Illicit Discharge Detection and Elimination (IDDE) Plan

Town of Burlington, Massachusetts

June 30, 2019

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1 Introduction

1.1 MS4 Program

This Illicit Discharge Detection and Elimination (IDDE) Plan has been developed by the Town of Burlington 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 Burlington's regulated area based on the 2014 Massachusetts Integrated List of Waters produced by MassDEP every two years. Impaired waters are water bodies that do not meet water quality standards for one or more designated use(s) such as recreation or aquatic habitat.

Table 1-1. Impaired Waters

BURLINGTON, Massachusetts

Water Body Name	Segment ID	Category	Impairment(s)	Associated Approved TMDL
Vine Brook	MA 83-06 in Burlington	4A	Phosphorus, E. coli	CN 122.0
Long Meadow Brook	MA83-11 in Burlington	4A	Phosphorus, E. coli	CN 122.0
Sandy Brook	MA83-13 in Burlington	4A	Phosphorus, E. coli	CN 122.0
Shawsheen River	MA83-17 outside Burlington	5	DO, phosphorus	CN 122.0
Lubbers Brook	MA92-05 outside Burlington	2	Phosphorus	
Ipswich River	MA92-06 outside Burlington	5	DO, phosphorus	
Sawmill Brook		3	Phosphorus	
Maple Meadow Brook	MA92-04 outside Burlington	4C	Phosphorus	
Halls Brook Tributary		3	Phosphorus	
Cummings Brook Tributary	MA71-10 outside Burlington	3	Phosphorus	
Little Brook		3	Phosphorus	
Butterfield Pond	MA83003_2008	5		
Mill Pond	MA92041_2008	4a	Mercury	NEHgTMDL

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

The applicable State standards specify that the maximum allowable concentration of fecal coliform bacteria shall not exceed a geometric mean of 200 organisms per 100 ml in any representative set of samples, nor shall more than 10% of the samples exceed 400 organisms per 100 ml.

1.5 IDDE Program Goals, Framework, and Timeline

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

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

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

Figure 1-1. IDDE Investigation Procedure Framework

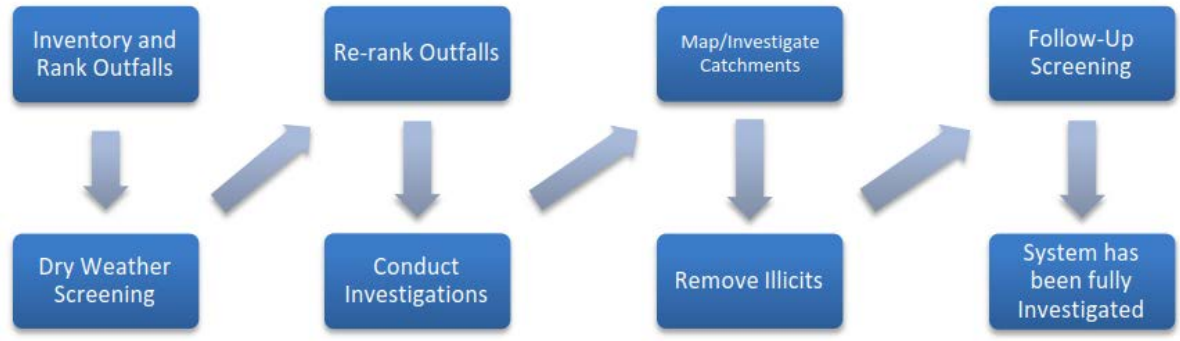


Table 1-2. IDDE Program Implementation Timeline

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

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

1.6 Work Completed to Date

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

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

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

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

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

2 Authority and Statement of IDDE Responsibilities

2.1 Legal Authority

The Town of Burlington adopted an Illicit Discharges and Detection Bylaw in 2006. A copy of the Illicit Discharges and Detection Bylaw is provided in **Appendix A**. The Illicit Discharges and Detection Bylaw provides the Town of Burlington 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 Burlington will review its current Illicit Discharges and Detection Bylaw and related land use regulations and policies for consistency with the 2016 MS4 Permit.

2.2 Statement of Responsibilities

The Board of Health is the lead municipal agency or department responsible for implementing the IDDE program pursuant to the provisions of the Illicit Discharges and Detection Bylaw. "Solely for the purposes of enforcing this bylaw, Agents of this Board includes the Director of Public Health, Health Agent, Environmental Engineer, Town Engineer, the Superintendent of Public Works, and the Inspector of Buildings."

Other agencies or departments with responsibility for aspects of the program include:

- Conservation Department – Has primary responsibility for coordinating compliance with the Phase II NPDES MS4 Stormwater Permit. Runs Stormwater Committee meetings. Runs Stormwater Intern program tasked with dry weather sampling and system mapping.
- Department of Public Works - Maintains a current and accurate map of the storm drain system, updating as necessary. Has primary responsibility for documenting suspected illicit discharges and providing for appropriate investigation, including but not limited to water quality monitoring, closed-circuit television inspection, smoke testing, and dye testing. Coordinates with other departments for new utility connections.
- Planning Department - Administers construction and post-construction stormwater management with Conservation.

3 Stormwater System Mapping

The Town of Burlington 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 Burlington DPW/Engineering Division is responsible for updating the stormwater system mapping pursuant to the 2016 MS4 Permit. The Town of Burlington 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 Burlington 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)
- Interconnections with other MS4s and other storm sewer systems – Interconnections with state drainage are mapped. There are no connections with other towns.
- 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. Any available system data and topographic information may be used to produce initial catchment delineations

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

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

Mapping of all features is done continuously as needed.

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

3.3 Additional Recommended Mapping Elements

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

- Storm sewer material, size (pipe diameter)
- Sanitary sewer system material, size (pipe diameter), age
- Privately owned stormwater treatment structures
- Where a municipal sanitary sewer system exists, properties known or suspected to be served by a septic system, especially in high density urban areas
- Area where the permittee's MS4 has received or could receive flow from septic system discharges
- Topography
- Orthophotography
- Alignments, dates and representation of work completed of past illicit discharge investigations
- Locations of suspected confirmed and corrected illicit discharges with dates and flow estimates.

4 Sanitary Sewer Overflows (SSOs)

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

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

Upon detection of an SSO, the Town of Burlington 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 Burlington will provide oral notice to EPA within 24 hours and written notice to EPA and MassDEP within five (5) days of becoming aware of the SSO occurrence.

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

Table 4-1. SSO Inventory

Town of Burlington, Massachusetts
Revision Date: June 30, 2019

SSO Location[1]	Discharge Statement[2]	Date[3]	Time Start[3]	Time End[3]	Estimated Volume[4]	Description[5]	Mitigation Completed[6]	Mitigation Planned[7]
6 Burlington Woods Drive	Discharge entered a catchbasin adjacent to property	08/22/ 2013			20 gallons	Caused by a sewer ejector pump blockage	Commercial operator removed blockage next day.	
20 Terrace Hall Ave.	Contained on site (in shower). Did not enter MS4 or surface water.	12/09/ 2013			5-10 gallons	Blockage in sewer main	DPW staff jet rodded main, relieving blockage	Jet main is rodded each month
112 Terrace Hall Ave. Sewer Station	Discharge entered Vine Brook	12/09/ 2014	9pm	1am	740,000 gallons	City of Woburn requested a bypass due to heavy rain.	Ongoing aggressive inflow and infiltration removal.	Interceptor at Horn Pond, Woburn, being upgraded.
8 Lucaya Circle	Discharge entered Sawmill Brook	11/15/ 2015	12:20 pm	2:40p m	190,000 gallons	Caused by hole in sewer main pipe near Lucaya Circle pump station	Impacted area cleaned. Town replaced pump station and force main in 2017.	
21 Freeport Drive	Discharge entered Sawmill Brook	07/08/ 2016			1100 gpm	Lucaya station force main failed. Overflow pumped from Lucaya Station (into Sawmill Brook).	Repaired pipe. Installed silt fence and hay bales. Spread lime in affected area. Town replaced pump station and force main in 2017.	
120 Cambridge St.	Discharge entered a catchbasin adjacent to property	07/26/ 2016			59 gallons	Telephone pole installed on pipe	Shut off water to 120 Cambridge street. Spread lime.	
8 Lucaya Circle	Discharge entered	09/12/			27,540	Caused by hole in	Tank trucks	

	Sawmill Brook	2016			gallons	sewer main pipe near Lucaya Circle pump station.	maintained station flow. Town replaced pump station and force main in 2017.	
26 Ray Ave.	Discharge remained on property.	10/22/ 2016			10 gallons	Discharge from pumps due to excessive rain	Sewer main rodded with vac truck	

[1] Location (approximate street crossing/address and receiving water, if any)
[2] A clear statement of whether the discharge entered a surface water directly or entered the MS4
[3] Date(s) and time(s) of each known SSO occurrence (i.e., beginning and end of any known discharge)
[4] Estimated volume(s) of the occurrence
[5] Description of the occurrence indicating known or suspected cause(s)
[6] Mitigation and corrective measures completed with dates implemented
[7] Mitigation and corrective measures planned with implementation schedules

5 Assessment and Priority Ranking of Outfalls

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

5.1 Outfall Catchment Delineations

A catchment is the area that drains to an individual outfall[1] or interconnection.[2] The catchments for each of the MS4 outfalls will be delineated to define contributing areas for investigation of potential sources of illicit discharges. Catchments are typically delineated based on topographic contours and mapped drainage infrastructure, where available. As described in **Section 3**, initial catchment delineations will be completed as part of the Phase I mapping, and refined catchment delineations 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 Conservation Department with assistance from the Engineering Department will complete an initial outfall and interconnection inventory and priority ranking to assess illicit discharge potential based on existing information. The initial inventory and ranking will be completed within one (1) year from the effective date of the permit. An updated inventory and ranking will be provided in each annual report thereafter. The inventory will be updated annually to include data collected in connection with dry weather screening and other relevant inspections.

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

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

1. **Problem Outfalls**: Outfalls/interconnections with known or suspected contributions of illicit discharges based on existing information shall be designated as Problem Outfalls. This shall include any outfalls/interconnections where previous screening indicates likely sewer input. Likely sewer input indicators are any of the following:

[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.

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

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

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

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

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

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

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

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

- **Past discharge complaints and reports.**

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

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

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

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

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

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

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

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

Table 5-1 provides the Burlington outfall inventory and priority ranking matrix.

Table 5-1. Outfall Inventory and Priority Ranking Matrix

Burlington, Massachusetts
Revision Date: February 12, 2019

High priority outfalls discharging to drinking water supplies; High priority outfalls based on characteristics listed below

Outfall ID	Receiving water	Previous Screening Results Indicate Likely Sewer Input[1]	Discharging to Area of Concern to Public Health[2]	Frequency of Past Discharge Complaints	Receiving Water Quality[3]	Density of Generating Sites[4]	Age of Development/Infrastructure[5]	Historic Combined Sewers or Septic?[6]	Aging Septic?[7]	Culverted Streams?[8]	Additional Characteristics	Score	Priority Ranking
Information Source		Outfall Inspections and Sample Results	GIS Maps	Town Staff	Impaired Waters List	Land Use/GIS Maps, Aerial Photography	Land Use Information, Visual Observation	Town Staff. GIS maps	Land Use, Town Staff	GIS and Storm System maps	Other		
Scoring Criteria		Yes = 3 (Problem Outfall) No = 0	Yes = 3 No = 0	Frequent = 3 Occasional = 2 None = 0	Poor = 3 Fair = 2 None = 0	High = 3 Medium = 2 Low = 1	High = 3 Medium = 2 Low = 1	Yes = 3 No = 0	Yes = 3 No = 0	Yes = 3 No = 0	TBD		
CUL386 (30 Middlesex Tpke)	Vine Brook D	0	3	0	3	1	3	0	0	0		10	High
CUL384 (1 Crowley Road)	Vine Brook D	0	3	0	3	1	3	0	0	0		10	High
CUL597 (2 Corcoran Road)	Vine Brook D	0	3	0	3	1	3	0	0	0		10	High
CUl595 (19 Luther Road)	Vine Brook D	0	3	0	3	1	3	0	0	0		10	High
240 Mdlsx Trnpk Ext.	Vine Brook C	0	3	0	3	1	3	0	0	0		10	High
CUL338 (157 Bedford St)	Vine Brook C	0	3	0	3	2	3	0	0	0		11	High
CUL340 (171 Bedford Street)	Vine Brook C	0	3	0	3	3	3	0	0	0		12	High
248 Mdlsx Tnpk Ext	Vine Brook C	0	3	0	3	1	3	0	0	0		10	High
DStr1721 (3 Fowler ter)	Vine Brook C	0	3	0	3	1	3	0	0	0		10	High
DStr1407 (3 Fowler Ter)	Vine Brook C	0	3	0	3	1	3	0	0	0		10	High
CUL273 (11 A St.)	Vine Brook C	0	3	0	3	2	3	0	3	0		14	High
CUL363 (225 Middlesex Tpk Ext)	Vine Brook C	0	3	0	3	1	3	0	0	0		10	High
50 Greenleaf Way (2)	Vine Brook C	0	3	0	3	1	1	0	0	0		8	High
230-234 Mdlsx Trnpk Ext (1)	Vine Brook C	0	3	0	3	2	3	0	0	0		11	High
230-234 Mdlsx Trnpk Ext (2)	Vine Brook C	0	3	0	3	2	3	0	0	0		11	High
CUL286 (44 Greenwood Rd)	Vine Brook C	0	3	0	3	1	3	0	0	0		10	High
CUL289 (15 A St)	Vine Brook C	0	3	0	3	2	3*	0	3	0		14	High
CUL261 (7 Fowler Ter)	Vine Brook C	0	3	0	3	1	3	0	0	0		10	High
CUL281 (20 Daniel Dr)	Vine Brook C	0	3	0	3	1	3	0	0	0		10	High
CUL287 (12 Daniel Dr)	Vine Brook C	0	3	0	3	1	3	0	0	0		10	High
CUL337 (4 Daniel Dr)	Vine Brook C	0	3	0	3	1	3	0	0	0		10	High
CUL616 (225 Middlesex Tpk Ext)	Vine Brook C	0	3	0	3	2	3*	0	0	0		11	High
CUL615 (225 Middlesex Tpk Ext)	Vine Brook C	0	3	0	3	2	3*	0	0	0		11	High
171 Middlesex Tnpk (DStr7844)	Vine Brook B	0	3	0	3	2	1	0	0	3		12	High
CUL614 (9 Partridge Lane)	Vine Brook B	0	3	0	3	1	3	0	0	0		10	High

DStr46 (155 Middlesex Tpk)	Vine Brook B	0	3	0	3	2	3*	0	0	0		11	High
DStr47 (155 Middlesex Tpk)	Vine Brook B	0	3	0	3	2	3*	0	0	0		11	High
CUL297 (3 Mark St)	Vine Brook B	0	3	0	3	1	3	0	0	0		10	High
CUL293 (11 Mark St)	Vine Brook B	0	3	0	3	1	3	0	0	0		10	High
64 Burlington mall Rd	Vine Brook B	0	3	0	3	1	3*	0	0	0		10	High
66-78 Burlington mall Rd	Vine Brook B	0	3	0	3	1	3*	0	0	0		10	High
DStr6644 (82 Burlington Mall Rd)	Vine Brook B	0	3	0	3	1	3*	0	0	0		10	High
CUL304 (82 Burlington Mall Rd)	Vine Brook B	0	3	0	3	1	3*	0	0	0		10	High
CUL307 (82 Burlington Mall Rd)	Vine Brook B	0	3	0	3	1	3*	0	0	0		10	High
113-191 Lexington St	Vine Brook B	0	3	0	3	1	3	0	0	0		10	High
CUL322 (132 Lexington St)	Vine Brook B	0	3	0	3	1	3	0	0	0		10	High
CUL323 (82 Burlington Mall Rd)	Vine Brook B	0	3	0	3	1	3*	0	0	0		10	High
128 Mdlsx Turnpike (1)	Vine Brook B	0	3	0	3	1	3*	0	0	3		13	High
128 Mdlsx Turnpike (2)	Vine Brook B	0	3	0	3	1	3*	0	0	3		13	High
128 Mdlsx Turnpike (3)	Vine Brook B	0	3	0	3	1	3*	0	0	3		13	High
128 Mdlsx Turnpike (4)	Vine Brook B	0	3	0	3	1	3*	0	0	3		13	High
10 2nd Ave (1)	Vine Brook B	0	3	0	3	1	3*	0	0	0		10	High
10 2nd Ave (2)	Vine Brook B	0	3	0	3	1	3*	0	0	0		10	High
10 2nd Ave (3)	Vine Brook B	0	3	0	3	1	3*	0	0	0		20	High
10 2nd Ave (4)	Vine Brook B	0	3	0	3	1	3*	0	0	0		10	High
112 Burlington Mall Road (2)	Vine Brook B	0	3	0	3	1	3*	0	0	3		13	High
DStr1249 (196 Burlington Mall Rd)	Vine Brook B	0	3	0	3	1	3*	0	0	0		10	High
112 Burlington Mall Road (3)	Vine Brook B	0	3	0	3	1	3*	0	0	3		13	High
112 Burlington Mall Road (4)	Vine Brook B	0	3	0	3	1	3*	0	0	3		13	High
112 Burlington Mall Road (5)	Vine Brook B	0	3	0	3	1	3*	0	0	3		13	High
CUL309 (1 District Ave)	Vine Brook B	0	3	0	3	1	3*	0	0	0		10	High
CUL312 (130 Middlesex Tpk)	Vine Brook B	0	3	0	3	1	3*	0	0	0		10	High
CUL316 (10 2nd Ave)	Vine Brook B	0	3	0	3	1	3*	0	0	0		10	High
DStr6691 (90 Middlesex Tpk)	Vine Brook B	0	3	0	3	1	3*	0	0	0		10	High
20 South Ave (1)	Vine Brook B	0	3	0	3	2	3*	0	0	0		11	High
20 South Ave (2)	Vine Brook B	0	3	0	3	2	3*	0	0	0		11	High
6 Adams St	Vine Brook A	0	3	0	3	2	3*	0	0	0		11	High
CUL318 (59 Middlesex Tpk)	Vine Brook A	0	3	0	3	1	3*	0	0	0		10	High
56 Mdlsx Trnpike (2)	Vine Brook A	0	3	0	3	2	3*	0	0	0		11	High
DStr3309 (25 Blanchard Rd)	Vine Brook A	0	3	0	3	2	3	0	0	0		11	High
CUL507 (15 Wheeler Rd)	Vine Brook A	0	3	0	3	1	3*	0	0	0		10	High
CUL509 (40 Blanchard Rd)	Vine Brook A	0	3	0	3	1	3*	0	0	0		10	High
CUL330 (70 Muller Rd)	Vine Brook A	0	3	0	3	1	3	0	0	0		10	High
CUL308 (193 Burlington Mall Rd)	Vine Brook A	0	3	0	3	1	3*	0	0	0		10	High
CUL333 (31 Eugene Rd)	Vine Brook A	0	3	0	3	1	3	0	0	0		10	High
CUL334 (37 Eugene Rd)	Vine Brook A	0	3	0	3	1	3	0	0	0		10	High
CUL332 (47 Eugene Rd)	Vine Brook A	0	3	0	3	1	3	0	0	0		10	High

