

Illicit Discharge Detection and Elimination Training

Provided by: Central Massachusetts Regional Stormwater Coalition &
Fuss & O'Neill



Illicit Discharge Detection and Elimination (IDDE) is an integral component of any municipal stormwater management program. IDDE requirements in the 2016 National Pollutant Discharge Elimination System (NPDES) General Permit for Stormwater Discharges from Small Municipal Separate Storm Sewer Systems (MS4) in Massachusetts (MS4 Permit) are more complex than the IDDE requirements from the previous permit. Fuss & O'Neill, in partnership with the Central Massachusetts Regional Stormwater Coalition, conducted a training workshop for municipal employees of MS4-regulated communities on implementing IDDE program requirements of the MS4 Permit. The training workshop was held on May 26, 2021 remotely via GoTo Meeting. The training provided at these workshops is also intended to satisfy the MS4 Permit requirements for annual IDDE training as outlined in Section 2.3.4.11 of the MS4 Permit.

While the workshop training presentation focused on IDDE program requirements, the presentation also included general information about all Six Minimum Control Measures and highlighted some of the additional permit requirements. The training presentation included detailed information on the following topics:

- General MS4 Information
 - Brief descriptions of each of the six minimum control measures
- IDDE requirements
- Identification of Illicit Discharges and Sanitary Sewer Overflows
- Safety Considerations for IDDE program staff
- IDDE Program Planning
- Illicit Discharge Source Identification Methods
- Catchment Investigation Planning and Execution

Participants were encouraged to ask questions throughout the presentation. Answers to questions can be found in the recording of the presentation.

If there are additional questions about the MS4 Permit or IDDE requirements, please feel free to contact Fuss & O'Neill directly.

Kerry Reed, P.E.
Co-Chairperson
Central Massachusetts Regional Stormwater Coalition
kr@framinghamma.gov

William Guenther, MS
Project Manager/Senior Scientist
wguenther@fando.com
800.286.2469 x4579
585-770-4320 cell

First Name:	Last Name:	Email Address:	Municipality	Job Title:	What are your specific responsibilities related to MS4 compliance?
Mark	Augello	maugello@sturbridge.gov	town of sturbridge	Operations Manager	oversight of permit, sampling outfalls, outfall inspections, writing all reports , annual report, idde training, attending trainings, stormwater management plans
Michael	Chipman	mchipman@ashlandmass.com	Ashland	Stormwater	Outfall Screening
Eilish	Corey	ecorey@town.auburn.ma.us	Auburn	Senior Civil Engineer	Program manager.
John	Digiaco	jdigiaco@natickma.org	Natick	Assistant Town Engineer	Work with Town Engineer on MS4 Compliance
Sarah	Fortune	sfortune@townpalmer.com	Palmer	Interim Conservation Agent	Just starting to get my feet wet with MS4 compliance. Experience in stormwater permit review and compliance inspections.
Luke	Haberman	lhberman@holdenma.gov	Town of Holden	Civil Engineer	Manage and implement MS4 activities for the Town of Holden.
Paul	Hutnak	phutnak@uxbridge-ma.gov	Uxbridge	Civil Engineer	Compliance suport
Kevin	Langmeyer	klangmeyer@ashlandmass.com	Ashland MA	Stormwater Tech.	All MS4 field work
William	McDowell	wmcdowell@natickma.org	Natick	Town Engineer	Engineering oversees MS4 compliance and reporting
Robert	Oliva	roliva@lunenburgonline.com	Lunenburg	Director	Oversight of the stormwater system and MS4 compliance
Angela	Panaccione	angela.panaccione@townofcharlton.net	Town of Charlton	Conservation Agent	Administration of permit
Joseph	Progin	jprogin@lunenburgonline.com	Lunenburg	Highway Superintendent	manage maintenance of the stormwater system
James	Shuris	jshuris@northbridgemass.org	Northbridge	DPW Director & Town Engineer	Administration & Technical
Gerry	Skowronek	gskowronek@townofpalmer.com	Palmer	DPW Dorector	Oversee entire MS4 program until new stormwater Director is hired
Vincent	Thai	vthai@shrewsburyma.gov	Shrewsbury	Stormwater Coordinator	Coordination of permit compliance activities and day-to-day tasks of said activities
Dan	Van Schalkwyk	dvanschalkwyk@ayer.ma.us	Ayer	Town Engineer	Manage Town's compliance with MS4
Evan	White	ewhite@ashlandmass.com	Ashland	Project Engineer	Primary town compliance responsibilities
Peter	Gerhard	pgerhard@oxfordma.us	Oxford	Project Manager, DPW	



Illicit Discharge Detection and Elimination (IDDE) Training Workshop

Central Massachusetts Regional Stormwater Coalition
(CMRSWC)

May, 2021

Fuss & O'Neill Team

William Guenther, MS
Senior Scientist/Project Manager
wguenther@fando.com
800.286.2469 x4579

Stefan Bengtson, MS
Scientist
sbengtson@fando.com
800.286.2469 x4587

Fuss & O'Neill, Inc.
1550 Main Street, Suite 400
Springfield, MA 01103

Today's Agenda

- Introduction/Tech Minute
- Upcoming Deadlines
- General MS4
- IDDE Requirements
- Identifying Illicit Discharges/SSOs
- Safety Considerations
- IDDE Program Planning
- Source Identification



Upcoming Deadlines – June 30, 2021

- Written SOPs
 - Parks and Open Space
 - Buildings and Facilities
 - Vehicles and Vehicle Maintenance
 - Site Inspection/Enforcement Procedures - Sediment and Erosion Control
- Stormwater Pollution Prevention Plans (SWPPP)
- IDDE Outfall inspections
- Regulatory mechanism for incorporating LID into site design for development sites
- Phosphorus Control Plan funding source assessment
 - Charles R. Watershed
 - Lake Phosphorus TMDLs

Upcoming Deadlines – Year 4

- Regulatory Reviews:
 - Street Design and Parking Lot Guidelines affecting Impervious Cover creation
 - Allowing Green Roofs, Infiltration Practices, Rain Barrels/Cisterns in site development
- Identify 5 Municipal Properties for Stormwater Retrofits
- Nitrogen Source Identification Report
 - Long Island Sound
- Define Phosphorus Control Plan scope
 - Charles R. Watershed
 - Lake Phosphorus TMDLs
- Phosphorus Source Identification Report
 - Non-TMDL Phosphorus Impairments

MS4, what?

Municipal Separate Storm Sewer System (MS4)

- Storm drainage system owned or operated by a municipality, state or federal agency
- Discharges to surface waters

Regulated Small MS4s

- Small MS4 located partially or entirely within an Urbanized Area (defined by 2010 U.S. Census)



