

# **Illicit Discharge Detection and Elimination (IDDE) Plan**

**Town of Wakefield,  
Massachusetts**



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## Illicit Discharge Detection and Elimination Plan

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Appendix A –IDDE Employee Training Record

# 1 Introduction

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## 1.1 MS4 Program

This Illicit Discharge Detection and Elimination (IDDE) Plan has been developed by the Town of Wakefield, MA (Wakefield) 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 Town of Wakefield has been issued a General Permit for Stormwater Discharges from Small Municipal Separate Storm Sewers in Massachusetts with an Issue Date of April 4, 2016 and an Effective Date of July 1, 2018. The permit will expire at midnight, June 30, 2023.

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.

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

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

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

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### 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).

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### 1.4 Receiving Waters and Impairments

**Table 1-1** lists the “impaired waters” within the boundaries of Wakefield 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  
Wakefield, Massachusetts**

Waterbody segment that receives flow from the MS4	Number of outfalls into receiving water segment	Chlorine	Chlorophyll-a	Dissolved Oxygen/ DO Saturation	Nitrogen	Oil & Grease/ PAH	Phosphorus	Solids/ TSS/ Turbidity	E. coli	Enterococcus	Other pollutant(s) causing impairments
Lake Quannapowitt, MA93060	31							X			Non-native aquatic plants, DDT, Excess algal growth
Saugus River, MA93-34	8				X		X	X			Fish-passage barrier, physical substrate habitat alterations, aquatic plants, excess algal growth, fecal coliform
Saugus River, MA93-35	8										Alteration in stream-side or littoral vegetative covers, low-flow alterations, fecal coliform
Mill River, MA93-31	21			X				X			Fecal coliform

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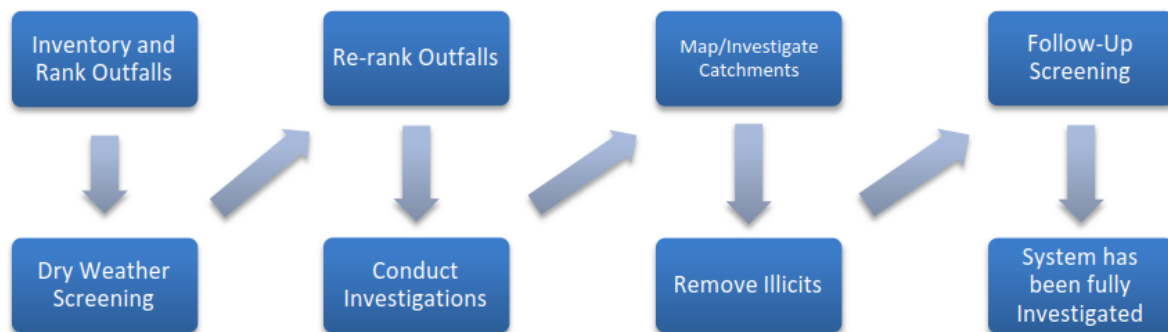
## 1.5 IDDE Program Goals, Framework, and Timeline

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					
Inventory of SSOs	X					
Written Catchment Investigation Procedure / SVF Inventory		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



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## 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 Wakefield 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

This document is fulfilling the following IDDE program activities consistent with the 2003 MS4 Permit requirements:

- Development of a Written IDDE Program Document
- Inventory of Sanitary Sewer Overflows (SSOs)
- Developed procedures for locating illicit discharges (i.e., visual screening of outfalls for dry weather discharges)
- Development of a priority list of outfalls.
- Development of procedures for locating the source of the discharge
- Development procedures for removal of the source of an illicit discharge
- Development procedures for documenting actions and evaluating impacts on the storm sewer system subsequent to removal

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

- Outfall inspection
- Additional storm system mapping (Phase II), including the locations of catch basins, manholes and pipe connectivity.

## 2 Authority and Statement of IDDE Responsibilities

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### 2.1 Legal Authority

The Town of Wakefield has adopted a Stormwater Management Bylaw. The Stormwater Management Bylaw provides the Town of Wakefield with adequate legal authority to:

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

The Town of Wakefield will continue to review its current Stormwater Management Bylaw and related land use regulations and policies for consistency with the 2016 MS4 Permit and if necessary, any bylaw, ordinance, or other regulatory mechanism will meet the requirements of the 2016 MS4 Permit and will be in place within 3 years of the permit effective date (July 1, 2020).

A copy of the Stormwater Management Bylaw can be viewed at the following web address: <https://ecode360.com/12359745>

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### 2.2 Statement of Responsibilities

The Wakefield Department of Public Works (DPW) is the lead municipal department responsible for implementing the IDDE program. The Wakefield (DPW) is responsible for identifying and categorizing outfalls and interconnections, dry weather screening and sampling, investigating and monitoring catchments and reporting to the Advisory Board of Public Works any illicit discharges for enforcement action by the Board pursuant to the provisions of the Stormwater Management Bylaw.

The DPW is also responsible for maintaining and updating the IDEE plan, maintaining all associated records, and IDDE training.

The Advisory Board of Public Works is responsible for administering the Stormwater Management Bylaw including aspects that pertain to the review and permitting and/or enforcement against illicit discharges. Enforcement includes the potential for fines, civil action and/or referral for criminal action, as appropriate. Projects which receive site plan approval or subdivision approval or a special permit from the Planning Board; or a finding or special permit or variance from the Board of Appeals; or drainage or subdivision approval from the Board of Health; or an Order of Conditions from the Conservation Commission subject to jurisdiction under the Wetlands Protection Act and demonstrate compliance with the Massachusetts Stormwater Management Policy are not required to file separately with

the Advisory Board of Public Works but the project is reviewed by Public Works through the individual plan review processes.

The Wakefield Conservation Commission is responsible for administering the Wakefield Wetland Protection Bylaw, including aspects that pertain to the review and permitting and/or enforcement against illicit discharges. Enforcement includes the potential for fines, civil action and/or referral for criminal action, as appropriate.

The Wakefield Board of Health regulates all private drinking water wells and septic leaching systems under state and local regulations.

Persons with responsibility for aspects of the program include:

- Town Engineer – William J. Renault, Jr., P.E.
- DPW Environmental Manager - Claire Moss
- DPW GIS Administrator and Project Manager - Katherine Lafferty

## 3 Stormwater System Mapping

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

The 2016 MS4 Permit requires the storm system map to be updated in two phases as outlined below. The Wakefield Department of Public Works (is responsible for updating the stormwater system mapping pursuant to the 2016 MS4 Permit. The Town of Wakefield will report on the progress towards completion of the storm system map in each annual report. Updates to the stormwater mapping will be uploaded to the following website:

<https://wakefieldma.maps.arcgis.com/apps/webappviewer/index.html?id=14599c1e9a35433182fbc1d1fc74d509>

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### 3.1 Phase I Mapping

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

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

The Town of Wakefield has completed the following updates to its stormwater mapping to meet the Phase I requirements (latitude and longitude with a minimum accuracy of +/-30 feet):

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

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

- Initial catchment delineations. Topographic contours and drainage system information may be used to produce initial catchment delineations.

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## 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
- Pipes
- Manholes
- Catch basins
- Refined catchment delineations. Catchment delineations must be updated to reflect information collected during catchment investigations.

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

- Location of Pipes
- Location of Manholes
- Location of Catch basins

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

- Refined catchment delineations. Catchment delineations shall be updated to reflect information collected during catchment investigations.

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## 3.3 Additional Recommended Mapping Elements

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

- Storm sewer material, size (pipe diameter), condition, age
- Privately owned stormwater treatment structures
- Topography
- Orthophotography.

## 4 Sanitary Sewer Overflows (SSOs)

The 2016 MS4 Permit requires municipalities to prohibit illicit discharges, including sanitary sewer overflows (SSOs), to the separate storm sewer system. SSOs are discharges of untreated sanitary wastewater from a municipal sanitary sewer that can contaminate surface waters, cause serious water quality problems and property damage, and threaten public health. SSOs can be caused by blockages, line breaks, sewer defects that allow stormwater and groundwater to overload the system, power failures, improper sewer design, and vandalism. The following Table 1-3 - Inventory of Sanitary Sewer Overflows provides a list from previous 5 years, pursuant of 2.3.4.4 Sanitary Sewer Overflow of MA MS4 General Permit. List includes all occurrences of overcapacity of system and SSOs due to outstanding repairs that may be potentially ongoing. Isolated incidents due to broken pieces of infrastructure that were immediately repaired were omitted from the list.

