

# **STORMWATER MANAGEMENT**

*for*

**1106 MASSACHUSETTS AVE  
LEXINGTON, MASSACHUSETTS**

## **Prepared for:**

Sheldon Corporation  
121 Marrett Road  
Lexington, Massachusetts 02421

## **Prepared by:**

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**DATE: December 12, 2017**

**REV: February 21, 2018**



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## **STORMWATER NARRATIVE**

## **Stormwater Management Standards**

### **Project Narrative:**

The project site is comprised of one (1) existing single-family lot. The parcel is identified on the Town of Lexington Assessor's Map 30 as Lot 65. The existing lot has an area of 1.46 acres, with existing site features currently including a single-family dwelling, a gravel driveway, an in-ground pool, a wood shed, stone walls, remains of a bituminous berm, and grassed and wooded areas. The properties abut land supporting single family dwellings in a RS district in all directions and an Historic District northwest and southeast of the site.

The applicant is proposing to subdivide the above-mentioned lot into a special permit subdivision with three (3) single-family dwellings.

This proposal utilizes conventional stormwater management techniques including water quality inlets, area drains and subsurface infiltration systems for the treatment and mitigation of stormwater.

The following is a summary of how the proposed project meets the DEP Stormwater Standards:

#### **Standard 1: No new stormwater conveyances may discharge untreated stormwater directly to or cause erosion in wetlands or waters of the Commonwealth.**

There are no untreated stormwater conveyances proposed to discharge to wetlands or waters of the Commonwealth from the project.

#### **Standard 2: Peak Rate Attenuation - Stormwater management systems shall be designed so that post-development peak discharge rates do not exceed pre-development peak discharge rates. This standard may be waived for discharges to land subject to coastal storm flowage as defined in 310 CMR 10.04.**

For the purpose of analyzing pre- and post-development stormwater peak rates of runoff, four (4) design points have been selected based on existing topographic conditions which were used for both the pre- and the post-peak rate calculations. The design points are the abutting property southeast of the site, the drainage system within Massachusetts Avenue, and an existing roof drain system on site.

The storm events that were used to calculate peak runoff rates for pre- and post-construction conditions are compiled from the Northeast Regional Climate Center "Atlas of Precipitation Extremes for the Northeastern United States and Southeastern Canada." A full detail of peak rate attenuation along with supplemental stormwater calculations utilizing HydroCAD as well as pre- and post-drainage site plans have been submitted with the Definitive Subdivision Application. The details of this report will show that the peak rates of runoff for the 2-year, 10-year and 100-year events have been either maintained or reduced from pre- to post-development conditions through the use of deep sump catch basins and subsurface infiltration systems.

The hydrologic calculations from HydroCAD have been included in this report and are located in the section tab entitled "Hydrologic Calculations".

**Proposed Design Points and Subcatchment Areas**

**Design Point #1:**

Design Point #1 (DP#1) is the abutting property southeast of the site. The contributing area to the Design Point consists of Subcatchment 1 & 101.

<b><u>Storm Event</u></b>	<b><u>Existing Conditions (Pre) Peak Flow (CFS)</u></b>	<b><u>Proposed Conditions (Post) Peak Flow (CFS)</u></b>
2-Year (3.2 in./hr.)	0.01	0.01
10-Year (4.8 in./hr.)	0.14	0.14
100-Year (8.8 in./hr.)	1.03	1.03

**Design Point #2:**

Design Point #2 (DP#2) is the drainage system within Massachusetts Avenue. The contributing area to the Design Point consists of Subcatchment 2, 201, & 502.

<b><u>Storm Event</u></b>	<b><u>Existing Conditions (Pre) Peak Flow (CFS)</u></b>	<b><u>Proposed Conditions (Post) Peak Flow (CFS)</u></b>
2-Year (3.2 in./hr.)	0.01	0.01
10-Year (4.8 in./hr.)	0.22	0.11
100-Year (8.8 in./hr.)	2.73	1.42

**Design Point #3:**

Design Point #3 (DP#3) is the drainage system within Massachusetts Avenue. The contributing area to the Design Point consists of Subcatchment 3 & 301.

<b><u>Storm Event</u></b>	<b><u>Existing Conditions (Pre) Peak Flow (CFS)</u></b>	<b><u>Proposed Conditions (Post) Peak Flow (CFS)</u></b>
2-Year (3.2 in./hr.)	0.00	0.00
10-Year (4.8 in./hr.)	0.01	0.01
100-Year (8.8 in./hr.)	0.38	0.38

**Design Point #4:**

Design Point #4 (DP#4) is the existing roof drain system on site. The contributing area to the Design Point consists of Subcatchment 4 & 401.

<u>Storm Event</u>	<u>Existing Conditions (Pre) Peak Flow (CFS)</u>	<u>Proposed Conditions (Post) Peak Flow (CFS)</u>
2-Year (3.2 in./hr.)	0.09	0.09
10-Year (4.8 in./hr.)	0.14	0.14
100-Year (8.8 in./hr.)	0.25	0.25

**Standard 3: Recharge - Loss of annual recharge to groundwater shall be eliminated or minimized...at a minimum, the annual recharge from the post-development site shall approximate the annual recharge from pre-development conditions based on soil type. This standard is met when the stormwater management system is designed to infiltrate the required recharge volume in accordance with the Mass Stormwater Handbook.**

Loss of annual recharge to groundwater has been minimized through the use of stormwater Best Management Practices (BMP's), three (3) subsurface infiltration systems, and a proposed operation and maintenance program. The three (3) subsurface infiltration systems have been designed for recharging groundwater.

Based on soil maps provided by U.S. Department of Agriculture Soil Conservation Service (map located in the Appendix to the narrative) the site falls within two soil types, both with a hydrologic group of A. Onsite soil testing was conducted by Meridian Associates Inc. on July 20, 2017 in the areas depicted on the attached plan. This testing revealed a sandy loam parent material with ledge refusal encountered at depths varying from 24" to 112".

