DRAINAGE REPORT

MISSION BOATHOUSE RESTAURANT

1 WATER STREET
BEVERLY, MASSACHUSETTS
AUGUST 12, 2019

SUBMITTED TO:

CITY OF BEVERLY
PLANNING BOARD
191 CABOT STREET
BEVERLY, MA 01915

APPLICANT:

BEVERLY RESTAURANT ASSOCIATES, LLC
50 LIBERTY DRIVE, UNIT 5D
BOSTON, MA 02210

DRAINAGE REPORT NARRATIVE LETTER

August 12, 2019

Beverly Planning Board
City of Beverly
191 Cabot Street
Beverly, MA 01915

Re: Stormwater Report and Drainage Calculations
1 Water Street, Beverly, MA

Dear Members of the Board:

On behalf of the project proponent, Beverly Restaurant Associates, LLC, The Morin-Cameron Group, Inc. (MCG) has prepared supporting documentation to demonstrate compliance with the Massachusetts Department of Environmental Protection Stormwater Handbook for the re-development of 1 Water Street in Beverly, Massachusetts. Included herewith, please find the project site plan set entitled "Site Redevelopment Plans Mission Boathouse Restaurant" prepared by The Morin-Cameron Group, Inc. (MCG) and dated August 12, 2019 and the following supplemental information:

- Figure 1: 2008 Ortho Map
- Figure 2: USGS Map
- Figure 3: SCS Soils Map
- Figure 4: FEMA Flood Map
- Figure 5: Proposed Rational Calculation Plan
- Stormwater Management Checklist
- MassDEP Redevelopment Project Checklist
- Stormwater Management Calculations
- Supplemental Stormwater Management Documentation
- Construction Phase Best Management Practices
- Long Term Pollution Prevention Plan
- Illicit Discharge Statement

Executive Summary

The project proponent proposes to construct a three-story restaurant at 1 Water Street in Beverly, Massachusetts at the site known as Glover's Wharf. The subject property is shown as Lot 85 on the City of Beverly Assessors Map 1 and consists of 0.97± acres of land in the Beverly Harbor Zoning District. Redevelopment of the property will include razing of the former McDonald's restaurant, construction and expansion of the public parking, pedestrian walkways and amenities in harmony with the Beverly Waterfront. This report is intended to be used in support of local and state permitting applications for the project.

Existing Site Description

The site is currently fully developed with the former McDonalds restaurant, impervious paved and gravel parking areas and Glover's Wharf. The site is bounded to the south by Glover's Wharf and the Beverly Harbor, to the north by Cabot Street, to the west by Ferry Landing Park, and to the east by Beverly Port Marina and Water Street. Frontage exists on both Cabot Street and Water Street with access to the site through the Water Street frontage.

Grades on the site are highest at the existing 1 story building and the site generally slopes in all directions away from the building. Slopes range from 2% to 15%. There is an existing retaining wall along the front property line on Cabot Street, with Cabot Street generally higher in elevation than the site. The site has a high elevation of approximately 14.5 ft. (NAVD88) and a low elevation of approximately 8.5 ft. Existing stormwater infrastructure on site is minimal; there is a catch basin at the base of the stairs for the existing building and a catch basin on the abutting Ferry Landing Park which discharges to the Beverly Harbor through the seawall supporting the park. A small section of the parking lot to the north flows into a series of existing catch basins located in a City of Beverly wall maintenance and drainage easement. These basins drain to city stormwater systems in Cabot Street and Water Street or through outfalls to the Beverly Harbor. There is also a 12" ductile iron drain that was installed with the Glover's Wharf reconstruction, for future use associated with redevelopment of the site. The 12" pipe is currently capped and not in use.

Soils on site are classified as Urban Land (602), as defined in the Soil Resource Report for Essex County, Massachusetts, Southern Part Version 15 dated September 7, 2018 (See Figure 3: SCS Soils Map). The majority of the existing site is shown to be in a Zone AE (elevation 10) on the FEMA Federal Insurance Rate Map (FIRM) #25009C0417, dated July 16, 2014 (See Figure 4: FEMA Map). The entirety of the property is located in historic filled tidelands which are considered Commonwealth Tidelands and require review and approval by the Massachusetts Department of Environmental Protection – Waterways Division under Chapter 91, The Massachusetts Public Waterfront Act. A separate application with Massachusetts Department of Environmental Protection Waterways Division will be filed for this project.

Existing Site Improvements

The existing site contains approximately 42,247 square feet of land. The existing building footprint is approximately 3,175 square feet. There is associated curbing, brick walkways, porches and landscaping for the building. An impervious gravel parking lot to the south of the property abuts the concrete walkway for Glover's Wharf. Approximately 5,770 square feet of the property are the existing pier. The remaining area is comprised of a paved parking lot.

The existing site generally drains to the Beverly Harbor either overland or through existing closed drainage systems. A small portion along the front of the building drains to a catch basin that connects to the Cabot Street drainage system. There is an existing 12" cast iron drain stub on Glover's Wharf that was put in place for future developments of the site that is currently not in use. Other utilities include existing sewer and water services for the building as well as water, sewer, and cable services for the old harbormaster building that was relocated to the abutting lot. The existing gas service and communications service on site are currently in use by the harbormaster's building on the abutting lot.

Proposed Site Conditions

The project proponent proposes to develop the property with a 3-story restaurant facility that will include ground level public amenities including restrooms, snack bar, beverage bar, and retail space as well as support space for the ground level public uses. The second and third floor will be used for the restaurant, which is a use considered to be a facility of public accommodation in accordance with 310 CMR 9.00: The Massachusetts Waterways Regulations. The ground floor has been designed to maximize the interface between the waterfront and the building. Vehicular access to the site will be via Water Street. Site construction will include a paved parking lot with 60 parking spaces, two of which will be located under the building and softscaping and hardscaping improvements to facilitate pedestrian access and circulation and the use of the waterfront. A new 10 foot wide walkway will be constructed along the east property line to connect Glover's Wharf to Water Street. Another public walkway connection will be made along the shoreline to Ferry Landing Park and also directly to the perpendicular walkway in Ferry Landing Park to the site. The redevelopment will result in a decrease in impervious area through the addition of landscaping.

The proposed building will be serviced by new water, sewer and gas utilities, brought in from the existing mains located in Cabot Street and Water Street. Electric, telephone and cable services will be coordinated with the local utility providers. The proposed stormwater management system for the site will consist of various Best Management Practices (BMP) designed to renovate stormwater runoff prior to discharging to the Beverly Harbor in accordance with the Massachusetts Stormwater Management Handbook.

The project is defined as redevelopment by the Massachusetts Stormwater Management Standards as a "development, rehabilitation, expansion and phased projects on previously developed sites, provided the redevelopment results in no net increase in impervious area." (Massachusetts Stormwater Handbook, Volume 1, Chapter 1, 7.2) Due to the decrease in impervious area through the addition of landscaping in the parking lot and around the building, the project meets this definition. Redevelopment projects are "required to meet...Standard 2, Standard 3, and the pretreatment and structural stormwater best management practices of Standards 4,5, and 6 only to the maximum extent practicable" (Massachusetts Stormwater Handbook, Volume 1, Chapter 1, 7.). Nonetheless, the project was designed to fully comply with these standards.

Proposed Stormwater Management Design

The redevelopment of the site will consist of 35,582 square feet of impervious land cover, comprised of the new roof area, sidewalks and paved parking lot. The remaining area will be comprised of landscape beds and grass areas. The site grading has been designed to provide positive stormwater runoff away from the building and abutting properties and to preserve existing drainage patterns to the extent practicable.

The general intent of the proposed drainage system is to maintain existing drainage patterns and to effectively and efficiently convey on-site runoff to the 24" reinforced concrete pipe on the abutting Ferry Landing Property. The roof drains from the new building will be connected to the existing 12 inch ductile iron culvert on the site. The stormwater management measures to be

implemented include two deep-sump hooded catch basins to capture runoff from the parking lot and provide sediment and floatable oil entrapment prior to conveyance through a new closed drainage system. The closed drainage system will pass through a hydrodynamic particle separator (Contech CDS 2015-4) prior to discharge into the existing 24" pipe via a new drain manhole installed on the Ferry Landing Property. Chapter 1, Volume 1 of the Stormwater Management Handbook defines "footpaths, bike paths and other paths for pedestrian and/or nonmotorized vehicle access" as areas where the standards shall apply to the maximum extent practicable. These pedestrian areas will mostly be separated from the vehicular areas, and therefore not subject to migration of contaminants associated with vehicles, by placing the building between the vehicular and pedestrian areas of the site. Comparatively, the existing site has parking all around the building and no separation between pedestrian and parking uses on the property. The existing catch basins along the north property line will be removed where possible or replaced with a drain manhole covers so that all the paved vehicular portions of the site pass through the treatment system. No stormwater mitigation is proposed or required for the redevelopment of the site since it is discharging to a tidal waterbody (Atlantic Ocean/Beverly Harbor).

The site drains to the Beverly Harbor which is a tidal water body. The property is subject to coastal storm flowage as "land subject to any inundation caused by coastal storms up to and including that caused by the 100-year storm, surge of record or storm of record, whichever is greater" (310 CMR 10.04). According to the Massachusetts Stormwater Handbook, the requirement to provide calculations for the post-development peak discharge rates "may be waived for discharges to land subject to coastal storm flowage as defined in 310 CMR 10.04 (Massachusetts Stormwater Handbook, Chapter 1, Volume 1, 1). The emphasis of the design is to provide a closed drainage system to treat and convey the parking lot runoff to the existing outfall as well as reduce the overland flow to the extent practicable. By reducing the impervious coverage on the site, surface runoff will be decreased and infiltrative capacity of the site is improved. Due to these factors, no subsurface or surface retention or detention of stormwater is necessary.

A summary of the site characteristics in both the existing and proposed conditions is presented in the table below.

WATERSHED AREA SUMMARY		
	Existing	**Proposed**
Landscape	636 SF	6,665 SF
Roof Area	3,175 SF	6,686 SF
Pavement	28,439 SF	28,896 SF
Gravel Parking	9,997	0 SF
TOTAL	42,247 SF	42,247 SF
Total Impervious	41,611 SF	35,582 SF
% Impervious	98%	84%

Stormwater Management Standards

As discussed previously, the design of the stormwater management system used the MassDEP Stormwater Handbook as a guideline. The following is a review of each of the 10 standards of the Handbook and how the project satisfies each standard.

1. *No stormwater conveyance system discharges untreated stormwater directly to or cause erosion in wetlands or waters of the Commonwealth.*

   There are no new untreated discharges to the Beverly Harbor. The parking lot runoff will be will be treated by parking lot maintenance, catch basins with hooded outlets and deep sumps and by a hydrodynamic separator. The roof runoff, which is considered clean runoff and does not require pretreatment, will be conveyed through the existing 12" culvert so that this flow does not impact the efficiency of the parking area treatment system (minimizes flushing velocities). The pedestrian and landscape areas of the site do not need pretreatment and will flow overland directly to Beverly Harbor.

