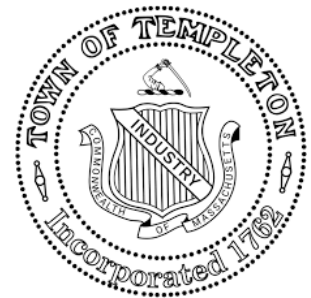


# Illicit Discharge Detection and Elimination (IDDE) Plan

Town of Templeton, MA

December 4, 2019



# Table of Contents

## Illicit Discharge Detection and Elimination Plan Town of Templeton

---

1	Introduction.....	1
1.1	MS4 Program.....	1
1.2	Illicit Discharges .....	1
1.3	Allowable Non-Stormwater Discharges.....	2
1.4	Receiving Waters and Impairments.....	3
1.5	IDDE Program Goals, Framework, and Timeline.....	3
1.6	Work Completed to Date.....	6
2	Authority and Statement of IDDE Responsibilities .....	7
2.1	Legal Authority.....	7
2.2	Statement of Responsibilities.....	7
3	Stormwater System Mapping .....	8
3.1	Phase I Mapping .....	8
3.2	Phase II Mapping.....	8
3.3	Additional Recommended Mapping Elements .....	9
4	Sanitary Sewer Overflows (SSOs) .....	10
5	Assessment and Priority Ranking of Outfalls .....	12
5.1	Outfall Catchment Delineations .....	12
5.2	Outfall and Interconnection Inventory and Initial Ranking.....	12
6	Dry Weather Outfall Screening and Sampling .....	15
6.1	Weather Conditions.....	15
6.2	Dry Weather Screening/Sampling Procedure.....	15
6.2.1	General Procedure.....	15
6.2.2	Field Equipment.....	16
6.2.3	Sample Collection and Analysis.....	17
6.3	Interpreting Outfall Sampling Results.....	20
6.4	Follow-up Ranking of Outfalls and Interconnections .....	21
7	Catchment Investigations.....	21
7.1	System Vulnerability Factors.....	22
7.2	Dry Weather Manhole Inspections .....	25
7.3	Wet Weather Outfall Sampling.....	26
7.4	Source Isolation and Confirmation .....	27
7.4.1	Sandbagging.....	27
7.4.2	Smoke Testing.....	28

7.4.3	Dye Testing.....	28
7.4.4	CCTV/Video Inspection.....	28
7.4.5	Optical Brightener Monitoring.....	29
7.4.6	IDDE Canines.....	29
7.5	Illicit Discharge Removal.....	29
7.5.1	Confirmatory Outfall Screening.....	29
7.6	Ongoing Screening.....	30
<b>8</b>	<b>Training .....</b>	<b>31</b>
<b>9</b>	<b>Progress Reporting .....</b>	<b>31</b>

## Tables

Table 1-1.	Impaired Waters.....	3
Table 1-2.	IDDE Program Implementation Timeline.....	5
Table 2-1.	IDDE Program Responsibilities.....	7
Table 4-1.	SSO Inventory.....	11
Table 6-1.	Field Equipment – Dry Weather Outfall Screening and Sampling.....	16
Table 6-2.	Sampling Parameters and Analysis Methods.....	18
Table 7-1.	Outfall Catchment System Vulnerability Factor (SVF) Inventory.....	24

## Figures

Figure 1-1.	IDDE Investigation Procedure Framework.....	4
-------------	---	---

## Appendices

Appendix A – Legal Authority (IDDE Bylaw or Ordinance)
Appendix B – Storm System Mapping
Appendix C – Outfall Ranking
Appendix D – Field Forms, Sample Bottle Labels, and Chain of Custody Forms
Appendix E – Outfall Sampling Standard Operating Procedure
Appendix F – Source Isolation and Confirmation Methods: Instructions, Manuals, and SOPs
Appendix G – IDDE Employee Training Record

# 1 Introduction

---

## 1.1 MS4 Program

This Illicit Discharge Detection and Elimination (IDDE) Plan has been developed by the Town of Templeton to address the requirements of the United States Environmental Protection Agency's (USEPA's) 2016 National Pollutant Discharge Elimination System (NPDES) General Permit for Stormwater Discharges from Small Municipal Separate Storm Sewer Systems (MS4) in Massachusetts, hereafter referred to as the "2016 Massachusetts MS4 Permit" or "MS4 Permit."

The 2016 Massachusetts MS4 Permit requires that each permittee, or regulated community, address six Minimum Control Measures. These measures include the following:

1. Public Education and Outreach
2. Public Involvement and Participation
3. Illicit Discharge Detection and Elimination Program
4. Construction Site Stormwater Runoff Control
5. Stormwater Management in New Development and Redevelopment (Post Construction Stormwater Management); and
6. Good Housekeeping and Pollution Prevention for Permittee Owned Operations.

Under Minimum Control Measure 3, the permittee is required to implement an IDDE program to systematically find and eliminate sources of non-stormwater discharges to its municipal separate storm sewer system and implement procedures to prevent such discharges. The IDDE program must also be recorded in a written (hardcopy or electronic) document. This IDDE Plan has been prepared to address this requirement.

---

## 1.2 Illicit Discharges

An "illicit discharge" is any discharge to a drainage system that is not composed entirely of stormwater, with the exception of discharges pursuant to a NPDES permit (other than the NPDES permit for discharges from the MS4) and discharges resulting from fire-fighting activities.

Illicit discharges may take a variety of forms and can enter the drainage system through direct or indirect connections. Direct connections may be relatively obvious, such as cross-connections of sewer services to the storm drain system. Indirect connections may be more difficult to detect or address, such as failing septic systems that discharge untreated sewage to a ditch within the MS4, or a sump pump that discharges contaminated water on an intermittent basis.

Some illicit discharges are intentional, such as dumping used oil (or other pollutant) into catch basins, a resident or contractor illegally tapping a new sewer lateral into a storm drain pipe to avoid the costs of a sewer connection fee and service, and illegal dumping of yard wastes into surface waters. Some illicit discharges are related to the unsuitability of original infrastructure to the modern regulatory environment. Examples of illicit discharges in this category include connected floor drains in old buildings, as well as sanitary sewer overflows that enter the drainage system. Sump pumps legally

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

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

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

---

### 1.3 Allowable Non-Stormwater Discharges

The following categories of non-storm water discharges are allowed under the Town's illicit discharge by-law; provided that the source is not a significant contributor or a pollutant to the municipal storm drain system and that any discharge to the public storm drain conforms to the standards set forth in the DEP-administered regulations:

- Municipal water line flushing
- Discharge from landscape or agricultural irrigation or lawn watering
- Water from individual residential car washing and temporary fund-raising car washes
- Discharge from dechlorinated swimming pool water
- Nonemergency fire-fighting activities
- Discharge from street sweeping
- Non-stormwater discharge permitted under a NPDES permit or a surface water discharge permit, waiver, or waste discharge order
- Rising groundwater
- Natural flow from riparian habitats and wetlands
- Water from exterior foundation drains, footing drains (not including active groundwater dewatering systems), crawl space pumps, or air conditioning condensation
- Uncontaminated groundwater infiltration, or uncontaminated pumped groundwater
- Flow from potable water sources
- Springs

The following categories of non-storm water discharges are allowed under the Town's illicit discharge by-law; provided that the source is not a significant contributor or a pollutant to the municipal storm drain system:

- Diverted streamflow
- Dye testing
- Uncontaminated groundwater discharge from a sump pump
- Discharge for which advanced written approval is received from the appropriate authorities, as necessary to protect public health, safety, welfare or the environment of Templeton

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

---

## 1.4 Receiving Waters and Impairments

Table 1-1 lists the “impaired waters” within the boundaries of the Town of Templeton’s regulated area based on the 2014 Massachusetts Integrated List of Waters produced by MassDEP every two years. Impaired waters are water bodies that do not meet water quality standards for one or more designated use(s) such as recreation or aquatic habitat.

Table 1-1. Impaired Waters  
Templeton, Massachusetts

Water Body Name	Segment ID	Category	Impairment(s)	Associated Approved TMDL <sup>1</sup>
Depot Pond	MA35018	4C	Aquatic Plants (Macrophytes)	4124
Otter River	MA35-08	5	PCB in Fish Tissue	N/A
Greenwood Pond	MA35026	4C	Aquatic Plants (Macrophytes)	4127

Category 4C Waters – water bodies where the impairment is not caused by a pollutant

Category 5 Waters – impaired water bodies that require a total maximum daily load (TMDL).

<sup>1</sup> “Approved TMDLs” are those that have been approved by EPA as of the date of issuance of the 2016 MS4 Permit. The Final Massachusetts Year 2016 Integrated List of Waters changed the listing of Depot Pond and Greenwood Pond from 4A, TMDL completed, to 4C, non-pollutant impairment.

In addition to the impairments listed in Table 1-1, Templeton is also subject to the Phosphorus TMDL for Selected Millers Basin Lakes and the Long Island Sound Nitrogen TMDL. Additional TMDL and impairment permit requirements are listed in Appendix F and Appendix H of the MS4 permit, respectively. The Town is also required to sample outfalls within the regulated area that directly discharge to impaired waters or waters subject to a TMDL according to the guidance in Appendix G of the MS4 permit. Massachusetts’ 2016 Integrated List of Waters delisted all impairments requiring additional monitoring under Appendix G of the MS4 permit.

---

## 1.5 IDDE Program Goals, Framework, and Timeline

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

- Legal authority and regulatory mechanism to prohibit illicit discharges and enforce this prohibition
- Storm system mapping

- Inventory and ranking of outfalls
- Dry weather outfall screening
- Catchment investigations
- Identification/confirmation of illicit sources
- Illicit discharge removal
- Follow-up screening
- Employee training.

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

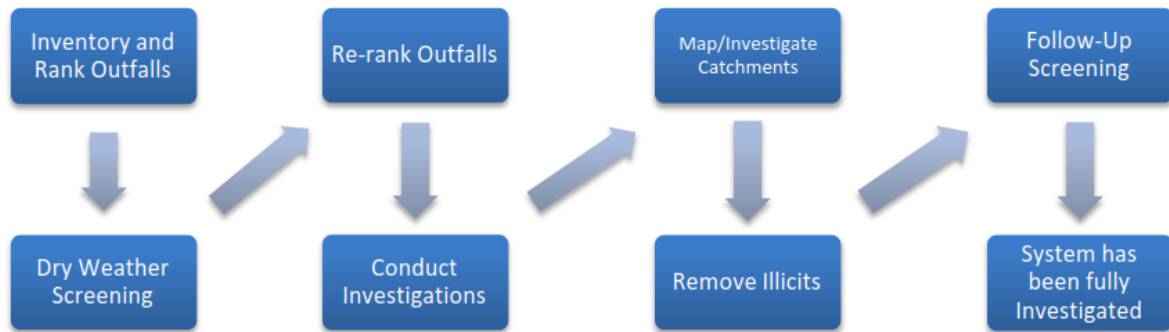


Figure 1-1. IDDE Investigation Procedure Framework

Table 1-2. IDDE Program Implementation Timeline

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



---

## 1.6 Work Completed to Date

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

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

- Developed a map of outfalls and receiving waters
- Adopted an IDDE bylaw or regulatory mechanism
- Developed procedures for removal of the source of an illicit discharge

In addition to the 2003 MS4 Permit requirements, other IDDE-related activities that are planned to achieve compliance with the 2016 MS4 permit include:

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

## 2 Authority and Statement of IDDE Responsibilities

### 2.1 Legal Authority

The Town of Templeton has adopted a Storm Drain Bylaw. A copy of the Storm Drain Bylaw is provided in Appendix A. The Storm Drain Bylaw provides the Town of Templeton with legal authority to:

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

The Town of Templeton will review its current Storm Drain Bylaw and related land use regulations and policies for consistency with the 2016 MS4 Permit.

### 2.2 Statement of Responsibilities

The Board of Selectmen is the lead municipal agency or department responsible for implementing the IDDE program pursuant to the provisions of the Storm Drain Bylaw. Table 2-1 outlines specific roles and responsibilities for the Town's IDDE program.

Table 2-1. IDDE Program Responsibilities

Responsible Department/Staff	IDDE Program Element
Sewer Department	<ul style="list-style-type: none"> <li>• Maintain SSO inventory and tracking</li> </ul>
Department of Public Works	<ul style="list-style-type: none"> <li>• Maintain and update the written IDDE plan</li> <li>• Ensure staff receives IDDE training</li> <li>• Coordinate outfall ranking, screening, and sampling</li> </ul>
Planning Board	<ul style="list-style-type: none"> <li>• Update stormwater system mapping as required</li> </ul>
Building Department	<ul style="list-style-type: none"> <li>• Implement and/or coordinate catchment investigations in accordance with permit requirements</li> </ul>

## 3 Stormwater System Mapping

The Town of Templeton 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 Planning Board is responsible for updating the stormwater system mapping pursuant to the 2016 MS4 Permit. The Town of Templeton will report on the progress towards completion of the storm system map in each annual report. Updates to the stormwater mapping will be included in Appendix B.

