Year 4 Annual Report
Massachusetts Small MS4 General Permit
Reporting Period: July 1, 2021-June 30, 2022

Please DO NOT attach any documents to this form. Instead, attach all requested documents to an email when submitting the form

Unless otherwise noted, all fields are required to be filled out. If a field is left blank, it will be assumed the requirement or task has not been completed. Please ONLY report on activities between July 1, 2021 and June 30, 2022 unless otherwise requested.

Part I: Contact Information

Name of Municipality or Organization: Town of Plymouth

EPA NPDES Permit Number: MAR041150

Primary MS4 Program Manager Contact Information

Name: Jonathan Beder Title: Director of Public Works

Street Address Line 1: Town of Plymouth

Street Address Line 2: 26 Court Street

City: Plymouth State: MA Zip Code: 02360

Email: jbeder@plymouth-ma.gov Phone Number: 508.830.4162 x12105

Stormwater Management Program (SWMP) Information

SWMP Location (web address): https://www.plymouth-ma.gov/engineering/pages/stormwater-ms4-permit

Date SWMP was Last Updated: June 30, 2021

If the SWMP is not available on the web please provide the physical address:

Part II: Self-Assessment

First, in the box below, select the impairment(s) and/or TMDL(s) that are applicable to your MS4. Make sure you are referring to the most recent EPA approved Section 303(d) Impaired Waters List which can be found here: https://www.epa.gov/tmdl/region-1-impaired-waters-and-303d-lists-state

Impairment(s)

☒ Bacteria/Pathogens ☐ Chloride ☒ Nitrogen ☒ Phosphorus
☒ Solids/ Oil/ Grease (Hydrocarbons)/ Metals

TMDL(s)

In State: ☐ Assabet River Phosphorus ☒ Bacteria and Pathogen ☐ Cape Cod Nitrogen
☐ Charles River Watershed Phosphorus ☐ Lake and Pond Phosphorus

Out of State: ☐ Bacteria/Pathogens ☐ Metals ☐ Nitrogen ☐ Phosphorus

Clear Impairments and TMDLs

Next, check off all requirements below that have been completed. ***By checking each box you are certifying that you have completed that permit requirement fully.*** *If you have not completed a requirement leave the box unchecked. Additional information will be requested in later sections.*

Year 4 Requirements

☒ Developed a report assessing current street design and parking lot guidelines and other local requirements within the municipality that affect the creation of impervious cover, made it available as part of the SWMP, and:

- ◉ No updates were recommended
- ○ Updates were recommended. The anticipated date or date of completion for updates is/was:

☒ Developed a report assessing local regulations to determine the feasibility of making green infrastructure practices allowable when appropriate site conditions exist, made it available as part of the SWMP, and:

- ◉ No updates were recommended
- ○ Updates were recommended. The anticipated date or date of completion for updates is/was:

☒ Identified a minimum of 5 permittee-owned properties that could potentially be modified or retrofitted with BMPs to reduce impervious cover

Optional: If you would like to describe progress made on any incomplete requirements listed above, provide an update on previous incomplete milestones, or provide any additional details, please use the box below:

Annual Requirements

- ☒ Provided an opportunity for public participation in review and implementation of SWMP and complied with State Public Notice requirements
- ☒ Kept records relating to the permit available for 5 years and made available to the public
- ☐ The SSO inventory has been updated, including the status of mitigation and corrective measures implemented
  - ○ This is not applicable because we do not have sanitary sewer
  - ◉ This is not applicable because we did not find any new SSOs
  - ○ The updated SSO inventory is attached to the email submission
  - ○ The updated SSO inventory can be found at the following website:
- ☒ Updated system map due in year 2 as necessary
- ☒ Provided training to employees involved in IDDE program within the reporting period
- ☒ Properly stored and disposed of catch basin cleanings and street sweepings so they did not discharge to receiving waters
- ☒ All curbed roadways were swept at least once within the reporting period
- ☒ Enclosed all road salt storage piles or facilities and implemented winter road maintenance procedures to minimize the use of road salt
- ☒ Implemented SWPPPs for all permittee owned or operated maintenance garages, public works yards, transfer stations, and other waste handling facilities
- ☒ Updated inventory of all permittee owned facilities as necessary
- ☒ O&M programs for all permittee owned facilities have been completed and updated as necessary
- ☒ Implemented all maintenance procedures for permittee owned facilities in accordance with O&M programs
- ☒ Implemented program for MS4 infrastructure maintenance to reduce the discharge of pollutants
- ☒ Inspected all permittee owned treatment structures (excluding catch basins)

Optional: If you would like to describe progress made on any incomplete requirements listed above or provide any additional details, please use the box below:

Bacteria/ Pathogens (Combination of Impaired Waters Requirements and TMDL Requirements as Applicable)

Annual Requirements

*Public Education and Outreach**

- ☒ Annual message was distributed encouraging the proper management of pet waste, including noting any existing ordinances where appropriate
- ☒ Permittee or its agents disseminated educational material to dog owners at the time of issuance or renewal of dog license, or other appropriate time

☒ Provided information to owners of septic systems about proper maintenance in any catchment that discharges to a water body impaired for bacteria

** Public education messages can be combined with other public education requirements as applicable (see Appendix H and F for more information)*

Optional: If you would like to describe progress made on any incomplete requirements listed above or provide any additional details, please use the box below:

Pet waste, owner septic system management brochures are available on the Town's website

Chloride

☒ Completed the Salt Reduction Plan due in Year 3, updated if necessary

- ◉ The Salt Reduction Plan is attached to the email submission
- ○ The Salt Reduction Plan can be found at the following website:

Annual Requirements

Public Education and Outreach

☒ Included an annual message in November/ December to private road salt applicators and commercial industrial site owners on the proper storage and application rates of winter deicing material, along with the steps that can be taken to minimize salt use and protect local waterbodies

Please fill out the following information on salt usage over Year 4 of the permit. Be sure to include units for amount of salt:

Type(s) of salt applied: Sodium Chloride (Rock Salt - Road Salt)

Amount of salt applied: 6,354 tons

Optional: If you would like to describe progress made on any incomplete requirements listed above or provide any additional details, please use the box below:

Anti Icing Best Management Practices (Salt Reduction Plan) will be posted on the towns website

Nitrogen (Combination of Impaired Waters Requirements and TMDL Requirements as Applicable)

Annual Requirements

*Public Education and Outreach**

☒ Distributed an annual message in the spring (April/May) that encourages the proper use and disposal of grass clippings and encourages the proper use of slow-release fertilizers

☒ Distributed an annual message in the summer (June/July) encouraging the proper management of pet waste, including noting any existing ordinances where appropriate

☒ Distributed an annual message in the fall (August/September/October) encouraging the proper disposal of leaf litter

** Public education messages can be combined with other public education requirements as applicable (see Appendix H and F for more information)*

Good Housekeeping and Pollution Prevention for Permittee Owned Operations

☒ Increased street sweeping frequency of all municipal owned streets and parking lots subject to Permit part 2.3.7.a.iii.(c) to a minimum of two times per year (spring and fall)

Nitrogen Source Identification Report

☒ Completed the Nitrogen Source Identification Report

- ◉ The Nitrogen Source Identification Report is attached to the email submission
- ○ The Nitrogen Source Identification Report can be found at the following website:

Potential structural BMPs

☐ Any structural BMPs listed in Table 3 of Attachment 1 to Appendix H already existing or installed in the regulated area by the permittee or its agents was tracked and the nitrogen removal by the BMP was estimated consistent with Attachment 1 to Appendix H. The BMP type, total area treated by the BMP, the design storage volume of the BMP and the estimated nitrogen removed in mass per year by the BMP were documented.

- ○ The BMP information is attached to the email submission
- ◉ The BMP information can be found at the following website:

Optional: If you would like to describe progress made on any incomplete requirements listed above or provide any additional details, please use the box below:

Phosphorus (Combination of Impaired Waters Requirements and TMDL Requirements as Applicable)

Annual Requirements

*Public Education and Outreach**

☒ Distributed an annual message in the spring (April/May) encouraging the proper use and disposal of grass clippings and encouraging the proper use of slow-release and phosphorus-free fertilizers

☒ Distributed an annual message in the summer (June/July) encouraging the proper management of pet waste, including noting any existing ordinances where appropriate

☒ Distributed an annual message in the fall (August/September/October) encouraging the proper disposal of leaf litter

** Public education messages can be combined with other public education requirements as applicable (see Appendix H and F for more information)*

Good Housekeeping and Pollution Prevention for Permittee Owned Operations

☒ Increased street sweeping frequency of all municipal owned streets and parking lots subject to Permit part 2.3.7.a.iii.(c) to a minimum of two times per year (spring and fall)

Phosphorus Source Identification Report

☒ Completed the Phosphorus Source Identification Report

- ◉ The Phosphorus Sourchace Identification Report is attached to the email submission
- ○ The Phosphorus Source Identification Report can be found at the following website:

Potential structural BMPs

☐ Any structural BMPs already existing or installed in the regulated area by the permittee or its agents was tracked and the phosphorus removal by the BMP was estimated consistent with Attachment 3 to Appendix F. The BMP type, total area treated by the BMP, the design storage volume of the BMP and the estimated phosphorus removed in mass per year by the BMP were documented.

- ○ The BMP information is attached to the email submission
- ◉ The BMP information can be found at the following website:

Optional: If you would like to describe progress made on any incomplete requirements listed above or provide any additional details, please use the box below:

Solids, Oil and Grease (Hydrocarbons), or Metals

Annual Requirements

Good Housekeeping and Pollution Prevention for Permittee Owned Operations

☒ Increased street sweeping frequency of all municipal owned streets and parking lots to a schedule that targets areas with potential for high pollutant loads

- ◉ The street sweeping schedule is attached to the email submission
- ○ The street sweeping schedule can be found at the following website:

☒ Prioritized inspection and maintenance for catch basins to ensure that no sump shall be more than 50 percent full; Cleaned catch basins more frequently if inspection and maintenance activities indicated excessive sediment or debris loadings

Optional: If you would like to describe progress made on any incomplete requirements listed above or provide any additional details, please use the box below:

Charles River Watershed Phosphorus TMDL

☐ Defined the scope of the Phosphorus Control Plan (PCP). *Please select one of the following:*

- ○ The PCP scope is the entire area within our jurisdiction within the Charles River Watershed
- ○ The PCP scope is the urbanized area portion of our jurisdiction within the Charles River Watershed

Optional: If you would like to describe progress made on any incomplete requirements listed above or provide any additional details, please use the box below:

NON-TRADITIONAL AND TRANSPORTATION MS4s ONLY- municipalities please skip this section:

☐ Estimated the current impervious area of permittee owned property, determined the Land Use information for permittee owned property, calculated the phosphorus removal in pounds per year for any structural BMP owned by the permittee in accordance with Appendix F Attachment 3, and recorded the date of last maintenance activity for all structural BMPs for which phosphorus removal is calculated

- ○ The above information is attached to the email submission
- ○ The above information can be found at the following website:

Lake and Pond Phosphorus TMDL

☐ Defined the scope of the Lake Phosphorus Control Plan (LPCP). *Please select one of the following:*

- ○ The PCP scope is the entire area within our jurisdiction discharging to the impaired waterbody
- ○ The PCP scope is the urbanized area portion of our jurisdiction discharging to the impaired waterbody

☐ Calculated baseline phosphorus, allowable phosphorus load, and phosphorus reduction requirement

Optional: If you would like to describe progress made on any incomplete requirements listed above or provide any additional details, please use the box below:

Optional: Use the box below to provide any additional information you would like to share as part of your self-assessment:

Part III: Receiving Waters/Impaired Waters/TMDL

Have you made any changes to your lists of receiving waters, outfalls, or impairments since the NOI was submitted?