CUL326 (16 Belmont Road)	Vine Brook A	0	3	0	3	1	3	0	0	0		10	High
CUL624 (3 Meyers Lane)	Vine Brook A	0	3	0	3	1	3	0	0	0		10	High
CUL625 (12 larson Circle)	Vine Brook A	0	3	0	3	1	3	0	3	0		13	High
5 Sorelle Place	Vine Brook A	0	3	0	3	1	1	0	0	0		8	High
CUL329 (119 Muller Rd)	Vine Brook A	0	3	0	3	1	3*	0	0	0		10	High
CUL173 (335 Cambridge St)	Sandy Brook	0	3	0	3	1	3	0	0	0		10	High
335 Cambridge St	Sandy Brook	0	3	0	3	1	3	0	3	0		13	High
CUL248 (14 Pathwood Ave)	Sandy Brook	0	3	0	3	1	3	0	3	0		13	High
CUL220 (5 Glenwood St)	Sandy Brook	0	3	0	3	1	3	0	0	0		10	High
CUL216 (21 Purity Springs Road)	Sandy Brook	0	3	0	3	1	3	0	0	0		10	High
CUL221 (5 Purity Springs Road)	Sandy Brook	0	3	0	3	1	3	0	0	0		10	High
CUL202 (1 Dale St)	Sandy Brook	0	3	0	3	1	3	0	0	0		10	High
CUL219 (17 Terry Ave)	Sandy Brook	0	3	0	3	2	3*	0	0	0		11	High
CUL201 (9 Edgemont Ave)	Sandy Brook	0	3	0	3	2	3	0	0	0		11	High
CUL610 (5 Elm Ave)	Sandy Brook	0	3	0	3	1	3	0	0	0		10	High
2 Ainsworth St	Sandy Brook	0	3	0	3	1	3	0	0	0		10	High
CUL225 (8 Carey Ave)	Sandy Brook	0	3	0	3	1	3	0	0	0		10	High
26 Fairfax St.	Sandy Brook	0	3	0	3	1	3	0	0	0		10	High
CUL223 (9 Fairfax St)	Sandy Brook	0	3	0	3	1	3	0	0	0		10	High
CUL224 (3 Fairfax St)	Sandy Brook	0	3	0	3	1	3	0	0	0		10	High
55 Bedford St	Sandy Brook	0	3	0	3	1	3	0	3	0		13	High
28 Lexington St	Sandy Brook	0	3	0	3	1	3	0	0	0		10	High
CUL267 (12 Old Colony Road)	Sandy Brook	0	3	0	3	1	3	0	0	0		10	High
18 Maud Graham Circle	Sandy Brook	0	3	0	3	1	3	0	0	0		10	High
10 Maud Graham Circle	Sandy Brook	0	3	0	3	1	3	0	0	0		10	High
CUL611 (5 Maud Graham Circle)	Sandy Brook	0	3	0	3	1	3	0	0	0		10	High
CUL268 (16 Chadwick Road)	Sandy Brook	0	3	0	3	1	3	0	0	0		10	High
CUL612 (18 Frothingham Rd)	Sandy Brook	0	3	0	3	1	3	0	0	0		10	High
27 Hilltop Dr	Sandy Brook	0	3	0	3	1	3	0	0	0		10	High
13 Sandy brook Rd	Sandy Brook	0	3	0	3	1	3	0	3	0		13	High
13 Sandy brook Rd	Sandy Brook	0	3	0	3	1	3	0	3	0		13	High
CUL618 (1 Indian Hill Rd)	Sandy Brook	0	3	0	3	1	3	0	0	0		10	High
11 Marrett Rd	Sandy Brook	0	3	0	3	1	3	0	0	0		10	High
18 Hilltop Drive	Sandy Brook	0	3	0	3	1	3	0	0	0		10	High
CUL270 (93 Lexington St)	Long Meadow Brook	0	3	0	3	1	3	0	0	0		10	High
CUL93 (1 Travers Ln)	Long Meadow Brook	0	3	0	3	1	3	0	0	0		10	High
3 McGinnis Dr (1)	Long Meadow Brook	0	3	0	3	1	3	0	0	0		10	High
3 McGinnis Dr (2)	Long Meadow Brook	0	3	0	3	1	3	0	0	0		10	High
3 McGinnis Dr (3)	Long Meadow Brook	0	3	0	3	1	3	0	0	0		10	High
CUL264 (16 Independence Drive)	Long Meadow Brook	0	3	0	3	2	3	0	0	0		11	High
18 Spruce hill Rd	Long Meadow Brook	0	3	0	3	1	3	0	0	0		10	High
DStr3997 (109 Cambridge St)	Long Meadow Brook	0	3	0	3	2	3	0	0	0		11	High

CUL620 (13 Shady Lane Dr)	Long Meadow Brook	0	3	0	3	1	3	0	0	0		10	High
CUL619 (10 Shady Lane Dr)	Long Meadow Brook	0	3	0	3	1	3	0	0	0		10	High
CUL621 (9 Theresa Ave)	Long Meadow Brook	0	3	0	3	1	1	0	0	0		8	High
32 Sunset Dr	Long Meadow Brook	0	3	0	3	1	3	0	0	0		10	High
CUL655 (10 Barbara Circle)	Long Meadow Brook	0	3	0	3	1	3	0	3	0		13	High
DStr177 (2 Burlington Mall Rd)	Long Meadow Brook	0	3	0	3	2	3	0	0	0		11	High
11 Stony Brook Rd	Long Meadow Brook	0	3	0	3	1	3	0	0	0		10	High
CUL271 (8 Fred St)	Long Meadow Brook	0	3	0	3	1	3	0	0	0		10	High
CUL294 (12 Fred ST)	Long Meadow Brook	0	3	0	3	1	3	0	0	0		10	High
5 South Bedford St (1)	Long Meadow Brook	0	3	0	3	1	3	0	0	0		10	High
5 South Bedford St (2)	Long Meadow Brook	0	3	0	3	1	3	0	0	0		10	High
CUL305 (66 Burlington Mall Rd)	Long Meadow Brook	0	3	0	3	1	3*	0	0	0		10	High
CUL303 (11 Laurel Hill Lane)	Long Meadow Brook	0	3	0	3	1	3	0	0	0		10	High
1500 Executive Mall Rd (District Ave?)	Long Meadow Brook	0	3	0	3	2	3*	0	0	0		11	High
CUL302 (45 Burlington Mall Rd)	Long Meadow Brook	0	3	0	3	2	3*	0	0	0		11	High
CUL512 (45 Burlington Mall Rd)	Long Meadow Brook	0	3	0	3	2	3*	0	0	0		11	High
CUL514 (45 Burlington Mall Rd)	Long Meadow Brook	0	3	0	3	2	3*	0	0	0		11	High
Cul199 (26 Francis Wyman Rd)	Shawsheen River	0	0	0	2	1	3	0	0	0		6	Low
26 Francis Wyman Road	Shawsheen River	0	0	0	2	1	3	0	0	0		6	Low
CUL200 (23 Arnold Terrace)	Shawsheen River	0	0	0	2	1	3	0	0	0		6	Low
CUL590 (32 Francis Wyman Road)	Shawsheen River	0	0	0	2	1	3	0	0	0		6	Low
17 Brantwood Lane	Shawsheen River	0	0	0	2	1	3	0	0	0		6	Low
25 Morrison Road	Shawsheen River	0	0	0	2	1	3	0	3	3		12	High
CUL396 (54 Francis Wyman Road)	Shawsheen River	0	0	0	2	1	3	0	3	3		12	High
CUL209 (20 Morrison Road)	Shawsheen River	0	0	0	2	1	3	0	0	0		6	Low
CUL399 (83 Macon Road)	Shawsheen River	0	0	0	2	1	3	0	0	0		6	Low
CUL401 (78 Macon Road)	Shawsheen River	0	0	0	2	1	3	0	0	0		6	Low
13 Violet Road	Shawsheen River	0	0	0	2	1	3	0	0	0		6	Low
CUL237 (23 Skelton Road)	Shawsheen River	0	0	0	2	1	3	0	0	0		6	Low
CUL240 (39 Skelton Rd)	Shawsheen River	0	0	0	2	1	3	0	0	3		9	High
CUL246 (10 Savin St)	Shawsheen River	0	0	0	2	1	3	0	0	0		6	Low
6 Cedar St	Shawsheen River	0	0	0	2	1	3	0	0	3		9	High
CUL243 (8 Cedar St)	Shawsheen River	0	0	0	2	1	3	0	0	0		6	Low
6 Luther Road	Shawsheen River	0	0	0	2	1	3	0	0	0		6	Low
CUL393 (17 Luther Road)	Shawsheen River	0	0	0	2	1	3	0	0	0		6	Low
CUL395 (2 Cedar ST)	Shawsheen River	0	0	0	2	1	3	0	0	0		6	Low
CUL592 (12 Cedar St)	Shawsheen River	0	0	0	2	1	3	0	0	0		6	Low
CUL214 (87 Francis Wyman)	Shawsheen River	0	0	0	2	1	3	0	0	0		6	Low
CUL594 (15 Gloria Circle)	Shawsheen River	0	0	0	2	1	3	0	0	0		6	Low
CUL591 (12 Eastern Ave)	Shawsheen River	0	0	0	2	1	3	0	0	0		6	Low
CUL593 (16 Cedar St)	Shawsheen River	0	0	0	2	1	3	0	0	0		6	Low

CUL599 (9 Buckman Dr)	Shawsheen River	0	0	0	2	1	1	0	0	0		4	Low
CUL598 (6 University Ave)	Shawsheen River	0	0	0	2	1	3	0	0	0		6	Low
CUL601 (7 University Ave)	Shawsheen River	0	0	0	2	1	3	0	0	0		6	Low
CUL249 (7 Sewall St)	Shawsheen River	0	0	0	2	1	3	0	0	0		6	Low
24 University Ave	Shawsheen River	0	0	0	2	1	3	0	3	0		9	High
CUL604 (10 McCarthy DR)	Shawsheen River	0	0	0	2	1	3	0	0	0		6	Low
CUL603 (10 McCarthy Dr)	Shawsheen River	0	0	0	2	1	3	0	0	0		6	Low
CUL 602 (3 Windsor Lane)	Shawsheen River	0	0	0	2	1	3	0	0	0		6	Low
CUL605 (10 McCarthy Dr)	Shawsheen River	0	0	0	2	1	3	0	0	0		6	Low
CUL205 (29 Crystal Circle)	Shawsheen River	0	0	0	2	1	3	0	0	0		6	Low
CUL229 (16 Carey Ave)	Shawsheen River	0	0	0	2	1	3	0	0	0		6	Low
99 Bedford St	Shawsheen River	0	0	0	2	1	3	0	0	0		6	Low
CUL136 (3 Marie Cir)	Shawsheen River Tributary B	0	0	0	2	1	3	0	0	0		6	Low
CUL179 (16 Ivy Lane Ext)	Shawsheen River Tributary B	0	0	0	2	1	1	0	0	0		4	Low
CUL580 (14 Ivy Lane Ext)	Shawsheen River Tributary B	0	0	0	2	1	1	0	0	0		4	Low
CUL187 (10 Ivy Lane)	Shawsheen River Tributary B	0	0	0	2	1	3	0	0	0		6	Low
CUL138 (30 Douglas Ave)	Shawsheen River Tributary B	0	0	0	2	1	3	0	3	0		9	High
CUL641 (2 Ivy Lane)	Shawsheen River Tributary B	0	0	0	2	1	3	0	0	0		6	Low
CUL192 (8 Douglas Ave)	Shawsheen River Tributary B	0	0	0	2	1	3	0	0	0		6	Low
CUL184 (4 Douglas Ave)	Shawsheen River Tributary B	0	0	0	2	1	3	0	0	0		6	Low
CUL606 (352 Cambridge St)	Shawsheen River Tributary B	0	0	0	2	1	3	0	0	0		6	Low
CUL176 (350 Cambridge St)	Shawsheen River Tributary B	0	0	0	2	1	3	0	0	0		6	Low
CUL172 (10 County Rd)	Shawsheen River Tributary B	0	0	0	2	1	3	0	0	0		6	Low
CUL656 (120 Wilmington Road)	Lubbers Brook	0	0	0	0	1	3	0	0	0		4	Low
9 Wheatland St	Lubbers Brook	0	0	0	0	1	3	0	0	0		4	Low
CUL16 (9 Kingsdale St()	Lubbers Brook	0	0	0	0	1	3	0	0	0		4	Low
CUL532 (6 Kingsdale St)	Lubbers Brook	0	0	0	0	1	3	0	0	0		4	Low
CUL530 (8 Radcliff St)	Lubbers Brook	0	0	0	0	1	3	0	0	0		4	Low
CUL114 (1 Richfield St)	Lubbers Brook	0	0	0	0	1	3	0	0	0		4	Low
CUL121 (5 Guild Rd)	Lubbers Brook	0	0	0	0	1	3	0	0	0		4	Low
CUL536 (13 Marjorie Road)	Lubbers Brook	0	0	0	0	1	3	0	0	0		4	Low
CUL535 (12 Irene St)	Lubbers Brook	0	0	0	0	1	3	0	0	0		4	Low

CUL128 (15 Jackson Road)	Lubbers Brook	0	0	0	0	1	3	0	0	0		4	Low
CUL524 (1 Gibson St)	Lubbers Brook	0	0	0	0	1	3	0	0	0		4	Low
CUL103 (5 Gibson St)	Lubbers Brook	0	0	0	0	1	3	0	0	3		7	Low
CUL525 (31 Gedick Rd)	Lubbers Brook	0	0	0	0	1	3	0	0	0		4	Low
CUL116 (20 Gibson St)	Lubbers Brook	0	0	0	0	1	3	0	0	0		4	Low
CUL120 (5 Guild Rd)	Lubbers Brook	0	0	0	0	1	3	0	0	0		4	Low
CUL13 (22 Lisa St)	Lubbers Brook	0	0	0	0	1	3	0	0	0		4	Low
CUL528 (9 Eisenhower Dr)	Lubbers Brook	0	0	0	0	1	3	0	0	0		4	Low
CUL10 (3 Sandra Ave)	Lubbers Brook	0	0	0	0	1	3	0	0	3		7	Low
CUL523 (12 Sandra Ave)	Lubbers Brook	0	0	0	0	1	3	0	0	0		4	Low
CUL3 (4 Goodwin dr)	Lubbers Brook	0	0	0	0	1	3	0	0	0		4	Low
CUL521 (18 Sandra Ave)	Lubbers Brook	0	0	0	0	1	3	0	0	0		4	Low
CUL520 (8 Brookside Lane)	Lubbers Brook	0	0	0	0	1	3	0	0	0		4	Low
CUL658 (9 Brookside Ln)	Lubbers Brook	0	0	0	0	1	3	0	0	0		4	Low
CUL659 (9 Brookside Ln)	Lubbers Brook	0	0	0	0	1	3	0	0	0		4	Low
CUL6 (9 Brookside Ln)	Lubbers Brook	0	0	0	0	1	3	0	0	0		4	Low
CUL660 (9 Brookside Ln)	Lubbers Brook	0	0	0	0	1	3	0	0	0		4	Low
CUL2 (15 Brookside Ln)	Lubbers Brook	0	0	0	0	1	3	0	0	0		4	Low
CUL1 (23 Brookside Ln)	Lubbers Brook	0	0	0	0	1	3	0	0	0		4	Low
CUL663 (25 Brookside Ln)	Lubbers Brook	0	0	0	0	1	3	0	0	0		4	Low
CUL516 (6 Cook Road)	Lubbers Brook	0	0	0	0	1	3	0	0	0		4	Low
CUL526 (6 Gedick Road0	Lubbers Brook	0	0	0	0	1	3	0	0	0		4	Low
CUL13 (21 Lisa St)	Lubbers Brook	0	0	0	0	1	3	0	0	0		4	Low
CUL656 (120 Wilmington Road)	Lubbers Brook	0	0	0	0	1	3	0	0	0		4	Low
CUL664 (29 Brookside Ln Ext)	Lubbers Brook	0	0	0	0	1	3	0	0	0		4	Low
CuL183 (4 High Pine)	Ipswich River	0	0	0	2	1	3	0	0	0		6	Low
CUL574 (11 Stephanie)	Ipswich River	0	0	0	2	1	3	0	0	0		6	Low
CUL171 (19 Ellen Rd)	Ipswich River	0	0	0	2	1	3	0	0	0		6	Low
CUL578 (4 Jessica Dr)	Ipswich River	0	0	0	2	1	3	0	0	0		6	Low
CUL189 (14 Paula St)	Ipswich River	0	0	0	2	1	3	0	0	0		6	Low
CUL160 (18 Phyllis Ave)	Ipswich River	0	0	0	2	1	3	0	0	3		9	High
CUL156 (5 Cutting Ln)	Ipswich River	0	0	0	2	1	3	0	0	0		6	Low
CUL158 (58 Wilmington Rd)	Ipswich River	0	0	0	2	1	3	0	0	0		6	Low
CUL572 (19 Harvard Ave)	Ipswich River	0	0	0	2	1	3	0	0	0		6	Low
CUL645 (68 Wilmington Rd)	Ipswich River	0	0	0	2	1	3	0	0	0		6	Low
CUL552 (82 Wilmington Rd)	Ipswich River	0	0	0	2	1	3	0	0	0		6	Low
CUl148 (11 Beaverbrook Rd)	Ipswich River	0	0	0	2	1	3	0	0	0		6	Low
CUL550 (4 Sheldon St)	Ipswich River	0	0	0	2	1	3	0	0	0		6	Low
CUL144 (28 Woodhill Rd)	Ipswich River	0	0	0	2	1	3	0	0	0		6	Low
CUL549 (8 Stonehill Cir)	Ipswich River	0	0	0	2	1	3	0	0	0		6	Low
CUL546 (1 Stonehill Cir)	Ipswich River	0	0	0	2	1	3	0	0	0		6	Low
CUL548 (2 Stonehill Cir)	Ipswich River	0	0	0	2	1	3	0	0	0		6	Low