   The proposed redevelopment meets this standard.

2. *No increase in post-development peak rate of runoff:*

   The site discharges to the Beverly Harbor which is a tidal water body and land subject to coastal storm flowage. According the Stormwater Handbook, the requirement "can be waived for discharges to land subject to coastal storm flowage." Therefore a waiver of this requirement is warranted.

   This standard does not apply.

3. *Groundwater Recharge:*

   The project will result in a reduction in paved and impervious surface area. Therefore, the sites ability to recharge stormwater runoff will be improved through greater surface permeability. Constructing an underground recharge system at this site is not practical due to the proximity to Beverly Harbor. Emphasis was placed on treating stormwater as this has a significantly more valuable environmental benefit that can be directly realized at the project shoreline.

   The proposed redevelopment meets this standard to the extent that there is a reduction in impervious surface area adjacent to the Beverly Harbor

4. *Water Quality:*

   As noted in the description of Standard 1 above, the primary focus of the stormwater design was to improve the sites ability to renovate stormwater runoff prior to discharge. A treatment train consisting of parking lot maintenance, deep-sump hooded catch basins and a hydrodynamic separator will provide pretreatment prior to discharge to the harbor. While the deep sump hooded catch basins do exist in the parking lot now, the additional measure of the hydrodynamic separator will help ensure that the system provides stormwater renovation in the post-development condition. Long term Pollution Prevention Plan which will include provisions for parking lot maintenance. A summary of the estimated Total Suspended Solids (TSS) removal benefits are included in the stormwater calculations section of this report.

   The proposed redevelopment meets this standard

5. *Land Uses with Higher Potential Pollutant Load:*

   This standard does not apply.

6. *Discharges to critical areas:*

   This standard does not apply.

7. *Redevelopment Projects:*

   In order to qualify as a redevelopment project, the project must meet the requirements listed in Volume 1, Chapter 1 of the Stormwater Management Handbook. The project will result in a reduction of impervious areas, which meets requirement 2 in the Handbook; see above sections for references. Regardless, the project was designed to fully meet all the requirements of the Stormwater Management Handbook.

   This proposed redevelopment meets this standard.

8. *Construction Phase Operation and Maintenance Plan:*

   A construction phase operation and maintenance plan is included herein.

   The proposed redevelopment meets this standard.

9. *A long-term operation and maintenance plan:*

   A long-term O&M has been prepared to ensure that the stormwater management system functions as designed. A copy of this O&M plan is included herein.

   The proposed redevelopment meets this standard.

10. *Illicit discharges:*

    To the best of our knowledge and belief there will be no illicit discharges to the municipal stormwater management system from this site.

    The proposed redevelopment meets this standard.

We trust this report and supporting documents and calculations provides sufficient demonstration that the project will result in a significant improvement to the standards of the City of Beverly and the MassDEP Stormwater Management Handbook. If you have any questions or comments, please do not hesitate to contact the undersigned at (978) 777-8586.

Sincerely,
THE MORIN-CAMERON GROUP, INC.

Scott P. Cameron, P.E.
Principal

SPC/kmm

Attachments

cc: Beverly Restaurant Associates, LLC
X:\Bloom, Martin A\3743\Docs\Drainage

FIGURES

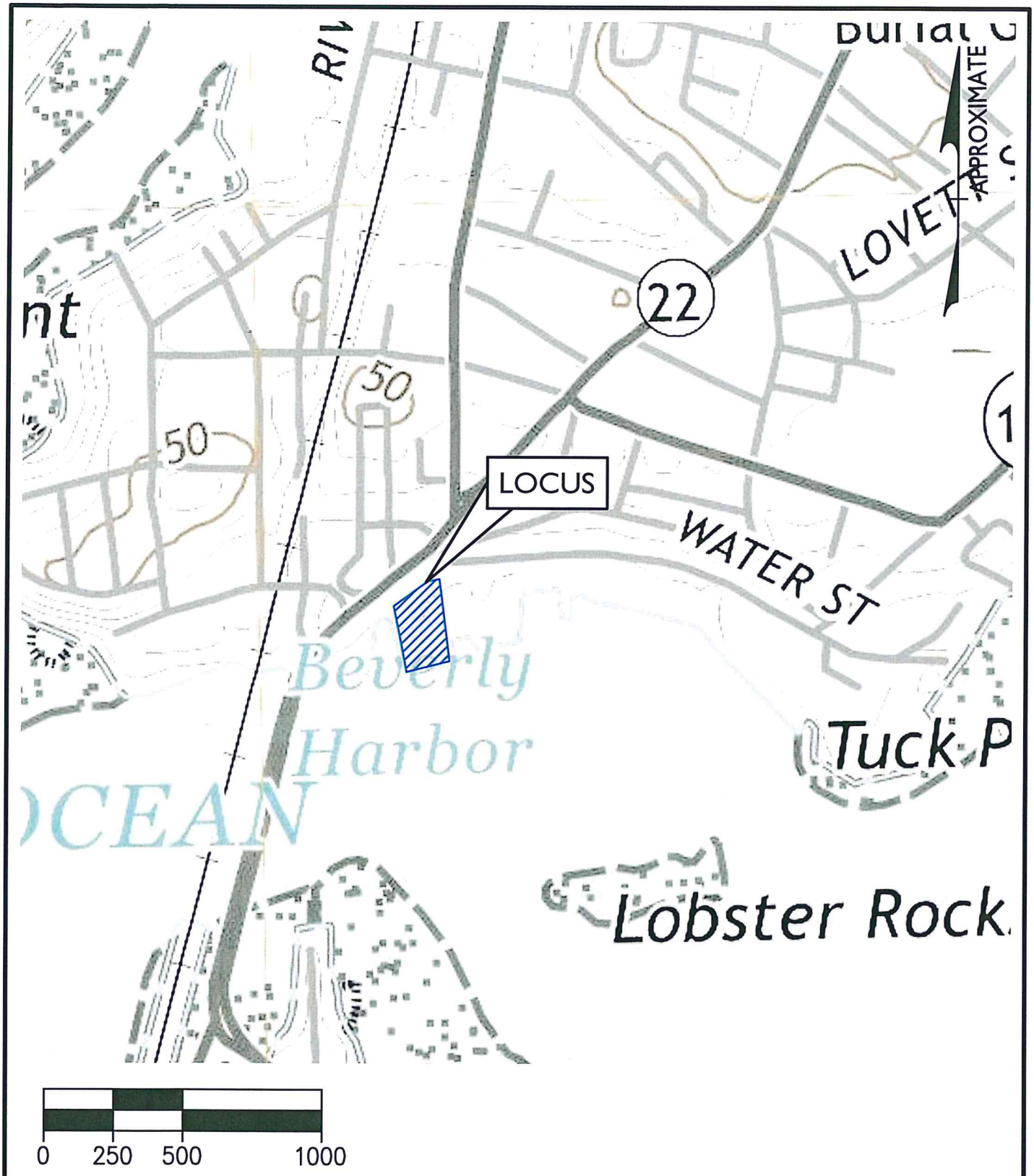
THE MORIN-CAMERON GROUP, INC.
66 ELM STREET, DANVERS, MA 01923
P | 978.777.8586 F | 978.774.3488
WWW.MORINCAMERON.COM

ORTHO MAP
1 WATER STREET
IN
BEVERLY, MA

DATE: AUGUST 12, 2019

Scale: 1" = 200'

FIGURE #1



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66 ELM STREET, DANVERS, MA 01923
P | 978.777.8586 F | 978.774.3488
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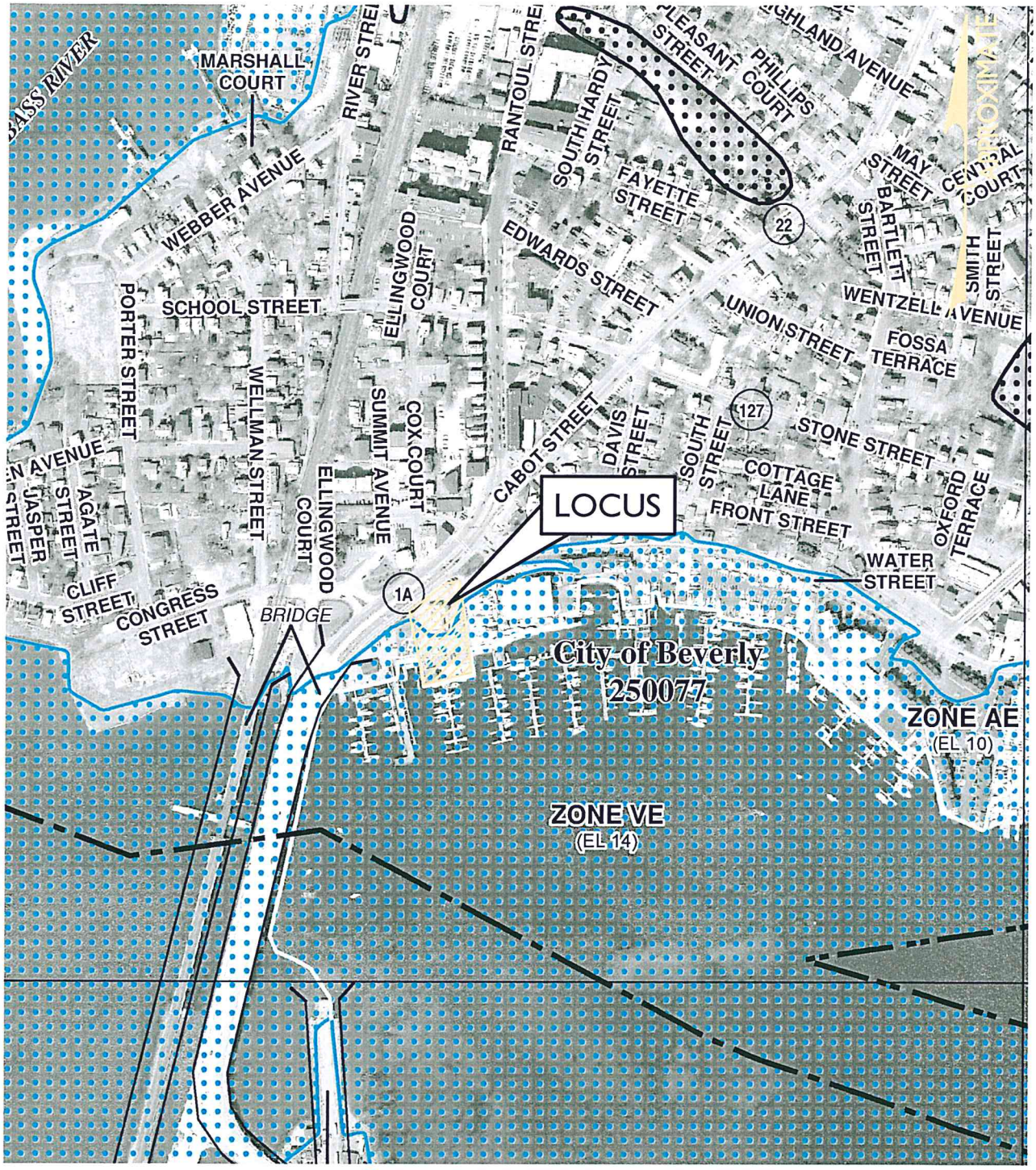
USGS LOCUS MAP
1 WATER STREET
IN
BEVERLY, MA

DATE: AUGUST 12, 2019

Scale: 1" = 500'

FIGURE #2

THE MORIN-CAMERON GROUP, INC. 66 ELM STREET, DANVERS, MA 01923 **P | 978.777.8586 F | 978.774.3488** WWW.MORINCAMERON.COM		SCS SOILS MAP 1 WATER STREET IN BEVERLY, MA
DATE: AUGUST 12, 2019	Scale: 1" = 200'	**FIGURE #3**



THE MORIN-CAMERON GROUP, INC.