**Table 4-3. Inventory of Sanitary Sewer Overflows**  
**Town of Wakefield, Massachusetts**  
**Revision Date: Initial Ranking June 28, 2019**

SSO Location	Discharge Statement	Date	Time Start	Time End	Estimated Volume	Description	Mitigation Completed	Mitigation Planned
Daniel Road @ Salem Street	Discharged onto ground surface and into catch basin.	12/10/14	11:00:00 AM	1:00 PM	400-600 Gallons	Extremely heavy rain throughout entire area for extended period of time caused street flooding, drainage system and sewer system flooding and surcharging throughout Eastern Massachusetts.	Area cleaned and spread with lime. Sewage originally contained with pump truck and then switched to bypass pumping into another main trunk line. Continued to bypass pump until 6:30pm 12/11/14. All mains and pump stations were continually dropping levels throughout the system.	Scheduled to install 266 LF of CIPP with Year 4 Construction in 2020/2021 (432 gpd to be removed)
94 New Salem Street, manhole in parking lot and street	Discharged onto ground surface and into catch basin.	12/11/14	11:43 AM	11:59 PM	1800 Gallons	Caused by rainfall- Received call from resident that sewage had backed up from manhole in back yard.	Upon arriving on site no sewage was discharging from manhole in parking lot. Cleaned up debris and limed entire area. Discovered manhole in street discharging. 12/11/2014, Area cleaned and spread with lime in parking lot and street twice. 12/12/14 Area around manhole in street no longer discharging flushed and limed, spread lime in drainage swale.	Scheduled to perform grouting of 127 LF of sewer (72 gpd to be removed), install 50 LF CIPP (structural purposes only, 0 gpd to be removed) and potentially replace 185 LF of 6" pipe with 8" pipe with Year 4 Construction in 2020/2021; Remaining area to be investigated in Spring 2020
36 Valley Street (manhole in back yard)	Discharged onto ground surface	12/10/14	2:00 PM	4:30 PM	50 Gallons	Caused by rainfall- Received call from resident that sewage had backed up from manhole in back yard. Extra heavy rain event constant for extended period of time flooded streets and surcharged drain and sewage systems.	Upon arriving on site no sewage was discharging from manhole. Cleaned up debris and limed entire area.	Scheduled to install 1,767 LF CIPP & grout 122 LF with Year 4 Construction in 2020/2021 (1,224 gpd to be removed); Remaining area to be investigated in 2020
24 Daniel Road	Backed up in Property Basement	4/1/2017	5:30	7:00	250 Gallons	Caused by heavy rainfall and street flooding. System surcharged due to high groundwater.	Bypassed pumped from surcharged main, Vector from surcharged manhole.	Scheduled to install 266 LF of CIPP with Year 4 Construction in 2020/2021 (432 gpd to be removed)
84 New Salem Street	Discharged into catch basin and assuming it ended up in Mill River	4/1/2017	11:30	9:15	2700 Gallons	Caused by rainfall/ high ground water	Bypassed pumped from surcharged main, Vector from surcharged manhole. Jetted sewer main with town equipment. Had MWRA Vector jet and clean a section of 16" main to remove any possible restriction. Check in line manholes to identify any blockages.	Scheduled to perform grouting of 127 LF of sewer (72 gpd to be removed), install 50 LF CIPP (structural purposes only, 0 gpd to be removed) and potentially replace 185 LF of 6" pipe with 8" pipe with Year 4 Construction in 2020/2021

## 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 the related public health significance. The ranking helps determine the priority order for performing IDDE investigations and meeting permit milestones.

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### 5.1 Outfall Catchment Delineations

A catchment is the area that drains to an individual outfall<sup>1</sup>, culverted stream<sup>2</sup> or interconnection<sup>3</sup>. 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 II mapping, and refined catchment delineations will be completed as part of the Phase II mapping to reflect information collected during catchment investigations

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### 5.2 Outfall and Interconnection Inventory and Initial Ranking

The Wakefield Department of Public Works completed an initial outfall, culverted stream and interconnection inventory and priority ranking to assess illicit discharge potential based on existing information. Updates to the inventory and ranking will be provided in each annual report 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 are classified into one of the following categories:

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

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<sup>1</sup> **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.

<sup>2</sup> **Culverted Stream** is a 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.

<sup>3</sup> **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.

- Ammonia  $\geq 0.5$  mg/L, surfactants  $\geq 0.25$  mg/L, and bacteria levels greater than the water quality criteria applicable to the receiving water, or
- Ammonia  $\geq 0.5$  mg/L, surfactants  $\geq 0.25$  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, but may be performed.**

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.

All outfalls will be ranked into the above priority categories. Based on the initial analysis, no outfalls will be excluded within the Town. Outfall ranking determined based on following characteristics, consistent with Section 2.3.4.7.a.iii. of the MA MS4 General Permit:

- **Previous screening results** – previous screening/sampling results indicate likely sewer input (see criteria above for Problem Outfalls).
- **Past discharge complaints and reports** - was developed using logged inquiries and the Town's SSO data
- **Density of generating sites** – criterion was informed by characterization of site by: industrial, commercial, or residential, using the Town's GIS. Outfalls located within industrial or commercial areas of Town are placed at a higher priority
- **Culverted Streams** - Rivers and/or streams that are culverted for distances greater than a simple roadway crossing.
- **Age of development and infrastructure** - was determined by the pipeline materials (e.g. vitrified clay and corrugated metal pipelines indicate older infrastructure compared to plastic-based materials).
- **Poor receiving water quality** - was informed by the Impaired Waters List: Saugus River MA93-35 (Bacteria TMDL), Mill River MA93-31 (Bacteria TMDL), and Saugus River MA93-34 (Bacteria TMDL). Outfalls discharging directly to an impaired stream segment are placed at a higher priority. Additional waters having a higher potential for exceeding water quality standards for bacteria, ammonia levels above 0.5 mg/l, surfactants levels greater than or equal to 0.25 mg/l



The following criteria was excluded from the analysis based on the reasons noted:

- **Combined Sewer System Areas - Wakefield's** drainage and sewer systems are historically separate systems, so we excluded combined sewer system areas as a criterion from our analysis.
- **Aging Septic Systems** - the Town has been fully sewerred (over 99%) for approximately 30+ years, so the aging septic system area criterion was also excluded from the analysis.

