Stormwater Management Plan

Town of Sharon
June 06, 2019
EPA Permit Number: MA-041061

Department of Public Works
Engineering Division
217 Rear South Main Street
Sharon MA, 02067
Updated: 09-22-2022

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Stormwater Management Plan
Town of Sharon – Engineering Division

MCM 1: Public Outreach and Education

Background and Goals

The Town will implement a public outreach and education program that complements and supports other activities planned under its SWMP.

The goals of the Town's public outreach and education program are to:

- Achieve compliance with public outreach and education requirements contained in the MS4 permit, including TMDL and impaired waters requirements for bacteria and nutrients.
- Increase awareness of the impact of stormwater pollution on water bodies in the Town, especially impaired and priority waters.
- Increase public awareness of the work being done by the Town to maintain and improve stormwater infrastructure, and the economic, recreational, water supply, and ecological benefits of that work.
- Increase awareness of how the public can support and assist the Town in implementing an effective stormwater management program.
- Encourage individuals and organizations to adopt habits and engage in voluntary actions that increase groundwater recharge, decrease pollutant loading, and decrease peak discharge rates, thereby reducing the burden placed on public stormwater infrastructure and the environment.
- For sites regulated by the Town under the Wetlands Act and/or the Town's stormwater bylaw, increase the quality of stormwater permit applications and the level of voluntary compliance with permit conditions and ongoing O&M requirements, while reducing the need for municipal regulators to take enforcement action.

Responsible Parties and Regional Implementation Strategy

The Town has joined with its neighboring communities to implement its public education and outreach program on a regional basis through the Neponset Stormwater Partnership (NSP).

One or more designated representatives from the Town participate in the meetings of the NSP to supervise the development, implementation, evaluation and revisions to the NSP regional public outreach and education program. The NSP Outreach Sub-committee develops an outreach and education work plan and budget each year, the implementation of which is funded by the Town in conjunction with other participating communities. The goal of this regional approach is to increase the effectiveness and reduce the cost of the public outreach and education program, relative to what could be achieved through a program implemented by the Town working on its own.

The Town's stormwater Outreach and Education Coordinator is:

- Kevin Davis – Engineering Field Agent

Key contacts with the NSP responsible for day to day planning, management and implementation of the NSP Outreach and Education Program include:

- Nancy Fyler, Outreach Director, Neponset River Watershed Association
- Ian Cooke, Executive Director, Neponset River Watershed Association

The above named individuals are responsible for ensuring that the outreach and education program is implemented in accordance with this SWMP.

Targeted Audiences and Key Topics and Messages

The Town's outreach and education program targets four key audiences as specified in the MS4 Permit:

1) Residents
2) Businesses, Institutions and Commercial Facilities
3) The Development and Construction Sector
4) Industrial Facilities

The Town has considered the topics listed in Part 2.3.2.d.i-iv of the MS4 Permit for each of the above target audiences. Based on this review, the Town has identified the following topics and messages as priorities for dissemination to each of the target audiences given local conditions.

<u>Residents</u>

This audience includes the general residential population of the community including small residential property owners and renters. Because many of the leaders in the business, industrial and construction industries are also local residents, the residential program will help to provide a base of knowledge for these other audiences as well. The key messages to be conveyed and/or behaviors to be encouraged for this audience include:

- Polluted stormwater is created when rain falls on impervious surfaces or unstable soils, collects pollutants, and makes its way directly or indirectly to streams and wetlands.
- Residential stormwater pollution is the result of a wide variety of common activities including pet waste management, lawn care, automotive maintenance, disposal of swimming pool water, and failing septic systems, among others.
- We are all responsible for stormwater pollution.
- Stormwater runoff is the largest source of pollution to local waterways.
- Stormwater pollution negatively impacts drinking water, recreation, wildlife habitats, and flooding in our community or neighboring communities.
- Most storm drains lead to streams or wetlands with minimal treatment.
- Keeping impervious surfaces clean, in addition to the storm drain itself, is essential to preventing the discharge of pollutants and reducing maintenance costs.
- Bacteria and nutrients are particular pollutants of concern in our area.
- Bacterial pollution can be reduced by properly disposing of pet waste, properly using/maintaining septic systems, and properly managing garbage.

- Nutrient pollution can be reduced by properly managing landscaping activities and landscape waste materials, properly disposing of pet waste, properly using/maintaining septic systems, preventing erosion, and properly managing garbage.
- Other common household pollutants should be stored and used or disposed of properly including but not limited to oil, pharmaceuticals, car washing chemicals, swimming pool chemicals, swimming pool water, and deicing chemicals.
- There are a variety of simple steps homeowners can implement on their own property to help increase groundwater recharge and reduce pollutant loading.
- Naturally vegetated buffers should be maintained along waterways and wetlands.
- Dumping of yard wastes or other debris into waterways and wetlands is illegal and contributes to water pollution.

Businesses, Institutions and Commercial Facilities

This audience includes all non-residential property owners and lessors with the exception of industrial property. In addition, the owners/managers of large residential properties (apartment complexes) are included in this group. This is a very diverse audience category. The key messages to be conveyed and/or behaviors to be encouraged for this audience include:

- Polluted stormwater is created when rain falls on impervious surfaces or unstable soils, collects pollutants, and makes its way directly or indirectly to streams and wetlands.
- Commercial stormwater pollution is the result of a wide variety of common activities including lawn care, construction activities, management of liquid and solid wastes and dumpsters, building maintenance, fleet maintenance, parking lot maintenance, de-icing activities, septic system management, disposal of swimming pool water, and pet waste management, among others.
- We are all responsible for stormwater pollution.
- Stormwater runoff is the largest source of pollution to local waterways.
- Stormwater pollution negatively impacts drinking water, recreation, wildlife habitats, and flooding in our community or neighboring communities.
- Most storm drains (both public and private) lead to streams or wetlands with minimal treatment.
- Keeping impervious surfaces clean, in addition to the storm drain itself, is essential to preventing the discharge of pollutants, and reducing maintenance costs.
- Bacteria and nutrients are particular pollutants of concern in our area.
- Bacterial pollution can be reduced by properly disposing of pet waste, properly using/maintaining septic systems, properly managing garbage, and preventing illicit discharges.
- Nutrient pollution can be reduced by properly managing landscaping activities and landscape waste materials, properly disposing of pet waste, properly using/maintaining septic systems, properly managing garbage, and preventing illicit discharges.
- Other common pollutants should be stored and used or disposed of properly including but not limited to oil, vehicle/building/pavement washing chemicals, pool water, and deicing chemicals.
- Proper training of employees and/or customers is essential to preventing pollution.

- Many private properties have stormwater permit requirements through the wetlands act and/or local wetlands/stormwater bylaws which require ongoing operation and maintenance activities and/or reporting.
- New development and redevelopment may trigger the need for a permit and upgrading of stormwater BMPs.
- There are a variety of simple pollution prevention and green infrastructure measures property owners can implement to help increase groundwater recharge and reduce pollutant loading.
- Naturally vegetated buffers should be maintained along waterways and wetlands.
- Dumping of yard wastes, snow or other debris into waterways and wetlands is illegal and contributes to water pollution.

Development and Construction Sectors

The development and construction sector includes private developers, construction contractors, and the engineers, attorneys and others who assist them. The key messages to be conveyed and/or behaviors to be encouraged for this audience include:

- Polluted stormwater is created when rain falls on impervious surfaces or unstable soils, collects pollutants, and makes its way directly or indirectly to streams and wetlands.
- Stormwater runoff is the largest source of pollution to local waterways.
- Stormwater pollution negatively impacts drinking water, recreation, wildlife habitats, and flooding in our community or neighboring communities.
- Construction site sedimentation and erosion is a significant water quality problem.
- Construction site sedimentation and erosion controls need to be properly designed, maintained and installed to protect waterways and avoid the cost of enforcement actions by local regulators.
- Local and federal stormwater and/or wetlands permit applications are required for most development and redevelopment projects.
- Construction and post-construction stormwater controls will be required of most permit applicants under the MA Wetlands Protection Act, local bylaws and/or the EPA Construction General Permit.
- TMDLs for bacteria and/or nutrients apply to projects in our area and permit applicants must propose BMPs that are consistent with or optimized for TMDL requirements.
- Permit applicants are encouraged to propose Low Impact Development and/or Green Infrastructure techniques which offer a variety of environmental benefits as well as potential cost savings.
- Sediment management, pollution prevention, and compliance with wetlands act resource area protections is also critical at construction equipment and material storage yards.
- Permitting standards are changing or have changed with the revision of the MS4 permit, MA Stormwater Handbook and the Town's stormwater bylaws, and construction industry representatives need to understand and comply with these changes.

Industrial Facilities

For purposes of the outreach and education SWMP industrial facilities are considered to include all properties which are engaged in the manufacture, processing, and storage of manufactured goods and materials. Some facilities in this category may be regulated by the EPA Multi-Sector General Permit. The key messages to be conveyed and/or behaviors to be encouraged for this audience include:

- Polluted stormwater is created when rain falls on impervious surfaces or unstable soils, collects pollutants, and makes its way directly or indirectly to streams and wetlands.
- Industrial stormwater pollution is the result of a wide variety of common activities including lawn care, construction activities, management of liquid and solid wastes and dumpsters, storage of raw materials, building maintenance, fleet maintenance, parking lot maintenance, and septic system management, among others.
- We are all responsible for stormwater pollution.
- Stormwater runoff is the largest source of pollution to local waterways.
- Stormwater pollution negatively impacts drinking water, recreation, wildlife habitats, and flooding in our community or neighboring communities.
- Most storm drains (both public and private) lead to streams or wetlands with minimal treatment.
- Keeping impervious surfaces clean, in addition to the storm drain itself, is essential to preventing the discharge of pollutants, and reducing maintenance costs.
- Bacteria and nutrients are particular pollutants of concern in our area.
- Bacterial pollution can be reduced by properly disposing of pet waste, properly using/maintaining septic systems, properly managing garbage, and preventing illicit discharges.
- Nutrient pollution can be reduced by properly managing landscaping activities and landscape waste materials, properly disposing of pet waste, properly using/maintaining septic systems, properly managing garbage, and preventing illicit discharges.
- Other common pollutants should be stored and used or disposed of properly including but not limited to oil, material stockpiles, vehicle/building/pavement washing chemicals, and deicing chemicals.
- Proper training of employees and/or customers is essential to preventing pollution.
- Many properties have stormwater permit requirements through the wetlands act, local wetlands/stormwater bylaws or the MSGP which require ongoing operation and maintenance activities and reporting.
- New development and redevelopment may trigger the need for a permit and upgrading of stormwater BMPs.
- There are a variety of simple green infrastructure measures property owners can implement to help increase groundwater recharge and reduce pollutant loading.
- Naturally vegetated buffers should be maintained along waterways and wetlands and dumping of yard wastes, snow or other debris into waterways and wetlands is illegal.
- Many industrial properties have specific permitting and compliance requirements under the EPA Multi-Sector General Permit.

Message Distribution Requirements

Section 2.3 of the MS4 Permit requires the distribution of two messages to each of the four target audiences over the five year permit period, with each message to the same audience spaced at least one year apart.

In addition to these basic requirements, the Town is subject to additional requirements as a result of one or more bacteria TMDLs as described in Appendix F of the permit. These additional requirements include:

- An annual message to residents on proper pet waste management and any local pet waste bylaws.
- Inclusion of pet waste management information with new or renewed dog licenses.
- A message to septic system owners on proper system maintenance.

Furthermore, under the provisions of Section 2.2.2 and Appendix H of the MS4 Permit, the Town is subject to additional requirements because it discharges to one or more water bodies that is water quality limited for phosphorous and/or nitrogen. These education requirements are in addition to the basic requirements of Section 2.3 of the MS4 Permit, but as the Town interprets the Permit, may be implemented concurrently with the special requirements for the bacteria TMDL(s) described above. These messages are required unless the Town documents that one or more of the following sources is an insignificant contributor of nitrogen or phosphorous to the MS4. These requirements include:

- An annual spring (March or April) message to resident and business audiences regarding proper use and disposal of grass clippings and slow-release and phosphorous-free fertilizers.
- An annual summer (June or July) message to residents and business audiences regarding proper management of pet waste, including any local pet waste ordinances.
- An annual fall (August, September or October) message to residents and business audiences regarding proper disposal of leaf litter.

Delivery Methods and Schedule

A variety of delivery methods will be used to reach each audience over the course of the permit period. Each year, working through the NSP Outreach Committee, the NSP will develop an annual work plan that specifies the final mix of activities that will be implemented that year. Each year's work plan will be revised or adjusted in response to the ongoing evaluation activities. The sections below outline the delivery methods that will be utilized, at a minimum, to reach each of the target audiences and the expected timing of each method.

Residential Audiences

- Develop and maintain a comprehensive regional stormwater website that covers key messages for the residential audience and maintain a prominent link to the site on the Town's homepage and or DPW homepage.
- Establish a regional stormwater telephone hotline and web form through which members of the public can report stormwater problems or ask questions.

- Inclusion of pet waste management information annually when completed dog licenses or renewal confirmations are mailed out by town clerks.
- Three annual messages (spring, summer and fall) covering grass clippings/fertilizer, pet waste, and leaf disposal distributed via a mixture of direct mailings, social media posts, town newsletters, bill stuffers, press releases, email marketing or signage campaigns.
- Distribution of at least two additional messages over the permit term via direct mail, social media, town newsletters, bill stuffers, press releases, email marketing or signage campaigns.
- One targeted mailing to septic system owners during the permit term.
- Deliver one to two hour 5th Grade interactive stormwater education classroom programs to all classes annually including take-home information.
- The Town may use an alternate delivery method for one or more of the messages outlined above where such alternate format is deemed more effective.

Businesses, Institutions and Commercial Facilities

- Develop and maintain a comprehensive regional stormwater website that covers key messages for the residential audience and maintain a prominent link to the site on the Town's homepage and or DPW homepage.
- Establish a regional stormwater telephone hotline and web form through which members of the public can report stormwater problems or ask questions.
- Two annual messages (spring and fall) covering grass clippings/fertilizer and leaf disposal distributed via a mixture of direct mailings, social media posts, town newsletters, bill stuffers, press releases, email marketing or signage campaigns.
- Distribution of at least two additional messages over the permit term via direct mail, social media, town newsletters, bill stuffers, press releases, email marketing, presentations to industry groups or signage campaigns.
- One targeted mailing to septic system owners (if any) during the permit term.
- A pilot project targeting the ten largest private impervious cover owners with a program of direct outreach via phone, personal mail and/or face to face to and based on the status of compliance with O&M requirements in local permits.
- Free technical assistance and property evaluation for green infrastructure retrofits.
- Distribute educational materials and/or signage that businesses can use to educate their employees and/or customers.
- The Town may use an alternate delivery method for one or more of the messages outlined above where such alternate format is deemed more effective.

Development and Construction Sectors

- Develop and maintain a comprehensive regional stormwater website that covers key messages for the Development/Construction audience and a prominent link to the Development/Construction section of the educational website will be placed on the on the town website where stormwater and/or wetland permit application forms can be downloaded.

- Establish a regional stormwater telephone hotline and web form through which members of the public can report stormwater problems or ask questions.
- Two messages distributed to a targeted list of local developers / and construction industry representatives via printed materials, mailings, presentations to industry groups, or personal communication that emphasize sediment and erosion control, changes to the Town's stormwater bylaw, anticipated changes to the MA Stormwater Handbook and/or the EPA Construction General Permit.
- The Town may use an alternate delivery method for one or more of the messages outlined above where such alternate format is deemed more effective.

Industrial Facilities

- Develop and maintain a comprehensive regional stormwater website that covers key messages for the Industrial audience.
- Establish a regional stormwater telephone hotline and web form through which members of the public can report stormwater problems or ask questions.
- Distribution of at least two additional messages over the permit term via direct mail, social media, town newsletters, bill stuffers, press releases, email marketing, presentations to industry groups, or signage campaigns.
- One targeted mailing to septic system owners (if any) during the permit term.
- A pilot project targeting the key large private impervious cover owners with a program of direct outreach via phone, personal mail and/or face to face to and/or based on status of compliance with O&M requirements in local permits or EPA MSGP.
- Free technical assistance and property evaluation for green infrastructure retrofits.
- Distribute educational materials and/or signage that industrial firms can use to educate their employees and/or customers.
- The Town may use an alternate delivery method for one or more of the messages outlined above where such alternate format is deemed more effective.

TABLE 1: PRELIMINARY SUMMARY OF OUTREACH AND EDUCATION BMPS BY AUDIENCE AND YEAR

AUDIENCE	**YR 1 (2018-2019)**	**YR 2 (2019-2020)**	**YR 3 (2020-2021)**	**YR 4 (2021-2022)**	**YR 5 (2022-2023)**
RESIDENTIAL	• Implement school outreach program • Fall leaf litter outreach Dog license renewal outreach • Spring fertilizer outreach • Summer dog waste outreach • Educational website • Stormwater hotline	• MCM message to residential audience • Assemble contact info for septic system owners • Implement school outreach program • Fall leaf litter outreach • Dog license renewal outreach • Spring fertilizer outreach • Summer dog waste outreach • Educational website • Stormwater hotline	• Targeted message to septic system owners • Implement school outreach program • Fall leaf litter outreach • Dog license renewal outreach • Spring fertilizer outreach • Summer dog waste outreach • Educational website • Stormwater hotline	• MCM message to residential audience • Implement school outreach program • Fall leaf litter outreach • Dog license renewal outreach • Spring fertilizer outreach • Summer dog waste outreach • Educational website • Stormwater hotline	• Implement school outreach program • Fall leaf litter outreach • Dog license renewal outreach • Spring fertilizer outreach • Summer dog waste outreach • Educational website • Stormwater hotline

BUSINESS, INDUSTRY AND COMMERCIAL FACILITIES	• Begin identifying 10 key private impervious owners per town and O&M plan status • Fall leaf litter outreach • Spring fertilizer outreach • Educational website • Stormwater hotline • Green infrastructure tech. assist. on request	• Pilot project to contact largest private impervious owners • Assemble contact info for septic system owners • Fall leaf litter outreach • Spring fertilizer outreach • Educational website • Stormwater hotline • Green infrastructure tech. assist. on request	• Targeted message to septic system owners • Fall leaf litter outreach • Spring fertilizer outreach • Educational website • Stormwater hotline • Green infrastructure tech. assist. on request	• MCM message to business audience • Fall leaf litter outreach • Spring fertilizer outreach • Educational website • Stormwater hotline • Green infrastructure tech. assist. on request	• Fall leaf litter outreach • Spring fertilizer outreach • Educational website • Stormwater hotline • Green infrastructure tech. assist. on request
DEVELOPER AND CONSTRUCTION	• Begin identifying key members of developer / construction industry in each community	• Prepare and distribute information on new bylaws / stormwater standards, and low impact development	-	-	• Distribute information on erosion and sediment control and EPA construction general permit
INDUSTRIAL FACILITIES	• Educational website • Stormwater hotline • Green infrastructure tech. assist. on request	• Begin developing list of key industrial property owners • Assemble contact info for septic system owners • Educational website • Stormwater hotline • Green infrastructure tech. assist. on request	• Contact key industrial property owners regarding outdoor maintenance practices • Targeted message to septic system owners • Educational website • Stormwater hotline • Green infrastructure tech. assist. on request	• Educational website • Stormwater hotline • Green infrastructure tech. assist. on request	• Contact key industrial property owners regarding outdoor maintenance practices Educational website Stormwater hotline Green infrastructure tech. assist. on request

Evaluation and Adaptive Management

The MS4 Permit requires that the Town conduct an ongoing process of evaluation on its outreach and education program to demonstrate:

- evidence of focused messages for specific audiences
- evidence that progress toward the educational goals has been achieved

The NSP will use the following methods to evaluate the effectiveness of its educational messages and its program overall:

- Track the number of messages delivered (pieces of material mailed, pieces of material handed out, press releases published and circulation, phone contacts where target is reached, classroom programs delivered, etc).
- Track the number of hits on the stormwater web site over time and in the period following distribution of each message.
- Track number of inquiries to the stormwater hotline via phone call or web submission.
- Track number of "shares" or "likes" on social media such as Facebook or Twitter.
- Track anecdotal feedback from classroom teachers whose students receive the school outreach program.
- Note any anecdotal feedback or observations of behavior change.
- If resources allow, the NSP may also conduct targeted public surveys using an online survey panel or other means.

If the evaluation program determines that any messages or distribution methods are ineffective, those messages and/or distribution methods shall be modified when the annual Outreach and Education work plan is finalized for the subsequent year.

Reporting

The Town will include documentation of its outreach and education program in its annual report to EPA in the format specified in the EPA annual report forms.

The NSP will provide the Town with an annual report on the NSP Outreach and Education program annually. For each year, this will include at a minimum:

- Copies of the messages (if any) distributed to each audience in the Town during the reporting period.
- The method of distribution for each message.
- The measures and/or methods used to assess the effectiveness of the messages.
- The measures and/or methods used to assess the overall effectiveness of the education program.

The Town may include the NSP annual Outreach and Education Program Progress Report, or applicable excerpts from it, in the Town's annual report to EPA.

MCM 2 Public Involvement and Participation

Background and Goals

The Town of Sharon (the Town) will implement a public participation program to complement and reinforce the town's MS4 public outreach program and other SWMP implementation activities.

The goals of the Town's public involvement and participation program are to:

- Provide opportunities for the public to participate in the review and implementation of the Town's SWMP.
- Achieve compliance with public involvement and participation requirements contained in section 2.3.3 of the MS4 permit.
- Increase awareness of the impact of stormwater pollution on water bodies in the Town, especially impaired and priority waters.
- Increase public awareness of the work being done by the Town to maintain and improve stormwater infrastructure, and the economic, recreational, water supply, and ecological benefits of that work.
- Increase awareness of how the public can support and assist the Town in implementing an effective stormwater management program.
- Encourage individuals and organizations to adopt habits and engage in voluntary actions that increase groundwater recharge, decrease pollutant loading, and decrease peak discharge rates, thereby reducing the burden placed on public stormwater infrastructure and the environment.

Responsible Parties and Regional Implementation Strategy

The Town has joined with its neighboring communities to implement its public education and outreach program on a regional basis through the Neponset Stormwater Partnership (NSP).

One or more designated representatives from the Town participate in the NSP meetings to develop, implement, evaluate and revise its public involvement and participation program. The NSP Outreach Committee develops a public involvement and participation work plan and budget each year, the implementation of which is funded by the Town in conjunction with other participating communities. The goal of this regional approach is to increase the effectiveness and reduce the cost of the public involvement and participation program, relative to what could be achieved through a program implemented by the Town working on its own.

The Town's stormwater Public Involvement and Participation Coordinator is:

- Kevin Davis – Engineering Field Agent

Key contacts with the NSP responsible for day to day planning, management and implementation of the NSP Outreach and Education Program include:

- Nancy Fyler, Outreach Director, Neponset River Watershed Association
- Ian Cooke, Executive Director, Neponset River Watershed Association

The above named individuals are responsible for ensuring that the public involvement and participation program is implemented in accordance with this SWMP.

Public Involvement and Participation Requirements

The MS4 Permit requires that the Town:

- Make the SWMP and all annual reports available to the public.
- Annually provide the public an opportunity to participate in the review and implementation of the SWMP.
- Ensure that all public involvement and participation activities be posted in accordance with state public notice requirements (MGL Chapter 30A, Sections 18 – 25 – effective 7/10/2010).

Public Involvement and Participation Activities

The Town's public involvement and participation program shall consist of the following activities:

Activities implemented by the Town's Public Participation and Involvement Coordinator:

- Promptly post the SWMP (and any future revisions to the SWMP) including the Town's annual reports on the Town website.
- Post a legal notice once per year inviting the public to review and submit comments on the SWMP in accordance with state public notice requirements.
- Allow the public to inspect the SWMP in person during regular business hours.
- Annually compile any comments received on the SWMP along with the corresponding response from the Town (if any).
- Post a link on the Town's website to the public participation area of the regional website.

Activities implemented by the NSP on behalf of the town

- Establish a regional stormwater telephone hotline and web form through which members of the public can report stormwater problems or ask questions.
- Invite volunteers to install storm drain markers and other educational signage.
- Invite businesses to install or circulate materials to educate their customers and/or employees about preventing stormwater pollution.
- Other participation activities that may be identified as circumstances arise.

Reporting and Evaluation

The Town will include documentation of its public involvement and participation program in its annual report to EPA in the format specified in the EPA annual report forms. For each year, this will include a listing of public participation activities implemented by the Town during the year.

The NSP will provide the Town with an annual report on the NSP Public Participation Program annually. For each year, this will include at a minimum dates and a brief description of activities implemented through the year, along with a qualitative evaluation of the effectiveness of those public

participation activities. Where any activities are judged to be ineffective, the NSP Public Participation Program will be modified accordingly for the subsequent year.

The Town may include the NSP annual Public Participation Program Progress Report, or applicable excerpts from it, in the Town's annual report to EPA.

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

Introduction and Purpose of Program

The municipal separate storm sewer system (MS4) permit issued by the Environmental Protection Agency (EPA) to the Town of Sharon (hereafter "the Town") requires the implementation of an Illicit Discharge Detection and Elimination (IDDE) Program to systematically find and eliminate non-stormwater discharges to the MS4 and to prevent the introduction of new illicit connections and discharges.

This document describes the Town's IDDE Program in detail and constitutes the "Written IDDE Program Document" required by the permit. This document was prepared based on a model provided by the Neponset Stormwater Partnership and funded in part through a Community Innovation Challenge Grant. The procedures outlined here were adapted from guidance documents by the Central Massachusetts Regional Stormwater Coalition, the Center for Watershed Protection, New England Interstate Water Pollution Control Commission, Massachusetts Department of Environmental Protection, US Environmental Protection Agency, the Boston Water and Sewer Commission, the New Hampshire Estuaries Project, and the Neponset River Watershed Association's water quality monitoring program.

This document will be reviewed and updated on a periodic basis to reflect changes to the Town's IDDE Program. The Town is required to submit an annual report each year of the permit term. Table 7 provides a summary of annual reporting requirements for the IDDE Program.

Acronyms and Definitions

Catchment – A catchment is the area of land that drains to an individual outfall or interconnection. Each Catchment has only one outfall, and each outfall has only one catchment.

CSO – Combined Sewer Overflow.

EPA – US Environmental Protection Agency.

IDDE – Illicit Discharge Detection and Elimination.

Illicit Connection – An illicit connection is any connection to the MS4 that is not authorized and is causing or contributing to an illicit discharge.

Illicit Discharge – An illicit discharge is any discharge of pollutants to the MS4 other than rain runoff or clean groundwater, examples include sewer-drain cross connections; seepage of septic system effluent or exfiltrate from a damaged sewer into a drain; sanitary sewer overflow; dumping or washing of pollutants into a catch basin such as oil, litter or pet waste; dumping of pollutants into a waterway or wetland such as yard waste; discharge from floor drains; or discharge of contaminated sump pump effluent. However, illicit discharges exclude discharges authorized under a separate NPDES permit and the following allowable non-stormwater discharges: water line flushing, landscape irrigation, diverted stream flows, rising groundwater, uncontaminated ground water infiltration, uncontaminated pumped ground water, discharge from potable water sources, foundation drains, air conditioning condensate, irrigation water, springs, uncontaminated water from crawl space pumps, footing drains, individual resident car washing, flows from riparian habitats and wetlands, dechlorinated swimming pool discharges, street wash waters, residential building wash waters without detergents, and flows from firefighting activities, unless the Town, EPA or MassDEP

identifies any of these as a significant contributor of pollutants to the MS4, in which case it will be addressed as an illicit discharge.
Interconnection – Any point in the Town's MS4 system that discharges to another MS4 or other stormwater system not owned and operated by the Town, or where a drainage collection system owned by an entity other than the Town connects to the Town's MS4 infrastructure. Interconnections where an outside system discharges to the Town system may be referred to as incoming interconnections, and where the Town system discharges to an outside system it is referred to as outgoing interconnections.
MassDEP – Massachusetts Department of Environmental Protection.
MS4 – The Municipal Separate Storm Sewer System owned and operated by the Town.
MS4 Permit – The 2016 NPDES Phase II Municipal Separate Storm Sewer System Permit which took effect in July 1 2018 as issued by EPA to the Town.
NPDES – National Pollutant Discharge Elimination System: A permit to discharge pollutants to a waterbody under the federal Clean Water Act.
NSP – The Neponset Stormwater Partnership. A regional collaboration of cities and towns who are cooperating on MS4 implementation activities.
Outfall – The end point of a storm drain collection system (pipe network, ditch, paved waterway, erosion channel, etc) where stormwater is discharged to a waterway or wetland (i.e. waters of the US). Refer also to "Cooke, Ian and Tedder, Newton Email Correspondence" under References below for further details. A point at which a closed pipe discharges to an open MS4 conveyance or an open structural BMP (i.e. closed pipe enters a detention basin or closed pipe enters a surface ditch) is not considered an outfall. In such cases the outfall is the point where the detention basin or ditch, or any closed piping downstream of them discharges to the environment. Similarly, the inlet and outlet of simple road culverts that convey a waterway under a road are not considered outfalls, though in many cases there are outfalls that discharge to waters of the US inside road crossing culverts. Throughout this document, the term "outfall" is used interchangeably to mean "outfall or outgoing interconnection."
SSO – Sanitary Sewer Overflow: An overflow of untreated sanitary wastewater from a municipal sanitary sewer to a waterbody, a storm drain collection system, roadway or inside a building.
SWMP – Stormwater Management Program: A written document describing the Town's program to comply with the MS4 Permit requirements.
TMDL – Total Maximum Daily Load: A cleanup plan for a specific pollutant that is causing a violation of water quality standards in a particular waterbody.

Legal Authority

Through its Stormwater Management bylaw, the Town has established the legal authority to:

- prohibit illicit discharges and Sanitary Sewer Overflows (SSOs) into the MS4 system
- investigate suspected illicit discharges
- eliminate illicit discharges, including discharges from properties not owned by or controlled by the town that discharge into the MS4 system, and
- implement appropriate enforcement procedures and actions

A copy of the Town's bylaw or regulation is included as a link in Table 6.

Statement of IDDE Responsibilities

The Town's Stormwater Management Bylaw empowers the Select Board to enforce the IDDE provisions of the Bylaw.
The Select Board has delegated day to day management, operation and reporting to the Town's Engineering Division and Conservation Administrator. There is also coordination required with other departments to make the program successful.
The Engineering Division and Conservation Administrator is responsible for coordinating the efforts of other departments when needed, ensuring that necessary interdepartmental communication occurs in a timely manner, and following up with other departments as needed regarding the status of their efforts.
Key contacts and roles for each of the other departments are as follows:

Table 1: IDDE Roles and Responsible Parties

IDDE Implementation Role	Responsible Authority/Individual
IDDE enforcement authority under Stormwater Bylaw	William A. Heitin, Select Board Member Walter B. Roach, Jr., Select Board Member Emily E. Smith-Lee, Select Board Member
Overall Supervision of IDDE Program	Eric Hooper, Director of Public Works
Day to Day Supervision of IDDE Program and Reporting	Peter O'Cain, Town Engineer Gregory Meister, Conservation Administrator
Enforcement authority for SSOs	William A. Heitin, Select Board Member Walter B. Roach, Jr., Select Board Member Emily E. Smith-Lee, Select Board Member
Enforcement authority for Septic Systems and Septic System Construction	Kevin Davis, Engineering Field Agent
Enforcement of State Plumbing Code	Joe Kent, Building Inspector
Enforcement Actions	Richard Gellerman, Esq., Town Counsel Lisa Whalen, Esq., Town Counsel
Departments Responsible for Recordkeeping	Engineering Division Conservation Administrator

Required Schedule

The MS4 permit defines the required timeline for major tasks in implementing the Town's IDDE program as summarized in Table 2 below.

Table 2: IDDE Program Required Schedule

IDDE Task	Permit Schedule
General	
Establish Adequate Legal Authority Over MS4	Due May 1, 2002
Written IDDE Program	Year 1 (June 30, 2019)
Eliminate Illicit Discharges or Make an Expeditious Plan for Elimination	Within 60 days of discovery
Training for all IDDE Staff	Annually
Tracking and Reporting IDDE Progress	Annually
SSO Inventory and Reporting	
Inventory of all SSO's that Occurred Over the Previous 5 years	Year 1 (June 30, 2019) and updated annually
Oral Notification to EPA and DEP of an SSO	24 hours from discovery
Written Notification to EPA and DEP of an SSO	5 days from discovery
System Mapping	
Phase 1 of System Mapping	Year 2 (June 30, 2020)
Phase 2 of System Mapping	Year 10 (June 30, 2028)
Outfall and Interconnection Screening	
Written Outfall and Interconnection Screening Procedure	Year 1 (June 30, 2019)
Initial Outfall and Interconnection Inventory and Ranking	Year 1 (June 30, 2019) and updated annually
Updated Outfall and Interconnection Ranking	Year 3 (June 30, 2021)
All Outfalls (High and Low Priority) Inspected During Dry Weather	Year 3 (June 30, 2021)
Revisit Outfalls With Evidence of Illicit Discharge but No Flow	Within 1 week of initial inspection
Confirmatory Outfall and Interconnection	Within 1 year of Illicit Discharge Removal
Catchment Investigations	
Written Catchment Investigation Procedure	18 Months (December 31, 2019)
Begin Investigations for All Catchments Related to Problem Outfalls	Year 2 (June 30, 2020)
Complete Investigations of All Catchments Related to Problem Outfalls	Year 7 (June 30, 2025)
Complete All Catchment Investigations	Year 10 (June 30, 2028)

Sanitary Sewer Overflows

Action will be taken to eliminate all dry weather and wet weather Sanitary Sewer Overflows (SSOs) immediately upon discovery. If the SSO cannot be eliminated immediately, interim mitigation measures to minimize the discharge of pollutants to the MS4 and/or the environment will be taken, and elimination will be completed as soon as possible. An Example SSO Emergency Response Plan is referenced in Table 6. This BWSC document also contains example field manual emergency response plans and corrective measures. Table 6 also includes EPA resources such as the Wastewater Collection System Toolbox and the EPA Preventative Maintenance and Sewer Response Plan Template.

EPA and MassDEP will be notified of all SSOs by telephone or in writing as soon as possible once the Town becomes aware that an SSO has occurred and, at a minimum, within 24 hours of discovery. In addition, immediate notification may be needed to the local Board of Health (see Table 1), to any affected downstream water supply or swimming/recreation area operators, or via the MassDEP 24-hour hotline when hazardous waste or oil may be involved.

MassDEP 24-hour Hotline: 1-888-304-1133

Written notice of all SSOs will be provided to EPA and MassDEP within 5 days of discovery using the required MassDEP reporting form. Copies of the written report will be forwarded to other relevant parties as indicated on the MassDEP form. Copies of written reports are maintained on file.

The Town also maintains an inventory of all dry weather and wet weather SSOs as a part of this program. An inventory of all SSOs that occurred within 5 years prior to the effective date of the permit will be prepared within the first year of the MS4 Permit and will be updated at least annually as part of the annual report. The inventory is maintained in the Town's computer database. The following information is collected and logged:

- Location (approximate address or intersection and receiving waterbody, if any);
- Clear statement of whether the discharge entered a surface water or storm drain;
- Start and end dates and times of SSO;
- Estimated approximate volume of the overflow;
- Description including known or suspected cause;
- Mitigation and corrective measures planned with implementation schedules;
- Date and description of mitigation and corrective actions taken;
- Current status of mitigation and corrective measures; and
- Copy of completed 5-day written report and documentation (if any) of 24-hour report (where available for older incidents).

A copy of the Town's SSO inventory template is referenced in Table 6.

System Mapping

The Town will complete more detailed mapping of its stormwater infrastructure in two phases. Phase one mapping will be completed within two years of the permit effective dates (June 30, 2020), and

phase two will be completed within 10 years (June 30, 2028). Recommended mapping elements will be completed as resources allow. Mapping will be prepared using ArcGIS. Storm system mapping will serve as a critical planning tool for the implementation of the IDDE program. The Town will update and 6
correct the mapping on an ongoing basis as new information becomes available and a status report on the mapping effort will be included with each annual report.
In addition to piped outfalls, the Town will also map "discrete conveyances" such as paved waterways discharging to waters of the US, and curb cuts that discharge to waters of the US without a paved waterway such as via an erosion channel (see "Cooke, Ian and Tedder, Newton Email Correspondence" under References below for further details).
Where resources allow, the Town may also map privately owned outfalls or incoming interconnections that it encounters during its field investigations as a means to validate that all Town-owned outfalls have been mapped and to avoid confusion on the part of field crews and to clarify responsibility and facilitate rapid correction in the event of any future pollution discharge incidents.

Phase 1: the following elements have been or will be mapped within two years of the permit effective date (6/30/20):

- Outfalls and receiving waters;
- Open channel conveyances (swales, ditches, paved waterways etc.);
- Interconnections with other MS4's and other storm drain systems;
- Municipally-owned stormwater treatment structures (e.g., detention and retention basins, infiltration systems, bioretention areas, rain gardens, tree filters, 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 MassDEP Integrated List of waters report pursuant to Clean Water Act section 303(d) and 305(b); and
- Initial catchment delineations. Any available system data and topographic information may be used to produce initial catchment delineations. For the purpose of this permit, a catchment is the area that drains to an individual outfall or outgoing interconnection.

Phase 2: Phase 2 system mapping shall be updated annually as new information becomes available during the implementation of catchment investigations. Phase 2 mapping will be completed by year 10 and will include:

- Outfall spatial location (latitude and longitude with a minimum accuracy of +/- 30 feet);
- Pipes;
- Manholes;
- Catch basins;
- Refined catchment delineations. Catchment delineations shall be updated to reflect information collected during catchment investigations;
- Municipal sanitary sewer system (if applicable); and
- Municipal combined sewer system (if applicable).

In addition to the above required elements, the following recommended elements will be incorporated into the Town's system mapping as funding and staffing allow:

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

- Privately-owned stormwater treatment structures;
- Where a municipal sanitary sewer system exists, properties known or suspected to be served by a septic system or other onsite wastewater management facility, especially in high-density urban areas;
- Areas where the MS4 has been or could be influenced by septic system discharges (e.g., areas with poor soils, or high ground water elevations unsuitable for conventional subsurface disposal systems near water bodies);
- Seasonal high water table elevations impacting sanitary alignments;
- Topography;
- Orthophotography;
- Alignments, dates and representation of work completed (with legend) of past illicit discharge investigations (e.g., flow isolation, dye testing, CCTV); and
- Locations of suspected, confirmed and corrected illicit discharges (with dates and flow estimates).

Assessment and Initial Ranking of Outfalls and Interconnections

The Town has mapped its MS4 outfalls and interconnections (incoming and outgoing) to other stormwater systems and has defined the preliminary boundaries of the catchment for each outfall or outgoing interconnection. Preliminary catchment delineations were developed using the Metropolitan Area Planning Council (MAPC) Catchment Delineation Procedure.

By the close of permit year 1, the NSP IDDE Prioritization Tool (see Table 6) will be used to synthesize the GIS data provided by MAPC along with ambient water quality data and impaired waters data provided by the Neponset River Watershed Association (NepRWA), MassDEP, along with local knowledge provided by the Town as detailed in the NSP IDDE Prioritization Tool.

Each of the outfalls and outgoing interconnections will be placed into one of the following categories based on available data and the weighting system built into the NSP IDDE Prioritization Tool:

Not Owned by Town – Outfalls or incoming interconnections which are not owned by the Town, but which have been mapped to validate the completeness of the outfall inventory and facilitate clear communication of responsibility and effective response in the event of any future discharges. These outfalls do not need to undergo outfall screening nor catchment investigation.

Not Waters of the US – Outfalls which are owned by the Town, but which do not discharge to waters of the US, are not subject to the requirements of the MS4 Permit. These outfalls will be tracked in the Town's outfall inventory for consistency, but do not need to undergo outfall screening, or catchment investigation.

Excluded – Excluded outfalls and outgoing interconnections are those that have no potential for illicit discharges. They are located in undeveloped areas with no dwellings and no sanitary sewers; or serve drainage for athletic fields, parks, or undeveloped green space or associated parking without services; or are cross-country drainage alignments (that neither cross nor are in proximity to sanitary sewer alignments) through undeveloped land.

Problem – Problem outfalls and outgoing interconnections are those with known or suspected illicit discharges due to past credible complaints, departmental knowledge or

previous screening. Problem outfalls may bypass the screening process and proceed directly to catchment investigation.

High Priority – High priority outfalls and outgoing interconnections are those that discharge to areas of concern to public health such as beaches, recreational areas, drinking water supplies or shellfish beds. They also include outfalls with catchments determined to have a high potential for sewage input based on outfall/interconnection screening results and catchment characteristics.

Low Priority – Low priority outfalls and outgoing interconnections include those that have been determined to have a low potential for sewage input based on outfall/interconnection screening results and catchment characteristics.

The Town's ranking process as captured by the NSP IDDE Prioritization Tool considers the following factors when ranking outfalls into and within the categories of problem, high priority and low priority, as required by the MS4 permit:

- Past discharge complaints and reports.
- Poor receiving water quality – the following guidelines are recommended to identify waters as having a high illicit discharge potential: exceeding water quality standards for bacteria; ammonia levels above 0.5 mg/l; surfactants levels greater than or equal to 0.25 mg/l.
- Density of generating sites – Generating sites are those places, including institutional, municipal, commercial, or industrial sites, with a potential to generate pollutants that could contribute to illicit discharges. Examples of these sites include, but are not limited to, car dealers; car washes; gas stations; garden centers; and industrial manufacturing areas.
- Age of development and infrastructure – Industrial areas greater than 40 years old and areas where the sanitary sewer system is more than 40 years old will probably have a high illicit discharge potential. Developments 20 years or younger will probably have a low illicit discharge potential.
- Sewer conversion – contributing catchment areas that were once serviced by septic systems, but have been converted to sewer connections may have a high illicit discharge potential.
- Historic combined sewer systems – contributing areas that were once serviced by a combined sewer system, but have been separated may have a high illicit discharge potential.
- Surrounding density of aging septic systems – Septic systems thirty years or older in residential land use areas are prone to have failures and may have a high illicit discharge potential.
- Culverted streams – any river or stream that is culverted for distances greater than a simple roadway crossing may have a high illicit discharge potential.
- Water quality limited waterbodies that receive a discharge from the MS4 or waters with approved TMDLs applicable to the permittee, where illicit discharges have the potential to contain the pollutant identified as the cause of the water quality impairment.

In order to conduct outfall screening in an efficient manner, the Town may choose to dry weather screen all outfalls along a given stream segment as a group. This will allow personnel to move quickly down the length of a single stream, and to collect a group of outfall screening samples that need to be tested for the same parameters based on stream impairments.

If so, in order to determine which stream segments will have their outfalls screened first, all outfalls (except excluded, not waters of the US and not owned by town) are initially ranked individually as problem, high, and low using the NSP IDDE Prioritization Tool. The outfalls are then sorted by MassDEP stream segment (assessment unit). Streams with the highest number of outfalls rated as "high priority" will be screened first as detailed in the NSP IDDE Prioritization Tool, referenced in Table 6.

The outfall inventory and ranking will be updated on an ongoing basis and at least annually as work on the IDDE program proceeds. The updated inventory and ranking will be included with each year's annual report.

