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Abbreviations

BMP	Best Management Practice
CCTV	Closed Circuit Television
CT	Connecticut
CTDEEP	Connecticut Department of Energy and Environmental Protection
CWA	Clean Water Act
EPA	United States Environmental Protection Agency
IDDE	Illicit Discharge Detection and Elimination
IWQR	Integrated Water Quality Report
L	liter
mg	milligrams
MS4	Municipal Separate Storm Sewer System
NPDES	National Pollutant Discharge Elimination System
*SSO	Sanitary Sewer Overflow
*SVF	System Vulnerability Factor
TMDL	Total Maximum Daily Load
UA	Urbanized Area
UV	Ultraviolet

Section 1
Introduction

1.1 MS4 Program Background

In 1990, the United States Environmental Protection Agency (EPA) promulgated Phase I of its municipal stormwater program under the authority of the Clean Water Act (CWA). Phase I utilized National Pollutant Discharge Elimination System (NPDES) permit coverage to address stormwater runoff from large municipal separate storm sewer systems (MS4s) that served urbanized areas.

The Connecticut Department of Energy and Environmental Protection (CTDEEP) administers NPDES permitting in Connecticut, and has issued a General Permit for the Discharge of Stormwater from Small Municipal Separate Storm Sewer Systems (MS4). Most municipalities in the state are required to register for the MS4 permit since they have urbanized areas, including Monroe. The permit requires covered municipalities to develop a plan documenting the stormwater best management practices they will use to meet the six minimum control measures identified in the permit

The permit authorizes discharge of stormwater and certain non-stormwater discharges from or associated with regulated MS4s, provided that the activity is conducted in accordance with the conditions set forth in the permit.

The first MS4 General Permit became effective January 1, 2004, expiring January 1, 2009. The original permit was reissued multiple times by CTDEEP without modifications, most recently on January 1, 2016 and expiring June 30, 2017.

CTDEEP has issued a new permit, to become effective July 1, 2017 that has several significant changes from the existing permit. The Town of Monroe has submitted its plan for the new MS4 permit to CTDEEP.

1.2 IDDE Program Overview

As part of the MS4 program, participating municipalities must develop and implement an Illicit Discharge Detection and Elimination (IDDE) Program within one (1) year of the effective date of the permit for existing 2004 MS4 permittees.

The objective of the IDDE program is to systematically find and eliminate sources of non-stormwater discharges to its MS4 and implement procedures to prevent such discharges.

During the development of the IDDE program, the Town must continue to implement their existing IDDE program established under the 2004 permit, per the requirements of the updated MS4 permit.

1.2.1 Definitions of Illicit Discharges and Sanitary Sewer Overflows

The Town will prohibit illicit discharges and sanitary sewer overflows (SSOs) to its MS4 and require removal of such discharges.

Sanitary Sewer Overflow (SSO). A SSO is a discharge of untreated sanitary wastewater from a municipal sanitary sewer.

Illicit Discharge. An illicit discharge is any discharge to an MS4 that is not composed entirely of stormwater, *except*:

- Discharges authorized under a separated NPDES permit that authorizes a discharge to the MS4; or
- Non-stormwater discharges allowed by Section 3(a)(2) of the MS4 general permit, summarized below:

Allowable Non-Stormwater Discharges

- **Uncontaminated groundwater discharges, including pumped groundwater, foundation drains, water from crawl space pumps and footing drains**
- **Irrigation water, including, but not limited to, landscape irrigation and lawn watering runoff**
- **Residual street wash water associated with sweeping**
- **Discharges from firefighting activities, except training**
- **Naturally occurring discharges, such as rising groundwaters, uncontaminated groundwater infiltration, springs, diverted stream flows, and flows from riparian habitats or wetlands**

1.2.2 Illicit Discharge and Sanitary Sewer Overflow Issues

The permit is focused on improving water quality of receiving watercourses and waterbodies. Studies have shown that illicit discharges can be a significant contributor to stormwater pollution.

There are many sources of illicit discharges, intentional and unintentional in nature. Typical examples include:

- Intentional dumping of materials into catch basins
- Cross connection of sanitary sewer system to storm drainage system
- Pumping of contaminated water and/or groundwater
- Failing septic systems
- Floor drains in older buildings
- Washing machines discharging to storm drainage systems

In the aggregate, illicit discharges are a significant contributor to poor receiving water quality.

Similarly, sanitary sewer overflows, caused by capacity issues or blockages, can also contaminate receiving waters with untreated waste.

1.2.3 Timeframe for Elimination of Illicit Discharges

The following are requirements for elimination listed in Appendix B of the MS4 permit:

Eliminate illicit discharges as soon as possible. Upon detection, the permittee shall eliminate illicit discharges as soon as possible and require the immediate

cessation of such discharges upon confirmation of responsible parties in accordance with its enforceable legal authorities.

Where illicit discharge can't be eliminated within 60 days. Where elimination of an illicit discharge within sixty (60) days of its confirmation is not possible, the permittee shall establish a schedule for its elimination not to exceed 180 days. The permittee shall immediately commence actions necessary for elimination. The permittee shall diligently pursue elimination of all illicit discharges. In the interim, the permittee shall take all reasonable and prudent measures to minimize the discharge of pollutants to its MS4.

No grace period provided. 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 this general permit, are unlawful, and remain unlawful until eliminated.

1.2.4 Non-Stormwater Discharges

Sources of non-stormwater listed in Section 3(a)(2) of the MS4 general permit do not need to be addressed. However if any of these sources are identified as significant contributors of pollutants to their MS4, the Town will implement measures to control these sources so they are no longer significant contributors of pollutants, and/or eliminate them entirely through this written IDDE program.

1.3 Statement of IDDE Program Responsibilities

The lead department responsible for implementing the IDDE Program in the Town of Monroe is:

Engineering Department

Other agencies that have coordination responsibilities under this program are identified in **Table 1-1**.

Table 1-1
Additional Roles and Responsibilities for IDDE Program

Role	Department
Septic System Construction	Monroe Health Department
Sanitary Sewer Inspections	Monroe Water Pollution Control Authority
Plumbing Code Enforcement	Building Department
Town Ordinance Enforcement Action	Town Attorney

1.4 Preparation of the IDDE Plan

The IDDE program for the Town was developed by the Town's hired consulting engineer, Tighe & Bond, with input from Town staff. Actions taken as part of the IDDE Plan will be documented in the Town's Annual Report as required by the MS4 General Permit.

1.5 Water Quality

Section 305(b) of the Federal Clean Water Act (CWA) requires each State to monitor, assess and report on the quality of its waters relative to designated uses. Section 303(d) of the CWA requires each State to list waters not meeting water quality standards and prioritize those waters for Total Maximum Daily Load (TMDL) development or other management. Reporting for these waters is submitted to EPA every two years.

