



# **Stormwater Management Plan**

**under the  
Massachusetts Stormwater  
Management Regulations**

**Beverly Police Station**

**175 Elliott Street  
Beverly, MA**

August 2019

Applicant:  
City of Beverly, MA

Submitted to:  
City of Beverly, MA



Prepared by:  
Griffin Engineering  
Beverly, MA

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STORMWATER  
MANAGEMENT  
CHECKLIST



# 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

## 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.

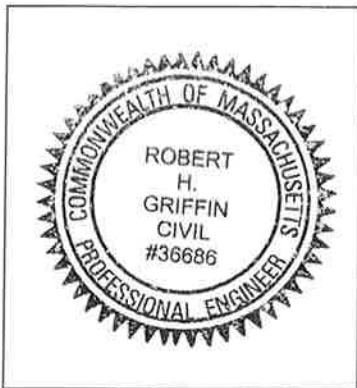
*Note:* Because stormwater requirements vary from project to project, it is possible that a complete Stormwater Report may not include information on some of the subjects specified in the Checklist. If it is determined that a specific item does not apply to the project under review, please note that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

### 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



*Robert H. Griffin* 8/8/19  
Signature and Date

## 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

## 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.

<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 proprietary 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

## 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

## 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.

ATTACHMENT A

PROJECT  
DESCRIPTION

## **1.0 INTRODUCTION**

This stormwater management report is prepared in support of the proposed site redevelopment and construction of the Beverly Police Station at 175 Elliott Street in Beverly, MA. The drainage system has been designed in accordance with the Massachusetts Department of Environmental Protection (MassDEP) Stormwater Management Standards.

### **1.1 Existing Conditions**

The site is approximately 2.01-acres in size. The western and central portions of the site are paved. Narrow mulched landscape islands bound the parking aisles. The Cummings Center uses the northeast portion of the site for storage, mulch and debris stockpiles, and equipment are present in the storage area. The southeast portion of the site is lawn with a bituminous and gravel walkway providing pedestrian access to the Cummings Center from Elliott Street. The existing gravel areas are dense from years of use. The site is bounded to the north by a commercial parking garage and parking lot, to the west by an ATM building and commercial parking lot, to the east by railroad tracks and to the south by Elliott Street.

The parking lot is relatively flat and drains to three catch basins that discharge to the municipal drainage system in Elliott Street. The three catch basins (CB4, CB5, and CB6) are masonry structures with no sumps or hoods. The drain pipes connecting them are 12-inch vitrified clay pipes with very shallow slopes. The connection from CB4 to the municipal drain manhole DMH3 in Elliott Street has a negative slope, as witnessed on a video inspection of this pipe provided to Griffin Engineering by the Cummings Center. The municipal drainage system in Elliott Street discharges into a large culvert at the McKay Street and Elliott Street intersection. This culvert discharges to the Bass River (tidal). Based on our site inspections and survey data review, the existing drainage system is tidally affected.

The FEMA Firm Flood Map shows that the site is located within a Zone "AE" Flood Hazard area (Elevation 10-ft; NAVD 1988 datum, reference: FEMA FIRM Map No. 25009C0417G dated July 16, 2014). Zone "AE" Flood Hazards are defined as areas subject to inundation by the 100-year flood event, with known base flood elevations.

### **1.2 Proposed Conditions**

The project involves redevelopment of the commercial parking lot to the new police station with associated parking lot, walkways, utilities and landscaping. To protect the station from potential sea level rise and since the project site is within a coastal flood zone, site topography will be raised approximately 4 to 6-ft. The first floor of the police station will be 4-ft above the FEMA base flood elevation. Site Plans showing the proposed redevelopment and stormwater management system have been separately provided.

The proposed project is considered a redevelopment and will improve existing conditions by capturing and treating runoff from all of the proposed parking area and walkways prior to discharging to the municipal drainage system and reducing the amount of impervious surfaces on-site. Runoff from the proposed building roof is considered clean and does not require treatment. All of the proposed impervious surfaces on-site will be in full compliance with the 10 Massachusetts DEP Stormwater Management Standards.

## **2.0 STORMWATER MANAGEMENT STANDARDS**

### **2.1 Standard 1: No New Untreated Discharges**

No new untreated discharges to wetlands or waterways are proposed. The site discharges to the existing municipal drainage system in Elliott Street.

### **2.2 Standard 2: Peak Rate Attenuation**

A waiver from Standard 2 applies because the project is located in land subject to coastal storm flowage. According to the FEMA Flood Map, the site will be inundated by flood waters from the Bass River (tidal) during the 100-year flood event. Flood waters will recede as the tide recedes. The proposed stormwater drainage system is hydraulically connected to the Bass River via the municipal drainage system in Elliott Street, which discharges to a large culvert at the McKay Street and Elliott Street intersection.