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

**Table 5-1. Outfall Inventory and Priority Ranking Matrix**

**Town of Wakefield, Massachusetts**  
**Revision Date: Initial Ranking June 28, 2019**

**Outfall Inventory and Priority Ranking Matrix**  
Wakefield, Massachusetts  
9/24/2019

Outfall ID	Receiving Water	Previous Screening Results indicate Likely Sewer Input? <sup>1</sup>	Discharging to Area of Concern to Public Health? Any public (swimming, boating, etc.) water body that has an outfall discharging within 200ft. <sup>2</sup>	Frequency of Past Discharge Complaints (SSO Data)	Receiving Water Quality <sup>3</sup>	Density of Generating Sites <sup>4</sup>	Age of Development/Infrastructure <sup>5</sup>	Culverted Stream? <sup>6</sup>	Additional Characteristics	Interconnection	Inspection Date	Street Name	Weather	Scouring	Algae Growth	Stressed	Staining	Floatables	Oil Sheen	Odor	Turbidity	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	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	TBD															
<b>OUTFALLS</b>																							
OF_ID	Discharge To							Culverted_	None		Inspection	StreetName	Weather	Scouring	AlgaeGro wt	Stressedv e	Staining	Floatable s	OilSheen	Odor	Turbidity		Problem
OF-001	Wetland	0	0	0	0	0	3	Yes	None		7/11/2018	MYRTLE AVENUE	Clear	No	No	No	No	No	No	No	No	3	Low Priority
OF-002	Lake	0	3	0	0	0	0				7/9/2018	WILLARD ROAD	Clear	No	No	No	No	No	Yes	No	No	3	Problem
OF-003	Lake	0	3	0	0	0	0				4/24/2019	NORTH AVENUE	Clear	No	No	No	No	No	No	No	No	3	High
OF-004	Lake	0	3	0	0	0	3				7/9/2018	CHURCH STREET	Clear	No	No	No	No	No	No	No	No	6	High
OF-005	Lake	0	3	0	0	0	0				5/21/2018	MAIN STREET	Clear	No	No	No	No	No	No	No	No	3	High
OF-006	Stream	0	0	0	0	0	0	Yes			7/11/2018	VALLEY STREET	Clear	No	No	No	No	No	No	No	No	0	Low Priority
OF-007	Stream	0	0	0	0	0	0	Yes			4/24/2019	SCHOOL	Cloudy	No	No	No	No	No	No	No	No	0	Low Priority
OF-008	Stream	0	0	0	3	3	0	Yes			7/10/2018	MELVIN STREET	Clear	No	No	No	No	No	No	No	No	6	High
OF-009	Stream	0	0	0	3	3	0	Yes			7/10/2018	MELVIN STREET	Clear	No	No	No	No	No	No	No	No	6	High
OF-010	Stream	0	0	0	0	0	0	Yes			8/15/2018	BATHOL STREET	Cloudy	No	No	No	No	No	No	No	No	0	Low Priority
OF-011	Wetland	0	0	0	0	0	0				4/22/2019	GREENWOOD STREET	Cloudy	No	No	No	No	No	No	No	No	0	Low Priority
OF-012	Wetland	0	0	0	0	0	0	Yes			7/11/2018	LINDEN STREET	Clear	No	No	No	No	No	No	No	No	0	Low Priority
OF-013	Wetland	0	0	0	3	0	0				5/14/2018	KING STREET	Cloudy	No	No	No	No	No	No	No	No	3	High
OF-014	Stream	0	0	0	0	0	0				7/10/2018	FOSTERS LANE	Clear	No	No	No	No	No	No	No	No	0	Low Priority
OF-015	Wetland	0	0	0	0	0	0				7/10/2018	PAON BOULEVARD	Clear	No	No	No	No	No	No	No	No	0	Low Priority
OF-016	Wetland	0	0	0	0	0	0				4/24/2019	WOODBRIAR ROAD	Rain	No	No	No	No	No	No	No	No	0	Low Priority
OF-017	Wetland	0	0	0	0	0	0				7/10/2018	WOODBRIAR ROAD	Clear	No	No	No	No	No	No	No	No	0	Low Priority
OF-018	Wetland	0	0	0	0	0	0				4/22/2019	KING STREET	Cloudy	No	No	No	No	No	No	No	No	0	Low Priority
OF-019	Stream	0	0	0	3	0	0				7/10/2018	PIERCE AVENUE	Clear	No	No	No	No	No	No	No	No	3	High
OF-020	0	0	0	0	0	0	0				4/13/2011	ELK SPRING DRIVE	0	No	No	No	No	No	No	No	No	0	High
OF-021	Wetland	0	0	0	3	0	0				5/14/2018	KING STREET	Cloudy	No	No	No	No	No	No	No	No	3	Low Priority
OF-022	Wetland	0	0	0	0	0	0				4/24/2019	HILL CREST ROAD	Rain	No	No	No	No	No	No	No	No	0	Low Priority
OF-023	Stream	0	0	0	0	0	0				8/21/2018	LOWELL STREET	Cloudy	No	No	No	No	No	No	No	No	0	Low Priority
OF-024	Stream	0	0	0	0	0	0				7/9/2018	WEST PARK DRIVE	Clear	No	Yes	No	No	No	No	No	No	0	High
OF-025	Wetland	0	0	0	0	0	0				7/11/2018	NAHANT STREET	Clear	No	No	No	No	No	No	No	No	0	Low Priority
OF-026	Wetland	0	0	0	3	0	0				7/10/2018	SYCAMORE ROAD	Clear	No	No	No	No	No	No	No	No	3	High
OF-027	Stream	0	0	0	0	0	0				8/15/2018	PRESTON STREET	Clear	No	No	No	No	No	No	No	No	0	Low Priority
OF-028	Wetland	0	0	0	0	0	3	Yes			7/11/2018	MYRTLE AVENUE	Clear	No	No	No	No	No	No	No	No	3	Low Priority
OF-029	0	0	0	0	0	0	0				10/14/2010	KENDRICK ROAD	0	No	No	No	No	No	No	No	No	0	Low Priority
OF-030	0	0	0	0	0	0	0				10/14/2010	KENDRICK ROAD	0	No	No	No	No	No	No	No	No	0	Low Priority
OF-031	0	0	0	0	0	0	0				10/14/2010	KENDRICK ROAD	0	No	No	No	No	No	No	No	No	0	Low Priority
OF-032	Wetland	0	0	0	0	0	0				7/11/2018	RANDALL TERRACE	Clear	No	No	No	No	No	No	No	No	0	Low Priority
OF-033	Wetland	0	0	0	0	0	0				7/11/2018	CRYSTAL STREET	Clear	No	No	No	No	No	No	No	No	0	Low Priority
OF-034	Lake	0	3	0	0	0	0				7/11/2018	MERIAM STREET	Clear	No	No	No	No	No	No	No	No	3	High
OF-035	Lake	0	3	0	0	0	3				7/11/2018	MERIAM STREET	Clear	Yes	No	No	No	No	No	No	No	6	Problem
OF-036	0	0	0	0	0	0	0				9/17/2010	HOLLAND ROAD	0	No	No	No	No	No	No	No	No	0	Low Priority
OF-037	0	0	0	0	0	0	0				9/17/2010	HOLLAND ROAD	0	No	No	No	No	No	No	No	No	0	Low Priority
OF-038	0	0	0	0	0	0	0				8/17/2010	HOLLAND ROAD	0	No	No	No	No	No	No	No	No	0	Low Priority
OF-039	Wetland	0	0	0	0	0	0				7/17/2018	MONTCLARE AVENUE	Clear	No	No	No	No	No	No	No	No	0	Low Priority
OF-040	0	0	0	0	0	0	0				8/14/2010	BALLISTER STREET	0	No	No	No	No	No	No	No	No	0	High
OF-041	Wetland	0	0	0	0	0	3				7/16/2018	BARTLEY STREET	Cloudy	No	No	No	No	No	No	No	No	3	High
OF-042	Wetland	0	0	0	0	0	3				7/16/2018	BARTLEY STREET	Cloudy	No	No	No	No	No	No	No	No	3	High
OF-043	Wetland	0	0	0	0	0	0				7/11/2018	GERMANO DRIVE	Clear	No	No	No	No	No	No	No	No	0	High
OF-044	Wetland	0	0	0	0	0	0				8/14/2018	ANDREWS ROAD	Clear	Yes	No	No	No	No	No	No	No	0	Low Priority
OF-045	Field	0	0	0	0	0	3				7/9/2018	DOYLE AVENUE	Clear	No	No	No	No	No	No	No	No	3	Low Priority
OF-046	Stream	0	0	0	0	0	0				7/10/2018	BUTLER AVENUE	Clear	No	No	No	No	No	No	No	No	0	Low Priority