Table 1-2 identifies the impaired waterbodies in the Town of Monroe based on the 2016 Integrated Water Quality Report.

Table 1-2
303(d) Impaired Waterbodies in Monroe

Watercourse	Location	Miles	Surface Water Quality Class	Description
Pequonnock River	Monroe Turnpike (Route 111) crossing (near intersection Route 25) Trumbull US to Outlet unnamed impoundment (US Purdy Hill Road crossing and US Harsh Pond) Monroe	1.8 Miles	A	Impaired Designated Use: Recreation Cause: Bacteria
Lake Zoar (Monroe/ Newtown/Oxford/ Southbury)	Stevenson Dam, Oxford/Monroe, US to a line drawn between DEP Lake Zoar wildlife area boat launch on northeast shore in Southbury, across to just DS of confluence with Gelding Brook on southwest shore in Newtown (Riverside). Includes Kettletown State Park.	580.57 Acres	B	Impaired Designated Use: Recreation Cause: Bacteria
Pequonnock River	Inlet unnamed impoundment (northeastern portion of pond) US to HW Stepney pond outlet dam (just US West Maiden Lane crossing) Monroe.	2.35 Miles	A	Impaired Designated Use: Recreation Cause: Bacteria
West Branch Pequonnock River	Mouth of Pequonnock River, DS Maple Drive Crossing, on Jewish Community Center property, US to Outlet West Pequonnock Reservoir, parallel to Route 25 Monroe.	1.51 Miles	A	Impaired Designated Use: Recreation Cause: Bacteria
Key	Surface Water Quality Designation: Class A: Designated uses: potential drinking water supply; fish and wildlife habitat; recreational use; agricultural and industrial supply and other legitimate uses including navigation. Class B: Designated uses: recreational use: fish and wildlife habitat; agricultural and industrial supply and other legitimate uses including navigation.			

CTDEEP has developed Total Maximum Daily Loads (TMDL) for waters in the Town of Monroe. The TMDL identifies the capacity of a surface water to assimilate pollutants without impacting its designated uses. Please refer to **Table 1-3**.

Table 1-3
TMDL or Management Strategies Applicable to Monroe

Name of TMDL or Strategy	Pollutant	Waterbody Name	Link
Statewide Bacteria TMDL	Bacteria	Pequonnock River (CT7105-00_04, CT7105-00_05)	http://www.ct.gov/deep/lib/deep/water/tmdl/statewidebacteria/swbtmdl_corefinal.pdf
Statewide Bacteria TMDL	Bacteria	West Branch Pequonnock River (CT7105-01_01)	http://www.ct.gov/deep/lib/deep/water/tmdl/statewidebacteria/swbtmdl_corefinal.pdf
Statewide Bacteria TMDL	Bacteria	Housatonic River/Lake Housatonic (CT6000-00-5+L4_01)	http://www.ct.gov/deep/lib/deep/water/tmdl/statewidebacteria/swbtmdl_corefinal.pdf

1.6 IDDE Program Goals and Milestones

In general, the goals of the IDDE program are to detect and eliminated illicit discharges, and prevent future illicit discharges. The primary components of the program include:

- Legal authority
- Storm sewer system mapping
- Categorization and Prioritization of Catchments
- Dry Weather Screening
- Catchment Investigations
- Identification and Elimination of Illicit Discharges

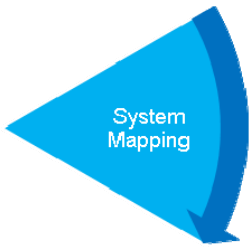
Figure 1: IDDE Program Elements

1.6.1 Legal Authority.

In order to enforce provisions of the IDDE program, the Town will review its existing legal authority to perform elements of its Written IDDE Plan. Monroe has already adopted an illicit discharge ordinance. In its Stormwater Management Plan, the Town will draft an illicit discharge ordinance and modify as needed to conform to the requirements of the MS4 General Permit.

1.6.2 Storm Sewer System Mapping.

Detailed storm sewer mapping is required to determine the extent of each outfall's catchment and to evaluate the potential for IDDE contributions. Monroe has mapped its outfalls, and is developing a full system map. In its Stormwater Management Plan, the Town will continue to build out its mapping and fill in data gaps. The Town will also begin delineation of the catchments contributing to each outfall.



1.6.3 Categorization and Prioritization of Catchments.

The Town will rank and prioritize catchments for screening based upon their potential for illicit discharge contributions. Please refer to the detailed discussion in Section 4. The categorization and prioritization process will guide the screening and investigation of the outfalls, and will be updated as information becomes available. The categorization and prioritization rankings will be reported in each year's Annual Report.

The initial categorization and prioritization must be completed by June 30, 2019, and then updated annually thereafter.

1.6.4 Dry Weather Screening

The Town will complete dry weather screening and sampling of required MS4 outfalls and interconnections no later than June 30, 2020, three years from the permit effective date. The procedure is outlined in Section 5.

Progress, including outfalls screened and results, will be included in each Annual Report.

1.6.5 Catchment Investigation Procedure Milestones

The Town will implement the Catchment Investigation Procedure in Section 5 in every catchment where required. The investigations shall begin no later than September 1, 2018, 15 months after the effective date of the permit.

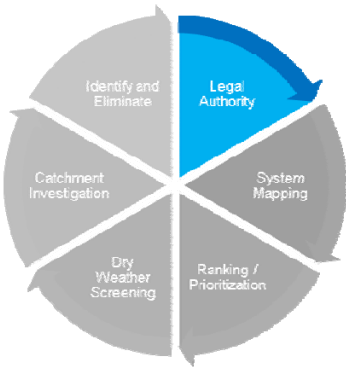
1.6.6 Identification and Elimination

Once the source of the illicit discharge has been isolated and confirmed, the Town shall take measures to eliminate the illicit discharge and perform follow-up confirmatory testing as identified in Section 7. Identified illicit discharges must be removed in accordance with the time frames established in Section 1.2.3.

Section 2
Legal Authority

2.1 Overview

The IDDE program shall provide that the permittee has adequate legal authority (a currently effective ordinance or other regulatory mechanism) to accomplish the following tasks:



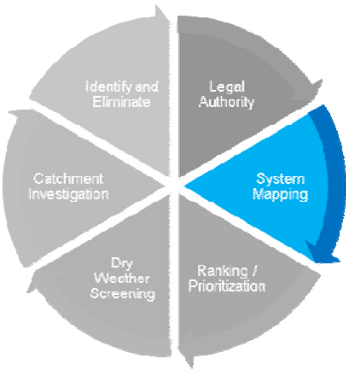
- Prohibit illicit discharges;
- Investigate suspected illicit discharges;
- Eliminate illicit discharges; and
- Implement enforcement procedures and actions.

