

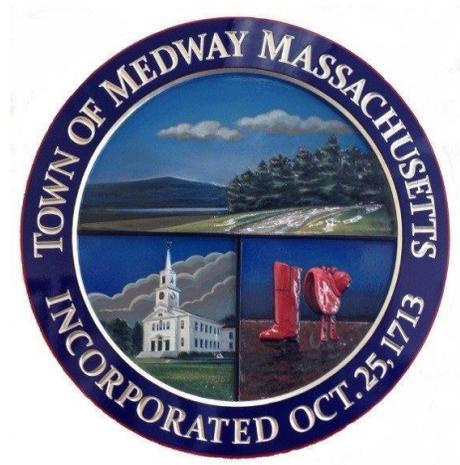
**ILLICIT DISCHARGE DETECTION & ELIMINATION PROGRAM
FOR
TOWN OF MEDWAY, MASSACHUSETTS**

APRIL 2014

Revised JUNE 2020

Revised NOVEMBER 2020

Revised JUNE 2021



PREPARED BY:



Revised by Town of Medway DPW Compliance Coordinator

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1. INTRODUCTION

1.1 NPDES MS4 Program

This Illicit Discharge Detection and Elimination (IDDE) Plan has been developed 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 NPDES MS4 Permit allows permittees to discharge stormwater in compliance with the Clean Water Act, as amended (33 U.S.C. § 1251 et seq) and the Massachusetts Clean Waters Act, as amended (M.G.L. Chap. 21 §§ 26-53), provided that the permit conditions are met. Permit Section 2.3.4. includes the requirement to develop and implement an Illicit Discharge Detection and Elimination Program.

1.2 Illicit Discharges

Discharges from stormwater management systems throughout urbanized areas have often included wastes and wastewater from non-stormwater sources. These flows are designated as “Illicit Discharges” because they consist of or contain materials the stormwater drainage system is not designed to treat, transport or discharge. Illicit Discharges are therefore considered by Federal regulations to be “...any discharge to an MS4 that is not composed entirely of stormwater...” There are a few particular exceptions to this definition, such as discharges from NPDES-permitted industrial sources and discharges from fire-fighting activities.

Illicit discharges enter stormwater systems through either direct connections (e.g., wastewater piping either mistakenly or deliberately connected to the storm drains etc.) or indirect connections (e.g., infiltration from cracked sanitary systems, spills collected by drain outlets, paint, used oil, or pet waste dumped directly into a drain, etc.). The untreated discharges then can contribute high levels of pollutants to receiving water bodies (for example, heavy metals, toxics, oil and grease, solvents, nutrients, viruses, and bacteria). Specific examples of illicit discharges include sanitary wastewater, effluent from septic tanks, car wash wastewaters, improper oil disposal, radiator flushing, laundry wastewaters, spills from roadway accidents, improper disposal of auto and household toxics. Pollutant levels from these illicit discharges have been shown to be high enough to significantly degrade receiving water quality and threaten aquatic, wildlife, and human health.

Illicit dry weather discharges are often characterized as continuous, intermittent or transitory. Continuous discharges are generally the easiest to identify and can typically be observed through a routine outfall monitoring program. Intermittent discharges may only happen during specific hours, days or seasons and are more difficult to capture through routine or periodic monitoring. An intermittent discharge could be created by illicit laundry hook-ups or sloop sinks that are only in use for short periods. A different type of monitoring or investigation may be required (such as upstream temporary dams). Transitory discharges are usually the result of an accident or spill that gets into the drain system. These may be virtually impossible to identify through routine monitoring. All three of these discharge types represent a significant threat to receiving water quality and an effective IDDE program will address all of these different circumstances.

1.3 Non-Stormwater Discharges

1.3.1 Allowable Non-Stormwater Discharges

Section 1.4 of the 2016 MS4 Permit lists authorized non-stormwater discharges provided it has been determined by the permittee, EPA, or MassDEP that they are not significant contributors of pollutants to the MS4. In a collaborative effort, the Department of Public Works (DPW) and Community and Economic Development Department (CEDD) determined that some of the previously authorized discharges were significant contributors to the MS4 and should be addressed in the IDDE Plan. On November 18, 2019, the Town voted to update its Stormwater Management and Land Disturbance Bylaw, which limited the scope of allowable discharges to the MS4. The following are allowable non-stormwater discharges:

- Water line flushing
- Diverted stream flows
- Discharge from potable water sources
- Air conditioning condensation
- Irrigation water, springs
- Individual resident car washing without detergents or chemicals
- Flows from riparian habitats and wetlands
- Street wash water
- Residential building wash waters without detergents
- Fire-fighting activities

1.3.2 Non-Stormwater Discharges Requiring a MS4 Connection and Discharge Permit (MS4CD)

In keeping with the updated Stormwater Management and Land Disturbance Bylaw, a limited number of non-stormwater discharges may be allowed after receiving a MS4CD Permit from the DPW. Permits to discharge these categories of non-stormwater may be issued after a finding by the DPW that there is no detriment to the public good and all viable alternatives have been examined. Details on the permitting process and requirements are explained in the MS4CD Permit Rules and Regulations. These categories are:

- Uncontaminated pumped ground water
- Foundation drains
- Water from crawl space pumps
- Footing drains

1.3.3 Prohibited Non-Storm Water Discharges

The following non-stormwater discharges are prohibited:

- Chlorinated swimming pool discharges
- Landscape irrigation
- Lawn watering
- Discharging anything other than stormwater or non-stormwater allowed in the sections above

1.4 Receiving Waters & Impairments

The following Impaired Waters (Massachusetts Year 2016 Integrated List of Waters, December 2019) are found within the boundaries of the Town of Medway, as shown on Table 1-1. Chicken Brook and Hopping Brook were recategorized from Category 2 waters to Category 5 waters on the 2016 List. The Charles River was reassessed as a Category 5 water from a Category 4a water in 2012.

Table 1-1: Impaired Waters, Town of Medway MA

Water Body	Segment ID	2016 Impairment Category	2016 Impairment	EPA TMDL #
Charles River	MA 72-04	5	Flow Regime Modification*	
			Chlordane in Fish Tissue	
			DDT in Fish Tissue	
			E. Coli	32366
			Fish Bioassessments	
			Mercury in Fish Tissue	
Charles River	MA 72-05	5	Non-native aquatic plants*	
			Algae	40317
			Benthic Macroinvertebrates	
			Chlordane in Fish Tissue	
			DDT in Fish Tissue	
			Dissolved Oxygen	40317
			Dissolved Oxygen Supersaturation	40317
			Mercury in Fish Tissue	
			Nutrient/Eutrophication Biological indicators	40317
			Phosphorus, Total	40317
Turbidity	40317			
Chicken Brook	MA 72-34	5	E. coli	
Hopping Brook	MA 72-35	5	E. coli	

Notes:

*TMDL not required (non-pollutant)

Category Definitions:

Category 1 – “Waters attaining all designated uses”

Category 2 – “Attaining some uses; other uses not assessed”

Category 3 – “No uses assessed”

Category 4a – “TMDL is completed”

Category 4b – “Impairment controlled by alternative pollution control requirements”

Category 4c – “Impairment not caused by a pollutant – TMDL not required”

Category 5 – “Waters requiring a TMDL” (i.e., the 303(d) List)

1.4.1 Nutrient (Phosphorus) TMDL

On June 10, 2011, the EPA approved the *Total Maximum Daily Load for Nutrients in the Upper/Middle Charles River*. The Town of Medway must comply with Appendix F (A) (I) – Charles River Watershed Phosphorus TMDL Requirements. As a part of these requirements the Town will implement a Phosphorus Control Plan (PCP) within the entire municipal boundary. The targeted reductions are shown in **Table 1-2** below.

Table 1-2: Community Annual Stormwater Phosphorus Load Reduction

Baseline Phosphorus Load (kg/year)	Stormwater Phosphorus Load Reduction Requirement (kg/year)	Allowable Phosphorus Load (kg/year)	Stormwater Percent Reduction in Phosphorus Load (%)
1,063	400	662	38%

1.4.2 Bacteria (E. coli) and Pathogen TMDL:

There are currently approved 16 approved bacteria (fecal coliform bacteria) or mixed pathogen (fecal coliform, E. coli, and/or enterococcus bacteria) TMDLs for certain waterbodies in Massachusetts. Medway is the primary municipality for Charles River segments 72-04 and 72-05, which are listed as having a pathogen impairment. Therefore, the Town must meet the requirements listed in section 2.3 of the Permit as well as the enhanced BMPs listed in Appendix F (A) (III).

Catchment areas draining to the Charles River, Chicken Brook, Hopping Brook, or any other waterbody with a bacteria and/or pathogen impairment and an approved TMDL shall be designated as a PROBLEM catchment or HIGH priority area in the IDDE program.

At any time, the Department of Environmental Protection may relieve the Town of these additional requirements.

1.5 Program Goals & Implementation Strategies

The purpose of the IDDE program is to systematically find and eliminate illicit discharges to the MS4 system and implement procedures to prevent such discharges from occurring 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 1-3**.

Figure 1-1. IDDE Investigation Procedure Framework

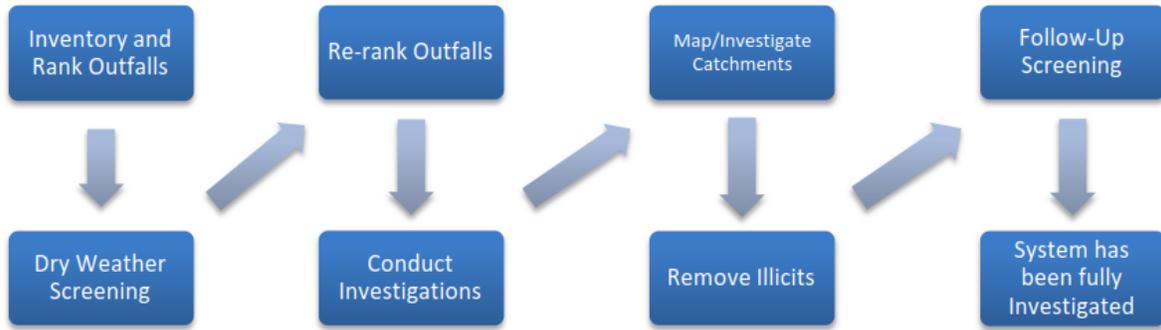


Table 1-3: IDDE Program Implementation Timeline

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 Definitions and Acronyms

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

Catch basin: A chamber or well, usually built to the curb line of a street which admits surface water for discharge into a storm water drain.

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

Direct Connection: A discharge that is connected to the MS4 through a pipe.

Discharge: when used without qualification, means the “discharge of a pollutant.”