Utilizing the current regulations, the proposed design will meet this standard as per the following calculation:

$$R_v = \text{Required Recharge Volume} = F \cdot x$$

F = Target Depth Factor associated with hydrologic soil groups located in table 2.3.2 in Volume 3 of the Stormwater Management Handbook  
x = Total impervious area proposed

Impervious area within project area (HSG A): 13,691 square feet (sf)  
Required recharge volume depth factor for A type soils: 0.6 inches

$$\text{Therefore, } R_v = (13,691)(0.6\text{inches}) / (12 \text{ inches per foot})$$
$$R_v = 685 \text{ cubic feet (cf)}$$

The proposed subsurface infiltration systems provide a total recharge storage volume of 4,094 cf of stormwater within the three (3) systems.

In accordance with the Stormwater Handbook, a capture area adjustment calculation has been provided in the appendix of this report to insure a minimum of 65% of the site impervious areas are directed into recharge facilities. The calculation demonstrates the proposed project will direct 77.6% of the site's proposed impervious surface areas toward recharge facilities.

**Standard 4: Water Quality – Stormwater management systems shall be designed to remove 80% of the average annual post-construction load of Total Suspended Solids (TSS). The standard is met with pollution prevention plans, stormwater BMP's sized to capture required water quality volume, and pretreatment measures.**

The stormwater management system has been designed to remove a minimum of 80% of the average annual post-construction load of Total Suspended Solids (TSS). TSS Removal Calculation Worksheets are included in the Stormwater Analysis and Calculations Report noted herein. These percentages have been achieved by the use of deep sump catch basins and subsurface infiltration systems.

The Stormwater Management Handbook assigns TSS removal percentages to each treatment BMP. Each treatment BMP is sized to capture the required water quality volume as calculated in accordance with the Handbook in order to achieve the assigned TSS removal rates.

General Equation from Stormwater Management Handbook

$V_{WQ}$  = Required Water Quality Volume =  $(D_{WQ})(A)$   
 $D_{WQ}$  = Water Quality Depth (1" for critical areas, 0.5" for non-critical areas)  
A = Impervious Area

The following are treatment sizing calculations for portions of the treatment trains based on the 0.5" for non-critical areas:

**Train 1** (SC501 & SC601 to PSIS-1)

$V_{wq} = (2,623)(0.5"/12) = 108 \text{ cf}$   
Provided = 2,042 cf

**Train 2** (SC701 to PSIS-2)

$V_{wq} = (3,389)(0.5"/12) = 141 \text{ cf}$   
Provided = 1,355 cf

**Train 3** (SC801 to PSIS-3)

$V_{wq} = (2,763)(0.5"/12) = 115 \text{ cf}$   
Provided = 697 cf

A separate document entitled "Operation and Maintenance & Erosion and Sedimentation Control Program for a Proposed Stormwater Management System" dated December 12,

2017, is included as part of this report. Suitable practices for source control and long-term pollution prevention have been identified and shall be implemented as discussed.

The utilization of pretreatment and treatment BMP's combined with the operation and maintenance plan provides compliance with this standard.

**Standard 5: Land Uses with Higher Potential Pollutant Loads (LUHPPLs) – Source control and pollution prevention shall be implemented in accordance with the Stormwater Handbook to eliminate or reduce the discharge of stormwater runoff from such land uses to the maximum extent practicable.**

Stormwater Standard 5 is not applicable to this project. The proposed development will not subject the site to higher potential pollutant loads as defined in the Massachusetts Department of Environmental Protection Wetlands and Water Quality Regulations.

LUHPPLs are identified in 310 CMR 22.20B(2) and C(2)(a)-(k) and (m) and CMR 22.21(2)(a)(1)-(8) and (b)(1)-(6), areas within a site that are the location of activities that are subject to an individual National Pollutant Discharge Elimination System (NPDES) permit or the NPDES Multi-sector General Permit; auto fueling facilities, exterior fleet storage areas, exterior vehicle service and equipment cleaning areas; marinas and boatyards; parking lots with high-intensity-use; confined disposal facilities and disposal sites.

**Standard 6: Critical Areas – Stormwater discharges to critical areas require the use of specific source control and pollution prevention measures and specific structural stormwater best management practices determined by the Department to be suitable for managing discharges to such areas.**

Stormwater Standard 6 is not applicable to this project given that proposed stormwater does not discharge near a critical area. Critical areas being Outstanding Resource Waters and Special Resource Waters as designated in 314 CMR 4.0, recharge areas for public water supplies as defined in 310 CMR 22.02, bathing beaches as defined in 105 CMR 445.000, cold-water fisheries and shellfish growing areas as defined in 314 CMR 9.02 and 310 CMR 10.04. The design points are not considered a critical area therefore Standard #6 does not apply to this project.

**Standard 7: Redevelopments – A redevelopment project is required to meet Standards 1-6 only to the maximum extent practicable. Remaining standards shall be met as well as the project shall improve the existing conditions.**

Stormwater Standard 7 is not applicable to this project. Within the Stormwater Management Handbook (volume 1 chapter 1 page 20), the definition of a redevelopment project includes, "development, rehabilitation, expansion and phased projects on previously developed sites, provided the redevelopment results in no net increase in impervious area".

This project will not result in a reduction of impervious area in the proposed conditions.

**Standard 8: Construction Period Pollution Prevention and Erosion and Sedimentation Control Plan shall be implemented.**



*An Operation and Maintenance & Erosion and Sediment Control Program for a Proposed Stormwater Management System* is included with this report. The program details the construction period operation and maintenance plan and sequencing for pollution prevention measures and erosion and sedimentation controls. Locations of erosion control measures for the project are depicted on the site plan set accompanying this report.

**Standard 9: A long term Operation and Maintenance Plan shall be implemented.**

*An Operation and Maintenance & Erosion and Sediment Control Program for a Proposed Stormwater Management System* is included with this report. The long term operation and maintenance section of the program provides details and the schedule for routine and non-routine maintenance tasks to be implemented at the completion of the project.