Dry Weather Outfall and Interconnection Screening and Sampling

Dry weather screening/sampling will be conducted at each of the Town's outfalls and at any outgoing interconnections with other stormwater systems, except for problem, excluded, not waters of the US, and not Town owned outfalls. The dry weather screening consists of a series of qualitative field observations along with field and/or lab analysis of selected water quality parameters where outfalls are discharging during dry weather. As described above, in the interest of efficiency, dry weather screening will be completed for an entire waterbody or stream segment at once in the order established during the initial outfall ranking described above. Dry weather outfall screening will be completed by the end of permit year three, and copies of all screening data collected through the program will be included with each annual report.

Weather and Scheduling

Dry weather outfall / interconnection screening will take place only when less than 0.1 inches of rainfall has occurred in the previous 24-hr period and no snow melt is occurring. However, where possible, dry weather screening will occur after 48-72 hours with no precipitation or runoff. Weather conditions will be monitored using data available from the Blue Hills or Norwood Airport weather station or a combination of both.

Scheduling will also be based on the availability of laboratory services. In particular E. coli samples must be delivered to the lab within six hours, and the lab analysis must be completed by reading the samples 24 hours after testing has begun. Thus, in most cases sampling will take place in the morning so that samples can be processed by the lab in the afternoon, and sampling will take place Monday through Thursday unless the selected lab is open on Saturday.

Where feasible, dry weather screening will be completed in the spring and early summer (March through June) to help ensure that smaller illicit discharges that might not reach the outfall during drought periods are also identified.

Field Data Collection

When performing dry weather screening in the field, the Town's outfall screening procedure is followed and a paper or digital outfall inspection form is filled out in the field. See Table 6 for references to example form documents. The following data is captured at a minimum for each outfall and interconnection:

- Unique Identifier Outfall ID;
- Receiving water;
- Date of most recent inspection;
- Dimensions;
- Shape;
- Material;
- Spatial location (GPS coordinates);
- Physical condition; and
- indicators of potential non-stormwater discharges, including presence or evidence of suspect flow and sensory observations such as odor, color, turbidity, floatables, or oil sheen;
- Photograph.

If flow is observed at the outfall or interconnection manhole during dry weather screening, a sample is taken for analysis as further described under "Outfall / Interconnection Sample Analysis" below. Submerged or inaccessible outfalls will be sampled from the first accessible upstream manhole or access structure and the actual location of sampling will be noted.

If no flow is observed, but there is evidence of illicit dry weather flow such as toilet paper, soap bubbles, fine gray residue, excessive algae on the outfall or odors of sewage or soap, the outfall will be visited again during dry weather within one week of the initial investigation (weather permitting) and sampled if found to be flowing. If the outfall continues to be suspected of containing illicit discharges in spite of a lack of flow during dry weather visits, alternative testing procedures such as multi-day optical brightener collection may be deployed, or the outfall will be ranked in the high priority category for catchment investigation.

If in the course of conducting dry weather screening additional Town-owned outfalls are encountered, such as non-piped discrete conveyances, paved waterways and stormwater erosion channels, the Town's mapping and outfall inventory will be updated to include these outfalls and they will be screened.

While not required to do so by the MS4 permit, the Town may elect to inspect privately owned outfalls which it encounters during the dry weather screening process, and if found to be flowing during dry weather, may elect to sample such private outfalls for some or all of the water quality indicators as described below. To the extent that a discharge from a non-Town outfall may be causing or contributing to a violation of water quality standards, it will reduce the Town's overall MS4 compliance burden to have that discharge eliminated. Any such non-Town outfalls that appear to be affected by illicit discharges will be referred to the appropriate authorities for resolution.

Outfall / Interconnection Sample Analysis

All samples taken during outfall/interconnection screening are analyzed for the basic screening indicators of temperature, conductivity, salinity, ammonia, chlorine, surfactants, and bacteria. Temperature is measured directly in the field. Conductivity and salinity are sent to a lab for analysis. Chlorine shall be measured in-house using a single parameter meter and appropriate reagents. Ammonia, Bacteria and surfactants are also sent to a lab. Specific instruments, hold times, and preservation methods used for the basic screening samples are described in Table 3 below.

All samples, not measured or analyzed directly in the field, will be immediately preserved in ice following sample collection and labeling. All screening samples are securely packed in a cooler with

plenty of ice with sufficient cooler space and ice coverage. Sample bottle care, such as firmly sealing bottles and/or placing foam sleeves between bottles, will be maintained during transport of the sample bottles.

In addition, when performing screening on a waterway which is impaired for one or more pollutants other than the basic screening parameters or which has is subject to a final TMDL, additional samples are collected as indicated in Appendix G of the MS4 permit. The impairment causes and associated additional required testing parameters that may apply to the Town are summarized in Table 4 below. Table 4 also lists impairment causes that may apply to the Town but for which no additional testing is required. Table 4 has been adapted from Appendix G of the MS4 Permit.

Note that in many areas, the Town may have outfalls that discharge to a wetland or waterway that is not identified as a stream segment or assessment unit by MassDEP. These are often smaller tributaries to the stream segment that is identified by MassDEP. Impaired waters samples are *only* collected from outfalls that are discharging directly to a MassDEP mapped stream segment, they are not collected from unmapped segments upstream of an impaired segment (see "Cooke, Ian and Tedder, Newton Email Correspondence" under References for further details).

If the Town has information from a source other than the MassDEP Integrated List of Waters that indicates that a waterway is impaired for a particular pollutant, even if that waterway is not mapped as a segment by MassDEP, then the additional impaired waters samples will be tested (see "Cooke, Ian and Tedder, Newton Email Correspondence" under References below for further details.).

These additional impaired waters samples and the standard bacteria sample are analyzed using the more rigorous procedures outlined in Appendix G of the MS4 Permit as dictated by 40 CFR §136.

Table 5 summarizes the required testing methods for the additional testing parameters, as well as sample container, preservation, hold times, and the instruments or laboratories used to test each sample.

When conducting outfall screening, to the extent possible, grab samples are collected and analyzed later at our offices or a lab rather than being processed in the field. In addition, where possible, a single larger sample bottle will be used as a source for multiple test parameters. This ensures efficient use of staff time and prevents the accidental release of potentially hazardous reagents to the environment. For these same safety reasons, the Town may not fully chemically preserve samples in the field (i.e. adding acid to nutrient samples) but rather will deliver them to the lab, on ice, promptly where they will be fully preserved as needed.

Further details on using field test kits for water quality analysis can be found in Table 6 under Water Quality Analysis including copies of equipment manuals and any field, office or lab standard operating procedures.

Table 3: Parameters, Instruments, Field Test Kits, and Laboratories for Basic Screening

Standard Screening Parameter	Target Detection Limit	Container Type & Sample Volume	Preservative	Hold Time	OK to Combine?	Instrument, Portable Meter, or Lab Name
Ammonia	0.05 mg/L	500 ml plastic	Ice	Process same day	Yes	Analytical Balance, Middleboro MA
Chlorine	0.02 mg/l	500ml plastic	Ice	Process same day	Yes	Analytical Balance, Middleboro MA
Conductivity	0.2 mS/cm	500 ml plastic	Ice	Process same day	Yes	Analytical Balance, Middleboro MA
E. coli or Enterococcus	<=4 cfu or mpn	Sterile 500 ml plastic	Ice	Deliver to lab in 6 hr (process in 8 hours)	No must be sterile	Analytical Balance, Middleboro MA
Salinity		500 ml plastic	Ice	Process same day	Yes	Analytical Balance, Middleboro MA
Surfactants	0.1 mg/L	1L glass amber jar	Ice	Process same day	No	Analytical Balance, Middleboro MA
Temperature	0 to 40 °C	Measure in field	None	Measure in field	n/a measure in field	Non-mercury field thermometer

Table 4: Additional Tests Required for Screening Impaired Waters (see Table 5 for test methods)

"Pollutant" Causing Impairment	Test For
Excess Algal Growth	Total Phosphorus (freshwater)
	Total Nitrogen (marine waters)
Fecal Coliform	Fecal Coliform
Nutrient/Eutrophication Biological Indicators	Total Phosphorus (freshwater)
	Total Nitrogen (marine waters)
Oxygen, Dissolved	Dissolved Oxygen
	Temperature
or	BOD5
	Total Phosphorus (freshwater)
Dissolved Oxygen Saturation	Total Nitrogen (marine waters)
Phosphorus (Total)	Total Phosphorus
Sedimentation/Siltation	Total Suspended Solids
Total Suspended Solids (TSS)	Total Suspended Solids
Turbidity	Total Suspended Solids
	Turbidity
Aquatic Macroinvertebrate Bioassessments	none required[1]
Aquatic Plants (Macrophytes)	none required
Chlordane	none required
Color	none required
DDT	none required
Debris/Floatables/Trash	none required
Dioxin (including 2,3,7,8-TCDD)	none required
Eurasian Water Milfoil, Myriophyllum spicatum	none required
Fishes Bioassessments	none required[1]
Fish-Passage Barrier	none required
Low flow alterations	none required
Mercury in Fish Tissue	none required
Non-Native Aquatic Plants	none required
Other	none required[1]
Other flow regime alterations	none required
PCB in Fish Tissue	none required
Pentachlorophenol (PCP)	none required
Physical substrate habitat alterations	none required
Polychlorinated biphenyls	none required
Taste and Odor	none required
Temperature, water	none required
[1] Awaiting confirmation from MassDEP as to whether sampling is required	

Table 5: Test Methods for Additional Impaired Waters Testing

Impaired Waters Additional Test Parameter	Required Test Method Options[1]	Target Detection Limit	Container Type / Sample Volume[2]	Preserv.	Hold Time[2]	OK to combine tests larger bottle?[2]	Instrument or Lab Name
Enterococcus	1106.1; 1600; Enterolert®	<=4 cfu or mpn	500ml sterile plastic with headspace	Ice	Deliver to lab within 6 hr	bacteria samples only	Analytical Balance, Middleboro MA
E. coli	1103.1; 1603; Colilert®, Colilert-18®; mColiBlue-24®	<=4 cfu or mpn	500ml sterile plastic with headspace	Ice	Deliver to lab within 6 hr	bacteria samples only	Analytical Balance, Middleboro MA
Phosphorus (Total)	365.1; 365.2; 365.3; SM 4500-P	<=10 ug/l	500ml plastic	Ice	Deliver to lab same day for preservation with acid[3]	yes	Analytical Balance, Middleboro MA
Nitrogen (Total)	351.1 or 351.2; and 353.2	<=0.2mg/l	500ml plastic	Ice	Deliver to lab same day for preservation with acid[3]	yes	Analytical Balance, Middleboro MA
Fecal Coliform	1680; 1681	1 CFU	100ml sterile plastic with headspace	Ice	Deliver to lab within 6 hr	bacteria samples only	Analytical Balance, Middleboro MA
Dissolved Oxygen	365.1; 365.2; 365.3 [SM4500-O]	0.5 mg/l	n/a, measure in field	n/a	measure immediately	n/a	Analytical Balance, Middleboro MA
Temperature	351.1/351.2 + 353.2 [SM2550]	0 to 40 °C	n/a, measure in field	n/a	measure immediately	n/a	Non-mercury field thermometer
BOD5	360.1; 360.2 [SM5210]	2 mg/l	1L plastic, no headspace or air	Ice	Deliver to lab same day	only those with no headspace	Analytical Balance, Middleboro MA
pH	150.2	4-10 SU	measure in field or 500ml plastic with no headspace/air	Ice	measure immediately or same day as soon as possible	only those with no headspace	Analytical Balance, Middleboro MA
Total Suspended	160.2 [SM2540]	<=5 mg/l	1L plastic	Ice	deliver to lab same day	yes	Analytical Balance,

Solids							Middleboro MA
Turbidity	180.1	<=.06 NTU	500ml plastic	Ice	deliver to lab same day	yes	Analytical Balance, Middleboro MA
[1]Information taken from MS4 Permit Appendix G. Note that there appear to be some errors in Appendix G of the permit. We expect that the information listed 40 CFR §136 prevails, and will confirm this with EPA and update this table when the government reopens. Methods indicated in red are clearly incorrect. Those in brackets seem to have been inadvertently omitted..							
[2]These are typical recommended values, if using a lab please update these columns with information provided by your lab.							
[3]For the safety of personnel and the environment we do not recommend preserving samples with acid in the field.							

Outfall Screening Quality Assurance and Quality Control

In order to ensure the integrity of the data, grab samples collected in the field for later analysis will be properly preserved and processed within the allowable hold time for each parameter as summarized in Table 5. In the interest of employee and environmental safety, standard preservation methods that involve hazardous materials (i.e. sulfuric acid) may be avoided in the field. Certain parameters must be measured directly in the field using field meters or other instruments as indicated in Tables 3 and 5 in this document.

All measurements are taken or analysis completed in accordance with manufacturer's and / or laboratory's instructions or a town specific SOP adapted from the manufacturer's and or laboratory's instructions, as to calibration and testing. See Table 6 under the Outfall Screening Procedures Category for relevant supporting documents.

In addition, to help further validate the reliability of testing measures being performed, when resources allow, the following additional quality assurance and quality control (QA/QC) measures may be implemented. These additional steps are not required by the MS4 permit:

- For field meters, post-calibration (pre-sampling) and post-sampling meter readings relative to a known calibration standard will be recorded.
- One lab blank, one lab positive or spike, and one lab split will be analyzed for each parameter on each mission (i.e. sampling day).
- Periodically, one field duplicate will be collected and analyzed for bacteria per mission.
- Where they are available, the results of QA/QC samples will be periodically evaluated and corrective measures including supplemental field team training will be undertaken as needed.

Follow-up ranking of outfalls and interconnections

The purpose of follow-up ranking is to use the information gathered during the ongoing outfall screening process to determine the order in which associated catchments will be investigated. Outfalls and interconnections may be reprioritized continuously as dry weather screening takes place. The NSP IDDE Prioritization Tool provides a framework for updating outfall rankings on a continuous basis. At a minimum, a follow up outfall and interconnection ranking will be completed by the end of year 3 of the permit (6/30/21) when dry weather outfall screening is complete.

All screening data for a given year will be included with that year's annual report, and any previously unknown outfalls or interconnections discovered during screening will be added to the outfall inventory and initial ranking, which is also submitted with the annual report.

Any outfalls that are found during screening to contain one or more of the following signs of sewage contamination will automatically be re-prioritized to the top of the high priority outfalls for catchment investigation:

- Olfactory or visual evidence of sewage;
- Ammonia ≥ 0.5 mg/L, surfactants ≥ 0.25 mg/L, and bacteria levels greater than the applicable water quality criteria for receiving water (235 CFU or MPN for E. coli or 61 CFU or MPN for Enterococcus); or
- Ammonia ≥ 0.5 mg/L, surfactants ≥ 0.25 mg/L and detectable levels of chlorine.

Please refer to the NSP IDDE Prioritization Tool, which details the Town's ranking process which considers numerous factors, but in general, outfalls with known illicit discharges or SSO history are

categorized as "problem outfalls" and placed at the top of the ranking. Outfalls with any of the indicator combinations described above are placed at the top of the "high priority" list. Outfalls with high bacteria but low or absent ammonia and surfactants are placed next in the overall ranking, followed by those with ammonia and/or surfactants but no other indicators. Where outfall screening discovers no contamination indicators, outfalls will be added to the "low priority" category. Outfalls without indicators but where available ambient stream water quality data indicates elevated levels of bacteria, will be moved to the high end of the low priority category. Rankings may also be adjusted in light of any known or suspected system vulnerability factors. Finally, higher priority will be given to catchments whose outfalls discharge to beaches, shell fishing areas or other public health priority areas.

At all times, the team leader will use their best judgment to schedule catchment investigations in the order that they believe is likely to lead to the most rapid identification and elimination of problem discharges to the MS4 and/or local waterways, and the team leader retains the discretion to adjust the prioritization as needed to accomplish that goal.

System Vulnerability Factors and Wet Weather Outfall Screening

If an outfall or interconnection's catchment contains one or more of the system vulnerability factors listed below, wet weather screening and sampling is required in addition to dry weather screening. The Town will document the presence or absence of system vulnerability factors in each catchment in the outfall inventory and ranking tool, an updated copy of which is included with each annual report.

System vulnerability factors may be known in advance of catchment investigation, or may be discovered during the course of the catchment historic records review or field investigation (see discussion below). If system vulnerability factors are known in advance, it is preferable but not required to conduct wet weather screening prior to catchment investigation so that the results can better inform the strategy employed during the investigation of each catchment.

If one or more system vulnerability factors is discovered during the course of catchment investigation, the wet weather screening will be completed concurrent with catchment investigation, and the associated catchment investigation may not be marked complete until wet weather screening is completed.

The NSP IDDE Prioritization Tool referenced in Table 6 under the Catchment Prioritization Category provides a framework for tracking which outfalls require wet weather screening and progress toward completion. The presence of one or more of the following required factors shall trigger wet weather screening.

Required System Vulnerability Factors

- History of SSOs, including, but not limited to, those resulting from wet weather, high water table, or fat/oil/grease blockages;
- Common or twin-invert manholes serving storm and sanitary sewer alignments;
- Common trench construction serving both storm and sanitary sewer alignments;
- Crossings of storm and sanitary sewer alignments where the sanitary system is shallower than the storm drain system;

- Sanitary sewer alignments known or suspected to have been constructed with an underdrain system;
- Inadequate sanitary sewer level of service (LOS) resulting in regular surcharging, customer back-ups, or frequent customer complaints;
- Areas formerly served by combined sewer systems;
- Sanitary sewer infrastructure defects such as leaking service laterals, cracked, broken, or offset sanitary infrastructure, directly piped connections between storm drain and sanitary sewer infrastructure, or other vulnerability factors identified through Inflow/Infiltration Analyses, Sanitary Sewer Evaluation Surveys, or other infrastructure investigations.

Recommended but Not Required System Vulnerability Factors

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

Wet Weather Outfall / Interconnection Screening and Sampling Field Procedures

Wet weather outfall screening will primarily occur March to June when groundwater levels are relatively high per EPA's strong recommendation. Wet weather screening only occurs when there is a rainfall event sufficient to produce a stormwater discharge. In general, a minimum of 0.25 inches of rain in the previous 24-hour period is preferred prior to wet weather screening and the drain system must be actively flowing at the time of sampling. Sampling during periods of medium to high intensity rainfall / storm drain discharge is preferred if possible.

The initial surface runoff from a rainstorm, called the "first flush," should not be sampled, if possible. The objective of the wet weather screening is to identify SSOs and wet weather cross connections, rather than street runoff.

In addition to collecting samples, an outfall inspection form will be completed at the time of sampling to note any visual or olfactory indicators of illicit discharge. See Table 6 under the Wet Weather Outfall Screening category for applicable procedures and forms.

Because of the need to coordinate personnel, equipment and laboratory resources in advance, it is usually preferable to plan for wet weather sampling when the forecast likelihood of rainfall is 60% or higher. It is also generally preferable to plan wet weather sampling in anticipation of frontal weather systems rather than thunderstorms or other scattered weather systems.

In the event that an outfall or interconnection is submerged, the screening and sampling is completed at the first accessible upstream manhole that is not submerged and this location is noted on the inspection form.

The parameters to be sampled on a given waterbody and sampling methods, test kits, laboratory arrangements and QA/QC procedures are the same as for dry weather screening on that waterbody.

Catchment Investigation Procedure

Each catchment associated with an outfall or interconnection within the MS4 (with the exception of excluded, not waters of the US and not owned by Town outfalls) will be investigated for indicators of illicit discharges, whether or not such indicators were found during outfall screening. Problem outfalls may bypass the dry weather outfall screening process and proceed directly to catchment investigation. High and low priority outfalls catchment investigations will begin once dry weather screening is complete.

Catchments are investigated one by one in order of priority without regard to geographic proximity. "Problem" catchments are investigated first, followed by high priority and then low priority catchments. Within each prioritization category, the catchments are investigated in the order they are ranked. The NSP IDDE Prioritization Tool provides a framework for ranking individual outfalls for catchment investigation purposes and tracking the progress of the program.

Investigation of catchments associated with problem outfalls will begin within two years of the permit effective date (i.e. by 6/30/20) and will be completed by year seven (6/30/25). Work may be ongoing in multiple catchments simultaneously to expedite the process. All catchments (except those which are categorized as excluded, not waters of the US, or not Town owned must be investigated within ten years of the permit effective date (i.e. by 6/20/28).

Review of Records and Preparation of Investigation Strategy for Each Catchment

Completed system mapping is critical to an effective catchment investigation. If the Phase 1, and Phase 2 mapping data described above under the section on system mapping has not been previously completed, this information will be gathered and updated concurrent with the investigation of each catchment. Where resources allow, the recommended mapping elements will also be collected at the same time.

Prior to beginning the investigation of a particular catchment, available mapping, as well as relevant, historic plans and records, and other sources of existing data for the catchment will be reviewed by the field team leader. For the Town, these data sources will include plans related to the construction of the storm drain, prior work performed on the storm drains, board of health or other municipal data on septic system failures or required upgrades, and complaint records related to SSOs, sanitary sewer surcharges, and septic system breakouts.

The locations of storm drains, sanitary sewers, and any combined sewer pipes and manholes are noted, as well as the outfall or interconnection location and receiving water. Information pertaining to any of the system vulnerability factors defined above, as well as the results of the outfall screening, will be considered during catchment investigation planning.

Any system vulnerability factors discovered during the records review or catchment field investigation process will be added to the system vulnerability inventory which is part of the outfall inventory ranking tool. The associated outfall will be scheduled for wet weather screening if one or more system vulnerability factors are identified, and the outfall/catchment rankings will be updated accordingly. The investigation of a catchment will not be considered complete until wet weather outfall screening is complete, if applicable.

The team will also note any system blockages or cleaning needs, and schedule appropriate maintenance activities as required, prior to field investigations if feasible.

Based on a review of the above information, an investigation strategy for the catchment will be developed. Specific manholes to be inspected will be defined for each catchment prior to beginning the field investigation of a catchment.

Junction manholes are those that receive flow from two or more drain segments. Key junction manholes receive the accumulated flow from two or more junction manholes or a junction manhole and an additional drain segment. Depending on its size and complexity, each catchment may have multiple junction and/or key junction manholes. Simple catchments may not have any junction or key junction manholes. Junction and key junction manholes are illustrated in Figure 1.

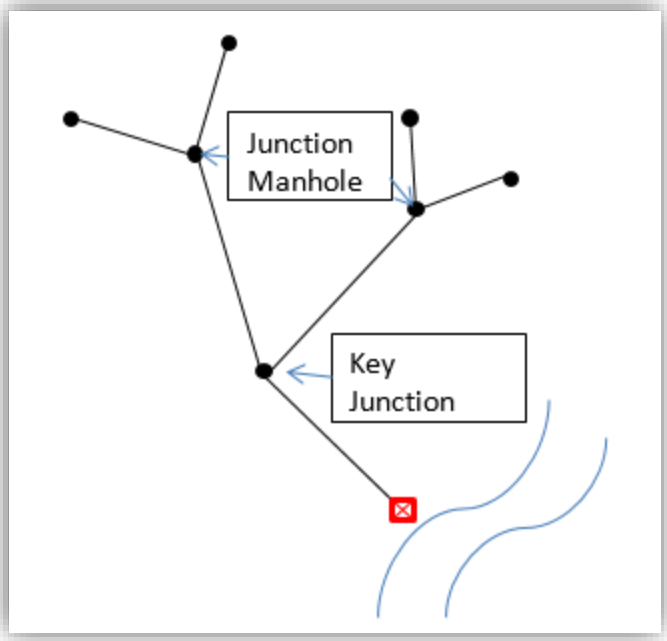

Figure 1: Junction and Key Junction Manholes

The resulting catchment investigation plan will include at a minimum, opening and inspection/testing of all key junction manholes—or, if no key junction manholes are present, junction manholes.

If no key junction or junction manholes are present, the dry and (if required) wet weather outfall inspections shall suffice for meeting the manhole inspection requirement, so long as the dry weather and (if required) wet weather outfall inspection reveal no indications of dry weather flow, illicit discharge or SSO activity. Where illicit discharge or SSO evidence is discovered, further manhole inspections or other investigations shall be conducted to isolate the affected pipe segment between two manholes as described further below.

Dry Weather Manhole Inspection Methodology

At the discretion of the field team leader, manhole inspections may be performed starting from the outfall or interconnection and working upstream, or starting from the upper parts of the catchment and working downstream, or a combination of both practices.

Key junction manholes are inspected in each catchment where they exist. If no key junction manholes are present in the system, inspections will include junction manholes. If no junction manholes exist, then the results of the outfall screening/testing will serve as the catchment investigation provided that no flow, illicit discharge, or SSO indicators were found at the outfall.

During the investigation of a catchment, storm drain manholes are opened and inspected during dry weather (less than 0.1 inches of rain in the preceding 24 hours and no snowmelt, with 72 hours dry preferred) to look for evidence of illicit discharges.

A manhole inspection form (see Table 6) is completed and any visual or olfactory evidence of illicit discharges is noted. Visual evidence may include toilet paper, sanitary products, visible sewage, soap,

food, gray filamentous bacterial growth, excrement, or other indications of anything other than stormwater entering the MS4. Olfactory evidence may include sewage, soap, laundry, bleach, food, or other odors not typical of stormwater.

If flow is observed in a storm drain manhole during dry weather, the team will use a field kit or laboratory grab sample to test the flow at a minimum for the presence of ammonia, chlorine, and surfactants using the procedures described above. In most cases these tests will be performed immediately on-site rather than being sent off to a lab so that they can be used to guide further investigations in real time. In the field team leader's discretion, samples may also be collected for E. coli and sent to the lab for analysis, especially where outfall inspection indicates potential presence of an illicit sewage discharge and/or flow is present but surfactant and ammonia tests are negative or inconclusive. E. coli sampling is recommended but not required by EPA.

In manholes where flow is present but at a level too low / shallow to be sampled, or where no flow is present but where visual or olfactory evidence of illicit discharge is found in the manhole, these indicators will be noted on the manhole inspection form and the team will in its discretion, either:

A) Re-inspect the manhole within one week and if flow is found on re-inspection, it will be sampled;
B) Dam the manhole with a sandbag or caulk dam, recheck after 48 hours of additional dry weather, and sample any discharge which has accumulated behind the dam (this process requires dry weather before, during and after placement of the dam); or
C) Proceed to investigate the collection area upstream of the manhole immediately in an effort to isolate the source of the flow or visual / olfactory indicators, and then if no upstream indicators are found, return to the original problem manhole to implement option A or B.

Sampling results will be evaluated using the criteria described above in the section titled "Follow-up ranking of outfalls and interconnections." If the observed flow is obviously an illicit discharge based on visual or olfactory evidence, the field team may note this and skip the testing.

Manhole investigations will continue upstream of the problem manhole, beginning with upstream key junction or junction manholes (if any) in an effort to identify a specific section of pipe between two manholes where the source of the discharge originates, at which point the process moves on to isolation and confirmation procedures as described further below.

If positive indicators of illicit discharge are found in a manhole, investigations further downstream of that problem manhole will be put on hold until the source of the discharge upstream has been isolated, confirmed and corrected, although investigations may continue on other key junction or junction manholes in the catchment that are unaffected by the problem manhole, if any.

To the extent that a catchment investigation reveals a discharge that does not meet the definition of an illicit discharge (see definitions and acronyms above) but is nonetheless undesirable, such as single home car washing or runoff from irrigation systems, the Town may refer the issue to the NSP for targeted follow up education in the immediate neighborhood. If the Town determines that such discharges represent a significant source of pollutants to the MS4, more formal measures will be implemented to control these sources so they are no longer significant contributors of pollutants, and/or they are eliminated entirely.

Wet Weather Manhole Inspection / Catchment Investigation

When an outfall or catchment is known or found to contain one or more system vulnerability factors as described above, the Town is required to conduct wet weather outfall or catchment investigations

"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." At a minimum, this investigation will include the wet weather outfall screening procedure described in the section above titled "Wet Weather Outfall / Interconnection Screening and Sampling Field Procedures." If necessary, investigations may also include additional inspections and testing in the catchment upstream of the outfall including but not limited to wet weather manhole inspection and sampling of the MS4 infrastructure, or in some cases inspection of associated sewer or septic infrastructure that may interact with the MS4 infrastructure during wet weather conditions.
The investigation of a catchment with one or more system vulnerability factors cannot be marked complete until the wet weather outfall screening and related wet weather catchment investigations (if any) are finalized.

Procedures to Isolate and Confirm Sources of Illicit Discharges

Discharges of concern may include direct cross connections, indirect connections (i.e. exfiltration from a leaking sewer lateral, sewer line or septic system that infiltrates the drain), intermittent discharges of solid or liquid waste (i.e. catch basin dumping), input from features such as sewer underdrains, or SSOs. The nature of the specific investigation techniques used will vary depending on the nature of the suspected problem.
Once a section of pipe between two manholes has been isolated as the approximate location of a dry weather or wet weather discharge, further testing will be undertaken to isolate and confirm the source. Dye testing of buildings and sanitary sewer pipes, smoke testing, internal video inspection of drains, sewers or laterals, and targeted internal plumbing investigations are used to confirm the source of the illicit discharge.
During the process of attempting to isolate and confirm the source of illicit discharges in an upstream area of a catchment, similar investigations in downstream areas of the same catchment will be placed on hold. Once the source of the illicit discharge has been identified and the removal of the illicit discharge has been confirmed, downstream work in the same catchment can be resumed.
The process of locating the illicit discharge is described in further detail in the Towns illicit discharge isolation procedures which are found in Table 6 under the Illicit Discharge Isolation Category.

Marking the Catchment Investigation Complete

If all key junction manholes have been inspected (or, if no key junction manholes are present, junction manholes, or, if no junction manholes are present, the outfall) and found to be free of dry weather flow or illicit discharge indicators, and any required wet weather outfall screening and catchment investigation has been completed, the investigation of that catchment is marked complete.
If sources of illicit discharge or SSO are found in a catchment, the investigation may be marked complete once the sources of the discharge have been isolated and confirmed as described above. In such cases the catchment may be marked "inspection complete, awaiting repair." Once repairs are finished, further catchment investigation will be scheduled to confirm that all sources of discharge have been eliminated.
If all required manhole inspections are clean but the outfall inspection still shows evidence of illicit discharge, the catchment may be marked "inspection complete, results inconclusive" and the Town will schedule further catchment investigation and/or outfall screening until such time as the source of illicit discharge has been identified, or the catchment has been confirmed to be free of illicit

discharges. In these situations, the Town may elect to collect additional outfall or manhole samples and have them analyzed for more sophisticated sewage indicators such as pharmaceuticals (using EPA 1694 LC/MS/MS methods with EPA specified MDLs) to help determine the nature of the discharge.

Catchment Investigation Summary Report and Recordkeeping

In order to document the process followed and results of wet and dry investigations in each catchment, the team leader will prepare a NSP Catchment Investigation Summary Report form (see Table 6). This form briefly describes the dates of the investigation, what investigation strategy was used, any system vulnerability factors discovered, any updates to mapping needed or completed, overview of sampling results, and the conclusions of the investigation. Where an illicit discharge is encountered, the report will also briefly outline measures taken to isolate the source, and any needed or completed repairs.

As catchment investigations proceed, the outfall inventory and ranking tool will be updated to reflect the status of each outfall's catchment investigation.

The summary report, updated outfall inventory and ranking as well as all catchment investigation field data will be included with the annual report each year to document the progress of the program.

Illicit Discharge Removal and Confirmation

Once the source of an illicit discharge has been identified, the Town will immediately notify all responsible parties for any such discharge and require immediate cessation of improper disposal practices in accordance with its legal authorities. Elimination will be pursued diligently and in the interim, the Town will implement or require implementation of all reasonable and prudent measures to minimize the discharge of pollutants to and from its MS4.

Illicit discharges will be corrected within 60 days as required by the MS4 permit. For illicit discharges that cannot be corrected in 60 days, an expeditious schedule for elimination will be created within 60 days.

When the source of an illicit discharge is identified, the Town will document the removal process using the procedures and forms included in Table 6 under the Illicit Discharge Isolation and Illicit Discharge Repair Report categories. At a minimum, the following information is collected from each illicit discharge that is removed and this information is included in each annual report to EPA:

- Location of the discharge and source(s);
- A description of the discharge, method of discovery, date of discovery;
- Dates of discovery, elimination, mitigation and/or enforcement action; and
- An estimate of the volume of flow removed.

The volume of flow removed will be estimated using an assumed volume of sewage from a typical house of 240 gallons per day. If only one fixture in a building is illicitly connected, or if the building is not a single family home, or if the illicit discharge is not a sewage cross connection, the estimated amount of sewage will be proportionately reduced or increased as appropriate.

Following the removal of an illicit discharge, confirmation outfall screening will be performed as soon as reasonably possible and, at a minimum, within 1 year. The confirmatory screening shall be conducted in dry weather unless one or more system vulnerability factors have been identified in the catchment area where the discharge was found, in which case both dry weather and wet weather

confirmatory screening shall be conducted. If confirmatory screening indicates evidence of additional illicit discharges, the catchment shall be scheduled for additional investigation.

On-going Screening

Once all catchment investigations and (if applicable) illicit discharge removal and confirmation have been completed, each outfall or outgoing interconnection will be reprioritized and rescreened every 5 years.

On-going screening consists of outfall / interconnection screening during dry weather and also during wet weather for catchments with one or more system vulnerability factors present. On-going screening is performed with the same methodology described above.

If follow-up screening indicates the presence of illicit discharges in the catchment, the catchment investigation procedure is once again implemented to locate and remove all sources of illicit discharges.

Illicit Discharge Prevention Procedures

The Town has the following procedures in place to prevent illicit discharges to the MS4:

- Spill Response Procedure
- Spill Reporting Procedure
- Spill Identification Procedure
- Spill Containment Procedure
- Public Awareness
- Spill/IDDE Reporting Hotline
- Training of Public Employees – required annually for employees

Copies of the Town's illicit discharge prevention procedures can be found as referenced in Table 6.

Training

The Town will provide annual training to all employees involved in IDDE program which will cover screening and investigation procedures and how to identify illicit discharges and SSOs. Information on the frequency and type of training shall be included in the Town's annual report.

Recordkeeping, Data Management and Annual Reports

The Town's IDDE program involves a significant level of recordkeeping, data management and reporting which is the responsibility of Engineering Division and Conservation Administrator.

The Town has documented its IDDE program procedures in a series of key reference documents and standard operating procedures. These documents are relatively static in nature, and many of them are attached directly to the IDDE SWMP for documentation purposes. Table 6 provides an overview of these key reference documents and where they can be found. Note that forms in Table 6 may be used as either paper forms, or electronic equivalents.

The Town is required to submit an annual report each year of the permit term, including tracking and evaluating IDDE program success and the overall effectiveness of the IDDE program. At a

minimum the Town will report the following as metrics of IDDE program progress in each annual report:

- The number of SSOs and illicit discharges identified and removed,
- The number and percent of total outfall catchments served by the MS4 evaluated using the catchment investigation procedure,
- All dry weather and wet weather screening and sampling results,
- The estimated volume of sewage removed, and
- The estimated annual phosphorous load reduction resulting from IDDE activities (for phosphorous TMDL communities)

The Town also maintains an extensive collection of program data which document the completed and ongoing field work and reporting on that field work. This information is constantly changing as work is completed or new events occur. The active copies of these data are maintained on one or more computer systems including spreadsheets, databases and/or the Town GIS system among other formats. Copies of most of these data, or summaries of them, are included in the annual reports as required. Because of their dynamic nature, most of these data are not included directly in the SWMP, but are available upon request or through the Town's annual reports.
Table 7 lists the program data that are maintained by the Town, where they can be found, and whether they are included in the annual report or available upon request.

Table 6: Summary of Key Protocols, SOPs and Forms

Category	Included Documents	Document Location
Bylaw	Chapter 230 – Stormwater Management (Link)	See link
SSO Inventory Spreadsheet	NSP Template for Inventory of SSO's in the Five Years Prior to Permit Effective Date (Link)	See link
SSO preventive Maintenance and Response	BWSC SSO Emergency Response Plan (Link)	See link
	Excerpt: BWSC SSO Example Field Manual Emergency Response Plan Appendix A (Link)	See link
	Excerpt: BWSC SSO Preventative and Corrective Measures (Link)	See link
	EPA Preventative Maintenance and Sewer Response Plan Template (Link)	See link
	EPA Wastewater Collection System Toolbox (Link)	See link
SSO Reporting	Blank MassDEP SSO Reporting Form (Link)	See link
	MassDEP SSO Reporting Form Instructions (Link)	See link
Catchment Delineation	MAPC Stormwater Catchment Delineation Procedure documentation (Link) [or other documentation if using something different]	See link
Catchment Prioritization	NSP IDDE Prioritization Tool Documentation and Instructions (Link) [or other documentation if using something different]	See link
General IDDE Materials	Central MA SOP 10- Locating Illicit Discharges SOP (Link)	See link
	Central MA SOP 10- Locating Illicit Discharges Form (Link)	See link
Dry Weather Outfall Screening	Central MA SOP 1- Dry Outfall Inspection SOP (Link) BWSC Dry Weather Outfall Inspection Procedure (Link)	See link
	Central MA SOP 1- Dry Outfall Inspection Form (Link) Center for Watershed Protect Outfall Recon, Inventory & Sample Field Sheet (Link) BWSC Dry Weather Outfall Inspection Form (Link)	See link
Wet Weather	Central MA SOP 2- Wet Weather Outfall Inspection SOP (Link) BWSC Wet Weather Outfall Inspection Procedure (Link)	See link

Outfall Screening	Central MA SOP 2- Wet Weather Outfall Inspection Form (Link) BWSC Wet Weather Outfall Inspection Form (Link)	See link
Water Quality Analysis	Central MA SOP 13- WQ Screening with Field Kits SOP (Link)	See link
	Central MA SOP 13- WQ Screening with Field Kits Form (Link)	See link
	Laboratory Methods for parameters tested at a lab	See attachments
	Manufacturer's instruction manuals for instruments used to make measurements in the field or equipment used to perform testing in-house	See attachments
Manhole Inspection	BWSC Manhole Inspection Procedure (Link)	See link
	BWSC Manhole Inspection Forms (Link)	See link
Catchment Investigation Report	NSP Catchment Investigation Summary Report Form (Link)	See link
Illicit Discharge Isolation	BWSC Dye Testing Procedure (Link)	See link
	BWSC Dye Testing Record Log (Link)	See link
	Other	See link
Illicit Discharge Repair Report	NSP Illicit Discharge Removal Tracking Form (Link)	See link
Illicit Discharge Prevention	Central MA SOP 4- Spill Response and Cleanup Procedures (Link)	See link
	Spill Reporting Procedure	See attachments
	Spill Identification Procedure	See attachments
	Spill Containment Procedure	See attachments
	Public Awareness	See attachments
	Spill/IDDE Reporting Hotline	See attachments
	Training of Public Employees	See attachments

Table 7: Summary of Key Program Data and Annual Reporting Requirements

Data Type	Storage Location
SSO inventory covering period 7/1/2013 to present	DPW hard drive. Included in annual report.
Copies of completed MassDEP SSO reporting forms	DPW hard drive. Copies available upon request
System mapping	Town GIS system. Copies available upon request subject to data format constraints. Brief update on status of mapping included in each annual report.
NSP Outfall Inventory, Prioritization and Tracking Tool	DPW hard drive. Included in annual report.
Completed dry weather, wet weather, confirmatory, and follow up outfall screening field data collection sheets	Town GIS system. Included in annual report.
Dry weather, wet weather, confirmatory, and follow up outfall screening field, laboratory, and/or office water quality analysis reports	DPW hard drive. Included in annual report.
Completed manhole inspection forms (noting any system vulnerability factors present)	DPW hard drive. Included in annual report.

Manhole inspection field or lab data reports (if not included on inspection forms)	DPW hard drive. Included in annual report.
Brief summary report on each catchment investigation and its results	DPW hard drive. Included in annual report.
Documentation and data on illicit / SSO isolation and confirmation including dye testing reports, video inspection files and similar data.	DPW hard drive. Included in annual report.
For each illicit discharge identified, a brief report describing its removal or if not yet removed, the plan to remove it as expeditiously as possible.	DPW hard drive. Included in annual report.
Annual IDDE self-evaluation which includes at a minimum the following EPA required annual reporting metrics: **• Number of illicit discharges identified and corrected** **• Number of SSOs identified and removed** **• Number and percent of outfalls screened** **• Outfall/interconnection inspection data and sampling results** **• Volume of sewage removed** **• Number and identifier of catchments evaluated**	DPW hard drive. Included in annual report.
Documentation of frequency and type of annual IDDE employee training	DPW hard drive. Included in annual report.
Documentation of the basis for any changes to IDDE BMPs (including why current BMP is ineffective/infeasible and expected performance of replacement BMP	DPW hard drive. Included in annual report.
Copies of any other stormwater or receiving-water monitoring performed or received by the Town.	DPW hard drive. Included in annual report.

References

40 C.F.R § 136. https://tinyurl.com/y754r4rn

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USEPA, November 2004. Lower Charles River Illicit Discharge Detection & Elimination (IDDE) Protocol Guidance for Consideration. USEPA. Accessed online at: https://www.mass.gov/files/documents/2016/08/xv/appendxa.pdf

USEPA, 2012. Draft EPA New England Bacterial Source Tracking Protocol. USEPA. Accessed online at https://www3.epa.gov/region1/npdes/stormwater/ma/2014AppendixI.pdf

IDDE Program Attachments

Copies of program attachments referenced in Table 6, if any, are included below.

Analytical Balance Laboratory Methods Used

Ammonia	EPA 350.1
Chlorine (Free/Res)	SM4500-Cl-G
Conductivity	SM 2510B
E. coli	EPA 1604

Salinity	SM 2520B
Surfactants	Hach 8028

MCM 4: Construction Site Stormwater Runoff Control

Introduction

The municipal separate storm sewer system (MS4) permit issued by the Environmental Protection Agency (EPA) to the Town of Sharon (hereafter "the Town") requires the implementation of a construction site stormwater runoff control program that prevents pollutants from construction site stormwater runoff from entering the Town's MS4. In addition, the MA Wetlands Protection Act and Chapter 262 of the Town of Sharon's Bylaws extend similar protections to discharges directly to wetlands and waterways.

This document references the Town's construction site stormwater runoff control program in detail and specific authority in the Town of Sharon's Stormwater Management bylaw (Chapter 230). This document was prepared based on a model provided by the Neponset Stormwater Partnership (NSP) and funded in part through a Community Innovation Challenge Grant and contributions from NSP member communities.

Program Purpose

In the absence of appropriate and well-maintained controls, stormwater runoff from construction sites will discharge very high concentrations of harmful pollutants into MS4s and/or local waterways, and ultimately degrade local water quality. In addition to harmful solid wastes and chemicals that are commonly found on construction sites, sediment in construction site runoff is often the most destructive.
While sedimentation of streams and rivers is a naturally occurring process, un-managed sediment from construction site runoff fills and clogs waterways at a high rate, causing severe physical and biological harm to local habitat and water quality, and exacerbating flooding.
Land disturbing activities and new construction projects including redevelopment are important for economic growth, public access and safety, and overall improvements of daily life.
Establishment of a legal authority to implement construction site stormwater runoff control will help prevent sediment as well as construction site debris and chemicals from entering local water systems while still allowing for construction activity.

Program Schedule

The MS4 permit defines the timeline for implementing the Town's Construction Site Stormwater Runoff Control Program as summarized in Table 1 below.