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OF-047	Wetland	0	0	0	0	0	0	0	0	4/22/2019	FOREST ROAD	Cloudy	No	No	No	No	No	No	No	No	0	Low Priority
OF-048	Stream	0	0	0	0	0	0	0	0	4/22/2019	OLD NAHANT ROAD	Rain	No	No	No	No	No	No	No	No	0	Low Priority
OF-049	Wetland	0	0	0	0	0	0	0	0	10/4/2018	PHEASANT WOOD DRIVE	Cloudy	No	No	No	No	No	No	No	No	0	Low Priority
OF-050	0	0	0	0	0	0	0	0	0	5/5/2010	BATHOL STREET	0	No	No	No	No	No	No	No	No	0	Low Priority
OF-051	0	0	0	0	0	0	0	0	0	5/5/2010	BATHOL STREET	0	No	No	No	No	No	No	No	No	0	Low Priority
OF-052	0	0	0	0	0	0	0	0	0	5/5/2010	WASHINGTON AVENUE	0	No	No	No	No	No	No	No	No	0	Low Priority
OF-053	0	0	0	0	0	0	0	0	0	5/5/2010	WASHINGTON AVENUE	0	No	No	No	No	No	No	No	No	0	Low Priority
OF-054	Stream	0	0	0	0	0	0	0	0	8/29/2018	ALBION STREET	Clear	No	No	No	No	No	No	No	No	0	High
OF-055	Stream	0	0	0	0	0	0	0	0	8/29/2018	ALBION STREET	Clear	No	No	No	No	No	No	No	No	0	High
OF-056	Stream	0	0	0	0	0	0	0	0	8/29/2018	ALBION STREET	Clear	No	No	No	No	No	No	No	No	0	High
OF-057	Stream	0	0	0	0	0	0	0	0	8/29/2018	ALBION STREET	Clear	No	No	No	No	No	No	No	No	0	High
OF-058	Stream	0	0	0	0	0	0	0	0	8/30/2018	BUTLER AVENUE	Clear	No	No	No	No	No	No	No	No	0	Low Priority
OF-059	Stream	0	0	0	0	0	0	0	0	9/27/2018	MONTROSE AVENUE	Clear	No	No	No	No	No	No	No	No	0	Low Priority
OF-060	River	0	0	2	3	3	0	0	0	4/24/2019	NEW SALEM STREET	Clear	No	No	No	No	No	Yes	No	Yes	5	Problem
OF-061	Stream	0	0	2	0	3	0	0	0	8/31/2018	NEW SALEM STREET	Clear	No	No	No	No	No	No	No	No	5	High
OF-062	Wetland	0	0	0	0	0	0	0	0	12/8/2017	EDWARDS AVENUE	Clear	No	No	No	No	No	No	No	No	0	Low Priority
OF-063	Stream	0	0	0	0	0	0	0	0	4/24/2019	GUNWOOD LANE	Clear	No	No	No	No	Yes	No	No	No	0	High
OF-064	Wetland	0	0	0	0	0	0	0	0	8/4/2018	DAVEY LANE	Clear	Yes	No	No	No	No	No	No	No	0	High
OF-065	Stream	0	0	0	0	0	0	0	0	8/6/2018	PARKER ROAD	Clear	No	No	No	No	No	No	No	No	0	Low Priority
OF-066	Stream	0	0	0	0	0	0	0	0	7/11/2018	VALLEY STREET	Clear	No	No	No	No	No	No	No	No	0	Low Priority
OF-067	Stream	0	0	0	0	0	0	0	0	7/18/2018	REYNOLDS ROAD	Clear	No	No	No	No	No	No	No	No	0	Low Priority
OF-068	Stream	0	0	0	0	0	0	0	0	4/22/2019	OLD NAHANT ROAD	Rain	No	No	No	No	No	No	No	No	0	Low Priority
OF-069	Stream	0	0	0	0	0	0	0	0	4/22/2019	FARM STREET	Rain	No	No	No	No	No	No	No	No	0	Low Priority
OF-070	Lake	0	3	0	3	0	0	0	0	5/7/2018	LINDA ROAD	Clear	No	No	No	No	No	No	No	No	6	High
OF-071	Stream	0	0	0	0	0	0	0	0	7/11/2018	OAK STREET	Clear	No	No	No	No	No	No	No	No	0	Low Priority
OF-072	Wetland	0	0	0	0	0	0	0	0	7/16/2018	BARTLEY STREET	Cloudy	No	No	No	No	No	No	No	No	0	High
OF-073	Wetland	0	0	0	0	0	0	0	0	7/10/2018	BUTLER AVENUE	Clear	No	No	No	No	No	No	No	No	0	Low Priority
OF-074	Wetland	0	0	0	0	0	0	0	0	7/10/2018	PRESTON STREET	Clear	Yes	No	No	No	No	No	No	No	0	Low Priority
OF-075	Stream	0	0	0	3	3	3	0	0	7/9/2018	LOWELL STREET	Clear	No	No	No	No	No	No	No	No	3	Problem
OF-076	Stream	0	0	0	3	0	0	0	0	7/9/2018	LOWELL STREET	Clear	No	No	No	No	No	No	No	No	3	High
OF-077	Stream	0	0	0	0	0	3	0	0	4/22/2019	NAHANT STREET	Rain	No	No	No	No	No	No	No	No	3	Low Priority
OF-078	Stream	0	0	0	0	0	0	0	0	10/11/2018	GRAFTON STREET	Cloudy	No	No	No	No	No	No	No	No	0	Low Priority
OF-079	0	0	0	0	0	0	0	0	0	0	KENDRICK ROAD	0	No	No	No	No	No	No	No	No	0	Low Priority
OF-080	Wetland	0	0	0	0	0	0	0	0	5/1/2019	MYRTLE AVENUE	Cloudy	No	No	No	No	No	No	No	No	0	Low Priority
OF-081	Wetland	0	0	0	0	0	0	0	0	7/11/2018	MONTCLARE AVENUE	Clear	No	No	No	No	No	No	No	No	0	Low Priority
OF-082	Stream	0	0	0	0	3	0	0	0	8/21/2018	LOWELL STREET	Cloudy	No	No	No	No	No	No	No	No	3	Low Priority
OF-083	Stream	0	0	0	0	0	0	0	0	8/21/2018	LOWELL STREET	Cloudy	No	No	No	No	No	No	No	No	0	Low Priority
OF-084	Stream	0	0	0	0	3	0	0	0	7/16/2018	BROADWAY	Clear	No	No	No	No	No	No	No	No	3	High
OF-085	Lake	0	3	0	0	0	3	0	0	7/9/2018	SYLVAN AVENUE	Clear	Yes	No	No	No	No	No	No	No	6	Problem
OF-086	Lake	0	3	0	0	0	0	0	0	7/9/2018	SYLVAN AVENUE	Clear	Yes	No	No	No	No	No	No	No	3	Problem
OF-087	Wetland	0	0	0	0	0	0	0	0	7/11/2018	PARTRIDGE LANE	Clear	No	No	No	No	No	No	No	No	0	Low Priority
OF-088	Stream	0	0	0	0	0	0	0	0	9/27/2018	MONTROSE AVENUE	Clear	No	No	No	No	No	No	No	No	0	Low Priority
OF-089	Stream	0	0	0	0	0	0	0	0	9/27/2018	MONTROSE AVENUE	Clear	No	No	No	No	No	No	No	No	0	Low Priority
OF-090	Stream	0	0	0	0	0	0	0	0	9/27/2018	MONTROSE AVENUE	Clear	No	No	No	No	No	No	No	No	0	Low Priority
OF-091	Wetland	0	0	0	0	0	0	0	0	4/24/2019	MONTROSE AVENUE	Cloudy	No	No	No	No	No	No	No	No	0	Low Priority
OF-092	Wetland	0	0	0	0	0	0	0	0	7/10/2018	MONTROSE AVENUE	Clear	No	No	No	No	No	No	No	No	0	Low Priority
OF-093	Wetland	0	0	0	0	3	0	0	0	7/10/2018	MONTROSE AVENUE	Clear	No	No	No	No	No	No	No	No	3	Low Priority
OF-094	Stream	0	0	0	0	0	0	0	0	8/15/2018	NEW SALEM STREET	Clear	No	No	No	No	No	No	No	No	0	Low Priority
OF-095	Stream	0	0	0	3	3	0	0	0	8/31/2018	NEW SALEM STREET	Clear	No	No	No	No	No	No	No	No	6	High
OF-096	Wetland	0	0	0	0	0	0	0	0	5/14/2018	LOWELL STREET	Clear	No	No	No	No	No	No	No	No	0	Low Priority
OF-097	Wetland	0	0	0	0	0	0	0	0	5/14/2018	LOWELL STREET	Clear	No	No	No	No	No	No	No	No	0	Low Priority
OF-098	Wetland	0	0	0	0	0	0	0	0	5/14/2018	LOWELL STREET	Clear	No	No	No	No	No	No	No	No	0	Low Priority
OF-099	Wetland	0	0	0	0	0	0	0	0	8/15/2018	EUNICE CIRCLE	Cloudy	No	No	No	No	No	No	No	No	0	Low Priority
OF-100	Wetland	0	0	0	0	0	0	0	0	5/14/2018	LOWELL STREET	Clear	No	No	No	No	No	No	No	No	0	Low Priority
OF-101	Wetland	0	0	0	3	0	0	0	0	10/2/2018	MACKENZIE LANE	Rain	No	No	No	No	No	No	No	No	3	High
OF-102	Wetland	0	0	0	0	0	0	0	0	8/15/2018	WILLIAM STREET	Cloudy	No	No	No	No	No	No	No	No	0	Low Priority
OF-103	Pond	0	0	0	0	0	0	0	0	8/15/2018	ALDRICH ROAD	Cloudy	No	No	No	No	No	No	No	No	0	Low Priority
OF-104	Wetland	0	0	0	0	0	0	0	0	7/16/2018	LAKE AVENUE	Clear	No	No	No	No	No	No	No	No	0	High
OF-105	Stream	0	0	0	0	0	0	0	0	7/16/2018	LAKE AVENUE	Clear	No	No	No	No	No	No	No	No	0	High
OF-106	Wetland	0	0	0	0	3	0	0	0	8/29/2018	BAY STATE ROAD	Clear	No	No	No	No	No	No	No	No	3	Low Priority
OF-107	Wetland	0	0	0	0	3	0	0	0	7/29/2018	BAY STATE ROAD	Clear	No	No	No	No	No	No	No	No	3	Low Priority
OF-108	Wetland	0	0	0	0	3	0	0	0	4/22/2019	BAY STATE ROAD	Cloudy	No	No	No	No	No	No	No	No	3	Low Priority
OF-109	Wetland	0	0	0	0	3	0	0	0	4/22/2019	BAY STATE ROAD	Cloudy	No	No	No	No	No	No	No	No	3	Low Priority
OF-110	Lake	0	3	0	0	0	0	0	0	5/29/2018	LOWELL STREET	Clear	No	No	No	No	No	No	No	No	3	High
OF-111	Wetland	0	0	0	0	0	0	0	0	8/21/2018	LOWELL STREET	Clear	No	No	No	No	No	No	No	No	0	Low Priority
OF-112	RR Track	0	0	0	0	0	0	0	0	8/30/2018	ELM SQUARE	Clear	No	No	No	No	No	No	No	No	0	High
OF-113	Lake	0	3	0	0	0	0	0	0	6/11/2018	CHURCH STREET	Clear	No	No	No	No	No	No	No	No	3	High
OF-114	Wetland	0	0	0	0	0	0	0	0	4/24/2019	COWDRY LANE	Clear	No	No	No	No	No	No	No	No	0	Low Priority