---

### 3.1 Phase I Mapping

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

- Outfalls and receiving waters (previously required by the MS4-2003 permit)
- Open channel conveyances (swales, ditches, etc.)
- Interconnections with other MS4s and other storm sewer systems
- Municipally owned stormwater treatment structures
- Water bodies identified by name and indication of all use impairments as identified on the most recent EPA approved Massachusetts Integrated List of Waters report
- Initial catchment delineations. Topographic contours and drainage system information may be used to produce initial catchment delineations.

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

- Outfalls and receiving waters (previously required by the MS4-2003 permit)

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

---

### 3.2 Phase II Mapping

Phase II mapping must be completed within ten (10) years of the effective date of the permit (July 1, 2028) and include the following information:

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

- Refined catchment delineations. Catchment delineations must be updated to reflect information collected during catchment investigations.
- Municipal Sanitary Sewer system (if available)

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

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

The Town of Templeton will update its stormwater mapping by July 1, 2027 to include the remaining following Phase II information.

---

### 3.3 Additional Recommended Mapping Elements

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

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

## 4 Sanitary Sewer Overflows (SSOs)

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

The Town of Templeton Sewer Department has completed an inventory of SSOs that have discharged to the MS4 within the five (5) years prior to the effective date of the 2016 MS4 Permit, based on review of available documentation pertaining to SSOs (Table 4-1). The inventory includes all SSOs that occurred during wet or dry weather resulting from inadequate conveyance capacities or where interconnectivity of the storm and sanitary sewer infrastructure allows for transfer of flow between systems. There have been no SSOs in the five years prior to the effective date of the permit.

Upon detection of an SSO, the Town of Templeton will eliminate it as expeditiously as possible and take interim measures to minimize the discharge of pollutants to and from its MS4 until the SSO is eliminated. Upon becoming aware of an SSO to the MS4, the Town of Templeton will provide oral notice to EPA within 24 hours and written notice to EPA and MassDEP within five (5) days of becoming aware of the SSO occurrence.

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



## 5 Assessment and Priority Ranking of Outfalls

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

---

### 5.1 Outfall Catchment Delineations

A catchment is the area that drains to an individual outfall<sup>2</sup> or interconnection.<sup>3</sup> The catchments for each of the MS4 outfalls will be delineated to define contributing areas for investigation of potential sources of illicit discharges. Catchments are typically delineated based on topographic contours and mapped drainage infrastructure, where available. As described in Section 3, initial catchment delineations will be completed as part of the Phase I mapping, and refined catchment delineations will be completed as part of the Phase II mapping to reflect information collected during catchment investigations

---

### 5.2 Outfall and Interconnection Inventory and Initial Ranking

The Department of Public Works will complete an initial outfall and interconnection inventory and priority ranking to assess illicit discharge potential based on existing information. The initial inventory and ranking will be completed within two (2) years from the effective date of the permit. An updated inventory and ranking will be provided in each annual report thereafter. The inventory will be updated annually to include data collected in connection with dry weather screening and other relevant inspections.

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

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

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

---

<sup>2</sup> Outfall means a point source as defined by 40 CFR § 122.2 as the point where the municipal separate storm sewer discharges to waters of the United States. An outfall does not include open conveyances connecting two municipal separate storm sewers or pipes, tunnels or other conveyances that connect segments of the same stream or other waters of the United States and that are used to convey waters of the United States. Culverts longer than a simple road crossing shall be included in the inventory unless the permittee can confirm that they are free of any connections and simply convey waters of the United States.

<sup>3</sup> Interconnection means the point (excluding sheet flow over impervious surfaces) where the permittee's MS4 discharges to another MS4 or other storm sewer system, through which the discharge is conveyed to waters of the United States or to another storm sewer system and eventually to a water of the United States.

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

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

2. High Priority Outfalls: Outfalls/interconnections that have not been classified as Problem Outfalls and that are:
  - Discharging to an area of concern to public health due to proximity of public beaches, recreational areas, drinking water supplies or shellfish beds
  - Determined by the permittee as high priority based on the characteristics listed below or other available information.
3. Low Priority Outfalls: Outfalls/interconnections determined by the permittee as low priority based on the characteristics listed below or other available information.
4. Excluded outfalls: Outfalls/interconnections with no potential for illicit discharges may be excluded from the IDDE program. This category is limited to roadway drainage in undeveloped areas with no dwellings and no sanitary sewers; drainage for athletic fields, parks or undeveloped green space and associated parking without services; cross-country drainage alignments (that neither cross nor are in proximity to sanitary sewer alignments) through undeveloped land.

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

- Previous screening results – previous screening/sampling results indicate likely sewer input (see criteria above for Problem Outfalls).
- Past discharge complaints and reports.
- Poor receiving water quality – the following guidelines are recommended to identify waters as having a high illicit discharge potential:
  - Exceeding water quality standards for bacteria
  - Ammonia levels above 0.5 mg/l
  - Surfactants levels greater than or equal to 0.25 mg/l
- Density of generating sites – Generating sites are those places, including institutional, municipal, commercial, or industrial sites, with a potential to generate pollutants that could contribute to illicit discharges. Examples of these sites include, but are not limited to, car dealers; car washes; gas stations; garden centers; and industrial manufacturing areas.



- Age of development and infrastructure – Industrial areas greater than 40 years old and areas where the sanitary sewer system is more than 40 years old will probably have a high illicit discharge potential. Developments 20 years or younger will probably have a low illicit discharge potential.
- Sewer conversion – Contributing catchment areas that were once serviced by septic systems, but have been converted to sewer connections may have a high illicit discharge potential.
- Surrounding density of aging septic systems – Septic systems thirty years or older in residential land use areas are prone to have failures and may have a high illicit discharge potential.
- Culverted streams – Any river or stream that is culverted for distances greater than a simple roadway crossing may have a high illicit discharge potential.
- Water quality limited waterbodies that receive a discharge from the MS4 or waters with approved TMDLs applicable to the permittee, where illicit discharges have the potential to contain the pollutant identified as the cause of the water quality impairment.

A copy of the initial outfall ranking is provided in Appendix C.

## 6 Dry Weather Outfall Screening and Sampling

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

---

### 6.1 Weather Conditions

Dry weather outfall screening and sampling may occur when no more than 0.1 inches of rainfall has occurred in the previous 24-hour period and no significant snow melt is occurring. For purposes of determining dry weather conditions, program staff will use precipitation data from Orange Municipal Airport (KORE). If Orange Municipal Airport (KORE) is not available or not reporting current weather data, then Fitchburg Municipal Airport (KFIT) will be used as a back-up.

---

### 6.2 Dry Weather Screening/Sampling Procedure

#### 6.2.1 General Procedure

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

1. Identify outfall(s) to be screened/sampled based on initial outfall inventory and priority ranking
2. Acquire the necessary staff, mapping, and field equipment (see Table 6-1 for list of potential field equipment)
3. Conduct the outfall inspection during dry weather:
  - a. Mark and photograph the outfall
  - b. Record the inspection information and outfall characteristics (using paper forms or digital form using a tablet or similar device) (see form in Appendix D.)
  - c. Look for and record visual/olfactory evidence of pollutants in flowing outfalls including odor, color, turbidity, and floatable matter (suds, bubbles, excrement, toilet paper or sanitary products). Also observe outfalls for deposits and stains, vegetation, and damage to outfall structures.
4. If flow is observed, sample and test the flow following the procedures described in the following sections.
5. If no flow is observed, but evidence of illicit flow exists (illicit discharges are often intermittent or transitory), revisit the outfall during dry weather within one week of the initial observation, if practicable, to perform a second dry weather screening and sample any observed flow. Other techniques can be used to detect intermittent or transitory flows including conducting inspections during evenings or weekends and using optical brighteners.
6. Input results from screening and sampling into spreadsheet/database. Include pertinent information in the outfall/interconnection inventory and priority ranking.
7. Include all screening data in the annual report.

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

## 6.2.2 Field Equipment

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

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

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

### 6.2.3 Sample Collection and Analysis

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

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

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

Table 6-2. Sampling Parameters and Analysis Methods

Analyte or Parameter	Instrumentation (Portable Meter)	Field Test Kit
Ammonia	CHEMetrics™ V-2000 Photometer Hach™ DR900 Multiparameter Colorimeter Hach™ DR300 Pocket Colorimeter	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 Photometer, K-2513 Hach™ DR900 Multiparameter Colorimeter Hach™ DR300 Pocket Colorimeter	NA
Conductivity	CHEMetrics™ CTS Testr™ I-1400 YSI Pro30 YSI EC300A Oakton 450	NA
Temperature	YSI Pro30 YSI EC300A Oakton 450	NA
Salinity	YSI Pro30 YSI EC300A Oakton 450	NA
Temperature	YSI Pro30 YSI EC300A Oakton 450	NA
Indicator Bacteria: <i>E. coli</i>	EPA certified laboratory procedure (40 CFR § 136)	NA
Pollutants of Concern <sup>1</sup>	EPA certified laboratory procedure (40 CFR § 136)	NA

<sup>1</sup> Where the discharge is directly into a water quality limited water or a water subject to an approved TMDL, the sample must be analyzed for the pollutant(s) of concern identified as the cause of the water quality impairment, as listed in Appendix G of the MS4 permit.

Testing for indicator bacteria and any pollutants of concern must be conducted using analytical methods and procedures found in 40 CFR § 136.<sup>4</sup> The pollutants of concern and that are applicable to Templeton's regulated area and the associated monitoring requirements according to Appendix G of the MS4 permit are listed in Table 6-3.

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

Table 6-3. Pollutants of Concern Monitoring Requirements for the Town of Templeton.

Water Body Name	Segment ID	Category	Impairment(s) or applicable TMDL	Monitoring Parameter
Depot Pond and tributaries	MA35018	4C	Aquatic Plants (Macrophytes)	No Monitoring Required (NMR)
			Lake and Pond Phosphorus TMDL <sup>1</sup>	Total Phosphorus
Greenwood Pond and tributaries	MA35026	4C	Aquatic Plants (Macrophytes)	No Monitoring Required (NMR)
			Lake and Pond Phosphorus TMDL <sup>1</sup>	Total Phosphorus
Otter River	MA35-08	5	PCB in Fish Tissue	NMR
All waterbodies within the regulated area	N/A	N/A	Long Island Sound Nitrogen TMDL	Total Nitrogen

<sup>1</sup> The MS4 Permit specifies that the Town is not relieved of its additional requirements relating to TMDL-impaired waterbodies, until: “[t]he applicable TMDL has been modified, revised or withdrawn and EPA has approved a new TMDL applicable for the receiving water that indicates that no additional stormwater controls for the control of phosphorus are necessary for the permittee’s discharge based on wasteload allocations in the newly approved TMDL”. Based on this new information and the permit language above, the Town will continue to comply with the requirements specified in Appendix F.II of the permit, until such time as a new TMDL is approved.

Samples for laboratory analysis must also be stored and preserved in accordance with procedures found in 40 CFR § 136<sup>5</sup>. Table 6-4 lists analytical methods, detection limits, hold times, and preservatives for laboratory analysis of dry weather sampling parameters.

<sup>5</sup> 40 CFR § 136: <http://www.ecfr.gov/cgi-bin/text-idx?SID=b3b41fdea0b7b0b8cd6c4304d86271b7&mc=true&node=pt40.25.136&rgn=div5>

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

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 <sub>2</sub> SO <sub>4</sub> to pH <2, No preservative required if analyzed immediately
Surfactants	SM: 5540-C	0.01 mg/L	48 hours	Cool ≤6°C
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 <sub>2</sub> S <sub>2</sub> O <sub>3</sub>
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 <sub>2</sub> SO <sub>4</sub> to pH <2
Total Nitrogen (Ammonia + Nitrate/Nitrite, methods are for Nitrate-Nitrite and need to be combined with Ammonia listed above.)	EPA: Cadmium reduction (automated)-353.2 Rev. 2.0, SM: 4500-NO <sub>3</sub> E-F	EPA: 0.05 mg/L SM : 0.05 mg/L	28 days	Cool ≤6°C, H <sub>2</sub> SO <sub>4</sub> to pH <2

SM = Standard Methods

### 6.3 Interpreting Outfall Sampling Results

Outfall analytical data from dry weather sampling can be used to help identify the major type or source of discharge. Table 6-5 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 6-5. 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 <sup>6</sup> : <i>E.coli</i> <i>Enterococcus</i>	<i>E.coli</i> : the geometric mean of the five most recent samples taken during the same bathing season shall not exceed 126 colonies per 100 ml and no single sample taken during the bathing season shall exceed 235 colonies per 100 ml  <i>Enterococcus</i> : the geometric mean of the five most recent samples taken during the same bathing season shall not exceed 33 colonies per 100 ml and no single sample taken during the bathing season shall exceed 61 colonies per 100 ml

## 6.4 Follow-up Ranking of Outfalls and Interconnections

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

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

## 7 Catchment Investigations

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

<sup>6</sup> Massachusetts Water Quality Standards: <http://www.mass.gov/eea/docs/dep/service/regulations/314cmr04.pdf>



potential illicit discharges. All data collected as part of the catchment investigations will be recorded and reported in each annual report.

