

# Town of Halifax

## Stormwater Management Program

For Coverage Under The

National Pollutant Discharge Elimination System (NPDES)  
General Permit for Municipal Separate Storm Sewer Systems (MS4)



Town of Halifax  
499 Plymouth Street  
Halifax MA, 02338

EPA NPDES Permit Number MA041035  
2021 Annual Update

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# Certification

"I certify under penalty of law that this document and all attachments were prepared under my direction or supervision in accordance with a system designed to assure that qualified personnel properly gathered and evaluated the information submitted. Based on my inquiry of the person or persons who manage the system, or those persons directly responsible for gathering the information, the information submitted is, to the best of my knowledge and belief, true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment for knowing violations."

Printed Name: Charlie Seelig

Signature: 

Date: 6/30/2021

# Background

The Town of Halifax (Halifax) understands the threat of pollution from stormwater and erosion. Halifax is committed to stormwater protection for the benefit of its residents, visitors, and the people of Massachusetts. Halifax's Stormwater Management Program (SWMP) outlines Halifax's existing and planned measures to address these threats and to comply with the National Pollutant Discharge Elimination System (NPDES) Phase II General Permit for Municipal Separate Storm Sewer Systems (MS4s).

## Regulatory Context

The Stormwater Phase II Final Rule was promulgated in 1999 and was the next step after the 1987 Phase I Rule in EPA's effort to preserve, protect, and improve the Nation's water resources from polluted stormwater runoff. The Phase II program expands the Phase I program by requiring additional operators of MS4s in urbanized areas and operators of small construction sites, through the use of NPDES permits, to implement programs and practices to control polluted stormwater runoff. Phase II is intended to further reduce adverse impacts to water quality and aquatic habitat by instituting the use of controls on the unregulated sources of stormwater discharges that have the greatest likelihood of causing continued environmental degradation. Under the Phase II rule all MS4s with stormwater discharges from Census designated Urbanized Area are required to seek NPDES permit coverage for those stormwater discharges.

On May 1, 2003, EPA Region 1 issued its Final General Permit for Stormwater Discharges from Small Municipal Separate Storm Sewer Systems (2003 small MS4 permit) consistent with the Phase II rule. The 2003 small MS4 permit covered "traditional" (i.e., cities and towns) and "non-traditional" (i.e., Federal and state agencies) MS4 Operators located in the states of Massachusetts and New Hampshire. This permit expired on May 1, 2008 but remained in effect until operators were authorized under the 2016 MS4 general permit, which became effective on July 1, 2018.

Additional permit modifications were incorporated January 6, 2021, including updating the deadlines for construction and post-construction stormwater bylaws to the end of Permit Year 3 (June 30, 2021).

## Stormwater Management Program (SWMP)

The SWMP describes and details the activities and measures that will be implemented to meet the terms and conditions of the permit. The SWMP accurately describes the permittees plans and activities. The document should be updated and/or modified during the permit term as the permittee's activities are modified, changed or updated to meet permit conditions during the permit term. The main elements of the stormwater management program are (1) a public education program in order to affect public behavior causing stormwater pollution, (2) an opportunity for the public to participate and provide comments on the stormwater program (3) a program to effectively find and eliminate illicit discharges within the MS4 (4) a program to effectively control construction site stormwater discharges to the MS4 (5) a program to ensure that stormwater from development projects entering the MS4 is adequately controlled by the construction of stormwater controls, and (6) a good housekeeping program to ensure that stormwater pollution sources on municipal properties and from municipal operations are minimized.

The SWMP describes the activities and measures, or Best Management Practices (BMPs), that Halifax will implement to meet the terms and conditions of the permit. The SWMP has been prepared to comply with the overall general permit. Halifax will update and/or modify the document during the permit term as Halifax's activities are modified, changed, or updated to meet permit conditions. The main elements of the SWMP are organized by minimum control measures (MCMs), water supply protection measures, and additional BMPs for discharges to water quality limited waterbodies.

MCM 1: A public education program aiming to affect public behavior causing stormwater pollution,

MCM 2: An opportunity for the public to participate and provide comments on the stormwater program,

MCM 3: A program to effectively find and eliminate illicit discharges within the MS4,

MCM 4: A program to effectively control construction site stormwater discharges to the MS4,

MCM 5: A program to ensure that stormwater from development projects entering the MS4 is adequately controlled by the construction of stormwater controls,

MCM 6: A good housekeeping program to ensure that stormwater pollution sources on Halifax properties and from town operations are minimized,

Water Supply Protection: Measures to protect surface public drinking water sources, and

TMDLs and Water Quality Impairments: Enhanced and additional BMPs to reduce pollutants of concern discharging to waterbodies with water quality impairments and Total Maximum Daily Loads (TMDLs) related to urban stormwater runoff.

This SWMP has been updated as of June 30, 2021 and replaces the previous SWMP.

## Halifax MS4 Background

Most of Halifax is within the Taunton River Watershed. Water quality in Halifax is an important concern due to the recreational uses of Monponsett Pond and other area waterbodies. Additionally, the northeast corner of Halifax falls within the watershed of Silver Lake, the drinking water source for Brockton, MA. Halifax was authorized to discharge stormwater under the 2003 MS4 Permit and is currently authorized under the 2016 MS4 Permit.

Halifax has many on-going programs to protect the water quality of water resources in and around the Town. Halifax participates in the Monponsett Pond Watershed Association, an advocacy group focused on protecting the water quality of the Pond. Frequent water quality testing is conducted throughout the summer months in the Pond to inform the public of the safety and condition of the Pond. Catchment areas and drainage infrastructure surrounding the Pond have been delineated to support the Town's efforts to identify sources of potential pollutants entering the Pond and impacting water quality. The Highway Department in Halifax conducts on-going maintenance of the drainage infrastructure in the Town, including cleaning sediment from the roads and catch basins and repairing deficient structures. The Board of Health ensures septic systems within in the Town, and especially around the Pond, are frequently maintained and functioning properly.

Through implementation of this SWMP, the existing programs to protect the water quality of water resources in Halifax will be enhanced and new programs will be added.

# Small MS4 Authorization

Halifax submitted its revised Notice of Intent (NOI) on March 22, 2019. EPA granted Authorization to Discharge on May 30, 2019. The NOI and Authorization Letter can be found at the following web address:

- NOI: <https://www3.epa.gov/region1/npdes/stormwater/ma/tms4noi/halifax.pdf>
- Authorization Letter: <https://www3.epa.gov/region1/npdes/stormwater/ma/tms4noi/halifax-auth.pdf>

## Stormwater Management Program Team

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# Receiving Waters

➤ The following table lists all receiving waters, impairments and number of outfalls discharging to each waterbody segment.

Waterbody segment that receives flow from the MS4	Number of outfalls into receiving water segment	Chloride	Chlorophyll-a	Dissolved Oxygen/ DO Saturation	Nitrogen	Oil & Grease/PAH	Phosphorus	Solids/TSS/Turbidity	E. Coli	Enterococcus	Other pollutant(s) causing impairments
East Monponsett Pond	30		X								Category 5: Harmful Algal Blooms, Mercury in Fish Tissue
West Monponsett Pond	16		X				X				Category 5: Harmful Algal Blooms, Transparency / Clarity
Plymouth Street Pond	25										Category 3
Winnetuxet River	12										Category 3
Silver Lake	13										Category 4C
Taunton River	7								X		Category 5
Elm Street Pond	3										Category 3

# Eligibility: Endangered Species and Historic Properties

The Town of Halifax completed the ESA eligibility process outlined in the MS4 Permit Appendix C. According to the U.S. Fish & Wildlife Service (USFWS) Information for Planning and Consultation (IPaC) tool, potential habitat for Northern Long-eared Bat and the Plymouth Redbelly Turtle occur within Halifax.

In a letter dated September 24, 2018, USFWS issued a determination that stormwater discharge activities associated with the 2016 MS4 Permit may affect, but are not likely to adversely affect, certain species listed under the ESA when specific conditions are met. A copy of the letter is included within Halifax's NOI here:

<https://www3.epa.gov/region1/npdes/stormwater/ma/tms4noi/halifax.pdf>

In accordance with the above referenced USFWS letter, Halifax confirms that the following conditions are true:

1. All stormwater discharges are pre-existing or previously permitted by EPA;
2. Any planned operations and maintenance work covered by this permit will only affect previously disturbed areas where stormwater controls are already installed. In these situations, the chance of encountering any of the subject species is discountable;
3. The project implements EPA MS4 Best Management Practices (BMPs) and meets Clean Water Act and Massachusetts Water Quality Standards. Although permitted discharges may reach the environment used by these species, BMPs reduce pollutants to the extent that discharges are not known to have measurable impacts on these species or their habitat;
4. No new construction or structural BMPs are proposed under this permit at this time; and
5. Halifax agrees that if, during the course of the permit term, DCR plans to install a structural BMP not identified in the NOI, DCR will re-initiate consultation with the USFWS as necessary.

In accordance with the ESA eligibility process outlined in MS4 Permit Appendix C, Halifax certifies permit eligibility with the ESA under **Criterion B**.

USFWS Criterion B: *In the course of formal or informal consultation with the Fish and Wildlife Service, under section 7 of the ESA, the consultation resulted in either a no jeopardy opinion (formal consultation) or a written concurrence by USFWS on a finding that the stormwater discharges and discharge related activities are "not likely to adversely affect" listed species or critical habitat (informal consultation).*

## National Historic Preservation Act (NHPA) Eligibility Determination

Halifax determined that operation of its MS4 system does not have the potential to cause effects on historic properties. Halifax does not plan to undertake any activity involving subsurface land disturbance less than an acre in the vicinity of historic properties. If, during the course of the permit term, the Town plans to undertake subsurface land disturbance less than an acre in the vicinity of a historic property, Halifax will assess the potential for the activity to affect the historic property and will consult with the Massachusetts Historical Commission as appropriate.

In accordance with the NHPA eligibility process outlined in the MS4 Permit Appendix D, Halifax certifies permit eligibility with the NHPA under **Criterion A**.

NHPA Criterion A: *The discharges do not have the potential to cause effects on historic properties.*



# MCM 1 Public Education and Outreach

Permit Part 2.3.2

## Objective

The objective of Halifax's public education and outreach program is to increase knowledge and change behavior of the public so that stormwater pollutants are reduced.

## Program Overview

Halifax's public education program is structured in accordance with the MS4 Permit at Part 2.3.2 and with specific requirements for impaired waterbodies in MS4 Permit Appendix H and waterbodies with an approved TMDL in MS4 Permit Appendix F. The messages target residents, businesses, institutions, commercial, and industrial facilities, and developers and focus on reducing stormwater pollutants that are most likely to be generated on these properties and/or to impact Halifax's receiving waterbodies. Topics may include:

- Pet waste,
- Erosion and sedimentation,
- Material and waste management,
- Lawn care, and
- Low Impact Development.

The educational messages will be distributed through a range of forums, selected to best reach each target audience. Each public education BMP has a measurable goal, which Halifax will assess annually to ensure that educational messages are reaching target audiences effectively.

The following table summarizes the educational messages, target audiences, and distribution schedule.

BMP	Target Audience	Schedule by Permit Year (Fiscal Year)				
		1 (FY19)	2 (FY20)	3 (FY21)	4 (FY22)	5 (FY23)
1.01: Spring Educational Message	Residents; Businesses, institutions, and commercial facilities	x	x	x	x	x
1.02: Summer Educational Message	Residents; Businesses, institutions, and commercial facilities	x	x	x	x	x
1.03: Fall Educational Message	Residents; Businesses, institutions, and commercial facilities	x	x	x	x	x
1.04: Residential and Commercial Educational Messages	Residents; Businesses, institutions, and commercial facilities		x		x	
1.05: Industrial Facility Educational Messages	Industrial facilities			x		x
1.06: Developer (construction) Educational Messages	Developers (construction)			x		x

1.07: Septic System Owners Educational Message	Residents	x	x	x	x	x
BMP 1.08: Dog Owner Education	Residents			x	x	x

### BMP 1.01: Spring Educational Message

#### Description:

Halifax will distribute educational messages each Spring (March/April) highlighting proper use and disposal of grass clippings and proper use of slow-release and phosphorus-free fertilizers. Messages will be distributed via the popular Halifax Facebook pages, the Halifax Board of Health Facebook page, the Town Website, and/or brochures/pamphlets available at Town Hall.

#### Targeted Audience:

- Residents
- Businesses, institutions and commercial facilities

#### Responsible Department/Parties:

- Board of Health

#### Measurable Goal(s):

- Number of messages distributed

### BMP 1.02: Summer Educational Message

#### Description:

Halifax will distribute educational messages each summer (June/July) highlighting proper management of pet wastes. Messages will be distributed via the popular Halifax Facebook pages, the Halifax Board of Health Facebook page, the Town Website, and/or brochures/pamphlets available at Town Hall.

#### Targeted Audience:

- Residents
- Businesses, institutions and commercial facilities

#### Responsible Department/Parties:

- Board of Health

#### Measurable Goal(s):

- Number of messages distributed

### BMP 1.03: Fall Educational Message

#### Description:

Halifax will distribute educational messages each Fall (August/September/October) highlighting proper disposal of leaf litter. Messages will be distributed via the popular Halifax Facebook pages, the Halifax Board of Health Facebook page, the Town Website, and/or brochures/pamphlets available at Town Hall.

**Targeted Audience:**

- Residents
- Businesses, institutions and commercial facilities

**Responsible Department/Parties:**

- Board of Health

**Measurable Goal(s):**

- Number of messages distributed
- 

**BMP 1.04: Residential and Commercial Educational Messages****Description:**

Halifax will post material on the popular Halifax Facebook pages, the Halifax Board of Health Facebook page, the Town Website, and/or brochures/pamphlets available at Town Hall, including information about lawn care, proper automotive maintenance, maintenance of septic systems, reducing the use of deicing materials, and/or Low Impact Development practices.

**Targeted Audience:**

- Residents
- Businesses, institutions and commercial facilities

**Responsible Department/Parties:**

- Board of Health

**Measurable Goal(s):**

- Distribute at least twice per permit term and spaced at least a year apart
  - Number of views
- 

**BMP 1.05: Industrial Facility Educational Message****Description:**

Halifax will post pollution prevention information on the popular Halifax Facebook pages, the Halifax Board of Health Facebook page, the Town Website, and/or brochures/pamphlets available at Town Hall, including information about equipment maintenance, site landscaping, irrigation, waste disposal, chemical storage, and/or spill prevention and response.

**Targeted Audience:**

- Industrial facilities

**Responsible Department/Parties:**

- Board of Health

**Measurable Goal(s):**

- Distribute at least twice per permit term and spaced at least a year apart
  - Number of views
-

## BMP 1.06: Developer (construction) Educational Message

### Description:

Halifax will distribute a handout highlighting erosion and sediment control with permits from the Planning Board. Messages on Low Impact Development practices will also be posted on the Halifax website.

### Targeted Audience:

- Developers (construction)

### Responsible Department/Parties:

- Board of Health
- Planning Board

### Measurable Goal(s):

- Number of handouts distributed
  - Number of views
- 

## BMP 1.07: Septic System Owners Educational Message

### Description:

Halifax will distribute educational messages about septic systems. Messages will be distributed via the popular Halifax Facebook pages, the Halifax Board of Health Facebook page, the Town Website, and/or brochures/pamphlets available at Town Hall.

### Targeted Audience:

- Residents

### Responsible Department/Parties:

- Board of Health

### Measurable Goal(s):

- Number of messages
  - Number of views, likes, and/or shares
- 

## BMP 1.08: Dog Owner Education

### Description:

All dogs must be licensed by June 1st in Halifax. Starting Permit Year 3, the Halifax Town Clerk will distribute a fact sheet about pet waste management to dog owners seeking or renewing dog licenses.

### Targeted Audience:

- Residents, dog owners

### Responsible Department/Parties:

- Board of Health
- Town Clerk

**Measurable Goal(s):**

- Number of fact sheets distributed

# MCM 2 Public Involvement and Participation

Permit Part 2.3.3

## Objective

Halifax's objective for its Public Involvement and Participation program is to engage the public in review and implementation of the SWMP.

## Program Overview

The following table summarizes the public involvement and participation BMPs and schedule.

BMP	Schedule by Permit Year (Fiscal Year)				
	1 (FY19)	2 (FY20)	3 (FY21)	4 (FY22)	5 (FY23)
2.01: Public Review of SWMP	x	x	x	x	x
2.02: Water Quality Data Posting	x	x	x	x	x
2.03: Hazardous Waste Collection Days	x	x	x	x	x
2.04: Annual Report Public Review	x	x	x	x	x
2.05: Partnership with Monponsett Watershed Association	x	x	x	x	x
2.06: Halifax Cleanup Day	x	x	x	x	x

## BMP 2.01: Public Review of Stormwater Management Program

### Description:

Halifax will post its SWMP on the Town's website to allow for ongoing public review. When a new version of the SWMP becomes available, Halifax will post on the home page to notify the public that the SWMP is available for review. Contact information is provided on the Town's website to allow the public to submit feedback on the SWMP or other stormwater management topics. Halifax will continue to update as needed. Halifax will allow annual public review and comment on the SWMP.

### Responsible Department/Parties:

- Town Administrator

### Measurable Goal(s):

- SWMP is publicly available on website
- Number of views
- Number of comments received

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## BMP 2.02: Water Quality Data Posting

### Description:

Halifax will make bacteria and cyanobacteria water quality testing results for Monponsett Ponds available on the Town's public webpage during beach season (Memorial Day-Labor Day). Results will also be posted on social media.

### Responsible Department/Parties:

- Board of Health
- Town Administrator

**Measurable Goal(s):**

- Number of views
- 

### **BMP 2.03: Hazardous Waste Collection Days**

**Description:**

Halifax will hold regular (e.g., annual or biannual) Hazardous Waste Collection Days to collect household hazardous waste and used oil.

**Responsible Department/Parties:**

- Halifax Recycling Center

**Measurable Goal(s):**

- Annual Hazardous Waste Collection Day held
  - Number of residents participating
- 

### **BMP 2.04: Annual Report Public Review**

**Description:**

Halifax will post its MS4 Annual report on the Town's website each year to allow for public review.

**Responsible Department/Parties:**

- Town Administrator

**Measurable Goal(s):**

- Number of views
- 

### **BMP 2.05: Partnership with Monponsett Watershed Association**

**Description:**

Halifax will continue its partnership with the Monponsett Watershed Association.

**Responsible Department/Parties:**

- Town Administrator

**Measurable Goal(s):**

- Number of meetings attended
- 

### **BMP 2.06: Halifax Cleanup Day**

**Description:**

Halifax will continue to organize and/or support Halifax Cleanup Day, an annual event encouraging residents to help clean the town and ponds, typically held in the spring around Earth Day. Fall clean-up days may also be held.

**Responsible Department/Parties:**

- Beautification Committee
- Highway Department

**Measurable Goal(s):**

- Number of participants at annual event
  - Amount of waste collected at annual event
-



# MCM 3 Illicit Discharge Detection and Elimination (IDDE) Program

Permit Part 2.3.4

## Objective

Halifax's objective for the IDDE program is to systematically find and eliminate illicit sources of non-stormwater discharges to its MS4 and to prevent such discharges.

## Program Overview

The following table summarizes the IDDE BMPs and schedule.

BMP	Schedule by Permit Year (Fiscal Year)				
	1 (FY19)	2 (FY20)	3 (FY21)	4 (FY22)	5 (FY23)
3.01: IDDE Legal Authority		x	x		
3.02: Sanitary Sewer Overflow (SSO) Inventory	x	x	x	x	x
3.03: Map of Storm Sewer System	x	x	x	x	x
3.04: IDDE Program	x	x	x	x	x
3.05: Employee Training	x	x	x	x	x

## BMP 3.01: IDDE Legal Authority

### Description:

In Permit Year 2 (2019-2020), Halifax developed a draft IDDE bylaw for passage at Town Meeting. The June 2020 Town Meeting was postponed due to COVID-19 public health crisis, so Halifax passed the bylaw at the rescheduled Town Meeting in September 2020. The IDDE bylaw provides 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; and implement appropriate enforcement procedures and actions. The bylaw identifies the Board of Health as the responsible authority. Halifax is currently working to implement edits to the bylaw proposed by the Massachusetts Attorney General and will finalize the bylaw as soon as feasible.

### Department Responsible for Enforcement:

- Town Administrator
- Board of Health

### Measurable Goal(s):

- Develop within 3 years of permit effective date (June 30, 2021).

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## BMP 3.02: Sanitary Sewer Overflow (SSO) Inventory

### Description:

Halifax will develop an inventory of sanitary sewer overflows (SSOs) that have occurred over the past 5 years and will update that list annually. An SSO is a discharge of untreated sanitary wastewater from a municipal sanitary sewer. While Halifax does not currently have Town-owned sanitary sewers, the SSO inventory will continue to be included in the written IDDE Program (BMP 3.04).

**Responsible Department/Parties:**

- Board of Health
- Highway Department

**Measurable Goal(s):**

- Complete within 1 year and update annually

**SSO Reporting:**

In the event of an overflow or bypass, a notification must be reported within 24 hours by phone to MassDEP, EPA, and other relevant parties. Follow up the verbal notification with a written report following MassDEP's Sanitary Sewer Overflow (SSO)/Bypass notification form within 5 calendar days of the time you become aware of the overflow, bypass, or backup.

The MassDEP contacts are:

Southeast Region: (508) 946-2750  
20 Riverside Drive  
Lakeville, MA 02347

The EPA contacts are:

EPA New England: (617) 918-1510  
5 Post Office Square  
Boston, MA 02109

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### **BMP 3.03: Map of Storm Sewer System**

**Description:**

Halifax will update its storm sewer map during IDDE program implementation. Mapping showing the storm sewer system map will be available for public viewing via a web map:

<http://vhb.maps.arcgis.com/apps/webappviewer/index.html?id=c1dfedc2a65545c98761d0ca7b70b30f>

Halifax will incrementally add drainage structures and treatment facilities, with associated data, to its GIS map. As the map is further developed, Halifax will evaluate whether facilities and outfalls meet the MS4 Permit definitions for regulated outfalls. A regulated outfall is defined by 40 CFR § 122.2 as the point where the MS4 discharges to waters of the United States.

The Phase I map, completed by June 30, 2020, includes:

- Outfalls
- Open channel conveyances (swales, ditches, etc.)
- Interconnections with other MS4s and other storm sewer systems
- Known Halifax -owned stormwater treatment structures (e.g., detention and retention basins, infiltration systems, bioretention areas, water quality swales, gross particle separators, oil/water separators, or other proprietary systems)
- Waterbodies identified by name and indication of all use impairments as identified on the most recent EPA approved Massachusetts Integrated List of Waters report
- Surface public drinking water supplies, watersheds, and protection zones
- Initial catchment delineations. A catchment is the area that drains to an individual outfall or interconnection.

Halifax completed the Phase I map by June 30, 2020 based on available information and will continue to update the Phase I map, as new information is identified and/or new infrastructure is installed.

The Phase II map, scheduled to be completed by June 30, 2028, will include:

- Outfall spatial location (latitude and longitude with a minimum accuracy of +/-30 feet)
- Pipes
- Manholes
- Catch basins
- Refined catchment delineations. Catchment delineations will be updated to reflect information collected during catchment investigations
- Septic systems, where applicable

**Responsible Department/Parties:**

- Highway Department

**Measurable Goal(s):**

- Completed the Phase I map by the end of Permit Year 2 (June 30, 2020)
  - Update of Phase II within 10 years of permit effective date (June 30, 2028)
- 

### **BMP 3.04: IDDE Program**

**Description:**

Halifax will continue to create and implement a written IDDE program including: ordinance, by-law, or regulatory mechanism, procedure for catchment investigations, outfall screening procedure for dry and wet weather; determine authority that will implement all aspects of the IDDE Program; conduct priority ranking of the outfalls discharging to the priority waterbodies; complete dry weather and wet weather screening of all outfalls, complete catchment investigations of entire MS4, and eliminate any identified illicit discharges.

The Halifax IDDE Plan is provided as an appendix of this SWMP and provides the specific procedures, timelines, and responsible parties for implementing the IDDE program.

**Responsible Department/Parties:**

- Highway Department

**Measurable Goal(s):**

- Completed written plan within 1 year of the effective date of permit and update as required
  - Continue to update IDDE Plan annually
  - Number of illicit discharges identified and eliminated
- 

### **BMP 3.05: Employee Training**

**Description:**

Halifax will train employees on IDDE implementation and how to recognize and respond to illicit discharges and SSOs.

**Responsible Department/Parties:**

- Highway Department

**Measurable Goal(s):**

- Hold annual training
- Number of employees trained annually

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# MCM 4 Construction Site Stormwater Runoff Control

Permit Part 2.3.5

## Objective

Halifax's objective for its construction stormwater runoff control program is to minimize or eliminate erosion and maintain sediment on site so that it is not transported in stormwater and allowed to discharge to a water of the U.S. through Halifax's MS4.

## Program Overview

The following table summarizes Construction Site Stormwater Runoff Control BMPs and schedule.

BMP	Schedule by Permit Year (Fiscal Year)				
	1 (FY19)	2 (FY20)	3 (FY21)	4 (FY22)	5 (FY23)
4.01: Sediment and Erosion Control Bylaw		x	x		
4.02: Site Plan Review Procedures		x	x	x	x
4.03: Site Inspections		x	x	x	x

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### BMP 4.01: Sediment and Erosion Control Bylaw

#### Description:

In 2019, Halifax developed a Town bylaw which requires the use of sediment and erosion control at construction sites in accordance with 2.3.5 c. i. of the 2016 permit and developed regulations for specific implementation details in Permit Year 3. In addition to addressing sediment and erosion control, the bylaw includes controls for other wastes on construction sites such as demolition debris, litter and sanitary wastes. The bylaw passed Town meeting on October 21, 2019 and associated regulations were implemented by the Conservation Commission June 22, 2021.

#### Department Responsible for Enforcement:

- Town Administrator
- Conservation Commission
- Planning Board

#### Measurable Goal(s):

- Develop within 3 years of permit effective date (June 30, 2021)

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### BMP 4.02: Site Plan Review Procedures

#### Description:

Halifax's bylaw listed under BMP 4.01 includes written procedures for site plan review and inspection and enforcement, and Halifax developed more detailed procedures under the regulations implemented in Permit Year 3. The bylaw and regulations site plan review procedure includes a pre-construction review by the town of the site design, the planned

operations at the construction site, planned BMPs during the construction phase, and the planned BMPs to be used to manage runoff created after development. The bylaw and regulations review procedure incorporates procedures for the consideration of potential water quality impacts, and procedures for the receipt and consideration of information submitted by the public. The bylaw and regulations site plan review procedure also includes evaluation of opportunities for use of low impact design and green infrastructure. When the opportunity exists, Halifax will encourage project proponents to incorporate these practices into the site design. Halifax will ensure that the bylaw and associated regulations are implemented for all applicable projects to meet permit requirements.

Halifax will conduct a site plan review on all projects requiring site plan review according to the procedures outlined above.

**Responsible Department/Parties:**

- Town Administrator
- Conservation Commission
- Planning Board

**Measurable Goal(s):**

- Complete within year 3 of the effective date of permit
  - Number of site plan reviews conducted annually
- 

### **BMP 4.03: Site Inspections and Enforcement of Sediment and Erosion Control Measures Procedures**

**Description:**

Halifax's bylaw listed under BMP 4.01 includes written procedures for site inspections and enforcement of sediment and erosion control, and Halifax developed more detailed procedures under the regulations developed in Permit Year 3. The bylaw and regulations procedures for site inspections conducted by Halifax include the requirement that inspections occur during construction of BMPs as well as after construction of BMPs to ensure they are working as described in the approved plans.

In the regulations, procedures for inspections are clearly defined including qualifications necessary to perform the inspections, the use of mandated inspection forms if appropriate, and procedure for tracking the number of site reviews, inspections, and enforcement actions. The bylaw and regulations clearly define who (Conservation Commission) is responsible for site inspections as well as who has authority to implement enforcement procedures. The bylaw provides that Halifax may, to the extent authorized by law, impose sanctions to ensure compliance with the local program.

Halifax will inspect all construction sites over 1-acre as outlined in the above documents and take enforcement actions as needed.

**Responsible Department/Parties:**

- Town Administrator
- Conservation Commission
- Planning Board

**Measurable Goal(s):**

- Complete within 3 years of the effective date of permit
  - Number and outcome of enforcement actions
-

# MCM 5 Post Construction Stormwater Management in New Development and Redevelopment

Permit Part 2.3.6

## Objective

Halifax's object for its post-construction stormwater management program is to reduce the discharge of pollutants found in stormwater to the MS4 through the retention or treatment of stormwater after construction on new or redeveloped sites and to ensure proper maintenance of installed stormwater controls.

## Program Overview

The following table summarizes Post-Construction Stormwater Management BMPs and schedule.

BMP	Schedule by Permit Year (Fiscal Year)				
	1 (FY19)	2 (FY20)	3 (FY21)	4 (FY22)	5 (FY23)
5.01: Post-Construction Bylaw		x	x		
5.02: Street and Parking Lot Guidelines Report				x	x
5.03: Green Infrastructure Report				x	x
5.04: List of Municipal Retrofit Opportunities				x	x
5.05: Demonstration Project Installation					After permit period

## BMP 5.01: Post-Construction Bylaw

### Description:

In 2019, Halifax developed a town bylaw to address post-construction stormwater runoff from all new development and redevelopment sites that disturb one or more acre and developed regulations for specific implementation details in Permit Year 3. The bylaw and regulations for post-construction stormwater treatment is in accordance with Section 2.3.6 a. ii. of the 2016 permit. Additionally, the bylaw and regulations require the submission of as-built drawings following the completion of construction projects and ensure procedures are in place for long-term operation and maintenance of post-construction stormwater management practices. Halifax's bylaw and regulations include a requirement that new development and redevelopment stormwater management BMPs be optimized for nutrient removal. Halifax receiving waterbodies impaired for nutrients are the Taunton River Watershed, which includes a downstream impairment for Nitrogen, and West Monponsett Pond Watershed, which is impaired for Phosphorous. The bylaw passed Town meeting on October 21, 2019, and regulations were implemented by the Conservation Commission June 22, 2021.

### Department Responsible for Enforcement:

- Town Administrator
- Conservation Commission
- Planning Board

**Measurable Goal(s):**

- Complete bylaw and regulations 3 years after effective date of permit.
- 

**BMP 5.02: Street Design and Parking Lot Guidelines Report****Description:**

Halifax will review street and parking lot design guidelines and other local requirements that affect the creation that affect the creation of impervious cover to develop an assessment report. The assessment will help determine if changes to design standards can be made to support low impact design options, such as permeable paving and minimizing impervious surface. If the assessment indicates that changes can be made, the report will include recommendations and proposed schedules to incorporate policies and standards into relevant documents and procedures to minimize impervious cover attributable to parking areas and street designs. Halifax will implement recommendations, in accordance with the schedules contained in the assessment.