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OF-115	Lake	0	3	0	0	0	0			6/20/2018	MAIN STREET	Clear	No	No	No	No	No	No	No	No	3	High
OF-116	Lake	0	3	0	0	0	0			6/20/2018	MAIN STREET	Clear	No	No	No	No	No	No	No	No	3	High
OF-117	Lake	0	3	0	0	0	0			5/21/2018	SPAUDING STREET	Clear	No	No	No	No	No	No	No	No	3	High
OF-118	Wetland	0	0	0	0	0	0			7/10/2018	PAGN BOULEVARD	Clear	No	No	No	No	No	No	No	No	0	Low Priority
OF-119	Stream	0	0	0	0	0	0			8/7/2018	MANFIELD DRIVE	Clear	No	No	No	No	No	No	No	No	0	Low Priority
OF-120	Wetland	0	0	0	0	0	0			4/22/2019	PARKER ROAD	Clear	No	No	No	No	No	No	No	No	0	Low Priority
OF-121	Lake	0	3	0	0	0	0			5/14/2018	MAIN STREET	Clear	No	No	No	No	No	No	No	No	3	High
OF-122	Lake	0	3	0	0	0	0			6/20/2018	MAIN STREET	Clear	No	No	No	No	No	No	No	No	3	High
OF-123	Lake	0	3	0	0	0	0			5/29/2018	MAIN STREET	Clear	No	No	No	No	No	No	No	No	3	High
OF-124	Lake	0	3	0	0	0	0			5/14/2018	MAIN STREET	Cloudy	No	No	No	No	No	No	No	No	3	High
OF-125	Stream	0	0	0	0	0	0			4/22/2019	EUNICE CIRCLE	Cloudy	No	No	No	No	No	No	No	No	0	Low Priority
OF-126	Stream	0	0	0	3	0	0			7/10/2018	SALEM STREET	Clear	No	No	No	No	No	No	No	No	3	High
OF-127	Stream	0	0	0	0	0	0			4/22/2019	PUTNAM AVENUE	Clear	No	No	No	No	No	No	No	No	0	Low Priority
OF-128	Stream	0	0	0	0	0	0			4/22/2019	PUTNAM AVENUE	Clear	No	No	No	No	No	No	No	No	0	Low Priority
OF-129	Stream	0	0	0	0	0	0			4/22/2019	PUTNAM AVENUE	Clear	No	No	No	No	No	No	No	No	0	Low Priority
OF-130	Wetland	0	0	0	0	0	0			4/24/2019	HOPKINS STREET	Clear	No	No	No	No	No	No	No	No	0	Low Priority
OF-131	Wetland	0	0	0	0	0	0			4/22/2019	ELM CREST ROAD	Clear	No	No	No	No	No	Yes	No	No	0	High
OF-132	Wetland	0	0	0	0	0	0			4/24/2019	OUTLOOK ROAD	Clear	No	No	No	No	No	No	No	No	0	Low Priority
OF-133	Lake	0	3	0	0	0	0			5/29/2018	MAIN STREET	Clear	No	No	No	No	No	No	No	No	3	High
OF-134	Lake	0	3	0	0	0	0			5/29/2018	MAIN STREET	Clear	No	No	No	No	No	No	No	No	3	High
OF-135	Lake	0	3	0	0	0	0			6/20/2018	MAIN STREET	Clear	No	No	No	No	No	No	No	No	3	High
OF-136	Lake	0	3	0	0	0	0			5/14/2018	MAIN STREET	Clear	No	No	No	No	No	No	No	No	3	High
OF-137	Lake	0	3	0	0	0	0			6/20/2018	MAIN STREET	Clear	No	No	No	No	No	No	No	No	3	High
OF-138	Lake	0	3	0	0	0	0			6/20/2018	MAIN STREET	Clear	No	No	No	No	No	No	No	No	3	High
OF-139	Lake	0	3	0	0	0	0			6/20/2018	MAIN STREET	Clear	No	No	No	No	No	No	No	No	3	High
OF-140	Lake	0	3	0	0	0	0			5/21/2018	MAIN STREET	Clear	No	No	No	No	No	No	No	No	3	High
OF-141	Lake	0	3	0	0	0	0			5/21/2018	MAIN STREET	Clear	No	No	No	No	No	No	No	No	3	High
OF-142	Lake	0	3	0	0	0	0			6/20/2018	MAIN STREET	Clear	No	No	No	No	No	No	No	No	3	High
OF-143	Stream	0	0	0	3	0	0			7/10/2018	NABULUS WAY	Clear	No	No	No	No	No	No	No	No	3	High
OF-144	Wetland	0	0	0	0	0	0			8/20/2018	SALEM STREET	Clear	Yes	No	No	No	No	No	No	No	0	High
OF-145	Wetland	0	0	0	0	0	0			8/20/2018	SALEM STREET	Clear	No	No	No	No	No	No	No	No	0	Low Priority
OF-146	Detention Pond	0	0	0	0	0	0			4/22/2019	ALYSSA DRIVE	Cloudy	No	No	No	No	No	No	No	No	0	Low Priority
OF-147	Detention Pond	0	0	0	0	0	0			4/22/2019	GARDEN LANE	Cloudy	No	No	No	No	No	No	No	No	0	Low Priority
OF-148	Wetland	0	0	0	0	0	0			4/22/2019	GARDEN LANE	Cloudy	No	No	No	No	No	No	No	No	0	Low Priority
OF-149	Wetland	0	0	0	0	0	0			8/14/2018	ANDREWS ROAD	Clear	No	No	No	No	No	No	No	No	0	Low Priority
OF-150	Wetland	0	0	0	0	0	0			8/14/2018	ANDREWS ROAD	Clear	No	No	No	No	No	No	No	No	0	Low Priority
OF-151	Wetland	0	0	0	0	0	0			4/22/2019	MONTROSE AVENUE	Cloudy	No	No	No	No	No	Yes	No	No	0	High
OF-152	Wetland	0	0	0	0	0	0			4/24/2019	WICKER LANE	Clear	No	No	No	No	No	No	No	No	0	Low Priority
OF-153	Wetland	0	0	0	0	0	0			10/2/2018	MACKENZIE LANE	Rain	No	No	No	No	No	No	No	No	0	Low Priority
OF-154	Wetland	0	0	0	0	0	0			4/24/2019	STEDMAN STREET	Clear	No	No	No	No	No	No	No	No	0	High
OF-155	Stream	0	0	0	0	0	0			7/16/2018	LAKE STREET	Clear	No	No	No	No	No	No	No	No	0	High
OF-156	Stream	0	0	0	0	0	0			7/18/2018	STARK AVENUE	Clear	No	No	No	No	No	No	No	No	0	Low Priority
OF-157	Wetland	0	0	0	0	0	0			4/22/2019	GREENWOOD STREET	Clear	No	No	No	No	No	No	No	No	0	Low Priority
OF-158	Wetland	0	0	0	0	0	0			7/17/2018	MARION ROAD	Clear	No	No	No	No	No	No	No	No	0	Low Priority
OF-159	Wetland	0	0	0	0	0	0			7/11/2018	GREENWOOD STREET	Clear	No	No	No	No	No	No	No	No	0	Low Priority
OF-160	Wetland	0	0	0	0	0	0			4/22/2019	RENNICK ROAD	Cloudy	No	No	No	No	No	No	No	No	0	Low Priority
OF-161	Wetland	0	0	0	0	0	0			4/24/2019	HOWARD STREET	Clear	No	No	No	No	No	No	No	No	0	Low Priority
OF-162	Stream	0	0	0	0	0	0	Yes		10/11/2018	GRAFTON STREET	Rain	No	No	No	No	No	No	No	No	0	Low Priority
OF-163	Wetland	0	0	0	0	0	0			7/10/2018	BRIARWOOD LANE	Clear	No	No	No	No	No	No	No	No	0	Low Priority
OF-164	Stream	0	0	0	3	0	0			7/17/2018	MILLBROOK LANE	Clear	Yes	No	No	No	No	No	No	No	3	Problem
OF-165	Stream	0	0	0	3	0	0			4/24/2019	WATER STREET	Clear	No	No	No	No	No	No	No	No	3	High
OF-166	Lake	0	0	0	0	0	0			7/11/2018	HAWTHORNE STREET	Clear	No	No	No	No	No	No	No	No	0	High
OF-167	Wetland	0	0	0	0	0	0			4/22/2019	HAWTHORNE STREET	Rain	No	No	No	No	No	No	No	No	0	High
OF-168	Wetland	0	0	0	0	0	0			7/18/2018	RIVERS LANE	Clear	No	No	No	No	No	No	No	No	0	Low Priority
OF-169	Wetland	0	0	0	0	0	0			7/18/2018	STONE WAY	Clear	No	No	No	No	No	No	No	No	0	Low Priority
OF-170	Stream	0	0	0	0	0	0			7/18/2018	REYNOLDS ROAD	Clear	No	No	No	No	No	No	No	No	0	Low Priority
OF-171	Wetland	0	0	0	0	0	0			4/22/2019	ROBERT STREET	Clear	Yes	No	No	No	No	Yes	No	No	0	Problem
OF-172	Wetland	0	0	0	0	0	0			12/7/2017	BROOK STREET	Clear	No	No	No	No	No	No	No	No	0	Low Priority
OF-173	Stream	0	0	0	0	0	0			12/8/2017	ELM CREST ROAD	Clear	No	No	No	No	No	Yes	No	No	0	High
OF-174	Stream	0	0	0	0	0	0			12/8/2017	ELM CREST ROAD	Clear	No	No	No	No	No	Yes	No	No	0	Low Priority
OF-175	Wetland	0	0	0	3	0	0			4/22/2019	LAKEVIEW CIRCLE	Clear	No	No	No	No	No	No	No	No	3	High
OF-176	Lake	0	3	0	0	0	0			5/29/2018	MAIN STREET	Clear	No	No	No	No	No	No	No	No	3	High
OF-177	Lake	0	3	0	0	0	0			5/29/2018	MAIN STREET	Clear	No	No	No	No	No	No	No	No	3	High
OF-178	Lake	0	3	0	0	0	0			6/11/2018	PARK	Clear	No	No	No	No	No	No	No	No	3	High
OF-179	Lake	0	3	0	0	0	0			6/11/2018	PARK	Clear	No	No	No	No	No	No	No	No	3	High
OF-180	Lake	0	3	0	0	0	0			6/11/2018	PARK	Clear	No	No	No	No	No	No	No	No	3	High
OF-181	Lake	0	3	0	0	0	3			6/11/2018	PARK	Clear	No	No	No	No	No	No	No	No	6	High
OF-182	Lake	0	3	0	0	0	0			6/20/2018	MAIN STREET	Clear	No	No	No	No	No	No	No	No	3	High