### **2.3 Standard 3: Recharge**

The post-development annual recharge at the site is greater than the pre-development annual recharge because the proposed project increases the amount of landscaping on-site by approximately 1,730 sq. ft. For this reason, this Standard is met with no additional infiltration structures required. Additionally, site constraints such as the lack of space and unsuitable soils make installation of an infiltration structure impracticable.

The United States Department of Agriculture Natural Resources Conservation Service Soil Survey characterizes the soil as Urban Land, which indicates that the soils have been significantly altered or obscured by urban works and structures. A series of test borings, test probes, and test pits were conducted at the site by Haley and Aldrich in August 2001, Sage Environmental, Inc. in November 2018, and Sage Environmental, Inc. in April 2019. According to the Geotechnical Engineering Report by Paul B. Aldinger & Associates (PBA)<sup>1</sup> dated April 2019, underlying soils encountered on-site are mainly comprised of non-engineered fill material, organic silt and peat overlying glaciomarine and glacial till soils. Groundwater levels were

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<sup>1</sup> Geotechnical Engineering Report for the Proposed Police Station, Beverly, MA, prepared for Sage Environmental, Inc. of Pawtucket, RI, prepared by Paul B. Aldinger & Associates, Inc. of East Providence, RI. April 2019

observed within the monitoring wells by PBA in April 2019 to be between 1.7 to 2.1 feet below the ground surface. High Groundwater, fill, organic soil, soft clay and hard glacial till are not suitable conditions for an infiltration structure. The Geotechnical Report by PBA was obtained from the City of Beverly.

#### **2.4 Standard 4: Water Quality**

The minimum required water quality treatment volume for the project site is the first half inch of runoff from impervious surfaces. The proposed stormwater treatment system is designed to provide a weighted average of approximately 93.0% TSS removal. The reader is referred to Water Quality Volume Calculations provided in Attachment B.

The water quality volume is satisfied by a First Defense (FD) proprietary separator pretreatment device and deep-sump, hooded catch basins. The FD pretreatment devices at the site are predicted to achieve an annual 96% TSS removal rate and catch basins were assigned a 25% TSS removal rate. The proprietary separator was sized to adequately treat the required water quality volume (WQV) by converting the WQV to an equivalent peak flow rate (Water Quality Flow (WQF)), in the manner specified by Mass DEP Stormwater Management guidelines.

Approximately 91% of the proposed parking area and walkways will be pretreated by the proprietary separator pretreatment devices and thereby will fully satisfy Standard 4. All of the proposed roof runoff (14,507 sq. ft.) is considered clean by Mass. DEP. Roof runoff will improve runoff water quality by replacing approximately 13,730 sq. ft. of existing untreated pavement. The proposed drainage system provides a level of pretreatment to all of the runoff from the proposed parking area and walkways on-site and approximately 5,345 sq. ft. of pavement and walkways off-site adjacent to the ATM building. Prior to site redevelopment, stormwater runoff from all the impervious surfaces (approximately 61,331 sq. ft.) drained to the Elliott Street municipal drainage system without being treated.

Computations for the proposed proprietary separator are provided in Attachment B. The calculated WQF rate was used with the manufacturer's TSS Removal Efficiency Curve to estimate the annual TSS removal. The efficiency calculations were based on third-party evaluations of the First Defense proprietary separators. The third-party evaluations are provided in Attachment F.

As required by the Stormwater Management Standards, a Long-Term Pollution Prevention Plan has been prepared for the project and is provided in Attachment C. The plan identifies suitable practices for source control and pollution prevention throughout the useful life of the site.

#### **2.5 Standard 5: Land Uses with Higher Potential Pollutant Loads**

In accordance with the Massachusetts Stormwater Management Standards, the

proposed primary site use is not considered a Land Use with Higher Potential Pollutant Load (LUHPPL). Therefore, this standard does not apply.

#### **2.6 Standard 6: Critical Areas**

The project site is not tributary to an environmentally-critical area as defined by the Massachusetts Stormwater Management Standards. Therefore, this standard does not apply to this project.

#### **2.7 Standard 7: Redevelopment and Other Projects Subject to the Standards only to the Maximum Extent Practicable**

The site has been previously developed with a paved parking lot, material stockpiles and equipment storage area. Existing surfaces are primarily gravel, dirt, and pavement. Since the project decreases impervious area by approximately 1,730 sq. ft., the project is considered a redevelopment and is required to meet Standards 2, 3, and the pretreatment and structural BMP requirements of Standard 4, 5, and 6 to the maximum extent practicable and fully comply with all other Standards.