---

## 7.1 System Vulnerability Factors

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

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

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

- History of SSOs, including, but not limited to, those resulting from wet weather, high water table, or fat/oil/grease blockages
- Common or twin-invert manholes serving storm and sanitary sewer alignments
- Common trench construction serving both storm and sanitary sewer alignments
- Crossings of storm and sanitary sewer alignments where the sanitary system is shallower than the storm drain system
- Sanitary sewer alignments known or suspected to have been constructed with an underdrain system
- Inadequate sanitary sewer level of service (LOS) resulting in regular surcharging, customer back-ups, or frequent customer complaints
- 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

The following SVFs are recommended in the MS4 permit:

- 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).

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

Table 7-1. Outfall Catchment System Vulnerability Factor (SVF) Inventory  
 Town of Templeton, Massachusetts  
 Revision Date:

Outfall ID	Receiving Water	1 History of SSOs	2 Common or Twin Invert Manholes	3 Common Trench Construction	4 Storm/Sanitary Crossings (Sanitary Above)	5 Sanitary Lines with Underdrains	6 Inadequate Sanitary Level of Service	7 Areas Formerly Served by Combined Sewers	8 Sanitary Infrastructure Defects	9 SSO Potential In Event of System Failures	10 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
Sample 1	XYZ River	Yes/No	Yes/No	Yes/No	Yes/No	Yes/No	Yes/No	Yes/No	Yes/No	Yes/No	Yes/No	Yes/No	Yes/No

Presence/Absence Evaluation Criteria:

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

---

## 7.2 Dry Weather Manhole Inspections

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

The Department of Public Works will be responsible for implementing the dry weather manhole inspection program. 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 D.
2. If flow is observed, a sample will be collected and analyzed at a minimum for ammonia, chlorine, and surfactants. Field kits can be used for these analyses. Sampling and analysis will be in accordance with procedures outlined in Section 6. Additional indicator sampling may assist in determining potential sources (e.g., bacteria for sanitary flows, conductivity to detect tidal backwater, etc.).
3. Where sampling results or visual or olfactory evidence indicate potential illicit discharges or SSOs, the area draining to the junction manhole will be flagged for further upstream manhole investigation and/or isolation and confirmation of sources.
4. Subsequent key junction manhole inspections will proceed until the location of suspected illicit discharges or SSOs can be isolated to a pipe segment between two manholes.
5. If no evidence of an illicit discharge is found, catchment investigations will be considered complete upon completion of key junction manhole sampling.

---

### 7.3 Wet Weather Outfall Sampling

Where a minimum of one (1) System Vulnerability Factor (SVF) is identified based on previous information or the catchment investigation, a wet weather investigation must also be conducted at the associated outfall. The Department of Public Works 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. Instructions and Standard Operating Procedures (SOPs) for these and other IDDE methods are provided in Appendix F.

Public notification is an important aspect of a detailed source investigation program. Prior to smoke testing, dye testing, or TV inspections, the Department of Public Works will notify property owners in the affected area. Smoke testing notification may include robocalls, hanging notifications, or email for single family homes, businesses and building lobbies for multi-family dwellings.

### 7.4.1 Sandbagging

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

## 7.4.2 Smoke Testing

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

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

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

## 7.4.3 Dye Testing

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

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

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

## 7.4.4 CCTV/Video Inspection

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

## 7.4.5 Optical Brightener Monitoring

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

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

---

## 7.5 Illicit Discharge Removal

When the specific source of an illicit discharge is identified, the Board of Selectmen will exercise its authority as necessary to require its removal. The annual report will include the status of IDDE investigation and removal activities including the following information for each confirmed source:

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

### 7.5.1 Confirmatory Outfall Screening

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



---

## 7.6 Ongoing Screening

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

## 8 Training

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

## 9 Progress Reporting

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

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

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

## Appendix A

---

### Legal Authority (IDDE Bylaw)

## **Chapter 230**

### **STORM DRAINS**

#### **GENERAL REFERENCES**

**Stormwater management — See Ch. 235.**

**Subdivision of land — See Ch. 310.**

---

#### **§ 230-1. Purpose and objectives.**

- A. The purpose of this bylaw is to regulate illicit connections and discharges to the storm drain system, which is necessary for the protection of Templeton water bodies and groundwater, and to safeguard the public health, safety, welfare and the environment. This bylaw is a requirement of the federal National Pollutant Discharge Elimination System Stormwater General Permit issued to the Town of Templeton.
- B. The objectives of this bylaw are:
- (1) To prevent pollutants from entering the Templeton municipal separate storm sewer system (MS4);
  - (2) To prohibit illicit connections and unauthorized discharges to the MS4;
  - (3) To require the removal of all such illicit connections;
  - (4) To comply with state and federal statutes and regulations relating to stormwater discharges;
  - (5) To establish the legal authority to ensure compliance with the provisions of this bylaw through inspection, monitoring, and enforcement; and
  - (6) To prevent contamination of drinking water supplies.

#### **§ 230-2. Definitions.**

As used in this bylaw, the following terms shall have the meanings indicated:

**AUTHORIZED ENFORCEMENT AGENCY** — The Templeton Board of Selectmen (Board), its employees or agents designated to enforce this bylaw.

**BEST MANAGEMENT PRACTICE (BMP)** — An activity, procedure, restraint, or structural improvement that helps to reduce the quantity or improve the quality of stormwater runoff.

**CLEAN WATER ACT** — The Federal Water Pollution Control Act (33 U.S.C. § 1251 et seq.), as hereafter amended.

**DISCHARGE OF POLLUTANTS** — The addition from any source of any pollutant or combination of pollutants into the municipal storm drain system or into the waters of the United States or commonwealth from any source.

**GROUNDWATER** — Water beneath the surface of the ground.

**ILLEGAL DISCHARGE** — Any direct or indirect non-stormwater discharge to the municipal storm drain system, except as exempted in § 230-8. The

term does not include a discharge in compliance with an NPDES stormwater discharge permit or a surface water discharge permit, pursuant to § 230-8 of this bylaw or resulting from emergency fire-fighting activities.

**ILLCIT CONNECTION** — Any surface or subsurface drain or conveyance which allows an illegal discharge into the municipal storm drain system, including without limitation sewage, process wastewater, or wash water and any connections from indoor drains, sinks, or toilets, regardless of whether said connection was previously allowed, permitted, or approved before the effective date of this bylaw

**IMPERVIOUS SURFACE** — Any material or structure on or above the ground that prevents water infiltrating the underlying soil.

**MUNICIPAL SEPARATE STORM SEWER SYSTEM (MS4) or MUNICIPAL STORM DRAIN SYSTEM** — The system of conveyances designed or used for collecting or conveying stormwater, including any road with a drainage system, street, gutter, curb, inlet, piped storm drain, pumping facility, retention or detention basin, man-made or altered drainage channel, reservoir, and other drainage structure that together comprise the storm drainage system owned or operated by the Town of Templeton.

**NATIONAL POLLUTANT DISCHARGE ELIMINATION SYSTEM (NPDES) STORMWATER DISCHARGE PERMIT** — A permit issued by United States Environmental Protection Agency or jointly with the state that authorizes the discharge of pollutants to waters of the United States.

**NON-STORMWATER DISCHARGE** — Discharge to the municipal storm drain system not composed entirely of stormwater.

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

**POLLUTANT** — Any element or property of sewage, agricultural, industrial or commercial waste, runoff, leachate, heated effluent, or other matter, whether originating at a point or nonpoint source, that is or may be introduced into any stormwater or drain system or waters of the commonwealth. Pollutants shall include, without limitation:

- A. Paints, varnishes, and solvents;
- B. Oil and other automotive fluids;
- C. Nonhazardous liquid and solid wastes and yard wastes;
- D. Refuse, rubbish, garbage, litter, or other discarded or abandoned objects, ordnances, accumulations and floatables;
- E. Pesticides, herbicides, and fertilizers;
- F. Hazardous materials and wastes; sewage, fecal coliform and pathogens;

- G. Dissolved and particulate metals;
- H. Animal wastes;
- I. Rock, sand, salt, soils;
- J. Construction wastes and residues; and
- K. Noxious or offensive matter of any kind.

PROCESS WASTEWATER — Water which, during manufacturing or processing, comes into direct contact with or results from the production or use of any material, intermediate product, finished product, or waste product.

RECHARGE — The process by which groundwater is replenished by precipitation through the percolation of runoff and surface water through the soil.

STORMWATER — Runoff from precipitation and snowmelt.

SURFACE WATER DISCHARGE PERMIT — A permit issued by the Department of Environmental Protection (DEP) pursuant to 314 CMR 3.00 that authorizes the discharge of pollutants to waters of the Commonwealth of Massachusetts.

TOXIC OR HAZARDOUS MATERIAL OR WASTE — Any material which, because of its quantity, concentration, chemical, corrosive, flammable, reactive, toxic, infectious or radioactive characteristics, either separately or in combination with any substance or substances, constitutes a present or potential threat to human health, safety, welfare, or to the environment. Toxic or hazardous materials include any synthetic organic chemical, petroleum product, heavy metal, radioactive or infectious waste, acid and alkali, and any substance defined as toxic or hazardous under MGL c. 21C and MGL c. 21E, and the regulations at 310 CMR 30.000 and 310 CMR 40.0000.

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, by-product or waste product.

WATERCOURSE — A natural or man-made channel through which water flows or a stream of water, including a river, brook, or underground stream.

WATERS OF THE COMMONWEALTH — All waters within the jurisdiction of the commonwealth, including, without limitation, rivers, streams, lakes, ponds, springs, impoundments, estuaries, wetlands, coastal waters, and groundwater.

### **§ 230-3. Applicability.**

This bylaw shall apply to flows entering the municipal storm drainage system in the Town of Templeton.

**§ 230-4. Authority.**

This bylaw is adopted under the authority granted by the Home Rule Amendment of the Massachusetts Constitution and the Home Rule Procedures Act and MGL c. 83, § 1 and § 10, as amended by St. 2004, c. 149, Subsections 135 through 140, and pursuant to the regulations of the federal Clean Water Act found at 40 CFR 122.34.

**§ 230-5. Responsibility for administration.**

The Board shall administer, implement and enforce this bylaw. Any powers granted to, or duties imposed upon, the Board may be delegated in writing by the Board to employees or agents of the Board.

**§ 230-6. Regulations.**

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

**§ 230-7. Prohibited activities.**

- A. Illegal discharges. No person shall dump, discharge, cause or allow to be discharged any pollutant or non-stormwater discharge into the municipal separate storm sewer system (MS4), into a watercourse, or into the waters of the commonwealth.
- B. Illicit connections. No person shall construct, use, allow, maintain or continue any illicit connection to the municipal storm drain system, regardless of whether the connection was permissible under applicable law, regulation or custom at the time of connection.
- C. Obstruction of municipal storm drain system. No person shall obstruct or interfere with the normal flow of stormwater into or out of the municipal storm drain system without prior written approval from the Board.

**§ 230-8. Exemptions. [Amended 5-17-2010]**

- A. The following non-stormwater discharges or flows are exempt from the prohibition of non-stormwaters, provided that the source is not a significant contributor of a pollutant to the municipal storm drain system and that any discharges to the public storm drain shall conform to the standards set forth in the DEP-administered regulations: 314 CMR 9.00 (401 Water Quality Certification), 314 CMR 3.00 (Surface Water Discharge Permit Program), 314 CMR 4.00 (Surface Water Quality Standards), and 314 CMR 5.00 (Groundwater Discharge Permit Program), as currently in effect:
  - (1) Municipal water line flushing.
  - (2) Discharge from landscape or agricultural irrigation or lawn watering.
  - (3) Water from individual residential car washing and temporary fund-raising car washes.
  - (4) Discharge from dechlorinated swimming pool water (less than one ppm chlorine), provided the water is allowed to stand for one week

prior to draining and the pool is drained in such a way as not to cause a nuisance.

- (5) Nonemergency fire-fighting activities.
  - (6) Discharge from street sweeping.
  - (7) Non-stormwater discharge permitted under an NPDES permit or a surface water discharge permit, waiver, or waste discharge order administered under the authority of the United States Environmental Protection Agency or the Department of Environmental Protection, provided that the discharge is in full compliance with the requirements of the permit, waiver, or order and applicable laws and regulations.
  - (8) Rising groundwater.
  - (9) Natural flow from riparian habitats and wetlands.
  - (10) Water from exterior foundation drains, footing drains (not including active groundwater dewatering systems), crawl space pumps, or air conditioning condensation.
  - (11) Uncontaminated groundwater infiltration as defined in 40 CFR 35.2005(20), or uncontaminated pumped groundwater.
  - (12) Flow from potable water sources.
  - (13) Springs.
- B. The following non-stormwater discharges or flows are exempt from the prohibition of non-stormwaters, provided that the source is not a significant contributor of a pollutant to the municipal storm drain system, and a written permit is approved by the Board or its agent:
- (1) Diverted stream flow.
  - (2) Dye testing, provided verbal notification is given to the Board prior to the time of the test.
  - (3) Uncontaminated groundwater discharge from a sump pump.
    - (a) The connection of the building sump pump to the public storm drain shall conform to the requirements of the building and plumbing code and/or other applicable rules and regulations of the Town. The portion of a private drain connection that is located within the applicant's own property is privately owned, while the portion that is constructed within the public way becomes the property of the Town, with all costs of construction, connection, and repair borne by the applicant. A dual backflow preventer or other device that makes it possible for the Town to shut off the flows from the private drain connection into the storm drain if conditions of the permit are violated will be made a part of the drain system.
    - (b) The applicant for the building drain permit shall notify the Board when the drain is ready for inspection and connection to the public storm drain. No connection shall be put to use and no backfilling is allowed until all appropriate inspections are made by the Board's representative inspector(s).
  - (4) Discharge for which advanced written approval is received from the Board or agents designated to enforce this bylaw, as necessary to protect public health, safety, welfare or the environment of Templeton.