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OF-183	Stream	0	0	0	0	0	0	0	7/10/2018	POSTERS LANE	Clear	No	No	No	No	No	No	No	0	Low Priority
OF-184	Stream	0	0	0	3	0	0	0	7/10/2018	SALEM STREET	Clear	No	No	No	No	No	No	No	3	High
OF-185	Stream	0	0	0	0	0	0	0	7/11/2018	VALLEY STREET	Clear	No	No	No	No	No	No	No	0	Low Priority
OF-186	Wetland	0	0	0	0	0	0	0	7/11/2018	UNIDEN STREET	Clear	No	No	No	No	No	No	No	0	Low Priority
OF-187	Wetland	0	0	0	0	0	0	0	7/18/2018	MEADOW VIEW ROAD	Clear	No	No	No	No	No	No	No	0	Low Priority
OF-188	Wetland	0	0	0	0	0	0	0	4/24/2019	CASTLE CLARE CIRCLE	Rain	No	No	No	No	No	No	No	0	Low Priority
OF-189	Wetland	0	0	0	0	0	0	0	4/22/2019	PAON BOULEVARD	Cloudy	No	No	No	No	No	No	No	0	Low Priority
OF-190	Wetland	0	0	0	0	0	0	0	4/22/2019	PAON BOULEVARD	Cloudy	No	No	No	No	No	No	No	0	Low Priority
OF-191	Wetland	0	0	0	0	0	0	0	4/22/2019	HARWICK ROAD	Clear	No	No	No	No	No	Yes	No	0	High
OF-192	Wetland	0	0	0	0	0	0	0	4/22/2019	HARWICK ROAD	Cloudy	No	No	No	No	No	No	No	0	Low Priority
OF-193	Wetland	0	0	0	0	0	0	3	4/22/2019	HARWICK ROAD	Cloudy	No	No	No	No	No	No	No	3	Low Priority
OF-194	Wetland	0	0	0	3	0	0	3	8/8/2018	PENFIELD CIRCLE	Clear	No	No	No	No	No	No	No	6	High
OF-195	Stream	0	0	0	0	0	0	0	4/24/2019	HERITAGE LANE	Cloudy	No	No	No	No	No	No	No	0	Low Priority
OF-196	Stream	0	0	0	0	0	0	0	4/24/2019	HOUSTON STREET	Rain	No	No	No	No	No	No	No	0	Low Priority
OF-197	Wetland	0	0	0	3	0	0	0	4/24/2019	TOBEY LANE	Cloudy	No	No	No	No	No	No	No	3	High
OF-198	Stream	0	0	2	3	0	0	0	8/8/2018	DANIEL ROAD	Clear	No	No	No	No	No	No	No	5	High
OF-199	Stream	0	0	2	3	0	0	0	4/24/2019	DANIEL ROAD	Cloudy	No	No	No	No	No	No	No	5	High
OF-200	Wetland	0	0	0	3	0	0	0	8/13/2018	RITCH COURT	Clear	No	No	No	No	No	No	No	3	High
OF-201	Wetland	0	0	0	0	0	0	0	4/22/2019	BUTTERNUT ROAD	Cloudy	No	No	No	No	No	No	No	0	Low Priority
OF-202	Stream	0	0	0	0	0	0	0	8/14/2018	GUNWOOD LANE	Clear	No	No	No	No	No	No	No	0	Low Priority
OF-203	Wetland	0	0	0	0	0	0	0	4/22/2019	ANDREWS ROAD	Cloudy	No	No	No	No	No	No	No	0	Low Priority
OF-204	Wetland	0	0	0	0	0	0	0	4/22/2019	ANDREWS ROAD	Cloudy	No	No	No	No	No	No	No	0	Low Priority
OF-205	Wetland	0	0	0	0	0	0	0	8/14/2018	CLOVER CIRCLE	Clear	No	No	No	No	No	No	No	0	Low Priority
OF-206	Wetland	0	0	0	0	0	0	0	8/14/2018	KATHY LANE	Cloudy	No	No	No	No	No	No	No	0	Low Priority
OF-207	Wetland	0	0	0	0	0	0	0	4/24/2019	BEECHTREE CIRCLE	Cloudy	No	No	No	No	No	No	No	0	Low Priority
OF-208	Wetland	0	0	0	0	0	0	0	8/14/2018	BEECHTREE CIRCLE	Clear	No	No	No	No	No	No	No	0	Low Priority
OF-209	Wetland	0	0	0	0	0	0	0	4/22/2019	WHITTIER ROAD	Cloudy	No	No	No	No	No	Yes	No	0	Low Priority
OF-210	Wetland	0	0	0	0	0	0	0	8/15/2018	EUNICE CIRCLE	Cloudy	No	No	No	No	No	No	No	0	Low Priority
OF-211	Stream	0	0	0	0	0	0	0	8/20/2018	PROSPECT STREET	Clear	No	No	No	No	No	No	No	0	Low Priority
OF-212	Stream	0	0	0	3	0	0	0	8/20/2018	SALEM STREET	Clear	No	No	No	No	No	No	No	3	High
OF-213	Wetland	0	0	0	0	0	0	0	8/21/2018	LOWELL STREET	Clear	No	No	No	No	No	No	No	0	Low Priority
OF-214	Stream	0	0	0	3	0	0	0	4/24/2019	LOWELL STREET	Clear	No	No	No	No	No	No	No	3	High
OF-215	Wetland	0	0	0	0	3	0	0	8/28/2018	NORTH AVENUE	Clear	No	No	No	No	No	No	No	3	High
OF-216	Wetland	0	0	0	0	0	0	0	8/28/2018	NORTH AVENUE	Clear	No	No	No	No	No	No	No	0	High
OF-217	Wetland	0	0	0	0	0	0	0	8/28/2018	NORTH AVENUE	Clear	No	No	No	No	No	No	No	0	High
OF-218	Stream	0	0	0	0	3	0	0	8/28/2018	NORTH AVENUE	Clear	No	No	No	No	No	No	No	3	High
OF-219	Detention Pond	0	0	0	0	0	0	0	9/21/2018	RUGATO WAY	Clear	No	No	No	No	No	No	No	0	Low Priority
OF-220	Wetland	0	0	0	0	0	0	0	9/21/2018	RUGATO WAY	Clear	No	No	No	No	No	No	No	0	Low Priority
OF-221	Wetland	0	0	0	0	0	0	0	9/21/2018	BELLEVUE AVENUE	Clear	No	No	No	No	No	No	No	0	Low Priority
OF-222	Wetland	0	0	0	0	0	0	0	9/27/2018	BUTLER AVENUE	Clear	No	No	No	No	No	No	No	0	Low Priority
OF-223	Wetland	0	0	0	0	0	0	0	9/27/2018	ROSEMARY AVENUE	Clear	Yes	No	No	No	No	No	Sotten Eggs	0	Problem
OF-224	Wetland	0	0	0	0	0	0	0	9/27/2018	ROSEMARY AVENUE	Clear	No	No	No	No	No	No	No	0	Low Priority
OF-225	Wetland	0	0	0	0	0	0	0	10/1/2018	AUDUBON ROAD	Clear	No	No	No	No	No	No	No	0	Low Priority
OF-226	Wetland	0	0	0	0	0	0	0	10/1/2018	AUDUBON ROAD	Clear	No	No	No	No	No	No	No	0	Low Priority
OF-227	Wetland	0	0	0	0	0	0	0	10/1/2018	AUDUBON ROAD	Clear	No	No	No	No	No	No	No	0	Low Priority
OF-228	Wetland	0	0	0	0	0	0	0	10/1/2018	AUDUBON ROAD	Cloudy	No	No	No	No	No	No	No	0	Low Priority
OF-229	Stream	0	0	0	0	0	0	0	4/24/2019	OLD COLONY DRIVE	Cloudy	No	No	No	No	No	No	No	0	Low Priority
OF-230	Wetland	0	0	0	0	0	0	0	4/24/2019	JESSICA LANE	Cloudy	No	No	No	No	No	No	No	0	Low Priority
OF-231	Wetland	0	0	0	3	0	0	0	10/1/2018	SUNSET DRIVE	Cloudy	No	No	No	No	No	No	No	3	High
OF-232	Wetland	0	0	0	3	0	0	0	4/22/2019	SUNSET DRIVE	Cloudy	No	No	No	No	No	No	No	3	High
OF-233	Wetland	0	0	0	3	0	0	0	4/22/2019	SUNSET DRIVE	Cloudy	No	No	No	No	No	No	No	3	High
OF-234	Detention Pond	0	0	0	0	0	0	0	10/2/2018	GRACE COURT	Rain	No	No	No	No	No	No	No	0	Low Priority
OF-235	Wetland	0	0	0	0	0	0	0	10/2/2018	GRACE COURT	Rain	No	No	No	No	No	No	No	0	Low Priority
OF-236	Wetland	0	0	0	0	0	0	0	4/24/2019	MACKENZIE LANE	Rain	No	No	No	No	No	No	No	0	Low Priority
OF-237	Stream	0	0	2	3	0	0	3	10/3/2018	VALLEY STREET	Cloudy	No	No	No	No	No	No	No	8	High
OF-238	Stream	0	0	0	3	0	0	0	4/24/2019	VALLEY STREET	Cloudy	No	No	No	No	No	No	No	3	High
OF-239	Stream	0	0	2	3	0	0	3	4/24/2019	VALLEY STREET	Cloudy	No	No	No	No	No	No	No	8	High
OF-240	Wetland	0	0	0	0	0	0	0	10/4/2018	PHEASANTWOOD DRIVE	Cloudy	No	No	No	No	No	No	No	0	Low Priority
OF-241	Wetland	0	0	0	0	0	0	0	4/22/2019	CROSBY ROAD	Clear	No	No	No	No	No	No	No	0	Low Priority
OF-242	Stream	0	0	0	3	0	0	0	10/10/2018	VERNON STREET	Clear	No	No	No	No	No	No	No	3	High
OF-243	Stream	0	0	0	0	0	0	0	10/11/2018	GRATTON STREET	Rain	No	No	No	No	No	No	No	0	Low Priority
OF-244	Wetland	0	0	0	0	0	0	0	4/29/2019	HIDDEN PLACE	Clear	No	No	No	No	No	No	No	0	Low Priority
OF-245	Wetland	0	0	0	0	0	0	0	7/1/2019	CRYSTAL STREET	Clear	No	No	No	No	No	No	No	0	Low Priority
OF-246	Stream	0	0	0	3	0	0	0	5/29/2019	WATER STREET	Clear	No	No	No	No	No	No	No	3	High
OF-247	Stream	0	0	0	3	0	0	0	5/29/2019	WATER STREET	Clear	No	No	No	No	No	No	No	3	High
OF-248	Stream	0	0	0	3	0	0	0	5/29/2019	WATER STREET	Clear	No	No	No	No	No	No	No	3	High
OF-249	Stream	0	0	0	3	0	0	0	5/29/2019	WATER STREET	Clear	No	No	No	No	No	No	No	3	High
OF-250	Wetland	0	0	0	0	0	0	0	5/31/2019	FARM STREET	Clear	No	No	No	No	No	No	No	0	Low Priority