- ○ Yes
- ◉ No

If yes, describe below, including any relevant impairments or TMDLs:

Part IV: Minimum Control Measures

Please fill out all of the metrics below. If applicable, include in the description who completed the task if completed by a third party.

MCM1: Public Education

Number of educational messages completed **during this reporting period**: 4

*Below, report on the educational messages completed **during this reporting period**. For the measurable goal(s) please describe the method/measures used to assess the overall effectiveness of the educational program.*

BMP:Pet Waste

Message Description and Distribution Method:

Fact sheet, promoting the proper management of pet waste and cites Town dog waste regulations that include fines for violations, has been posted to the Town website.

Targeted Audience: Residential/Business/Commercial/Institution Facilities

Responsible Department/Parties: Engineering

Measurable Goal(s):

Enable Town residents, businesses, institutions and commercial facilities to reduce nitrogen and bacteria in stormwater runoff. Town webmaster will track # of people who view materials and # of people that download materials. Goal: 100 fact sheets will be downloaded by website visitors annually, and Survey Monkey will measure effectiveness of messaging

Message Date(s): July 2020

Message Completed for: Appendix F Requirements ☐ Appendix H Requirements ☒

Was this message different than what was proposed in your NOI? Yes ○ No ◉

If yes, describe why the change was made:

BMP:Yard Waste

Message Description and Distribution Method:

Fact sheet, promoting the proper management of grass clippings and yard waste and their effects on the environment, has been posted to the Town website.

Targeted Audience: Residential/Business/Commercial/Institution Facilit

Responsible Department/Parties: Engineering

Measurable Goal(s):

Enable Town residents, businesses, institutions and commercial facilities to reduce nitrogen and bacteria in

stormwater runoff. Town webmaster will track # of people who view materials and # of people that download materials. Goal: 100 fact sheets will be downloaded by website visitors annually, and Survey Monkey will measure effectiveness of messaging.

Message Date(s): July 2020

Message Completed for: Appendix F Requirements ☐ Appendix H Requirements ☒

Was this message different than what was proposed in your NOI? Yes ○ No ◉

If yes, describe why the change was made:

BMP:Septic Systems

Message Description and Distribution Method:

Fact sheet, including how septic systems work, maintenance measures, and how a system can adversely impact the environment, has been posted to the Town website.

Targeted Audience: All septic users, specifically home owners

Responsible Department/Parties: Engineering

Measurable Goal(s):

Enable Town residents, businesses, institutions and commercial facilities to reduce nitrogen and bacteria in stormwater runoff. Town webmaster will track # of people who view materials and # of people that download materials. Goal: 100 fact sheets will be downloaded by website visitors annually, and Survey Monkey will measure effectiveness of messaging.

Message Date(s): July 2020

Message Completed for: Appendix F Requirements ☐ Appendix H Requirements ☒

Was this message different than what was proposed in your NOI? Yes ○ No ◉

If yes, describe why the change was made:

BMP:Salt Reduction - Anti Icing Plan

Message Description and Distribution Method:

Fact sheet, including how to make your own brine and reduce salt use during the winter months, has been posted to the Town website.

Targeted Audience: Residential/Business/Commercial/Institution Facilities

Responsible Department/Parties: DPW Operations

Measurable Goal(s):

Enable Town residents, businesses, institutions and commercial facilities to reduce nitrogen and bacteria in stormwater runoff. Town webmaster will track # of people who view materials and # of people that download materials. Goal: 100 fact sheets will be downloaded by website visitors annually, and Survey Monkey will measure effectiveness of messaging.

Message Date(s): July 2022

Message Completed for: Appendix F Requirements ☐ Appendix H Requirements ☒

Was this message different than what was proposed in your NOI? Yes ○ No ◉

If yes, describe why the change was made:

BMP:[Message name here]

Message Description and Distribution Method:

Targeted Audience:

Responsible Department/Parties:

Measurable Goal(s):

Message Date(s):

Message Completed for: Appendix F Requirements ☐ Appendix H Requirements ☐

Was this message different than what was proposed in your NOI? Yes ○ No ○

If yes, describe why the change was made:

Add an Educational Message

MCM2: Public Participation

Describe the opportunity provided for public involvement in the development of the Stormwater Management Program (SWMP) **during this reporting period**:

Stormwater Management Plan posted at https://www.plymouth-ma.gov/engineering/pages/Stormwater

Was this opportunity different than what was proposed in your NOI? Yes ○ No ◉

Describe any other public involvement or participation opportunities conducted **during this reporting period**:
Prepared SWMP presentation, plans to facilitate presentation set for end of the year

MCM3: Illicit Discharge Detection and Elimination (IDDE)

Sanitary Sewer Overflows (SSOs)

Check off the box below if the statement is true.

☐ This SSO section is NOT applicable because we DO NOT have sanitary sewer

*Below, report on the number of SSOs identified in the MS4 system and removed **during this reporting period**.*

Number of SSOs identified: 0

Number of SSOs removed: 0

MS4 System Mapping

Optional: Provide additional status information regarding your map:
MS4 Mapping was completed under year 3 annual report.

Screening of Outfalls/Interconnections

If conducted, please submit any outfall monitoring results from this reporting period. Outfall monitoring results should include the date, outfall/interconnection identifier, location, weather conditions at time of sampling, precipitation in previous 48 hours, field screening parameter results, and results from all analyses. Please also include the updated inventory and ranking of outfalls/interconnections based on monitoring results.

○ No outfalls were inspected

◉ The outfall screening data is attached to the email submission

○ The outfall screening data can be found at the following website:

Below, report on the number of outfalls/interconnections screened ***during this reporting period.***

Number of outfalls screened: 34

Below, report on the percent of outfalls/interconnections screened ***to date.***

Percent of outfalls screened: 100

Optional: Provide additional information regarding your outfall/interconnection screening:
All the outfalls have been screened to date. Under year 4 annual report wet weather screening and sampling was performed to the outfalls that where deemed necessary during the dry weather screening. See attached wet weather screening and results

Catchment Investigations

If conducted, please submit all data collected during this reporting period as part of the dry and wet weather investigations. Also include the presence or absence of System Vulnerability Factors for each catchment.

- (•) No catchment investigations were conducted
- ( ) The catchment investigation data is attached to the email submission
- ( ) The catchment investigation data can be found at the following website:

Below, report on the number of catchment investigations completed ***during this reporting period.***

Number of catchment investigations completed this reporting period: 0

Below, report on the percent of catchments investigated ***to date.***

Percent of total catchments investigated: 100

Optional: Provide any additional information for clarity regarding the catchment investigations below:
Catchment investigation data was submitted under year 3 annual report.

IDDE Progress

If illicit discharges were found, please submit a document describing work conducted over this reporting period, and cumulative to date, including location source; description of the discharge; method of discovery; date of discovery; and date of elimination, mitigation, or enforcement OR planned corrective measures and schedule of removal.

- (•) No illicit discharges were found
- ( ) The illicit discharge removal report is attached to the email submission
- ( ) The illicit discharge removal report can be found at the following website:

*Below, report on the number of illicit discharges identified and removed, along with the volume of sewage removed **during this reporting period.***

Number of illicit discharges identified: 0

Number of illicit discharges removed: 0

Estimated volume of sewage removed: 0 gallons/day

*Below, report on the total number of illicit discharges identified and removed to date. At a minimum, report on the number of illicit discharges identified and removed **since the effective date of the permit (July 1, 2018)**.*

Total number of illicit discharges identified: 0

Total number of illicit discharges removed: 0

Optional: Provide any additional information for clarity regarding illicit discharges identified, removed, or planned to be removed below:

Employee Training

Describe the frequency and type of employee training conducted **during this reporting period**:

Employee training as outlined on the IDDE manual was performed. IDDE manual was submitted to the Town during year 3 annual report.

MCM4: Construction Site Stormwater Runoff Control

*Below, report on the construction site plan reviews, inspections, and enforcement actions completed **during this reporting period**.*

Number of site plan reviews completed: 93

Number of inspections completed: 0

Number of enforcement actions taken: 1

Optional: Enter any additional information relevant to construction site plan reviews, inspections, and enforcement actions:

Town requires storm water systems to be inspected during construction and certified by a Professional Engineer.

MCM5: Post-Construction Stormwater Management in New Development and Redevelopment

Ordinance or Regulatory Mechanism

Date update was completed (due in year 3): July 2021

As-built Drawings

*Below, report on the number of as-built drawings received **during this reporting period**.*

Number of as-built drawings received: 20

Optional: Enter any additional information relevant to the submission of as-built drawings:

Updates made to the procedure for as-built drawings and updated the Town Guide for the Design of Stormwater Facilities. Update will require BMPs to be optimized for the nitrogen removal. Submission of long term operation and maintenance measures is required in the Design Guide.

Retrofit Properties Inventory

Below, list the permittee-owned properties that could be modified or retrofitted with BMPs to mitigate impervious areas (at least 5):

See attached report identifying the five (5) permittee-owned properties that can potentially be modified or retrofitted with BMPs to reduce impervious areas.

MCM6: Good Housekeeping

Catch Basin Cleaning

*Below, report on the number of catch basins inspected and cleaned, along with the total volume of material removed from the catch basins **during this reporting period**.*

Number of catch basins inspected: 675

Number of catch basins cleaned: 675

Total volume or mass of material removed from all catch basins: 816 cubic yards

Below, report on the total number of catch basins in the MS4 system.

Total number of catch basins: 5,200

If applicable:

Report on the actions taken if a catch basin sump is more than 50% full during two consecutive routine inspections/cleaning events:

Street Sweeping

*Report on street sweeping completed **during this reporting period** using one of the three metrics below.*

- ○ Number of miles cleaned:
- ◉ Volume of material removed: 8,160 cubic yards
- ○ Weight of material removed: [Select Units]

Stormwater Pollution Prevention Plan (SWPPP)

*Below, report on the number of site inspections for facilities that require a SWPPP completed **during this reporting period**.*

Number of site inspections completed: 93

Describe any corrective actions taken at a facility with a SWPPP:

Private property under construction was issued a correction item on the condition of the erosion control barrier. It was corrected promptly

Additional Information

Monitoring or Study Results

Results from any other stormwater or receiving water quality monitoring or studies conducted during the reporting period not otherwise mentioned above, where the data is being used to inform permit compliance or permit effectiveness must be attached.