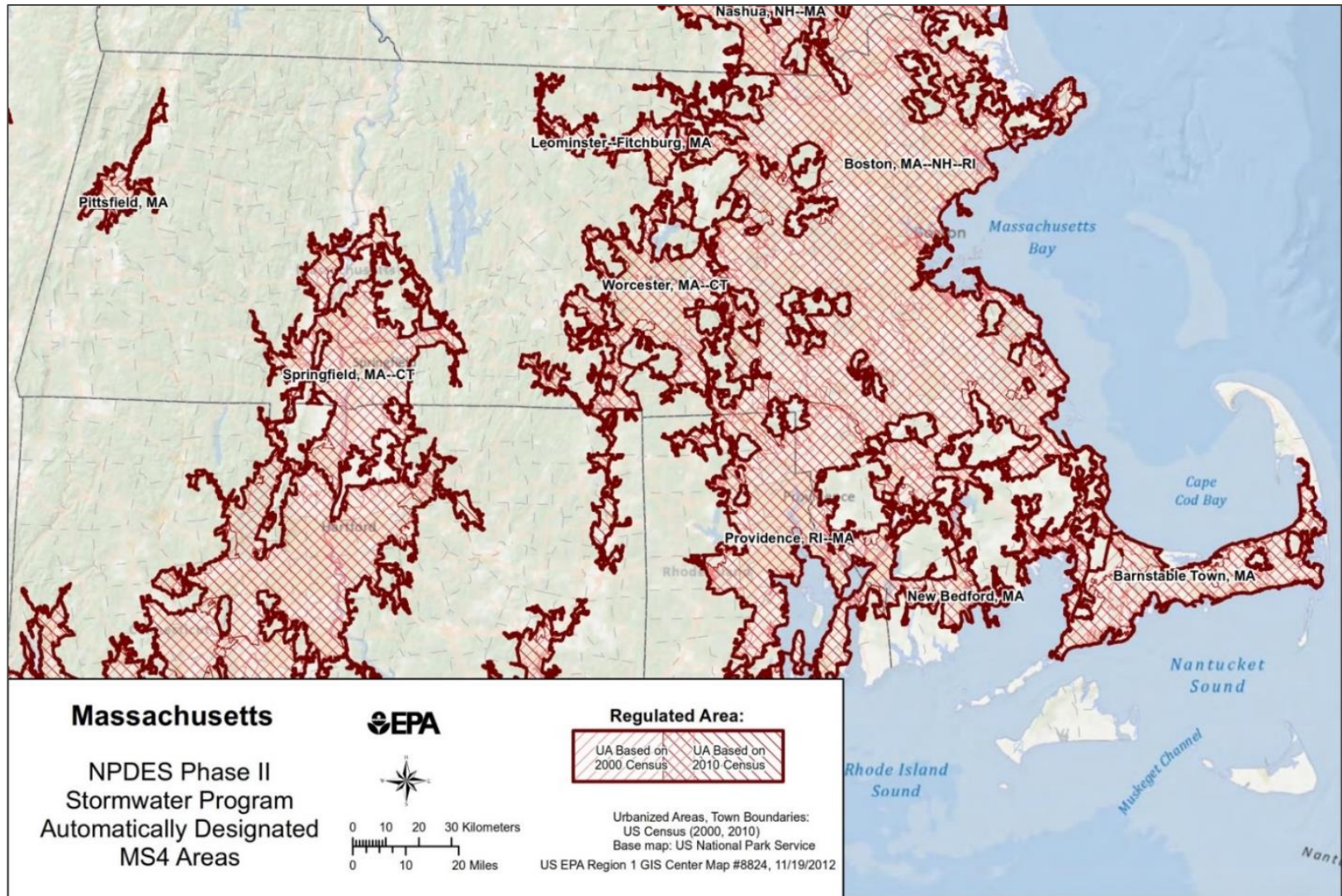
MS4 Permit 101

US Environmental Protection Agency

- Phase II Stormwater Program - 1999
 - Targets smaller communities in “urbanized areas”
 - ***Goal is to reduce the discharge of pollutants to the “maximum extent practicable”***
 - Construction sites disturbing ≥ 1 acre
- General Permit for Stormwater Discharges from Small Municipal Separate Storm Sewer Systems in Massachusetts (MA MS4 Permit)



MS4 Regulated Areas in MA



Phase II Stormwater Program



MCM 1: Public Education and Outreach

- 2 messages each to 4 audiences over term of permit (8 total)
- Audiences
 - Residential
 - Businesses, Institutions, Commercial
 - Industrial
 - Developers
- Additional Messaging for waters subject to a TMDL



MCM 2: Public Participation

- Need to provide opportunities for public participation
- Annual report public notice
- Town website, stormwater committee, public meetings



MCM 4: Construction Site Runoff Controls

- Essentially unchanged from 2003 permit
- Ordinance or regulatory mechanism to control construction site runoff
- Also include controls for other construction related wastes including demolition debris, litter, and sanitary wastes
- Written site plan review procedure (CMRSWC Template)
- Inspections to be conducted both during BMP construction and after to ensure proper installation and operation



MCM 5: Post-Construction Stormwater Management

Development Sites >1 acre

- Controls need to retain 1-inch of runoff from impervious surfaces AND/OR
- Controls need to remove 90% of TSS and 60% of TP (annual load)

Redevelopment Sites >1 acre

- Controls need to retain 0.8-inch of runoff from impervious surfaces AND/OR
- Controls need to remove 80% of TSS and 50% of TP (annual load)



MCM 5: Post-Construction Stormwater Management

- Shall require as-built drawings no later than 2 years after completion of construction projects
- Shall have procedures to ensure long-term operation and maintenance of on site controls
- Within 4 years of the effective date permittees will need to complete a retrofit inventory of at least 5 municipally owned properties.
 - These identified projects can be used for offsite mitigation within same HUC10
 - Municipality needs to keep a rolling list of 5 opportunities



MCM 6: Good Housekeeping

What falls under Good Housekeeping?

- SWPPPs
- Street Sweeping
- Catch Basin Cleaning
- Winter De-Icing Operations



MCM 6: Good Housekeeping (cont.)

- Written O&M Plans
 - Infrastructure
 - Operations (i.e., parks and open space, facilities, and vehicles & equipment)
- Routine cleaning of catch basins such that no basin will be >50% full
 - Need to report total #of catch basins, # inspected, #cleaned, and the total volume/mass of material removed from all catch basins annually
- All streets swept once annually
 - Exceptions – rural uncurbed roads with no catch basins & TMDL watersheds (2x/year)
 - Need to report # of miles cleaned or volume/mass of material removed annually



Infrastructure O&M Plan

CMRSWC Resource

Municipal Stormwater Infrastructure Operation and Maintenance Plan

Central Massachusetts Regional Stormwater Coalition

June 30, 2016



This project has been financed with Funds from the Massachusetts Department of Environmental Protection (the Department). The contents do not necessarily reflect the views and policies of the Department, nor does the mention of trade names or commercial products constitute endorsement or recommendation for use.



Table of Contents

Municipal Stormwater Infrastructure Operation and Maintenance Plan

Central Massachusetts Regional Stormwater Coalition

1	Introduction.....	1
2	Catch Basins	1
3	Streets and Parking Lots	2
4	Catch Basin Cleanings and Street Sweepings	3
5	Winter Road Maintenance	3
6	Structural Stormwater BMPs	4

Appendices

Appendix A – Stormwater Infrastructure Map
Appendix B – Catch Basin Inspection/Cleaning Procedure, Inspection Form, and Log
Appendix C – Street and Parking Lot Sweeping Log
Appendix D – Inventory of Structural Stormwater Best Management Practices
Appendix E – Structural Stormwater BMP Inspection Procedures and Checklists

MCM 6: Good Housekeeping (cont.)

Stormwater Pollution Prevention Plans (SWPPPs)

- New requirement under 2016 permit
- Required for maintenance garages, public works yards, transfer stations, and other waste handling facilities where pollutants are exposed to stormwater
- Covers the following topics specific to the site:
 - Spill Prevention and Response
 - Erosion and Sediment Control (on-site)
 - Salt Storage
 - Training
 - Maintenance

MCM 3: IDDE

- Illicit Discharge Detection and Elimination
- Area of largest change between 2003 and 2016 permit
- 2003 permit required an ordinance, map of **outfalls**
- New permit requirements include:
 - Additional mapping requirements
 - Catchment delineations
 - Dry-weather outfall inspections
 - Catchment Investigations



What are Illicit Discharges?