66 ELM STREET, DANVERS, MA 01923

P | 978.777.8586 F | 978.774.3488

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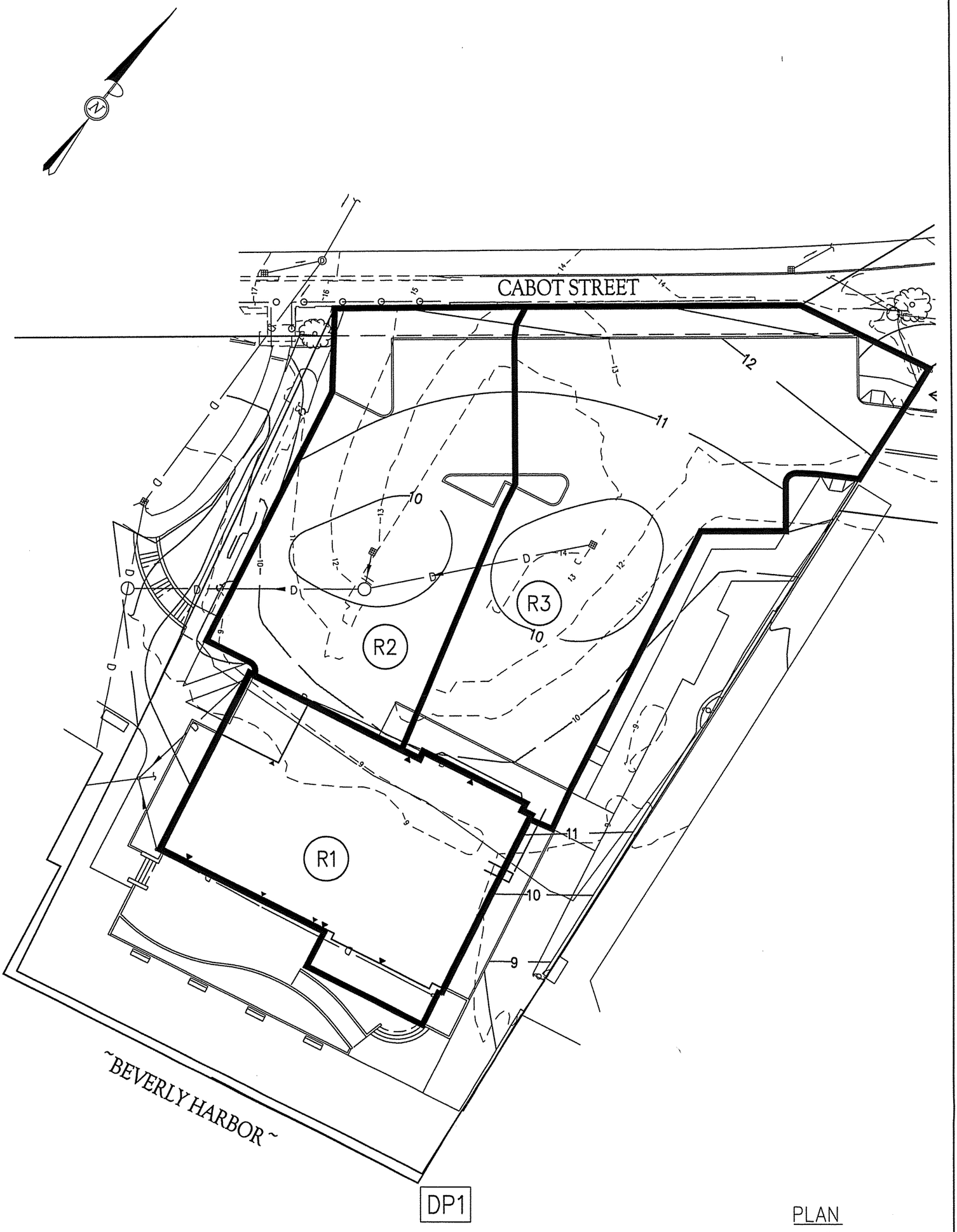
FEMA FLOOD MAP
1 WATER STREET
IN
BEVERLY, MA

DATE: AUGUST 12, 2019

Scale: 1" = 500'

FIGURE #4



PLAN

SCALE: 1" = 30'

0 15 30 60

PROPOSED RATIONAL METHOD WATERSHED FIGURE

AT:

1 WATER STREET
BEVERLY, MASSACHUSETTS

FIGURE 5
DATE: 8/12/19
SCALE: 1"=30'

The Morin-Cameron GROUP, INC.
CIVIL ENGINEERS | ENVIRONMENTAL CONSULTANTS
LAND SURVEYORS | LAND USE PLANNERS
66 ELM STREET, DANVERS, MASSACHUSETTS 01923
P: 978-777-8588, F: 978-774-3488, W: WWW.MORINCAMERON.COM

PROJ. #3743

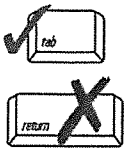
MASSDEP STORMWATER MANAGEMENT CHECKLIST

Massachusetts Department of Environmental Protection
Bureau of Resource Protection - Wetlands Program

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.[1] 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[2]
- 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.

[1] 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.

[2] 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.

Massachusetts Department of Environmental Protection
Bureau of Resource Protection - Wetlands Program

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.

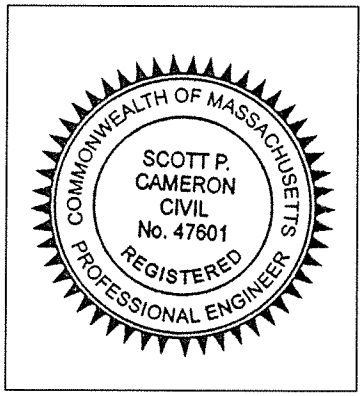
Note: Because stormwater requirements vary from project to project, it is possible that a complete Stormwater Report may not include information on some of the subjects specified in the Checklist. If it is determined that a specific item does not apply to the project under review, please note that the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



8-12-14

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

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[1]

☐ 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.

[1] 80% TSS removal is required prior to discharge to infiltration BMP if Dynamic Field method is used.

Checklist for Stormwater Report

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

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

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.

MASSDEP REDEVELOPMENT

PROJECT CHECKLIST

Chapter 3

Checklist for Redevelopment Projects

Standard 7: A redevelopment project is required to meet the following Stormwater Management Standards only to the maximum extent practicable: Standard 2, Standard 3, and the pretreatment and structural stormwater best management practice requirements of Standards 4, 5, and 6. Existing stormwater discharges shall comply with Standard 1 only to the maximum extent practicable. A redevelopment project shall also comply with all other requirements of the Stormwater Management Standards and improve existing conditions.

Redevelopment is defined to include

- Maintenance and improvement of existing roadways, including widening less than a single lane, adding shoulders, correcting substandard intersections, improving existing drainage systems, and repaving;
- Development rehabilitation, expansion and phased projects on previously developed sites, provided the redevelopment results in no net increase in impervious area; and
- Remedial projects specifically designed to provide improved stormwater management, such as projects to separate storm drains and sanitary sewers, and stormwater retrofit projects.

Components of redevelopment projects that include development of previously undeveloped sites do not meet this definition. The portion of the project located in a previously developed area must meet Standard 7, but project components within undeveloped areas must meet all the Standards.

MassDEP recognizes that site constraints often make it difficult to comply with all the Standards at a redevelopment site. These constraints are as follows:

Lack of space. Because of the presence of existing structures, on-site subsurface sewage disposal systems, stormwater best management practices, and water bodies and wetlands, and easements, the space available for the installation of additional stormwater BMPs may be quite limited. On many suites it may be difficult or impossible to use space-intensive BMPs such as wet detention basins.

Soils: The presence of bedrock or clay can limit the effectiveness of infiltration or detention BMPs. Often soils at redevelopment sites have been compacted by buildings and heavy traffic, impairing their ability to infiltrate stormwater into the ground.

Underground utilities. The presence of underground utilities including gas and water mains, sewer pipes and electric cable conduits can greatly reduce the amount of land available for BMPs.

This chapter provides specific guidance and checklists to ensure that the applicant has met his/her obligations under Standard 7. Because it may be difficult for a redevelopment project to comply with all the Stormwater Management Standards, Standard 7 provides that a redevelopment project is required to comply with the following Standards only "to the maximum extent practicable": Standard 2, Standard 3, and the pretreatment and structural stormwater best management practice requirements of Standards 4, 5, and 6. Existing outfalls shall be brought into compliance with Standard 1 only to the maximum extent practicable.

As set forth in Standard 7, the phrase "to the maximum extent practicable" means that:

✓ (1) Proponents of redevelopment projects have made all reasonable efforts to meet the requirements of Standards 2 and 3 and the pretreatment and structural stormwater best management practices requirements of Standards 4, 5, and 6 and to bring existing outfalls into compliance with Standard 1. SEE NARRATIVE

✓ (2) They have made a complete evaluation of possible stormwater management measures, including environmentally sensitive site design that minimizes land disturbance and impervious surfaces, low impact development techniques and structural stormwater BMPs; and SEE NARRATIVE

✓ (3) If not in full compliance with Standard 1 for existing outfalls, Standards 2 and 3 and the pretreatment and structural stormwater best management practice requirements of Standards 4, 5, and 6, they are implementing the highest practicable level of stormwater management. SEE NARRATIVE

Generally, an alternative is practicable if it can be implemented within the site being redeveloped, taking into consideration cost, land area requirements, soils and other site constraints. However, offsite alternatives may also be practicable. Proponents must document the evaluation of practicable alternatives with sufficient information to support the conclusions of the analysis.