Table 1. Program Schedule

Construction Site Stormwater Runoff Control Task	Permit Schedule
Sediment and Erosion Control Ordinance Adoption	May 01, 2008
Written Site Plan Review Procedures Adoption	Year 1 (June 30, 2019)
Written Site Inspection Procedures Adoption	Year 1 (June 30, 2019)
Implementation of Sediment and Erosion Control Program	Ongoing

Responsible Parties

The Town's Stormwater Management Bylaw (Chapter 230) empowers the Select Board to appoint the Town Engineer or Assistant Town Engineer or such other Town employee as the Select Board may from time to time determine and designate in a writing to aid the Board of Selectmen in the enforcement and/or administration to enforce the construction site stormwater runoff control provisions of the bylaw. The Town Engineer has delegated day to day management, site plan review and inspection, and reporting to the Town's Engineering Division. The Town Engineer is responsible for coordinating the efforts of other departments when needed, ensuring that necessary interdepartmental communication occurs in a timely manner, and following up with other departments as needed regarding the status of their efforts.
Key contacts and roles for each of the other departments are as follows:

Table 2: Responsible Parties

Implementation Role	Responsible Authority/Individual
Construction Stormwater Enforcement Authority	Select Board
Overall Supervision of Construction Stormwater Program	DPW Engineering Division Conservation Administrator
Person(s) Responsible for Site Plan Review	DPW Engineering Division Conservation Administrator
Person(s) Authorized to Conduct Construction Site Inspection on Behalf of the Town	Peter O'Cain Kevin Davis Lance DelPriore Gregory Meister
Enforcement Authority for Construction Stormwater Compliance	DPW Engineering Division Conservation Administrator
Legal Support for Enforcement Actions	Richard Gelerman Lisa Whelan
Person(s) Responsible for Construction Stormwater Recordkeeping	DPW Engineering Division Conservation Administrator

Construction Site Stormwater Runoff Control Program'

Consistent with the requirements of the MS4 Permit, the Town is implementing and enforcing a program to reduce pollutants in stormwater runoff discharged from all construction activities. The objective of the construction site stormwater runoff control program is described in Section 2.3.5 of the 2016 MS4 permit. The Town's program includes the following key elements:

1) **Bylaw.** The Town has enacted a bylaw consistent with 2.3.5.c.i to accomplish the following required elements of the construction site stormwater runoff program. The location of the Town's bylaw is provided in Table 4. The bylaw was adopted by the Town Meeting of the Town of Sharon as indicated in article histories and amendments are noted where applicable.

    A. Regulates land disturbance of 1 acre or more consistent with MS4 Permit part 2.3.5.a and disturbances of less than this area threshold if part of a larger common plan of development or sale that would exceed the threshold;

    B. Establishes authority for conducting site inspections, taking enforcement action and imposing sanctions as described further below and consistent with MS4 Permit part 2.3.5.c.ii.

    C. Establishes the following requirements and standards for erosion and sediment control BMPs consistent with MS4 Permit part 2.3.5.c.iii;
        - Compliance with the MA Stormwater Policy and Handbook
        - Minimize the amount of disturbed area and protect natural resources;
        - Stabilize sites when projects are complete or operations have temporarily ceased;
        - Protect slopes on the construction site;
        - Protect all storm drain inlets and armor all newly constructed outlets;
        - Use perimeter controls at the site;
        - Stabilize construction site entrances and exits to prevent off-site tracking;
        - Inspect stormwater controls at consistent intervals

    D. Establishes requirements for construction site operators to control wastes such as concrete washout, discarded building materials, chemicals, litter, and sanitary waste consistent with MS4 Permit part 2.3.5.c.iv;

    E. Establishes the written procedures for pre-construction site plan review consistent with MS4 Permit part 2.3.5.c.v. including requirements for review of:
        - Site design
        - Planned operations at the construction site
        - Planned sediment and erosion control BMPs to be use during the construction phase
        - Planned BMPs to manage runoff after construction (See the section on "Post Construction Runoff Controls" in this SWMP)

- Consideration of potential water quality impacts
- Receipt and consideration of information received from the public
- Required evaluation of opportunities for the use of low impact development and green infrastructure, and encouragement for the utilization of these methods were feasible

2) **Written Procedures for Site Inspection.** The Town has established written site inspection procedures, site inspector qualifications, and site inspection tracking protocols that are consistent with MS4 Permit part 2.3.5.c.v. These policies and procedures supplement the authority to conduct site inspections established by the Town's Stormwater Management Bylaw. The Town's site inspection procedures by the Town Meeting of the Town of Sharon as indicated in article histories and can be found in Table 4 below.

   The Town's procedures require that inspections shall occur twice at each regulated site, during construction of erosion and sediment control BMPs and after construction of BMPs to verify that they are working as described in the approved plans.

   The Town requires that all personnel performing construction site inspections have been approved by the Select Board or their agent and have adequate qualifications in their opinion. Inspection forms and protocols can be found in Table 4 below.

Measurable Goals

Table 3: Construction Site Stormwater Runoff Control Measurable Goals

BMP #	BMP Description	Measurable Goals	Date Adopted / Amended
1	Sediment and Erosion Control Ordinance	Adopt Stormwater Management Bylaw. Review and update as needed.	2008
2	Site Plan Review Procedures	Conduct site plan review of 100% of jurisdictional project sites according to the procedures outlined above	06/30/2019
3	Site Inspection Procedures	Inspect 100% of construction sites as outlined in the above document and take enforcement actions as needed	06/30/2019

Annual Reporting

The Town submits annual reports each year consistent with MS4 Permit part 2.3.5.c.v. The following indicators are tracked and included with the annual report:

- Number of project plans reviewed
- Number of construction site inspections performed, and percentage of sites inspected, and

- Number of enforcement actions undertaken.

The responsibility for supervising the reporting process is as indicated in Table 2.

Key Program Documents

Table 4 provides an overview of key program reference documents and where they can be found. Note that forms in Table 4 may be used as either paper forms or electronic equivalents.

Table 4: Summary of Key Protocols, SOPs and Forms

Category	Included Documents	Document Location
E&S Bylaw	Stormwater Management Bylaw (Link)	See Link
E&S Regulations	Stormwater Management Bylaw (Link)	See Link
E&S Design Standards	> Massachusetts Stormwater Handbook and Stormwater Standards (Link) > Massachusetts Erosion and Sediment Control Guidelines, MassDEP (Link) > Stormwater Management Bylaw (Link)	See Link
E&S Site Plan Review Procedures	Stormwater Management Bylaw (Link)	See Link
Construction Site Inspection and Enforcement Procedures	Stormwater Management Bylaw (Link) > Central MA SOP 5 – Construction Site Inspection (Link) > Central MA SOP 5 – Construction Site Inspection Form (Link) > Central MA SOP 6 – Erosion and Sediment Control (Link) > Central MA SOP 6 – Erosion and Sediment Control Inspection Form (Link)]	See Link

References

Central Massachusetts Regional Stormwater Coalition. Standard Operating Procedures # 5, 6, and 9. Retrieved February 11 2018, from https://www.centralmastormwater.org/toolbox/pages/standard-operating-procedures

Commonwealth of Massachusetts. Massachusetts Wetland Protection Act. Massachusetts General Laws Chapter 131 § 40. Accessed online at: https://malegislature.gov/Laws/GeneralLaws/PartI/TitleXIX/Chapter131/Section40

USEPA, July 2018. General Permits For Stormwater Discharges From Small Municipal Separate Storm Sewer Systems In Massachusetts. USEPA. Accessed online at: https://www3.epa.gov/region1/npdes/stormwater/ma/2016fpd/final-2016-ma-sms4-gp.pdf

USEPA, 2017. National Pollutant Discharge and Elimination System (NDPES) Construction General Permit (CGP). USEPA. Accessed online at: https://www.epa.gov/npdes/epas-2017-construction-general-permit-cgp-and-related-documents

Massachusetts Department of Environmental Protection (MassDEP). Wetlands Protection Act Regulations. Code of Massachusetts Regulations Title 310 10.00. Accessed online at: https://www.mass.gov/files/documents/2016/08/vy/310cmr10a.pdf

Envirocert International CPESC Program Information, Requirements, and Fees https://www.envirocertintl.org/cpesc/cpesc-requirements-fees-processes/

Stormwater Management Bylaw of the Town of Sharon, Chapter 230. Accessed online at: https://www.ecode360.com/29554490

"Massachusetts Stormwater Handbook and Stormwater Standards." *Mass.gov*. Accessed Online at: www.mass.gov/guides/massachusetts-stormwater-handbook-and-stormwater-standards

MCM 5: Post Construction Stormwater Management

Introduction

The municipal separate storm sewer system (MS4) permit issued by the Environmental Protection Agency (EPA) to the Town of Sharon (hereafter "the Town") requires the implementation of a post construction stormwater management plan to reduce the discharge of pollutants found in stormwater through the retention or treatment of stormwater after construction on new or redeveloped sites. This document describes the Town's post construction stormwater management program in detail and specific authority in the Stormwater Management Bylaw, Chapter 230. This document was prepared based on a model provided by the Neponset Stormwater Partnership and funded in part through a Community Innovation Challenge Grant and contributions from NSP member communities.

Program Purpose

The Town is required by the MS4 Permit to develop, implement, and enforce a program to address stormwater runoff in post construction to reduce the discharge of pollutants found in stormwater from all new development and redevelopment sites.
In other words, the MS4 Permit demands that the Town create a Town-run stormwater permitting program to require most public and private parties who are developing or redeveloping land, to obtain a permit that requires the use of various techniques to capture and clean up stormwater runoff before it reaches streams or wetlands.
The program is designed to lead the Town, over time, to develop stormwater management regulations that require targeted low impact design (LID) and green infrastructure (GI) stormwater systems to reduce impervious area, better simulate the natural hydrologic condition, and reduce impacts to local water quality.

Program Schedule

The MS4 permit defines the required timeline for implementing the Town's Post Construction Stormwater Management Program as summarized in Table 1 below.

Table 1: Program Schedule

Post-Construction Stormwater Management Task	Permit Schedule
Adoption of 2003 MS4 Program for Post Construction Stormwater Management	2008 (completed)
Operation of 2003 MS4 Post Construction Program	Until Expanded Program Adopted
Expanded Post Construction Stormwater Bylaw and/or Regulation Adoption	Year 2 (June 30, 2020)

Street Design and Parking Lot Guidelines Evaluation Report	Year 4 (June 30, 2022)
Green Infrastructure Report	Year 4 (June 30, 2022)
List of Five Municipal Retrofit Opportunities	Year 4 (June 30, 2022)
Identification of Additional Municipal Retrofit Opportunities to Maintain Minimum Inventory of Five Sites	Year 5 (June 30, 2023) and annually thereafter
Implementation of Post Construction Stormwater Program	Ongoing

Responsible Parties

The Town's Stormwater Management Bylaw empowers the Select Board or their agent to enforce the post construction stormwater runoff control provisions of the Bylaw. The Select Board has delegated day to day management, record keeping, and reporting to the Town's Conservation Commission and Engineering Division of Public Works. The agent is responsible for coordinating the efforts of other departments when needed, ensuring that necessary interdepartmental communication occurs in a timely manner, and following up with other departments as needed regarding the status of their efforts.
Key contacts and roles for each of the other departments are as follows:

Table 2: Responsible Parties

Implementation Role	Responsible Authority/Individual
Post Construction Stormwater Permitting Authority	Select Board
Overall Supervision of Post Construction Stormwater Program	DPW Engineering Division Conservation Administrator
Site Plan Review	DPW Engineering Division Conservation Administrator
Site Inspection and Enforcement	DPW Engineering Division Conservation Administrator
Enforcement Legal Support	Richard Gelerman, Town Counsel Lisa Whelan, Town Counsel
Preparation of Street and Parking Lot Design Report	DPW Engineering Division Conservation Administrator
Preparation of Green Infrastructure Report	DPW Engineering Division Conservation Administrator
Preparation and maintenance of Potential BMP Retrofit Inventory	DPW Engineering Division Conservation Administrator

Recordkeeping	DPW Engineering Division Conservation Administrator

Massachusetts Stormwater Policy

The Massachusetts Stormwater Policy, issued by the Department of Environmental Protection defines performance and design standards under the authority of the Massachusetts Wetlands Protection Act and Massachusetts Clean Waters Act to prevent or reduce pollutants from reaching water bodies and control the quantity of runoff from a site.

Many of these performance standards are incorporated by reference in the MS4 permit part 2.3.6 a.ii.3 and 2.3.6.a.ii.4. However, the MS4 Permit includes some performance standards that go beyond and/or differ from what is required by the MA Stormwater Policy.

In addition, the geographic applicability of the MA Stormwater Policy differs somewhat from the geographic applicability of the MS4 Permit's Post Construction stormwater requirements. The state rules apply to activity near wetlands, whereas the MS4 Permit applies to projects of a certain size wherever they are.

In order to streamline the permitting process for all property owners applying to the Town for a permit, as well as to simplify the administration of the Town's Post Construction Stormwater Program and ensure a fair and consistent treatment of all properties in town, the Town has established an integrated stormwater permitting program that provides a single set of standards and a single application process for all applicants who need a stormwater or wetlands permit from the Town, as described further below.

Table 3 below provides a brief description to serve as a quick reference of the Massachusetts Stormwater Standards. A link to the complete MA Stormwater Policy and Handbook can be found below in the "Key Program Documents" section of this SWMP.

Table 3: Massachusetts Stormwater Policy Design Standards Overview

MA Stormwater Handbook Standard	MA Stormwater Handbook Design Standard Description
Standard 1	No new stormwater conveyances allowed to discharge untreated stormwater
Standard 2*	Peak runoff rate control requirements
Standard 3*	Groundwater recharge requirements
Standard 5	Eliminate or reduce polluted discharge from higher pollutant loading land uses
Standard 6*	Protect Zone II or Interim Wellhead Protection Areas of public water supply
Standard 9	Implement long term operation maintenance practices
***Indicates standard is necessary and required for Section 401 water quality certification by MA.**	

Post Construction Stormwater Management Program

Consistent with the requirements of the MS4 permit, the Town is implementing and enforcing a program to reduce pollutants in stormwater runoff discharged after construction on new or redeveloped sites. The Town's program includes the following key elements:

1) **Bylaw.** The Town has enacted a bylaw and or regulations consistent with all requirements of section 2.3.6.a of the MS4 permit to accomplish the following required elements of the post construction site stormwater runoff program. The location of the Town's bylaw is provided in Table 5. The bylaw was adopted by the Town Meeting of the Town of Sharon as indicated in article histories, amendments noted where applicable.

2) **Street Design and Parking Lot Guidelines Report.** Consistent with the requirements of part 2.3.6.b of the MS4 permit, the Town is required to develop a report assessing current street design and parking lot guidelines and other local requirements that affect the creation of impervious cover within four (4) years of the effective date of the permit (June 30, 2022). The Town's street design and parking lot guidelines report will be developed before 6/30/2022.

3) **Green Infrastructure Report.** Consistent with the requirements of part 2.3.6.c of the MS4 permit, the Town is required to develop a green infrastructure report assessing existing local regulations within four (4) years of the effective date of the permit (June 30, 2022). The Town's green infrastructure report will be developed before 6/30/2022.

4) **List of Municipal Retrofit Opportunities**. Consistent with the requirements of 2.3.6.d of the MS4 permit, the Town is required to develop a list of municipal retrofit opportunities within four (4) years of the effective date of the permit (June 30, 2022). The Town's list of Municipal Retrofit Opportunities will be developed before 6/30/2022.

Measurable Goals

Table 4: Post Construction Stormwater Management Measurable Goals

BMP Number	BMP Description	Measurable Goals	Date Adopted / Amended
1	Bylaw	Review existing bylaw to ensure compliance with new MS4 requirements	06/30/2019
2	Street Design and Parking Lot Guidance	Recommendations are implemented by 06/30/2023 with progress reported annually	06/30/2022
3	Green Infrastructure Report	Recommendations are implemented by 06/30/2023 with progress reported annually	06/30/2022
4	List of Municipal Retrofit Opportunities	Recommendations are implemented by 06/30/2023 with progress reported annually	06/30/2022

Annual Reporting

The Town is required to submit annual reports each year of the permit term. Evaluation of stormwater management for new development and redevelopment including status of ordinance development, review and status of the street design assessment, assessments to barriers to green infrastructure, and retrofit inventory status. The responsibility for supervising the reporting process is as indicated in Table 2 above. Yearly annual reporting includes the following:

Bylaw. The Town is required to report annually on its progress in adopting or amending its post construction stormwater bylaw.

As-Built Plans and Ensuring Long Term O&M. The Town is required to report annually on measures it has implemented to require as-built plans and ensure proper long-term operations and maintenance on properties where the Town has issued post construction stormwater permits.

Street Design and Parking Lot Guidelines Annual Reporting Requirements. The Town is required to report in each annual report on the status of this assessment including any planned or completed changes to local regulations and guidelines.

Green Infrastructure Report Annual Reporting Requirements. The Town is required to report in each annual report on its findings and progress towards making the practices allowable.

List of Municipal Retrofit Opportunities Annual Reporting Requirements. Beginning with the fifth year annual report (June 30, 2023) and in each subsequent annual report, the Town is required to identify additional permittee owned sites and infrastructure that could be retrofitted such that the permittee maintains a minimum of 5 sites in their inventory, until such a time as the permittee has less than five sites remaining. In addition, the Town will report on all properties that have been modified or retrofitted with BMPs to mitigate IA that were inventoried in accordance with this part. The permittee may also include in its annual report non-MS4 owned property that has been modified or retrofitted with BMPs to mitigate IA.

Key Program Documents and Deliverables

Table 5 provides a listing of key program documents and required deliverables for Post Construction Stormwater Management and where copies of these documents may be found.

Table 5: Resources for Post Construction Stormwater Management SWMP

Category	Included Documents	Document Location
Post Construction Stormwater Bylaw and/or Regulations	Stormwater Management Bylaw, Chapter 230 (Link) NSP Model Regulatory Guidance on Bacteria (Link)	See Link
Additional Design Standards or Guidance Documents Used in Administering Post Construction Program	MA Stormwater Standards (Link) MA Stormwater Handbook (Link) NSP Model Regulatory Guidance on Bacteria (Link) Stormwater Management Bylaw, Chapter 230	See Links

	(Link)	
Street Design and Parking Lot Report	DPW Street Design and Parking Lot Report	See Annual Report
Green Infrastructure Report	DPW Green Infrastructure Report	See Annual Report
Inventory of Municipal BMP Retrofit Opportunities	Inventory of Municipal BMP Retrofit Opportunities	See Annual Report

References

USEPA, July 2018. General Permits For Stormwater Discharges From Small Municipal Separate Storm Sewer Systems In Massachusetts. USEPA. Accessed online at: https://www3.epa.gov/region1/npdes/stormwater/ma/2016fpd/final-2016-ma-sms4-gp.pdf

Massachusetts Department of Environmental Protection, 2008. Massachusetts Stormwater Handbook and Stormwater Standards. MassDEP. Accessed online at: https://www.mass.gov/guides/massachusetts-stormwater-handbook-and-stormwater-standards#stormwater-handbook-volume-1

Resources

Resources for Post Construction Bylaw (Link)
EPA Model Ordinances for Post Construction Controls (Link)

Resources for Street Design and Parking Lot Guidelines Report
EPA Checklist for Assessing Street and Parking Design Standards in NH and MA (Link)
EPA Sustainable Design and Green Building Toolkit for Local Governments (Link)
Mass.Gov Smart Growth Smart Energy Toolkit Low Impact Development Module (Link)
Center for Watershed Protection BMP Design Supplement for Cold Climates (Link)
Massachusetts Institute of Technology (MIT) Design Guidelines for Urban Stormwater Wetlands (Link)
Permeable Pavers Design Webinars and Specification ICPI (Link)
Center for Watershed Protection Better Site Design Code and Ordinance (COW) Worksheet (Link)
Center for Watershed Protection Better Site Design Code and Ordinance (COW) Scoring Spreadsheet (Link)
American Planning Association MA Chapter Neighbor Road Design Guidebook (Link)

Resources for Green Infrastructure Report
MAPC Low Impact Regulatory Review Checklist (Link)
MAPC Low Impact Development Toolkit and Factsheets (Link)
Green Neighborhoods Open Space Residential Design in Massachusetts (Link)
Massachusetts Institute of Technology (MIT) Design Guidelines for Urban Stormwater Wetlands (Link)
NHDES Innovative Land Use Planning Techniques (Link)
Center for Watershed Protection Developing Off-site Stormwater Compliance (Link)
Rain Garden Alliance Raingarden Design Guide (Link)
Green Neighborhoods Open Space Residential Design in Massachusetts (Link)

MCM 6 Good Housekeeping in Municipal Operations

The Town of Sharon has implemented good housekeeping practices in municipal operations such as vehicle maintenance, open space, buildings and infrastructure. The following section addresses the requirements as set forth by the NPDES small MS4 permit including but not limited to annual street sweeping, optimization of catch basin cleaning, and development of pollution prevention plans at waste management facilities and maintenance garage.

Municipal Stormwater Infrastructure Operation and Maintenance Plan Introduction

This Operation and Maintenance (O&M) Plan has been prepared by the Town of Sharon to address stormwater infrastructure O&M requirements[1] 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."

This O&M Plan addresses Minimum Control Measure 6, Good Housekeeping and Pollution Prevention for Permittee Owned Operations, by describing the activities and procedures the Town of Sharon will implement so that the MS4 infrastructure is maintained in a timely manner to reduce the discharge of pollutants from the MS4. The O&M Plan outlines inspection and maintenance procedures for catch basins, municipally-owned streets and parking lots, and structural stormwater Best Management Practices (BMPs).

The Department of Public Works (DPW) is responsible for inspection and maintenance of the stormwater infrastructure in The Town of Sharon. A map of the existing stormwater infrastructure in The Town of Sharon is provided in **Appendix A**.

Long term operation and maintenance of the stormwater BMP's when accepted by the municipality becomes the responsibility of the Town of Sharon Department of Public Works (Sharon DPW). The Town may enter into a services agreement with a qualified outside party to perform the required maintenance of the BMP's as well as providing the inspection records and maintenance logs of activity.

A priority maintenance schedule must be developed by the Town for all stormwater BMP's similar to this example provided below

- **Priority A** – Detention and Retention Basins that are designated as consistently generating the highest volumes of trash and/or debris

- **Priority B** – Detention and Retention Basins that are designated as consistently generating moderate volumes of trash and/or debris

[1] See Part 2.3.7.a.iii of the 2016 MS4 Permit for Infrastructure Operation and Maintenance program requirements.

- **Priority C** – Detention and Retention Basins that are designated as generating low volumes of trash and/or debris

Catch Basins

The DPW performs routine inspections, cleaning, and maintenance of approximately two thousand five hundred (2500) catch basins that are located within the MS4 regulated area. The Town of Sharon will implement the following catch basin inspection and cleaning procedures to reduce the discharge of pollutants from the MS4

- Routine inspection and cleaning of catch basins. Catch basins should be cleaned such that they are no more than 50 percent full[2] at any time. The Town of Sharon will initially inspect all catch basins within the regulated area within two (2) years of the effective date of the permit to evaluate sediment or debris accumulation and establish optimal inspection and maintenance frequencies to meet the "50 percent" goal. A sample catch basin inspection form is included in **Appendix B**. A log of the catch basin cleaning performed each year shall be included in the Town Annual Report.

- 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) will be 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.

- The following information will be included in each annual report:
    - 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.

B.M.P. For Municipal Construction Activities

Municipal construction activities such as roadway repairs, utility installation / repairs and landscaping among others have the potential to generate contaminants that can eventually enter the stormwater

[2] 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

drainage system. Some of the pollutants of concern are heavy metals, hydrocarbons, concrete and stone dust, trash and sediment. Stormwater pollution control BMP's should always be included in the planning and design of municipal construction projects.

Some of the BMP's that should be considered include the following:

Minimize Disturbed Area and Protect Natural Features and Soil

The areas of soil exposed to potential erosion must be minimized and be only as necessary for sequential construction activities. Phases of soil disturbance activities include stripping of bituminous and concrete pavements, stripping existing vegetation and utility excavations. Suitable soils such as loam / topsoil should be salvaged where possible for reuse.

Control Stormwater Flowing onto and Through the Project Site

Earthwork activities shall be performed in a manner such that stormwater runoff is contained on the site of the project and is directed by grading to temporary drainage swales and stormwater inlets protected with sediment traps (e.g. Silt Sack®, Gutter Buddy®). Runoff shall not be allowed to erode unprotected slopes.

Stabilize Soils

Stabilization of open soil surfaces shall be implemented as soon as possible after fine grading activities have temporarily or permanently ceased. Hay mulch and/or wood chips can be used for temporary soil stabilization. Permanent stabilization will be accomplished with the installation of bituminous and concrete surfaces and the planting of perennial grasses. Temporary and permanent vegetation cover may be established by hydro-seeding or placement of loam and seed. A suitable topsoil, good seed preparation, and adequate lime, fertilizer, and water shall be provided for effective vegetative stabilization. Mulch will be used after seeding if necessary to protect soil from the impact of falling rain and to increase water absorption requiring that less irrigation water be applied. Where necessary for dust control, water will be used only as needed to moisten the soils to a condition below optimum moisture content resulting in no "free" water.

Protect Slopes

All disturbed slopes shall be stabilized with permanent vegetative cover as soon as possible. Disturbed slopes that are no longer subject to construction activities shall be planted with vegetative cover as soon as final grades are established. If seasonal conditions prevent the establishment of vegetative cover disturbed areas shall be mulched until weather conditions allow seeding. All slopes greater than 3:1 shall be covered with erosion control matting.

Protect Storm Drain Inlets

All storm drain inlets in the vicinity of the project that have the potential to be impacted by runoff from the work being performed must be protected with sediment traps. The sediment traps may be a manufactured product such as Silt Sack® or Gutter Buddy® or may be fabricated using a hay bale dike and/or filter fabric.

Establish Perimeter Controls and Sediment Barriers

Sediment barriers consisting of hay bales and silt fence fabric or a combination thereof shall be installed to prevent "offsite" sediment impacts. The barriers shall be inspected daily for accumulated sediments and need of a repair/replacement. Soil stockpiles must be surrounded with sediment barriers or covered to control siltation.

Retain Sediment on Site

Discharge from trench or other dewatering operations, an allowable non-stormwater discharge, is to be controlled and directed to temporary settling basins, frac tanks or to protected stormwater inlets. Temporary settling basins shall be positioned near the area(s) that require dewatering and shall be sized according to the required application. All silt and accumulated debris shall be collected and properly disposed of.

Establish Stabilized Construction Exits

Some larger scale projects will require that run-off pads, constructed of crushed stone, be installed at vehicle access points to reduce sediment transport off site. Wash stations may also be established but no washing of vehicles is allowed other than as necessary to prevent transport of sediment off site. On smaller projects sediment transport can be controlled by sweeping of vehicle wheels/tires. Roadways adjacent to the project site will be swept daily as required.

Waste Management

Solid wastes from construction activities will be removed and disposed of off-site. Waste collection containers will be available for use on site. Depending on the scale of the project, commercial dumpsters may be used or simply trash barrels. In no case should solid waste be allowed to enter the stormwater drainage system. When portable toilets are provided on-site, the waste will be collected and disposed of in accordance with local regulations.

Designate Washout Areas

Concrete trucks will wash out and/or discharge surplus concrete in locations outside of sensitive areas (e.g. wetland resources or their buffer zones). The area designated shall be located so as to prevent the surplus material from being transported by stormwater (i.e. shallow pit).

Equipment / Vehicle Fueling and Maintenance Practices

Servicing of equipment including, but not limited to, fueling, changing, adding or applying lubricants or hydraulic fluid) shall be done in areas outside of any wetland buffer zone and 200 ft. beyond any river, stream, pond or other open body of water. Such equipment must be maintained to prevent leakage or discharge of pollutants; Overnight storage of equipment must be a minimum of fifty (50) feet from such sensitive areas. All petroleum products will be stored in tightly sealed containers which are clearly labeled.

Spill Prevention and Control

- Site personnel will be made aware of the manufacturers' recommended methods for spill cleanup procedures.

- Materials and equipment necessary for spill cleanup will be kept on-site. Equipment and materials will include but not be limited to absorbent pads, brooms, dust pans, mops, rags, gloves, goggles, kitty litter, sand, sawdust, and plastic and metal trash containers specifically for this purpose.

- All spills will be cleaned up immediately after discovery.

- Spill prevention procedures will be adjusted to include measures to prevent any type of spill from reoccurring.

- The site superintendent responsible for the day-to-day site operations will be the spill prevention and cleanup coordinator.

- On-site vehicles will be monitored for leaks. Any asphalt substances used on-site will be applied according to the manufacturer's recommendations.

- Fertilizers used will be applied only in the minimum amounts recommended by the manufacturer.

- Covered storage will be used for any fertilizer stored on-site.

Hazardous Materials Response

- An Environmental Consultant shall be responsible for evaluating soil with non-natural discoloration, petroleum or chemical odor, the presence of petroleum liquid or sheening on the groundwater surface or any abnormal gas or materials in the ground which are known or suspected to be contaminated with oil or hazardous materials. Soil suspected of gasoline contamination shall be field tested using the jar headspace procedures according to Department of Environmental Protection Bureau of Waste Site Cleanup Interim Policy # WSC-94-400 "Reuse and Disposal of Contaminated Soils at Landfills" and the Bureau of Waste Prevention Interim Policy # BWP-94-037.

- The Fire Department shall be contacted immediately when any results indicate contamination requiring soil removal or when contamination not detectable by on-site instrumentation is suspected.

- The Fire Department shall be required to supply all personnel and materials necessary to comply with this section and to support the anticipated levels of protection and monitoring described above.

- Where possible, all soils originally in contact with groundwater will be replaced in the same trench up to the existing groundwater level. All soils determined to be contaminated by metals or petroleum products, through the monitoring / evaluation program will be stockpiled for disposal in accordance with all Massachusetts Department of Environmental Protection statutes, policies and regulations.

- The Environmental Consultant / Contractor shall be responsible for identifying a disposal / recycling facility and obtaining all permits, approvals, Bill of Lading, etc. prior to the removal of the contaminated soil from the site.

Streets and Parking Lots

Streets and municipally-owned parking lots are swept twice a year during the spring. The Town of Sharon utilizes Elgin Pelican Street Sweepers to perform the street sweeping as outlined below. In addition, the Town of Sharon subcontracts Consider it Dunn to perform additional sweeping when needed.

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

- All public streets with the exception of rural uncurbed roads with no catch basins or high speed limited access highways will be swept and/or cleaned a minimum of once per year in the spring (following winter activities such as sanding).

- More frequent sweeping will be considered for targeted areas based on pollutant load reduction potential, inspections, pollutant loads, catch basin cleaning or inspection results, land use, impaired waters, or other factors.

- More frequent sweeping is required for municipally-owned streets and parking lots in areas that discharge to certain nutrient-impaired waters. Sweeping must be performed in these areas 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).

- For rural uncurbed roadways with no catch basins and limited access highways, the Town of Sharon will either meet the minimum frequencies above, or develop and implement an inspection, documentation, and targeted sweeping plan outlining reduced frequencies within two (2) year of the effective date of the permit, and submit such plan with its year one annual report.

- The following information will be included in each annual report:
    - Number of miles cleaned or the volume or mass of material removed (see sweeping log in **Appendix C**).

Water Quality Chambers

Water quality chambers provide a greater ability to trap and contain stormwater borne pollutants than standard catch basins. They are fitted with baffles and chambers that create a hydrodynamic separation of floatable and non-floatable particles. Water quality chambers under operational control of the "Town" will be assigned a priority maintenance schedule according to the system identified for catch basins contained herein.

O & M Description

BMP	Activity	Frequency
Water Quality	Inspection / Cleaning	Priority A – three (3) times / year

Chamber		Priority B – two (2) times / year Priority C – one (1) time / year or as needed

Inspection of the water quality chamber will include the operational condition of any baffles and filters contained within the structure. The depth of sediment collected in the chamber will also be measured. All floatable trash will be removed from the chamber during each inspection. If a hydrocarbon sheen is noted on the surface of the water in the chamber it shall be removed using absorbent pads. If the accumulated sediment is within 18 inches of the outlet elevation, it will be removed by vacuum or mechanical means. Disposal of all collected sediments will conform to the procedures described herein for disposal of sediments collected from municipal catch basins.

Detention and Retention Basins

Open stormwater basins under operational control by the "Town" will be assigned a priority maintenance schedule according to the system identified for catch basins contained herein. The priority rankings will be selected to address the stormwater control structures that have shown the most sensitivity related to flooding during significant storm events.

The inspection / cleaning schedule will be as follows:

BMP	Activity	Frequency
Detention/Retention Basin	Inspection / Cleaning / Mowing	Priority A – three (3) times / year Priority B – two (2) times / year Priority C – one (1) time / year or as needed

The drainage basin shall be inspected / cleaned on a regular schedule to ensure proper operation of the system and all components. The basin inspection includes observing the condition of the inlet and outlet structures, the accumulation of sediment within the basin, evidence of oil/gas sheen, the accumulation of trash within the basin and the condition of vegetation within the basin. Any erosion noted must be repaired as soon as possible but no later than the next scheduled inspection. Repairs may include the replacement of displaced rip-rap and the repair of eroded banks. Repairs to vegetated banks will be stabilized with erosion control mats until sufficient vegetation has been established as evidenced by 75% new seeding growth. Sediment collecting in the basin will be removed when its depth reaches 6-inches anywhere in the basin. Disposal of all collected sediments will conform with the procedures described herein for disposal of sediments collected from municipal catch basins.

During the growing season the basin will be mowed in accordance with the priority maintenance schedule. All tree saplings will be removed from embankments and basin bottoms. Materials removed from the basin shall not re-enter the stormwater system. Vegetation collected from the basin will be transported to the "Town" composting facility.

Catch Basin Cleanings and Street Sweepings

Catch basin cleanings (i.e., solid materials such as leaves, sand and twigs removed from stormwater collection systems during cleaning operations) and street sweepings will be managed in compliance with current Massachusetts Department of Environmental Protection policies:

- Catch Basin Cleanings
  http://www.mass.gov/eea/agencies/massdep/recycle/regulations/management-of-catch-basin-cleanings.html

- Street Sweepings
  http://www.mass.gov/eea/docs/dep/recycle/laws/stsweep.pdf

Prior to disposal or reuse, catch basin cleanings and street sweepings will be stored indoors or using proper controls such that they do not discharge to receiving waters.

Winter Road Maintenance

The Town of Sharon performs a variety of maintenance activities to ensure safe winter driving conditions on its roads and parking lots. Currently the road treatment involves the use of a salt sand mixture of 1:1. Snow storage is achieved at 32 Canton Street and 217 Rear South Main street which have an abundance of storage space for snow storms.

The Town of Sharon 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[3] (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.

- 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

[3] 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.

- Provide training for municipal employees on winter roadway maintenance procedures.

Department of Public Works Yard Operations

Background

Municipal maintenance facilities require different sets of control measures depending on the activities conducted and the materials that are stored and used. Developing a site specific plan of operation will help to ensure that employees responsible for facility operations are aware of the stormwater controls required for the site.

Common activities and storage areas that have a high potential of contributing to stormwater pollution can include road salts or other deicing materials that are easily transported by stormwater, fueling and vehicle maintenance areas that are prone to spills / drips of automotive fluids and equipment and vehicle wash areas. The best way to avoid stormwater pollution from these and other sources is to prevent precipitation and runoff from coming in contact with the chemicals and activity areas. Stockpiles can be covered, structures can be dedicated for stored materials and paved areas can be bermed to control runoff and prevent it from contacting contaminated areas.

The facility should be inspected quarterly so that the water quality of the stormwater discharge can be assessed and corrective action taken where necessary. The results of the inspection must be documented to ensure consistency and that maintenance of stormwater pollution controls are part of the standard operations.

Best Management Practices

- Institute a preventive maintenance program to minimize fluid leaks and equipment failures. Inspect vehicles and equipment frequently for leaks, collecting leaks with pans or absorbent and repairing leaks.
- All routine vehicle maintenance and repairs are to be performed indoors. On occasion and when necessary, outside maintenance work will be performed in a paved area with provisions made to contain and clean up all drips and spills.
- Washing of all vehicles must be conducted in the designated vehicle wash building.
- Use of non-hazardous, environmentally safe products when possible. Avoid use of chlorinated organic solvents.
- Environmentally safe detergents are used instead of caustic cleaning solutions.
- Flammable liquids are kept in a vented fire-rated cabinet.

- All supply material and waste containers are marked clearly and properly to identify the contents.
- Keep material safety data sheets (MSDS) for chemicals onsite for information on reportable spill quantifies, proper handling and health and safety.

- All supply material and waste containers are stored under cover to prevent contact with rainfall; or when uncovered, containers are clean and sealed.

- Tops of containers have absorbent mats and are free of standing liquid, and stored containers are kept closed.

- Waste oils, filters, antifreeze, and other wastes are collected in designated, labeled containers and recycled to the maximum extent practicable.

- Wheel weights are kept in a container marked "scrap lead".

- Records of waste pick-ups are logged and maintained in file.

- Drain pans are labeled for specific types of fluid. Use plans under vehicles and equipment with fluid leaks. Always use drip pans when making and breaking connections.

- Batteries, waste oil, etc. having spill / leak potential are stored indoors and are in secondary containment, when possible.

- Neutralizer and absorbent are kept by both new and used batteries.

- All floors are clean of oil and grease.

- Immediately clean up all spills of chemicals or vehicle fluids using dry methods (absorbents), minimizing the use of water whenever possible.

- Vehicle operators should be instructed to remain with the vehicle during fueling, and not to top-off the fuel tank to avoid overflows and spills.

- For painting or sanding activities outdoors, use a tarp enclosure to contain and capture material. Collect and dispose of paint chips and sand blast waste in the trash for non-lead based paint, or evaluate lead based paint for hazardous waste disposal.

- Keep the facility and surrounding area clear of litter.

Spill Prevention

- A spill control plan should be in place with procedures for proper spill response to minimize environmental impacts.

- Procedures for loading, unloading and transfer operations should be developed to prevent overfilling and spills.

- In areas where spills could occur, such as fueling areas, keep spill kits with absorbent materials nearby and display signage indicating the location of those spill kits. Immediate action is required to prevent the flow of spilled material from entering the storm drain system.

- For fueling areas, post signs that state "no topping off".

- Regularly inspect all tanks and containers to ensure physical integrity.

- Maintain equipment to ensure the proper operation of automatic shutoff devices on pumps and, overfill protection and spill buckets on tanks.

- Emergency phone numbers are clearly posted in the shop and near material storage areas.

Facility Maintenance

- All floors in work areas are sloped to floor drains that are connected to a MADEP approved sediment / oil trap and industrial wastewater holding tank.

- A site-plumbing schematic showing all drains, traps, and shut offs for utilities should be posted in shop. Employees should be made aware of storm sewer inlets to ensure that no wastewater is discharged to the system.

- Storm drains / inlets must be labeled to help protect from improper usage.

- All above ground storage tanks must have secondary containment in accordance with 40 CFR 112 requirements and are covered with a roof. If containment is not roofed, inspect accumulated rain water for contamination prior to dis-charge.

- Fueling areas are recommended to be designed with a roof to prevent contact with stormwater. The area should be graded and sloped to direct stormwater runoff away from the fueling site and to prevent runoff from flowing over the fueling area.

- Stormwater treatment devices can be used to treat runoff from fueling areas.

- "No smoking" signs are posted in the shop, and near hazardous waste and flammable material storage areas. Verify that fire extinguishers are charged and inspected yearly.

Structural Stormwater BMPs

An inventory of structural stormwater Best Management Practices (BMPs) owned and/or maintained by Town of Sharon is provided in **Appendix D**. The stormwater infrastructure map in **Appendix A** shows the locations of the structural BMPs.

Structural stormwater BMPs will be inspected annually at a minimum. Recommended inspection procedures and checklists are provided in ***Appendix E***.

Inventory of Town Property

The following is a comprehensive listing of all town owned parks, buildings, facilities and vehicle storage:

Town Buildings	Address
Town Hall	90 South Main Street
Sharon Public Library	11 North Main Street
Community Center	219 Massapoag Avenue
Public Safety Building	211-213 South Main Street

DPW Buildings	217R South Main Street
Water Department Building	5 Upland Road
1 School Street	1 School Street
Sharon High School & Fields	181 Pond Street
Sharon Middle School & Fields	75 Mountain Street
East Elementary School & Fields	45 Wilshire Drive
Heights Elementary School & Fields	454 South Main Street
Cottage Street School & Fields	36 Cottage Street
Snack Shack at Memorial Park Beach	82 Gunhouse Street
Sharon Housing Authority Apartments	21 South Pleasant Street
Sharon Housing Authority Apartments	18 Hixson Farm Road
Sharon Housing Authority Home	2601 Bay Road

Town Parks	Address
Gavins Pond Road	195 Gavins Pond Road
Deborah Sampson Park	25 East Foxboro Street
Deborah Sampson Park (former Sacred Heart property)	30 East Foxboro Street
Walter Griffin Playground & Ballfield	75 Ames Street
Memorial Park Beach	82 Gunhouse Street
Community Center Beach	219 Massapoag Avenue
Kate Morrell Park	21 South Pleasant Street
Lakeview Meadow	229 Lakeview Street
Sledding Hill	10 Hillside Avenue

Beech Tree Park	31 Beach Street
First Sergeant James Keating Memorial Park	10 Station Street

Cemeteries	Address
Chestnut Hill Cemetery	000 Canton Street
The West Cemetery	685 South Main Street
Esty Cemetery	000 East Foxboro Street
Moose Hill Cemetery	000 High Plain Street
Oliver Lothrup Yard	000 Moose Hill Street
Tisdale Cemetery	730 Mountain Street
The George Drake Burial Ground	R Mansfield Street
The Drake Cemetery	295R Mountain Street

Water Department	Address
Upland Road Water Tank	135R Upland Road
Massapoag Avenue Water Tank	438 Massapoag Avenue
Moose Hill Water Tank	0 Moose Hill Street
Hampton Road Water Tank	301 Hampton Road
Pump Station 2	0 Moose Hill Street
Pump Station 3	12-17 Farnham Road
Pump Station 4	5 Upland Road
Pump Station 5	50R Gavins Pond Road
Pump Station 6	411 East Foxboro Street
Pump Station 7	195 Gavins Pond Road

Town Dams	
Manns Pond Dam	161 Billings Street
Hammershop Pond Dam	75 Ames Street
Trowel Shop Pond Dam	265 North Main Street

Stormwater Pollution Prevention Plan

Introduction

This Stormwater Pollution Prevention Plan (SWPPP) has been developed by the Town of Sharon 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.

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 Measure 6, Good Housekeeping and Pollution Prevention for Permittee Owned Operations, the permittee is required, per Section 2.3.7.b of the 2016 Massachusetts MS4 Permit (page 50-54), to:

> *…develop and fully implement a SWPPP for each of the following permittee-owned or operated facilities: maintenance garages, public works yards, transfer stations, and other waste handling facilities where pollutants are exposed to stormwater as determined by the permittee.*
>
> *The SWPPP shall contain the following elements:*
> 1. *Pollution Prevention Team*
> 2. *Description of the facility and identification of potential pollutant sources.*
> 3. *Identification of stormwater controls*
> 4. *Management practices including: minimize or prevent exposure, good housekeeping, preventative maintenance, spill prevention and response, erosion and sediment control, management of runoff, management of salt storage piles or piles containing salt, employee training, and maintenance of control measures.*
> 5. *Site inspections*

This SWPPP accomplishes these requirements by:

- Providing an inventory of the materials and equipment at a facility that have the potential to cause stormwater pollution, and identifying locations where these materials are stored;
- Describing how stormwater is managed at a facility, including: engineered storm drain system conveyance; on-site pretreatment, treatment and infiltration systems; and discharges to surface water directly from the site;
- Reviewing activities that occur at the facility that represent a potential for stormwater pollution;
- Describing the Best Management Practices (BMPs) that will be implemented at the facility to reduce, eliminate and prevent the discharge of pollutants to stormwater;
- Identifying the employees responsible for developing, implementing, maintaining, and revising, as necessary, this SWPPP;
- Establishing a schedule and description of site inspections to be conducted at the facility to determine if the SWPPP is effective in preventing the discharge of pollutants;
- Serving as a tool for the facility employees, including a place to maintain recordkeeping associated with these requirements.