**Responsible Department/Parties:**

- Town Administrator
- Highway Department
- Planning

**Measurable Goal(s):**

- Complete 4 years after effective date of permit and implement recommendations of report.
- 

**BMP 5.03: Green Infrastructure Report****Description:**

Halifax will develop a report assessing existing local regulations to determine the feasibility of making green infrastructure practices allowable when appropriate site conditions exist.

**Responsible Department/Parties:**

- Town Administrator
- Highway Department
- Planning Board

**Measurable Goal(s):**

- Complete 4 years after effective date of permit and implement recommendations of report
- 

**BMP 5.04: List of Municipal Retrofit Opportunities****Description:**

Halifax will identify at least 5 town-owned properties that could be modified or retrofitted with BMPs designed to reduce the frequency, volume, and pollutant loads of stormwater discharges to and from its MS4. Within five years of the permit effective date, Halifax will evaluate identified town-owned properties. The evaluation will include:

1. The next planned infrastructure, resurfacing, or redevelopment activity planned for the property (if applicable) OR planned retrofit date;

2. The estimated cost of redevelopment or retrofit BMPs; and
3. The engineering and regulatory feasibility of redevelopment or retrofit BMPs.

Halifax will provide a listing of planned structural BMPs and a plan and schedule for implementation in the Year 5 Annual Report.

Halifax will track and estimate the nutrient removal for structural BMPs, consistent with MS4 permit Attachment 3 to Appendix F. Halifax will document in each Annual Report the BMP type, total area treated by the BMP, the design storage volume of the BMP, and the estimated nutrient removed in mass per year by the BMP.

**Responsible Department/Parties:**

- Highway Department
- Town Administrator

**Measurable Goal(s):**

- Complete 4 years after effective date of permit and report annually on retrofitted properties
- Complete list of planned structural BMPs and implementation schedule within five years of permit effective date (by June 30, 2023) (in year 5 annual report)

---

## **BMP 5.05: Demonstration Project Installation**

**Description:**

Halifax will plan and install a minimum of one structural BMP as a demonstration project within the drainage area of the water quality-limited waterbodies or their tributaries (West Monponsett Pond or its tributaries (impaired for Phosphorous) or Taunton River or its tributaries (impaired for Nitrogen)) within six years of the permit effective date. The demonstration project will be installed targeting a catchment with high nutrient load potential.

Halifax will identify additional town-owned sites and infrastructure that could be retrofitted such that Halifax maintains a minimum of 5 sites in their inventory; evaluate all town-owned properties identified as presenting retrofit opportunities or areas for structural BMP installation, identified in the Nutrient Source Identification Reports (BMP 6.10), that are within the drainage area of West Monponsett Pond (impaired for Phosphorous) or its tributaries and/or tributaries to the Taunton River (impaired for Nitrogen).

**Responsible Department/Parties:**

- Highway Department

**Measurable Goal(s):**

- Complete within 6 years of the effective date of the permit



# MCM 6 Good Housekeeping and Pollution Prevention for Permittee Owned Operations

Permit Part 2.3.7

## Objective

The objective of Halifax's Good Housekeeping program is to prevent or reduce pollutant runoff from Halifax facilities and operations.

## Program Overview

The following table summarizes Good Housekeeping BMPs and schedule.

BMP	Schedule by Permit Year (Fiscal Year)				
	1 (FY19)	2 (FY20)	3 (FY21)	4 (FY22)	5 (FY23)
<b>Permittee Owned Facilities</b>					
6.01: Parks and Open Spaces Inventories and Operations and Maintenance Procedures		x	x	x	x
6.02: Buildings and Facilities Operations and Maintenance Procedures		x	x	x	x
6.03: Vehicles and Equipment Operations and Maintenance Procedures		x	x	x	x
<b>Infrastructure</b>					
6.04: Infrastructure Operations and Maintenance Procedures		x	x	x	x
6.05: Catch Basin Cleaning Program		x	x	x	x
6.06: Street Sweeping Program		x	x	x	x
6.07: Winter Road Maintenance Program		x	x	x	x
6.08: Stormwater Treatment Structures Inspection and Maintenance Procedures	x	x	x	x	x
6.09: SWPPP			x	x	x
6.10: Nutrient Source Identification Report				x	
6.11: Nutrients Additional Requirements	x	x	x	x	x

## PERMITTEE OWNED FACILITIES

### BMP 6.01: Parks and Open Spaces Inventories and Operations and Maintenance Procedures

#### Description:

In 2020, Halifax created written Operations and Maintenance (O&M) procedures including all requirements contained in permit section 2.3.7.a.ii 1 for parks and open spaces owned by the Town. Procedures address:

- The proper use, storage, and disposal of pesticides, herbicides, and fertilizers including minimizing the use of these products and using only in accordance manufacturer's instruction;
- Lawn maintenance and landscaping activities to ensure practices are protective of water quality;
- Pet waste handling collection and disposal at all parks and open space where pets are permitted, including the placing of proper signage concerning the proper collection and disposal of pet waste;
- Waterfowl congregation areas where appropriate to reduce waterfowl droppings from entering the MS4;
- Management of trash containers at parks and open space (scheduled cleanings; sufficient number); and
- Erosion or poor vegetative cover, especially within 50 feet of a surface water.

Halifax will continue to review and update these inventories and procedures. These inventories and procedures are included as an appendix to this SWMP.

#### Responsible Department/Parties:

- Highway Department
- Parks Commission
- Conservation
- Town Administrator

#### Measurable Goal:

- Established O&M procedures within 2 years of the effective date of the permit
- Implement the O&M procedures on 100% of the parks and open spaces

---

### BMP 6.02: Buildings and Facilities Operations and Maintenance Procedures

#### Description:

In 2020, Halifax created written O&M procedures including all requirements contained in 2.3.7.a.ii 2 for buildings and facilities owned by the Town. Halifax will target buildings and facilities where pollutants are exposed to stormwater runoff and will develop procedures to address:

- The use, storage, and disposal of petroleum products and other potential stormwater pollutants; management of dumpsters and other waste management equipment;
- Maintenance of parking lots and areas surrounding the facilities to reduce runoff of pollutants; and
- Employee training.

Halifax will continue to review and update these inventories and procedures. These inventories and procedures are included as an appendix to this SWMP.

#### Responsible Department/Parties:

- Highway Department
- Building Committee
- School Committee
- Town Administrator

#### Measurable Goal:

- Complete within 2 years of the effective date of permit
  - Implement the O&M procedures on 100% of buildings and facilities
- 

### **BMP 6.03: Vehicles and Equipment Operations and Maintenance Procedures**

#### **Description:**

In 2020, Halifax created written O&M procedures including all requirements contained in 2.3.7.a.ii 3 for vehicles and equipment facilities owned by the town. Halifax established procedures for the storage of vehicles, management of fueling areas, and the discharge of vehicle wash waters. Halifax will continue to review and update these inventories and procedures. These inventories and procedures are included as an appendix to this SWMP.

#### **Responsible Department/Parties:**

- Highway Department

#### **Measurable Goal:**

- Completed and implement within 2 years of the effective date of the permit
- Implement the O&M procedures on 100% of vehicles and equipment

## **INFRASTRUCTURE**

### **BMP 6.04: Infrastructure Operations and Maintenance Procedures**

#### **Description:**

In 2020, Halifax established O&M procedures and implemented a program for repair and rehabilitation of MS4 infrastructure so that the MS4 infrastructure is maintained in a timely manner to reduce the discharge of pollutants from the MS4. The infrastructure O&M procedures include the catch basin cleaning program (BMP 6.05), street and parking lot sweeping program (BMP 6.06), winter road maintenance program (BMP 6.07), and stormwater treatment system inspection program (BMP 6.08). Halifax will continue to review and update these procedures. These inventories and procedures are included as an appendix to this SWMP.

#### **Responsible Department/Parties:**

- Highway Department

#### **Measurable Goal(s):**

- Completed within 2 years of the permit effective date
- 

### **BMP 6.05: Catch Basin Cleaning Program**

#### **Description:**

Halifax will establish schedule for catch basin cleaning such that each catch basin is no more than 50% full. Halifax will complete an optimization analysis to schedule routine inspections, cleaning, and maintenance of catch basins such that the following conditions are met:

- Prioritize inspection and maintenance for catch basins located near construction activities. Clean catch basins in such areas more frequently if inspection and maintenance activities indicate excessive sediment or debris

loadings.

- Establish a schedule with a goal that the frequency of routine cleaning will ensure that no catch basin at any time will be more than 50 percent full.
- If a catch basin sump is more than 50 percent full during two consecutive routine inspections/cleaning events, document that finding, investigate the contributing drainage area for sources of excessive sediment loading, and to the extent practicable, abate contributing sources. Describe any actions taken in annual report.

The procedures will also identify proper storage of catch basin cleanings and street sweepings prior to disposal or reuse. Halifax will report in each annual report the total number of catch basins, number inspected, number cleaned, and the total volume or mass of material removed from all catch basins.

**Responsible Department/Parties:**

- Highway Department

**Measurable Goal(s):**

- Clean catch basins on established schedule and report number of catch basins cleaned and volume of material moved annually

---

## **BMP 6.06: Street Sweeping Program**

**Description:**

Halifax will sweep all town-owned streets and parking lots in the regulated MS4 area a minimum of once in the Spring and once in the Fall and all other streets and town-owned parking lots once per year. Halifax will also sweep more frequently in areas with land uses that generate higher sediment loading and/or where catch basin inspections indicate higher loading rates, as needed.

**Responsible Department/Parties:**

- Highway Department

**Measurable Goal(s):**

- Street Sweeping Program shall be implemented within 2 years of the effective date of the permit.
- Annually sweep 100% of all town-owned streets and parking lots in MS4 regulated area twice per year (once in the Spring and once in the Fall) and all other town-owned roads and parking lots once per year.

---

## **BMP 6.07: Winter Road Maintenance Program**

**Description:**

In 2020, Halifax established and implemented written procedures for winter road maintenance, including the use and storage of salt and sand and opportunities to use alternative materials. The procedures will also ensure that snow disposal activities do not result in disposal of snow into waters of the United States. Halifax will continue to review and update these procedures. These procedures are included in the O&M Plan as an appendix to this SWMP.

**Responsible Department/Parties:**

- Highway Department

**Measurable Goal(s):**

- Implement salt use optimization during deicing season

- Evaluate the use of at least one salt/chloride alternative

---

## **BMP 6.08: Stormwater Treatment Structures Inspection and Maintenance Procedures**

### **Description:**

In 2020, Halifax established and implemented inspection and maintenance procedures and frequencies of stormwater treatment structures such as water quality swales, leaching catch basins, detention basins, infiltration structures, and proprietary treatment devices. Halifax will inspect all town-owned stormwater treatment units (excluding catch basins) annually at a minimum. Halifax will continue to review and update these inventories and procedures. These procedures are included in the O&M Plan as an appendix to this SWMP.

### **Responsible Department/Parties:**

- Highway Department

### **Measurable Goal(s):**

- Inspect and maintain 100% of treatment structures to ensure proper function
- 

## **BMP 6.09: SWPPP**

### **Description:**

In 2020, Halifax created SWPPPs for the Town's 60 Hemlock Lane maintenance facility and 917 Plymouth Street recycling facility. The SWPPPs include the following elements:

- Pollution prevention team
- Description of the facility and identification of potential pollutant sources
- Identification of stormwater controls
- Management practices to minimize or prevent exposure and clean exposed areas
- Preventative maintenance
- Spill prevention and response
- Erosion and sediment control
- Management of runoff
- Enclosure of salt storage piles or piles containing salt
- Employee training
- Maintenance of control measures
- Site inspections schedule and documentation

Halifax will maintain all records associated with the SWPPPs and continue to update them as needed. Employees will be trained annually on the contents and procedures of the SWPPPs.

### **Responsible Department/Parties:**

- Highway Department
- Water Board

### **Measurable Goal(s):**

- Complete and implement within 2 years of permit effective date
  - Regularly train employees on SWPPPs
  - Inspect 60 Hemlock Lane and 917 Plymouth Street facilities quarterly
-

## BMP 6.10: Nutrient Source Identification Report

### Description:

For catchments discharging to nutrient-impaired waterbodies and their tributaries (West Monponsett Pond for Phosphorous and Taunton River for Nitrogen), Halifax will develop a nutrient source identification report. Halifax will develop the report within four years of the permit effective date (by June 30, 2022), and will submit the Report as part of Halifax's Year 4 Annual Report.

The nutrient (Phosphorous and Nitrogen) source identification report will include the following elements:

1. Calculation of total MS4 area draining to the water quality limited water segments or their tributaries incorporating updated mapping of the MS4 and catchment delineations produced pursuant to part 2.3.4.6,
2. All screening and monitoring results pursuant to part 2.3.4.7.d., targeting the receiving water segment(s)
3. Impervious area and directly connected impervious area (DCIA) for the target catchment
4. Identification, delineation and prioritization of potential catchments with high nutrient loading
5. Identification of potential retrofit opportunities or opportunities for the installation of structural BMPs during redevelopment

Reports will include the information required in Appendix H of the permit, Part I.1.b.i for Nitrogen and Part II.1.b.i for Phosphorous.

### Responsible Department/Parties:

- External Contractor
- Town Administrator
- Highway Department

### Measurable Goal(s):

- Complete within four years of permit effective date (Submitted to EPA as part of the Year 4 Annual Report)
- 

## BMP 6.11: Nutrients Additional Requirements

### Description:

Per Appendix H of the permit, for town-owned properties, Halifax will manage grass clippings and leaf litter, prohibit blowing organic waste material onto impervious surfaces, and establish requirements for use of slow release fertilizers and reducing fertilizer use in watersheds of waterbodies impaired for nutrients, West Monponsett Pond for Phosphorous and the Taunton River (tributary to Mount Hope Bay) for Nitrogen. These procedures are included in the O&M procedures listed under BMP 6.01, 6.02, 6.03, 6.04, 6.05, and 6.06 above.

### Responsible Department/Parties:

- Board of Health

### Measurable Goal(s):

- Monitor and enforce these requirements annually
-

# Surface Public Drinking Water Supply Protection

## Permit Part 3.0

The MS4 Permit Part 3.0 requires permittees to implement additional measures for discharges to surface drinking water supplies and their tributaries. Halifax will prioritize discharges to public surface drinking water supply sources (Class A and Class B surface waters used for drinking water) or their tributaries in implementation of this SWMP. The northeast corner of Halifax falls within the watershed of Silver Lake, the drinking water source for Brockton, MA.

### Applicable Waterbodies

Silver Lake

### Enhanced BMPs

Halifax will implement the following measures to avoid or minimize impacts to surface public drinking water supply sources.

#### **BMP 7.01 Pretreatment for Septic Systems**

##### **Description:**

Halifax will continue to require pretreatment for septic systems located in the watershed of Silver Lake.

##### **Responsible Department/Parties:**

- Board of Health

##### **Measurable Goal(s):**

- Number of septic systems conducting pretreatment

#### **BMP 7.02 Zoning Districts**

##### **Description:**

Halifax will continue to enforce its zoning to protect drinking water sources, through the Conservancy District and Floodplain District. The Conservancy District is intended "to protect the town's wetlands, floodplains and bogs while allowing appropriate development. The district allows most public/institutional and agricultural uses as of right while requiring special permits for housing and major institutions and prohibiting most business and commercial recreation uses." The Floodplain District is intended "to preserve and protect the streams and other watercourses of the town and their adjoining lands; to protect the health and safety of persons and property against the hazards of flooding; to protect the community against the detrimental use and development of lands adjoining such watercourses; and to conserve the watershed areas of the town for the health, safety and welfare of the public. The Floodplain District is an overlay district superimposed over other districts shown on the Zoning Map as a recognition of the special hazard which exists in such areas."

##### **Responsible Department/Parties:**

- Planning Board

##### **Measurable Goal(s):**

- Number of projects reviewed in Conservancy Districts and Floodplain Districts

The following enhanced BMPs described in MCMs 1-6 also have particular relevance to drinking water supply protection:

<b>Enhanced BMP for Surface Water Supply Protection</b>	
1.01: Spring Educational Message	
1.02: Summer Educational Message	
1.03: Fall Educational Message	
1.04: Residential and Commercial Educational Messages	
1.05: Industrial Facility Educational Messages	
1.06: Developer (construction) Educational Messages	
1.07: Septic System Owners Educational Message	
1.08: Dog Owner Education	
2.02: Water Quality Data Posting	
2.05: Partnership with Monponsett Watershed Association	



# TMDLs and Water Quality Limited Waters

## Permit Part 2.2

The MS4 permit Part 2.2 describes additional requirements for MS4s that discharge to waters that are subject to Total Maximum Daily Loads (TMDLs) and/or that discharge to certain water quality limited waters. The segment of the Taunton River in Halifax is impaired for E. Coli, and there is a pathogen TMDL for the Taunton River that was developed before this segment's impairment was added. While there is a draft TMDL for Phosphorous for West and East Monponsett Pond(s), because this TMDL was not finalized before the date of issuance of the 2016 MS4 permit, Halifax is exempt from the requirements in the permit Appendix F: Requirements for Discharges to Impaired Waters with an Approved TMDL for Monponsett Pond(s). Halifax will comply with the requirements within Appendix H and Appendix F for the impairments listed below .

Halifax's facilities discharge to the waterbodies in watersheds of the following impaired waterbodies with and without approved TMDLs:

Waterbody	Impairment	Applicable TMDL
West Monponsett Pond	Phosphorous	N/A
Mount Hope Bay (Taunton River Watershed)	Nitrogen	N/A
Taunton River	E. Coli	<i>Final Pathogen TMDL for the Taunton River Watershed (CN256.0)</i>

Specific requirements for these waterbodies are detailed in the MS4 permit Appendix H: Requirements Related to Discharges to Certain Water Quality Limited Waterbodies and Appendix F: Requirements for Discharges to Impaired Waters with an Approved TMDL.

## Enhanced BMPs – Nutrients (Phosphorous and Nitrogen)

The following table summarizes the Enhanced BMPs, as described in the SWMP above, that Halifax will implement to meet MS4 Permit Appendix H requirements for discharge to phosphorus-impaired waterbodies and their tributaries (West Monponsett Pond) and tributaries to nitrogen-impaired waterbodies (Taunton River).

Requirements	Enhanced BMPs
Distribute an annual message in the spring (April/May) that encourages the proper use and disposal of grass clippings and encourages the proper use of slow-release and phosphorus-free fertilizers	BMP 1.01: Spring Educational Message will cover this topic.
Distribute an annual message in the summer (June/July) encouraging the proper management of pet waste	BMP 1.02: Summer Educational Message will cover this topic.
Distribute an annual message in the fall (August/September/October) encouraging the proper disposal of leaf litter	BMP 1.03: Fall Educational Message will cover this topic.
For post-development stormwater management, include a requirement that new development and redevelopment stormwater management BMPs be optimized for [nutrient (phosphorous or nitrogen)] removal	BMP 5.01: Post Construction Bylaw will include optimized structural BMP requirements.

<b>Requirements</b>	<b>Enhanced BMPs</b>
For retrofit inventory and priority ranking, include consideration of BMPs to reduce nutrient discharges	BMP 5.04: List of Municipal Retrofit Opportunities <ul style="list-style-type: none"> <li>Halifax will evaluate all town-owned properties identified as presenting retrofit opportunities or areas for structural BMP installation, identified in the Nutrient Source Identification Reports (BMP 6.10), that are within the drainage area of West Monponsett Pond or its tributaries or tributaries to Taunton River.</li> </ul>
Establish procedures to properly manage grass cuttings and leaf litter on permittee property, including prohibiting blowing organic waste materials onto adjacent impervious surfaces	BMP 6.11: Nutrients Additional Requirements will cover this topic. <ul style="list-style-type: none"> <li>O&amp;M Procedures (BMP 6.04) detail measures to address water quality impairments, including landscape maintenance to reduce nutrient loading to impaired waterbodies</li> </ul>
Increase street sweeping frequency of all municipal owned streets and parking lots subject to permit part 2.3.7.a.iii.(c) to a minimum of two times per year (spring and fall)	BMP 6.06: Street Sweeping Program <ul style="list-style-type: none"> <li>Halifax will sweep all streets and town-owned parking lots two times per year (spring and fall).</li> </ul>
Within four years of the permit effective date the permittee shall complete a [Nutrient (Nitrogen and Phosphorous)] Source Identification Report	BMP 6.10: Nutrient Source Identification Report

### Enhanced BMPs – Bacteria/ Pathogens (E. Coli)

The following table summarizes the Enhanced BMPs, as described in the SWMP above, that Halifax will implement to meet MS4 Permit Appendix F requirements for discharge to bacteria- or pathogens-impaired waterbodies with TMDLs (Taunton River).

<b>Requirements</b>	<b>Enhanced BMPs</b>
Supplement public education program with an annual message encouraging the proper management of pet waste	BMP 1.02: Summer Educational Message will cover this topic.
Disseminate educational materials to dog owners at the time of issuance or renewal of a dog license, or other appropriate time	BMP 1.08: Dog Owner Education
Provide information to owners of septic systems about proper maintenance in any catchment that discharges to a waterbody impaired for bacteria or pathogens	BMP 1.07: Septic System Owners Educational Message will cover this topic.

Requirements	Enhanced BMPs
Designate catchments draining to any waterbody impaired for bacteria/pathogens as either Problem Catchments or High Priority in implementation of the IDDE Program.	BMP 3.04: IDDE Program will cover this topic.

# Annual Evaluation

This section will be updated annually as annual reports are completed.

## Year 1 Annual Report

### Document Name and/or Web Address:

[http://www.halifax-ma.org/sites/g/files/vyhlif4496/f/uploads/halifax\\_stormwater\\_management\\_program\\_report\\_-\\_year\\_1.pdf](http://www.halifax-ma.org/sites/g/files/vyhlif4496/f/uploads/halifax_stormwater_management_program_report_-_year_1.pdf)

<https://www3.epa.gov/region1/npdes/stormwater/ma/reports/2019/halifax-ma-ar19.pdf>

## Year 2 Annual Report

### Document Name and/or Web Address:

<http://www.halifax-ma.org/sites/g/files/vyhlif4496/f/uploads/ma-annual-report-yr2-halifax1.pdf>

<https://www3.epa.gov/region1/npdes/stormwater/ma/reports/2020/halifax-ma-ar20.pdf>

## Year 3 Annual Report

### Document Name and/or Web Address:

## Year 4 Annual Report

### Document Name and/or Web Address:

## Year 5 Annual Report

### Document Name and/or Web Address:

## Appendices

Halifax IDDE Plan

Halifax Operations and Maintenance (O&M) Plan

# Town of Halifax

## Illicit Discharge Detection and Elimination (IDDE) Plan



June 30, 2021

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- Appendix A – Field Forms, Sample Bottle Labels, and Chain of Custody Forms
- Appendix B – IDDE Employee Training Record



# 1 Introduction

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## 1.1 MS4 Program

This Illicit Discharge Detection and Elimination (IDDE) Plan has been developed by Halifax 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.

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## 1.2 Illicit Discharges

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

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

Some illicit discharges are intentional, such as dumping used oil (or other pollutant) into catch basins, a resident or contractor illegally tapping a new sewer lateral into a storm drain pipe 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 minimal additional cost of dog waste bins and the municipal commitment to disposal of collected materials on a regular basis.

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

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### 1.3 Allowable Non-Stormwater Discharges

The following categories of non-storm water discharges are allowed under the MS4 Permit unless the permittee, USEPA or Massachusetts Department of Environmental Protection (MassDEP) identifies any category or individual discharge of non-stormwater discharge as a significant contributor of pollutants to the MS4:

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

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

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### 1.4 Receiving Waters and Impairments

**Table 1-1** lists the “impaired waters” within the boundaries of Halifax’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****Halifax**

Water Body Name	Segment ID	Category	Impairment(s)	Associated Approved TMDL
West Monponsett Pond	MA62119	5	Chlorophyll-a, Phosphorous, Harmful Algal Blooms, Transparency / Clarity	N/A
East Monponsett Pond	MA62218	5	Chlorophyll-a , Harmful Algal Blooms, Mercury in Fish Tissue	N/A
Silver Lake	MA94143	4C	Other flow regime alterations	N/A
Taunton River	MA62-01	5	E. Coli	<i>Final Pathogen TMDL for the Taunton River Watershed (CN256.0)</i>

Category 4a Waters – impaired water bodies with a completed Total Maximum Daily Load (TMDL).

Category 4c Waters – impaired water bodies where the impairment is not caused by a pollutant. No TMDL required.

Category 5 Waters – impaired water bodies that require a TMDL.

“Approved TMDLs” are those that have been approved by EPA as of the date of issuance of the 2016 MS4 Permit.

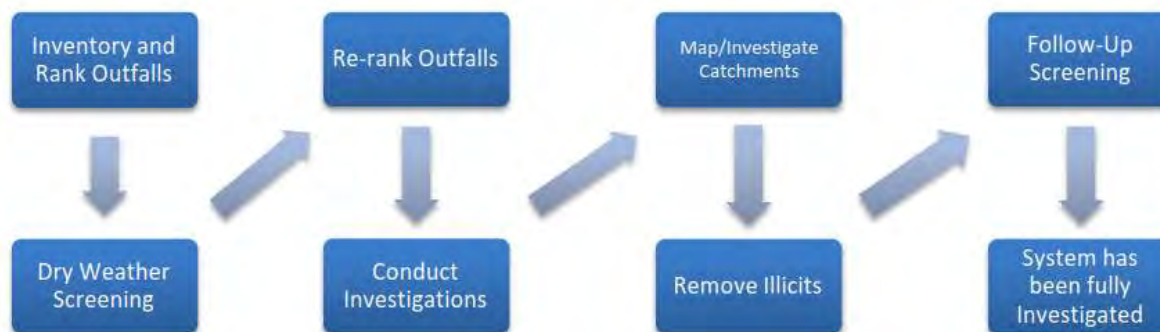
## 1.5 IDDE Program Goals, Framework, and Timeline

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
- Followup 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

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## 1.6 Work Completed to Date

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

Halifax has completed the following IDDE program activities prior to the 2016 MS4 Permit term:

- Mapped outfalls and receiving waters town-wide
- Mapped catch basins, pipes, manhole junctions, culverts, and overflows for much of the town
- Delineated catchment areas for areas draining to East and West Monponsett Pond
- Conducted dry weather outfall screening at 30 outfalls discharging to East and West Monponsett Pond
- Inspected East and West Monponsett Pond watershed for sanitary sewer overflows (SSOs)

In Permit Year 2, Halifax completed Phase I mapping, initial catchment delineations of all catchments, and conducted initial dry weather outfall screening at all outfalls in the MS4 regulated areas. In Year 3, Halifax refined its mapping and catchment delineations and performed follow up dry weather screening and sampling at various outfalls. Additional information on Permit Year 3 efforts is presented in the following sections, where applicable.

## 2 Authority and Statement of IDDE Responsibilities

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### 2.1 Legal Authority

Halifax is required to adopt a bylaw, to provide Halifax with adequate legal authority to:

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

In Permit Year 2 (Fiscal Year 2020), Halifax developed a draft IDDE bylaw for passage at Town Meeting. The June Town Meeting was postponed due to COVID-19 public health crisis, so Halifax passed the bylaw at the rescheduled Town Meeting in September 2020. The IDDE bylaw meets the requirements of the 2016 MS4 Permit, including the authorities listed above. Halifax is currently working to implement edits to the bylaw proposed by the Massachusetts Attorney General and will finalize the bylaw as soon as feasible, once Attorney General edits are implemented.

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### 2.2 Statement of Responsibilities

The IDDE bylaw referenced above identifies the “The Town of Halifax Board of Health (the Board), its employees or agents” as responsible for implementing the IDDE program and enforcement.

## 3 Stormwater System Mapping

Halifax originally developed mapping of its stormwater system to meet the mapping requirements of the 2003 MS4 Permit. That storm system map contained much of the additional infrastructure required under the 2016 MS4 Permit, and Halifax has continued to refine the storm system map to facilitate the identification of key infrastructure, factors influencing proper system operation, and the potential for illicit discharges. The existing storm system map is available online at this link:

<http://vhb.maps.arcgis.com/apps/webappviewer/index.html?id=c1dfedc2a65545c98761d0ca7b70b30f>

The 2016 MS4 Permit requires the storm system map to be updated in two phases as outlined below. The Highway Department is responsible for updating the stormwater system mapping pursuant to the 2016 MS4 Permit. Halifax 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 the online map.

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### 3.1 Phase I Mapping

Phase I mapping must be completed within two (2) years of the effective date of the permit (July 1, 2019) 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.

Halifax updated its stormwater mapping by July 1, 2020 to include the remaining available Phase I information and has and will continue to refine the map as necessary.

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## 3.2 Phase II Mapping

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

- Outfall spatial location (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.

Halifax will update its stormwater mapping by July 1, 2028 to include the remaining following Phase II information.

## 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.

Within the five (5) years prior to the effective date of the 2016 MS4 Permit, Halifax did not identify any SSOs that have discharged to the MS4 based on review of available documentation pertaining to SSOs and field investigations. There are no sanitary sewers in Halifax, and septic systems are inspected on a schedule set by the Board of Health.

Upon detection of an SSO, Halifax 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, Halifax 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 Highway Department and Board of Health will update the SSO inventory in this Plan 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.

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### 5.1 Outfall Catchment Delineations

A catchment is the area that drains to an individual outfall<sup>1</sup> or interconnection.<sup>2</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 were 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.

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### 5.2 Outfall and Interconnection Inventory and Initial Ranking

The Highway Department completed an initial outfall and interconnection inventory and priority ranking to assess illicit discharge potential based on existing information. The initial inventory and ranking was completed within one (1) year from the effective date of the permit.

The outfall and interconnection inventory identifies each outfall and interconnection discharging from the MS4, records its location and condition, and provides a framework for tracking inspections, screenings and other IDDE program activities.

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

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

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<sup>1</sup> **Outfall** means a point source as defined by 40 CFR § 122.2 as the point where the municipal separate storm sewer discharges to waters of the United States. An outfall does not include open conveyances connecting two municipal separate storm sewers or pipes, tunnels or other conveyances that connect segments of the same stream or other waters of the United States and that are used to convey waters of the United States. 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>2</sup> **Interconnection** means the point (excluding sheet flow over impervious surfaces) where the permittee's MS4 discharges to another MS4 or other storm sewer system, through which the discharge is conveyed to waters of the United States or to another storm sewer system and eventually to a water of the United States.

- Ammonia  $\geq 0.5$  mg/L, surfactants  $\geq 0.25$  mg/L, and 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.

