphthalene, C1-C4 Naphthalenes, 2-Methylnaphthalene, 1-Methylnaphthalene, Biphenyl, Acenaphthylene, Acenaphthene, Fluorene, C1-C3 Fluorenes, Phenanthrene, C1-C4 Phenanthrenes/Anthracenes, Anthracene, Fluoranthene, Pyrene, C1-C4 Fluoranthenes/Pyrenes, Benz(a)anthracene, Chrysene, C1-C4 Chrysenes, Benzo(b)fluoranthene, Benzo(j)(k)fluoranthene, Benzo(e)pyrene, Benzo(a)pyrene, Perylene, Indeno(1,2,3-cd)pyrene, Dibenz(ah)+(ac)anthracene, Benzo(g,h,i)perylene. If a 'Total' result is requested, the results of its individual components will also be reported.

PFAS Total: With respect to PFAS analyses, the 'PFAS, Total (5)' result is defined as the summation of results for: PFHpA, PFHxS, PFOA, PFNA and PFOS. In addition, the 'PFAS, Total (6)' result is defined as the summation of results at or above the RL for: PFHpA, PFHxS, PFOA, PFNA, PFDA and PFOS. (Note: 'PFAS, Total (6)' is applicable to MassDEP DW compliance analysis only.). If a 'Total' result is requested, the results of its individual components will also be reported.

The target compound Chlordane (CAS No. 57-74-9) is reported for GC ECD analyses. Per EPA, this compound "refers to a mixture of chlordane isomers, other chlorinated hydrocarbons and numerous other components." (Reference: USEPA Toxicological Review of Chlordane, In Support of Summary Information on the Integrated Risk Information System (IRIS), December 1997.)

Total: With respect to Organic analyses, a 'Total' result is defined as the summation of results for individual isomers or Aroclors. If a 'Total' result is requested, the results of its individual components will also be reported. This is applicable to 'Total' results for methods 8260, 8081 and 8082.

Data Qualifiers

- A** - Spectra identified as "Aldol Condensates" are byproducts of the extraction/concentration procedures when acetone is introduced in the process.
- B** - The analyte was detected above the reporting limit in the associated method blank. Flag only applies to associated field samples that have detectable concentrations of the analyte at less than ten times (10x) the concentration found in the blank. For MCP-related projects, flag only applies to associated field samples that have detectable concentrations of the analyte at less than ten times (10x) the concentration found in the blank. For DOD-related projects, flag only applies to associated field samples that have detectable concentrations of the analyte at less than ten times (10x) the concentration found in the blank AND the analyte was detected above one-half the reporting limit (or above the reporting limit for common lab contaminants) in the associated method blank. For NJ-Air-related projects, flag only applies to associated field samples that have detectable concentrations of the analyte above the reporting limit. For NJ-related projects (excluding Air), flag only applies to associated field samples that have detectable concentrations of the analyte, which was detected above the reporting limit in the associated method blank or above five times the reporting limit for common lab contaminants (Phthalates, Acetone, Methylene Chloride, 2-Butanone).
- C** - Co-elution: The target analyte co-elutes with a known lab standard (i.e. surrogate, internal standards, etc.) for co-extracted analyses.
- D** - Concentration of analyte was quantified from diluted analysis. Flag only applies to field samples that have detectable concentrations of the analyte.
- E** - Concentration of analyte exceeds the range of the calibration curve and/or linear range of the instrument.
- F** - The ratio of quantifier ion response to qualifier ion response falls outside of the laboratory criteria. Results are considered to be an estimated maximum concentration.
- G** - The concentration may be biased high due to matrix interferences (i.e. co-elution) with non-target compound(s). The result should be considered estimated.
- H** - The analysis of pH was performed beyond the regulatory-required holding time of 15 minutes from the time of sample collection.
- I** - The lower value for the two columns has been reported due to obvious interference.
- J** - Estimated value. This represents an estimated concentration for Tentatively Identified Compounds (TICs).
- M** - Reporting Limit (RL) exceeds the MCP CAM Reporting Limit for this analyte.
- ND** - Not detected at the reporting limit (RL) for the sample.
- NJ** - Presumptive evidence of compound. This represents an estimated concentration for Tentatively Identified Compounds (TICs), where

Report Format: Data Usability Report



Project Name: Not Specified**Lab Number:** L2117405**Project Number:** Not Specified**Report Date:** 04/15/21**Data Qualifiers**

the identification is based on a mass spectral library search.