At the same time, stormwater runoff from redevelopment projects must be properly managed. To this end, Standard 7 provides that redevelopment projects shall comply with all other requirements of the Stormwater Management Standards, including, without limitation, the pollution prevention requirements of Standards 4, 5, and 6, the erosion and sedimentation control requirements of Standard 8, the operation and maintenance requirements of Standard 9, and the prohibition of illicit discharge set forth in Standard 10. Proponents must also improve existing conditions.

Proponents of redevelopment projects shall document their compliance with these requirements. To assist proponents and reviewers in determining whether a redevelopment project complies with Standard 7, MassDEP has prepared the following redevelopment checklist.

[*Proponents of MassHighway redevelopment projects and Conservation Commissions reviewing such projects may follow the guidelines for redevelopment provided in the MassHighway Stormwater Handbook for Highways and Bridges (May 2004 or latest version) in lieu of the guidance set forth in this chapter.*[1] *The MassHighway Stormwater Handbook was developed by the Massachusetts Highway Department and issued by joint correspondence of May 7, 2004 by MassHighway and MassDEP. It provides detailed guidance on the evaluation and implementation of stormwater management practices for MassHighway road and bridge redevelopment projects, including a methodology for screening and selecting Best Management Practices (BMPs). Proponents and reviewers of other public roadway redevelopment projects may find useful information in the MassHighway Stormwater Handbook.*]

[1] The MassHighway Handbook published in 2004 must be revised to make it consistent with this Handbook.

Redevelopment Checklist

Existing Conditions

- On-site: For all redevelopment projects, proponents should document existing conditions, including a description of extent of impervious surfaces, soil types, existing land uses with higher potential pollutant loads, and current onsite stormwater management practices.
- Watershed: Proponents should determine whether the project is located in a watershed or subwatershed, where flooding, low streamflow or poor water quality is an issue.

The Project

Is the project a redevelopment project? YES

NO • Maintenance and improvement of existing roadways
YES → • Development of rehabilitation, expansion or phased project on redeveloped site, or
NO • Remedial stormwater project

For non-roadway projects, is any portion of the project outside the definition of redevelopment?

NO • Development of previously undeveloped area
NO • Increase in impervious surface

If a component of the project is not a redevelopment project, the proponent shall use the checklist set forth below to document that at a minimum the proposed stormwater management system fully meets each Standard for that component. The proponent shall also document that the proposed stormwater management system meets the requirements of Standard 7 for the remainder of the project.

The Stormwater Management Standards

The redevelopment checklist reviews compliance with each of the Stormwater Management Standards in order.

Standard 1: (Untreated discharges) FULLY COMPLIES
No new stormwater conveyances (e.g., outfalls) may discharge untreated stormwater directly to or cause erosion in wetlands or waters of the Commonwealth.
Same rule applies for new developments and redevelopments.

Full compliance with Standard 1 is required for new outfalls.

- What BMPs are proposed to ensure that all new discharges associated with the discharge are adequately treated?
- What BMPs are proposed to ensure that no new discharges cause erosion in wetlands or waters of the Commonwealth?
- Will the proposed discharge comply with all applicable requirements of the Massachusetts Clean Waters Act and the regulations promulgated thereunder at 314 CMR 3.00, 314 CMR 4.00 and 314 CMR 5.00?

Existing outfalls shall be brought into compliance with Standard 1 to the maximum extent practicable.

- Are there any existing discharges associated with the redevelopment project for which new treatment could be provided? YES
- If so, the proponent shall specify the stormwater BMP retrofit measures that have been considered to ensure that the discharges are adequately treated and indicate the reasons for adopting or rejecting those measures. (See Section entitled "Retrofit of Existing BMPs".) – WATER QUALITY STRUCTURE SEE NARRATIVE
- What BMPs have been considered to prevent erosion from existing stormwater discharges?

Standard 2: (Peak rate control and flood prevention)

Stormwater management systems must be designed so that post-development peak discharge rates do not exceed pre-development peak discharge rates. This Standard may be waived for land subject to coastal storm flowage. NOT APPLICABLE

Full compliance for any component that is not a redevelopment

NA Compliance to the Maximum Extent Practicable:

- Does the redevelopment design meet Standard 2, comparing post-development to pre-development conditions?
- If not, the applicant shall document an analysis of alternative approaches for meeting the Standard. (See Menu of Strategies to Reduce Runoff and Peak Flows and/or Increase Recharge Menu included at the end of this chapter.)

NA Improvement of existing conditions:

- Does the project reduce the volume and/or rate of runoff to less than current estimated conditions? Has the applicant considered all the alternatives for reducing the volume and/or rate of runoff from the site? (See Menu.)
- Is the project located within a watershed subject to damage by flooding during the 2-year or 10-year 24-hour storm event? If so, does the project design provide for attenuation of the 2-year and 10-year 24-hour storm event to less than current estimated conditions? Have measures been implemented to reduce the volume of runoff from the site resulting from the 2 year or 10 year 24 hour storm event? (See Menu.)
- Is the project located adjacent to a water body or watercourse subject to adverse impacts from flooding during the 100-year 24-hour storm event? If so, are portions of the site available to increase flood storage adjacent to existing Bordering Land Subject to Flooding (BLSF)?
- Have measures been implemented to attenuate peak rates of discharge during the 100-year 24-hour storm event to less than the peak rates under current estimated conditions? Have measures been implemented to reduce the volume of runoff from the site resulting from the 100-year 24-hour storm event? (See Menu.) REDUCTION IN PAVEMENT

Standard 3: (Recharge to Ground water)

Loss of annual recharge to ground water shall be eliminated or minimized through the use of infiltration measures, including environmentally sensitive site design, low impact development techniques, best management practices, and good operation and maintenance. At a minimum, the annual recharge from the post-development site shall approximate the annual recharge from the pre-development conditions based on soil type. This Standard is met when the stormwater management system is designed to infiltrate the required recharge volume as determined in accordance with the Massachusettss Stormwater Handbook.

Full compliance for any component that is not a redevelopment

Compliance to the Maximum Extent Practicable:

- Does the redevelopment design meet Standard 3, comparing post-development to pre-development conditions? YES
- If not, the applicant shall document an analysis of alternative approaches for meeting the Standard?
- What soil types are present on the site? Is the site is comprised solely of C and D soils and bedrock at the land surface?
- Does the project include sites where recharge is proposed at or adjacent to an area classified as contaminated, sites where contamination has been capped in place, sites that have an Activity and Use Limitation (AUL) that precludes inducing runoff to the groundwater, pursuant to MGL Chapter 21E and the Massachusetts Contingency Plan 310 CMR 40.0000; sites that are the location of a solid waste landfill as defined in 310 CMR 19.000; or sites where groundwater from the recharge location flows directly toward a solid waste landfill or 21E site?[2]
- Is the stormwater runoff from a land use with a higher potential pollutant load?
- Is the discharge to the ground located within the Zone II or Interim Wellhead Protection Area of a public water supply?
- Does the site have an infiltration rate greater than 2.4 inches per hour?

Improvements to Existing Conditions:

NO
- Does the project increase the required recharge volume over existing (developed) conditions? If so, can the project be redesigned to reduce the required recharge volume by decreasing impervious surfaces (make building higher, put parking under the building, narrower roads, sidewalks on only one side of street, etc.) or using low impact development techniques such as porous pavement?

NO
- Is the project located within a basin or sub-basin that has been categorized as under high or medium stress by the Massachusetts Water Resources Commission, or where there is other evidence that there are rivers and streams experiencing low flow problems? If so, have measures been considered to replace the natural recharge lost as a result of the prior development? (See Menu.)
- Has the applicant evaluated measures for reducing site runoff? (See Menu.)

REDUCTION IN PAVEMENT

Standard 4: (80% TSS Removal)

Stormwater management systems must be designed to remove 80% of the average annual post-construction load of Total Suspended Solids (TSS). This standard is met when:

a. Suitable practices for source control and pollution prevention are identified in a long-term pollution prevention plan and thereafter are implemented and maintained;

b. Stormwater BMPs are sized to capture the required water quality volume determined in accordance with the Massachusetts Stormwater Handbook; and

c. Pretreatment is provided in accordance with the Massachusetts Stormwater Handbook.

Full compliance for any component that is not a redevelopment

Full compliance with the long-term pollution plan requirement for new developments and redevelopments.

YES
- Has the proponent developed a long-term pollution plan that fully meets the requirements of Standard 4?

YES
- Does the pollution prevention plan include the following source control measures?
  - Street sweeping

[2] A mounding analysis is needed if a site falls within this category. See Volume 3.

- Proper management of snow, salt, sand and other deicing chemicals
- Proper management of fertilizers, herbicides and pesticides
- Stabilization of existing eroding surfaces

Compliance to the Maximum Extent Practicable for the other requirements:

- Does the redevelopment design provide for treatment of all runoff from existing (as well as new) impervious areas to achieve 80% TSS removal? If 80% TSS removal is not achieved, has the stormwater management system been designed to remove TSS to the maximum extent practicable? YES, ALL PARKING AREA THROUGH CB's & WQS
- Have the proposed stormwater BMPs been properly sized to capture the prescribed runoff volume?
  - One inch rule applies for discharge
    - within a Zone II or Interim Wellhead Protection Area,
    - near or to another critical area,
    - from a land use with a higher potential pollutant load
    - to the ground where the infiltration rate is greater than 2.4 inches per hour
- Has adequate pretreatment been proposed?
  - 44% TSS Removal Pretreatment Requirement applies if:
    - Stormwater runoff is from a land use with a higher potential pollutant load
    - Stormwater is discharged
      - To the ground within the Zone II or Interim Wellhead Protection Area of a Public Water Supply
      - To the ground with an infiltration rate greater than 2.4 inches per hour
      - Near or to an Outstanding Resource Water, Special Resource Water, Cold-Water Fishery, Shellfish Growing Area, or Bathing Beach.

• If the stormwater BMPs do not meet all the requirements set forth above, the applicant shall document an analysis of alternative approaches for meeting the these requirements. (See Section on Retrofitting Existing BMPs (the "Retrofit Section").

Improvements to Existing Conditions:

- YES Have measures been provided to achieve at least partial compliance with the TSS removal standard?
- YES Have any of the best management practices in the Retrofit Section been considered?
- YES Have any of the following pollution prevention measures been considered?
  - Reduction or elimination of winter sanding, where safe and prudent to do so
  - Tighter controls over the application of fertilizers, herbicides, and pesticides
  - Landscaping that reduces the need for fertilizer, herbicides and pesticides
  - High frequency sweeping of paved surfaces using vacuum sweepers
  - Improved catch basin cleaning
  - Waterfowl control programs
- NO Are there any discharges (new or existing) to impaired waters? If so, see TMDL section.