2.2 Existing Legal Authority

The Town does not have an ordinance specifically prohibiting illicit discharges. As part of its stormwater management plan, will develop an illicit discharge ordinance within the first year of the MS4 General Permit.

Section 3
Storm Sewer System Mapping

3.1 Mapping Requirements



The mapping shall include, at a minimum, a depiction of the permittee's separate storm sewer system in the system's priority areas. "Priority areas" are defined as areas within the urbanized area, discharging to impaired waters, or having directly connected impervious area in excess of 11 percent.

The mapping is intended to facilitate the identification of key infrastructure and factors influencing proper system operation, and the potential for illicit sanitary sewer discharges. The map shall include the required infrastructure and water resources information as indicated in Section 3.1.1 below, and shall include the information in Section 3.1.2 below, where available.

3.1.1 Required Mapping Elements

- Municipal separate storm sewer system
  - outfalls and receiving waters
  - pipes
  - open channel conveyances (swales, ditches, etc.)
  - catch basins
  - manholes
  - interconnections with other MS4s and other storm sewer systems
  - municipally-owned stormwater treatment structures
    - detention and retention basins
    - infiltration systems
    - bioretention areas
    - water quality swales
    - gross particle separators
    - oil/water separators
    - other proprietary systems
- Catchment delineations for use in priority rankings
- Waterbodies identified by name and indication of all use impairments as identified on the most recent Integrated Water Quality Report pursuant to Clean Water Act section 303(d) and 305(b).

3.1.2 Elements Required Where Available

- Municipal sanitary sewer system
- Municipal combined sewer system, if applicable

3.1.3 Recommended Elements

- Storm sewer material, size and age
- Sanitary sewer system material, size and age

- Where a municipal sanitary sewer system exists, properties known or suspected to be served by a septic system, especially in high-density urban areas
- Area where the permittee's MS4 has received or could receive flow from septic system discharges (e.g. areas with poor soils, or high ground water elevations unsuitable for conventional subsurface disposal systems)
- Seasonal high-water table elevations impacting sanitary alignments
- Topography
- Orthophotography
- Alignments, dates and representation of work completed (with legend) of past illicit discharge investigations (e.g. flow isolation, dye testing, CCTV)
- Locations of suspected, confirmed and corrected illicit discharges (with dates and flow estimates)

3.2 Status of Existing Mapping

The mapping of municipal storm sewer outfalls within the Town of Monroe requires completion. The Town collected coordinate points for all its outfalls, and has partnered with Metro COG to map them.

Section 4
Categorization and Prioritization of Catchments in the MS4

4.1 Catchment Prioritization Purpose

The Town will categorize and priority rank the catchments for each outfall within the MS4 in terms of their potential to have illicit discharges and SSOs and the related public health significance. This ranking determines the priority order for screening of outfalls and interconnections (Section 4.3), and catchment investigation procedures (Section 5).

4.2 Sanitary Sewer Overflows

The first step in the categorization process is to identify sanitary sewer overflows within the MS4. SSOs result in the discharge of untreated sanitary sewer wastewaters that will contaminate receiving waters. SSOs can be caused by capacity issues, blockages, broken sanitary sewers, and other causes.

The permit requires the Town to identify by October 28, 2017, 120 days from the effective date of the permit, SSOs that have discharged to the MS4 within the five years preceding the effective permit. **Table 4-1** lists the SSOs the Town of Monroe has identified since July 1, 2012. As new SSOs are identified, they will be recorded on the table, and a copy of the table as of the end of the reporting period will be included in the Town's Annual Report.

Upon identification of an SSO, the Town shall eliminate it as soon as possible, and take measures to minimize the discharge to the MS4. In addition, EPA and CTDEEP must be provided with written notice within 24 hours of identification.

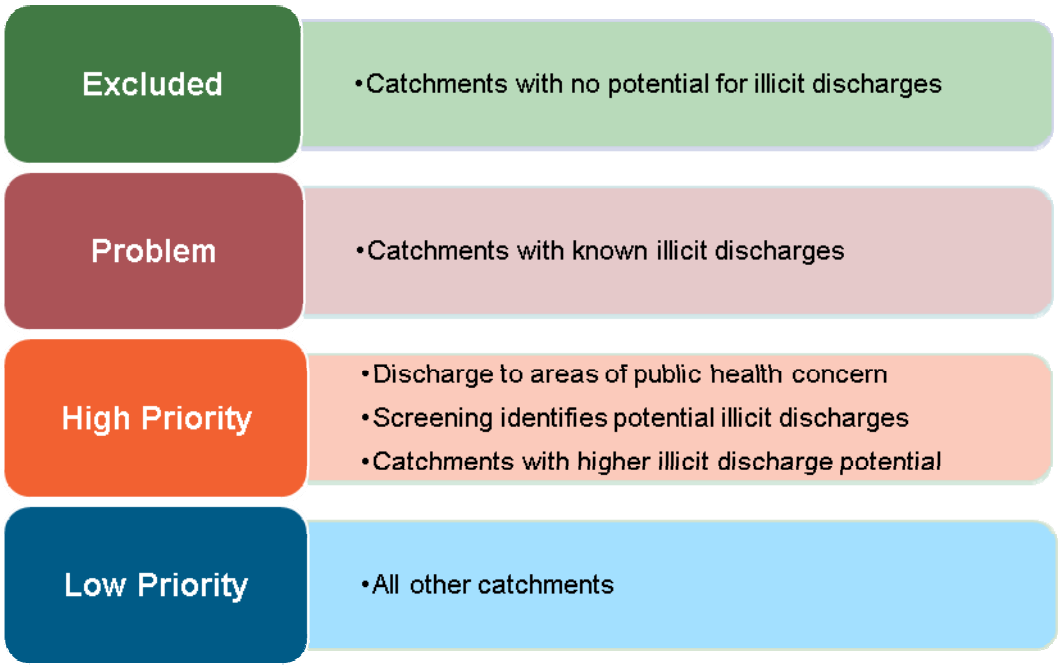
Table 4-1
Town of Monroe, SSO Inventory Since July 1, 2012

Location	Direct Discharge to MS4	Direct Discharge to Surface Water	Description	Date	Time Start & End	Estimated Volume	Mitigation Status: Corrective Actions Completed	Mitigation Status: Corrective Measures Planned
123 Sample Street	X		Overflow of 500 gallons of untreated wastewater at manhole in street due to blockage	07/01/2012	9:00 – 13:00	500 gallons	Blockage removed on 07/01/2012	

4.3 Catchment Categorization Process

The Town will delineate the catchment areas to each of its outfalls, and classify each catchment into one of the following four categories:

- Excluded
- Problem
- High Priority
- Low Priority



4.3.1 Excluded Catchments

Catchments 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.