Discharge of Pollutants: Any addition of any pollutant or combination of pollutants to waters of the United States from any point source. This includes additions of pollutants into waters of the United States from surface runoff which is collected and channeled by man; or discharges through pipes, sewers, or other conveyances, leading into privately owned treatment works

Groundwater: Water beneath the surface of the ground.

Illicit Connection: A direct or indirect connection, which allows an illicit discharge into the MS4, 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 or approved before the effective date of this Bylaw.

Illicit Discharge: Any discharge to a MS4 that is not composed entirely of stormwater except discharges pursuant to a NPDES permit (other than NPDES permit for discharges from the MS4) and discharges from firefighting activities.

Impaired water: A water is impaired if it does not meet one or more of its designated use(s). For purposes of permit, “impaired” refers to category 4 or 5 of the five-part categorization approach used for classifying the water quality standards attainment status for water segments under the TMDL program. Impaired waters compilations are sometimes referred to as “303(d) lists.”

Impervious Surface: Any surface that prevents or significantly impedes the infiltration of water into the underlying soil. This can include but is not limited to roads, driveways, parking areas and other areas created using nonporous material; buildings, rooftops, structures, artificial turf and compacted gravel or soil.

Indirect Connection: A flow generated outside the MS4 that enters through storm drain inlets or by infiltrating through the joints of the pipe.

Interconnection: 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 eventually conveyed to a water of the United States. Interconnections shall be treated similarly to outfalls throughout the permit.

Land Disturbance: An action to alter the existing vegetation and/or underlying soil of a site, such as clearing, grading, site preparation (e.g., excavating, cutting and filling), soil compaction, and movement and stockpiling of topsoils.

Manhole: Sewer system structure typically made out of brick, concrete block, or monolithic concrete sections. Manholes have solid covers that do not accept runoff like a catch basin. Manholes within a storm sewer system are installed typically at bends in pipe runs, every 300 feet to 400 feet within a storm sewer pipe run, intersections of two or more pipe runs, and at the ends of pipe runs. Manholes allow for the cleaning and inspection of storm sewer systems. Manholes are typically ‘fed’ stormwater by catch basins and upstream storm sewer pipes.

Junction Manhole: Under the Permit, a 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.

Key Junction Manhole: Under the permit, key junction manholes are those junction manholes that can represent one of more junction manholes without compromising adequate implementation of the illicit discharge program. Adequate implementation of the illicit discharge program would not be compromised exclusion of a particular junction manhole as a key junction manhole would not affect the permittee 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 connection.

Municipal Separate Storm Sewer System (MS4): A conveyance or system of conveyances (including roads with drainage systems, municipal streets, catch basins, curbs, gutters, ditches, manmade channels, or storm drains):

- a) Owned and operated by the Town that discharges to waters of the United States
- b) Designated or used for collection or conveyance stormwater
- c) Which is not a combined sewer; and
- d) Which is not part of Publicly Owned Treatment Works (POTW) is as defined at 40 CFR 122.2.

National Pollutant Discharge Elimination System (NPDES) Stormwater Discharge Permit: A permit issued by United States Environmental Protection Agency or jointly with the Commonwealth of Massachusetts that authorizes the discharge of pollutants to waters of the United States.

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

Outfall – means a point source at the point where a 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. (40 CFR § 122.26(b)(9)). Culverts longer than a simple road crossing shall be included in the outfall inventory unless the permittee can confirm that they are free of any connections and simply convey waters of the United States.

Outfall Catchment: the land area draining to a single outfall or interconnection. The extent of the outfall's catchment is determined not only by localized topography and impervious cover but also by the location of drainage structures and the connectivity of MS4 pipes.

Point Source – Any discernible, confined and discrete conveyance, including but not limited to any pipe, ditch, channel, tunnel, conduit, well, discrete fissure, container, rolling stock, concentrated animal feeding operation, landfill leachate collection system, vessel, or other floating craft from which pollutants are or may be discharged. This term does not include return flows from irrigated agriculture or agriculture stormwater runoff.

Pollutant: Dredged spoil, solid waste, incineration residue, filter backwash, sewage, garbage, sewer sludge, munitions, chemical wastes, biological materials, heat, wrecked or discarded equipment, rock, sand, cellar dirt, and industrial, municipal and agriculture waste discharged into water.

Pollutant of concern: a pollutant which causes or contributes to a violation of a water quality standard, including a pollutant which is identified as causing an impairment in a State's 303(d) list.

Storm sewer - A sewer that carries only surface runoff, street wash, and snow melt from the land. In a separate sewer system, storm sewers are completely separate from those that carry domestic and commercial wastewater (sanitary sewers).

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

Total Suspended Solids (TSS) – The entire amount of organic and inorganic particles dispersed in water. TSS is a water quality metric used to assess the quality of a water sample.

Unauthorized Connection –A connection that discharges to the Towns MS4 without written permit from the Town.

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.

ACRONYMS

BMP – Best Management Practice

DWF – Dry Weather Flow

DPW – Department of Public Works

EPA – Environmental Protection Agency

GIS – Geographic Information System

GPS – Global Positioning System

IDDE – Illicit Discharge Detection and Elimination

IUP – Intended Use Plan

MADEP – Massachusetts Department of Environmental Protection

MS4 – Municipal Separate Storm Sewer System

NOAA – National Oceanic and Atmospheric Administration

NOI – Notice of Intent

NPDES – National Pollutant Discharge Elimination System

SRF – State Revolving Fund

SWMP – Storm Water Management Plan

2. TOWN OF MEDWAY LEGAL AUTHORITY & RESPONSIBILITIES

2.1 *Legal Authority*

The Town of Medway has adopted a Stormwater Management and Land Disturbance Bylaw as Article 26 of its General Bylaws (Revised June 2020). A copy of the Stormwater Management and Land Disturbance Bylaw is provided in **Appendix A**. As required by the Permit, the Bylaw provides the Town with adequate legal authority to:

- Prohibit illicit discharges (ID) and unauthorized discharges to the MS4 and/or the Town right-of-way
- Prohibit illicit and unauthorized connections to the MS4
- Investigate suspected illicit discharges
- Eliminate ID (including those not owned or controlled by the MS4 that discharge into the MS4 system)
- Require owners to obtain a MS4 Connection and Discharge (MS4CD) Permit for existing and new connections
- Require owners to demonstrate that discharges are not contaminated, and no other options are viable than to connect to the MS4
- Issue a MS4CD provided discharges are not contaminated and the installation be inspected by the Town
- Enforce the IDDE program and levy fines.

In addition to the Stormwater Management and Land Disturbance Bylaw, the Town has other legal authority pertaining to stormwater management:

- The Medway Zoning Bylaws describe general requirements and specific requirements for Exempt uses.
- The Planning Board Site Plan review process requires applicants to describe existing and proposed site conditions and mitigating measures in accordance with Planning Board Rules and Regulations.
- Design Review Guidelines (2008) encourage the use of minimizing of impervious areas and innovative stormwater management and low impact design concepts.

2.2 *Program Responsibilities*

The Department of Public Works (DPW) is delegated by the Board of Selectmen as responsible for administering, implementing, and enforcing the provisions section 26.4 of the Stormwater Management and Land Disturbance Bylaw, which prohibits illicit discharges. The DPW is responsible for all aspects of the IDDE Program, including ID identification and reporting, elimination of IDs, documentation and verification of ID elimination, and tracking and reporting of program progress.

3. TOWN OF MEDWAY STORMWATER MAPPING

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

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

3.1 Phase 1 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
- Open channel conveyances (swales, ditches, etc.)
- Interconnections with other MS4s and other storm sewer systems
- Municipally owned stormwater treatment structures
- Water bodies identified by name and indication of all use impairments as identified on the most recent EPA approved Massachusetts Integrated List of Waters report
- Initial catchment delineations. Topographic contours and drainage system information may be used to produce initial catchment delineations.

3.2 Phase II Mapping

Phase II mapping must be completed within ten (10) years of the effective date of the permit (July 1, 2027) and include the following information:

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

3.3 Additional Recommended Mapping Elements

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

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

- Septic systems
- Soil types
- Areas with high ground water
- Areas with seasonal high water table elevations
- Orthophotography

4. SANITARY SEWER OVERFLOWS (SSOs)

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

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

Upon detection of an SSO, the Town 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 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 DPW 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. To date, there have been no reported SSOs in Medway within the reporting timeframe.

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. Medway has been building its outfall inventory since 2003 and the list is updated annually. As of this update, 407 outfalls/interconnections have been identified.

5.1 Outfall Catchment Delineations

A catchment is the area that drains to an individual outfall or interconnection. 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 Ranking

The Department of Public Works manages the outfall inventory and ranking. The purpose is to identify each outfall and interconnection discharging from the MS4, record its location and condition, and conduct inspections, screenings and other IDDE program activities. The inventory is updated annually to include data collected during dry weather screening and other relevant inspections.

Outfalls and interconnections are classified into one of the following categories:

Problem Outfalls: known or suspected contributions of illicit discharges, specifically sewer input.

Likely sewer input indicators are any of the following:

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

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

High Priority Outfalls: Outfalls/interconnections that have not been classified as Problem Outfalls and that:

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

Medium Priority Outfalls: Outfalls/interconnections determined by the permittee as medium priority based on the characteristics listed below or other available information.

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

Outfalls are ranked as Problem, High, Medium or Low Priority based on the following characteristics of the catchment areas, where information is available.

- **Past discharge complaints or reports**
- **Receiving water quality**
- **Density of generating sites** - institutional, municipal, commercial, or industrial sites with potential to generate pollutants that could contribute to illicit discharges- for example: car dealers, car washes, garage/gas stations, garden centers, industrial manufacturing, residential areas with swimming pools
- **Age of surrounding 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.
- **Proximately to a groundwater protection zone**

GIS mapping, land use and development age, Board of Health inventory of failed septic systems, Water and Sewer Division sewer inventory, interviews, and the Massachusetts Impaired Waters List were used to gather information regarding the above factors and develop the Outfall Inventory and Priority Ranking Matrix shown in **Table 5-1**.

Factors were assigned different values to add more weight to better sources of data and/or areas of importance. The sum of the factor scores were used to generate an overall ranking score of Problem, High, Medium, or Low for each outfall. Heavier weight was given to factors such as: the quality of the receiving waters, discharge to waters with a TMDL, location within the Zone I and/or Zone II groundwater protection area, historical dry weather flow, and known problem outfalls. The results of the ranking are summarized in in **Table 5-2** below. Both tables are updated annually.