N/A Standard 5 (Higher Potential Pollutant Loads (HPPL)

For land uses with higher potential pollutant loads, source control and pollution prevention shall be implemented in accordance with the Massachusetts Stormwater Handbook to eliminate or reduce the discharge of stormwater runoff from such land uses to the maximum extent practicable. If through source control and/or pollution prevention, all land uses with higher potential pollutant loads cannot

be completely protected from exposure to rain, snow, snow melt and stormwater runoff, the proponent shall use the specific stormwater BMPs determined by the Department to be suitable for such use as provided in the Massachusetts Stormwater Handbook. Stormwater discharges from land uses with higher potential pollutant loads shall also comply with the requirements of the Massachusetts Clean Waters Act, M.G.L. c. 21, §§ 26-53, and the regulations promulgated thereunder at 314 CMR 3.00, 314 CMR 4.00 and 314 CMR 5.00.
Full compliance for any component that is not a redevelopment.
Full compliance with pollution prevention requirements for new developments and redevelopments.

Pollution Prevention

- Has the proponent considered any of the following operational source control measures?
  - Formation of a pollution prevention team,
  - Good housekeeping practices,
  - Preventive maintenance procedures,
  - Spill prevention and clean up,
  - Employee training, and
  - Regular inspection of pollutant sources.

- Has the proponent considered implementation of any of the following operational changes to reduce the quantity of pollutants on site?
  - Process changes,
  - Raw material changes,
  - Product changes, or
  - Recycling.

- Has the proponent considered making capital improvements to protect the land uses with higher potential pollutant loads from exposure to rain, snow, snow melt, and stormwater runoff?

  - Enclosing and/or covering pollutant sources (e.g. placing pollutant sources within a building or other enclosure, placing a roof over storage and working areas, placing tarps under pollutant source)

  - Installing a containment system with an emergency shutoff to contain spills?

  - Physically segregating the pollutant source to prevent run-on of uncontaminated stormwater?

Treatment

- If applicable, compliance with the treatment and pretreatment requirements of Standard 5 only to the Maximum Extent Practicable by directing the stormwater runoff from land uses with higher potential pollutant loads to appropriate stormwater BMPs?

  - Are the BMPs selected capable of removing the pollutants associated with the higher potential pollutant load land ("LUHPPL") use?

  - Is the land use likely to generate stormwater with high concentrations of oil and grease? If so has an oil grit separator, sand filter, filtering bioretention area or equivalent been proposed for pretreatment?

Improvement of Existing Conditions.

NA

- If the redevelopment converts a site from a non-LUHPPL use to a LUHPPL use, the applicant shall document how the stormwater BMPs shall be modified or replaced to come into compliance with Standard 5.

- What specific measures have been considered to offset the anticipated impacts of land uses with higher potential pollutant loads?

- If the redevelopment proposal is a brownfield project, the applicant shall demonstrate how the stormwater management measures have been designed to prevent mobilization or remobilization of soil and groundwater contamination. (See Brownfield section)

Other Requirements

- Does the discharge comply with all applicable requirements of the Massachusetts Clean Waters Act, 314 CMR 3.00, 314 CMR 4.00 and 314 CMR 5.00?

Standard 6 (Critical Areas)

Stormwater discharges to a Zone II or Interim Wellhead Protection Area of a public water supply and stormwater discharges near or any other critical area require the use of the specific source control and pollution prevention measures and the specific stormwater best management practices determined by the Department to be suitable for managing discharges to such area, as provided in the Massachusetts Stormwater Handbook. A discharge is near a critical area if there is a strong likelihood of a significant impact occurring to said area, taking into account site-specific factors. Stormwater discharges to Outstanding Resource Waters or Special Resource Waters shall be set back from the receiving water and receive the highest and best practical method of treatment. A "stormwater discharge," as defined in 314 CMR 3.04(2)(a)1. or (b), to an Outstanding Resource Water or Special Resource Water shall comply with 314 CMR 3.00 and 314 CMR 4.00. Stormwater discharges to a Zone I or Zone A are prohibited unless essential to the operation of the public water supply.

Full compliance for component of project that is not a redevelopment

Full compliance with pollution prevention requirements for new developments and redevelopments.

If applicable, compliance to the Maximum Extent Practicable with the pretreatment and treatment requirements of Standard 6:

- Does the redevelopment project utilize the pretreatment, treatment and infiltration BMPs approved for discharges near or to critical areas?
- If the redevelopment project does not comply with Standard 6, the applicant shall document an analysis of alternative measures for meeting Standard 6. (See Section on Specific Redevelopment Projects.)

Improvements to Existing Conditions:

- Have measures to protect critical areas been considered, including additional pollution prevention measures and structural and non-structural BMPs?

Other Requirements

- Does the discharge comply with the Massachusetts Clean Waters Act, 314 CMR 3.00, 314 CMR 4.00, and 314 CMR 5.00?

Standard 8: (Erosion, Sediment Control) COMPLIES

A plan to control construction-related impacts, including erosion sedimentation and other pollutant sources during construction and land disturbance activities (construction period erosion, sedimentation, and pollution prevention plan), must be developed and implemented.

All redevelopment projects shall fully comply with Standard 8.

YES
- Has the proponent submitted a construction period erosion, sedimentation and pollution prevention plan that meets the requirements of Standard 8?

Standard 9: (Operation and Maintenance) COMPLIES
A long-term operation and maintenance plan must be developed and implemented to ensure that stormwater management systems function as designed.
All redevelopment projects shall fully comply with Standard 9.

- Has the proponent submitted a long-term Operation and Maintenance plan that meets the requirements of Standard 9? YES

Standard 10 (Illicit Discharges) COMPLIES
All illicit discharges to the stormwater management system are prohibited.
All redevelopment projects shall fully comply with Standard 10.

- Are there any known or suspected illicit discharges to the stormwater management system at the redevelopment project site? NO
- Has an illicit connection detection program been implemented using visual screening, dye or smoke testing?
- Have an Illicit Discharge Compliance Statement and associated site map been submitted verifying that there are no illicit discharges to the stormwater management system at the site? YES

Improvements to Existing Conditions:
- Once all illicit discharges are removed, has the proponent implemented any measures to prevent additional illicit discharges? YES

LONG TERM POLLUTION PREVENTION PLAN

Figure 5-1

Menu of Strategies to Reduce Runoff or Peak Flows and/or Increase Recharge

- Rehabilitate the soils
- Plant trees and other vegetation
- Install a green roof
- Maximize naturally vegetated areas
- Reduce impervious surfaces
- Disconnect roof runoff from direct discharge to the drainage system
- Disconnect other existing paved areas from direct discharge to the drainage system, allowing controlled flow over pervious areas or through BMPs providing at least partial recharge
- Install porous pavement and/or other recharge measures (where sustainable and maintainable for promoting infiltration)
- Apply LID techniques for runoff reduction
- Install additional structural BMPs that are appropriate for redevelopment sites including infiltration trenches, subsurface structures, oil-grit separators, proprietary BMPs
- Retrofit existing BMPs

Retrofitting Existing BMPs

Many BMPs can be effectively retrofitted depending on site conditions and the water quantity or quality objectives trying to be achieved.[3] The objective of stormwater retrofitting is to remedy problems associated with, and improve water quality mitigation functions of, older, poorly designed, or poorly maintained stormwater management systems. Prior to the development of the stormwater standards, site drainage design did not require stormwater detention for controlling post-development peak flows. As a result, drainage, flooding, and erosion problems can be common in many older developed areas of the state. Furthermore, a majority of the dry detention basins throughout the state have been designed to control peak flows, without regard to water quality mitigation. Therefore, many existing dry detention basins provide only minimal water quality benefit. Incorporating stormwater retrofits into existing developed sites or into redevelopment projects can reduce the adverse impacts of uncontrolled stormwater runoff.

Bioretention Area Retrofits - can be used as a stormwater retrofit, by modifying existing landscaped areas, or if a parking lot is being resurfaced. In highly urban watersheds, they are one of the few practical retrofit options.

Catch Basin Retrofits or Reconstruction - Older catch basins without sumps can be replaced with catch basins having four foot-deep sumps. Sumps provide storage volume for coarse sediments, assuming that accumulated sediment is removed on a regular basis. Hooded outlets, which are covers over the catch basin outlets that extend below the standing water line, can also be used to trap litter and other floatable materials. Leaching catch basins can be installed adjacent to deep sump catch basins to achieve 80% TSS removal. Be aware, however, that many products are being touted as catch basin inserts, but the effectiveness of these devices can vary significantly.

Dry Detention Basin Retrofits - Traditional dry detention basins can be modified to become extended dry detention basins, wet basins, or constructed stormwater wetlands for enhanced pollutant removal. This is one of the most commonly and easily implemented retrofits, since it typically requires little or no additional land area, capitalizes on an existing facility for which there is already some resident acceptance of stormwater management, and involves minimal impacts to environmental resources (Claytor, Center for Watershed Protection, 2000).

There are numerous retrofit options that will enhance the removal of pollutants in detention basins:

- Excavate the basin bottom to create more permanent pool storage.
- Raise the basin embankment to obtain additional storage for extended detention.
- Modify the outfall structure to create a two-stage release to better control small storms while not significantly compromising flood control detention for large storms.
- Increase the flow path from inflow to outflow and eliminate short-circuiting by using baffles, earthen berms or micro-pond topography to increase residence time.
- Incorporate stilling basins at inlets and outlets.
- Regrade the basin bottom to create a wetland area near the basin outlet or revegetate parts of the basin bottom with wetland vegetation to enhance pollutant removal, reduce mowing, and improve aesthetics.
- Create a wetland shelf along the perimeter of a wet basin to improve shoreline stabilization, enhance pollutant filtering, and enhance aesthetic and habitat functions.
- Create a low maintenance "no-mow" wildflower ecosystem in the drier portions of the basin.

[3] Additional information on retrofitting stormwater BMPs can be found in the Urban Stormwater Retrofit Practices Manual. See http://www.cwp.org/Downloads/ELC_USRM3app.pdf.

- Provide a high flow bypass to avoid resuspension of captured sediments/pollutants during high flows.
- Eliminate low-flow bypasses.

Drainage Channel Retrofits - Existing channelized streams and drainage conveyances such as drainage channels can be modified to reduce flow velocities and enhance pollutant removal. Weir walls or riprap check dams placed across a channel create opportunities for ponding, infiltration, and establishment of wetland vegetation upstream of the retrofit. In-stream retrofit practices include stream bank stabilization of eroded areas and placement of habitat improvement structures (i.e., flow deflectors, boulders, pools/riffles, and low-flow channels) in natural streams and along stream banks. In-stream retrofits may require an evaluation of potential flooding and floodplain impacts resulting from altered channel conveyance, as well as requirements for local, state, or federal approval for work in wetlands and watercourses.