4.3.2 Problem Catchments

Catchments with known or suspected contributions of illicit discharges based on existing information that shall be designated as Problem Catchments. This will include any catchments where previous outfall/interconnection screening indicates sewer input based on olfactory/visual evidence or sampling results:

- 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.

Problem Catchments need not be screened pursuant to Section 5 and shall be scheduled for catchment investigation pursuant to Section 6. Problem catchments were identified during the initial ranking of catchments, and subsequent rankings shall not add any catchments to the Problem Catchment category.

4.3.3 High Priority Catchments

Catchments that have not been classified as Problem Catchments 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; catchments determined by the permittee as high priority based on outfall/interconnection screening under Section 5 and the catchment characteristics assessment in Section 4.4. Any catchment where outfall/interconnection screening indicates sewer input based on olfactory/visual evidence or sampling results shall be ranked at the top of the High Priority Catchments category and scheduled for catchment investigation. The applicable sampling results are:

- 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.

4.3.4 Low Priority Catchments

Catchments determined to be low priority based on the outfall/interconnection screening and catchment characteristics assessment.

4.4 Prioritization of Catchments

Within the High Priority and Low Priority categories, the Town will then prioritize the catchments within these categories for screening based upon an evaluation of the following information for each catchment:

- **Past discharge complaints and reports.** Where past complaints and reports indicate the potential for illicit discharge connections.
- **Poor dry weather receiving water quality**, using the following criteria:
  - Water quality standards for bacteria have been exceeded;
  - Ammonia levels $\geq$ 0.5 mg/L;
  - Surfactants concentrations $\geq$ 0.25 mg/L
- **High density of generating sites**. Institutional, municipal, commercial, or industrial sites, with a historically higher potential to generate pollutants that could contribute to illicit discharges.
  - Vehicle dealers
  - Car washes
  - Service stations
  - Landscape and garden centers
  - Industrial manufacturing areas)
- **Areas with older infrastructure.** Industrial areas and/or areas where the sanitary sewer system are older than 40 years have a higher illicit discharge potential.

- **Past sewer conversions.** Catchments that formerly served by septic systems but subsequently converted to sewer connections have a higher illicit discharge potential.

- **Historic combined sewer systems.** Catchments that were once served by a combined sewer system but have since been separated have a higher illicit discharge potential.

- **Aging septic systems.** Septic systems older than 30 years are more susceptible to failure and as a result have higher illicit discharge potential.

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

- **Pollutant contributor to impaired waterbodies**. Impaired waterbodies that receive a discharge from the MS4 or waters with approved TMDLs, where illicit discharges have the potential to contain the pollutant identified as the cause of the impairment

Table 4-2 provides a matrix to develop a scoring system to assist in the prioritization of various catchments.

Table 4-2
Outfall Inventory and Priority Ranking Matrix

Outfall ID	Receiving Water	(1) Previous Screening Results Indicate Likely Sewer Input?	(2) Discharging to Area of Concern to Public Health?	Frequency of Past Discharge Complaints	(3) Receiving Water Quality	(4) Density of Generating Sites	(5) Age of Development / Infrastructure	Historic Combined Sewers of Septic	(6) Aging Septic?	(7) Culverted Streams?	Score
Information Source ►		Outfall observations and sample results	GIS Mapping	Town Staff	Impaired Waters List	Land Use / GIS Maps, Aerial Photography	Land Use Information, Visual Observations	Town Staff, GIS Maps	Land Use, Town Staff	GIS and Storm System Maps	
Scoring Criteria		Yes = 3 No = 0	Yes = 3 No = 0	Frequent = 3 Occasional = 2 None = 0	Poor = 3 Fair = 2 Good = 0	High = 3 Medium = 2 Low = 1	High = 3 Medium = 2 Low = 1	Yes = 3 No = 0	Yes = 3 No = 0	Yes = 3 No = 0	
Sample 001	Big River	3	0	2	0	2	1	0	0	3	11

(1) Yes if previous screening results indicate likely sewer input, or if any of the following apply: (a) olfactory or visual evidence of sewage, (b) Ammonia > 0.5 mg/L, surfactants > 0.25 mg/L, and bacteria levels greater than the water quality criteria applicable to the receiving water, (c) Ammonia > 0.5 mg/L, surfactants > 0/25 mg/L, and detectable levels of chlorine.
(2) Outfalls/interconnections that discharge to or in the vicinity of public beaches, recreation areas, drinking water supplies, or shellfish beds.
(3) Based on latest CTDEEP Integrated Water Quality Report. Poor = Waters with approved TMDLs, Fair = Water quality limited waterbodies, Good = No water quality impairments.
(4) Generating sites with higher illicit discharge potential include vehicle dealerships, service stations, car washes, landscape and garden centers, and manufacturing.
(5) High = Over 40 years, Medium = 20 – 40 years, Low = Less than 20 years
(6) Systems over 30 years old.
(7) Excludes simple roadway crossings.

4.4.1 Annual Report Content

The Town will provide an updated listing of all catchments and the results of the ranking for each catchment in each annual report.

4.5 Required Timeframe

The initial illicit discharge potential assessment and priority ranking based on existing information shall be completed within two (2) years from the effective date of the 2017 MS4 permit, as the Town was an existing 2004 MS4 permittee.

The categorizations and rankings will continue to be updated as additional information is obtained through the execution of the IDDE program.

Section 5 Dry Weather Screening and Sampling

5.1 Screening and Sampling Purpose

This screening procedure is to be used for screening and sampling of High Priority and Low Priority outfalls and interconnections from the MS4 in dry weather for evidence of illicit discharges and SSOs.

Dry weather observations are important to the IDDE protocol, because flow during dry weather is often an indication of potential illicit discharges.

5.2 Screening and Sampling Process

5.2.1 Dry Weather Screening / Sampling

Dry weather screening and sampling shall proceed only when no more than 0.1 inches of rainfall has occurred in the previous 24-hour period. When discharge is observed, a sample of the flow shall be collected and analyzed for the parameters listed in Section 5.2.3 below. If no dry weather flow is observed, the Town shall record the condition of the outfall and other relevant information. If no flow is observed, but evidence of dry weather flow exists, the Town shall revisit the outfall during dry weather within one (1) week of the initial observation, if practicable, to perform a second dry weather screening and sample any observed flow. The Town shall identify in the Annual Report any other necessary follow-up actions to identify the source of any apparent intermittent flow not sampled.