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OF-251	Wetland	0	0	0	0	0	0			5/31/2019	FARM STREET	Clear	No	No	No	No	No	No	No	No	0	Low Priority
OF-252	Wetland	0	0	0	0	0	0			5/31/2019	FARM STREET	Clear	No	No	No	No	No	No	No	No	0	Low Priority
OF-253	River	0	0	0	3	0	0			5/31/2019	FARM STREET	Clear	No	No	No	No	No	No	No	No	3	High
OF-254	River	0	0	0	3	0	0			5/31/2019	FARM STREET	Clear	No	No	No	No	No	No	No	No	3	High
OF-255	Wetland	0	0	0	0	0	0			6/3/2019	MERIAM STREET	Clear	No	No	No	No	No	No	No	No	0	High
OF-256	Wetland	0	0	0	0	0	0			6/3/2019	MYRTLE AVENUE	Clear	Yes	No	No	No	No	No	No	No	0	High
OF-257	Wetland	0	0	0	0	0	0			6/4/2019	GREEN STREET	Clear	No	No	No	No	No	No	No	No	0	Low Priority
OF-258	Wetland	0	0	0	0	0	0			6/5/2019	OAK STREET	Clear	No	No	No	No	No	No	No	No	0	Low Priority
OF-259	Wetland	0	0	0	0	0	0			6/5/2019	OAK STREET	Clear	No	No	No	No	No	No	No	No	0	Low Priority
OF-260	Wetland	0	0	0	0	0	0			6/5/2019	GREENWOOD STREET	Clear	Yes	No	No	No	No	No	No	No	0	High
OF-261	Wetland	0	0	0	0	0	0			6/5/2019	OAK STREET	Clear	No	No	No	No	No	No	No	No	0	High
OF-262	Wetland	0	0	0	0	0	0			6/5/2019	OAK STREET	Clear	No	Yes	No	No	No	Yes	No	No	0	High
OF-263	Wetland	0	0	0	0	0	0			6/5/2019	NAHANT STREET	Clear	Yes	No	No	No	No	No	No	No	0	High
OF-264	Wetland	0	0	0	0	0	0			6/5/2019	NAHANT STREET	Clear	No	No	No	No	No	No	No	No	0	Low Priority
OF-265	Wetland	0	0	0	0	0	0			6/5/2019	NAHANT STREET	Clear	No	No	No	No	No	No	No	No	0	Low Priority
OF-266	Wetland	0	0	0	0	0	0			6/5/2019	NAHANT STREET	Clear	No	No	No	No	No	No	No	No	0	Low Priority
OF-267	Wetland	0	0	0	0	0	0			6/5/2019	NAHANT STREET	Clear	Yes	No	No	No	No	No	No	No	0	High
OF-268	Wetland	0	0	0	0	0	0			6/5/2019	CRYSTAL STREET	Clear	No	No	No	No	No	No	No	No		Low Priority

## 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 Town of Wakefield DPW is responsible for conducting dry weather outfall screening, starting with High Priority outfalls, followed by Low Priority outfalls, based on the initial priority rankings described in the previous section.

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### 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 US NOAA Weather Station located at the Lawrence Municipal Airport (<https://w1.weather.gov/data/obhistory/KLWC.html>).

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### 6.2 Dry Weather Screening/Sampling Procedure

#### 6.2.1 General Procedure

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

1. Identify outfall(s) to be screened/sampled based on initial outfall inventory and priority ranking
2. Acquire the necessary staff, mapping, and field equipment (see **Table 6-1** for list of potential field equipment)
3. Conduct the outfall inspection during dry weather:
  - a. Mark and photograph the outfall
  - b. Record the inspection information and outfall characteristics (using paper forms or digital form using a tablet or similar device).
  - 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.

## 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<sup>2</sup> 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 (using paper forms or digital form using a tablet or similar device
2. Put on protective gloves (nitrile/latex/other) before sampling
3. Collect sample with dipper or directly in sample containers. If possible, collect water from the flow directly in the sample bottle. Be careful not to disturb sediments.
4. If using a dipper or other device, triple rinse the device with distilled water and then in water to be sampled (not for bacteria sampling)
5. Use test strips, test kits, and field meters (rinse similar to dipper) for most parameters (see **Table 6-2**)
6. Place laboratory samples on ice for analysis of bacteria and pollutants of concern
7. Fill out chain-of-custody form for laboratory samples
8. Deliver samples to Alpha Analytical
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.

**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

<sup>2</sup> 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 septic wastewater), and **optical brighteners** (indicative of laundry detergents).

Analyte or Parameter	Instrumentation (Portable Meter)	Field Test Kit
Chlorine	CHEMetrics™ V-2000, K-2513 Hach™ Pocket Colorimeter™ II	NA
Conductivity	CHEMetrics™ I-1200 YSI Pro30 YSI EC300A Oakton 450	NA
Temperature	YSI Pro30 YSI EC300A Oakton 450	NA
Salinity	YSI Pro30 YSI EC300A Oakton 450	NA
Temperature	YSI Pro30 YSI EC300A Oakton 450	NA
Indicator Bacteria: <i>E. coli</i> (freshwater) or Enterococcus (saline water)	EPA certified laboratory procedure (40 CFR § 136)	NA
Pollutants of Concern <sup>1</sup>	EPA certified laboratory procedure (40 CFR § 136)	NA

<sup>1</sup> 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.<sup>3</sup> Samples for laboratory analysis must also be stored and preserved in accordance with procedures found in 40 CFR § 136.