Parking Lots and Roadways- Parking lots offer ideal opportunities for a wide range of stormwater retrofits:

1. Incorporate bioretention areas into parking lot islands and landscaped areas; tree planter boxes can be converted into functional bioretention areas, rain gardens, or treebox filters to reduce and treat stormwater runoff.
2. Remove curbing and add slotted curb stops. Curbs along the edges of parking lots can sometimes be removed or slotted to re-route runoff to vegetated filter strips, water quality swales, grass channels, or bioretention facilities. The capacity of existing swales may need to be evaluated and expanded as part of this retrofit option.
3. Incorporate new treatment practices such as bioretention areas, sand filters, and constructed stormwater wetlands at the edges of parking lots.
4. In overflow parking or other low-traffic areas, asphalt can be replaced with porous pavement.

Sand Filter Retrofits - are suitable where space is limited, because they consume little surface space and have few site restrictions. Since sand filters cannot treat large drainage areas, retrofitting many small individual sites may be the only option. This option may be expensive.

Storm Drain Outfalls - New stormwater treatment practices can be constructed at the outfalls of existing drainage systems. The new stormwater treatment practices are commonly designed as *off-line devices* to treat the first flush volume and bypass larger storms. Water quality swales, bioretention areas, sand filters, constructed stormwater wetlands, and wet basins are commonly used for this type of retrofit. Other stormwater treatment practices may also be used if there is enough space for construction and maintenance.

Specific Redevelopment Projects

Redevelopment projects present unique challenges for controlling stormwater. It is possible that site constraints may prevent a redevelopment project from complying with one or more of the Stormwater Management Standards. Even if a redevelopment project cannot meet all of the Standards, there may be ample opportunity to improve existing site conditions depending on the other water quality or quantity issues in the watershed. The following special considerations provide unique opportunities for identifying how existing conditions may be improved:

A. Groundwater Recharge Areas - Redevelopment projects located within these areas (Zone II, Interim Wellhead Protection Areas (IWPA), aquifer protection districts, etc.) should place a high priority on ground water recharge BMPs.
   1) Disconnecting Rooftop Runoff – In some instances, building roof drains connected to the stormwater drainage system can be disconnected and re-directed to vegetated filter strips, bioretention facilities, or infiltration structures (dry wells or infiltration trenches).
   2) Use of Porous Paving Materials - Existing impermeable pavement in overflow parking or other low-traffic areas can sometimes be replaced with alternative permeable materials such as modular concrete paving blocks, modular concrete or plastic lattice, or cast-in-place concrete grids. Site-specific factors including traffic volumes, soil permeability, maintenance, sediment loads, and land use must be carefully considered prior to selection.

B. Cold-Water Fisheries - Redevelopment projects adjacent to these areas should place a high priority on mitigating potential thermal impacts. Techniques to consider include:

   1) Maintain Time of Concentration - Time of concentration (Tc) is based on the flow path and length, ground cover, slope and channel shape. When development occurs, Tc is often shortened due to the impervious area, causing greater flows to occur over a shorter period of time. Increasing the Tc will help to reduce the thermal impact of stormwater runoff from warm surface areas. Options to consider include:
      - Increasing the length of the runoff flow path
      - Increasing the surface roughness of the flow path
      - Detaining flows on site
      - Minimizing land disturbance
      - Creating flatter slopes.
   2) Disconnecting impervious areas – Breaking up large impervious expanses with vegetated zones will reduce the potential temperature increases of stormwater flowing across hot pavement.

C. Brownfield Redevelopment – Redeveloping urban and non-urban brownfield sites (which in Massachusetts includes most "disposal sites" under the Massachusetts Contingency Plan [MCP]) are a Commonwealth priority, with ramifications for urban sprawl as well as the remediation of historically contaminated properties. Proponents of brownfield redevelopment projects should evaluate BMPs that will prevent the significant uncontrolled mobilization or remobilization of soil or ground water contamination. BMP considerations at these sites should consider such factors as:
   - The location of stormwater infiltration units with respect to contaminated areas
   - Ground water mounding effects on the rate and direction of migration of ground water contaminants
   - The location of outfalls
   - Water quality BMPs.

D. Runoff to Impaired Water Bodies – If MassDEP has issued a Total Maximum Daily Load (TMDL) that establishes a waste load allocation for stormwater discharge and/or a TMDL Implementation Plan that identifies remedies aimed at reducing the amount of pollutants from stormwater discharges, proponents may be required to install stormwater BMPs that are consistent with the TMDL.

E. Runoff to Areas of Localized Flooding – Project proponents must also understand the potential impacts of stormwater runoff in areas prone to localized flooding. When completing the checklist, proponents should consider the capacity of the receiving water and/or storm drainage system. When evaluating discharges to areas subject to localized flooding, the proponent should evaluate the ability to maintain and/or improve existing site cover and reduce runoff volume.

STORMWATER MANAGEMENT

CALCULATIONS

Weighted Runoff Coefficients "C" for Rational Method

THE MORIN-CAMERON GROUP, INC.

66 Elm Street
Danvers, MA 01923
P: (978) 777-8586
F: (978) 774-3488
W: www.morincameron.com

C'- Coefficients

Pervious Soil	0.35
Impervious	0.9

Description of Area CB-1	Area (acres)	Runoff Coefficient	A x C
Pervious	0.031	0.35	0.01
Impervious	0.161	0.90	0.14
Totals =	**0.191**		0.16

Weighted Runoff Coefficient = **S(AxC) / SA = 0.81**

Description of Area CB-2	Area (acres)	Runoff Coefficient	A x C
Pervious	0.033	0.35	0.01
Impervious	0.258	0.90	0.23
Totals =	**0.291**		0.24

Weighted Runoff Coefficient = **S(AxC) / SA = 0.84**

Description of Area WQS	Area (acres)	Runoff Coefficient	A x C
Pervious	0.064	0.35	0.02
Impervious	0.419	0.90	0.38
Totals =	**0.482**		0.40

Weighted Runoff Coefficient = **S(AxC) / SA = 0.83**

August 12, 2019

Stormwater Management Calculations

STANDARD 3: Recharge to Groundwater: Static Method

(On site only)

- Calculate New Impervious Area
  - Existing Impervious Area = 41,611 SF
  - Proposed Impervious Area = 35,721
  - New Impervious area = 35,721 – 41,611 = -5,887 SF = 0 SF

- Determine Rainfall Depth to be Recharged

(MassDEP Stormwater Management Handbook: Table 2.3.2)

Hydrologic Soil Group	Recharge Rainfall Depth
A	0.60"
B	0.35"
C	0.25"
D	0.10"

- Calculate Recharge Volume Required (*MassDEP Stormwater Management Handboook: Vol. 1, Chapter 1, page 5)*

  'Rv' = [Recharge Rainfall Depth" x Increase in Impervious Area] = [0.X" x 0 SF/12]

  Rv' **=0 CF**

No Recharge System Required

VERIFY PIPE CAPACITY-25 YEAR STORM

Pipe Sizing Calculation Spreadsheet:

THE MORIN-CAMERON GROUP, INC.
66 Elm Street
Danvers, MA 0193
P: (978) 777-8586
F: (978) 774-3488
W: www.morincameron.com

Name: Mission Boathouse Restaurant
Location: 1 Water Street
Beverly, MA
County: Essex County
Owner: Beverly Restaurant Association, LLC

Proj. No.: 3743
Date: 8/12/2019
Revised:
Computed by: Annie Raftery. E.I.T.
Checked by: Scott P, Cameron, P.E.

Design Parameters:
IDF Curve
100 Year Storm Boston, MA
k_e= 0.2

DESCRIPTION	LOCATION		AREA (AC.)	C	C x A	SUM C x A	FLOW TIME (MIN)		i*	DESIGN					CAPACITY		PIPE PROFILE				
	FROM	TO					PIPE	CONC. TIME		Q cfs	V fps	n	PIPE SIZE	SLOPE	Q full ft^3/s	V full ft/s	LENGTH ft	FALL ft	RIM	INV UPPER	INV LOWER
Roof	Downspout	Outlet	0.15	0.90	0.14	0.14	0.76	5.0	6.0	0.8	2.9	0.012	12	0.008	3.4	4.3	135	1.02	-	7	5.98
CB-1	CB-1	WQU	0.19	0.81	0.16	0.16	0.04	6.0	5.7	0.9	6.6	0.012	12	0.093	11.8	15.0	15	1.40	9.50	5.50	4.10
CB-2	CB-2	WQU	0.29	0.84	0.24	0.24	0.22	6.0	5.7	1.4	5.0	0.012	12	0.021	5.6	7.1	67	1.40	9.50	5.50	4.10
WQU	WQU	DMH-1	0.48	0.83	0.40	0.40	0.21	6.2	5.7	2.3	5.7	0.012	12	0.021	5.6	7.1	72	1.50	9.85	4.00	2.50

CONSTRUCTION PHASE BEST MANAGEMENT PRACTICES

Constructed Phase Best Management Practice (BMP's) Plan
for
1 Water Street
Beverly, Massachusetts

The following best management practice plan has been prepared as a guidance document for the efficient implementation, operation and maintenance of the on-site stormwater management systems. The following procedures shall be implemented to ensure success of the Stormwater Management Plan:

1. The contractor shall comply with the details of construction of the site as shown on the approved plans.
2. The catch basins and subsurface infiltration systems shall be maintained as shown in the manufacturer's guidelines and as indicated below.
3. Effective erosion control measurers during and after construction shall be maintained until a stable turf is established on all altered areas.

Basic Information

Stormwater Management System Owner:	Beverly Restaurant Associates, LLC 50 Liberty Drive, Unit 5D Boston, MA 02210
Beverly Engineering Division:	Beverly City Hall 191 Cabot Street Beverly, MA 01915 P: (978) 605-2355
Beverly Planning Board:	Beverly City Hall 191 Cabot Street Beverly, MA 01915 P: (978) 921-6000
Beverly Conservation Commission:	Beverly City Hall 191 Cabot Street Beverly, MA 01915 P: (978) 921-6000

Construction Phase Pollution Prevention Plan

Erosion and Sedimentation Controls during Construction:

The site and drainage construction contractor shall be responsible for maintaining the stormwater system during construction. Routine maintenance of all items shall be performed to ensure adequate runoff and pollution control during construction.