- **Past discharge complaints, reports, and screening results.**
- **Discharging to Area of Concern to Public Health** – outfalls or interconnections that discharge to public beaches, recreational areas, drinking water supplies and/or shellfish beds
- **Impaired Waterbodies** – discharges to waters impaired for bacteria according to the most recent 303(d) list.
- **TMDL Watershed** – discharges to waters with an approved TMDL where illicit discharges may contribute to the pollutant of concern.
- **Density of generating sites within Catchment** – Generating sites are those places, including institutional, municipal, commercial, or industrial sites, with a potential to generate pollutants that could contribute to illicit discharges, based on land use codes or local knowledge.

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## 5.3 Follow-up Ranking of Outfalls and Interconnections

An updated inventory and ranking will be provided in each annual report. The inventory will be updated annually to include data collected in connection with dry weather screening and other relevant inspections. Based on guidance in the permit, the outfalls identified as Problem Outfalls in Permit Year 1 prioritization remain problem outfalls for the permit requirements. Outfalls/interconnections where dry weather screening information was found indicating sewer input to the MS4, or sampling results indicated sewer input, will be considered likely to contain illicit discharges from sanitary sources and will be ranked at the top of the High Priority Outfalls (Highest) category for investigation.

**Table 5-1** provides the most recent Halifax outfall inventory and priority ranking.

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

**Halifax, Massachusetts**  
**Revision Date: 6/30/2021**  
**Total Outfalls in Urban Area: 106**  
**Highest Priority Outfalls: 1**  
**High Priority Outfalls: 65**  
**Low Priority Outfalls: 40**

Outfall ID	Receiving Water		Reports or Complaints of Potential Illicit Discharges? <sup>1</sup>	Discharging to Area of Concern to Public Health? <sup>2</sup>				Receiving Water Quality <sup>3</sup>	TMDL Watershed <sup>4</sup>	Density of Generating Sites within Catchment <sup>5</sup>	Outfalls with Screening Results that Indicate Likely Sewer Input <sup>6</sup>	Score	Priority Ranking
Information Source			Town/Agency Records	a	b	c	d	Impaired Waters List	IDDE Screening/Sampling Results	Land Use/GIS Maps	IDDE Screening/Sampling Results		
Scoring Criteria			Yes = 40 (Problem Outfall) No = 0	Yes = 6 No = 0				Bacteria = 6 Other = 2 None = 0	Yes = 2 No = 0	High = 3 Medium = 2 Low = 0	Yes = 30 No = 0	Yes = 30 No = 0	Problem = ≥50 Highest Priority = ≥ 40 High Priority = ≥6 Low Priority = <6
OE-3	MA62218	Monponsett Pond, East Basin	0	0	0	6	0	2	2	2	30	42	Highest Priority
OE-38	MA62218	Monponsett Pond, East Basin	0	0	6	6	0	2	2	0	0	16	High Priority
OE-33	MA62218	Monponsett Pond, East Basin	0	0	6	6	0	2	2	0	0	16	High Priority
OE-31	MA62218	Monponsett Pond, East Basin	0	0	0	6	0	2	2	3	0	13	High Priority
OW-7	MA62119	Monponsett Pond, West Basin	0	0	0	6	0	2	2	3	0	13	High Priority
OE-1	MA62218	Monponsett Pond, East Basin	0	0	0	6	0	2	2	3	0	13	High Priority
OW-18	MA62119	Monponsett Pond, West Basin	0	0	0	6	0	2	2	3	0	13	High Priority
OW-24	MA62119	Monponsett Pond, West Basin	0	0	0	6	0	2	2	3	0	13	High Priority
OW-9	MA62119	Monponsett Pond, West Basin	0	0	0	6	0	2	2	2	0	12	High Priority
OW-5	MA62119	Monponsett Pond, West Basin	0	0	0	6	0	2	2	2	0	12	High Priority
OW-2	MA62119	Monponsett Pond, West Basin	0	0	0	6	0	2	2	2	0	12	High Priority
OE-5	MA62218	Monponsett Pond, East Basin	0	0	0	6	0	2	2	2	0	12	High Priority

Outfall ID	Receiving Water		Reports or Complaints of Potential Illicit Discharges? <sup>1</sup>	Discharging to Area of Concern to Public Health? <sup>2</sup>				Receiving Water Quality <sup>3</sup>	TMDL Watershed <sup>4</sup>	Density of Generating Sites within Catchment <sup>5</sup>	Outfalls with Screening Results that Indicate Likely Sewer Input <sup>6</sup>	Score	Priority Ranking
Information Source			Town/Agency Records	a	b	c	d	Impaired Waters List	IDDE Screening/Sampling Results	Land Use/GIS Maps	IDDE Screening/Sampling Results		
Scoring Criteria			Yes = 40 (Problem Outfall) No = 0	Yes = 6 No = 0				Bacteria = 6 Other = 2 None = 0	Yes = 2 No = 0	High = 3 Medium = 2 Low = 0	Yes = 30 No = 0	Yes = 30 No = 0	Problem = ≥50 Highest Priority = ≥ 40 High Priority = ≥6 Low Priority = <6
OE-2	MA62218	Monponsett Pond, East Basin	0	0	0	6	0	2	2	2	0	12	High Priority
OE-4	MA62218	Monponsett Pond, East Basin	0	0	0	6	0	2	2	2	0	12	High Priority
OW-8	MA62119	Monponsett Pond, West Basin	0	0	0	6	0	2	2	2	0	12	High Priority
OE-7	MA62218	Monponsett Pond, East Basin	0	0	0	6	0	2	2	2	0	12	High Priority
OE-8	MA62218	Monponsett Pond, East Basin	0	0	0	6	0	2	2	2	0	12	High Priority
OE-9	MA62218	Monponsett Pond, East Basin	0	0	0	6	0	2	2	2	0	12	High Priority
OE-10	MA62218	Monponsett Pond, East Basin	0	0	0	6	0	2	2	2	0	12	High Priority
OE-11	MA62218	Monponsett Pond, East Basin	0	0	0	6	0	2	2	2	0	12	High Priority
OE-12	MA62218	Monponsett Pond, East Basin	0	0	0	6	0	2	2	2	0	12	High Priority
OE-15	MA62218	Monponsett Pond, East Basin	0	0	0	6	0	2	2	2	0	12	High Priority
OE-14	MA62218	Monponsett Pond, East Basin	0	0	0	6	0	2	2	2	0	12	High Priority
OE-25	MA62218	Monponsett Pond, East Basin	0	0	0	6	0	2	2	2	0	12	High Priority
OE-18	MA62218	Monponsett Pond, East Basin	0	0	0	6	0	2	2	2	0	12	High Priority
OW-1	MA62119	Monponsett Pond, West Basin	0	0	0	6	0	2	2	2	0	12	High Priority
OW-3	MA62119	Monponsett Pond, West Basin	0	0	0	6	0	2	2	2	0	12	High Priority
OW-4	MA62119	Monponsett Pond, West Basin	0	0	0	6	0	2	2	2	0	12	High Priority
OW-16	MA62119	Monponsett Pond, West Basin	0	0	0	6	0	2	2	2	0	12	High Priority

Outfall ID	Receiving Water		Reports or Complaints of Potential Illicit Discharges? <sup>1</sup>	Discharging to Area of Concern to Public Health? <sup>2</sup>				Receiving Water Quality <sup>3</sup>	TMDL Watershed <sup>4</sup>	Density of Generating Sites within Catchment <sup>5</sup>	Outfalls with Screening Results that Indicate Likely Sewer Input <sup>6</sup>	Score	Priority Ranking
Information Source			Town/Agency Records	a	b	c	d	Impaired Waters List	IDDE Screening/Sampling Results	Land Use/GIS Maps	IDDE Screening/Sampling Results		
Scoring Criteria			Yes = 40 (Problem Outfall) No = 0	Yes = 6 No = 0				Bacteria = 6 Other = 2 None = 0	Yes = 2 No = 0	High = 3 Medium = 2 Low = 0	Yes = 30 No = 0	Yes = 30 No = 0	Problem = ≥50 Highest Priority = ≥ 40 High Priority = ≥6 Low Priority = <6
OE-21	MA62218	Monponsett Pond, East Basin	0	0	0	6	0	2	2	2	0	12	High Priority
OE-19	MA62218	Monponsett Pond, East Basin	0	0	0	6	0	2	2	2	0	12	High Priority
OW-17	MA62119	Monponsett Pond, West Basin	0	0	0	6	0	2	2	2	0	12	High Priority
OE-37	MA62218	Monponsett Pond, East Basin	0	0	0	6	0	2	2	2	0	12	High Priority
OW-19	MA62119	Monponsett Pond, West Basin	0	0	0	6	0	2	2	2	0	12	High Priority
OSL-07	MA94143	Silver Lake	0	0	0	6	0	0	2	3	0	11	High Priority
OSL-11	MA94143	Silver Lake	0	0	0	6	0	0	2	3	0	11	High Priority
OSL-09	MA94143	Silver Lake	0	0	0	6	0	0	2	3	0	11	High Priority
OT-03	MA62-01	Taunton River	0	0	0	0	0	6	2	3	0	11	High Priority
OT-06	MA62-01	Taunton River	0	0	0	0	0	6	2	3	0	11	High Priority
OT-08	MA62-01	Taunton River	0	0	0	0	0	6	2	3	0	11	High Priority
OSL-10	MA94143	Silver Lake	0	0	0	6	0	0	2	2	0	10	High Priority
OSL-06	MA94143	Silver Lake	0	0	0	6	0	0	2	2	0	10	High Priority
OSL-03	MA94143	Silver Lake	0	0	0	6	0	0	2	2	0	10	High Priority
OSL-04	MA94143	Silver Lake	0	0	0	6	0	0	2	2	0	10	High Priority
OSL-05	MA94143	Silver Lake	0	0	0	6	0	0	2	2	0	10	High Priority
OSL-01	MA94143	Silver Lake	0	0	0	6	0	0	2	2	0	10	High Priority
OSL-02	MA94143	Silver Lake	0	0	0	6	0	0	2	2	0	10	High Priority
OSL-08	MA94143	Silver Lake	0	0	0	6	0	0	2	2	0	10	High Priority
OT-04	MA62-01	Taunton River	0	0	0	0	0	6	2	2	0	10	High Priority
OT-05	MA62-01	Taunton River	0	0	0	0	0	6	2	2	0	10	High Priority
OW-6	MA62119	Monponsett Pond, West Basin	0	0	0	6	0	2	2	0	0	10	High Priority
OE-17	MA62218	Monponsett Pond, East Basin	0	0	0	6	0	2	2	0	0	10	High Priority
OE-13	MA62218	Monponsett Pond, East Basin	0	0	0	6	0	2	2	0	0	10	High Priority

Outfall ID	Receiving Water		Reports or Complaints of Potential Illicit Discharges? <sup>1</sup>	Discharging to Area of Concern to Public Health? <sup>2</sup>				Receiving Water Quality <sup>3</sup>	TMDL Watershed <sup>4</sup>	Density of Generating Sites within Catchment <sup>5</sup>	Outfalls with Screening Results that Indicate Likely Sewer Input <sup>6</sup>	Score	Priority Ranking
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OE-20	MA62218	Monponsett Pond, East Basin	0	0	0	6	0	2	2	0	0	10	High Priority
OSL-12	MA94143	Silver Lake	0	0	0	6	0	0	2	2	0	10	High Priority
OSL-13	MA94143	Silver Lake	0	0	0	6	0	0	2	2	0	10	High Priority
OT-09	MA62-01	Taunton River	0	0	0	0	0	6	2	2	0	10	High Priority
OT-10	MA62-01	Taunton River	0	0	0	0	0	6	2	2	0	10	High Priority
OE-26	MA62218	Monponsett Pond, East Basin	0	0	0	0	0	2	2	3	0	7	High Priority
OE-27	MA62218	Monponsett Pond, East Basin	0	0	0	0	0	2	2	3	0	7	High Priority
OE-28	MA62218	Monponsett Pond, East Basin	0	0	0	0	0	2	2	3	0	7	High Priority
OE-29	MA62218	Monponsett Pond, East Basin	0	0	0	0	0	2	2	3	0	7	High Priority
OW-15	MA62119	Monponsett Pond, West Basin	0	0	0	0	0	2	2	2	0	6	High Priority
OE-30	MA62218	Monponsett Pond, East Basin	0	0	0	0	0	2	2	2	0	6	High Priority
OE-36	MA62218	Monponsett Pond, East Basin	0	0	0	0	0	2	2	2	0	6	High Priority
OW-26	MA62119	Monponsett Pond, West Basin	0	0	0	0	0	2	2	2	0	6	High Priority
OESP-02	MA62066	Elm Street Pond	0	0	0	0	0	0	2	3	0	5	Low Priority
OPSP-03	MA62141	Plymouth Street Pond	0	0	0	0	0	0	2	3	0	5	Low Priority
OPSP-01	MA62141	Plymouth Street Pond	0	0	0	0	0	0	2	3	0	5	Low Priority
OPSP-19	MA62141	Plymouth Street Pond	0	0	0	0	0	0	2	2	0	4	Low Priority
OPSP-17	MA62141	Plymouth Street Pond	0	0	0	0	0	0	2	2	0	4	Low Priority
OPSP-11	MA62141	Plymouth Street Pond	0	0	0	0	0	0	2	2	0	4	Low Priority
OPSP-12	MA62141	Plymouth Street Pond	0	0	0	0	0	0	2	2	0	4	Low Priority
OPSP-18	MA62141	Plymouth Street Pond	0	0	0	0	0	0	2	2	0	4	Low Priority
OPSP-15	MA62141	Plymouth Street Pond	0	0	0	0	0	0	2	2	0	4	Low Priority
OESP-01	MA62066	Elm Street Pond	0	0	0	0	0	0	2	2	0	4	Low Priority
OPSP-10	MA62141	Plymouth Street Pond	0	0	0	0	0	0	2	2	0	4	Low Priority



Outfall ID	Receiving Water		Reports or Complaints of Potential Illicit Discharges? <sup>1</sup>	Discharging to Area of Concern to Public Health? <sup>2</sup>				Receiving Water Quality <sup>3</sup>	TMDL Watershed <sup>4</sup>	Density of Generating Sites within Catchment <sup>5</sup>	Outfalls with Screening Results that Indicate Likely Sewer Input <sup>6</sup>	Score	Priority Ranking
Information Source			Town/Agency Records	a	b	c	d	Impaired Waters List	IDDE Screening/Sampling Results	Land Use/GIS Maps	IDDE Screening/Sampling Results		
Scoring Criteria			Yes = 40 (Problem Outfall) No = 0	Yes = 6 No = 0				Bacteria = 6 Other = 2 None = 0	Yes = 2 No = 0	High = 3 Medium = 2 Low = 0	Yes = 30 No = 0	Yes = 30 No = 0	Problem = ≥50 Highest Priority = ≥ 40 High Priority = ≥6 Low Priority = <6
OPSP-04	MA62141	Plymouth Street Pond	0	0	0	0	0	0	2	2	0	4	Low Priority
OPSP-06	MA62141	Plymouth Street Pond	0	0	0	0	0	0	2	2	0	4	Low Priority
OPSP-07	MA62141	Plymouth Street Pond	0	0	0	0	0	0	2	2	0	4	Low Priority
OPSP-14	MA62141	Plymouth Street Pond	0	0	0	0	0	0	2	2	0	4	Low Priority
OPSP-21	MA62141	Plymouth Street Pond	0	0	0	0	0	0	2	2	0	4	Low Priority
OPSP-05	MA62141	Plymouth Street Pond	0	0	0	0	0	0	2	2	0	4	Low Priority
OWR-08	MA62-24	Winnetuxet River	0	0	0	0	0	0	2	2	0	4	Low Priority
OWR-10	MA62-24	Winnetuxet River	0	0	0	0	0	0	2	2	0	4	Low Priority
OWR-06	MA62-24	Winnetuxet River	0	0	0	0	0	0	2	2	0	4	Low Priority
OWR-11	MA62-24	Winnetuxet River	0	0	0	0	0	0	2	2	0	4	Low Priority
OWR-04	MA62-24	Winnetuxet River	0	0	0	0	0	0	2	2	0	4	Low Priority
OWR-05	MA62-24	Winnetuxet River	0	0	0	0	0	0	2	2	0	4	Low Priority
OWR-09	MA62-24	Winnetuxet River	0	0	0	0	0	0	2	2	0	4	Low Priority
OPSP-28	MA62141	Plymouth Street Pond	0	0	0	0	0	0	2	2	0	4	Low Priority
OPSP-26	MA62141	Plymouth Street Pond	0	0	0	0	0	0	2	2	0	4	Low Priority
OPSP-24	MA62141	Plymouth Street Pond	0	0	0	0	0	0	2	2	0	4	Low Priority
OWR-22	MA62-24	Winnetuxet River	0	0	0	0	0	0	2	2	0	4	Low Priority
OWR-27	MA62-24	Winnetuxet River	0	0	0	0	0	0	2	2	0	4	Low Priority
OWR-43	MA62-24	Winnetuxet River	0	0	0	0	0	0	2	2	0	4	Low Priority
OESP-03	MA62066	Elm Street Pond	0	0	0	0	0	0	0	3	0	3	Low Priority
OPSP-13	MA62141	Plymouth Street Pond	0	0	0	0	0	0	2	0	0	2	Low Priority
OPSP-09	MA62141	Plymouth Street Pond	0	0	0	0	0	0	2	0	0	2	Low Priority
OPSP-22	MA62141	Plymouth Street Pond	0	0	0	0	0	0	2	0	0	2	Low Priority
OWR-12	MA62-24	Winnetuxet River	0	0	0	0	0	0	2	0	0	2	Low Priority
OPSP-02	MA62141	Plymouth Street Pond	0	0	0	0	0	0	2	0	0	2	Low Priority
OWR-25	MA62-24	Winnetuxet River	0	0	0	0	0	0	2	0	0	2	Low Priority
OPSP-23	MA62141	Plymouth Street Pond	0	0	0	0	0	0	2	0	0	2	Low Priority
OPSP-27	MA62141	Plymouth Street Pond	0	0	0	0	0	0	2	0	0	2	Low Priority
OPSP-25	MA62141	Plymouth Street Pond	0	0	0	0	0	0	2	0	0	2	Low Priority



**Scoring Criteria:**

- <sup>1</sup> Previous reports of dumping, failing septic systems, odors, or other indications of potential illicit discharges.
- <sup>2</sup> Outfalls/interconnections that discharge to or in the vicinity of any of the following areas, as determined via GIS evaluation of the following datalayers. Note: Discharges to an area of concern to public health will automatically be considered High Priority.
- a. Public Beaches: <https://docs.digital.mass.gov/dataset/massgis-data-marine-beaches>
  - b. Recreational Areas (note: query layer for only PRIM\_PURP = “R” to only review areas protected for recreation primarily): <https://docs.digital.mass.gov/dataset/massgis-data-protected-and-recreational-openspace>
  - c. Drinking Water Supplies: <https://docs.digital.mass.gov/dataset/massgis-data-surface-water-supply-watersheds>
  - d. Shellfish Beds: <https://docs.digital.mass.gov/dataset/massgis-data-designated-shellfish-growing-areas>
- <sup>3</sup> Receiving water quality based on latest version of MassDEP Integrated List of Waters: <https://www.mass.gov/lists/integrated-lists-of-waters-related-reports>
- Bacteria: Discharges to waters or their tributaries listed as impaired for bacteria (Category 4a or 5 Waters). This may include waters impaired for Fecal Coliform or Escherichia coli.
    - o Note: Discharges to bacteria impaired waters will automatically be considered High Priority, based on guidance provided in Appendix H of the 2016 Permit
  - Other: Discharges to waters or their tributaries listed as impaired for pollutants other than bacteria (Category 4a or 5 Waters). This does not include waters impaired for non-pollutants.
  - None: Discharges to waters or their tributaries with no water quality impairments (Category 2 or 3 Waters)

<sup>4</sup>Discharges to waters with an approved TMDL where illicit discharges have the potential to contain the pollutant identified as the cause of the impairment. Listing of approved TMDLs can be found here: <https://www.mass.gov/lists/total-maximum-daily-loads-by-watershed>

- <sup>5</sup> Density of generating sites based on MassGIS Land Use layer: <https://docs.digital.mass.gov/dataset/massgis-data-land-use-2005>
- High Density: Catchment area contains any of the following Land Use Codes = 10, Multi-Family Residential; 11, High Density Residential; 15, Commercial; 16, Industrial; 17, Transitional; 18, Transportation; 19, Waste Disposal; 31, Urban Public/Institutional; 36, Nursery; 39, Junkyard
    - o Note: Discharges with known sites with the high potential to generate pollutants that could contribute to illicit discharges within its catchment area should be included in this category. Examples include by are not limited to: car dealers, car washes, gas stations, garden centers, and industrial manufacturing areas.
  - Medium Density: 50% or more of catchment area is made of up of Land Use Codes = 5, Mining; 7, Participation Recreation; 8, Spectator Recreation; 9, Water-Based Recreation; 12, Medium Density Residential; 13, Low Density Residential; 26, Golf Course; 29, Marina
  - Low Density: 50% or more of catchment area is made of up of Land Use Codes = 1, Cropland; 2, Pasture; 3, Forest; 4, Non-Forested Wetland; 6, Open Land; 14, Saltwater Wetland, 20, Water; 23, Cranberry Bog; 24, Powerline/Utility; 25, Saltwater Sandy Beach; 34, Cemetery; 35, Orchard; 37, Forested Wetland; 38, Very Low Density Residential; 40, Brushland/Successional

- <sup>6</sup> Previous screening results indicate likely sewer input if any of the following are true:
- Olfactory or visual evidence of sewage,
  - Ammonia ≥ 0.5 mg/L, surfactants ≥ 0.25 mg/L, and bacteria levels greater than the water quality criteria applicable to the receiving water, or
  - Ammonia ≥ 0.5 mg/L, surfactants ≥ 0.25 mg/L, and detectable levels of chlorine

## 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 Highway Department 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.

In Permit Year 3, Halifax completed dry weather outfall screening at all known outfalls and sampling at required outfalls in the MS4 regulated areas.

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### 6.1 Weather Conditions

Dry weather outfall screening and sampling may occur when no more than 0.1 inches of rainfall has occurred in the previous 24-hour period and no significant snow melt is occurring. For purposes of determining dry weather conditions, program staff will use precipitation data from the Town of Halifax EMA weather station (KMAHALIF12). If Town of Halifax EMA station is not available or not reporting current weather data, then Turkey Swamp Yacht Club (KMAHALIF2) will be used as a back-up.

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### 6.2 Dry Weather Screening/Sampling Procedure

#### 6.2.1 General Procedure

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

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

**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
Mobile Device with Collector or Field Maps, including camera and GPS	Mobile device used for conducting dry weather screening/sampling. Also used for taking photos and geospatial locating of structures.
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 (or tablet or mobile phone with camera)	For documenting field conditions at time of inspection
Personal Protective Equipment (PPE)	Reflective vest, Safety glasses and boots at a minimum
GPS Receiver (or tablet or mobile phone with GPS)	For taking spatial location data
Water Quality Sonde	If needed, for sampling conductivity, temperature, pH
Water Quality Meter (if needed)	Handheld meters and test kits for testing for various water quality parameters such as ammonia, surfactants, and chlorine. See Table 6-2 below for meters used.
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 (if needed)	For damming low flows in order to take samples

Equipment	Use/Notes
Small Mallet or Hammer	Helping to free stuck manhole and catch basin covers
Utility Knife	Multiple uses
Measuring Tape	Measuring distances and/or depth of flow
Safety Cones	Safety
Hand Sanitizer	Disinfectant/decontaminant
Zip Ties/Duct Tape	For making field repairs
Rubber Boots/Waders	For accessing shallow streams/areas
Sampling Pole/Dipper/Sampling Cage	For accessing hard to reach outfalls and manholes

### 6.2.3 Sample Collection and Analysis

If flow is present during a dry weather outfall inspection, a sample will be collected and analyzed for the required permit parameters<sup>3</sup> listed in **Table 6-2**. The general procedure for collection of outfall samples is as follows:

1. At least one day prior to outfall sampling, coordinate with Alpha Analytical (716-783-9291) to schedule the laboratory analysis. This coordination will include the time of delivery and/or courier drop-off and number of samples expected to be sent for analysis. Confirm with Alpha Analytical if any anticipated hold time issues anticipated.
2. Fill out all sample information on sample bottles and field sheets (see **Appendix A** for Sample Labels and Field Sheets)
3. Put on protective gloves (nitrile/latex/other) before sampling
4. Collect sample with dipper or directly in sample containers. If possible, collect water from the flow directly in the sample bottle, or if necessary, use grab jar and pour into the lab sample bottles, so as to not disturb the preservatives in the sample bottles. Be careful not to disturb sediments.
5. If using a dipper or other device, triple rinse the device with distilled water and/or then in water to be sampled (not for bacteria sampling)
6. Use test strips, test kits, and field meters (rinse similar to dipper) for most parameters (see **Table 6-2**)
7. Place laboratory samples on ice for analysis of bacteria and pollutants of concern
8. Fill out chain-of-custody form (**Appendix A**) for laboratory samples
9. Contact Alpha Analytical for lab sample pick up
10. Dispose of used test strips and test kit ampules properly
11. 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. As necessary, field staff will continue to the next upstream

<sup>3</sup> Other potentially useful parameters, although not required by the MS4 Permit, include **fluoride** (indicator of potable water sources in areas where water supplies are fluoridated), **potassium** (high levels may indicate the presence of sanitary wastewater), and **optical brighteners** (indicative of laundry detergents).

structure until there is no longer an influence from the receiving water on the visual inspection or sampling.

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

**Table 6-2. Sampling Parameters and Analysis Methods**

Analyte or Parameter	Instrumentation (Portable Meter)	Field Test Kit
Ammonia	NA	Hach™ Ammonia Test Strips
Surfactants (Detergents)	NA	CHEMetrics™ K-9400
Chlorine	CHEMetrics™ V-2000, K-2513 Hach™ DR300 Pocket Colorimeter™ II	NA
Conductivity	EXTECH EC500	NA
Temperature	EXTECH EC500	NA
Salinity	EXTECH EC500	NA
Temperature	EXTECH EC500	NA
Indicator Bacteria: <i>E. coli</i> (freshwater) or Enterococcus (saline water)	EPA certified laboratory procedure (40 CFR § 136)	NA
Pollutants of Concern <sup>1</sup>	EPA certified laboratory procedure (40 CFR § 136)	NA

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

Testing for indicator bacteria and any pollutants of concern must be conducted using analytical methods and procedures found in 40 CFR § 136.<sup>4</sup> Samples for laboratory analysis must also be stored and preserved in accordance with procedures found in 40 CFR § 136. **Table 6-3** lists analytical methods, detection limits, hold times, and preservatives for laboratory analysis of dry weather sampling parameters.

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

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

SM = Standard Methods

### 6.3 Interpreting Outfall Sampling Results

Outfall analytical data from dry weather sampling can be used to help identify the major type or source of discharge. **Table 6-4** shows values identified by the U.S. EPA and the Center for Watershed Protection as typical screening values for select parameters. These represent the typical concentration (or value) of each parameter expected to be found in stormwater. Screening values that exceed these benchmarks may be indicative of pollution and/or illicit discharges.

**Table 6-4. Benchmark Field Measurements for Select Parameters**

Analyte or Parameter	Benchmark
Ammonia	>0.5 mg/L
Conductivity	>2,000 µS/cm
Surfactants	>0.25 mg/L
Chlorine	>0.02 mg/L (detectable levels per the 2016 MS4 Permit)
Indicator Bacteria <sup>5</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

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<sup>5</sup> Massachusetts Water Quality Standards: <http://www.mass.gov/eea/docs/dep/service/regulations/314cmr04.pdf>



## 7 Catchment Investigations

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

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### 7.1 System Vulnerability Factors

The Highway 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
- Prior work on storm drains
- 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
- Any storm drain infrastructure greater than 40 years old
- Widespread code-required septic system upgrades required at property transfers (indicative of inadequate soils, water table separation, or other physical constraints of the area rather than poor owner maintenance)
- 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**

**Halifax, Massachusetts**

**Revision Date: TO BE UPDATED**

Outfall ID	Receiving Water	1 History of SSOs	2 Storm Drain Infrastructure >40 years Old	3 Septic with Poor Soils or Water Table Separation	4 History of BOH Actions Addressing Septic Failure
Sample 1	XYZ River	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. Any storm drain infrastructure greater than 40 years old
3. 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)
4. History of multiple Board of Health actions addressing widespread septic system failures (indicative of inadequate soils, water table separation, or other physical constraints of the area rather than poor owner maintenance)

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## 7.2 Dry Weather Manhole Inspections

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

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

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

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

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

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

For most catchments, manhole inspections will proceed from the outfall moving up into the system. However, the decision to move up or down the system depends on the nature of the drainage system and the surrounding land use and the availability of information on the catchment and drainage system. Moving up the system can begin immediately when an illicit discharge is detected at an outfall, and only a map of the storm drain system is required. Moving down the system requires more advance preparation and reliable drainage system information on the upstream segments of the storm drain system, but may be more efficient if the sources of illicit discharges are believed to be located in the upstream portions of the catchment area. Once a manhole inspection methodology has been selected, investigations will continue systematically through the catchment.

Inspection of key junction manholes will proceed as follows:

1. Manholes will be opened and inspected for visual and olfactory evidence of illicit connections. A sample field inspection form is provided in **Appendix A**.
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 Highway Department 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. 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.