- P** - The RPD between the results for the two columns exceeds the method-specified criteria.
- Q** - The quality control sample exceeds the associated acceptance criteria. For DOD-related projects, LCS and/or Continuing Calibration Standard exceedences are also qualified on all associated sample results. Note: This flag is not applicable for matrix spike recoveries when the sample concentration is greater than 4x the spike added or for batch duplicate RPD when the sample concentrations are less than 5x the RL. (Metals only.)
- R** - Analytical results are from sample re-analysis.
- RE** - Analytical results are from sample re-extraction.
- S** - Analytical results are from modified screening analysis.

Project Name: Not Specified
Project Number: Not Specified

Lab Number: L2117405
Report Date: 04/15/21

REFERENCES

- 4 Methods for Chemical Analysis of Water and Wastes. EPA 600/4-79-020. Revised March 1983.
- 121 Standard Methods for the Examination of Water and Wastewater. APHA-AWWA-WEF. Standard Methods Online.

LIMITATION OF LIABILITIES

Alpha Analytical performs services with reasonable care and diligence normal to the analytical testing laboratory industry. In the event of an error, the sole and exclusive responsibility of Alpha Analytical shall be to re-perform the work at it's own expense. In no event shall Alpha Analytical be held liable for any incidental, consequential or special damages, including but not limited to, damages in any way connected with the use of, interpretation of, information or analysis provided by Alpha Analytical.

We strongly urge our clients to comply with EPA protocol regarding sample volume, preservation, cooling, containers, sampling procedures, holding time and splitting of samples in the field.



Alpha Analytical, Inc.Facility: **Company-wide**Department: **Quality Assurance**Title: **Certificate/Approval Program Summary**ID No.: **17873**

Revision 19

Published Date: 4/2/2021 1:14:23 PM

Page 1 of 1

Certification Information

The following analytes are not included in our Primary NELAP Scope of Accreditation:

Westborough Facility**EPA 624/624.1:** m/p-xylene, o-xylene, Naphthalene**EPA 625/625.1:** alpha-Terpineol**EPA 8260C/8260D:** NPW: 1,2,4,5-Tetramethylbenzene; 4-Ethyltoluene, Azobenzene; SCM: Iodomethane (methyl iodide), 1,2,4,5-Tetramethylbenzene; 4-Ethyltoluene.**EPA 8270D/8270E:** NPW: Dimethylnaphthalene, 1,4-Diphenylhydrazine, alpha-Terpineol; SCM: Dimethylnaphthalene, 1,4-Diphenylhydrazine.**SM4500:** NPW: Amenable Cyanide; SCM: Total Phosphorus, TKN, NO₂, NO₃.**Mansfield Facility****SM 2540D:** TSS**EPA 8082A:** NPW: PCB: 1, 5, 31, 87, 101, 110, 141, 151, 153, 180, 183, 187.**EPA TO-15:** Halothane, 2,4,4-Trimethyl-2-pentene, 2,4,4-Trimethyl-1-pentene, Thiophene, 2-Methylthiophene,

3-Methylthiophene, 2-Ethylthiophene, 1,2,3-Trimethylbenzene, Indan, Indene, 1,2,4,5-Tetramethylbenzene, Benzothiophene, 1-Methylnaphthalene.

Biological Tissue Matrix: EPA 3050B

The following analytes are included in our Massachusetts DEP Scope of Accreditation

Westborough Facility:**Drinking Water****EPA 300.0:** Chloride, Nitrate-N, Fluoride, Sulfate; **EPA 353.2:** Nitrate-N, Nitrite-N; **SM4500NO3-F:** Nitrate-N, Nitrite-N; **SM4500F-C, SM4500CN-CE,****EPA 180.1, SM2130B, SM4500CI-D, SM2320B, SM2540C, SM4500H-B, SM4500NO2-B****EPA 332:** Perchlorate; **EPA 524.2:** THMs and VOCs; **EPA 504.1:** EDB, DBCP.**Microbiology:** **SM9215B; SM9223-P/A, SM9223B-Colilert-QT, SM9222D.****Non-Potable Water****SM4500H,B, EPA 120.1, SM2510B, SM2540C, SM2320B, SM4500CL-E, SM4500F-BC, SM4500NH3-BH:** Ammonia-N and Kjeldahl-N, **EPA 350.1:**Ammonia-N, **LACHAT 10-107-06-1-B:** Ammonia-N, **EPA 351.1, SM4500NO3-F, EPA 353.2:** Nitrate-N, **SM4500P-E, SM4500P-B, E, SM4500SO4-E,****SM5220D, EPA 410.4, SM5210B, SM5310C, SM4500CL-D, EPA 1664, EPA 420.1, SM4500-CN-CE, SM2540D, EPA 300:** Chloride, Sulfate, Nitrate.**EPA 624.1:** Volatile Halocarbons & Aromatics,**EPA 608.3:** Chlordane, Toxaphene, Aldrin, alpha-BHC, beta-BHC, gamma-BHC, delta-BHC, Dieldrin, DDD, DDE, DDT, Endosulfan I, Endosulfan II,

