Illicit Discharge Detection and Elimination (IDDE) Plan

June 30, 2019

TOWN OF DRACUT

Table of Contents

Illicit Discharge Detection and Elimination Plan
Central Massachusetts Regional Stormwater Coalition

Tables

Figures

Appendices

1 Introduction

1.1 MS4 Program

This Illicit Discharge Detection and Elimination (IDDE) Plan has been developed by the Town of Dracut 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 wash water 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 dispose of collected materials on a regular basis.

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

1.3 Allowable Non-Stormwater Discharges

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

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

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

1.4 Receiving Waters and Impairments

Table 1-1 lists the "impaired waters" within the boundaries of the Town of Dracut's regulated area based on the 2016 Massachusetts Integrated List of Waters produced by MassDEP every two years. Impaired waters are water bodies that do not meet water quality standards for one or more designated use(s) such as recreation or aquatic habitat.

Table 1-1. Impaired Waters

Dracut, Massachusetts

Water Body Name	Segment ID	Category	Impairment(s)	Associated Approved TMDL
Lake Mascuppic	MA84037	4c	Non-native aquatic plants	TMDL not required
Bartlett Brook	MA84A-36	5	E.coli	
Beaver Brook	MA84A-11	5	Debris/floatables/trash Physical substrate habitat alterations Aquatic macroinvertebrate biomasses, E.coli, taste, odor, turbidity	
Long Pond	MA84032	5	Non-native aquatic plants Harmful algal bloom Mercury in fish tissue	TMDL No. 33880
Peppermint Brook	MA84A-35	5	Debris/floatables/trash E.coli	
Richardson Brook	MA84A-12	5	E.coli	
Trout Brook	MA84-13	5	E.coli	

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.

1.5 IDDE Program Goals, Framework, and Timeline

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

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

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

Figure 1-1. IDDE Investigation Procedure Framework

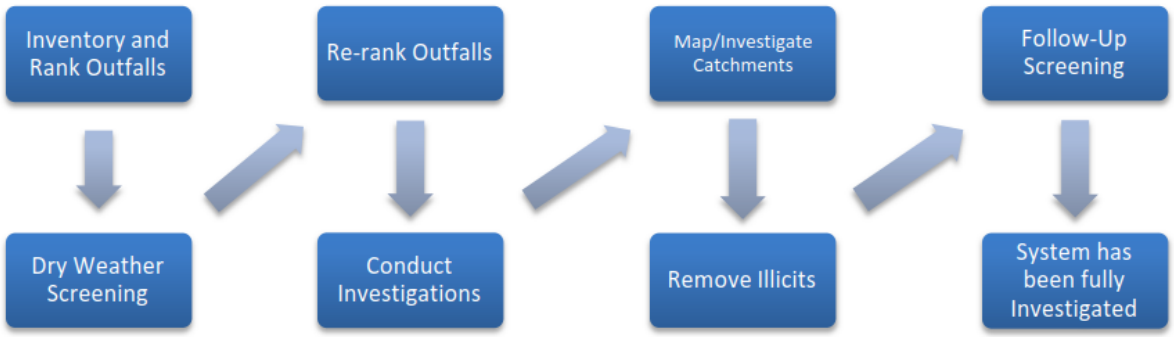


Table 1-2. IDDE Program Implementation Timeline

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

1.6 Work Completed to Date

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

The Town of Dracut 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

In addition to the 2003 MS4 Permit requirements, other IDDE-related activities that may 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 Dracut has adopted an Illicit Discharge By-Law on June 4, 2019. A copy of the Illicit Discharge By-Law is provided in Appendix A. The Illicit Discharge By-Law provides the Town of Dracut with adequate legal authority to:

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

The Town of Dracut will review its current Illicit Discharge By-Law and related land use regulations and policies for consistency with the 2016 MS4 Permit.

2.2 Statement of Responsibilities

The Stormwater Department is responsible for implementing the IDDE program pursuant to the provisions of the Illicit Discharge By-Law. Other agencies or departments with responsibility for aspects of the program may also include:

- Department of Public Works
- Sewer Department
- Building Department
- Health Department
- Engineering Department
- Recreational Department
- Conservation Agent
- Community Development Department
- Town Manager

3 Stormwater System Mapping

The Town of Dracut 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. A more detailed storm system map is required of the 2016 MS4 permit and 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 Stormwater Department is responsible for updating the stormwater system mapping pursuant to the 2016 MS4 Permit. The Town of Dracut 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, 2019) 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 include: Topographic contours and drainage system information.

The Town of Dracut 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
- Initial catchment delineations include: Topographic contours and drainage system information.

The Town of Dracut will update its stormwater mapping by July 1, 2019 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

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

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

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

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 Dracut not had an SSO that has discharged to the MS4 within the five (5) years prior to the effective date of the 2016 MS4 Permit.

Upon detection of an SSO, the Town of Dracut 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 Dracut 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 Sewer Department when new SSOs are detected. The SSO inventory will be included in the annual report, including the status of mitigation and corrective measures to address each identified SSO.

Table 4-1. SSO Inventory

Dracut, Massachusetts
Revision Date: May 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]

[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

The Town of Dracut has not had an SSO that has discharged into the MS4 within the five (5) years prior to the effective date of the 2016 MS4 Permit. If the event that an SSO does discharge into the MS4, the SSO will be documented using Table 4-1 SSO Inventory.

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 Stormwater 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.

- **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.

Table 5-1. Outfall Inventory and Priority Ranking Matrix provides the initial ranking of outfalls for the Town of Dracut.

Table 5-1. Outfall Inventory and Priority Ranking Matrix

Dracut, Massachusetts
Revision Date: June 30, 2019

Outfall ID	Receiving Water	Previous Screening Results Indicate Likely Sewer Input? [1]	Discharging to Area of Concern to Public Health? [2]	Frequency of Past Discharge Complaints	Receiving Water Quality [3]	Density of Generating Sites [4]	Age of Development/ Infrastructure [5]	Historic Combined Sewers or Septic? [6]	Aging Septic? [7]	Culverted Streams? [8]	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 Good = 0	High = 3 Medium = 2 Low = 1	High = 3 Medium = 2 Low = 1	Yes = 3 No = 0	Yes = 3 No = 0	Yes = 3 No = 0	TBD		
1-1	Mascuppic Lake	0	3	2	0	1	3	3	0	0		12	High Priority
1-2	Mascuppic Lake	0	3	2	0	1	3	3	0	0		12	High Priority
1-3	Mascuppic Lake	0	3	2	0	1	3	3	0	0		12	High Priority
1-4	Open Ditch	0	0	0	0	1	3	3	0	0		7	Low Priority
1-5	Mascuppic Lake	0	3	2	0	1	3	3	0	0		12	High Priority
1-6	Intersection	0	0	0	0	1	3	3	0	0		7	Low Priority
1-7	Intersection	0	0	0	0	1	3	3	0	0		7	Low Priority
1-8	Intersection	0	0	0	0	1	3	3	0	0		7	Low Priority
1-9	Intersection	0	0	0	0	1	3	3	0	0		7	Low Priority
1-10	Long Pond	0	3	3	2	1	3	3	0	0		15	High Priority
1-11	Long Pond	0	3	3	2	1	3	3	0	0		12	High Priority
1-12	Open Ditch	0	0	0	0	1	3	3	0	0		7	Low Priority
1-13	Open Ditch	0	0	0	0	1	3	3	0	0		7	Low Priority
1-14	Off Road	0	0	0	0	1	3	3	0	0		7	Low Priority
1-15	Intersection	0	0	0	0	1	3	3	0	0	Does not exist	7	Low Priority
1-16	Open Ditch	0	0	0	0	1	3	3	0	0		7	Low Priority
1-17	Off Road	0	0	0	0	1	3	3	0	0	Does not exist	7	Low Priority
2-1	Off Road	0	0	0	0	1	3	3	0	0		7	Low Priority
2-2	Off Road	0	0	0	0	1	3	3	0	0		7	Low Priority
2-3	Off Road	0	0	0	0	1	3	3	0	0		7	Low Priority
2-4	Off Road	0	0	0	0	1	2	3	0	0		6	Low Priority
2-5	detention area	0	0	0	0	1	2	3	0	0		6	Low Priority

2-6	Off Road	0	0	0	0	1	2	3	0	0		6	Low Priority
2-7	Open Ditch	0	0	0	0	1	2	3	0	0		6	Low Priority
2-8	Off Road	0	0	0	0	1	2	3	0	0		6	Low Priority
2-9	Off Road	0	0	0	0	1	2	3	0	0		6	Low Priority
2-10	Off Road	0	0	0	0	1	2	3	0	0		6	Low Priority
2-11	Off Road	0	0	0	0	1	2	3	0	0		6	Low Priority
2-12	Off Road	0	0	0	0	1	2	3	0	0		6	Low Priority
2-13	Off Road	0	0	0	0	1	2	3	0	0		6	Low Priority
2-14	Open Ditch	0	0	0	0	1	2	3	0	0		6	Low Priority
2-15	Off Road	0	0	0	0	1	2	3	0	0		6	Low Priority
2-16	Off Road	0	0	0	0	1	2	3	0	0		6	Low Priority
2-17	Off Road	0	0	0	0	1	2	3	0	0		6	Low Priority
2-18	Off Road	0	0	0	0	1	2	3	0	0		6	Low Priority
2-19	Off Road	0	0	0	0	1	2	3	0	0		6	Low Priority
2-20	double brook	0	3	0	0	1	2	3	0	0		9	High Priority
2-21	double brook	0	3	0	0	1	2	3	0	0		9	High Priority
2-22	double brook	0	3	0	0	1	2	3	0	0		9	High Priority
2-23	double brook	0	3	0	0	1	3	3	0	0		10	High Priority
2-24	Off Road	0	0	0	0	1	3	3	0	0		7	Low Priority
3-1	Long Pond	0	3	3	2	1	3	3	0	0		15	High Priority
3-2	Long Pond	0	3	3	2	1	3	3	0	0		15	High Priority
3-3	Long Pond	0	3	3	2	1	3	3	0	0		15	High Priority
3-4	Long Pond	0	3	3	2	1	3	3	0	0		15	High Priority
3-5	Long Pond	0	3	3	2	1	3	3	0	0		12	High Priority
3-6	Long Pond	0	3	3	2	1	3	3	0	0		12	High Priority
3-7	Off Road	0	0	0	0	1	2	3	0	0		6	Low Priority
3-8	double brook	0	3	0	0	1	3	3	0	0		7	Low Priority
3-9	double brook	0	3	0	0	1	3	3	0	0		7	Low Priority
3-10	double brook	0	3	0	0	1	3	3	0	0		7	Low Priority
3-11	double brook	0	3	0	0	1	3	3	0	0		7	Low Priority
3-12	double brook	0	3	0	0	1	3	3	0	0		7	Low Priority
3-13	double brook	0	3	0	0	1	2	3	0	0		6	Low Priority
3-14	Off Road	0	0	0	0	1	3	3	0	0		7	Low Priority
3-15	Off Road	0	0	0	0	1	3	3	0	0		7	Low Priority
3-16	double brook	0	3	0	0	1	3	3	0	0		7	Low Priority
4-1	Long Pond	0	3	3	2	1	3	3	0	0		12	High Priority
4-2	Long Pond	0	3	3	2	1	3	3	0	0		12	High Priority

4-3	Long Pond	0	3	3	2	1	3	3	0	0		12	High Priority
4-4	Off Road	0	0	0	0	1	3	3	0	0		7	Low Priority
4-5	Off Road	0	0	0	0	1	3	3	0	0		7	Low Priority
4-6	Off Road	0	0	0	0	1	3	3	0	0		7	Low Priority
4-7	Off Road	0	0	0	0	1	3	3	0	0		7	Low Priority
4-8	Off Road	0	0	0	0	1	3	3	0	0		7	Low Priority
4-9	Off Road	0	0	0	0	1	3	3	0	0		7	Low Priority
5-1	Off Road	0	0	0	0	1	3	3	0	0		7	Low Priority
5-2	Beaver Brook	0	3	0	2	1	3	3	0	0		12	High Priority
5-3	Open Ditch	0	0	0	0	1	3	3	0	0		7	Low Priority
5-4	Open Ditch	3	0	0	0	1	3	3	0	0		10	High Priority
5-5	Off Road	3	0	0	0	1	3	3	0	0		10	High Priority
5-6	Open Ditch	0	0	0	0	1	2	3	0	0		6	Low Priority
5-7	Beaver Brook	0	3	0	2	1	3	3	0	0		12	High Priority
5-8	Beaver Brook	0	3	0	2	1	3	3	0	0		12	High Priority
5-9	Off Road	0	0	0	0	1	3	3	0	0		7	Low Priority
5-10	Off Road	0	0	0	0	1	3	3	0	0		7	Low Priority
5-11	Off Road	0	0	0	0	1	2	3	0	0		6	Low Priority
5-12	Off Road	0	0	0	0	1	3	3	0	0		7	Low Priority
5-13	Beaver Brook	0	3	0	2	1	3	3	0	0		12	High Priority
5-14	Beaver Brook	0	3	0	2	1	3	3	0	0		12	High Priority
5-15	Beaver Brook	0	3	0	2	1	3	3	0	0		12	High Priority
5-16	Off Road	0	0	0	0	1	3	3	0	0		7	Low Priority
5-17	Off Road	0	0	0	0	1	3	3	0	0		7	Low Priority
5-18	Off Road	0	0	0	0	3	3	3	0	0		9	High Priority
5-19	not listed	0	0	0	0	1	3	3	0	0	Does not exist	7	Low Priority
5-20	Beaver Brook	0	3	0	2	1	3	3	0	0		12	High Priority
5-21	not listed	0	0	0	0	1	3	3	0	0	Does not exist	7	Low Priority
5-22	Beaver Brook	0	3	0	2	2	3	3	0	0		13	High Priority
5-23	Open Ditch	0	0	0	0	1	3	3	0	0		7	Low Priority
5-24	Off Road	0	0	0	0	1	3	3	0	0		7	Low Priority
5-25	Open Ditch	0	0	0	0	2	3	3	0	0		8	High Priority
5-26	stream	0	0	0	0	1	3	3	0	0		7	Low Priority
5-27	stream	0	0	0	0	1	3	3	0	0		7	Low Priority
5-28	Off Road	0	0	0	0	1	3	3	0	0		7	Low Priority
5-29	Off Road	0	0	0	0	1	3	3	0	0		7	Low Priority
6-1	Beaver Brook	0	3	0	2	1	2	3	0	0		11	High Priority