Public notification is an important aspect of a detailed source investigation program. Prior to smoke testing, dye testing, or TV inspections, the Highway Department will notify property owners in the affected area. Smoke testing notification will include a letter delivered to the property 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, Halifax 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 B**. 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

---

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

#### **Halifax Bottle Label**

##### **Halifax Water Quality Sampling Program Sample**

Sample ID: \_\_\_\_\_

Laboratory Analysis: \_\_\_\_\_

Preservative:   (pre-populated by lab)  

Date: \_\_\_\_\_

Time: \_\_\_\_\_

Collected By: \_\_\_\_\_

Bottle Type:          (pre-populated by lab)

## Halifax Inspection Form

IDDE Outfall Screening Form	
Date of Inspection:	Date of Last Storm:
Inspector Name:	
Type of Inspection: <input type="checkbox"/> Dry Weather <input type="checkbox"/> Wet Weather	
Structure Found: <input type="checkbox"/> Yes <input type="checkbox"/> No	
Next upstream structure visited? <input type="checkbox"/> Yes <input type="checkbox"/> No	
<b>Outfall Condition:</b>	
Outfall Condition: <input type="checkbox"/> Good: Inspect Within 2 Years <input type="checkbox"/> Fair: Inspect Within 1 Year <input type="checkbox"/> Failing: Requires Immediate Action <input type="checkbox"/> Poor: Requires Maintenance <input type="checkbox"/> Unknown	
Sedimentation: <input type="checkbox"/> No Sedimentation <input type="checkbox"/> Slight Sedimentation <input type="checkbox"/> High Sedimentation	
IDDE Class: <input type="checkbox"/> Potential <input type="checkbox"/> Obvious <input type="checkbox"/> Unlikely	
Reason for Illicit Suspicion:	
<b>Visual Inspection:</b>	
Staining: <input type="checkbox"/> No Staining <input type="checkbox"/> Some Staining <input type="checkbox"/> Significant Staining	
Scour Protection Condition: <input type="checkbox"/> Good: Inspect Within 2 Years <input type="checkbox"/> Fair: Inspect Within 1 Year <input type="checkbox"/> Failing: Requires Immediate Action <input type="checkbox"/> Poor: Requires Maintenance <input type="checkbox"/> Unknown	
Needs Repair? <input type="checkbox"/> Yes <input type="checkbox"/> No	Needs Cleaning? <input type="checkbox"/> Yes <input type="checkbox"/> No
Vegetative Growth: <input type="checkbox"/> None <input type="checkbox"/> < 25% Vegetated <input type="checkbox"/> < 50% Vegetated <input type="checkbox"/> 50% Vegetated <input type="checkbox"/> > 50% Vegetated <input type="checkbox"/> 100% Vegetated	
Flow: <input type="checkbox"/> Yes <input type="checkbox"/> No	Flow Volume: <input type="checkbox"/> Low <input type="checkbox"/> Moderate <input type="checkbox"/> Heavy
Flow Clarity: <input type="checkbox"/> Clear <input type="checkbox"/> Cloudy <input type="checkbox"/> Opaque	
Color of Flow: <input type="checkbox"/> N/A <input checked="" type="checkbox"/> Clear <input type="checkbox"/> Tea/Coffee <input type="checkbox"/> Clear Black <input type="checkbox"/> Orange-Red <input type="checkbox"/> Tan to Light Brown <input type="checkbox"/> Milky/Dirty Dishwater Gray <input type="checkbox"/> Milky White <input type="checkbox"/> White Crusty Deposits <input type="checkbox"/> Greenish-Bluish <input type="checkbox"/> Blue <input type="checkbox"/> Purple <input type="checkbox"/> Dark Red <input type="checkbox"/> Other (describe in notes)	
Floatables: <input type="checkbox"/> Yes <input type="checkbox"/> No	Sewage, Sheens & Scum: <input type="checkbox"/>

	Yes <input type="checkbox"/> No
Visual evidence of sewage?: <input type="checkbox"/> Yes <input type="checkbox"/> No	
Odor: <input type="checkbox"/> None <input type="checkbox"/> Rotten Eggs/Hydrogen Sulfide <input type="checkbox"/> Musty Odor <input type="checkbox"/> Sharp, Pungent Odor <input type="checkbox"/> Sweet, Fruit <input type="checkbox"/> Gasoline, Petroleum <input type="checkbox"/> Chlorine <input type="checkbox"/> Other (describe in notes)	
<b>Water Quality Sampling</b>	
Temperature (deg C):	
pH:	Conductivity (micro-Siemens/cm):
Ammonia (mg/L):	Salinity (ppm):
Surfactants (mg/L):	Chlorine (mg/L):
Additional Parameters Screened:	
Sample for Lab Collected: <input type="checkbox"/> Yes <input type="checkbox"/> No	
Lab Sample 1 Test:	Lab Sample 1 Results:
Lab Sample 2 Test:	Lab Sample 2 Results:
Lab Sample 3 Test:	Lab Sample 3 Results:
Notes:	

## Halifax Example Chain of Custody Form from Alpha Analytical

[illegible]

## Appendix B

---

### IDDE Employee Training Record

**Illicit Discharge Detection and Elimination (IDDE)  
Employee Training Record**

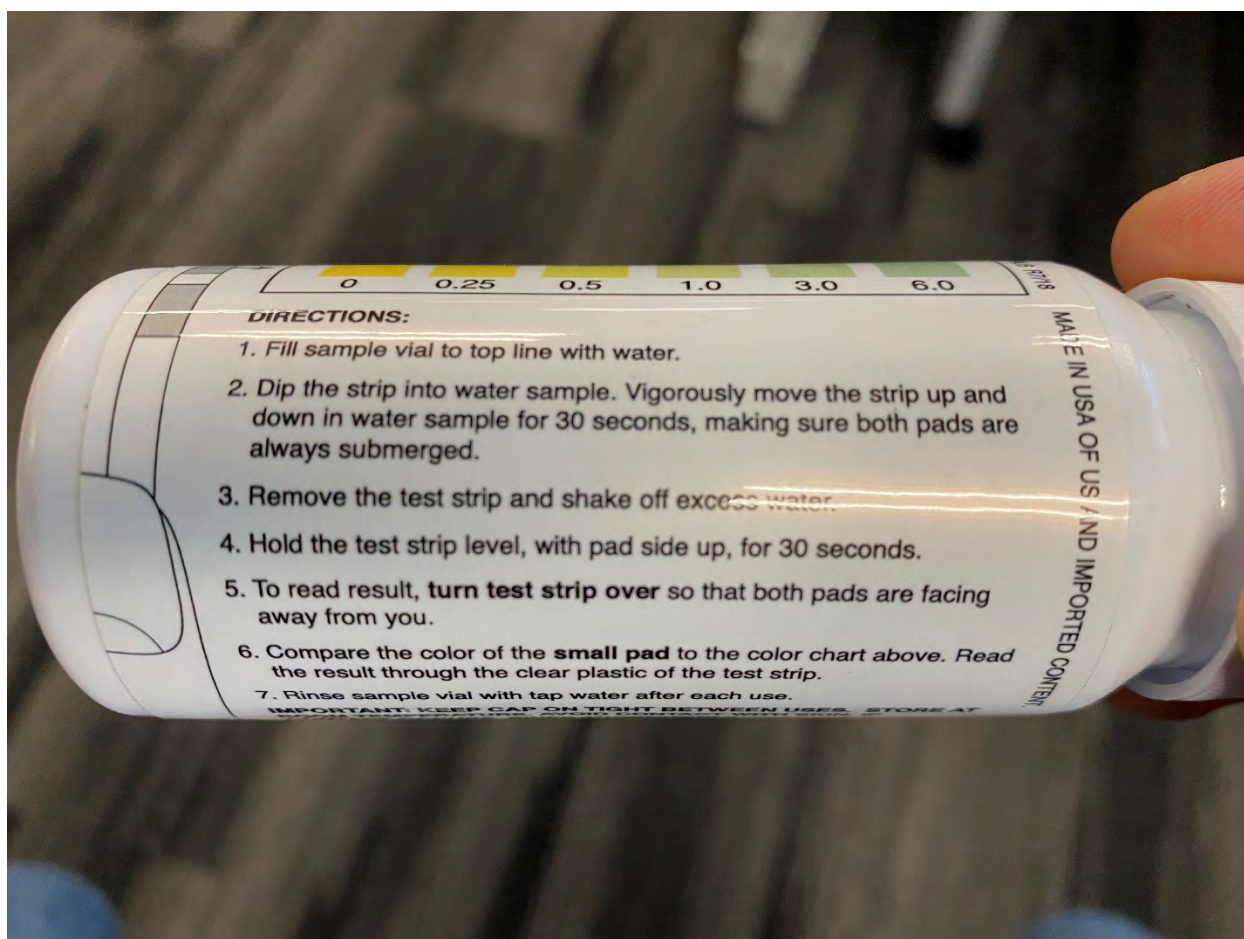
**Halifax, Massachusetts**

Date	Title	Approximate Number of Attendees	Duration	Topics Covered
6/18/20	Town of Halifax IDDE Stormwater Training	5	1 hour	Stormwater and MS4 basics, stormwater regulations, what are and how to recognize illicit discharges and SSOs, how to respond, operations and maintenance practices to avoid illicit discharges
6/11/21	Town of Halifax IDDE Stormwater Training	4	1 hour	Stormwater and MS4 basics, stormwater regulatory background, Halifax IDDE Bylaw, what are and how to recognize illicit discharges and SSOs, how to respond and report, using Halifax app.

## Appendix D

---

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



**DIRECTIONS:**

1. Fill sample vial to top line with water.
2. Dip the strip into water sample. Vigorously move the strip up and down in water sample for 30 seconds, making sure both pads are always submerged.
3. Remove the test strip and shake off excess water.
4. Hold the test strip level, with pad side up, for 30 seconds.
5. To read result, **turn test strip over** so that both pads are facing away from you.
6. Compare the color of the **small pad** to the color chart above. Read the result through the clear plastic of the test strip.
7. Rinse sample vial with tap water after each use.

**IMPORTANT: KEEP CAP ON TIGHT BETWEEN USES. STORE AT**





DOC022.97.90639

**DR300**

10/2019, Edition 3

**User Manual**  
**Manual del usuario**  
**Manuel de l'utilisateur**  
**Manual do Usuário**

用戶手冊  
使用手冊  
取扱説明書  
사용 설명서  
ຄູ່ມືນຳໃຊ້

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## Section 1 Specifications

Specifications are subject to change without notice.

Specification	Details
Dimensions (W x H x D)	6.9 x 15.7 x 3.4 cm (2.7 x 6.2 x 1.3 in.)
Enclosure	IP67, waterproof at 1 m (3.3 ft) for 30 minutes when battery compartment is closed and locked.
Light source	Light emitting diode (LED)
Detector	Silicon photodiode
Display	LCD with backlight
Weight	0.25 kg (0.55 lb)
Power requirements	4 AAA batteries; approximate life of 5000 tests (use of backlight decreases this number) Rechargeable batteries are not recommended.
Operating environment	0 to 50 °C (32 to 122 °F), 0 to 90% relative humidity non-condensing
Storage temperature	-20 to 55 °C (-4 to 131 °F), 0 to 80% relative humidity non-condensing
Wavelength	Fixed wavelength $\pm 2$ nm, different for each model
Filter bandwidth	15 nm
Absorbance range	0 to 2.5 Abs
Sample cell	25 mm (10 mL) and 1 cm (10 mL)
Data storage	Last 50 measurements

Specification	Details
Bluetooth® <sup>1</sup>	Bluetooth® is on when the optional Hach Communication Dongle is installed.
Certifications	CE
Warranty	1 year (EU: 2 years)

## Section 2 General information

In no event will the manufacturer be liable for direct, indirect, special, incidental or consequential damages resulting from any defect or omission in this manual. The manufacturer reserves the right to make changes in this manual and the products it describes at any time, without notice or obligation. Revised editions are found on the manufacturer's website.

### 2.1 Safety information

#### **NOTICE**

The manufacturer is not responsible for any damages due to misapplication or misuse of this product including, without limitation, direct, incidental and consequential damages, and disclaims such damages to the full extent permitted under applicable law. The user is solely responsible to identify critical application risks and install appropriate mechanisms to protect processes during a possible equipment malfunction.

Please read this entire manual before unpacking, setting up or operating this equipment. Pay attention to all danger and caution statements. Failure to do so could result in serious injury to the operator or damage to the equipment.

Make sure that the protection provided by this equipment is not impaired. Do not use or install this equipment in any manner other than that specified in this manual.

<sup>1</sup> The Bluetooth® word mark and logos are registered trademarks owned by the Bluetooth SIG, Inc. and any use of such marks by HACH is under license.

### 2.1.1 Use of hazard information

#### **DANGER**

Indicates a potentially or imminently hazardous situation which, if not avoided, will result in death or serious injury.

#### **WARNING**

Indicates a potentially or imminently hazardous situation which, if not avoided, could result in death or serious injury.

#### **CAUTION**



Indicates a potentially hazardous situation that may result in minor or moderate injury.

#### **NOTICE**

Indicates a situation which, if not avoided, may cause damage to the instrument. Information that requires special emphasis.

### 2.1.2 Precautionary labels

Read all labels and tags attached to the instrument. Personal injury or damage to the instrument could occur if not observed. A symbol on the instrument is referenced in the manual with a precautionary statement.

	This symbol, if noted on the instrument, references the instruction manual for operation and/or safety information.
	Electrical equipment marked with this symbol may not be disposed of in European domestic or public disposal systems. Return old or end-of-life equipment to the manufacturer for disposal at no charge to the user.

### 2.1.3 Certification

#### **Canadian Radio Interference-Causing Equipment Regulation, ICES-003, Class B:**

Supporting test records reside with the manufacturer.

This Class B digital apparatus meets all requirements of the Canadian Interference-Causing Equipment Regulations.

Cet appareil numérique de classe B répond à toutes les exigences de la réglementation canadienne sur les équipements provoquant des interférences.

### **FCC Part 15, Class "B" Limits**

Supporting test records reside with the manufacturer. The device complies with Part 15 of the FCC Rules. Operation is subject to the following conditions:

1. The equipment may not cause harmful interference.
2. The equipment must accept any interference received, including interference that may cause undesired operation.

Changes or modifications to this equipment not expressly approved by the party responsible for compliance could void the user's authority to operate the equipment. This equipment has been tested and found to comply with the limits for a Class B digital device, pursuant to Part 15 of the FCC rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment. This equipment generates, uses and can radiate radio frequency energy and, if not installed and used in accordance with the instruction manual, may cause harmful interference to radio communications. Operation of this equipment in a residential area is likely to cause harmful interference, in which case the user will be required to correct the interference at their expense. The following techniques can be used to reduce interference problems:

1. Move the equipment away from the device receiving the interference.
2. Reposition the receiving antenna for the device receiving the interference.
3. Try combinations of the above.

## **2.2 Product overview**

This instrument is a portable filter photometer used for testing water.

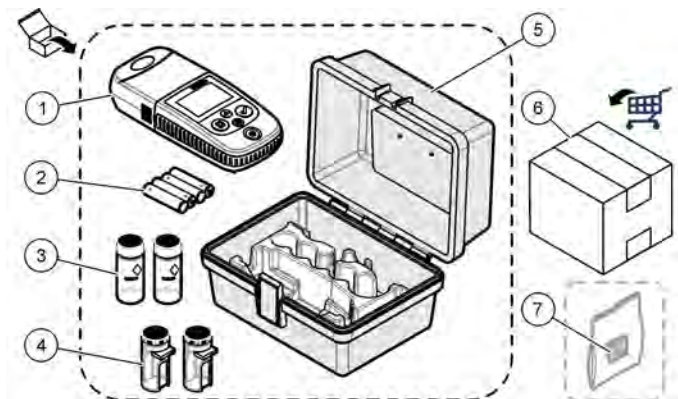
**Note:** *This instrument has not been evaluated to measure chlorine and chloramines in medical applications in the United States.*

## **2.3 Product components**

Make sure that all components have been received. Refer to [Figure 1](#). If any items are missing or damaged, contact the manufacturer or a

sales representative immediately. [Figure 1](#) is an example and shows the parts supplied with LPV445.99.00110. Other instruments come with different components.

**Figure 1 Product components**




1 DR300	5 Storage case
2 AAA alkaline batteries	6 Reagents
3 Sample cells, 25 mm (10 mL), glass	7 Hach Communication Dongle (optional, supplied separately)
4 Sample cells, 1 cm (10 mL), plastic	

## Section 3 Install the batteries

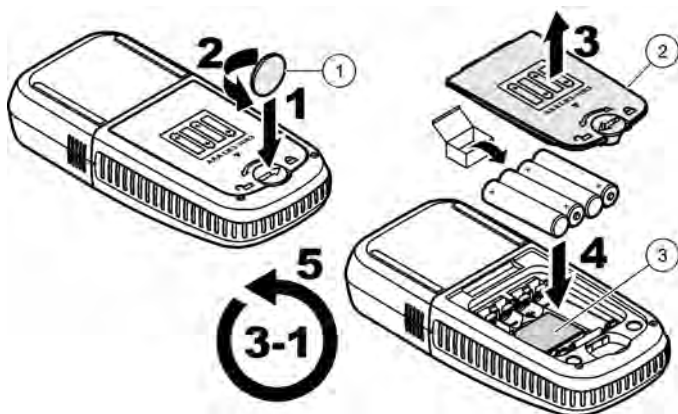
### ⚠ WARNING



Explosion hazard. Incorrect battery installation can cause the release of explosive gases. Be sure that the batteries are of the same approved chemical type and are inserted in the correct orientation. Do not mix new and used batteries.

Refer to [Figure 2](#) to install the batteries. Then, push  to set the instrument to on.

**Figure 2 Install the batteries**



1 Coin

2 Battery cover

3 Plastic insert for dongle<sup>2</sup>

## **Section 4 User interface and navigation**

### **4.1 Keypad description**

**Figure 3** shows the keypad and gives the key functions.

<sup>2</sup> Only remove the plastic insert to install the Hach Communication Dongle. Refer to the installation instructions supplied with the dongle.



**Figure 3 Keypad**

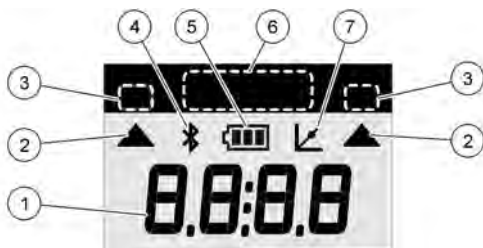


<p><b>1 Range key:</b> Selects the measurement range (e.g., LR or HR). Push and hold for 3 seconds to enter or exit menu mode. In menu mode, scrolls up or increases the value of the selected digit.</p>	<p><b>4 Backlight key:</b> Sets the backlight to on and off. In menu mode, scrolls down or decreases the value of the selected digit.</p>
<p><b>2 Zero key:</b> Sets the zero value before a measurement. In menu mode, goes back one menu level or moves the cursor to the previous digit.</p>	<p><b>5 Read key:</b> Starts a sample measurement. In menu mode, selects the menu option shown or moves the cursor to the next digit.</p>
<p><b>3 Power key:</b> Sets the power to on and off. Push and hold for 5 seconds to reset the instrument. The calibration is not deleted.</p>	

## 4.2 Display description

Figure 4 shows the values and icons shown on the display.

Figure 4 Display



<b>1 Numeric display:</b> Measured value or menu options	<b>5 Battery icon:</b> Battery power level. Flashes when the battery power level is low.
<b>2 Range icon:</b> Points to the selected measurement range	<b>6</b> Parameter and measurement ranges
<b>3</b> Measurement ranges or parameters	<b>7 Calibration adjusted icon:</b> The factory default calibration was adjusted or a user-entered calibration curve was entered.
<b>4 Bluetooth® icon:</b> Bluetooth® is on <sup>3</sup> .	

## Section 5 Set the time

Set the time (24-hour format).

1. Push and hold ▲ for 3 seconds to enter menu mode.  
The time shows (or 00:00).
2. Push ✓ to set the time.
3. Push the ▲ or ⚙ to change the number that flashes. Push ✓ to go to the next digit. Push ◀ to go to the previous digit.

<sup>3</sup> Shows when the Hach Communication Dongle is installed.

## Section 6 Do a test

### DANGER



Chemical or biological hazards. If this instrument is used to monitor a treatment process and/or chemical feed system for which there are regulatory limits and monitoring requirements related to public health, public safety, food or beverage manufacture or processing, it is the responsibility of the user of this instrument to know and abide by any applicable regulation and to have sufficient and appropriate mechanisms in place for compliance with applicable regulations in the event of malfunction of the instrument.

### DANGER



Chemical exposure hazard. Obey laboratory safety procedures and wear all of the personal protective equipment appropriate to the chemicals that are handled. Refer to the current safety data sheets (MSDS/SDS) for safety protocols.



### CAUTION




Chemical exposure hazard. Dispose of chemicals and wastes in accordance with local, regional and national regulations.

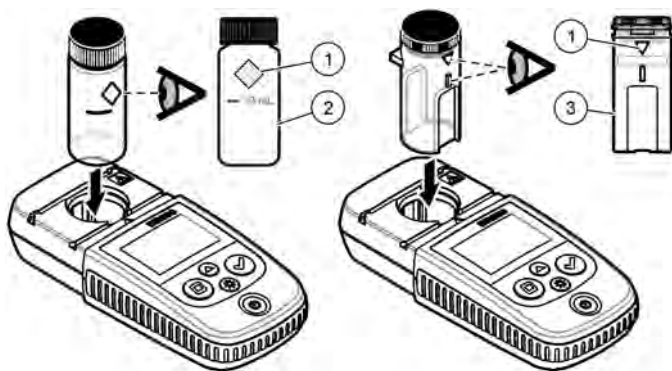
The generic steps to do a test follow.

To do a test for a specific parameter (e.g., chlorine), download the test procedure from the manufacturer's website. Refer to [Download a test procedure](#) on page 14.

1. Push  to select the applicable measurement range (e.g., LR or HR).
2. Prepare the blank. Refer to the test procedure.
3. Clean the sample cell with a no-lint cloth.
4. Insert the blank sample cell into the cell holder. Make sure to install the blank sample cell in the correct and consistent orientation so that the results are more repeatable and precise. Refer to [Figure 5](#).
5. Install the instrument cap over the cell holder. Refer to [Figure 6](#).
6. Push  to set the instrument zero.

7. Remove the blank sample cell.
8. Prepare the sample. Refer to the test procedure.
9. Clean the sample cell with a no-lint cloth.
10. Insert the sample cell into the cell holder. Make sure to install the sample cell in the correct and consistent orientation so that the results are more repeatable and precise. Refer to [Figure 5](#).
11. Install the instrument cap over the cell holder. Refer to [Figure 6](#).
12. Push . The display shows the results in concentration units or absorbance.  
**Note:** *The result flashes if the result is less or more than the instrument range.*
13. Remove the sample cell from the cell holder.
14. Immediately empty and rinse the sample cell. Rinse the sample cell and cap three times with deionized water (or distilled water).  
**Note:** *As an alternative, use tap water to rinse the sample cell if the samples measured have a higher concentration than the tap water.*

**Figure 5 Sample cell orientation**



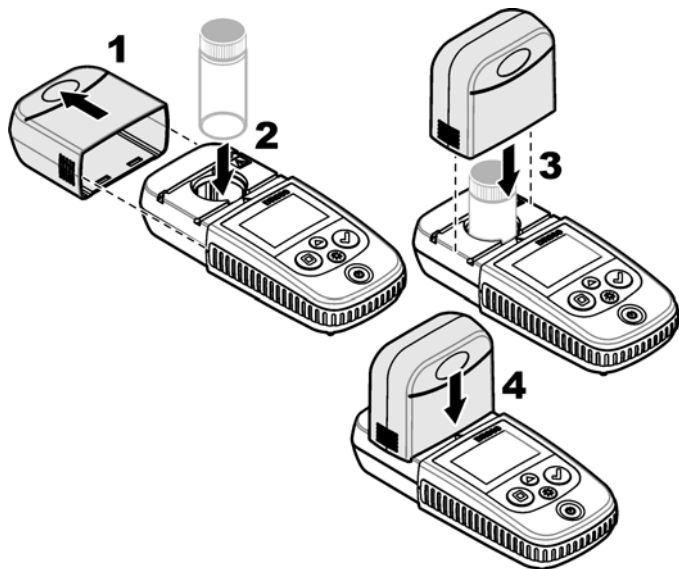
<b>1</b> Orientation mark <sup>4</sup>	<b>2</b> Sample cell, 25-mm (10 mL), glass <sup>5</sup>	<b>3</b> Sample cell, 1-cm (10 mL), plastic <sup>6</sup>
--	---	--

<sup>4</sup> Some variants of the instrument have sample cells without an orientation mark.

<sup>5</sup> Use the glass sample cell for low-range chlorine tests.

<sup>6</sup> Use the plastic sample cell for high-range chlorine tests.

**Figure 6** Install the instrument cap over the cell holder



## 6.1 Download a test procedure

1. Go to <http://www.hach.com>.
2. Enter "DR300" in the Search box.
3. Select the applicable instrument from the list.
4. Click the Downloads tab.
5. Scroll down to "Methods/Procedures".
6. Click the link for the applicable test procedure to download it.

## Section 7 Show measurements

**Note:** The instrument saves a maximum of 50 measurements. After 50 measurements are done, new measurements replace the oldest measurements.

1. Push and hold ▲ for 3 seconds.
2. Push ▲ until "rCL" (recall) shows, then push ✓.  
"– 01 –" shows. Measurement 01 is the last measurement done.
3. Push ✓ to scroll forward.  
The measurement number is followed by the measurement value and then the time.
4. To go to a measurement number, push ✓ until a measurement number shows, then push ▲ or ⚙.  
**Note:** Measurements cannot be deleted.
5. Push and hold ▲ for 3 seconds to go back to measurement mode.

## Section 8 Calibration

This instrument is calibrated at the factory. No user calibration is necessary.

### 8.1 Standard calibration adjust

Use the standard calibration adjust (SCA) option when a calibration must be adjusted to meet regulatory requirements. The factory calibration is adjusted slightly with the standard calibration adjust (SCA) option so that the instrument shows the expected value of the standard solution. The adjusted calibration is then used for all test results. This adjustment can increase the test accuracy when there are slight variations in the reagents or instruments.

**Note:** For instruments with factory-calibrated ranges or methods, the standard calibration adjust (SCA) feature is disabled when a user-entered calibration is entered into the instrument. To set SCA back to on, set the instrument to the factory default calibration. Refer to [Set to the factory default calibration](#) on page 20.

### 8.1.1 Do a standard calibration adjust

1. Complete the test procedure for the range to calibrate. For the sample, use the standard solution concentration given in the test procedure documentation.

**Note:** If a standard solution concentration is not given in the test procedure documentation, a different known standard can be used.

2. When the test procedure is completed, push and hold ▲ for 3 seconds.
3. Push ▲ until "SCA" shows, then push ✓.  
The display shows the standard calibration adjust value.
4. If a different known standard is used, enter the value of the standard:
  - a. Push ▲ until "Edit" shows, then push ✓.
  - b. Enter the value of the standard.

Push the ▲ or ✖ to change the number that flashes. Push ✓ to go to the next digit. Push □ to go to the previous digit.

5. Push ✓ to add the standard calibration adjust value to the factory calibration curve.

### 8.1.2 Set the standard calibration adjust to off

To use the factory default calibration again, set standard calibration adjust (SCA) to off.

1. Push and hold ▲ for 3 seconds to enter menu mode.
2. Push ▲ until "SCA" shows, then push ✓.
3. Push ▲ until "OFF" shows, then push ✓.

**Note:** To set the SCA function to on again, do a standard calibration adjust.

## 8.2 User-entered calibration curve

This instrument accepts a user-prepared calibration curve. The calibration curve can be from 0 to 2.5 absorbance. Make sure that the calibration curve includes standard values that are less and more than the range of interest.

The instrument range will be the same as the calibration range. For example, when the standards that are used are 1.00, 2.00 and 4.00. The instrument range is 1.00 to 4.00.



There are two options to enter a user calibration curve:

- **Enter a calibration curve with standards**—The standard solution values are entered with the keypad and the absorbance values are measured.
- **Enter a calibration curve with the keypad**—The standard solution values and absorbance values are entered with the keypad.

**Note:** If the instrument is set to off or the instrument power is removed before a user-entered calibration curve is completed, the calibration curve is not saved. The instrument automatically switches off in user-entered calibration entry mode after 60 minutes of no activity. User-entered calibrations are completed when the user goes out of calibration (cal) mode or edit mode.

### 8.2.1 Enter a calibration curve with standards

#### ⚠ WARNING



Chemical exposure hazard. Obey laboratory safety procedures and wear all of the personal protective equipment appropriate to the chemicals that are handled. Refer to the current safety data sheets (MSDS/SDS) for safety protocols.

















#### ⚠ CAUTION



Chemical exposure hazard. Dispose of chemicals and wastes in accordance with local, regional and national regulations.


**Note:** As an alternative, deionized water can be used for the blank unless the sample is significantly more turbid or has more color than deionized water.

1. Push **▲** to set the instrument to the range to calibrate (e.g., LR or HR).
2. Prepare the blank. Refer to the test procedure.
3. Clean the sample cell with a no-lint cloth.
4. Set the instrument to zero.
  - a. Insert the blank sample cell in the cell holder.
  - b. Install the instrument cap over the cell holder.

- c. Push . The display shows "- - -", then "0.00".
5. Push and hold  for 3 seconds to enter menu mode.
6. Push  until "USER" shows, then push .
7. Push  until "CAL" shows, then push .
8. When "S0" shows on the display, push .
9. Enter 00.00 (or 000.0) for the blank value.  
Push the  or  to change the number that flashes. Push  to go to the next digit. Push  to go to the previous digit.
10. When "A0" shows on the display, push  to measure the absorbance of the blank.  
The display shows the absorbance value for "S0".
11. Remove the sample cell from the cell holder.
12. Prepare the sample. Refer to the test procedure. For the sample, use the standard solution concentration given in the test procedure documentation.
13. Clean the sample cell with a no-lint cloth.
14. Push  to show "S1" (or "Add"), then push .
15. Enter the concentration value of the first calibration standard, then push .
16. When "A1" shows on the display, do the steps that follow to measure the absorbance:
  - a. Insert the reacted standard sample cell in the cell holder.
  - b. Install the instrument cap over the cell holder.
  - c. Push . The display shows the absorbance value for "S1".
17. The calibration is completed with two calibration points. If additional standards are necessary for calibration:  
Do steps 11 – 16 again to measure more calibration standards.
18. Remove the sample cell from the cell holder.








19. Immediately empty and rinse the sample cell. Rinse the sample cell and cap three times with deionized water (or distilled water).

**Note:** As an alternative, tap water can be used to rinse the sample cell if the concentration of the parameter in the tap water is less than the samples measured.







20. Push and hold  for 3 seconds to go back to measurement mode.

### 8.2.2 Enter a calibration curve with the keypad

At least two data pairs are necessary to enter a user-prepared calibration curve. A concentration value and the absorbance value for the given concentration is necessary for each data pair. A maximum of 10 data pairs can be entered.

1. Push  to set the instrument to the range to calibrate (e.g., LR or HR).
2. Push and hold  for 3 seconds to enter menu mode.
3. Push  until "USEr" shows, then push .
4. Push  until "Edit" shows, then push .
5. When "S0" shows on the display, push .
6. Enter the first data pair.

The first data pair is S0 (concentration value) and A0 (absorbance value).

- Push  or  to change the number that flashes.
  - Push  to go to the next digit.
  - Push  to go to the previous digit.
7. Do steps 5 and 6 again to enter the second data pair (S1 and A1).
  8. The calibration is completed with two data pairs. If additional data pairs are necessary for calibration:
    - a. When "Add" shows, push .
    - b. Do steps 5 and 6 again to enter more data pairs.
  9. Push and hold  for 3 seconds to go back to measurement mode.

### 8.2.3 Set to the factory default calibration

To remove a user-entered calibration curve from the instrument and use the factory calibration, do the steps that follow:

1. Push and hold ▲ for 3 seconds to enter menu mode.
2. Push ▲ until "USER" shows, then push ✓.
3. Push ▲ until "dFL" (default) shows, then push ✓.