**Standard 10: Prohibition of Illicit Discharges – Illicit discharges to the stormwater management system are prohibited.**

Illicit discharges to the stormwater management system are discharges that are not entirely comprised of stormwater. Discharges to the stormwater management system from the following activities or facilities are permissible: Firefighting, water line flushing, landscape irrigation, uncontaminated groundwater, potable water sources, foundation drains, air conditioning condensation, footing drains, individual resident car washing, flows from riparian habitats and wetlands, dechlorinated water from swimming pools, water used for street washing and water used to clean residential buildings without detergents. All other illicit discharges are prohibited.

There are no known illicit discharges anticipated through the completion of this project. During construction and post construction procedures are provided to dissipate the potential for illicit discharges to the drainage system. Post construction preventions of illicit discharges are described in the Operation and Maintenance Program under the Good Housekeeping Practices section of the report.

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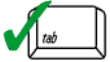
**CHECKLIST FOR STORMWATER REPORT**



# Checklist for Stormwater Report

## A. Introduction

**Important:** When filling out forms on the computer, use only the tab key to move your cursor - do not use the return key.



A Stormwater Report must be submitted with the Notice of Intent permit application to document compliance with the Stormwater Management Standards. The following checklist is NOT a substitute for the Stormwater Report (which should provide more substantive and detailed information) but is offered here as a tool to help the applicant organize their Stormwater Management documentation for their Report and for the reviewer to assess this information in a consistent format. As noted in the Checklist, the Stormwater Report must contain the engineering computations and supporting information set forth in Volume 3 of the [Massachusetts Stormwater Handbook](#). The Stormwater Report must be prepared and certified by a Registered Professional Engineer (RPE) licensed in the Commonwealth.

The Stormwater Report must include:

- The Stormwater Checklist completed and stamped by a Registered Professional Engineer (see page 2) that certifies that the Stormwater Report contains all required submittals.<sup>1</sup> This Checklist is to be used as the cover for the completed Stormwater Report.
- Applicant/Project Name
- Project Address
- Name of Firm and Registered Professional Engineer that prepared the Report
- Long-Term Pollution Prevention Plan required by Standards 4-6
- Construction Period Pollution Prevention and Erosion and Sedimentation Control Plan required by Standard 8<sup>2</sup>
- Operation and Maintenance Plan required by Standard 9

In addition to all plans and supporting information, the Stormwater Report must include a brief narrative describing stormwater management practices, including environmentally sensitive site design and LID techniques, along with a diagram depicting runoff through the proposed BMP treatment train. Plans are required to show existing and proposed conditions, identify all wetland resource areas, NRCS soil types, critical areas, Land Uses with Higher Potential Pollutant Loads (LUHPPL), and any areas on the site where infiltration rate is greater than 2.4 inches per hour. The Plans shall identify the drainage areas for both existing and proposed conditions at a scale that enables verification of supporting calculations.

As noted in the Checklist, the Stormwater Management Report shall document compliance with each of the Stormwater Management Standards as provided in the Massachusetts Stormwater Handbook. The soils evaluation and calculations shall be done using the methodologies set forth in Volume 3 of the Massachusetts Stormwater Handbook.

To ensure that the Stormwater Report is complete, applicants are required to fill in the Stormwater Report Checklist by checking the box to indicate that the specified information has been included in the Stormwater Report. If any of the information specified in the checklist has not been submitted, the applicant must provide an explanation. The completed Stormwater Report Checklist and Certification must be submitted with the Stormwater Report.

<sup>1</sup> The Stormwater Report may also include the Illicit Discharge Compliance Statement required by Standard 10. If not included in the Stormwater Report, the Illicit Discharge Compliance Statement must be submitted prior to the discharge of stormwater runoff to the post-construction best management practices.

<sup>2</sup> For some complex projects, it may not be possible to include the Construction Period Erosion and Sedimentation Control Plan in the Stormwater Report. In that event, the issuing authority has the discretion to issue an Order of Conditions that approves the project and includes a condition requiring the proponent to submit the Construction Period Erosion and Sedimentation Control Plan before commencing any land disturbance activity on the site.



# Checklist for Stormwater Report

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## B. Stormwater Checklist and Certification

The following checklist is intended to serve as a guide for applicants as to the elements that ordinarily need to be addressed in a complete Stormwater Report. The checklist is also intended to provide conservation commissions and other reviewing authorities with a summary of the components necessary for a comprehensive Stormwater Report that addresses the ten Stormwater Standards.

*Note:* Because stormwater requirements vary from project to project, it is possible that a complete Stormwater Report may not include information on some of the subjects specified in the Checklist. If it is determined that a specific item does not apply to the project under review, please note that the item is not applicable (N.A.) and provide the reasons for that determination.

A complete checklist must include the Certification set forth below signed by the Registered Professional Engineer who prepared the Stormwater Report.

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### Registered Professional Engineer's Certification

I have reviewed the Stormwater Report, including the soil evaluation, computations, Long-term Pollution Prevention Plan, the Construction Period Erosion and Sedimentation Control Plan (if included), the Long-term Post-Construction Operation and Maintenance Plan, the Illicit Discharge Compliance Statement (if included) and the plans showing the stormwater management system, and have determined that they have been prepared in accordance with the requirements of the Stormwater Management Standards as further elaborated by the Massachusetts Stormwater Handbook. I have also determined that the information presented in the Stormwater Checklist is accurate and that the information presented in the Stormwater Report accurately reflects conditions at the site as of the date of this permit application.

Registered Professional Engineer Block and Signature

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Signature and Date

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## Checklist

**Project Type:** Is the application for new development, redevelopment, or a mix of new and redevelopment?

- New development
- Redevelopment
- Mix of New Development and Redevelopment



# Checklist for Stormwater Report

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## Checklist (continued)

**LID Measures:** Stormwater Standards require LID measures to be considered. Document what environmentally sensitive design and LID Techniques were considered during the planning and design of the project:

- No disturbance to any Wetland Resource Areas
- Site Design Practices (e.g. clustered development, reduced frontage setbacks)
- Reduced Impervious Area (Redevelopment Only)
- Minimizing disturbance to existing trees and shrubs
- LID Site Design Credit Requested:
  - Credit 1
  - Credit 2
  - Credit 3
- Use of “country drainage” versus curb and gutter conveyance and pipe
- Bioretention Cells (includes Rain Gardens)
- Constructed Stormwater Wetlands (includes Gravel Wetlands designs)
- Treebox Filter
- Water Quality Swale
- Grass Channel
- Green Roof
- Other (describe): \_\_\_\_\_

### Standard 1: No New Untreated Discharges

- No new untreated discharges
- Outlets have been designed so there is no erosion or scour to wetlands and waters of the Commonwealth
- Supporting calculations specified in Volume 3 of the Massachusetts Stormwater Handbook included.