6-2	Beaver Brook	0	3	0	2	1	2	3	0	0		11	High Priority
6-3	Beaver Brook	0	3	0	2	1	2	3	0	0		11	High Priority
6-4	Beaver Brook	0	3	0	2	1	2	3	0	0		11	High Priority
6-5	Beaver Brook	0	3	0	2	1	3	3	0	0		12	High Priority
6-6	Beaver Brook	0	3	0	2	1	3	3	0	0		12	High Priority
6-7	Beaver Brook	0	3	0	2	1	3	3	0	0		12	High Priority
6-8	Beaver Brook	0	3	0	2	2	3	3	0	0		13	High Priority
6-9	Beaver Brook	0	3	0	2	2	3	3	0	0		13	High Priority
6-10	Off Road	0	0	0	0	1	3	3	0	0	Does not exist	7	Low Priority
6-11	Off Road	0	0	0	0	1	2	3	0	0		6	Low Priority
6-12	Off Road	0	0	0	0	1	2	3	0	0		6	Low Priority
6-13	Off Road	0	0	0	0	1	3	3	0	0		7	Low Priority
6-14	Off Road	0	0	0	0	1	3	3	0	0	Does not exist	7	Low Priority
6-15	Off Road	0	0	0	0	1	3	3	0	0		7	Low Priority
6-16	Off Road	0	0	0	0	1	3	3	0	0		7	Low Priority
6-17	Off Road	0	0	0	0	1	3	3	0	0		7	Low Priority
6-18	Off Road	0	0	0	0	1	2	3	0	0		6	Low Priority
6-19	Off Road	0	0	0	0	1	2	3	0	0		6	Low Priority
6-20	Off Road	0	0	0	0	1	2	3	0	0		6	Low Priority
6-19	Off Road	0	0	0	0	1	2	3	0	0		6	Low Priority
6-20	Off Road	0	0	0	0	1	2	3	0	0		6	Low Priority
6-21	Off Road	0	0	0	0	1	2	3	0	0		6	Low Priority
6-22	Off Road	0	0	0	0	1	2	3	0	0		6	Low Priority
6-23	Off Road	0	0	0	0	1	2	3	0	0		6	Low Priority
6-24	Off Road	0	0	0	0	1	2	3	0	0		6	Low Priority
6-15	Off Road	0	0	0	0	1	2	3	0	0		6	Low Priority
6-26	Off Road	0	0	0	0	1	2	3	0	0		6	Low Priority
6-27	Off Road	0	0	0	0	1	2	3	0	0		6	Low Priority
6-28	open swale	0	0	0	0	1	2	3	0	0		6	Low Priority
6-29	open swale	0	0	0	0	1	2	3	0	0		6	Low Priority
6-30	Off Road	0	0	0	0	1	2	3	0	0		6	Low Priority
6-31	Off Road	0	0	0	0	1	2	3	0	0		6	Low Priority
6-32	Off Road	0	0	0	0	1	2	3	0	0		6	Low Priority
6-33	Off Road	0	0	0	0	1	2	3	0	0		6	Low Priority
7-1	Beaver Brook	0	3	0	2	2	3	3	0	0		13	High Priority
7-2	Off Road	0	0	0	0	3	3	3	0	0		9	High Priority
7-3	Open Ditch	0	0	0	0	1	3	3	0	0		7	Low Priority
7-4	Off Road	0	0	0	0	1	3	3	0	0		7	Low Priority
7-5	Open Ditch	0	0	0	0	1	3	3	0	0		7	Low Priority

7-6	Open Ditch	0	0	0	0	1	3	3	0	0		7	Low Priority
7-7	Off Road	0	0	0	0	3	3	3	0	0	Does not exist	9	High Priority
7-8	Off Road	0	0	0	0	3	3	3	0	0		9	High Priority
7-9	Off Road	0	0	0	0	2	2	3	0	0		7	Low Priority
7-10	Off Road	0	0	0	0	1	3	3	0	0		7	Low Priority
7-11	Off Road	0	0	0	0	1	3	3	0	0		7	Low Priority
7-12	Beaver Brook	0	3	0	2	1	2	3	0	0		11	High Priority
7-13	Beaver Brook	0	3	0	2	1	2	3	0	0		11	High Priority
8-1	Off Road	0	0	0	0	1	2	3	0	0		6	Low Priority
8-2	Off Road	0	0	0	0	1	2	3	0	0		6	Low Priority
8-3	swale	0	0	0	0	1	2	3	0	0		6	Low Priority
8-4	Beaver Brook	0	3	0	2	1	2	3	0	0		11	High Priority
8-5	Beaver Brook	0	3	0	2	1	2	3	0	0		11	High Priority
8-6	Off Road	0	0	0	0	1	2	3	0	0		6	Low Priority
8-7	Off Road	0	0	0	0	1	2	3	0	0		6	Low Priority
8-8	Off Road	0	0	0	0	1	3	3	0	0		7	Low Priority
8-9	Beaver Brook	0	3	0	2	1	3	3	0	0		12	High Priority
8-10	Beaver Brook	0	3	0	2	1	3	3	0	0		12	High Priority
8-11	Beaver Brook	0	3	0	2	1	3	3	0	0		12	High Priority
8-12	Beaver Brook	0	3	0	2	3	3	3	0	0		14	High Priority
8-13	Beaver Brook	0	3	0	2	1	3	3	0	0		12	High Priority
8-14	towards beaver brook	0	3	0	0	1	3	3	0	0		10	High Priority
8-15	Off Road	0	0	0	0	1	3	3	0	0		7	Low Priority
8-16	Off Road	0	0	0	0	1	3	3	0	0		7	Low Priority
8-17	Off Road	0	0	0	0	1	3	3	0	0		7	Low Priority
8-18	Off Road	0	0	0	0	1	3	3	0	0		7	Low Priority
8-19	Off Road	0	0	0	0	1	3	3	0	0		7	Low Priority
8-20	Off Road	0	0	0	0	1	3	3	0	0		7	Low Priority
8-21	skyline drive	0	0	0	0	1	3	3	0	0		7	Low Priority
8-22	skyline drive	0	0	0	0	1	3	3	0	0		7	Low Priority
8-23	Off Road	0	0	0	0	1	3	3	0	0		7	Low Priority
8-24	Off Road	0	0	0	0	2	3	3	0	0		8	High Priority
9-1	Off Road	0	0	0	0	1	3	3	0	0		7	Low Priority
9-2	Off Road	0	0	0	0	1	3	3	0	0		7	Low Priority
9-3	Off Road	0	0	0	0	1	3	3	0	0		7	Low Priority
9-4	Off Road	0	0	0	0	1	3	3	0	0		7	Low Priority

9-5	Off Road	0	0	0	0	1	3	3	0	0		7	Low Priority
10-1	Off Road	0	0	0	0	1	2	3	0	0		6	Low Priority
10-2	Off Road	0	0	0	0	1	3	3	0	0		7	Low Priority
10-3	Off Road	0	0	0	0	1	3	3	0	0		7	Low Priority
10-4	Beaver Brook	0	3	0	2	1	3	3	0	0		12	High Priority
10-5	Peppermint Brook	0	3	0	2	1	3	3	0	0		12	High Priority
10-6	Peppermint Brook	0	3	0	2	1	3	3	0	0		12	High Priority
10-7	open swale	0	0	0	0	1	3	3	0	0		7	Low Priority
10-8	Peppermint Brook	0	3	0	2	1	3	3	0	0		12	High Priority
10-9	Peppermint Brook	0	3	0	2	1	3	3	0	0		12	High Priority
10-10	Peppermint Brook	0	3	0	2	2	3	3	0	0		13	High Priority
10-11	Peppermint Brook	0	3	0	2	2	3	3	0	0		13	High Priority
10-12	Off Road	0	0	0	0	1	3	3	0	0		7	Low Priority
11-1	Off Road	0	0	0	0	1	3	3	0	0	Does not exist/Not an outfall	7	Low Priority
11-2	Off Road/Peppermint Brook	0	3	0	2	1	3	3	0	0		12	High Priority
11-3	Off Road	0	0	0	0	1	3	3	0	0		7	Low Priority
11-4	towards peppermint brook	0	3	0	2	1	3	3	0	0		12	High Priority
11-5	towards peppermint brook	0	3	0	2	1	3	3	0	0		12	High Priority
11-6	Off Road	0	0	0	0	1	3	3	0	0		7	Low Priority
11-7	Off Road	0	0	0	0	1	3	3	0	0		7	Low Priority
11-8	Off Road	0	0	0	0	1	3	3	0	0		7	Low Priority
11-9	Beaver Brook	0	3	0	2	3	3	3	0	0		14	High Priority
11-10	Beaver Brook	0	3	0	2	3	3	3	0	0		14	High Priority
11-11	Beaver Brook	0	3	0	2	1	3	3	0	0		12	High Priority
11-12	Beaver Brook	0	3	0	2	1	3	3	0	0		12	High Priority
12-1	Off Road	0	0	0	0	1	3	3	0	0		7	Low Priority

12-2	Off Road	0	0	0	0	1	3	3	0	0		7	Low Priority
12-3	Off Road	0	0	0	0	1	3	3	0	0		7	Low Priority
12-4	Off Road	0	0	0	0	1	3	3	0	0		7	Low Priority
12-5	Off Road	0	0	0	0	1	2	3	0	0		6	Low Priority
12-6	Off Road	0	0	0	0	1	2	3	0	0		6	Low Priority
12-7	Off Road	0	0	0	0	1	3	3	0	0		7	Low Priority
12-8	Off Road	0	0	0	0	1	2	3	0	0		6	Low Priority
12-9	Off Road	0	0	0	0	1	2	3	0	0		6	Low Priority
12-10	Off Road	0	0	0	0	1	3	3	0	0		7	Low Priority
12-11	Off Road	0	0	0	0	1	3	3	0	0		7	Low Priority
12-12	Off Road/Peppermint Brook	0	3	0	2	1	3	3	0	0		12	High Priority
12-13	Off Road	0	0	0	0	1	2	3	0	0		6	Low Priority
12-14	Off Road	0	0	0	0	1	2	3	0	0		6	Low Priority
12-15	Off Road	0	0	0	0	1	2	3	0	0		6	Low Priority
12-16	Off Road/Peppermint Brook	0	3	0	2	1	2	3	0	0		11	High Priority
12-17	Off Road	0	0	0	0	1	3	3	0	0		7	Low Priority
13-1	Off Road	0	0	0	0	1	3	3	0	0		7	Low Priority
13-2	Off Road	0	0	0	0	1	3	3	0	0		7	Low Priority
13-3	Off Road	0	0	0	0	1	3	3	0	0		7	Low Priority
13-4	Off Road	0	0	0	0	1	3	3	0	0		7	Low Priority
13-5	towards peppermint brook	0	3	0	2	1	3	3	0	0		12	High Priority
13-6	Off Road	0	0	0	0	1	2	3	0	0		6	Low Priority
13-7	Off Road	0	0	0	0	1	2	3	0	0		6	Low Priority
13-8	Off Road	0	0	0	0	1	3	3	0	0	Dead end CB	7	Low Priority
13-9	Off Road	0	0	0	0	1	3	3	0	0		7	Low Priority
13-10	Off Road	0	0	0	0	1	3	3	0	0		7	Low Priority
13-11	Off Road	0	0	0	0	1	3	3	0	0		7	Low Priority
13-12	Off Road	0	0	0	0	1	3	3	0	0		7	Low Priority
13-13	detention area	0	0	0	0	1	3	3	0	0		7	Low Priority
13-14	Lowell, MA	0	0	0	3	1	3	3	0	0		10	High Priority
14-1	Off Road/Peppermint Brook	0	3	0	2	3	3	3	0	0		14	High Priority