## Section 9 Maintenance

### ⚠ CAUTION



Multiple hazards. Only qualified personnel must conduct the tasks described in this section of the document.

### NOTICE

Do not disassemble the instrument for maintenance. If the internal components must be cleaned or repaired, contact the manufacturer.

### 9.1 Clean the instrument

Clean the exterior of the instrument with a moist cloth and a mild soap solution and then wipe the instrument dry as necessary.

### 9.2 Clean the sample cells

### ⚠ CAUTION



Chemical exposure hazard. Obey laboratory safety procedures and wear all of the personal protective equipment appropriate to the chemicals that are handled. Refer to the current safety data sheets (MSDS/SDS) for safety protocols.

### ⚠ CAUTION



Chemical exposure hazard. Dispose of chemicals and wastes in accordance with local, regional and national regulations.

Most laboratory detergents are used at recommended concentrations. Neutral detergents, such as Liquinox, are safer to use when regular

cleaning is necessary. To decrease the cleaning times, increase the temperature or use an ultrasonic bath. To complete the cleaning, rinse a few times with deionized water and then let the sample cell air dry. Sample cells may also be cleaned with acid, followed by a thorough rinse with deionized water.



**Note:** Always use acid to clean sample cells that were used for low-level metal tests.

Special cleaning methods are necessary for individual procedures. When a brush is used to clean sample cells, take extra care to avoid scratches on the interior surfaces of the sample cells.

### 9.3 Replace the batteries


Replace the batteries when the battery power level is low. Refer to [Install the batteries](#) on page 7.

## Section 10 Troubleshooting

Error	Description	Solution
E-00	No Zero	In user calibration mode, a standard solution was measured before the instrument zero was set. Measure a blank solution to set the instrument to zero.
E-01	Ambient light error <sup>7</sup>	There is ambient light in the cell holder. Make sure that the instrument cap is fully installed on the cell holder. Refer to <a href="#">Do a test</a> on page 11.
E-02	LED error <sup>7</sup>	The LED (light source) is out of regulation. Replace the batteries. Make sure that the LED in the cell holder comes on when  or  is pushed.

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<sup>7</sup> When an E-01 or E-02 error occurs on a measurement, the display shows "\_. \_". The decimal place depends on the chemistry. If the E-01 or E-02 error occurs while the instrument is set to zero, set the instrument to zero again.

Error	Description	Solution
E-03	Standard adjust error	<ul style="list-style-type: none"> <li>• The measured value of the standard solution is more than the adjustment limits. Prepare a fresh standard.</li> <li>• The standard solution is not within the concentration range that can be used for standard calibration adjust. Prepare a standard with a value at or near the recommended concentrations given in the procedure.</li> <li>• Make sure that the concentration of the standard solution is entered correctly.</li> </ul>
Reading flashes followed by E-04	The reading is more or less than the instrument range. <sup>8</sup>	If the reading is less than the instrument range, make sure that the instrument cap is fully installed on the cell holder. Measure a blank. If the blank reading is not zero, set the instrument to zero again.
		If the reading is more than the instrument range, identify if there is a light blockage in the cell holder. Dilute the sample. Do the test again.
E-06	Absorbance error	The absorbance value is not correct or the user-entered calibration curve has fewer than two points. Enter or measure the absorbance value again.
E-07	Standard value error	The standard solution concentration is equal to another standard solution concentration that is already entered in the user-entered calibration curve. Enter the correct standard concentration.
E-09	Flash error	The instrument is not able to save data. Push and hold  for 5 seconds to reset the instrument.
E-10	Environment temperature too high or too low	The ambient temperature is out of range. Use the instrument only in the specified operating conditions. Refer to <a href="#">Specifications</a> on page 3.

<sup>8</sup> The value that flashes will be 10% over the upper test range limit.

Error	Description	Solution
E-12	Low battery power	Battery power is too low. Replace the batteries. Refer to <a href="#">Install the batteries</a> on page 7.
E-13	Parameter load failure	The memory of the instrument is defective. Contact technical support.
E-14 followed by "_._" or "0" if no zero was present	Zero measurement invalid	The zero measurement is too low. Use a sample cell filled with water and try again. If the error continues, contact technical support.
E-15 followed by "_._"	Absorbance too high	Identify if there is a light blockage in the cell holder. Clean the cell holder. Dilute the sample. Do the test again. <b>Note:</b> This instrument can not read absorbance values higher than 3.5 Abs.
E-20	Signal measurement out of range	There is too much light on the light detector. Make sure that the instrument cap is fully installed on the cell holder. Do the test again. If the error continues, contact technical support.
E-21	Signal measurement unstable	There is an unstable signal on the light detector. There is too much or unstable ambient light. Make sure that the instrument cap is fully installed on the cell holder. Do the test again. If the error continues, contact technical support.
E-22	Hardware error	The electronic system is defective. Contact technical support.

The following errors can occur immediately after an instrument update.

Error	Description	Solution
E-30	No application	There was an error during the application update. A valid application was not found on the instrument. Update the instrument again.
E-31	Bootloader update failed	There was an error during the transmission of the bootloader update. Update the bootloader again.

Error	Description	Solution
E-32	Application update failed	There was an error during the transmission of the application update. Update the instrument again.
E-66	Update failed	The instrument is defective. Contact technical support.

## Section 11 Replacement parts and accessories

### ⚠ WARNING



Personal injury hazard. Use of non-approved parts may cause personal injury, damage to the instrument or equipment malfunction. The replacement parts in this section are approved by the manufacturer.

**Note:** Product and Article numbers may vary for some selling regions. Contact the appropriate distributor or refer to the company website for contact information.

### Replacement parts

Description	Quantity	Item no.
AAA batteries, alkaline	4/pkg	4674300
Instrument cap	1	LPZ445.99.00006
Battery cover	1	LPZ445.99.00007
Sample cell, 25 mm (10 mL), glass	6/pkg	2427606
Sample cell, 1 cm (10 mL), plastic	2/pkg	4864302

### Accessories

Description	Quantity	Item no.
Hach Communication Dongle	1	LPV446.99.00012
Soft-sided case/holster	1	5953100



# EXTECH®

## User Manual

### ExStik® EC500

pH / Conductivity / TDS / Salinity / Temperature Meter



## ***Introduction***

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Congratulations on your purchase of the ExStik® EC500 pH/Conductivity/Total Dissolved Solids (TDS) / Salinity meter. With the EC500's dynamic cell-constant technology it is possible to measure a wide range of Conductivity, TDS, and Salinity with the same electrode. Careful use and maintenance will provide years of reliable service.

## ***Powering the ExStik™***

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The ExStik® uses four (4) CR2032 Lithium Ion Batteries (included). If the batteries are weak, the 'BAT' indicator appears on the LCD. Press the ON/OFF key to turn the ExStik® on or off. The auto power off feature shuts the ExStik® off automatically after 10 minutes of inactivity to preserve battery life.

## ***Getting Started***

---

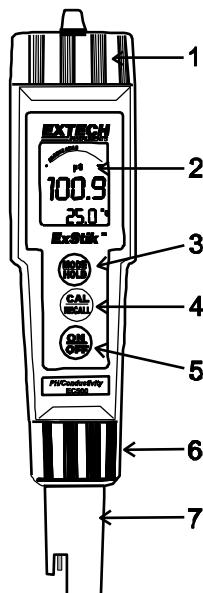
- Remove the cap from the bottom of the ExStik to expose the pH electrode, reference junction and conductivity electrodes.
- Before the first use or after storage, soak the electrode in tap water or pH 4 buffer solution for about 10 minutes.
- White KCL crystals may be present in the cap or on the electrode. This is to be expected depending on the length of time in storage. These crystals will dissolve while soaking the electrode or they can be rinsed away with tap water.
- For best results calibrate with pH 7 buffer solution first, then calibrate with the buffer solution closest to the expected pH value of the solution or material to be tested.
- To preserve the pH electrode life, keep the sponge in the protective cap soaked with tap water or pH 4 buffer solution.
- For best results, calibrate for conductivity with a standard in the expected range of the sample. For maximum accuracy calibrate from low conductivity value standards to high value standards.

## Meter Description

### Front Panel Description

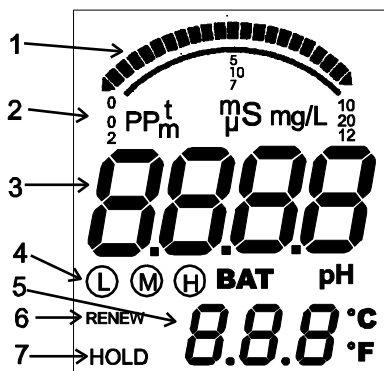
1. Battery compartment cover
2. LCD Display
3. MODE/HOLD button
4. CAL/RECALL button
5. ON/OFF button
6. Electrode Collar
7. pH/Conductivity Electrode

(Note: The Electrode cap is not shown)



### LCD Display

1. Bargraph display
2. Measurement units
3. Main display
4. Range calibration and low battery indicators
5. Temperature display
6. Renew indicator
7. Reading hold indicator



## Measurement Procedure

### Sample Preparation:

1. For Conductivity, TDS or Salinity place the test sample in a sample cup with enough depth (2.5cm minimum) to cover the electrode. Stir the solution to remove any air bubbles.
2. For pH, place the tip of the electrode in the sample or make contact with a wet surface.

### Conductivity

TDS  
Salinity

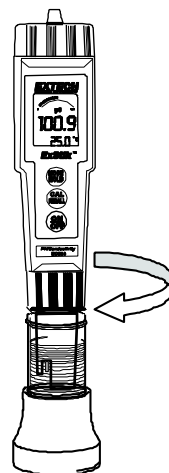


pH

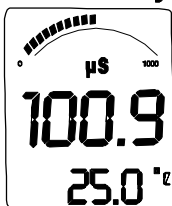


### Measurement:

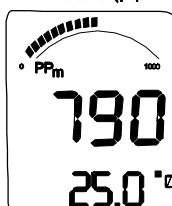
1. Press the **ON** button. (**8888** and then "SELF CAL" will appear in the display during the turn-on diagnostics)
2. Depress and hold the **MODE/HOLD** key to scroll to the desired measurement mode.
3. Insert the electrode into the sample making sure that the electrodes are completely submersed.
4. Slowly stir the solution with the electrode to remove air bubbles if in the Conductivity, TDS or Salinity mode.
5. If in the Conductivity, TDS or Salinity modes, the meter will auto-range and then display the reading.



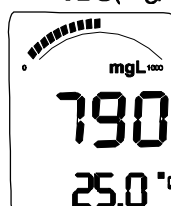
### Conductivity



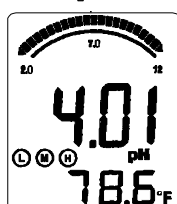
### TDS(ppm)



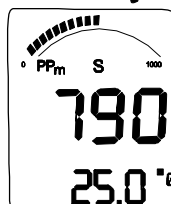
### TDS(mg/l)



### pH



### Salinity



## Changing Measurement Function

The meter can be set to measure pH, Conductivity, TDS or Salinity.

To change the mode:

1. Press and Hold the **MODE/HOLD** button for 2 seconds and the display will begin to scroll through the units.

**µS** (Conductivity); **pH**; **ppm S** (Salinity); **ppm** (TDS); **mg/l** (TDS);

**Note:** The “HOLD” function cannot be on when changing the measurement function. If “HOLD” is displayed in the lower left corner of the display, briefly press the **MODE/HOLD** button to turn it off.

2. When the desired units are displayed, release the **MODE/HOLD** button.

## TDS Compensation Ratio

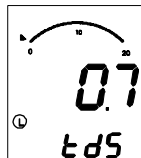
The TDS value is determined by multiplying a conductivity reading by a known ratio factor. The meter allows for selecting a conversion ratio in the range of 0.4 to 1.0. The ratio varies with the application, but is typically set between 0.5 and 0.7.

Note: The stored ratio will briefly appear in the lower temperature display when the meter is first turned on, or when changing measurement function to TDS.

**Note: In the Salinity mode the ratio is 0.4 to 0.6 auto**

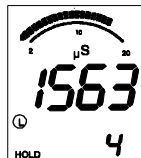
To change the ratio, while in the TDS measurement mode (ppm or mg/l):

1. Press and release the **CAL/RECALL** button twice in succession. The stored ratio will appear in the display.
2. Press the **MODE/HOLD** button to increase the ratio value in steps of 0.1.
3. When the desired ratio is displayed, press and release the **CAL/RECALL** button to store the value and return to the normal mode.
4. If no buttons are pressed for 5 seconds, the meter returns to measure mode.



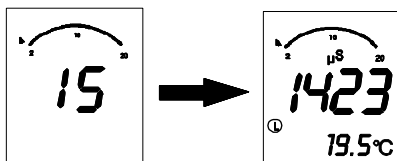
## Storing Readings

1. Press the **MODE/HOLD** button to store a reading. The storage location number will be displayed on the lower display, while the main display shows the stored reading. The meter will enter the HOLD mode and the “HOLD” indicator will appear.
2. Press the **MODE/HOLD** button again to exit the HOLD mode and return to normal operation.
3. If more than 25 readings are stored, previously stored readings (starting with number 1) will be overwritten.



## Recalling Stored Readings

1. Press the **CAL/RECALL** button and then press the **MODE/HOLD** button. A location number (1 through 25) will briefly appear and then the value stored in that location will appear. The displayed units will flash, indicating that the storage recall mode is active.



2. The last stored reading will be displayed first. Pressing and releasing the **MODE/HOLD** button will scroll through the stored readings one at a time. The location number is displayed first, followed by the reading stored in that location.
3. To exit the storage mode, press the **CAL/RECALL** button and the meter will return to normal operation, after displaying "End".

## Clear Stored Memory

With the unit on, press and hold ON/OFF for 4 seconds. "clr" will be briefly displayed when the memory is cleared.

## Changing Temperature Units

To change the displayed temperature units (°C or °F):

1. With the unit OFF, press and hold down the **CAL/RECALL** button.
2. With the **CAL/RECALL** button depressed momentarily press the **ON/OFF** button. When "SELF CAL" appears in the display release the **CAL/RECALL** button. The unit will power on with temperature displayed in the new units.

## Data Hold Mode

Press the **MODE/HOLD** button to hold (freeze) a reading in the display. The meter will enter the HOLD mode and the "HOLD" indicator will appear.

Note: This also stores the reading.

Press the **MODE/HOLD** button again to return to normal operation.

## Auto Power OFF

The auto power off feature automatically shuts the meter off 10 minutes after the most recent button press.

## Auto Power OFF Disable

To disable the Auto Power Off feature:

1. Turn the unit on
2. Press **CAL/RECALL** once (**Quickly**)
3. Immediately and simultaneously press the **MODE/HOLD** and **ON/OFF** buttons for approximately 2 seconds, until "oFF" is briefly displayed

To disengage this feature, turn the unit off with the **ON/OFF** button. The next time the unit is powered up, Auto Power OFF mode will be engaged again.

## Low Battery Indication

When the batteries become weak the "BAT" icon will appear in the display. Refer to the Maintenance section for battery replacement information.

## Calibration - pH (1, 2, or 3 points)

1. Place the electrode into a buffer solution (4, 7, or 10). Press and hold the **CAL/RECALL** key until "CAL" appears in the lower (temp.) display. When doing a 2 or 3 point calibration, calibrate with pH 7 buffer first, then follow with pH 4 then the pH 10 buffer.
2. The ExStik® automatically recognizes the solution and calibrates itself to that value (the circled number on the LCD will match the solution). Note that if the solution is more than 1 pH unit off from the L (4), M (7), or H (10) pH buffer, or if the electrode slope is low, the ExStik® will assume an error and abort the calibration ('End' will be displayed, and the unit will return to measure mode.)
3. During calibration, the pH reading flashes on the main display.
4. When calibration is complete, the ExStik® automatically displays "SA", then "End" and returns to normal operation mode.
5. The appropriate circled indicator (L, M, or H) appears on the LCD when a particular calibration or series of calibrations has been completed within one power on cycle. When the ExStik® is turned off, the circled indicator configuration and the calibration data will be retained.
6. For a two or three-point calibration, repeat steps 1-4.
7. See **Reset Calibration Data** to clear all calibration data from the meter.

## CAL Reminder Display

When in pH measurement mode, a "CAL" icon will appear after 15 on/off cycles of the meter without performing a calibration. The CAL display is simply a reminder to calibrate pH, and will turn off when the pH electrode is recalibrated. The reminder does not affect function in any way.

## RENEW Display

A flashing 'RENEW' warning indicates that the probe is not performing to expected specifications. If cleaning and recalibration does not cause the RENEW icon to disappear, replace the probe (see optional accessories on the last page of this manual). The RENEW display appears as a result of the pH electrode slope falling below 70% of a nominal slope.

## Measurement and Display Considerations

- If the unit appears to be locked (display frozen). It is possible that the Data Hold mode has been inadvertently accessed by pressing the **MODE/HOLD** button. ("HOLD" will be displayed in the bottom left of the LCD.) Simply press the **MODE/HOLD** button again or turn the meter off and then on.
- For maximum accuracy, allow sufficient time for the temperature of the probe to reach the temperature of the sample before calibrating. This will be indicated by a stable temperature reading on the display.

## Reset Calibration Data

Follow this procedure to clear all calibration data from the meter. Resetting the calibration data may be necessary when new calibration solutions are used or accuracy of measurements is in question.

1. Turn off the meter.
2. Press and Hold the Cal/Recall and Mode/Hold buttons.
3. Momentarily press the On/Off button, as soon as the display comes on, release all 3 buttons.
4. The display will show "**dFLt rSt**" (default reset) and all of the calibration data will be erased. If "**dFLt rSt**" does not appear, retry the procedure.
5. Proceed to the calibration routine for pH and Conductivity.

## Calibration - Conductivity

Meter accuracy verification should be performed on a periodic basis. Once per month is the recommended cycle for normal use. If calibration is required, a conductivity standardizing solution must be obtained. The meter can be calibrated in any or all of the three ranges. Standardizing solutions of 84 $\mu$ S/cm, 1413 $\mu$ S/cm or 12.88mS/cm (12,880 $\mu$ S/cm) are used for the automatic calibration recognition procedure. No other calibration values are permitted.

Calibration is always done in conductivity mode. Since salinity and TDS values are calculated from conductivity values, this procedure also calibrates the salinity and TDS ranges.

1. Fill a sample cup with the standardizing solution.
2. Turn the meter ON and insert the electrode into the solution. Tap or move the electrode in the sample to dislodge any air bubbles.
3. Press and hold the **CAL/RECALL** button (approximately 2 seconds) until "CAL" appears in the lower (temp) display. The main display will start flashing.
4. The meter will automatically recognize and calibrate to the standardizing solution. The display will briefly indicate "SA", End and then return to the measurement mode after a calibration. Note: The "SA" will not appear if the calibration fails.
5. The "range calibrated" symbol will appear in the display for each range that is calibrated during that power on cycle.
  - (L) Low range, 84 $\mu$ S/cm
  - (M) Medium range, 1413 $\mu$ S/cm
  - (H) High range, 12.88mS/cm (12,880 $\mu$ S/cm)

Note: Each time the calibration mode is entered all calibration symbols on the display are cleared, but only the calibration data for the currently calibrated range is replaced. The other two ranges keep the existing calibration data, just the symbols are removed. Calibration of all three ranges must be performed during one power on period for all three range calibration symbols to appear.

See **Reset Calibration Data** to clear all calibration data from the meter.

Note: The meter allows for a 1, 2 or 3 point calibration. If calibration is done for more than one point the lowest value standard should be done first to obtain the best accuracy.

## Considerations and Techniques

- Do not touch the inner surfaces of the conductivity electrodes. Touching the surface of the platinized electrodes may damage and reduce the life of the probe.
- Store the electrode in the wetting cap with the sponge moistened with pH 4.01 buffer solution.
- Always rinse the electrode in de-ionized water between measurements to avoid cross contamination of the sample. Double rinsing is recommended when high accuracy is required.
- Periodically, accumulated salt deposits from the reference electrode may build up in the storage cap, and should be rinsed away. These deposits could affect measured values of low conductivity samples.
- When measuring low conductivity samples, extra care is recommended in rinsing the probe to avoid contamination of the sample with electrolyte from the pH reference electrode. This will only be a factor when measuring in the low range, and can be further minimized by increasing the volume of the sample. (Example: Try a 200 to 500 mL sample.)
- If the 20mL sample cup is to be used, then the electrode should not be allowed to sit in the sample for any longer than necessary, to avoid pH electrolyte leakage into the sample, raising the conductivity value.



## Operational Matrix

<b>Function / Resulting Action</b>	<b>Power Status</b>	<b>Mode Setting</b>	<b>Required Key Press Sequence</b>
On/Off	On or Off	Any	Momentary press of the ON/OFF key
Calibration	On	pH or Conductivity	Press & hold CAL/RECALL key for 2 seconds, until it enters CAL function
Store Reading	On	Any measure mode	Momentary press of the MODE/HOLD key
Hold Release	On	While In Hold Mode	Momentary press of the MODE/HOLD key
Enter Memory Retrieval	On	Any measure mode	Momentary press of the CAL/RECALL key followed by a momentary press of the MODE/HOLD key (Within 4 seconds)
Scroll Stored Readings	On	Memory Recall	Momentary press of the MODE/HOLD key (Displays "last in first out")
Exit Memory Retrieval	On	Memory Recall	Momentary press of the CAL/RECALL key
Clear Stored Memory	On	Any Measure Mode	Press and hold the ON/OFF key for 4 seconds, until "clr" is displayed.
Change Measurement Mode	On	Any	Press and hold the MODE/HOLD key for at least 2 seconds (the modes will scroll by until the key is released)
Enter Cond/TDS Ratio	On	TDS (ppm or mg/l)	Press and release the CAL/RECALL key twice in quick succession
Change Cond/TDS Ratio	On	TDS ratio	Momentary press of the MODE/HOLD key (each key press increases the ratio by 0.1, the value cycles from 0.4 - 1.0)
Exit Cond/TDS Ratio	On	TDS ratio	Momentary press of the CAL/RECALL key
Change Temperature Units	Off	n/a (off mode)	Press and hold the CAL/RECALL key then momentarily press the On/Off key. Release the CAL/RECALL key after the "SELF CAL" lights
Override Auto Power Off	On	Any measure mode	Momentarily press the CAL/RECALL key then simultaneously press and hold the ON/OFF & MODE/HOLD key for approximately 2 seconds, until "oFF" is displayed
Default Reset	OFF	n/a	Simultaneously press ON/OFF, CAL/RECALL and MODE/HOLD momentarily. "dFLt" will be displayed.

## Specifications

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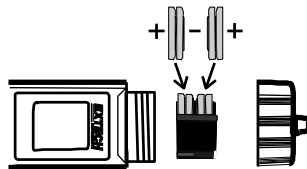
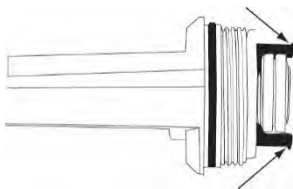
Display	2000 count LCD with Bargraph
pH Range	0.00 to 14.00
pH Accuracy	±0.01 pH typical
pH ATC Range	32°F to 194°F (0°C to 90°C)
pH Reference Junction	Permanent gel, non-refillable
Conductivity ranges	0 to 199.9µS 200 to 1999µS 2.00 to 19.99mS
TDS ranges (Variable ratio)	0 to 99.9ppm or mg/L 100 to 999ppm or mg/L 1.00 to 9.99ppt or g/L
Salinity range	0 to 99.9ppm 100 to 999ppm 1.00 to 9.99ppt
TDS Ratio	0.4 to 1.0 adjustable
Salinity Ratio	0.4 to 0.6 auto
Conductivity ATC	2.0% per °C
Conductivity ATC Range	32.0°F to 140°F (0.0°C to 60.0°C)
Temperature Range	23.0°F to 194°F (-5.0°C to 90.0°C)
Temperature Resolution	0.1 up to 99.9, 1 >100
Temperature Accuracy	±1.8°F; 1°C (from 23 to 122°F; -5 to 50°C) ±5.4°F; 3°C (from 122 to 194°F; 50 to 90°C)
Accuracy	Conductivity: ±2% full scale TDS: ±2% full scale Salinity: ±2% full scale
Measurement Memory	25 tagged (numbered) readings
Low battery indication	'BAT' appears on the LCD
Power	Four (4) CR2032 Lithium Ion Batteries
Auto power off	After 10 minutes (override available)
Operating conditions	23°F to 122°F (-5°C to 50°C)
Dimensions	1.6 x 7.9 x 1.6" (40 x 200 x 40 mm)
Weight	3.3 oz (93 g)

# Maintenance

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## Battery Replacement

1. Twist off the battery compartment cap
2. Holding the battery housing in place with a finger, pull out the battery carrier using the two small tabs.
3. Replace the four (4) CR2032 batteries observing polarity.
4. Replace the battery compartment cap



Safety: Please dispose of batteries responsibly; never dispose of batteries in a fire, batteries may explode or leak. If the meter is not to be used for 60 days or more, remove the battery and store separately

## Electrode Replacement

1. To remove an electrode, unscrew and completely remove the electrode collar (turn the collar counter-clockwise to remove).
2. Gently rock the electrode from side to side, pulling it downwards, until it disconnects from the meter.
3. To attach an electrode, carefully plug the electrode into the meter socket (note that the electrode connector is keyed, ensuring proper connection).
4. Tighten the electrode collar firmly enough to make a good seal (a rubber gasket seals the electrode with the meter).

## Cleaning Recommendations

When cleaning the probe, take care not to scratch or damage the sensing surface or the platinized electrode surfaces.

<b><i>Contaminant</i></b>	<b><i>Cleaning Solution</i></b>	<b><i>Instructions</i></b>
Water soluble substances	Deionized water	Soak or scrub with a soft brush. Recondition in 4 or 7 buffer for 1 hour.
Grease & Oil	Warm water and household detergent	Soak or scrub with a soft brush, maximum of 10 minutes. Rinse thoroughly with DI water, recondition in 4 or 7 buffer for 1 hour.
Heavy grease & Oil	Alcohol	Maximum of 5 minute soak, scrub with a soft brush. Rinse thoroughly with DI water, recondition in 4 or 7 buffer for 1 hour.
Lime and hydroxide coatings	10% acetic acid	Soak until coating dissolved, maximum of 5 minutes. Rinse thoroughly with DI water, recondition in 4 or 7 buffer for 1 hour.

**Please Note:** Since the EC500 does not have a refillable pH reference electrolyte chamber, it is important not to soak the electrode in the above solutions for more than the recommended times. To do so may cause a reference potential shift, which will cause degradation in performance or failure.

## Troubleshooting

<b><i>Problem</i></b>	<b><i>Possible Cause</i></b>	<b><i>Action</i></b>
Reading is frozen	Unit is in "HOLD" mode	Press MODE/HOLD key to exit "HOLD" mode
"BAT" message	Batteries are low	Replace batteries
Unit will not calibrate in pH	Low pH slope	Replace electrode, see reorder information
Unit will not calibrate in pH	Clogged or contaminated reference junction	Clean junction (see cleaning instructions)
Unit will not calibrate in pH	Damaged or worn out sensing membrane	Replace electrode, see reorder information
Unit will not calibrate in pH	Contaminated pH buffers	Use fresh buffers
Unit will not calibrate in conductivity mode	Contaminated conductivity standards	Use fresh standards
Unit will not calibrate in conductivity mode	Dirty probe	Clean conductivity probe (See cleaning instructions)
Unit will not calibrate in conductivity mode	Damaged conductivity probe	Replace electrode, see reorder information
Unit will not calibrate in conductivity mode	Trapped air bubbles	Tap or stir to release air bubbles
Unit will not turn on	Batteries are low or dead	Replace batteries
Unit will not turn on	Batteries installed with incorrect polarity	Replace batteries, observe polarity
"RENEW" message	pH sensor needs recalibration	Recalibrate unit Use fresh buffers
"RENEW" message	pH sensor slope has fallen below acceptable limits	Replace electrode, see reorder information
Unit will not respond to any key presses	Internal fault	Perform hard reboot: Remove batteries, hold ON/OFF switch down for 5 seconds, replace batteries

## ***Two-year Warranty***

---

**FLIR Systems, Inc. warrants this Extech brand instrument to be free of defects in parts and workmanship for two years from date of shipment (a six-month limited warranty applies to sensors and cables). To view the full warranty text please visit: <http://www.extech.com/support/warranties>.**

## ***Calibration and Repair Services***

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**FLIR Systems, Inc. offers calibration and repair services for the Extech brand products we sell. We offer NIST traceable calibration for most of our products. Contact us for information on calibration and repair availability, refer to the contact information below. Annual calibrations should be performed to verify meter performance and accuracy. Product specifications are subject to change without notice. Please visit our website for the most up-to-date product information:**

**[www.extech.com](http://www.extech.com).**

## ***Contact Customer Support***

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**Customer Support Telephone List: <https://support.flir.com/contact>**

**Calibration, Repair, and Returns: [repair@extech.com](mailto:repair@extech.com)**

**Technical Support: <https://support.flir.com>**

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**[www.extech.com](http://www.extech.com)**

# Detergents CHEMets Kit

K-9400/R-9400: 0 - 3 ppm

## Test Procedure

1. Rinse the reaction tube with the sample to be tested, and then fill it to the 5 mL mark with the sample.
2. While holding the double-tipped ampoule in a vertical position, snap the upper tip using the tip breaking tool (fig. 1).
3. Invert the ampoule and position the open end over the reaction tube. Snap the upper tip and allow the contents to drain into the reaction tube (fig. 1).
4. Cap the reaction tube and shake it vigorously for **30 seconds**. Allow the tube to stand undisturbed for **1 minute**.
5. Make sure that the flexible tubing is firmly attached to the CHEMet ampoule tip.
6. Insert the CHEMet assembly (tubing first) into the reaction tube making sure that the end of the flexible tubing is at the bottom of the tube. Break the tip of the CHEMet ampoule by gently pressing it against the side of the reaction tube (fig. 2). The ampoule should draw in fluid only from the organic phase (bottom layer).
7. When filling is complete, remove the CHEMet assembly from the reaction tube.
8. Remove the flexible tubing from the CHEMet ampoule and wipe all liquid from the exterior of the ampoule. Place an ampoule cap firmly onto the tip of the CHEMet ampoule. Invert the ampoule several times, allowing the bubble to travel from end to end.