**§ 230-9. Emergency suspension of storm drain system access.**

- A. The Board may suspend municipal storm drain system access to any person or property without prior written notice when such suspension is necessary to stop an actual or threatened discharge of pollutants that presents imminent risk of harm to the public health, safety, welfare or the environment. In the event any person fails to comply with an emergency suspension order, the Board or its authorized agent may take all reasonable steps to prevent or minimize harm to the public health, safety, welfare or the environment.
- B. Any person discharging to a municipal storm drain system in violation of this bylaw may have his/her storm drain system access terminated if such termination would abate or reduce an illicit discharge. The Board, or its agent, will notify a violator of the proposed termination of storm drain system access. The violator may petition the Board for reconsideration and hearing. A person commits an offense if the person reinstates storm drain system access to premises terminated pursuant to this section, without prior approval from the Board.

**§ 230-10. Notification of spills.**

Notwithstanding other requirements of local, state or federal law, as soon as a person responsible for a facility or operation, or responsible for emergency response for a facility or operation, has information of or suspects a release of materials at that facility or operation resulting in or which may result in discharge of pollutants to the municipal drainage system or waters of the commonwealth, the person shall take all necessary steps to ensure containment and cleanup of the release. In the event of an accidental release of oil or hazardous materials, the person shall immediately notify the Templeton Fire Department, Police Department, the Board and the Board of Health. In the event of a release of nonhazardous material, the reporting person shall notify the Board no later than the next business day. The reporting person shall provide to the Board written confirmation of all telephone, facsimile or in-person notifications within three business days thereafter. If the discharge of prohibited materials is from a commercial or industrial facility, the facility owner or operator of the facility shall retain on site a written record of the discharge and the actions taken to prevent its recurrence. Such records shall be retained for at least three years.

**§ 230-11. Enforcement; violations and penalties.**

The Board or an authorized agent of the Board shall enforce this bylaw, regulations, orders, violation notices, and enforcement orders, and may pursue all civil and criminal remedies for such violations.

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

## B. Orders.

- (1) The Board or an authorized agent of the Board may issue a written order to enforce the provisions of this bylaw or the regulations thereunder, which may include:
    - (a) Elimination of illicit connections or discharges to the MS4;
    - (b) Termination of access to the storm drainage system;
    - (c) Performance of monitoring, analyses, and reporting;
    - (d) That unlawful discharges, practices, or operations shall cease and desist; and
    - (e) Remediation of contamination in connection therewith. If the Board or its authorized agent determines that abatement or remediation of contamination is required, the order shall set forth a deadline by which such abatement or remediation must be completed. Said order shall further advise that, should the violator or property owner fail to abate or perform remediation within the specified deadline, the Town may, at its option, undertake such work, and expenses thereof shall be charged to the violator or property owner.
  - (2) Within 30 days after completing all measures necessary to abate the violation or to perform remediation, the violator and the property owner will be notified of the costs incurred by the Town, including administrative costs. The violator or property owner may file a written protest objecting to the amount or basis of costs with the Board within 30 days of receipt of the notification of the costs incurred. If the amount due is not received by the expiration of the time in which to file a protest or within 30 days following a decision of the Board affirming or reducing the costs, or from a final decision of a court of competent jurisdiction, the costs shall become a special assessment against the property owner and shall constitute a lien on the owner's property for the amount of said costs. Interest shall begin to accrue on any unpaid costs at the statutory rate provided in MGL c. 59, § 57 after the 31st day at which the costs first become due.
- C. Criminal penalty. Any person who violates any provision of this bylaw, regulation, order or permit issued thereunder shall be punished by a fine of not more than \$500. Each day or part thereof that such violation occurs or continues shall constitute a separate offense.
- D. Noncriminal disposition. As an alternative to criminal prosecution or civil action, the Town may elect to utilize the noncriminal disposition procedure set forth in MGL c. 40, § 21D, and this bylaw of the Town of Templeton, in which case the Board or its authorized agent shall be the enforcing person. The penalty for the first violation shall be \$100. The penalty for the second violation shall be \$200. The penalty for the third and subsequent violations shall be \$300. Each day or part thereof that such violation occurs or continues shall constitute a separate offense.
- E. Entry to perform duties under this bylaw. To the extent permitted by state law, or if authorized by the owner or other party in control of the property, the Board, its agents, officers, and employees may enter upon privately owned property for the purpose of performing their duties

under this bylaw and regulations and may make or cause to be made such examinations, surveys or sampling as the Board or its authorized agent deems reasonably necessary.

- F. Appeals. The decisions or orders of the Board shall be final. Further relief shall be to a court of competent jurisdiction.
- G. Remedies not exclusive. The remedies listed in this bylaw are not exclusive of any other remedies available under any applicable federal, state or local law.

**§ 230-12. Severability.**

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

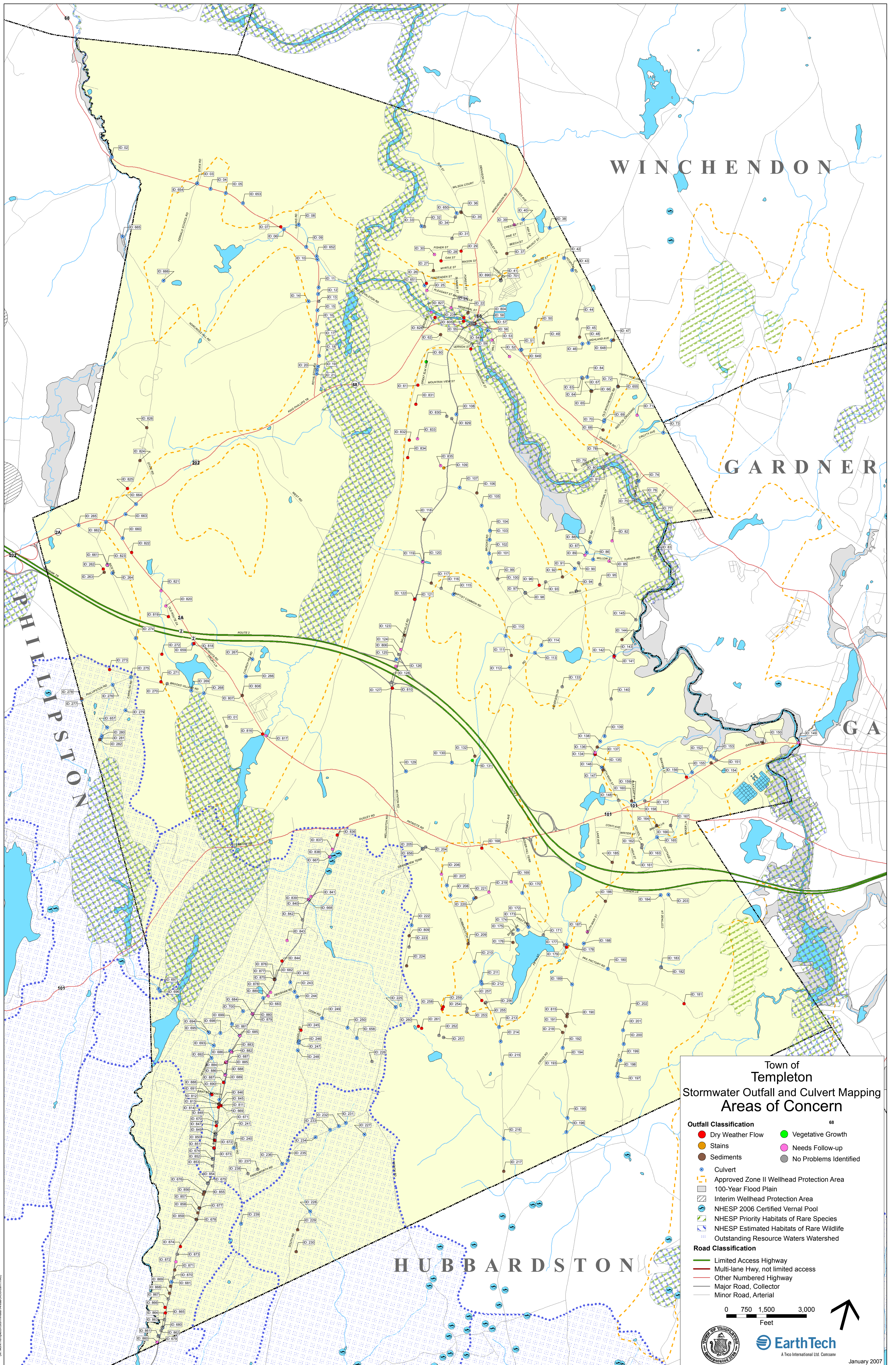
**§ 230-13. Transitional provisions.**

Residential property owners shall have 120 days from the effective date of the bylaw to comply with its provisions, provided good cause is shown for the failure to comply with the bylaw during that period.

---

## Appendix B

### Storm System Mapping



WINCHENDON

GARDNER

GA

PHILLIPSTON

HUBBARDSTON

### Town of Templeton Stormwater Outfall and Culvert Mapping Areas of Concern

- Outfall Classification**
- Dry Weather Flow
  - Stains
  - Sediments
  - Vegetative Growth
  - Needs Follow-up
  - No Problems Identified
- Culvert**
- Culvert
- Other Features**
- Approved Zone II Wellhead Protection Area
  - 100-Year Flood Plain
  - Interim Wellhead Protection Area
  - NHESP 2006 Certified Vernal Pool
  - NHESP Priority Habitats of Rare Species
  - NHESP Estimated Habitats of Rare Wildlife
  - Outstanding Resource Waters Watershed
- Road Classification**
- Limited Access Highway
  - Multi-lane Hwy, not limited access
  - Other Numbered Highway
  - Major Road, Collector
  - Minor Road, Arterial

0 750 1,500 3,000  
Feet

January 2007

© 2007 EarthTech. All rights reserved. Map data from various sources.