CUL133 (4 Sarah St)	Ipswich River	0	0	0	2	1	3	0	0	3		9	High
CUL657 (7 Sarah St)	Ipswich River	0	0	0	2	1	3	0	0	0		6	Low
CUL538 (5 Myrna St)	Ipswich River	0	0	0	2	1	3	0	0	0		6	Low
CUL123 (7 Phillip Ave)	Ipswich River	0	0	0	2	1	3	0	0	3		9	Low
CUL18 (30 Westwood St)	Ipswich River	0	0	0	2	1	3	0	0	0		6	Low
CUL17 (42 Wheatland St)	Ipswich River	0	0	0	2	1	3	0	0	0		6	Low
CUL553 (44 Westwood St)	Ipswich River	0	0	0	2	1	3	0	0	0		6	Low
CUL665 (48 Westwood St)	Ipswich River	0	0	0	2	1	3	0	3	0		9	High
CUL534 (24 Michael Dr)	Ipswich River	0	0	0	2	1	3	0	0	0		6	Low
CUL22 (18 Michael Dr)	Ipswich River	0	0	0	2	1	3	0	0	0		6	Low
CUL137 (27 ellen Rd)	Ipswich River	0	0	0	2	1	3	0	0	0		6	Low
CUL127 (97 Wilmington Rd)	Ipswich River	0	0	0	2	1	3	0	3	0		9	High
CUL541 (2 Donna Ln)	Sawmill Brook	0	0	0	0	1	3	0	0	0		4	Low
CUL29 (236 Fox Hill Rd)	Sawmill Brook	0	0	0	0	1	3	0	0	0		4	Low
CUL31 (58 Donald Rd)	Sawmill Brook	0	0	0	0	1	3	0	0	0		4	Low
CUL157 (16 Cutting Ln)	Sawmill Brook	0	0	0	0	1	3	0	0	0		4	Low
CUL150 (21 Upland Rd)	Sawmill Brook	0	0	0	0	1	3	0	0	0		4	Low
CUL153 (25 Dolores Dr)	Sawmill Brook	0	0	0	0	1	3	0	0	0		4	Low
CUL544 (38 Upland Rd)	Sawmill Brook	0	0	0	0	1	3	0	0	0		4	Low
CUL152 (9 Baxter Cir)	Sawmill Brook	0	0	0	0	1	3	0	0	0		4	Low
5 Wildwood St	Sawmill Brook	0	0	0	0	1	3	0	0	0		4	Low
195 Fox Hill Rd	Sawmill Brook	0	0	0	0	1	3	0	0	0		4	Low
CUL33 (7 Tinkham Ave)	Sawmill Brook	0	0	0	0	1	3	0	0	0		4	Low
CUL542 (8 Tinkham Ave)	Sawmill Brook	0	0	0	0	1	3	0	0	0		4	Low
CUL543 (12 Tinkham Ave)	Sawmill Brook	0	0	0	0	1	3	0	0	3		7	Low
CUL51 (7 Blueberry Ln)	Sawmill Brook	0	0	0	0	1	3	0	0	0		4	Low
CUL52 (9 Corbett Dr)	Sawmill Brook	0	0	0	0	1	1	0	0	0		2	Low
CUL42 (12 Thornton Dr)	Sawmill Brook	0	0	0	0	1	1	0	0	0		2	Low
12 Thornton Dr (2)	Sawmill Brook	0	0	0	0	1	1	0	0	0		2	Low
12 Thornton Dr (3)	Sawmill Brook	0	0	0	0	1	1	0	0	0		2	Low
CUL41 (6 Erin Ln)	Sawmill Brook	0	0	0	0	1	1	0	0	3		5	Low
CUL47 (2 Dublin Cir)	Sawmill Brook	0	0	0	0	1	1	0	0	0		2	Low
CUL648 (152 Mill St)	Sawmill Brook	0	0	0	0	1	3	0	0	0		4	Low
CUL48 (143 Mill St)	Sawmill Brook	0	0	0	0	1	3	0	0	0		4	Low
CUL649 (145 Mill St)	Sawmill Brook	0	0	0	0	1	3	0	0	0		4	Low
CUL583 (180 Mill St)	Sawmill Brook	0	0	0	0	1	3	0	0	0		4	Low
CUL46 (7 Freeport Dr)	Sawmill Brook	0	0	0	0	1	3	0	0	3		7	Low
CUL49 (12 Spring Valley Rd)	Sawmill Brook	0	0	0	0	1	3	0	0	0		4	Low
CUL559 (8 Lucaya Cir)	Sawmill Brook	0	0	0	0	2	3	0	0	0		5	Low
CUL405 (7 Mulberry Ln)	Sawmill Brook	0	0	0	0	1	3	0	0	0		4	Low
CUL196 (20 Chestnut Ave)	Sawmill Brook	0	0	0	0	1	3	0	0	0		4	Low
CUL195 (174 Fox Hill Rd)	Sawmill Brook	0	0	0	0	1	3	0	0	0		4	Low

CUL584 (42 Skilton Ln)	Sawmill Brook	0	0	0	0	1	3	0	0	0		4	Low
CUL165 (31 Skilton Ln)	Sawmill Brook	0	0	0	0	1	3	0	0	0		4	Low
CUL198 (35 Cresthaven Dr)	Sawmill Brook	0	0	0	0	2	3	0	0	0		5	Low
CUL562 (23 Cresthaven Dr)	Sawmill Brook	0	0	0	0	1	3	0	0	0		4	Low
CUL563 (13 Susan Ave)	Sawmill Brook	0	0	0	0	1	3	0	0	0		4	Low
CUL56 (120 Drake Rd)	Sawmill Brook	0	0	0	0	1	3	0	0	0		4	Low
CUL170 (81 Mill St)	Sawmill Brook	0	0	0	0	1	3	0	0	0		4	Low
CUL582 (68 Mill St)	Sawmill Brook	0	0	0	0	1	3	0	0	0		4	Low
CUL60 (75 Mill St)	Sawmill Brook	0	0	0	0	1	3	0	0	0		4	Low
CUL558 (3 Ruping Dr)	Sawmill Brook	0	0	0	0	1	3	0	0	0		4	Low
CUL59 (37 Freeport Dr)	Sawmill Brook	0	0	0	0	1	3	0	0	0		4	Low
CUL58 (35 Freeport Dr)	Sawmill Brook	0	0	0	0	1	3	0	0	0		4	Low
CUL57 (34 Freeport Dr)	Sawmill Brook	0	0	0	0	1	3	0	0	0		4	Low
CUL564 (13 Cresthaven Dr)	Sawmill Brook	0	0	0	0	1	3	0	0	0		4	Low
CUL561 (1 Susan Ave)	Sawmill Brook	0	0	0	0	1	3	0	0	0		4	Low
CUL560 (2 Susan Ave)	Sawmill Brook	0	0	0	0	1	3	0	0	0		4	Low
CUL556 (2 Susan Ave)	Sawmill Brook	0	0	0	0	1	3	0	0	0		4	Low
CUL76 (40 Mill St)	Sawmill Brook	0	0	0	0	1	3	0	0	0		4	Low
CUL78 (41 Mill St)	Sawmill Brook	0	0	0	0	1	3	0	0	0		4	Low
CUL413 (56 Chandler Rd)	Sawmill Brook Tributary	0	0	0	0	1	3	0	0	0		4	Low
CUL414 (52 Chandler Rd)	Sawmill Brook Tributary	0	0	0	0	1	3	0	0	0		4	Low
CUL441 (19 Town Line Rd)	Sawmill Brook Tributary	0	0	0	0	1	3	0	0	0		4	Low
CUL82 (102 Locust St)	Maple Meadow Brook	0	0	0	3	1	3	0	0	0		7	Low
CUL418 (4 Makechnie Rd)	Maple Meadow Brook	0	0	0	3	1	3	0	0	0		7	Low
CUL419 (36 Locust St)	Maple Meadow Brook	0	0	0	3	1	3	0	0	0		7	Low
CUL91 (7 Travers Ln)	Maple Meadow Brook	0	0	0	3	1	3	0	0	0		7	Low
CUL632 (2 Shamrock Dr)	Maple Meadow Brook	0	0	0	3	1	3	0	0	0		7	Low
4 Shamrock Dr	Maple Meadow Brook	0	0	0	3	1	3	0	0	0		7	Low
91 Center St	Maple Meadow Brook	0	0	0	3	1	3	0	0	0		7	Low
5 Margaret St	Maple Meadow Brook	0	0	0	3	1	3	0	0	0		7	Low
161 Winn St	Maple Meadow Brook	0	0	0	3	1	3	0	0	0		7	Low
28 Locust St	Maple Meadow	0	0	0	3	1	3	0	3	0		10	High

	Brook												
4 McCafferty Way	Maple Meadow Brook	0	0	0	3	1	3	0	0	0		7	Low
114 Winn St	Maple Meadow Brook	0	0	0	3	1	3	0	0	0		7	Low
9 Birch St	Maple Meadow Brook	0	0	0	3	1	3	0	0	0		7	Low
22 Peach Orchid Rd	Maple Meadow Brook	0	0	0	3	1	3	0	0	0		7	Low
CUL421 (17 Winter St)	Halls Brook Tributary	0	0	0	0	1	3	0	0	0		4	Low
CUL422 (7 Winter St)	Halls Brook Tributary	0	0	0	0	1	3	0	0	0		4	Low
CUL587 (61 Peach Orchard Rd)	Halls Brook Tributary	0	0	0	0	1	3	0	3	0		7	Low
CUL424 (51 Peach Orchard Rd)	Halls Brook Tributary	0	0	0	0	1	3	0	0	0		4	Low
CUL565) 2 Lt. Litchfield Way	Halls Brook Tributary	0	0	0	0	1	1	0	0	0		2	Low
1 Duncan Rd	Cummings Brook Tributary	0	0	0	0	1	3	0	0	0		4	Low
CUL446 (3 Beacon St)	Cummings Brook Tributary	0	0	0	0	1	3	0	0	0		4	Low
CUL446 (3 Beacon St)	Cummings Brook Tributary	0	0	0	0	1	3	0	0	0		4	Low
CUL445 (3 Beacon St)	Cummings Brook Tributary	0	0	0	0	1	3	0	0	0		4	Low
CUL452 (11 Joesphine Ave)	Cummings Brook Tributary	0	0	0	0	1	3	0	0	0		4	Low
CUL453 (10 Harriet Ave)	Cummings Brook Tributary	0	0	0	0	1	3	0	0	0		4	Low
CUL458 (18 Harriet Ave)	Cummings Brook Tributary	0	0	0	0	1	3	0	0	0		4	Low
CUL457 (31 Wildmere Ave)	Cummings Brook Tributary	0	0	0	0	1	3	0	0	0		4	Low
CUL459 (1 Wildmere Ave)	Cummings Brook Tributary	0	0	0	0	1	3	0	0	3		7	Low
CUL454 (29 Winn St)	Cummings Brook Tributary	0	0	0	0	1	3	0	0	0		4	Low
CUL460 (29 Winn St)	Cummings Brook Tributary	0	0	0	0	1	3	0	0	0		4	Low
CUL461 (28 Winn St)	Cummings Brook Tributary	0	0	0	0	1	3	0	0	0		4	Low
CUL462 (11 Wyman St)	Cummings Brook Tributary	0	0	0	0	1	3	0	0	0		4	Low
3 Ganley Dr	Little Brook	0	0	0	0	1	3	0	0	0		4	Low
10 Ward St	Little Brook	0	0	0	0	1	3	0	0	0		4	Low

CUL438 (33 Fieldstone Dr)	Little Brook	0	0	0	0	1	3	0	0	0		4	Low
CUL570 (2 Derryfield Ave)	Little Brook	0	0	0	0	1	3	0	0	0		4	Low
DStr163 (55 Cambridge St)	Little Brook	0	0	0	0	2	3	0	0	0		5	Low
64 Cambridge St	Little Brook	0	0	0	0	3	3	0	0	0		6	Low
DStr6132 (64 Cambridge St)	Little Brook	0	0	0	0	3	3	0	0	0		6	Low
DStr6132(2) (64 Cambridge St)	Little Brook	0	0	0	0	3	3	0	0	0		6	Low
DStr6133 (64 Cambridge St)	Little Brook	0	0	0	0	3	3	0	0	0		6	Low
1 Burlington Mall Rd	Little Brook	0	0	0	0	2	3	0	0	0		5	Low
DStr6572 (1 Burlington Mall Rd)	Little Brook	0	0	0	0	2	3	0	0	0		5	Low
DStr6571 (1 Burlington Mall Rd)	Little Brook	0	0	0	0	2	3	0	0	0		5	Low
DStr6607 (1 Burlington Mall Rd)	Little Brook	0	0	0	0	2	3	0	0	0		5	Low
3 Burlington Woods Dr	Little Brook	0	0	0	0	2	3	0	0	3		8	Low
CUL500 (3 Burlington Woods Dr)	Little Brook	0	0	0	0	2	3	0	0	0		5	Low
CUL504 (33 B)	Little Brook	0	0	0	0	2	3	0	0	0		5	Low
CUL446 (20 Wall St)	Little Brook	0	0	0	0	2	1	0	0	0		3	Low
CUl623 (28 Cambridge St)	Little Brook	0	0	0	0	1	3	0	0	0		4	Low
CUL467 (1 Oxbow Ln)	Little Brook	0	0	0	0	1	3	0	0	0		4	Low
CUL567 (20 Oxbow Ln)	Little Brook	0	0	0	0	2	3	0	0	0		5	Low
30 Ray Ave	Little Brook	0	0	0	0	2	3	0	0	0		5	Low
10 Ray Ave	Little Brook	0	0	0	0	2	3	0	0	0		5	Low
10 Ray Ave	Little Brook	0	0	0	0	2	3	0	0	0		5	Low
DStr7241 (145 S Bedford St)	Little Brook	0	0	0	0	2	1	0	0	0		3	Low
DStr7238 (145 S Bedford St)	Little Brook	0	0	0	0	2	1	0	0	0		3	Low
DStr7232 (145 S Bedford St)	Little Brook	0	0	0	0	2	1	0	0	0		3	Low
DStr7229 (145 S Bedford St)	Little Brook	0	0	0	0	2	1	0	0	0		3	Low
DStr7230 (145 S Bedford St)	Little Brook	0	0	0	0	2	1	0	0	0		3	

Scoring Criteria:

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

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

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

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

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

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

[5] Age of development and infrastructure:

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

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

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

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

6 Dry Weather Outfall Screening and Sampling

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

6.1 Weather Conditions

Dry weather outfall screening and sampling may occur when no more than 0.1 inches of rainfall has occurred in the previous 24-hour period and no significant snow melt is occurring. For purposes of determining dry weather conditions, program staff will use precipitation data from the closest weather station reporting current weather data on WeatherUnderground.

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 a digital form on the Conservation Department iPad) (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. Include pertinent information in the outfall/interconnection inventory and priority ranking.
7. Include all screening data in the annual report.

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

6.2.2 Field Equipment

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

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

Equipment	Use/Notes
Clipboard	For organization of field sheets and writing surface
Field Sheets	Field sheets for both dry weather inspection and Dry weather sampling should be available with extras
Chain of Custody Forms	To ensure proper handling of all samples
Pens/Pencils/Permanent Markers	For proper labeling
Nitrile Gloves	To protect the sampler as well as the sample from contamination
Flashlight/headlamp w/batteries	For looking in outfalls or manholes, helpful in early mornings as well
Cooler with ice packs	For transporting samples to the laboratory
Personal Protective Equipment (PPE)	Reflective vest, Safety glasses and boots at a minimum
iPad equipped with Mobile 311 program	For taking spatial location data and recording observations, including photographing field conditions at time of inspection
YSI multiparameter meter	For sampling conductivity, temperature, pH
Hach pocket colorimeter	For testing for chlorine
Test Kits	For ammonia screening. 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	For surfactant and *E. coli* screening. 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).
Utility Knife	Multiple uses
Measuring Tape	Measuring distances and depth of flow
Safety Cones	Safety
Hand Sanitizer	Disinfectant/decontaminant
Zip Ties/Duct Tape	For making field repairs
Rubber Boots/Waders	For accessing shallow streams/areas
Sampling Pole/Dipper	For accessing hard to reach outfalls and manholes

6.2.3 Sample Collection and Analysis

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

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

In the event that an outfall is submerged, either partially or completely, or inaccessible, DPW staff will join Conservation stormwater field staff and together they 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 ***EPA certified laboratory procedure (40 CFR § 136)***	CHEMetrics™ K-9400 and K-9404 Hach™ DE-2
Chlorine	CHEMetrics™ V-2000, K-2513 ***Hach™ Pocket Colorimeter™ II***	NA
Conductivity	CHEMetrics™ I-1200 ***YSI Pro30*** YSI EC300A Oakton 450	NA
Temperature	***YSI Pro30*** YSI EC300A Oakton 450	NA
Salinity	***YSI Pro30*** YSI EC300A Oakton 450	NA
Temperature	***YSI Pro30*** YSI EC300A Oakton 450	NA
Indicator Bacteria: *E. coli* (freshwater) or Enterococcus (saline water)	***EPA certified laboratory procedure (40 CFR § 136)***	NA
Pollutants of Concern[1]	EPA certified laboratory procedure (40 CFR § 136)	NA

*Method used by Town of Burlington in red italics.

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

Testing for indicator bacteria and any pollutants of concern must be conducted using analytical methods and procedures found in 40 CFR § 136.[4] Samples for laboratory analysis must also be stored and preserved in accordance with procedures found in 40 CFR § 136. **Table 6-3** lists analytical methods, detection limits, hold times, and preservatives for laboratory analysis of dry weather sampling parameters.

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

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

Analyte or Parameter	Analytical Method	Detection Limit	Max. Hold Time	Preservative
Ammonia	**EPA**: 350.2, **SM**: 4500-NH3C	0.05 mg/L	28 days	Cool ≤6°C, H_2SO_4 to pH <2, No preservative required if analyzed immediately
Surfactants	**SM**: 5540-C	0.01 mg/L	48 hours	Cool ≤6°C
Chlorine	**SM**: 4500-Cl G	0.02 mg/L	Analyze within 15 minutes	None Required
Temperature	**SM**: 2550B	*NA*	Immediate	None Required
Specific Conductance	**EPA**: 120.1, **SM**: 2510B	0.2 µs/cm	28 days	Cool ≤6°C
Salinity	**SM**: 2520	-	28 days	Cool ≤6°C
Indicator Bacteria: *E.coli* Enterococcus	*E.coli* **EPA**: 1603 **SM**: 9221B, 9221F , 9223 B **Other**: Colilert®, Colilert-18® *Enterococcus* **EPA**: 1600 **SM**: 9230 C **Other**: Enterolert®	*E.coli* **EPA**: 1 cfu/100mL **SM**: 2 MPN/100mL **Other**: 1 MPN/100mL *Enterococcus* **EPA**: 1 cfu/100mL **SM**: 1 MPN/100mL **Other**: 1 MPN/100mL	8 hours	Cool ≤10°C, 0.0008% $Na_2S_2O_3$
Total Phosphorus	**EPA**: Manual-365.3, Automated Ascorbic acid digestion-365.1 Rev. 2, ICP/AES4-200.7 Rev. 4.4 **SM**: 4500-P E-F	**EPA**: 0.01 mg/L **SM** : 0.01 mg/L	28 days	Cool ≤6°C, H_2SO_4 to pH <2
Total Nitrogen (Ammonia + Nitrate/Nitrite, methods are for Nitrate-Nitrite and need to be combined with Ammonia listed above.)	**EPA**: Cadmium reduction (automated)-353.2 Rev. 2.0, **SM**: 4500-NO_3 E-F	**EPA**: 0.05 mg/L **SM** : 0.05 mg/L	28 days	Cool ≤6°C, H_2SO_4 to pH <2

SM = Standard Methods

6.3 Interpreting Outfall Sampling Results

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

Table 6-4. Benchmark Field Measurements for Select Parameters

Analyte or Parameter	Benchmark
Ammonia	>0.5 mg/L
Conductivity	>2,000 µS/cm
Surfactants	>0.25 mg/L
Chlorine	>0.02 mg/L (detectable levels per the 2016 MS4 Permit)
Indicator Bacteria[5]: *E.coli* *Enterococcus*	*E.coli*: the geometric mean of the five most recent samples taken during the same bathing season shall not exceed 126 colonies per 100 ml and no single sample taken during the bathing season shall exceed 235 colonies per 100 ml *Enterococcus:* the geometric mean of the five most recent samples taken during the same bathing season shall not exceed 33 colonies per 100 ml and no single sample taken during the bathing season shall exceed 61 colonies per 100 ml

6.4 Follow-up Ranking of Outfalls and Interconnections

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

Outfalls/interconnections where relevant information was found indicating sewer input to the MS4 or sampling results indicating sewer input are highly likely to contain illicit discharges from sanitary sources. Such outfalls/interconnections will be ranked at the top of the High Priority Outfalls category for investigation. Other outfalls and interconnections may be re-ranked based on any new information from the dry weather screening.