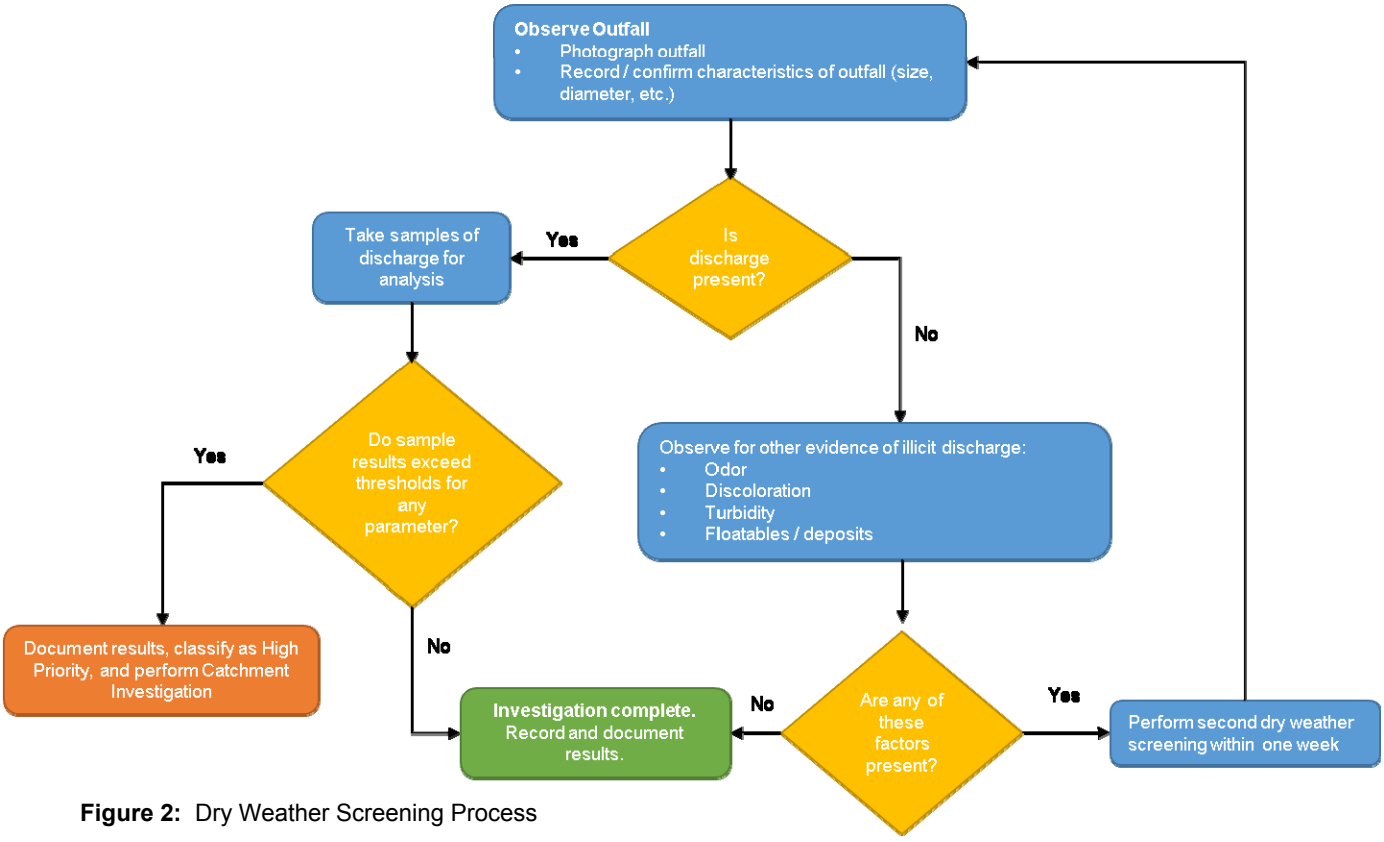


Figure 2: Dry Weather Screening Process

5.2.2 Inaccessible Outfalls

If an outfall is inaccessible or submerged, the Town shall proceed to the first accessible upstream manhole or structure for the observation and sampling and report the location with the screening results. If an interconnection is inaccessible or submerged, interconnection screening shall occur at the first accessible location within the Town's MS4 system upgradient of the interconnection.

5.2.3 Sample Analysis

Where samples are taken, they shall be analyzed for the following parameters:

- Ammonia
- Chlorine
- Conductivity
- Salinity
- *E. coli* (for freshwater receiving water)
- Surfactants (e.g. MBAS)
- Temperature
- TMDL indicator pollutant, where applicable.

Analyses can be performed with field test kits/field instrumentation, except for bacteriological analyses, which must be conducted by a laboratory.

Field test kits or field instrumentation are permitted for all parameters except indicator bacteria and any pollutants of concern. The typical sampling process is outlined below:

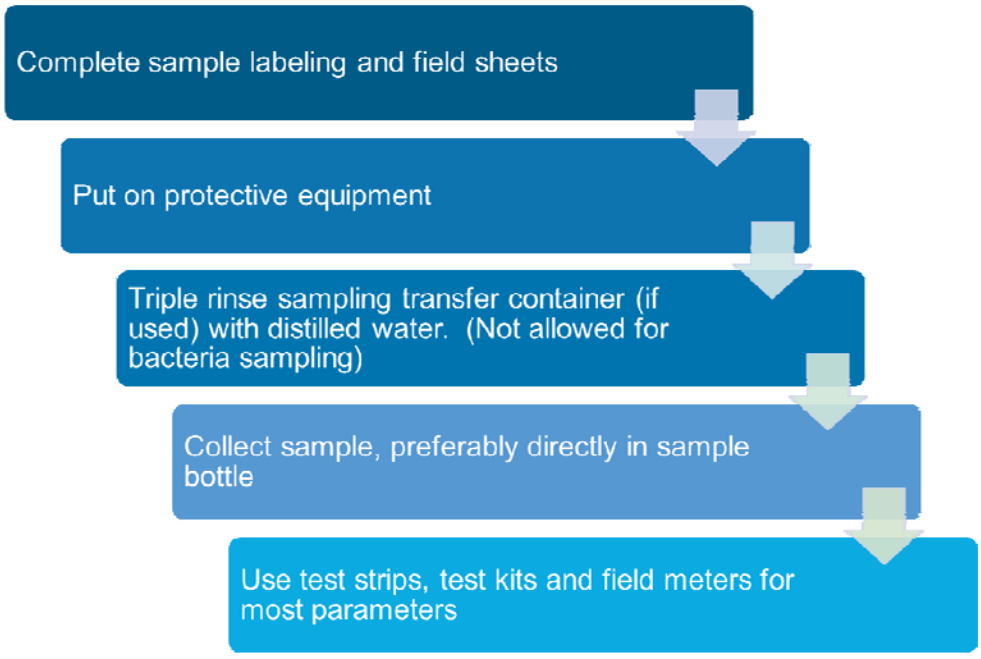


Table 5-1 lists various field test kits and field instruments that can be used for outfall sampling associated with the MS4 General Permit parameters, other than indicator bacteria and any pollutants of concern.