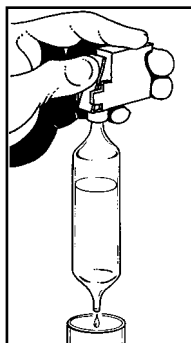


Figure 1

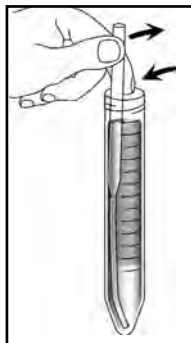


Figure 2

9. Obtain a test result by placing the ampoule, flat end first, into the comparator. Hold the comparator up toward a source of light and view from the bottom. Rotate the comparator until the best color match is found (fig. 3).

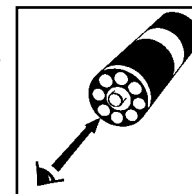


Figure 3

## Tip Breaker

The tip breaker opens for easy disposal of the glass tips (pull lever away from body of tip breaker or pull open the side wall). The tip breaker will work most effectively if the tips are emptied out frequently.

## Test Method

The Detergents CHEMets®<sup>1</sup> test kit employs the methylene blue extraction method<sup>2,3,4</sup>. Anionic detergents react with methylene blue to form a blue complex that is extracted into an immiscible organic solvent. The intensity of the blue color is directly related to the concentration of "methylene blue active substances (MBAS)" in the sample. Anionic detergents are one of the most prominent methylene blue active substances. Test results are expressed in ppm (mg/Liter) linear alkylbenzene sulfonate (equivalent weight 325).

1. CHEMets is a registered trademark of CHEMetrics, Inc. U.S. Patent No. 3,634,038
2. APHA Standard Methods, 22nd ed., Method 5540 C - 2000
3. EPA Methods for Chemical Analysis of Water and Wastes, Method 425.1 (1983)
4. ASTM D 2330-02, Methylene Blue Active Substances

## Safety Information

Read SDS (available at [www.chemetrics.com](http://www.chemetrics.com)) before performing this test procedure. Wear safety glasses and protective gloves.



[www.chemetrics.com](http://www.chemetrics.com)  
4295 Catlett Road, Midland, VA 22728 U.S.A.  
Phone: (800) 356-3072; Fax: (540) 788-4856  
E-Mail: [orders@chemetrics.com](mailto:orders@chemetrics.com)

Feb. 18, Rev. 10

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# Halifax Municipal Operations and Maintenance (O+M) Plan for MS4 Permit Compliance

This document was compiled based on template was created by VHB for use by municipal MS4 clients. This template was developed by modifying a template and standard operating procedures (SOPs) from the Central Massachusetts Regional Stormwater Coalition (CMRSWC).



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# 1 Introduction

This Operation and Maintenance (O+M) Plan covers Halifax's facilities, infrastructure, and other assets, with chapters organized around the following categories: parks and open space, building and facilities, vehicles and equipment, catch basins, streets and parking lots, winter road maintenance, and structural stormwater best management practices (BMPs). The O+M Plan outlines inspection and maintenance procedures for these assets and facilities. There are two appendices with additional details covering the following two topics: winter road maintenance and spill prevention and control. A third appendix provides information on Halifax's streets and street sweeping.

This O+M Plan has been prepared by Halifax in part to address O+M requirements<sup>1</sup> of the United States Environmental Protection Agency's (USEPA) 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 permit, "2016 Massachusetts MS4 Permit," or "MS4 Permit."

More specifically, this plan addresses Minimum Control Measure 6, Good Housekeeping and Pollution Prevention for Permittee Owned Operations, by describing the activities and procedures Halifax will implement so that infrastructure is maintained in a timely manner to reduce the discharge of pollutants from the MS4. This document fulfills the permit requirement for Halifax to develop an inventory and written (hardcopy or electronic) operations and maintenance procedures for parks and open spaces, buildings and facilities, vehicles and equipment, and infrastructure within two (2) year of the effective date of the permit. These details are outlined in Section 2.3.7.A of the MS4 Permit.

Employees and contractors who conduct maintenance and operations of municipal parks, open space, buildings, vehicles and equipment, streets and parking lots, and stormwater infrastructure are given a copy of this plan and provided with regular training on best practices.

<sup>1</sup> See Part 2.3.7.a.iii of the 2016 MS4 Permit for Infrastructure Operation and Maintenance program requirements.

## 2 Parks and Open Space

### 2.1 Overview and Inventory

This section establishes procedures for operations and maintenance of parks and open spaces owned and operated by Halifax, as required in the permit. The following MS4 Permit requirements are addressed in this section:

- Develop an inventory of all parks and open space owned by the permittee;
- Evaluate lawn maintenance and landscaping activities to ensure practices are protective of water quality, including reduced mowing frequencies, proper disposal of lawn clippings, and use of alternative landscaping materials (e.g., drought resistant planting);
- Establish procedures for management of trash containers at parks and open space (scheduled cleanings; sufficient number);
- Establish procedures to address the proper use, storage, and disposal of pesticides, herbicides, and fertilizers including minimizing the use of these products and using only in accordance manufacturer's instruction;
- Establish pet waste handling collection and disposal locations at all parks and open space where pets are permitted, including the placing of proper signage concerning the proper collection and disposal of pet waste;
- Establish procedures to address waterfowl congregation areas where appropriate to reduce waterfowl droppings from entering the MS4; and
- Establish procedures to address erosion or poor vegetative cover when the permittee becomes aware of it; especially if the erosion is within 50 feet of a surface water.

**Section 2.2** includes Halifax's approach to these requirements.

**Table 1** lists the parks and open space owned and operated by Halifax, to which these O+M procedures apply.

**Table 1     Inventory of Town-Owned Parks and Open Spaces<sup>2</sup>**

Name	Address or Location	Size (acres)	Responsible Department or Manager	Description and Uses(s)
Randall/Hilliard Preserve	River Street and Pratt Street along the Winnetux River	~68	Wildlands Trust of Southeastern Massachusetts (WTSEM)	Wildlife Preserve – nature study, hiking, potentially canoeing and kayaking
Peterson Swamp Land	Aldeana Road	14.99	MA Division of Fisheries and Wildlife	Wooded swamp
Indian Path Conservation Land	Indian Path Road, (Between Indian Path neighborhood and extensive Morse Bros Cranberry lands)	8.8	Halifax Conservation Commission	Informal open space
Kumpenen Bog Land	South of Hayward Street	21.19	Town of Halifax	Habitat, stream protection
Elm St./ Stump Brook Land	East of Elm Street between Furnace and Plymouth Streets	15.08	Halifax Conservation Commission	Stream protection and portion of potential Stump Brook Trail
YMCA Camp Water Land	End of Lingan Street	39.98	Water Commission	Water supply protection (town has two well fields on the site) and probable informal recreation
Stump Brook Well Site	Rear of Cranberry Drive	15.06	Water Commission	Vacant land originally proposed for a town well
Richmond Park Water Land	Plymouth Street, South of Richmond Park	14.7	Water Commission	Water supply protection, site of Town's Richmond Park wells
Matt Whitcomb Park	Holmes Street	12.84	Youth and Recreation Commission (Maintained by Highway Department)	Basketball and Playground activities and possible informal outdoor activities
Richmond Park	172 Plymouth Street	2.02	Water Commission	Public Park, no developed facilities
Wood Street Park	An island surrounded by Wood and Fuller Streets	1.5	Highway Department	Local park
Frank Lyon Park	Plymouth Street across from Fire Station	0.93	Highway Department	Local park
Urann Park	Off of Plymouth Street, adjacent to Town Hall-Hemlock Lane properties	4.13	Park Commission	Passive open space
Aldena Road Former Dog Pound Property	Aldana Road near Oak Street	13.33	Town, Police, Animal Control Officer	Former Dog Pound with a sizable parking area plus possible informal wildlife/open space use of rear land
Town Center Land	540 Plymouth Street, 490 South Street, 530 Plymouth Street	8.3	Town/Youth and Recreation Commission	Town land behind new police station and surrounding former library and church near corner of South Street and Plymouth Street (9.8 acres total, minus estimated 1.5 acres for new police station). Includes Vaughn Athletic Fields and Gordon Riker Wheels Park.
Elementary School Environs	470-480 Plymouth Street	84.9 minus school site	Highway Department/Youth and Recreation Commission (owned by School Department)	Elementary School and attached library on 5-6 acres along Rte. 106, the former Police Station and the Popes Tavern/COA building on 1.5 acres, and 9-10.5 acres of athletic fields. Facilities include 2 large and 2 small baseball fields, 1 soccer field, 2 tennis courts, 5 basketball hoops, an extensive creative playground, a smaller fully accessible play area, and a popular sledding slope.
East Cemetery	Plymouth Street, near Richmond Park	1.07	Highway Department	Cemetery, informal outdoor use, pond viewing
Hemlock Lane Cemetery	Hemlock Lane	3.79	Highway Department	Cemetery, informal open space
Thompson Street Cemetery	Thompson Street	3.2	Highway Department	Cemetery
Summit Street Soccer Fields (Former Summit Street Farmland)	Summit Street	11.0	Youth and Recreation Commission	Soccer fields, woods (formerly farmland)

<sup>2</sup> Information and descriptions in this table are from Chapter 10 of 2010 Halifax Master Plan, available at <http://www.halifax-ma.org/planning-board/pages/master-plan> and [http://www.halifax-ma.org/sites/halifaxma/files/uploads/masterplan10\\_.pdf](http://www.halifax-ma.org/sites/halifaxma/files/uploads/masterplan10_.pdf), accessed June 25, 2020.

Name	Address or Location	Size (acres)	Responsible Department or Manager	Description and Uses(s)
East Monponsett Pond Boat Launching Area and Beach	40 Holmes Street	0.022 (960 Square feet)	Park Commission, maintained by Highway Department	Boat launching and small swimming area indicated by an adjacent "Boat Landing and Beach" sign, and apparently open to all, not just to Town residents. Cars park at Brockton Water Diversion facility across the street. Only this tiny parcel is listed, but the facility also uses adjacent land in the Holmes Street right-of-way next to the Pond for the ramp, while the beach is to the south
Lingan Street/ West Monponsett Pond Lands	Off Lignan Street	5.23	Park Commission, maintained by Highway Department	Town beach, informal park next to a boat ramp
Holmes Street Lots	Across from 34 Holmes Street	4.46	Town	Informal open space
Hemlock Lane Land	Off Hemlock Lane and Plymouth Street (Abus Urann Park)	44.07	Town	Town Hall, Town Barn, water tower, and related facilities, and much informal open space
Monponsett Street/ Turkey Swamp Holdings	East of Monponsett Street., south of Richmond Park wells	177.04	Town	Wildlife, water supply protection
River Street/ Lucas Brook	West of 360 River Street	1.12	Town	Access to private land on the brook
Monponsett/ Palmer Mill Brook Property	West of Brook, north of powerline	8.28	Town	Habitat protection
Wood St./Winnetuxet River Land	Within bend of Winnetuxet River, NE of Wood Street	20.48	Town	Wildlife habitat, stream protection, and access for any potential trail
First House Site/Orchard Circle Land	Off Thompson Street, at rear of Orchard Circle Development	26.5	Town	Some wooded upland off Thompson Street mostly wooded swamp
Pond Street Swampland	Pond Street at East Bridgewater line	3.39	Town	Local wetlands habitat /informal open space, the adjacent land to the west is an East Bridgewater well site
Winnetuxet River Land	South of Thompson Street	4.96	Wildlands Trust of Southeastern Massachusetts (WTSEM)	Wildlife habitat, informal open space
Upper Monponsett Street Holdings	Boston Street, Bow Street, Standish Street, Monponsett Street	~1.5	Town	Potential additions to adjacent houses, local open space
Crystal Lake Holdings	Off of Oak Street , on paper streets; Ramsel Street, Morse Street	~8.7	Town	Wildlife habitat and wooded backdrop for a few houses along Crescent Ave. and Thompson Street in Pembroke and across pond on Crystal Lake Road in Halifax. About 5.7 acres in lots and about 3.0 acres in abutting paper streets
Annawon Drive Area	Scattered lots on Annawon Drive, Chestnut Road, Jordan Road, Birch Road Hemlock Road, Buttonwood Road, and Hickory Road	2.5	Town	Vacant lots mixed with houses, informal open space
Brandeis Circle Drainage Area	Brandeis Circle, just south of Harvard Street	1.08+	Highway Department	Drainage basin
Bosworth Circle Drainage Area	Bosworth Circle across from # 90	1.08+	Highway Department	Drainage basin

## 2.2 O+M Procedures

Maintaining parks and open space is critical for the quality of life of Halifax's residents and visitors. This section focuses on procedures to protect the water quality of waterbodies in Halifax by preventing pollutants in parks and open space from being carried in stormwater runoff to nearby waterbodies. Halifax will implement the following procedures at municipal parks and open spaces to reduce the discharge of pollutants from the MS4. **Table 1** describes these parks and open spaces.

### 2.2.1 Mowing and Landscaping

Grass clippings and other organic wastes from open space and park sites are left on site to decompose. Leaves from the cemetery are disposed of at the Highway Department Garage Facility.

As indicated in Halifax's Stormwater Management Program (SWMP), Halifax discharges into nitrogen or phosphorus impaired waterbodies or tributaries. Under MS4 Permit requirements, Halifax acknowledges that blowing organic waste material (grass cuttings, leaf litter) into waterbodies is strictly prohibited.

#### Mowing and Landscaping Best Practices

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##### Mowing

- Mow grass to 2-3 inches in height for water retention and weed control.
- Mow frequently, while cutting no more than one third of grass height per mowing.
- Reduce mowing frequencies wherever possible by establishing low/no-mow areas in lesser-used spaces.
- Remove debris and trash from landscaped areas prior to mowing.
- Collect grass clippings and leaves after mowing. Do not blow or wash them into the street, gutter, or storm drains.
- Keep mowing equipment in good state of repair, including sharp blades and well-oiled lawn mowers and maintain equipment over grassy areas or in contained washout areas that do not drain to MS4 or directly to surface water waters.
- Follow proper fueling procedures of equipment to guard against petroleum products from mistakenly entering the stormwater system.

- When establishing new plantings, use alternative landscaping material such as drought resistant plants, and native plants, based on site conditions (e.g., sunlight, wetness, slope, use) and to reduce the need for irrigation and fertilizers and pesticides.

##### Irrigation

- Only irrigate at a rate that can infiltrate into the soil to limit run-off.
- Irrigate in the early morning; use irrigation water conservatively; and direct irrigation equipment to appropriate vegetated areas, rather than sidewalks, parking lots, or driveways.
- Avoid irrigating close to impervious surfaces such as parking lots and sidewalks.
- Turn off irrigation systems during periods of adequate rainfall.
- Repair broken sprinkler heads as soon as possible

### 2.2.2 Trash and Trash Container Management

At parks and open space sites which have trash and/or recycling receptacles, these receptacles are emptied and inspected according to a weekly schedule (more frequently, as needed). Summit Street Soccer Fields, Matt Whitcomb Park, and the Halifax Elementary School Fields have carry-in, carry-out policies. Halifax follows the best practices outlined in Section 3.2.2 Trash and Recyclables Management for trash receptacles within municipal-owned parks and open space. Generally, receptacles are not placed or washed in areas where they could leak or overflow directly to the MS4 or a water resource.

### 2.2.3 Pesticides, Herbicides, and Fertilizer Use

Halifax does not use or store pesticides, herbicides, and fertilizers. The Summit Street Soccer Fields and Vaughn Athletic Fields use a private contractor for fertilizer use, paid for by the leagues. Any contractors are expected to follow best practices listed below. Any other chemical storage follows the procedures outlined in Section 3.2.1 Use, Storage and Disposal of Potential Pollutants.

Should Halifax use pesticides, herbicides, and fertilizers, Halifax will minimize their use at municipal-owned properties in an effort to protect surrounding waterbodies. Standards set forth in Massachusetts regulations on plant nutrient application (330 CMR 31.00) will be followed. The state requirements for fertilizers can be found here: <https://www.mass.gov/doc/330-cmr-31-plant-nutrient-application-requirements-for-agricultural-land-and-non-agricultural/download>. As required by the State, only fertilizer, pesticide, and herbicide products registered with the Department of Agricultural Resources will be used.

Proper approval from the Conservation Commission will be obtained before applying chemicals within 25 feet of resource areas as defined in the MA Wetlands Protection Act.

In accordance with TMDL and impaired waterbody requirements of the MS4 Permit, Halifax will use slow-release fertilizers in addition to reducing fertilizer use to reduce runoff to nutrient impaired waterbodies, as indicated in Halifax's Stormwater Management Program (SWMP). Phosphorus will only be applied in areas where a soil test indicates that it is not present in sufficient quantities. Where possible, Halifax will use phosphorus-free fertilizer options.

#### **Pesticides, Herbicides, and Fertilizer Use Best Practices**

---

##### **General**

- Avoid application over impervious surfaces.
- Clean up any spills with dry clean up methods (i.e., do not hose down a spill site).
- Do not hose down paved areas after application to a storm drain or drainage ditch.
- Read all labels and use products only as directed.
- Mix chemicals using clean application equipment under cover in an area where accidental spills will not enter surface water or groundwater and will not contaminate the soil.
- Spot treat infected areas instead of the entire location.



- Calibrate application equipment regularly to ensure proper application and loading rates.

### **Fertilizers**

- Test soils before applying fertilizer to determine what nutrients need to be supplemented. Prepare and apply only as much chemical as is needed.
- Do not apply fertilizers in the following conditions:
  - Between December 1 and March 1
  - To frozen and/or snow-covered soil
  - To saturated soils or soils that are frequently flooded
  - When rain is forecast for 24 hours
- Time fertilizer application methods for maximum plant uptake, usually in the fall and spring (e.g., between April 15 and October 15). When applying at the beginning and end of planting season, take into consideration the slower uptake rate of fertilizer by plants and adjust the fertilizer application accordingly.
- Fertilizers should only be applied by properly trained personnel.
- Never apply fertilizers in quantities exceeding the manufacturer's instructions. Instead, apply small amounts throughout the growing season.

### **Pesticides and Herbicides**

- Pesticides should only be applied by licensed or certified applicators.
- Use alternatives to pesticides and herbicides, such as manual weed control, biological controls, and Integrated Pest Management strategies (learn more at: <https://www.mass.gov/files/documents/2016/08/wk/ipm-kit-for-bldg-mgrs.pdf>).
- Ensure that pesticide application equipment is capable of immediate shutoff in case of emergency.
- Never apply pesticides in quantities exceeding the manufacturer's instructions.

- Apply pesticides at the life stage when the pest is most vulnerable.
- Never apply pesticides if it is raining or immediately before expected rain.
- Establish setback distances from pavement, storm drains, and waterbodies, which act as buffers from pesticide application, with disease-resistant plants and minimal mowing.
- Do not apply pesticides within 100 feet of open waters or of drainage channels.

#### **2.2.4 Pet Waste**

Pet waste removal in public parks is an important component of park maintenance for public health, aesthetics, and protecting water quality. It is the responsibility of pet owners to clean up after their pets when visiting parks in Halifax, and pet owners are expected to carry out dog waste and deposit via the Town's trash program. Halifax will target educational messages to ensure that that policy is communicated widely. There are currently no parks designated specifically for pets in Halifax.

Halifax will continue to evaluate and review applicability of the MS4 Permit, requirements related to pet waste.

#### **2.2.5 Waterfowl Congregation**

Congregation of waterfowl, including Canada Geese and others, can result in large nutrient loads to surrounding waterbodies due to the volume of fecal waste produced by the waterfowl. If waterfowl cannot be deterred, drainage from congregation areas should be redirected away from drainage infrastructure and waterbodies. Halifax does not currently engage in waterfowl deterrent practices, but best practices for future consideration are listed below.

##### **Best Practices to Discourage Waterfowl Congregation**

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- Instruct visitors not to feed waterfowl through signage or other public outreach methods and enforcement.
- Avoid mowing grass up to the edge of water to provide a natural vegetative buffer around a waterbody. This provides a small barrier for waterfowl to access the shoreline and provides a buffer where nutrient can be absorbed before reaching the waterbody.
- As necessary, conduct waterfowl deterrent practices such as reflective tape, strobe lights, adding eggs, harassment (human and/or dog), habitat manipulation, exclusionary fencing, and repelling devices.

#### **2.2.6 Slope Erosion and Vegetative Cover**

Ground disturbance and eroded slopes can result in moving soil, rock, or other material from up-slope areas into a waterbody, potentially transporting excess sediment, nutrients, and other contaminants. Controlling erosion by stabilizing disturbed areas and slopes can help maintain water quality.

The Highway Department conducts inspections for eroding areas during on-going operation and maintenance of parks and open space.

Upon identification of eroding areas, measures are taken immediately to minimize erosion. These measures include installing energy dissipators, re-establishing vegetation, and installing temporary erosion controls, as needed. The Highway Department will install erosion controls during any ground disturbance within 250 feet of a water body or wetland resource or greater than 1-acre in size.

Halifax ensures all contractors comply with their National Pollutant Discharge Elimination System (NPDES) Construction Stormwater Permit(s) for erosion control, as required. Following ground disturbance, the ground will be immediately stabilized with mulch or other practices and vegetation will be re-established as quickly as possible.

## 3 Buildings and Facilities

### 3.1 Overview and Inventory

This section covers Halifax's approach to maintaining its buildings and facilities. Halifax's MS4 Permit requires development of O+M procedures for town-owned buildings and facilities where pollutants are exposed to stormwater runoff. The Halifax-owned buildings and facilities that these procedures apply to are listed in **Table 2**.

The goal of these procedures is to minimize the potential for sites to generate pollutants that can runoff into the drainage system or nearby waterbodies. The following MS4 Permit requirements are addressed in this section:

- Develop an inventory of all permittee-owned buildings and facilities where pollutants are exposed to stormwater runoff, including schools, town offices, fire stations, municipal pools, and parking garages;
- Evaluate the use, storage, and disposal of petroleum products and other potential stormwater pollutants and ensure employees or contractors responsible for handling products are trained;
- Ensure Spill Prevention Plans are in place, as applicable, and coordinate with the fire department as necessary;
- Develop management procedures for dumpsters and other waste management equipment; and
- Ensure parking lots are swept and areas surrounding facilities are kept clean to reduce runoff of pollutants.

**Table 2     Inventory of Buildings and Facilities**

Name and Type	Address	Stormwater Pollution Prevention Plan (SWPPP) Required and Completed	Parking Lot (Y/N)
Highway Department Garage Facility	60 Hemlock Lane	Yes	Yes
Fire Department	438 Plymouth Street		Yes
Elementary School and Facilities	464 Plymouth Street		Yes
Holmes Public Library and Facilities	470 Plymouth Street		Yes
Elementary School	480 Plymouth Street		Yes
Town Hall	499 Plymouth Street		Yes
Halifax Water Department	500 Plymouth Street		Yes
Pope's Tavern Senior Center - Council on Aging	506 Plymouth Street		Yes
The Museum of Halifax	516 Plymouth Street		Yes, paved and dirt
Brockton Store, Vaughn Playground, Skate Park	530 Plymouth Street		Yes, gravel
Police Department	540 Plymouth Street		Yes
Recycling Center	917 Plymouth Street	Yes	Yes
Halifax Historical Commission (the Blacksmith Shop, the School House)	490 South Street		Yes, dirt

## 3.2 O+M Procedures

Halifax values the maintenance and upkeep of buildings and facilities to ensure the comfort and safety of residents, employees, and visitors, while also preventing stormwater issues associated with these facilities and ensuring that these facilities perform at high levels. Halifax employees participate in training on buildings and facilities to ensure best practices and skills are kept up to date.

The O+M topics listed below are of particular concern under permit requirements. Additional information is provided in individual facility's SWPPPs.

### 3.2.1 Use, Storage and Disposal of Potential Pollutants

Potential pollutants stored at municipal facilities include, but are not limited to, oil, gasoline, antifreeze, fertilizers, pesticides, and de-icing agents and additives. Minimizing or eliminating contact of materials containing potential pollutants with stormwater can significantly reduce pollution of receiving waters. Proper material handling and storage also contributes to employee health, an organized workplace, and efficient operations.

Spill prevention plans are put in place where applicable, based on inventories of material storage and potential pollutants. The attached Spill Prevention Control and Countermeasure (SPCC) Plan (Appendix A) applies to the facilities in **Table 2** where hazardous material occurs. The SPCC Plan will be reviewed with the fire department. Employees and contractors who are responsible for material use are trained on the SPCC plan and the guidelines below.

#### **Best Practices for the Use, Storage, and Disposal of Potential Pollutants**

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- Follow manufacturer's guidance on proper storage, disposal, and use.
- Store chemicals under cover in an enclosed controlled, ventilated, well-lit, high and dry area that is cool and insulated to protect against temperature extremes. Ensure storage areas were constructed in accordance with local fire codes for storing flammable or combustible materials.
- Confine material storage indoors whenever possible. Plug or disconnect floor drains that lead to the stormwater system.
- Confine outdoor material storage to designated areas that are covered, on impervious surfaces, away from high traffic areas, and outside of drainage pathways.
- Equip storage areas with easily accessible spill cleanup materials and portable firefighting equipment. Emergency eyewash stations and emergency drench showers should be located near the storage area.
- Storage cabinets are locked with a weather proof sign that warns of the existence and danger of the materials inside visible at a distance of 25 feet, as appropriate.
- Include material safety data sheets (MSDS) in an accessible location(s).
- Keep materials in their original containers.
- If materials are not in their original containers, clearly label all storage containers with the name of the chemical, the expiration date, and handling instructions.

- Maintain an inventory of all raw and waste materials to identify leakage. Order new materials only when needed.
- Provide secondary containment for storage tanks and drums with sufficient volume to store 110 percent of the volume of the material.
- Inspect storage areas for spills or leaks and containment units for corrosion or other failures.
- Ensure that contaminated waste materials are kept in designated containers and stored in labeled, designated, covered, and contained areas.
- Dispose of excess or obsolete materials and associated waste materials in accordance with the manufacturer's specification and all applicable regulations.

### 3.2.2 Trash and Recyclables Management

All liquid and solid waste must be disposed of properly. Some of the most common sources of pollution at municipal facilities are a result of littering, improper collection of debris, and improper disposal of waste. Residents can report trash container or dumpster issues through the Recycling Center at (781) 293-1732.

#### Best Practices for Waste Management

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- Ensure a sufficient number of waste receptacles are in place, where appropriate. Additional receptacles will be placed in high traffic areas based on observation.
- All waste and recycling receptacles must be leak-tight with tight-fitting lids or covers.
- Keep lids on dumpsters and containers closed at all times unless adding or removing material. If using an open-top roll-off dumpster, cover it and tie it down with a tarp unless adding materials.
- Place waste or recycling receptacles indoors or under a roof or overhang whenever possible.
- Locate dumpsters on a flat, paved surface not over or adjacent to catch basins and install berms or curbs around the storage area to prevent run-on and run-off.
- Arrange for waste or recycling to be picked up regularly and disposed of at approved disposal facilities. Prior to transporting waste, trash, or recycling, ensure that containers are not leaking (double bag if needed) and properly secure containers to the vehicle.
- Never place hazardous materials, liquids, or liquid-containing wastes in a dumpster or recycling or trash container.
- Do not wash trash or recycling containers outdoors or in parking lots.
- Conduct periodic inspections and clean and sweep solid and liquid waste storage areas. Clean up any liquid leaks or spills with dry cleanup methods.
- In dumpster areas, regularly pick up surrounding trash and debris and regularly sweep the area.

### 3.2.3 General Maintenance

The following best practices are applied when conducting general maintenance at municipal owned facilities. These practices apply to all facilities listed in Tables 1 and 2.

- When power washing buildings and facilities, ensure that the washwater does not flow into the storm system. Containment or filtering systems should be provided.
- When sanding, painting, power washing, etc., ensure that sites are properly prepared (e.g., use tarps) and cleaned (e.g., use dry cleaning methods) especially if they are near storm drains. Protect catch basins when maintenance work is conducted upgradient of them. Do not conduct when it is raining or prior to expected rain.
- When painting, use a drop cloth and clean up any spills immediately.
- Do not leave open containers on the ground where they may accidentally tip over.
- Buildings should be routinely inspected for areas of potential leaks.
- Do not discharge chlorinated pool water into the stormwater system. Water must be properly dechlorinated and tested before it is discharged.
- Streets and parking lots surrounding municipal buildings and facilities should be swept and kept clean to reduce runoff of pollutants and debris to the stormwater system.



## 4 Vehicles and Equipment

### 4.1 Overview and Inventory

This section covers Halifax's approach to maintaining its vehicles and equipment. Halifax 's MS4 permit requires the Town to establish procedures for the storage and maintenance of town-owned vehicles and equipment, so as to minimize their contribution of pollution to waterbodies. This section addresses the following MS4 Permit requirements:

- Develop an inventory of permittee-owned vehicles and equipment;
- Establish procedures for the storage of vehicles.;
- Evaluate fueling areas owned or operated by the permittee; and
- Establish procedures to ensure vehicle wash waters are not discharged into the municipal storm sewer system or surface waters.

An inventory of these facilities is included in **Table 3** below.

**Table 3      Inventory of Vehicles and Equipment**

Facility	Vehicle and Equipment Type Stored
Halifax Highway Department Garage Facility 60 Hemlock Lane	Highway Department vehicles and equipment; Water Department vehicles and equipment
Halifax Recycling Center 917 Plymouth Street	Forklift, truck, vehicles
Pope's Tavern Senior Center 506 Plymouth Street	Senior Center vans (3)
Halifax Police Department 540 Plymouth Street	Police Department vehicles and equipment
Halifax Fire Department 438 Plymouth Street	Fire Department vehicles and equipment

### 4.2 O+M Procedures

Halifax strives to maintain its vehicles and equipment in good working order so as to provide high quality municipal services and ensure the safety of employees, residents, and visitors, all while preventing stormwater pollution from vehicles and equipment.

The town follows the following procedures for vehicles and equipment:

- Fleet and equipment are inspected every time an oil change is conducted, and managers ensure that leaking vehicles or equipment are not used.
- Vehicles with fluid leaks are stored indoors or containment is otherwise provided until repaired.
- Vehicles and equipment are fueled at the Halifax Highway Department Garage Facility ("Town Barn"). Fueling areas are under cover and include spill containment measures in order to minimize exposure.
- Vehicles and equipment are maintained and washed at the locations listed in Table 3 location, which includes containment and spill prevention measures where appropriate.
- Materials used for maintaining and/or washing vehicles and equipment are used, stored, and disposed of in accordance with Section 3.2.1 Use, Storage and Disposal of Potential Pollutants.
- No wash water from vehicle and equipment maintenance areas is disposed of into the drainage system or allowed to flow overland off-site.
- Vehicle and equipment maintenance and washing procedures are covered in a facility specific SWPPP for the Town's 60 Hemlock Lane Highway Department Garage Facility. Additional vehicle and equipment maintenance procedures for other facilities are included below.

#### **4.2.1 Vehicle and Equipment Maintenance**

Halifax vehicles and equipment are inspected on a regular basis, and managers ensure that leaking vehicles or equipment are not used. Vehicles with fluid leaks are stored indoors or containment is otherwise provided until repaired. The following best practices are followed for vehicle and equipment storage, maintenance, and fueling.