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

7 Catchment Investigations

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

7.1 System Vulnerability Factors

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

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

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

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

- History of multiple Board of Health actions addressing widespread septic system failures (indicative of inadequate soils, water table separation, or other physical constraints of the area rather that poor owner maintenance).

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

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

Burlington, Massachusetts
Revision Date: April 12, 2019

Outfall ID	Receiving Water	1 History of SSOs	2 Common or Twin Invert Manholes	3 Common Trench Construction	4 Storm/Sanitary Crossings (Sanitary Above)	5 Sanitary Lines with Underdrains	6 Inadequate Sanitary Level of Service	7 Areas Formerly Served by Combined Sewers	8 Sanitary Infrastructure Defects	9 SSO Potential In Event of System Failures	10 Septic with Poor Soils or Water Table Separation	11 History of BOH Actions Addressing Septic Failure
CUL386 (30 Middlesex Tpke)	Vine Brook D	No	No	No	No	No	No	No	No	No	No	No
CUL384 (1 Crowley Road)	Vine Brook D	No	No	No	No	No	No	No	No	No	No	No
CUL597 (2 Corcoran Road)	Vine Brook D	No	No	No	No	No	No	No	No	No	No	No
CUl595 (19 Luther Road)	Vine Brook D	No	No	No	No	No	No	No	No	No	No	No
240 Mdlsx Trnpk Ext.	Vine Brook C	No	No	No	No	No	No	No	No	No	No	No
CUL338 (157 Beford St)	Vine Brook C	No	No	No	No	No	No	No	No	No	No	No
CUL340 (171 Bedford Street)	Vine Brook C	No	No	No	No	No	No	No	No	No	No	No
248 Mdlsx Tnpk Ext	Vine Brook C	No	No	No	No	No	No	No	No	No	No	No
DStr1721 (3 Fowler ter)	Vine Brook C	No	No	No	No	No	No	No	No	No	No	No
DStr1407 (3 Fowler Ter)	Vine Brook C	No	No	No	No	No	No	No	No	No	No	No
CUL273 (11 A St.)	Vine Brook C	No	No	No	No	No	No	No	No	No	No	No
CUL363 (225 Middlesex Tpk Ext)	Vine Brook C	No	No	No	No	No	No	No	No	No	No	No
50 Greenleaf Way (2)	Vine Brook C	No	No	No	No	No	No	No	No	No	No	No
230-234 Mdlsx Trnpk Ext (1)	Vine Brook C	No	No	No	No	No	No	No	No	No	No	No
230-234 Mdlsx Trnpk Ext (2)	Vine Brook C	No	No	No	No	No	No	No	No	No	No	No
CUL286 (44 Greenwood Rd)	Vine Brook C	No	No	No	No	No	No	No	No	No	No	No
CUL289 (15 A St)	Vine Brook C	No	No	No	No	No	No	No	No	No	No	No
CUL261 (7 Fowler Ter)	Vine Brook C	No	No	No	No	No	No	No	No	No	No	No
CUL281 (20 Daniel Dr)	Vine Brook C	No	No	No	No	No	No	No	No	No	No	No
CUL287 (12 Daniel Dr)	Vine Brook C	No	No	No	No	No	No	No	No	No	No	No
CUL337 (4 Daniel Dr)	Vine Brook C	No	No	No	No	No	No	No	No	No	No	No
CUL616 (225 Middlesex Tpk Ext)	Vine Brook C	No	No	No	No	No	No	No	No	No	No	No
CUL615 (225 Middlesex Tpk Ext)	Vine Brook C	No	No	No	No	No	No	No	No	No	No	No
171 Middlesex Tnpk (DStr7844)	Vine Brook B	No	No	No	No	No	No	No	No	No	No	No
CUL614 (9 Partridge Lane)	Vine Brook B	No	No	No	No	No	No	No	No	No	No	No
DStr46 (155 Middlesex Tpk)	Vine Brook B	No	No	No	No	No	No	No	No	No	No	No
DStr47 (155 Middlesex Tpk)	Vine Brook B	No	No	No	No	No	No	No	No	No	No	No
CUL297 (3 Mark St)	Vine Brook B	No	No	No	No	No	No	No	No	No	No	No
CUL293 (11 Mark St)	Vine Brook B	No	No	No	No	No	No	No	No	No	No	No
64 Burlington mall Rd	Vine Brook B	No	No	No	No	No	No	No	No	No	No	No

66-78 Burlington mall Rd	Vine Brook B	No	No	No	No	No	No	No	No	No	No	No
DStr6644 (82 Burlington Mall Rd)	Vine Brook B	No	No	No	No	No	No	No	No	No	No	No
CUL304 (82 Burlington Mall Rd)	Vine Brook B	No	No	No	No	No	No	No	No	No	No	No
CUL307 (82 Burlington Mall Rd)	Vine Brook B	No	No	No	No	No	No	No	No	No	No	No
113-191 Lexington St	Vine Brook B	No	No	No	No	No	No	No	No	No	No	No
CUL322 (132 Lexington St)	Vine Brook B	No	No	No	No	No	No	No	No	No	No	No
CUL323 (82 Burlington Mall Rd)	Vine Brook B	No	No	No	No	No	No	No	No	No	No	No
128 Mdlsx Turnpike (1)	Vine Brook B	No	No	No	No	No	No	No	No	No	No	No
128 Mdlsx Turnpike (2)	Vine Brook B	No	No	No	No	No	No	No	No	No	No	No
128 Mdlsx Turnpike (3)	Vine Brook B	No	No	No	No	No	No	No	No	No	No	No
128 Mdlsx Turnpike (4)	Vine Brook B	No	No	No	No	No	No	No	No	No	No	No
10 2nd Ave (1)	Vine Brook B	No	No	No	No	No	No	No	No	No	No	No
10 2nd Ave (2)	Vine Brook B	No	No	No	No	No	No	No	No	No	No	No
10 2nd Ave (3)	Vine Brook B	No	No	No	No	No	No	No	No	No	No	No
10 2nd Ave (4)	Vine Brook B	No	No	No	No	No	No	No	No	No	No	No
112 Burlington Mall Road (2)	Vine Brook B	No	No	No	No	No	No	No	No	No	No	No
DStr1249 (196 Burlington Mall Rd)	Vine Brook B	No	No	No	No	No	No	No	No	No	No	No
112 Burlington Mall Road (3)	Vine Brook B	No	No	No	No	No	No	No	No	No	No	No
112 Burlington Mall Road (4)	Vine Brook B	No	No	No	No	No	No	No	No	No	No	No
112 Burlington Mall Road (5)	Vine Brook B	No	No	No	No	No	No	No	No	No	No	No
CUL309 (1 District Ave)	Vine Brook B	No	No	No	No	No	No	No	No	No	No	No
CUL312 (130 Middlesex Tpk)	Vine Brook B	No	No	No	No	No	No	No	No	No	No	No
CUL316 (10 2nd Ave)	Vine Brook B	No	No	No	No	No	No	No	No	No	No	No
DStr6691 (90 Middlesex Tpk)	Vine Brook B	No	No	No	No	No	No	No	No	No	No	No
20 South Ave (1)	Vine Brook B	No	No	No	No	No	No	No	No	No	No	No
20 South Ave (2)	Vine Brook B	No	No	No	No	No	No	No	No	No	No	No
6 Adams St	Vine Brook A	No	No	No	No	No	No	No	No	No	No	No
CUL318 (59 Middlesex Tpk)	Vine Brook A	No	No	No	No	No	No	No	No	No	No	No
56 Mdlsx Trnpike (2)	Vine Brook A	No	No	No	No	No	No	No	No	No	No	No
DStr3309 (25 Blanchard Rd)	Vine Brook A	No	No	No	No	No	No	No	No	No	No	No
CUL507 (15 Wheeler Rd)	Vine Brook A	No	No	No	No	No	No	No	No	No	No	No
CUL509 (40 Blanchard Rd)	Vine Brook A	No	No	No	No	No	No	No	No	No	No	No
CUL330 (70 Muller Rd)	Vine Brook A	No	No	No	No	No	No	No	No	No	No	No
CUL308 (193 Burlington Mall Rd)	Vine Brook A	No	No	No	No	No	No	No	No	No	No	No
CUL333 (31 Eugene Rd)	Vine Brook A	No	No	No	No	No	No	No	No	No	No	No
CUL334 (37 Eugene Rd)	Vine Brook A	No	No	No	No	No	No	No	No	No	No	No
CUL332 (47 Eugene Rd)	Vine Brook A	No	No	No	No	No	No	No	No	No	No	No
CUL326 (16 Belmont Road)	Vine Brook A	No	No	No	No	No	No	No	No	No	No	No
CUL624 (3 Meyers Lane)	Vine Brook A	No	No	No	No	No	No	No	No	No	No	No
CUL625 (12 larson Circle)	Vine Brook A	No	No	No	No	No	No	No	No	No	No	No
5 Sorelle Place	Vine Brook A	No	No	No	No	No	No	No	No	No	No	No

CUL329 (119 Muller Rd)	Vine Brook A	No	No	No	No	No	No	No	No	No	No	No
CUL173 (335 Cambridge St)	Sandy Brook	No	No	No	No	No	No	No	No	No	No	No
335 Cambridge St	Sandy Brook	No	No	No	No	No	No	No	No	No	No	No
CUL248 (14 Pathwood Ave)	Sandy Brook	No	No	No	No	No	No	No	No	No	No	No
CUL220 (5 Glenwood St)	Sandy Brook	No	No	No	No	No	No	No	No	No	No	No
CUL216 (21 Purity Springs Road)	Sandy Brook	No	No	No	No	No	No	No	No	No	No	No
CUL221 (5 Purity Springs Road)	Sandy Brook	No	No	No	No	No	No	No	No	No	No	No
CUL202 (1 Dale St)	Sandy Brook	No	No	No	No	No	No	No	No	No	No	No
CUL219 (17 Terry Ave)	Sandy Brook	No	No	No	No	No	No	No	No	No	No	No
CUL201 (9 Edgemont Ave)	Sandy Brook	No	No	No	No	No	No	No	No	No	No	No
CUL610 (5 Elm Ave)	Sandy Brook	No	No	No	No	No	No	No	No	No	No	No
2 Ainsworth St	Sandy Brook	No	No	No	No	No	No	No	No	No	No	No
CUL225 (8 Carey Ave)	Sandy Brook	No	No	No	No	No	No	No	No	No	No	No
26 Fairfax St.	Sandy Brook	No	No	No	No	No	No	No	No	No	No	No
CUL223 (9 Fairfax St)	Sandy Brook	No	No	No	No	No	No	No	No	No	No	No
CUL224 (3 Fairfax St)	Sandy Brook	No	No	No	No	No	No	No	No	No	No	No
55 Bedford St	Sandy Brook	No	No	No	No	No	No	No	No	No	No	No
28 Lexington St	Sandy Brook	No	No	No	No	No	No	No	No	No	No	No
CUL267 (12 Old Colony Road)	Sandy Brook	No	No	No	No	No	No	No	No	No	No	No
18 Maud Graham Circle	Sandy Brook	No	No	No	No	No	No	No	No	No	No	No
10 Maud Graham Circle	Sandy Brook	No	No	No	No	No	No	No	No	No	No	No
CUL611 (5 Maud Graham Circle)	Sandy Brook	No	No	No	No	No	No	No	No	No	No	No
CUL268 (16 Chadwick Road)	Sandy Brook	No	No	No	No	No	No	No	No	No	No	No
CUL612 (18 Frothingham Rd)	Sandy Brook	No	No	No	No	No	No	No	No	No	No	No
27 Hilltop Dr	Sandy Brook	No	No	No	No	No	No	No	No	No	No	No
13 Sandy brook Rd	Sandy Brook	No	No	No	No	No	No	No	No	No	No	No
13 Sandy brook Rd	Sandy Brook	No	No	No	No	No	No	No	No	No	No	No
CUL618 (1 Indian Hill Rd)	Sandy Brook	No	No	No	No	No	No	No	No	No	No	No
11 Marrett Rd	Sandy Brook	No	No	No	No	No	No	No	No	No	No	No
18 Hilltop Drive	Sandy Brook	No	No	No	No	No	No	No	No	No	No	No
CUL270 (93 Lexington St)	Long Meadow Brook	No	No	No	No	No	No	No	No	No	No	No
CUL93 (1 Travers Ln)	Long Meadow Brook	No	No	No	No	No	No	No	No	No	No	No
3 McGinnis Dr (1)	Long Meadow Brook	No	No	No	No	No	No	No	No	No	No	No
3 McGinnis Dr (2)	Long Meadow Brook	No	No	No	No	No	No	No	No	No	No	No
3 McGinnis Dr (3)	Long Meadow Brook	No	No	No	No	No	No	No	No	No	No	No
CUL264 (16 Independence Drive)	Long Meadow Brook	No	No	No	No	No	No	No	No	No	No	No
18 Spruce hill Rd	Long Meadow Brook	No	No	No	No	No	No	No	No	No	No	No
DStr3997 (109 Cambridge St)	Long Meadow Brook	No	No	No	No	No	No	No	No	No	No	No
CUL620 (13 Shady Lane Dr)	Long Meadow Brook	No	No	No	No	No	No	No	No	No	No	No
CUL619 (10 Shady Lane Dr)	Long Meadow Brook	No	No	No	No	No	No	No	No	No	No	No
CUL621 (9 Theresa Ave)	Long Meadow Brook	No	No	No	No	No	No	No	No	No	No	No
32 Sunset Dr	Long Meadow Brook	No	No	No	No	No	No	No	No	No	No	No

CUL655 (10 Barbara Circle)	Long Meadow Brook	No	No	No	No	No	No	No	No	No	No	No
DStr177 (2 Burlington Mall Rd)	Long Meadow Brook	No	No	No	No	No	No	No	No	No	No	No
11 Stony Brook Rd	Long Meadow Brook	No	No	No	No	No	No	No	No	No	No	No
CUL271 (8 Fred St)	Long Meadow Brook	No	No	No	No	No	No	No	No	No	No	No
CUL294 (12 Fred ST)	Long Meadow Brook	No	No	No	No	No	No	No	No	No	No	No
5 South Bedford St (1)	Long Meadow Brook	No	No	No	No	No	No	No	No	No	No	No
5 South Bedford St (2)	Long Meadow Brook	No	No	No	No	No	No	No	No	No	No	No
CUL305 (66 Burlington Mall Rd)	Long Meadow Brook	No	No	No	No	No	No	No	No	No	No	No
CUL303 (11 Laurel Hill Lane)	Long Meadow Brook	No	No	No	No	No	No	No	No	No	No	No
1500 Executive Mall Rd (District Ave?)	Long Meadow Brook	No	No	No	No	No	No	No	No	No	No	No
CUL302 (45 Burlington Mall Rd)	Long Meadow Brook	No	No	No	No	No	No	No	No	No	No	No
CUL512 (45 Burlington Mall Rd)	Long Meadow Brook	No	No	No	No	No	No	No	No	No	No	No
CUL514 (45 Burlington Mall Rd)	Long Meadow Brook	No	No	No	No	No	No	No	No	No	No	No
Cul199 (26 Francis Wyman Rd)	Shawsheen River	No	No	No	No	No	No	No	No	No	No	No
26 Francis Wyman Road	Shawsheen River	No	No	No	No	No	No	No	No	No	No	No
CUL200 (23 Arnold Terrace)	Shawsheen River	No	No	No	No	No	No	No	No	No	No	No
CUL590 (32 Francis Wyman Road)	Shawsheen River	No	No	No	No	No	No	No	No	No	No	No
17 Brantwood Lane	Shawsheen River	No	No	No	No	No	No	No	No	No	No	No
25 Morrison Road	Shawsheen River	No	No	No	No	No	No	No	No	No	No	No
CUL396 (54 Francis Wyman Road)	Shawsheen River	No	No	No	No	No	No	No	No	No	No	No
CUL209 (20 Morrison Road)	Shawsheen River	No	No	No	No	No	No	No	No	No	No	No
CUL399 (83 Macon Road)	Shawsheen River	No	No	No	No	No	No	No	No	No	No	No
CUL401 (78 Macon Road)	Shawsheen River	No	No	No	No	No	No	No	No	No	No	No
13 Violet Road	Shawsheen River	No	No	No	No	No	No	No	No	No	No	No
CUL237 (23 Skelton Road)	Shawsheen River	No	No	No	No	No	No	No	No	No	No	No
CUL240 (39 Skelton Rd)	Shawsheen River	No	No	No	No	No	No	No	No	No	No	No
CUL246 (10 Savin St)	Shawsheen River	No	No	No	No	No	No	No	No	No	No	No
6 Cedar St	Shawsheen River	No	No	No	No	No	No	No	No	No	No	No
CUL243 (8 Cedar St)	Shawsheen River	No	No	No	No	No	No	No	No	No	No	No
6 Luther Road	Shawsheen River	No	No	No	No	No	No	No	No	No	No	No
CUL393 (17 Luther Road)	Shawsheen River	No	No	No	No	No	No	No	No	No	No	No
CUL395 (2 Cedar ST)	Shawsheen River	No	No	No	No	No	No	No	No	No	No	No
CUL592 (12 Cedar St)	Shawsheen River	No	No	No	No	No	No	No	No	No	No	No
CUL214 (87 Francis Wyman)	Shawsheen River	No	No	No	No	No	No	No	No	No	No	No
CUL594 (15 Gloria Circle)	Shawsheen River	No	No	No	No	No	No	No	No	No	No	No
CUL591 (12 Eastern Ave)	Shawsheen River	No	No	No	No	No	No	No	No	No	No	No
CUL593 (16 Cedar St)	Shawsheen River	No	No	No	No	No	No	No	No	No	No	No
CUL599 (9 Buckman Dr)	Shawsheen River	No	No	No	No	No	No	No	No	No	No	No
CUL598 (6 University Ave)	Shawsheen River	No	No	No	No	No	No	No	No	No	No	No
CUL601 (7 University Ave)	Shawsheen River	No	No	No	No	No	No	No	No	No	No	No
CUL249 (7 Sewall St)	Shawsheen River	No	No	No	No	No	No	No	No	No	No	No