- Any substance entering storm drain system not entirely composed of stormwater
- Some examples
 - Illegal floor drain connections
 - Broken sanitary sewer lines
 - Sanitary cross-connections
 - Sanitary sewer overflows
 - Car washwater
 - Grass clippings, pet waste, or other material dumped into catch basins



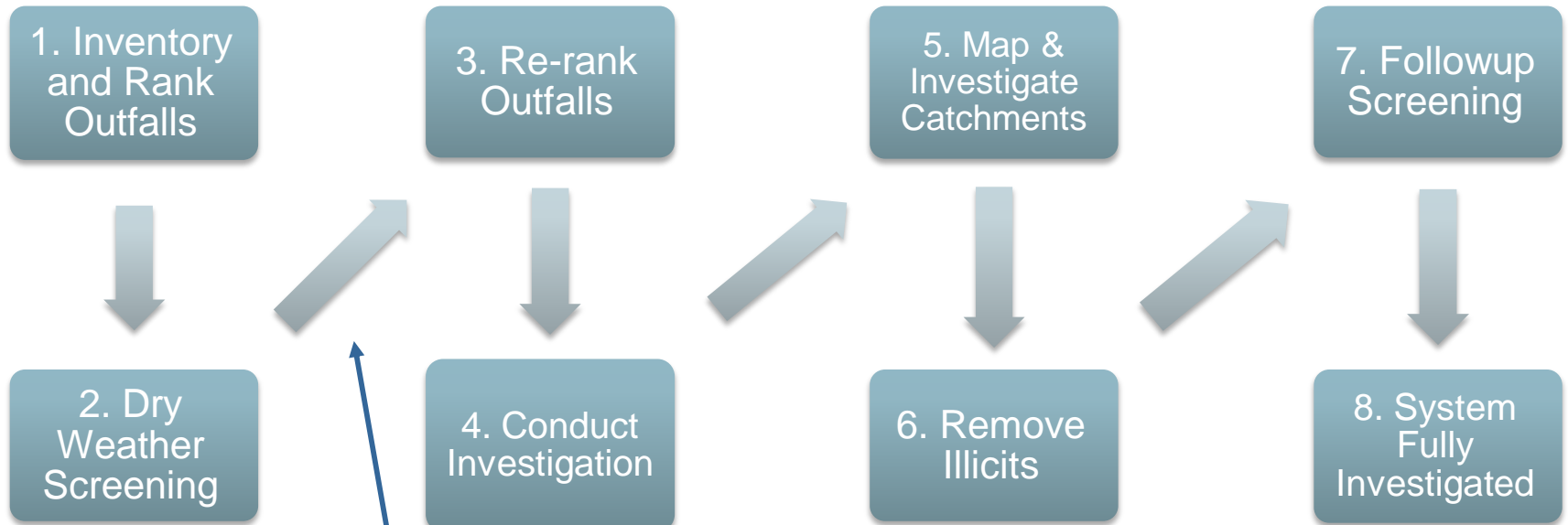
Not All Discharges are Illicit

Permit allows some limited discharges*

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

***Unless you, EPA, or DEP determines these are significant source of pollutants**

New IDDE Program Protocol



**We are
here**

IDDE Requirements & Deadlines

Requirement	1YR	1.5YR	3YR	7YR	10YR
Written IDDE Plan	X				
Outfall/Interconnection Inventory and Ranking	X				
SSO Inventory	X				
Catchment Investigation Procedure		X			
Dry Weather Outfall Sampling			X		
Follow-up ranking of outfalls and interconnections			X		
Catchment Investigations - Problem				X	
Catchment Investigations - Problem, High & Low Priority					X

Red = dry weather outfall screening and sampling

Blue = wet weather screening and sampling

Written IDDE Program

- Required by end of Year 1
- Formal documentation of program and process already in place
- Must describe procedures for
 - Sample collection
 - Use of field kits
 - Storage and conveyance of samples (incl. hold times)
 - Field data collection and storage



Table of Contents

Written Illicit Discharge Detection and Elimination Program Town of Belchertown Belchertown, Massachusetts

1	Introduction	3
1.1	MS4 Program	3
1.2	Illicit Discharges	3
1.3	Allowable Non-Stormwater Discharges	4
1.4	Receiving Waters and Impairments	4
1.5	Written IDDE Program Goals, Framework, and Timeline	5
1.6	Work Completed to Date	7
2	Authority and Statement of IDDE Responsibilities	8
2.1	Legal Authority	8
2.2	Statement of Responsibilities	8
3	Stormwater System Mapping	10
3.1	Phase I Mapping	10
3.2	Phase II Mapping	11
3.3	Additional Recommended Mapping Elements	12
4	Sanitary Sewer Overflows (SSOs)	13
5	Assessment and Priority Ranking of Outfalls	15
5.1	Outfall Catchment Delineations	15
5.2	Outfall and Interconnection Inventory and Initial Ranking	15
6	Dry Weather Outfall Screening and Sampling	24
6.1	Weather Conditions	24
6.2	Dry Weather Screening/Sampling Procedure	24
6.2.1	General Procedure	24
6.2.2	Field Equipment	25
6.2.3	Sample Collection and Analysis	26
6.3	Interpreting Outfall Sampling Results	28
6.4	Follow-up Ranking of Outfalls and Interconnections	29
7	Catchment Investigations	29
7.1	System Vulnerability Factors	30
7.2	Dry Weather Manhole Inspections	33
7.3	Wet Weather Outfall Sampling	34
7.4	Source Isolation and Confirmation	35

Written IDDE Program – Template



Table of Contents

Illicit Discharge Detection and Elimination (IDDE) Plan Town of Belchertown

1	Introduction.....	3
1.1	MS4 Program.....	3
1.2	Illicit Discharges	3
1.3	Allowable Non-Stormwater Discharges.....	4
1.4	Receiving Waters and Impairments.....	4
1.5	Written IDDE Program Goals, Framework, and Timeline.....	5
1.6	Work Completed to Date.....	7
2	Authority and Statement of IDDE Responsibilities	8
2.1	Legal Authority.....	8
2.2	Statement of Responsibilities	8
3	Stormwater System Mapping	9
3.1	Phase I Mapping	9
3.2	Phase II Mapping.....	10
3.3	Additional Recommended Mapping Elements	10
4	Sanitary Sewer Overflows (SSOs)	11
5	Assessment and Priority Ranking of Outfalls	13
5.1	Outfall Catchment Delineations	13
5.2	Outfall and Interconnection Inventory and Initial Ranking.....	13
6	Dry Weather Outfall Screening and Sampling	16
6.1	Weather Conditions.....	16
6.2	Dry Weather Screening/Sampling Procedure.....	16
6.2.1	General Procedure.....	16
6.2.2	Field Equipment.....	17
6.2.3	Sample Collection and Analysis.....	18
6.3	Interpreting Outfall Sampling Results.....	20
6.4	Follow-up Ranking of Outfalls and Interconnections	21
7	Catchment Investigations	22
7.1	System Vulnerability Factors.....	22
7.2	Dry Weather Manhole Inspections	24
7.3	Wet Weather Outfall Sampling.....	25
7.4	Source Isolation and Confirmation	26
7.4.1	Sandbagging.....	26
7.4.2	Smoke Testing.....	26



7.4.3	Dye Testing.....	27
7.4.4	CCTV/Video Inspection.....	27
7.4.5	Optical Brightener Monitoring.....	28
7.4.6	IDDE Canines.....	28
7.5	Illicit Discharge Removal.....	28
7.5.1	Confirmatory Outfall Screening	28
7.6	Ongoing Screening.....	29

8	Training	30
----------	-----------------------	-----------

9	Progress Reporting	31
----------	---------------------------------	-----------

Tables

Table 1-1.	Impaired Waters.....	5
Table 1-2.	Written IDDE Program Implementation Timeline.....	6
Table 2-1.	IDDE Program Responsibilities.....	8
Table 4-1.	SSO Inventory.....	12
Table 6-1.	Field Equipment – Dry Weather Outfall Screening and Sampling.....	17
Table 6-2.	Sampling Parameters and Analysis Methods.....	19
Table 6-3.	Required Analytical Methods, Detection Limits, Hold Times, and Preservatives ⁴	20
Table 6-4.	Benchmark Field Measurements for Select Parameters.....	21
Table 7-1.	Outfall Catchment System Vulnerability Factor (SVF) Inventory.....	23

Figures

Figure 1-1.	IDDE Investigation Procedure Framework.....	6
-------------	---	---

Appendices

Appendix A –	Illicit Connections and Discharges to the Municipal Storm Drainage System Bylaw
Appendix B –	Storm System Mapping
Appendix C –	Outfall Inventory and Priority Ranking
Appendix D –	Field Forms, Sample Bottle Labels, and Chain of Custody Forms
Appendix E –	Water Quality Analysis Instructions, User's Manuals and Standard Operating Procedures
Appendix F –	IDDE Employee Training Record
Appendix G –	Source Isolation and Confirmation Methods: Instructions, Manuals, and SOPs

Written IDDE Program – Template

- Instruction boxes
- Boilerplate text
- Highlighted text to add or edit
 - Community-specific information



1 Introduction

Instructions: Throughout this document, the symbol '##' has been used to represent locations where community or site-specific information is required.