- ◉ Not applicable
- ○ The results from additional reports or studies are attached to the email submission
- ○ The results from additional reports or studies can be found at the following website(s):

If such monitoring or studies were conducted on your behalf or if monitoring or studies conducted by other entities were reported to you, a brief description of the type of information gathered or received shall be described below:

Additional Information

Optional: Enter any additional information relevant to your stormwater management program implementation during the reporting period. Include any BMP modifications made by the MS4 if not already discussed above:

COVID-19 Impacts

Optional: If any of the above year 4 requirements could not be completed due to the impacts of COVID-19, please identify the requirement that could not be completed, any actions taken to attempt to complete the requirement, and reason the requirement could not be completed below:

Activities Planned for Next Reporting Period

Please confirm that your SWMP has been, or will be, updated to comply with all applicable permit requirements including but not limited to the year 5 requirements summarized below. (Note: impaired waters and TMDL requirements are not listed below)

Yes, I agree ☒

Annual Requirements

- Annual report submitted and available to the public
- Annual opportunity for public participation in review and implementation of SWMP
- Keep records relating to the permit available for 5 years and make available to the public
- Properly store and dispose of catch basin cleanings and street sweepings so they do not discharge to receiving waters
- Annual training to employees involved in IDDE program
- Update inventory of all known locations where SSOs have discharged to the MS4
- Continue public education and outreach program
- Update outfall and interconnection inventory and priority ranking and include data collected in

connection with the dry weather screening and other relevant inspections conducted
- Implement IDDE program
- Review site plans of construction sites as part of the construction stormwater runoff control program
- Conduct site inspection of construction sites as necessary
- Inspect and maintain stormwater treatment structures
- Log catch basins cleaned or inspected
- Sweep all curbed streets at least annually
- Continue investigations of catchments associated with Problem Outfalls
- Implemented SWPPPs for all permittee owned or operated maintenance garages, public works yards, transfer stations, and other waste handling facilities
- Review inventory of all permittee owned facilities in the categories of parks and open space, buildings and facilities, and vehicles and equipment; update if necessary
- Review O&M programs for all permittee owned facilities; update if necessary
- Implement all maintenance procedures for permittee owned facilities in accordance with O&M programs
- Implement program for MS4 infrastructure maintenance to reduce the discharge of pollutants
- Enclose all road salt storage piles or facilities and implemented winter road maintenance procedures to minimize the use of road salt
- Review as-built drawings for new and redevelopment to ensure compliance with post construction bylaws, regulations, or regulatory mechanism consistent with permit requirements
- Inspect all permittee owned treatment structures (excluding catch basins)
- Identify additional permittee-owned properties that could potentially be modified or retrofitted with BMPs to reduce impervious areas so that the permittee maintains a minimum of 5 sites in their inventory, until such a time when the permittee has less than 5 sites remaining

Provide any additional details on activities planned for permit year 5 below:

Part V: Certification of Small MS4 Annual Report 2021

40 CFR 144.32(d) 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 gather and evaluate 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, I certify that 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.

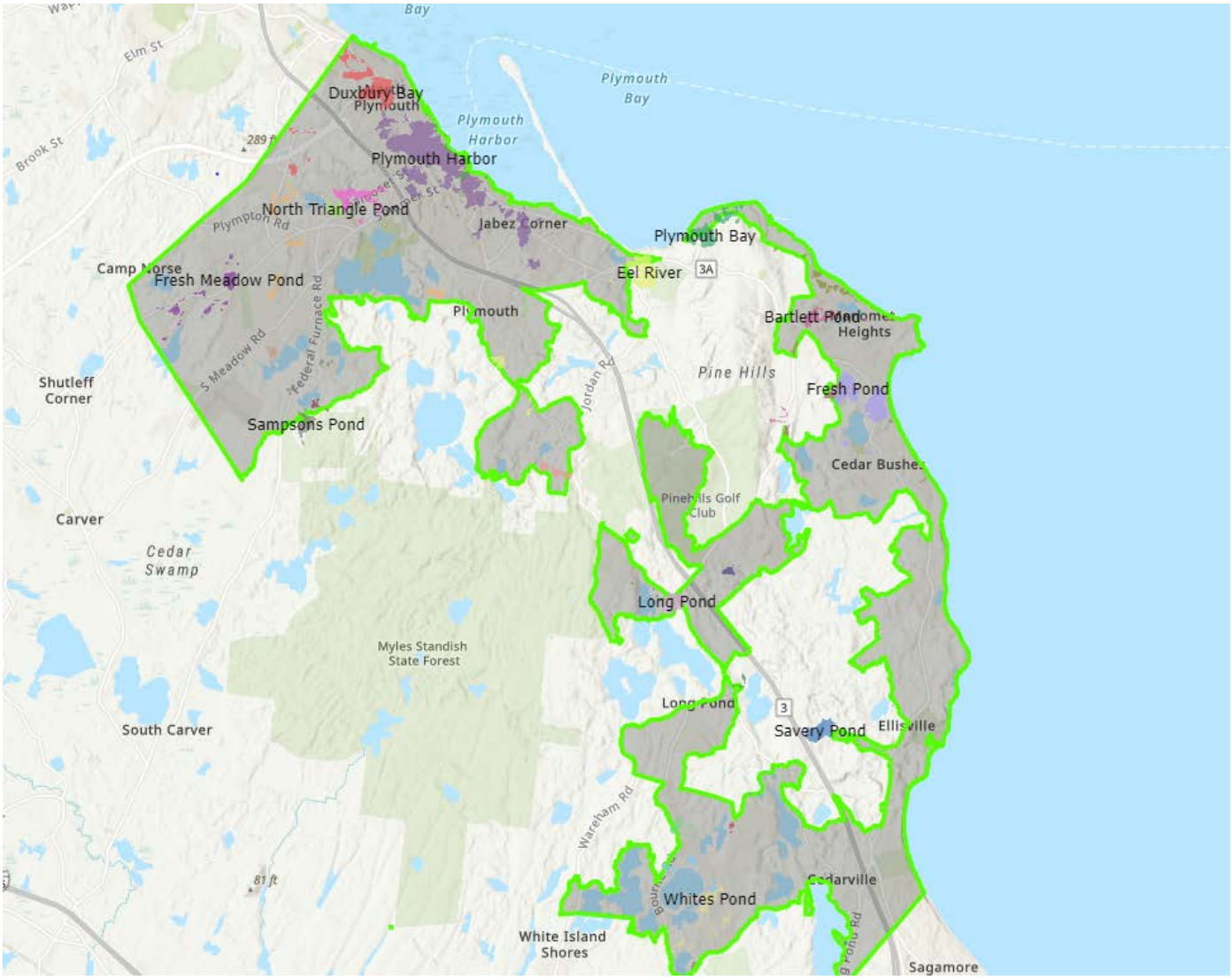
Name: JONATHAN BEDER Title: DPW DIRECTOR

Signature: [signature] Date: 9/28/22

[Signatory may be a duly authorized representative]

Nitrogen – Phosphorus Source Identification Report

Town of Plymouth, MA



Prepared by: EBI Consulting July 2022

This document is not submitted as a regulatory compliance document

EBI Consulting
environmental | engineering | due diligence

Introduction
Nutrients and Water 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

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 Plymouth (“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.
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

Table 1. Impaired Receiving Waters

Category 5 – Requiring a TMDL				
Water Body	**Segment ID**	**Size**	**Units**	**Impairments**
Billington Sea	MA94007	263	Acres	Phosphorus, Algae, Turbidity, Dissolved Oxygen, Nutrients
Russel Mill Pond	MA94132	42	Acres	Algae, Dissolved Oxygen
Savery Pond	MA94136	29	Acres	Phosphorus, harmful Algae

Data Sources and Analytical Methods for Identifying Nitrogen & Phosphorus Loading

Several existing databases were used to complete this report. Table 2 below lists the data set and their origin.

Table 2. Data Sources

Existing Data Set	Origin	Date Published / Update
ArcGIS	EBI GIS File	Current as of the publishing of this report
Soil Survey Database	UC Davis Cal Soil Survey	Current as of the publishing of this report
Google Earth	Google Earth	October 2021

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 contributing watersheds was calculated using the ArcGIS that is part of the EBI database. The overall watershed area contributing to a

specific imparted water was calculated and the total impervious area was calculated using ArcGIS and Google Earth. EBI has compiled a very detailed database of all the Town's outfalls, catch basins, drain manholes, drainpipes and existing BMPS.

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.

Impervious / DCIA Summary by Receiving Water Catchment Areas

Table 3. Catchment Areas

Water Body (Catchment ID)	Total Catchment Area (Acres)	Impervious Area (Acres)	Percent Impervious	DCIA (Acres)	Percent DCIA
Billington Sea	62	12.4	20	12.4	20
Russel Mill Pond	8.1	3.25	40	3.25	40
Savery Pond	9	2.7	30	2.7	30

Total catchment area was calculated using the data on the ArcGIS that EBI has gathered and managed throughout the years. The area take-off tool built in the ArcGIS was used. Most of the catchment areas for the above referenced waterbodies are in mostly rural areas that include mainly single-family parcels with some retail developments too. The impervious areas were estimated using ArcGIS and Google Earth. The approximate impervious areas were also increase to account for any new impervious areas that are not shown on the aerial maps yet, and to be conservative, so the estimated nitrogen and phosphorus loading is not under reported.

Tables 3-1 & Table 3-2 on Appending F were used to calculate both nitrogen and phosphorus loading summary by catchment area.

Table 3-2: Average annual distinct nitrogen (N) load export rates for use in estimating N load reduction credits in the MA MS4 Permit

Nitrogen Source Category by Land Use	Land Surface Cover	N Load Export Rate, lbs./acre/year	N Load Export Rate, kg/ha/yr.
Commercial (COM) and Industrial (IND)	Directly connected impervious	15.0	16.9
	Pervious	See* DevPERV	See* DevPERV
All Residential	Directly connected impervious	14.1	15.8
	Pervious	See* DevPERV	See* DevPERV
Highway (HWY)	Directly connected impervious	10.5	11.8
	Pervious	See* DevPERV	See* DevPERV
Forest (FOR)	Directly connected impervious	11.3	12.7
	Pervious	0.5	0.6
Open Land (OPEN)	Directly connected impervious	11.3	12.7
	Pervious	See* DevPERV	See* DevPERV
Agriculture (AG)	Directly connected impervious	11.3	12.7
	Pervious	2.6	2.9
*Developed Land Pervious (DevPERV) – HSG A	Pervious	0.3	0.3
*Developed Land Pervious (DevPERV) – HSG B	Pervious	1.2	1.3
*Developed Land Pervious (DevPERV) – HSG C	Pervious	2.4	2.7
*Developed Land Pervious (DevPERV) – HSG C/D	Pervious	3.1	3.5
*Developed Land Pervious (DevPERV) – HSG D	Pervious	3.6	4.1

For this report a combination of A/B HSG soils is used. Most of the soils in Plymouth is classified as HSG A, but there are some sections where the HSG is B, therefore a hybrid nitrogen load export rate of (0.3+1.2)/2 = 0.75 lb/ac/yr rate is used. The catchment areas consist of mostly residential with some commercial development therefore a hybrid nitrogen load export rate of (15.0 + 14.1) / 2 = 14.55 lb/ac/yr is used.