A proposed silt sock will be placed as shown on the Grading Plan prior to the commencement of any clearing, grubbing, and earth removal or construction activity. The integrity of the erosion control barrier will be maintained by periodic inspection and replacement as necessary. The erosion control barrier will remain in place until the first course of pavement has been placed and all side slopes have been loamed and seeded and vegetation has been established. Silt sacks will be placed in the existing catch basins along Lafayette Street and West Avenue. Silt sacks will also be placed in the new catch basins once constructed.

Operations and maintenance plans for the Stormwater Management construction phase and long term operation of the system have been attached to this report.

Structural Practices:

1) **Mulch Sock** – A mulch sock sediment barrier will be constructed around the limit of work as indicated on the Grading and Drainage Plan to prevent the spreading of fine sediments from the site. This control will be installed prior to major soil disturbance on the site.

   Mulch Sock Requirements *

   a) Locate the mulch sock upland where identified on the plans.
   b) The mulch sock should be nearly level through most of its length to impound a broad, temporary pool. The last 10 to 20 feet at each end of the mulch sock should be swung slightly uphill (approximately 0.5 feet in elevation) to provide storage capacity.
   c) Stake the mulch sock in accordance with the construction details.
   d) The mulch sock should be removed when it has served its useful purpose, but not before the upslope area has been permanently stabilized through one growing season and only following approval by the Conservation Commission or their representative. Retained sediment must be removed and properly disposed of, or mulched and seeded.

   Mulch Sock Inspection/Maintenance *

   a) Mulch socks should be inspected immediately after each rainfall event of 1-inch or greater, and at least daily during prolonged rainfall. Inspect the depth of sediment, tears, if the mulch sock is securely attached to the stakes, and to see that the stakes are firmly in the ground. Repair or replace as necessary.
   b) Remove sediment deposits promptly after storm events to provide adequate storage volume for the next rain and to reduce pressure on the mulch sock. Sediment will be removed from behind the mulch sock when it becomes about 4" deep at the mulch sock. Take care to avoid undermining the mulch sock during cleanout.
   c) If the mulch sock tears, decomposes, or in any way becomes ineffective, replace it immediately.
   d) Remove all mulch sock materials after the contributing drainage area has been properly stabilized. The mulch can remain at the discretion of the owner as this will decompose over time. However, any fabric or stakes should be removed. Sediment

1) **Temporary Seeding** – Temporary seeding will allow a short-term vegetative cover on disturbed site areas that may be in danger of erosion. Temporary seeding will be done at stock piles and disturbed portions of the site where construction activity will temporarily cease for at least 21 days. The temporary seedings will stabilize cleared and unvegetated areas that will not be brought into final grade for several weeks or months.

Temporary Seeding Planting Procedures *

a) Planting should preferably be done between April 1st and June 30th, and September 1st through September 31st. If planting is done in the months of July and August, irrigation may be required. If planting is done between October 1st and March 31st, mulching should be applied immediately after planting. If seeding is done during the summer months, irrigation of some sort will probably be necessary.
b) Before seeding, install structural practice controls. Utilize Amoco supergro or equivalent.
c) Select the appropriate seed species for temporary cover from the following table.

Species	Seeding Rate (lbs/1,000 sq.ft.)	Seeding Rate (lbs/acre)	Recommended Seeding Dates	Seed Cover required
Annual Ryegrass	1	40	April 1st to June 1st August 15th to Sept. 15th	¼ inch
Foxtail Millet	0.7	30	May 1st to June 30th	½ to ¾ inch
Oats	2	80	April 1st to July 1st August 15th to Sept. 15th	1 to 1-½ inch
Winter Rye	3	120	August 15th to Oct. 15th	1 to 1-½ inch

Apply the seed uniformly by hydroseeding, broadcasting, or by hand.

d) Use effective mulch, such as clean grain straw; tacked and/or tied with netting to protect seedbed and encourage plant growth.

Temporary Seeding Inspection/Maintenance *

a) Inspect within 6 weeks of planting to see if stands are adequate. Check for damage within 24 hours of the end to a heavy rainfall, defined as a 2-year storm event (i.e., 3.2 inches of rainfall within a twenty-four hour period). Stands should be uniform and dense. Reseed and mulch damaged and sparse areas immediately. Tack or tie down mulch as necessary.
b) Seeds should be supplied with adequate moisture. Furnish water as needed, especially in abnormally hot or dry weather. Water application rates should be controlled to prevent runoff.

Straw mulch is subject to wind blowing unless anchored, is the most commonly used mulching material, and has the best microenvironment for germinating seeds.

Mulch Maintenance *

a) Inspect after rainstorms to check for movement of mulch or erosion. If washout, breakage, or erosion occurs, repair surface, reseed, remulch, and install new netting.
b) Straw or grass mulches that blow or wash away should be repaired promptly.
c) If plastic netting is used to anchor mulch, care should be taken during initial mowings to keep the mower height high. Otherwise, the netting can wrap up on the mower blade shafts. After a period of time, the netting degrades and becomes less of a problem.
d) Continue inspections until vegetation is well established.

4) **Land Grading** – Grading on fill slopes, cut slopes, and stockpile areas will be done with full siltation controls in place.

Land Grading Design/Installation Requirements

a) Areas to be graded should be cleared and grubbed of all timber, logs, brush, rubbish, and vegetated matter that will interfere with the grading operation. Topsoil should be stripped and stockpiled for use on critical disturbed areas for establishment of vegetation. Cut slopes to be topsoiled should be thoroughly scarified to a minimum depth of 3-inches prior to placement of topsoil.
b) Fill materials should be generally free of brush, rubbish, rocks, and stumps. Frozen materials or soft and easily compressible materials should not be used in fills intended to support buildings, parking lots, roads, conduits, or other structures.
c) Earth fill intended to support structural measures should be compacted to a minimum of 90 percent of Standard Proctor Test density with proper moisture control, or as otherwise specified by the engineer responsible for the design. Compaction of other fills should be to the density required to control sloughing, erosion or excessive moisture content. Maximum thickness of fill layers prior to compaction should not exceed 9 inches.
d) The uppermost one foot of fill slopes should be compacted to at least 85 percent of the maximum unit weight (based on the modified AASHTO compaction test). This is usually accomplished by running heavy equipment over the fill.
e) Fill should consist of material from borrow areas and excess cut will be stockpiled in areas shown on the Site Plans. All disturbed areas should be free draining, left with a neat and finished appearance, and should be protected from erosion.

Land Grading Stabilization Inspection/Maintenance *

a) All slopes should be checked periodically to see that vegetation is in good condition. Any rills or damage from erosion and animal burrowing should be repaired immediately to avoid further damage.
b) If seeps develop on the slopes, the area should be evaluated to determine if the seep will cause an unstable condition. Subsurface drains or a gravel mulch may be required to solve seep problems. However, no seeps are anticipated.
c) Areas requiring revegetation should be repaired immediately. Control undesirable vegetation such as weeds and woody growth to avoid bank stability problems in the future.

5) **Topsoiling *** – Topsoiling will help establish vegetation on all disturbed areas throughout the site during the seeding process. The soil texture of the topsoil to be used will be a sandy loam to a silt loam texture with 15% to 20% organic content.

recommendations, omitting lime and fertilizer in the absence of soil test results. If the season prevents resowing, mulch or jute netting is an effective temporary cover.

d) Seeded areas should be fertilized during the second growing season. Lime and fertilize thereafter at periodic intervals, as needed. Organic fertilizer shall be utilized in areas within the 100-foot buffer zone to a wetland resource area.

Dust Control:

Dust control will be utilized throughout the entire construction process of the site. For example, keeping disturbed surfaces moist during windy periods will be an effective control measure, especially for construction access roads. The use of dust control will prevent the movement of soil to offsite areas. However, care must be taken to not create runoff from excessive use of water to control dust. The following are methods of Dust Control that may be used on-site:

- Vegetative Cover – The most practical method for disturbed areas not subject to traffic.
- Calcium Chloride – Calcium chloride may be applied by mechanical spreader as loose, dry granules or flakes at a rate that keeps the surface moist but not so high as to cause water pollution or plant damage.
- Sprinkling – The site may be sprinkled until the surface is wet. Sprinkling will be effective for dust control on haul roads and other traffic routes.
- Stone – Stone will be used to stabilize construction roads; will also be effective for dust control.

The general contractor shall employ an on-site water vehicle for the control of dust as necessary.

Non-Stormwater Discharges:

The construction de-watering and all non-stormwater discharges will be directed into a sediment dirt bag (or equivalent inlet protection) or a sediment basin. Sediment material removed shall be disposed of in accordance with all applicable local, state, and federal regulations.

The developer and site general contractor will comply with the E.P.A.'s Final General Permit for Construction De-watering Discharges, (N.P.D.E.S., Section 402 and 40 C.F.R. 122.26(b)(14)(x).

Inspection/Maintenance:

Operator personnel must inspect the construction site at least once every 14 calendar days and within 24 hours of a storm event of ½-inch or greater. The applicant shall be responsible to secure the services of a design professional or similar professional (inspector) on an on-going basis throughout all phases of the project. Refer to the Inspection/Maintenance Requirements presented earlier in the "Structural and Stabilization Practices." The inspector should review the erosion and sediment controls with respect to the following:

- Whether or not the measure was installed/performed correctly.
- Whether or not there has been damage to the measure since it was installed or performed.
- What should be done to correct any problems with the measure.

The inspector should complete the Stormwater Management Construction Phase BMP Inspection Schedule and Evaluation Checklist, as attached, for documenting the findings and should request the required maintenance or repair for the pollution prevention measures when the inspector finds that it is necessary for the measure to be effective. The inspector should

STORMWATER BEST MANAGEMENT PRACTICES

LONG-TERM POLLUTION PREVENTION PLAN

Long Term Stormwater Best Management Practices
Operation and Maintenance Plan
for
1 Water Street
Beverly, Massachusetts

The following Best Management Practice and Operation and Maintenance plan has been prepared as a guidance document for the efficient implementation, operation and maintenance of the on-site stormwater management systems and to satisfy the requirements of Standard 9 of the MassDEP Stormwater Management Handbook. The following procedures shall be implemented to ensure success of the Stormwater Management Plan:

1. The contractor shall comply with the details of construction of the site as shown on the approved plans.
2. The catch basins, drain manhole, and water quality unit (CDS) shall be maintained as shown in the manufacturer's guidelines and as indicated below.
3. Effective erosion control measurers during and after construction shall be maintained until a stable turf is established on all altered areas.
4. A Stormwater Management Maintenance Log is included at the end of this Appendix.