14-2	Off Road/Peppermint Brook	0	3	0	2	3	3	3	0	0		14	High Priority
14-3	Off Road/Peppermint Brook	0	3	0	2	3	3	3	0	0		14	High Priority
14-4	Off Road/Peppermint Brook	0	3	0	2	3	3	3	0	0		14	High Priority
14-5	Off Road/Peppermint Brook	0	3	0	2	1	3	3	0	0		12	High Priority
14-6	Off Road/Peppermint Brook	0	3	0	2	1	3	3	0	0		12	High Priority
14-7	Off Road	0	0	0	0	1	3	3	0	0		7	Low Priority
14-8	Off Road	0	0	0	0	1	3	3	0	0		7	Low Priority
14-9	Off Road	0	0	0	0	1	2	3	0	0		6	Low Priority
14-10	Off Road	0	0	0	0	1	2	3	0	0		6	Low Priority
14-11	Off Road	0	0	0	0	1	2	3	0	0		6	Low Priority
14-12	Off Road	0	0	0	0	1	3	3	0	0		7	Low Priority
14-13	Off Road	0	0	0	0	1	3	3	0	0		7	Low Priority
14-14	Off Road	0	0	0	0	3	2	3	0	0		8	High Priority
14-15	Off Road	0	0	0	0	3	2	3	0	0		8	High Priority
14-16	Off Road	0	0	0	0	3	2	3	0	0		8	High Priority
14-17	Off Road	0	0	0	0	2	3	3	0	0		8	High Priority
14-18	Off Road	0	0	0	0	1	3	3	0	0		7	Low Priority
14-19	Off Road	0	0	0	0	1	3	3	0	0		7	Low Priority
14-20	Off Road	0	0	0	0	1	3	3	0	0		7	Low Priority
14-21	Off Road	0	0	0	0	1	2	3	0	0		6	Low Priority
14-22	Off Road	0	0	0	0	1	3	3	0	0		7	Low Priority
14-23	detention area	0	0	0	0	1	2	3	0	0		6	Low Priority
14-24	detention area	0	0	0	0	1	2	3	0	0		6	Low Priority
14-25	detention area	0	0	0	0	1	2	3	0	0		6	Low Priority
14-26	Off Road	0	0	0	0	1	2	3	0	0		6	Low Priority
14-27	Off Road	0	0	0	0	1	3	3	0	0		7	Low Priority
14-28	Off Road	0	0	0	0	1	3	3	0	0		7	Low Priority
14-29	Off Road	0	0	0	0	1	2	3	0	0		6	Low Priority
14-30	Off Road	0	0	0	0	1	3	3	0	0		7	Low Priority

15-1	Off Road	0	0	0	0	1	3	3	0	0		7	Low Priority
15-2	Off Road	0	0	0	0	1	3	3	0	0		7	Low Priority
15-3	Off Road	0	0	0	0	1	3	3	0	0		7	Low Priority
15-4	Off Road	0	0	0	0	1	3	3	0	0		7	Low Priority
15-5	Off Road	0	0	0	0	1	3	3	0	0		7	Low Priority
15-6	Off Road	0	0	0	0	1	3	3	0	0		7	Low Priority
15-7	Off Road	0	0	0	0	2	3	3	0	0		8	High Priority
15-8	towards cheever ave	0	0	0	0	1	3	3	0	0		7	Low Priority
15-9	Off Road	0	0	0	0	1	3	3	0	0		7	Low Priority
15-10	Off Road	0	0	0	0	1	3	3	0	0		7	Low Priority
15-11	Off Road/Richardson Brook	0	3	0	2	1	2	3	0	0		11	High Priority
15-12	towards richardson brook	0	3	0	2	1	2	3	0	0		11	High Priority
15-13	towards richardson brook	0	3	0	2	1	2	3	0	0		11	High Priority
15-14	Off Road	0	0	0	0	1	2	3	0	0		6	Low Priority
15-15	Richardson Brook	0	3	0	2	1	2	3	0	0		11	High Priority
15-16	Richardson Brook	0	3	0	2	1	2	3	0	0		11	High Priority
15-17	Richardson Brook	0	3	0	2	1	2	3	0	0		11	High Priority
15-18	Richardson Brook	0	3	0	2	1	2	3	0	0		11	High Priority
15-19	Richardson Brook	0	3	0	2	1	2	3	0	0		11	High Priority
15-20	Richardson Brook	0	3	0	2	1	2	3	0	0		11	High Priority
15-21	Richardson Brook	0	3	0	2	1	2	3	0	0		11	High Priority
15-22	towards richardson brook	0	3	0	2	1	2	3	0	0		11	High Priority
15-23	Richardson Brook	0	3	0	2	1	2	3	0	0		11	High Priority
15-24	Richardson Brook	0	3	0	2	1	2	3	0	0		11	High Priority
15-25	Off Road	0	0	0	0	1	2	3	0	0		6	Low Priority
15-26	Off Road	0	0	0	0	1	2	3	0	0		6	Low Priority
15-27	Trout Brook	0	3	0	2	1	2	3	0	0		11	High Priority
15-28	Richardson Brook	0	3	0	2	1	2	3	0	0		11	High Priority
15-29	Richardson Brook	3	3	0	2	1	2	3	0	0		14	High Priority
15-30	towards richardson brook	0	3	0	2	1	2	3	0	0		11	High Priority
15-31	Richardson Brook	0	3	0	2	1	2	3	0	0		11	High Priority

15-32	Off Road/Truot Brook	0	3	0	2	1	2	3	0	0		11	High Priority
15-33	Off Road	0	0	0	0	1	2	3	0	0		6	Low Priority
15-34	Richardson Brook	0	3	0	2	1	2	3	0	0		11	High Priority
15-35	Off Road	0	0	0	0	1	2	3	0	0		6	Low Priority
16-1	Off Road	0	0	0	0	1	3	3	0	0		7	Low Priority
16-2	Off Road	0	0	0	0	1	3	3	0	0	Does not exist	7	Low Priority
16-3	brook	0	0	0	0	1	2	3	0	0		6	Low Priority
16-4	Off Road	0	0	0	0	1	2	3	0	0		6	Low Priority
16-5	Off Road	0	0	0	0	1	2	3	0	0		6	Low Priority
16-6	Off Road	0	0	0	0	1	2	3	0	0		6	Low Priority
16-7	brook	0	0	0	0	1	2	3	0	0		6	Low Priority
16-8	brook	0	0	0	0	1	2	3	0	0		6	Low Priority
16-9	brook	0	0	0	0	1	2	3	0	0		6	Low Priority
16-10	brook	0	0	0	0	1	3	3	0	0		7	Low Priority
16-11	brook	0	0	0	0	1	3	3	0	0		7	Low Priority
16-12	Merrimack River	0	3	0	0	1	3	3	0	0		10	High Priority
16-13	brook	0	0	0	0	1	3	3	0	0		7	Low Priority
17-1	Off Road	0	0	0	0	1	3	3	0	0		7	Low Priority
1-2	Off Road	0	0	0	0	1	3	3	0	0		7	Low Priority
17-3	towards brook	0	0	0	0	1	2	3	0	0		6	Low Priority
17-4	towards brook	0	0	0	0	1	2	3	0	0		6	Low Priority
17-5	towards brook	0	0	0	0	1	2	3	0	0		6	Low Priority
17-6	Off Road	0	0	0	0	1	2	3	0	0		6	Low Priority
17-7	Off Road	0	0	0	0	1	3	3	0	0		7	Low Priority
17-8	Off Road	0	0	0	0	1	3	3	0	0		7	Low Priority
17-9	Off Road	0	0	0	0	1	2	3	0	0		6	Low Priority
17-10	Off Road	0	0	0	0	1	3	3	0	0		7	Low Priority
17-11	Off Road	0	0	0	0	1	3	3	0	0		7	Low Priority
17-12	Off Road	0	0	0	0	1	3	3	0	0		7	Low Priority
17-13	crescent st	0	0	0	0	1	2	3	0	0		6	Low Priority
17-14	Merrimack River	0	3	0	3	1	3	3	0	0		13	High Priority
17-15	Off Road	0	0	0	0	1	3	3	0	0		7	Low Priority
17-16	Off Road	0	0	0	0	1	3	3	0	0		7	Low Priority
17-17	Richardson Brook	0	3	0	2	1	3	3	0	0		12	High Priority
17-18	Off Road	0	0	0	0	1	3	3	0	0		7	Low Priority
18-1	Off Road	0	0	0	0	1	3	3	0	0		7	Low Priority

18-2	Off Road (near Merrimack River)	0	3	0	3	2	3	3	0	0		14	High Priority
18-3	Merrimack River	0	3	0	3	2	3	3	0	0		14	High Priority
18-4	Merrimack River	0	3	0	3	1	3	3	0	0		13	High Priority
18-5	Merrimack River	0	3	0	3	2	3	3	0	0		14	High Priority
18-6	Merrimack River	0	3	0	3	1	3	3	0	0		13	High Priority
19-1	Off Road	0	0	0	0	1	3	3	0	0		7	Low Priority
19-2	Off Road	0	0	0	0	1	2	3	0	0		6	Low Priority
19-3	Trout Brook	0	3	0	2	1	2	3	0	0		11	High Priority
19-4	Trout Brook	0	3	0	2	1	2	3	0	0		11	High Priority
19-5	Trout Brook	0	3	0	2	1	2	3	0	0		11	High Priority
19-6	Trout Brook	0	3	0	2	1	2	3	0	0		11	High Priority
19-7	Trout Brook	0	3	0	2	1	2	3	0	0		11	High Priority
19-8	Trout Brook	0	3	0	2	1	2	3	0	0		11	High Priority
19-9	Trout Brook	0	3	0	2	1	2	3	0	0		11	High Priority
19-10	Off Road	0	0	0	0	1	3	3	0	0		7	Low Priority
19-11	Off Road	0	0	0	0	1	3	3	0	0		7	Low Priority
19-12	Off Road	0	0	0	0	1	3	3	0	0		7	Low Priority
19-13	Trout Brook	0	3	0	2	1	2	3	0	0		11	High Priority
19-14	Trout Brook	0	3	0	2	1	2	3	0	0		11	High Priority
19-15	towards Trout Brook	0	3	0	2	1	2	3	0	0		11	High Priority
19-16	Off Road	0	0	0	0	1	3	3	0	0		7	Low Priority
19-17	Off Road	0	0	0	0	1	3	3	0	0		7	Low Priority
19-18	brook	0	0	0	0	1	1	3	0	0		5	Low Priority
19-19	brook	0	0	0	0	1	1	3	0	0		5	Low Priority
19-20	brook	0	0	0	0	1	1	3	0	0		5	Low Priority
19-21	Off Road	0	0	0	0	1	1	3	0	0		5	Low Priority
19-22	Off Road	0	0	0	0	1	1	3	0	0		5	Low Priority
19-23	Off Road	0	0	0	0	1	3	3	0	0		7	Low Priority
19-24	Off Road	0	0	0	0	1	2	3	0	0		6	Low Priority
19-25	off road	0	0	0	0	1	2	3	0	0		6	Low Priority
19-26	off road	0	0	0	0	1	2	3	0	0		6	Low Priority
19-27	off road	0	0	0	0	1	2	3	0	0		6	Low Priority
19-28	off road	0	0	0	0	1	2	3	0	0		6	Low Priority
19-29	off road	0	0	0	0	1	2	3	0	0		6	Low Priority
19-30	off road	0	0	0	0	1	2	3	0	0		6	Low Priority

19-31	off road	0	0	0	0	1	2	3	0	0		6	Low Priority
19-32	off road	0	0	0	0	1	2	3	0	0		6	Low Priority
19-33	towards Methuen City Line	0	0	0	0	1	2	3	0	0		6	Low Priority
19-34	brook	0	0	0	0	1	2	3	0	0		6	Low Priority
19-35	off road	0	0	0	0	1	2	3	0	0		6	Low Priority
19-36	off road	0	0	0	0	1	2	3	0	0		6	Low Priority
19-37	off road	0	0	0	0	1	2	3	0	0		6	Low Priority
19-38	off road	0	0	0	0	1	3	3	0	0		7	Low Priority
19-39	Trout Brook	0	3	0	2	1	2	3	0	0		11	High Priority
19-40	Trout Brook	0	3	0	2	1	2	3	0	0		11	High Priority
19-41	off road	0	0	0	0	1	2	3	0	0		6	Low Priority
20-1	off road	3	0	0	0	1	2	3	0	0		9	High Priority
20-2	off road	0	0	0	0	1	3	3	0	0		7	Low Priority
20-3	off road	0	0	0	0	1	3	3	0	0		7	Low Priority
20-4	off road	0	0	0	0	1	3	3	3	0		10	High Priority
20-5	off road	0	0	0	0	1	3	3	0	0		7	Low Priority
20-6	off road	0	0	0	0	1	3	3	0	0		7	Low Priority
20-7	off road	0	0	0	0	1	3	3	0	0		7	Low Priority
20-8	off road	0	0	0	0	1	3	3	0	0		7	Low Priority
20-9	off road	0	0	0	0	1	2	3	0	0		6	Low Priority
21-1	off road	0	0	0	0	1	3	3	0	0		7	Low Priority
21-2	off road	0	0	0	0	1	3	3	0	0		7	Low Priority
21-3	off road	0	0	0	0	1	3	3	0	0		7	Low Priority
21-4	off road	0	0	0	0	1	3	3	0	0		7	Low Priority
21-5	off road	0	0	0	0	1	3	3	0	0		7	Low Priority
21-6	off road	0	0	0	0	1	3	3	0	0		7	Low Priority
21-7	off road	0	0	0	0	1	2	3	0	0		6	Low Priority
21-8	off road	0	0	0	0	1	2	3	0	0		6	Low Priority
21-9	off road	0	0	0	0	1	2	3	0	0		6	Low Priority
21-10	off road	0	0	0	0	1	2	3	0	0		6	Low Priority
21-11	off road	0	0	0	0	1	2	3	0	0		6	Low Priority
21-12	off road	0	0	0	0	1	2	3	0	0		6	Low Priority
21-13	towards Peters Pond	0	0	0	0	1	2	3	0	0		6	Low Priority
21-14	detention area	0	0	0	0	1	1	3	0	0		5	Low Priority
21-15	off road	0	0	0	0	1	3	3	0	0		7	Low Priority
21-16	brook	0	0	0	0	1	2	3	0	0		6	Low Priority