All of the proposed work area on-site meets the 10 DEP Stormwater Management Standards except for approximately 3,491 sq. ft. of proposed pavement and walkways on the subject parcel located adjacent to ATM building (offsite impervious area was omitted from the calculations). Due to the small size of this area and its location downstream of the project, these areas are considered “de minimus” under the criteria listed in the Massachusetts Stormwater Management Handbook and a weighted average method can be used to determine if the 80%TSS removal rate can be achieved on a site-wide basis. The proposed stormwater treatment system is designed to provide a weighted average of approximately 93.0% TSS removal; therefore Standard 4 is met. The reader is referred to Water Quality Volume Calculations provided in Attachment B.

#### **2.8 Standard 8: Construction Period Pollution Prevention and Erosion and Sediment Control**

Consistent with the NPDES Construction General Permit requirements, a Stormwater Pollution Prevention Plan (SWPPP) is required for any project resulting in over 1-acre of land disturbance. The proposed project anticipates approximately 2.22-acres of land disturbance. Therefore, a SWPPP will be prepared and submitted to the issuing authority prior to land disturbance commencing.

#### **2.9 Standard 9: Operation and Maintenance Plan**

An Operations & Maintenance Plan has been provided in Attachment D. The owner of the land (City of Beverly) is responsible for system operation and maintenance.

#### **2.10 Standard 10: Illicit Discharges**

The submitted Long-Term Pollution Prevention Plan (Attachment C) specifies measures to prevent illicit discharges from entering the stormwater management



system. Source control and response plans are also specified to prevent illicit discharges from being conveyed through the stormwater management system.

Since the project site has been previously developed, a signed Illicit Discharge Compliance Statement cannot be provided at this time. A component of the proposed project includes relocating and abandoning existing utilities from the Cummings Center property. Consistent with the Massachusetts Stormwater Handbook, the property owner will submit a signed Illicit Discharge Compliance Statement prior to discharging any stormwater runoff to the post-construction stormwater BMP's. A draft copy of the Illicit Discharge Statement is provided in Attachment E.

### **3.0 SUMMARY**

The proposed drainage system and site redevelopment plans for the police station at 175 Elliott Street conforms to MassDEP Stormwater Management Regulations. The proposed drainage system will treat and remove TSS and other pollutants throughout the project area and minimize erosion. Proper construction and operation and maintenance of the proposed drainage system are critical to its long-term performance. To that end, an Operations and Maintenance Plan and Long-Term Pollution Prevention Plan have been prepared and will be instituted throughout the facility's life.

ATTACHMENT B

STORMWATER COMPUTATIONS

B.1 – Recharge Calculations

B.2 – Water Quality Volume Calculations

B.3 – Water Quality Flow Calculations

B.4 – TSS Removal Calculation Worksheets

B.5 – TSS Removal Efficiency Curve  
by Hydro International



## RECHARGE VOLUME & DESIGN CALCULATIONS

Job Name: Beverly Police Station - 175 Elliott St  
 Job No: 1573  
 Date: 8/8/2019  
 Designer: MBP  
 Checked By: RHG

### IMPERVIOUS AREA:

	Total	
	(sf)	(acres)
Existing*	61,331	1.41
Proposed	59,601	1.37
Net Increase	0	0.00
Net Decrease	1,730	0.04

\* Existing Impervious Area includes 57,851 sf of impervious area with project limits (pavement, concrete, and roof) & 3,480 of compacted gravel surfaces.

### Required Volume (Rv) to Recharge per MassDEP:

$$Rv = (0 \text{ sf}) \times (0.25 \text{ in}) \times (1/12 \text{ in}) = 0 \text{ cf}$$

Impervious Area Tributary to Infiltration Field: 0 sf  
 Percentage of Total New Impervious Surfaces: 0.0%  
 Ratio of Total Impervious Area to Tributary Area: 0.000  
**Adjusted Min. Required Recharge Volume: 0 cf**

### Notes:

The project reduces impervious area on-site by approx. 1,730 sq. ft., therefore there is no loss of annual recharge associated with the project. Standard 3 is met with no additional infiltration structures. Additionally, soils on-site are mainly comprised of non-engineered fill material, organic silt and peat overlying glaciomarine and glacial till soils (Classified as "C" & "D" Hydrologic Soil Groups) and groundwater was encountered approx. 1.7 to 2.1 feet below the ground surface in April 2019. These conditions limit the effectiveness of a subsurface infiltration BMP.