---

## Appendix C

### Outfall Ranking

Outfall ID	Past Discharge Reports	Receiving Water Quality	Density of Generating Sites	Age of Development and Infrastructure	Past Sewer Conversion	Historic CSOs	Septic Age	Culverted Streams	Public Health Area	Illicit Connection TMDL	Score (0-10)	Priority
26	Flow, no IDDE evidence	NonTMDL	Low	Pre-1970	Yes	No	Sewered	No	Yes	No	10.0	High
58	Screened, No IDDE Evidence	NonTMDL	High	Pre-1970	Yes	No	Sewered	No	Yes	No	10.0	High
81	Screened, No IDDE Evidence	NonTMDL	High	Pre-1970	Yes	No	Sewered	No	Yes	No	10.0	High
57	Flow, no IDDE evidence	NonTMDL	High	Pre-1970	Yes	No	Sewered	No	No	No	8.8	High
24	Screened, No IDDE Evidence	NonTMDL	Low	Pre-1970	Yes	No	Sewered	No	Yes	No	7.5	High
82	Unscreened	Good or unassessed	Low	Pre-1970	Yes	No	Sewered	No	Yes	No	7.5	High
37	Screened, No IDDE Evidence	Good or unassessed	Low	Pre-1970	Yes	No	Sewered	No	No	No	6.3	High
39	Unscreened	Good or unassessed	Low	Pre-1970	Yes	No	Sewered	No	No	No	6.3	High
41	Screened, No IDDE Evidence	NonTMDL	Low	1970-1990	Yes	No	Sewered	No	No	No	6.3	High
44	Screened, No IDDE Evidence	Good or unassessed	Low	Pre-1970	Yes	No	Sewered	No	No	No	6.3	High
45	Screened, No IDDE Evidence	Good or unassessed	Low	1970-1990	Yes	No	Sewered	No	No	No	6.3	High
52	Flow, no IDDE evidence	NonTMDL	Low	Pre-1970	Yes	No	Sewered	No	No	No	6.3	High
149	Unscreened	Good or unassessed	High	Pre-1970	Yes	No	Sewered	No	No	No	6.3	High
25	Unscreened	NonTMDL	Low	Pre-1970	Yes	No	Sewered	No	No	No	5.0	Low
29	Flow, no IDDE evidence	Good or unassessed	Low	Pre-1970	Yes	No	Sewered	No	No	No	5.0	Low
36	Unscreened	Good or unassessed	Low	Post-1990	Yes	No	Sewered	No	Yes	No	5.0	High
49	Unscreened	NonTMDL	Low	Pre-1970	Yes	No	Sewered	No	No	No	5.0	Low
109	Flow, no IDDE evidence	Good or unassessed	Low	Pre-1970	Yes	No	Sewered	No	No	No	5.0	High
118	Unscreened	Good or unassessed	High	1970-1990	Yes	No	Sewered	No	No	No	5.0	Low
148	Screened, No IDDE Evidence	Good or unassessed	High	Pre-1970	Yes	No	Sewered	No	No	No	5.0	Low
156	Flow, no IDDE evidence	Good or unassessed	Low	Pre-1970	Yes	No	Sewered	No	No	No	5.0	Low
22	Screened, No IDDE Evidence	NonTMDL	Low	Pre-1970	Yes	No	Sewered	No	No	No	3.8	Low
27	Unscreened	Good or unassessed	Low	Pre-1970	Yes	No	Sewered	No	No	No	3.8	Low
28	Flow, no IDDE evidence	Good or unassessed	Low	1970-1990	Yes	No	Sewered	No	No	No	3.8	Low
35	Screened, No IDDE Evidence	Good or unassessed	Low	Post-1990	Yes	No	Sewered	No	Yes	No	3.8	High
53	Screened, No IDDE Evidence	NonTMDL	Low	Pre-1970	Yes	No	Sewered	No	No	No	3.8	Low
55	Screened, No IDDE Evidence	NonTMDL	Low	Pre-1970	Yes	No	Sewered	No	No	No	3.8	Low
56	Screened, No IDDE Evidence	NonTMDL	Low	Pre-1970	Yes	No	Sewered	No	No	No	3.8	Low
61	Flow, no IDDE evidence	Good or unassessed	Low	1970-1990	Yes	No	Sewered	No	No	No	3.8	Low
62	Screened, No IDDE Evidence	NonTMDL	Low	Pre-1970	Yes	No	Sewered	No	No	No	3.8	Low
75	Screened, No IDDE Evidence	NonTMDL	Low	Pre-1970	Yes	No	Sewered	No	No	No	3.8	Low
77	Unscreened	NonTMDL	Low	1970-1990	Yes	No	Sewered	No	No	No	3.8	Low
78	Unscreened	Good or unassessed	Low	Pre-1970	Yes	No	Sewered	No	No	No	3.8	Low
79	Screened, No IDDE Evidence	NonTMDL	Low	Pre-1970	Yes	No	Sewered	No	No	No	3.8	Low
80	Screened, No IDDE Evidence	NonTMDL	Low	Pre-1970	Yes	No	Sewered	No	No	No	3.8	Low
99	Flow, no IDDE evidence	Good or unassessed	Low	1970-1990	Yes	No	Sewered	No	No	No	3.8	Low
154	Unscreened	Good or unassessed	High	Post-1990	Yes	No	Sewered	No	No	No	3.8	Low
287	Screened, No IDDE Evidence	NonTMDL	Low	Pre-1970	Yes	No	Sewered	No	No	No	3.8	Low
331	Flow, no IDDE evidence	Good or unassessed	Low	1970-1990	Yes	No	Sewered	No	No	No	3.8	High
30	Screened, No IDDE Evidence	Good or unassessed	Low	Pre-1970	Yes	No	Sewered	No	No	No	2.5	Low
68	Screened, No IDDE Evidence	Good or unassessed	Low	Pre-1970	Yes	No	Sewered	No	No	No	2.5	Low
71	Unscreened	Good or unassessed	Low	1970-1990	Yes	No	Sewered	No	No	No	2.5	Low
72	Screened, No IDDE Evidence	Good or unassessed	Low	Pre-1970	Yes	No	Sewered	No	No	No	2.5	Low
76	Screened, No IDDE Evidence	NonTMDL	Low	1970-1990	Yes	No	Sewered	No	No	No	2.5	Low
83	Screened, No IDDE Evidence	Good or unassessed	Low	Pre-1970	Yes	No	Sewered	No	No	No	2.5	Low
89	Unscreened	Good or unassessed	Low	1970-1990	Yes	No	Sewered	No	No	No	2.5	Low
90	Screened, No IDDE Evidence	Good or unassessed	Low	Pre-1970	Yes	No	Sewered	No	No	No	2.5	Low
92	Screened, No IDDE Evidence	Good or unassessed	Low	Pre-1970	Yes	No	Sewered	No	No	No	2.5	Low

Outfall ID	Past Discharge Reports	Receiving Water Quality	Density of Generating Sites	Age of Development and Infrastructure	Past Sewer Conversion	Historic CSOs	Septic Age	Culverted Streams	Public Health Area	Illicit Connection TMDL	Score (0-10)	Priority
100	Screened, No IDDE Evidence	Good or unassessed	Low	Pre-1970	Yes	No	Sewered	No	No	No	2.5	Low
111	Screened, No IDDE Evidence	Good or unassessed	Low	Pre-1970	Yes	No	Sewered	No	No	No	2.5	Low
120	Screened, No IDDE Evidence	Good or unassessed	Low	Pre-1970	Yes	No	Sewered	No	No	No	2.5	Low
132	Unscreened	Good or unassessed	Low	1970-1990	Yes	No	Sewered	No	No	No	2.5	Low
157	Screened, No IDDE Evidence	Good or unassessed	Low	Pre-1970	Yes	No	Sewered	No	No	No	2.5	Low
158	Screened, No IDDE Evidence	Good or unassessed	Low	Pre-1970	Yes	No	Sewered	No	No	No	2.5	Low
160	Screened, No IDDE Evidence	Good or unassessed	Low	Pre-1970	Yes	No	Sewered	No	No	No	2.5	Low
161	Screened, No IDDE Evidence	Good or unassessed	Low	Pre-1970	Yes	No	Sewered	No	No	No	2.5	Low
162	Screened, No IDDE Evidence	Good or unassessed	Low	Pre-1970	Yes	No	Sewered	No	No	No	2.5	Low
164	Screened, No IDDE Evidence	Good or unassessed	Low	Pre-1970	Yes	No	Sewered	No	No	No	2.5	Low
166	Screened, No IDDE Evidence	Good or unassessed	Low	Pre-1970	Yes	No	Sewered	No	No	No	2.5	Low
185	Screened, No IDDE Evidence	Good or unassessed	Low	Pre-1970	Yes	No	Sewered	No	No	No	2.5	Low
328	Screened, No IDDE Evidence	Good or unassessed	Low	Pre-1970	Yes	No	Sewered	No	No	No	2.5	Low
330	Flow, no IDDE evidence	Good or unassessed	Low	Post-1990	Yes	No	Sewered	No	No	No	2.5	High
332	Unscreened	Good or unassessed	Low	1970-1990	Yes	No	Sewered	No	No	No	2.5	High
333	Flow, no IDDE evidence	Good or unassessed	Low	Post-1990	Yes	No	Sewered	No	No	No	2.5	Low
334	Flow, no IDDE evidence	Good or unassessed	Low	Post-1990	Yes	No	Sewered	No	No	No	2.5	High
423	Screened, No IDDE Evidence	NonTMDL	Low	1970-1990	Yes	No	Sewered	No	No	No	2.5	Low
66	Flow, no IDDE evidence	Good or unassessed	Low	Post-1990	Yes	No	Sewered	No	No	No	2.5	High
50	Screened, No IDDE Evidence	NonTMDL	Low	Post-1990	Yes	No	Sewered	No	No	No	1.3	Low
60	Unscreened	Good or unassessed	Low	Post-1990	Yes	No	Sewered	No	No	No	1.3	Low
95	Screened, No IDDE Evidence	Good or unassessed	Low	1970-1990	Yes	No	Sewered	No	No	No	1.3	Low
151	Screened, No IDDE Evidence	Good or unassessed	Low	1970-1990	Yes	No	Sewered	No	No	No	1.3	Low
163	Screened, No IDDE Evidence	Good or unassessed	Low	1970-1990	Yes	No	Sewered	No	No	No	1.3	Low
47	Screened, No IDDE Evidence	Good or unassessed	Low	Post-1990	Yes	No	Sewered	No	No	No	0.0	Low
64	Screened, No IDDE Evidence	Good or unassessed	Low	Post-1990	Yes	No	Sewered	No	No	No	0.0	Low
67	Screened, No IDDE Evidence	Good or unassessed	Low	Post-1990	Yes	No	Sewered	No	No	No	0.0	Low
85	Screened, No IDDE Evidence	Good or unassessed	Low	Post-1990	Yes	No	Sewered	No	No	No	0.0	Low
94	Screened, No IDDE Evidence	Good or unassessed	Low	Post-1990	Yes	No	Sewered	No	No	No	0.0	Low
131	Screened, No IDDE Evidence	Good or unassessed	Low	Post-1990	Yes	No	Sewered	No	No	No	0.0	Low
167	Screened, No IDDE Evidence	Good or unassessed	Low	Post-1990	Yes	No	Sewered	No	No	No	0.0	Low
329	Screened, No IDDE Evidence	Good or unassessed	Low	Post-1990	Yes	No	Sewered	No	No	No	0.0	Low



## Appendix D

---

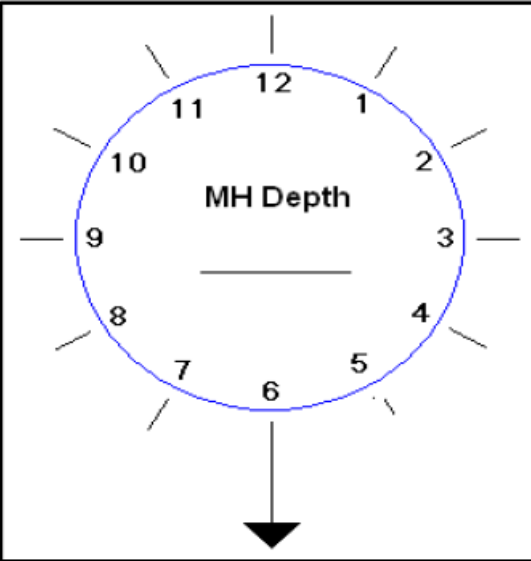
### Field Forms, Sample Bottle Labels, and Chain of Custody Forms



# Manhole Inspection Form



Catchment ID	Date
Manhole ID	Rain Last 48 Hours
Street Location	
Inspector	



Sketch direction(s) of incoming flow

Clock Position (1-12) Pipe Material (Concrete, HDPE, PVC, Ductile Iron, CMP)	Pipe Diameter (in.)	Invert Elevation (ft)	Upgradient Structure/Source (MH ID, CB, Priv, Unk)	Flow (Damp, Trickle, Moderate, High)

<b>Cover Conditions:</b> Diameter of clear opening (in.)	Buried: <input type="checkbox"/>	Cannot Inspect: <input type="checkbox"/>	Cannot Locate: <input type="checkbox"/>
<b>Evidence of Flow:</b> <input type="checkbox"/> Yes <input type="checkbox"/> No	<b>If Yes, Description of Flow:</b> <input type="checkbox"/> Damp <input type="checkbox"/> Trickle <input type="checkbox"/> Moderate <input type="checkbox"/> High		

<b>Visual Evidence of Illicit Discharge</b> Visual Inspection: <input type="checkbox"/> None <input type="checkbox"/> Floatables <input type="checkbox"/> Pet Waste <input type="checkbox"/> Oily Sheen <input type="checkbox"/> Sanitary Waste <input type="checkbox"/> Algae <input type="checkbox"/> Foam
<b>Olfactory Evidence of Illicit Discharge</b> Olfactory Inspection: <input type="checkbox"/> None <input type="checkbox"/> Sewage Smell <input type="checkbox"/> Musty <input type="checkbox"/> Rotten Eggs <input type="checkbox"/> Ammonia <input type="checkbox"/> Petroleum

Samples Taken and Sampling Results			
Temp.	Conductivity	Salinity	Chlorine
Ammonia	Surfactants	Bacteria	Pollutant of Concern

**COMMENTS:**

**Further investigation needed?**  Yes  No





---

## Appendix E

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

## **INTRODUCTION**

This Standard Operating Procedure (SOP) applies to the collection of water quality samples at in-stream locations and stormwater outfalls, for the purposes of compliance with the MS4 General Permit, including chemical and bacteriological sampling.

## **FIELD PERSONNEL PROTECTION**

Field personnel will protect themselves from potential exposure to pathogens and other contaminants. Precautions against exposure include the use of nitrile gloves and protective eyewear while collecting samples. Face shields will be worn if samples are collected from CSO regulator box and CSO outfall/intermediate manhole locations. Safety glasses with side shields will be worn by the sampler at all other sample locations.

Some work will be performed in flowing water. A personal flotation device will be worn while wearing chest or hip waders. Additionally, sampling will not be conducted alone. For work performed in roadways, samplers are required to wear a high visibility vest or clothing and use traffic cones for visibility. An escort vehicle/traffic detail will be provided when necessary to enhance visibility at road locations and provide additional eyes to look for potential safety issues.

## **COOLER PREPARATION**

Before sampling begins, all coolers to be used for sample transport will be prepared with ice/water mixtures to ensure uniformity and that appropriate sample preservation temperatures (<4°C) are met.