# Checklist for Stormwater Report

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## Checklist (continued)

### Standard 2: Peak Rate Attenuation

- Standard 2 waiver requested because the project is located in land subject to coastal storm flowage and stormwater discharge is to a wetland subject to coastal flooding.
- Evaluation provided to determine whether off-site flooding increases during the 100-year 24-hour storm.
- Calculations provided to show that post-development peak discharge rates do not exceed pre-development rates for the 2-year and 10-year 24-hour storms. If evaluation shows that off-site flooding increases during the 100-year 24-hour storm, calculations are also provided to show that post-development peak discharge rates do not exceed pre-development rates for the 100-year 24-hour storm.

### Standard 3: Recharge

- Soil Analysis provided.
- Required Recharge Volume calculation provided.
- Required Recharge volume reduced through use of the LID site Design Credits.
- Sizing the infiltration, BMPs is based on the following method: Check the method used.
  - Static
  - Simple Dynamic
  - Dynamic Field<sup>1</sup>
- Runoff from all impervious areas at the site discharging to the infiltration BMP.
- Runoff from all impervious areas at the site is *not* discharging to the infiltration BMP and calculations are provided showing that the drainage area contributing runoff to the infiltration BMPs is sufficient to generate the required recharge volume.
- Recharge BMPs have been sized to infiltrate the Required Recharge Volume.
- Recharge BMPs have been sized to infiltrate the Required Recharge Volume *only* to the maximum extent practicable for the following reason:
  - Site is comprised solely of C and D soils and/or bedrock at the land surface
  - M.G.L. c. 21E sites pursuant to 310 CMR 40.0000
  - Solid Waste Landfill pursuant to 310 CMR 19.000
  - Project is otherwise subject to Stormwater Management Standards only to the maximum extent practicable.
- Calculations showing that the infiltration BMPs will drain in 72 hours are provided.
- Property includes a M.G.L. c. 21E site or a solid waste landfill and a mounding analysis is included.

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<sup>1</sup> 80% TSS removal is required prior to discharge to infiltration BMP if Dynamic Field method is used.



# Checklist for Stormwater Report

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## Checklist (continued)

### Standard 3: Recharge (continued)

- The infiltration BMP is used to attenuate peak flows during storms greater than or equal to the 10-year 24-hour storm and separation to seasonal high groundwater is less than 4 feet and a mounding analysis is provided.
- Documentation is provided showing that infiltration BMPs do not adversely impact nearby wetland resource areas.

### Standard 4: Water Quality

The Long-Term Pollution Prevention Plan typically includes the following:

- Good housekeeping practices;
  - Provisions for storing materials and waste products inside or under cover;
  - Vehicle washing controls;
  - Requirements for routine inspections and maintenance of stormwater BMPs;
  - Spill prevention and response plans;
  - Provisions for maintenance of lawns, gardens, and other landscaped areas;
  - Requirements for storage and use of fertilizers, herbicides, and pesticides;
  - Pet waste management provisions;
  - Provisions for operation and management of septic systems;
  - Provisions for solid waste management;
  - Snow disposal and plowing plans relative to Wetland Resource Areas;
  - Winter Road Salt and/or Sand Use and Storage restrictions;
  - Street sweeping schedules;
  - Provisions for prevention of illicit discharges to the stormwater management system;
  - Documentation that Stormwater BMPs are designed to provide for shutdown and containment in the event of a spill or discharges to or near critical areas or from LUHPPL;
  - Training for staff or personnel involved with implementing Long-Term Pollution Prevention Plan;
  - List of Emergency contacts for implementing Long-Term Pollution Prevention Plan.
- A Long-Term Pollution Prevention Plan is attached to Stormwater Report and is included as an attachment to the Wetlands Notice of Intent.
  - Treatment BMPs subject to the 44% TSS removal pretreatment requirement and the one inch rule for calculating the water quality volume are included, and discharge:
    - is within the Zone II or Interim Wellhead Protection Area
    - is near or to other critical areas
    - is within soils with a rapid infiltration rate (greater than 2.4 inches per hour)
    - involves runoff from land uses with higher potential pollutant loads.
  - The Required Water Quality Volume is reduced through use of the LID site Design Credits.
  - Calculations documenting that the treatment train meets the 80% TSS removal requirement and, if applicable, the 44% TSS removal pretreatment requirement, are provided.



# Checklist for Stormwater Report

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## Checklist (continued)

### Standard 4: Water Quality (continued)

- The BMP is sized (and calculations provided) based on:
  - The ½" or 1" Water Quality Volume or
  - The equivalent flow rate associated with the Water Quality Volume and documentation is provided showing that the BMP treats the required water quality volume.
- The applicant proposes to use proprietary BMPs, and documentation supporting use of proprietary BMP and proposed TSS removal rate is provided. This documentation may be in the form of the propriety BMP checklist found in Volume 2, Chapter 4 of the Massachusetts Stormwater Handbook and submitting copies of the TARP Report, STEP Report, and/or other third party studies verifying performance of the proprietary BMPs.
- A TMDL exists that indicates a need to reduce pollutants other than TSS and documentation showing that the BMPs selected are consistent with the TMDL is provided.