Detailed Facility Assessment

Facility Summary

The Department of Public Works (DPW) building is located at 217R South Main Street and is owned and operated by the Town of Sharon. The Locus Map in **Figure 2** shows the location of the facility within the Town of Sharon.

The Department of Public Works is primarily responsible for activities at, and maintenance of, the facility.

Figure 2 - Locus Map

Site Inspection

The site inspection associated with the development of this SWPPP was completed on 02/05/2020. The inspection was conducted by Peter O'Cain, Town Engineer.

During the site inspection, information related to activities at the site, vehicles stored at the site, fueling operations, material storage, transport of oil and other materials, and spill history was gathered.

Pollution Prevention Team

A Pollution Prevention Team for the DPW building has been prepared and designated the task of developing, implementing, maintaining, and revising, as necessary, the SWPPP for this facility. Listed below are Pollution Prevention Team members and their respective responsibilities.

Responsibilities assigned to one or more members of the Pollution Prevention Team include:

- Implementing, administering and revising the SWPPP
- Regularly inspecting stormwater control structures
- Conducting stormwater training
- Recordkeeping

Leader: Peter O'Cain **Office Phone:** 781-784-1525 x2316
Title: Town Engineer

Responsibilities: Considers all stages of plan development, inspections, and implementation; coordinates employee training programs; maintains all records and ensures that reports are submitted; oversees sampling program. Responsible for certifying the completeness and accuracy of the SWPPP.

Member: Kevin Davis **Office Phone:** 508-697-5215 x2317
Title: Assistant Town Engineer **Cell Phone:** 508-441-2840

Responsibilities: Implements the preventative maintenance program; oversees good housekeeping activities; serves as spill response coordinator; conducts inspections; assists with employee training programs; conducts sampling/visual monitoring.

Facility Description

The primary purpose of the DPW building is to operate and maintain the municipal infrastructure of the Town of Sharon. Activities at the site are described in the Site Activities section.

The facility covers approximately ten (10) acres, and contains the structures and other features shown on the Site Map in **Figure 3** and described in detail in the following sections. Components shown on the site map include:

- Location of the engineered drainage system, including catch basins, ditches, drain manholes, and treatment BMPs

- Direction of surface water flow
- Structural stormwater pollution control measures
- Location of floor drains
- Vehicle washing areas
- Vehicle fueling areas
- Aboveground storage tanks (indoors and outdoors)
- Underground storage tanks
- Chemical storage areas
- Pesticide and fertilizer storage areas
- Salt storage areas
- Materials stockpiles
- Non-hazardous waste areas.

Figure 3 - Site Map

Facility Structures

Vehicle Storage and Maintenance

Buildings at the DPW building are used to provide the Town of Sharon personnel with heated, covered areas in which to complete minor maintenance, oil changes and preparation of vehicles, equipment and tools for use at locations around the Town of Sharon. These buildings contain two (2) floor drains, which discharge to a tight tank.

Maintenance and Storage Buildings

Small equipment, signage, and tools are stored in the DPW Garage. This building contains floor drains, which discharge to a tight tank and is fully enclosed.

Latex paint, spray paint, and similar products are stored in the storage units. This building contains no floor drains and is fully enclosed. These products are properly stored in flammable materials storage cabinets.

Vehicle Wash Bays or Recycling Systems

the Town of Sharon maintains a vehicle wash bay/recycling system in side garage, at the rear portion of the property. The building is fully-enclosed. This side garage is used for storage of DPW equipment and washing.

The wash bay/recycling system discharges to the tight tank located on-site. This building contains two (2) catch basins, which discharge to a tight tank below the structure

Waste Oil Burner

There is no Waste Oil Burner on-site at the DPW buildings.

Storage of Deicing Materials

Road Salt at the Department of Public Works are stored in Salt Shed. This Salt Shed is enclosed and the materials are fully contained within the building. The good housekeeping measure used to minimize the exposure resulting for adding to or removing stored materials include sweeping the loading and unloading area regularly or when salt has accumulated on the paved surface.

Storage of Road Deicing Equipment

The Town of Sharon utilizes a number of salt spreaders/ sanders/ snow plows on its vehicles to adequately maintain roads. A Vehicle Storage Garage for these devices is located at the rear portion of the property. In this Vehicle Storage Garage, the equipment is suspended off the ground so that can easily be cleaned, inspected, and maintained, but is protected from the elements. The equipment is covered by a roof, but is open on all sides so that plow trucks and other vehicles can easily attach the devices.

Administrative Buildings

The Department of Public Works Administrative offices are located at the rear portion of the property. This building includes administrative space/ locker rooms/ office space/ break room/ materials storage.

Additional Site Features

Fuel Islands

An island containing two (2) fuel pumps for gasoline and diesel is located at the rear portion of the property, and is used on a 24-hour basis for fueling of all the Town of Sharon vehicles. The island is covered, and roof drainage discharges to side of the unit. Access to these fuel pumps is accomplished through security keys and pin codes. The location of the fuel island is such that all users are visible to personnel at all buildings at the Department of Public Works.

Emergency Generators

An emergency generator located at the rear portion of the facility provides backup power to the facility during outages. The generator, ONAN 45EM, is Fully Enclosed and runs on natural gas. The generator is not located on a pervious surface.

Oil/Water Separators

The Town of Sharon maintains oil/water separators at the Department of Public Works.

The oil/water separator is located at the rear portion of the property. This pretreatment structure has a cleanout manhole, and is pumped on an annual basis. The DPW is responsible for contracting this work, and maintains records on the pumpout activities. This oil/water separator provides treatment of flow from the bituminous concrete pavement.

Tight Tanks

The Town of Sharon maintains three (3) tight tanks at the Department of Public Works.

The Tight tanks are located at the rear portion of the property. These pretreatment structures have a cleanout manhole, and are pumped on an annual basis. The Department of Public Works is responsible for contracting this work, and maintains records on the pump out activities. The tight tanks provide treatment of flow from all on-site structures. Floor drains in all areas where oil materials are used and/or where vehicles are stored receive pretreatment via this tight tank.

Solid Waste Management

The Town of Sharon maintains dumpsters at the rear portion of the property. This dumpster is kept closed when not in use. No inappropriate materials were observed during the facility inspection.

Parking Areas

There are several designated parking areas at the Department of Public Works, each of which is an impervious surface. These parking lots are used primarily for visitors to the Department of Public Works, the Town of Sharon-owned cars for daily use by the Department of Public Works employees, and employees' personal vehicles; the Department of Public Works trucks and/or heavy equipment are not kept in this parking lot. The DPW building contains a total number of parking spaces for sixty-five (65) vehicles

Site Drainage

No stormwater from adjacent properties impacts the Department of Public Works property.

Sheet Flow

Drainage from the impervious surfaces at the Department of Public Works is directed partially to various catch basins over the paved areas and then directed to water quality treatment units.

Engineered Drainage

Engineered drainage at the Department of Public Works treats and recharges all of the paved bituminous concrete areas on-site. Maintenance of the catch basin structures, including sediment removal, is completed by the DPW.

Receiving Waters

The final point of discharge for stormwater from this site is the detention pond in the rear of the facility and is not categorized as a 303(d) List (Impaired) surface water.

The good housekeeping practices, preventative maintenance and Best Management Practices implemented at the facility are methods to limit potential negative impacts to stormwater. These practices are discussed in the Non Structural Controls section of this SWPPP.

Applicable TMDLS

There are no water bodies identified as Category 5, as shown in **Table 6**, that the Department of Public works facilities discharge to.

Site Activities

The following activities occur at the facility:

- Compost Production or Storage
- Facility or Building Maintenance
- Fueling Operations
- Landscaping
- Chemical unloading, handling, and storage (including paint, flammables, fertilizers, and pesticides)
- Painting
- Paving
- Sand storage
- Salt storage
- Snow dump (seasonal)
- Solid waste management (including scrap metal)
- Tool storage
- Vehicle and equipment storage
- Vehicle and equipment maintenance/repair (including oil changes)
- Vehicle and equipment washing
- Waste Handling and Disposal
- Waste oil storage.

Below is a discussion of site activities and the potential pollutant sources associated with each, as well as measures taken to minimize pollution. Locations of each activity are shown on the Site Plan (**Figure 2**).

The Department of Public Works does not store hazardous materials other than those noted previously, and no obsolete vehicles or other potential sources of pollutants are kept in any structure at the Department of Public Works.

No solvent-based parts washers were observed in any structure at the Department of Public Works. Any hazardous materials are either collected by a third party vendor contracted by the Town of Sharon on an annual basis, or collected at the annual Household Hazardous Waste Day (HHHD) that is hosted for the benefit of the Town of Sharon residents. Waste materials from the Department of Public Works operations that may be collected at the annual HHHW Day include used motor vehicle fluids that cannot be utilized for the waste oil burner, such as used antifreeze and brake fluid.

These materials are properly labeled and stored using appropriate Best Management Practices between the time of generation and disposal.

The DPW does not apply or utilize fertilizers, herbicides, or pesticides at any facility owned or managed by the Town of Sharon. As such, no fertilizers, herbicides, or pesticides are stored at the Department of Public Works.

Compost Production or Storage

Potential Sources of Stormwater Pollution

Compost production and storage locations present the threat to contaminate stormwater with pathogens, including bacteria and viruses, nutrients, including phosphorus and nitrogen, fertilizers, pesticides and sediments.

Pollution Prevention

Compost storage areas shall be located and properly labeled within a designated stockpile area that is covered and contained to prevent exposure to precipitation. If the storage area is unable to be covered it should be contained within an area contained by silt fence or concrete barriers and located in an area that does not receive a substantial amount of runoff from upland areas and does not drain directly to a waterbody. The compost shall be kept in neat, separate piles from all other materials.

Stockpiles and Sand Storage

Potential Sources of Stormwater Pollution

Sand stored in piles for use during construction and during winter plowing and deicing activities represents a potential source to stormwater pollution. Stockpiled materials such as gravel, loam, and crushed rock represent a similar source of pollution. When stored unprotected outdoors, sand piles and material stockpiles are exposed to precipitation. When the resulting eroded material enters the stormwater system, the sediment can quickly fill the sumps of catch basin structures, rendering them ineffective.

Mixing sand and salt for use in deicing activities poses an additional element of stormwater pollution, particularly if the mixing area is not fully enclosed and protected from the elements.

Pollution Prevention

To avoid contamination of stormwater by sand and other stockpiled materials, erosion and sediment control measures should be implemented at each storage site. When planning a location for a stockpile, a relatively level site away from slopes and water features should be selected.

Stockpiles can be stabilized by seeding or mulching if they are to remain exposed for more than two weeks, or can be covered with impermeable sheeting to protect the material from rainwater. If the stockpile location becomes a permanent storage site for sand, a roofed structure should be considered to reduce erosion.

Sediment barriers should be placed around the perimeter of the storage site to prevent any runoff carrying sand from entering storm drains and surface waters. If the weather becomes dry and windy, regular light watering of the stockpile and surrounding area will provide effective dust control. Please refer to SOP 6, "Erosion and Sedimentation Control," included in the appendix for more information.

Sand that has been mixed with salt for use during winter plowing and deicing activities should always be stored in an enclosed and covered salt shed. Salt sheds should be constructed on level ground with an impervious base on which to store the salt/sand mixture. Under no circumstances should loose salt/sand mix be stored outside and unprotected. All mixing of salt and sand should take place within the salt shed or other covered, enclosed area.

Ensuring that the storage area is regularly swept and kept clean is an important good housekeeping practice.

Salt Storage

Potential Sources of Stormwater Pollution

Salt stored in piles for use during winter plowing and deicing operations represents a potential major contributor to stormwater pollution. When stored unprotected outdoors, salt is exposed to precipitation, causing leachate with high chloride that can be discharged to the receiving water. Salt delivery and loading activities can contribute pollutants to stormwater if the material is not handled with care, and if spills from handling operations are not promptly cleaned up.

Pollution Prevention

To prevent stormwater pollution, all salt piles should be enclosed and covered in sheds to prevent exposure to precipitation. Salt sheds should be constructed on level ground with an impervious base on which to store the salt. The shed should prevent disturbance or migration of the salt by wind.

During delivery and loading activities, salt should be transferred to and from vehicles within the salt shed, whenever possible. Any spills during unloading and loading events should be tended to without delay. Ensuring that the salt storage area is regularly swept and kept clean is an important good housekeeping practice.

If it is not feasible to fully enclose the salt pile, the salt should be stored on an impervious base and covered with an impermeable membrane material. Under no circumstances should loose salt be stored outside and exposed to precipitation.

The area should not be hosed down to a storm drain as a cleaning method. To further limit stormwater pollution, an independent runoff collection system may be installed in the area of the salt storage to collect and convey runoff either directly to a treatment best management practice or to a sanitary sewer system, with approval from the operator of the sanitary sewer system.

Solid Waste Management

Potential Sources of Stormwater Pollution

Solid waste production and storage locations present the threat to contaminate stormwater with pathogens, including bacteria and viruses, nutrients, including phosphorus and nitrogen, metals and sediments.

Solid waste may be classified as both hazardous and non-hazardous waste consisting of agricultural, construction and demolition, dead animals, industrial, municipal, and tire waste.

Pollution Prevention

To prevent or reduce the potential for stormwater pollution from solid waste management practices the following preventative maintenance procedures are recommended:

1. All staff shall be properly trained in correct solid waste management practices, including waste disposal and spill prevention and response. All employees shall also be knowledge of the potential hazards associated with solid waste handling and storage.
2. Each waste storage location shall be properly labeled and all significant sources of pollution shall be kept in a secure, covered and contained area.
3. The facility and storage containers shall remain locked at all times other than during normal hours of operation.
4. All waste storage containers and waste handling equipment shall be routinely inspected for signs of spills, leaks, corrosion or general deterioration.
5. The facility shall maintain spill response materials in accordance with SOP 4, "Spill Response and Cleanup".

Snow Dump

Potential Sources of Stormwater Pollution

Snow collected from plowing and road clearing activities and managed in snow dumps can contaminate engineered storm drain systems and receiving waters if disposal sites are not properly selected and maintained. As snow is removed from roadways, parking lots, sidewalks, and other paved areas, contaminants such as sand, salt, litter, and automotive oil are collected along with the snow. These pollutants are ultimately transported to the storage site and eventually to receiving waters once the snow melts.

Infiltration of pollutants in snow, such as chlorides from road salt, can impact groundwater, including drinking water aquifers.

When snow, including sand and debris contained within it, is stored directly on top of catch basins, when combined with sand and debris, discharge to the engineered drainage system can be blocked, causing localized flooding.

Pollution Prevention

To avoid contamination of stormwater and drinking water supplies by snow dumps, storage sites should be selected and prepared before the snow season begins. The snow dump should be located on a pervious surface in an upland area away from water resources and wells, so that meltwater can be filtered through the soil.

Selected sites should have a combined capacity large enough to cope with the estimated snowfall totals for the season. Snow should not be dumped within a Zone II or Interim Wellhead Protection Area of a public water supply, or within 75 feet of a private well. Sanitary landfills are not appropriate locations for snow dumps because the infiltration of meltwater will result in greater amounts of contaminated leachate. High groundwater levels also make gravel pits poor sites for snow storage.

Proper preparation and maintenance of snow disposal sites will also prevent stormwater pollution. Before winter begins, a silt fence or sediment barrier should be placed on the down-gradient side of the snow dump to collect any sediment in snow meltwater. If the site is located near a body of water, a 50-foot vegetated buffer strip (at minimum) should be maintained during the growth season to filter pollutants out of meltwater. Prior to using the site for snow disposal, all debris should be cleared.

Debris and litter left after the snow has melted should be cleared and disposed of at the end of the snow season, no later than May 15 of each year.

Except under the most extraordinary of circumstances, when all land-based snow disposal options have been exhausted, snow should not be dumped into any body of water. When this option is necessary, requirements of "Snow Disposal Guidance" (BRPG01-01) issued by MassDEP on March 8, 2001, shall be followed.

Use or Storage of Pesticides or Fertilizers

Potential Sources of Stormwater Pollution

Improper use and storage of fertilizers and pesticides can contribute to loadings of nutrients and toxic compounds to stormwater. Applying fertilizers and pesticides in quantities exceeding the manufacturer's recommendations does not make the product more effective. Rather, excess fertilizer and pesticide will be washed away during precipitation events, entering directly into stormwater and surface waters. The risk of incorrect use or spilling of fertilizers and pesticides increases when the

chemicals are not handled by properly trained personnel. Contamination of stormwater can also occur during storage, when the pesticides and fertilizers are not being directly used. Leaks and spills from faulty containers can migrate to the storm drain system if not promptly controlled. Fires may break out if pesticides and fertilizers are not stored in the appropriate facilities.

Pollution Prevention

To avoid contamination of stormwater by fertilizers and pesticides during application, all products should be used in strict accordance with the manufacturer's instructions and with local regulations. Soil testing should be performed before evaluating and selecting a fertilizer. Using the right type and amount of fertilizer for the location will help ensure that the proper nutrients are absorbed by the plants and will reduce runoff. Efficient use of pesticides is maximized when pesticides are applied at the life stage when the pest is most vulnerable. Pesticides must be handled and applied by individuals licensed with the Massachusetts Department of Agricultural Resources.

Fertilizers and pesticides should always be stored indoors in well-ventilated, dry locations. Floors of storage areas should be water tight, impervious, and provide spill containment. In case a spill or leak does occur, storage areas and any vehicles transporting fertilizers and pesticides should be equipped with a spill response kit. For more information, please refer to SOP 4 "Spill Response and Cleanup Procedures," and SOP 12 "Storage and Use of Pesticides and Fertilizer," both included in the appendix.

Vehicle and Equipment Storage

Potential Sources of Stormwater Pollution

Vehicle and equipment storage activities are a potential source of pollution due to the diesel fuel, gasoline, oil, hydraulic fluid, antifreeze and similar hazardous material or fuel the machinery may contain. In addition, vehicles or machinery may pick up pollutants during the course of offsite activities or at other facilities, and then deposit these pollutants at the storage facility.

Pollution Prevention

Regular visual inspection and maintenance of vehicles and equipment can greatly reduce the potential for pollution by finding and addressing leaks before pollution of the environment occurs. When in storage, vehicles and equipment should be kept on a covered slab or within a building with a common drain. Discharge to this drain shall be managed by an oil/ water separator (refer to SOP 11, "Oil/Water Separator Maintenance", included in the appendix) to remove oils and gasoline. Vehicle washing activities shall not be completed in areas served by an oil/water separator.

No equipment should be kept in an area where leaks could result in pollutants entering catch basins, channels leading to outfalls, or the engineered storm drain system. If vehicles and equipment are stored outdoors, catch basins or engineered drainage system structures should include devices

intended to remove oils and sediments prior to entering the system. These treatment devices should be inspected and replaced at the frequency recommended by the manufacturer.

Vehicle and Equipment Maintenance/Repair

Potential Sources of Stormwater Pollution

Vehicle and equipment maintenance and repair often requires the use of harmful liquids such as fuels, oils, and lubricants, and has the potential for producing dust, scrap and by-products that may contain pollutants. Both accidental and purposeful spillage, i.e., a leaky oil pan needing repair vs. draining the pan during an oil change, can lead to situations where pollutants can potentially enter stormwater runoff if the situations are not approached properly. Although there is little potential for effecting stormwater, it should be noted that hazardous gases can be produced during maintenance and repair as well.

Pollution Prevention

Proper maintenance and repair for vehicles and equipment shall include a preliminary assessment of potential pollutant sources. This assessment shall be used to determine the best means of containing any potential spills or by-products of the situation at hand. Approved containers shall be used to capture hazardous liquids to then be disposed of according to applicable MassDEP and USEPA guidelines. If the project may produce hazardous dust that could come in contact and mix with any liquids, the proper containment shall be utilized.

Due to heavy metal accumulation in antifreeze, brake fluid, transmission fluid, and hydraulic oils, it is not recommended that any of these liquids are disposed of in the sanitary sewer system. Contaminated parts removed or replaced on any vehicles or equipment shall be disposed of properly.

All work shall take place on a covered slab or within a building with a common drain. Discharge to this drain shall be managed by an oil/ water separator (refer to SOP 11, "Oil/Water Separator Maintenance", included in the appendix) to remove oils and gasoline.

Maintenance and repairs shall not take place in areas prone to stormwater runoff or where pollutants could enter catch basins, channels leading to outfalls, or an engineered storm drain system. All catch basins or engineered drainage systems on site that could be affected by accidental spills should include devices intended to remove oils and sediments prior to entering the system. These treatment devices should be inspected and replaced at the frequency recommended by the manufacturer.

Vehicle and Equipment Washing

Potential Sources of Stormwater Pollution

Vehicle and equipment washing activities are a potential source of pollution not only from petroleum products and pollutants deposited on the exterior of the equipment, but also from nutrients and sediment being washed into water bodies from the act of washing itself. Although some cleaning agents are becoming environmentally friendly, many still contain regulated contaminants. Due to the possibility for multiple types of pollutants, vehicle and equipment washing activities have a high potential for degrading stormwater quality.

Pollution Prevention

Outdoors, the use of a tight tank or other similar structure that can contain the wash water is ideal. If the wash water cannot be contained, it shall not be allowed to directly enter water bodies. Use phosphate free detergents that do not contain regulated contaminants, and avoid using solvents where the wash water may enter a sanitary sewer. Impervious surfaces may be used to promote infiltration and treatment before wash water enters the groundwater, but wash water coming from impervious pavement shall be treated to remove nutrients and petroleum products before entering an engineered storm drain system. Infiltration shall not be used within wellhead protection areas or other protected resource areas. Power washing, steam cleaning and engine and undercarriage washing shall not occur outdoors. Heavily soiled or vehicle dirtied from salting shall not be washed outdoors. All adjacent catch basins shall have a sump and be cleaned periodically, (refer to SOP 3, "Catch Basin Inspection and Cleaning", included in the appendix). All debris and particulate accumulation shall be removed and swept clean in all outdoor washing areas.

Washing vehicles and equipment indoors in the proper facilities is preferred over washing outdoors whenever possible. Indoor facilities shall have a common drain and it shall utilize a tight tank or other containment device to hold the wash water. The use of detergents shall be avoided and when the use of detergents cannot be avoided, use detergents free from phosphates and regulated contaminants. Detergents shall not be used when the discharge of this drain is controlled by an oil/ water separator (refer to SOP 11, "Oil/Water Separator Maintenance", included in **Appendix A**). All drains that discharge directly to a water body of engineered storm drain system shall be plugged or abandoned. Dry clean-up methods such as vacuuming and sweeping shall be used whenever possible to avoid washing down floors with water.

For both outdoor and indoor washing, maintain absorbent pads and drip pans to collect spills and leaks observed during washing activities. Refer to SOP 4, "Spill Response and Cleanup Procedures" included in the appendix for more information.

Washing of all facility vehicles is completed in the Wash Bay at the Department of Public Works. Wastewater from vehicle washing operations is discharged to a tight tank that is maintained by the DPW.

Salt and sand spreaders stored at the Vehicle Garage are occasionally pressure washed at that location.

Waste Handling and Disposal

Potential Sources of Stormwater Pollution

Waste handling and disposal facilities and activities present a potential to contaminate stormwater with pathogens (including bacteria and viruses), nutrients, including phosphorus and nitrogen, fertilizers, pesticides and sediments.

There are several classifications of waste which contribute to stormwater pollution, including:

1. Solid Waste
2. Hazardous Materials and Waste
3. Pesticides and Fertilizers
4. Petroleum Products
5. Detergents

Pollution Prevention

A variety of measures are considered appropriate to prevent pollution from waste handling and disposal activities, based on the waste classifications noted previously.

Solid Waste

1. Designate a waste collection area on the site that does not receive a substantial amount of runoff from upland areas and does not drain directly to a receiving water.
2. Ensure that containers have lids so they can be covered before periods of rain, and keep containers in a covered area whenever possible.
3. Schedule waste collection to prevent the containers from overfilling.
4. Clean up spills immediately and in accordance with SOP 4, "Spill Response and Cleanup Procedures" included in the appendix.

Hazardous Materials and Wastes

1. To prevent leaks, empty and clean hazardous waste containers before disposing of them.
2. Never remove the original product label from the container. Follow the manufacturer's recommended method of disposal, printed on the label.
3. Never mix excess products when disposing of them, unless specifically recommended by the manufacturer.
4. Clean up spills immediately and in accordance with SOP 4 "Spill Response and Cleanup".

Pesticides, Fertilizers and Petroleum Products

1. Do not handle the materials more than necessary.
2. Store materials in a dry, covered, contained area.
3. Clean up spills immediately and in accordance with SOP 4, "Spill Response and Cleanup".

Detergents

1. Never dump wastes containing detergents to a storm drain system. All wastes containing detergents shall be directed to a sanitary sewer system for treatment at a wastewater treatment plant.

In addition to the pollution prevention requirements a waste management plan is recommended. The plan shall include employee training and signage informing individuals of the hazards associated with improper storage, handling and disposal of wastes. It is imperative that all employees are properly trained and follow the correct procedures to reduce or eliminate stormwater pollution. Routine visual inspection of storage and use areas is critical. The visual inspection process shall include identification of containers or equipment which could malfunction and cause leaks or spills. The equipment and containers shall be inspected for the following:

1. Leaks
2. Corrosion
3. Support or Foundation Failure
4. Other Deterioration

In the case a defect is found, immediately repair or replace.

Waste Oil Storage

Potential Sources of Stormwater Pollution

When not stored properly, waste oil can be a potential source of petroleum in stormwater. Waste oil containers can leak, and spills can occur while during transportation activities.

Pollution Prevention

All waste oil containers should be properly labeled and stored with secondary containment. Containers should be regularly inspected for rust, leaks, or other signs of deterioration. Defective containers should be promptly removed and replaced. A spill response kit should be located wherever waste oil is stored. Facility personnel should know where the spill kit is located and be familiar with the procedures outlined in SOP 4 "Spill Response and Cleanup Procedures" in the appendix. Used oil filters should also be properly disposed.

Care should be taken when transferring used oil to and from storage containers. For additional information see SOP 7 "Fuel and Oil Handling Procedures" found in the appendix.

Waste oil should be stored indoors or under a covered structure to prevent exposure to precipitation. Floor drain in waste oil storage areas should drain to an oil/water separator rather than the storm drain system. See SOP 11 "Oil/Water Separator Maintenance" in the appendix for further information.

When possible, steps should be taken to recycle waste oil or reduce the amount generated.

Vehicle and Equipment Inventory

Vehicles and major equipment stored and maintained at the Department of Public Works are shown in **Table 6**.

Table 6. Vehicle Inventory

Vehicle Type	Number on Site
ASV Skid Steere	1
Bobcat Melrose 753H	1
Bombardier	1
Bombardier	2
CAT928H	1
Chevy Impala	1
Elgin	1
Essex93B	1
F-250	1
F-350	1
F-E350	1
Ford	3
Ford E-350	1
Ford E-450	2
Ford Econo Van	1
Ford Edge	2
Ford Edge	1
Ford Escape	4
Ford Expedition	1
Ford Explorer	1
Ford F150	1
Ford F-150	7
Ford F-250	1
Ford F-350	10
Ford F-450	4
Ford F-550	3
Ford F-750	1
Ford L-8000	3
Ford L-8500	1
Ford Sterling	5
Ford Super Duty	1
Ford Van	2

Vehicle Type	Number on Site
Hudson	1
Hustler BigTex	1
Hustler Hudson	1
Ing-Ran	1
JCB215	1
John Deere	2
John Deere 624GH	1
John Deere Skid Steere	1
Morbarch Chipper	1
Morbark	1
PJ 20' Carhauler Tilt Trailer	1
Sullivan	1
Superliner	1
Toro	2
Towmaster 94	1
Toyota Hybrid	1
Trackless	1
Trailer	1
WANCO #1	1
WANCO #2	1
WANCO #3	1
WANCO #4	1
Water Cannon	1

Freightliner	7
Harben	1
Homemade	1

Location of Leak and Spill Cleanup Materials

Leak and spill cleanup materials are stored at the Department of Public Works in order to facilitate rapid response. Locations and types of leak and spill cleanup materials are identified in **Table 7**.

Table 7 - Leak and Spill Cleanup Materials

Building or Area	Location	Materials Available
Fuel Pumps	DPW Parking Lot	Chemtex Spill Kit
DPW	Garage	Absorbent Drum Pads
DPW	Garage	Absorbent Strips
DPW	Garage	Parts Master Abs. Env.

Allowable Non-Stormwater Discharges

A non-stormwater discharge is defined as any discharge or flow to the engineered storm drain system that is not composed entirely of stormwater runoff.

Allowable non-stormwater discharges that occur at this facility include:

- Water line flushing
- Rising ground water
- Uncontaminated ground water infiltration (as defined at 40 CFR § 35.2005(20))
- Uncontaminated pumped ground water
- Discharge from potable water sources
- Foundation drains
- Air conditioning condensation
- Irrigation water, springs
- Lawn watering
- Street wash waters

It has been determined that the above non-stormwater discharges at the DPW do not represent a significant contribution of pollution to the MS4 or the waters of the United States. Therefore, these are considered to be authorized under the current MS4 permit.

Existing Stormwater Monitoring Data

There is no historical stormwater monitoring data at the Department of Public Works buildings due to the fact that all runoff is contained and treated on-site through Best Management Practices (BMP) and does not discharge to outfalls or to Waters of the United States. **Table 8** below is reserved for testing should it be required at a future date.

Table 8 - Existing Stormwater Monitoring Data - The Department of Public Works

Building or Area	Location	Type of Monitoring

Significant Material Inventory

Materials stored include those specified in the "Site Activities" section. An inventory of these materials at the Department of Public Works is included in **Table 9**, which also reviews the likelihood for each identified material to come in contact with stormwater. The type of container has also been identified. Oil, gasoline, and other petroleum-based materials are listed separately in the table.

The locations of these material storage areas are provided on the Site Plan in **Figure 3**.

Table 9 - Significant Material Inventory - The Department of Public Works

Material	Storage Location	Quantity	Potential Pollutant	Covered (C) or Enclosed (E)	Likelihood of Contact with Stormwater
Petroleum-Based Compounds					
Diesel fuel	Pump Station	10,000 Gallons	Petroleum hydrocarbons	C	Low
Gasoline	Pump Station	10,000 Gallons	Petroleum hydrocarbons	C	Low
Hydraulic Fluid	Garage	300 Gallons	Petroleum hydrocarbons	E	None
Motor Oil	Garage	250 Gallons	Petroleum hydrocarbons	E	None
Fuel Oil, No. 2	Garage	-	Petroleum hydrocarbons	-	-
Fuel Oil, No. 6	-	-	Petroleum hydrocarbons	-	-
Lubricants	Garage	40 Gallons	Petroleum hydrocarbons	E	None
Transmission Fluid	Garage	30 Gallons	Petroleum	E	None

			hydrocarbons		
Waste Oil	Garage	165 Gallons	Petroleum hydrocarbons	E	None
Other:					
Total Volume of Oil At Facility = 20,785 GALLONS					
Non-Petroleum Significant Materials					
Antifreeze	Garage	175 Gallons	Ethylene glycol; potential source of BOD	E	None
Spray Lubricant	Garage	50 Gallons	Petroleum hydrocarbons	E	None
Sodium Hypochlorite	-	-	Chlorides; pH adjustment	-	-
Sodium Bisulfite	-	-	pH adjustment	-	-
Acid	-	-	pH adjustment	-	-
Adhesives and sealants	Garage	1 Gallons	Volatile and semivolatile organic compounds	E	None
Aggregates	Stock Yard	60 Y^3	Sediments	C	Low
Animal Wastes	-	-	Fecal	-	-
Asphalt	-	-	Sediments	-	-
Batteries, Used Lead Acid	Garage	15 Units	Lead, sulfuric acid; possible particulate matter and residual oil	E	None
Brake Fluid	Garage	5 Gallons	Volatile organic compounds; non-petroleum based oil	E	None
Coolant (new or used)	Garage	55 Gallons	Volatile organic compounds	E	None
Deicer- Calcium Chloride (liquid)	Garage	3 Cases	Chlorides	E	None
Deicer- Road Salt	Shed	950 Y^3	Chlorides	E	Low
Detergents	-	-	Surfactants	-	-
Fertilizers	Wash Bay	500 lbs	Nutrients	E	None
Paint, Latex	Side Bay	100 Gallons	Petroleum constituents, including volatile and semivolatile organic compounds	E	None
Paint, Oil-Based	-	-	Petroleum	-	-

			constituents, including volatile and semivolatile organic compounds		
Paint, Spray	Garage	15 Gallons	Petroleum constituents, including volatile and semivolatile organic compounds	E	None
Pesticides	-	-	Volatile and semivolatile organic compounds	-	-
Herbicides	Side Bay	2 Gallons	Volatile and semivolatile organic compounds	E	None
Sand	Stock Yard	60 Y^3	Sediments	C	Low
Solvents	-	-	Volatile organic compounds	-	-
Solid Waste, Recyclable	Stock Yard	30 Y^3	Miscellaneous debris/solids, particulate matter, metals		
Solid Waste, for Disposal	Stock Yard	120 Y^3	Particulate matter, solids, metals	C	Low
Solid Waste, C&D	-	-	Particulate matter, solids, metals	-	-
Spill response material (Speedi Dri or similar)	Garage	1 Pallet	Particulate matter, solids, residual oil.	E	None

Applicability of Spill Prevention, Control and Countermeasure (SPCC) Requirements

Under federal regulations 40 CFR Part 112 (and Amendments), a Spill Prevention, Control, and Countermeasure (SPCC) Plan is required when a facility has an aboveground oil storage capacity greater than 1,320 Gallons, when including containers with a capacity of 55 Gallons or more. The Department of Public Works does not have aboveground oil storage capacity that exceeds 1,320 Gallons.

Description of Significant Material Storage Areas

Many activities at the DPW which involve the materials included in **Table 9** occur within contained garages or bays. These activities may include minor equipment/vehicle repair, oil changes, repainting, lubrication, and parts replacement.

Fueling of all the Town of Sharon vehicles occurs at the Fuel Island located at the Side of the DPW Administration Building. All bulk delivery of fuel to the Fuel Island is monitored by the Town of Sharon employees.

The Department of Public Works emergency generator is fueled with natural gas.

Waste oil and other used motor fluids are stored in the Garage. Waste oil is stored in tanks and drums also located within the Garage, all of which have internal containment or are located on appropriate containment pallets. All delivery of waste oil from the facility occurs within the DPW and is monitored by the Department of Public Works employees.

Chemicals, including herbicides, are used at the Department of Public Works. These chemicals are stored within the Side Bay of the Vehicle Storage Building and fully contained. Delivery of all chemicals to the Side Bay is monitored by the Department of Public Works employees.

Within the Salt Shed, deicing materials including road salt and sand are stored. Delivery of deicing materials to the salt shed is monitored by the Department of Public Works employees.

List of Significant Leaks or Spills

Significant leaks or spills that occurred at the Department of Public Works in the last three years are shown in **Table 10.**

Table 10 - Significant Leaks or Spills
Department of Public Works

Building or Area	Material	Volume

Forms included in **Appendix B** will be used to document any spill or leak that occurs at the facility in the future.

Structural BMPs

Structural BMPs include onsite constructed systems that provide pretreatment or treatment of stormwater flows. The following structural BMPs are presently used at the Department of Public Works to maintain water quality.

Pretreatment Structural BMPs

- Deep sump catch basins
- Oil/Grit Separators
- Proprietary Separators
- Sediment Forebays
- Vegetated Filter strip
- Infiltration trench

Treatment Structural BMPs

- Media Filter/ Subsurface Infiltration Bed
- Extended Wet Basin
- Vegetated swale
- Infiltration berm & retentive grading
- Dry extended detention basin

Other Structural BMPs

- Riparian buffer restoration
- Landscape restoration
- Soil amendment and restoration
- Floodplain restoration

Sediment and Erosion Control

Site topography at the Department of Public Works prevents drainage of stormwater and any associated sedimentation from entering the Town of Sharon storm drain system or discharging directly to a water body.

Non-Structural Controls

Good Housekeeping

Good housekeeping practices are activities, often conducted daily, that help maintain a clean facility and prevent stormwater pollution problems. The following is a list of good housekeeping measures that are practiced at the facility:

- All washing of vehicles is performed within the designated vehicle wash bay.
- All fluid products and wastes are kept indoors.
- Fueling of small equipment is completed indoors.
- All floor drains present within garage bays drain to a tight tank.
- Spill materials and cleanup kits are maintained at all locations where oil materials are used, stored, or may be present, including at Fuel Islands.
- Used spill cleanup materials are disposed of properly.
- Materials are stored indoors or in covered areas to minimize exposure to stormwater.
- Lead-acid batteries are stored indoors and within secondary containment.
- Hazardous materials storage lockers with spill containment are used. Storage areas are located away from vehicle and equipment paths to reduce the potential of accident related leaks and spills.
- Storage drums and containers are not located close to storm drain inlets.
- All hazardous material storage areas and containers have proper signage, labels, restricted access, locks, inventory control, overhead coverage, and secondary containment.
- All materials, waste oil storage containers, and gas cans are properly labeled.
- Oil/water separators and catch basins are maintained regularly and properly.
- Speedi Dri (or similar absorbent) is readily available and used for appropriate spills.
- Spill kits are located in areas where fluids are stored or where activities may result in a spill.
- Tools and materials are returned to designated storage areas after use.
- Waste materials are properly collected and disposed of.
- Different types of wastes are separated as appropriate.
- Regular waste disposal is arranged.
- Work areas are clean and organized.
- Work areas are regularly swept or vacuumed to collect metal, wood, and other particulates and materials.
- Obtain only the amount of materials required to complete a job.
- Materials are recycled when possible.
- Staff is familiar with manufacturer directions for proper use of materials and associated Safety Data Sheets (SDSs).
- Staff is familiar with proper use of equipment.
- Bollards, berms, and containment features are in place around areas and structures where fluids are stored.
- Drip pans are used for maintenance operations involving fluids and under leaking vehicles and equipment waiting repair.

The facility maintains a supply of spill cleanup materials at many buildings on site, and will maintain this inventory. An inventory of spill containment, control, and cleanup materials and spill kits maintained at the Department of Public Works was shown in **Table 7**.

Preventative Maintenance

Preventative Maintenance can minimize the occurrence of stormwater pollution by addressing issues before they become problems. Vehicles and equipment should be regularly inspected to prevent leaks of fuel, oil, and other liquids. Structural stormwater controls should be regularly maintained to prevent inadequate performance during storm events.

The following is a list of preventative maintenance procedures practiced at the facility

- All staff members are aware of spill prevention and response procedures.
- All staff members have received formal spill prevention and response procedure training.
- All equipment fueling procedures are completed by qualified personnel trained in spill response procedures.
- Hydraulic equipment is kept in good repair to prevent leaks.
- Vehicle storage areas are inspected frequently for evidence of leaking oil.
- Material storage tanks and containers are regularly inspected for leaks.
- All material and bulk deliveries are monitored by facility employees.
- All waste oil is fully contained and the containers are inspected regularly.

Best Management Practices

In a SWPPP, existing and planned BMPs are identified that will prevent or reduce the discharge of pollutants in stormwater runoff for each area of concern listed in the "Detailed Facility Assessment" section.

To prevent or reduce the potential of stormwater contamination from petroleum products, the following BMPs shall continue to be followed:

1. Follow Standard Operating Procedures (s) during delivery of waste oil to the equipment/waste oil storage bay. These SOPs are included in the appendix.
2. Follow Standard Operating Procedures during delivery of bulk oil to the emergency generator and bulk fuel to the Fuel Island. These SOPs are included in the appendix.
3. Minimize the volume of gasoline stored within the buildings and on the site.
4. Clean up any oil spills observed in the parking lot, garages, or other surfaces in a timely manner.
5. Monitor all material deliveries.
6. Inspect all storage tanks prior to filling activities for spills, leaks and corrosion.

Spill Prevention and Response

The following procedures apply to the facility:

- All personnel are instructed in location, use, and disposal of spill response equipment and supplies maintained at the site such as oil absorbent materials.
- The Pollution Prevention Team leader will be advised immediately of all spills of hazardous materials or regulated materials, regardless of quantity.
- Spills will be evaluated to determine the necessary response. If there is a health hazard, fire or explosion potential, 911 will be called. If a spill exceeds five Gallons or threatens surface waters, including the storm drain system, state or federal emergency response agencies will be called.
- Spills will be contained as close to the source as possible with oil-absorbent materials. Additional materials or oil-absorbent socks will be utilized to protect adjacent catch basins.

Plan Implementation

Employee Training

Regular employee training is required for employees who work in areas where materials or activities are exposed to stormwater, or who are responsible for implementing activities identified in the SWPPP, including all members of the Pollution Prevention Team.

The Department of Public Works is responsible for stormwater management training for the DPW's employees. This position coordinates training related to stormwater management on at least an annual basis to review specific responsibilities for implementing this SWPPP, what and how to accomplish those responsibilities, including BMP implementation.

Additionally, general awareness training is provided regularly (preferably annually) to all employees whose actives may impact stormwater discharges. The purpose of this training is to educate workers on activities that can impact stormwater discharges and to help implement BMPs.

All employees responsible for the fueling or lubrication of vehicles or equipment stored at the facility will be trained regularly (preferably annually). The topics below will be covered at employee training sessions.

1. Spill prevention and response.
2. Good housekeeping.
3. Materials management practices.

Pollution Prevention Team members will meet at least twice a year to discuss the effectiveness of and improvement to the SWPPP. The appendix contains copies of training documentation from these training activities including attendance sheets, instructor name and affiliation, date, time, and location of the training.

Site Inspection Requirements

It is required that the entire the Department of Public Works be inspected at least once each calendar quarter when the facility is in operation (at least one inspection must be conducted during a period when stormwater discharge is occurring). The Town Engineer is responsible for completing this inspection.

The inspection must check for evidence of pollution, evaluate non-structural controls in place at the site, and inspect equipment. The site inspection report must include:

- The inspection date and time
- The name of the inspector
- Weather information and a description of any discharge occurring at the time of the inspection
- Identification of any previously unidentified discharges from the site
- Any control measures needing maintenance or repair
- Any failed control measures that need replacement
- Any SWPPP changes required as a result of the inspection
- Signed certification statement.

The inspection form for these inspections, and copies of completed inspection forms, are included in the appendix.

Corrective actions may be required based on evidence of past stormwater pollution or the high potential for future stormwater pollution to occur. Information about any issues and the respective corrective actions must be included in a Compliance Evaluation report. The permittee must repair or replace control measures in need of repair or replacement before the next anticipated storm event if possible, or as soon as practicable. In the interim, the permittee shall have back-up measures in place. The Compliance Evaluation report must be kept with the SWPPP and must state the problem, the solution, and when the solution was implemented.