Table 3-1: Average annual distinct phosphorus (P) load export rates for use in estimating P load reduction credits in the MA MS4 Permit

Phosphorus Source Category by Land Use	Land Surface Cover	P Load Export Rate, lbs./acre/year	P Load Export Rate, kg/ha/yr.
Commercial (COM) and Industrial (IND)	Directly connected impervious	1.78	2.0
	Pervious	See* DevPERV	See* DevPERV
Multi-Family (MFR) and High-Density Residential (HDR)	Directly connected impervious	2.32	2.6
	Pervious	See* DevPERV	See* DevPERV
Medium -Density Residential (MDR)	Directly connected impervious	1.96	2.2
	Pervious	See* DevPERV	See* DevPERV
Low Density Residential (LDR) - "Rural"	Directly connected impervious	1.52	1.7
	Pervious	See* DevPERV	See* DevPERV
Highway (HWY)	Directly connected impervious	1.34	1.5
	Pervious	See* DevPERV	See* DevPERV
Forest (FOR)	Directly connected impervious	1.52	1.7
	Pervious	0.13	0.13
Open Land (OPEN)	Directly connected impervious	1.52	1.7
	Pervious	See* DevPERV	See* DevPERV
Agriculture (AG)	Directly connected impervious	1.52	1.7
	Pervious	0.45	0.5
*Developed Land Pervious (DevPERV) – HSG A	Pervious	0.03	0.03
*Developed Land Pervious (DevPERV) – HSG B	Pervious	0.12	0.13
*Developed Land Pervious (DevPERV) – HSG C	Pervious	0.21	0.24
*Developed Land Pervious (DevPERV) – HSG C/D	Pervious	0.29	0.33
*Developed Land Pervious (DevPERV) – HSG D	Pervious	0.37	0.41

For this report a combination of A/B HSG soils is used. Most of the soils in Plymouth is classified as HSG A, but there are some sections where the HSG is B, therefore a hybrid phosphorus load export rate of (0.03+0.12)/2 = 0.075 lb/ac/yr rate is used. The catchment areas consist of mostly residential with some commercial development therefore a hybrid nitrogen load export rate of (1.78 + 1.96) / 2 = 1.84 lb/ac/yr is used.

Estimated Nutrient Loading from Catchments

Using the methods described above, estimates of nitrogen and phosphorus loading potential were created for each catchment areas as shown in table 3 of this report. Each catchment area consists of multiple sub-catchment areas that ultimately discharge to the impaired waters.

Table 4 of this report shows the calculated nitrogen and phosphorus loading estimates for the three (3) identified catchment areas. Table 5 of this report shows the sub-catchment areas with the highest estimated nitrogen and phosphorus loading. Sub-catchments with large impervious areas and land uses that are estimated to generate large nitrogen and phosphorus loading rates were selected.

Table 4. Estimated Loading Rates

Catchment ID	Estimated Nitrogen Loading (Lbs / Yr)	Estimated Phosphorus Loading (Lbs/Yr)
Billington Sea	217.62	26.54
Russel Mill Pond	50.93	6.35
Savery Pond	44.00	5.44

Table 5. Sub-Catchments with Highest Potential Loading Rates

Sub-Catchment ID	Estimated Nitrogen Loading (Lbs / Yr)	Estimated Phosphorus Loading (Lbs/Yr)
Billington Sea (Sub-Catchments 8-14)	112.40	22.96
Russel Mill Pond (All 3 Sub-Catchments)	50.93	6.35
Savery Pond Sub-Catchment	44.00	5.44

Note that the estimated loading rates for both nitrogen and phosphorus area based on soils type, land use and estimated DCIA. Actual loading rates may vary considerably from site to site depending on what stormwater control measures are present. This report has tried to not to underestimate the impervious and DCIA area in order to provide a valuable guide to help identify the areas in the Town that should be the highest priorities for intervention to begin reducing pollutant loading.

It must be noted that the Town has constructed and maintain several BMP's throughout the Town that reduce both nitrogen and phosphorus loading. These BMP's are part of other catchment areas that discharge to other receiving waters.

The Town also implements street sweeping by-annually and catch basin cleaning by-annually.

Dry Weather Outfall Screening Results.

Screening of all MS4 outfalls was performed as part of year 3 requirements and data from the screening with recommendations and lab results of potential problem outfall is included as an attachment to this report.

Potential Retrofit Opportunities.

Town parcels / properties were examined for potential BMP retrofit or new BMP opportunities. After assessing the data, each high-loading catchment was reviewed for potential BMP sites. Three parcels or land near ROW were chosen and are listed in Table 6 of this report. All parcels or land near ROW chosen are Town owned, and Town owned parcels often present the fewer barriers to constructing new BMPs.

Table 6. Town Owned Parcel or ROWs To Be Considered for Potential Retrofit Opportunities

Address	Notes
ROW near Outfalls 193, 194, 195 on Black Cat Road	Undeveloped land bordering residential area.
ROW near Outfalls 240 on Billionton Street	Undeveloped land bordering residential area.
ROW near Outfalls 321 on Camelot Dr	Undeveloped land near wetlands.

These results provide a valuable starting point for the next phase of requirements in Appendix H of the MS4 permit which are due by the end of the permit year 5. They include the following:

1. Within five years of the permit effective date, the permittee shall evaluate all permittee owned properties identified as presenting retrofit opportunities or areas of structural BMP installation under permit part 2.3.6.d.i.i or identified in the Nitrogen Source Identification Report that are within the drainage areas of the impaired water or its tributaries.

EBI Consulting
environmental | engineering | due diligence

Project Name: Plymouth MS4
Project Location: 2 Battery March Park, Suite 100 | Quincy, MA
Project Number: 1619000055

Dry Weather Survey Results

NPDES ID	Type of Outfall	Pipe Material	Pipe Condition	Pipe Shape	Round Pipe Measurements	Headwall	Headwall Condition	Description of Flow	Outlet Submerged	Height Above Outlet	Visual Notes	Materials Present	Required Maintenance	Additional Notes	Maintenance Required?
102	Pipe	Steel	Fair	Rounded pipe	Inner Diameter (in.)d = 42 Flow Depth (in.) h= 4	Yes	Fair	Moderate	No			Algae, rip rap		Gap on fernco Algae and barnacles on headwall	
103	Pipe	Clay tile	Good	Rounded pipe	Inner Diameter (in.)d = 18	No		Dry	Yes	Inches =4		Excessive sediment, excessive vegetation	Sediment removal, soil stabalization		Yes
104	Pipe	Concrete	Good	Rounded pipe	Inner Diameter (in.)d = 36 Flow Depth (in.) h= 8.5	Yes	Good	Moderate	No				Tree work	Corrugations in wall of concrete, no evidence of corrugated pipe	
107	Pipe	Clay tile	Good	Rounded pipe	Inner Diameter (in.)d = 24	Yes	Fair	Moderate	No			Excessive vegetation	Clean pipe, remove trash debris	2 pipes, Concrete, no flow, 12 in pool of water *Clay, moderate flow, 24 in (connected to manhole as shown on mapping) flow - 9in; sediment - 7in ; a few chips	Yes
110	Pipe	Concrete	Fair			No		Dry	No			Rip rap	Remove vegetation from outlet, remove trash debris	Covered in thorns; cannot get good view. Appears to have flared end, cannot see pipe, private property, easement?	Yes
115	Pipe	Concrete	Good	Rounded pipe	Inner Diameter (in.)d = 36 Flow Depth (in.) h= 6	No		Moderate	No			Excessive sediment	Clean pipe	Sediment from beach, subject to tides.	Yes
117	Pipe	Clay tile	Good	Rounded pipe	Inner Diameter (in.)d = 12	No		Trickling	No			Excessive sediment	Clean pipe	Pipe half filled with sand and rock, flow depth not measurable, trickling over sand	Yes
118	Pipe	Clay tile	Poor	Rounded pipe	Inner Diameter (in.)d = 12	Yes	Crumbling	Trickling	No			Excessive sediment, algae	Clear sediment, repair pipe	pipe is settled and siconnected one pipe length inside	Yes
119	Pipe	Concrete	Good	Rounded pipe	Inner Diameter (in.)d = 32	No		Dry	No			Rip rap, algae	Remove trash debris	Concrete flared end	
120	Pipe	Concrete	Fair	Rounded pipe	Inner Diameter (in.)d = 36 Flow Depth (in.) h=2	Yes	Good	Moderate	No		There is an odor present	Rip rap, excessive sediment, algae	Clean pipe, clear sediment	White coating on rocks in pipe	Yes

Dry Weather Survey Results

NPDES ID	Type of Outfall	Pipe Material	Pipe Condition	Pipe Shape	Round Pipe Measurements	Headwall	Headwall Condition	Description of Flow	Outlet Submerged	Height Above Outlet	Visual Notes	Materials Present	Required Maintenance	Additional Notes	Maintenance Required?
121	Pipe	Corrugated metal	Fair	Rounded pipe	Inner Diameter (in.)d = 42h x 64w Flow Depth (in.) h=2	Yes	Fair	Moderate	No			Rip rap, algae	Remove trash debris		
124	Pipe	Clay tile	Fair	Rounded pipe	Outer Diameter (in.) D= 12	No		Dry	No				Other	Barnacles in and pipe, some seweed in pipe	
127	Pipe	Concrete	Good	Rounded pipe	Inner Diameter (in.)d = 15	Yes	Good	Dry	No			Rip rap		Bar in pipe, flared end	
131	Pipe	Plastic	Good	Rounded pipe	Outer Diameter (in.) D= 7	No		Dry	No			Rip rap	Remove trash debris		
130	Pipe	Clay tile	Fair	Rounded pipe	-Inner Diameter (in.)d = 9	Yes	Fair	Dry	No		There is scouring below outlet		Erosion at structure	Not positive on pipe material, could be concrete	
133	Pipe	Clay tile	Fair	Rounded pipe	-Outer Diameter (in.) d= 14	Yes	Good	Dry	No			Rip rap	Other, remove trash debris	Rip rap is higher than pipe, looks like front portion of pipe broke off, back part is still intact and looks functional.	Yes
134	Pipe	Concrete	Fair	Rounded pipe	-Outer Diameter (in.) D= 14 estimated	Yes	Good	Dry	No		There is an odor present	Rip rap	Other,blocked pipe	Rocks and debris in front of pipe, not completely blocking	Yes
135	Pipe	Other	Fair			Yes	Good	Dry	No			Rip rap	Other	Cannot see pipe, either not an outfall or completely covered by rock, trash and debris	
136	Pipe	Concrete	Poor	Rounded pipe	-Inner Diameter (in.)d = 28	No		Dry	No			Rip rap	Other	Front section of pipe broken	Yes
137	Pipe	Clay tile	Poor	Rounded pipe	-Inner Diameter (in.)d = 18 estimated	No		Dry	No			Rip rap	Other	Covered by rock half full with rocks and leaves	Yes
138	Pipe	Concrete	Fair	Rounded pipe	-Inner Diameter (in.)d = 24 estimated	No		Dry	No		There is an odor present	Rip rap	Blocked pipe, remove trash debris	Flared end, bars covered. Blocked by rip rap, half filled with rocks and debris	Yes
142	Pipe	Concrete	Good	Rounded pipe	Inner Diameter (in.)d = 14 (left), 12 (right)	No		Dry	No			Floatables			
143	Pipe	Concrete	Good	Rounded pipe	Inner Diameter (in.)d = 24	Yes	Good	Dry	No			Rip rap, excessive vegetation	Remove trash debris		Yes
144	Pipe	Concrete	Good	Rounded pipe	Inner Diameter (in.)d = 36 Outer Diameter (in.) D= 42	Yes	Good	Dry	No			Rip rap		No flow, stagnant pool below invert	