21-17	off Road	0	0	0	0	1	2	3	0	0		6	Low Priority
21-18	towards Peters Pond	0	0	0	0	1	2	3	0	0		6	Low Priority
21-19	towards Peters Pond	0	0	0	0	1	2	3	0	0		6	Low Priority
21-20	off road	0	0	0	0	1	2	3	0	0		6	Low Priority
21-21	off road	0	0	0	0	1	2	3	0	0		6	Low Priority
21-22	off Road	0	0	0	0	1	2	3	0	0		6	Low Priority
21-23	off Road	0	0	0	0	1	2	3	0	0		6	Low Priority
21-24	off Road	0	0	0	0	1	2	3	0	0		6	Low Priority
21-25	Bartlet Brook	0	3	0	2	1	2	3	0	0		11	High Priority
21-26	Bartlet Brook	0	3	0	2	1	2	3	0	0		11	High Priority
21-27	Bartlet Brook	0	3	0	2	1	2	3	0	0		11	High Priority
21-28	Bartlet Brook	0	3	0	2	1	2	3	0	0		11	High Priority
21-29	off road	0	0	0	0	1	2	3	0	0		6	Low Priority
21-30	off road	0	0	0	0	1	3	3	0	0		7	Low Priority
21-31	peters pond	0	0	0	0	1	3	3	0	0		7	Low Priority
21-32	towards Peters Pond	0	0	0	0	1	3	3	0	0		7	Low Priority
21-33	towards Peters Pond	0	0	0	0	1	3	3	0	0		7	Low Priority
21-34	peters pond	0	0	0	0	1	3	3	0	0		7	Low Priority
21-35	peters pond	0	0	0	0	1	3	3	0	0		7	Low Priority
21-36	peters pond	0	0	0	0	1	3	3	0	0		7	Low Priority
21-37	towards Peters Pond	0	0	0	0	1	2	3	0	0		6	Low Priority
21-38	towards Peters Pond	0	0	0	0	1	3	3	0	0		7	Low Priority
21-39	off road	0	0	0	0	1	2	3	3	0		9	High Priority
21-40	off road	0	0	0	0	1	2	3	0	0		6	Low Priority
21-41	off road	0	0	0	0	1	3	3	0	0		7	Low Priority
21-42	off road	0	0	0	0	1	2	3	0	0		6	Low Priority
21-43	towards Methuen City Line	0	0	0	0	3	3	3	0	0		9	High Priority
21-44	towards Bartlet Brook	0	0	0	2	3	3	3	0	0		11	High Priority
21-45	off road	0	0	0	0	1	2	3	0	0		6	Low Priority
21-46	towards Peters Pond	0	0	0	0	1	2	3	0	0		6	Low Priority
21-47	off road	0	0	0	0	1	2	3	0	0		6	Low Priority

21-48	off road	0	0	0	0	1	2	3	0	0	Inlet/Does not exist	6	Low Priority
21-49	off road	0	0	0	0	1	3	3	0	0		7	Low Priority
21-50	Bartlet Brook	0	3	0	2	1	3	3	0	0		12	High Priority
21-51	Open Ditch	0	0	0	0	1	3	3	0	0		7	Low Priority
21-52	peters pond	0	0	0	0	1	3	3	0	0		7	Low Priority

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 Stormwater 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 Precision Weather.

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.
3. Conduct the outfall inspection during dry weather:
    a. Mark and photograph the outfall
    b. Record the inspection information and outfall characteristics (see form in Appendix C).
    c. Look for and record visual/olfactory evidence of pollutants in flowing outfalls including odor, color, turbidity, and floatable matter (suds, bubbles, excrement, toilet paper or sanitary products). Also observe outfalls for deposits and stains, vegetation, and damage to outfall structures.
4. If flow is observed, sample and test the flow following the procedures described in the following sections.
5. If no flow is observed, but evidence of illicit flow exists (illicit discharges are often intermittent or transitory), revisit the outfall during dry weather within one week of the initial observation, if practicable, to perform a second dry weather screening and sample any observed flow. Other techniques can be used to detect intermittent or transitory flows including conducting inspections during evenings or weekends and using optical brighteners.
6. Input results from screening and sampling into spreadsheet/database. Include pertinent information in the outfall/interconnection inventory and priority ranking.
7. Include all screening data in the annual report.

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

6.2.2 Field Equipment

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

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

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

6.2.3 Sample Collection and Analysis

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

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

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

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

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

Table 6-2. Sampling Parameters and Analysis Methods

Analyte or Parameter	Instrumentation (Portable Meter)	Field Test Kit
Ammonia	CHEMetrics™ V-2000 Colorimeter Hach™ DR/890 Colorimeter Hach™ Pocket Colorimeter™ II	CHEMetrics™ K-1410 CHEMetrics™ K-1510 (series) Hach™ NI-SA Hach™ Ammonia Test Strips
Surfactants (Detergents)	CHEMetrics™ I-2017	CHEMetrics™ K-9400 and K-9404 Hach™ DE-2
Chlorine	CHEMetrics™ V-2000, K-2513 Hach™ Pocket Colorimeter™ II	NA
Conductivity	CHEMetrics™ I-1200 YSI Pro30 YSI EC300A Oakton 450	NA
Temperature	YSI Pro30 YSI EC300A Oakton 450	NA
Salinity	YSI Pro30 YSI EC300A Oakton 450	NA
Temperature	YSI Pro30 YSI EC300A Oakton 450	NA
Indicator Bacteria: *E. coli* (freshwater) or Enterococcus (saline water)	EPA certified laboratory procedure (40 CFR § 136)	NA
Pollutants of Concern[1]	EPA certified laboratory procedure (40 CFR § 136)	NA

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

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

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

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

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

SM = Standard Methods

6.3 Interpreting Outfall Sampling Results

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

Table 6-4. Benchmark Field Measurements for Select Parameters

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

6.4 Follow-up Ranking of Outfalls and Interconnections

The Town of Dracut 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 Stormwater and Engineering Departments 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
- Engineering and Sewer Department as well as other municipal data on septic systems
- Complaint records related to SSOs
- Septic system breakouts.

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

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

- Widespread code-required septic system upgrades required at property transfers (indicative of inadequate soils, water table separation, or other physical constraints of the area rather than 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

Dracut, Massachusetts
Revision Date: June 30, 2019

Outfall ID	Receiving Water	History of SSO's	Common or Twin Invert Manholes	Common Trench Construction	Storm/Sanitary Crossings (Sanitary Above)	Sanitary Lines with Underdrains	Inadequate Sanitary Level of Service	Areas Formerly served by combined sewers	Sanitary Infrastructure Defects	SSO Potential in event of system failures	Sanitary and storm drain Infrastructure >40 years old	Widespread code-required septic system upgrades required at property transfers	History of multiple board of health actions addressing widespread septic system failures
Sample 1	XYZ River	Yes/No	Yes/No	Yes/No	Yes/No	Yes/No	Yes/No	Yes/No	Yes/No	Yes/No	Yes/No	Yes/No	Yes/No
1-1	Mascuppic Lake	NO	NO	NO	NO	NO	NO	NO	NO	NO	yes	NO	NO
1-2	Mascuppic Lake	NO	NO	NO	NO	NO	NO	NO	NO	NO	yes	NO	NO
1-3	Mascuppic Lake	NO	NO	NO	NO	NO	NO	NO	NO	NO	yes	NO	NO
1-4	Open Ditch	NO	NO	NO	NO	NO	NO	NO	NO	NO	No	NO	NO
1-5	Mascuppic Lake	NO	NO	NO	NO	NO	NO	NO	NO	NO	No	NO	NO
1-6	Intersection	NO	NO	NO	NO	NO	NO	NO	NO	NO	No	NO	NO
1-7	Intersection	NO	NO	NO	NO	NO	NO	NO	NO	NO	yes	NO	NO
1-8	Intersection	NO	NO	NO	NO	NO	NO	NO	NO	NO	no	NO	NO
1-9	Intersection	NO	NO	NO	NO	NO	NO	NO	NO	NO	yes	NO	NO
1-10	Long Pond	NO	NO	NO	NO	NO	NO	NO	NO	NO	No	NO	NO
1-11	Long Pond	NO	NO	NO	NO	NO	NO	NO	NO	NO	No	NO	NO
1-12	Open Ditch	NO	NO	NO	NO	NO	NO	NO	NO	NO	yes	NO	NO
1-13	Open Ditch	NO	NO	NO	NO	NO	NO	NO	NO	NO	yes	NO	NO
1-14	Off Road	NO	NO	NO	NO	NO	NO	NO	NO	NO	yes	NO	NO
1-15	Intersection	NO	NO	NO	NO	NO	NO	NO	NO	NO	yes	NO	NO
1-16	Open Ditch	NO	NO	NO	NO	NO	NO	NO	NO	NO	yes	NO	NO
1-17	Off Road	NO	NO	NO	NO	NO	NO	NO	NO	NO	yes	NO	NO
2-1	Off Road	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO
2-2	Off Road	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO
2-3	Off Road	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO
2-4	Off Road	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO
2-5	detention area	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO
2-6	Off Road	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO
2-7	Open Ditch	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO
2-8	Off Road	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO
2-9	Off Road	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO

2-10	Off Road	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO
2-11	Off Road	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO
2-12	Off Road	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO
2-13	Off Road	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO
2-14	Open Ditch	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO
2-15	Off Road	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO
2-16	Off Road	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO
2-17	Off Road	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO
2-18	Off Road	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO
2-19	Off Road	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO
2-20	double brook	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO
2-21	double brook	NO	NO	NO	NO	NO	NO	NO	NO	NO	Yes	NO	NO
2-22	double brook	NO	NO	NO	NO	NO	NO	NO	NO	NO	Yes	NO	NO
2-23	double brook	NO	NO	NO	NO	NO	NO	NO	NO	NO	Yes	NO	NO
2-24	Off Road	NO	NO	NO	NO	NO	NO	NO	NO	NO	Yes	NO	NO
3-1	Long Pond	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO
3-2	Long Pond	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO
3-3	Long Pond	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO
3-4	Long Pond	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO
3-5	Long Pond	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO
3-6	Long Pond	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO
3-7	Off Road	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO
3-8	double brook	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO
3-9	double brook	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO
3-10	double brook	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO
3-11	double brook	NO	NO	NO	NO	NO	NO	NO	NO	NO	yes	NO	NO
3-12	double brook	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO
3-13	double brook	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO
3-14	Off Road	NO	NO	NO	NO	NO	NO	NO	NO	NO	yes	NO	NO
3-15	Off Road	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO
3-16	double brook	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO
4-1	Long Pond	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO
4-2	Long Pond	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO
4-3	Long Pond	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO
4-4	Off Road	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO
4-5	Off Road	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO
4-6	Off Road	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO
4-7	Off Road	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO
4-8	Off Road	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO
4-9	Off Road	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO

5-1	Off Road	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO
5-2	Beaver Brook	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO
5-3	Open Ditch	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO
5-4	Open Ditch	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO
5-5	Off Road	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO
5-6	Open Ditch	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO
5-7	Beaver Brook	NO	NO	NO	NO	NO	NO	NO	NO	YES	NO	NO	NO
5-8	Beaver Brook	NO	NO	NO	NO	NO	NO	NO	NO	YES	NO	NO	NO
5-9	Off Road	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO
5-10	Off Road	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO
5-11	Off Road	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO
5-12	Off Road	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO
5-13	Beaver Brook	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO
5-14	Beaver Brook	NO	NO	NO	NO	NO	NO	NO	NO	YES	NO	NO	NO
5-15	Beaver Brook	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO
5-16	Off Road	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO
5-17	Off Road	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO
5-18	Off Road	NO	NO	NO	NO	NO	NO	NO	NO	NO	yes	NO	NO
5-19	not listed	NO	NO	NO	NO	NO	NO	NO	NO	NO	No	NO	NO
5-20	Beaver Brook	NO	NO	NO	NO	NO	NO	NO	NO	NO	No	NO	NO
5-21	not listed	NO	NO	NO	NO	NO	NO	NO	NO	NO	No	NO	NO
5-22	Beaver Brook	NO	NO	NO	NO	NO	NO	NO	NO	NO	No	NO	NO
5-23	Open Ditch	NO	NO	NO	NO	NO	NO	NO	NO	NO	yes	NO	NO
5-24	Off Road	NO	NO	NO	NO	NO	NO	NO	NO	NO	yes	NO	NO
5-25	Open Ditch	NO	NO	NO	NO	NO	NO	NO	NO	NO	yes	NO	NO
5-26	stream	NO	NO	NO	NO	NO	NO	NO	NO	NO	No	NO	NO
5-27	stream	NO	NO	NO	NO	NO	NO	NO	NO	NO	Yes	NO	NO
5-28	Off Road	NO	NO	NO	NO	NO	NO	NO	NO	NO	yes	NO	NO
5-29	Off Road	NO	NO	NO	NO	NO	NO	NO	NO	NO	yes	NO	NO
6-1	Beaver Brook	NO	NO	NO	NO	NO	NO	NO	NO	NO	No	NO	NO
6-2	Beaver Brook	NO	NO	NO	NO	NO	NO	NO	NO	NO	No	NO	NO
6-3	Beaver Brook	NO	NO	NO	NO	NO	NO	NO	NO	NO	No	NO	NO
6-4	Beaver Brook	NO	NO	NO	NO	NO	NO	NO	NO	NO	No	NO	NO
6-5	Beaver Brook	NO	NO	NO	NO	NO	NO	NO	NO	NO	No	NO	NO
6-6	Beaver Brook	NO	NO	NO	NO	NO	NO	NO	NO	NO	No	NO	NO
6-7	Beaver Brook	NO	NO	NO	NO	NO	NO	NO	NO	NO	No	NO	NO
6-8	Beaver Brook	NO	NO	NO	NO	NO	NO	NO	NO	NO	No	NO	NO
6-9	Beaver Brook	NO	NO	NO	NO	NO	NO	NO	NO	NO	No	NO	NO
6-10	Off Road	NO	NO	NO	NO	NO	NO	NO	NO	NO	No	NO	NO
6-11	Off Road	NO	NO	NO	NO	NO	NO	NO	NO	NO	yes	NO	NO