24 University Ave	Shawsheen River	No	No	No	No	No	No	No	No	No	No	No
CUL604 (10 McCarthy DR)	Shawsheen River	No	No	No	No	No	No	No	No	No	No	No
CUL603 (10 McCarthy Dr)	Shawsheen River	No	No	No	No	No	No	No	No	No	No	No
CUL 602 (3 Windsor Lane)	Shawsheen River	No	No	No	No	No	No	No	No	No	No	No
CUL605 (10 McCarthy Dr)	Shawsheen River	No	No	No	No	No	No	No	No	No	No	No
CUL205 (29 Crystal Circle)	Shawsheen River	No	No	No	No	No	No	No	No	No	No	No
CUL229 (16 Carey Ave)	Shawsheen River	No	No	No	No	No	No	No	No	No	No	No
99 Bedford St	Shawsheen River	No	No	No	No	No	No	No	No	No	No	No
CUL136 (3 Marie Cir)	Shawsheen River Tributary B	No	No	No	No	No	No	No	No	No	No	No
CUL179 (16 Ivy Lane Ext)	Shawsheen River Tributary B	No	No	No	No	No	No	No	No	No	No	No
CUL580 (14 Ivy Lane Ext)	Shawsheen River Tributary B	No	No	No	No	No	No	No	No	No	No	No
CUL187 (10 Ivy Lane)	Shawsheen River Tributary B	No	No	No	No	No	No	No	No	No	No	No
CUL138 (30 Douglas Ave)	Shawsheen River Tributary B	No	No	No	No	No	No	No	No	No	No	No
CUL641 (2 Ivy Lane)	Shawsheen River Tributary B	No	No	No	No	No	No	No	No	No	No	No
CUL192 (8 Douglas Ave)	Shawsheen River Tributary B	No	No	No	No	No	No	No	No	No	No	No
CUL184 (4 Douglas Ave)	Shawsheen River Tributary B	No	No	No	No	No	No	No	No	No	No	No
CUL606 (352 Cambridge St)	Shawsheen River Tributary B	No	No	No	No	No	No	No	No	No	No	No
CUL176 (350 Cambridge St)	Shawsheen River Tributary B	No	No	No	No	No	No	No	No	No	No	No
CUL172 (10 County Rd)	Shawsheen River Tributary B	No	No	No	No	No	No	No	No	No	No	No
CUL656 (120 Wilmington Road)	Lubbers Brook	No	No	No	No	No	No	No	No	No	No	No
9 Wheatland St	Lubbers Brook	No	No	No	No	No	No	No	No	No	No	No
CUL16 (9 Kingsdale St()	Lubbers Brook	No	No	No	No	No	No	No	No	No	No	No
CUL532 (6 Kingsdale St)	Lubbers Brook	No	No	No	No	No	No	No	No	No	No	No
CUL530 (8 Radcliff St)	Lubbers Brook	No	No	No	No	No	No	No	No	No	No	No
CUL114 (1 Richfield St)	Lubbers Brook	No	No	No	No	No	No	No	No	No	No	No
CUL121 (5 Guild Rd)	Lubbers Brook	No	No	No	No	No	No	No	No	No	No	No
CUL536 (13 Marjorie Road)	Lubbers Brook	No	No	No	No	No	No	No	No	No	No	No
CUL535 (12 Irene St)	Lubbers Brook	No	No	No	No	No	No	No	No	No	No	No
CUL128 (15 Jackson Road)	Lubbers Brook	No	No	No	No	No	No	No	No	No	No	No
CUL524 (1 Gibson St)	Lubbers Brook	No	No	No	No	No	No	No	No	No	No	No
CUL103 (5 Gibson St)	Lubbers Brook	No	No	No	No	No	No	No	No	No	No	No
CUL525 (31 Gedick Rd)	Lubbers Brook	No	No	No	No	No	No	No	No	No	No	No
CUL116 (20 Gibson St)	Lubbers Brook	No	No	No	No	No	No	No	No	No	No	No
CUL120 (5 Guild Rd)	Lubbers Brook	No	No	No	No	No	No	No	No	No	No	No
CUL13 (22 Lisa St)	Lubbers Brook	No	No	No	No	No	No	No	No	No	No	No
CUL528 (9 Eisenhower Dr)	Lubbers Brook	No	No	No	No	No	No	No	No	No	No	No
CUL10 (3 Sandra Ave)	Lubbers Brook	No	No	No	No	No	No	No	No	No	No	No
CUL523 (12 Sandra Ave)	Lubbers Brook	No	No	No	No	No	No	No	No	No	No	No
CUL3 (4 Goodwin dr)	Lubbers Brook	No	No	No	No	No	No	No	No	No	No	No
CUL521 (18 Sandra Ave)	Lubbers Brook	No	No	No	No	No	No	No	No	No	No	No
CUL520 (8 Brookside Lane)	Lubbers Brook	No	No	No	No	No	No	No	No	No	No	No
CUL658 (9 Brookside Ln)	Lubbers Brook	No	No	No	No	No	No	No	No	No	No	No

CUL659 (9 Brookside Ln)	Lubbers Brook	No	No	No	No	No	No	No	No	No	No	No
CUL6 (9 Brookside Ln)	Lubbers Brook	No	No	No	No	No	No	No	No	No	No	No
CUL660 (9 Brookside Ln)	Lubbers Brook	No	No	No	No	No	No	No	No	No	No	No
CUL2 (15 Brookside Ln)	Lubbers Brook	No	No	No	No	No	No	No	No	No	No	No
CUL1 (23 Brookside Ln)	Lubbers Brook	No	No	No	No	No	No	No	No	No	No	No
CUL663 (25 Brookside Ln)	Lubbers Brook	No	No	No	No	No	No	No	No	No	No	No
CUL516 (6 Cook Road)	Lubbers Brook	No	No	No	No	No	No	No	No	No	No	No
CUL526 (6 Gedick Road)	Lubbers Brook	No	No	No	No	No	No	No	No	No	No	No
CUL13 (21 Lisa St)	Lubbers Brook	No	No	No	No	No	No	No	No	No	No	No
CUL656 (120 Wilmington Road)	Lubbers Brook	No	No	No	No	No	No	No	No	No	No	No
CUL664 (29 Brookside Ln Ext)	Lubbers Brook	No	No	No	No	No	No	No	No	No	No	No
CuL183 (4 High Pine)	Ipswich River	No	No	No	No	No	No	No	No	No	No	No
CUL574 (11 Stephanie)	Ipswich River	No	No	No	No	No	No	No	No	No	No	No
CUL171 (19 Ellen Rd)	Ipswich River	No	No	No	No	No	No	No	No	No	No	No
CUL578 (4 Jessica Dr)	Ipswich River	No	No	No	No	No	No	No	No	No	No	No
CUL189 (14 Paula St)	Ipswich River	No	No	No	No	No	No	No	No	No	No	No
CUL160 (18 Phyllis Ave)	Ipswich River	No	No	No	No	No	No	No	No	No	No	No
CUL156 (5 Cutting Ln)	Ipswich River	No	No	No	No	No	No	No	No	No	No	No
CUL158 (58 Wilmington Rd)	Ipswich River	No	No	No	No	No	No	No	No	No	No	No
CUL572 (19 Harvard Ave)	Ipswich River	No	No	No	No	No	No	No	No	No	No	No
CUL645 (68 Wilmington Rd)	Ipswich River	No	No	No	No	No	No	No	No	No	No	No
CUL552 (82 Wilmington Rd)	Ipswich River	No	No	No	No	No	No	No	No	No	No	No
CUl148 (11 Beaverbrook Rd)	Ipswich River	No	No	No	No	No	No	No	No	No	No	No
CUL550 (4 Sheldon St)	Ipswich River	No	No	No	No	No	No	No	No	No	No	No
CUL144 (28 Woodhill Rd)	Ipswich River	No	No	No	No	No	No	No	No	No	No	No
CUL549 (8 Stonehill Cir)	Ipswich River	No	No	No	No	No	No	No	No	No	No	No
CUL546 (1 Stonehill Cir)	Ipswich River	No	No	No	No	No	No	No	No	No	No	No
CUL548 (2 Stonehill Cir)	Ipswich River	No	No	No	No	No	No	No	No	No	No	No
CUL133 (4 Sarah St)	Ipswich River	No	No	No	No	No	No	No	No	No	No	No
CUL657 (7 Sarah St)	Ipswich River	No	No	No	No	No	No	No	No	No	No	No
CUL538 (5 Myrna St)	Ipswich River	No	No	No	No	No	No	No	No	No	No	No
CUL123 (7 Phillip Ave)	Ipswich River	No	No	No	No	No	No	No	No	No	No	No
CUL18 (30 Westwood St)	Ipswich River	No	No	No	No	No	No	No	No	No	No	No
CUL17 (42 Wheatland St)	Ipswich River	No	No	No	No	No	No	No	No	No	No	No
CUL553 (44 Westwood St)	Ipswich River	No	No	No	No	No	No	No	No	No	No	No
CUL665 (48 Westwood St)	Ipswich River	No	No	No	No	No	No	No	No	No	No	No
CUL534 (24 Michael Dr)	Ipswich River	No	No	No	No	No	No	No	No	No	No	No
CUL22 (18 Michael Dr)	Ipswich River	No	No	No	No	No	No	No	No	No	No	No
CUL137 (27 Ellen Rd)	Ipswich River	No	No	No	No	No	No	No	No	No	No	No
CUL127 (97 Wilmington Rd)	Ipswich River	No	No	No	No	No	No	No	No	No	No	No
CUL541 (2 Donna Ln)	Sawmill Brook	No	No	No	No	No	No	No	No	No	No	No
CUL29 (236 Fox Hill Rd)	Sawmill Brook	No	No	No	No	No	No	No	No	No	No	No

CUL31 (58 Donald Rd)	Sawmill Brook	No	No	No	No	No	No	No	No	No	No	No
CUL157 (16 Cutting Ln)	Sawmill Brook	No	No	No	No	No	No	No	No	No	No	No
CUL150 (21 Upland Rd)	Sawmill Brook	No	No	No	No	No	No	No	No	No	No	No
CUL153 (25 Dolores Dr)	Sawmill Brook	No	No	No	No	No	No	No	No	No	No	No
CUL544 (38 Upland Rd)	Sawmill Brook	No	No	No	No	No	No	No	No	No	No	No
CUL152 (9 Baxter Cir)	Sawmill Brook	No	No	No	No	No	No	No	No	No	No	No
5 Wildwood St	Sawmill Brook	No	No	No	No	No	No	No	No	No	No	No
195 Fox Hill Rd	Sawmill Brook	No	No	No	No	No	No	No	No	No	No	No
CUL33 (7 Tinkham Ave)	Sawmill Brook	No	No	No	No	No	No	No	No	No	No	No
CUL542 (8 Tinkham Ave)	Sawmill Brook	No	No	No	No	No	No	No	No	No	No	No
CUL543 (12 Tinkham Ave)	Sawmill Brook	No	No	No	No	No	No	No	No	No	No	No
CUL51 (7 Blueberry Ln)	Sawmill Brook	No	No	No	No	No	No	No	No	No	No	No
CUL52 (9 Corbett Dr)	Sawmill Brook	No	No	No	No	No	No	No	No	No	No	No
CUL42 (12 Thornton Dr)	Sawmill Brook	No	No	No	No	No	No	No	No	No	No	No
12 Thornton Dr (2)	Sawmill Brook	No	No	No	No	No	No	No	No	No	No	No
12 Thornton Dr (3)	Sawmill Brook	No	No	No	No	No	No	No	No	No	No	No
CUL41 (6 Erin Ln)	Sawmill Brook	No	No	No	No	No	No	No	No	No	No	No
CUL47 (2 Dublin Cir)	Sawmill Brook	No	No	No	No	No	No	No	No	No	No	No
CUL648 (152 Mill St)	Sawmill Brook	No	No	No	No	No	No	No	No	No	No	No
CUL48 (143 Mill St)	Sawmill Brook	No	No	No	No	No	No	No	No	No	No	No
CUL649 (145 Mill St)	Sawmill Brook	No	No	No	No	No	No	No	No	No	No	No
CUL583 (180 Mill St)	Sawmill Brook	No	No	No	No	No	No	No	No	No	No	No
CUL46 (7 Freeport Dr)	Sawmill Brook	No	No	No	No	No	No	No	No	No	No	No
CUL49 (12 Spring Valley Rd)	Sawmill Brook	No	No	No	No	No	No	No	No	No	No	No
CUL559 (8 Lucaya Cir)	Sawmill Brook	No	No	No	No	No	No	No	No	No	No	No
CUL405 (7 Mulberry Ln)	Sawmill Brook	No	No	No	No	No	No	No	No	No	No	No
CUL196 (20 Chestnut Ave)	Sawmill Brook	No	No	No	No	No	No	No	No	No	No	No
CUL195 (174 Fox Hill Rd)	Sawmill Brook	No	No	No	No	No	No	No	No	No	No	No
CUL584 (42 Skilton Ln)	Sawmill Brook	No	No	No	No	No	No	No	No	No	No	No
CUL165 (31 Skilton Ln)	Sawmill Brook	No	No	No	No	No	No	No	No	No	No	No
CUL198 (35 Cresthaven Dr)	Sawmill Brook	No	No	No	No	No	No	No	No	No	No	No
CUL562 (23 Cresthaven Dr)	Sawmill Brook	No	No	No	No	No	No	No	No	No	No	No
CUL563 (13 Susan Ave)	Sawmill Brook	No	No	No	No	No	No	No	No	No	No	No
CUL56 (120 Drake Rd)	Sawmill Brook	No	No	No	No	No	No	No	No	No	No	No
CUL170 (81 Mill St)	Sawmill Brook	No	No	No	No	No	No	No	No	No	No	No
CUL582 (68 Mill St)	Sawmill Brook	No	No	No	No	No	No	No	No	No	No	No
CUL60 (75 Mill St)	Sawmill Brook	No	No	No	No	No	No	No	No	No	No	No
CUL558 (3 Ruping Dr)	Sawmill Brook	No	No	No	No	No	No	No	No	No	No	No
CUL59 (37 Freeport Dr)	Sawmill Brook	No	No	No	No	No	No	No	No	No	No	No
CUL58 (35 Freeport Dr)	Sawmill Brook	No	No	No	No	No	No	No	No	No	No	No
CUL57 (34 Freeport Dr)	Sawmill Brook	No	No	No	No	No	No	No	No	No	No	No
CUL564 (13 Cresthaven Dr)	Sawmill Brook	No	No	No	No	No	No	No	No	No	No	No

CUL561 (1 Susan Ave)	Sawmill Brook	No	No	No	No	No	No	No	No	No	No	No
CUL560 (2 Susan Ave)	Sawmill Brook	No	No	No	No	No	No	No	No	No	No	No
CUL556 (2 Susan Ave)	Sawmill Brook	No	No	No	No	No	No	No	No	No	No	No
CUL76 (40 Mill St)	Sawmill Brook	No	No	No	No	No	No	No	No	No	No	No
CUL78 (41 Mill St)	Sawmill Brook	No	No	No	No	No	No	No	No	No	No	No
CUL413 (56 Chandler Rd)	Sawmill Brook Tributary	No	No	No	No	No	No	No	No	No	No	No
CUL414 (52 Chandler Rd)	Sawmill Brook Tributary	No	No	No	No	No	No	No	No	No	No	No
CUL441 (19 Town Line Rd)	Sawmill Brook Tributary	No	No	No	No	No	No	No	No	No	No	No
CUL82 (102 Locust St)	Maple Meadow Brook	No	No	No	No	No	No	No	No	No	No	No
CUL418 (4 Makechnie Rd)	Maple Meadow Brook	No	No	No	No	No	No	No	No	No	No	No
CUL419 (36 Locust St)	Maple Meadow Brook	No	No	No	No	No	No	No	No	No	No	No
CUL91 (7 Travers Ln)	Maple Meadow Brook	No	No	No	No	No	No	No	No	No	No	No
CUL632 (2 Shamrock Dr)	Maple Meadow Brook	No	No	No	No	No	No	No	No	No	No	No
4 Shamrock Dr	Maple Meadow Brook	No	No	No	No	No	No	No	No	No	No	No
91 Center St	Maple Meadow Brook	No	No	No	No	No	No	No	No	No	No	No
5 Margaret St	Maple Meadow Brook	No	No	No	No	No	No	No	No	No	No	No
161 Winn St	Maple Meadow Brook	No	No	No	No	No	No	No	No	No	No	No
28 Locust St	Maple Meadow Brook	No	No	No	No	No	No	No	No	No	No	No
4 McCafferty Way	Maple Meadow Brook	No	No	No	No	No	No	No	No	No	No	No
114 Winn St	Maple Meadow Brook	No	No	No	No	No	No	No	No	No	No	No
9 Birch St	Maple Meadow Brook	No	No	No	No	No	No	No	No	No	No	No
22 Peach Orchid Rd	Maple Meadow Brook	No	No	No	No	No	No	No	No	No	No	No
CUL421 (17 Winter St)	Halls Brook Tributary	No	No	No	No	No	No	No	No	No	No	No
CUL422 (7 Winter St)	Halls Brook Tributary	No	No	No	No	No	No	No	No	No	No	No
CUL587 (61 Peach Orchard Rd)	Halls Brook Tributary	No	No	No	No	No	No	No	No	No	No	No
CUL424 (51 Peach Orchard Rd)	Halls Brook Tributary	No	No	No	No	No	No	No	No	No	No	No
CUL565) 2 Lt. Litchfield Way	Halls Brook Tributary	No	No	No	No	No	No	No	No	No	No	No
1 Duncan Rd	Cummings Brook Tributary	No	No	No	No	No	No	No	No	No	No	No
CUL446 (3 Beacon St)	Cummings Brook Tributary	No	No	No	No	No	No	No	No	No	No	No
CUL445 (3 Beacon St)	Cummings Brook Tributary	No	No	No	No	No	No	No	No	No	No	No
CUL452 (11 Joesphine Ave)	Cummings Brook Tributary	No	No	No	No	No	No	No	No	No	No	No
CUL453 (10 Harriet Ave)	Cummings Brook Tributary	No	No	No	No	No	No	No	No	No	No	No
CUL458 (18 Harriet Ave)	Cummings Brook Tributary	No	No	No	No	No	No	No	No	No	No	No
CUL457 (31 Wildmere Ave)	Cummings Brook Tributary	No	No	No	No	No	No	No	No	No	No	No
CUL459 (1 Wildmere Ave)	Cummings Brook Tributary	No	No	No	No	No	No	No	No	No	No	No
CUL454 (29 Winn St)	Cummings Brook Tributary	No	No	No	No	No	No	No	No	No	No	No
CUL460 (29 Winn St)	Cummings Brook Tributary	No	No	No	No	No	No	No	No	No	No	No
CUL461 (28 Winn St)	Cummings Brook Tributary	No	No	No	No	No	No	No	No	No	No	No
CUL462 (11 Wyman St)	Cummings Brook Tributary	No	No	No	No	No	No	No	No	No	No	No
3 Ganley Dr	Little Brook	No	No	No	No	No	No	No	No	No	No	No
10 Ward St	Little Brook	No	No	No	No	No	No	No	No	No	No	No
CUL438 (33 Fieldstone Dr)	Little Brook	No	No	No	No	No	No	No	No	No	No	No