Table 5-1: Outfall Inventory and Priority Ranking Matrix

Medway, Massachusetts
Revision Date: 06/30/2020

Outfall ID	Street	Quality of Receiving Waters	Waters with TMDL	Density of generating sites (industrial zoned)	Sewer conversion	Surrounding septic system	Culverted Streams	Groundwater Protection	Historical Flow	Suspected ID	# of Similarities	Priority Ranking
		Poor = 3 Fair = 2 No = 0	Yes = 3 No = 0	High = 2 Low = 0	Yes = 2 No = 0	Yes = 2 No = 0	Yes = 1 No = 0	Yes = 3 No = 0	Yes = 3 No = 0	Yes = 20 No = 0		Problem = 20 or more High = 9-19 Medium = 2-8 Low = 0-1
OF 68-3	Charles St	3	3	0	2	2	1	0	3	0	14	High
OF 72-2	Lakeshore Dr	3	3	0	0	0	1	3	3	0	13	High
OF 53-1	Alder St	2	0	2	2	2	1	3	0	0	12	High
OF 53-2	Alder St	2	0	2	2	2	1	3	0	0	12	High
OF 48-1	Main St	3	0	0	2	2	1	0	3	0	11	High
OF 67-7	Waterview Dr	3	3	0	2	2	1	0	0	0	11	High
OF 71-3	Village St	0	3	0	2	2	1	3	0	0	11	High
OF 54-3	Trotter Dr	0	0	2	2	2	1	3	0	0	10	High
OF 66-4	Summer St	0	0	2	2	2	1	0	3	0	10	High
OF 30-1	Delmar Rd	3	0	0	2	2	0	0	3	0	10	High
OF 55-4	Holbrook St	3	0	0	2	2	0	0	3	0	10	High
OF 6-7	Whitney Rd	3	0	0	2	2	0	0	3	0	10	High
OF 23-3	Green Valley Rd	0	0	0	2	2	0	3	3	0	10	High
OF 50-1	Broad St	0	0	0	2	2	0	3	3	0	10	High
OF 61-1	Village St	3	3	0	0	0	1	3	0	0	10	High
OF 67-10	Charles St	3	3	0	0	0	1	0	3	0	10	High
OF 70-1	John St	3	3	0	0	0	1	3	0	0	10	High
OF 71-1	Walker St	3	3	0	0	0	1	3	0	0	10	High
OF 72-1	Cyntha Cir	3	3	0	0	0	1	3	0	0	10	High
OF 66-6	West St	3	0	2	2	2	0	0	0	0	9	High
OF 54-1	Trotter Dr	0	0	2	2	2	0	3	0	0	9	High

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OF 63-1	Alder St	0	0	2	2	2	0	3	0	0	9	High
OF 63-2	Alder St	0	0	2	2	2	0	3	0	0	9	High
OF 64-1	Trotter Dr	0	0	2	2	2	0	3	0	0	9	High
OF 60-2	Village St	3	3	0	2	0	1	0	0	0	9	High
OF 60-3	Village St	3	3	0	2	0	1	0	0	0	9	High
OF 44-6	Milford St	3	0	0	2	2	1	0	0	0	8	Medium
OF 45-8	Milford St	3	0	0	2	2	1	0	0	0	8	Medium
OF 48-17	Oak St	3	0	0	2	2	1	0	0	0	8	Medium
OF 13-1	Wards Ln	0	0	0	2	2	1	0	3	0	8	Medium
OF 16-8	Saddle Hill Rd	0	0	0	2	2	1	3	0	0	8	Medium
OF 21-11	Lovering St	0	0	0	2	2	1	0	3	0	8	Medium
OF 21-9	Lovering St	0	0	0	2	2	1	0	3	0	8	Medium
OF 23-4	Spruce Rd	0	0	0	2	2	1	0	3	0	8	Medium
OF 3-13	Homestead Dr	0	0	0	2	2	1	0	3	0	8	Medium
OF 32-4	Main St	0	0	0	2	2	1	3	0	0	8	Medium
OF 33-6	Main St	0	0	0	2	2	1	3	0	0	8	Medium
OF 40-4	Main St	0	0	0	2	2	1	3	0	0	8	Medium
OF 40-5	Main St	0	0	0	2	2	1	3	0	0	8	Medium
OF 40-6	Main St	0	0	0	2	2	1	3	0	0	8	Medium
OF 40-7	Main St	0	0	0	2	2	1	3	0	0	8	Medium
OF 40-8	Main St	0	0	0	2	2	1	3	0	0	8	Medium
OF 6-3	Summer St	0	0	0	2	2	1	0	3	0	8	Medium
OF 67-8	Waterview Cir	0	3	0	2	2	1	0	0	0	8	Medium
OF 68-4	Shaw St	0	3	0	2	2	1	0	0	0	8	Medium
OF 8-3	Fairway Ln	0	0	0	2	2	1	0	3	0	8	Medium
OF 66-1	West St	3	0	2	2	0	1	0	0	0	8	Medium
OF 66-5	Summer St	0	0	2	2	2	1	0	0	0	7	Medium
OF 13-2	Musquit Rd	3	0	0	2	2	0	0	0	0	7	Medium
OF 20-1	Iarussi Way	3	0	0	2	2	0	0	0	0	7	Medium
OF 26-3	Stone End Rd	3	0	0	2	2	0	0	0	0	7	Medium
OF 26-4	Stone End Rd	3	0	0	2	2	0	0	0	0	7	Medium
OF 26-5	Ledgewood Rd	3	0	0	2	2	0	0	0	0	7	Medium
OF 35-5	Deerfield Rd	3	0	0	2	2	0	0	0	0	7	Medium
OF 35-6	Fisher St	3	0	0	2	2	0	0	0	0	7	Medium
OF 44-8	Rainbow Rd	3	0	0	2	2	0	0	0	0	7	Medium
OF 47-11	Oak St	3	0	0	2	2	0	0	0	0	7	Medium

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OF 48-18	Oak St	3	0	0	2	2	0	0	0	0	7	Medium
OF 55-11	Williamsburg Way	3	0	0	2	2	0	0	0	0	7	Medium
OF 55-12	Williamsburg Way	3	0	0	2	2	0	0	0	0	7	Medium
OF 55-6	Millbrook Rd	3	0	0	2	2	0	0	0	0	7	Medium
OF 10-5	Broken Tree Rd	0	0	0	2	2	0	0	3	0	7	Medium
OF 12-10	Thayer Rd	0	0	0	2	2	0	0	3	0	7	Medium
OF 12-9	Stable Way	0	0	0	2	2	0	0	3	0	7	Medium
OF 16-3	Maple Leaf Ln	0	0	0	2	2	0	3	0	0	7	Medium
OF 16-4	Pine Needle Dr	0	0	0	2	2	0	3	0	0	7	Medium
OF 18-4	Broad Acres Farm Rd	0	0	0	2	2	0	0	3	0	7	Medium
OF 23-1	Green Valley Rd	0	0	0	2	2	0	3	0	0	7	Medium
OF 23-2	Green Valley Rd	0	0	0	2	2	0	3	0	0	7	Medium
OF 24-1	Indian Creek Rd	0	0	0	2	2	0	3	0	0	7	Medium
OF 28-4	Azalea Dr	0	0	0	2	2	0	0	3	0	7	Medium
OF 59-7	Forest Rd	0	0	0	2	2	0	0	3	20	27	Problem
OF 34-3	Clark St	0	0	0	2	2	0	0	3	0	7	Medium
OF 34-4	Laurelwood Ln	0	0	0	2	2	0	3	0	0	7	Medium
OF 43-1	Laurelwood Ln	0	0	0	2	2	0	3	0	0	7	Medium
OF 50-2	Kenart Rd	0	0	0	2	2	0	3	0	0	7	Medium
OF 51-2	Oakland St	0	0	0	2	2	0	3	0	0	7	Medium
OF 54-4	Blue Ribbon Ln	0	0	0	2	2	0	3	0	0	7	Medium
OF 54-7	Alder St	0	0	0	2	2	0	3	0	0	7	Medium
OF 62-4	Pine Ridge	0	0	0	2	2	0	3	0	0	7	Medium
OF 64-10	Paddock Ln	0	0	0	2	2	0	3	0	0	7	Medium
OF 64-2	Fox Run Rd	0	0	0	2	2	0	3	0	0	7	Medium
OF 64-3	Fox Run Rd	0	0	0	2	2	0	3	0	0	7	Medium
OF 64-4	Fox Run Rd	0	0	0	2	2	0	3	0	0	7	Medium
OF 64-5	Stallbrook Rd	0	0	0	2	2	0	3	0	0	7	Medium
OF 64-6	Fox Run Rd	0	0	0	2	2	0	3	0	0	7	Medium
OF 64-7	Stallbrook Rd	0	0	0	2	2	0	3	0	0	7	Medium
OF 64-8	Stallbrook Rd	0	0	0	2	2	0	3	0	0	7	Medium
OF 71-2	Populatic St	0	0	0	2	2	0	3	0	0	7	Medium
OF 9-5	Fairway Ln	0	0	0	2	2	0	0	3	0	7	Medium
OF 58-17	Guernsey St	3	0	0	0	0	1	0	3	0	7	Medium
OF 67-6	Franklin St	3	3	0	0	0	1	0	0	0	7	Medium