1. Add ice to each cooler until the cooler is approximately half full. Once ice has been added to the cooler, add distilled water until the water level is at or near the ice surface. At this point the cooler is ready to accept samples and should be kept closed and shaded.
2. Periodically monitor water and ice levels in the coolers during the sampling event to ensure an appropriate amount of ice such that sample temperatures remain at or below 4°C. If additional ice needs to be added, first drain a portion of the water, not to exceed half of the water level, and add ice as necessary to ensure proper temperatures.
3. Samples should not rest on top of the ice/water mixture; rather they should be submerged or nearly submerged at all times. Be sure that all caps are tightened and undamaged. To avoid possible cross-contamination, sample bottles should be placed in unused colorless plastic zip-type bags by sample location.
4. Store the sample on wet ice in a clean cooler until it is delivered to the lab. Each cooler must contain a temperature blank, used to measure cooler temperature upon arrival at the lab. Unless samples were collected within 2 hours of delivery to the lab, chemical samples warmer than 6°C will be flagged, and bacteriological samples warmer than 10°C will be flagged.

## SAMPLE BOTTLES AND ORDER OF FILLING

Table 1 lists the sampling parameters and bottles, in the order they should be collected, which is generally in order of decreasing volatility. Sample preservatives will be included in the appropriate bottles provided by the laboratory. Field sampling personnel should double-check via visual inspection prior to sampling to make sure the bottles have the appropriate preservative. Care should be taken not to displace preservative during filling of the sample bottle. Unfilled sample bottles should be kept cool, and potentially on ice, during extremely hot weather to prevent volatilization of any acid preservatives.

**Table 1. Sample parameters, bottle size, preservative, headspace recommendation, and holding time.**

Parameter	Sampling Technique	Sample Volume	Sample Preservation	Maximum Holding Time	Quality Control Procedure	Headspace
Volatile Organic Compounds	grab sample	40 ml	Hydrochloric acid; 4°C	14 days	Collect 1 duplicate field sample per team, per event	None
Semi-volatile Organic Compounds	grab sample	1000 ml	4°C; protect from light	40 days	Collect 1 duplicate field sample per team, per event	None
<i>E. coli</i>	grab sample	120 ml	Sterile container (sodium thiosulfate); 4°C	6 hours	Collect 1 duplicate field sample per team, per event	Fill to bottle shoulder (or fill indicator line)
Chemical Oxygen Demand	grab sample	500 ml	Sulfuric acid to pH <2	28 days	Collect 1 duplicate field sample per team, per event	Fill to bottle shoulder
Oil & Grease	grab sample	1000 ml	Sulfuric acid to pH <2; 4°C	28 days	Collect 1 duplicate field sample per team, per event	Fill to bottle shoulder
Phosphorus	grab sample	500 ml	Sulfuric acid to pH <2; 4°C	28 days	Collect 1 duplicate field sample per team, per event	Fill to bottle shoulder
Total Kjeldahl Nitrogen	grab sample	500 ml	Sulfuric acid to pH 1.5-2; 4°C	28 days	Collect 1 duplicate field sample per team, per event	Fill to bottle shoulder



Parameter	Sampling Technique	Sample Volume	Sample Preservation	Maximum Holding Time	Quality Control Procedure	Headspace
Total Metals	grab sample	250 ml	Nitric acid to pH <2; 4°C	6 months	Collect 1 duplicate field sample per team, per event	Fill to bottle shoulder
Hardness	grab sample	250 ml	Nitric acid to pH <2; 4°C	6 months	Collect 1 duplicate field sample per team, per event	Fill to bottle shoulder
Dissolved Metals	grab sample	250 ml	4°C	6 months	Collect 1 duplicate field sample per team, per event	Fill to bottle shoulder
Total Suspended Solids	grab sample	500 ml	4°C	7 days	Collect 1 duplicate field sample per team, per event	Fill to bottle shoulder
Turbidity	grab sample	500 ml	4°C	48 hours	Collect 1 duplicate field sample per team, per event	Fill to bottle shoulder
Pesticides	grab sample	1000 ml	4°C	40 days	Collect 1 duplicate field sample per team, per event	Fill to bottle shoulder

## **SAMPLING METHODS**

Sample collection methods will differ depending on location type and based on site-specific factors such as water level, discharge velocity, water depth, and safety. The technique used for sample collection should be selected in the following order of priority, considering site access and safety (sampling should be conducted in the safest manner possible):

1. Direct Collection – preferred whenever possible
2. Pole Sampling – when direct collection is not feasible or cannot be done safely

### **In-Stream Locations (Dry and Wet Weather)**

For in-stream sampling locations, water samples will be collected from flowing water, and mid-stream to ensure that the water is not stagnant. The sample will be collected upstream of the sampler, so as not to have

interference from disturbed sediments during collection and to minimize the potential for the sampler to contaminate the sample. If more than one sample is needed at a particular location or two sampling sites are in close proximity, the downstream samples will be collected before upstream samples. For direct sample collection, the sampler should use waders or hip boots to access the mid-stream sampling location. If water depths or water velocity prevent direct collection, a sample should be collected using a sampling pole.

### **Stormwater Outfalls (Dry Weather if flowing, and Wet Weather)**

Stormwater outfall samples will be collected from the outlet of the outfall and by direct collection where possible. In situations where water depth or velocity prevents direct collection, samples will be taken using a sampling pole where appropriate. Samples should be collected from the direct flow emanating from the outfall and care should be taken not to touch the lip of the sample bottle to the outfall or otherwise contaminate the sample. In instances where outfalls are inundated due to elevated river levels, samples will be collected at the nearest accessible upstream manhole.

## **SAMPLING TECHNIQUES AND METHODS**

In general, when the sample location is easily accessible by foot, grab samples will be collected by submerging the sample container directly into the surface water (direct collection). In areas where access is limited or difficult, sampling may be conducted with a long-handled pole. This is often the case at large streams where sampling away from the bank or from a bridge is necessary to obtain representative surface water samples. When such a sampling device is utilized, sample bottles will be attached to the device in an appropriate manner and equipment blanks will be used to ensure sample integrity.

### **Clean Sampling Techniques**

In all cases, the following clean sampling techniques will be used, regardless of sample collection technique:

1. Never re-use sample bottles.
2. Wear powder-free nitrile gloves when collecting metal samples to avoid contamination of the sample. Either powder-free nitrile or latex gloves can be used for other sampling.
3. Change gloves if they are soiled or if there is potential for cross-contamination.
4. When collecting the sample, do not touch the inside of the bottle or cap. Do not put the cap on the ground.
5. When collecting the sample, do not breathe in the direction of the container.
6. No eating, drinking, or smoking or chewing tobacco during sample collection.
7. Do not park vehicles in the immediate sample collection area.
8. After each sample is collected, record the sample time and immediately place the bottles on ice in a cooler prepared as described above.

Surface water samples can be collected from flowing water by direct bottle submersion or by attaching sample bottles to an extendable swing-arm sampling pole or a weighted sampling vessel attached to a rope to sample from a distance, in a manhole or from a bridge.

---

**Direct Collection (Bottle Immersion Technique)**

The protocol for collecting surface water samples from flowing water using direct bottle submersion is as follows:

1. Label the sample bottles prior to sampling. Wet labels are difficult to write on. Use permanent marker or waterproof pen for labeling.
2. Collect samples in order of decreasing volatility. Sample preservatives should be included in the laboratory-supplied sample bottles. Double check via visual inspection that any required preservative is in the bottle prior to sampling.
3. Uncap the sample bottle. Do not touch the inside of the bottle or cap. Do not put the cap on the ground.
4. Collect samples upstream of the sampler at mid-stream. Care should be taken not to disturb bottom sediments during sample collection to prevent particles from becoming suspended in the water column.
5. Holding the bottle upside down, push the bottle below the water surface. Turn the bottle forward and scoop it forward and up and out of the water. Do this in one sweeping motion. Make sure you sample forward and away from you so that there is no chance that you will contaminate the sample with bacteria from your arm.
6. If the bottle contains a preservative, do not displace it while filling the container and leave adequate space in the sample bottle for mixing the preservative and the sample. If the sample bottle is completely filled, pour some of the sample out to provide adequate head space.
7. After filling the bottle, carefully replace the lid and shake the bottle to assure adequate mixing of the preservative and the sample.
8. When filling sample containers for volatile and semi-volatile organic compounds, do not agitate the sample during collection in the sample container. Tip the sample container so that a slow, laminar flow of water enters the sample container. The stream of water will be directed to the sides of the sample container to prevent aeration of the sample due to turbulence. Vials will be sealed with no headspace to prevent any further volatilization of the sample once it has been collected. Before it is sealed the VOA vial will be filled to overflowing such that a meniscus will form at the lip of the vial. The lid will be placed over the meniscus and tightened so that no air bubbles are present. After the lid is screwed on, the VOA vial will be turned over and tapped on a hard surface and checked for bubbles. If bubbles are observed in the VOA vial, empty the contents and follow step 8 until no head space is achieved.
9. Place sample(s) into unused colorless plastic zip-type bags (only with sample bottles from the same site) and in an iced cooler. Deliver samples to the laboratory within 6 hours of collection to meet bacteria sample hold times.
10. Perform sampling equipment decontamination procedures, as necessary, before leaving the site (see Decontamination Procedures, below).

## **Pole Sampling Technique**

The protocol for collecting a water sample using an extendable pole sampler is outlined below.

1. Label the sample bottles prior to sampling. Wet labels are difficult to write on. Use permanent marker or waterproof pen for labeling.
2. Collect samples in order of decreasing volatility. Sample preservatives should be included in the laboratory-supplied sample bottles. Double check via visual inspection that any required preservative is in the bottle prior to sampling.
3. Affix the sample bottle to the swing arm of the pole sampler using cable ties. Make sure that the bottle is sufficiently secure so as not to be pulled away from the swing arm during sampling.
4. Uncap the sample bottle. Do not touch the inside of the bottle or cap. Do not put the cap on the ground.
5. Reach the pole, with sample bottle attached, out above the location to be sampled. Lower the lip of the sample bottle so that water begins to fill the vessel or just below the water surface. Take care to not touch the lip of the sample bottle to adjacent surfaces such as the bottom of the stream or outfall pipe to avoid disturbing/collecting sediment, algae, or other debris.
6. If the bottle contains a preservative, do not displace it while filling the container and leave adequate space in the sample bottle for mixing the preservative and the sample. If the sample bottle is completely filled, pour some of the sample out to provide adequate head space.
7. After filling the bottle, carefully replace the lid and shake the bottle to assure adequate mixing of the preservative and the sample.
8. When filling sample containers for volatile and semi-volatile organic compounds, do not agitate the sample during collection in the sample container. Tip the sample container so that a slow, laminar flow of water enters the sample container. The stream of water will be directed to the sides of the sample container to prevent aeration of the sample due to turbulence. Vials will be sealed with no headspace to prevent any further volatilization of the sample once it has been collected. Before it is sealed the VOA vial will be filled to overflowing such that a meniscus will form at the lip of the vial. The lid will be placed over the meniscus and tightened so that no air bubbles are present. After the lid is screwed on, the VOA vial will be turned over and tapped on a hard surface and checked for bubbles. If bubbles are observed in the VOA vial, empty the contents and follow step 8 until no head space is achieved.
9. Place sample(s) into unused colorless plastic zip-type bags (only with sample bottles from the same site) and in an iced cooler. Deliver samples to the laboratory within 6 hours of collection to meet bacteria sample hold times.
10. Perform sampling equipment decontamination procedures, as necessary, before leaving the site (see Decontamination Procedures, below).

## **QUALITY CONTROL SAMPLES – FIELD DUPLICATES**

Duplicate samples should be collected at the frequency detailed in the sampling plan. Sampling techniques will be identical to those outlined for direct, pole and weighted vessel sampling. Duplicate samples will be collected immediately after the primary sample for the same parameter.

## **FIELD MEASUREMENTS**

Instantaneous water quality measurements using field instruments will be collected prior to samples collected for laboratory analysis. Ammonia, surfactants, chlorine, water temperature, salinity, and conductivity will be measured in the field using a water quality meter and/or field test kit at the time of sample collection. Water quality field measurements will be taken with the approved meter(s)/probe(s) at half (1/2) the water depth where overall stream depth is greater than one (1) foot. Otherwise, the probe will be sufficiently submerged to collect water quality measurements. If water depth is not sufficient to fully submerge the probe, then water will be collected in a clean, spare, sample bottle or graduated cylinder such that the probe can be submerged. The water quality field parameters will be measured immediately after filling the container. Equipment decontamination procedures outlined in the Decontamination Procedure SOP will be followed, as necessary, between samples and sites.