CUL570 (2 Derryfield Ave)	Little Brook	No	No	No	No	No	No	No	No	No	No	No
DStr163 (55 Cambridge St)	Little Brook	No	No	No	No	No	No	No	No	No	No	No
64 Cambridge St	Little Brook	No	No	No	No	No	No	No	No	No	No	No
DStr6132 (64 Cambridge St)	Little Brook	No	No	No	No	No	No	No	No	No	No	No
DStr6132(2) (64 Cambridge St)	Little Brook	No	No	No	No	No	No	No	No	No	No	No
DStr6133 (64 Cambridge St)	Little Brook	No	No	No	No	No	No	No	No	No	No	No
1 Burlington Mall Rd	Little Brook	No	No	No	No	No	No	No	No	No	No	No
DStr6572 (1 Burlington Mall Rd)	Little Brook	No	No	No	No	No	No	No	No	No	No	No
DStr6571 (1 Burlington Mall Rd)	Little Brook	No	No	No	No	No	No	No	No	No	No	No
DStr6607 (1 Burlington Mall Rd)	Little Brook	No	No	No	No	No	No	No	No	No	No	No
3 Burlington Woods Dr	Little Brook	No	No	No	No	No	No	No	No	No	No	No
CUL500 (3 Burlington Woods Dr)	Little Brook	No	No	No	No	No	No	No	No	No	No	No
CUL504 (33 B)	Little Brook	No	No	No	No	No	No	No	No	No	No	No
CUL446 (20 Wall St)	Little Brook	No	No	No	No	No	No	No	No	No	No	No
CUl623 (28 Cambridge St)	Little Brook	No	No	No	No	No	No	No	No	No	No	No
CUL467 (1 Oxbow Ln)	Little Brook	No	No	No	No	No	No	No	No	No	No	No
CUL567 (20 Oxbow Ln)	Little Brook	No	No	No	No	No	No	No	No	No	No	No
30 Ray Ave	Little Brook	No	No	No	No	No	No	No	No	No	No	No
10 Ray Ave	Little Brook	No	No	No	No	No	No	No	No	No	No	No
10 Ray Ave	Little Brook	No	No	No	No	No	No	No	No	No	No	No
DStr7241 (145 S Bedford St)	Little Brook	No	No	No	No	No	No	No	No	No	No	No
DStr7238 (145 S Bedford St)	Little Brook	No	No	No	No	No	No	No	No	No	No	No
DStr7232 (145 S Bedford St)	Little Brook	No	No	No	No	No	No	No	No	No	No	No
DStr7229 (145 S Bedford St)	Little Brook	No	No	No	No	No	No	No	No	No	No	No
DStr7230 (145 S Bedford St)	Little Brook	No	No	No	No	No	No	No	No	No	No	No

Presence/Absence Evaluation Criteria:

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

7.2 Dry Weather Manhole Inspections

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

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

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

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

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

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

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

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

For most catchments, manhole inspections will proceed from the outfall moving up into the system. However, the decision to move up or down the system depends on the nature of the drainage system and the surrounding land use and the availability of information on the catchment and drainage system. Moving up the system can begin immediately when an illicit discharge is detected at an outfall, and only a map of the storm drain system is required. Moving down the system requires more advance preparation and reliable drainage system information on the upstream segments of the storm drain system, but may be more efficient if the sources of illicit discharges are believed to be located in the

upstream portions of the catchment area. Once a manhole inspection methodology has been selected, investigations will continue systematically through the catchment.

Inspection of key junction manholes will proceed as follows:

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

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

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

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

7.3 Wet Weather Outfall Sampling

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

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

Wet weather outfall sampling will proceed as follows:

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

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

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

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

7.4 Source Isolation and Confirmation

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

- CCTV/Video Inspections
- Smoke Testing
- Dye Testing
- Sandbagging
- 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 DPW/Engineering Department will notify property owners in the affected area. Smoke testing notification will include reverse 911 and direct mailing for single family homes, businesses and building lobbies for multi-family dwellings.

7.4.1 CCTV/Video Inspection

This 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.

7.4.2 Smoke Testing

Smoke testing involves injecting non-toxic smoke into drain lines and noting the emergence of smoke from sanitary sewer vents in illegally connected buildings or from cracks and leaks in the system itself. Typically a smoke bomb or smoke generator is used to inject the smoke into the system at a catch basin or manhole and air is then forced through the system. Test personnel are place in areas where there are suspected illegal connections or cracks/leaks, noting any escape of smoke (indicating an illicit connection or damaged storm drain infrastructure). It is important when using this technique to make proper notifications to area residents and business owners as well as local police and fire departments.

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

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

7.4.3 Dye Testing

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

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

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

7.4.4 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.

7.4.5 Optical Brightener Monitoring

Optical brighteners are fluorescent dyes that are used in detergents and paper products to enhance their appearance. The presence of optical brighteners in surface waters or dry weather discharges suggests there is a possible illicit discharge or insufficient removal through adsorption in nearby septic systems or

wastewater treatment. Optical brightener monitoring can be done in two ways. The most common, and least expensive, methodology involves placing a cotton pad in a wire cage and securing it in a pipe, manhole, catch basin, or inlet to capture intermittent dry weather flows. The pad is retrieved at a later date and placed under UV light to determine the presence/absence of brighteners during the monitoring period. A second methodology uses handheld fluorometers to detect optical brighteners in water samples 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 Burlington will exercise its authority as necessary to require its removal. The annual report will include the status of IDDE investigation and removal activities including the following information for each confirmed source:

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

7.5.1 Confirmatory Outfall Screening

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

7.6 Ongoing Screening

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

8 Training

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

9 Progress Reporting

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

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

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

Appendix A

Legal Authority (IDDE Bylaw or Ordinance)

7.0 Illicit Discharges and Detection
7.1 Purpose/Intent

The purpose of this bylaw is to protect Burlington's water bodies and groundwater, and to safeguard the public health, safety, welfare and the environment through the regulation of non-storm water discharges to the storm drainage system to the maximum extent practicable as required by federal and state law. Increased and contaminated storm water runoff is a major cause of impairment of water quality and flow in lakes, ponds, streams, rivers, wetlands and groundwater; contamination of drinking water supplies; alteration or destruction of aquatic and wildlife habitat; and flooding.

This bylaw establishes methods for controlling the introduction of pollutants into the municipal separate storm sewer system (MS4) in order to comply with requirements of the National Pollutant Discharge Elimination System (NPDES) general permit. The objectives of this bylaw are:

1. To regulate the contribution of pollutants to the municipal separate storm sewer system (MS4) by storm water discharges by any user;
2. To prohibit Illicit Connections and Discharges to the municipal separate storm sewer system;
3. To require the removal of all such illicit connections;
4. To establish legal authority to carry out all inspection, surveillance and monitoring procedures necessary to ensure compliance with this bylaw; and
5. To establish the legal authority to ensure compliance with the provisions of this bylaw through inspection, monitoring, and enforcement.

7.2 Definitions

For the purposes of this bylaw, the following shall mean:
AUTHORIZED ENFORCEMENT AGENCY: The Board of Health and its Agents are designated to enforce this bylaw. Solely for the purposes of enforcing this bylaw, Agents of this Board includes the Director of Public Health, Health Agent, Environmental Engineer, Town Engineer, the Superintendent of Public Works, and the Inspector of Buildings.
BEST MANAGEMENT PRACTICE (BMP): An activity, procedure, restraint, or structural improvement that helps to reduce the quantity or improve the quality of storm water runoff. It also includes schedules of activities, prohibitions of practices, general good house keeping practices, pollution prevention and educational practices, maintenance procedures, and other management practices to prevent or reduce the discharge of pollutants directly or indirectly to storm water, receiving waters, or storm water conveyance systems.
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.
HAZARDOUS MATERIALS AND WASTES: Any liquid, gaseous, solid or radioactive, material, including any substance, waste, or combination thereof, which because of its quantity and/or concentration of the material and/or of its constituents, or physical, chemical, or infectious characteristics may cause, or significantly contribute to, a substantial present or potential hazard to human health, safety, property, or the environment when improperly treated, stored, transported, disposed of, or otherwise managed. Hazardous materials and wastes shall include without limitation:
1. paints, varnishes, and solvents;
2. oil and other automotive fluids;
3. 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;
7. dissolved and particulate metals;
8. animal wastes;
9. rock, sand, salt, soils;
10. construction wastes and residues;
11. industrial or commercial waste,
12. runoff, leachate, heated effluent; and
13. noxious or offensive matter of any kind.

ILLICIT CONNECTION: A surface or subsurface drain or conveyance, which allows an illicit discharge into the municipal storm drain system, including without limitation sewage, process wastewater, or wash water and any connections from indoor drains, sinks, or toilets, regardless of whether said connection was previously allowed, permitted, or approved before the effective date of this bylaw. An illicit connection is any conveyances which allow any non-storm water discharge including sewage, process wastewater, and wash water to enter the storm drain system and any connections to the storm drain system from indoor drains and sinks, regardless of whether said drain or connection had been previously allowed, permitted, or approved by an authorized enforcement agency.
ILLICIT DISCHARGE: Direct or indirect discharge to the municipal storm drain system that is not composed entirely of storm water, except as exempted in Section 7.8. The term does not include a discharge in compliance with an NPDES Storm Water Discharge Permit or a Surface Water Discharge Permit, or resulting from fire fighting activities exempted pursuant to Section 7.8 of this bylaw.
IMPERVIOUS SURFACE: Any material or structure on or above the ground that prevents water infiltrating the underlying soil. Impervious surface includes without limitation roads, paved parking lots, sidewalks, and rooftops.
INDUSTRIAL ACTIVITY: Activities subject to NPDES Industrial Permits as defined in 40 CFR, Section 122.26 (b)(14).
MUNICIPAL SEPARATE STORM SEWER SYSTEM (MS4) or MUNICIPAL STORM DRAIN SYSTEM: The system of conveyances designed or used for collecting or conveying storm water, including any road with a drainage system, street, gutter, curb, inlet, piped storm drain, pumping facility, retention or detention basin, natural or man-made or altered drainage channel, reservoir, and other drainage structure that together comprise the storm drainage system owned or operated by the Town of Burlington.
NATIONAL POLLUTANT DISCHARGE ELIMINATION SYSTEM (NPDES) STORM WATER DISCHARGE PERMIT: A permit issued by United States Environmental Protection Agency or jointly with the State that authorizes the discharge of pollutants to waters of the United States.
NON-STORM WATER DISCHARGE: Discharge to the municipal storm drain system not composed entirely of storm water.

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 hazardous materials, hazardous wastes or sewage from residential, agricultural, industrial or commercial sources whether originating at point or non-point sources, that is or may be introduced into the storm water system of the Town of Burlington. Pollutants, for the purposes of this bylaw, include (but not limited to) dredged soil, solid waste, incinerator residue, garbage, wastewater, wastewater sludge, chemical waste, biological materials, radioactive materials, rock, sand, dust, industrial waste, sediment, nutrients, toxic substance, pesticide, herbicide, trace metal, automotive fluid, petroleum-based substance, and oxygen-demanding material.
PREMISES: Any building, lot, parcel of land, or portion of land whether improved or unimproved.
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.
SEWAGE: The waste and wastewater produced by residential and commercial sources and discharged into sewers. A substance that contains the waste products or excrement or other discharge from the bodies of human beings or animals. Sewage contains pathogens and fecal coliform that is harmful to the public health, to animal or aquatic life or to the use of water for domestic water supply or for recreation.
STORM DRAINAGE SYSTEM: Publicly-owned facilities by which storm water is collected and/or conveyed, including but not limited to any roads with drainage systems, municipal streets, gutters, curbs, inlets, piped storm drains, pumping facilities, retention and detention basins, natural and human-made or altered drainage channels, reservoirs, and other drainage structures.
STORM WATER: Storm water runoff, snow melt runoff, and surface water runoff and drainage.
SURFACE WATER DISCHARGE PERMIT. A permit issued by the Department of Environmental Protection (DEP) pursuant to 314 CMR 3.00 that authorizes the discharge of pollutants to waters of the Commonwealth of Massachusetts.
STORM WATER POLLUTION PREVENTION PLAN: A document which describes the Best Management Practices and activities to be implemented by a person or business to identify sources of pollution or contamination at a site and the actions to eliminate or reduce pollutant discharges to Storm water, Storm water Conveyance Systems, and/or Receiving Waters to the Maximum Extent Practicable.
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.

7.3 Applicability

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

7.4 Authority

This bylaw is adopted under the authority granted by the Home Rule Amendment of the Massachusetts Constitution and the Home Rule Procedures Act and G.L. c. 83, Sect. 1 and Sect. 10, as amended by St. 2004, c. 149, sections 135 - 140, and pursuant to the regulations of the Federal Clean Water Act found at 40 CFR 122.34.

7.5 Responsibility for Administration

The Board of Health and its Agents shall administer, implement and enforce this bylaw. Any powers granted to or duties imposed upon these Boards may be delegated in writing by these Boards to persons or entities acting in the beneficial interest of or in the employ of these agencies.

7.6 Regulations

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

7.7 Prohibited Activities

A. Prohibition of Illegal Discharges. No person shall discharge or cause to be discharged into the municipal storm drain system or watercourses any materials, including but not limited to pollutants or waters containing any pollutants or non-storm water discharge that cause or contribute to a violation of applicable water quality standards, other than storm water into the municipal separate storm sewer system (MS4), into a watercourse, or into the waters of the Commonwealth.

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

C. Obstruction of Municipal Storm Drain System. No person shall obstruct or interfere with the normal flow of storm water into or out of the municipal storm drain system without prior written approval from the Board of Health.

7.8 Exemptions

Discharges from fire-fighting activities are exempt from the provisions of this bylaw, except when fire water has accumulated and is contaminated with hazardous materials. If such determination has been made, then disposition of such water shall be made by the Board of Health or its Agents.

The following non-storm water discharges or flows are exempt from the prohibition of non-storm waters 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;
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) and the pool is drained in such a way as not to cause a nuisance;
12. Dye testing, provided verbal notification is given to the Board of Health prior to the time of the test;
13. Non-storm water discharge permitted under an NPDES permit or a Surface Water Discharge Permit, waiver, or waste discharge order administered under the authority of the United States Environmental Protection Agency or the Department of Environmental Protection, provided that the discharge is in full compliance with the requirements of the permit, waiver, or order and applicable laws and regulations; and
14. Discharge for which advanced written approval is received from the Board of Health as necessary to protect public health, safety, welfare or the environment.

7.9 EMERGENCY SUSPENSION OF STORM DRAINAGE SYSTEM ACCESS

A. Suspension due to Illicit Discharges in Emergency Situations. The Board of Health and its Agents designated to enforce this bylaw may, without prior notice, suspend MS4 discharge access to a person when such suspension is necessary to stop an actual or threatened discharge which presents or may present imminent and substantial danger to the environment, or to the health or welfare of persons, or to the MS4 or Waters of the United States. If the violator fails to comply with a suspension order issued in an emergency, the authorized enforcement agency may take such steps as deemed necessary to prevent or minimize damage to the MS4 or Waters of the United States, or to minimize danger to persons.

B. Suspension due to the Detection of Illicit Discharge. Any person discharging to the MS4 in violation of this bylaw may have their MS4 access terminated if such termination would abate or reduce an illicit discharge. The authorized enforcement agency will notify a violator of the proposed termination of its MS4 access. The violator may petition the Board of Health for a reconsideration and hearing.

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

7.10 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 Board of Health and its Agents designated to enforce this bylaw prior to the allowing of discharges to the MS4.

7.11 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 (as defined in 310 CMR 40.0352 and 310 CMR 40.1600) 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 and Board of Health. In the event of a release of non-hazardous material, the reporting person shall notify the Board of Health no later than the next business day. The reporting

person shall provide to the Board of Health written confirmation of all telephone, facsimile or in-person notifications within three business days thereafter. If the discharge of prohibited materials is from a commercial or industrial facility, the facility owner or operator of the facility shall retain on-site a written record of the discharge and the actions taken to prevent its recurrence. Such records shall be retained for at least three years.

7.12 ENFORCEMENT

The Board of Health and its Agents shall enforce this bylaw, regulations, orders, violation notices, and enforcement orders, and may pursue all civil and criminal remedies for such violations as noted below:

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

B. Orders. The Board of Health and its Agents designated to enforce this bylaw may issue a written order to enforce the provisions of this bylaw or the regulations thereunder.

Orders of this Board 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.

The issuance of an enforcement order by a Board of Health Agent without a prior vote of the Board of Health to address conditions that require immediate attention, is subject to ratification by the Board of Health at its next regularly scheduled meeting.

The party responsible for completing monitoring, abatement or remediation must contract a person licensed to conduct such work, as necessary. During and upon completion of the work, the professional opinion of this licensed person and a final report will be required to be submitted to the Board of Health in summary and certification of said work being accomplished.

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 of Burlington may, at its option, seek a court order requiring the property owner to perform the work.

C. Criminal Penalty. Any person who violates any provision of this bylaw, regulation, order or permit issued thereunder, shall be punished by a fine. Each day or part thereof that such violation occurs or continues shall constitute a separate offense.

D. Non-Criminal Disposition. As an alternative to criminal prosecution or civil action, the Town of Burlington may elect to utilize the non-criminal disposition procedure set forth in G.L. Ch. 40, S21D in which case the Environmental Engineer is authorized to be the enforcing person designated to issues non-criminal disposition penalties. The penalty for the 1st violation shall be $100. The penalty for the 2nd violation shall be $300. The penalty for the 3rd and subsequent violations shall be $300 each day or part thereof that such violation occurs or continues shall constitute a separate offense.

E. Appeals. The enforcement decisions or orders of the Board of Health and its Agents shall be final unless modified or reversed in a public meeting of the Board of Health. Persons aggrieved by an enforcement action by the Board of Health and/or its Agents designated to enforce this bylaw may request a public meeting with the Board of Health within 7 days of written enforcement action to review the circumstances and decisions related to the enforcement action. At this hearing, any affected party has the right to appear, and have the right to inspect and obtain copies of all relevant inspection and investigation reports, orders, notices, and other documentary evidence. If further relief by aggrieved persons is desired, such relief shall be to a court of competent jurisdiction.

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

7.13 MONITORING OF DISCHARGES

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

B. Access to Facilities. Access to facilities shall be governed by the following:

1. To the extent permitted by state law and if probable cause exists, or if authorized by the owner or other party in control of property which is not permitted with an NPDES Permit, the Board of Health and its Agents may enter upon privately owned property for the purpose of performing their duties under this bylaw and regulations and may make or cause to be made such examinations, surveys or sampling as the Board of Health deems reasonably necessary. 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. Under the conditions for access stated in Part (a) above, facility operators shall allow the Board of Health and its Agents designated to enforce this bylaw, ready access to all parts of the premises for a facility not already regulated with a NPDES Permit for the purposes of inspection, sampling, examination and copying of records relating to the discharge of storm water that may contain sewage, hazardous materials or wastes, or other pollutants, and the performance of any additional duties as defined by state and federal law. For NPDES permit holders, the Town of Burlington will contact the appropriate U.S. Environmental Protection Agency enforcing agents to inform them of suspected violations of an NPDES permit for discharges from that facility.