**Table 6-3** lists analytical methods, detection limits, hold times, and preservatives for laboratory analysis of dry weather sampling parameters.

**Table 6-3. Required Analytical Methods, Detection Limits, Hold Times, and Preservatives<sup>4</sup>**

Analyte or Parameter	Analytical Method	Detection Limit	Max. Hold Time	Preservative
Ammonia	EPA: 350.2, SM: 4500-NH <sub>3</sub> C	0.05 mg/L	28 days	Cool ≤6°C, H <sub>2</sub> SO <sub>4</sub> to pH <2, No preservative required if analyzed immediately
Surfactants	SM: 5540-C	0.01 mg/L	48 hours	Cool ≤6°C

<sup>3</sup> 40 CFR § 136: <http://www.ecfr.gov/cgi-bin/text-idx?SID=b3b41fdea0b7b0b8cd6c4304d86271b7&mc=true&node=pt40.25.136&rgn=div5>

Analyte or Parameter	Analytical Method	Detection Limit	Max. Hold Time	Preservative
Chlorine	<b>SM:</b> 4500-Cl G	0.02 mg/L	Analyze within 15 minutes	None Required
Temperature	<b>SM:</b> 2550B	NA	Immediate	None Required
Specific Conductance	<b>EPA:</b> 120.1, <b>SM:</b> 2510B	0.2 µs/cm	28 days	Cool ≤6°C
Salinity	<b>SM:</b> 2520	-	28 days	Cool ≤6°C
Indicator Bacteria: <i>E.coli</i> Enterococcus	<i>E.coli</i> <b>EPA:</b> 1603 <b>SM:</b> 9221B, 9221F, 9223 B <b>Other:</b> Colilert®, Colilert-18®  <i>Enterococcus</i> <b>EPA:</b> 1600 <b>SM:</b> 9230 C <b>Other:</b> Enterolert®	<i>E.coli</i> <b>EPA:</b> 1 cfu/100mL <b>SM:</b> 2 MPN/100mL <b>Other:</b> 1 MPN/100mL  <i>Enterococcus</i> <b>EPA:</b> 1 cfu/100mL <b>SM:</b> 1 MPN/100mL <b>Other:</b> 1 MPN/100mL	8 hours	Cool ≤10°C, 0.0008% Na <sub>2</sub> S <sub>2</sub> O <sub>3</sub>
Total Phosphorus	<b>EPA:</b> Manual-365.3, Automated Ascorbic acid digestion-365.1 Rev. 2, ICP/AES4-200.7 Rev. 4.4  <b>SM:</b> 4500-P E-F	<b>EPA:</b> 0.01 mg/L <b>SM :</b> 0.01 mg/L	28 days	Cool ≤6°C, H <sub>2</sub> SO <sub>4</sub> to pH <2
Total Nitrogen (Ammonia + Nitrate/Nitrite, methods are for Nitrate-Nitrite and need to be combined with Ammonia listed above.)	<b>EPA:</b> Cadmium reduction (automated)-353.2 Rev. 2.0, <b>SM:</b> 4500-NO <sub>3</sub> E-F	<b>EPA:</b> 0.05 mg/L <b>SM :</b> 0.05 mg/L	28 days	Cool ≤6°C, H <sub>2</sub> SO <sub>4</sub> 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

Analyte or Parameter	Benchmark
Surfactants	>0.25 mg/L
Chlorine	>0.02 mg/L (detectable levels per the 2016 MS4 Permit)
Indicator Bacteria <sup>4</sup> : <i>E.coli</i> <i>Enterococcus</i>	<i>E.coli</i> : the geometric mean of the five most recent samples taken during the same bathing season shall not exceed 126 colonies per 100 ml and no single sample taken during the bathing season shall exceed 235 colonies per 100 ml  <i>Enterococcus</i> : the geometric mean of the five most recent samples taken during the same bathing season shall not exceed 33 colonies per 100 ml and no single sample taken during the bathing season shall exceed 61 colonies per 100 ml

## 6.4 Follow-up Ranking of Outfalls and Interconnections

The Town of Wakefield DPW 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 updated within three (3) years of the effective date of the permit (July 1, 2021).

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

<sup>4</sup> 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. **Written Catchment Investigation Procedures are due December 2019.**

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### 7.1 System Vulnerability Factors

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

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

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

- Any storm drain infrastructure greater than 40 years old
- Widespread code-required septic system upgrades required at property transfers (indicative of inadequate soils, water table separation, or other physical constraints of the area rather than poor owner maintenance) or known basement sump interconnection
- History of multiple Board of Health actions addressing widespread septic system failures (indicative of inadequate soils, water table separation, or other physical constraints of the area rather than poor owner maintenance).

**A SVF inventory will be documented for each covered catchment (see Table 7-1) by December 2019, retained as part of this IDDE Plan, and included in the annual report.**

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1. Any storm drain infrastructure greater than 40 years old
2. 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) or known basement sump interconnection
3. History of multiple Board of Health actions addressing widespread septic system failures (indicative of inadequate soils, water table separation, or other physical constraints of the area rather than poor owner maintenance)

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## 7.2 Dry Weather Manhole Inspections

The Town of Wakefield has initiated a dry weather storm drain network investigation that involved systematically and progressively observing, sampling and evaluating key junction manholes in the MS4 to determine the approximate location of suspected illicit discharges.

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

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

- ***Junction Manhole*** is a manhole or structure with two or more inlets accepting flow from two or more MS4 alignments. Manholes with inlets solely from private storm drains, individual catch basins, or both are not considered junction manholes for these purposes.
- ***Key Junction Manholes*** are those junction manholes that can represent one or more junction manholes without compromising adequate implementation of the illicit discharge program. Adequate implementation of the illicit discharge program would not be compromised if the exclusion of a particular junction manhole as a key junction manhole would not affect the permittee's ability to determine the possible presence of an upstream illicit discharge. A permittee may exclude a junction manhole located upstream from another located in the immediate vicinity or that is serving a drainage alignment with no potential for illicit connections.

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

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

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

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

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

Inspection of key junction manholes will proceed as follows:

1. Manholes will be opened and inspected for visual and olfactory evidence of illicit connections. A sample field inspection form is provided in (using paper forms or digital form using a tablet or similar device)
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/septic flows, conductivity to detect tidal backwater, etc.).
3. Where sampling results or visual or olfactory evidence indicate potential illicit discharges, 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 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.

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## 7.3 Wet Weather Outfall Sampling

Where a minimum of one (1) System Vulnerability Factor (SVF) is identified based on previous information or the catchment investigation, a wet weather investigation must also be conducted at the associated outfall. The DPW 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 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. 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.

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## 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
- CCTV/Video Inspection
- Dye Testing
- Optical Brightener Monitoring

Public notification is an important aspect of a detailed source investigation program. Prior to smoke testing, dye testing, or TV inspections, the DPW will notify property owners in the affected area. Notification will be made to single family homes, businesses and building lobbies for multi-family dwellings. The DPW will also notify the Board of Health, Fire Department, Police Department, etc., as appropriate.

### 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 drains and noting the emergence of smoke from 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 sewer lines can also be performed. Unlike storm drain smoke tests, buildings that do not emit smoke during 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, floor drains, 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 the Board of Health 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 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, recording the presence or absence of the dye.

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

### 7.4.4 CCTV/Video Inspection

Another method of source isolation involves the use of mobile video cameras that are guided remotely through stormwater drain lines to observe possible illicit discharges. IDDE program staff can review the videos and note any visible illicit discharges. While this tool is

both effective and usually definitive, it can be costly and time consuming when compared to other source isolation techniques.

#### 7.4.5 Optical Brightener Monitoring

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

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### 7.5 Illicit Discharge Removal

When the specific source of an illicit discharge is identified, the Town of Wakefield Conservation Commission 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, if possible.

#### 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.

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## 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 within the DPW. The training will be coordinated and appropriate records maintained by the DPW. This training format and presentation has been developed and includes:

- General NPDES MS4 Program Overview (including the six Minimum Control Measures)
- Explanation of what components make up the MS4
- Information on permitted discharges
- Information on illicit discharges – What is an Illicit Discharge? How to identify?
- Mapping Process –Inspections, documentation process.
- Good Housekeeping requirements
- may also include additional training specific to the functions of particular personnel and their function within the framework of the IDDE

Training records will be maintained in **Appendix A**.

## 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 prepared by the Town Engineer and will include, as appropriate, the following indicators of program progress:

- Number of 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
- Number of employees trained annually.

The success of the IDDE program will be measured by the IDDE activities completed within the required permit timelines. The annual report will be submitted to the MassDEP and EPA.

# Appendix A

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**Illicit Discharge Detection and Elimination (IDDE)  
Employee Training Record  
Town of Wakefield, Massachusetts**

**Date of Training:** \_\_\_\_\_

**Duration of Training:** \_\_\_\_\_

<b>Name</b> Please Print Clearly	<b>Title</b>	<b>Signature</b>