Dry Weather Survey Results

NPDES ID	Type of Outfall	Pipe Material	Pipe Condition	Pipe Shape	Round Pipe Measurements	Headwall	Headwall Condition	Description of Flow	Outlet Submerged	Height Above Outlet	Visual Notes	Materials Present	Required Maintenance	Additional Notes	Maintenance Required?
145	Pipe	Concrete	Good	Rounded pipe	Inner Diameter (in.)d = 16	No		Dry	No			Excessive vegetation			
148	Pipe	Concrete	Good	Rounded pipe	Inner Diameter (in.)d = 24	No		Dry	No			Algae	Clear vegetation from front of outfall	Flared end, 2in muck with 1in water on top, stagnant water pool, fallen tree over pipe, partially blocked	Yes
150	Pipe	Corrugated metal	Good	Rounded pipe	Inner Diameter (in.)d = 24	No		Dry	No			Rip rap, excessive vegetation, excessive sediment	Tree work, remove trash debris	Flared end metal - bottom is rusted	
166	Pipe	Concrete	Good	Rounded pipe	Inner Diameter (in.)d = 18	No		Dry				Excessive sediment		Flared end concrete. 2 vertical bars at entrance.	
170	Pipe	Plastic	Fair	Rounded pipe	-Inner Diameter (in.)d = 12	No		Dry	No			Rip rap	Other, blocked pipe	Flared end plastic, one side broken by rocks, pipe partially blocked	Yes
203	Pipe	Plastic	Good	Rounded pipe	-Inner Diameter (in.)d = 8	Yes	Good	Dry	No						
206	Pipe	Plastic	Good	Rounded pipe	-Outer Diameter (in.) D= 5	No		Heavy	No						
207	Pipe	Concrete	Good	Rounded pipe	-Inner Diameter (in.)d = 12	Yes	Good	Heavy	No						
209	Pipe	Concrete	Good	Rounded pipe	-Inner Diameter (in.)d = 12	No		Dry	No						
212	Pipe	Unknown		Rounded pipe	Inner Diameter (in.)d = ~12	No			No				Remove vegetation	See pictures	Yes
215	Pipe	Concrete	Good	Rounded pipe	Inner Diameter (in.)d = 36	Yes	Good	Moderate	Yes	Inches = 2	There is an odor present				
216	Pipe	Concrete	Good	Rounded pipe	Inner Diameter (in.)d = ~12	No		dry	Yes	Inches = ~6		Excessive sediment, sheen bacterial	Remove trash debris, sediment removal		Yes
217	Pipe	Plastic	Good	Rounded pipe	Inner Diameter (in.)d = 12	No		Dry	No			Rip rap	Remove trash debris from flared end	Plastic flared end	Yes
218	Pipe	Concrete	Good	Rounded pipe	Inner Diameter (in.)d = 15	No		Dry	No			Rip rap, excessive sediment, excessive vegetation, sheen bacterial	Stabilize with rip rap, remove trash debris	Flared end concrete	Yes

Dry Weather Survey Results

NPDES ID	Type of Outfall	Pipe Material	Pipe Condition	Pipe Shape	Round Pipe Measurements	Headwall	Headwall Condition	Description of Flow	Outlet Submerged	Height Above Outlet	Visual Notes	Materials Present	Required Maintenance	Additional Notes	Maintenance Required?
220	Pipe	Clay tile	Good	Rounded pipe	Inner Diameter (in.)d = ~12	No		Dry	Yes	Inches = 9		Rip rap	Remove sediment inside structure and sediment trap	Trickling water downstream, but doesn't appear to be coming from outfall	Yes
229	Pipe	Corrugated metal	Crumbling	Rounded pipe	Inner Diameter (in.)d = 12	No		Dry	No				Structural corrosion, repair/ replace pipe	Pipe rusted out ~14ft back, water flows out there	Yes
230	Pipe	Plastic	Poor	Rounded pipe	Inner Diameter (in.)d = 15	Yes	Fair	Dry	Yes	Inches =9		Excessive sediment, excessive vegetation	Tree work, remove trash debris	Pipe crushed/deformed	Yes
235	Pipe	Concrete	Good	Rounded pipe	Inner Diameter (in.)d = ~15	No		Dry	No			Excessive sediment, excessive vegetation	Remove trash debris, clean pipe	Flared end concrete	Yes
236	Pipe	Corrugated metal	Poor	Rounded pipe	Inner Diameter (in.)d = 15	Yes	Good	Dry	No			Excessive sediment, excessive vegetation	Clean pipe, remove trash debris, remove sediment	Ditch work for excessive sediment, see pictures	Yes
237	Pipe	Concrete	Fair	Rounded pipe	Inner Diameter (in.)d = 22	Yes	Good	Dry	No			Excessive sediment	Clean pipe, remove sediment	Exposed rebar on left pipe. Second pipe not on map, invert ~3in lower, corrugated metal pipe caved in, 3in left open, 15in	Yes
239	Pipe	Concrete	Good	Rounded pipe	Inner Diameter (in.)d = 18	Yes	Good	Dry	No			Sheen bacterial			
240	Pipe	Concrete	Good	Rounded pipe	Inner Diameter (in.)d = 18	Yes	Good	Dry	No						
242	Pipe	Concrete	Good	Rounded pipe	Inner Diameter (in.)d = 4 Flow Depth (in.) h=3	No		Dry	No					Flared end section, stagnant water	
244	Pipe	Concrete	Good	Rounded pipe	Inner Diameter (in.)d = 30	No		Dry				Excessive sediment	Remove sediment at entrance, clean pipe	Flared end, 9in of sediment - 20x20 plume of muck	Yes
245	Pipe	Concrete	Good	Rounded pipe	Inner Diameter (in.)d = 30	No		Dry	No			Excessive sediment	Remove sediment at entrance, clean pipe	12in sediment, 15x15 plume of muck	Yes
249	Pipe	Concrete	Fair	Rounded pipe	Inner Diameter (in.)d = 20	Yes	Good	Dry	No			Excessive sediment	Clear pipe	Grate over pipe, completely blocked by trash and debris	Yes
253	Pipe	Concrete	Good	Rounded pipe	Inner Diameter (in.)d = 12 Outer Diameter (in.) D= 14	Yes	Good	Dry	No			Sheen bacterial	Repair concrete crack	Stagnant pool underneath pipe, headwall worn away under pipe see picture	Yes
254	Pipe	Concrete	Good	Rounded pipe	Inner Diameter (in.)d = 12	Yes	Good	Dry	No			Sheen bacterial			

Dry Weather Survey Results

NPDES ID	Type of Outfall	Pipe Material	Pipe Condition	Pipe Shape	Round Pipe Measurements	Headwall	Headwall Condition	Description of Flow	Outlet Submerged	Height Above Outlet	Visual Notes	Materials Present	Required Maintenance	Additional Notes	Maintenance Required?
255	Pipe	Plastic	Fair	Rounded pipe	Inner Diameter (in.)d = 12	Yes	Fair	Dry	No				Remove trash debris		Yes
256	Pipe	Plastic	Good	Rounded pipe	Inner Diameter (in.)d = 12	No		Dry	No			Excessive sediment		Flared end, 12in minus rip rap embankment	
257	Pipe	Concrete	Good	Rounded pipe	Inner Diameter (in.)d = 18	Yes	Good	Dry	No			Excessive sediment			
259	Pipe	Corrugated metal	Good	Rounded pipe	Inner Diameter (in.)d = ~24	No		Dry	No			Excessive sediment, excessive vegetation	Clear pipe, remove sediment	~16 in of sediment	Yes
260	Pipe	Corrugated metal	Crumbling	Rounded pipe	Inner Diameter (in.)d = 15	No		Dry	No			Excessive sediment, excessive vegetation	Replace pipe and flared end section, inspect at manhole to verify structural integrity	Flared end rotted,	Yes
261	Pipe	Corrugated metal	Good	Rounded pipe	Inner Diameter (in.)d = 18	No		Dry	No			Excessive vegetation	Clear outfall entrance	Flared end detached	Yes
262	Pipe	Corrugated metal	Good	Rounded pipe	Inner Diameter (in.)d = 12	Yes	Good	Dry	No			Rip rap			
263	Pipe	Concrete	Good	Rounded pipe	Inner Diameter (in.)d = 21	Yes	Good	Dry	No			Excessive sediment	Remove trash debris, clean pipe, remove sediment, stabalize soil	Grate over pipe, sediment is higher than pipe	Yes
264	Pipe	Concrete	Good	Rounded pipe	Inner Diameter (in.)d = 24	No		Trickling	No			Excessive sediment		Flared concrete end	
265	Pipe	Corrugated metal	Crumbling	Rounded pipe	Inner Diameter (in.)d = 12	No		Dry	No			Sheen bacterial	Clear vegetation	Pipe rotted back into embankment, stagnant water	Yes
266	Pipe		Good			No		Dry	No			Algae, sheen bacterial		27x27 D shape catch basin grate, overflow system, see pictures	
268	Pipe	Concrete	Good	Rounded pipe	Inner Diameter (in.)d = 12	No		Dry	No		There is scouring below outlet	Rip rap	Clear pipe, stabalize eroded area	Flared end concrete. Homeowners next door concerned with amount of water, other catch basins do not alleviate flow during storms.	Yes
269	Pipe	Concrete	Fair	Rounded pipe	Inner Diameter (in.)d = ~15	No		Dry	Yes	Inches = ~17			Clear concrete	Fully submerged. Extends ~8 feet into pond	Yes
270	Pipe	Corrugated metal	Good	Rounded pipe	Inner Diameter (in.)d = 10	Yes	Good	Dry	No		There is scouring below outlet		Inspect yearly for maintenance issues		Yes
271	Pipe	Concrete	Good	Rounded pipe	Inner Diameter (in.)d = 15	Yes	Good	Dry	No						