### Standard 5: Land Uses With Higher Potential Pollutant Loads (LUHPPLs)

- The NPDES Multi-Sector General Permit covers the land use and the Stormwater Pollution Prevention Plan (SWPPP) has been included with the Stormwater Report.
- The NPDES Multi-Sector General Permit covers the land use and the SWPPP will be submitted **prior to** the discharge of stormwater to the post-construction stormwater BMPs.
- The NPDES Multi-Sector General Permit does **not** cover the land use.
- LUHPPLs are located at the site and industry specific source control and pollution prevention measures have been proposed to reduce or eliminate the exposure of LUHPPLs to rain, snow, snow melt and runoff, and been included in the long term Pollution Prevention Plan.
- All exposure has been eliminated.
- All exposure has **not** been eliminated and all BMPs selected are on MassDEP LUHPPL list.
- The LUHPPL has the potential to generate runoff with moderate to higher concentrations of oil and grease (e.g. all parking lots with >1000 vehicle trips per day) and the treatment train includes an oil grit separator, a filtering bioretention area, a sand filter or equivalent.

### Standard 6: Critical Areas

- The discharge is near or to a critical area and the treatment train includes only BMPs that MassDEP has approved for stormwater discharges to or near that particular class of critical area.
- Critical areas and BMPs are identified in the Stormwater Report.





# Checklist for Stormwater Report

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## Checklist (continued)

### Standard 7: Redevelopments and Other Projects Subject to the Standards only to the maximum extent practicable

- The project is subject to the Stormwater Management Standards only to the maximum Extent Practicable as a:
  - Limited Project
  - Small Residential Projects: 5-9 single family houses or 5-9 units in a multi-family development provided there is no discharge that may potentially affect a critical area.
  - Small Residential Projects: 2-4 single family houses or 2-4 units in a multi-family development with a discharge to a critical area
  - Marina and/or boatyard provided the hull painting, service and maintenance areas are protected from exposure to rain, snow, snow melt and runoff
  - Bike Path and/or Foot Path
  - Redevelopment Project
  - Redevelopment portion of mix of new and redevelopment.
- Certain standards are not fully met (Standard No. 1, 8, 9, and 10 must always be fully met) and an explanation of why these standards are not met is contained in the Stormwater Report.
- The project involves redevelopment and a description of all measures that have been taken to improve existing conditions is provided in the Stormwater Report. The redevelopment checklist found in Volume 2 Chapter 3 of the Massachusetts Stormwater Handbook may be used to document that the proposed stormwater management system (a) complies with Standards 2, 3 and the pretreatment and structural BMP requirements of Standards 4-6 to the maximum extent practicable and (b) improves existing conditions.

### Standard 8: Construction Period Pollution Prevention and Erosion and Sedimentation Control

A Construction Period Pollution Prevention and Erosion and Sedimentation Control Plan must include the following information:

- Narrative;
  - Construction Period Operation and Maintenance Plan;
  - Names of Persons or Entity Responsible for Plan Compliance;
  - Construction Period Pollution Prevention Measures;
  - Erosion and Sedimentation Control Plan Drawings;
  - Detail drawings and specifications for erosion control BMPs, including sizing calculations;
  - Vegetation Planning;
  - Site Development Plan;
  - Construction Sequencing Plan;
  - Sequencing of Erosion and Sedimentation Controls;
  - Operation and Maintenance of Erosion and Sedimentation Controls;
  - Inspection Schedule;
  - Maintenance Schedule;
  - Inspection and Maintenance Log Form.
- A Construction Period Pollution Prevention and Erosion and Sedimentation Control Plan containing the information set forth above has been included in the Stormwater Report.



# Checklist for Stormwater Report

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## Checklist (continued)

### Standard 8: Construction Period Pollution Prevention and Erosion and Sedimentation Control (continued)

- The project is highly complex and information is included in the Stormwater Report that explains why it is not possible to submit the Construction Period Pollution Prevention and Erosion and Sedimentation Control Plan with the application. A Construction Period Pollution Prevention and Erosion and Sedimentation Control has **not** been included in the Stormwater Report but will be submitted **before** land disturbance begins.
- The project is **not** covered by a NPDES Construction General Permit.
- The project is covered by a NPDES Construction General Permit and a copy of the SWPPP is in the Stormwater Report.
- The project is covered by a NPDES Construction General Permit but no SWPPP been submitted. The SWPPP will be submitted BEFORE land disturbance begins.

### Standard 9: Operation and Maintenance Plan

- The Post Construction Operation and Maintenance Plan is included in the Stormwater Report and includes the following information:
  - Name of the stormwater management system owners;
  - Party responsible for operation and maintenance;
  - Schedule for implementation of routine and non-routine maintenance tasks;
  - Plan showing the location of all stormwater BMPs maintenance access areas;
  - Description and delineation of public safety features;
  - Estimated operation and maintenance budget; and
  - Operation and Maintenance Log Form.
- The responsible party is **not** the owner of the parcel where the BMP is located and the Stormwater Report includes the following submissions:
  - A copy of the legal instrument (deed, homeowner's association, utility trust or other legal entity) that establishes the terms of and legal responsibility for the operation and maintenance of the project site stormwater BMPs;
  - A plan and easement deed that allows site access for the legal entity to operate and maintain BMP functions.

### Standard 10: Prohibition of Illicit Discharges

- The Long-Term Pollution Prevention Plan includes measures to prevent illicit discharges;
- An Illicit Discharge Compliance Statement is attached;
- NO Illicit Discharge Compliance Statement is attached but will be submitted **prior to** the discharge of any stormwater to post-construction BMPs.

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**OPERATION AND MAINTENANCE & EROSIONS AND  
SEDIMENT CONTROL PROGRAM**

**OPERATION AND MAINTENANCE &  
EROSION AND SEDIMENTATION CONTROL PROGRAM**  
*for*  
**A PROPOSED STORMWATER MANAGEMENT SYSTEM**  
*located at*  
**1106 MASSACHUSETTS AVENUE  
LEXINGTON, MASSACHUSETTS**



**Applicant:**

Sheldon Corporation  
121 Marrett Road  
Lexington, Massachusetts 02421

**Prepared by:**

Meridian Associates, Inc.  
500 Cummings Center, Suite 5950  
Beverly, Massachusetts 01915  
(978) 299-0447

**December 12, 2017**

**Project Name:** 1106 Massachusetts Avenue

**Owner Name:** Vasiliki Realty Trust – Thomas J. Cataldo, Trustee

**Party Responsible for Maintenance**

**During Construction:** Contractor

**Party Responsible for Maintenance**

**After Construction:** Homeowner's Association

### **Erosion and Sedimentation Control Measures during Construction Activities**

#### **Filtermitt (or approved equal)**

Filtermitt (or approved equal) will be installed along the down gradient limit of work as depicted on the Site Plan. The FilterMitt shall be installed prior to the commencement of any work on-site and in accordance with the design plans. An additional supply of filtermitt shall be on-site to replace and/or repair any filtermitt that have been disturbed or are in poor condition. The line of FilterMitt shall be inspected and maintained on a weekly basis and after every major storm event (2-year) during construction. No construction activities are to occur beyond the FilterMitt at any time. Deposited sediments shall be removed when the volume of the deposition reaches approximately one-half the height of the filtermitt.