1.1 MS4 Program

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

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

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

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

1.2 Illicit Discharges

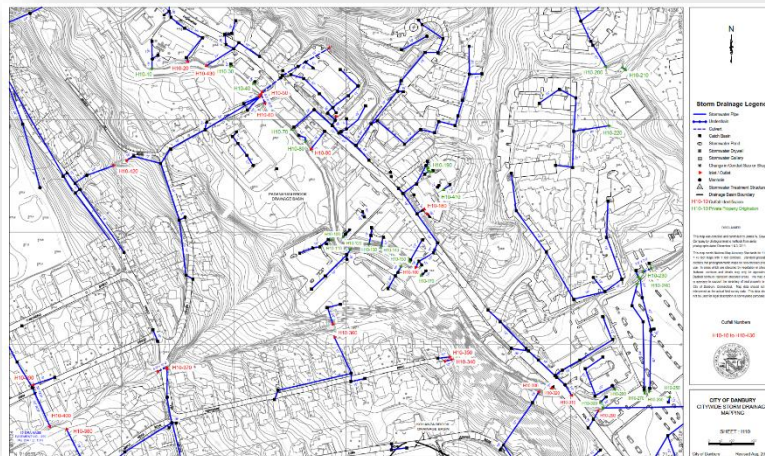
An "illicit discharge" is any discharge to a drainage system that is not composed entirely of stormwater, with the exception of discharges pursuant to a NPDES permit (other than the NPDES permit for discharges from the MS4) and discharges resulting from fire-fighting activities.

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

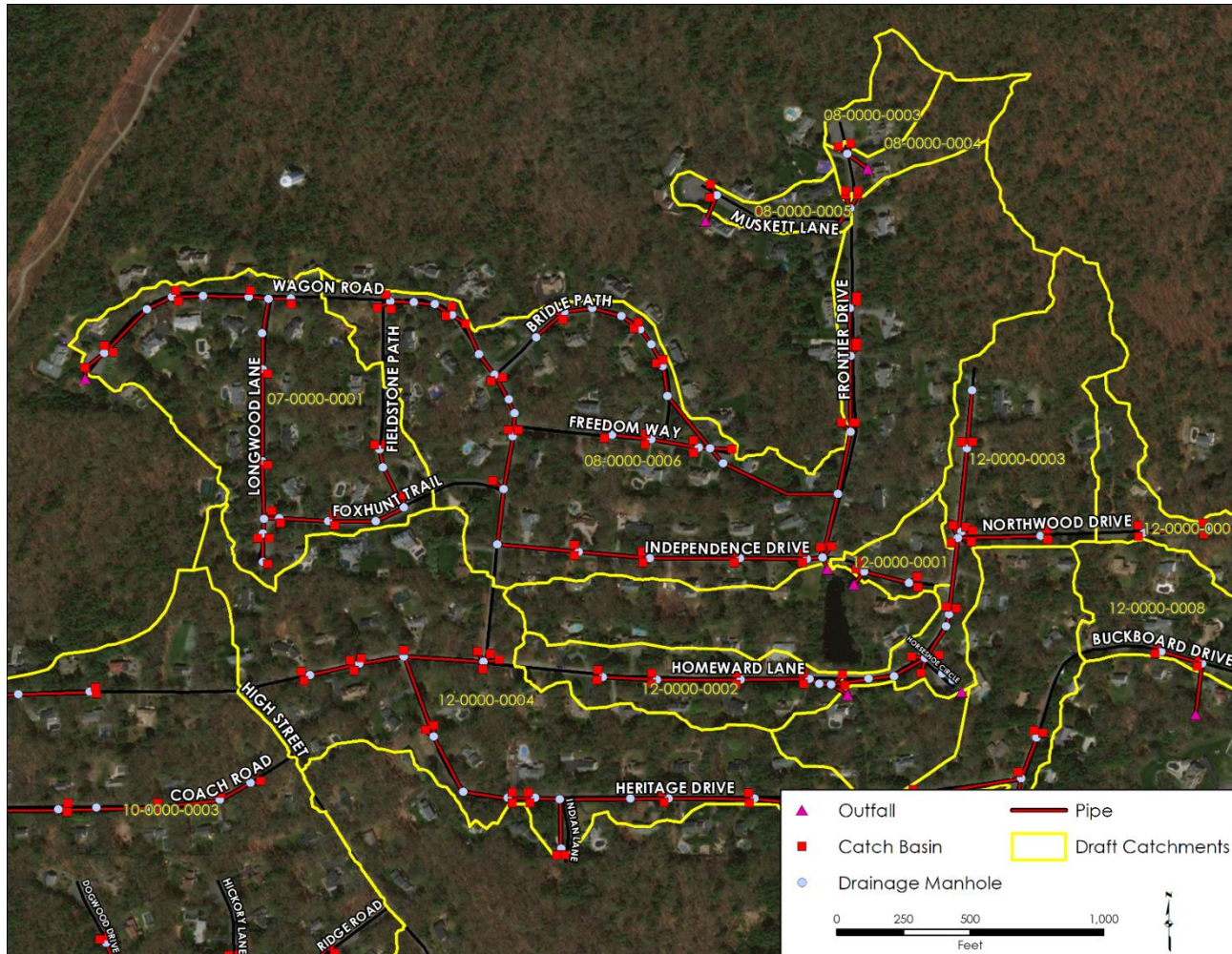
Some illicit discharges are intentional, such as dumping used oil (or other pollutant) into catch basins, a resident or contractor illegally tapping a new sewer lateral into a storm drain pipe to avoid the costs of a sewer connection fee and service, and illegal dumping of yard wastes into surface waters.