Recordkeeping and Reporting

The permittee must keep a written record (hardcopy or electronic) of all activities required by the SWPPP including but not limited to maintenance, inspections, and training for a period of at least five years.

This SWPPP shall be kept at the DPW Engineering Division and shall be updated if any updates or new information is found. The SWPPP and records shall be made available to state or federal inspectors and the general public upon request.

The 2016 Massachusetts MS4 Permit requires that each permittee report on the findings from Site Inspections in the annual report to USEPA and MassDEP.

Inspections of the Department of Public Works should be performed at least quarterly (at least one during stormwater discharge) and described in the Annual Report, including any corrective actions taken, to demonstrate that operation of the Department of Public Works is in compliance with the 2016 Massachusetts MS4 Permit.

Triggers for SWPPP Revisions

The Town of Sharon shall review this SWPPP regularly to determine if any update or revision is required. Changes that may trigger revision include:

- An increase in the quantity of any potential pollutant stored at the facility;
- The addition of any new potential pollutant (not already addressed in this SWPPP) to the list of materials stored or used at the facility;

- Physical changes to the facility that expose any potential pollutant (not presently exposed) to stormwater;
- Presence of a new authorized non-stormwater discharge at the facility; or
- Addition of an activity that introduces a new potential pollutant.

Changes in activity may include an expansion of operations, or changes in any significant material handling or storage practices which could impact stormwater.

The amended SWPPP will describe the new activities that could contribute to increased pollution, as well as control measures that have been implemented to minimize the potential for pollution.

This SWPPP will be amended if a state or federal inspector determines that it is not effective in controlling stormwater pollutants discharged to waterways.

SWPPP 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.

_____ _____

Authorized Official Title

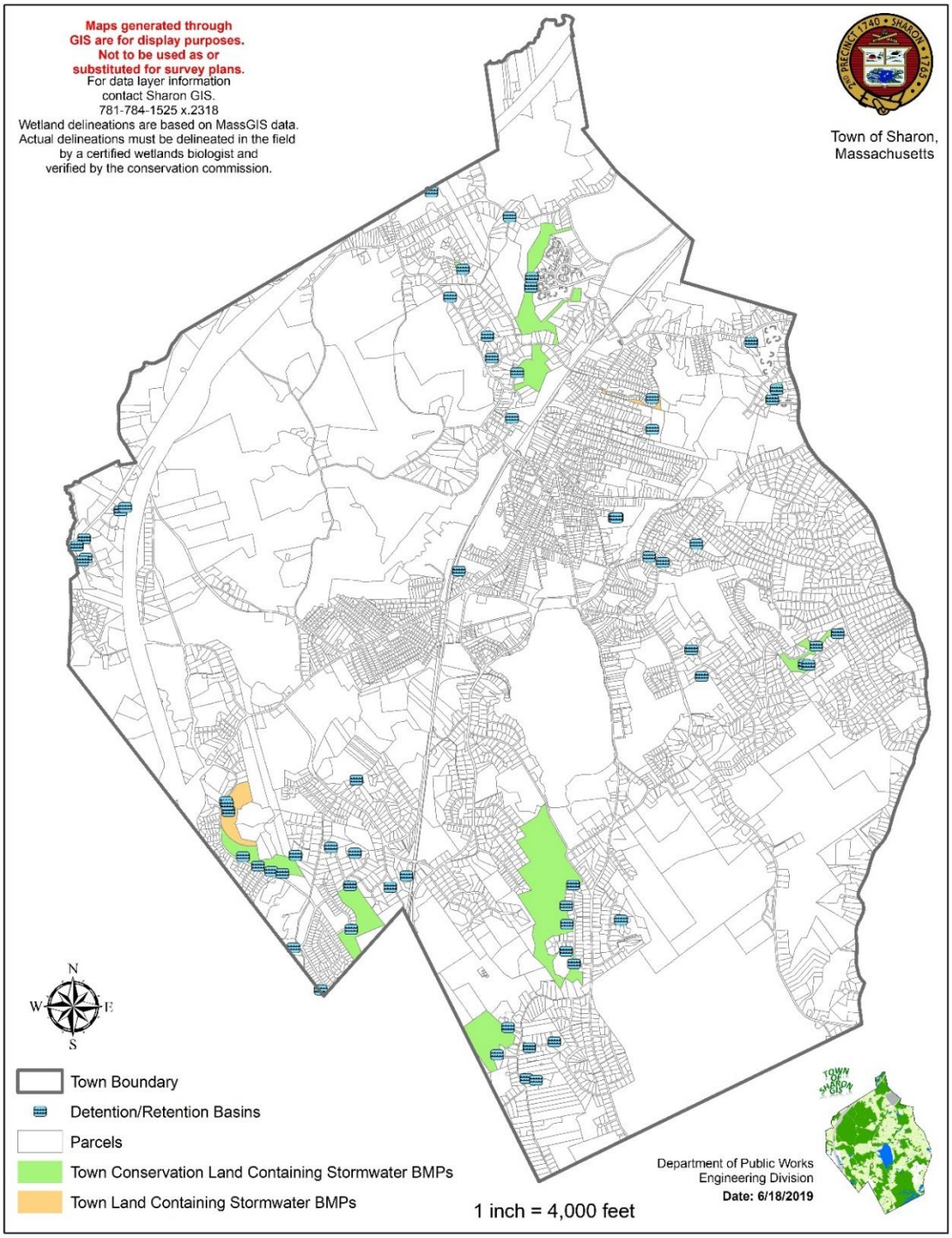
_____

Date

Appendices

Appendix A

Stormwater Infrastructure Map



Appendix B

Catch Basin Inspection and Cleaning Procedure

Catch Basin Inspection Form & Catch Basin Cleaning Log Example

Catch Basin Cleaning 2018	
ID	2906
Operator	Rodney
Cleaning Date (Text)	Thu Dec 20 2018 10:51:59 GMT-0500 (EST)
Catch Basin ID No. (type 0, if not on map)	2104
GPS Location	Latitude:42.132207, Longitude:-71.170383, Altitude:62.099998, Speed:0.210000, Accuracy:12.500000, Provider:gps, Time:12/20/2018 10:52:02 EST
Latitude	42.132207
Longitude	-71.170383
Grate Condition	Serviceable
Overall Structural Condition	Good
Able to Remove Grate?	Yes
Depth to Top of Debris (inches) - BEFORE CLEANING Measure from Ground Surface to Top of Debris	48
Depth to Bottom of Sump (inches) - AFTER CLEANING Measure from Ground Surface to Bottom of Sump	84
Depth to Outlet Invert (inches) - Measure from Ground Surface to Bottom of Lowest Pipe	48
Calculated Depth of Sump (inches)	36
Calculated Debris Removed (inches)	36
Debris/Sump Ratio	1

Appendix C

Street and Parking Lot Sweeping Log

Street Section	Distance (Miles)	Operator	Date	Operator Notes

SSO Inventory

Location	Volume	Operator	Date	Operator Notes

Appendix D

Inventory of Structural Stormwater Best Management Practices

Inventory of Structural Stormwater Best Management Practices (BMPs): Town of Sharon, Massachusetts

BMP Description	Parcel ID	No.	Location	Inspection Frequency	BMP ID
Detention Basin	119049000	38	RICHARDS AVE	Annually	23
Detention Basin	119043000	90	MASKWONICUT ST	Annually	3
Detention Basin	125030000	27	PHEASANT WOOD RD	Annually	49
Retention Basin	021002000	17R	OLD WOLOMOLOPOAG ST	Annually	53
Detention Basin	114018000	13	GINGER WAY	Annually	43
Detention Basin	074074000	74	ASPEN RD	Annually	39, 41, 42
Detention Basin	024099000	6	BRAMBLE LN	Annually	8
Proprietary Treatment Devices	029059000	12	MINK TRAP LN	Annually	29
Retention and Detention Basin	023027000	229	LAKEVIEW ST	Annually	25, 26, 27, 28, 52
Retention and Detention Basin	029045000	100	GAVINS POND RD	Annually	32, 33, 34, 35
Retention and Detention Basins	007005006	15	RED FOX RUN	Annually	6
Infiltration Structures / Detention and Retention Basins	092099000	36	COTTAGE ST	Annually	55, 56, 57
Retention Basin	080043000	19	FLINTLOCK RD	Annually	2

Drainage Swale / Detention Basin	112118000	1	BELLA RD	Annually	7
Retention Basin	111096000	11	WOODS WAY	Annually	4
Detention Basin	121088000	6	CHIVE DR	Annually	37
Retention Basin	039108000	9	CHIPPEWA LN	Annually	5
Detention Basin	093101000	9R	LU STUBBS LN	Annually	44
Retention Basin	038047000	30	GAVINS POND RD	Annually	30, 31, 54
Retention / Detention Basin	020011000	233	FURNACE ST	Annually	36
Retention Basin	031078000	12	BURNT BRIDGE RD	Annually	17
Detention Basin	003019005	2	MASSASOIT RD	Annually	19

Structural Stormwater BMP Inspection Procedures and Checklists

SOP 9: INSPECTING CONSTRUCTED BEST MANAGEMENT PRACTICES

Best Management Practices (BMPs) are policies, procedures and structures designed to reduce stormwater pollution, prevent contaminant discharges to natural water bodies, and reduce stormwater facility maintenance costs. Constructed BMPs are permanent site features designed to treat stormwater before infiltrating it to the subsurface or discharging it to a surface water body.

This Standard Operating Procedure provides a general summary of inspection procedures for eight common constructed BMPs, including:

1. Bioretention Areas and Rain Gardens
2. Constructed Stormwater Wetlands
3. Extended Dry Detention Basins
4. Proprietary Media Filters
5. Sand and Organic Filters
6. Wet Basins
7. Dry Wells
8. Infiltration Basins

This SOP is based on the Massachusetts Stormwater Handbook and is not intended to replace that document. This SOP is also not intended to replace the Stormwater BMP Operation and Maintenance (O&M) Plan required by the Massachusetts Wetlands Protection Act, Order of Conditions.

Bioretention Areas and Rain Gardens

Bioretention areas and rain gardens are shallow depressions filled with sandy soil, topped with a thick layer of mulch and planted with dense native vegetation. There are two types of bioretention cells:

1. Filtering bioretention area: Areas that are designed solely as an organic filter; and
2. Exfiltration bioretention area: Areas that are configured to recharge groundwater in addition to acting as a filter.

Inspection & Maintenance

Regular inspection and maintenance are important to prevent against premature failure of bioretention areas or rain gardens. Regular inspection and maintenance of pretreatment devices and bioretention cells for sediment buildup, structural damage and standing water can extend the life of the soil media.

Maintenance Schedule: Bioretention Areas and Rain Gardens

Activity	Time of Year	Frequency
Inspect for soil erosion and repair	Year round	Monthly
Inspect for invasive species and remove if	Year round	Monthly
Remove trash	Year round	Monthly
Mulch Void Areas	Spring	Annually
Remove dead vegetation	Fall and Spring	Bi-Annually
Replace dead vegetation	Spring	Annually
Prune	Spring or Fall	Annually
Replace all media and vegetation	Late Spring/Early	As Needed

When failure is discovered, excavate the bioretention area, scarify the bottom and sides, replace the filter fabric and soil, replant vegetation and mulch the surface.

Never store snow within a bioretention area or rain garden. This would prevent required water quality treatment and the recharge of groundwater.

Constructed Stormwater Wetlands

Constructed stormwater wetlands maximize the pollutant removal from stormwater through the use of wetland vegetation uptake, retention and settling. Constructed storm water wetlands must be used in conjunction with other BMPs, such as sediment forebays.

Inspection & Maintenance

Regular inspection and maintenance are important to prevent against premature failure of bioretention areas or rain gardens. Regular inspection and maintenance of pretreatment devices and bioretention cells for sediment buildup, structural damage and standing water can extend the life of the soil media.

Maintenance Schedule, Constructed Stormwater Wetlands: Years 0-3

Activity	Time of Year	Frequency
Inspect for invasive species and remove if present	Year round	Monthly
Record and Map:	Year round	Annually
Types and distribution of dominant wetland plants	Year round	Bi-Annually
Presence and distribution of planted wetland species	Spring	Annually
Presence and distribution of invasive species	Fall and Spring	Bi-Annually
Indications other species are replacing planted wetland species	Spring	Annually
Percent of standing water that is not vegetated	Spring or Fall	Annually
Replace all media and vegetation	Late Spring/Early Summer	As Needed
Stability of original depth zones and micro-topographic features		
Accumulation of sediment in the forebay and micropool and survival rate of plants		

Maintenance Schedule, Constructed Stormwater Wetlands: Years 4-Lifetime

Activity	Time of Year	Frequency
Inspect for invasive species and remove if	Year round	Monthly
Clean forebays	Year round	Annually
Clean sediment in basin/wetland system	Year round	Once every 10 years
Mulch Void Areas	Spring	Annually
Remove dead vegetation	Fall and Spring	Bi-Annually
Replace dead vegetation	Spring	Annually
Prune	Spring or Fall	Annually
Replace all media and vegetation	Late Spring/Early Summer	As Needed

When failure is discovered, excavate the bioretention area, scarify the bottom and sides, replace the filter fabric and soil, replant vegetation and mulch the surface.

Never store snow within a constructed stormwater wetland. This would prevent required water quality treatment and the recharge of groundwater.

Extended Dry Detention Basins

Extended dry detention basins are designed to control both stormwater quantity and quality. These BMPs are designed to hold stormwater for at least 24 hours, allowing solids to settle and to reduce local and downstream flooding. Pretreatment is required to reduce the potential for overflow clogging. The

outflow may be designed as either fixed or adjustable. Additional nutrient removal may be achieved by a micropool or shallow marsh.

Inspection & Maintenance

Annual inspection of extended dry detention basins is required to ensure that the basins are operating properly. Potential problems include: erosion within the basin and banks, tree growth on the embankment, damage to the emergency spillway and sediment accumulation around the outlet. Should any of these problems be encountered, necessary repairs should be made immediately.

Maintenance Schedule: Extended Dry Detention Basins

Activity	Time of Year	Frequency
Inspect basins	Spring and Fall	Bi-Annually, and during and after major storms
Examine outlet structure for clogging or high outflow release velocities	Spring and Fall	Bi-Annually
Mow upper stage, side slopes, embankment and emergency spillway	Spring through Fall	Bi-Annually
Remove trash and debris	Spring	Bi-Annually
Remove sediment from basin	Year round	At least once every 5 years

Proprietary Media Filters

Media Filters are designed to reduce total suspended solids and other target pollutants, such as organics, heavy metals or nutrients, which are sorbed onto the filter media, which is contained in a concrete structure. The substrate used as filter media depends on the target pollutants, and may consist of leaf compost, pleated fabric, activated charcoal, perlite, amended sand in combination with perlite, and zeolite. Two types of Media Filters are manufactured: Dry Media Filters, which are designed to dewater within 72 hours; and Wet Media Filters, which maintain a permanent pool of water as part of the treatment system.

Inspection & Maintenance

Maintenance in accordance with the manufacturer's requirements is necessary to ensure stormwater treatment. Inspection or maintenance of the concrete structure may require OSHA confined space training. Dry Media Filters are required to dewater in 72 hours, thus preventing mosquito and other insect breeding. Proper maintenance is essential to prevent clogging. Wet Media Filters require tight fitting seals to keep mosquitoes and other insects from entering and breeding in the permanent pools. Required maintenance includes routine inspection and treatment.

Maintenance Schedule: Proprietary Media Filters

Activity	Time of Year	Frequency
Inspect for standing water, trash, sediment and clogging	Per manufacturer's schedule	Bi-Annually (minimum)
Remove trash and debris	N/A	Each Inspection
Examine to determine if system drains in 72 hours	Spring, after large storm	Annually
Inspect filtering media for clogging	Per manufacturer's schedule	Per manufacturer's schedule

Sand and Organic Filters

Sand and organic filters, also known as filtration basins, are intended for quality control rather than quantity control. These filters improve water quality by removing pollutants through a filtering media and settling pollutants on top of the sand bed and/or in a pretreatment basin. Pretreatment is required to prevent filter media from clogging. Runoff from the filters is typically discharged to another BMP for additional treatment.

Inspection & Maintenance

If properly maintained, sand and organic filters have a long design life. Maintenance requirements include raking the sand and removing sediment, trash and debris from the surface of the BMP. Over time, fine sediments will penetrate deep into the sand requiring replacement of several inches or the entire sand layer. Discolored sand is an indicator of the presence of fine sediments, suggesting that replacement of the sand should be completed.

Maintenance Schedule: Proprietary Media Filters

Activity	Frequency
Inspect filters and remove debris	After every major storm for the first 3 months after construction completion. Every 6 months thereafter.

Wet Basins

Wet basins are intended to treat stormwater quality through the removal of sediments and soluble pollutants. A permanent pool of water allows sediments to settle and removes the soluble pollutants, including some metals and nutrients. Additional dry storage is required to control peak discharges during large storm events, and if properly designed and maintained wet basins can add fire protection, wildlife habitat and aesthetic values to a property.

Inspection & Maintenance

To ensure proper operation, wet basin outfalls should be inspected for evidence of clogging or excessive outfall releases. Potential problems to investigate include erosion within the basin and banks, damage to the emergency spillway, tree growth on the embankment, sediment accumulation around the outlet and the emergence of invasive species. Should any of these problems be encountered, perform repairs immediately. An on-site sediment disposal area will reduce sediment removal costs.

Maintenance Schedule: Wet Basins

Activity	Time of Year	Frequency
Inspect wet basins	Spring and/or Fall	Annually (Minimum)
Mow upper stage, side slopes, embankment and emergency spillway	Spring through Fall	Bi-Annually (Minimum)
Remove sediment, trash and debris	Spring through Fall	Bi-Annually (Minimum)
Remove sediment from basin	Year round	As required, but at least once every 10 years

Dry Wells

Dry wells are used to infiltrate uncontaminated runoff. These BMPs should never be used to infiltrate stormwater or runoff that has the potential to be contaminated with sediment and other pollutants. Dry wells provide groundwater recharge and can reduce the size and cost required of downstream BMPs or storm drains. However, they are only applicable in drainage areas of less than one acre and may experience high failure rates due to clogging.

Inspection & Maintenance

Proper dry well function depends on regular inspection. Clogging has the potential to cause high failure rates. The water depth in the observation well should be measured at 24 and 48 hour intervals after a storm and the clearance rate calculated. The clearance rate is calculated by dividing the drop in water level (inches) by the time elapsed (hours).

Maintenance Schedule: Dry Wells

Activity	Frequency
Inspect filters and remove debris	After every major storm for the first 3 months after construction completion. Every 6 months thereafter.

Infiltration Basins

Infiltration basins are designed to contain stormwater quantity and provide groundwater recharge. Pollution prevention and pretreatment are required to ensure that contaminated stormwater is not infiltrated. Infiltration basins reduce local flooding and preserve the natural water balance of the site, however high failure rates often occur due to improper siting, inadequate pretreatment, poor design and lack of maintenance.

Inspection & Maintenance

Regular maintenance is required to prevent clogging, which results in infiltration basin failure. Clogging may be due to upland sediment erosion, excessive soil compaction or low spots. Inspections should include signs of differential settlement, cracking, erosion, leakage in the embankments, tree growth on the embankments, riprap condition, sediment accumulation and turf health.

Maintenance Schedule: Infiltration Basins

Activity	Time of Year	Frequency
Preventative maintenance	Spring and Fall	Bi-Annually
Inspection	Spring and Fall	After every major storm for the first 3 months after construction completion. Bi-annually thereafter and discharges through the high outlet orifice.
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

INSPECTION OF CONSTRUCTED STORMWATER WETLANDS
Years 0-3 of Operation

General Information

BMP Description	Constructed Stormwater Wetland		
BMP Location			
Inspector's Name			
Date of Inspection		Date of Last Inspection	
Start Time		End Time	
Type of Inspection: Regular ☐ Pre-Storm Event ☐ During Storm Event ☐ Post-Storm Event ☐			
Describe the weather conditions at time of inspection			

Specific Information

Maintenance Activity	Maintenance Frequency	Is Status of BMP Satisfactory?	Corrective Action Needed
Inspect for invasive species and remove if present	Monthly	Yes ☐ No ☐	
Replace all media and vegetation	As Needed	Yes ☐ No ☐	

In addition, the following information should be recorded and mapped at least once per year:

- Types and distribution of dominant wetland plants
- Presence and distribution of planted wetland species
- Presence and distribution of invasive species
- Indications other species are replacing planted wetland species
- Percent of standing water that is not vegetated
- Replace all media and vegetation
- Stability of original depth zones and micro-topographic features
- Accumulation of sediment in the forebay and micropool and survival rate of plants

INSPECTION OF CONSTRUCTED STORMWATER WETLANDS
Year 4 - Lifetime of Operation

General Information

BMP Description	Constructed Stormwater Wetland		
BMP Location			
Inspector's Name			
Date of Inspection		Date of Last Inspection	
Start Time		End Time	
Type of Inspection: Regular ☐ Pre-Storm Event ☐ During Storm Event ☐ Post-Storm Event ☐			
Describe the weather conditions at time of inspection			

Specific Information

Maintenance Activity	Maintenance Frequency	Is Status of BMP Satisfactory?	Corrective Action Needed
Inspect for invasive species and remove if present	Monthly	Yes ☐ No ☐	
Clean forebays	Annually	Yes ☐ No ☐	
Clean sediment in basin/wetland system	Once every 10 years	Yes ☐ No ☐	
Mulch void areas	Annually	Yes ☐ No ☐	
Remove dead vegetation	Bi-Annually	Yes ☐ No ☐	
Replace dead vegetation	Annually	Yes ☐ No ☐	
Prune	Annually	Yes ☐ No ☐	
Replace all media and vegetation	As Needed	Yes ☐ No ☐	

INSPECTION OF EXTENDED DRY DETENTION BASINS

Inspections should be conducted bi-annually, and during and after major storm events.

General Information

BMP Description	Extended Dry Detention Basin		
BMP Location			
Inspector's Name			
Date of Inspection		Date of Last Inspection	
Start Time		End Time	
Type of Inspection: Regular ☐ Pre-Storm Event ☐ During Storm Event ☐ Post-Storm Event ☐			
Describe the weather conditions at time of inspection			

Specific Information

Maintenance Activity	Maintenance Frequency	Is Status of BMP Satisfactory?	Corrective Action Needed
Examine outlet structure for clogging or high outflow release velocities	Bi-Annually	Yes ☐ No ☐	
Mow upper stage, side slopes, embankment and emergency spillway	Bi-Annually	Yes ☐ No ☐	
Remove trash and debris	Bi-Annually	Yes ☐ No ☐	
Remove sediment from basin	At least once every 5 years	Yes ☐ No ☐	

INSPECTION OF PROPRIETARY MEDIA FILTERS

General Information

BMP Description	Media Filter		
BMP Location			
Media Type			
Inspector's Name			
Date of Inspection		Date of Last Inspection	
Start Time		End Time	
Type of Inspection: Regular ☐ Pre-Storm Event ☐ During Storm Event ☐ Post-Storm Event ☐			
Describe the weather conditions at time of inspection			

Specific Information

Maintenance Activity	Maintenance Frequency	Is Status of BMP Satisfactory?	Corrective Action Needed
Inspect for standing water, trash, sediment and clogging	Bi-Annually (minimum)	Yes ☐ No ☐	
Remove trash and debris	Each Inspection	Yes ☐ No ☐	
Examine to determine if system drains in 72 hours	Annually	Yes ☐ No ☐	
Inspect filtering media for clogging	Per manufacturer's schedule	Yes ☐ No ☐	

INSPECTION OF SAND AND ORGANIC FILTERS

Inspections should be conducted after every major storm event for the first 3 months following completion, then every 6 months thereafter.

General Information

BMP Description	Sand/Organic Filter		
BMP Location			
Media Type			
Inspector's Name			
Date of Inspection		Date of Last Inspection	
Start Time		End Time	
Type of Inspection: Regular ☐ Pre-Storm Event ☐ During Storm Event ☐ Post-Storm Event ☐			
Describe the weather conditions at time of inspection			

Specific Information

Maintenance Activity	Maintenance Frequency	Is Status of BMP Satisfactory?	Corrective Action Needed
Remove sediment, trash, and debris	Every 6 months	Yes ☐ No ☐	
Rake sand	Every 6 months	Yes ☐ No ☐	

INSPECTION OF DRY WELLS

Regular inspections should be conducted after every major storm event for the first 3 months following completion, then annually thereafter.

General Information

BMP Description	Dry Well		
BMP Location			
Inspector's Name			
Date of Inspection		Date of Last Inspection	
Start Time		End Time	
Type of Inspection: Regular ☐ Pre-Storm Event ☐ During Storm Event ☐ Post-Storm Event ☐			
Describe the weather conditions at time of inspection			
Describe condition of dry well at time of inspection			

After a major storm event, the water depth in the observation well should be measured at 24 and 48 hour intervals and the clearance rate calculated.

INSPECTION OF WET BASINS

Inspections should be conducted after every major storm event for the first 3 months following completion, then biannually thereafter.

General Information

BMP Description	Wet Basin		
BMP Location			
Inspector's Name			
Date of Inspection		Date of Last Inspection	
Start Time		End Time	
Type of Inspection: Regular ☐ Pre-Storm Event ☐ During Storm Event ☐ Post-Storm Event ☐			
Describe the weather conditions at time of inspection			
Describe condition of wet basin at time of inspection			

Specific Information

Maintenance Activity	Maintenance Frequency	Is Status of BMP Satisfactory?	Corrective Action Needed
Preventative maintenance	Bi-Annually	Yes ☐ No ☐	
Mow/rake buffer area, side slopes and basin bottom	Bi-Annually	Yes ☐ No ☐	
Remove trash, debris and organic matter	Bi-Annually	Yes ☐ No ☐	
Inspect and clean pretreatment devices	Every other month and after every major storm event	Yes ☐ No ☐	

INSPECTION OF OTHER BMP

General Information

BMP Description			
BMP Location			
Inspector's Name			
Date of Inspection		Date of Last Inspection	
Start Time		End Time	
Type of Inspection: Regular ☐ Pre-Storm Event ☐ During Storm Event ☐ Post-Storm Event ☐			
Describe the weather conditions at time of inspection			

Specific Information

Maintenance Activity	Maintenance Frequency	Is Status of BMP Satisfactory?	Corrective Action Needed
		Yes ☐ No ☐	
		Yes ☐ No ☐	
		Yes ☐ No ☐	
		Yes ☐ No ☐	
		Yes ☐ No ☐	
		Yes ☐ No ☐	
		Yes ☐ No ☐	

Appendix F

Document Credit

Thanks and credit for templates and assistance for the Stormwater Management Plan from the following persons and organizations.

- Neponset Stormwater Partnership (Link)
- Central MA Regional Stormwater Coalition (Link)
- Fuss & O'Neill (Link)

Appendix G

Stormwater Management Plan

ABSTRACT

Town of Sharon

June 06, 2019

By: Kevin Davis and Sonal Pai

Table of Contents

Green Infrastructure Regulation Review

Introduction

This report aims to provide a comparative and in-depth analysis of the existing Green Infrastructure regulations in the Town of Sharon and illustrate potential opportunities to improve various regulations and bylaws. The requirements of this report per NPDES MS4 are as follows;

"Within four (4) years from the effective date of the permit, the permittee shall develop a report assessing existing local regulations to determine the feasibility of making, at a minimum, the following practices allowable when appropriate site conditions exist:
i. Green roofs;
ii. Infiltration practices such as rain gardens, curb extensions, planter gardens, porous and pervious pavements, and other designs to manage stormwater using landscaping and structured or augmented soils; and
iii. Water harvesting devices such as rain barrels and cisterns, and the use of stormwater for non-potable uses.

The assessment should indicate if the practices are allowed in the MS4 jurisdiction and under what circumstances are they allowed. If the practices are not allowed, the permittee shall determine what hinders the use of these practices, what changes in local regulations may be made to make them allowable and provide a schedule for implementation of recommendations. The permittee shall implement all recommendations, in accordance with the schedules, contained in the assessment. The permittee shall report in each annual report on its findings and progress towards making the practices allowable."

Existing Applicable Bylaws and Regulations Referenced

Town of Sharon

Chapter 230, Article I and II "Stormwater Management"
Chapter 275 Article I, II, and IV "Zoning"
Chapter 340 Article IV "Subdivision Regulations"

Town of Walpole

Chapter 200 Section 1 "Stormwater Management"
Chapter 235 Section 28 "Zoning"
Chapter 503 Section 4 "Wetland Regulations"

Town of Stoughton

Chapter 159 Section 7
7. B.1 Low Impact Design (LID) site planning and stormwater design strategies must be used to the maximum extent practicable. Specific strategies and BMPs to be considered include - but are not limited to – reducing or minimizing impervious surfaces, incorporating stormwater management facilities into landscape islands, bioretention basins, grass and surface swales, infiltrative basins and chambers, pervious pavers, etc. A decentralized approach to stormwater management, including installing different BMP's throughout the site, should be included. Traditional collect and convey systems should be minimized. In the event that LID site design strategies and BMPs are not proposed, the applicant should provide a narrative describing why these facilities cannot be incorporated into the site design.
Chapter 159 Section 10
10.0A The Town of Stoughton will not accept ownership of stormwater BMPs located outside of street rights of way, Town easements, or Town Parcels of land. The maintenance of such facilities shall remain the

permanent responsibility of the applicant or his successors and/or assigns. The OWNER of the property on which work has been done pursuant to these Regulations for private stormwater management facilities, or any other PERSON or agent in control of such property, shall maintain in good condition and promptly repair and restore all grade surfaces, walls, drains, dams and structures, vegetation, erosion and SEDIMENTATION controls, and other protective devices. Such repairs or restoration and maintenance shall be in accordance with approved plans. When a project is a Definitive Subdivision, it is responsibility of the developer to maintain the stormwater system until the Subdivision is accepted by the Town. In the event a homeowner's association is created to maintain the subdivision, it will be the responsibility of the homeowner's association to maintain the stormwater management system.

Town of Canton

Article XXI, Section 6

6.0A(1) Low Impact Development and Green Infrastructure site design strategies shall be utilized to preserve existing natural features of the site, minimize the creation of impervious surfaces and manage stormwater in a decentralized fashion, to the maximum extent feasible.

6.0A(2) The selection, design and construction of all pretreatment, treatment and infiltration BMPs shall be in accordance with Massachusetts Stormwater Handbook and shall be consistent with all elements of the Massachusetts Stormwater Standards including but not limited to those regarding new stormwater conveyances, peak runoff rates, recharge, land uses with higher potential pollutant loads, discharges to Zone II or interim wellhead protection areas, sediment and erosion control, and illicit discharges.

6.0E (3) Projects must use Low Impact Development techniques where adequate soil, groundwater and topographic conditions allow. These may include but not be limited to reduction in impervious surfaces, disconnection of impervious surfaces, bioretention (rain gardens) and infiltration systems. The use of one or more Low Impact Development site design measures by the applicant may allow for a reduction in the water quality treatment volume required by these regulations. The applicant may, if approved by the Stormwater Authority, take credit for the use of stormwater Low Impact Development measures to reduce some of the requirements specified in these regulations. The site design practices that qualify for these credits and procedures for applying and calculating credits are identified in the Massachusetts Stormwater Handbook.

Town of Foxborough

Chapter 275 Section 9.4.13 "Zoning"
Chapter 232 "Stormwater Management"

Town of Mansfield

Chapter 230 Section 4.9 "Zoning"
Chapter 185 Section 22 "Stormwater Management"

Other References

http://www.epa.gov/region1/npdes/stormwater/assets/pdf/AddressingBarrier2LID.pdf

http://www.mapc.org/resources/low-impact-dev-toolkit/local-codes-lid

Green Infrastructure Regulation Review Summary

After reviewing various other municipalities and our regulations and reference documents, no changes to the existing policies have been recommended. However, the Conservation Commission is drafting new Stormwater Regulations, including additional regulatory requirements. Therefore, after the Stormwater Regulation Draft is final, further review may be warranted.

Street Design and Parking Lot Guideline Assessment

Introduction

This report aims to provide a comparative and in-depth analysis of the existing street design and parking lot guidelines in the Town of Sharon and illustrate potential opportunities to improve various regulations and bylaws. The requirements of this report per NPDES MS4 are as follows;

"2.3.6 b. - Within four (4) years of the effective date of this permit, the permittee shall develop a report assessing current street design and parking lot guidelines and other local requirements that affect the creation of impervious cover. This assessment shall be used to provide information to allow the permittee to determine if changes to design standards for streets and parking lots can be made to support low impact design options. If the assessment indicates that changes can be made, the assessment shall 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. The permittee shall implement all recommendations, in accordance with the schedules, contained in the assessment. The local planning board and local transportation board should be involved in this assessment. This assessment shall be part of the SWMP. The permittee shall report in each annual report on the status of this assessment including any planned or completed changes to local regulations and guidelines."

Street Design and Parking Lot Guidelines Assessment Summary

After reviewing various other municipalities and our regulations and reference documents, no changes to the existing policies have been recommended.

Town Properties for Retrofit

Introduction

This report aims to provide a comprehensive list of retrofit opportunities for municipal lands in the Town of Sharon and illustrate potential opportunities to improve the sites with innovative LID and green infrastructure designs. The requirements of this report per NPDES MS4 are as follows;

"Four (4) years from the effective date of this permit, the permittee shall identify a minimum of 5 permittee-owned properties that could potentially be modified or retrofitted with BMPs designed to reduce the frequency, volume, and pollutant loads of stormwater discharges to and from its MS4 through the reduction of impervious area. Properties and infrastructure for consideration shall include those with the potential for reduction of on-site impervious area (I.A.) as well as those that could provide reduction of off-site I.A. At a minimum, the permittee shall consider municipal properties with significant impervious cover (including parking lots, buildings, and maintenance yards) that could be modified or retrofitted. MS4 infrastructure to be considered includes existing street rights-of-way, outfalls and conventional stormwater conveyances and controls (including swales and detention practices) that

could be readily modified or retrofitted to provide reduction in frequency, volume or pollutant loads of such discharges through reduction of impervious cover.

In determining the potential for modifying or retrofitting particular properties, the permittee shall consider factors such as access for maintenance purposes; subsurface geology; depth to water table; proximity to aquifers and subsurface infrastructure including sanitary sewers and septic systems; and opportunities for public use and education. In determining its priority ranking, the permittee shall consider factors such as schedules for planned capital improvements to storm and sanitary sewer infrastructure and paving projects; current storm sewer level of service; and control of discharges to water quality limited waters, first or second order streams, public swimming beaches, drinking water supply sources and shellfish growing areas.

Beginning with the fifth-year annual report and in each subsequent annual report, the permittee shall identify additional permittee owned sites and infrastructure that could be retrofitted such that the permittee maintains a minimum of 5 sites in their inventory, until such a time as when the permittee has less than 5 sites remaining. In addition, the permittee shall report on all properties that have been modified or retrofitted with BMPs to mitigate I.A. that were inventoried in accordance with this part. The permittee may also include in its annual report non-MS4 owned property that has been modified or retrofitted with BMPs to mitigate I.A."

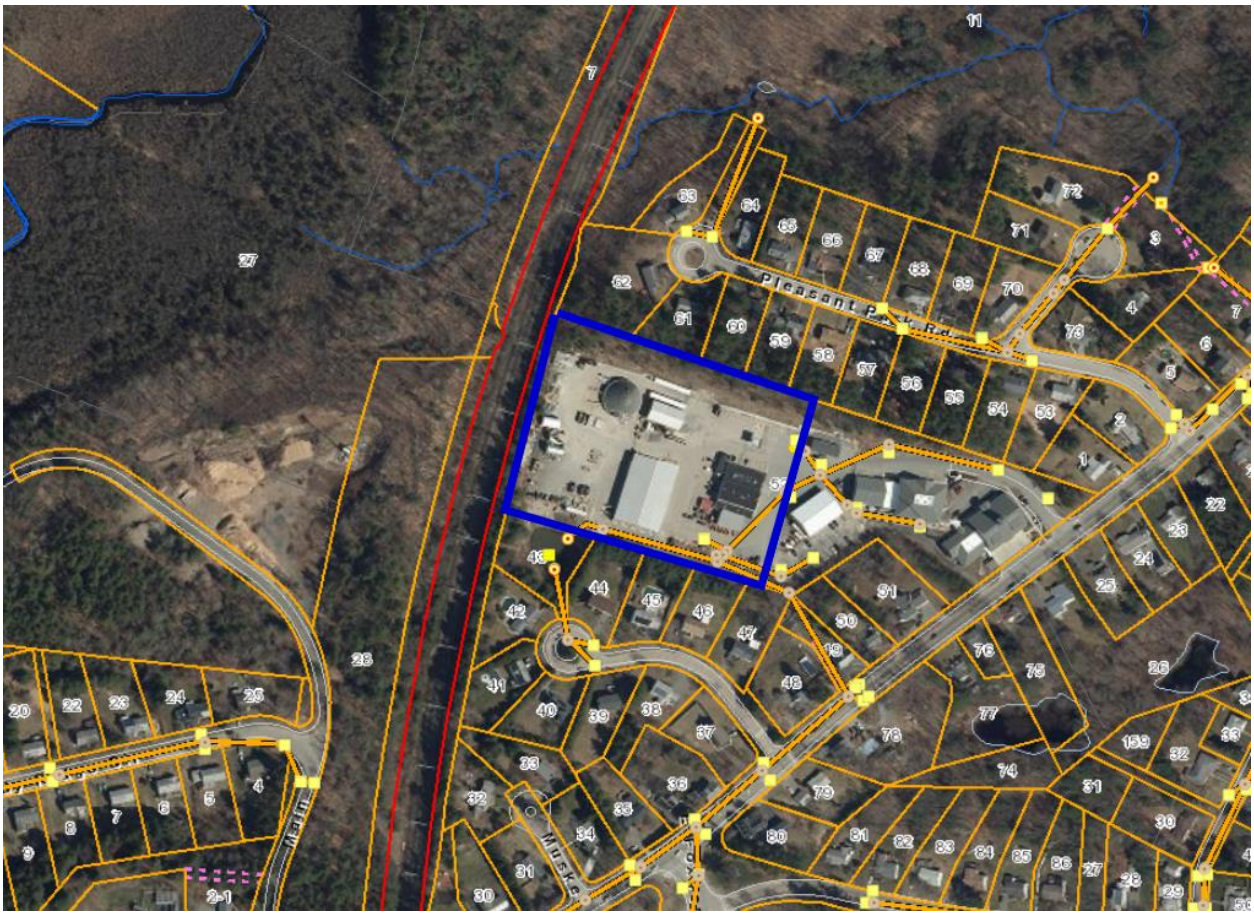
Details of Potential Properties

Sharon DPW- 217 R South Main Street

Existing Conditions

The site at 217R South Main Street has 59,000 S.F. if impervious area. The site is located on the westerly side of South Main Street and abuts various residential dwellings. The ten (10) acre site is identified on the assessing records as Map 80 Lot 52 in Single Residential District A and houses the Public Safety Building, The Department of Public Works, Various Garages and Workshops, Storage Units, Salt Sheds, Corrals, and Work Trailers. Existing improvements include a drainage basin at the property's rear and grass and gravel strips lining the southerly portion of the impervious area.
The site is a multi-department office, storage, and garage for Police, Fire, and the Department of Public Works. According to historical data, the existing depth from the surface to groundwater in that area is 10-12 feet. In addition, the site is in the Groundwater Protection District as defined by Chapter 275, "Zoning."

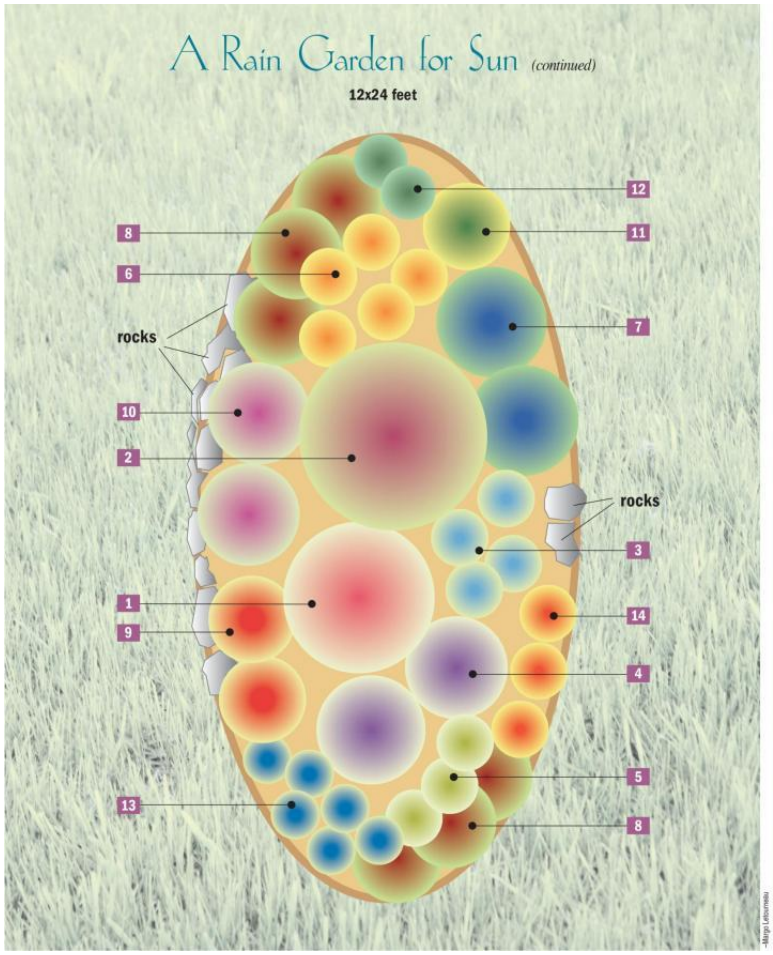
Potential Projects: DPW located at 217 R South Main Street



Addition of Rain Garden to Center of Pavement Area

Type of Improvement: Rain Garden
Size of Improvement: 5 to 10% of impervious area
Reduction in TSS and Pollutant Load:90 % with Filter Strip or Pretreatment
Details: This is an example of a rain garden that can be created for this location using Native New England Plants. (Figure 1)

Figure 1 (Sun Rain Garden using Native New England Plants)



Sun Rain Garden Plant List/ Description

In the center, plant #1 to #6. For the drier, outer edge, plant #7 to #14.

1.Summersweet (*Clethra alnifolia***' Ruby Spice')**, a woody shrub that bears fragrant, pink, bottlebrush flowers in the summer. 5 to 6 feet tall; Zones 4 to 9. One plant.

2.Red osier dogwood (*Cornus sericea***)**, which has white blossoms in spring and reddish-purple leaves in the fall—although its most attractive features are its red stems, which lend winter interest to the landscape. 6 to 10 feet tall; Zones 2 to 8. One plant.

3.Blue flag iris **(***Iris versicolor***)**, which brightens the rain garden with lavender-blue flowers in the spring. It looks very natural in a wet setting. Avoid the yellow flag iris (Iris pseudacorus), which is an invasive species that will take over. 2 to 4 feet tall; Zones 3 to 9. Four plants.

Figure 2 (Blue flag iris)

4.Joe Pye weed (*Eupatorium maculatum***)**, which has purple flowers in late summer that butterflies can't resist. 3 to 5 feet tall; Zones 3 to 7. Two plants.