Dry Weather Survey Results

NPDES ID	Type of Outfall	Pipe Material	Pipe Condition	Pipe Shape	Round Pipe Measurements	Headwall	Headwall Condition	Description of Flow	Outlet Submerged	Height Above Outlet	Visual Notes	Materials Present	Required Maintenance	Additional Notes	Maintenance Required?
274	Pipe	Corrugated metal	Good	Rounded pipe	Inner Diameter (in.)d = 15	Yes	Good	Dry	No			Excessive sediment, excessive vegetation	Remove sediment, clear pipe	~11in of sediment in pipe	Yes
277	Pipe	Plastic	Good	Rounded pipe	Inner Diameter (in.)d = 15	No		Dry	No			Excessive sediment	Clear pipe, remove sediment	8in of silt in pipe	Yes
280	Pipe	Concrete	Good	Rounded pipe	Inner Diameter (in.)d = 12	Yes	Good	Dry	No			Excessive sediment	Clear pipe, remove sediment		Yes
281	Pipe	Concrete	Good	Rounded pipe	Inner Diameter (in.)d = 15	Yes	Good	Dry	No			Excessive sediment, rip rap		Single vertical bar in pipe entry way	
6/16.	Pipe	Plastic	Good	Rounded pipe	Inner Diameter (in.)d = 24	Yes	Good	Dry	No			Excessive sediment, sheen bacterial	Clear pipe	Outlet control structure 6x11ft. Two 8in low flow controls. See pictures.	Yes
6/16-1	Pipe	Corrugated metal	Good	Rounded pipe	Inner Diameter (in.)d = 12	No		Dry	No			Excessive sediment	Remove trash debris	Outfall not identified on town GIS, looks fairly new. Rip rap embankment.	Yes
6/16 -2	Pipe	Plastic	Good	Rounded pipe	Inner Diameter (in.)d = 12	No		Dry	No			Excessive sediment, excessive vegetation		Flared end plastic	
6/16-3	Pipe	Plastic	Good	Rounded pipe	Inner Diameter (in.)d = 12	No		Dry	No			Excessive vegetation			

EBI Consulting
environmental | engineering | due diligence

Project Name: Plymouth MS4
Project Location: 2 Battery March Park, Suite 100 | Quincy, MA
Project Number: 1619000055

Dry Weather Survey Results

NPDES ID	Type of Outfall	Open Swale Material	Open Swale Condition	Swale Shape	Rounded Triangular Swale Measurements	Headwall	Headwall Condition	Description of Flow	Outlet Submerged	Materials Present	Required Maintenance	Additional Notes	Maintenance Required?
231	Open swale	Paved asphalt	Good	Rounded swale	Swale Width (in.) T= 3ft Swale Height (in.) H= 3in	No		Dry	No	Excessive sediment		9ft long asphalt	
149	Open swale	Concrete	Fair	Rectangular swale		No		Dry	No	Rip rap, excessive sediment	Remove trash debris	Weir: 4 ft length, 8in breath, fixed wooden sluiceway	Yes
226	Open swale	Earthen	Fair	Rounded swale	Swale Width (in.) T= 24 Swale Height (in.) H= 12	No		Dry	No	Excessive sediment, excessive vegetation	Repair erosion, soil stabalization, sediment removal	Asphalt at top leading into earth	Yes
227	Open swale	Earthen	Crumbling	Rounded swale		No		Dry	No	Excessive sediment, excessive vegetation	Remove trash debris, tree work	No visible root beyond edge of pavement	
273	Open swale	Concrete	Good	Rounded swale	Swale Width (in.) T= 3ft Swale Height (in.) H= 6in	Yes	Good	Dry	No		Remove trash debris	21in pipe leading into swale	Yes
278	Open swale	Paved asphalt	Crumbling	Rounded swale	Swale Width (in.) T= 5ft	No		Dry	No	Excessive vegetation	Remove trash debris	Location for future BMP	Yes
621	Open Swale	Paved asphalt	Good	Rounded swale	Swale Width (in.) T= 108 Flow Width (in.) t= 60	No		Dry	No	Rip rap			

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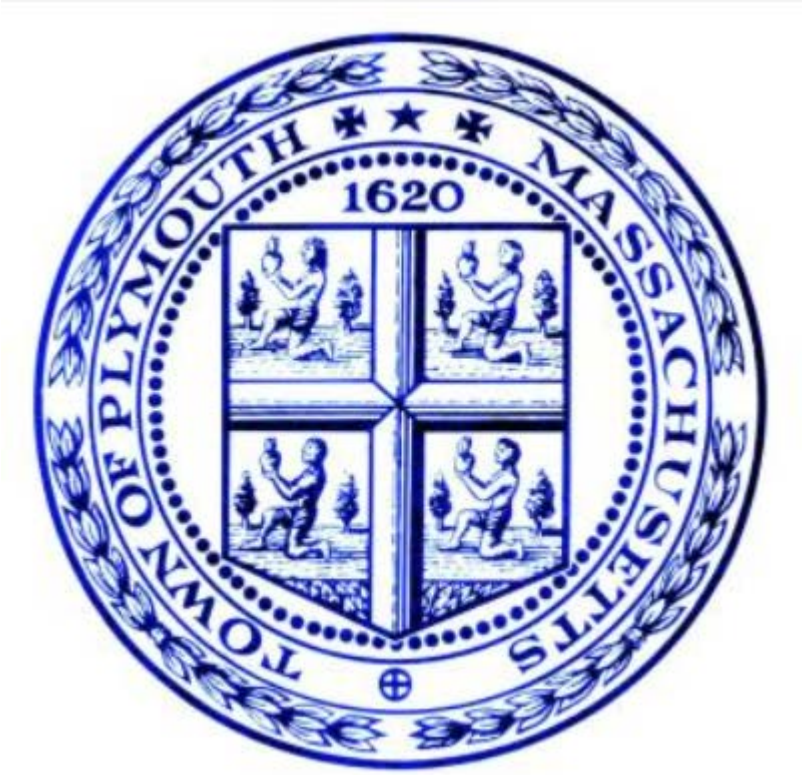
Street & Parking Lot Design Assessment Report

Town of Plymouth, MA



Prepared by: EBI Consulting July 2022

This document is not submitted as a regulatory compliance document

EBI Consulting
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Introduction

Under the federal and state clean water acts, the Massachusetts Department of Environmental Protection (MassDEP) is charged with establishing standards for stormwater management measures in new developments and redevelopments. The objective of this control measure is to reduce the discharge of pollutants found in stormwater through the retention or treatment of stormwater after construction of redeveloped sites (private or municipal)

The Town of Plymouth ("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 to review current street and parking lot design guidelines within the municipality that affect the creation of impervious cover.

This assessment is intended to provide information to allow the Town to determine if changes to design standards for street and parking lots can be made to support low impact design options. If this assessment indicates that changes can be made, then the assessment will include recommendations and schedules to incorporate policies and standards into relevant documents and procedures to minimize impervious cover attributable to parking areas and street designs.

The Town shall implement all recommendations, in accordance with the schedules contained in this assessment (if any).

Municipal Code Regulating Parking Lot Design Guidelines Review

Parking lot or off-street parking is regulated by the Zoning Bylaws of the Town of Plymouth as amended through April 2022 section 203.7.

The regulations have been reviewed to ensure they promote low impact design (LID) options, promote stormwater treatment and recharge and reduce impervious cover. The regulations allow engineers to design parking lots with the minimum number of parking spaces based on the intended use. Compact parking spaces that can further reduce the impervious area are allowed by special permits. All new parking lots must also comply with the Town's stormwater regulations "A Guide for the Design of Storm Drainage Facilities in the Town of Plymouth MA". The stormwater regulations require LID features to be incorporated in all new construction sites or redevelopment sites that require stormwater improvements.

LID features such as rain gardens, biofiltration systems and infiltration basins are encouraged and preferred. Besides total suspended solids (TSS) removal the Town requires 60% total phosphorus removal and 30% total nitrogen removal for any new parking lot projects. A construction phase and long-term operations and maintenance plan is also required. These operation and maintenance plans are critical to ensuring the long-term performance of the LID features. Landscape features are also required for all proposed off-street (parking lot) designs, which promotes impervious area reduction.

The parking lot or off-street parking regulations promote efficient design by requiring paved parking spaces based on the intended use of the proposed development. The regulations allow compact parking spaces that can meet the parking demand with reduced impervious area. Shared parking spaces where more than one use exists is allowed, this also promotes impervious area reduction. The above-mentioned stormwater regulations are required to be implemented for all new projects and redevelopment projects that increase impervious cover.

In conclusion the existing parking lot or off-street parking regulations along with the existing stormwater regulations support low impact design (LID) options, promote infiltration, requires nutrient removal and complies with the Massachusetts small MS4 General Permit. No recommendations are proposed at this point.

Municipal Code Regulating Street Design Guidelines Review

Street design is regulated by the Rules and Regulations Governing the Subdivision of Land of the Town of Plymouth as amended through February 2019 Article 3 – Streets.

The regulations have been reviewed to ensure they promote low impact design (LID) options, promote stormwater treatment and recharge and reduce impervious cover. The regulations allow engineers to design new streets based on the anticipated traffic demand, so the proposed paved width is kept to the required minimum. All new streets are treated as new impervious areas and must comply with the Town's stormwater regulations "A Guide for the Design of Storm Drainage Facilities in the Town of Plymouth MA". The stormwater regulations require LID features to be incorporated in all new street projects.

The regulations allow the engineers to design the new street widths based on anticipated demand and type of traffic, but minimum widths and pedestrian accessibility standards are required for safety. LID features such as rain gardens, biofiltration systems and infiltration basins are encouraged and preferred. Besides total suspended solids (TSS) removal the Town requires 60% total phosphorus removal and 30% total nitrogen removal for any new projects that increase impervious area.

The Town has and is adding LID features (such as rain gardens and sediment forebays) to existing street drainage to improve water quality. As part of the Year 4 MS4 Annual Report the Town has identified five (5) Town owned sites where new LID features will be installed, some of those identified project are existing streets.

In conclusion the existing street design regulations along with the existing stormwater regulations support low impact design (LID) options, promote infiltration, requires nutrient removal and complies with the Massachusetts small MS4 General Permit. No recommendations are proposed at this point.

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Green Infrastructure Assessment Report

Town of Plymouth, MA

Prepared by: EBI Consulting July 2022

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Introduction

Under the federal and state clean water acts, the Massachusetts Department of Environmental Protection (MassDEP) is charged with establishing standards for stormwater management measures in new developments and redevelopments. The objective of this control measure is to reduce the discharge of pollutants found in stormwater through the retention or treatment of stormwater after construction of redeveloped sites (private or municipal)

The Town of Plymouth ("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 to review current local stormwater regulations to determine the feasibility of making green infrastructure allowable when appropriate site conditions exist.

This assessment is intended to provide information to allow the Town to determine if changes to "A Guide for the Design of Storm Drainage Facilities in the Town of Plymouth Including Low Impact Development Standards" promotes the use of green infrastructure practices. If this assessment indicates that changes can be made, then the assessment will include recommendations and schedules to incorporate policies and standards into relevant documents and procedures to minimize impervious cover attributable to parking areas and street designs.

The Town shall implement all recommendations, in accordance with the schedules contained in this assessment (if any).

Municipal Code Regulating Parking Lot Design Guidelines Review

A GUIDE FOR THE DESIGN OF STORM DRAINAGE FACILITIES IN THE TOWN OF PLYMOUTH MA INCLUDING LOW IMPACT DEVELOPMENT STANDARDS as amended June 2021.

The regulations have been reviewed to ensure they promote green infrastructure, low impact design (LID) options, promote stormwater treatment, and recharge and reduce impervious cover.

The Town requires all new development and redevelopment projects to comply with the stormwater standards. LID features such as green roof, rain barrel/cistern (with on-site re use) rain gardens, biofiltration systems, water quality swales and infiltration basins are a few of the many green infrastructure design options engineers and developers can chose from. Besides total suspended solids (TSS) removal the Town requires 60% total phosphorus removal and 30% total nitrogen removal for any new development or redevelopment projects. A construction phase and long-term operations and maintenance plan is also required. These operation and maintenance plans are critical to ensuring the long-term performance of the LID features. Landscape features are also required for all proposed off-street (parking lot) designs, which promotes impervious area reduction.