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OF 69-6	Mishawum St	3	3	0	0	0	1	0	0	0	7	Medium
OF 70-5	Neelon Ln	3	3	0	0	0	1	0	0	0	7	Medium
OF 70-6	Neelon Ln	3	3	0	0	0	1	0	0	0	7	Medium
OF 70-7	Neelon Ln	3	3	0	0	0	1	0	0	0	7	Medium
OF 33-1	Industrail Park Rd	0	0	0	0	0	1	3	3	0	7	Medium
OF 33-4	Industrail Park Rd	0	0	0	0	0	1	3	3	0	7	Medium
OF 61-3	Populatic St	0	3	0	0	0	1	3	0	0	7	Medium
OF 68-1	Shaw St	0	3	0	0	0	1	3	0	0	7	Medium
OF 70-2	River St	0	3	0	0	0	1	3	0	0	7	Medium
OF 30-2	Maple St	3	0	0	2	0	1	0	0	0	6	Medium
OF 12-5	Claybrook Farm Rd	0	0	0	2	2	1	0	0	0	5	Medium
OF 16-1	Hickory Dr	0	0	0	2	2	1	0	0	0	5	Medium
OF 16-6	Saddle Hill Rd	0	0	0	2	2	1	0	0	0	5	Medium
OF 19-4	Summer St	0	0	0	2	2	1	0	0	0	5	Medium
OF 19-8	Broad Acres Farm Rd	0	0	0	2	2	1	0	0	0	5	Medium
OF 21-10	Lovering St	0	0	0	2	2	1	0	0	0	5	Medium
OF 21-8	Lovering St	0	0	0	2	2	1	0	0	0	5	Medium
OF 22-15	Holliston St	0	0	0	2	2	1	0	0	0	5	Medium
OF 22-6	Holliston St	0	0	0	2	2	1	0	0	0	5	Medium
OF 3-14	Homestead Dr	0	0	0	2	2	1	0	0	0	5	Medium
OF 3-15	Homestead Dr	0	0	0	2	2	1	0	0	0	5	Medium
OF 36-5	Fisher Terr	0	0	0	2	2	1	0	0	0	5	Medium
OF 4-1	Curtis Ln	0	0	0	2	2	1	0	0	0	5	Medium
OF 4-2	Holliston St	0	0	0	2	2	1	0	0	0	5	Medium
OF 44-4	Liberty Rd	0	0	0	2	2	1	0	0	0	5	Medium
OF 44-7	Short St	0	0	0	2	2	1	0	0	0	5	Medium
OF 45-1	Fisher St	0	0	0	2	2	1	0	0	0	5	Medium
OF 45-2	Fisher St	0	0	0	2	2	1	0	0	0	5	Medium
OF 45-4	Gray Squirrel Cir	0	0	0	2	2	1	0	0	0	5	Medium
OF 45-6	Milford St	0	0	0	2	2	1	0	0	0	5	Medium
OF 45-7	Fisher St	0	0	0	2	2	1	0	0	0	5	Medium
OF 46-3	Milford St	0	0	0	2	2	1	0	0	0	5	Medium
OF 47-2	Daniels Rd	0	0	0	2	2	1	0	0	0	5	Medium
OF 4-8	Skyline Dr	0	0	0	2	2	1	0	0	0	5	Medium
OF 48-11	Evergreen St	0	0	0	2	2	1	0	0	0	5	Medium

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OF 48-19	Evergreen St	0	0	0	2	2	1	0	0	0	5	Medium
OF 48-5	Cottage St	0	0	0	2	2	1	0	0	0	5	Medium
OF 55-10	Castle Rd	0	0	0	2	2	1	0	0	0	5	Medium
OF 57-3	Village St	0	0	0	2	2	1	0	0	0	5	Medium
OF 59-5	Village St	0	0	0	2	2	1	0	0	0	5	Medium
OF 59-9	Forest Rd	0	0	0	2	2	1	0	0	0	5	Medium
OF 66-2	Summer St	0	0	0	2	2	1	0	0	0	5	Medium
OF 66-3	Village St	0	0	0	2	2	1	0	0	0	5	Medium
OF 6-8	Summer Street	0	0	0	2	2	1	0	0	0	5	Medium
OF 7-2	Kimberly Dr	0	0	0	2	2	1	0	0	0	5	Medium
OF 7-3	Kimberly Dr	0	0	0	2	2	1	0	0	0	5	Medium
OF 9-4	Fairway Ln	0	0	0	2	2	1	0	0	0	5	Medium
OF 21-3	Clover Ln	3	0	0	2	0	0	0	0	0	5	Medium
OF 42-3	Oakview Cir	0	0	0	2	0	0	3	0	0	5	Medium
OF 42-5	Oakland St	0	0	0	2	0	0	3	0	0	5	Medium
OF 42-6	Oakland St	0	0	0	2	0	0	3	0	0	5	Medium
OF 42-8	Oakland St	0	0	0	2	0	0	3	0	0	5	Medium
OF 48-16	Main St	0	0	0	2	0	0	0	3	0	5	Medium
OF 10-1	Puddingstone Ln	0	0	0	2	2	0	0	0	0	4	Medium
OF 10-2	Puddingstone Ln	0	0	0	2	2	0	0	0	0	4	Medium
OF 10-3	Hickory Dr	0	0	0	2	2	0	0	0	0	4	Medium
OF 10-4	Hickory Dr	0	0	0	2	2	0	0	0	0	4	Medium
OF 10-6	Hickory Dr	0	0	0	2	2	0	0	0	0	4	Medium
OF 12-1	Summit Rd	0	0	0	2	2	0	0	0	0	4	Medium
OF 12-11	Olde Surrey Ln	0	0	0	2	2	0	0	0	0	4	Medium
OF 12-12	Stable Way	0	0	0	2	2	0	0	0	0	4	Medium
OF 12-13	Olde Surrey Ln	0	0	0	2	2	0	0	0	0	4	Medium
OF 12-14	Olde Surrey Ln	0	0	0	2	2	0	0	0	0	4	Medium
OF 12-7	Claybrook Farm Rd	0	0	0	2	2	0	0	0	0	4	Medium
OF 12-8	Longmeadow Ln	0	0	0	2	2	0	0	0	0	4	Medium
OF 13-4	Iarussi Way	0	0	0	2	2	0	0	0	0	4	Medium
OF 13-7	Lovering St	0	0	0	2	2	0	0	0	0	4	Medium
OF 13-9	Iarussi Way	0	0	0	2	2	0	0	0	0	4	Medium
OF 14-1	Ohlson Cir	0	0	0	2	2	0	0	0	0	4	Medium
OF 14-3	Lovering St	0	0	0	2	2	0	0	0	0	4	Medium

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OF 15-4	Sun Valley Dr	0	0	0	2	2	0	0	0	0	4	Medium
OF 16-2	Broken Tree Rd	0	0	0	2	2	0	0	0	0	4	Medium
OF 16-5	Broken Tree Rd	0	0	0	2	2	0	0	0	0	4	Medium
OF 16-7	Walnut Ln	0	0	0	2	2	0	0	0	0	4	Medium
OF 19-10	Newton Ln	0	0	0	2	2	0	0	0	0	4	Medium
OF 19-2	Blueberry Hill Rd	0	0	0	2	2	0	0	0	0	4	Medium
OF 19-7	Broad Acres Farm Rd	0	0	0	2	2	0	0	0	0	4	Medium
OF 21-13	Howe St	0	0	0	2	2	0	0	0	0	4	Medium
OF 21-2	Winthrop St	0	0	0	2	2	0	0	0	0	4	Medium
OF 2-2	Alexsandria Dr	0	0	0	2	2	0	0	0	0	4	Medium
OF 22-1	Howe St	0	0	0	2	2	0	0	0	0	4	Medium
OF 22-18	Overlook Dr	0	0	0	2	2	0	0	0	0	4	Medium
OF 2-3	Alexsandria Dr	0	0	0	2	2	0	0	0	0	4	Medium
OF 23-6	Bridle Path Way	0	0	0	2	2	0	0	0	0	4	Medium
OF 2-4	Colonial Rd	0	0	0	2	2	0	0	0	0	4	Medium
OF 26-1	Ledgewood Rd	0	0	0	2	2	0	0	0	0	4	Medium
OF 26-2	Cedar Farms Rd	0	0	0	2	2	0	0	0	0	4	Medium
OF 27-8	Cedar Farms Rd	0	0	0	2	2	0	0	0	0	4	Medium
OF 28-1	Autumn Rd	0	0	0	2	2	0	0	0	0	4	Medium
OF 3-1	Cider Mill Rd	0	0	0	2	2	0	0	0	0	4	Medium
OF 3-10	Fairway Ln	0	0	0	2	2	0	0	0	0	4	Medium
OF 3-11	Fairway Ln	0	0	0	2	2	0	0	0	0	4	Medium
OF 3-12	Fairway Ln	0	0	0	2	2	0	0	0	0	4	Medium
OF 3-2	Hill St	0	0	0	2	2	0	0	0	0	4	Medium
OF 32-2	Coffee St	0	0	0	2	2	0	0	0	0	4	Medium
OF 3-4	Hill St	0	0	0	2	2	0	0	0	0	4	Medium
OF 34-2	Liberty Rd	0	0	0	2	2	0	0	0	0	4	Medium
OF 34-5	Clark St	0	0	0	2	2	0	0	0	0	4	Medium
OF 3-5	Hill St	0	0	0	2	2	0	0	0	0	4	Medium
OF 35-1	Fisher St	0	0	0	2	2	0	0	0	0	4	Medium
OF 35-3	Deerfield Rd	0	0	0	2	2	0	0	0	0	4	Medium
OF 36-1	Cedar Farms Rd	0	0	0	2	2	0	0	0	0	4	Medium
OF 36-2	Deerfield Rd	0	0	0	2	2	0	0	0	0	4	Medium
OF 36-3	Deerfield Rd	0	0	0	2	2	0	0	0	0	4	Medium
OF 36-4	Fisher St	0	0	0	2	2	0	0	0	0	4	Medium

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OF 3-7	Hill St	0	0	0	2	2	0	0	0	0	4	Medium
OF 3-8	Fairway Ln	0	0	0	2	2	0	0	0	0	4	Medium
OF 3-9	Fairway Ln	0	0	0	2	2	0	0	0	0	4	Medium
OF 4-4	Curtis Ln	0	0	0	2	2	0	0	0	0	4	Medium
OF 44-1	Milford St	0	0	0	2	2	0	0	0	0	4	Medium
OF 44-9	Gray Squirrel Dr	0	0	0	2	2	0	0	0	0	4	Medium
OF 4-5	Juniper Rd	0	0	0	2	2	0	0	0	0	4	Medium
OF 45-3	Gray Squirrel Cir	0	0	0	2	2	0	0	0	0	4	Medium
OF 45-5	Gray Squirrel Cir	0	0	0	2	2	0	0	0	0	4	Medium
OF 4-6	Juniper Rd	0	0	0	2	2	0	0	0	0	4	Medium
OF 46-2	Little Tree Rd	0	0	0	2	2	0	0	0	0	4	Medium
OF 46-4	Independence Ln	0	0	0	2	2	0	0	0	0	4	Medium
OF 46-5	Independence Ln	0	0	0	2	2	0	0	0	0	4	Medium
OF 4-7	Juniper Rd	0	0	0	2	2	0	0	0	0	4	Medium
OF 47-1	Brandywine Rd	0	0	0	2	2	0	0	0	0	4	Medium
OF 47-4	Highland St	0	0	0	2	2	0	0	0	0	4	Medium
OF 47-5	Oak St	0	0	0	2	2	0	0	0	0	4	Medium
OF 47-6	Oak St	0	0	0	2	2	0	0	0	0	4	Medium
OF 47-7	Oak St	0	0	0	2	2	0	0	0	0	4	Medium
OF 4-9	Skyline Dr	0	0	0	2	2	0	0	0	0	4	Medium
OF 5-1	Juniper Rd	0	0	0	2	2	0	0	0	0	4	Medium
OF 5-2	Juniper Rd	0	0	0	2	2	0	0	0	0	4	Medium
OF 5-3	Hunter Ln	0	0	0	2	2	0	0	0	0	4	Medium
OF 54-5	Stoney Ridge Rd	0	0	0	2	2	0	0	0	0	4	Medium
OF 54-6	Hawthorne Rd	0	0	0	2	2	0	0	0	0	4	Medium
OF 67-9	Waterview Dr	3	3	0	2	0	1	0	3	20	32	Problem
OF 55-1	Granite St	0	0	0	2	2	0	0	0	0	4	Medium
OF 55-7	Lantern Ln	0	0	0	2	2	0	0	0	0	4	Medium
OF 55-9	Lantern Ln	0	0	0	2	2	0	0	0	0	4	Medium
OF 56-4	Amelia Way	0	0	0	2	2	0	0	0	0	4	Medium
OF 56-5	Little Tree Rd	0	0	0	2	2	0	0	0	0	4	Medium
OF 57-7	Fales St	0	0	0	2	2	0	0	0	0	4	Medium
OF 6-10	Summer St	0	0	0	2	2	0	0	0	0	4	Medium
OF 6-2	Summer St	0	0	0	2	2	0	0	0	0	4	Medium
OF 6-4	Wildebroad Rd	0	0	0	2	2	0	0	0	0	4	Medium
OF 64-10	Daffodil Ln	0	0	0	2	2	0	0	0	0	4	Medium