Storm System Mapping

- Outfalls, manholes, catch basins, pipes, interconnections, and refined catchment delineations by year 10
- Much of this info will be needed earlier to complete catchment delineations and investigations
- Outgoing interconnections are outfalls



Delineation Example



Sanitary Sewer Overflows (SSOs)

- Inadequate conveyance capacity
- Inventory of locations going back 5 years
- Must report new SSOs to EPA
 - Verbally w/in 24 hours
 - In writing within 5 days
- Requires mitigation and corrective action



Sanitary Sewer Overflows

- Inventory and subsequent reports to EPA must contain:
 - Location (street crossing/address and receiving water)
 - Did SSO enter stream/pond directly or MS4?
 - Date(s) and time(s) of beginning and end of discharge
 - Estimate volume of discharge
 - Description, including known or suspected cause
 - Mitigation and corrective measures completed, with dates
 - Mitigation and corrective measures planned, with implementation schedule

Priority Ranking Criteria

Rank using the following criteria:

- Past discharge complaints/reports
- Poor receiving water quality (Impairment/TMDL)
- Density of generating sites
- Age of development and infrastructure
- Sewer conversion
- Historically combined systems
- Surrounding density of aging septic systems
- Culverted streams longer than a simple road crossing

**No mention of how to rank based on criteria,
just that these criteria be used

Outfall/Catchment Ranking

- Ranking grouped into the following categories:
 - **Problem:** Known or suspected illicit discharges based on existing info
 - **High Priority:** Discharging to an area of concern or previous evidence of an illicit discharge
 - **Low Priority:** Lack of screening or system vulnerability factors
 - **Excluded:** No potential for illicit discharges



Dry Weather Outfall Inspection/Sampling

- For each outfall and interconnection, conduct visual inspection during dry weather

Basic Information

- Unique identifier
- Receiving water
- Date of most recent inspection
- Dimensions
- Shape
- Material (concrete, PVC)
- Spatial location (latitude & longitude with a minimum accuracy of +/-30 feet)
- Physical condition

Evidence of Non-Stormwater Flows

- Odor: sewage, sulfur, sour, rancid, petroleum/gas smells
- Visual: color, turbidity (cloudy water), floatables (suds, toilet paper), or oil sheen

Types of Illicit Discharges

- Continuous
 - Cross connected sewer
- Intermittent
 - Cross connected residential laundry
- Transitory
 - dumping



Common Illicit Discharges

- Cross connected sewer line



Common Illicit Discharges

- Failing septic system/cross connected septic



Common Illicit Discharges

- Sanitary Sewer Overflows



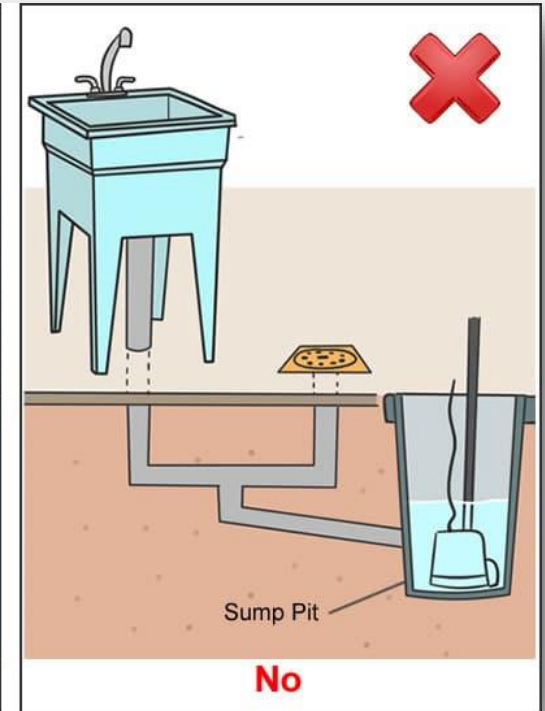
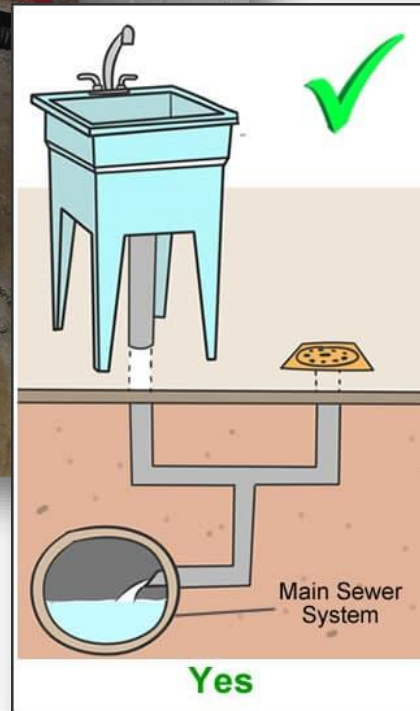
Common Illicit Discharges

- Floor drains



Common Illicit Discharges

- Contaminated sump pumps



Common Illicit Discharges

- Chlorinated pool water
 - Never drain to street or driveway
 - Let pool water stand for one week
 - Dechlorinate before draining (<1ppm)
 - Neutralize pH (6.5 – 8.5)
 - Slowly discharge to pervious surfaces



Common Illicit Discharges

- Construction site runoff



Common Illicit Discharges

- Dumping



Common Illicit Discharges

- Fats, Oils, and Grease from dumpsters



Common Illicit Discharges

- Spills



Illicit Discharges – Visual Indicators

Natural Sheen vs. Synthetic Sheen



Natural sheen



Synthetic sheen

Foam and Suds



Low severity, naturally occurring suds



High severity suds

Illicit Discharges – Visual Indicators

Sanitary sewer input



There could be a noticeable smell

Sanitary sewer input, trash



Illicit Discharges – Olfactory Indicators

- Sewage smell
- “Fresh” or “Clean”
- Gas or petroleum



Likely Sewer Input Indicators

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

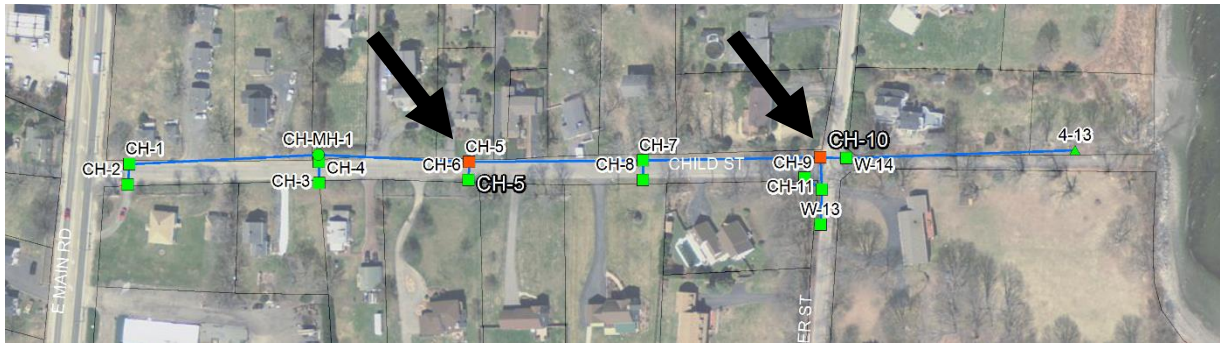
Evidence of Flow: <input type="checkbox"/> Yes <input type="checkbox"/> No If Yes, Description of Flow: <input type="checkbox"/> Damp <input type="checkbox"/> Trickle <input type="checkbox"/> Moderate <input type="checkbox"/> High			
Visual Evidence of Illicit Discharge Visual Inspection: <input type="checkbox"/> 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			
Olfactory Evidence of Illicit Discharge 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

Revise Initial Outfall Priority Ranking

- Due June 2021
- Based on Outfall Investigation results
- Outfalls with Likely Sewer Input Indicators
 - Automatically top of priority list
- Other outfall ranking changes at permittee's discretion

Catchment Investigations

- System Vulnerability Factors (SVF) – indicators of likely sanitary sewer input
 - SSOs, sanitary/storm pipe alignment crossings, past CSO areas, infiltration/inflow, high septic failure rate, etc.
- Key Junction Manholes to streamline effort



Isolate pipe segment where illicit discharge enters system

Catchment Investigations

- Where System Vulnerability Factor(s) present, must also conduct wet-weather sampling (i.e., during rain event)
 - Do high sanitary flows during wet weather or high-groundwater in Title 5 system areas enter storm drain system?
- When pipe segment is identified, locate source
 - Video investigation
 - Smoke/dye testing
- Work with property owner or use bylaw enforcement mechanism to remove any illicit connections found
- Document investigations and enforcement/removal actions
 - Include in Annual Reports