Endosulfan sulfate, Endrin, Endrin Aldehyde, Heptachlor, Heptachlor Epoxide, PCBs

EPA 625.1: SVOC (Acid/Base/Neutral Extractables), **EPA 600/4-81-045:** PCB-Oil.**Microbiology:** **SM9223B-Colilert-QT; Enterolert-QT, SM9221E, EPA 1600, EPA 1603, SM9222D.****Mansfield Facility:****Drinking Water****EPA 200.7:** Al, Ba, Cd, Cr, Cu, Fe, Mn, Ni, Na, Ag, Ca, Zn. **EPA 200.8:** Al, Sb, As, Ba, Be, Cd, Cr, Cu, Pb, Mn, Ni, Se, Ag, TL, Zn. **EPA 245.1 Hg.****EPA 522, EPA 537.1.****Non-Potable Water****EPA 200.7:** Al, Sb, As, Be, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mn, Mo, Ni, K, Se, Ag, Na, Sr, TL, Ti, V, Zn.**EPA 200.8:** Al, Sb, As, Be, Cd, Cr, Cu, Fe, Pb, Mn, Ni, K, Se, Ag, Na, TL, Zn.**EPA 245.1 Hg.****SM2340B**

For a complete listing of analytes and methods, please contact your Alpha Project Manager.

 ALPHA Westborough, MA 01581 8 Walkup Dr. TEL: 508-898-9220 FAX: 508-898-9193		NEW JERSEY CHAIN OF CUSTODY Mansfield, MA 02048 320 Forbes Blvd TEL: 508-822-9300 FAX: 508-822-3288		Service Centers Mahwah, NJ 07430: 35 Whitney Rd, Suite 5 Albany, NY 12205: 14 Walker Way Tonawanda, NY 14150: 275 Cooper Ave, Suite 105		Page of		Date Rec'd in Lab 4/7/21		ALPHA Job # L2117405													
Client Information Client: Town of Wilmington Address: 121 Glen Rd Wilmington, MA Phone: 978-654-4417 Fax: Email:				Project Information Project Name: Project Location: Project # (Use Project name as Project #) ☐ Project Manager: ALPHAQuote #: Turn-Around Time Standard ☐ Due Date: Rush (only if pre approved) ☐ # of Days:				Deliverables ☐ NJ Full / Reduced ☐ EQulS (1 File) ☐ EQulS (4 File) ☐ Other Regulatory Requirement ☐ SRS Residential/Non Residential ☐ SRS Impact to Groundwater ☐ NJ Ground Water Quality Standards ☐ NJ IGW SPLP Leachate Criteria ☐ Other				Billing Information ☐ Same as Client Info PO #											
These samples have been previously analyzed by Alpha ☐				For EPH, selection is REQUIRED: ☐ Category 1 ☐ Category 2				For VOC, selection is REQUIRED: ☐ 1,4-Dioxane ☐ 8011				Other project specific requirements/comments: Please specify Metals or TAL.				ANALYSIS				Sample Filtration ☐ Done ☐ Lab to do Preservation ☐ Lab to do (Please Specify below)		Total Bottles	
ALPHA Lab ID (Lab Use Only)				Sample ID				Collection Date Time		Sample Matrix		Sampler's Initials						Sample Specific Comments					
17405 -01				17004-11				4/7 11:30						ABK ELW									
-02				15022-2				4/7 11:15						X X									
-03				17019-26				4/7 11:00															
-04				17007-11				4/7 9:30															
-05				15022-5				4/7 3:45															
-06				17007-63				4/7 10:00															
-07				17005-35				4/7 10:15															
-08				17004-14				4/7 11:00															
Preservative Code: A = None B = HCl C = HNO3 D = H2SO4 E = NaOH F = MeOH G = NaHSO4 H = Na2S2O3 K/E = Zn Ac/NaOH O = Other				Container Code P = Plastic A = Amber Glass V = Vial G = Glass B = Bacteria Cup C = Cube O = Other E = Encore D = BOD Bottle				Westboro: Certification No: MA935 Mansfield: Certification No: MA015				Container Type				Preservative				Please print clearly, legibly and completely. Samples can not be logged in and turnaround time clock will not start until any ambiguities are resolved. BY EXECUTING THIS COC, THE CLIENT HAS READ AND AGREES TO BE BOUND BY ALPHA'S TERMS & CONDITIONS. (See reverse side.)			
Relinquished By:				Date/Time				Received By:				Date/Time											
[Signature]				4/7 2:22 PM				[Signature]				4/7/21 14:22											
Form No: 01-14 HC (rev. 30-Sept-2013)																							