6-12	Off Road	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO
6-13	Off Road	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO
6-14	Off Road	NO	NO	NO	NO	NO	NO	NO	NO	NO	yes	NO	NO
6-15	Off Road	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO
6-16	Off Road	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO
6-17	Off Road	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO
6-18	Off Road	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO
6-19	Off Road	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO
6-20	Off Road	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO
6-21	Off Road	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO
6-22	Off Road	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO
6-23	Off Road	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO
6-24	Off Road	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO
6-15	Off Road	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO
6-26	Off Road	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO
6-27	Off Road	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO
6-28	open swale	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO
6-29	open swale	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO
6-30	Off Road	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO
6-31	Off Road	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO
6-32	Off Road	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO
6-33	Off Road	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO
7-1	Beaver Brook	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO
7-2	Off Road	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO
7-3	Open Ditch	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO
7-4	Off Road	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO
7-5	Open Ditch	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO
7-6	Open Ditch	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO
7-7	Off Road	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO
7-8	Off Road	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO
7-9	Off Road	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO
7-10	Off Road	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO
7-11	Off Road	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO
7-12	Beaver Brook	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO
7-13	Beaver Brook	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO
8-1	Off Road	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO
8-2	Off Road	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO
8-3	swale	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO
8-4	Beaver Brook	NO	NO	NO	NO	NO	NO	NO	NO	NO	YES	NO	NO
8-5	Beaver Brook	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO

8-6	Off Road	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO
8-7	Off Road	NO	NO	NO	NO	NO	NO	NO	NO	YES	NO	NO	NO
8-8	Off Road	NO	NO	NO	NO	NO	NO	NO	NO	NO	YES	NO	NO
8-9	Beaver Brook	NO	NO	NO	NO	NO	NO	NO	NO	NO	yes	NO	NO
8-10	Beaver Brook	NO	NO	NO	NO	NO	NO	NO	NO	NO	YES	NO	NO
8-11	Beaver Brook	NO	NO	NO	NO	NO	NO	NO	NO	NO	YES	NO	NO
8-12	Beaver Brook	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO
8-13	Beaver Brook	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO
8-14	towards beaver brook	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO
8-15	Off Road	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO
8-16	Off Road	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO
8-17	Off Road	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO
8-18	Off Road	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO
8-19	Off Road	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO
8-20	Off Road	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO
8-21	skyline drive	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO
8-22	skyline drive	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO
8-23	Off Road	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO
8-24	Off Road	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO
9-1	Off Road	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO
9-2	Off Road	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO
9-3	Off Road	NO	NO	NO	NO	NO	NO	NO	NO	NO	yes	NO	NO
9-4	Off Road	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO
9-5	Off Road	NO	NO	NO	NO	NO	NO	NO	NO	NO	yes	NO	NO
10-1	Off Road	NO	NO	NO	NO	NO	NO	NO	NO	NO	YES	NO	NO
10-2	Off Road	NO	NO	NO	NO	NO	NO	NO	NO	NO	YES	NO	NO
10-3	Off Road	NO	NO	NO	NO	NO	NO	NO	NO	NO	YES	NO	NO
10-4	Beaver Brook	NO	NO	NO	NO	NO	NO	NO	NO	NO	YES	NO	NO
10-5	Peppermint Brook	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO
10-6	Peppermint Brook	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO
10-7	open swale	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO
10-8	Peppermint Brook	NO	NO	NO	NO	NO	NO	NO	NO	NO	Yes	NO	NO
10-9	Peppermint Brook	NO	NO	NO	NO	NO	NO	NO	NO	NO	yes	NO	NO
10-10	Peppermint Brook	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO
10-11	Peppermint Brook	NO	NO	NO	NO	NO	NO	NO	NO	NO	yes	NO	NO
10-12	Off Road	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO
11-1	Off Road	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO
11-2	Off Road/Peppermint Brook	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO
11-3	Off Road	NO	NO	NO	NO	NO	NO	NO	NO	NO	YES	NO	NO
11-4	towards peppermint brook	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO

11-5	towards peppermint brook	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO
11-6	Off Road	NO	NO	NO	NO	NO	NO	NO	NO	NO	YES	NO	NO
11-7	Off Road	NO	NO	NO	NO	NO	NO	NO	NO	NO	YES	NO	NO
11-8	Off Road	NO	NO	NO	NO	NO	NO	NO	NO	NO	YES	NO	NO
11-9	Beaver Brook	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO
11-10	Beaver Brook	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO
11-11	Beaver Brook	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO
11-12	Beaver Brook	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO
12-1	Off Road	NO	NO	NO	NO	NO	NO	NO	NO	NO	yes	NO	NO
12-2	Off Road	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO
12-3	Off Road	NO	NO	NO	NO	NO	NO	NO	NO	NO	YES	NO	NO
12-4	Off Road	NO	NO	NO	NO	NO	NO	NO	NO	NO	YES	NO	NO
12-5	Off Road	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO
12-6	Off Road	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO
12-7	Off Road	NO	NO	NO	NO	NO	NO	NO	NO	YES	NO	NO	NO
12-8	Off Road	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO
12-9	Off Road	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO
12-10	Off Road	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO
12-11	Off Road	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO
12-12	Off Road/Peppermint Brook	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO
12-13	Off Road	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO
12-14	Off Road	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO
12-15	Off Road	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO
12-16	Off Road/Peppermint Brook	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO
12-17	Off Road	NO	NO	NO	NO	NO	NO	NO	NO	NO	YES	NO	NO
13-1	Off Road	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO
13-2	Off Road	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO
13-3	Off Road	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO
13-4	Off Road	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO
13-5	towards peppermint brook	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO
13-6	Off Road	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO
13-7	Off Road	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO
13-8	Off Road	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO
13-9	Off Road	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO
13-10	Off Road	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO
13-11	Off Road	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO
13-12	Off Road	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO
13-13	detention area	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO
13-14	Lowell, MA	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO
14-1	Off Road/Peppermint Brook	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO

14-2	Off Road/Peppermint Brook	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO
14-3	Off Road/Peppermint Brook	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO
14-4	Off Road/Peppermint Brook	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO
14-5	Off Road/Peppermint Brook	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO
14-6	Off Road/Peppermint Brook	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO
14-7	Off Road	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO
14-8	Off Road	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO
14-9	Off Road	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO
14-10	Off Road	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO
14-11	Off Road	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO
14-12	Off Road	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO
14-13	Off Road	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO
14-14	Off Road	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO
14-15	Off Road	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO
14-16	Off Road	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO
14-17	Off Road	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO
14-18	Off Road	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO
14-19	Off Road	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO
14-20	Off Road	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO
14-21	Off Road	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO
14-22	Off Road	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO
14-23	detention area	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO
14-24	detention area	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO
14-25	detention area	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO
14-26	Off Road	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO
14-27	Off Road	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO
14-28	Off Road	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO
14-29	Off Road	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO
14-30	Off Road	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO
15-1	Off Road	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO
15-2	Off Road	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO
15-3	Off Road	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO
15-4	Off Road	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO
15-5	Off Road	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO
15-6	Off Road	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO
15-7	Off Road	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO
15-8	towards cheever ave	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO
15-9	Off Road	NO	NO	NO	NO	NO	NO	NO	NO	YES	NO	NO	NO
15-10	Off Road	NO	NO	NO	NO	NO	NO	NO	NO	YES	NO	NO	NO
15-11	Off Road/Richardson Brook	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO

15-12	towards richardson brook	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO
15-13	towards richardson brook	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO
15-14	Off Road	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO
15-15	Richardson Brook	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO
15-16	Richardson Brook	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO
15-17	Richardson Brook	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO
15-18	Richardson Brook	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO
15-19	Richardson Brook	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO
15-20	Richardson Brook	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO
15-21	Richardson Brook	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO
15-22	towards richardson brook	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO
15-23	Richardson Brook	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO
15-24	Richardson Brook	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO
15-25	Off Road	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO
15-26	Off Road	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO
15-27	Trout Brook	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO
15-28	Richardson Brook	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO
15-29	Richardson Brook	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO
15-30	towards richardson brook	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO
15-31	Richardson Brook	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO
15-32	Off Road/Truot Brook	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO
15-33	Off Road	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO
15-34	Richardson Brook	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO
15-35	Off Road	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO
16-1	Off Road	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO
16-2	Off Road	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO
16-3	brook	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO
16-4	Off Road	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO
16-5	Off Road	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO
16-6	Off Road	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO
16-7	brook	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO
16-8	brook	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO
16-9	brook	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO
16-10	brook	NO	NO	NO	NO	NO	NO	NO	NO	NO	yes	NO	NO
16-11	brook	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO
16-12	Merrimack River	NO	NO	NO	NO	NO	NO	NO	NO	NO	yes	NO	NO
16-13	brook	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO
17-1	Off Road	NO	NO	NO	NO	NO	NO	NO	NO	NO	Yes	NO	NO
1-2	Off Road	NO	NO	NO	NO	NO	NO	NO	NO	NO	Yes	NO	NO
17-3	towards brook	NO	NO	NO	NO	NO	NO	NO	NO	NO	Yes	NO	NO

17-4	towards brook	NO	NO	NO	NO	NO	NO	NO	NO	NO	Yes	NO	NO
17-5	towards brook	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO
17-6	Off Road	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO
17-7	Off Road	NO	NO	NO	NO	NO	NO	NO	NO	NO	Yes	NO	NO
17-8	Off Road	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO
17-9	Off Road	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO
17-10	Off Road	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO
17-11	Off Road	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO
17-12	Off Road	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO
17-13	crescent st	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO
17-14	Merrimack River	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO
17-15	Off Road	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO
17-16	Off Road	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO
17-17	Richardson Brook	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO
17-18	Off Road	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO
18-1	Off Road	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO
18-2	Off Road (near Merrimack River)	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO
18-3	Merrimack River	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO
18-4	Merrimack River	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO
18-5	Merrimack River	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO
18-6	Merrimack River	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO
19-1	Off Road	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO
19-2	Off Road	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO
19-3	Trout Brook	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO
19-4	Trout Brook	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO
19-5	Trout Brook	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO
19-6	Trout Brook	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO
19-7	Trout Brook	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO
19-8	Trout Brook	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO
19-9	Trout Brook	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO
19-10	Off Road	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO
19-11	Off Road	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO
19-12	Off Road	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO
19-13	Trout Brook	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO
19-14	Trout Brook	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO
19-15	towards Trout Brook	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO
19-16	Off Road	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO
19-17	Off Road	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO
19-18	brook	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO

19-19	brook	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO
19-20	brook	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO
19-21	Off Road	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO
19-22	Off Road	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO
19-23	Off Road	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO
19-24	Off Road	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO
19-25	off road	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO
19-26	off road	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO
19-27	off road	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO
19-28	off road	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO
19-29	off road	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO
19-30	off road	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO
19-31	off road	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO
19-32	off road	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO
19-33	towards Methuen City Line	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO
19-34	brook	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO
19-35	off road	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO
19-36	off road	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO
19-37	off road	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO
19-38	off road	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO
19-39	Trout Brook	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO
19-40	Trout Brook	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO
19-41	off road	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO
20-1	off road	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO
20-2	off road	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO
20-3	off road	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO
20-4	off road	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO
20-5	off road	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO
20-6	off road	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO
20-7	off road	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO
20-8	off road	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO
20-9	off road	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO
21-1	off road	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO
21-2	off road	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO
21-3	off road	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO
21-4	off road	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO
21-5	off road	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO
21-6	off road	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO
21-7	off road	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO
21-8	off road	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO

21-9	off road	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO
21-10	off road	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO
21-11	off road	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO
21-12	off road	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO
21-13	towards Peters Pond	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO
21-14	detention area	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO
21-15	off road	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO
21-16	brook	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO
21-17	off Road	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO
21-18	towards Peters Pond	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO
21-19	towards Peters Pond	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO
21-20	off road	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO
21-21	off road	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO
21-22	off Road	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO
21-23	off Road	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO
21-24	off Road	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO
21-25	Bartlet Brook	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO
21-26	Bartlet Brook	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO
21-27	Bartlet Brook	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO
21-28	Bartlet Brook	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO
21-29	off road	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO
21-30	off road	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO
21-31	peters pond	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO
21-32	towards Peters Pond	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO
21-33	towards Peters Pond	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO
21-34	peters pond	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO
21-35	peters pond	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO
21-36	peters pond	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO
21-37	towards Peters Pond	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO
21-38	towards Peters Pond	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO
21-39	off road	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO
21-40	off road	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO
21-41	off road	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO
21-42	off road	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO
21-43	towards Methuen City Line	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO
21-44	towards Bartlet Brook	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO
21-45	off road	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO
21-46	towards Peters Pond	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO
21-47	off road	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO
21-48	off road	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO

21-49	off road	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO
21-50	Bartlet Brook	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO
21-51	Open Ditch	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO
21-52	peters pond	NO	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. Any sanitary sewer and storm drain infrastructure greater than 40 years old
11. Widespread code-required septic system upgrades required at property transfers (indicative of inadequate soils, water table separation, or other physical constraints of the area rather that poor owner maintenance)
12. History of multiple Board of Health actions addressing widespread septic system failures (indicative of inadequate soils, water table separation, or other physical constraints of the area rather that poor owner maintenance)

7.2 Dry Weather Manhole Inspections

The Town of Dracut 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 Stormwater 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, conductivity to detect tidal backwater, etc.).