## **DECONTAMINATION PROCEDURES: GENERAL REQUIREMENTS**

- Before using any equipment, clean/decontaminate all sampling equipment that is exposed to the sample.
- At the start of a sampling event transport all equipment to the field pre-cleaned and ready to use, unless otherwise justified.
- Rinse all equipment with water after use, even if it is to be field-cleaned for other sites.
- Segregate equipment that is only used once (i.e., not cleaned in the field) from clean equipment and return to the in-house cleaning facility to be cleaned in a controlled environment.
- Protect decontaminated field equipment from environmental contamination by securely wrapping and sealing with one of the following:
  - Aluminum foil (commercial grade is acceptable);
  - Untreated butcher paper; or
  - Clean, untreated, disposable plastic bags. Plastic bags may be used:
    - For all analyte groups except volatile and extractable organics;
    - For volatile and extractable organics, if the equipment is first wrapped in foil or butcher paper or if the equipment is completely dry.
- Containerize all solvent rinsing wastes, detergent wastes and other chemical wastes requiring off-site or regulated disposal. Dispose of all wastes in conformance with applicable regulations.

## **CLEANING REAGENTS**

Detergents:

Luminox (or a non-phosphate solvent based equivalent) and Liqui-Nox (or a non-phosphate equivalent).

Note that Alconox cannot be used if Total Phosphorus is an analyte. EPA recommends Luminox (or equivalent) since solvent rinses can be eliminated from the cleaning process. Liquinox (or equivalent) may be substituted (solvent rinses, when applicable, must be performed).

Solvents:

Pesticide grade solvents must be used and must be purchased from a laboratory supply vendor.

- Properly dispose of all wastes according to applicable regulations. Containerize all solvents (including rinsates) for on-site remediation or off-site disposal, as required.
- Store all solvents away from potential sources of contamination (gas, copier supplies, etc.).

Analyte-free Water:

Analyte-free water is water in which all analytes of interest and all interferences are below method detection limits.

- Maintain documentation (such as results from equipment blanks) to demonstrate the reliability and purity of analyte-free water sources.
- The source of the water must meet the requirements of the analytical method and must be free from the analytes of interest. In general, the following water types are associated with specific analyte groups:
  - Milli-Q (or equivalent polished water): suitable for all analyses.
  - Organic-free: suitable for volatile and extractable organics.
  - Deionized water: not suitable for volatile and extractable organics if the analytes of interest are present in concentrations that affect the result.
  - Distilled water: not suitable for volatile and extractable organics, metals or ultra-trace metals.
- Use analyte-free water for blank preparation and the final decontamination water rinse.
- In order to minimize long-term storage and potential leaching problems, obtain or purchase analyte-free water just prior to the sampling event. If obtained from a source (such as a laboratory), fill the transport containers and use the contents for a single sampling event. Empty the transport container(s) at the end of the sampling event.
- Discard any analyte-free water that is transferred to a dispensing container (such as a wash bottle) at the end of each sampling day.

Acids:

- Reagent Grade Nitric Acid: 10 - 15% (one volume concentrated nitric acid and five volumes deionized water).
  - Use for the acid rinse unless nitrogen components (e.g., nitrate, nitrite, etc.) are to be sampled.
  - If sampling for ultra-trace levels of metals, use an ultra-pure grade acid.
- Reagent Grade Hydrochloric Acid: 10% hydrochloric acid (one volume concentrated hydrochloric and three volumes deionized water).
  - Use when nitrogen components are to be sampled.
- **If samples for both metals and the nitrogen-containing components are collected with the equipment, use the hydrochloric acid rinse, or thoroughly rinse with hydrochloric acid after a nitric acid rinse.**
- If sampling for ultra trace levels of metals, use an ultra-pure grade acid.
- Freshly prepared acid solutions may be recycled during the sampling event or cleaning process. Dispose appropriately at the end of the sampling event, cleaning process or if acid is discolored or appears otherwise contaminated (e.g., floating particulates).
  - Transport only the quantity necessary to complete the sampling event.
- Dispose of any unused acids properly.

## **REAGENT STORAGE CONTAINERS**

The contents of all containers must be clearly marked.

- Detergents:
  - Store in the original container or in a high density polyethylene (HDPE) or polypropylene (PP) container.
- Solvents:
  - Store solvents to be used for cleaning or decontamination in the original container until use in the field. If transferred to another container for field use, the container must be either glass or Teflon.
  - Use dispensing containers constructed of glass, Teflon, or stainless steel. Note: if stainless steel sprayers are used, any components (including gaskets and transfer lines) that contact the solvents must be constructed of inert materials.
- Analyte-free Water: Transport in containers appropriate to the type of water to be stored. If the water is commercially purchased (e.g., grocery store), use the original containers when transporting the water to the field. Containers made of glass, Teflon, polypropylene, or Polyethylene (PE) are acceptable.
  - Use glass, Teflon, polypropylene or PE to transport organic-free sources of water on-site.
  - Dispense water from containers made of glass, Teflon, PE or polypropylene.
  - Do not store water in transport containers before beginning a sampling event, unless satisfactory long-term storage of analyte-free water for a specified maximum storage time has been documented for the analytes of interest. The water should be replaced and the maximum storage time shortened if it is determined that the analyte-free water has been contaminated, e.g., by the analysis of field-QC blanks or other QC blanks that have been composed using the water stored in the container.
  - Store and dispense acids using containers made of glass, Teflon, PE or polypropylene.

## **FIELD DECONTAMINATION OF PERSONAL PROTECTIVE EQUIPMENT**

Personal protective equipment which comes into contact with the sampling matrix (i.e., stream water or outfall or CSO discharge) will be replaced or decontaminated in the field between sampling locations.

In most cases, only gloves will need to be replaced between sampling locations to prevent the inadvertent cross-contamination of samples. If waders or boots require decontamination between locations, decontamination will follow the procedure described below for sampling equipment.

## **FIELD DECONTAMINATION OF SAMPLING EQUIPMENT**

Flow measuring equipment such as staff gages, velocity meters, and other stream gauging equipment may be cleaned with tap water between measuring locations, if necessary. No further field decontamination is necessary.

The following must be done prior to field decontamination:

1. Wear clean nitrile gloves & safety glasses.
2. No eating, smoking, drinking, chewing, or any hand to mouth contact shall be permitted during decontamination operations.
3. If stream sampling, rinse equipment in stream to remove any mud or debris.
4. Disassemble equipment (unscrew plastic bottle holder from pole sampler).

*Preferred Method of Decontamination*

The following procedure for field decontamination is taken from SESDPROC-205-R3, Field Equipment Cleaning and Decontamination (EPA SESD, 2015) and is the preferred method to be used for field decontamination of sampling equipment or components of equipment that come in contact with the sample:

1. An optional Liquinox® detergent wash step may be useful to remove gross dirt and soil, if present
2. Clean with tap water and Luminox® detergent using a brush, if necessary, to remove particulate matter and surface films.
3. Rinse thoroughly with tap water.
4. Rinse thoroughly with analyte-free water (deionized or better) and place on a clean foil-wrapped surface to air-dry.
5. Wrap the dry equipment with aluminum foil. If the equipment is to be stored overnight before it is wrapped in foil, it should be covered and secured with clean, unused plastic sheeting.
6. Upon arrival at next sampling location, rinse several times with sample water from the next sampling location.

Properly dispose of any analyte-free water that is transferred to a dispensing container (such as a wash bottle) at the end of each sampling day.

*Alternative Method of Decontamination*

The historical solvent rinse method of cleaning equipment for trace contaminant sampling remains an acceptable method, but should be used only if equipment blanks obtained using the field decontamination method above show evidence of cross-contamination due to sampling. Use of solvents and acids in the field is not preferred due to increased health and safety and disposal concerns. The procedure for field decontamination using

1. Clean with tap water and Liquinox® detergent using a brush, if necessary, to remove particulate matter and surface films.
2. Rinse thoroughly with tap water.
3. Rinse thoroughly with deionized water.
4. Rinse with 10% hydrochloric acid solution (Nitric acid cannot be used when sample analysis includes nutrients).
5. Rinse with analyte-free water (deionized or better).
6. Place on a clean foil-wrapped surface to air dry.
7. Wrap the dry equipment with aluminum foil. If the equipment is to be stored overnight before it is wrapped in foil, it should be covered and secured with clean, unused plastic sheeting.
8. Upon arrival at next sampling location, rinse several times with sample water from the next sampling location.

All rinsate from field decontamination will be collected in 5 gallon buckets, containerized with a lid, and neutralized to approximately pH 7 before off-site disposal. Equipment will be allowed to air dry before wrapping in aluminum foil.

The outside surface of containers is often covered with the matrix from which the sample was taken and/or corrosive preservatives. Consequently, sealed sample containers must be rinsed (with tap or deionized water) or wiped free of excess gross media/debris to the extent possible prior to its placement into the cooler. This measure will reduce the possibility that subsequent handlers will be exposed to analytes of interest and/or hazardous preservatives.



In addition, all equipment, instruments and containers must be cleaned of obvious mud, leaves, and debris prior to leaving the site.

### **FIELD DECONTAMINATION OF FIELD INSTRUMENTS (TAPES, METERS, ETC.)**

Follow manufacturer's recommendations for cleaning instruments. At a minimum:

- Wipe down equipment body and cables with lab-grade detergent solution (Liqui-nox). Probes shall be well rinsed. Check manufacturer's instructions for recommendations and/or restrictions on cleaning.
- Rinse thoroughly with tap water.
- Rinse thoroughly with analyte-free water (deionized or better).
- Store equipment according to the manufacturer's recommendation or wrap equipment in aluminum foil, untreated butcher paper or untreated plastic bags to eliminate potential environmental contamination.

### **FIELD DECONTAMINATION SUPPLIES**

Required solutions and equipment for field decontamination using the procedures described above:

- 5 gallon buckets with lid to containerize decontamination wastes
- Scrub brush
- Nitrile gloves
- Safety glasses
- Paper towels
- Cube of tap water (minimum 10 L) and squeeze bottle
- Cube of deionized water (minimum 10 L) and Teflon squeeze bottle
- Organic-free water and Teflon squeeze bottle,
- Non-phosphate detergent (Liquinox and Luminox) solutions in Teflon squeeze bottle
- +/- 10% hydrochloric acid solution in Teflon squeeze bottle

### **DECONTAMINATION OF OTHER SAMPLING-RELATED EQUIPMENT**

#### **Analyte-Free Water Containers**

This section pertains to containers that are purchased to transport, store and dispense analyte-free water. It does not apply to water that has been purchased in containers.

New Containers:

- Wash containers and caps according to the instructions above for sampling equipment, omitting the solvent rinse if plastic (polyethylene or polypropylene) containers are being cleaned.
- Cap with Teflon film or the bottle cap. The bottle cap must be composed of the same material as the container and cannot be lined.

Reused Containers:

- Immediately after emptying, cap with aluminum foil, Teflon film or the container cap.
- Wash the exterior of the container with lab-grade detergent solution (Luminox) and rinse with analyte-free water.
- Rinse the interior thoroughly with analyte-free water.
- Invert and allow to drain and dry.

Ice Chests and Shipping Containers

- Wash the exterior and interior of all ice chests with laboratory detergent (Luminox) after each use.

- Rinse with tap water and air dry before storing.
- If the ice chest becomes severely contaminated, clean as thoroughly as possible, render unusable, and properly dispose.

**REFERENCES**

1. U.S. Environmental Protection Agency, Region IV, Science and Ecosystem Support Division, Field Equipment Cleaning and Decontamination, December 2015, (SESDPROC-205-R3).
2. Florida Department of Environmental Protection, FC 1000 Cleaning / Decontamination Procedures, March 1, 2014 (DEP-SOP-001/01).

## Appendix F

---

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

## SOP 10: LOCATING ILLICIT DISCHARGES

### *Introduction*

An “illicit discharge” is any discharge to an engineered storm drain system that is not composed entirely of stormwater unless the discharge is defined as an allowable non-stormwater discharge under the 2003 Massachusetts MS4 Permit. Illicit discharges may enter the engineered storm drain system through direct or indirect connections, such as: cross-connections of sewer services to engineered storm drain systems; leaking septic systems; intentional discharge of pollutants to catch basins; combined sewer overflows; connected floor drains; and sump pumps connected to the system (under some circumstances). Illicit discharges can contribute high levels of pollutants, such as heavy metals, toxics, oil, grease, solvents, nutrients, and pathogens to receiving streams.

Illicit discharges can be located by several methods, including routine dry weather outfall inspections and catch basin inspections, which are described in detail in SOP 1, “Dry Weather Outfall Inspection” and SOP 3, “Catch Basin Inspection and Cleaning”, respectively, as well as from citizen reports.

This SOP assumes that the municipality has legal authority (i.e., a bylaw or ordinance) in place, per the requirements of the 2003 Massachusetts MS4 Permit, to prohibit the connection of non-stormwater discharges into the storm drain system. The authority or department for addressing illicit discharge reports would be clearly identified in the municipality’s legal authority. In Massachusetts, this is typically a combination of the Board of Health, the Department of Public Works (or Highway Department), and the local sanitary sewer department or commission. In some communities, the Conservation Commission may also play a role. This SOP refers to “appropriate authority” generically to reflect differences in how municipalities have identified these roles.

### *Identifying Illicit Discharges*

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

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

Both bacteria and petroleum can create a sheen on the water surface. The source of the sheen can be differentiated by disturbing it, such as with a pole. A sheen caused by oil will remain intact and move in

a swirl pattern; a sheen caused by bacteria will separate and appear “blocky”. Bacterial sheen is not a pollutant but should be noted.