Table 5-1
Field Test Kit Matrix

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

Testing for indicator bacteria and any pollutants of concern must be conducted using analytical methods and procedures found in 40 CFR § 136. Samples for laboratory analysis must also be stored and preserved in accordance with procedures found in 40 CFR § 136. **Table 5-2** lists analytical methods, detection limits, hold times, and preservatives for laboratory analysis of dry weather sampling parameters.

Table 5-2
Sample Analytical Method, Detection Limit, Hold Time and Preservatives

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

5.2.4 Field Equipment and Supplies

Table 5-3 indicates field equipment that may be necessary in order to carry out the dry weather screening tasks.

Table 5-3
Dry Weather Screening Field Equipment and Supplies

Equipment/ Supplies	Purpose
Clipboard	For organization of field sheets and writing surface
Field Sheets	To record observation data
Laboratory 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 Meter and Reagents	Hand held meter, if available, for testing for various water quality parameters such as ammonia, surfactants and chlorine, conductivity, temperature, pH
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	For accessing hard to reach outfalls and manholes

5.3 Interpretation of Results

Where samples exceed the benchmarks in Table 5-4, likely indicate the potential for illicit discharges, and as a result, the outfall should be moved to the list of Problem Catchments and be scheduled for investigation.

Table 5-4
Sampling Benchmarks

Parameter	Benchmark
Ammonia	> 0.5 mg/L
Surfactants	> 0.25 mg/L
Bacteria	In excess of receiving waterbody limits
Chlorine	> 0.02 mg/L (Above detectable limits established by the MS4 General Permit)

Based upon the results of the screening, the categorization and prioritization results will be adjusted accordingly and documented in the Annual Report. Where illicit discharges are suspected based on the screening results, those catchments shall be moved to the High Priority category, with the highest prioritization given to those catchments with suspected sewer inputs.

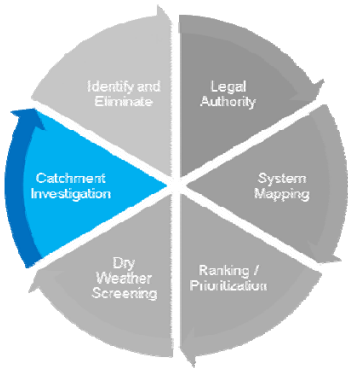
5.4 Required Timeframe

Dry weather outfall screening and sampling is to begin no later than September 1, 2018, which is 15 months from the effective date of the permit,

Section 6
Catchment Investigation Procedure

6.1 Catchment Investigation Purpose

Where Stormwater catchments with evidence of potential illicit discharges have been identified, the catchment investigation procedure is to be employed to isolate the source of the potential discharge. There is a desktop review and field investigation component for the Catchment Investigation process. The investigation procedure and results must be documented for inclusion in the Annual Report.



6.2 Desktop Review – System Vulnerability Factors

6.2.1 Review Mapping, Plans, Records for Catchments

For each catchment being investigated, the Town will review relevant mapping and historic plans and records to the extent available, including but not limited to plans related to the construction of the storm drain and of sanitary sewers in the catchment, prior work performed on the storm drain or sanitary sewers, local health official or other municipal data on septic system failures or required upgrades, and complain records related to SSOs, sanitary sewer surcharges, and septic system breakouts.

6.2.2 System Vulnerability Factors

This review shall be used to identify areas within the catchment with higher potential for illicit connections and System Vulnerability Factors (SVFs) that indicate a risk of sanitary or septic system inputs to the MS4 under wet weather conditions.

The Town will consult with local or state health officials during the review process.

The following SVFs will be evaluated and recorded by the Town:

- History of SSOs, including, but not limited to, those resulting from wet weather, high water table, or fat/oil/grease blockages;
- Sewer pump/lift stations, siphons, or known sanitary sewer restrictions where power/equipment failures or blockages could readily result in SSOs;
- Inadequate sanitary sewer level of service (LOS) resulting in regular surcharging, customer back-ups, or frequent customer complaints;
- 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;
- Sanitary sewer alignments known or suspected to have been constructed with an underdrain system;
- 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;

- Areas formerly served by combined sewer systems;
- Any sanitary sewer and storm drain infrastructure greater than 40 years old in medium and densely developed areas;
- Widespread code-required septic system upgrades required at property transfers
- (indicative of inadequate soils, water table separation, or other physical constraints of the area rather that poor owner maintenance);
- History of multiple local health department or sanitarian 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.

Table 6-1
System Vulnerability Factor Inventory

Outfall ID	Receiving Water	(1) History of SSOs	(2) Common or Twin Invert Manholes	(3) Common Trench Construction	(4) Storm/Sanitary Crossings (Sanitary Above)	(5) Sanitary Lines with Underdrains	(6) Inadequate Sanitary Level of Service	(7) Areas Formerly Served by Combined Sewers	(8) Sanitary Infrastructure Defects	(9) SSO Potential In Event of System Failures	(1)0 Sanitary and Storm Drain Infrastructure >40 years Old	(11) Septic with Poor Soils or Water Table Separation	(12) History of BOH Actions Addressing Septic Failure

1. History of SSOs, including, but not limited to, those resulting from wet weather, high water table, or fat/oil/grease blockages
2. Common or twin-invert manholes serving storm and sanitary sewer alignments
3. Common trench construction serving both storm and sanitary sewer alignments
4. Crossings of storm and sanitary sewer alignments where the sanitary system is shallower than the storm drain system
5. Sanitary sewer alignments known or suspected to have been constructed with an underdrain system
6. Inadequate sanitary sewer level of service (LOS) resulting in regular surcharging, customer back-ups, or frequent customer complaints
7. Areas formerly served by combined sewer systems
8. Sanitary sewer infrastructure defects such as leaking service laterals, cracked, broken, or offset sanitary infrastructure, directly piped connections between storm drain and sanitary sewer infrastructure, or other vulnerability factors identified through Inflow/Infiltration Analyses, Sanitary Sewer Evaluation Surveys, or other infrastructure investigations
9. Sewer pump/lift stations, siphons, or known sanitary sewer restrictions where power/equipment failures or blockages could readily result in SSOs
10. Any sanitary sewer and storm drain infrastructure greater than 40 years old
11. Widespread code-required septic system upgrades required at property transfers (indicative of inadequate soils, water table separation, or other physical constraints of the area rather that poor owner maintenance)
12. History of multiple Board of Health actions addressing widespread septic system failures (indicative of inadequate soils, water table separation, or other physical constraints of the area rather that poor owner maintenance)

The Town shall document the SVFs for each catchment subject to the catchment investigation procedure, and include the data in its Annual Report.

6.3 Manhole Inspection Methodology

Where additional investigation is required by screening, the Town shall work its way up the storm drainage system of the catchment in an attempt to isolate the source of the illicit discharge. These manhole investigations shall be done in dry weather. If one or more SVFs are present, the investigation shall also occur during wet weather events.