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

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

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

7.3 Wet Weather Outfall Sampling

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

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

Wet weather outfall sampling will proceed as follows:

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

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

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

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

7.4 Source Isolation and Confirmation

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

- Sandbagging
- Smoke Testing
- Dye Testing
- CCTV/Video Inspections

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 Stormwater Department will notify property owners in the affected area. Smoke testing notification can include postcards, door hangers, and reverse911. Notifications will also be posted on the Dracut website and DPW Facebook page for single family homes, businesses and building lobbies for multi-family dwellings.

7.4.1 Sandbagging

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

7.4.2 Smoke Testing

Smoke testing involves injecting non-toxic smoke into drain lines and noting the emergence of smoke from sanitary sewer vents in illegally connected buildings or from cracks and leaks in the system itself. Typically a smoke bomb or smoke generator is used to inject the smoke into the system at a catch basin or manhole and air is then forced through the system. Test personnel are placed in areas where there are

suspected illegal connections or cracks/leaks, noting any escape of smoke (indicating an illicit connection or damaged storm drain infrastructure). It is important when using this technique to make proper notifications to area residents and business owners as well as local police and fire departments.

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

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

7.4.3 Dye Testing

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

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

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

7.4.4 CCTV/Video Inspection

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

7.5 Illicit Discharge Removal

When the specific source of an illicit discharge is identified, the Town of Dracut 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 By-law)

CHAPTER 25: ILLICIT DISCHARGE BY-LAW

SECTION 1: Purpose

Increased and contaminated stormwater runoff is a major cause of impairment of water quality and flow in lakes, ponds, streams, rivers, wetlands and groundwater; contamination of drinking water supplies; alteration or destruction of aquatic and wildlife habitat; and flooding.

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

The objectives of this by-law are:

- to prevent pollutants from entering the town's municipal separate storm sewer system (MS4);
- to protect existing watercourses within the Town of Dracut by preventing pollutants from entering these resource areas;
- to prohibit illicit connections and unauthorized discharges to the MS4;
- to require the removal of all such illicit connections;
- to comply with state and federal statutes and regulations relating to stormwater discharges; and
- to establish the legal authority to ensure compliance with the provisions of this by-law through inspection, monitoring, and enforcement.

SECTION 2: Definitions

For the purposes of this by-law, the following shall mean:

"Authority": Board of Selectmen (or Stormwater Permitting Authority).

"Authorized Administrative Agency": The Stormwater Permitting Authority hereafter the SPA, its employees or agents designated to enforce this by-law.

"Best Management Practices (BMP)": An activity, procedure, restraint, or structural improvement that helps to reduce the quantity or improve the quality of stormwater runoff.

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

"Discharge of Pollutants": The addition from any source of any pollutant or combination of pollutants into the municipal storm drain system or into the waters of the United States or Commonwealth from any source.

"Groundwater": Water beneath the surface of the ground.

"Illicit Connection": A surface or subsurface drain or conveyance, which allows an illicit discharge into the municipal storm drain system, including without limitation sewage, process wastewater, or wash water and any connections from indoor drains, sinks, or toilets, regardless

of whether said connection was previously allowed, permitted, or approved before the effective date of this by-law.

"Illicit Discharge": Direct or indirect discharge to the municipal storm drain system that is not composed entirely of stormwater, except as exempted in Section 8. The term does not include a discharge in compliance with an NPDES Storm Water Discharge Permit or a Surface Water Discharge Permit.

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

"Municipal Separate Storm Sewer System (MS4) or Municipal Storm Drain System": The system of conveyances designed or used for collecting or conveying stormwater, including any road with a drainage system, street, gutter, curb, inlet, piped storm drain, pumping facility, retention or detention basin, natural or man-made or altered drainage channel, reservoir, and other drainage structure that together comprise the storm drainage system owned or operated by the town of Dracut.

"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-Stormwater Discharge": Discharge to the municipal storm drain system not composed entirely of stormwater

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

"Pollutant": Any element or property of sewage, agricultural, industrial or commercial waste, runoff, leachate, heated effluent, or other matter whether originating at a point or non-point source, that is or may be introduced into any sewage treatment works or waters of the Commonwealth.

Pollutants shall include without limitation:
(1) paints, varnishes, and solvents;
(2) oil and other automotive fluids;
(3) non-hazardous liquid and solid wastes and yard wastes;
(4) refuse, rubbish, garbage, litter, or other discarded or abandoned objects, ordnances, accumulations and floatables;
(5 pesticides, herbicides, and fertilizers;
(6) hazardous materials and wastes; sewage, fecal coliform and pathogens;
(7) dissolved and particulate metals;
(8) animal wastes;
(9) rock, sand, salt, soils;
(10) construction wastes and residues; and
(11) noxious or offensive matter of any kind.

"Process Wastewater": Water which, during manufacturing or processing, comes into direct contact with or results from the production or use of any material, intermediate product, finished product, or waste product.
"Recharge": The process by which groundwater is replenished by precipitation through the percolation of runoff and surface water through the soil.

"Stormwater": 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.

"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.

SECTION 3: Applicability
This by-law shall apply to flows entering the municipally owned storm drainage system.

SECTION 4: Authority
This bylaw is adopted under the authority granted by the Home Rule Amendment of the Massachusetts Constitution and the Home Rule Procedures Act, and pursuant to the regulations of the federal Clean Water Act found at 40 CFR 122.34.

SECTION 5: Responsibility for Administration
The STORMWATER PERMITTING AUTHORITY (SPA) shall administer, implement and enforce this by-law. Any powers granted to or duties imposed upon the STORMWATER PERMITTING AUTHORITY (SPA) may be delegated in writing by the Board of Selectmen to the STORMWATER PERMITTING AUTHORITY (SPA).

SECTION 6: Regulations The Board of Selectmen may promulgate rules and regulations to effectuate the purposes of this by-Law. Failure by the Board of Selectmen to promulgate such rules and regulations shall not have the effect of suspending or invalidating this by-law.

SECTION 7: Prohibited Activities
Illicit Discharges. No person shall dump, discharge, cause or allow to be discharged any pollutant or non-stormwater discharge into the municipal separate storm sewer system (MS4), into a watercourse, or into the waters of the Commonwealth.

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

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

SECTION 8: Exemptions
Discharge or flow resulting from firefighting activities.

The following non-stormwater discharges or flows are exempt from the prohibition of non-stormwater 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.
(9) Discharge from landscape irrigation or lawn watering or air conditioning condensation;
(10) Water from individual residential car washing;
(11) Discharge from dechlorinated swimming pool water (less than one ppm chlorine) provided the water is allowed to stand for one week prior to draining and the pool is drained in such a way as not to cause a nuisance;
(12) Discharge from street sweeping;
(13) Dye testing, provided writing notification is given to the STORMWATER PERMITTING AUTHORITY (SPA) prior to the time of the test;
(14) Non-stormwater 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,
(15) Discharge for which advanced written approval is received from the Board of Selectmen as necessary to protect public health, safety, welfare or the environment,

(16) For discharges pertaining to items defined in section 7 and 8 the Town shall require testing of currently conveyed or to be conveyed flow at the expense of the property owner. The town may also require a hydraulic capacity analysis of its drainage system to accommodate the flow conveyed or to be conveyed.

SECTION 9: Emergency Suspension of Storm Drainage System Access
The Board of Selectmen may suspend municipal storm drain system access to any person or property without prior written notice when such suspension is necessary to stop an actual or threatened discharge of pollutants that presents imminent risk of harm to the public health, safety, welfare or the environment. In the event any person fails to comply with an emergency suspension order, the Authorized Enforcement Agency may take all reasonable steps to prevent or minimize harm to the public health, safety, welfare or the environment.

SECTION 10: Notification of Spills
Notwithstanding other requirements of local, state or federal law, as soon as a person responsible for a facility or operation, or responsible for emergency response for a facility or operation has information of or suspects a release of materials at that facility or operation resulting in or which may result in discharge of pollutants 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 [insert other appropriate departments]. In the event of a release of non-hazardous material, the reporting person shall notify the Authorized Enforcement Agency no later than the next business day. The reporting person shall provide to the Authorized Enforcement Agency written confirmation of all telephone, facsimile or in-person notifications within three business days thereafter. If the discharge of prohibited materials is from a commercial
or industrial facility, the facility owner or operator of the facility shall retain on-site a written record of the discharge and the actions taken to prevent its recurrence. Such records shall be retained for at least three years.

SECTION 11: Enforcement
The Board of Selectmen through the STORMWATER PERMITTING AUTHORITY (SPA) shall enforce this by-law, regulations, orders, violation notices, and enforcement orders, and may pursue all civil and criminal remedies for such violations.

Civil Relief. If a person violates the provisions of this by-law, regulations, permit, notice, or order issued thereunder, the Board of Selectmen 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.

Orders: The STORMWATER PERMITTING AUTHORITY (SPA) may issue a written order to enforce the provisions of this by-law or the regulations thereunder, which may include:

(a) elimination of illicit connections or discharges to the MS4
(b) performance of monitoring, analyses, and reporting;
(c) that unlawful discharges, practices, or operations shall cease and desist; and
(d) remediation of contamination in connection therewith.

If the town determines that abatement or remediation of contamination is required, the order shall set forth a deadline by which such abatement or remediation must be completed. Said order shall further advise that, should the violator or property owner fail to abate or perform remediation within the specified deadline, the town may, at its option, undertake such work, and expenses thereof shall be charged to the violator.

Within thirty (30) days after completing all measures necessary to abate the violation or perform remediation, the violator and the property owner will be notified of the costs incurred by the town including administrative costs. The violator or property owner may file a written protest objecting to the amount or basis of costs with the Board of Selectmen within thirty (30) days of receipt of the notification of the costs incurred. If the amount due is not received by the expiration of the time in which to file a protest or within thirty (30) days following a decision of the Board of Selectmen affirming or reducing the costs, or from a final decision of a court of competent jurisdiction, the costs shall become a special assessment against the property owner and shall constitute a lien on the owner's property for the amount of said costs. Interest shall begin to accrue on any unpaid costs at the statutory rate provided in G.L. Ch. 59, 57 after the thirty-first day at which the costs first become due.

Criminal Penalty: Any person who violates any provision of this by-law, regulation, order or permit issued thereunder, shall be punished by a fine of not more than $ 250.00. Each day or part thereof that such violation occurs or continues shall constitute a separate offense.

Non-Criminal Disposition: As an alternative to criminal prosecution or civil action, the Board of Selectmen may elect to utilize the non-criminal disposition procedure set forth in G.L. Ch. 40, §21D in which case the STORMWATER PERMITTING AUTHORITY (SPA) shall be the enforcing town department The penalty for the 1st violation shall be $100.00. The penalty for the 2nd violation shall be $250.00. The penalty for the 3rd and subsequent violations shall be $300.00. Each day or part thereof that such violation occurs or continues shall constitute a separate offense.

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

Appeals: The decisions or orders of the Board of Selectmen shall be final. Further relief shall be to a court of competent jurisdiction.

Remedies Not Exclusive: The remedies listed in this by-law are not exclusive of any other remedies available under any applicable federal, state or local law.

SECTION 12: Violations Deemed a Public Nuisance.

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

SECTION 13: Severability
The provisions of this by-law are hereby declared to be severable. If any provision, paragraph, sentence, or clause, of this by-law 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 by-law.

SECTION 14: Transitional Provisions
Residential property owners shall have (90) ninety days from the effective date of the by-law to comply with its provisions provided good cause is shown for the failure to comply with the by-law during that period.

SECTION 15. WATERCOURSE PROTECTION.

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

SECTION 16. INDUSTRIAL OR CONSTRUCTION ACTIVITY DISCHARGES.