Outfall and Catchment Investigation How-To

- Safety Considerations
- IDDE Program Planning and Procedures



General Safety Considerations

- Traffic
- Weather
- Water Quality
- Insects: Ticks, Bees, Hornets & Wasps, Mosquitos
- Plants: Poison Ivy, Poison Sumac, Poison Oak
- Excessive Heat
- Slips/Trips/Falls
- Drowning
- Stuck in mud



Example Job Hazard Analysis (JHA)

Job Hazard Analysis (JHA)

PROJECT/PROJECT LOCATION:		DATE:		<input type="checkbox"/> NEW <input type="checkbox"/> REVISED	PAGE 1 of 1
PROJECT/TASK NUMBER:		TASK ACTIVITY: Conduct Dry-Weather IDDE Inspection/Sampling		TASK DESCRIPTION: Collect samples of potential illicit discharges at outfalls or stormwater structures	
PREPARER(S)		REVIEWED BY		SITE CONTACT	EMERGENCY CONTACT
MINIMUM REQUIRED PERSONAL PROTECTIVE EQUIPMENT (SEE CRITICAL ACTIONS FOR TASK-SPECIFIC REQUIREMENTS)					
<input type="checkbox"/> SAFETY VEST <input type="checkbox"/> HARD HAT <input type="checkbox"/> LIFELINE / BODY HARNESS <input type="checkbox"/> SAFETY GLASSES		<input type="checkbox"/> GOGGLES <input type="checkbox"/> FACE SHIELD <input type="checkbox"/> HEARING PROTECTION <input type="checkbox"/> SAFETY SHOES		<input type="checkbox"/> AIR PURIFYING RESPIRATOR <input type="checkbox"/> PPE CLOTHING TYPE: <input type="checkbox"/> LIFE JACKET (PFD)	
				<input type="checkbox"/> GLOVES (Type <u>nitrile</u>) <input type="checkbox"/> FIRE EXTINGUISHER <input type="checkbox"/> CONES <input type="checkbox"/> OTHER	
JOB STEPS		POTENTIAL HAZARDS		CRITICAL ACTIONS	

Site-Specific Training Requirements:

Field Team Member Review of JHA

I have read and understand the JHA and will comply with the provisions contained herein.

Name Printed

Signature

Date

Example Job Hazard Analysis (JHA)

Job Hazard Analysis (JHA)

PROJECT/PROJECT LOCATION:		DATE:		<input type="checkbox"/> NEW <input type="checkbox"/> REVISED	PAGE 1 of 1
PROJECT/TASK NUMBER:		TASK ACTIVITY: Conduct Dry-Weather IDDE Inspection/Sampling		TASK DESCRIPTION: Collect samples of potential illicit discharges at outfalls or stormwater structures	
PREPARER(S)		REVIEWED BY		SITE CONTACT	EMERGENCY CONTACT
MINIMUM REQUIRED PERSONAL PROTECTIVE EQUIPMENT (SEE CRITICAL ACTIONS FOR TASK-SPECIFIC REQUIREMENTS)					
<input checked="" type="checkbox"/> SAFETY VEST <input type="checkbox"/> HARD HAT <input type="checkbox"/> LIFELINE / BODY HARNESS <input checked="" type="checkbox"/> SAFETY GLASSES		<input type="checkbox"/> GOGGLES <input type="checkbox"/> FACE SHIELD <input type="checkbox"/> HEARING PROTECTION <input type="checkbox"/> SAFETY SHOES		<input type="checkbox"/> AIR PURIFYING RESPIRATOR <input checked="" type="checkbox"/> PPE CLOTHING TYPE: <u>Warm Clothing, Hi-Vis Vest</u> <input type="checkbox"/> LIFE JACKET (PFD)	
<input checked="" type="checkbox"/> GLOVES (Type <u>nitrile</u>) <input type="checkbox"/> FIRE EXTINGUISHER <input checked="" type="checkbox"/> CONES <input type="checkbox"/> OTHER					
JOB STEPS		POTENTIAL HAZARDS		CRITICAL ACTIONS	
1. Arrive on site 2. Evaluate traffic hazard 3. Access outfall 4. Collect Sample (As Necessary) 5. Conduct field kit tests		1. Slip, trip, fall 2. Weather exposure 3. Traffic 4. Ticks 5. Poison Ivy / Poison Sumac 6. Falling into water 7. Confined Space 8. Lifting Posture While Removing Heavy Covers-Back Injuries Losing Control Of Cover While Trying To Remove, Pinched Hands & Feet 9. Pathogen exposure		1. Use appropriate foot wear. Avoid steep slopes 2. Wear clothing appropriate to conditions. Bring wet-weather clothing in case of rain. Use sunscreen as needed 3. Park car in safe location where possible. If working in roadway, park vehicle between traffic and work site, set up cones around site and vehicle, and use hazard lights. Wear high visibility vest. Be vigilant and aware of surroundings at all times. 4. Wear long sleeves and pants. Tuck pants into socks. Check for ticks upon returning, utilize tick repellent 5. Be able to recognize plant and avoid, use tecnu wash if contact made 6. Bring a change of cloths, Wear a PFD as appropriate 7. DO NOT ENTER ANY STRUCTURE OR CONFINED SPACE 8. Use magnetic manhole lifter to open structure and manipulate cover. Set up cones around open structure. 9. Wear nitrile gloves and safety glasses when collecting samples. Wash hands before eating. Keep cell phone on you in case of emergency	

Site-Specific Training Requirements:

Field Team Member Review of JHA

I have read and understand the JHA and will comply with the provisions contained herein.

Name Printed

Signature

Date

Safety Minute

What's wrong with this picture?



Safety Minute

What's wrong with this picture?



IDDE Program Planning

- Equipment Checklist
- Sampling Procedure
- Data Collection Options
- Weather Considerations
- Source Identification

Outfall Sampling Checklist

Equipment needed for both screening and sampling:

- ☐ Clipboard
- ☐ Field Sheets/ Tablet
- ☐ Pens/Pencils/Permanent Markers
- ☐ Dry Erase Board and Markers
- ☐ Measuring Tape
- ☐ Flashlight/Headlamp with Batteries
- ☐ Digital Camera (or phone with a camera)
- ☐ GPS Receiver (or phone with a GPS app.)
- ☐ Manhole Cover Assisted Opener, Pry Bar, Pick, and/or Manhole Lifter
- ☐ Small Mallet or Hammer
- ☐ Appropriate footwear (Boots and/or Waders)
- ☐ Reflective Vest
- ☐ Traffic Cones
- ☐ Poison Ivy Scrub

Equipment needed for sampling:

- ☐ Sampling Pole
- ☐ Utility Knife
- ☐ Zip ties/Duct Tape
- ☐ Safety Glasses
- ☐ Nitrile Gloves
- ☐ Hand Sanitizer
- ☐ Chain of Custody Forms
- ☐ Cooler with Ice
- ☐ Water Quality Sonde (if needed/available for conductivity, temperature and pH)
- ☐ Water Quality Meter (if needed/available for ammonia, surfactants and/or chlorine)
- ☐ Test Kits (if needed/available for ammonia and surfactants)
- ☐ Labels for sample bottles
- ☐ Sample bottles (bring some extras; bacteria bottles need to be sterile)
- ☐ Sand bags (for damming low flows)

It's a lot of stuff. Stay organized and prep all gear the day before inspection/sampling.