#### **Stockpiles**

All unused debris, soil, and other material shall be stockpiled in locations of relatively flat grades, away from any trees identified to be saved and upgradient of the filtermitt. Stockpile side slopes shall not be greater than 2:1. All stockpiles shall be surrounded by a row of filtermitt. Surrounding filtermitt shall be inspected and maintained on a daily basis.

#### **Surface Stabilization**

The surface of all disturbed areas shall be stabilized during and after construction. Disturbed areas remaining idle for more than 14 days shall be stabilized. Temporary measures shall be taken during construction to prevent erosion and siltation. No construction sediment shall be allowed to enter any infiltration system or formal drainage system. All disturbed slopes will be stabilized with a permanent vegetative cover. Some or all of the following measures will be utilized on this project as conditions may warrant.

- a. Temporary Seeding
- b. Temporary Mulching
- c. Permanent Seeding
- d. Placement of Sod
- e. Hydroseeding
- f. Placement of Hay
- g. Placement of Jute Netting

Dust shall be controlled at the site.

## **Tree Protection**

Existing trees to be saved shall be protected with orange construction fence (offset from the tree trunk by professional standard based on canopy).

## **Construction Tracking Pad**

A construction tracking pad shall be installed at the designated entrances/exits, as shown on the Site plans, to the site to reduce the amount of sediment transported off site. The construction tracking pad shall be inspected weekly.

## **Silt Sacks**

Silt Sacks shall be installed within the basins. The performance of the basins shall be checked after every major storm event during construction, in the event of clogging within the Silt Sack, it shall be removed and replaced with a clean Silt Sack. Stormwater quality unit shall be checked bi-weekly.

## **Inspection and Maintenance of Area Drain & Water Quality Units**

The performance of the area drain and water quality units shall be checked after every major storm event during construction.

## **Subsurface Infiltration Facilities**

Construction activity above and around the proposed location of the subsurface infiltration facility shall be limited to prevent compaction of the existing soil. Care shall be taken to redirect stormwater runoff from this area to prevent ponding. Installation of this system shall occur under dry weather conditions and system shall be backfilled immediately to prohibit the introduction of fines or other material that would compromise the functionality of this system.

## **Removal of Sediment and Erosion Controls**

At the completion of construction activities and after receiving approval from the Town of Lexington, all physical sediment and erosion controls shall be removed from the site per Town of Lexington. The areas where the controls have been removed shall be seeded and stabilized immediately upon removal.

## **Long-Term Inspection and Maintenance Measures after Construction**

### **Erosion Control**

Eroded sediments can adversely affect the performance of the stormwater management system. Eroding or barren areas should be immediately re-vegetated.

### **Storm Water Quality Inlets (CDS)**

The CDS system should be inspected at regular intervals and maintained when necessary to ensure optimum performance. At minimum, inspections shall be performed twice per year (e.g. spring and fall) and after every major storm. The visual inspection should ascertain that the system components are in working order and that there are no blockages or obstructions in the inlet or separation screen. The inspection shall also quantify the accumulation of hydrocarbons, trash and sediment in the system. The CDS system shall be cleaned when the level of sediment has reached 75% of capacity in the isolated sump or when an appreciable level of hydrocarbons and trash has accumulated. Cleaning of a CDS unit shall be done during dry weather when no flow is entering the system. The use of a vacuum truck is generally the most effective and convenient method. Simply remove the manhole covers and insert the vacuum hose into the sump. The system shall be completely drained down and the sump fully evacuated of sediment. The area outside the screen shall also be cleaned to ensure it is free of trash and debris. Manhole covers shall be securely seated following cleaning activities to prevent leakage of runoff into the system from above. Disposal of all material removed from the CDS system shall be done in accordance with local regulations.

### **Subsurface Infiltration Facility**

The infiltration system inspections should include inspections following the first several rainfall events or first few months after construction, after all major storms (3.2" inches of rain over a 24-hour period or greater), and on regular bi-annual scheduled dates, to ascertain whether captured runoff drains within 72 hours following the event. Pondered water inside the system (as visible from the observation well) after several dry days often indicates that the bottom of the system is clogged. If the water does not drain, then a qualified professional should be retained to determine the cause of apparent infiltration failure and recommend corrective action. Such corrective action should be immediately implemented by the homeowner. If depth of sediment is observed to be greater than 3" then the system should be cleaned. The homeowner shall contact a sewer and drain cleaning company to flood the system via pump truck so the water is forced back to the upstream cleanout where sediment can be vacuumed out.

### **Debris and Litter Removal**

Trash may collect in the BMP's, potentially causing clogging of the facilities. All debris and litter shall be removed when necessary, and after each storm event. Sediment and debris collected from vacuuming and/or sweeping should be disposed of at a permitted waste disposal facility. Avoid disposing of this material on site, where it could be washed into the proposed subsurface infiltration systems.

### **Lawn Mowing**

All lawn mowing to take place will be done with a mulch mower so grass clippings will not be an issue.

## **Good Housekeeping Practices (in accordance with Standard 10 of the Stormwater Management Handbook to prevent illicit discharges)**

### **Provisions for storing paints, cleaners, automotive waste and other potentially hazardous household waste products inside or under cover**

- All materials on site will be stored inside in a neat, orderly, manner in their appropriate containers with the original manufacturer's label.
- Only store enough material necessary. Whenever possible, all of a product shall be used up before disposing of container.
- Manufacturer, local, and State recommendations for proper use and disposal shall be followed.