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OF 64-11	Daffodil Ln	0	0	0	2	2	0	0	0	0	4	Medium
OF 64-12	Daffodil Ln	0	0	0	2	2	0	0	0	0	4	Medium
OF 6-5	Summit Rd	0	0	0	2	2	0	0	0	0	4	Medium
OF 65-1	Tulip Way	0	0	0	2	2	0	0	0	0	4	Medium
OF 65-2	Tulip Way	0	0	0	2	2	0	0	0	0	4	Medium
OF 65-3	Tulip Way	0	0	0	2	2	0	0	0	0	4	Medium
OF 6-6	Summit Rd	0	0	0	2	2	0	0	0	0	4	Medium
OF 57-4	Village St	0	0	0	0	0	1	0	3	20	24	Problem
OF 59-2	Kings Ln	0	0	0	0	0	1	0	3	20	24	Problem
OF 6-9	Summer St	0	0	0	2	2	0	0	0	0	4	Medium
OF 7-1	Diane Dr	0	0	0	2	2	0	0	0	0	4	Medium
OF 8-1	Fairway Ln	0	0	0	2	2	0	0	0	0	4	Medium
OF 9-1	Fairway Ln	0	0	0	2	2	0	0	0	0	4	Medium
OF 9-2	Holliston St	0	0	0	2	2	0	0	0	0	4	Medium
OF 9-3	Fairway Ln	0	0	0	2	2	0	0	0	0	4	Medium
OF 9-6	Puddingstone Ln	0	0	0	2	2	0	0	0	0	4	Medium
OF 9-7	Puddingstone Ln	0	0	0	2	2	0	0	0	0	4	Medium
OF 9-8	Woodland Rd	0	0	0	2	2	0	0	0	0	4	Medium
OF 39-16	Winthrop St	3	0	0	0	0	1	0	0	0	4	Medium
OF 39-3	Winthrop St	3	0	0	0	0	1	0	0	0	4	Medium
OF 39-4	Winthrop St	3	0	0	0	0	1	0	0	0	4	Medium
OF 58-10	Village St	3	0	0	0	0	1	0	0	0	4	Medium
OF 58-13	Wellington St	3	0	0	0	0	1	0	0	0	4	Medium
OF 58-14	Wellington St	3	0	0	0	0	1	0	0	0	4	Medium
OF 58-18	Guernsey St	3	0	0	0	0	1	0	0	0	4	Medium
OF 58-19	Guernsey St	3	0	0	0	0	1	0	0	0	4	Medium
OF 58-5	Cottage St	3	0	0	0	0	1	0	0	0	4	Medium
OF 58-6	Cottage St	3	0	0	0	0	1	0	0	0	4	Medium
OF 58-7	Village St	3	0	0	0	0	1	0	0	0	4	Medium
OF 28-7	Summer St	0	0	0	0	0	1	0	3	0	4	Medium
OF 30-4	Pond St	0	0	0	0	0	1	0	3	0	4	Medium
OF 33-2	Industrail Park Rd	0	0	0	0	0	1	3	0	0	4	Medium
OF 37-2	Azalea Dr	0	0	0	0	0	1	0	3	0	4	Medium
OF 37-4	Azalea Dr	0	0	0	0	0	1	0	3	0	4	Medium
OF 68-2	Charles St	0	3	0	0	0	1	0	0	0	4	Medium

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OF 69-4	Riverview St	0	3	0	0	0	1	0	0	0	4	Medium
OF 69-5	Riverview St	0	3	0	0	0	1	0	0	0	4	Medium
OF 70-4	Sanford St	0	3	0	0	0	1	0	0	0	4	Medium
OF 70-5	Sanford St	0	3	0	0	0	1	0	0	0	4	Medium
OF 70-6	Sanford St	0	3	0	0	0	1	0	0	0	4	Medium
OF 22-16	Shamrock Ln	0	0	0	2	0	1	0	0	0	3	Medium
OF 46-6	Independence Ln	0	0	0	2	0	1	0	0	0	3	Medium
OF 67-4	Village St	0	0	0	2	0	1	0	0	0	3	Medium
OF 67-5	Village St	0	0	0	2	0	1	0	0	0	3	Medium
OF 21-4	Clover Ln	3	0	0	0	0	0	0	0	0	3	Medium
OF 44-3	Short St	3	0	0	0	0	0	0	0	0	3	Medium
OF 48-13	Cutler St	3	0	0	0	0	0	0	0	0	3	Medium
OF 48-15	Norfolk Ave	3	0	0	0	0	0	0	0	0	3	Medium
OF 19-1	Stanley Rd	0	0	0	0	0	1	0	0	0	1	Low
OF 19-12	Newton Ln	0	0	0	0	0	1	0	0	0	1	Low
OF 19-13	Stanley Rd	0	0	0	0	0	1	0	0	0	1	Low
OF 22-7	Holliston St	0	0	0	0	0	1	0	0	0	1	Low
OF 27-4	Autumn Rd	0	0	0	0	0	1	0	0	0	1	Low
OF 31-10	Lovering St	0	0	0	0	0	1	0	0	0	1	Low
OF 31-9	Lovering St	0	0	0	0	0	1	0	0	0	1	Low
OF 37-13	Pheasant Run Rd	0	0	0	0	0	1	0	0	0	1	Low
OF 37-15	Pheasant Run Rd	0	0	0	0	0	1	0	0	0	1	Low
OF 37-16	Pheasant Run Rd	0	0	0	0	0	1	0	0	0	1	Low
OF 37-3	Azalea Dr	0	0	0	0	0	1	0	0	0	1	Low
OF 37-7	Dogwood Ln	0	0	0	0	0	1	0	0	0	1	Low
OF 37-9	Dogwood Ln	0	0	0	0	0	1	0	0	0	1	Low
OF 39-7	Drybridge Rd	0	0	0	0	0	1	0	0	0	1	Low
OF 44-2	Liberty Rd	0	0	0	0	0	1	0	0	0	1	Low
OF 44-5	Liberty Rd	0	0	0	0	0	1	0	0	0	1	Low
OF 48-7	Royal Heights Dr	0	0	0	0	0	1	0	0	0	1	Low
OF 57-1	Sherwood Dr	0	0	0	0	0	1	0	0	0	1	Low
OF 57-2	Sherwood Dr	0	0	0	0	0	1	0	0	0	1	Low
OF 57-5	Village St	0	0	0	0	0	1	0	0	0	1	Low
OF 57-6	Village St	0	0	0	0	0	1	0	0	0	1	Low
OF 58-1	Wellington St	0	0	0	0	0	1	0	0	0	1	Low
OF 58-16	Wellington St	0	0	0	0	0	1	0	0	0	1	Low

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OF 58-2	Cottage St	0	0	0	0	0	1	0	0	0	1	Low
OF 58-3	Wellington St	0	0	0	0	0	1	0	0	0	1	Low
OF 58-15	Wellington St	3	0	0	0	0	1	0	3	20	27	Problem
OF 59-1	Kings Ln	0	0	0	0	0	0	0	3	20	23	Problem
OF 59-6	Villa Dr	0	0	0	0	0	0	0	3	20	23	Problem
OF 55-8	Fisher St	3	0	0	0	0	0	0	0	0	3	Medium
OF 58-11	Cottage St	3	0	0	0	0	0	0	0	0	3	Medium
OF 27-2	Dogwood Ln	0	0	0	0	0	0	0	3	0	3	Medium
OF 31-1	Sunset Dr	0	0	0	0	0	0	0	3	0	3	Medium
OF 32-3	Main St	0	0	0	0	0	0	0	3	0	3	Medium
OF 33-5	Vernon Rd	0	0	0	0	0	0	3	0	0	3	Medium
OF 40-1	Holliston St	0	0	0	0	0	0	0	3	0	3	Medium
OF 42-2	Vernon Rd	0	0	0	0	0	0	3	0	0	3	Medium
OF 42-4	Oakview Cir	0	0	0	0	0	0	3	0	0	3	Medium
OF 48-10	Evergreen St	0	0	0	0	0	0	0	3	0	3	Medium
OF 50-3	Kenney Dr	0	0	0	0	0	0	3	0	0	3	Medium
OF 51-1	Oakland St	0	0	0	0	0	0	3	0	0	3	Medium
OF 59-11	Center St	0	0	0	0	0	0	0	3	0	3	Medium
OF 59-4	Village St	0	0	0	0	0	0	0	3	0	3	Medium
OF 60-1	Sanderson St	0	0	0	0	0	0	3	0	0	3	Medium
OF 62-1	Island Rd	0	0	0	0	0	0	3	0	0	3	Medium
OF 62-2	Candlewood Cir	0	0	0	0	0	0	3	0	0	3	Medium
OF 62-3	Pine Ridge	0	0	0	0	0	0	3	0	0	3	Medium
OF 69-2	Samoset Cir	0	0	0	0	0	0	0	3	0	3	Medium
OF 71-4	Island Rd	0	0	0	0	0	0	3	0	0	3	Medium
OF 22-17	Shamrock Ln	0	0	0	2	0	0	0	0	0	2	Medium
OF 30-5	Pond St	0	0	0	2	0	0	0	0	0	2	Medium
OF 32-1	Applegate Rd	0	0	0	2	0	0	0	0	0	2	Medium
OF 56-1	Little Tree Rd	0	0	0	2	0	0	0	0	0	2	Medium
OF 18-1	Mallard Dr	0	0	0	0	0	0	0	0	0	0	Low
OF 19-11	Newton Ln	0	0	0	0	0	0	0	0	0	0	Low
OF 19-3	Stanley Rd	0	0	0	0	0	0	0	0	0	0	Low
OF 19-9	Broad Acres Farm Rd	0	0	0	0	0	0	0	0	0	0	Low
OF 2-1	Winthrop St	0	0	0	0	0	0	0	0	0	0	Low
OF 21-1	Winthrop St	0	0	0	0	0	0	0	0	0	0	Low