15.1. Submission of NOI to EPA.

(1) 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 Special Permit Granting Authority prior to the allowing of discharges to the MS4.
(2) The operator of a facility, including construction sites, required to have an NPDES permit to discharge storm water associated with industrial activity shall submit a copy of the Notice of Intent (NOI) to the Special Permit Granting Authority at the same time the operator submits the original Notice of Intent to the EPA as applicable.
(3) The copy of the Notice of Intent may be delivered to the authorized enforcement agency either in person or by mailing it to:

Notice of Intent to Discharge Storm Water

Dracut Stormwater Permitting Authority

62 Arlington Street

Dracut, MA 01826

(4) A person commits an offense if the person operates a facility that is discharging storm water associated with industrial activity without having submitted a copy of the Notice of Intent to do so to the Special Permit Granting Authority.";

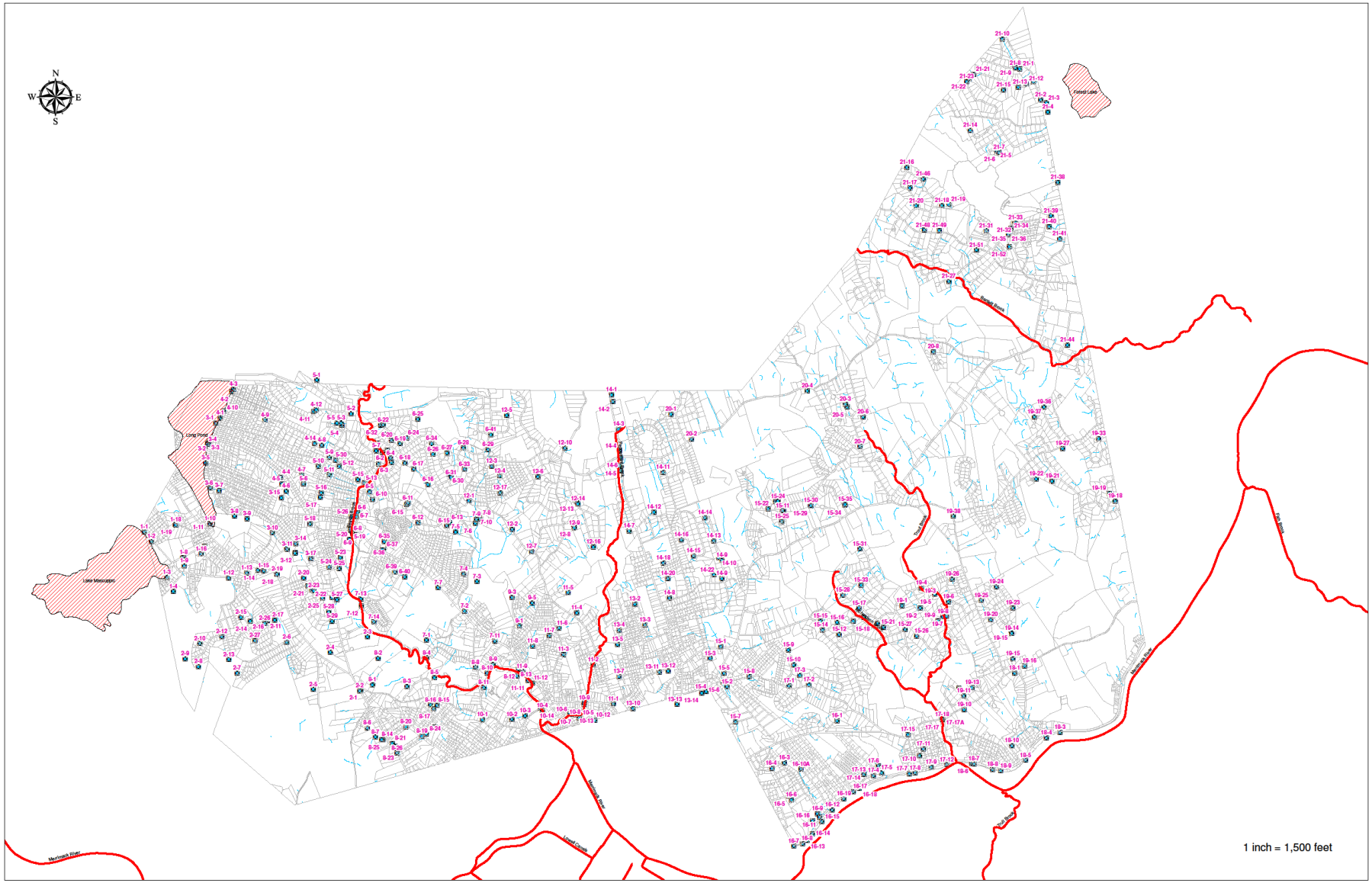
or act in any other way relative thereto.

Submitted by James A. Duggan, Town Manager
Recommendations:

Appendix B

Storm System Mapping

Discharge Points & Impaired rivers and ponds



Appendix C

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

Sample Bottle Labels

Inspector:_____

Lab:_____

Date: _____

Time:_____

Outfall ID:_____

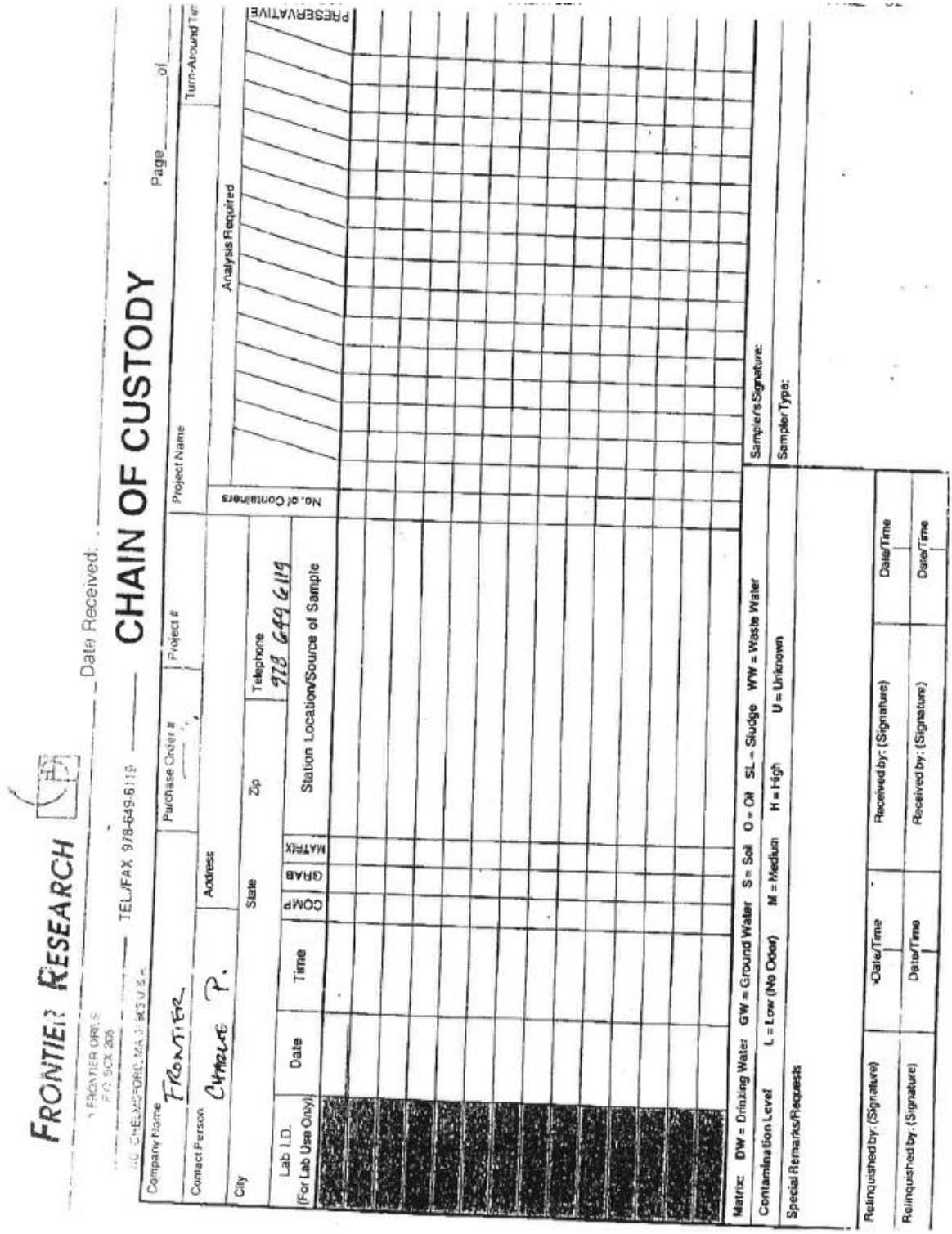
Location:_____

Analysis:_____

Additional Comments:_____

_____

Chain of Custody



Field Sample Sheet

Beach Sampling Field Data

Revised 2018

Town/City:
Date Collected:
Collected by:

Time Delivered to Lab:
Delivered by:
Relinquished to:

ID #	Sample Location (If beach has multiple samples, note location)	Marine or Fresh	Sample Time	Water Clarity: Clear (C) Partly (P) Murky (M)	Water Temp (°F)	Wave Intensity: Calm (C) Normal (N) Rough (R)	Days Since Rain (7 = Within 24 hrs.)	Potential Pollution Sources - If none, check "none" (Use check mark for others. For people, birds, and dogs, indicate number)						
								# People in Water	# Birds	# Dogs	Algae	Trash	Animal/ Human waste	Wrack	None
Y	YMCA CAMP	F		C P M		C N R									
				C P M		C N R									
				C P M		C N R									
				C P M		C N R									
				C P M		C N R									
				C P M		C N R									
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				C P M		C N R									
				C P M		C N R									
				C P M		C N R									
				C P M		C N R									
				C P M		C N R									
				C P M		C N R									

Cloud Cover: ☐ Clear ☐ Partly Cloudy ☐ Cloudy/Overcast

Comments: _____

A copy of this form must be included with the samples when they are submitted to the lab.

Appendix D

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

Standard Operating Procedures *Town of Dracut* *Department of Public Works* **Water Quality Screening**	**SOP Number:** 13	**Issue Date:** June 30, 2019
Approved by: *The Stormwater Committee* _____ *Edward Patenaude* *Public Works Director* _____ *Tina Douk* *Stormwater Manager*		

Purpose

Outfalls from an engineered storm drain system can be in the form of pipes or ditches. Water quality parameters can be collected during dry weather and wet weather outfall inspections. Additional opportunity to collect water quality data can be conducted when catch basin inspection and cleanings are maintained.

This standard operating procedure addresses screening-level measurements than can be collected at outfalls, catch basins, receiving waters, or other water bodies. The measurements can be collected with field test kits or with portable meters.

Water quality screening data collected in this manner can feed into an illicit discharge detection and elimination investigation.

Visual Condition Assessment

In the standard operating procedures for dry weather outfall inspection, wet weather outfall inspection, and catch basin inspection and cleaning, a Visual Condition Assessment is described to collect observations related to the quality of stormwater conveyed by an engineered storm drain system. These observations may include such visual evidence and/or potential pollutants as:

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

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

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

Field Kits and Sampling Methods Available

The following table shows field test kits and portable meters that can be used for screening parameters.

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

Analyte or Parameter	Instrumentation (Portable meter)	Field Test Kit
Ammonia	CHEMetrics™ V-2000 Colorimeter Hach™ DR/890 Colorimeter Hach™ Pocket Colorimeter™ II	CHEMetrics™ K-1410 CHEMetrics™ K-1510 (series) Hach™ NI-SA Hach™ Ammonia Test Strips
Bacteria	Bacteria field test kits require 24-hour window	
Boron	N/A	Hanna™ HI 38074 Taylor™ K-1541
Chloride	CHEMetrics™ V-2000 Colorimeter Hach™ Pocket Colorimeter™ II LaMotte™ DC1200 Colorimeter	CHEMetrics™ K-2002 through K-2070 Hach™ CDS-DT Hach™ Chloride QuanTab® Test Strips
Color		Hach™ ColorDisc
Conductivity	CHEMetrics™ I-1200	N/A
Detergents (Surfactants)	CHEMetrics™ I-2017	CHEMetrics™ K-9400 and K-9404 Hach™ DE-2
Fluoride	CHEMetrics™ V-2000 Colorimeter Hach™ Pocket Colorimeter™ II	N/A
Hardness	N/A	CHEMetrics™ K-1705 and K-1710 CHEMetrics™ K-4502 through K-4530 Hach™ HA-DT Hach™ Hardness Test Strips
Optical enhancers	Field tests still under development	
pH	CHEMetrics™ I-1000	Hach™ 17J through 17N Hach™ pH Test Strips
Potassium	Horiba™ Cardy C-131	LaMotte™ 3138 KIW
Turbidity	CHEMetrics™ I-1300	N/A

Each field test kit will include instructions specific to that test kit, and most kits are available in configurations that detect different ranges of the parameter.

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

Table SOP 13-2
Benchmark Field Measurements for Select Parameters

Analyte or Parameter	Benchmark
Ammonia	>50.0 mg/L
Conductivity	>2,000
Detergents (Surfactants)	> 0.25 mg/L
Fluoride	>0.25 mg/L
pH	<5
Potassium	>20 mg/L

If water quality screening samples exceed these benchmark concentrations, analytical samples should be collected for laboratory analysis.

Field test kits and portable instrumentation can be used as a screening tool. Field test kits can be used as an inexpensive method of field testing compared to a full analyses conducted at a laboratory. Portable instrumentation such as the colorimeters have the benefit of providing accurate readings, measure to low detection limits, and can be purchased pre-programmed to measure concentrations of most parameters required.

WATER QUALITY SCREENING FORM

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

FIELD WATER QUALITY SCREENING RESULTS

Sample Parameter	Field Test Kit or Portable Instrument Meter	Benchmark	Field Screening Result	Full Analytical Required?
Ammonia[1]		> 50.0 mg/L		☐ Yes ☐ No
Boron[1]		> 0.35 mg/L		☐ Yes ☐ No
Chloride[2]		230 mg/L		☐ Yes ☐ No
Color[1]		> 500 units		☐ Yes ☐ No
Specific Conductance[1]		> 2,000 µS/cm		☐ Yes ☐ No
Detergents & Surfactants[3]		> 0.25 mg/L		☐ Yes ☐ No
Fluoride[3]		> 0.25 mg/L		☐ Yes ☐ No
Hardness[1]		< 10 mg/L or > 2,000 mg/L		☐ Yes ☐ No
pH[1]		< 5		☐ Yes ☐ No
Potassium[1]		> 20 mg/L		☐ Yes ☐ No
Turbidity[1]		> 1,000 NTU		☐ Yes ☐ No

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

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

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

FULL ANALYTICAL TESTING WATER QUALITY RESULTS

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

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

Appendix E

IDDE Employee Training Record

Illicit Discharge Detection and Elimination (IDDE)
Employee Training Record

Dracut, Massachusetts

Date of Training: _____

Duration of Training: _____

Name	Title	Signature

Appendix F

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

Standard Operating Procedures *Town of Dracut* *Department of Public Works* **Dry Weather Outfall Inspection**	**SOP Number:** 10	**Issue Date:** June 30, 2019

Approved by: *The Stormwater Committee*

_____	_____
Edward Patenaude *Public Works Director*	*Tina Douk* *Stormwater Manager*

Purpose

Outfalls from an engineered storm drain system can be in the form of pipes or ditches. Water quality inspections under dry weather and wet weather conditions must be documented to comply with current regulations. During a dry weather period, it is anticipated that minimal flow from stormwater outfalls will be observed. 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.