6.3.1 Terms and Definitions

The following terms are referenced in the Manhole Inspection Methodology and are defined as follows:

6.3.1.1 Junction Manhole

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 for these purposes.

6.3.1.2 Key Junction Manholes

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.

6.3.2 Dry Weather Investigation

Key junction manholes will be opened and inspected for visual and olfactory evidence of illicit connections (e.g. excrement, toilet paper, gray filamentous bacterial growth, or sanitary products present). If flow is observed, the Town will sample the flow at a minimum for ammonia, chlorine, and surfactants and will use field kits or a laboratory for these analyses.

Additional indicator sampling may assist in determining potential sources (e.g. bacteria for sanitary flows, conductivity to detect tidal backwater, etc.). 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 investigation, through upstream junction manhole investigation and/or isolation and confirmation of sources.

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

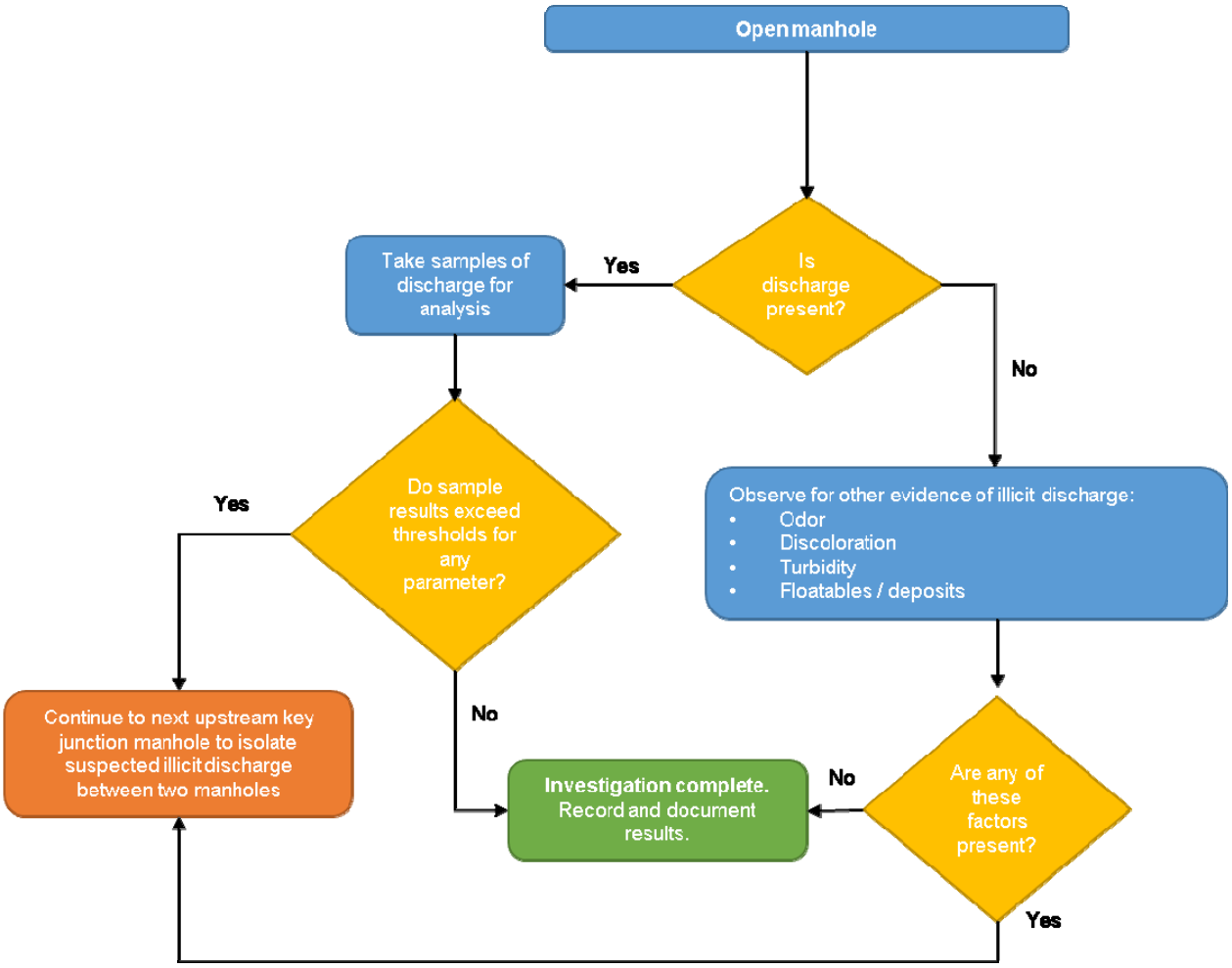


Figure 3. Dry weather manhole investigation process

6.3.3 Wet Weather Investigation

Where the review of mapping and historic plans and records and/or manhole inspections indicate the presence of one or more SVFs, the Town will also inspect and sample 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.

The wet weather investigation can be done upon completion of any dry weather investigation but must be completed before catchment investigation is marked as complete. All data will be recorded and reported in each Annual Report.

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.

A sample shall be taken of the discharge at the outfall, sampling for the same parameters as the dry weather screening. Should the results indicate that the parameters are all less

than the benchmarks for follow-up testing, the investigation shall be considered complete. Otherwise, work upstream to attempt to isolate the source of the suspected illicit discharge.