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OF 21-7	Ash Ln	0	0	0	0	0	0	0	0	0	0	0	Low
OF 22-10	Field Rd	0	0	0	0	0	0	0	0	0	0	0	Low
OF 22-11	Field Rd	0	0	0	0	0	0	0	0	0	0	0	Low
OF 22-13	Redgate Dr	0	0	0	0	0	0	0	0	0	0	0	Low
OF 22-3	Fern Path	0	0	0	0	0	0	0	0	0	0	0	Low
OF 22-4	Fern Path	0	0	0	0	0	0	0	0	0	0	0	Low
OF 22-8	Field Rd	0	0	0	0	0	0	0	0	0	0	0	Low
OF 22-9	Field Rd	0	0	0	0	0	0	0	0	0	0	0	Low
OF 23-5	Cardinal Cir	0	0	0	0	0	0	0	0	0	0	0	Low
OF 27-1	Summer Hill Rd	0	0	0	0	0	0	0	0	0	0	0	Low
OF 27-5	Autumn Rd	0	0	0	0	0	0	0	0	0	0	0	Low
OF 27-6	Cedar Farms Rd	0	0	0	0	0	0	0	0	0	0	0	Low
OF 27-7	Cedar Farms Rd	0	0	0	0	0	0	0	0	0	0	0	Low
OF 28-5	Dogwood Ln	0	0	0	0	0	0	0	0	0	0	0	Low
OF 28-6	Dogwood Ln	0	0	0	0	0	0	0	0	0	0	0	Low
OF 28-8	Summer Hill Rd	0	0	0	0	0	0	0	0	0	0	0	Low
OF 30-6	Heritage Dr	0	0	0	0	0	0	0	0	0	0	0	Low
OF 30-7	Heritage Dr	0	0	0	0	0	0	0	0	0	0	0	Low
OF 30-8	Heritage Dr	0	0	0	0	0	0	0	0	0	0	0	Low
OF 30-9	Lovering St	0	0	0	0	0	0	0	0	0	0	0	Low
OF 31-3	Holliston St	0	0	0	0	0	0	0	0	0	0	0	Low
OF 31-4	Willow Crest Way	0	0	0	0	0	0	0	0	0	0	0	Low
OF 34-1	Liberty Rd	0	0	0	0	0	0	0	0	0	0	0	Low
OF 35-2	Deerfield Rd	0	0	0	0	0	0	0	0	0	0	0	Low
OF 35-4	Deerfield Rd	0	0	0	0	0	0	0	0	0	0	0	Low
OF 37-10	Hooksett Cir	0	0	0	0	0	0	0	0	0	0	0	Low
OF 37-12	Pheasant Run Rd	0	0	0	0	0	0	0	0	0	0	0	Low
OF 37-14	Pheasant Run Rd	0	0	0	0	0	0	0	0	0	0	0	Low
OF 37-5	Dogwood Ln	0	0	0	0	0	0	0	0	0	0	0	Low
OF 37-6	Dogwood Ln	0	0	0	0	0	0	0	0	0	0	0	Low
OF 39-10	Temple St	0	0	0	0	0	0	0	0	0	0	0	Low
OF 39-11	Grove St	0	0	0	0	0	0	0	0	0	0	0	Low
OF 39-12	Temple St	0	0	0	0	0	0	0	0	0	0	0	Low
OF 39-13	Temple St	0	0	0	0	0	0	0	0	0	0	0	Low
OF 39-14	Temple St	0	0	0	0	0	0	0	0	0	0	0	Low

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OF 39-15	Drybridge Rd	0	0	0	0	0	0	0	0	0	0	Low
OF 39-8	Temple St	0	0	0	0	0	0	0	0	0	0	Low
OF 39-9	Temple St	0	0	0	0	0	0	0	0	0	0	Low
OF 40-2	Holliston St	0	0	0	0	0	0	0	0	0	0	Low
OF 40-3	Holliston St	0	0	0	0	0	0	0	0	0	0	Low
OF 46-7	Kingson Ln	0	0	0	0	0	0	0	0	0	0	Low
OF 46-8	Kingson Ln	0	0	0	0	0	0	0	0	0	0	Low
OF 46-9	Kingson Ln	0	0	0	0	0	0	0	0	0	0	Low
OF 47-12	Independence Ln	0	0	0	0	0	0	0	0	0	0	Low
OF 47-13	Independence Ln	0	0	0	0	0	0	0	0	0	0	Low
OF 47-14	Independence Ln	0	0	0	0	0	0	0	0	0	0	Low
OF 47-15	Freedom Trail	0	0	0	0	0	0	0	0	0	0	Low
OF 47-8	Slocumb Pl	0	0	0	0	0	0	0	0	0	0	Low
OF 49-1	Orchard St	0	0	0	0	0	0	0	0	0	0	Low
OF 49-11	Crestview Ave	0	0	0	0	0	0	0	0	0	0	Low
OF 49-13	Crestview Ave	0	0	0	0	0	0	0	0	0	0	Low
OF 49-14	Crestview Ave	0	0	0	0	0	0	0	0	0	0	Low
OF 49-2	Orchard St	0	0	0	0	0	0	0	0	0	0	Low
OF 49-3	Henry St	0	0	0	0	0	0	0	0	0	0	Low
OF 49-4	Henry St	0	0	0	0	0	0	0	0	0	0	Low
OF 49-9	Gable Way	0	0	0	0	0	0	0	0	0	0	Low
OF 58-12	Brigham St	0	0	0	0	0	0	0	0	0	0	Low
OF 58-4	Village St	0	0	0	0	0	0	0	0	0	0	Low
OF 59-3	Dean St	0	0	0	0	0	0	0	0	0	0	Low
OF 59-8	Forest Rd	0	0	0	0	0	0	0	0	0	0	Low
OF 60-4	Lovers Ln	0	0	0	0	0	0	0	0	0	0	Low
OF 61-4	Oakland St	0	0	0	0	0	0	0	0	0	0	Low
OF 62-4	Island Rd	0	0	0	0	0	0	0	0	0	0	Low
OF 64-9	Tulip Way	0	0	0	0	0	0	0	0	0	0	Low
OF 69-1	Samoset Cir	0	0	0	0	0	0	0	0	0	0	Low
OF 69-3	Charles River Rd	0	0	0	0	0	0	0	0	0	0	Low
OF 70-3	Sanford St	0	0	0	0	0	0	0	0	0	0	Low
OF 8-2	Skyline Dr	0	0	0	0	0	0	0	0	0	0	Low

Table 5-2: Outfall Priority Ranking Summary

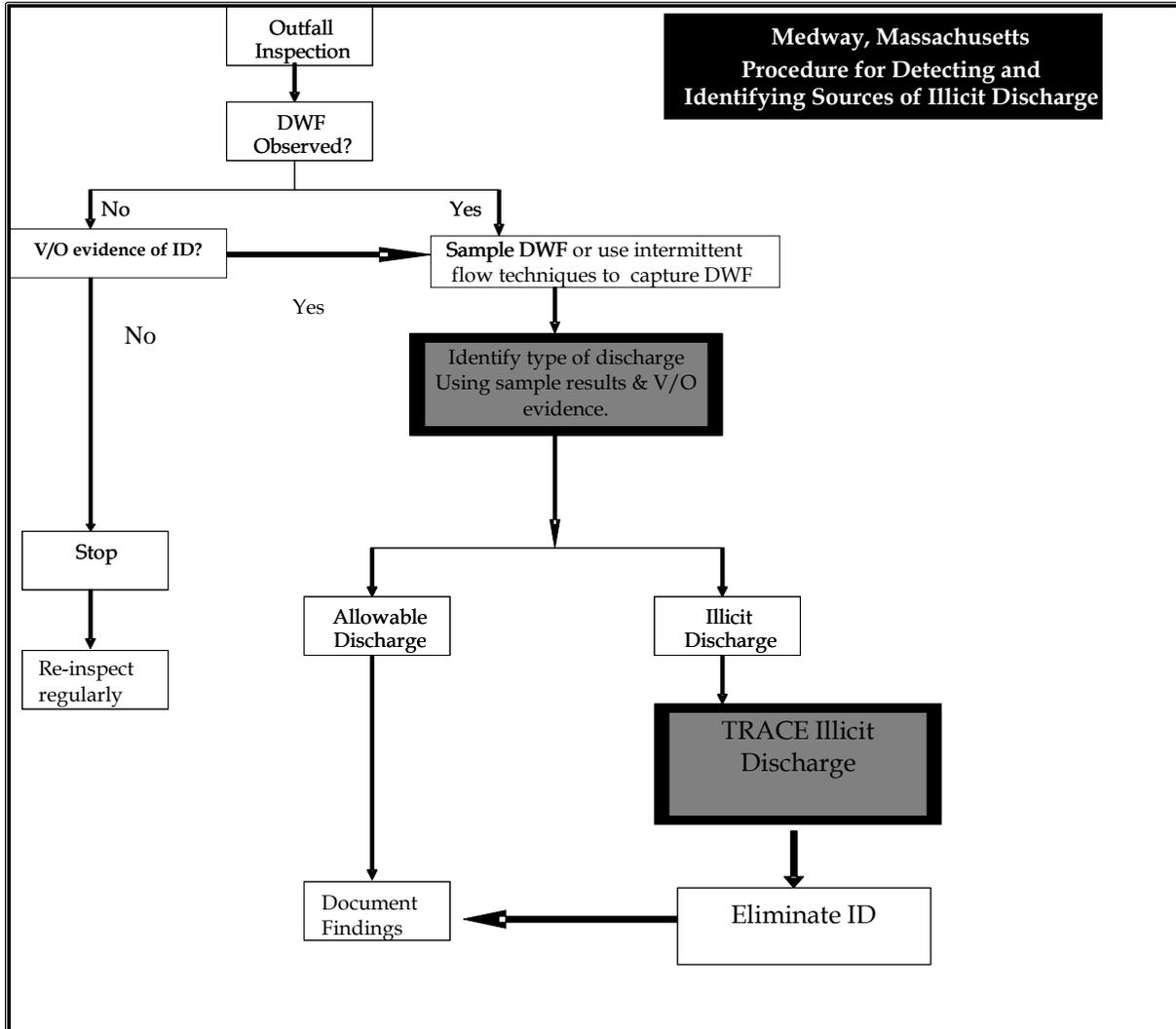
Category	Description	Score Range	Quantity
PROBLEM	Known or suspected contributions of IDs, specifically sewer input.	20 or more	7
HIGH	Direct discharge to Charles River, Chicken Brook, or Hopping Brook. Historic dry weather flow. Proximity to Groundwater Protection Zone. Density of generating sites.	9 - 19	26
MEDIUM	Sewer conversion. Surrounding septic systems. Culverted streams.	2 - 8	275
LOW	Low potential for illicit discharge / low priority for investigation.	0 - 1	99

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 outfalls) to be inspected for the presence of dry weather flow. The DPW is responsible for conducting dry weather outfall screening, starting with High Priority outfalls, followed by Medium and Low Priority Outfalls, based on the initial priority rankings described in the previous section.