### **Vehicle washing controls**

- A commercial car wash shall be used when possible. Car washes treat and/or recycle water.
- Cars shall be washed on gravel, grass, or other permeable surfaces to allow filtration to occur.
- Use biodegradable soaps.
- A water hose with a nozzle that automatically turns off when left unattended.

### **Requirements for routine inspection and maintenance of stormwater BMPs**

- See Inspection and Maintenance Measures after Construction.

### **Spill prevention and response plans**

- Spill Control Practices shall be in conformance with the guidelines set forth in the National Pollutant Discharge Elimination System (NPDES) Stormwater Pollution Prevention Plan (SWPPP)

### **Provisions for maintenance of lawns, gardens, and other landscaped areas**

- Grass shall not be cut shorter than 2 to 3 inches and mulch clipping should be left on lawn as a natural fertilizer.
- Use low volume water approaches such as drip-type or sprinkler systems. Water plants only when needed to enhance root growth and avoid runoff problems.
- The use of mulch shall be utilized where possible. Mulch helps retain water and prevents erosion.

### **Requirements for storage and use of fertilizers, herbicides and pesticides**

- Fertilizers used will be applied only in the minimum amounts recommended by the manufacturer. Once applied, fertilizer will be worked into the soil to limit exposure to storm water. Storage will be in a covered shed. The contents of any partially used bags of fertilizer will be transferred to a sealable plastic bin to avoid spills.
- Do not fertilize before a rainstorm.
- Consider using organic fertilizers. They release nutrients more slowly.
- Pesticides shall be applied on lawns and gardens only when necessary and applied only in the minimum amounts recommended by the manufacturer.

### **Pet waste management**

- Scoop up and seal pet wastes in a plastic bag. Dispose of properly, in the garbage.



**Provisions for solid waste management**

- All solid waste shall be disposed of or recycled in accordance with local town regulations.

**Snow disposal and plowing plans relative to Resource Area**

- Snow shall be plowed and stored on gravel, grass, or other permeable surfaces to allow filtration to occur.
- Once snow melts all sand salt and debris shall be extracted from surface and properly disposed of.
- Snow shall not be disposed of in any resource area or waterbody.
- Avoid disposing snow on top of storm drain catchbasins or stormwater drainage swale.

**Winter Road Salt and/or Sand use and storage restrictions**

- Sand storage piles should be located outside the 100-year buffer zone and shall be covered at all times. No salt to be stored or used on site.
- Alternative materials, such as sand or gravel, should be used in especially sensitive areas.

**Roadway and Parking Lot sweeping schedule**

- Pavement sweeping shall be conducted at a frequency of not less than once per year.
- Removal of any accumulated sand, grit, and debris from driveway after the snow melts shall be completed shortly after snow melts for the season.

**Documentation that Stormwater BMPs are designed to provide for shutdown and containment in the event of a spill or discharges to or near critical areas or from LUHPPL**

Not Applicable

**Training for staff or personnel involved with implementing Long-Term Pollution Prevention Plan**

To be determined by the owner.

**List of Emergency contacts for implementing Long-Term Pollution Prevention Plan**

To be determined by the owner.

**Applicant's Certification**

I certify under penalty of law that I have read, understand and agree to abide by the practices outlined in this document.

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

Sheldon Corporation

**Contractor's Certification**

I certify under penalty of law that I have read, understand and agree to abide by the practices outlined in this document.

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

Contractor

**STORMWATER MANAGEMENT**  
**CONSTRUCTION PHASE**

**INSPECTION SCHEDULE AND EVALUATION CHECKLIST**

**PROJECT LOCATION:** 1106 Massachusetts Ave, Lexington, MA

**WEATHER:** \_\_\_\_\_

<i>Inspection Date</i>	<i>Inspector</i>	<i>Area Inspected</i>	<i>Required Inspection Frequency if BMP</i>	<i>Comments</i>	<i>Recommendation</i>	<i>Follow-up Inspection Required (yes/no)</i>
		<i>FilterMitt</i>	<i>Weekly and After Major Storm Events</i>			
		<i>Construction Tracking Pad</i>	<i>Weekly and After Major Storm Events</i>			
		<i>Silt Sack</i>	<i>Weekly and After Major Storm Events</i>			
		<i>CDS Treatment BMP's</i>	<i>Weekly and After Major Storm Events</i>			
		<i>Subsurface Infiltration Systems</i>	<i>Weekly and After Major Storm Events</i>			
		<i>Area Drain</i>	<i>Weekly and After Major Storm Events</i>			

- 
- (1) Refer to the Massachusetts Stormwater Handbook, Volume Two: Stormwater Technical Handbook (February 2008) for recommendations regarding frequency for inspection and maintenance of specific BMP's.
  - (2) Inspections to be conducted by a qualified professional such as an environmental scientist or civil engineer.

Limited or no use of sodium chloride salts, fertilizers or pesticides recommended.

Other notes: (Include deviations from: Con. Comm. Order of Conditions, PB Approval, Construction Sequence and Approved Plan)  
Stormwater Control Manager: \_\_\_\_\_

**STORMWATER MANAGEMENT**  
**AFTER CONSTRUCTION**

**INSPECTION SCHEDULE AND EVALUATION CHECKLIST**

**PROJECT LOCATION:** 1106 Massachusetts Ave, Lexington, MA

**WEATHER:** \_\_\_\_\_

<i>Inspection Date</i>	<i>Inspector</i>	<i>Area Inspected</i>	<i>Required Inspection Frequency if BMP</i>	<i>Comments</i>	<i>Recommendation</i>	<i>Follow-up Inspection Required (yes/no)</i>
		<i>CDS Treatment BMP's</i>	<i>Bi-annually and After Major Storm Events</i>			
		<i>Subsurface Infiltration Systems</i>	<i>Bi-annually and After Major Storm Events</i>			

- 
- (3) Refer to the Massachusetts Stormwater Handbook, Volume Two: Stormwater Technical Handbook (February 2008) for recommendations regarding frequency for inspection and maintenance of specific BMP's.
  - (4) Inspections to be conducted by a qualified professional such as an environmental scientist or civil engineer.