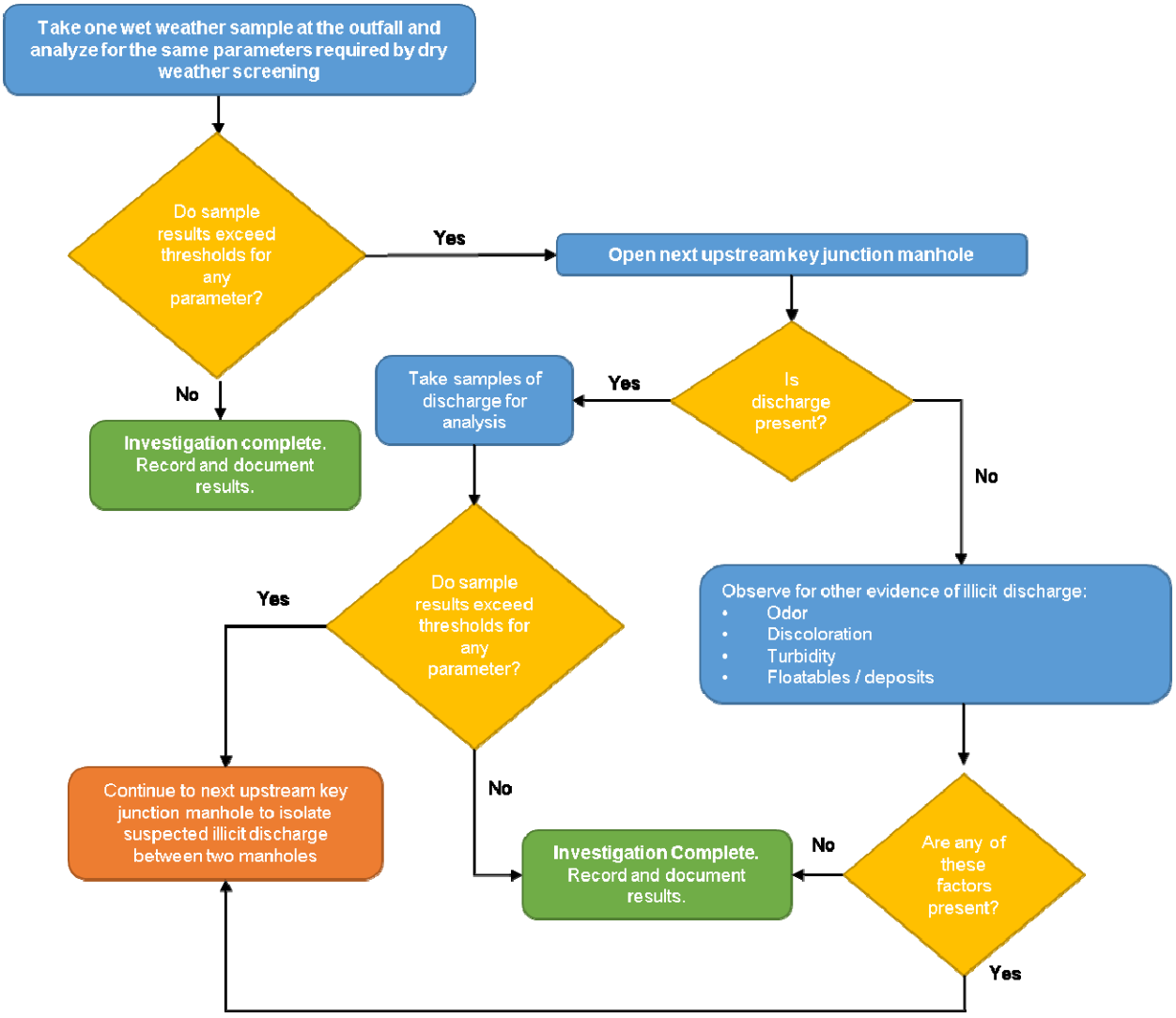


Figure 4: Wet weather manhole investigation process

6.4 Required Timeframe

- The Town shall complete the Catchment Investigation Procedure in a minimum of 80% of the MS4 area served by Problem Catchments by June 30, 2020, within three (3) years of the permit effective date and 100% of Problem Catchments by June 30, 2022, within five years of the permit effective date.

- The Town shall complete the Catchment Investigation Procedure in every catchment of the MS4 where information indicates sewer input including outfall/interconnection screening that indicates sewer input based on olfactory/visual evidence or sampling results (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) by June 30, 2022, within five (5) years of the permit effective date.

- The Town shall complete the Catchment Investigation Procedure in 40%of the area served by all MS4 catchments by June 30, 2022, within five (5) years of the permit effective date, and in 100% of the area served by all MS4 catchments by June 30, 2027, within ten (10) years of the permit effective date. The permittee may count the area of low priority catchments only if the Catchment Investigation has been started in all other MS4 catchments. For the purposed of this section, catchment investigations that have been started include those where provisions of the Catchment Investigation Procedure have been completed.

Section 7
Identification and Elimination

7.1 Source Isolation Procedures

When the source of a suspected illicit discharge can be confined between two manholes, more detailed investigation methodologies shall be used to isolate the source of the illicit discharge.

The more detailed methodologies may include one or more of the following:

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

It is important to note that public notification is an important aspect of these investigations, particularly where such methods are visible to the public. Prior to smoke testing, dye testing, or TV inspections, the Town shall notify property owners in the affected area.

7.1.1 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.

7.1.2 Smoke Testing

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

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

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

7.1.3 Dye Testing

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

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

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

7.1.4 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.

7.1.5 Optical Brightener Monitoring

Optical brighteners are fluorescent dyes that are used in detergents and paper products to enhance their appearance. The presence of optical brighteners in surface waters or dry weather discharges suggests there is a possible illicit discharge or insufficient removal through adsorption in nearby septic systems or wastewater treatment. Optical brightener monitoring can be done in two ways. The most common, and least expensive, methodology involves placing a cotton pad in a wire cage and securing it in a pipe, manhole, catch basin, or inlet to capture intermittent dry weather flows. The pad is retrieved at a later date and placed under UV light to determine the presence/absence of brighteners during the monitoring period. A second methodology uses handheld fluorometers to detect optical brighteners in water 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.

7.1.6 IDDE Canines

Dogs specifically trained to smell human related sewage are becoming a cost-effective way to isolate and identify sources of illicit discharges. While not widespread at the moment, the use of IDDE canines is growing as is their accuracy. The use of IDDE canines is not recommended as a standalone practice for source identification; rather it is recommended as a tool to supplement other conventional methods, such as dye testing, in order to fully verify sources of illicit discharges.

7.2 Removal and Confirmation

When the source of an illicit discharge or SSO is identified and confirmed, the Town will exercise its authority as necessary (see Section 2: Legal Authority) to require its removal.

7.2.1 Reporting Requirements

For each confirmed source the permittee shall include in the Annual Report the following information:

- Location of the discharge and its source(s);
- Description of the discharge;
- Method of discovery;
- Date of discovery;
- Date of elimination;
- Mitigation or enforcement action taken; and
- Estimate of the Volume of Flow Removed.

7.2.2 Confirmatory Screening

Within one year of removal of all identified illicit discharge and SSO sources within a catchment area, confirmatory outfall or interconnection screening will be conducted by the Town. The confirmatory screening will be conducted in dry weather unless SVFs have been identified in the catchment, in which case both dry weather and wet weather confirmatory screening shall be conducted. If confirmatory screening indicates evidence of additional illicit discharges, the catchment shall be scheduled for additional investigation.

Confirmatory screening is not required in catchments where no illicit discharges or system vulnerability factors have been identified and no previous screening indicated suspicious flows.

7.3 Follow-Up Screening Process

Upon completion of the catchment investigation and illicit discharge removal and confirmation, if necessary. the catchment outfall or interconnection will be scheduled for follow-up screening within five years.

The Town may elect to conduct follow-up screening sooner based on the catchment's illicit discharge priority.

Follow-up screening will consist of dry weather screening and sampling; wet weather screening and sampling will also be required in catchments where wet weather screening is required due to SVFs.

Section 8
Training

8.1 Training Purpose

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. The frequency and type of training will be included in the annual report.