The figure below shows an overview of the inspection process.

Figure 6-1: Overview Flow Chart of IDDE Procedure



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 NOAA’s Norwood Memorial Airport weather station.

6.2 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 the outfall inventory and priority ranking
2. Acquire the necessary staff, mapping, and field equipment (see **Table 6-1**)
3. Conduct the outfall inspection during dry weather:
 - a. Mark and photograph the outfall
 - b. Record the inspection information and outfall characteristics (using the Utility Cloud digital forms **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 the Utility Cloud database. Include pertinent information in the outfall/interconnection inventory and priority ranking.
7. Include all screening data in the annual report.

6.3 Field Equipment

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	Handheld 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

Equipment	Use/Notes
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 require 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

6.4 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 parameters¹ 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**).
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 (see **Appendix C**).
8. Deliver samples to R.I Analytical in Hudson, MA or Nashoba Analytical in Ayer, MA.
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

¹ 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).

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**.

Table 6-2. Sampling Parameters and Analysis Methods

Analyte or Parameter	Instrumentation (Portable Meter)	Field Test Kit
Ammonia	-	Hach™ Ammonia Test Strips
Surfactants (Detergents)	-	CHEMetrics™ K-9400
Chlorine	-	Hach™ Chlorine Test Strips
Conductivity	Oakton Multiparameter Testr 35 Series	-
Temperature	Oakton Multiparameter Testr 35 Series	-
Salinity	Oakton Multiparameter Testr 35 Series	-
Temperature	Oakton Multiparameter Testr 35 Series	-
Indicator Bacteria: <i>E. coli</i> (freshwater) or Enterococcus (saline water)	EPA certified laboratory procedure (40 CFR § 136)	-
Pollutants of Concern ¹	EPA certified laboratory procedure (40 CFR § 136)	-

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 § 136.² Samples for laboratory analysis must also be stored and preserved in accordance with procedures found in 40 CFR § 136. **Table 6-3** lists analytical methods, detection limits, hold times, and preservatives for laboratory analysis of dry weather sampling parameters.

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

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

Analyte or Parameter	Analytical Method	Detection Limit	Max. Hold Time	Preservative
Ammonia	EPA: 350.2, SM: 4500-NH3C	0.05 mg/L	28 days	Cool ≤6°C, H ₂ SO ₄ to pH <2, No preservative required if analyzed immediately
Surfactants	SM: 5540-C	0.01 mg/L	48 hours	Cool ≤6°C
Chlorine	SM: 4500-Cl G	0.02 mg/L	Analyze within 15 minutes	None Required
Temperature	SM: 2550B	NA	Immediate	None Required
Specific Conductance	EPA: 120.1, SM: 2510B	0.2 μs/cm	28 days	Cool ≤6°C
Salinity	SM: 2520	-	28 days	Cool ≤6°C
Indicator Bacteria: <i>E. coli</i> Enterococcus	<i>E. coli</i> EPA: 1603 SM: 9221B, 9221F, 9223 B Other: Colilert®, Colilert-18® <i>Enterococcus</i> EPA: 1600 SM: 9230 C Other: Enterolert®	<i>E. coli</i> EPA: 1 cfu/100mL SM: 2 MPN/100mL Other: 1 MPN/100mL <i>Enterococcus</i> EPA: 1 cfu/100mL SM: 1 MPN/100mL Other: 1 MPN/100mL	8 hours	Cool ≤10°C, 0.0008% Na ₂ S ₂ O ₃
Total Phosphorus	EPA: Manual-365.3, Automated Ascorbic acid digestion-365.1 Rev. 2, ICP/AES4-200.7 Rev. 4.4 SM: 4500-P E-F	EPA: 0.01 mg/L SM : 0.01 mg/L	28 days	Cool ≤6°C, H ₂ SO ₄ to pH <2
Total Nitrogen (Ammonia + Nitrate/Nitrite, methods are for Nitrate-Nitrite and need to be combined with Ammonia listed above.)	EPA: Cadmium reduction (automated)-353.2 Rev. 2.0, SM: 4500-NO ₃ E-F	EPA: 0.05 mg/L SM : 0.05 mg/L	28 days	Cool ≤6°C, H ₂ SO ₄ to pH <2

SM = Standard Methods

6.5 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 ³ : <i>E.coli</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

6.6 Follow-up Ranking of Outfalls and Interconnections

The Town 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 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.

³ Massachusetts Water Quality Standards: <http://www.mass.gov/eea/docs/dep/service/regulations/314cmr04.pdf>

7. CATCHMENT INVESTIGATION

The purpose of delineating outfall catchments is to define contributing areas for investigation of potential sources of illicit discharges. As such, the catchment delineations are a planning and investigation tool. They are not intended to be at the rigorous level of detail that would be used for determining the volume of stormwater contribution for sizing and designing stormwater treatment, for example.

Topographic contours were used as the governing parameter, and where available, use mapped drainage infrastructure to adjust delineations. The approach used is conservative because it includes areas that contribute overland flow, in addition to piped stormwater, towards the outfall location. In some cases, this may help identify non-point sources of pollution to receiving waters.

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 (SVFs)

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

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

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

- History of SSOs, including, but not limited to, those resulting from wet weather, high water table, or fat/oil/grease blockages;
- Common or twin-invert manholes serving storm and sanitary sewer alignments;
- Common trench construction serving both storm and sanitary sewer alignments;
- Crossings of storm and sanitary sewer alignments where the sanitary system is shallower than the storm drain system;
- Sanitary sewer alignments known or suspected to have been constructed with an underdrain system;
- Inadequate sanitary sewer level of service (LOS) resulting in regular surcharging, customer back-ups, or frequent customer complaints;
- Areas formerly served by combined sewer systems;
- Sanitary sewer infrastructure defects such as leaking service laterals, cracked, broken, or offset sanitary infrastructure, directly piped connections between storm drain and sanitary sewer infrastructure, or

other vulnerability factors identified through Inflow/Infiltration Analyses, Sanitary Sewer Evaluation Surveys, or other infrastructure investigations;

- Sewer pump/lift stations, siphons, or known sanitary sewer restrictions where power/equipment failures or blockages could readily result in SSOs;
- Any sanitary sewer and storm drain infrastructure greater than 40 years old;
- Widespread code-required septic system upgrades required at property transfers (indicative of inadequate soils, water table separation, or other physical constraints of the area rather 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 than poor owner maintenance).

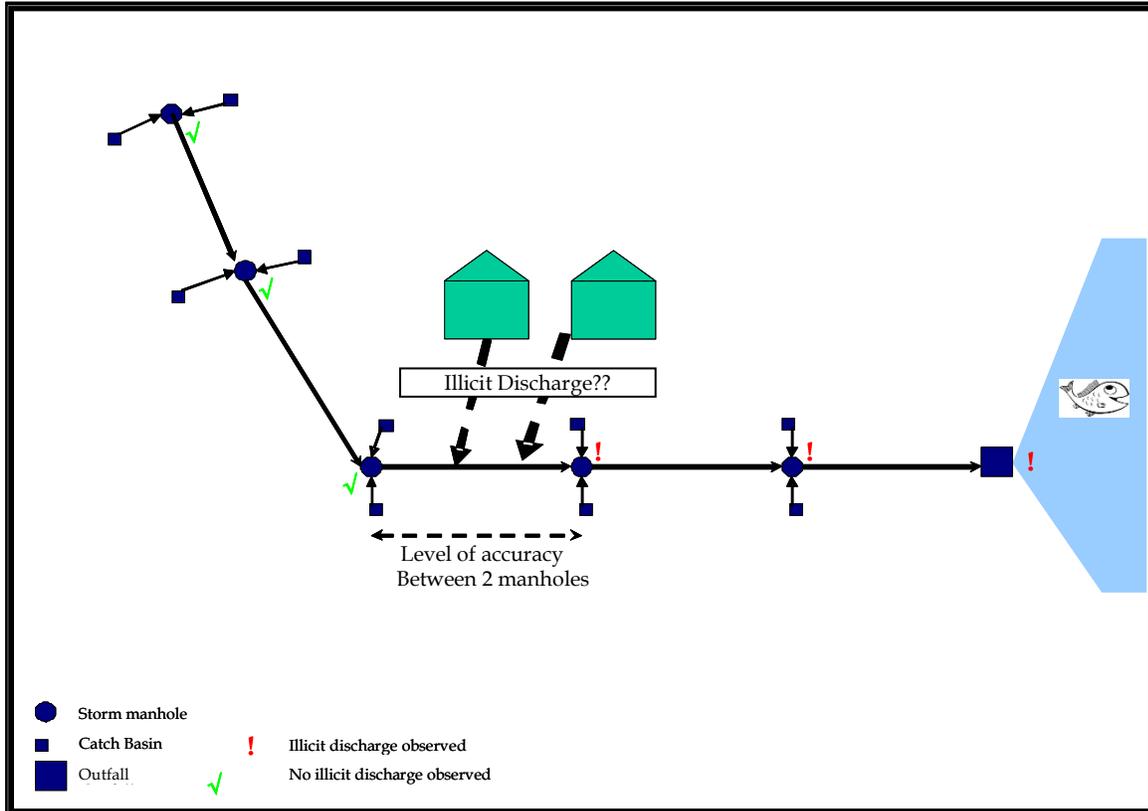
The DPW shall document the presence or absence of SVFs for each catchment, update the inventory (**Table 7-1**) based on information gathered during inspections, and report this information in Annual Reports.

Table 7-1: System Vulnerability Factors Inventory

7.2 Dry Weather Manhole Inspections

The Town of Medway 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. **Figure 7-1** illustrates the standard procedure for locating the source of an illicit discharge.

Figure 7-1: Locating Sources of Illicit Discharges



The DPW will be responsible for implementing the dry weather manhole inspection program and updating it 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, 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.