3. The Board of Health and its Agents designated to enforce this bylaw shall have the right to set up on any non-NPDES 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 Board of Health and its Agents designated to enforce this bylaw has the right to require the discharger to install monitoring equipment as necessary. The facility's sampling and monitoring equipment shall be maintained at all times in a safe and proper operating condition by the discharger at its own expense. All devices used to measure storm water flow and quality shall be calibrated to ensure their accuracy.

5. Any temporary or permanent obstruction to safe and easy access to the facility to be inspected and/or sampled shall be promptly removed by the operator at the written or oral request of the Board of Health and its Agents designated to enforce this bylaw and shall not be replaced. The costs of clearing such access shall be borne by the operator.

6. If the Board of Health and its Agents designated to enforce this bylaw 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 bylaw, 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 bylaw 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.

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

The Board of Health designated to enforce this bylaw may adopt requirements identifying Best Management Practices for any activity, operation, or non-NPDES permitted facility which may cause or contribute to pollution or contamination of storm water, the storm drain system, or waters of the U.S.

Further, any person responsible for a property or premise, which is, or may be, the source of an illicit discharge, may be required to implement, at said person's expense, additional structural and non-structural BMPs to prevent the further discharge of pollutants to the municipal separate storm sewer system.

For NPDES permitted facilities, compliance with all terms and conditions of a valid NPDES permit authorizing the discharge of storm water associated with industrial activity, to the extent practicable, shall be deemed compliance with the provisions of this section. In the event that the Board of Health determines that additional BMPs may be required for NPDES permitted facilities, the Board of Health may at its option, ask for EPA to review the terms of the facility's NPDES permit to determine if additional best management practices may be required.

In the event that said person responsible for a non-NPDES property or premise, believes that said compliance with additional BMPs is not required, the Board of Health may issue an enforcement order requiring such compliance. If said person refuses to comply with such order for implementing additional BMPs, then the Town of Burlington may seek a court order requiring such implementation.

Compliance with this bylaw, its regulations or BMPs, or policies promulgated under this bylaw does not imply that there will be no contamination, pollution, nor unauthorized discharge of pollutants. Compliance with this bylaw, its regulations or BMPs, or policies promulgated under this bylaw also does not relieve a person from being subject to such enforcement actions as may be required to correct contamination, pollution, and/or unauthorized discharge of pollutants.

7.15 COMPENSATORY ACTION

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

7.16 SEVERABILITY

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

7.17 TRANSITIONAL PROVISIONS

Residential property owners shall have 60 days from the effective date of the bylaw to comply with its provisions provided good cause is shown for the failure to comply with the bylaw during that period.

7.18 REMEDIES NOT EXCLUSIVE

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

Note: Amended Art. 8 TM 9/25/06. App. AG 10/31/06. Posted 11/20/06.

Appendix B

Storm System Mapping

The stormwater system map for Burlington is found here:

http://cms2.revize.com/revize/burlingtonma/TFH-NPDES_DrainMap2-Proj.pdf

Appendix C

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

Town of Burlington

BURLINGTON DRY WEATHER OUTFALL SAMPLE COLLECTION FIELD SHEET

Section 1: Background Data

Subwatershed:	Outfall ID:	
Today's date:	Time:	
Investigators:	Form completed by:	
Temperature (Air):	Rainfall (in.) last 24 hours:	
Photo of Outfall taken: ☐ Yes ☐ No Photo #s:	Longitude:	Latitude:
Description (e.g.., initial sampling, follow up sampling, whether dry weather or wet weather sampling):		

Section 2: Outfall Description

WATER FLOW ONLY	
Flow Description	☐ No Discernible Flow ☐ Trickle ☐ Moderate ☐ Substantial

Section 3: Water Quality & Other Physical Indicators

INDICATOR	DESCRIPTION
Turbidity	☐ Clear ☐ Cloudy
Color	☐ Clear ☐ Gray ☐ Light Tea ☐ Light Green ☐ Tea ☐ White ☐ Other:
Odor	☐ None ☐ Musty ☐ Fishy ☐ Oily ☐ Organic ☐ Sewage ☐ Rotten Eggs
Floatables (Does Not Include Trash!)	☐ Sewage or Sanitary Waste ☐ Foam or Suds ☐ Oily Sheen
Deposits/Stains	☐ No Deposits or Stains ☐ Excessive Sediment ☐ Oil or Grease ☐ Foam ☐ Orange Staining ☐ Other:
Vegetation or Benthic Growth	☐ No Issues Noted ☐ Excessive Vegetation, Algae and/or Bacteria in Outfall ☐ Surrounding Vegetation Distressed

Section 4: Quantitative Characterization

FIELD DATA FOR FLOWING OUTFALLS			
PARAMETER	**RESULT**	**UNIT**	**EQUIPMENT**
Ammonia		mg/L	Test strip
Chlorine		mg/L	Colorimeter
Conductivity		µmhos/cm	YSI meter
Salinity		ppt	YSI meter or Refractometer
Surfactants		mg/L	Test kit
Temperature		°F	YSI meter or Thermometer
E. coli/Fecal Coliform	Sample for lab? ☐ Yes ☐ No		
Total Phosphorus	Sample for lab? ☐ Yes ☐ No		

Section 5: Comments (include sample location if outside outfall) or unusual flow observations

BURLINGTON WET WEATHER OUTFALL SAMPLE COLLECTION FIELD SHEET

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

Inspector: _____

Time of Inspection: _____

Street Name _____

Last rainfall event _____

WET WEATHER OUTFALL INSPECTION SURVEY

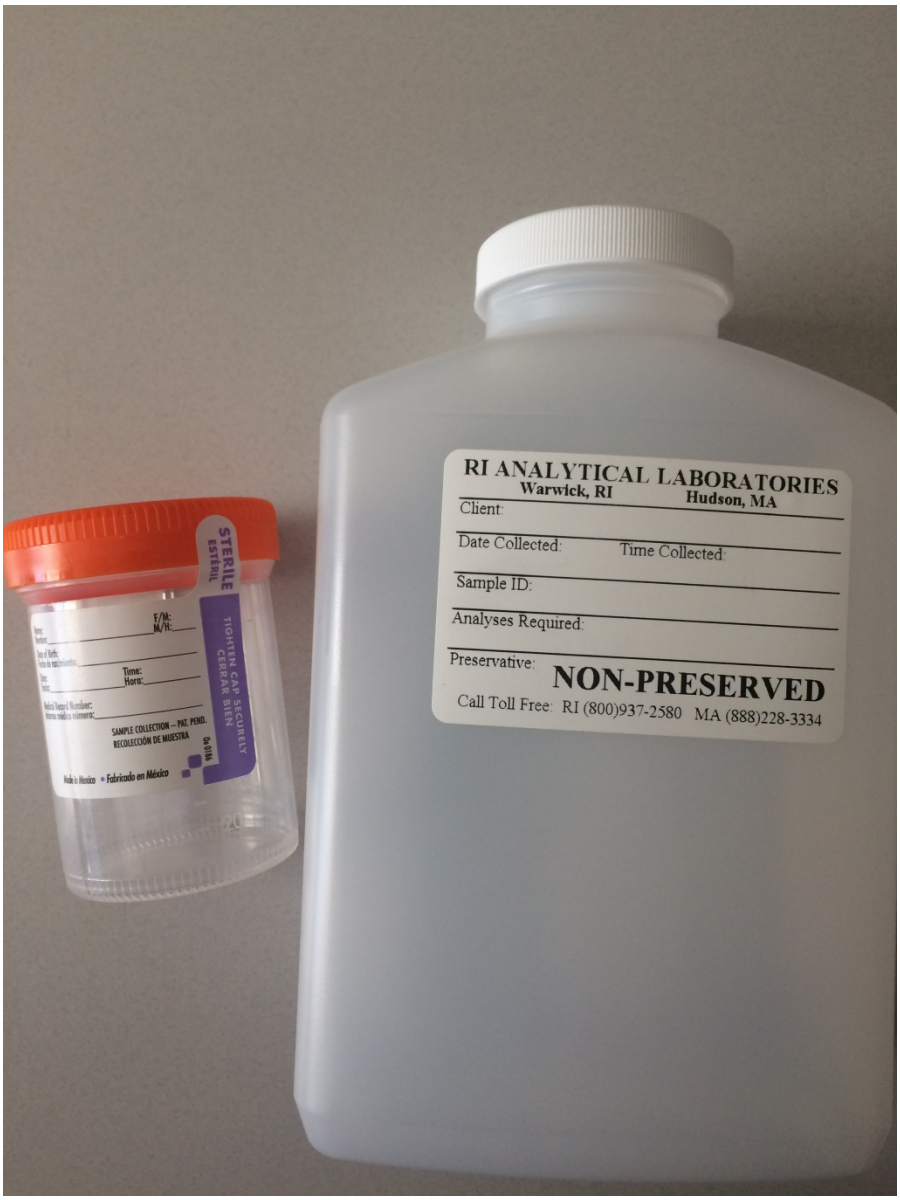
Visual Inspection:	Yes	No	Comments (Include probable source of observed contamination):
Color	☐	☐	
Odor	☐	☐	
Turbidity	☐	☐	
Excessive Sediment	☐	☐	
Sanitary Waste	☐	☐	
Pet Waste	☐	☐	
Floatable Solids	☐	☐	
Oil Sheen	☐	☐	
Bacterial Sheen	☐	☐	
Foam	☐	☐	
Algae	☐	☐	
Orange Staining	☐	☐	
Excessive Vegetation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

Sample labels for Surfactant and E coli testing:



Sample Chain of Custody Form – RI Analytical

R.I. ANALYTICAL
Specialists in Environmental Services

CHAIN OF CUSTODY RECORD

41 Illinois Avenue
Warwick, RI 02888-3007
800-937-2580 • Fax: 401-738-1970

131 Coolidge St., Suite 105
Hudson, MA 01749-1331
800-937-2580 • Fax: 978-568-0078

Date Collected	Time Collected	Field Sample Identification	Grab or Composite	# of Containers & Type [C]	Preservation Code [P]	Matrix Code [M]	E.coli	Surfactants
6/26/18	9:57	CuL S6	G	1P	NP	SW		X
	9:57	CuL 56	G	ST	NP	SW	X	
6/26/18	10:32	CuL 170	G	1P	NP	SW		X
	10:32	CuL 170	G	ST	NP	SW	X	
6/26/18	10:35	B1 Mill	G	1P	NP	SW		X
	10:35	B1 Mill	G	ST	NP	SW	X	
6/26/18	10:57	CuL 200	G	1P	NP	SW		X
	10:57	CuL 200	G	ST	NP	SW	X	
6/26/18	11:13	CuL 594	G	1P	NP	SW		X
	11:13	CuL 594	G	ST	NP	SW	X	
6/26/18	11:56	CuL 202	G	1P	NP	SW		X
	11:55	CuL 202	G	ST	NP	SW	X	
				12				

Coliform Analyzed in Hudson

Client Information			Project Information		
Company Name:	Town Of Burlington Conservation Department		Project Name:	Storm Water 2018	
Address:	25 Center St		P.O. Number:		Project Number:
City / State / Zip:	Burlington MA 01803		Report To:	Eileen Coleman	Phone: / Fax
Telephone:	781-270-1655	Fax:	Sampled by:	David Stuczynski	Email report to these addresses: ecoleman@burlington.org
Contact Person:	Eileen Coleman		Quote No:		

Relinquished By Signatures	Date	Time	Received By Signatures	Date	Time
David Stuczynski	6/26/18	13:30		6/26/18	13:30
	6/26/18	1540		6/26/18	1540
	6/26/18	1600	RL	6-26-18	1600 1755

RECD 6-26-18 @ 1755

Turn Around Time

	Normal		EMAIL Report
	5-7 Business days		
	Rush – Date Due: ___/___/___		

Pages 5 of 5

Project Comments

Circle if applicable: GW-1, GW-2, GW-3, S-1, S-2, S-3 MCP Data Enhancement QC Package? Yes No

S-1

Temp. Upon Receipt 3.1 °C

Lab Use Only

✓	Sample Pick Up Only
	RIAL sampled; attach field hours
✓	Shipped on ice
	Workorder No: 1806 13388

Containers: P=Poly, G=Glass, AG=Amber Glass, V=Vial, St=Sterile Preservatives: A=Ascorbic Acid, NH4=NH_4Cl, H=HCl, M=MeOH, N=HNO_3, NP=None, S=H_2SO_4, SB=$NaHSO_4$, SH=NaOH, T=$Na_2S_2O_3$, Z=ZnOAc
Matrix Codes: GW=Groundwater, SW=Surface Water, WW=Wastewater, DW=Drinking Water, S=Soil, SL=Sludge, A=Air, B=Bulk/Solid, WP=Wipe, O=_____

CMRSWC

BURLINGTON CATCH BASIN INSPECTION SHEET

BURLINGTON

Job No.: _____ **Town:** _____

Inspector: _____ **Date:** _____

CATCH BASIN INSPECTION FORM

Catch Basin I.D.	_____	**Final Discharge from Structure?** Yes ☐ No ☐ **If Yes, Discharge to Outfall No:** _____	
Catch Basin Label:	**Stencil** ☐ **Ground Inset** ☐ **Sign** ☐ **None** ☐ **Other** _____		
Basin Material:	Concrete ☐ Corrugated metal ☐ Stone ☐ Brick ☐ Other: _____ ☐	**Catch Basin Condition:**	Good ☐ Poor ☐ Fair ☐ Crumbling ☐
Pipe Material:	Concrete ☐ HDPE ☐ PVC ☐ Clay Tile ☐ Other: _____	**Pipe Measurements:**	Inlet Dia. (in): d= ____ Outlet Dia. (in): D= ____

Required Maintenance/ Problems (check all that apply):

- ☐ Tree Work Required
- ☐ New Grate is Required
- ☐ Pipe is Blocked
- ☐ Frame Maintenance is Required
- ☐ Remove Accumulated Sediment
- ☐ Pipe Maintenance is Required
- ☐ Basin Undermined or Bypassed
- ☐ Cannot Remove Cover
- ☐ Ditch Work
- ☐ Corrosion at Structure
- ☐ Erosion Around Structure
- ☐ Remove Trash & Debris
- ☐ Need Cement Around Grate

Other: _____

Catch Basin Grate Type :	**Sediment Buildup Depth :**	**Description of Flow:**	**Street Name/ Structure Location:**
Bar: ☐ Cascade: ☐ Other: _____ Properly Aligned: Yes ☐ No ☐	0-6 (in): ____ 6-12(in): ____ 12-18 (in): ____ 18-24 (in): ____ 24 + (in): ____	Heavy ☐ Moderate ☐ Slight ☐ Trickling ☐	

***If the outlet is submerged check yes and indicate approximate height of water above the outlet invert.** h above invert (in):___	Yes ☐	No ☐

☐ **Flow** ☐ **Standing Water** **(check one or both)**	**Observations:**		**Circle those present:**
	Color:		Foam / Oil Sheen
	Odor:		Sanitary Waste / Bacterial Sheen
Weather Conditions :	Dry > 24 hours ☐	Wet ☐	Orange Staining / Floatables
Sample of Screenings Collected for Analysis? Yes ☐ No ☐			Excessive sediment / Pet Waste
Comments:			Other: _____ / Optical Enhancers

Appendix D

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

Quick Reference Guide for Sampling Procedure

Step 1. Collect water sample

- Select a sample location as close to the pipe as possible.
- Submerge dipper 6 inches below water surface (if possible) to fill dipper, then pour out water on bank. This is to rinse the dipper.
- Submerge dipper 6 inches below water surface again to retrieve sample.
- Work together to fill sample bottles using the dipper container.

Step 2. Conduct ammonia test

- Rinse 1 sample vial from the ammonia sample kit by filling it with water (stream water is OK), capping with thumb, inverting, and then disposing of rinse water. Repeat.
- Fill 1 sample vial from the ammonia sample kit to top line (marked in red) with water.
- Dip 1 ammonia sample strip into water sample. Vigorously move the strip up and down in the water sample for 30 seconds, making sure both pads are always submerged. See photo 3.
- Remove the test strip and shake off excess water.
- Hold the test strip level, with pad side up, for 30 seconds. See photo 4.
- To read results, turn test strip over so that both pads are facing away from you.
- Compare the color of the small pad to the color chart on the back of the test strip bottle. Read the result through the clear plastic of the test strip. See photo 5.
- Dispose of sample on ground; rinse sample vial with water (stream water is OK) after each use.
- Record results on data sheet.


P3


P4

Step 3. Assess water clarity, color, and odor

- Visually assess water for clarity (clear or cloudy) using best judgment.
- Visually assess water color using best judgment.
  Hold dipper with sample water up against white paper to see color.
- Waft air over water sample towards nose to assess odor using best judgment.
- Record results on data sheet.

PROCEDURE FOR FREE CHLORINE WITH THE COLORIMETER

(instructions provided with Hach Colorimeter)

Chlorine, Free and Total, Low Range DOC316.53.01450
USEPA DPD Method1 Method 8021 (free) 8167 (total)
0.02 to 2.00 mg/L Cl2 (LR) Powder Pillows or AccuVac® Ampuls
Scope and application: For testing residual chlorine and chloramines in water, wastewater, estuary water and seawater; USEPA-accepted for reporting for drinking and wastewater analyses.2 This product has not been evaluated to test for chlorine and chloramines in medical applications in the United States.
1 Adapted from Standard Methods for the Examination of Water and Wastewater.
2 Procedure is equivalent to USEPA and Standard Method 4500-Cl G for drinking water and wastewater analysis.

Test preparation
Before starting
Analyze the samples immediately. The samples cannot be preserved for later analysis.
Always do tests in sample cells or AccuVac© Ampuls. Do not put the instrument in the sample or pour the sample into the cell holder.
Make sure that the sample cells are clean and there are no scratches where the light passes through them.
Rinse the sample cell and cap with the sample three times before the sample cell is filled.
Make sure that there are no fingerprints or liquid on the external surface of the sample cells or AccuVac© Ampuls. Wipe with a lint-free cloth before measurement.
Cold waters can cause condensation on the sample cell or bubbles in the sample cell during color development. Examine the sample cell for condensation or bubbles. Remove condensation with a lint-free cloth. Invert the sample cell to remove bubbles.
Install the instrument cap over the cell holder before ZERO or READ is pushed.
After the test, immediately empty and rinse the sample cell. Rinse the sample cell and cap three times with deionized water.
Do not use the same sample cells for free and total chlorine. If trace iodide from the total chlorine reagent is carried over into the free chlorine determination,monochloraminewill interfere. It is best to use separate, dedicated sample cells for free and total chlorine measurements.
If the test result is over-range, or if the sample temporarily turns yellow after the reagent addition, dilute the sample with a known volume of high quality, chlorine demand-free water and do the test again. Some loss of chlorine may occur due to the dilution. Multiply the result by the dilution factor. Additional methods are available to measure chlorine without dilution.
For the best results, measure the reagent blank value for each new lot of reagent. Replace the sample with deionized water in the test procedure to determine the reagent blank value. Subtract the reagent blank value from the sample results.