##### **Best Practices for Vehicle and Equipment Storage, Maintenance, and Fueling**

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###### **Vehicle Storage**

- Monitor vehicles and equipment for leaks and use drip pans as needed until repairs can be performed.
- When drip pans are used, avoid overtopping.
- Drain fluids from leaking or wrecked vehicles and parts as soon as possible. Dispose of fluids properly.
- Store and park vehicles on impervious surfaces and/or under cover or indoors whenever possible.

###### **Vehicle Maintenance**

- Conduct routine inspections of heavy equipment and vehicles to proactively identify maintenance needs or potential leaks.
- Perform routine preventive maintenance to ensure heavy equipment and vehicles are operating optimally.
- Recycle or dispose of waste properly and promptly.
- Sweep and pick up trash and debris as needed.
- Do not dump any liquids or other

materials outside, especially near or in storm drains or ditches.

### **Body Repair and Painting**

- Conduct all body repair and painting work indoors.
- Minimize waste from paints and thinners. Calculate paint needs based on surface area.
- Use dry cleanup methods (vacuum, sweep) to clean up metal filings and dust and paint chips from grinding, shaving and sanding. Sweep debris from wet sanding after allowing it to dry overnight on the shop floor. Dispose of waste properly; never dump waste into storm or sanitary sewers.

- Use sanding tools equipped with vacuum capability to pick up debris and dust.
- Store all chemicals in accordance with Section 3.2.1 Use, Storage and Disposal of Potential Pollutants.

### **Fueling**

- Fueling areas owned or operated by Halifax should be covered.
- Fueling areas should be evaluated to ensure that pollutants (e.g., gasoline or oil) do not enter the MS4.
- Follow procedures in Section 4.2.3 Fuel and Oil Handling.

## **4.2.2 Vehicle Washing Procedures**

Halifax conducts vehicle washing at the Town's 60 Hemlock Lane Highway Department Garage Facility in designated outdoor wash slab, as described in the facility's SWPPP. The wash water travels along the concrete slab to a collection basin where solids can settle out and water can evaporate, infiltrate or be stored. Outdoor washing of Halifax vehicles should be avoided unless wash water is contained in a tight tank or similar structure. Where no alternate wash system is available, and full containment of wash water cannot be achieved, the procedures in the following sections shall be followed.

### **Best Practices for Vehicle Washing**

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#### **General**

- Bring smaller vehicles to commercial washing stations.
- Where use of detergent cannot be avoided, use products that do not contain regulated contaminants. Use of a biodegradable, phosphate-free detergent is preferred.
- Maintain absorbent pads and drip pans to capture and collect spills or noticeable leaks observed during washing activities. Clean up any spills using the procedures described in the SPCC provided in Appendix A.
- Avoid discharge of any wash water

directly to a surface water (e.g., stream, pond, drainage swale, etc.)

- Minimize use of water to the extent practical.
- Solids and particulate accumulation from the washing area shall be completed through periodic sweeping and/or cleaning.
- Designate separate areas for routine maintenance and vehicle cleaning. This helps prevent contamination of wash water by motor oils, hydraulic lubricants, greases, etc.
- Store all chemicals in accordance with Section 3.2.1 Use, Storage and Disposal of Potential Pollutants.

### **Outdoor Vehicle Washing**

- Do not use solvents except in dedicated solvent parts washer systems or in areas not connected to a sanitary sewer.
- Do not power wash, steam clean or perform engine cleaning or undercarriage cleaning.
- Grassy and pervious (porous) surfaces may be used to promote direct infiltration of wash water, providing treatment before recharging groundwater and minimizing runoff to an adjacent stormwater system. Pervious surfaces or other infiltration-based systems shall not be used within wellhead protection areas or within other protected resources.
- Impervious surfaces discharging to engineered storm drain systems shall not discharge directly to a surface water unless treatment is provided. Treatment can include a compost-filled sock designed specifically for removal of petroleum and nutrients, such as the Filtrex™ FilterSoxx product, or equal. The treatment device shall be positioned such that all drainage must flow through the device, preventing bypassing or short-circuiting.
- All adjacent engineered storm drain system catch basins shall have a sump. These structures shall be cleaned periodically.
- Heavily soiled vehicles or vehicles dirtied from salting or snow removal efforts shall not be washed outside, without exception.

### **Indoor Vehicle Washing Procedures**

- Detergents shall not be used in areas

where oil/water separators provide pre-treatment of drainage.

- Floor drains shall be connected to a sanitary sewer or tight tank. Floor drains discharging to adjacent surface water bodies or engineered storm drain systems shall be permanently plugged or otherwise abandoned before any vehicle wash activities are completed.
- Dry clean-up methods, such as sweeping and vacuuming, are recommended within garage facilities. Do not wash down floors and work areas with water.

### **Engine Washing and Steam Washing Procedures**

- Do not wash parts outdoors.
- Maintain drip pans and smaller containers to contain motor oils, hydraulic lubricants, greases, etc. and to capture and collect spills or noticeable leaks observed during washing activities, to the extent practicable. Clean up any spills using the procedures described in the SPCC provided in Appendix A.
- Avoid cleaning with solvents except in dedicated solvent parts washer systems. Make use of pressure washing and steam cleaning.
- Recycle clean solutions and rinse water to the extent practicable.
- Wash water shall discharge to a tight tank or a sanitary sewer via an oil/water separator. Detergents shall not be used in areas where oil/water separators provide pre-treatment of drainage.

## **4.2.3 Fuel and Oil Handling**

Spills, leaks, and overfilling can occur during handling of fuels and petroleum-based materials, representing a potential source of stormwater pollution, even in small volumes. This section provides guidance to Halifax employees on a variety of ways by which fuels and petroleum-based materials can be delivered, as well as steps to be taken when petroleum products (such as waste oil) are loaded onto vehicles for offsite disposal or recycling.

## Best Practices for Fuel and Oil Handling

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### General

- There is no smoking while fuel handling is in process or underway. Sources of flame are kept away while fuel handling is being completed. This includes smoking, lighting matches, carrying any flame, or carrying a lighted cigar, pipe, or cigarette.
- The delivery or pickup truck driver should check in with the facility upon arrival.
- The facility representative should ensure that the appropriate spill cleanup and response equipment and personal protective equipment are readily available and easily accessible. Refer to the SPCC in Appendix A for examples of spill cleanup and response materials.
- The delivery vehicle's hand brake is set, and wheels are chocked while the activity is being completed.
- Catch basins and drain manholes are adequately protected.
- No tools are to be used that could damage fuel or oil containers or the delivery vehicle.
- No flammable liquid should be unloaded from any motor vehicle while the engine is operating, unless the engine of the motor vehicle is required to be used for the operation of a pump.
- Ensure that local traffic does not interfere with fuel transfer operations. If it does, make appropriate accommodations.
- The attending persons should watch for any leaks or spills. Any small leaks or spills should be immediately stopped, and spilled materials absorbed and disposed of properly. Follow the procedures in the SPCC in Appendix A.
- In the event of a large spill or one that

discharges to surface waters or an engineered storm drain system, the facility representative should activate the facility's Stormwater Pollution Prevention Plan (SWPPP) and report the incident as specified in the document.

### Delivery of Bulk Fuel

- The facility representative should check to ensure that the amount of delivery does not exceed the available capacity of the tank.
- A level gauge can be used to verify the level in the tank.
- If a level gauge is not functioning or is not present on the tank, the tank should be stick tested prior to filling.
- The truck driver and the facility representative should both remain with the vehicle during the delivery process.
- The truck driver and the facility representative should inspect all visible lines, connections, and valves for leaks.
- When delivery is complete and the hoses are removed, buckets should be placed underneath connection points to catch drippings.
- The delivery vehicle should be inspected prior to departure to ensure that the hose is disconnected from the tank.
- The facility representative should inspect the fuel tank to verify that no leaks have occurred, or that any leaked or spilled material has been cleaned and disposed of properly.
- The facility representative should gauge tank levels to ensure that the proper amount of fuel is delivered and collect a receipt from the truck driver.

### **Delivery of Drummed Materials**

- If damaged drums are found, they should be closely inspected for leaks or punctures.
- Breached drums should be removed to a dry, well-ventilated area and the contents transferred to other suitable containers.
- Drums should be disposed of in accordance with all applicable regulations.
- Drummed materials should not be unloaded outdoors during wet weather events.
- The truck driver and the facility representative should both remain with the vehicle during the delivery process.
- Drums should be handled and unloaded carefully to prevent damage.
- Upon completion of unloading, the facility representative should inspect the unloading point and the drums to verify that no leaks have occurred, that any leaked or spilled material has been cleaned up and disposed of properly, and that the unloaded drums are not leaking.
- The facility representative should check to ensure that the proper amount of fuel or

other material is delivered and collect a receipt from the truck driver.

### **Removal of Waste Oil**

- The truck driver and the facility representative should both remain with the vehicle during the tank draining process.
- When draining is complete and the hoses are removed, buckets should be placed underneath connection points to catch drippings.
- The facility representative should inspect the loading point and the tank to verify that no leaks have occurred, or that any leaked or spilled material has been cleaned up and disposed of properly.
- The facility representative should collect a receipt from the truck driver.
- When draining bulk oil tanks:
- The facility representative should verify that the volume of waste oil in the tank does not exceed the available capacity of the disposal hauler's vehicle.
- The disposal hauler vehicle should be inspected prior to departure to ensure that the hose is disconnected from the tank.

# 5 Catch Basins

## 5.1 Overview and Inventory

This section covers Halifax's approach to maintaining its catch basins. Maintaining catch basins in good working order is an important best practice and MS4 Permit requirement. The Highway Department performs routine inspections, cleaning, and maintenance of town-owned catch basins, twice a year for catch basins in the regulated MS4 area and once per year for all other town-owned catch basins. In total, there are 1,210 catch basins throughout Halifax, including 1,021 in the MS4 regulated area. Of the 1,210 total catch basins, 1,001 are on Town-accepted roads throughout Halifax, including 840 in the MS4 regulated area.

This section addresses the following MS4 Permit requirements:

- Establish a schedule with a goal that the frequency of routine cleaning will ensure that no catch basin at any time will be more than 50% full.
- Document in each annual report the following information:
  - Any action taken in response to excessive sediment or debris loadings
  - Total number of catch basins
  - Number of catch basins inspected
  - Number of catch basins cleaned
  - Total volume or mass of material removed from catch basins.

Catch basin locations are provided on the town's stormwater map at the following link:

<http://vhb.maps.arcgis.com/apps/webappviewer/index.html?id=c1dfedc2a65545c98761d0ca7b70b30f>

## 5.2 O+M Procedures

Halifax will implement the following catch basin inspection and cleaning procedures to reduce the discharge of pollutants from the MS4:

- Catch basins will be cleaned such that they are no more than 50 percent full<sup>3</sup> at any time.
- If a catch basin sump is more than 50 percent full during two consecutive routine inspections or cleaning events, the finding will be documented, the contributing drainage area will be investigated for sources of excessive sediment loading, and to the extent practicable, contributing sources will be addressed. If no contributing sources are found, the inspection and cleaning frequency will be increased.
- Catch basins located near construction activities (roadway construction, residential, commercial, or industrial development or redevelopment) are inspected and cleaned more frequently if inspection and maintenance activities indicate excessive sediment or debris loadings (i.e., catch basins more than 50 percent full). Priority will also be given to catch basins that discharge to impaired waters.
- Properly dispose of collected sediments and catch basin cleanings (solid material, such as leaves, sand, and twigs removed from stormwater collection systems during cleaning operations).
- Cleanings from stormwater-only drainage systems may be disposed at any landfill that is permitted by MassDEP to accept solid waste. MassDEP does not routinely require stormwater-only catch basin cleanings to be tested before disposal, unless there is evidence that they have been contaminated by a spill or some other means.
- Screenings may need to be placed in a drying bed to allow water to evaporate before proper disposal. In this case, ensure that the screenings are managed properly to prevent pollution.
- Catch basin cleanings must be handled and disposed in accordance with compliance with the applicable MassDEP regulations, policies, and guidance (<https://www.mass.gov/files/documents/2018/03/09/catch-basins.pdf>).
- Collect data on the condition of the physical basin structure, its frame, and the grate, as well as on the quality of stormwater conveyed by the structure during inspections and cleanings.
- Make note of any potential pollutants or non-stormwater flows within the catch basin. Observations of oil sheen, discoloration, and/or trash and debris can indicate sources of pollution within the storm drain system. Observations of the following can indicate a potential connection of sanitary sewer and/or septic system(s) to the storm drain system: fecal matter, sewage odors, foaming (such as from detergent), optical enhancers (such as fluorescent dye added to laundry detergent). Note: There are no sanitary sewers in Halifax.
- If any if signs of pollution and/or septic system or sanitary sewer connections are present, notify the Highway Department and/or Board of Health.

<sup>3</sup> A catch basin sump is more than 50 percent full if the contents within the sump exceed one half the distance between the bottom

interior of the catch basin to the invert of the deepest outlet of the catch basin



# 6 Streets and Parking Lots

## 6.1 Overview and Inventory

This section covers Halifax's approach to maintaining its streets and parking lots. As impervious surfaces, streets and parking lots can contribute to stormwater pollution. The following MS4 Permit requirements are covered in this section:

- Establish and implement procedures for sweeping and/or cleaning streets and permittee-owned parking lots.
- Document in each annual report the following information:
  - Number of miles cleaned, volume of material removed, or weight of material removed,
  - Street sweeping schedule to target areas with high pollutant loads.

Halifax's street inventory and street sweeping list is provided in Appendix C. Halifax-owned parking lots are associated with the buildings and facilities and parks and open spaces listed in Tables 1 and 2. Each of these properties is swept following the procedures outlined below.

## 6.2 O+M Procedures

All municipal-owned streets and parking lots in the MS4 regulated area will be swept and/or cleaned a minimum of two times per year, once in the spring (following winter activities such as sanding) and at least once in the fall (Sept 1 – Dec 1; following leaf fall). This twice-yearly sweeping in MS4 regulated areas covers the permit requirement that more frequent sweeping is required for municipal-owned streets and parking lots in areas that discharge to certain nutrient-impaired waters, as indicated in Halifax's Stormwater Management Program (SWMP). Other town-accepted roads and parking lots are swept once per year.

In accordance with the TMDL and Impaired Waters requirements for these waterbodies, Halifax will conduct more frequent sweeping for municipal-owned streets and parking lots and in commercial areas, high density residential areas, or drainage areas with a large amount of impervious area, as needed.

Halifax will dispose sweepings at a licensed contractor in accordance with MS4 regulations.

Halifax will implement the following street and parking lot sweeping procedures to reduce the discharge of pollutants from the MS4:

## **Sweeping**

- Street sweeping will be conducted in dry weather. Sweeping will not be conducted during or immediately after rain storms.
- Dry cleaning methods will be used whenever possible, with the exception of very fine water spray for dust control. Avoid wet cleaning or flushing of the pavement.
- When necessary, parking bans will be enacted to facilitate sweeping on busy streets.
- Sweeping will be conducted in a manner that avoids depositing debris into storm drains.
- Sweeping equipment (mechanical, regenerative air, vacuum filter, tandem sweeping) will be selected depending on the level of debris. Brush alignment, sweeper speed, rotation rate, and sweeping pattern will be set to optimal levels to manage debris.
- Sweeping equipment will be routinely inspected and maintained to reduce the potential for leaks.

## **Disposal**

- The reuse of sweepings is recommended by MassDEP. If street sweepings are reused (e.g., as anti-skid material or fill in parking lots), they will be properly filtered to remove solid waste, such as paper or trash, in accordance with their intended reuse. All reuse and/or disposal of street sweepings will be managed in accordance with current MassDEP policies and regulations. <http://www.mass.gov/eea/docs/dep/recycle/laws/stsweep.pdf>
- Sweepings intended for reuse can be stored for up to one year in approved temporary storage areas. Storage areas will be protected to prevent erosion and runoff and should be located away from wetland resource areas and buffer zones, surface water, or groundwater.
- Sweepings are classified as solid waste. If not reused, they will be disposed of at solid waste disposal sites.

# 7 Winter Road Maintenance

## 7.1 Overview

Halifax performs a variety of maintenance activities to ensure safe winter driving conditions on its roads and parking lots. This section addresses the following MS4 Permit requirements:

- Establish and implement procedures for winter road maintenance including
  - Use and storage of sand and salt
  - Minimize the use of sodium chloride and other salts
  - Evaluate opportunities for use of alternative materials
- Ensure snow disposal activities do not result in disposal of snow into waters of the United States.

Halifax pretreats road salt with Safemelt (liquid) before use and checks road temperature and weather forecasts to use appropriate levels of treatment to the extent practicable.

## 7.2 O+M Procedures

Halifax understands that winter road operations can impact water quality. As a result, Halifax will implement the following winter maintenance procedures to reduce the discharge of pollutants from the MS4:

- Minimize the use and optimize the application of sodium chloride and other salt<sup>4</sup> (while maintaining public safety) and consider opportunities for use of alternative materials.
- Optimize sand and/or chemical application rates through the use, where practicable, of automated application equipment (e.g., zero velocity spreaders), anti-icing and pre-wetting techniques, implementation of pavement management systems, and alternate chemicals. Maintain records of the application of sand, anti-icing and/or de-icing chemicals to document the reduction of chemicals to meet established goals.
- Prevent exposure of deicing product (salt, sand, or alternative products) storage piles to precipitation by enclosing or covering the storage piles. Implement good housekeeping, diversions, containment or other measures to minimize exposure resulting from adding to or removing materials from the pile. Store piles in such a manner as not to impact surface water resources, groundwater resources, recharge areas, and wells.
- Halifax uses the following deicing materials for winter road maintenance: Safemelt (liquid) and road salt.

<sup>4</sup> For purposes of the MS4 Permit, salt means any chloride-containing material used to treat paved surfaces for deicing, including sodium chloride, calcium chloride, magnesium chloride, and brine solutions.

- Halifax stores Safemelt in a tank next to the road salt in a covered and enclosed salt shed at the Highway Department Garage Facility. Further details are in the facility's SWPPP.
- The MS4 Permit prohibits snow disposal into waters of the United States. Snow disposal activities, including selection of appropriate snow disposal sites, will adhere to the Massachusetts Department of Environmental Protection Snow Disposal Guidance, Guideline No. BWR G2015-01 (Effective Date: December 21, 2015), located at: <http://www.mass.gov/eea/agencies/massdep/water/regulations/snow-disposal-guidance.html>

Additional details on best practices are included in Appendix B and the Highway Department Garage Facility SWPPP.

## 8 Structural Stormwater BMPs

### 8.1 Overview and Inventory

Structural stormwater Best Management Practices (BMPs) are structural controls that are designed, built, and maintained to treat stormwater prior to being discharged to the drainage system or waterbody. BMPs often retain or infiltrate stormwater, allowing natural processes like settling, vegetation uptake, and filtration to remove pollutants from runoff. Examples include infiltration structures or swales, bioretention systems (e.g., rain gardens), wet ponds, detention basins, and infiltration/leaching basins or chambers.

An inventory of structural stormwater BMPs owned and/or maintained by Halifax is provided in on the town's stormwater map at the following link:

<http://vhb.maps.arcgis.com/apps/webappviewer/index.html?id=c1dfedc2a65545c98761d0ca7b70b30f>

Best practices for maintenance procedures are included below.

## 8.2 O+M Procedures

Halifax understands that in order to function properly and provide associated stormwater benefits, structural stormwater BMPs must be kept in good working order.

### 8.2.1 Inspections

Structural stormwater BMPs will be inspected annually at a minimum.

During inspections, the following BMP components will be reviewed for signs of potential issues, as listed below.

- **Inlet and Outlet Structures**
  - Blocked flow paths
  - Inlet is functioning as expected and flow from the contributing area is reaching the BMP
  - Outlet is performing as expected and flow is leaving the BMP appropriately
  - Structural damage
  - Vegetation is well established and there are no signs of erosion
  - Evaluate level of sedimentation and trash accumulation
- **BMP Treatment Areas**
  - Flow is dispersed evenly throughout the BMP
  - Erosion and rutting on the side slopes
  - Vegetation is well established, and invasive species are not present
  - For infiltration-type BMPs, review to evaluate whether standing water exists 72 hours after a rain event
  - Identify any signs of illicit discharges or vandalism
  - Evaluate level of sedimentation and trash accumulation
- **Underground Components**
  - Evaluate level of sedimentation and trash accumulation
  - Structural damage
  - Access to components are not compromised
  - Inspect dry wells after every major storm for the first 3 months once construction is complete and annually thereafter

During inspection, Halifax will assign a level of service to each item reviewed. Areas where follow up maintenance is warranted will be indicated. The following maintenance activities will occur at structural BMPs based on condition determined during annual inspections:

- Repair structural damage
- Remove excess sediment, trash, and debris
- Re-establish vegetation
- Remove invasive vegetation
- Re-grade areas, as necessary to ensure proper flow patterns
- Stabilize eroded areas via vegetation establishment, placement of stone, or other energy dissipation measures

Halifax will maintain records of annual inspections and maintenance actions performed for each structural BMP in the Town's GIS database using tablets and online forms.

### **8.2.2 Maintenance**

Regular maintenance is important to prevent against premature failure of BMPs. The table on the following page outlines maintenance schedule in general and for specific BMP types.

**Table 4 BMP Maintenance Schedule**

Activity	Time of Year	Frequency
<b>General</b>		
Mow	Spring through Fall	As needed, Annually minimum
Remove dead or invasive vegetation	Fall and spring	Bi-annually
Prune	Spring or fall	Annually
<b>If identified during inspections as needed</b>		
Replace dead vegetation	Spring	As Needed
Stabilize eroded areas	Spring through Fall	As Needed
Re-grade areas to ensure proper flow patterns	Spring through Fall	As Needed
Remove excess sediment, trash, and debris	Spring through Fall	As Needed
Repair structural damage	Spring through Fall	As Needed
<b>Bioretention Areas and Rain Gardens</b>		
Mulch void areas	Spring	Annually
Replace all media and vegetation and repair structural damage as needed	Late spring/early summer	As needed
<b>Extended Dry Detention Basin and Wet Basin</b>		
Mow upper stage, side slopes, embankment and emergency spillway	Spring through Fall	Bi-annually
Remove sediment from basin	Year round	As required, at least once every 5 years
Remove sediment, trash and debris	Spring through Fall	Bi-annually (Minimum)
<b>Dry Well</b>		
Inspect dry wells	Spring through Fall	After every major storm for the first 3 months after construction completion. Annually thereafter
<b>Infiltration Basin</b>		
Mow/rake buffer area, side slopes, and basin bottom	Spring and fall	Bi-annually
Remove trash, debris and organic matter	Spring and fall	Bi-annually



# Appendix A: Spill Prevention Control and Countermeasure (SPCC) Plan

## Introduction

Municipalities are responsible for any contaminant spill or release that occurs on property that they own or operate. Particular areas of concern include any facilities that use or store chemicals, fuel oil, or hazardous waste, including schools, garages, and landfills. Implementation of proper spill response and cleanup procedures can help to mitigate the effects of a contaminant release. The goal of this written document is to provide guidance to municipal employees to help reduce the discharge of pollutants from the MS4 as a result of spills or releases.

Halifax undertakes various precautions with spill response and cleanup procedures.

## Procedures

Halifax will implement the following spill response and cleanup procedures to reduce the discharge of pollutants from the MS4:

### Responding to a Spill

Employees should be trained in proper spill response specific to the materials used at their site and appropriate personal protective equipment (PPE). In the event of a spill, follow these spill response and cleanup procedures:

1. If the facility has a Stormwater Pollution Prevention Plan (SWPPP), notify a member of the facility's Pollution Prevention Team, the facility supervisor, and/or the facility safety officer (fill out the attached spill response contact list). If not, continue to follow the procedures outlined below.
2. Assess the contaminant release site for potential safety issues and for direction of flow.
3. Complete the following:
  - 3.1. Stop the contaminant release.
  - 3.2. Contain the contaminant release through the use of spill containment berms or absorbents.
  - 3.3. Protect all drains and/or catch basins with the use of absorbents, booms, berms or drain covers.
  - 3.4. Clean up the spill.
  - 3.5. Dispose of all contaminated products in accordance with applicable federal, state and local regulations.
    - 3.5.1. Soil contaminated with petroleum should be handled and disposed of as described in MassDEP policy WCS-94-400, Interim Remediation Waste

Management Policy for Petroleum Contaminated Soils

(<https://www.mass.gov/files/documents/2016/08/mq/94-400.pdf>).

- 3.5.2. Products saturated with petroleum products or other hazardous chemicals require special handling and disposal by licensed transporters. Licensed transporters will pick up spill contaminated materials for recycling or disposal. Save the shipping records for at least three years.
- 3.5.3. Waste oil contaminated industrial wipes and sorptive minerals:
  - 3.5.3.1. Perform the "one drop" test to ensure absorbents do not contain enough oil to be considered hazardous, as described in the MassDEP Waste Oil Management Guide (<https://www.mass.gov/files/documents/2018/12/18/oilwiper.pdf>).
  - 3.5.3.2. Wring absorbents through a paint filter. If doing so does not generate one drop of oil, the materials are not hazardous.
  - 3.5.3.3. If absorbents pass the "one drop" test they may be discarded in the trash unless contaminated with another hazardous waste.
    - 3.5.3.3.1. It is acceptable to mix the following fluids and handle them as waste oil:
      - Waste motor oil
      - Hydraulic fluid
      - Power steering fluid
      - Transmission fluid
      - Brake fluid
      - Gear oil
    - 3.5.3.3.2. **Do not mix** the following materials with waste oil. Store each separately:
      - Gasoline
      - Antifreeze
      - Brake and carburetor cleaners
      - Cleaning solvents
      - Other hazardous wastes
    - 3.5.3.4. If absorbents do not pass the "one drop" test they should be placed in separate metal containers with tight fitting lids, labeled "Oily Waste Absorbents Only."
4. If you need assistance containing and/or cleaning up the spill or preventing it from discharging to a surface water (or an engineered storm drain system), contact your local fire department using the number listed below. **In the case of an emergency call 911.**  
Halifax Fire Department: **(781) 293-1751**
5. Contact the MassDEP 24-hour spill reporting notification line, toll-free at **(888)-304-1133**;

- 5.1. The following scenarios are exempt from MassDEP reporting requirements (see the MassDEP factsheet on oil and hazardous materials handling for more information: <https://www.mass.gov/files/documents/2016/08/xm/spillmgm.pdf>).
- 5.1.1. Spills that are less than 10 gallons of petroleum and do not impact a water body
  - 5.1.2. Spills that are less than one pound of hazardous chemicals and do not present an imminent health or safety hazard
  - 5.1.3. Fuel spills from passenger vehicle accidents
- 5.2. Spills within a vault or building with a watertight floor and walls that completely contain all released chemicals

## **Reporting a Spill**

When contacting emergency response personnel or a regulatory agency, or when reporting the contaminant release, be prepared to provide the following information:

1. Your name and the phone number you are calling from.
2. The exact address and location of the contaminant release.
3. Specifics of release, including:
  - 3.1. What was released;
  - 3.2. How much was released, which may include:
    - 3.2.1. Pounds
    - 3.2.2. Gallons
    - 3.2.3. Number of containers
4. Where was the release sent/what was contaminated, addressing:
  - 4.1. Pavement
  - 4.2. Soil
  - 4.3. Drains
  - 4.4. Catch basins
  - 4.5. Water bodies
  - 4.6. Public streets
  - 4.7. Public sidewalks
5. The concentration of the released contaminant.
6. What/who caused the release.
7. Is the release being contained and/or cleaned up or is the response complete.
8. Type and amount of petroleum stored on site, if any.
9. Characteristics of contaminant container, including:
  - 9.1. Tanks
  - 9.2. Pipes
  - 9.3. Valves

## **Maintenance and Prevention Guidance**

Prevention of spills is preferable to even the best response and cleanup. To mitigate the effects of a contaminant release, provide proper maintenance and inspection at each facility. To protect against contaminant release, adhere to the following guidance:

- Ensure all employees are properly trained to respond in the case of a spill, understand the nature and properties of the contaminant, and understand the spill control materials and personnel safety equipment. Maintain training records of current personnel on site and retain training records of former personnel for at least three years from the date last worked at the facility.
- Provide yearly maintenance and inspection at all municipal facilities, paying particular attention to underground storage tanks. Maintain maintenance and inspection records on site.
- Implement good management practices where chemicals and hazardous wastes are stored:
  - Ensure storage in closed containers inside a building and on an impervious surface wherever possible.
  - If storage cannot be provided inside, ensure secondary containment for 110 percent of the maximum volume of the storage container.
  - Locate storage areas near maintenance areas to decrease the distance required for transfer.
  - Provide accurate labels, Material Safety Data Sheets (MSDS) information, and warnings for all stored materials.
  - Regularly inspect storage areas for leaks.
  - Ensure secure storage locations, preventing access by untrained or unauthorized persons.
  - Maintain accurate records of stored materials.
- Replace traditional hazardous materials such as pesticides and cleansers with non-hazardous products such as bio-lubricants which can reduce response costs in the case of a spill.

Maintain appropriately stocked spill response kits at each facilities and locations where oil, chemicals, or other hazardous materials are handled and stored.

## Employee Training

- Employees who perform work with potential stormwater pollutants will be trained annually on proper spill procedures.
- Employees are also trained on stormwater pollution prevention and illicit discharge detection and elimination (IDDE) procedures.
- If services are contracted, the contractor should be given a copy of this and any applicable SOPs to ensure compliance with MS4 regulations.

## Spill Response and Cleanup Contact List

Name	Title	Contact Information
Steven Hayward	Highway Surveyor, Highway Department	781-293-1760 steve.hayward@halifax-ma.org
Dave Swanson	Working Foreman	781-293-1760

## Appendix B: Winter Road Maintenance Best Practices Details

### Equipment and Maintenance

Halifax will implement the following winter maintenance procedures to reduce the discharge of pollutants from the MS4:

- Calibrate equipment to reduce and optimize salt use and ensure deicing agents are being used efficiently. Provide employee training on proper calibration procedures.
- Do not overfill trucks with deicing materials as it may lead to spills.
- Optimize sand and/or chemical application rates through the use, where practicable, of automated application equipment (e.g., zero velocity spreaders), anti-icing and pre-wetting techniques, implementation of pavement management systems, and alternate chemicals.
- When possible, retrofit vehicles to include equipment such as on-board application regulators, temperature sensors for air and pavement, and anti-icing and pre-wetting equipment.
- Wash equipment using proper procedures to prevent pollutants from entering the stormwater system. Dry cleanup procedures should be used when possible. Vehicles dirtied from salt or sand application should be washed according to procedures in Section 4. Vehicles and Equipment.
- Regularly inspect and maintain equipment to reduce the potential for leaks. See Section 4. Vehicles and Equipment.