Continuously flowing illicit discharges are much easier to detect than intermittent or transitory flows. However, transitory often comprise the majority of illicit discharges. If no dry weather flow is observed, but other V/O

evidence suggests illicit discharge, the following techniques can be used for detecting intermittent or transitory flows:

- **Odd hours monitoring:** Conduct inspections of manholes / outfalls in Problem or High Risk catchments during evenings and/or weekends.
- **Optical brightener monitoring traps:** Secure an unbleached absorbent cotton pad to the invert of the pipe and leave in place for a period of time. Viewed under a black light, the pad will phosphoresce if detergents have been absorbed by the pad.
- **Caulk dams:** Using plumbers' putty or other materials, create a 2-inch (+/-) high berm to trap a portion of intermittent flow. Use a hand-pump sampler or large syringe to obtain a water sample for testing.
- **Pool sampling:** If a plunge pool exists at an outfall, use it as a water sample source (note this may provide results that are biased high, as the pool likely will contain stagnant water that has accumulated pollution).

7.3 Wet Weather Outfall Sampling

When a minimum of one (1) SVF is identified based on previous information or the investigation, a **wet weather** investigation must 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 sanitary sewers or high groundwater in areas served by septic systems result in discharges of sanitary flow to the MS4.

Wet weather outfall sampling will proceed as follows:

1. At least one wet weather sample will be collected at the outfall for the same parameters required during dry weather screening.
2. Wet weather sampling will occur during or after a storm event of sufficient depth or intensity to produce a stormwater discharge at the outfall. There is no specific rainfall amount that will trigger sampling, although minimum storm event intensities that are likely to trigger sanitary sewer interconnections are preferred. To the extent feasible, sampling should occur during the spring (March through June) when groundwater levels are relatively high.
3. If wet weather outfall sampling indicates a potential illicit discharge, then additional wet weather source sampling will be performed, as warranted, or source isolation and confirmation procedures will be followed as described in **Section 7.4**.
4. If wet weather outfall sampling does not identify evidence of illicit discharges, and no evidence of an illicit discharge is found during dry weather manhole inspections, catchment investigations will be considered complete.

7.4 Source Isolation and Confirmation

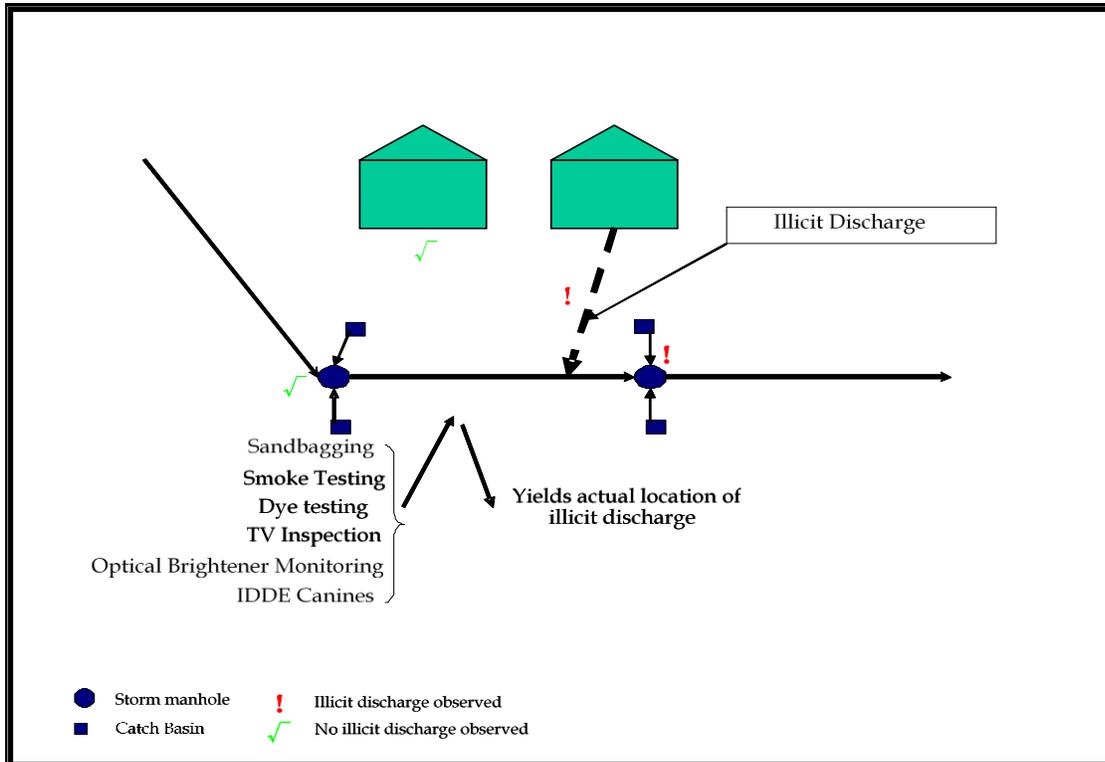
Once the source of an illicit discharge is approximated between two manholes, more detailed investigation techniques will be used to isolate and confirm the source of the illicit discharge. The following methods may be used in isolating and confirming the source of illicit discharges:

- Sandbagging
- Smoke Testing

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

These methods are described in the sections below and shown graphically in **Figure 7-2**.

Figure 7-2: Illicit Discharge Isolation and Source Confirmation Methods



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

Blowing smoke, under pressure, into an isolated section of storm sewer system that has been plugged (by sandbags, beach balls, or other types of plug) at all ends. The pressurized smoke will not be able to exit via the plugged manholes/catch basins and will therefore seek the path of least resistance to exit the system. If there

are other connections to the system, such as roof leaders or floor drains, the smoke will flow up these connections and exit the system this way. Inspector should look out for smoke coming out of roof leaders or basements for a positive test. A dye test is typically used to confirm the results of a positive smoke test.

Smoke testing is useful for determining inflow sources such as roof leaders, cellar, yard, and area drains, foundation drains, abandoned building sewers, faulty connections, illegal connections, and cross connections with the sanitary sewers. Smoke testing **REQUIRES** specific equipment (mechanical blowers etc.) and training. If it is determined that smoke testing is the most appropriate tracing method to be used, a local contractor should be contacted to undertake the work, unless the DPW has trained personnel.

Smoke testing is a multi-source method and most appropriately used when there are multiple potential sources between consecutive manholes or along a stretch of several manholes. Because of the use of smoke, coordination with the public is particularly important when undertaking smoke testing (see **Section 7.4.6**).

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.

Dye testing is a single source method - each dye test setup will confirm only one source. It is best used on a source that is strongly suspected of being connected to the system, because it is part of the only property contributing flow to a suspected portion of storm system, or because it is a high-risk property. If there are multiple properties along a suspected section of storm system, it may be more efficient to conduct smoke testing, as multiple dye tests along a single section of storm system can be time consuming and can yield confusing results.

Dye testing **does not require** specific training or equipment and can typically be undertaken by DPW employees. The dye that is used in this process is generally made of vegetable dyes and is harmless. Ultimately, dye that is introduced into the storm sewer system will flow out of the outfall and will likely cause discoloration of the water in the vicinity of the outfall.

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.

Figure 7-3: Dye Testing – positive dye test result



7.4.4 CCTV/Video Inspection

Television inspection consists of a robotic TV camera that is mounted on wheels and is placed within the suspect pipe. The camera has an odometer on it to measure distance. The camera travels down the pipe and records the pipe condition while being watched by a technician from above. The technician can adjust the focus and camera direction from up top. If an illicit discharge source is found, the technician can then stop the travel of the camera and focus in on the source. TV inspection is used to follow a trunk line to determine the location of an illicit discharge from within the pipe itself. TV inspection will also yield a measurement from the camera entry point to the illicit source, making it easier to locate the source on street level when it is time to eliminate the illicit connection. The TV inspection method will also yield the direction of the illicit connection entering the pipe (left or right of the robot), which can be very useful to determine the source of the flow.

TV inspection is most appropriately used when there are multiple potential sources between consecutive manholes or along a stretch of several manholes. The camera can pinpoint a connection and still see if there is any flow upstream of that connection telling the camera operator to continue upstream until there are no dry weather flows in the pipe. They are also useful within areas sensitive to public concern. The TV inspection method does not produce any visual effects on the water bodies, such as dye testing. TV inspection also does not produce any visual effects within the air space of a sensitive property like a nursing home or hospital, such as smoke testing. It is also useful when a property owner will not allow access to their property to confirm a suspected source of inflow. See **Section 7.4.7** for public notification details.

7.4.5 Optical Brightener Monitoring

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

7.4.6 Public Notification

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.

Smoke testing – Coordinating with the public is particularly important during smoke testing. The fire department should also be alerted to where and when smoking testing will take place, as they will likely get calls from residents who see smoke and believe there is a fire emergency. The smokes used are generally harmless but may in some cases cause aggravation to those with previously existing breathing difficulties.

Dye testing - The harmless dye ultimately makes its way to an outfall, which can cause concern to local residents. The DPW will notify the appropriate departments so that these concerns can be put to rest.

CCTV/Video Inspection - Because of the need to have access to the storm sewers and the need to park a TV inspection vehicle in the street it is necessary to coordinate all activities with the local police department. A police detail to direct traffic may be needed. Alerting local residents of these activities will also reduce the phone calls to Town departments from concerned residents.

7.5 Illicit Discharge Removal

When the specific source of an illicit discharge is identified, the DPW will exercise its authority as necessary to require its removal and immediate cessation of improper disposal practices. 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.

Where elimination within 60 days is not possible, an expeditious schedule shall be established; with enforcement action taken within 6 months of notifying responsible parties, if the ID has not been eliminated. The DPW shall diligently pursue elimination of all illicit discharge, and in the interim, shall take all reasonable and prudent measures to minimize the discharge of pollutants to and from the MS4. The period between identification and elimination of an illicit discharge is not a grace period. Discharges from an MS4 that are mixed with an illicit discharge are not authorized by the NPDES MS4 Permit (part 1.3.a) and are unlawful until eliminated.

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

Stormwater Management and Land Disturbance Bylaw

Appendix B

2020 Stormwater Base Map

Appendix C

Field Forms

- Outfall Inspection Sheet
- Catch Basin Inspection Sheet
- Interconnection Field Sheet
- Town-owned BMP sheet
- Stormwater Water Quality Testing Sheet

Sample Collection Procedures

- Chain of Custody Laboratory Form E.Coli and Phosphorus
- Chain of Custody Laboratory Form Heavy Metals and Total Petroleum

Appendix D

Ammonia testing equipment and safety data sheet

Chlorine testing equipment and safety data sheet

Detergents testing equipment and safety data sheet

pH, Conductivity, TDS, Salinity, and Temperature testing equipment and safety data

Public Notification Forms for Dye Testing and Smoke Testing

Appendix E

IDDE Training records