5.Astilbes **(***Astilbe***)**, which are long-lived, moisture-loving perennials that will thrive in the sunny rain garden if planted where they get some afternoon shade from taller shrubs nearby. They bloom in summer and are available in pinks, reds, purple, and white. 1 to 3 feet tall; Zones 3 to 8. Three plants.

6.Daylilies **(***Hemerocallis***)**, which may not be natives but can keep your rain garden in bloom over a long season if you plant early, midseason, and late varieties. Assorted heights and a rainbow of colors are available. Zones 4 to 11. Five plants.

7.Blueberries **(***Vaccinium***)**, whether highbush (up to 5 feet tall) or lowbush (up to 2 feet tall) varieties, which add both a flowering shrub and an edible fruit to your landscape. Zones 3 to 8. Two plants.

8.American cranberry **(***Vaccinium macrocarpon***)**, which is a pretty, ground-covering shrub that also bears edible fruit. About 6 inches tall; Zones 2 to 7. Six plants.

9.Bee balm **(***Monarda***)**, which in summer features brilliant-red, pink, or white flowers that attract hummingbirds and butterflies. Look for a mildew-resistant variety. 3 feet tall and wide; Zones 3 to 9. Two plants.

10.New England aster **(***Aster novae-angliae***)**, which will carry the show into fall with its bright, violet-purple flowers. It gets quite tall but can be cut back to half its height in June to create a shorter and bushier plant, if desired. Up to 6 feet tall; Zones 4 to 8. Two plants.

11.Sneezeweed (*Helenium autumnale***)**, which bears sunny yellow flowers in late summer. It is highly adaptable to wet or dry soil. 3 to 5 feet tall; Zones 4 to 8. One plant.

12.Meadow anemone (*Anemone canadensis***)**, which is deer-resistant and salt-tolerant. This tough little perennial bears pure-white blossoms in late spring. 2 feet tall; Zones 2 to 9. Two plants.

13.Blue cardinal flower (*Lobelia siphilitica***)**, which has spikes of true blue flowers in late summer. 2 to 4 feet tall; Zones 5 to 9. Six plants.

14.Butterfly weed (*Asclepias tuberosa***)**, which features orange blossoms that provide excellent nectar for butterflies. In addition, the plants are an important larval food for monarch butterflies. 2 to 3 feet tall; Zones 4 to 9. Three plants

Appendix H

Nutrient Source Identification Report and Addendum

Nutrient Source Identification Report
Town of Sharon

Prepared By: Neponset River Watershed Association
June 16, 2021

This report is being submitted as a final grant deliverable for the MS4 Municipal Assistance Grant Program. This specific submission is not intended for regulatory compliance purposes.

Acknowledgements

This is one among twenty Nutrient Source Identification Reports prepared by the Neponset River Watershed Association (NepRWA) and the Pioneer Valley Planning Commission (PVPC). These reports are meant to provide MS4 permitted municipalities with documents they can finalize and submit to U.S. EPA as part of their Year 4 reporting requirements.

This work is made possible through a grant from the MassDEP Municipal Assistance Program. Project staff from NepRWA and PVPC appreciate the conversation and feedback provided by MassDEP and U.S. EPA staff in working through methodology to prepare these reports. Aside from producing nutrient source identification reports for 20 communities, this project also resulted in the following: lake-pond phosphorous control plan Year 4 submission requirements for two communities; documentation of approach and methods for use by other MS4 permittees across MA in meeting these Year 4 requirements; and setting of the stage for upgrading existing stormwater infrastructure in key high pollutant loading catchments.

NepRWA and PVPC staff are grateful also to the partner communities who joined them in this pilot project. Following is a list of cities and towns who participated in this project:

Agawam
Canton
Dedham
Foxborough
Granby
Longmeadow
Ludlow
Medfield
Milton
Northampton
Quincy
Randolph
Sharon
South Hadley
Southampton
Southwick
Stoughton
Westfield
Westwood
Wilbraham

Background: The Nutrient Pollution Problem

Nitrogen and phosphorous are naturally occurring plant fertilizers or "nutrients." When land is developed, and storm drain systems are installed, the amount of nitrogen and phosphorous discharged to local streams, ponds and wetlands increases significantly relative to natural stream conditions. In the urban environment, nitrogen and phosphorous come from a variety of sources including organic debris such as fallen leaves, animal and pet waste, lawn and agricultural fertilizers, malfunctioning sewers and septic systems, and atmospheric deposition from car exhaust, among other sources.

Some of these sources also occur in the natural environment. However, in the urban environment the prevalence of paved and impervious areas coupled with the availability of storm drain collection systems allows street runoff containing excess nutrient pollution to be very quickly collected and conveyed to the nearest waterbody, generally with little or no treatment—bypassing the natural processes such as soil filtration and infiltration that would capture and recycle nutrients before they reached waterways in an undeveloped landscape.

As a result, nutrient pollution from polluted stormwater runoff has become a major source of pollution across the country. Nutrient pollution increases undesirable plant and algae growth in waterways, which can be highly toxic to humans and wildlife and reduce oxygen levels in the water. This, in turn, impedes recreation and creates chronic challenges for aquatic life, sometimes leading to fish kills. In freshwater waterways phosphorous is generally the primary pollutant of concern, while nitrogen becomes the primary concern once freshwater rivers flow into saltwater estuaries and bays.

Background: Regulatory Context

Under the federal and state clean water acts, the Massachusetts Department of Environmental Protection (MassDEP) is charged with establishing water quality standards and determining whether waterways meet these designated standards. MassDEP publishes its Integrated List of Waters, also referred to at the 303d Impaired Waters List, identifying waters that do not meet standards. These waterways are referred to as being "impaired" or "water quality limited" based on one or more causes which may include nitrogen, phosphorous, "nutrient/eutrophication biological indicators" or in some cases turbidity or transparency. MassDEP is also charged with preparing waterbody-specific cleanup plans for nutrient pollution known as Total Maximum Daily Loads or TMDLs, though these are yet to be prepared for many impaired waterways.

The Town of Sharon ("the Town") is subject to the requirements of US Environmental Protection Agency's (EPA's) 2016 Massachusetts Small MS4 General Permit. One of the requirements of this permit is that communities discharging stormwater to waterways that are listed by MassDEP as impaired for phosphorous or nitrogen, or that flow into impaired waterways, and for which a total maximum daily load does not exist, shall prepare a Nutrient Source Identification Report as detailed in Appendix H of the permit. This report has been developed to satisfy this requirement of the permit.

The nutrient source identification report must be submitted with the permit year 4 annual report (year ending June 30, 2022 and report due late September 2022). The requirements include (excerpt from EPA 2016 MS4 Permit Appendix H):

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.b., targeting the receiving water segment(s);
3. Impervious area and DCIA for the target catchment;
4. Identification, delineation and prioritization of potential catchments with high [*nitrogen and/or phosphorous*] loading;
5. Identification of potential retrofit opportunities or opportunities for the installation of structural BMPs during redevelopment.

MS4 Permit Appendix H Applicability

Portions of the Town lie both within the Neponset River Watershed and the Taunton River Watershed. Of the Town's 18 receiving waters, two have been identified as specifically impaired for phosphorus. In some cases, the Town's receiving waters also flow into another water body that is impaired for phosphorous, or waters that are listed as impaired for a cause in which phosphorous pollution is a factor such as dissolved oxygen, or eutrophication biological indicators.

The saltwater portion of the Neponset River, known as the Neponset River Estuary, is not specifically listed as impaired for nitrogen by MassDEP, but is listed as impaired for several other factors for which nitrogen pollution is a contributing factor. Furthermore, EPA has directed the City of Quincy to prepare a nutrient source identification report for nitrogen based on its stormwater discharges to the Neponset River. While EPA has not provided any clear direction to other communities in the Neponset River Watershed that are upstream of the Neponset Estuary regarding the need for a nitrogen source identification report, the possibility exists that EPA may issue such a requirement in the future. In the interest of efficiency of analysis, this report also includes an analysis of nitrogen pollution loading for all communities in the Neponset River Watershed. Further, catchments in the Taunton River Watershed are subject to the Mount Hope Bay TMDL.

Therefore, this report has been prepared in accordance with the guidelines in sections I.1.b and II.1.b of Appendix H of the 2016 Massachusetts Small MS4 General Permit.

The status of receiving waters in the Town is summarized in Table 1 below.

Table 1. Receiving Waters for the Town of Sharon

Receiving Water	Number of Outfalls	Impaired for P?	Impaired for N?	Other Impairments
Neponset River (MA73-01)	2	Yes	No	Dissolved Oxygen, TSS, DDT, E. Coli, Excess Algal Growth, Other, PCB in Fish Tissue, Sedimentation, Turbidity

Massapoag Brook (MA73-21)	21	Yes	No	TSS, Aquatic Macroinvertebrate Bioassessments, Non-Native Aquatic Plants, Turbidity
Canoe River (MA62-27)	24	No	No	
Rumford River (MA62-39)	2	No	No	Aquatic Macroinvertebrate Bioassessments, Dioxin, Fecal Coliform, Fishes Bioassessments, PCP, Physical Substrate Habitat Alterations, Sedimentation
Ames Long Pond (MA62001)	10	No	No	Aquatic Plants, Non-Native Aquatic Plants, Turbidity
Briggs Pond (MA62021)	3	No	No	
Gavins Pond (MA62077)	37	No	No	Non-Native Aquatic Plants
Upper Leach Pond (MA62123)	2	No	No	
Whiteville Pond (MA62211)	4	No	No	
Wolomolopoag Pond (MA62216)	8	No	No	
School Meadow Brook (MA73-06)	6	No	No	Fecal Coliform
Traphole Brook (MA73-17)	3	No	No	Fecal Coliform
Beaver Brook (MA73-19)	24	No	No	Aquatic Macroinvertebrate Bioassessments, Dissolved Oxygen
Unnamed Tributary to the Neponset River (MA73-31)	7	No	No	Fecal Coliform
Clark Pond (MA73008)	4	No	No	Non-Native Aquatic Plants
Massapoag Lake (MA73030)	50	No	No	Mercury in Fish Tissue, Non-Native Aquatic Plants
Town Pond (MA73056)	12	No	No	Non-Native Aquatic Plants
Billing Street/East Street Pond (MA73065)	18	No	No	Non-Native Aquatic Plants

Data Sources and Analytical Methods

Several existing datasets were used to complete this work. Table 2 below lists the utilized data sets and their origin.

Table 2. Data Sources

Existing Data Set	Origin	Date Published/Updated	Link
2016 Land Cover/Land Use	MassGIS	May 2019	https://docs.digital.mass.gov/dataset/massgis-data-2016-land-coverland-use
Soil Survey Geographic (SSURGO) Database for Norfolk and Suffolk Counties, Massachusetts	USDA	June 2020	Downloaded through Web Soil Survey (https://websoilsurvey.sc.egov.usda.gov/App/HomePage.htm). Hydrologic soil groups extracted using Soil Data Viewer Version 6.1 (https://www.nrcs.usda.gov/wps/portal/nrcs/detail/soils/survey/geo/?cid=nrcs142p2_053619)
Town Catchments	Town GIS Files	Current as of the publishing of this report	N/A
Massachusetts Land Parcel Database (Metro Boston Region)	MAPC	May 2019	Used to locate SCM opportunities, this shapefile contains the "Parloc_ID" field used to identify parcels. https://datacommon.mapc.org/browser/datasets/360

Impervious area is the portion of the Town that is paved, covered by buildings, or otherwise rendered unable to absorb water naturally due to development. Impervious area for the town was calculated using the MassGIS 2016 Land Cover/Land Use data layer which was published in 2019. This data layer maps impervious and pervious land cover by land use type based on aerial photography and other data sources. This was overlaid with the Town's data layer for outfall catchment areas (the area draining to each town-owned stormwater discharge point) to estimate total areas and total impervious area discharging to or upstream of nutrient-impaired waterways, as well as to estimate impervious area for each stormwater outfall catchment.

Directly connected impervious area (DCIA), also referred to as "effective impervious cover," is the amount of impervious area that is directly connected to the storm drain system. Most land in the Town was developed before the creation of modern requirements to capture, clean, slow down, and recharge stormwater runoff using stormwater control measures (SCMs). However, many new development and redevelopment projects constructed in recent years have required the installation or upgrade of SCMs, such that today some properties have no SCMs, some have SCMs that meet some modern standards, and some have SCMs that are fully compliant with

modern standards. Because site-specific information about the existence of specific SCMs is not available at the parcel level, an estimate of DCIA or effective impervious cover is used to approximate the average level of SCMs installed across the watershed. Estimating DCIA can yield a more specific pollutant loading estimate for a given area. DCIA was estimated based on land use categories following EPA guidance.

To estimate the pollutant loads for nitrogen and/or phosphorous in each catchment, estimated pollutant loading rates for different combinations of land use type, land cover type, and soil type were applied in accordance with guidance in the EPA 2016 MS4 Permit. The individual loading rates for these unique subsections were summed based on catchment, which produced an overall estimated catchment pollutant loading rate.

For a more detailed description of the analytical methods used for this project, please refer to the supplement to this report, entitled "Nutrient Source Identification Report Addendum: Methods."

Note that two catchments in the Town's data set identified as "0" and "313" were multipart shapefiles made up of several catchments spread throughout the Town. These were assumed to be a collective entry for catchments with no definitive outfall. While these catchments were included in analysis, they were removed from any rankings.

Total Area Draining to Water Quality Limited Segments (or Tributaries)

The total area of the Town is approximately 15,598 acres. Since all areas of the Town are located either in the Neponset River Watershed or the Taunton River Watershed and drainage flows either directly to waters that are impaired for phosphorus or waters that are listed as impaired for a cause in which phosphorous pollution is a factor, this report included all areas of the town in the evaluation. Table 3 below shows how much of the Town is located in each watershed.

Similarly, portions of the town are upstream of the Neponset Estuary and therefore drain to a segment that EPA may consider impaired for nitrogen. While EPA has not provided clear guidance indicating that the Town is subject to the requirements of Appendix H of the 2016 MS4 permit for nitrogen, this report includes the analysis for nitrogen so that the relevant data is available should EPA make such a determination in the future. Therefore, catchments located in the Neponset River Watershed were included in this nitrogen loading analysis sections of this report. Catchments located in the Taunton River Watershed are subject to the Mt. Hope Bay TMDL and therefore were also included in catchment rankings for nitrogen.

Table 3. Summary of Area Draining to Water Quality Limited Segments

Receiving Water Impaired for Phosphorus	Neponset Watershed	Taunton Watershed	Total
Total Area of Town (Acres)	10,020	5,578	15,598
Area Draining to Phosphorous Impaired Waters or Potentially Impaired Waters (Acres)	10,020	5,578	15,598

Area Draining to Nitrogen Impaired or Potentially Impaired Waters (Acres)	10,020	5,578	15,598

Impervious Area and Directly Connected Impervious Area

Table 4 below summarizes the total impervious area (IA) and estimated DCIA in the Town. It is also important to note that most of the impervious area in the Town is not owned or maintained by the Town, but by private parties or other public agencies.

Table 4. Summary of Impervious Area and DCIA

	Neponset Watershed	Taunton Watershed	Total
Impervious Area (Acres)	944	425	1,369
Estimated DCIA (Acres)	19	6.5	25.5

Table A-1 and A-2 in Appendix A of this report provides impervious area and estimates of DCIA for the Town's catchments in the Taunton and Neponset River Watersheds, respectively. Table 5 and 6 below show the same information for the ten catchments with the most impervious area in each watershed. The catchments are labeled using the Town's identifier for the outfall to which they drain. The table is sorted in descending order of total impervious area.

Table 5. Total Impervious Area and DCIA for the Ten Most Impervious Town Catchments in the Taunton River Watershed

Catchment Identifier	Impervious Area (Acres)	Percent Impervious	DCIA (Acres)	Percent DCIA
219	50.90	16.43 %	3.93	1.27 %
326	23.77	5.30 %	0.78	0.17 %
279	11.96	3.72 %	0.53	0.17 %
92	10.41	26.80 %	2.29	5.89 %
10	9.31	43.96 %	2.14	10.11 %
134	8.12	37.96 %	1.82	8.52 %
358	7.26	25.80 %	1.57	5.58 %
128	6.51	24.57 %	0.93	3.51 %
12	6.10	32.36 %	1.17	6.19 %
298	6.07	13.50 %	0.49	1.09 %
Top 10 Catchments as a % of Town Watershed Total	31.82 %		29.67 %	

Table 6. Total Impervious Area and DCIA for the Ten Most Impervious Town Catchments in the Neponset River Watershed

Catchment Identifier	Impervious Area (Acres)	Percent Impervious	DCIA (Acres)	Percent DCIA
109	81.45	5.83 %	2.46	0.18 %
146	33.23	2.74 %	0.72	0.06 %
107	32.45	29.36 %	4.12	3.73 %
138	23.77	14.99 %	2.54	1.60 %
4	18.59	29.81 %	2.66	4.26 %
355	17.32	9.35 %	1.10	0.59 %
89	16.95	12.55 %	1.20	0.89 %
145	16.40	43.95 %	3.25	8.71 %
153	16.16	26.14 %	2.18	3.53 %
217	11.85	18.97 %	1.35	2.16 %
Top 10 Catchments as a % of Town Watershed Total	40.91 %		21.83 %	

Estimated Nutrient Loading from Catchments

Using the methods described in the addendum to this report, estimates of phosphorus and nitrogen loading potential were created for each of the Town's storm drain outfall catchments.

Tables B-1 and B-2 in Appendix B and C-1 and C-2 in Appendix C of this report show calculated phosphorus and nitrogen loading estimates, respectively, for all catchments in the Town. Tables 7-10 below show the five catchments with the highest estimated phosphorus and nitrogen loading, respectively.

Table 7. Estimated Phosphorus Loading for Five Highest-Load Town Catchments in the Taunton River Watershed

Catchment Identifier	Estimated P Load (Lbs/Yr)
219	129.40
326	114.71
279	62.27
15	21.60
298	20.43
Top 5 as a % of Total Town Watershed Load	28.56 %

Table 8. Estimated Nitrogen Loading for Five Highest-Load Town Catchments in the Taunton River Watershed

Catchment Identifier	Estimated N Load (Lbs/Yr)
219	1129.02
326	778.47
279	496.81
298	191.83
92	155.36
Top 5 as a % of Total Town Watershed Load	28.57 %

Table 9. Estimated Phosphorus Loading for Five Highest-Load Town Catchments in the Neponset River Watershed

Catchment Identifier	Estimated P Load (Lbs/Yr)
109	282.79
146	213.65
107	81.44
138	56.79
355	56.78
Top 5 as a % of Total Town Watershed Load	37.66 %

Table 10. Estimated Nitrogen Loading for Five Highest-Load Town Catchments in the Neponset River Watershed

Catchment Identifier	Estimated N Load (Lbs/Yr)
109	3539.67
146	2024.23
107	683.33
336	470.07
355	444.65
Top 5 as a % of Total Town Watershed Load	43.79 %

Note these are estimated loadings based on soil type, land use and estimated DCIA (e.g. typical level of SCMs in town). Actual loading may vary considerably from site to site depending on what SCMs are actually present, and regional studies such as the Charles River Phosphorous TMDL have indicated that the default DCIA assumptions used by EPA are somewhat optimistic, such that actual loading rates may be higher. However, these estimates provide a valuable guide to help identify those areas of the Town that should be the highest priorities for interventions to begin reducing pollutant loading.

Outfall Screening Monitoring Results

The Town's dry weather outfall screening results as of 2/1/2021 were reviewed during the writing of this report. A table showing dry weather sampling data is included in Appendix F. Twenty-five MS4 outfalls were sampled, but no significant nutrient concentrations were found during sampling. As future outfall screening and catchment investigations take place, this report shall be updated.

Catchment Prioritization

Since outfall screening activities did not indicate any specific catchments with high nutrient loads, this report is prioritizing the catchments based solely on the phosphorus and nitrogen loading estimates, in the order shown in Tables B-1 and B-2 (phosphorus) and C-1 and C-2 (nitrogen). As outfall screening and catchment investigations continue, the list of catchments should be re-examined and the "Top 5" list should be updated based on these real-world data.

Potential Retrofit Opportunities

Town parcels were examined for potential BMP retrofit opportunities using the Neponset Stormwater Partnership's BMP Tool (NSP BMP Tool). This tool analyzes soil data, estimated pollutant loading, and various limitations of each parcel in Town to determine the locations most suitable for further field assessment of SCM opportunities to reduce chosen pollutants.

The NSP BMP Tool uses slightly different methods to estimate pollutant loading than are utilized in this report so estimated loading rates will differ. However, this does not diminish the utility of the NSP BMP Tool as a means to help identify potential retrofit sites, especially given additional features that are incorporated into the Tool.

After assessing the data, each high-loading catchment was reviewed for potential SCM sites. Five parcels were chosen and are listed in Tables 11-14 below. All parcels in these lists are Town-owned, as town-owned properties often present the fewest barriers to SCM development. These sites should be visited first when performing reconnaissance work to locate SCMs that will reduce nutrient loading in the town. Additionally, it should be noted that the NSP BMP Tool does not rank rights-of-way as Town-owned, but they are often highly desirable sites for SCMs. All rights-of-way, particularly in the high-loading catchments, should be considered in addition to individual parcels. Note that "Parloc_ID" is an attribute from the MAPC parcel data set that may be helpful in identifying the indicated parcels.

More extensive lists of Town-owned properties to be considered for SCM development is included in Appendix D and E. In these lists, they are ranked by the BMP Tool's priority score, which projects each parcel's pollutant load and considers how suited that parcel is for SCM's designed to remove the targeted pollutant. Appendix D ranks parcels for phosphorus removal and Appendix E ranks them for nitrogen removal. The larger lists in these appendices should be considered a more comprehensive collection of the parcels that should be considered first for SCM development. As Town-owned parcels are evaluated, the Town should begin considering privately-owned parcels, as well, using the NSP BMP Tool as a guide.

Table 11. High-Priority Parcels in the Taunton Watershed to be Considered for SCM Development for Phosphorus Pollution

Address	Parloc_ID	Catchment	Notes
36 R Norfolk Pl	F_738097_2862400	326	Undeveloped land bordering a large residential area.
115 Old Post Rd	F_731859_2861629	279	Undeveloped land behind a residential area.
61 Gavins Pond Rd	F_732830_2856195	219	Undeveloped land bordering a residential area.
235R Wolomolopoag St	F_737072_2857582	326	Undeveloped land bordering a residential area.
250 East Foxboro St	F_741304_2859546	18	Undeveloped land in a residential area. Not located in a high-load catchment, but the parcel was scored very well by the NSP BMP Tool.

Table 12. High-Priority Parcels in the Taunton Watershed to be Considered for SCM Development for Nitrogen Pollution

Address	Parloc_ID	Catchment	Notes
115 Old Post Rd	F_731859_2861629	279	Undeveloped land behind a residential area.
154R Wolomolopoag St	F_736502_2859897	326	Undeveloped land behind a residential area. Multiple parcels available in this area.
93R Mansfiled St	F_741519_2852418	313	Undeveloped land behind a residential area. Multiple parcels available in this area.
17R Old Wolomolopoag St	F_737558_2854803	313	Undeveloped land bordering several residential areas.
21R Gavins Pond Rd	F_732166_2858853	313	Undeveloped land in a residential area.

*Few Town-owned parcels were found in the Taunton River Watershed in prioritized catchments. It is recommended that roadways in the high-load catchments are strongly considered to address nitrogen pollution.

Table 13. High-Priority Parcels in the Neponset River Watershed to be Considered for SCM Development for Phosphorus Pollution

Address	Parloc_ID	Catchment	Notes
179R Morse St	F_744829_2858764	109	Undeveloped land near residential area.
110 Lakeview St	F_742746_2860263	109	Undeveloped land bordering Lake Massapoag
30 East Foxboro St	F_741450_2865494	109	Athletic fields and a parking area along with a large area of undeveloped land.
12-17 Farnham Rd	F_739433_2867371	146	Undeveloped land bordering a residential area. Parcel also borders a stream, so wetlands may be present. Recommend focusing assessment on section of parcel near the residential area.
62R Upland Rd	F_740632_2871135	146	Undeveloped land in residential area.

Table 14. High-Priority Parcels in the Neponset River Watershed to be Considered for SCM Development for Nitrogen Pollution

Address	Parloc_ID	Catchment	Notes
219 Massapoag Ave	F_744820_2859540	109	Undeveloped land bordering Lake Massapoag.
181 Pond St	F_743482_2866485	109	Sharon High School. Multiple open spaces around the area.
75 Mountain St	F_746802_2864140	109	Sharon Middle School. Multiple open spaces around the area.
12-17 Farnham Rd	F_739433_2867371	146	Undeveloped land bordering a residential area. Parcel also borders a stream, so wetlands may be present. Recommend focusing assessment on section of parcel near the residential area.
000 Hixson Farm Rd	F_748823_2874491	0	Multi-family housing with multiple open spaces.

These results provide a valuable starting point for the next phase of requirements in Appendix H of the 2016 MS4 Permit which are due by the end of permit year 5 (6/30/2023), which include:

- "Evaluate all permittee-owned properties identified as presenting retrofit opportunities",
- "Provide a listing of planned structural BMPs and a plan and schedule for implementation", and
- "Any structural BMPs installed…by the permittee…shall be tracked and the permittee shall estimate the phosphorus removal by the BMP."

Appendix A: Impervious/DCIA Summary by Catchment

Table A-1. Impervious and DCIA Amounts for All Town Catchments in the Taunton River Watershed, Sorted by Impervious Area

Catchment Identifier	Impervious Area (Acres)	Percent Impervious	DCIA (Acres)	Percent DCIA
313	151.63	13.09	7.77	0.67
219	50.90	16.43	3.93	1.27
326	23.77	5.30	0.78	0.17
279	11.96	3.72	0.53	0.17
92	10.41	26.80	2.29	5.89
10	9.31	43.96	2.14	10.11
134	8.12	37.96	1.82	8.52
358	7.26	25.80	1.57	5.58
128	6.51	24.57	0.93	3.51
12	6.10	32.36	1.17	6.19
298	6.07	13.50	0.49	1.09
300	4.61	11.73	0.57	1.45
60	4.57	17.70	0.59	2.29
218	4.41	20.40	0.46	2.12
225	4.36	25.63	0.73	4.27
62	4.16	25.04	0.57	3.41
8	4.11	34.16	0.73	6.09
180	3.99	13.47	0.45	1.51
328	3.96	30.87	0.86	6.72
95	3.94	11.22	0.34	0.96
90	3.60	21.34	0.79	4.67
15	3.58	4.19	0.25	0.30
258	3.45	9.41	0.44	1.19
249	3.40	13.97	0.39	1.62
18	3.26	9.46	0.21	0.61
129	3.20	30.80	0.50	4.76
59	3.15	18.84	0.42	2.52
299	3.08	21.43	0.50	3.49
126	3.05	23.93	0.61	4.79

185	2.90	18.95	0.59	3.88
7	2.86	31.32	0.72	7.88
44	2.72	16.19	0.25	1.50
127	2.54	70.95	2.05	57.34
178	2.43	10.75	0.41	1.80
29	2.42	25.28	0.71	7.41
323	2.28	9.56	0.23	0.98
366	2.16	14.84	0.31	2.11
136	2.04	4.37	0.34	0.72
210	2.00	28.91	0.40	5.71
221	1.97	21.84	0.31	3.41
13	1.85	14.79	0.34	2.70
34	1.82	14.94	0.25	2.05
327	1.80	12.88	0.22	1.59
234	1.76	29.51	0.52	8.80
243	1.66	27.30	0.48	7.88
94	1.63	19.81	0.27	3.31
324	1.60	21.90	0.25	3.47
43	1.58	8.87	0.15	0.83
288	1.56	29.63	0.35	6.70
325	1.56	29.37	0.39	7.29
28	1.44	13.70	0.23	2.18
36	1.34	26.99	0.44	8.79
91	1.32	22.30	0.23	3.93
27	1.28	21.48	0.20	3.40
14	1.25	20.53	0.24	3.93
63	1.24	26.28	0.25	5.23
68	1.19	17.76	0.28	4.13
22	1.17	36.25	0.35	10.69
31	1.14	12.12	0.11	1.19
66	1.12	15.82	0.18	2.58
289	1.09	8.56	0.19	1.47

39	1.09	11.90	0.21	2.35
33	1.08	15.95	0.16	2.39
277	1.04	16.89	0.19	3.02
24	0.95	38.23	0.40	16.22
220	0.92	16.14	0.10	1.69
214	0.90	68.28	0.56	42.04
45	0.86	22.78	0.15	3.88
183	0.83	22.23	0.16	4.22
67	0.74	17.44	0.17	4.11
291	0.71	26.34	0.16	5.80
65	0.69	21.06	0.17	5.20
231	0.65	34.15	0.18	9.70
40	0.62	40.63	0.26	16.73
131	0.60	27.94	0.23	10.92
26	0.60	16.94	0.12	3.45
30	0.59	34.54	0.27	15.72
348	0.57	78.30	0.47	64.16
47	0.57	10.20	0.09	1.63
46	0.56	24.74	0.11	4.78
23	0.56	28.75	0.16	7.93
184	0.55	42.53	0.33	25.67
182	0.53	31.35	0.20	12.05
58	0.53	13.73	0.10	2.63
49	0.49	33.29	0.26	17.50
233	0.48	13.83	0.08	2.25
224	0.47	14.23	0.11	3.22
42	0.44	21.47	0.09	4.30
337	0.44	40.50	0.15	14.14
93	0.41	18.29	0.12	5.28
181	0.40	23.53	0.14	8.29
57	0.38	20.26	0.14	7.47
278	0.38	14.48	0.09	3.56

48	0.38	72.96	0.32	61.36
248	0.37	29.54	0.15	11.80
360	0.36	13.43	0.06	2.26
38	0.35	17.60	0.07	3.44
9	0.35	23.72	0.07	4.59
173	0.32	13.34	0.07	3.00
56	0.28	38.26	0.14	18.79
130	0.25	6.30	0.07	1.68
132	0.22	36.96	0.10	16.53
70	0.20	38.68	0.11	21.50
41	0.19	29.55	0.08	11.58
174	0.18	69.37	0.11	41.42
362	0.18	27.70	0.07	11.32
301	0.17	6.72	0.04	1.67
25	0.15	30.37	0.06	11.89
61	0.09	27.50	0.05	14.42
64	0.05	34.97	0.02	17.26
212	0.04	0.22	0.00	0.01
177	0.00	15.06	0.00	5.84
232	0.00	30.00	0.00	16.43

Table A-2. Impervious and DCIA Amounts for All Town Catchments in the Neponset River Watershed, Sorted by Impervious Area

Catchment Identifier	Impervious Area (Acres)	Percent Impervious	DCIA (Acres)	Percent DCIA
109	81.45	5.83	2.46	0.18
0	67.17	18.49	3.82	1.05
146	33.23	2.74	0.72	0.06
107	32.45	29.36	4.12	3.73
138	23.77	14.99	2.54	1.60
4	18.59	29.81	2.66	4.26
355	17.32	9.35	1.10	0.59

89	16.95	12.55	1.20	0.89
145	16.40	43.95	3.25	8.71
153	16.16	26.14	2.18	3.53
217	11.85	18.97	1.35	2.16
286	11.80	68.84	4.66	27.20
369	11.49	7.91	0.68	0.46
84	11.15	22.48	1.70	3.43
170	8.44	34.37	1.79	7.27
151	8.12	18.45	1.95	4.44
83	7.95	18.22	1.02	2.34
116	7.83	41.04	3.26	17.08
53	7.57	7.39	0.45	0.44
88	7.17	15.42	1.06	2.27
287	7.11	41.37	2.56	14.87
344	7.09	41.86	5.41	31.93
330	6.31	17.48	0.57	1.58
320	6.26	12.49	0.75	1.49
365	5.55	10.62	0.35	0.66
196	5.08	22.42	1.04	4.61
186	4.87	19.12	0.93	3.67
195	4.39	29.12	1.25	8.31
193	3.90	9.95	0.29	0.73
194	3.80	17.74	0.54	2.54
236	3.63	8.75	0.41	0.98
168	3.45	25.06	1.33	9.67
123	3.44	20.16	0.63	3.68
336	3.41	1.94	0.12	0.07
161	3.40	26.03	0.64	4.91
159	3.39	34.03	0.54	5.46
142	3.32	34.26	1.00	10.31
172	3.29	33.21	1.37	13.80
371	3.25	11.07	0.28	0.96

163	3.11	18.13	0.29	1.66
125	3.10	6.17	0.15	0.29
156	3.08	22.31	0.41	2.98
347	3.00	37.99	1.26	15.99
87	3.00	17.70	0.49	2.90
21	2.93	23.92	0.59	4.86
72	2.91	17.97	0.41	2.54
97	2.86	32.57	0.66	7.55
105	2.80	11.62	0.26	1.07
155	2.78	33.19	0.87	10.37
76	2.58	23.06	0.54	4.84
268	2.54	22.17	0.46	4.00
124	2.46	34.41	0.66	9.31
150	2.43	19.53	0.35	2.84
332	2.41	17.37	0.55	3.97
230	2.31	20.35	0.41	3.60
346	2.29	24.05	0.94	9.90
154	2.27	19.15	0.20	1.66
118	2.25	24.94	0.54	5.97
32	2.24	24.33	0.55	5.96
115	2.23	3.03	0.13	0.17
367	2.22	23.32	0.51	5.35
285	2.19	29.54	0.38	5.16
256	2.18	26.26	0.51	6.15
144	1.98	59.04	1.14	34.10
122	1.95	30.07	0.69	10.59
372	1.94	28.59	0.65	9.60
117	1.92	29.75	0.56	8.67
103	1.91	30.01	0.60	9.48
227	1.89	23.18	0.45	5.53
77	1.87	24.17	0.43	5.49
79	1.83	28.94	0.52	8.23

302	1.81	38.02	0.64	13.50
137	1.81	15.59	0.30	2.59
345	1.77	23.46	0.64	8.44
339	1.77	8.44	0.15	0.71
370	1.76	17.12	0.31	3.03
147	1.75	26.31	0.33	4.91
50	1.69	22.59	0.39	5.15
353	1.67	20.48	0.43	5.31
1	1.66	27.50	0.28	4.57
149	1.63	21.82	0.39	5.15
238	1.56	14.32	0.18	1.65
237	1.56	20.64	0.29	3.80
160	1.53	26.28	0.32	5.52
228	1.46	11.15	0.12	0.95
78	1.45	16.05	0.34	3.80
11	1.40	19.99	0.30	4.31
190	1.35	21.27	0.28	4.45
162	1.33	17.77	0.16	2.17
3	1.29	27.59	0.42	8.91
351	1.29	20.28	0.29	4.49
257	1.27	31.90	0.40	9.92
157	1.25	20.84	0.20	3.41
96	1.25	32.38	0.43	11.24
368	1.25	35.27	0.36	10.25
203	1.23	29.17	0.32	7.71
75	1.22	28.96	0.45	10.56
292	1.22	23.76	0.24	4.67
229	1.19	28.19	0.30	7.09
100	1.19	40.90	0.42	14.59
255	1.18	23.90	0.32	6.42
73	1.09	23.64	0.23	4.91
113	1.06	14.72	0.20	2.77

251	1.06	25.10	0.30	7.07
139	1.00	1.69	0.04	0.07
98	0.93	4.98	0.09	0.50
121	0.92	20.81	0.27	6.02
71	0.91	25.16	0.25	6.93
110	0.91	38.79	0.38	16.06
167	0.90	34.34	0.25	9.59
197	0.89	19.63	0.20	4.47
112	0.81	33.11	0.23	9.56
304	0.79	29.79	0.17	6.51
5	0.77	44.68	0.28	16.34
331	0.75	22.79	0.15	4.51
86	0.74	25.24	0.15	5.21
208	0.73	17.07	0.13	3.11
106	0.72	22.84	0.17	5.43
143	0.69	35.77	0.28	14.47
334	0.65	21.67	0.23	7.67
283	0.62	20.76	0.14	4.53
222	0.60	49.51	0.33	27.38
114	0.60	42.70	0.29	20.21
191	0.58	18.39	0.13	4.15
165	0.58	23.37	0.12	4.89
188	0.54	32.82	0.18	11.15
166	0.53	41.16	0.20	15.04
342	0.53	9.27	0.07	1.17
223	0.49	25.39	0.24	12.27
80	0.47	30.46	0.16	10.55
189	0.47	25.78	0.15	8.16
19	0.47	44.39	0.13	12.83
275	0.46	32.66	0.10	7.08
158	0.45	40.25	0.22	19.40
6	0.44	39.86	0.18	16.67

187	0.44	33.99	0.17	13.43
16	0.44	27.80	0.14	8.70
169	0.43	47.98	0.21	23.47
352	0.43	48.61	0.27	29.90
235	0.43	25.36	0.15	8.67
17	0.42	14.66	0.10	3.35
104	0.42	30.02	0.16	11.25
51	0.39	20.29	0.13	6.73
141	0.38	11.32	0.08	2.31
35	0.38	48.03	0.18	22.95
148	0.37	35.95	0.09	8.31
85	0.34	23.69	0.08	5.84
111	0.33	51.01	0.18	28.44
74	0.31	43.23	0.20	28.08
206	0.31	23.25	0.09	6.91
207	0.28	23.81	0.08	6.81
226	0.26	36.43	0.08	10.98
102	0.24	40.60	0.13	21.38
99	0.21	25.10	0.06	6.85
202	0.18	39.63	0.09	19.55
101	0.16	8.49	0.03	1.38
205	0.16	18.65	0.05	6.25
204	0.16	32.28	0.05	9.37
133	0.15	1.19	0.02	0.12
215	0.14	35.91	0.04	10.57
119	0.13	6.43	0.02	1.17
209	0.10	14.68	0.02	3.35
120	0.10	30.20	0.03	10.27
108	0.07	29.38	0.03	11.01
240	0.06	57.28	0.03	33.77
135	0.05	51.37	0.03	31.52
171	0.04	100.00	0.04	100.00

20	0.03	32.32	0.02	18.37
216	0.03	40.65	0.02	23.89
340	0.00	0.00	0.00	0.00

Appendix B: Estimated Phosphorus Loading Summary by Catchment

Table B-1. Estimated Phosphorus Loading for All Town Catchments in the Taunton River Watershed

Catchment Identifier	Estimated P Load (Lbs/Yr)
313	414.46
219	129.40
326	114.71
279	62.27
15	21.60
298	20.43
92	20.34
10	17.71
258	16.64
134	15.76
358	14.89
128	13.47
300	13.03
12	12.11
60	12.08
95	11.10
225	10.89
180	10.35
62	10.17
18	9.83
136	9.83
218	9.74
44	8.88
8	8.45
328	7.61
178	7.45
323	7.40
249	7.30
59	7.26
90	7.20
43	6.63
129	6.40
299	6.15
7	6.05
185	6.01
126	6.01
29	5.93
34	4.75
28	4.59
127	4.57
366	4.50
327	4.18
234	4.12
221	4.07
210	3.98
243	3.96
31	3.93
289	3.77
13	3.58
288	3.56
27	3.54
94	3.30
324	3.25
325	3.21
33	2.82
39	2.64
91	2.63
45	2.62
212	2.62
36	2.59

22	2.58
14	2.57
63	2.46
68	2.45
66	2.32
277	2.25
58	1.96
233	1.95
130	1.95
220	1.93
24	1.79
183	1.69
214	1.62
47	1.52
67	1.50
40	1.47
42	1.45
65	1.41
291	1.40
46	1.35
30	1.29
231	1.25
360	1.23
131	1.23
182	1.22
26	1.21
49	1.14

23	1.12
224	1.09
348	1.04
184	1.01
278	0.87
93	0.86
337	0.83
57	0.82
181	0.78
248	0.77
38	0.72
48	0.72
9	0.71
173	0.70
56	0.56
41	0.52
132	0.44
301	0.38
70	0.37
362	0.35
174	0.32
25	0.29
61	0.19
64	0.09
177	0.01
232	0.00

Table B-2. Estimated Phosphorus Loading for All Town Catchments in the Neponset River Watershed

Catchment Identifier	Estimated P Load (Lbs/Yr)
109	282.79
146	213.65
0	168.09
107	81.44
138	56.79
355	56.78
89	42.53
153	41.55
4	38.91
217	34.34
145	33.99
369	31.97
53	31.27
336	28.90
286	22.73
84	22.08
320	19.30
151	18.71
170	17.27
88	17.07
344	16.73
83	16.28
365	15.46
330	14.96
116	14.75
287	14.64
125	13.12
193	12.45
115	11.47
186	10.98
196	10.06
139	9.88
371	9.39
161	9.21
163	8.82
105	8.60
195	8.34
236	8.29
194	7.91
156	7.75
159	7.69
168	7.44
347	7.12
142	7.05
154	6.96
123	6.87
21	6.76
172	6.71
346	6.33
332	6.27
87	6.05
72	5.96
155	5.90
150	5.85
97	5.71
32	5.59
285	5.52
230	5.31
256	5.22
76	5.12
370	5.08
268	5.06
345	5.02
228	4.86
147	4.77
124	4.72
144	4.47
137	4.45
367	4.41
118	4.40
50	4.37
149	4.24
339	4.19
160	4.05
1	3.88
122	3.88
237	3.80
77	3.78
162	3.76
117	3.75

227	3.71
372	3.69
103	3.67
79	3.54
302	3.45
238	3.43
203	3.34
353	3.32
157	3.13
78	2.90
257	2.84
11	2.83
255	2.82
190	2.76
351	2.66
3	2.64
98	2.44
368	2.42
292	2.42
96	2.40
75	2.37
229	2.33
113	2.28
100	2.27
73	2.20
342	2.19
251	2.08
71	1.99
304	1.99
133	1.90
167	1.89
197	1.88
121	1.81
112	1.77
110	1.70
208	1.68
143	1.56
331	1.51
86	1.48
334	1.47
5	1.46
165	1.46
106	1.44
283	1.33
222	1.22

223	1.18
191	1.18
114	1.15
166	1.08
188	1.04
275	0.97
80	0.92
189	0.92
206	0.91
158	0.89
19	0.89
51	0.88
235	0.88
148	0.86
17	0.86
16	0.86
169	0.85
6	0.84
187	0.84
141	0.82
104	0.80
352	0.79
35	0.74
85	0.68
119	0.65
207	0.62
111	0.60
74	0.60
226	0.52
205	0.52
102	0.45
99	0.43
204	0.42
202	0.42
101	0.37
215	0.28
209	0.21
120	0.19
108	0.13
240	0.10
135	0.09
171	0.08
20	0.07
216	0.05
340	0.01

Appendix C: Estimated Nitrogen Loading Summary by Catchment

Table C-1. Estimated Nitrogen Loading for All Catchments in the Taunton River Watershed

Catchment Identifier	Estimated N Load (Lbs/Yr)
313	3258.92
219	1129.02
326	778.47
279	496.81
298	191.83
92	155.36
15	138.30
10	135.85
136	122.48
134	120.34
358	110.66
60	108.65
300	107.55
128	103.42
12	91.93
95	89.46
18	86.60
62	85.13
225	84.45
180	84.09
218	76.67
44	69.82
178	68.84
258	66.65
8	65.73
328	58.56
59	57.84
249	56.37
90	54.70
323	53.21
43	52.54
29	51.19
129	48.70
7	47.46
299	46.92
126	45.88
212	45.63
185	44.61
289	43.79
28	41.95
34	40.86
127	36.10
366	35.07
31	35.03
234	34.89
243	34.01
327	31.36
27	31.14
210	30.25
221	29.84
13	29.27
288	27.31
325	25.38
94	24.97
33	24.91
324	24.69
39	23.47
22	21.19
45	20.64
91	20.26