General Inspection/Sampling Procedure

1. Identify Outfall to Inspect/Sample
2. Fill out all sample information on field sheets and bottles as completely as possible
3. Conduct Visual and Olfactory Investigation
4. If sampling, put on protective gloves (nitrile/latex/other)
5. If using a sampling pole: triple rinse dipper in distilled water and then in water to be sampled (not for bacteria sampling)
6. Collect sample with pole or directly in sample containers. Do Not Disturb Sediments.
7. Collect additional samples as necessary depending on parameters
8. Conduct Test Strip and Test Kit analyses as needed
9. Conduct meter readings as needed (Rinse similar to sampling pole dipper)
10. Place Lab samples on ice, fill out Chain of Custody
11. Deliver samples to lab
12. Dispose of used test strips and test kit ampules properly

Paper vs. Digital Data Collection

Outfall/Catchment Screening Form



Catchment ID: _____ Town: _____

Inspector: _____ Date/Time: _____

Street Name: _____

Last rainfall event (date and amount): _____

Type of Sampling Event ☐ Dry Weather Screening ☐ Wet Weather Sampling

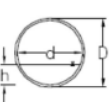
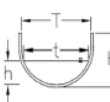
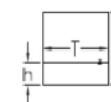
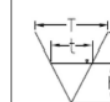




Location: ☐ Outfall ☐ Manhole ☐ Catch Basin ☐ Interconnection

Is outfall submerged/inundated? ☐ Yes ☐ No If YES screen/sample at 1" non-influenced structure: ☐ MH ☐ CB

Location ID: _____ Latitude: _____ Longitude: _____

Shape of Pipe/Swale (check one)

				
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Rounded Pipe	Rounded Swale	Rectangular Pipe/Swale	Triangular Swale	Trapezoidal Swale

Outfall Material: <input type="checkbox"/> Concrete <input type="checkbox"/> HDPE <input type="checkbox"/> Corrugated Metal Pipe (CMP) <input type="checkbox"/> Ductile Iron <input type="checkbox"/> Clay <input type="checkbox"/> PVC <input type="checkbox"/> Other	Pipe Measurements: Inner Dia. (in.): d = _____ Outer Dia. (in.): D = _____ Pipe Width (in.): W = _____ Pipe Height (in.): H = _____ Flow Depth (in.): h = _____	Swale Measurements: Swale Width (in.): T = _____ Flow Width (in.): t = _____ Swale Height (in.): H = _____ Flow Depth (in.): h = _____ Bottom Width (in.): b = _____
--	---	--

Outfall/Manhole/Catchbasin Condition:
☐ Good ☐ Fair ☐ Poor ☐ Crumbling

Evidence of Flow: ☐ Yes ☐ No If Yes, Description of Flow: ☐ Damp ☐ Trickle ☐ Moderate ☐ High

Visual Evidence of Illicit Discharge
 Visual Inspection: ☐ None ☐ Floatables ☐ Pet Waste ☐ Oily Sheen ☐ Sanitary Waste ☐ Algae ☐ Foam

Olfactory Evidence of Illicit Discharge
 Olfactory Inspection: ☐ None ☐ Sewage Smell ☐ Musty ☐ Rotten Eggs ☐ Ammonia ☐ Petroleum

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

Dry Weather Sampling Form

Sample Start Time *
 April 11, 2019 1:50 PM

Sampler Name(s) *

Last Rain Date *
 Date of last precipitation >0.1 inches, recorded at Groton Airport [Click here](#)
 Date

Last Rain Amount *
 Amount of precipitation >0.1 inches, recorded at Groton Airport

Sample Location

Is the outfall inundated? *
☐ Yes ☐ No

Picture *

Sample Info

How much flow is present? *
☐ Dry ☐ Damp (wet, no flow) ☐ Trickle (minor flow) ☐ Moderate flow ☐ High flow

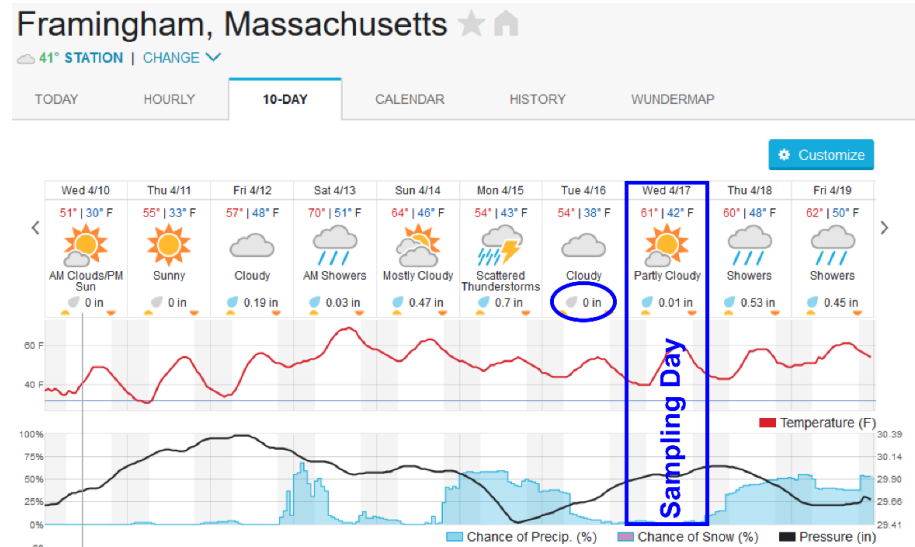
Are there any visual indicators of illicit discharge? *
☐ None ☐ Floatables ☐ Pet waste ☐ Oily sheen ☐ Sanitary waste
☐ Excessive algae ☐ Foam

Are there any smells indicating illicit discharge? *
☐ None ☐ Sewage smell ☐ Must ☐ Rotten eggs ☐ Ammonia
☐ Petroleum ☐ Clean laundry

Dry-Weather Considerations

1 week prior to screening



- Look at the extended forecast for a day that will meet dry weather criteria
 - < 0.1 inch of rain in the past 24 hours and no significant snow melt.
 - Get weather data
 - Use Weather Underground or similar weather service
- <https://www.wunderground.com>
- Enter your town/city in the search bar. Hourly forecasts with rain totals and historical rainfall data are provided.
 - Acquire all required field equipment. See the Outfall Screening Equipment Checklist.



Dry-Weather Considerations

1 day prior to screening



- Verify that dry weather criteria will be met for the following day: < 0.1 inch of rain in the past 24 hours and no significant snow melt.
- Identify outfalls to be screened based on initial outfall inventory and priority ranking. Plan a route to minimize driving time.
- Gather all required field equipment. See the Outfall Screening Equipment Checklist.



Framingham, Massachusetts  














42° STATION | [CHANGE](#) ✓

TODAY **HOURLY** 10-DAY CALENDAR HISTORY WUNDERMAP

< Hourly Forecast for Tomorrow, Thursday 04/11 >

 **Tomorrow 04/11**  0% / 0 in
Mainly sunny. High near 55F. Winds NW at 10 to 15 mph.

 **Tomorrow Night 04/11**  0% / 0 in
Mainly clear skies. Low 33F. Winds light and variable.

Time	Conditions	Temp.	Feels Like	Precip	Amount	Cloud Cover	Dew Point	Humidity	Wind	Pressure
7:00 am	 Sunny	32 °F	26 °F	1%	0 in	6%	20 °F	61%	7 mph NW	30.16 in
8:00 am	 Sunny	36 °F	29 °F	0%	0 in	2%	21 °F	53%	9 mph NNW	30.19 in
9:00 am	 Sunny	39 °F	33 °F	0%	0 in	0%	20 °F	44%	10 mph NW	30.21 in
10:00 am	 Sunny	43 °F	37 °F	0%	0 in	2%	18 °F	37%	10 mph NW	30.21 in
11:00 am	 Mostly Sunny	45 °F	40 °F	0%	0 in	25%	17 °F	33%	9 mph NW	30.22 in
12:00 pm	 Mostly Sunny	47 °F	43 °F	0%	0 in	29%	17 °F	30%	9 mph NW	30.22 in
1:00 pm	 Sunny	49 °F	46 °F	0%	0 in	1%	17 °F	27%	8 mph NW	30.21 in
2:00 pm	 Sunny	51 °F	48 °F	0%	0 in	0%	17 °F	26%	8 mph NW	30.21 in
3:00 pm	 Sunny	53 °F	50 °F	0%	0 in	1%	17 °F	24%	8 mph NW	30.20 in
4:00 pm	 Sunny	54 °F	51 °F	0%	0 in	16%	17 °F	23%	8 mph NW	30.20 in
5:00 pm	 Sunny	54 °F	51 °F	0%	0 in	4%	17 °F	23%	8 mph WNW	30.22 in
6:00 pm	 Sunny	53 °F	50 °F	0%	0 in	7%	19 °F	26%	7 mph NW	30.24 in
7:00 pm	 Sunny	50 °F	48 °F	0%	0 in	12%	21 °F	31%	6 mph NNW	30.25 in