The Town has and is adding LID features (such as rain gardens and sediment forebays) to existing street drainage to improve water quality. As part of the Year 4 MS4 Annual Report the Town has identified five (5) Town owned sites where new LID features will be installed, some of those projects identified are existing streets.

In conclusion the existing stormwater regulations support low impact design (LID) options, promote infiltration, requires nutrient removal and complies with the Massachusetts small MS4 General Permit. No recommendations are proposed at this point.

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Permittee Owned Properties That Could be Modified or Retrofitted

Town of Plymouth, MA

Prepared by: EBI Consulting July 2022

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Introduction

Under the federal and state clean water acts, the Massachusetts Department of Environmental Protection (MassDEP) is charged with establishing standards for stormwater management measures in new developments and redevelopments. The objective of this control measure is to reduce the discharge of pollutants found in stormwater through the retention or treatment of stormwater after construction of redeveloped sites (private or municipal)

The Town of Plymouth ("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 to identify five (5) permittee owned properties that could potentially be modified or retrofitted with BMPs to reduce impervious cover.

List of Town Owned Propertied That Can Be Potentially Modified or Retrofitted with BMPs and Reduced Impervious.

1) Memorial Hall Parking Lot – Assessors Map 17, Lot 100
    - The Town proposes to remove existing asphalt at the center island and replace it with plantings. This new area can be potentially converted into a rain garden system if the grades allow it. Total reduction in impervious area: 1,975 SF

2) Sansone Street Cul-De-Sac
    - The Town proposes to remove existing asphalt at the center section of the cul-de-sac and replace it with a rain garden / biofiltration type system. Total reduction in impervious area: 1,660 SF

3) Laurinda Lane Cul-De-Sac
    - The Town proposes to remove existing asphalt at the center section of the cul-de-sac and replace it with a rain garden / biofiltration type system. Total reduction in impervious area: 1,660 SF

4) South Street Playground – Assessors Map 21, Lot 62
    - The Town proposes to remove the existing asphalt basketball court and replace it with pervious pavement and crushed stone sub-base for stormwater storage and to promote infiltration. Total reduction in impervious area: 4,000 SF

5) Standish Ave Park/Playground – Assessors Map 5, Lots 93B, 94C, 95C, 96.
    - The Town proposes to remove the existing asphalt basketball court and replace it with pervious pavement and crushed stone sub-base for stormwater storage and to promote infiltration. Total reduction in impervious area: 4,300 SF

In conclusion the Town owned properties that can potentially be retrofitted will reduce impervious cover, promote infiltration add LID features and comply with the Massachusetts small MS4 General Permit. Total potential impervious area reduction for all five Town owned properties is: 11,935 SF.

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TOWN OF PLYMOUTH
ANTI-ICING – SALT REDUCITION PLAN

Best Management Practices

GET OUT EARLY

Typically, anti-icing is most effective if applied 1-2 hours before the precipitation begins however it can be applied up to 24 hours in advance

TRY IT FIRST

Trying anti-icing for the first time? Make a 23.3% brine solution and before a storm spray pavement on your own property using a masonry/plant sprayer. Use this experiment to determine how best to use with your clients.

LEAVE SOME PAVEMENT BARE

It's always best to use stream nozzles instead of a fan tip to avoid creating a slippery condition. If the anti-icing liquid freezes the bare pavement will still provide a traction surface

USE OF FILTER

Having a filter in your liquid dispensing system will reduce clogs in your nozzle. Automotive in line fuel filters work quiet well. If your liquid dispenser is not functioning properly be sure to check the filter first.

ANTI-ICING

Anti-icing using brine, or an alternative is an efficient way of preventing ice to pavement bonding. one can compare it to using a non-stick spray on a pan before cooking. just like a nonstick spray prevents food from bonding to the pan, anti-icing prevents snow and ice from bonding to the pavement so that it can be plowed away. Anti-icing can save you money as reduces the amount of salt used reactive deicing by 50%.

MAKE YOUR OWN SALT BRINE

When making brine it is important to add enough salt to produce a 23.3% solution which freezes at around 0°F. Roughly 2.5lb per gallon of water will produce a 23.3% solution. Verify using a salometer, a 23.3% solution will have a specific gravity of 1.176, or 85% salinity. Consult the Brine Making BMP sheet for more info.

HOW MUCH SHOULD I USE AND WHEN

You can apply brine up to 24 hours in advance of the storm. Typical appication rates range from 0.5 to 0.75 gallon per 1000sq.ft (10'x100' area). Other chemicals such as magnesium are also available – consult your supplier for application rates. Anti-icing is not advised prior to freezing rain events.

GETTING STARTED

Try making your own salt brine by putting 13lb of salt in 5 gallons of water to get a 23.3% salt brine solution. Mix the brine until all of the salt is dissolved. Using a masonry sprayer apply the liquid several hours before a storm. Start by applying about 0.25-0.5 gallons to a 10'x50' area. Adjust the application rates based on your experience.

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Project Name: Plymouth MS4

Project Location: 2 Battery March Park, Suite 100 | Quincy, MA

Project Number: 1622000078

Wet Weather Survey Results

NPDES ID	Type of Outfall	Pipe Material	Pipe Condition	Pipe Shape	Round Pipe Measurements	Headwall	Headwall Condition	Description of Flow	Outlet Submerged	Additional Notes	Stormwater Tested?
102	Pipe	Steel	Fair	Rounded pipe	Inner Diameter (in.)d = 42	Yes	Fair	Normal Flow	No	Flwoing, algae at the bottom of outfall	YES
103	Pipe	Clay tile	Good	Rounded pipe	Inner Diameter (in.)d = 18	No	N/A	Low Flow	No	Clean outlet and flow	NO
104	Pipe	Concrete	Good	Rounded pipe	Inner Diameter (in.)d = 36	Yes	Good	Normal Flow	No	Outfall had a smell. Some sand at the bottom most likely from sand aggitation at bottom of pond	YES
107	Pipe	Clay tile	Good	Rounded pipe	Inner Diameter (in.)d = 24	Yes	Fair	Normal Flow	No	Clean outlet and flow	NO
115	Pipe	Concrete	Good	Rounded pipe	Inner Diameter (in.)d = 36	No	-	Low Flow	No	Outfall had a smel. Excessive sediment ,most likely from beach erosion. Needs cleaning	YES
117	Pipe	Clay tile	Good	Rounded pipe	Inner Diameter (in.)d = 12	No	-	Low Flow	No	Outfall coverd by rip-rap. Needs to be exposed. Flow was clean.	NO
119	Pipe	Concrete	Good	Rounded pipe	Inner Diameter (in.)d = 32	No	-	Very Low Flow	No	Sea weeds at bottom of outfall. Flow was clean. Outfall needs cleaning	NO
120	Pipe	Concrete	Fair	Rounded pipe	Inner Diameter (in.)d = 36 Flow Depth (in.) h=2	Yes	Good	Normal Flow	No	Slight odor at outfall. Sediment from beach observed. Needs cleaning	YES
121	Pipe	Corrugated metal	Fair	Rounded pipe	Inner Diameter (in.)d = 42h x 64w Flow Depth (in.) h=2	Yes	Fair	Normal Flow	No	Algae at the bottom of the outfall.	YES
134	Pipe	Concrete	Fair	Rounded pipe	-Outer Diameter (in.) D= 14 estimated	Yes	Good	normal Flow	No	Odor and algae present at outfall	YES
138	Pipe	Concrete	Fair	Rounded pipe	-Inner Diameter (in.)d = 24 estimated	No	-	Very Low Flow	No	Outfall coverd by rip-rap. Needs to be exposed. Flow was clean.	NO
157	Pipe	Concrete	Good	Rounded pipe	Inner Diameter (in.)d = 24	No	-	Low Flow	No	Sediemnt at bottom of outfall .Orange staining. Needs cleaning	Yes

Wet Weather Survey Results

NPDES ID	Type of Outfall	Pipe Material	Pipe Condition	Pipe Shape	Round Pipe Measurements	Headwall	Headwall Condition	Description of Flow	Outlet Submerged	Additional Notes	Stormwater Tested?
158	Pipe	Concrete	Good	Rounded pipe	Inner Diameter (in.)d = 24	No		Low Flow	No	Odor and algae present at outfall	YES
159	Pipe	Concrete	Good	Rounded pipe	Inner Diameter (in.)d = 24	No		Low Flow	No	Clean outlet and flow	NO
160	Pipe	Corrugated metal	Good	Rounded pipe	Inner Diameter (in.)d = 60	No		Normal Flow	No	Clean outlet and flow	NO
169	Pipe	Concrete	Good	Rounded pipe	Inner Diameter (in.)d = 24	No		Normal Flow	No	Clean outlet and flow	NO
206	Pipe	Ductile Iron	Good	Rounded pipe	Inner Diameter (in.) D=18	No	-	Normal Flow	No	Clean outlet and flow	NO
207	Pipe	Concrete	Good	Rounded pipe	-Inner Diameter (in.)d = 12	Yes	Good	Normal Flow	No	Algae at the bottom of the outfall.	YES
215	Pipe	Concrete	Good	Rounded pipe	Inner Diameter (in.)d = 36	Yes	Good	Normal Flow	No	Odor present at the outfall	YES
216	Pipe	Concrete	Good	Rounded pipe	Inner Diameter (in.)d = ~12	No	-	Normal Flow	No	Clean outlet and flow	NO
217	Pipe	Plastic	Good	Rounded pipe	Inner Diameter (in.)d = 12	No	-	Normal Flow	No	Clean outlet and flow	NO
239	Pipe	Concrete	Good	Rounded pipe	Inner Diameter (in.)d = 18	Yes	Good	Normal Flow	No	Some sediment at the bottom of the outlet. Needs cleaning. Flow was clean	NO
254	Pipe	Concrete	Good	Rounded pipe	Inner Diameter (in.)d = 12	Yes	Good	Normal Flow	No	Clean outlet and flow	NO
264	Pipe	Concrete	Good	Rounded pipe	Inner Diameter (in.)d = 24	No	-	Very Low Flow	No	Color, oder and turbidity present at the outfall	YES
265	Pipe	Corrugated metal	Crumbling	Rounded pipe	Inner Diameter (in.)d = 12	No	-	Normal Flow	No	Algae at the bottom of the outfall.	YES
266	Pipe		Good		Inner Diameter (in.)d = 12	No	-	Low Flow	No	Algae at the bottom of the outfall.	YES
306	Pipe	Plastic	Good	Rounded pipe	Inner Diameter (in.)d = 12	No	-	Normal Flow	No	Clean outlet and flow	NO
307	Pipe	Corrugated metal	Poor	Rounded pipe	Inner Diameter (in.)d = 18	No	-	Normal Flow	No	Clean outlet and flow	NO
316	Pipe	Concrete	Good	Rounded pipe	Inner Diameter (in.)d = 24	Yes	Good	Low Flow	No	Clean outlet and flow	NO
317	Pipe	Concrete	Good	Rounded pipe	Inner Diameter (in.)d = 24	Yes	Good	Low Flow	No	Exessive sediment at outfal, most likely from nearby erision. Flow was clean	NO
345	Pipe	Concrete	Good	Rounded pipe	Inner Diameter (in.)d = 15	Yes	Fair	Low Flow	No	Odor and algae present at outfall	YES
346	Pipe	Concrete	Good	Rounded pipe	Inner Diameter (in.)d = 18	No	-	Low Flow	No	Algae at the bottom of the outfall.	YES
615	Pipe	Plastic	Good	Rounded pipe	Inner Diameter (in.)d = 15 □	No	-	Low Flow	No	Clean outlet and flow	NO
616	Pipe	Plastic	Good	Rounded pipe	Inner Diameter (in.)d = 15 □	No	-	Low Flow	No	Clean outlet and flow	NO