### *Citizen Call in Reports*

Reports by residents and other users of a water body can be effective tools in identifying the presence of illicit discharges. Many communities have set up phone hotlines for this purpose, or have provided guidance to local police departments and dispatch centers to manage data reported in this manner. Municipal employees and the general public should receive education to help identify the signs of illicit discharges and should be informed how to report such incidents.

When a call is received about a suspected illicit discharge, the attached IDDE Incident Tracking Sheet shall be used to document appropriate information. Subsequent steps for taking action to trace, document, and eliminate the illicit discharge are described in the following sections.

Potential illicit discharges reported by citizens should be reviewed on an annual basis to locate patterns of illicit discharges, identify high-priority catchments, and evaluate the call-in inspection program.

### *Tracing Illicit Discharges*

Whenever an illicit discharge is suspected, regardless of how it was identified, the attached IDDE Incident Tracking Sheet should be utilized. The Incident Tracking Sheet shall be provided to the appropriate authority (i.e., Board of Health, Department of Public Works, etc.), which shall promptly investigate the reported incident.

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

1. Review and consider information collected when illicit discharge was initially identified, for example, the time of day and the weather conditions for the previous 72 hours. Also consider and review past reports or investigations of similar illicit discharges in the area.
2. Obtain storm drain mapping for the area of the reported illicit discharge. If possible, use a tracking system that can be linked to your system map, such as GIS.
3. Document current conditions at the location of the observed illicit discharge point, including odors, water appearance, estimated flow, presence of floatables, and other pertinent information. Photograph relevant evidence.
4. If there continues to be evidence of the illicit discharge, collect water quality data using the methods described in SOP 13, “Water Quality Screening in the Field”. This may include using field test kits or instrumentation, or collecting analytical samples for full laboratory analysis.
5. Move upstream from the point of observation to identify the source of the discharge, using the system mapping to determine infrastructure, tributary pipes, and drainage areas that contribute. At each point, survey the general area and surrounding properties to identify potential sources of the illicit discharge. Document observations at each point on the IDDE Incident Tracking Sheet as well as with photographs.
6. Continue this process until the illicit discharge is no longer observed, which will define the boundaries of the likely source. For example if the illicit discharge is present in catch basin 137

but not the next upstream catch basin, 138, the source of the illicit discharge is between these two structures.

If the source of the illicit discharge could not be determined by this survey, consider using dye testing, smoke testing, or closed-circuit television inspection (CCTV) to locate the illicit discharge.

### Dye Testing

Dye testing is used to confirm a suspected illicit connection to a storm drain system. Prior to testing, permission to access the site should be obtained. Dye is discharged into the suspected fixture, and nearby storm drain structures and sanitary sewer manholes observed for presence of the dye. Each fixture, such as sinks, toilets, and sump pumps, should be tested separately. A third-party contractor may be required to perform this testing activity.

### Smoke Testing

Smoke testing is a useful method of locating the source of illicit discharges when there is no obvious potential source. Smoke testing is an appropriate tracing technique for short sections of pipe and for pipes with small diameters. Smoke added to the storm drain system will emerge in connected locations. A third-party contractor may be required to perform this testing activity.

### Closed Circuit Television Inspection (CCTV)

Televised video inspection can be used to locate illicit connections and infiltration from sanitary sewers. In CCTV, cameras are used to record the interior of the storm drain pipes. They can be manually pushed with a stiff cable or guided remotely on treads or wheels. A third-party contractor may be required to perform this testing activity.

If the source is located, follow steps for removing the illicit discharge. Document repairs, new sanitary sewer connections, and other corrective actions required to accomplish this objective. If the source still cannot be located, add the pipe segment to a future inspection program.

This process is demonstrated visually on the last page of this SOP.

### *Removing Illicit Discharges*

Proper removal of an illicit discharge will ensure it does not recur. Refer to Table SOP 10-1, attached for, for examples of the notification process.

In any scenario, conduct a follow up inspection to confirm that the illicit discharge has been removed. Suspend access to the storm drain system if an “imminent and substantial danger” exists or if there is a threat of serious physical harm to humans or the environment.

### *Attachments*

1. Illicit Discharge Incident Tracking Sheet

*Related Standard Operating Procedures*

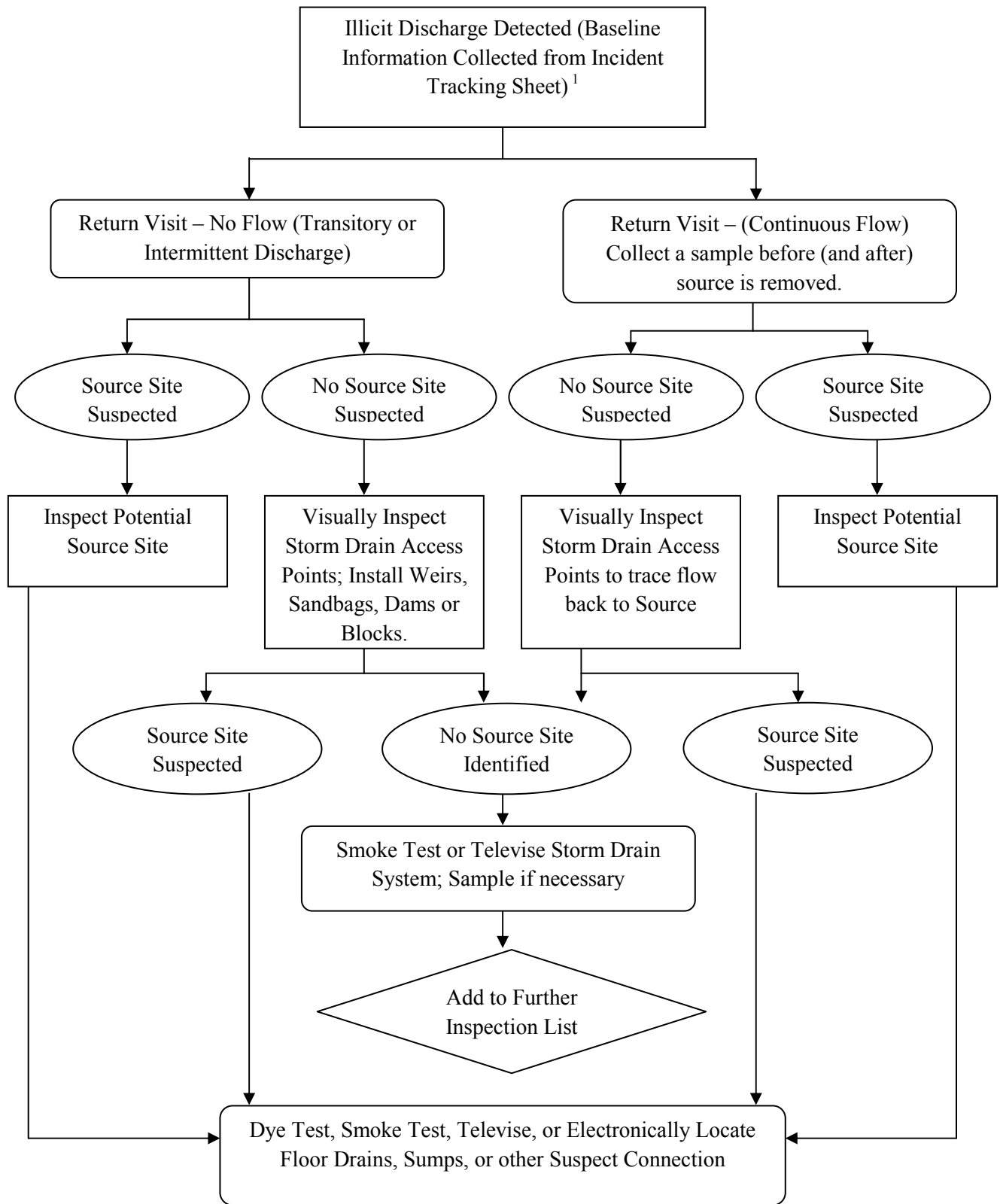
1. SOP 1: Dry Weather Outfall Inspection
2. SOP 2: Wet Weather Outfall Inspection
3. SOP 3: Catch Basin Inspection
4. SOP 13: Using Field Test Kits For Outfall Screening
5. SOP 15: Private Drainage Connections

**Table SOP 10-1**

**Notification and Removal Procedures for Illicit Discharges  
 into the Municipal Separate Storm Sewer System**

<b>Financially Responsible</b>	<b>Source Identified</b>	<b>Enforcement Authority</b>	<b>Procedure to Follow</b>
Private Property Owner	One-time illicit discharge (e.g. spill, dumping, etc.)	Ordinance enforcement authority (e.g. Code Enforcement Officer)	<ul style="list-style-type: none"> <li>• Contact Owner</li> <li>• Issue Notice of Violation</li> <li>• Issue fine</li> </ul>
Private Property Owner	Intermittent or continuous illicit discharge from legal connection	Ordinance enforcement authority (e.g. Code Enforcement Officer)	<ul style="list-style-type: none"> <li>• Contact Owner</li> <li>• Issue Notice of Violation</li> <li>• Determine schedule for removal</li> <li>• Confirm removal</li> </ul>
Private Property Owner	Intermittent or continuous illicit discharge from illegal connection or indirect (e.g. infiltration or failed septic)	Plumbing Inspector or ordinance enforcement authority	<ul style="list-style-type: none"> <li>• Notify Plumbing Inspector or ordinance enforcement authority</li> </ul>
Municipal	Intermittent or continuous illicit discharge from illegal connection or indirect (e.g. failed sewer line)	Ordinance enforcement authority (e.g. Code Enforcement Officer)	<ul style="list-style-type: none"> <li>• Issue work order</li> <li>• Schedule removal</li> <li>• Remove connection</li> <li>• Confirm removal</li> </ul>
Exempt 3 <sup>rd</sup> Party	Any	USEPA	<ul style="list-style-type: none"> <li>• Notify exempt third party and USEPA of illicit discharge</li> </ul>







<sup>1</sup> – *Guidelines and Standard Operating Procedures: Illicit Discharge Detection and Elimination and Pollution Prevention/Good Housekeeping for Stormwater Phase II Communities in New Hampshire*, New Hampshire Estuary Project, 2006, p. 25, Figure 2-1.

### Illicit Discharge Incident Tracking Sheet

Incident ID:			
<b>Responder Information (for Citizen-Reported issues)</b>			
Call Taken By:		Call Date:	
Call Time:		Precipitation (inches) in past 24-48 hours:	
<b>Observer Information</b>			
Date and Time of Observation:		Observed During Regular Maintenance or Inspections? <input type="checkbox"/> Yes <input type="checkbox"/> No	
Caller Contact Information (optional) or Municipal Employee Information:			
<b>Observation Location: (complete one or more below)</b>			
Latitude and Longitude:			
Stream Address or Outfall #:			
Closest Street Address:			
Nearby Landmark:			
<b>Primary Location Description</b>		<b>Secondary Location Description:</b>	
<input type="checkbox"/> Stream Corridor (In or adjacent to stream)		<input type="checkbox"/> Outfall	<input type="checkbox"/> In-stream Flow <input type="checkbox"/> Along Banks
<input type="checkbox"/> Upland Area (Land not adjacent to stream)		<input type="checkbox"/> Near Storm Drain	<input type="checkbox"/> Near other water source (stormwater pond, wetland, ect.):
Narrative description of location:			
<b>Upland Problem Indicator Description</b>			
<input type="checkbox"/> Dumping	<input type="checkbox"/> Oil/Solvents/Chemicals	<input type="checkbox"/> Sewage	
<input type="checkbox"/> Detergent, suds, etc.	<input type="checkbox"/> Other: _____		
<b>Stream Corridor Problem Indicator Description</b>			
Odor	<input type="checkbox"/> None	<input type="checkbox"/> Sewage	<input type="checkbox"/> Rancid/Sour <input type="checkbox"/> Petroleum (gas)
	<input type="checkbox"/> Sulfide (rotten eggs); natural gas	<input type="checkbox"/> Other: Describe in "Narrative" section	
Appearance	<input type="checkbox"/> "Normal"	<input type="checkbox"/> Oil Sheen	<input type="checkbox"/> Cloudy <input type="checkbox"/> Foam
	<input type="checkbox"/> Optical enhancers	<input type="checkbox"/> Discolored	
	<input type="checkbox"/> Other: Describe in "Narrative" section		
Floatables	<input type="checkbox"/> None	<input type="checkbox"/> Sewage (toilet paper, etc)	<input type="checkbox"/> Algae <input type="checkbox"/> Trash or debris
	<input type="checkbox"/> Other: Describe in "Narrative" section		
Narrative description of problem indicators:			
Suspected Source (name, personal or vehicle description, license plate #, address, etc.):			



---

## Appendix G

### IDDE Employee Training Record

Illicit Discharge Detection and Elimination (IDDE)  
Employee Training Record

Town of Templeton, Massachusetts

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

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

Name	Title	Signature