14	20.18
36	19.97
63	18.50
68	18.39
58	17.78
66	17.74
277	16.24
233	15.81
220	14.39
24	13.84
214	12.84
183	12.58
40	12.09
360	11.98
47	11.84
42	11.67
67	11.42
65	10.99
30	10.93
46	10.90
291	10.56
182	10.29
49	9.63
231	9.52
26	9.28
131	8.88
224	8.59

23	8.43
348	8.11
184	7.92
57	6.47
93	6.39
337	6.33
248	6.20
181	6.15
278	6.01
48	5.85
38	5.47
9	5.29
173	5.12
130	4.62
56	4.48
41	4.40
132	3.44
301	3.12
70	2.90
362	2.66
174	2.56
25	2.19
61	1.34
64	0.69
177	0.05
232	0.01

Table C-2. Estimated Nitrogen Loading for All Catchments in the Neponset River Watershed

Catchment Identifier	Estimated N Load (Lbs/Yr)
109	3539.67
146	2024.23
0	1284.81
107	683.33
336	470.07
355	444.65
138	403.49
153	352.96
53	327.44
217	326.75
89	325.42
4	303.16
145	257.39
369	226.56
286	180.12
84	168.69
320	166.03
151	148.37
170	131.03
83	125.89
287	115.86
116	115.62
330	114.47
88	112.87
193	110.69
139	106.89
344	103.18
365	99.91
105	87.39
125	78.56
196	76.94
161	76.83
163	75.31
186	74.79
156	67.66
195	65.13
236	63.30
159	62.86
115	61.69
332	61.47
194	60.62
154	59.26
142	58.14
21	56.57
172	54.74
371	54.60
123	52.54
168	51.80
150	50.21
346	50.04
32	48.33
347	47.53
155	47.22
87	46.61
285	45.93
72	45.50
256	44.90
97	44.52
230	43.80
133	41.87
147	39.05
76	38.94
268	38.55
345	37.85
149	37.05
50	36.53
124	36.03
137	35.54
367	34.17
162	34.01
160	33.94
118	33.78
370	31.39
228	31.38
339	31.11
1	30.61
237	30.55
144	29.87
122	28.83
372	28.82
117	28.55
227	28.52
103	28.26
77	28.17
157	27.91
79	27.16

302	26.40
238	26.22
255	25.73
353	25.53
257	24.44
78	22.67
11	21.50
342	21.06
190	20.86
203	20.85
351	19.79
3	19.23
98	18.51
96	18.39
292	18.32
368	18.28
75	18.16
229	17.97
100	17.28
113	16.87
73	16.61
304	16.05
251	15.87
71	15.72
334	14.82
167	14.74
121	13.97
197	13.70
110	13.21
112	12.65
165	12.64
208	11.89
331	11.80
143	11.39
5	11.21
86	11.11
106	10.89
223	10.39
283	10.28
222	10.09
191	8.97
114	8.75

166	8.45
188	7.89
275	7.40
148	7.16
158	7.09
80	7.01
189	6.98
19	6.84
17	6.70
169	6.69
16	6.53
187	6.46
235	6.43
6	6.41
141	6.30
352	6.23
104	6.18
51	6.00
35	5.51
206	5.46
85	5.24
74	4.82
111	4.70
226	4.57
207	4.44
102	3.46
99	3.08
205	3.07
101	2.83
202	2.82
204	2.61
119	2.36
215	2.11
209	1.56
120	1.42
108	1.00
240	0.80
135	0.66
171	0.63
20	0.51
216	0.44
340	0.03

Appendix D: Town-Owned Parcels Sorted by the NSP BMP Tool's Phosphorus Priority Ranking

Table D-1. Town-Owned Parcels Sorted by BMP Tool Priority Score for Phosphorus Removal

Address	Parloc_ID	Use Description	BMP Tool Priority Score (Max Score = 1)
81R MANSFIELD ST	F_742301_2853663	Municipal Vacant	1.0000
2601 BAY RD	F_754005_2851972	Municipal, Federal, or State	1.0000
202 MORSE ST	F_744619_2857143	Municipal Vacant	1.0000
156 MOUNTAIN ST	F_748693_2862642	Municipal Vacant	1.0000
56R COTTAGE ST	F_745542_2868042	Municipal Vacant	1.0000
35 HIGH PLAIN ST	F_736193_2877857	Municipal Vacant	1.0000
20 CEDAR ST	F_742250_2865173	Municipal Vacant	1.0000
000 FARNHAM RD	F_739762_2866417	Municipal Vacant	1.0000
57 OAK HILL DR	F_749477_2865823	Municipal Vacant	1.0000
22 OAK HILL DR	F_750786_2866174	Municipal Vacant	1.0000
36 MONT FERN AVE	F_741016_2877403	Municipal Vacant	1.0000
0 MONT FERN AVE	F_741609_2876784	Municipal Vacant	1.0000
19 TRACEY LN	F_744039_2850654	Municipal Vacant	0.9706
61 GAVINS POND RD	F_732830_2856195	Municipal Vacant	0.9706
12 MINK TRAP LN	F_735015_2856905	Municipal Vacant	0.9706
165 MORSE ST	F_745138_2858440	Municipal Vacant	0.9706
8R LU STUBBS LN	F_748734_2867686	Municipal Vacant	0.9706
15 HICKORY WAY	F_749665_2865190	Municipal Vacant	0.9706
45 SANDY RIDGE CIR	F_737416_2865984	Municipal Vacant	0.9706
25 OAK HILL DR	F_749774_2866963	Municipal Vacant	0.9706
9R LU STUBBS LN	F_748291_2867821	Municipal Vacant	0.9706
000 CREST RD WAY	F_747703_2871001	Municipal Vacant	0.9706
13 GINGER WAY	F_750782_2873234	Municipal Vacant	0.9706
195 GAVINS POND RD	F_734467_2855143	Municipal, Federal, or State	0.9617
68R MOHAWK ST	F_739391_2859128	Municipal Vacant	0.9617
5 MANOR LN	F_745941_2863767	Municipal Vacant	0.9617
66A R MASSAPOAG AVE	F_745879_2864293	Municipal Vacant	0.9617
74 ASPEN RD	F_751646_2863863	Municipal Vacant	0.9617
26 OAK HILL DR	F_750386_2865809	Municipal Vacant	0.9617
154A BILLINGS ST	F_746720_2869914	Municipal Vacant	0.9617
93R MANSFIELD ST	F_741519_2852418	Municipal Vacant	0.9556
164 FURNACE ST	F_735286_2854594	Municipal Vacant	0.9556
10 HILLSIDE AVE	F_742480_2870789	Municipal Vacant	0.9556
368R NORTH MAIN ST	F_748831_2875924	Municipal Vacant	0.9517
000 MANSFIELD ST	F_742894_2854303	Municipal Vacant	0.9517
10 BRAMBLE LN	F_746574_2854692	Municipal Vacant	0.9517
30 COBBLESTONE RD	F_736551_2854717	Municipal Vacant	0.9517
29 BRIAR HILL RD	F_746081_2855285	Municipal Vacant	0.9517

110 FURNACE ST	F_735676_2855563	Municipal Vacant	0.9517
2 MASSASOIT RD	F_743240_2849628	Municipal Vacant	0.9517
2589 BAY RD	F_753939_2852348	Municipal Vacant	0.9517
169R MANSFIELD ST	F_740971_2852149	Municipal Vacant	0.9517
235R WOLOMOLOPOAG ST	F_737072_2857582	Municipal Vacant	0.9517
195 WOLOMOLOPOAG ST	F_736897_2858103	Municipal Vacant	0.9517
250 EAST FOXBORO ST	F_741304_2859546	Municipal Vacant	0.9517
110 LAKEVIEW ST	F_742746_2860263	Municipal Vacant	0.9517
R LAKEVIEW ST	F_742912_2860383	Municipal Vacant	0.9517
000 CHESSMAN DR	F_753287_2864013	Municipal Vacant	0.9517
156 OAK HILL DR EXT	F_751853_2864443	Municipal Vacant	0.9517
5 KINGS RD	F_753636_2862792	Municipal Vacant	0.9517
1571 BAY RD	F_753988_2860878	Municipal Vacant	0.9517
252R MOUNTAIN ST	F_752436_2861779	Municipal Vacant	0.9517
89 OAK HILL DR	F_749999_2865226	Municipal Vacant	0.9517
45 BLAIR CIR	F_728089_2865306	Municipal Vacant	0.9517
45R BLAIR CIR	F_727189_2865910	Municipal Vacant	0.9517
149 EDGE HILL RD	F_740260_2879024	Municipal Vacant	0.9517
1 HIXSON FARM RD	F_749010_2873826	Municipal Vacant	0.9517
55 RICHARDS AVE	F_744073_2874831	Municipal Vacant	0.9517
368R NORTH MAIN ST	F_748831_2875924	Municipal Vacant	0.9517
R EDGE HILL RD	F_742120_2877786	Municipal Vacant	0.9517
28R KING PHILIP RD	F_741134_2853987	Municipal Vacant	0.9056
6 BRAMBLE LN	F_746016_2855046	Municipal Vacant	0.9056
1 KING PHILIP RD	F_739527_2856020	Municipal Vacant	0.9056
200 GAVINS POND RD	F_735061_2855974	Municipal Vacant	0.9056
62R UPLAND RD	F_740632_2871135	Municipal Vacant	0.9056
27 PHEASANT WOOD RD	F_739866_2877027	Municipal Vacant	0.9056
81R MANSFIELD ST	F_741592_2854073	Municipal Vacant	0.8987
71R MANSFIELD ST	F_741266_2854534	Municipal Vacant	0.8987
R R BRIAR HILL RD	F_746684_2854982	Municipal Vacant	0.8987
20 MASSASOIT RD	F_744033_2849555	Municipal Vacant	0.8987
2 CANOE RIVER RD	F_740337_2856607	Municipal Vacant	0.8987
60R FURNACE ST	F_736379_2857770	Municipal Vacant	0.8987
30 GAVINS POND RD	F_732640_2858205	Municipal Vacant	0.8987
147 BEACH ST	F_741262_2863765	Municipal Vacant	0.8987
247 SOUTH WALPOLE ST	F_728638_2864060	Municipal Vacant	0.8987
223 HAMPTON RD	F_749533_2860729	Municipal Vacant	0.8987
115 OLD POST RD	F_731859_2861629	Municipal Vacant	0.8987
59 EISENHOWER DR	F_753087_2862449	Municipal Vacant	0.8987

100A HAMPTON RD	F_751405_2864880	Municipal Vacant	0.8987
32 COMMERCIAL ST	F_728590_2866020	Municipal Vacant	0.8987
R HUNTERS RIDGE RD	F_746970_2872539	Municipal Vacant	0.8987
90 MASKWONICUT ST	F_742493_2873615	Municipal Vacant	0.8987
28 RICHARDS AVE	F_743385_2874854	Municipal Vacant	0.8987
000 CANTON ST	F_747089_2877054	Municipal Vacant	0.8987
15 RED FOX RUN	F_741633_2850899	Municipal Vacant	0.8907
25R CONDOR RD	F_741769_2856068	Municipal Vacant	0.8907
11 RHODES AVE	F_744572_2874129	Municipal Vacant	0.8907
40 GAVINS POND RD	F_732420_2858438	Municipal Vacant	0.8873
179R MORSE ST	F_744829_2858764	Municipal Vacant	0.8873
9 CHIPPEWA LN	F_736885_2859553	Municipal Vacant	0.8873
5 PINE ST	F_729367_2867164	Municipal Vacant	0.8873
000 BILLINGS ST	F_747992_2869967	Municipal Vacant	0.8873
R GREENWOOD RD	F_743534_2872846	Municipal Vacant	0.8873
7R HOLLY LN	F_733362_2857603	Municipal Vacant	0.8731
10 SAMOSET LN	F_734878_2858644	Municipal Vacant	0.8731
154 WOLOMOLOPOAG ST	F_736036_2859279	Single family residence	0.8731
36R NORFOLK PL	F_738097_2862400	Municipal Vacant	0.8731
000 HILLSIDE AVE	F_742323_2871110	Municipal Vacant	0.8731
25 EAST FOXBORO ST	F_740099_2865370	Municipal Vacant	0.8713
30 EAST FOXBORO ST	F_741450_2865494	Municipal Vacant	0.8713
424 EAST FOXBORO ST	F_739970_2856587	Municipal Vacant	0.8454
411 EAST FOXBORO ST	F_739584_2857473	Municipal Vacant	0.8432
12-17 FARNHAM RD	F_739433_2867371	Municipal Vacant	0.8432
263 SOUTH WALPOLE ST	F_728628_2864611	Single family residence	0.8432
000 MINUTE MAN RD	F_745432_2865931	Municipal Vacant	0.8432
11 COMMERCIAL ST	F_727836_2866320	Municipal Vacant	0.8432
000 CREST RD WAY	F_747311_2871703	Municipal Vacant	0.8432
00N EDGE HILL RD	F_740956_2883132	Municipal Vacant	0.8432
69 AZALEA RD	F_749205_2863988	Single family residence	0.8321
1300 GENERAL EDWARDS HWY	F_727425_2866053	Municipal Vacant	0.8321
50R GAVINS POND RD	F_733458_2858246	Municipal Vacant	0.7762
161 EDGE HILL RD	F_740738_2879041	Municipal Vacant	0.7762
71 CHESTNUT ST	F_741093_2868324	Condominium	0.7748
17R OLD WOLOMOLOPOAG ST	F_737558_2854803	Municipal Vacant	0.7707
1969R BAY RD	F_752925_2857431	Municipal Vacant	0.7707
150 LAKEVIEW ST	F_743319_2859123	Municipal Vacant	0.7707
231 MASSAPOAG AVE	F_745642_2859866	Municipal Vacant	0.7707
36R NORFOLK PL	F_738283_2863101	Municipal Vacant	0.7707

50R BRADFORD AVE	F_742921_2867873	Municipal Vacant	0.7707
148 BROOK RD	F_748090_2870746	Municipal Vacant	0.7707
000 CREST RD WAY	F_746557_2871261	Municipal Vacant	0.7707
83 BELCHER ST	F_748158_2872421	Municipal Vacant	0.7707
000 EDGE HILL RD	F_742029_2882379	Municipal Vacant	0.7707
279 NORTH MAIN ST	F_746998_2874831	Municipal Vacant	0.7707
203 EDGE HILL RD	F_742288_2878572	Municipal Vacant	0.7707
207 EDGE HILL RD	F_742487_2878677	Municipal Vacant	0.7707
15 ATHERTON LN	F_732469_2856557	Municipal Vacant	0.7455
276 MOUNTAIN ST	F_750375_2859573	Municipal Vacant	0.7455
35 QUINCY ST	F_744701_2866134		0.7455
000 EDGE HILL RD	F_742705_2884731	Municipal Vacant	0.7396
2 HORIZONS RD	F_744701_2856117	Municipal Vacant	0.7396
356 MANSFIELD ST	F_744004_2846512	Municipal Vacant	0.7396
000 EAST FOXBORO ST	F_739255_2856827		0.7396
226 HAMPTON RD	F_749728_2860097	Municipal Vacant	0.7396
45 MOHAWK ST	F_739641_2861069	Municipal Vacant	0.7396
64 EISENHOWER DR	F_753139_2861284	Municipal Vacant	0.7396
157 EDGE HILL RD	F_740514_2879086	Municipal Vacant	0.7396
000 EDGE HILL RD	F_742705_2884731	Municipal Vacant	0.7396
249 NORTH MAIN ST	F_746191_2874642	Municipal Vacant	0.7396
233 FURNACE ST	F_734950_2853769	Municipal Vacant	0.7174
80R CANNON BALL RD	F_735715_2855887	Municipal Vacant	0.7139
348 MANSFIELD ST	F_743933_2846651	Municipal Vacant	0.7139
340 MANSFIELD ST	F_743861_2846782	Municipal Vacant	0.7139
16 BAREFOOT HILL RD	F_735565_2859051	Municipal Vacant	0.7139
205 EAST FOXBORO ST	F_740564_2860990	Municipal Vacant	0.7139
25 MOHAWK ST	F_740126_2861414	Municipal Vacant	0.7139
25R MOHAWK ST	F_739801_2861684	Municipal Vacant	0.7139
10 CHESSMAN DR	F_755336_2864058	Municipal Vacant	0.7139
20R PLEASANT ST	F_742480_2871096	Municipal Vacant	0.7139
15 CANTON ST	F_747505_2875862	Municipal Vacant	0.7139
340R MANSFIELD ST	F_744279_2847005	Municipal Vacant	0.7077
17 DRAKE CIR	F_745173_2848221	Municipal Vacant	0.7077
229 LAKEVIEW ST	F_743509_2856005	Municipal Vacant	0.7077
37R MASKWONICUT ST	F_743968_2874214	Municipal Vacant	0.7077
21R GAVINS POND RD	F_732166_2858853	Municipal Vacant	0.6917
51 LAKEVIEW ST	F_742053_2860670	Municipal Vacant	0.6917
161 BILLINGS ST	F_746019_2867966	Municipal Vacant	0.6917
0 EDGE HILL RD	F_741047_2881390	Municipal Vacant	0.6917
219 MASSAPOAG AVE	F_744820_2859540	Municipal, Federal, or State	0.6868
13 KING PHILIP RD	F_740402_2855017	Municipal Vacant	0.6862

49 KNOB HILL ST	F_744803_2850440	Municipal Vacant	0.6841
3R PRESCOTT RD	F_740047_2859513	Municipal Vacant	0.6841
000 SOUTH MAIN ST	F_736621_2861304	Municipal Vacant	0.6841
48R BELCHER ST	F_750521_2872993	Municipal Vacant	0.6841
13 DRAKE CIR	F_745406_2848188		0.6650
301 HAMPTON RD	F_749007_2863857	Municipal Vacant	0.6642
12 UPLAND RD	F_741646_2870888	Municipal Vacant	0.6642
400 EAST FOXBORO ST	F_740508_2856795	Municipal Vacant	0.6231
100 GAVINS POND RD	F_734526_2856547	Municipal Vacant	0.6231
25 MANOMET RD	F_738432_2859436	Municipal Vacant	0.6231
11 CEDAR PARK RD	F_740605_2864444	Municipal Vacant	0.6231
146 EAST FOXBORO ST	F_741235_2862628	Municipal Vacant	0.6231
299R EAST ST	F_748990_2868701	Municipal Vacant	0.6231
171 AMES ST	F_746237_2866814	Municipal Vacant	0.6231
25 BEACH ST	F_742819_2865729	Municipal Vacant	0.6231
192 BILLINGS ST	F_747452_2869425	Municipal Vacant	0.6231
15 TREE LN	F_741781_2871438	Municipal Vacant	0.6231
000 RR R/W #36	F_743185_2873239	Municipal Vacant	0.6231
288R NORTH MAIN ST	F_747363_2875384	Municipal Vacant	0.6231
409 EAST FOXBORO ST	F_740416_2857003	Municipal Vacant	0.5862
24 CASTLE DR	F_754609_2861990	Municipal Vacant	0.5862
360 MANSFIELD ST	F_743571_2846158	Municipal Vacant	0.5804
4 BRAMBLE LN	F_745793_2854932		0.5804
25 BLACK ELK RD	F_737624_2855229	Municipal Vacant	0.5804
50 CONDOR RD	F_742594_2856213	Municipal Vacant	0.5804
14 MATTAKESETT CIR	F_745085_2850000	Municipal Vacant	0.5804
20 TRACEY LN	F_743761_2851072	Municipal Vacant	0.5804
135 BEACH ST	F_741679_2864027	Municipal Vacant	0.5804
141 EAST FOXBORO ST	F_740454_2862892	Municipal Vacant	0.5804
117 EAST FOXBORO ST	F_740938_2863390	Municipal Vacant	0.5804
43 CASTLE DR	F_753793_2863469	Municipal Vacant	0.5804
19 CATTAIL LN	F_752558_2863570	Municipal Vacant	0.5804
00 LOTHRUP WAY	F_747091_2868142	Municipal Vacant	0.5804
00 LOTHRUP WAY	F_746759_2868279	Municipal Vacant	0.5804
200R EAST ST	F_747365_2868222	Municipal Vacant	0.5804
000 BIRCHWOOD CIR	F_750716_2866835	Municipal Vacant	0.5804
2 MASSAPOAG AVE	F_744279_2865480	Municipal Vacant	0.5804
000 SHEILA RD	F_753171_2865631	Municipal Vacant	0.5804
000 TAMARACK WAY	F_749502_2866314	Municipal Vacant	0.5804
16R HIGH ST	F_743810_2870593		0.5804
138 BROOK RD	F_747769_2870808	Municipal Vacant	0.5804
000 UPLAND RD	F_741907_2871259	Municipal Vacant	0.5804
60 HUNTINGTON AVE	F_746322_2872336	Municipal Vacant	0.5804

16 BELLA RD	F_745713_2872954	Municipal Vacant	0.5804
26 POND VIEW CIR	F_746555_2874710	Municipal Vacant	0.5804
263 NORTH MAIN ST	F_746679_2874720	Municipal Vacant	0.5804
9 PHEASANT WOOD RD	F_739043_2877221	Municipal Vacant	0.5804
21 SOUTH PLEASANT ST	F_742480_2869932	Municipal, Federal, or State	0.5575
9 KNOB HILL ST	F_745163_2849356	Municipal Vacant	0.5406
000 MASSAPOAG AVE	F_745551_2850205	Municipal Vacant	0.5406
5 GROVE AVE	F_741142_2863748	Municipal Vacant	0.5406
000 MASSAPOAG AVE	F_744490_2865079	Municipal Vacant	0.5406
19 QUINCY ST	F_745089_2866519	Municipal Vacant	0.5406
303 SOUTH WALPOLE ST	F_727390_2864731	Municipal Vacant	0.5372
000 MASSAPOAG AVE	F_745373_2849853	Municipal Vacant	0.5278
93R MANSFIELD ST	F_741398_2853001	Municipal Vacant	0.5278
25 CONDOR RD	F_741995_2856539	Municipal Vacant	0.5278
9R FALCON RD	F_740144_2859207	Municipal Vacant	0.5278
14 HARDING ST	F_740903_2864341	Municipal Vacant	0.5278
18 CASTLE DR	F_754762_2861537	Municipal Vacant	0.5278
60 CEDAR ST	F_741506_2864923	Municipal Vacant	0.5278
38 GUNHOUSE ST	F_741346_2866035	Municipal Vacant	0.5278
R CHERYL DR	F_746555_2873493	Municipal Vacant	0.5278
7 POND VIEW CIR	F_746480_2874181	Municipal Vacant	0.5278
000 MANSFIELD ST	F_744182_2846473	Municipal Vacant	0.5111
49 CONDOR RD	F_742365_2856009	Municipal Vacant	0.5111
11 MATTAKESETT CIR	F_745156_2849803	Municipal Vacant	0.5111
93R MANSFIELD ST	F_741384_2853059	Municipal Vacant	0.5111
80 RICHARDS AVE	F_744140_2876092	Municipal Vacant	0.5111
27 IRON HOLLOW RD	F_733366_2855446	Municipal Vacant	0.5093
80 CANNON BALL RD	F_735889_2855971	Municipal Vacant	0.5093
9R MATTAKESETT CIR	F_745316_2849585	Municipal Vacant	0.5093
22A HOWARD FARM RD	F_744728_2851488	Municipal Vacant	0.5093
000 FURNACE ST	F_735153_2853359	Municipal Vacant	0.5093
177 FURNACE ST	F_735035_2853597	Municipal Vacant	0.5093
0000 UNKNOWN	F_732023_2857050	Municipal Vacant	0.5093
30 FURNACE ST	F_735907_2858392	Municipal Vacant	0.5093
37 FURNACE ST	F_735798_2858456	Municipal Vacant	0.5093
20 FURNACE ST	F_736054_2858554	Municipal Vacant	0.5093
950 SOUTH MAIN ST	F_730833_2858647	Municipal Vacant	0.5093
25 FURNACE ST	F_735997_2858640	Municipal Vacant	0.5093
16 GAVINS POND RD	F_733031_2859405	Municipal Vacant	0.5093
121 WOLOMOLOPOAG ST	F_735535_2859521	Municipal Vacant	0.5093

115 WOLOMOLOPOAG ST	F_735374_2859661	Municipal Vacant	0.5093
000 LEE RD	F_737354_2862870	Municipal Vacant	0.5093
135 EAST FOXBORO ST	F_739881_2863100	Municipal Vacant	0.5093
R ESSEX RD	F_739216_2863473	Municipal Vacant	0.5093
73 ASPEN RD	F_752234_2863585	Municipal Vacant	0.5093
21 LAKEVIEW ST	F_741155_2861057	Municipal Vacant	0.5093
000 SOUTH WALPOLE ST	F_730138_2862382	Municipal Vacant	0.5093
26 STURGES RD	F_741116_2862289	Municipal Vacant	0.5093
R OLD POST RD	F_730043_2862492	Municipal Vacant	0.5093
284R NORTH MAIN ST	F_747254_2875439	Municipal Vacant	0.5093
276 NORTH MAIN ST	F_746857_2875396	Municipal Vacant	0.5093
000 RR R/W #26	F_740019_2866612	Municipal Vacant	0.5093
75 MOUNTAIN ST	F_746802_2864140	Municipal, Federal, or State	0.5093
000 HAMPSHIRE AVE	F_737634_2865147	Municipal Vacant	0.5093
82 GUNHOUSE ST	F_743435_2865718	Municipal, Federal, or State	0.5093
000 FARNHAM RD	F_739611_2866200	Municipal Vacant	0.5093
80 GUNHOUSE ST	F_742637_2865969	Municipal Vacant	0.5093
000 FARNHAM RD	F_739646_2866383	Municipal Vacant	0.5093
17 SANDY RIDGE CIR	F_739087_2866377	Municipal Vacant	0.5093
19 FLINTLOCK RD	F_740153_2866702	Municipal Vacant	0.5093
154 BROOK RD	F_748211_2870585	Municipal Vacant	0.5093
38 NORWOOD ST	F_741226_2872478	Municipal Vacant	0.5093
83R BELCHER ST	F_747911_2872776	Municipal Vacant	0.5093
265 NORTH MAIN ST	F_747279_2873534	Municipal Vacant	0.5093
93R MANSFIELD ST	F_741492_2853044	Municipal Vacant	0.4761
R MANSFIELD ST	F_741463_2853082	Municipal Vacant	0.4761
93R MANSFIELD ST	F_741392_2853176	Municipal Vacant	0.4761
000 SOUTH WALPOLE ST	F_730223_2862001	Municipal Vacant	0.4761
17 COMMERCIAL ST	F_727640_2866647	Municipal Vacant	0.4733
428 EAST FOXBORO ST	F_739858_2856503	Municipal Vacant	0.4686
315 EAST FOXBORO ST	F_740328_2857660	Municipal Vacant	0.4686
000 RR R/W #35	F_742257_2871624	Municipal Vacant	0.4686
438 MASSAPOAG AVE	F_745464_2854784	Municipal Vacant	0.4491
2 KING PHILIP RD	F_739826_2856186	Municipal Vacant	0.4491
000 RR R/W	F_739468_2862952	Municipal Vacant	0.4491
63 HARDING ST	F_741791_2863913	Municipal Vacant	0.4491
12 CEDAR PARK RD	F_740733_2864527		0.4491
211-215 SOUTH MAIN ST	F_740626_2866882	Municipal, Federal, or State	0.4491

100 COTTAGE ST	F_745366_2867130	Municipal Vacant	0.4491
	F_740321_2867729		0.4491
421 EAST FOXBORO ST	F_739283_2856866	Municipal Vacant	0.3905
45R MOHAWK ST	F_739494_2861338	Municipal Vacant	0.3905
00N EDGE HILL RD	F_741337_2883417	Municipal Vacant	0.3905
32 BLUEBERRY LN	F_739343_2877865	Municipal Vacant	0.3873
0 MOOSE HILL ST	F_740358_2868870	Municipal Vacant	0.3670
000 FURNACE ST	F_733791_2857073	Municipal Vacant	0.3452
4 DRY POND RD	F_755908_2862923	Municipal Vacant	0.3452
21R MOHAWK ST	F_739826_2862024	Municipal Vacant	0.3452
192R BILLINGS ST	F_747569_2869668	Municipal Vacant	0.3452
17 HAMPSHIRE AVE	F_737594_2865195	Municipal Vacant	0.3231
175 POND ST	F_743832_2867003	Municipal Vacant	0.3118
7 COW HILL RD	F_741937_2854578	Municipal Vacant	0.2902
4 CANOE RIVER RD	F_740756_2856470	Municipal Vacant	0.2902
000 FURNACE ST	F_733994_2857288	Municipal Vacant	0.2902
000 SOUTH MAIN ST	F_737236_2860624	Municipal Vacant	0.2902
000 SOUTH MAIN ST	F_737277_2860683	Municipal Vacant	0.2902
72 UPLAND RD	F_740335_2871365	Municipal Vacant	0.2902
0 MOOSE HILL ST	F_734343_2867027	Municipal Vacant	0.2667
181 POND ST	F_743482_2866485	Municipal, Federal, or State	0.2667
31 BEACH ST	F_744100_2865803	Municipal Vacant	0.2667
000 HIXSON FARM RD	F_748823_2874491	Municipal, Federal, or State	0.2446
10 STATION ST	F_742792_2869750	Municipal Vacant	0.2434
28 MOHAWK ST	F_739925_2860992	Municipal Vacant	0.2072
000 SOUTH MAIN ST	F_738974_2861786	Municipal Vacant	0.1918
12 BURNT BRIDGE RD	F_738703_2856324	Municipal Vacant	0.1804
9A PILGRIM DR	F_741170_2860607	Municipal Vacant	0.1804
3 HAMPSHIRE AVE	F_738025_2864859	Municipal Vacant	0.1804
90 SOUTH MAIN ST	F_742949_2869110		0.1554
75 AMES ST	F_744597_2866799	Municipal Vacant	0.1374
51R MANSFIELD ST	F_744070_2853471	Municipal Vacant	0.1369
139R EAST FOXBORO ST	F_740028_2862568	Municipal Vacant	0.1369
R LEE RD	F_737411_2861853	Municipal Vacant	0.1369
154R WOLOMOLOPOAG ST	F_736502_2859897	Municipal Vacant	0.1336
100 WOLOMOLOPOAG ST	F_735709_2860358	Municipal Vacant	0.1336
36A WILSHIRE DR	F_751124_2867569	Municipal Vacant	0.1336
80 SOUTH MAIN ST	F_742939_2869320	Municipal Vacant	0.1336
18 BILLINGS ST	F_743682_2870149	Municipal Vacant	0.1336
11 NORTH MAIN ST	F_743449_2870424		0.1336

16 HIGH ST	F_743761_2870497		0.1336
1 SCHOOL ST	F_743498_2871060	Municipal, Federal, or State	0.1336
135R UPLAND RD	F_738814_2871348	Municipal Vacant	0.1336
	F_745669_2860341		0.1336
15 FORGE RD	F_735397_2853345	Municipal Vacant	0.0637
72A FURNACE ST	F_735802_2857451	Municipal Vacant	0.0637
21 GAVINS POND RD	F_732527_2858913	Municipal Vacant	0.0637
810 SOUTH MAIN ST	F_731696_2859461	Municipal Vacant	0.0637
10 GAVINS POND RD	F_732779_2859651	Municipal Vacant	0.0637
355A EAST FOXBORO ST	F_741050_2857206	Municipal Vacant	0.0637
0 CHESTNUT ST	F_741969_2870583	Municipal Vacant	0.0637
6 UPLAND RD	F_741739_2870791	Municipal Vacant	0.0637
11 WOODS WAY	F_741818_2871917	Municipal Vacant	0.0637
7R ROB'S LN	F_747897_2870157	Municipal Vacant	0.0059
000 LEE RD	F_737352_2862717	Municipal Vacant	0.0049
000 SOUTH MAIN ST	F_738949_2862464	Municipal Vacant	0.0046
129 EAST FOXBORO ST	F_740172_2863295	Municipal Vacant	0.0046
0 EDGE HILL RD	F_741488_2882968	Municipal Vacant	0.0046
0 EDGE HILL RD	F_741677_2883220	Municipal Vacant	0.0046
00R EDGE HILL RD	F_741827_2883671	Municipal Vacant	0.0046
260R NORTH MAIN ST	F_746441_2875983	Municipal Vacant	0.0046
25R MOHAWK ST	F_739050_2862674	Municipal Vacant	0.0035
000 SOUTH MAIN ST	F_739182_2863031	Municipal Vacant	0.0035
36R NORFOLK PL	F_738982_2862191	Municipal Vacant	0.0035
6 CANOE RIVER RD	F_740452_2856406	Municipal Vacant	0.0030
1 CANOE RIVER RD	F_740063_2856360	Municipal Vacant	0.0030
255R EAST FOXBORO ST	F_739867_2858954	Municipal Vacant	0.0030
2 NAUSET RD	F_738170_2859236	Municipal Vacant	0.0030
33R COLBURN DR	F_739903_2859919	Municipal Vacant	0.0030
000 SOUTH MAIN ST	F_737300_2860107	Municipal Vacant	0.0030
000 SOUTH MAIN ST	F_737054_2860418	Municipal Vacant	0.0030
154R WOLOMOLOPOAG ST	F_737084_2860469	Municipal Vacant	0.0030
100R WOLOMOLOPOAG ST	F_736146_2860863	Municipal Vacant	0.0030
000 SOUTH MAIN ST	F_736355_2861192	Municipal Vacant	0.0030
000 SOUTH MAIN ST	F_737349_2860990	Municipal Vacant	0.0030
00N EDGE HILL RD	F_743316_2883467	Municipal Vacant	0.0030
30 OSPREY RD	F_739888_2858122	Municipal Vacant	0.0003

Appendix E: Town-Owned Parcels Sorted by the NSP BMP Tool's Nitrogen Priority Ranking

Table E-1. Town-Owned Parcels Sorted by BMP Tool Priority Score for Nitrogen Removal

Address	Parloc_ID	Use Description	BMP Tool Priority Score (Max Score = 1)
219 MASSAPOAG AVE	F_744820_2859540	Municipal, Federal, or State	0.9997
195 GAVINS POND RD	F_734467_2855143	Municipal, Federal, or State	0.9985
000 HIXSON FARM RD	F_748823_2874491	Municipal, Federal, or State	0.9922
181 POND ST	F_743482_2866485	Municipal, Federal, or State	0.9864
75 MOUNTAIN ST	F_746802_2864140	Municipal, Federal, or State	0.9864
82 GUNHOUSE ST	F_743435_2865718	Municipal, Federal, or State	0.9864
263 SOUTH WALPOLE ST	F_728628_2864611	Single family residence	0.9756
35 QUINCY ST	F_744701_2866134		0.9655
71 CHESTNUT ST	F_741093_2868324	Condominium	0.9655
2601 BAY RD	F_754005_2851972	Municipal, Federal, or State	0.8623
69 AZALEA RD	F_749205_2863988	Single family residence	0.8623
90 SOUTH MAIN ST	F_742949_2869110		0.6987
13 DRAKE CIR	F_745406_2848188		0.6349
21 SOUTH PLEASANT ST	F_742480_2869932	Municipal, Federal, or State	0.6349
154 WOLOMOLOPOAG ST	F_736036_2859279	Single family residence	0.6224
211-215 SOUTH MAIN ST	F_740626_2866882	Municipal, Federal, or State	0.6077
	F_740321_2867729		0.6077

12 CEDAR PARK RD	F_740733_2864527		0.4271
4 BRAMBLE LN	F_745793_2854932		0.4163
000 EAST FOXBORO ST	F_739255_2856827		0.4163
11 NORTH MAIN ST	F_743449_2870424		0.4163
16R HIGH ST	F_743810_2870593		0.4163
1 SCHOOL ST	F_743498_2871060	Municipal, Federal, or State	0.4163
	F_745669_2860341		0.4163
000 SOUTH MAIN ST	F_738949_2862464	Municipal Vacant	0.1197
139R EAST FOXBORO ST	F_740028_2862568	Municipal Vacant	0.1197
129 EAST FOXBORO ST	F_740172_2863295	Municipal Vacant	0.1197
000 SOUTH MAIN ST	F_738974_2861786	Municipal Vacant	0.1197
7R ROB'S LN	F_747897_2870157	Municipal Vacant	0.1197
0 EDGE HILL RD	F_741488_2882968	Municipal Vacant	0.1197
0 EDGE HILL RD	F_741677_2883220	Municipal Vacant	0.1197
00R EDGE HILL RD	F_741827_2883671	Municipal Vacant	0.1197
260R NORTH MAIN ST	F_746441_2875983	Municipal Vacant	0.1197
000 FURNACE ST	F_733791_2857073	Municipal Vacant	0.1173
R ESSEX RD	F_739216_2863473	Municipal Vacant	0.1173
25R MOHAWK ST	F_739801_2861684	Municipal Vacant	0.1173
21R MOHAWK ST	F_739826_2862024	Municipal Vacant	0.1173
26 STURGES RD	F_741116_2862289	Municipal Vacant	0.1173
60 CEDAR ST	F_741506_2864923	Municipal Vacant	0.1173
192R BILLINGS ST	F_747569_2869668	Municipal Vacant	0.1173
00N EDGE HILL RD	F_741337_2883417	Municipal Vacant	0.1173
265 NORTH MAIN ST	F_747279_2873534	Municipal Vacant	0.1173
15 CANTON ST	F_747505_2875862	Municipal Vacant	0.1173
179R MORSE ST	F_744829_2858764	Municipal Vacant	0.1153
135 EAST FOXBORO ST	F_739881_2863100	Municipal Vacant	0.1153
73 ASPEN RD	F_752234_2863585	Municipal Vacant	0.1153
284R NORTH MAIN ST	F_747254_2875439	Municipal Vacant	0.1153
276 NORTH MAIN ST	F_746857_2875396	Municipal Vacant	0.1153

80 GUNHOUSE ST	F_742637_2865969	Municipal Vacant	0.1153
000 MINUTE MAN RD	F_745432_2865931	Municipal Vacant	0.1153
161 BILLINGS ST	F_746019_2867966	Municipal Vacant	0.1153
000 BILLINGS ST	F_747992_2869967	Municipal Vacant	0.1153
000 CREST RD WAY	F_747311_2871703	Municipal Vacant	0.1153
83R BELCHER ST	F_747911_2872776	Municipal Vacant	0.1153
R GREENWOOD RD	F_743534_2872846	Municipal Vacant	0.1153
00N EDGE HILL RD	F_740956_2883132	Municipal Vacant	0.1153
81R MANSFIELD ST	F_741592_2854073	Municipal Vacant	0.1125
71R MANSFIELD ST	F_741266_2854534	Municipal Vacant	0.1125
R R BRIAR HILL RD	F_746684_2854982	Municipal Vacant	0.1125
100 GAVINS POND RD	F_734526_2856547	Municipal Vacant	0.1125
30 GAVINS POND RD	F_732640_2858205	Municipal Vacant	0.1125
231 MASSAPOAG AVE	F_745642_2859866	Municipal Vacant	0.1125
226 HAMPTON RD	F_749728_2860097	Municipal Vacant	0.1125
68R MOHAWK ST	F_739391_2859128	Municipal Vacant	0.1125
66A R MASSAPOAG AVE	F_745879_2864293	Municipal Vacant	0.1125
11 CEDAR PARK RD	F_740605_2864444	Municipal Vacant	0.1125
146 EAST FOXBORO ST	F_741235_2862628	Municipal Vacant	0.1125
223 HAMPTON RD	F_749533_2860729	Municipal Vacant	0.1125
64 EISENHOWER DR	F_753139_2861284	Municipal Vacant	0.1125
299R EAST ST	F_748990_2868701	Municipal Vacant	0.1125
100A HAMPTON RD	F_751405_2864880	Municipal Vacant	0.1125
171 AMES ST	F_746237_2866814	Municipal Vacant	0.1125
74 ASPEN RD	F_751646_2863863	Municipal Vacant	0.1125
25 BEACH ST	F_742819_2865729	Municipal Vacant	0.1125
26 OAK HILL DR	F_750386_2865809	Municipal Vacant	0.1125
192 BILLINGS ST	F_747452_2869425	Municipal Vacant	0.1125
154A BILLINGS ST	F_746720_2869914	Municipal Vacant	0.1125
83 BELCHER ST	F_748158_2872421	Municipal Vacant	0.1125
249 NORTH MAIN ST	F_746191_2874642	Municipal Vacant	0.1125
000 CANTON ST	F_747089_2877054	Municipal Vacant	0.1125

28R KING PHILIP RD	F_741134_2853987	Municipal Vacant	0.1083
13 KING PHILIP RD	F_740402_2855017	Municipal Vacant	0.1083
61 GAVINS POND RD	F_732830_2856195	Municipal Vacant	0.1083
12 MINK TRAP LN	F_735015_2856905	Municipal Vacant	0.1083
165 MORSE ST	F_745138_2858440	Municipal Vacant	0.1083
276 MOUNTAIN ST	F_750375_2859573	Municipal Vacant	0.1083
8R LU STUBBS LN	F_748734_2867686	Municipal Vacant	0.1083
45 SANDY RIDGE CIR	F_737416_2865984	Municipal Vacant	0.1083
368R NORTH MAIN ST	F_748831_2875924	Municipal Vacant	0.1048
51R MANSFIELD ST	F_744070_2853471	Municipal Vacant	0.1048
81R MANSFIELD ST	F_742301_2853663	Municipal Vacant	0.1048
17R OLD WOLOMOLOPOAG ST	F_737558_2854803	Municipal Vacant	0.1048
6 CANOE RIVER RD	F_740452_2856406	Municipal Vacant	0.1048
1 CANOE RIVER RD	F_740063_2856360	Municipal Vacant	0.1048
49 KNOB HILL ST	F_744803_2850440	Municipal Vacant	0.1048
169R MANSFIELD ST	F_740971_2852149	Municipal Vacant	0.1048
1969R BAY RD	F_752925_2857431	Municipal Vacant	0.1048
255R EAST FOXBORO ST	F_739867_2858954	Municipal Vacant	0.1048
2 NAUSET RD	F_738170_2859236	Municipal Vacant	0.1048
33R COLBURN DR	F_739903_2859919	Municipal Vacant	0.1048
000 SOUTH MAIN ST	F_737300_2860107	Municipal Vacant	0.1048
154R WOLOMOLOPOAG ST	F_736502_2859897	Municipal Vacant	0.1048
000 SOUTH MAIN ST	F_737054_2860418	Municipal Vacant	0.1048
154R WOLOMOLOPOAG ST	F_737084_2860469	Municipal Vacant	0.1048
000 LEE RD	F_737352_2862717	Municipal Vacant	0.1048
100 WOLOMOLOPOAG ST	F_735709_2860358	Municipal Vacant	0.1048
100R WOLOMOLOPOAG ST	F_736146_2860863	Municipal Vacant	0.1048