NEW JERSEY CHAIN OF CUSTODY

Westborough, MA 01581
8 Walkup Dr.
TEL: 508-898-9220
FAX: 508-898-9193

Mansfield, MA 02048
320 Forbes Blvd
TEL: 508-822-9300
FAX: 508-822-3268

Service Centers

Mahwah, NJ 07430: 35 Whitney Rd, Suite 5
Albany, NY 12205: 14 Walker Way
Tonawanda, NY 14150: 275 Cooper Ave, Suite 105

Page

of

Date Rec'd
in Lab

4/7/21

ALPHA Job #

L2117405

Client Information

Client: Town of Wilmington

Address: 121 Glen Rd

Wilmington, MA

Phone: 978-654-4411

Fax:

Email:

Project Information

Project Name:

Project Location:

Project #

(Use Project name as Project #) ☐

Project Manager:

ALPHAQuote #:

Turn-Around Time

Standard ☐

Due Date:

Rush (only if pre approved) ☐

of Days:

Deliverables

☐ NJ Full / Reduced

☐ EQuIS (1 File) ☐ EQuIS (4 File)

☐ Other

Regulatory Requirement

☐ SRS Residential/Non Residential

☐ SRS Impact to Groundwater

☐ NJ Ground Water Quality Standards

☐ NJ IGW SPLP Leachate Criteria

☐ Other

Billing Information

☐ Same as Client Info

PO #

Site Information

Is this site impacted by
Petroleum? Yes ☐

Petroleum Product:

These samples have been previously analyzed by Alpha ☐

For EPH, selection is
REQUIRED:

- ☐ Category 1
☐ Category 2

For VOC, selection
is REQUIRED:

- ☐ 1,4-Dioxane
☐ 8011

Other project specific requirements/comments:

Please specify Metals or TAL.

ANALYSIS

Sample Filtration

- ☐ Done
☐ Lab to do
Preservation
☐ Lab to do

(Please Specify below)

Sample Specific Comments

Total Bottles

ALPHA Lab ID
(Lab Use Only)

Sample ID

Collection

Date

Time

Sample
Matrix

Sampler's
Initials

17405 -01

17005-11

4/7

11:30

1 BK 64

-02

15022-2

4/7

11:15

-03

17019-26

4/7

11:00

-04

17007-11

4/7

9:30

-05

15022-3

4/7

3:43

-06

17007-63

4/7

10:00

-07

17005-35

4/7

10:15

-08

17004-14

4/7

11:00

Preservative Code:

A = None
B = HCl
C = HNO₃
D = H₂SO₄
E = NaOH
F = MeOH
G = NaHSO₄
H = Na₂S₂O₃
K/E = Zn Ac/NaOH
O = Other

Container Code

P = Plastic
A = Amber Glass
V = Vial
G = Glass
B = Bacteria Cup
C = Cube
O = Other
E = Encore
D = BOD Bottle

Westboro: Certification No: MA935

Mansfield: Certification No: MA015

Container Type

Preservative

Relinquished By:

Date/Time

Received By:

Date/Time

[Signature]

4/7 2:22 PM

[Signature]

4/7/21 14:22

Please print clearly, legibly
and completely. Samples can
not be logged in and
turnaround time clock will not
start until any ambiguities are
resolved. BY EXECUTING
THIS COC, THE CLIENT
HAS READ AND AGREES
TO BE BOUND BY ALPHA'S
TERMS & CONDITIONS.
(See reverse side.)