Review the Safety Data Sheets (MSDS/SDS) for the chemicals that are used. Use the recommended personal protective equipment.
Dispose of reacted solutions according to local, state and federal regulations. Refer to the Safety Data Sheets for disposal information for unused reagents. Refer to the environmental, health and safety staff for your facility and/or local regulatory agencies for further disposal information.

Items to collect
Powder pillows
Description Quantity
Chlorine, Free: DPD Free Chlorine Reagent Powder Pillows, 10-mL 1
Chlorine, Total: DPD Total Chlorine Reagent Powder Pillows, 10-mL 1
Sample cells, 25-mm (10 mL) 2
Sample collection
• Analyze the samples immediately. The samples cannot be preserved for later analysis.

• Chlorine is a strong oxidizing agent and is unstable in natural waters. Chlorine reacts quickly with various inorganic compounds and more slowly with organic compounds. Many factors, including reactant concentrations, sunlight, pH, temperature and salinity influence the decomposition of chlorine in water.
• Collect samples in clean glass bottles. Do not use plastic containers because these can have a large chlorine demand.
• Pretreat glass sample containers to remove chlorine demand. Soak the containers in a weak bleach solution (1 mL commercial bleach to 1 liter of deionized water) for at least 1 hour. Rinse fully with deionized or distilled water. If sample containers are rinsed fully with deionized or distilled water after use, only occasional pretreatment is necessary.
• Make sure to get a representative sample. If the sample is taken from a spigot or faucet, let the water flow for at least 5 minutes. Let the container overflow with the sample several times and then put the cap on the sample container so that there is no headspace (air) above the sample.

Chlorine, Free and Total, LR (0.02 to 2.00 mg/L)
Powder pillow procedure
1. Set the instrument to low range (LR). Refer to the instrument documentation.
2. Prepare the blank: Fill a sample cell to the 10-mL mark with sample. Close the sample cell.
3. Clean the blank sample cell.
4. Insert the blank into the cell holder. Point the diamond mark on the sample cell toward the keypad.
5. Install the instrument cap over the cell holder.
6. Push **ZERO**. The display shows "0.00".
7. Remove the sample cell from the cell holder.
8. Prepare the sample: Fill a second sample cell to the 10-mL mark with sample.
9. Add one 10-mL DPD Free Chlorine Reagent Powder Pillow or one 10-mL DPD Total Chlorine Reagent Powder Pillow to the second sample cell.
10. Close the sample cell. Shake the sample cell for about **20 seconds** to dissolve the reagent. Undissolved power will not affect accuracy. A pink color will show if chlorine is in the sample.
11. Clean the prepared sample cell.
12. Free chlorine measurement: Within 1 minute of the reagent addition, insert the prepared sample into the cell holder. Point the diamond mark on the sample cell toward the keypad. Go to step 15.

Chlorine, Free and Total, LR (0.02 to 2.00 mg/L)
13. Set and start a timer for 3 minutes. A 3-minute reaction time starts.
14. Total chlorine measurement: After 3 minutes and within 6 minutes of the reagent addition, insert the prepared sample into the cell holder. Point the diamond mark on the sample cell toward the keypad.
15. Install the instrument cap over the cell holder.
16. Push **READ**. Results show in mg/L Cl2.

TAKING MEASUREMENTS AND STORING DATA WITH THE YSI

1. Press  to turn the instrument on. The instrument will be in Run mode and begin sampling but not recording.
2. To begin recording, insert the entire probe past the orange marker. Shake the probe in the sample to release any air bubbles and wait until the temperature and DO stabilize. The YSI will beep and the **AS** symbol next to the DO readings will be solid once it has stabilized.
3. To begin recording data on the YSI, highlight **Log One Sample** and press ENTER. **Log One Sample** is already highlighted when the instrument is turned on. A submenu will open at the top of the screen. Highlight **Sites** and press ENTER**.** Select the outfall to be sampled and press ENTER. Then highlight **Folders** and select the subwatershed and press ENTER.
4. Then highlight **Log Now** and press ENTER. If there is no flow, gently move the probe in a stirring motion to provide movement for measuring DO.
5. The instrument will confirm that the data point was logged successfully on the YSI, with a beep and solid **AS** symbol next to the DO and SPC readings.
6. Record the Temp. (°F), DO (mg/L), and Conductivity (µS/cm) on the Sample Collection data sheet. Once sampling is complete remove the probe from the water and turn off the instrument. Then lightly shake off the probe to remove excess water. Place the transport sleeve over the probe and return the instrument to the carrying case.

Appendix E

IDDE Employee Training Record

Illicit Discharge Detection and Elimination (IDDE)
Employee Training Record

Burlington, Massachusetts

Date of Training: **October 17 and 18, 2018**

Duration of Training: **30 minutes each day**

Subject Matter: **Stormwater & Wetlands Impacts**

Name	*Departments represented*
Mike Rose	Water and Sewer
Chris Lavoie	Highway
Robert MacMahon	Highway
Chuck Woods	Water and Sewer
Rich Lembo	Highway
Don McNeill	Water and Sewer
Kevin Keene	Highway
Ricky McClenningham	Highway
Rachel Caplan	DPW Office
Matt Davis	Water and Sewer
Aaron Chase	Water and Sewer
Ken Ganley	Water and Sewer
Mike Desmone	Highway
Dan Matarazzo	Highway
Michael Giulina	Highway
Paul Bieren	Water and Sewer
Mike Murphy	Highway
Pat Duran	Highway
Rachel Caplan	DPW Office

Illicit Discharge Detection and Elimination (IDDE)
Employee Training Record

Burlington, Massachusetts

Date of Training: **April 22, 25 and 29, 2019**

Duration of Training: **10 minutes each session**

Subject Matter: **Guide to Illicit Discharges**

Name	*Departments represented*
Thomas Harrington **Reid** **Lembo** **Michael Desimone** **Michael Murphy** **Michael Giardina** **Chris hayes** **Mike McCarthy** **Chris Lavole** **Ricky McClenningham** **Kevin Keene** **Bob McMahon**	DPW/Highway
Matt Davis **Aaron Chase** **Kyle Lebrecht** **Ken Ganley** **Chuck Woods** **Don McNeil** **Mike Rose**	DPW/Water and Sewer

Paul Bieren	
Anthony Repucci **Brian White** **Thomas Hayes** **Stephen Hildreth** **Tim Mazzone** **Lisa Mattarazzo** **Rachel Caplan**	DPW Office

Appendix F

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

SOP 1: 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. SOP 2, "Wet Weather Outfall Inspection", covers the objectives of that type of inspection. This 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 13, "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.

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 indictor 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.

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.

Attachments

- Burlington Outfall Reconnaissance & Inventory Field Sheet
- Burlington Outfall sample Collection Field Sheet

Related Standard Operating Procedures

- SOP 2, Wet Weather Outfall Inspection
- SOP 10, Locating Illicit Discharges
- SOP 13, Water Quality Screening in the Field

Town of Burlington

BURLINGTON OUTFALL RECONNAISSANCE & INVENTORY FIELD SHEET

Section 1: Background Data

Subwatershed:	Outfall ID:	
Today's date:	Time:	
Investigators:	Form completed by:	
Temperature (Air):	Rainfall (in.) last 24 hours:	
Photo of Outfall taken: ☐ Yes ☐ No Photo #s:	Longitude:	Latitude:
Description (e.g.., initial screening, follow up screening, origin of outfall, if known):		

Section 2: Outfall Description

LOCATION	MATERIAL	SHAPE	DIMENSIONS (IN.)	HEADWALL CONDITION	PHYSICAL CONDITION	SUBMERGED
☐ **Closed Pipe**	☐ RCP ☐ CMP ☐ Plastic ☐ Other: _____ ☐ Material Incorrect	☐ Round ☐ Rectangular ☐ Oval ☐ Other: _____ ☐ Shape Incorrect	Diameter/Dimensions (2, 4, 6, 8, 10, 12, 15, 18, 24 or Other – explain): _____ ☐ Pipe Size Incorrect	☐ Not Applicable ☐ Good ☐ Fair ☐ Poor	☐ Good ☐ Fair ☐ Poor	In Water: ☐ No ☐ Partially ☐ Fully In Sediment: ☐ No ☐ Partially ☐ Fully
☐ **Open drainage**	☐ Paved ☐ Natural Channel ☐ Rip-rap ☐ Other: _____	Open Drain Height: _____ Open Drain Width: _____				
Flow Present?	☐ Yes ☐ No *If No, Skip to Section 4*					
Flow Description (If present)	☐ No Discernible Flow ☐ Trickle ☐ Moderate ☐ Substantial					

Section 3: Water Quality Indicators (for Flowing Outfalls Only)

INDICATOR	DESCRIPTION
Turbidity	☐ Clear ☐ Cloudy
Color	☐ Clear ☐ Gray ☐ Light Tea ☐ Light Green ☐ Tea ☐ White ☐ Other:
Odor	☐ None ☐ Musty ☐ Fishy ☐ Oily ☐ Organic ☐ Sewage ☐ Rotten Eggs
Floatables (Does Not Include Trash!)	☐ Sewage or Sanitary Waste ☐ Foam or Suds ☐ Oily Sheen

Section 4: Other Physical Indicators (for Both Flowing and Non-Flowing Outfalls)

INDICATOR	DESCRIPTION
Deposits/Stains	☐ No Deposits or Stains ☐ Excessive Sediment ☐ Oil or Grease ☐ Foam ☐ Orange Staining ☐ Other:
Vegetation or Benthic Growth	☐ No Issues Noted ☐ Excessive Vegetation, Algae and/or Bacteria in Outfall ☐ Surrounding Vegetation Distressed

Section 5: Maintenance Concerns

☐ No Concerns	☐ Blocked Pipe	☐ Structural Corrosion
☐ Erosion or Scouring at Outlet	☐ Trash or Debris	☐ Trees or Branches Blocking Flow

Section 6: Comments

BURLINGTON OUTFALL SAMPLE COLLECTION FIELD SHEET

Section 1: Background Data

Subwatershed:	Outfall ID:	
Today's date:	Time:	
Investigators:	Form completed by:	
Temperature (Air):	Rainfall (in.) last 24 hours:	
Photo of Outfall taken: ☐ Yes ☐ No Photo #s:	Longitude:	Latitude:
Description (e.g.., initial sampling, follow up sampling, whether dry weather or wet weather sampling):		

Section 2: Outfall Description

WATER FLOW ONLY	
Flow Description	☐ No Discernible Flow ☐ Trickle ☐ Moderate ☐ Substantial

Section 3: Water Quality & Other Physical Indicators

INDICATOR	DESCRIPTION
Turbidity	☐ Clear ☐ Cloudy
Color	☐ Clear ☐ Gray ☐ Light Tea ☐ Light Green ☐ Tea ☐ White ☐ Other:
Odor	☐ None ☐ Musty ☐ Fishy ☐ Oily ☐ Organic ☐ Sewage ☐ Rotten Eggs
Floatables (Does Not Include Trash!)	☐ Sewage or Sanitary Waste ☐ Foam or Suds ☐ Oily Sheen
Deposits/Stains	☐ No Deposits or Stains ☐ Excessive Sediment ☐ Oil or Grease ☐ Foam ☐ Orange Staining ☐ Other:
Vegetation or Benthic Growth	☐ No Issues Noted ☐ Excessive Vegetation, Algae and/or Bacteria in Outfall ☐ Surrounding Vegetation Distressed

Section 4: Quantitative Characterization

FIELD DATA FOR FLOWING OUTFALLS			
PARAMETER	**RESULT**	**UNIT**	**EQUIPMENT**
Ammonia		mg/L	Test strip
Chlorine		mg/L	Colorimeter
Conductivity		µmhos/cm	YSI meter
Salinity		ppt	YSI meter or Refractometer
Surfactants		mg/L	Test kit
Temperature		°F	YSI meter or Thermometer
E. coli/Fecal Coliform	Sample for lab? ☐ Yes ☐ No		
Total Phosphorus	Sample for lab? ☐ Yes ☐ No		

Section 5: Comments (include sample location if outside outfall) or unusual flow observations

SOP 2: 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. SOP 1, "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.
2. Oil sheen: result of a leak or spill.

- Cloudiness: indicator of suspended solids such as dust, ash, powdered chemicals and ground up materials.
- Color or odor: Indicator of raw materials, chemicals, or sewage.
- Excessive sediment: indicative of disturbed earth of other unpaved areas lacking adequate erosion control measures.
- Sanitary waste and optical enhancers (fluorescent dyes added to laundry detergent): indicators of illicit discharge.
- 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 indictor 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.

Related Standard Operating Procedures

- SOP 1, Dry Weather Outfall Inspection
- SOP 10, Locating Illicit Discharges
- SOP 13, Water Quality Screening in the Field

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, as well as from citizen reports.
In its Illicit Discharges & Detection Bylaw, Burlington has legal authority to prohibit the connection of non-stormwater discharges into the storm drain system. The Board of Health and its Agents are designated to enforce this bylaw. Solely for the purposes of enforcing this bylaw, Agents of this Board includes the Director of Public Health, Health Agent, Environmental Engineer, Town Engineer, the Superintendent of Public Works, and the Inspector of Buildings.

Identifying Illicit Discharges

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

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

In Burlington, the town website provides phone numbers for reporting illicit discharges and an online form for asking non-emergency questions. The numbers and form may be accessed from here: http://www.burlington.org/community_development/stormwater_management.php#Report_Storm_Drain_Dumping
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 (Board of Health & its agents), 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

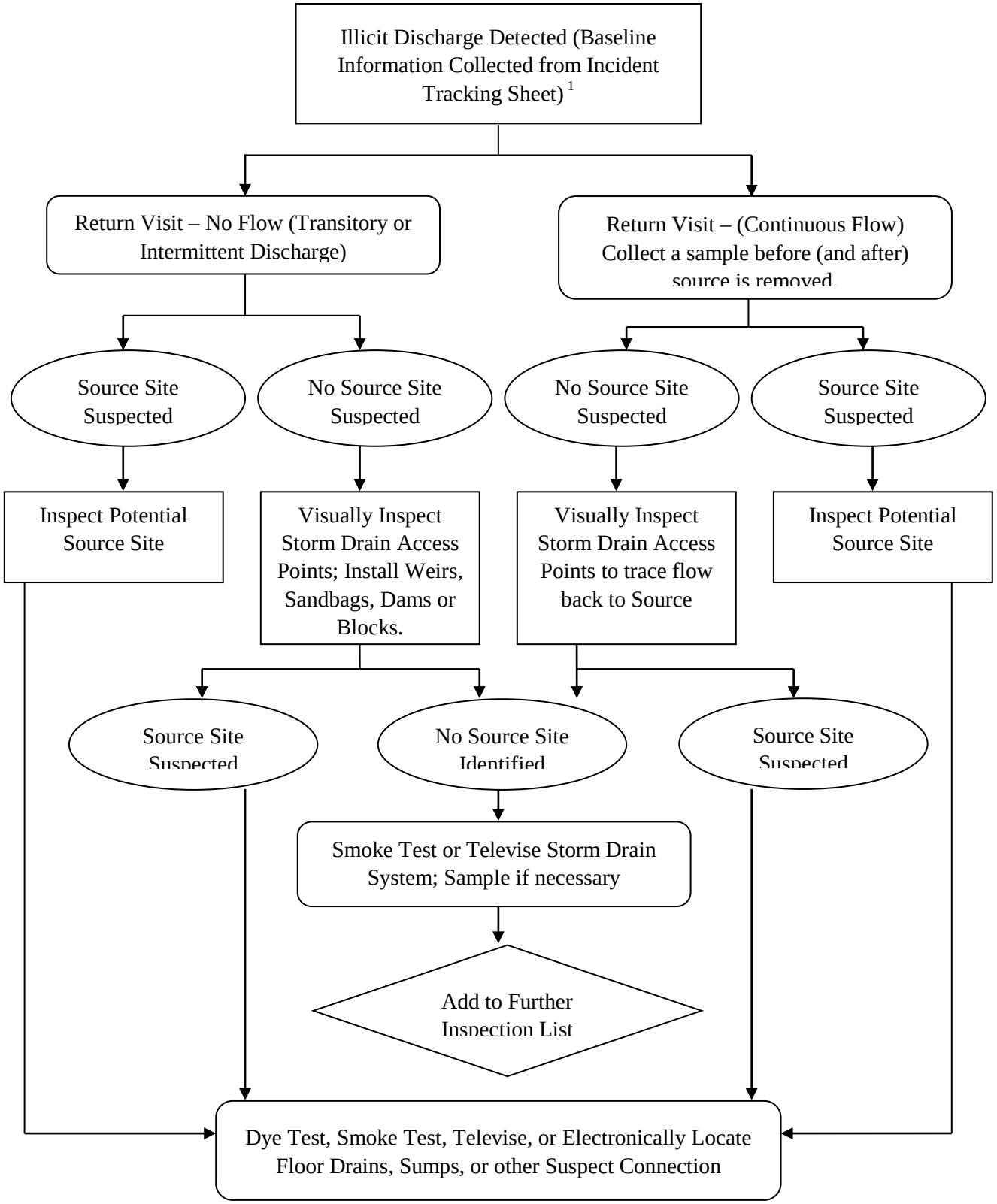
Proper removal of an illicit discharge will ensure it does not recur. Refer to Table SOP F-1, attached for, for examples of the notification process.
In any scenario, conduct a follow up inspection to confirm that the illicit discharge has been removed. Suspend access to the storm drain system if an “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

Table SOP F-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 (Board of Health and its Agents)	• Contact Owner • Issue Notice of Violation • Issue fine
Private Property Owner	Intermittent or continuous illicit discharge from legal connection	Ordinance enforcement authority (Board of Health and its Agents)	• 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)	Ordinance enforcement authority (Board of Health and its Agents)	• Notify plumbing inspector
Municipal	Intermittent or continuous illicit discharge from illegal connection or indirect (e.g. failed sewer line)	Ordinance enforcement authority (Board of Health and its Agents)	• Issue work order • Schedule removal • Remove connection • Confirm removal
Exempt 3rd 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	☐Petroleum (gas)
	☐Sulfide (rotten eggs); natural gas	☐Other: Describe in "Narrative" section		
Appearance	☐"Normal"	☐Oil Sheen	☐Cloudy	☐Foam
	☐Optical enhancers	☐ Discolored		
	☐Other: Describe in "Narrative" section			
Floatables	☐None	☐Sewage (toilet paper, etc)	☐Algae	☐Trash or debris
	☐Other: Describe in "Narrative" section			
Narrative description of problem indicators:				
Suspected Source (name, personal or vehicle description, license plate #, address, etc.):				