Limited or no use of sodium chloride salts, fertilizers or pesticides recommended.

Other notes: (Include deviations from: Con. Comm. Order of Conditions, PB Approval, Construction Sequence and Approved Plan)  
Stormwater Control Manager: \_\_\_\_\_

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**SUPPORTING DOCUMENTS AND CALCULATIONS**

**INSTRUCTIONS:**

1. Sheet is nonautomated. Print sheet and complete using hand calculations. Column A and B: See MassDEP Structural BMP Table
2. The calculations must be completed using the Column Headings specified in Chart and Not the Excel Column Headings
3. To complete Chart Column D, multiple Column B value within Row x Column C value within Row
4. To complete Chart Column E value, subtract Column D value within Row from Column C within Row
5. Total TSS Removal = Sum All Values in Column D

**Location:** 1106 Massachusetts Avenue, Lexington, MA

**Train 1:** Proprietary Treatment BMP (SWQI-2), Subsurface Infiltration System (PSIS-1)

**TSS Removal Calculation**

A BMP	B TSS Removal Rate	C Starting TSS Load*	D Amount Removed (B*C)	E Remaining Load (C-D)
Proprietary Treatment BMP	44%	1.00	0.44	0.56
Infiltration Basin	80%	0.56	0.45	0.11

**Total TSS Removal =**

**88.8%**

**Project:** 6009  
**Prepared By:** Meridian Associates, Inc.  
**Date:** 12/12/2017

\*Equals remaining load from previous BMP(E) which enters the BMP

\*\* See portion of STEP Fact Sheet for removal rate

**INSTRUCTIONS:**

1. Sheet is nonautomated. Print sheet and complete using hand calculations. Column A and B: See MassDEP Structural BMP Table
2. The calculations must be completed using the Column Headings specified in Chart and Not the Excel Column Headings
3. To complete Chart Column D, multiple Column B value within Row x Column C value within Row
4. To complete Chart Column E value, subtract Column D value within Row from Column C within Row
5. Total TSS Removal = Sum All Values in Column D

**Location:** 1106 Massachusetts Avenue, Lexington, MA

**Train 2:** Proprietary Treatment BMP (SWQI-1), Subsurface Infiltration System (PSIS-2)

**TSS Removal Calculation**

A BMP	B TSS Removal Rate	C Starting TSS Load*	D Amount Removed (B*C)	E Remaining Load (C-D)
Proprietary Treatment BMP	44%	1.00	0.44	0.56
Infiltration Basin	80%	0.56	0.45	0.11

**Total TSS Removal =**

**88.8%**

**Project:** 6009  
**Prepared By:** Meridian Associates, Inc.  
**Date:** 12/12/2017

\*Equals remaining load from previous BMP(E) which enters the BMP

\*\* See portion of STEP Fact Sheet for removal rate

**INSTRUCTIONS:**

1. Sheet is nonautomated. Print sheet and complete using hand calculations. Column A and B: See MassDEP Structural BMP Table
2. The calculations must be completed using the Column Headings specified in Chart and Not the Excel Column Headings
3. To complete Chart Column D, multiple Column B value within Row x Column C value within Row
4. To complete Chart Column E value, subtract Column D value within Row from Column C within Row
5. Total TSS Removal = Sum All Values in Column D

**Location:** 1106 Massachusetts Avenue, Lexington, MA

**Train 3:** Subsurface Infiltration System (PSIS-3)

**TSS Removal Calculation**

A BMP	B TSS Removal Rate	C Starting TSS Load*	D Amount Removed (B*C)	E Remaining Load (C-D)
Infiltration Basin	80%	1.00	0.80	0.20

**Total TSS Removal =**

80.0%

**Project:** 6009  
**Prepared By:** Meridian Associates, Inc.  
**Date:** 12/12/2017

\*Equals remaining load from previous BMP(E) which enters the BMP

\*\* See portion of STEP Fact Sheet for removal rate



## 72-HOUR DRAW DOWN CALCULATIONS

$$\text{Time} = \frac{R_v}{(K)(\text{BottomArea})}$$

$R_v$  = Storage Volume

$K$  = Saturated Hydraulic Conductivity = 1.02

Bottom Area = Bottom Area of Recharge Structure

### **PSIS #1**

$R_v$  = 2,402 cf

Bottom Area = 961 sf

$$\text{Time} = \frac{62,402}{(1.02)(1/12)(961)} = 29.4 \text{ hours}$$

29.4 hours < 72 hours

### **PSIS #2**

$R_v$  = 1,355 cf

Bottom Area = 713 sf

$$\text{Time} = \frac{1,355}{(1.02)(1/12)(713)} = 22.4 \text{ hours}$$

22.4 hours < 72 hours

### **PSIS #3**

$R_v$  = 697 cf

Bottom Area = 371 sf

$$\text{Time} = \frac{697}{(1.02)(1/12)(371)} = 22.1 \text{ hours}$$

22.1 hours < 72 hours

## CAPTURE AREA ADJUSTMENT

The following calculation in accordance with MA Stormwater Handbook demonstrates that the storage capacity of the infiltration BMP's is sufficient to meet Standard #3.

Steps:

1. Required recharge volume for total site impervious area.

From Standard #3 recharge calculations page, summation of required recharge volume = 685 CF

2. Site impervious area draining to recharge facilities (from previous).

Area = 10,315 SF

3. Divide total site impervious area by impervious area draining to recharge facilities.

Total Site Impervious = 13,691 SF

$$\frac{13,691}{10,315} = 1.3$$

4. Multiply result of #3 by original recharge volume in #1.

$$1.3 \times 685 = 909 \text{ CF}$$

5. Insure minimum 65% impervious area draining to recharge facilities.

$$\frac{10,315}{13,691} \times 100\% = 75.3\%$$

6. Recharge facilities provide total recharge volume of 4,094 CF. Recharge volume 4,084 CF > 909 CF adjusted total recharge volume.

All Recharge Volumes have been achieved as required by the Massachusetts Stormwater Management Standards