Definition of Dry Weather

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

For any visually observed 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 or 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. Illicit discharges can 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). 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 caused by pollution, the following is considered.

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 inspector shall indicate the presence of a specific water quality indicator or parameter on the dry weather inspection form. Provide additional details in 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 within the comments section.

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 collected with the use of field test kits and instrumentation, or by discrete analytical samples processed by a laboratory.

The dry weather outfall inspection form includes fields to document the results of such screenings. The dry weather inspection form 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 Form that analytical samples were collected, specify parameters, and note the sample time on the Inspection Form. 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

1. Dry Weather Outfall Inspection Form

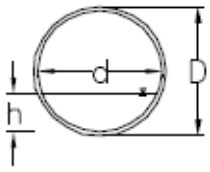
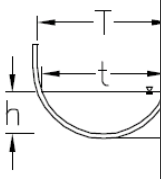
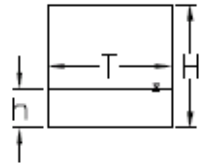
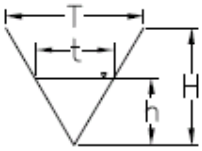
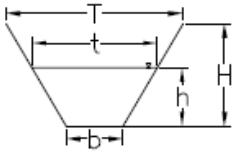
DRY WEATHER OUTFALL INSPECTION FORM

Outfall ID: _____ **Town:** _____ **Date:** _____

Inspector: _____ **Street name:** _____ **Last rain event:** _____

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

Shape of Pipe/Swale (check one)

11  **12** ☐ **13**  ☐	 **14** ☐	 ☐	 ☐
Rounded Pipe/Swale	**Rectangular Pipe/Swale**	**Triangular Swale**	**Trapezoidal Swale**

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

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

If the outlet is submerged check yes and indicate approximate height of water above the outlet invert. h above invert (in):		**Circle All Materials Present:**
Odor: Yes ☐ No ☐ **Optical enhancers suspected?** Yes ☐ No ☐ **Has channelization occurred?** Yes ☐ No ☐ **Has scouring occurred below the outlet?** Yes ☐ No ☐		Rip rap Excessive sediment Foam Sanitary Waste Orange Staining
Required Maintenance: Tree Work, Ditch Work, Structural Corrosion, N/A, Remove Trash/Debris, Blocked Pipe, Erosion at Structure, Other		Sheen: Bacterial Sheen: Petroleum Floatables Algae Excessive Vegetation
Comments:		

Standard Operating Procedures *Town of Dracut* *Department of Public Works* **Wet Weather Outfall Inspection**	**SOP Number:** 11	**Issue Date:** June 30, 2019
Approved by: *The Stormwater Committee* _____ *Edward Patenaude* *Public Works Director* _____ *Tina Douk* *Stormwater Manager*		

Purpose

Outfalls from an engineered storm drain system can be in the form of pipes or ditches. Water quality inspections under dry weather and wet weather conditions must be documented to comply with current regulations. 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.

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.

A wet weather inspection should be scheduled when weather forecasts show a 40% chance of rain or greater. Coordination with the laboratory for bottleware and for sample drop-off needs to occur in the event that a sample is collected.

Visual Condition Assessment

The Wet Weather Outfall Inspection Form 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:

8. Foam: indicator of upstream vehicle washing activities, or an illicit discharge.
9. Oil sheen: result of a leak or spill.
10. Cloudiness: indicator of suspended solids such as dust, ash, powdered chemicals and ground up materials.
11. Color or odor: Indicator of raw materials, chemicals, or sewage.
12. Excessive sediment: indicator of disturbed earth or other unpaved areas lacking adequate erosion control measures.

13. Sanitary waste and optical enhancers (fluorescent dyes added to laundry detergent): indicators of illicit discharge.
14. Orange staining: indicator of high mineral concentrations.

Many of these observations are indicators of an illicit discharge. Illicit discharges can 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).

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 caused by pollution, the following is considered.

5. 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.
6. Proximity to a potential pollution source: some entities including the textile industry, paper production facilities, oil industries, and firefighting 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.
7. Feeling: natural foam is typically persistent, light, and not slimy to the touch.
8. 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 inspector shall indicate the presence of a specific water quality indicator or parameter on the wet weather outfall inspection form.

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

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 collected with the use of field test kits or by discrete analytical samples processed by a laboratory.

The Wet Weather Outfall Inspection Form includes fields to document the results of such screening. The Inspection Form 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:

15. Do not eat, drink or smoke during sample collection and processing.
16. Do not collect or process samples near a running vehicle.
17. Do not park vehicles in the immediate sample collection area, including both running and non-running vehicles.
18. Always wear clean, powder-free nitrile gloves when handling sample containers and lids.
19. Never touch the inside surface of a sample container or lid, even with gloved hands.
20. Never allow the inner surface of a sample container or lid to be contacted by any material other than the sample water.
21. Collect samples while facing upstream and so as not to disturb water or sediments in the outfall pipe or ditch.
22. 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.
23. Slowly lower the bottle into the water to avoid bottom disturbance and stirring up sediment.
24. Do not allow any object or material to fall into or contact the collected water sample.
25. Do not allow rainwater to drip from rain gear or other surfaces into sample containers.
26. Replace and tighten sample container lids immediately after sample collection.
27. Accurately label the sample with the time and location.
28. Document on the Wet Weather Outfall Inspection Form that analytical samples were collected, specify parameters, and note the sample time on the Inspection Form. This creates a reference point for samples.

Analytical Sample Quality Control and Assurance

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

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

Maximum acceptable holding times are also specified for each analytical method in 40 CFR 136.3. Holding time is defined as the period of time between sample collection and extraction for analysis of the sample at the laboratory.

Holding time is important because prompt laboratory analysis allows the laboratory to review the data and if analytical problems are found, re-analyze the affected samples within the holding times.

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

Attachments

2. Wet Weather Outfall Inspection Form

WET WEATHER OUTFALL INSPECTION FORM

Outfall ID: _____ **Town:** _____ **Date:** _____

Inspector: _____ **Street name:** _____ **Last rain event:** _____

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.

Standard Operating Procedures *Town of Dracut* *Department of Public Works* **Locating Illicit Discharges**	**SOP Number:** 12	**Issue Date:** June 30, 2019
Approved by: *The Stormwater Committee* _____ *Edward Patenaude* *Public Works Director* _____ *Tina Douk* *Stormwater Manager*		

Purpose

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 2016 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.

Identifying Illicit Discharges

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

15. Foam: indicator of upstream vehicle washing activities, or an illicit discharge.
16. Oil sheen: result of a leak or spill.
17. Cloudiness: indicator of suspended solids such as dust, ash, powdered chemicals and ground up materials.
18. Color or odor: Indicator of raw materials, chemicals, or sewage.
19. Excessive sediment: indicator of disturbed earth of other unpaved areas lacking adequate erosion control measures.
20. Sanitary waste and optical enhancers (fluorescent dyes added to laundry detergent): indicator of the cross-connection of a sewer service.
21. 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. When a call is received about a suspected illicit discharge, the IDDE Tracking Sheet shall be used to document appropriate information. Action to trace, document, and eliminate the illicit discharge will be taken.

Potential illicit discharges reported by citizens will be reviewed on an annual basis to locate patterns of illicit discharges and identify high-priority catchments.

Tracing Illicit Discharges

Whenever an illicit discharge is suspected, the IDDE Tracking Sheet should be utilized. The Tracking Sheet shall be provided to the appropriate authority (i.e., Stormwater Department, Department of Public Works, etc.), which shall promptly investigate the reported incident.

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

1. Review information collected when illicit discharge was initially identified (i.e. time of day, weather conditions for the previous 72 hours). Review past reports or investigations of similar illicit discharges in the area.
2. Obtain GIS storm drain mapping for the area of the reported illicit discharge.
3. Document current conditions at the location of the observed illicit discharge point (i.e. odors, water appearance, estimated flow, presence of floatables, etc.). Photograph relevant evidence.
4. If there continues to be evidence of the illicit discharge, collect water quality data. Use 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 GIS 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 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.

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) or other forms of source isolation methods 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.

Sandbagging

Sandbagging can be useful when attempting to isolate intermittent illicit discharges. Sandbags or similar barriers are placed within outlet manholes to form a temporary dam to collect intermittent flow that may occur. If no flow collects behind the sandbag, the upstream network can be ruled out as a source of intermittent discharge.

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.

Removing Illicit Discharges

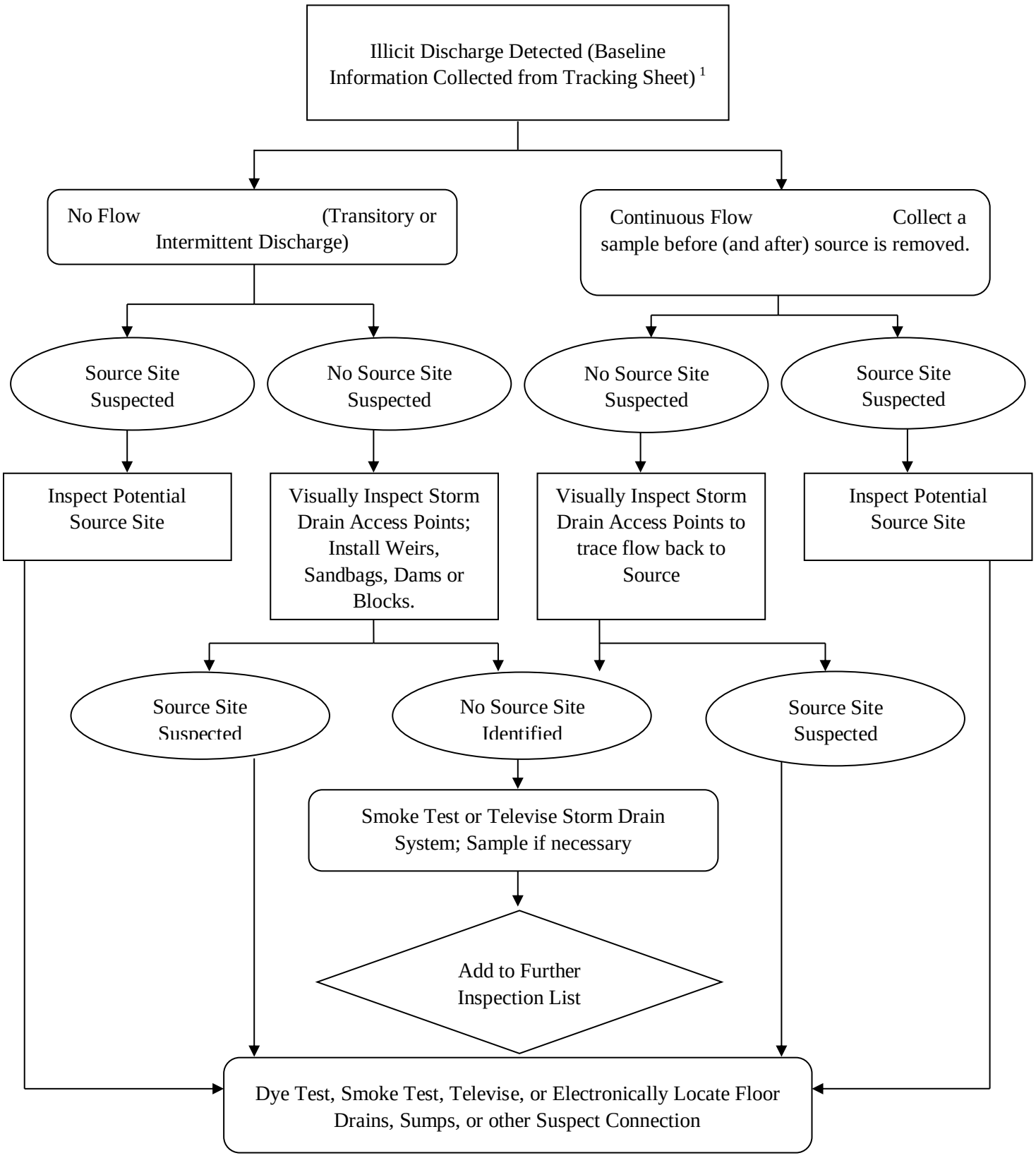
Proper removal of an illicit discharge will ensure it does not recur. In any scenario, conduct a follow up inspection to confirm that the illicit discharge has been removed. Suspend access to the storm drain system if an "imminent and substantial danger" exists or if there is a threat of serious physical harm to humans or the environment.

Attachments

1. Illicit Discharge Tracking Sheet

Table SOP 12-1
Notification and Removal Procedures for Illicit Discharges into the Municipal Separate Storm Sewer System

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