Wet-Weather Considerations

1 week prior to screening

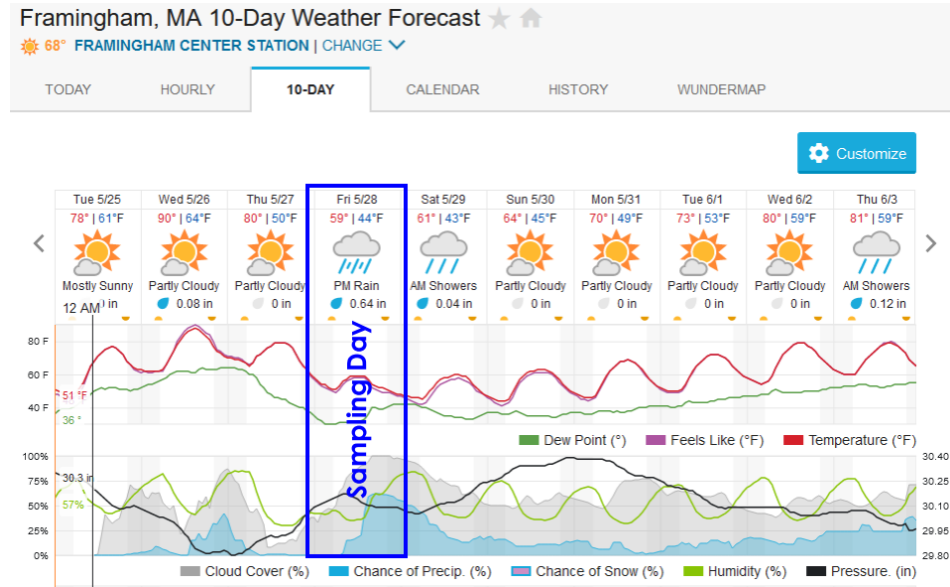
- Look at the extended forecast for a day that will meet wet weather criteria

Typically >0.1 inches of rain, enough to generate flow at outfall

- Get weather data
- Use Weather Underground or similar weather service

<https://www.wunderground.com>

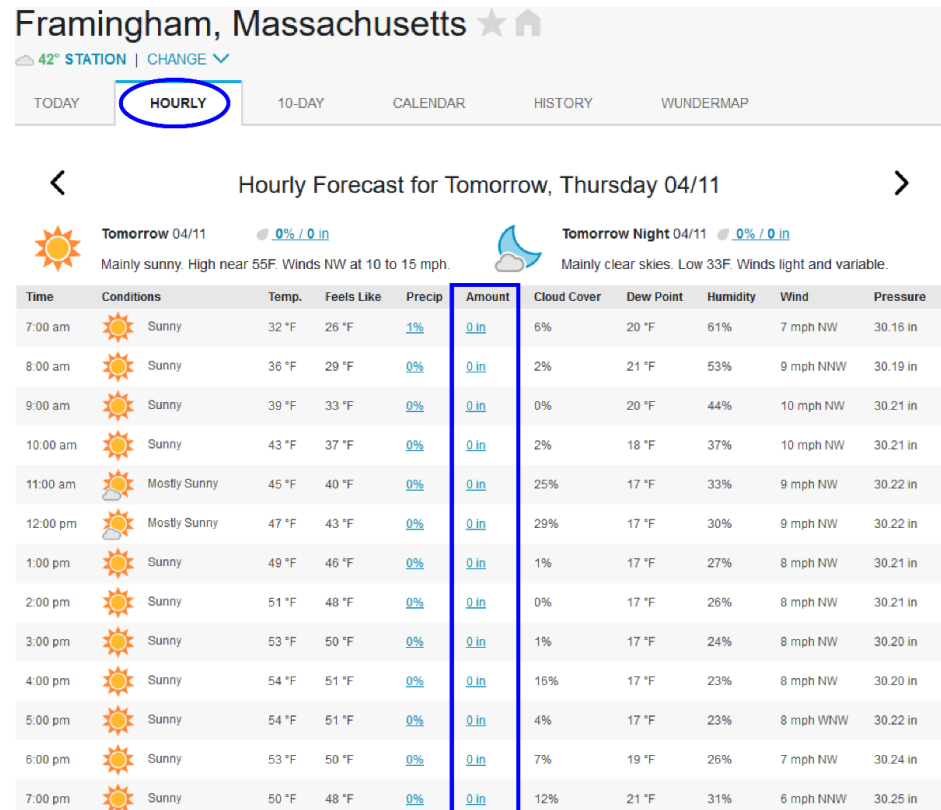
- Avoid late night and weekend sampling
- Acquire all required field equipment. See the Outfall Screening Equipment Checklist.



Wet-Weather Considerations

Preparation: 1 day prior to screening

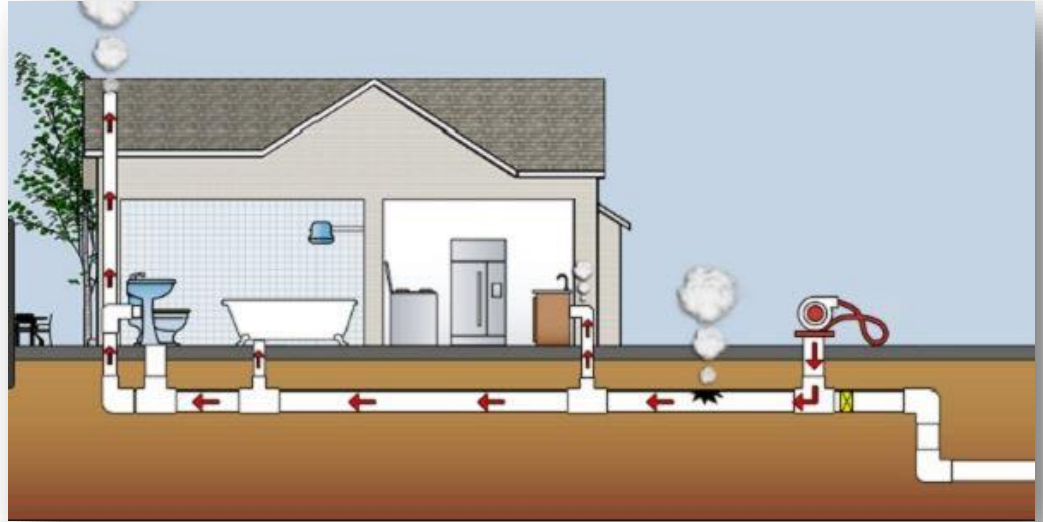
- Verify that wet weather criteria will be met for the following day
- Identify outfalls to be screened based on SVF analysis. Plan a route to minimize driving time.
- Gather all required field equipment. See the Outfall Screening Equipment Checklist.



Source Identification



Source Identification



Source Identification

- **Identify and Remove Illicit Discharge**
- **Work with property owner and/or use bylaw enforcement**
- **Follow-up Inspection/Sampling**



QUESTIONS?



William Guenther, MS
Senior Scientist/Project Manager
wguenther@fando.com
800.286.2469 x4579