### Anti-icing and Deicing

- Minimize the use and optimize the application of sodium chloride and other salt<sup>5</sup> (while maintaining public safety) and consider opportunities for use of alternative materials (e.g., calcium magnesium acetate, magnesium chloride, or calcium chloride).
- Remove as much snow as possible using mechanical means like plowing, blowing, or shoveling before deicing to reduce the need for road salt or other deicing chemicals.
- When possible, use anti-icing practices to prevent ice formation and reduce the need for deicers. Apply anti-icing agents 1-2 hours before winter weather events to ensure optimal performance (can be applied up to 24 prior).
- Only apply road salt when the pavement temperature is above 15° F.
- When using deicers, use pre-wetting agents (e.g., salt brine) to help them work more efficiently and to reduce road salt scatter and bounce.

<sup>5</sup> For purposes of the MS4 Permit, salt means any chloride-containing material used to treat paved surfaces for deicing, including sodium chloride, calcium chloride, magnesium chloride, and brine solutions.

- Salt brine solution used for anti-icing and pre-wetting can be stored for up to a year –concentration should be tested before use. If temperatures fall below 0° F, use a circulator pump to prevent the brine from freezing.
- Avoid mixing road salt and sand. Doing so makes both the salt and sand work less efficiently and leads to over-application.
- Only apply enough deicer so that plows can remove the snow and ice. Adjust the application rate of deicers based on the type of storm, type of agent used, and anti-icing and pre-wetting techniques used.
- Track the amount of deicer used and maintain records of the application of sand, anti-icing and/or de-icing chemicals to document the reduction of chemicals to meet established goals.

### **Storage of Deicing Materials**

- Prevent exposure of deicing product (salt, sand, or alternative products) storage piles to precipitation by enclosing or covering the storage piles. Implement good housekeeping, diversions, containment or other measures to minimize exposure resulting from adding to or removing materials from the pile. Store piles in such a manner as not to impact surface water resources, groundwater resources, recharge areas, and wells.
- Store materials under covered or enclosed areas and on impervious surfaces.
- Ensure that there are adequate drainage controls in storage areas to prevent runoff from entering the stormwater system.
- Perform unloading/loading of trucks on impervious surfaces whenever possible. These areas should be frequently cleaned and swept to reduce the tracking and runoff of salt and to capture any spills.
- For liquid deicing chemicals, provide secondary storage containment.
- Do not store road salt near drinking water supplies, surface water resources, groundwater resources, recharge areas, and wells. Follow proper storage guidelines from MassDEP (<https://www.mass.gov/guides/guidelines-on-road-salt-storage>).

### **Snow Storage and Disposal**

- The MS4 Permit prohibits snow disposal into waters of the United States. Snow disposal and storage activities, including selection of appropriate snow disposal sites, will adhere to the MassDEP Snow Disposal Guidance, Guideline No. BWR G2015-01 (<http://www.mass.gov/eea/agencies/massdep/water/regulations/snow-disposal-guidance.html>).
- Snow should not be pushed or dumped into waterbodies or wetlands, into stormwater drainage swales or ditches, or on top of catch basins.
- Snow should not be stored near drinking water areas, waterbodies, or wetlands.

The Halifax currently leaves snow at the edges of plowed areas and does not dispose of snow in specific disposal areas, in compliance with MS4 regulations.

## **Appendix C: Town Streets Inventory and Street Sweeping List**



town maintained = not town owned but plowed

				Aug-17
	STREET NAME	DATE ACCEPTED	ARTICLE #	COMMENTS
1	A Street			town maintained
2	Aldana Road	1970's		1896 previously Lake St. /town maintained
3	Annawon Drive			previously Pine Tree Dr., Monponset Lake Shores
4	Arrowhead Park			outstanding issues/Highland Estates
5	Ash Road	03/07/60	17A	1896 road was named
6	Autumn Lane			outstanding issues
7	Baker Court	03/06/67	25	
8	Baker Street	03/06/67	23	
9	Bayberry Lane			outstanding issues/Highland Estates
10	Beech Road	03/07/60	17A	
11	Beechwood Road	N/A	N/A	Mobile Home Park
12	Birch Road			town maintained
13	Bourne Drive			outstanding issues/Article 44 of the ATM 5/8/17 - passed over
14	Bow Street	03/02/65	17	
15	Brandeis Circle	05/11/94	46	5/10/95 reaccepted - Article 28
16	Buttonwood Road	05/16/79	23	
17	Carver Street			1896 street was named
18	Cedar Lane	03/06/67	22	
19	Cedar Street			1896 street was named/town maintained
20	Cherry Street	1938		1896 street was named; previously Childs St.
21	Chestnut Road	05/20/74	18	
22	Christmas Tree Lane			need to contact developer/Andrew Dyer
23	Church Street	03/02/65	17	

24	Circuit Street	05/15/84	23	
25	Clyde O Bosworth Road	05/10/99	57	
26	Colby Drive	03/02/71	20	
27	Country Club Drive	05/10/99	58	
28	Cranberry Drive	06/15/92	29	5/10/95 reaccepted - Article 28
29	Crescent Avenue			town maintained/changed to Spring St. @ BOS meeting 10/15/96
30	Cross Street	03/05/45	18	1896 street was named; at Halifax Beach
31	Crystal Lake Road			town maintained
32	<b>Danson Lane</b>			<b>outstanding issues/Article 44 of the ATM 5/8/17 - passed over</b>
33	Darmouth Street	03/04/68	24	
3	Deer Run Road	05/10/99	57	
35	<b>Delia Way</b>			<b>need to contact developer/off Holmes St.</b>
36	Doris Road	03/07/60	17A	
37	Dwight Street	03/02/65	17	
38	E Street	N/A	N/A	paper
39	<b>East Street</b>	<b>09/29/59</b>		<b>Plymouth County Decree 1265</b>
40	Eighth Avenue			town maintained
41	Eleventh Avenue	03/05/45	18	1995 accepted extension portion
42	Elm Street			1896 street was named
43	Fairway Drive	05/10/99	58	
44	Fayette Street			town maintained
45	Ferndale Drive	N/A	N/A	Mobile Home Park
46	Fifth Avenue			
47	Firefly Road	05/10/95	29	
48	First Avenue			town maintained
49	Forstdale Drive	N/A	N/A	Mobile Home Park
50	Fourteenth Avenue			



51	Fourth Avenue	03/02/64	48	1970 accepted portion located between Lingan St. & W. Monponsett Lake
52	Franklin Street			1896 street was named/town maintained
53	Fuller Street			1896 street was named/town maintained
54	Furnace Street			1896 street was named/town maintained
55	Garden Road			town maintained
56	Gold Street	N/A	N/A	paper
57	Grove Street			
58	Harvard Street	03/04/68	23	1995 accepted extension portion
59	Harvest Lane	05/11/09	32	
60	Hayward Street			1896 street was named
61	Headwaters Drive	06/15/92	29	5/10/95 reaccepted - Article #28
62	Helpmate Street			town maintained
63	Hemlock Lane	03/07/60	17A	previously Driftway
64	Hemlock Road			
65	<b>Heron Way</b>			<b>outstanding issues/Article 45 of the ATM 5/8/17 - passed over ?</b>
66	Hickory Road	03/07/60	17A	
67	<b>Highland Circle</b>			<b>outstanding issues/Highland Estates</b>
68	<b>Hilda Way</b>			<b>need to contact developer/off Hayward St.</b>
69	Hillside Avenue	03/06/50	18	1961 reaccepted
70	Holly Hill	N/A	N/A	private way
71	Holly Street	05/02/42	9	1943 accepted lines from Wamsutta Ave. northerly to Standish St.
72	Holmes Street	1927 & 1942		1896 street was named
73	Hudson Street			1896 street was named/town maintained
74	Indian Path Road	05/11/94	47	5/10/95 reaccepted - Article 28
75	Industrial Drive	05/10/95	29	
76	Island Street	N/A	N/A	paper
77	Jerome Drive	N/A	N/A	paper

78	John Wade Drive	05/12/97	40	
79	Jordan Road			town maintained
80	Kenzie's Path	05/14/12	40	
81	Kestrel Lane	05/08/06	43	
82	Lake Street	03/01/43	14	1942 Wamsutta Ave. to Stetson Brook; 1943 Wamsutta Ave. easterly 1,644 ft.
83	Lampost Lane	05/14/12	41	
84	Lantern Lane	03/06/67	26	
85	Larry Avenue	05/20/74	17	
86	Laurel Street	03/01/54	27	previously Cross St.
87	Lawrence Road	03/04/68	21	
88	Lillypond Lane	05/10/95	29	
89	Lingan Street	03/05/28	14	
90	Lydon Lane	N/A	N/A	condo
91	Madison Road	03/07/60	17A	
92	Maplewood Drive	N/A	N/A	Mobile Home Park
93	Marilyn Way	05/10/95	29	
94	Marjorie Drive	05/20/74	16	
95	McClelland Road	03/04/68	22	formally Yale St.
96	Monponsett Street	1930 & 1967		1896 street was named; 1967 Plympton to 106, 106 to Hanson
97	Mustertfield Lane			town maintained
98	Natureway Circle	N/A	N/A	Mobile Home Park
99	Ninth Avenue	03/07/61	43	
100	Oak Place			town maintained
101	Oak Street			1896 street was named
102	Ocean Avenue			3/5/34 Article 14 - voted to definitely postpone
103	Old Farm Road	05/10/99	59	
104	Old Franklin Street			1896 street was named; previously Franklin St.

105	Old Ocean Avenue			previously Ocean Ave.
106	Old Plymouth Street			previously Plymouth St.
107	Old Summit Street			previously Summit St.
108	Orchard Circle	05/13/02	17	<b>contingent upon the ornamental lights being removed off town way - has lights been removed?</b>
109	Palmer Mill Road			previously Monponsett St.
110	Paradise Lane	05/20/74	19	
111	Paradise Lane Ext.	N/A	N/A	private way
112	Parkwood Drive	N/A	N/A	Mobile Home Park
113	Parsons Lane			elderly housing
114	Pasture Lane			
115	Pemmican Way	05/11/94	47	5/10/95 reaccepted - Article #28
116	Pheasant Hill Road	05/10/99	57	
117	Pine Brook Drive	1986	39	5/10/95 reaccepted - Article #28
118	Pine Street			1896 street was named
119	Pine Street North	N/A	N/A	private way
110	Pine Tree Drive	08/09/50	3	3/3/52 - Article 20 name changed to Annawon Dr.
111	Plymouth Street	1941 & 1965		1896 street was named; 1941 Elm St. to E. Bridge.; 1965 Thompson St. to E. Bridge.
112	Pond Street			1896 street was named
113	Poplar Road			town maintained
114	Pratt Street			1896 street was named; formerly Bridge St.
115	Princeton Street			town maintained
116	Putters Way	5/10/99	58	
117	Radcliffe Terrace	5/11/94	46	5/10/95 reaccepted - Article #28
118	Redwood Drive	N/A	N/A	Mobile Home Park
119	Revere Street			
120	Richview Avenue	03/05/45	18	
121	Ridge Road	03/06/67	24	



122	Ridge Road Ext.	03/06/67	24	
123	River Street			1896 street was named; previously Ash St.
124	Rosewood Drive	N/A	N/A	Mobile Home Park
125	<b>Rye Meadow Lane</b>			<b>outstanding issues/Highland Estates</b>
126	Second Avenue			town maintained
127	Seventh Avenue			town maintained
128	Short Street			town maintained
129	<b>Sherwood Drive</b>			<b>outstanding issues/Highland Estates</b>
130	Sixth Avenue	03/02/64	48	northly side of Lingan St. only
131	Snow Street	N/A	N/A	private way
132	South Street			1896 street was named; formerly Cherry St.
133	Spenser Drive	05/12/08	52	
134	<b>Split Rail Lane</b>			<b>outstanding issues/Highland Estates</b>
135	Spring Street			town maintained/formerly Crescent St.
136	Spruce Road	03/07/60	17A	
137	Standish Street	05/02/42	9	1942 from Mon. St. to Wamsutter; 1943 from Mon. St. easterly 436 ft.; chg. to Water St. @ BOS meeting 10/15/96
138	State Street			
139	Stoney Weir Road	05/10/99	57	
140	Summit Street			1896 street was named
141	Sycamore Drive	N/A	N/A	Mobile Home Park
142	Tenth Avenue	03/05/45	18	
143	Third Avenue			town maintained
144	Thirteenth Avenue	03/05/45	18	
145	Thompson Street			1896 street was named
146	Trinity Avenue			town maintained
147	Twelfth Avenue	03/05/45	18	
148	Twin Lakes Drive	N/A	N/A	condo

149	Upton Street	03/02/65	17	
150	Walnut Street			1896 street was named
151	Waltham Street	03/05/45	11	from Ocean Ave. to Hanson line
152	Wamsutta Avenue	05/02/42	9	Standish St. to Holly St.
153	Water Street			town maintained/formerly Standish St.
154	White Island Road	12/13/50	7	
155	Willow Road			town maintained
156	Wood Street	1896		previously River St.
157	Wood Sreet North	N/A	N/A	private way

# **SWEEPER STREET LIST**

**HEMLOCK LN.**

**PLYMOUTH ST. WEST**

**CLYDE O BOSWORTH RD.**

**STONEY WEIR RD.**

**PHEASANT HILL RD.**

**CRANBERRY DR.**

**HEADWATER DR.**

**OLD PLYMOUTH ST.**

**CHRISTMAS TREE LN.**

**PINE ST. NORTH**

**CIRCUIT ST. NORTH**

**ELM ST.**

**HUDSON ST.**

**PASTURE LN.**

**OLD FARM RD.**

**LAMPPOST DR.**

**JOHN WADE DR.**

**POND ST.**

**SPENCER DR.**

**AUTUM LN.**

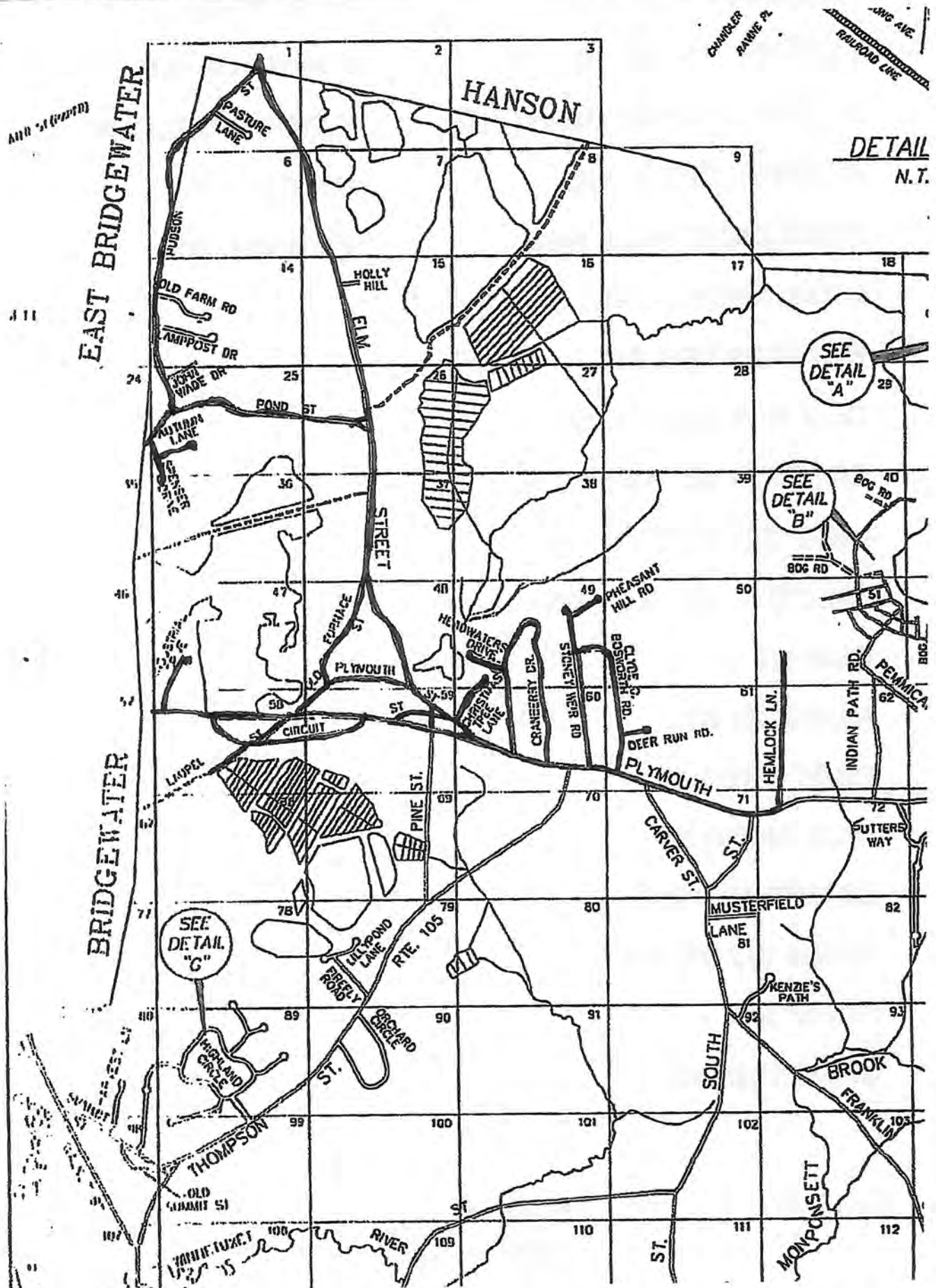
**FURNACE ST.**

**INDUSTRIAL DR.**

**CIRCUIT ST.**

**LAUREL ST.**





# **SWEEPER STREET LIST**

**PINE ST.**

**THOMPSON ST.**

**FIREFLY RD.**

**LILLYPOND LN.**

**ORCHARD CIR.**

**HIGHLAND CIR.**

**RYE MEADOW LN.**

**BAYBERRY LN.**

**SPLIT RAIL LN.**

**ARROWHEAD LN.**

**SHERWOOD DR.**

**SUMMIT ST.**

**KESTREL LN.**

**HARVEST LN.**

**WALNUT ST.**

**CHERRY ST.**

**BOURNE DR.**

**DANSON LN.**

**PRATT ST.**

**RIVER ST.**

**WOOD ST.**

**CEDAR ST.**

**FULLER ST.**

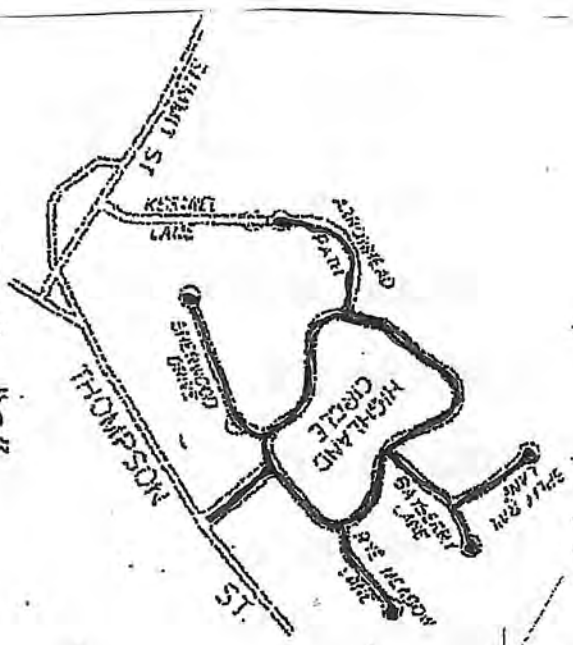
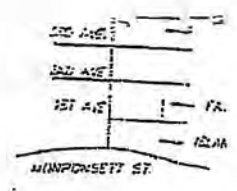
**SOUTH ST.**

**HAYWARD ST.**

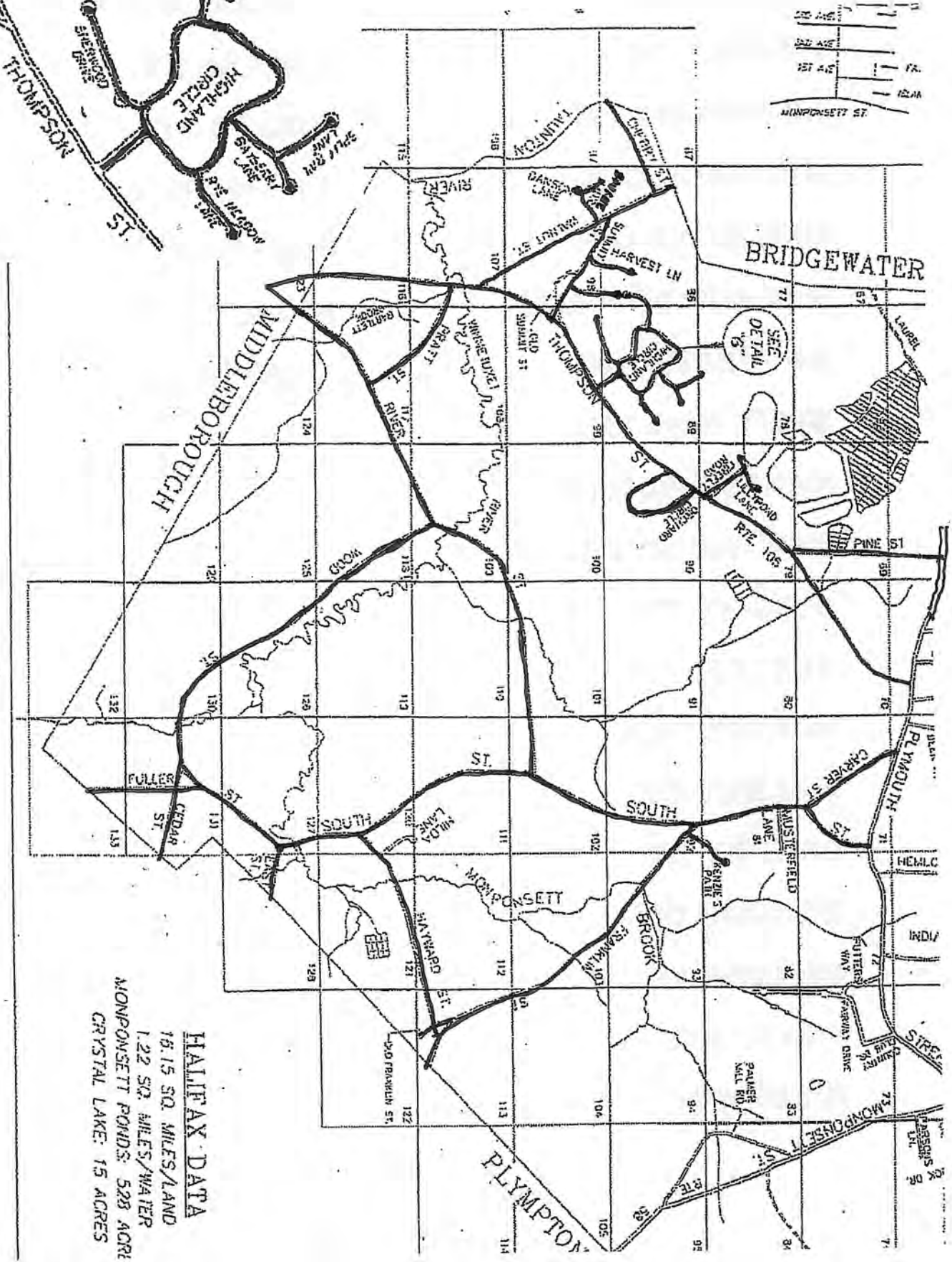
**FRANKLIN ST.**

**KENZIES PATH**

**CARVER ST.**



DETAIL "G"  
N.I.S.



**HAILEX DATA**  
16.15 SQ. MILES/LAND  
1.22 SQ. MILES/WATER  
NONCONSETT PONDS: 528 ACRES  
CRYSTAL LAKE: 15 ACRES

# **SWEEPER STREET LIST**

**PLYMOUTH ST. EAST**

**INDIAN PATH RD.**

**COUNTRY CLUB DR.**

**PEMMICAN WAY**

**FAIRWAY DR.**

**BOAT RAMP PARKING LOT**

**PUTTERS WAY**

**MONPONSETT ST. SOUTH**

**PALMERMILL RD.**

**RIDERS WAY**

**MONPONSETT ST. NORTH**

**WHITE ISLAND RD.**

**WAMSUTT AVE.**

**LAKE ST.**

**STANDISH ST.**

**HOLLY ST.**

**OCEAN AVE. & OLD OCEAN AVE.**

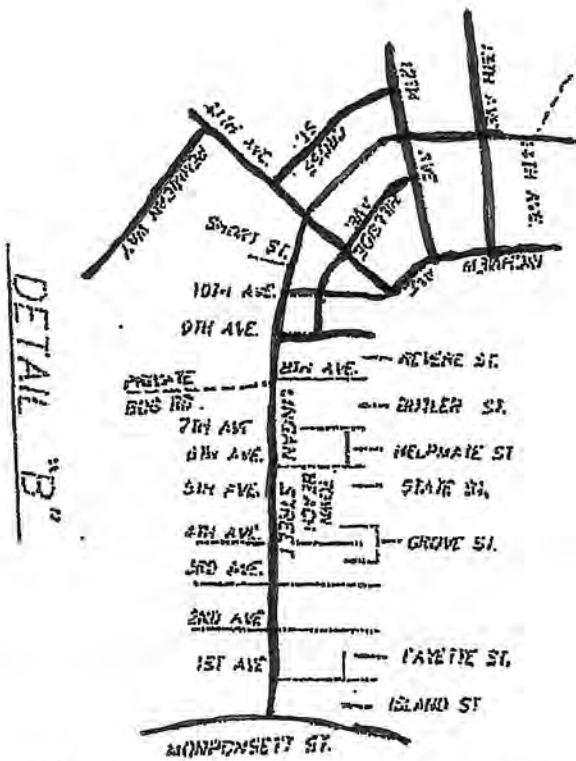
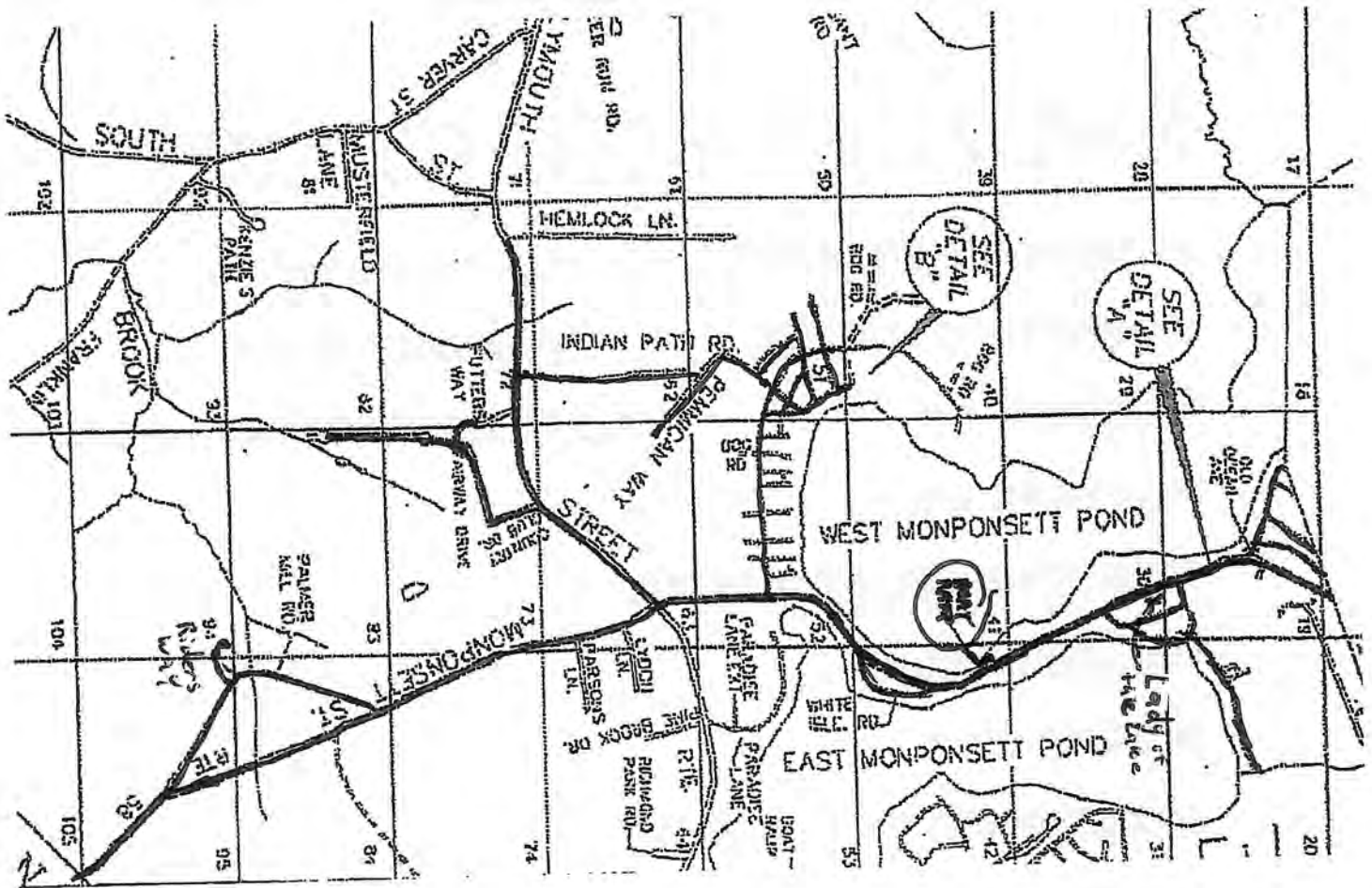
**DWIGHT ST.**

**UPTON ST.**

**WALTHAM ST. (1<sup>st</sup> PART)**

**LINGAN ST. (EVERYTHING OFF LINGAN ST.)**





# **SWEEPER STREET LIST**

**PLYMOUTH ST. EAST**

**RADCLIFFE TER.**

**PINE BROOK DR.**

**COLBY DR.**

**PARADISE LN.**

**MARILYN WAY**

**PARADISE EXT. (carefully)**

**HOLMES ST.**

**CEDAR LN.**

**HERON RD.**

**LANTERN LN.**

**BAKER ST. AND CT.**

**RIDGE RD. AND EXT.**

**ANNAWON DR./CHESTNUT RD. AREA**

**DELIA WAY**

**GARDEN RD.**

**LAWRENCE RD.**

**OAK ST.**

**MCCLELLAND RD.**

**DARTMOUTH ST.**

**PRINCETON ST.**

**HARVARD ST.**

**BRANDEIS CIR.**

# ITTS