000 SOUTH MAIN ST	F_736355_2861192	Municipal Vacant	0.1048
000 SOUTH MAIN ST	F_737349_2860990	Municipal Vacant	0.1048
R LEE RD	F_737411_2861853	Municipal Vacant	0.1048
252R MOUNTAIN ST	F_752436_2861779	Municipal Vacant	0.1048
30 EAST FOXBORO ST	F_741450_2865494	Municipal Vacant	0.1048
00N EDGE HILL RD	F_743316_2883467	Municipal Vacant	0.1048
1 HIXSON FARM RD	F_749010_2873826	Municipal Vacant	0.1048
368R NORTH MAIN ST	F_748831_2875924	Municipal Vacant	0.1048
7 COW HILL RD	F_741937_2854578	Municipal Vacant	0.0947
4 CANOE RIVER RD	F_740756_2856470	Municipal Vacant	0.0947
000 FURNACE ST	F_733994_2857288	Municipal Vacant	0.0947
3R PRESCOTT RD	F_740047_2859513	Municipal Vacant	0.0947
000 SOUTH MAIN ST	F_737236_2860624	Municipal Vacant	0.0947
000 SOUTH MAIN ST	F_737277_2860683	Municipal Vacant	0.0947
000 SOUTH MAIN ST	F_736621_2861304	Municipal Vacant	0.0947
154 BROOK RD	F_748211_2870585	Municipal Vacant	0.0947
72 UPLAND RD	F_740335_2871365	Municipal Vacant	0.0947
428 EAST FOXBORO ST	F_739858_2856503	Municipal Vacant	0.0923
315 EAST FOXBORO ST	F_740328_2857660	Municipal Vacant	0.0923
93R MANSFIELD ST	F_741519_2852418	Municipal Vacant	0.0912
15 RED FOX RUN	F_741633_2850899	Municipal Vacant	0.0912
25R CONDOR RD	F_741769_2856068	Municipal Vacant	0.0912
000 EDGE HILL RD	F_742705_2884731	Municipal Vacant	0.0907
000 RR R/W #36	F_743185_2873239	Municipal Vacant	0.0907
000 EDGE HILL RD	F_742705_2884731	Municipal Vacant	0.0907
2 KING PHILIP RD	F_739826_2856186	Municipal Vacant	0.0898
400 EAST FOXBORO ST	F_740508_2856795	Municipal Vacant	0.0898
000 RR R/W	F_739468_2862952	Municipal Vacant	0.0898
36R NORFOLK PL	F_738283_2863101	Municipal Vacant	0.0898
12-17 FARNHAM RD	F_739433_2867371	Municipal Vacant	0.0898
11 COMMERCIAL ST	F_727836_2866320	Municipal Vacant	0.0898
48R BELCHER ST	F_750521_2872993	Municipal Vacant	0.0898

000 EDGE HILL RD	F_742029_2882379	Municipal Vacant	0.0898
17 DRAKE CIR	F_745173_2848221	Municipal Vacant	0.0878
9 KNOB HILL ST	F_745163_2849356	Municipal Vacant	0.0878
229 LAKEVIEW ST	F_743509_2856005	Municipal Vacant	0.0878
14 MATTAKESETT CIR	F_745085_2850000	Municipal Vacant	0.0871
20 MASSASOIT RD	F_744033_2849555	Municipal Vacant	0.0865
2 CANOE RIVER RD	F_740337_2856607	Municipal Vacant	0.0865
7R HOLLY LN	F_733362_2857603	Municipal Vacant	0.0865
10 SAMOSET LN	F_734878_2858644	Municipal Vacant	0.0865
21R GAVINS POND RD	F_732166_2858853	Municipal Vacant	0.0865
247 SOUTH WALPOLE ST	F_728638_2864060	Municipal Vacant	0.0865
36R NORFOLK PL	F_738097_2862400	Municipal Vacant	0.0865
115 OLD POST RD	F_731859_2861629	Municipal Vacant	0.0865
32 COMMERCIAL ST	F_728590_2866020	Municipal Vacant	0.0865
90 MASKWONICUT ST	F_742493_2873615	Municipal Vacant	0.0865
157 EDGE HILL RD	F_740514_2879086	Municipal Vacant	0.0865
1 KING PHILIP RD	F_739527_2856020	Municipal Vacant	0.0831
200 GAVINS POND RD	F_735061_2855974	Municipal Vacant	0.0831
340R MANSFIELD ST	F_744279_2847005	Municipal Vacant	0.0831
25 OAK HILL DR	F_749774_2866963	Municipal Vacant	0.0831
62R UPLAND RD	F_740632_2871135	Municipal Vacant	0.0831
000 CREST RD WAY	F_747703_2871001	Municipal Vacant	0.0831
13 GINGER WAY	F_750782_2873234	Municipal Vacant	0.0831
27 PHEASANT WOOD RD	F_739866_2877027	Municipal Vacant	0.0831
10 BRAMBLE LN	F_746574_2854692	Municipal Vacant	0.0804
30 COBBLESTONE RD	F_736551_2854717	Municipal Vacant	0.0804
235R WOLOMOLOPOAG ST	F_737072_2857582	Municipal Vacant	0.0804
250 EAST FOXBORO ST	F_741304_2859546	Municipal Vacant	0.0804
25R MOHAWK ST	F_739050_2862674	Municipal Vacant	0.0804

000 SOUTH MAIN ST	F_739182_2863031	Municipal Vacant	0.0804
1571 BAY RD	F_753988_2860878	Municipal Vacant	0.0804
36R NORFOLK PL	F_738982_2862191	Municipal Vacant	0.0804
50R BRADFORD AVE	F_742921_2867873	Municipal Vacant	0.0804
56R COTTAGE ST	F_745542_2868042	Municipal Vacant	0.0804
0 MOOSE HILL ST	F_734343_2867027	Municipal Vacant	0.0804
31 BEACH ST	F_744100_2865803	Municipal Vacant	0.0804
000 CREST RD WAY	F_746557_2871261	Municipal Vacant	0.0804
149 EDGE HILL RD	F_740260_2879024	Municipal Vacant	0.0804
1300 GENERAL EDWARDS HWY	F_727425_2866053	Municipal Vacant	0.0804
0 MONT FERN AVE	F_741609_2876784	Municipal Vacant	0.0804
R EDGE HILL RD	F_742120_2877786	Municipal Vacant	0.0804
203 EDGE HILL RD	F_742288_2878572	Municipal Vacant	0.0804
207 EDGE HILL RD	F_742487_2878677	Municipal Vacant	0.0804
356 MANSFIELD ST	F_744004_2846512	Municipal Vacant	0.0726
60R FURNACE ST	F_736379_2857770	Municipal Vacant	0.0726
147 BEACH ST	F_741262_2863765	Municipal Vacant	0.0721
5 MANOR LN	F_745941_2863767	Municipal Vacant	0.0721
24 CASTLE DR	F_754609_2861990	Municipal Vacant	0.0721
59 EISENHOWER DR	F_753087_2862449	Municipal Vacant	0.0721
R HUNTERS RIDGE RD	F_746970_2872539	Municipal Vacant	0.0721
6 BRAMBLE LN	F_746016_2855046	Municipal Vacant	0.0709
19 TRACEY LN	F_744039_2850654	Municipal Vacant	0.0709
15 HICKORY WAY	F_749665_2865190	Municipal Vacant	0.0709
9R LU STUBBS LN	F_748291_2867821	Municipal Vacant	0.0709
37R MASKWONICUT ST	F_743968_2874214	Municipal Vacant	0.0709
000 MANSFIELD ST	F_742894_2854303	Municipal Vacant	0.0688
438 MASSAPOAG AVE	F_745464_2854784	Municipal Vacant	0.0688
29 BRIAR HILL RD	F_746081_2855285	Municipal Vacant	0.0688
348 MANSFIELD ST	F_743933_2846651	Municipal Vacant	0.0688
340 MANSFIELD ST	F_743861_2846782	Municipal Vacant	0.0688

202 MORSE ST	F_744619_2857143	Municipal Vacant	0.0688
195 WOLOMOLOPOAG ST	F_736897_2858103	Municipal Vacant	0.0688
110 LAKEVIEW ST	F_742746_2860263	Municipal Vacant	0.0688
R LAKEVIEW ST	F_742912_2860383	Municipal Vacant	0.0688
000 CHESSMAN DR	F_753287_2864013	Municipal Vacant	0.0688
156 OAK HILL DR EXT	F_751853_2864443	Municipal Vacant	0.0688
5 KINGS RD	F_753636_2862792	Municipal Vacant	0.0688
156 MOUNTAIN ST	F_748693_2862642	Municipal Vacant	0.0688
5 PINE ST	F_729367_2867164	Municipal Vacant	0.0688
35 HIGH PLAIN ST	F_736193_2877857	Municipal Vacant	0.0688
89 OAK HILL DR	F_749999_2865226	Municipal Vacant	0.0688
20 CEDAR ST	F_742250_2865173	Municipal Vacant	0.0688
000 FARNHAM RD	F_739762_2866417	Municipal Vacant	0.0688
301 HAMPTON RD	F_749007_2863857	Municipal Vacant	0.0688
57 OAK HILL DR	F_749477_2865823	Municipal Vacant	0.0688
25 EAST FOXBORO ST	F_740099_2865370	Municipal Vacant	0.0688
22 OAK HILL DR	F_750786_2866174	Municipal Vacant	0.0688
36 MONT FERN AVE	F_741016_2877403	Municipal Vacant	0.0688
288R NORTH MAIN ST	F_747363_2875384	Municipal Vacant	0.0688
411 EAST FOXBORO ST	F_739584_2857473	Municipal Vacant	0.0598
10 CHESSMAN DR	F_755336_2864058	Municipal Vacant	0.0595
424 EAST FOXBORO ST	F_739970_2856587	Municipal Vacant	0.0592
161 EDGE HILL RD	F_740738_2879041	Municipal Vacant	0.0592
2589 BAY RD	F_753939_2852348	Municipal Vacant	0.0589
148 BROOK RD	F_748090_2870746	Municipal Vacant	0.0589
75 AMES ST	F_744597_2866799	Municipal Vacant	0.0584
51 LAKEVIEW ST	F_742053_2860670	Municipal Vacant	0.0576
175 POND ST	F_743832_2867003	Municipal Vacant	0.0576
28 RICHARDS AVE	F_743385_2874854	Municipal Vacant	0.0576
164 FURNACE ST	F_735286_2854594	Municipal Vacant	0.0555
10 HILLSIDE AVE	F_742480_2870789	Municipal Vacant	0.0555

11 RHODES AVE	F_744572_2874129	Municipal Vacant	0.0555
9R MATTAKESETT CIR	F_745316_2849585	Municipal Vacant	0.0547
409 EAST FOXBORO ST	F_740416_2857003	Municipal Vacant	0.0547
110 FURNACE ST	F_735676_2855563	Municipal Vacant	0.0535
2 MASSASOIT RD	F_743240_2849628	Municipal Vacant	0.0535
40 GAVINS POND RD	F_732420_2858438	Municipal Vacant	0.0535
150 LAKEVIEW ST	F_743319_2859123	Municipal Vacant	0.0535
9R FALCON RD	F_740144_2859207	Municipal Vacant	0.0535
9 CHIPPEWA LN	F_736885_2859553	Municipal Vacant	0.0535
45 BLAIR CIR	F_728089_2865306	Municipal Vacant	0.0535
303 SOUTH WALPOLE ST	F_727390_2864731	Municipal Vacant	0.0535
45R BLAIR CIR	F_727189_2865910	Municipal Vacant	0.0535
12 UPLAND RD	F_741646_2870888	Municipal Vacant	0.0535
279 NORTH MAIN ST	F_746998_2874831	Municipal Vacant	0.0535
55 RICHARDS AVE	F_744073_2874831	Municipal Vacant	0.0535
000 HILLSIDE AVE	F_742323_2871110	Municipal Vacant	0.0462
25 MANOMET RD	F_738432_2859436	Municipal Vacant	0.0461
63 HARDING ST	F_741791_2863913	Municipal Vacant	0.0457
100 COTTAGE ST	F_745366_2867130	Municipal Vacant	0.0457
15 ATHERTON LN	F_732469_2856557	Municipal Vacant	0.0448
16 BAREFOOT HILL RD	F_735565_2859051	Municipal Vacant	0.0447
14 HARDING ST	F_740903_2864341	Municipal Vacant	0.0447
18 CASTLE DR	F_754762_2861537	Municipal Vacant	0.0447
20R PLEASANT ST	F_742480_2871096	Municipal Vacant	0.0447
R CHERYL DR	F_746555_2873493	Municipal Vacant	0.0447
7 POND VIEW CIR	F_746480_2874181	Municipal Vacant	0.0447
0 EDGE HILL RD	F_741047_2881390	Municipal Vacant	0.0447
233 FURNACE ST	F_734950_2853769	Municipal Vacant	0.0418
000 MASSAPOAG AVE	F_745551_2850205	Municipal Vacant	0.0418
5 GROVE AVE	F_741142_2863748	Municipal Vacant	0.0418
000 MASSAPOAG AVE	F_744490_2865079	Municipal Vacant	0.0418

19 QUINCY ST	F_745089_2866519	Municipal Vacant	0.0418
360 MANSFIELD ST	F_743571_2846158	Municipal Vacant	0.0390
25 BLACK ELK RD	F_737624_2855229	Municipal Vacant	0.0390
80R CANNON BALL RD	F_735715_2855887	Municipal Vacant	0.0390
2 HORIZONS RD	F_744701_2856117	Municipal Vacant	0.0390
50 CONDOR RD	F_742594_2856213	Municipal Vacant	0.0390
20 TRACEY LN	F_743761_2851072	Municipal Vacant	0.0390
30 OSPREY RD	F_739888_2858122	Municipal Vacant	0.0390
135 BEACH ST	F_741679_2864027	Municipal Vacant	0.0390
141 EAST FOXBORO ST	F_740454_2862892	Municipal Vacant	0.0390
117 EAST FOXBORO ST	F_740938_2863390	Municipal Vacant	0.0390
43 CASTLE DR	F_753793_2863469	Municipal Vacant	0.0390
19 CATTAIL LN	F_752558_2863570	Municipal Vacant	0.0390
28 MOHAWK ST	F_739925_2860992	Municipal Vacant	0.0390
45 MOHAWK ST	F_739641_2861069	Municipal Vacant	0.0390
205 EAST FOXBORO ST	F_740564_2860990	Municipal Vacant	0.0390
25 MOHAWK ST	F_740126_2861414	Municipal Vacant	0.0390
00 LOTHRUP WAY	F_747091_2868142	Municipal Vacant	0.0390
00 LOTHRUP WAY	F_746759_2868279	Municipal Vacant	0.0390
200R EAST ST	F_747365_2868222	Municipal Vacant	0.0390
000 BIRCHWOOD CIR	F_750716_2866835	Municipal Vacant	0.0390
32 BLUEBERRY LN	F_739343_2877865	Municipal Vacant	0.0390
2 MASSAPOAG AVE	F_744279_2865480	Municipal Vacant	0.0390
36A WILSHIRE DR	F_751124_2867569	Municipal Vacant	0.0390
000 SHEILA RD	F_753171_2865631	Municipal Vacant	0.0390
000 TAMARACK WAY	F_749502_2866314	Municipal Vacant	0.0390
80 SOUTH MAIN ST	F_742939_2869320	Municipal Vacant	0.0390
10 STATION ST	F_742792_2869750	Municipal Vacant	0.0390
18 BILLINGS ST	F_743682_2870149	Municipal Vacant	0.0390
16 HIGH ST	F_743761_2870497		0.0390
138 BROOK RD	F_747769_2870808	Municipal Vacant	0.0390
135R UPLAND RD	F_738814_2871348	Municipal Vacant	0.0390

60 HUNTINGTON AVE	F_746322_2872336	Municipal Vacant	0.0390
16 BELLA RD	F_745713_2872954	Municipal Vacant	0.0390
26 POND VIEW CIR	F_746555_2874710	Municipal Vacant	0.0390
263 NORTH MAIN ST	F_746679_2874720	Municipal Vacant	0.0390
9 PHEASANT WOOD RD	F_739043_2877221	Municipal Vacant	0.0390
45R MOHAWK ST	F_739494_2861338	Municipal Vacant	0.0180
0 MOOSE HILL ST	F_740358_2868870	Municipal Vacant	0.0178
000 MANSFIELD ST	F_744182_2846473	Municipal Vacant	0.0175
000 MASSAPOAG AVE	F_745373_2849853	Municipal Vacant	0.0174
93R MANSFIELD ST	F_741398_2853001	Municipal Vacant	0.0174
25 CONDOR RD	F_741995_2856539	Municipal Vacant	0.0174
38 GUNHOUSE ST	F_741346_2866035	Municipal Vacant	0.0174
50R GAVINS POND RD	F_733458_2858246	Municipal Vacant	0.0162
49 CONDOR RD	F_742365_2856009	Municipal Vacant	0.0160
11 MATTAKESETT CIR	F_745156_2849803	Municipal Vacant	0.0160
93R MANSFIELD ST	F_741384_2853059	Municipal Vacant	0.0160
80 RICHARDS AVE	F_744140_2876092	Municipal Vacant	0.0160
17 COMMERCIAL ST	F_727640_2866647	Municipal Vacant	0.0154
93R MANSFIELD ST	F_741492_2853044	Municipal Vacant	0.0149
R MANSFIELD ST	F_741463_2853082	Municipal Vacant	0.0149
93R MANSFIELD ST	F_741392_2853176	Municipal Vacant	0.0149
000 SOUTH WALPOLE ST	F_730223_2862001	Municipal Vacant	0.0149
27 IRON HOLLOW RD	F_733366_2855446	Municipal Vacant	0.0139
80 CANNON BALL RD	F_735889_2855971	Municipal Vacant	0.0139
12 BURNT BRIDGE RD	F_738703_2856324	Municipal Vacant	0.0139
22A HOWARD FARM RD	F_744728_2851488	Municipal Vacant	0.0139
000 FURNACE ST	F_735153_2853359	Municipal Vacant	0.0139
177 FURNACE ST	F_735035_2853597	Municipal Vacant	0.0139
15 FORGE RD	F_735397_2853345	Municipal Vacant	0.0139
0000 UNKNOWN	F_732023_2857050	Municipal Vacant	0.0139
72A FURNACE ST	F_735802_2857451	Municipal Vacant	0.0139

30 FURNACE ST	F_735907_2858392	Municipal Vacant	0.0139
37 FURNACE ST	F_735798_2858456	Municipal Vacant	0.0139
20 FURNACE ST	F_736054_2858554	Municipal Vacant	0.0139
950 SOUTH MAIN ST	F_730833_2858647	Municipal Vacant	0.0139
25 FURNACE ST	F_735997_2858640	Municipal Vacant	0.0139
21 GAVINS POND RD	F_732527_2858913	Municipal Vacant	0.0139
810 SOUTH MAIN ST	F_731696_2859461	Municipal Vacant	0.0139
16 GAVINS POND RD	F_733031_2859405	Municipal Vacant	0.0139
121 WOLOMOLOPOAG ST	F_735535_2859521	Municipal Vacant	0.0139
115 WOLOMOLOPOAG ST	F_735374_2859661	Municipal Vacant	0.0139
10 GAVINS POND RD	F_732779_2859651	Municipal Vacant	0.0139
9A PILGRIM DR	F_741170_2860607	Municipal Vacant	0.0139
000 LEE RD	F_737354_2862870	Municipal Vacant	0.0139
21 LAKEVIEW ST	F_741155_2861057	Municipal Vacant	0.0139
000 SOUTH WALPOLE ST	F_730138_2862382	Municipal Vacant	0.0139
R OLD POST RD	F_730043_2862492	Municipal Vacant	0.0139
17 HAMPSHIRE AVE	F_737594_2865195	Municipal Vacant	0.0139
000 RR R/W #26	F_740019_2866612	Municipal Vacant	0.0139
3 HAMPSHIRE AVE	F_738025_2864859	Municipal Vacant	0.0139
000 HAMPSHIRE AVE	F_737634_2865147	Municipal Vacant	0.0139
355A EAST FOXBORO ST	F_741050_2857206	Municipal Vacant	0.0139
000 FARNHAM RD	F_739611_2866200	Municipal Vacant	0.0139
000 FARNHAM RD	F_739646_2866383	Municipal Vacant	0.0139
17 SANDY RIDGE CIR	F_739087_2866377	Municipal Vacant	0.0139
19 FLINTLOCK RD	F_740153_2866702	Municipal Vacant	0.0139
0 CHESTNUT ST	F_741969_2870583	Municipal Vacant	0.0139
6 UPLAND RD	F_741739_2870791	Municipal Vacant	0.0139
11 WOODS WAY	F_741818_2871917	Municipal Vacant	0.0139
38 NORWOOD ST	F_741226_2872478	Municipal Vacant	0.0139

000 RR R/W #35	F_742257_2871624	Municipal Vacant	0.0014
000 UPLAND RD	F_741907_2871259	Municipal Vacant	0.0011
421 EAST FOXBORO ST	F_739283_2856866	Municipal Vacant	0.0005
15 TREE LN	F_741781_2871438	Municipal Vacant	0.0003
4 DRY POND RD	F_755908_2862923	Municipal Vacant	0.0002

Appendix F: Town Outfall Screening Data

Ammonia mg/L	E. coli CFU/100 mL	Phosphorus mg/L	Salinity g/L	Conductivity umhos/cm	Surfactants mg/L	Chlorine	pH	Temp (pH) C°	Smell (visual)	Color (visual)	Clarity (visual)	Turbidity (visual)	**Red values are priority**
ND	<10	0.01	0.13	301	0.15		6.55	9.9	None	Colorless	Clear	None	
0.39	100	0.01	0.42	916	0.19		6.87	11.1	Rotten Eggs	Colorless	Clear	None	3
ND	<10	0.01	ND	200	0.14		6.82	10.3	None	Colorless	Clear	None	
									None	Colorless	Clear	None	
ND	<10	0.01	ND	196	0.19		6.95	10.1	None	Colorless	Clear	None	
0.14	<10	ND	0.19	428	ND				None	Colorless	Clear	None	
ND	<10	ND	0.17	402	0.13		6.21	13.4	None	Colorless	Clear	None	
0.22	<10	ND	ND	82.7	ND		5.85	23.2	None	Colorless	Clear	None	
ND	<10	0.03	0.16	368	0.15				None	Colorless	Clear	None	
0.26	<10	0.01	0.38	822	0.15		6.11	23.3	None	Colorless	Clear	None	
ND	<10	ND	ND	201	ND		6.59	9.9	None	Colorless	Clear	None	
ND	10	ND	0.31	682	0.19		5.98	11.7	None	Colorless	Clear	None	
									Musty	Colorless	Cloudy	Oily Sheen	
									Musty	Colorless	Cloudy	None	
ND	<10	ND	ND	207	ND		5.91	10.9	None	Colorless	Clear	None	
ND	<10	ND	ND	189	0.44		6.82	11.2	None	Colorless	Cloudy	None	2
ND	270	0.02	0.11	267	0.27		6.79	10.3	Musty	Colorless	Clear	None	1
									None	Rusty Orange	Opaque	Oily Sheen	
ND	<10	0.01	0.11	255	0.15				Musty	Colorless	Clear	None	4
ND	<10	ND	ND	191	0.19		6.83	13.5	None	Colorless	Clear	None	
ND	<10	0.01	ND	174	0.13		5.65	11.8	None	Colorless	Clear	Other	
0.18	<10	ND	0.19	428	0.13				None	Colorless	Clear	None	
							5.4	7.7	None	Colorless	Clear	None	
ND	<10	ND	0.1	240	0.12		7.1	9.1	None	Colorless	Clear	None	
0.44	10	ND	0.33	725	0.11		6.41	23.3	None	Colorless	Clear	None	
			tempurature outliers due to the duration of time between sampling and testing.						oonly ordered the outfalls that have been tested				

Nutrient Source Identification Report Addendum: Methods

Prepared By: Neponset River Watershed Association
June 10, 2021

This report is being submitted as a final grant deliverable for the MS4 Municipal Assistance Grant Program. This specific submission is not intended for regulatory compliance purposes.

Acknowledgements

This is one among twenty Nutrient Source Identification Reports prepared by the Neponset River Watershed Association (NepRWA) and the Pioneer Valley Planning Commission (PVPC). These reports are meant to provide MS4 permitted municipalities with documents they can finalize and submit to U.S. EPA as part of their Year 4 reporting requirements.

This work is made possible through a grant from the MassDEP Municipal Assistance Program. Project staff from NepRWA and PVPC appreciate the conversation and feedback provided by MassDEP and U.S. EPA staff in working through methodology to prepare these reports. Aside from producing nutrient source identification reports for 20 communities, this project also resulted in the following: lake-pond phosphorous control plan Year 4 submission requirements for two communities; documentation of approach and methods for use by other MS4 permittees across MA in meeting these Year 4 requirements; and setting of the stage for upgrading existing stormwater infrastructure in key high pollutant loading catchments.

NepRWA and PVPC staff are grateful also to the partner communities who joined them in this pilot project. Following is a list of cities and towns who participated in this project:

Agawam
Canton
Dedham
Foxborough
Granby
Longmeadow
Ludlow
Medfield
Milton
Northampton
Quincy
Randolph
Sharon
South Hadley
Southampton
Southwick
Stoughton
Westfield
Westwood
Wilbraham

Introduction

This is an addendum to the Town's Nutrient Source Identification Report. This document explains the methods followed to produce the information in the report. All actions described were performed using ArcMap 10.6.1.

The analysis requires 3 existing shapefiles. Information on each of these required shapefiles is provided in Table 1 below.

Table 1. Shapefiles Used in Analysis

Existing Data Set	Origin	Date Published/Updated	Link
2016 Land Cover/Land Use	MassGIS	May 2019	https://docs.digital.mass.gov/dataset/massgis-data-2016-land-coverland-use
Soil Survey Geographic (SSURGO) Database for Norfolk and Suffolk Counties, Massachusetts	USDA	June 2020	Downloaded through Web Soil Survey (https://websoilsurvey.sc.egov.usda.gov/App/HomePage.htm). Hydrologic soil groups extracted using Soil Data Viewer Version 6.1 (https://www.nrcs.usda.gov/wps/portal/nrcs/detail/soils/survey/geo/?cid=nrcs142p2_053619)
Town Catchments	Town GIS Files	Current as of 6/10/21	N/A
Massachusetts Land Parcel Database (Metro Boston Region)	MAPC	May 2019	Used to locate SCM opportunities, this shapefile contains the "Parloc_ID" field used to identify parcels. https://datacommon.mapc.org/browser/datasets/360

Creation of Base Shapefile

To support the analysis, a base shapefile containing pertinent information for land cover, land use, and soil types in the area of interest was created. This was completed by performing a "union" operation with two input shapefiles shown in Table 1 above: the 2016 Land Cover/Land Use shapefile and a shapefile containing the SSURGO soil hydrologic groups. Each record in the resulting shapefile represents areas with specific land cover, land use, and soil types.

Several fields were then added to the resulting shapefile to support later steps of this analysis. Table 2 below lists the added fields and provides a brief description of the data that was added. The complete shapefile is entitled "NSIRBaseShapefile" and is available in the files the Town received upon completion of this project.

Table 2. Summary of Fields Added to "NSIRBaseShapefile"

Added Field	Description
FIRST_PLCR	The phosphorus loading category to which a record was assigned. See Table 1-2 in Attachment 1 of Appendix F of the 2016 Massachusetts Small MS4 General Permit for a full listing of loading categories and rates.
FIRST_NLCR	The nitrogen loading category to which a record was assigned. See Table 1 in Attachment 1 of Appendix H of the 2016 Massachusetts Small MS4 General Permit for a full listing of loading categories and rates
MAX_PLER	The numerical phosphorus loading rate assigned to a record. The value originates from Table 1-2 in Attachment 1 of Appendix F of the 2016 Massachusetts Small MS4 General Permit
MAX_NLER	The numerical nitrogen loading rate assigned to a record. The value originates from Table 1 in Attachment 1 of Appendix H of the 2016 Massachusetts Small MS4 General Permit
MAX_DCIA_M	The multiplier from the applicable Sutherland equation to estimate directly connected impervious area for a record. Note that entry is <Null> for all non-impervious records. For more detailed information about how these values were assigned, see the "DCIA Calculation" section below.
MAX_DCIA_E	The exponent from the applicable Sutherland equation to estimate directly connected impervious area for a record. Note that entry is <Null> for all non-impervious records. For more detailed information about how these values were assigned, see the "DCIA Calculation" section below.

In addition to these fields, other new fields were added as placeholders for later analysis. These fields are entitled “AreaAcre,” “ImpAreaAcr,” “ImpPercent,” “PercentOfC,” “DCIAPercen,” “DCIAAcre,” “PLoadLbYr,” and “NLoadLbYr.” Values for these fields are all “0” in the “NSIRBaseShapefile” and actual values were calculated later in the process as described in the “Summarized Analysis” section.

Preparation of Catchment Shapefile and Intersect with Base Shapefile

The prepare the Town’s catchment shapefile for later analysis, a field entitled either “CatchAreaAcr” or “CatchAreaA” (depending on inherent limitations on field name size in the Town’s shapefile) was added to the attribute table. The “calculate geometry” function was used to populate this field for each record, measuring the total area of each catchment in acres.

Once the additional field was added, the “Intersect” tool was run with two input datasets: “NSIRBaseShapefile” (described in the last section) and the Town’s Catchment shapefile. The resulting shapefile was entitled “[TownName]Intersect” and is available in the files the Town received upon completion of this project.

This resulting shapefile limits the information contained in the broader “NSIRBaseShapefile” to what specifically occurs in each of the Town’s catchments, allowing further catchment-level analysis of several criteria.

Summarized Analysis

Operations were then performed on the extra fields that were carried through from “NSIRBaseShapefile” for later analysis. Table 3 below lists the fields, the description of the data they contain, and shows the operations involved in calculating the applicable data. Further details about each calculation can be found in the individual sections below.

Table 3. New Fields Added to "[TownName]Intersect" Shapefile

New Field	Description	Units	Function Used to Calculate	Calculation Method
AreaAcre	The area of a record.	Acres	Calculate Geometry	Calculate the area in acres.
ImpAreaAcr	The area of impervious surfaces occupied by a record.	Acres	Calculate Geometry	Query only records with “Impervious” entry for CoverName, then calculate the area in acres. After removing the query, all non-impervious records will have a “0” listed for this field.
ImpPercent	The amount of impervious area in a record as a percentage of the overall	Percentage of the total catchment area	Field Calculator	([ImpAreaAcr]/[CatchAreaAcr])*100

	catchment area.			
PercentOfC*	The percentage of the catchment represented by a record.	Percentage of the total catchment area	Field Calculator	([AreaAcre]/[CatchAreaAcr])*100
DCIAPercen	An estimate of directly connected impervious area represented by a record	Percentage of the total catchment area.	Field Calculator	([ImpPercent]^[MAX_DCIA_E])*[MAX_DCIA_M]
DCIAAcre	An estimate the amount of directly connected impervious area associated with a record.	Acres	Field Calculator	([DCIAPercen]/100)*[CatchAreaAcr]
PLoadLbYr	The estimated phosphorus load from a record	Lbs/Year	Field Calculator	[AreaAcre]*[MAX_PLER]
NLoadLbYr	The estimated nitrogen load from a record	Lbs/Year	Field Calculator	[AreaAcre]*[MAX_NLER]

**PercentOfC was only used as a "check" field and is not described further in this document.*

Impervious Calculation

The "[TownName]Intersect" shapefile contains polygons of areas within each catchment with like land cover, land use, and soil type. To begin the analysis for impervious area, the "[TownName]Intersect" attribute table was queried so that only polygons with an entry of "Impervious" for the "CoverName" field were shown. Then, the Calculate Geometry tool was used in the "ImpAreaAcr" field on those queried records to display the area of each impervious polygon in acres. These results were eventually summed for overall catchment totals of impervious area as described in the "Final Preparation of Deliverable Shapefile" section below.

To further illustrate impervious cover statistics and for use in DCIA calculation, the impervious cover in each polygon was also calculated as a percentage of each catchment. For this measurement, the Field Calculator tool was used on the "ImpPercent" field to divide the impervious area of each polygon ("ImpAreaAcr") by the total catchment size ("CatchAreaAcr" or "CatchAreaA", created when preparing the catchment shapefile). This figure was then multiplied by 100 to obtain a percent.

DCIA Calculation

DCIA estimates were based on the Sutherland equations and an EPA guidance document entitled "Estimating Change in Impervious Area (IA) and Directly Connected Impervious Areas (DCIA) for Massachusetts Small MS4 Permit" (Revised April 2014). Table 4 below shows the relation between various land uses in the watershed, the chosen "connectedness" category, and the associated Sutherland equation used in the DCIA estimate.

Table 4. "Connectedness" Category and Sutherland DCIA Equation Assignments for All Land Uses. NOTE: DCIA and IA are both percentages.

USEGENNAME	"Connectedness" Category	Sutherland Equation
Agriculture	Mostly Disconnected	$DCIA = 0.01(IA)^2$
Commercial	Average	$DCIA = 0.1(IA)^{1.5}$
Forest	Mostly Disconnected	$DCIA = 0.01(IA)^2$
Industrial	Average	$DCIA = 0.1(IA)^{1.5}$
Mixed use, other	Average	$DCIA = 0.1(IA)^{1.5}$
Mixed use, primarily commercial	Average	$DCIA = 0.1(IA)^{1.5}$
Mixed use, primarily residential	Average	$DCIA = 0.1(IA)^{1.5}$
Open land	Average	$DCIA = 0.1(IA)^{1.5}$
Recreation	Average	$DCIA = 0.1(IA)^{1.5}$
Residential - multi-family	Highly Connected	$DCIA = 0.4(IA)^{1.2}$
Residential - other	Average	$DCIA = 0.1(IA)^{1.5}$
Residential - single family	Average	$DCIA = 0.1(IA)^{1.5}$
Right-of-way	Average	$DCIA = 0.1(IA)^{1.5}$
Tax exempt	Average	$DCIA = 0.1(IA)^{1.5}$
Unknown	Average	$DCIA = 0.1(IA)^{1.5}$
Water	Average	$DCIA = 0.1(IA)^{1.5}$

In these equations, the percentage of impervious cover for a given area is used to determine the percentage of DCIA in the same area. Thus, DCIA percent was calculated in the "DCIAPercen" field using Field Calculator. In this calculation, the impervious percentage of the catchment represented by the polygon ("ImpPercent") was raised to the power shown in the appropriate equation (already entered in the "MAX_DCIA_E" field when preparing the base shapefile) and multiplied by the factor shown (already entered in the "MAX_DCIA_M" field when preparing the base shapefile). Essentially, the Field Calculator equation was "DCIAPercen" = ("ImpPercent" ^ "MAX_DCIA_E") * "MAX_DCIA_M". These results were eventually summed for overall catchment totals of impervious area as described in the "Final Preparation of Deliverable Shapefile" section below.

Finally, the estimated acreage of DCIA for each polygon was calculated in the "DCIAAcre" field using Field Calculator. In this calculation, "DCIAPercen" was divided by 100 and multiplied by the overall catchment size ("CatchAreaAcr" or "CatchAreaA").

Note that, by default, any records with a "0" in the "ImpPercent" field (such as records with non-impervious land cover) also resulted in an entry of "0" for "DCIAPercen" and "DCIAAcre", as DCIA only exists where impervious area exists.

Also, please note that, for catchments located in the Charles River Watershed, DCIA calculations, were not calculated using the exact same method as what was used in the Charles River Phosphorus TMDL. The TMDL used a similar method but adjusted the model in some instances. Thus, the results in the DCIA and phosphorus loading estimates in the TMDL and the results from this report may differ somewhat.

Phosphorus Load Calculation

Phosphorus loads were calculated for each record in the "[TownName]Intersect" shapefile by multiplying the area of each polygon ("AreaAcre") by the phosphorus loading rate assigned to the record's specific land cover/land use/soil type combination (the "MAX_PLER" field, which was entered during the creation of the base shapefile). The Field Calculator tool was used to complete this calculation in the "PLoadLbYr" field. As the name suggests, the units for the loading estimates are pounds/year. These results are eventually summed for overall catchment totals of impervious area as described in the "Final Preparation of Deliverable Shapefile" section below.

For reference, the phosphorus loading category into which each record is assigned is recorded in the "FIRST_PLCR" field, which stands for Phosphorus Load Crosswalk. The entries in this field correspond to the land uses and phosphorus load export rates shown in Table 1-2 of Attachment 1 to Appendix F of the 2016 Massachusetts Small MS4 General Permit. An abbreviated crosswalk is shown in Table 5 below.

Note that the "CoverName" field was also consulted when assigning phosphorus loading rates. If the polygon was identified as "Impervious," it was given the loading rates for Directly Connected Impervious for a given land use shown in Table 1-2 of Attachment 1 to Appendix F of the 2016 Massachusetts Small MS4 General Permit. If the polygon was identified as non-impervious, it was given the loading rates for Pervious cover for a given land use shown in the same table. The pervious loading rates often rely on the records' soil type, so the "HSG_P" field was consulted as necessary when assigning phosphorus loading rates to pervious records.

Also note that in most cases, land use categories were descriptive enough to assign the polygon to a particular phosphorus loading category. However, in the case of some more general land uses (such as "Unknown"), the "CoverName" field was consulted to assign the polygon to an appropriate category.

Table 5. Crosswalk Linking Land Use and Land Cover to the Phosphorus Source Categories Shown in Table 1-2 of Attachment 1 to Appendix F of the 2016 Massachusetts Small MS4 General Permit

USEGENNAME	Phosphorus Source Category
Agriculture	Agriculture (Ag)
Commercial	Commercial/Industrial (Com-Ind)
Forest	Forest (For)
Industrial	Commercial/Industrial (Com-Ind)
Mixed use, other	Varied based on land cover
Mixed use, primarily commercial	Commercial/Industrial (Com-Ind)
Mixed use, primarily residential	Medium-Density Residential (MDR)
Open land	Varied based on land cover
Recreation	Varied based on land cover
Residential - multi-family	Multi-Family and High-Density Residential (MFR-HDR)
Residential - other	Medium-Density Residential (MDR)
Residential - single family	Medium-Density Residential (MDR)
Right-of-way	Varied based on land cover
Tax exempt	Varied based on land cover
Unknown	Varied based on land cover
Water	Varied based on land cover

N Load Calculation

Nitrogen loads were calculated for each record in the "[TownName]Intersect" shapefile by multiplying the area of each polygon ("AreaAcre") by the nitrogen loading rate assigned to the record's specific land cover/land use/soil type combination (the "MAX_NLER" field, which was entered during the creation of the base shapefile). The Field Calculator tool was used to complete this calculation in the "NLoadLbYr" field. As the name suggests, the units for the loading rates are pounds/year. These results are eventually summed for overall catchment totals of impervious area as described in the "Final Preparation of Deliverable Shapefile" section below.

For reference, the nitrogen loading category into which each record is assigned is recorded in the "FIRST_NLCR" field, which stands for Nitrogen Load Crosswalk. The entries in this field correspond to the Nitrogen Source Categories and nitrogen load export rates shown in Table 1 of Attachment 1 to Appendix H of the 2016 Massachusetts Small MS4 General Permit. An abbreviated crosswalk is shown in Table 6 below. Note that this crosswalk only considers the land cover of the record (the "CoverName" field) and, where necessary, the soil type of the record (the "HSG_N" field).

Table 6. Crosswalk Linking Land Cover and Soil Type to the Nitrogen Loading Categories Shown in Table 1 of Attachment 1 to Appendix H of the 2016 Massachusetts Small MS4 General Permit

Land Cover	Soil Type	Nitrogen Source Category
Impervious	All	All Impervious Cover
Non-Impervious	A	Developed Land Pervious (DevPERV)-HSG A
Non-Impervious	B	Developed Land Pervious (DevPERV)-HSG B
Non-Impervious	C	Developed Land Pervious (DevPERV)-HSG C
Non-Impervious	D	Developed Land Pervious (DevPERV)-HSG D
Non-Impervious	A/D	Developed Land Pervious (DevPERV)-HSG A
Non-Impervious	B/D	Developed Land Pervious (DevPERV)-HSG B
Non-Impervious	C/D	Developed Land Pervious (DevPERV)-HSG C/D

Final Preparation of Deliverable Shapefile

Once all calculations were made as described above, the "[TownName]Intersect" shapefile was condensed using the Dissolve tool. The "Dissolve_Field" was defined as the field containing catchment identifiers and the following fields were defined as "Statistics Fields" with a "Statistic Type" of "Sum": "AreaAcre," "ImpAreaAcr," "ImpPercent," "DCIAAcre," "DCIAPercen," "PLoadLbYr," and "NLoadLbYr."

The resulting layer was named "[TownName]Final" and was provided with all other deliverables from this project. This shapefile displays the Town's catchment and contains totals of each catchment's area, impervious area, estimated DCIA, impervious percentage, estimated DCIA percentage, estimated phosphorus load, and estimated nitrogen load.

Selection of SCM/BMP Sites

To select sites for future evaluation for SCM/BMP retrofits, the NSP BMP Tool was used. Town-owned sites were identified as the most desirable parcels to inspect first, since they typically do not require use agreements or other considerations. A .csv file was exported from the tool that contained records for all Town-owned properties and the Tool's priority score for each property relative to both phosphorus and nitrogen. To obtain this score, the tool considers multiple factors such as pollutant loading rate, soil type, location of stormwater infrastructure, and various confounding factors. The closer the score is to 1, the better it is expected to be for a retrofit targeting the selected pollutant.

This .csv file was imported into ArcGIS and joined with an existing parcel layer from the Metropolitan Area Planning Council (MAPC), which also contained a "parloc_id" field to allow the records from the .csv to be spatially referenced.

The display of the catchments was changed to make the highest-loading catchments stand out. The display of the BMP Tool results was changed to make the parcels with the highest priority score stand out. The map was then examined and any high-score parcels in high-loading catchments were noted. In cases where there weren't enough, lower-scoring parcels in mid-loading catchments or mid-scoring parcels in high-loading catchments were chosen.

The top-5 of these chosen parcels were included in the body of the report, while the longer list of all Town-owned properties was included in an Appendix. As all of these properties are evaluated in the future, the Town may re-run the above analysis focusing on non-Town-owned properties.

If a municipality does not have access to a resource like the NSP BMP Tool, this analysis could be completed in ArcGIS by using the "Intersect" tool with the input datasets of "NSIRBaseShapefile" (the base shapefile) and any parcel layer the municipality has access to. Then, the serious of nutrient loading calculations described in the above sections could be reproduced and the completed layer could be dissolved using the parcel identifiers as a "Dissolve_Field." The resulting shapefile would display the highest-loading parcels throughout the municipality. This could be used along with the catchment loading shapefile as a prioritization tool in determining which parcels to assess first. It would also be recommended that a field identifying an owner of each parcel be preserved during this process, as Town-owned parcels are often more desirable opportunities.

Final Deliverables

Along with the final report and this methods addendum, the Town was provided with copies of three ArcGIS shapefiles that were used in or products of the analysis. Table 7 below gives a brief description of each shapefile.

Table 7. Descriptions of Shapefiles Provided as Deliverables of this Project

Shapefile Name	Description
NSIRBaseShapefile	A shapefile containing polygons with like land cover, land use, soil type, and pertinent loading rates, multipliers, etc. for Neponset towns.
[TownName] Intersect	The product of an intersect operation between the base shapefile above and the Town's stormwater catchment shapefile. This shapefile specifically shows only the information from the base shapefile that is pertinent to the Town's catchments. Calculations for impervious area, directly connected impervious area, and pollutant loads were made within this shapefile's attribute table.
[TownName] Final	This shapefile is the final product of the analysis. It contains the following for each catchment within the Town: total area (acres), total impervious area (acres), percent of catchment that is impervious, total estimated directly connected impervious area (acres), estimated percent of catchment that is directly connected impervious area, estimated phosphorus load from catchment (lb/year), estimated nitrogen load from catchment (lb/year)