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Project Name: Plymouth MS4
Project Location: 2 Battery March Park, Suite 100 | Quincy, MA
Project Number: 1622000078

Water Quality Screening Results

			Ammonia				Boron				Chloride				Color			
NPDES ID	Date of Inspection	Type of Inspection	Test Type	Results	Benchmark	Full Analytical Required?*	Field Test Kit	Results	Benchmark	Full Analytical Required?*	Field Test Kit	Results	Benchmark	Full Analytical Required?*	Field Test Kit	Results	Benchmark	Full Analytical Required?*
102	8/17/2022	Regular	Field Test	0.4		No	Field Test	0.027		No	Field Test	172		No	Field Test	67		No
104	8/17/2022	Regular	Field Test	0.54		No	Field Test	0.045		No	Field Test	71		No	Field Test	85		No
115	8/17/2022	Regular	Field Test	0.22		No	Field Test	0.015		No	Field Test	122		No	Field Test	74		No
120	8/17/2022	Regular	Field Test	0.54		No	Field Test	0.03		No	Field Test	186		No	Field Test	38		No
121	8/17/2022	Regular	Field Test	0.46		No	Field Test	0.03		No	Field Test	304		No	Field Test	37		No
134	8/23/2022	Regular	Lab Test	0.22		Yes	Lab Test	1.19		Yes	Lab Test	3200		Yes	Lab Test	<5		Yes
157	8/17/2022	Regular	Field Test	0.64		No	Lab Test	0.045		No	Lab Test	111		Yes	Lab Test	222		No
158	8/17/2022	Regular	Field Test	0.25	> 0.5 mg/L	No	Lab Test	0.05	> 0.35 mg/L	No	Lab Test	90	230 mg/L	Yes	Lab Test	90	>500 units	No
207	8/23/2022	Regular	Lab Test	BRL		Yes	Lab Test	0.026		Yes	Lab Test	60		Yes	Lab Test	<5		Yes
215	8/17/2022	Regular	Field Test	0.21		No	Lab Test	0.039		No	Lab Test	100		Yes	Lab Test	37		No
264	8/17/2022	Regular	Field Test	0.74		No	Lab Test	0.045		No	Lab Test	32		Yes	Lab Test	190		No
265	8/23/2022	Regular	Lab Test	BRL		Yes	Lab Test	0.022		Yes	Lab Test	32		Yes	Lab Test	<5		Yes
266	8/23/2022	Regular	Lab Test	BRL		Yes	Lab Test	BRL		Yes	Lab Test	<3		Yes	Lab Test	<5		Yes
345	8/31/2022	Regular	Lab Test	<0.5		Yes	Lab Test	0.047		Yes	Lab Test	110		Yes	Lab Test	<5		Yes
346	8/31/2022	Regular	Lab Test	<0.5		Yes	Lab Test	0.025		Yes	Lab Test	68		Yes	Lab Test	55		Yes

			Detergents and Surfactants				Fluoride				Hardness				pH			
NPDES ID	Date of Inspection	Type of Inspection	Test Type	Results	Benchmark	Full Analytical Required?*	Field Test Kit	Results	Benchmark	Full Analytical Required?*	Field Test Kit	Results	Benchmark	Full Analytical Required?*	Field Test Kit	Results	Benchmark	Full Analytical Required?*
102	8/17/2022	Regular	Field Test	<0.25		No	Field Test	<0.1		No	Field Test	104		No	Field Test	6.9		No
104	8/17/2022	Regular	Field Test	<0.25		No	Field Test	0.13		No	Field Test	80		No	Field Test	6.65		No
115	8/17/2022	Regular	Field Test	<0.25		No	Field Test	0.15		No	Field Test	60		No	Field Test	6.2		No
120	8/17/2022	Regular	Field Test	<0.1		No	Field Test	<0.1		No	Field Test	72		No	Field Test	6.12		No
121	8/17/2022	Regular	Field Test	<0.1		No	Field Test	0.17		No	Field Test	96		No	Field Test	6.56		No
134	8/23/2022	Regular	Lab Test	BRL		Yes	Lab Test	0.11		Yes	Lab Test	1230		Yes	Lab Test	7.44		Yes
157	8/17/2022	Regular	Field Test	<0.1		No	Lab Test	<0.25		No	Lab Test	40		Yes	Lab Test	6.68		No
158	8/17/2022	Regular	Field Test	<0.25	> 0.25 mg/L	No	Lab Test	<0.25	> 0.25 mg/L	No	Lab Test	36	<10 mg/L or >2,000 mg/L	Yes	Lab Test	6.23	< 5	No
207	8/23/2022	Regular	Lab Test	BRL		Yes	Lab Test	0.1		Yes	Lab Test	41		Yes	Lab Test	6.71		Yes
215	8/17/2022	Regular	Field Test	0.13		No	Lab Test	0.12		No	Lab Test	12		Yes	Lab Test	6.26		No
264	8/17/2022	Regular	Field Test	<0.25		No	Lab Test	<0.25		No	Lab Test	4		Yes	Lab Test	6.8		No
265	8/23/2022	Regular	Lab Test	BRL		Yes	Lab Test	<0.1		Yes	Lab Test	20		Yes	Lab Test	6.55		Yes
266	8/23/2022	Regular	Lab Test	BRL		Yes	Lab Test	<0.1		Yes	Lab Test	2.3		Yes	Lab Test	7.76		Yes
345	8/31/2022	Regular	Lab Test	0.06		Yes	Lab Test	0.01		Yes	Lab Test	31		Yes	Lab Test	6.73		Yes
346	8/31/2022	Regular	Lab Test	0.05		Yes	Lab Test	0.038		Yes	Lab Test	12		Yes	Lab Test	6.64		Yes

			Potassium			Specific Conductance					Turbidity			
NPDES ID	Date of Inspection	Type of Inspection	Test Type	Results	Benchmark	Full Analytical Required?*	Field Test Kit	Results	Benchmark	Full Analytical Required?*	Field Test Kit	Results	Benchmark	Full Analytical Required?*
102	8/17/2022	Regular	Field Test	8.2	>20 mg/L	No	Field Test	755	> 2,000 uS/cm	No	Field Test	9	> 1,000 NTU	No
104	8/17/2022	Regular	Field Test	5.3		No	Field Test	322		No	Field Test	8		No
115	8/17/2022	Regular	Field Test	>20		No	Field Test	570		No	Field Test	6		No
120	8/17/2022	Regular	Field Test	6.5		No	Field Test	790		No	Field Test	4		No
121	8/17/2022	Regular	Field Test	7.1		No	Field Test	1330		No	Field Test	3		No
134	8/23/2022	Regular	Lab Test	120		Yes	Lab Test	9200		Yes	Lab Test	4.4		Yes
157	8/17/2022	Regular	Field Test	8.8		No	Lab Test	510		Yes	Lab Test	18		No
158	8/17/2022	Regular	Field Test	4		No	Lab Test	425		Yes	Lab Test	5		No
207	8/23/2022	Regular	Lab Test	11		Yes	Lab Test	260		Yes	Lab Test	1		Yes
215	8/17/2022	Regular	Field Test	4.3		No	Lab Test	490		Yes	Lab Test	4		No
264	8/17/2022	Regular	Field Test	5.9		No	Lab Test	150		Yes	Lab Test	16		No
265	8/23/2022	Regular	Lab Test	1.8		Yes	Lab Test	140		Yes	Lab Test	<1		Yes
266	8/23/2022	Regular	Lab Test	0.5		Yes	Lab Test	33		Yes	Lab Test	<1		Yes
345	8/31/2022	Regular	Lab Test	3.3		Yes	Lab Test	420		Yes	Lab Test	4.3		Yes
346	8/31/2022	Regular	Lab Test	2.1		Yes	Lab Test	250		Yes	Lab Test	20		Yes

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Project Name: Plymouth MS4
Project Location: 2 Battery March Park, Suite 100 | Quincy, MA
Project Number: 1622000078

Water Quality Laboratory Results

NPDES ID	Date of Inspection	Type of Inspection	Laboratory	Enterococcus	E-Coli
102	8/17/2022	Regular	EnviroTech	**170 CFU/100ml**	200 CFU/100ml
104	8/17/2022	Regular	EnviroTech	**520 CFU/100ml**	**1,100 CFU/100ml**
115	8/17/2022	Regular	EnviroTech	30 CFU/100ml	<10 CFU/100ml
121	8/17/2022	Regular	EnviroTech	<10 CFU/100ml	<10 CFU/100ml
215	8/17/2022	Regular	EnviroTech	30 CFU/100ml	40 CFU/100ml
264	8/17/2022	Regular	EnviroTech	**300 CFU/100ml**	20 CFU/100ml
345	8/31/2022	Regular	EnviroTech	**3,400 CFU/100ml**	**1,500 CFU/100ml**
346	8/31/2022	Regular	EnviroTech	**120 CFU/100ml**	**2,900 CFU/100ml**

Threshold:
Enterococcus: 61 CFU/100ml
E coli: 235 CFU/100ml

*Results exceeding allowable threshold are **bold**

Street Sweeping Schedule

Catch Basin Cleaning Schedule

Town of Plymouth, MA

Prepared by: EBI Consulting July 2022

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Narrative

Under the federal and state clean water acts, the Massachusetts Department of Environmental Protection (MassDEP) is charged with establishing standards for stormwater management measures in new developments and redevelopments. The objective of this control measure is to reduce the discharge of pollutants found in stormwater through the retention or treatment of stormwater after construction of redeveloped sites (private or municipal)

The Town of Plymouth ("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 to provide a schedule for increased street sweeping frequency of all owned streets and parking lots.

This assessment is intended to provide information to the Town regarding the catchment areas with potential high pollutant loads. The nitrogen and phosphorus identification reports have identified the water bodies that are potentially subject to high pollutant loads and town owned parles with potential high pollutant loads that can be retrofitted with BMPS. It is our recommendation that the Town increase the street sweeping frequency to those areas to at least three (3) time per year. The Town is on a street sweeping schedule of two (2) times per year, and by increasing the sweeping frequency to three (3) times per year in those areas it will help reduce the pollutant loads significantly. The areas of interest are listed on the table below:

Address	Notes
ROW near Outfalls 193, 194, 195 on Black Cat Road	Undeveloped land bordering residential area.
ROW near Outfalls 240 on Billionton Street	Undeveloped land bordering residential area.
ROW near Outfalls 321 on Camelot Dr	Undeveloped land near wetlands.