Basic Information

Stormwater Management System Owner:	Beverly Restaurant Associates, LLC 50 Liberty Drive, Unit 5D Boston, MA 02210
Beverly Engineering Division:	Beverly City Hall 191 Cabot Street Beverly, MA 01915 P: (978) 605-2355
Beverly Planning Board:	Beverly City Hall 191 Cabot Street Beverly, MA 01915 P: (978) 921-6000
Beverly Conservation Commission:	Beverly City Hall 191 Cabot Street Beverly, MA 01915 P: (978) 921-6000
Site Design Engineer Information:	The Morin-Cameron Group, Inc. 66 Elm Street Danvers, MA 01923 Phone: (978) 777-8586

General Conditions

1. The property owner shall be responsible for scheduling regular inspections and maintenance of the stormwater BMP's as detailed in the following long-term pollution prevention plan and illustrated on the approved design plans:

   "Site Redevelopment Plans Mission Boathouse Restaurant" prepared by The Morin-Cameron Group, Inc. (MCG) and dated August 12, 2019.

2. All Stormwater BMP's shall be operated and maintained in accordance with the design plans and the following Long-Term Pollution Prevention Plan.
3. The owner shall:
   a. Maintain an Operation and Maintenance Log (see Attachment A) for the last three years. The Log shall include all BMP inspections, repairs, replacement activities and disposal activities (disposal material and disposal location shall be included in the Log);
   b. Make the log available to the Beverly Engineering Department and Planning Department upon request;
   c. Allow members and agents of the Beverly Conservation Commission and Planning Board to enter the premises and ensure that the Owner has complied with the Operation and Maintenance Plan requirements for each BMP.
4. A recommended inspection and maintenance schedule is outlined below based on statewide averages. This inspection and maintenance schedule shall be adhered to at a minimum for the first year of service of all BMP's referenced in this document. At the commencement of the first year of service, a more accurate inspection/maintenance schedule shall be determined based on the level of service for this site.

Long-Term Pollution Prevention Plan (LTPPP)

Vegetated Areas:

Immediately after construction, monitoring of the erosion control systems shall occur until establishment of natural vegetation. Afterwards, vegetated areas shall be maintained as such. Vegetation shall be replaced as necessary to ensure proper stabilization of the site.

Cost: Included with annual landscaping budget. Consult with local landscape contractors.

Paved Areas:

Sweepers shall sweep paved areas periodically during dry weather to remove excess sediments and to reduce the amount of sediments that the drainage system shall have to remove from the runoff. The sweeping shall be conducted primarily between March 15th and November 15th. Special attention shall be made to sweeping paved surfaces in March and April before spring rains wash residual sand into the drainage system.

Cost: $100-$150 per sweeping

Salt used for de-icing on the parking lot during winter months shall be limited as much as possible as this will reduce the need for removal and treatment. Sand containing the minimum amount of calcium chloride (or approved equivalent) needed for handling may be applied as part of the routine winter maintenance activities.

Catch Basins

The catch basin grates shall be checked quarterly and following heavy rainfalls to verify that the inlet openings are not clogged by debris. Debris shall be removed from the grates and disposed of properly. Deep sump catch basins shall be inspected and cleaned quarterly as needed when accumulated sediments exceed 2' from the bottom of the sump (approximately 1/2 of the sump capacity). Catch basins with hoods shall be inspected annually to check oil build-up and outlet obstructions. Material shall be removed from catch basins and disposed of in accordance with all applicable regulations by a licensed hauler.

Cost: Estimated $50 - $100 per cleaning per catch basin as needed. The Owner shall consult local waste haulers for detailed cost estimates.

Public Safety Concerns: Catch basins shall not be left open and unattended at any time during inspection, cleaning or otherwise. Broken grates or frames shall be replaced immediately. At no time shall any person enter the basin structure unless measures have been taken to ensure safe access in accordance with enclosed space regulations.

CDS Water Quality Unit:

The CDS Water Quality Unit shall be inspected and maintained as shown in the manufacturer's guidelines enclosed herein.

Cost: Estimated $50 - $100 per cleaning per structure as needed. The Owner shall consult local vacuum cleaning contractors for detailed cost estimates.

Public Safety Concerns: structures shall not be left open and unattended at any time during inspection, cleaning or otherwise. Broken grates or frames shall be replaced immediately. At no time shall any person enter the basin structure unless measures have been taken to ensure safe access in accordance with enclosed space regulations.

Debris & Litter:

All debris and litter shall be removed from the parking area as necessary to prevent migration into the drainage system.

Pesticides, Herbicides, and Fertilizers:

Pesticides and herbicides shall be used sparingly. Fertilizers shall be restricted to the use of organic fertilizers only. All fertilizers, herbicides, pesticides, sand and salt for deicing and the like shall be stored in dry area that is protected from weather.

Cost: Included in the routine landscaping maintenance schedule. The Owner shall consult local landscaping contractors for details.

Public Safety Concerns: Chemicals shall be stored in a secure area to prevent children from obtaining access to them. Any major spills shall be reported to municipal officials.

Snow Storage and Removal:

Snow storage areas are designated on the approved design plans and designed to melt back into the paved areas or stormwater management system. Snow shall only be stored in designated areas. In heavy snow seasons, snow shall be removed from the property and disposed of in accordance with applicable regulations and a certified snow disposal site. The owner shall be responsible for informing snow removal contractors of the location for snow storage areas on the property.

Cost: Annual snow removal budget to be established by the Owner. The Owner shall consult local snow removal contractors for details.

Prevention of Illicit Discharges:

Illicit discharges to the stormwater management system are not allowed. Illicit discharges are discharges that are not comprised entirely of stormwater. Pursuant to MassDEP Stormwater Standards the following activities or facilities are not considered illicit discharges: 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 building without detergents.

To prevent illicit discharges to the stormwater management system the following policies should be implemented:

1. Provisions For Storing Materials And Waste Products Inside Or Under Cover
2. Vehicle Maintenance And Washing Controls
3. Requirements for Routine Inspections of the Stormwater Management System (i.e.: catch basins, sediment forebay, bio-retention areas & particle separator.)
4. Spill Prevention and Response Plans.

Stormwater System Maintenance Log

1 Water Street
Beverly, MA

BMP STRUCTURE	INSPECTION DATE	WORK PERFORMED	DATE WORK PERFORMED	COMMENTS
Drain Manhole 1				
CDS Water Quality Unit				
Catchbasin 1				
Catchbasin 2				
Additional Comments:				

NOTE: All structures to be inspected at least two times per year. Refer to O&M plan dated 8/12/19.

SUPPLEMENTAL STORMWATER MANAGEMENT DOCUMENTATION

Project: 1 Water Street
Location: Beverly, MA
Prepared For: The Morin-Cameron Group

CONTECH ENGINEERED SOLUTIONS

Purpose: To calculate the water quality flow rate (WQF) over a given site area. In this situation the WQF is derived from the first 1" of runoff from the contributing impervious surface.

Reference: Massachusetts Dept. of Environmental Protection Wetlands Program / United States Department of Agriculture Natural Resources Conservation Service TR-55 Manual

Procedure: Determine unit peak discharge using Figure 1 or 2. Figure 2 is in tabular form so is preferred. Using the tc, read the unit peak discharge (qu) from Figure 1 or Table in Figure 2. qu is expressed in the following units: cfs/mi^2/watershed inches (csm/in).

Compute Q Rate using the following equation:

$$Q = (qu)\ (A)\ (WQV)$$

where:

Q = flow rate associated with first 1" of runoff
qu = the unit peak discharge, in csm/in.
A = impervious surface drainage area (in square miles)
WQV = water quality volume in watershed inches (1" in this case)

Structure Name	Impv. (acres)	A (miles^2)	t_c (min)	t_c (hr)	WQV (in)	qu (csm/in.)	Q (cfs)
CDS	0.40	0.0006250	6.0	0.100	1.00	774.00	0.48

CONTECH ENGINEERED SOLUTIONS

CDS TECHNOLOGIES

CDS ESTIMATED NET ANNUAL SOLIDS LOAD REDUCTION BASED ON THE RATIONAL RAINFALL METHOD

1 WATER STREET
BEVERLY, MA

Area	0.40 ac	Unit Site Designation	CDS
Weighted C	0.9	Rainfall Station #	69
t_c	6 min		
CDS Model	1515-3	CDS Treatment Capacity	**1.0 cfs**

Rainfall Intensity[1] (in/hr)	Percent Rainfall Volume[1]	Cumulative Rainfall Volume	Total Flowrate (cfs)	Treated Flowrate (cfs)	Incremental Removal (%)
0.02	10.2%	10.2%	0.01	0.01	9.8
0.04	9.6%	19.8%	0.01	0.01	9.3
0.06	9.4%	29.3%	0.02	0.02	9.0
0.08	7.7%	37.0%	0.03	0.03	7.4
0.10	8.6%	45.6%	0.04	0.04	8.1
0.12	6.3%	51.9%	0.04	0.04	5.9
0.14	4.7%	56.5%	0.05	0.05	4.4
0.16	4.6%	61.2%	0.06	0.06	4.3
0.18	3.5%	64.7%	0.06	0.06	3.3
0.20	4.3%	69.1%	0.07	0.07	4.0
0.25	8.0%	77.1%	0.09	0.09	7.3
0.30	5.6%	82.7%	0.11	0.11	5.0
0.35	4.4%	87.0%	0.13	0.13	3.9
0.40	2.5%	89.5%	0.14	0.14	2.2
0.45	2.5%	92.1%	0.16	0.16	2.2
0.50	1.4%	93.5%	0.18	0.18	1.2
0.75	5.0%	98.5%	0.27	0.27	4.0
1.00	1.0%	99.5%	0.36	0.36	0.7
1.50	0.0%	99.5%	0.54	0.54	0.0
2.00	0.0%	99.5%	0.72	0.72	0.0
3.00	0.5%	100.0%	1.08	1.00	0.1
					92.2
				Removal Efficiency Adjustment[2] =	6.5%
				Predicted % Annual Rainfall Treated =	93.5%
				Predicted Net Annual Load Removal Efficiency =	**85.7%**

1 - Based on 10 years of hourly precipitation data from NCDC Station 770, Boston WSFO AP, Suffolk County, MA
2 - Reduction due to use of 60-minute data for a site that has a time of concentration less than 30-minutes.

THE MORIN-CAMERON GROUP, INC.
66 Elm Street
Danvers, MA 01923
p | 978.777.8586 m | 781.520.9496

Standard 4: Total Suspended Solids Calculation for Water Quality Structure

Name: 1 Water Street
Location: 1 Water Street
Beverly, MA
County: Essex County
Applicant: Beverly Restaurant Associates, LLC

Proj. No.: 3743
Date: 8/12/2019
Revised:
Computed by: Annie Raftery
Checked by: Scott P, Cameron, P.E.

TSS Removal Calculation

B BMP	C TSS Removal Rate	D Starting TSS Load (*F)	E Amount Removed (C*D)	F Remaining Load (D-E)
Deep Sump and Hooded Catch Basin	**0.25**	**1.00**	**0.25**	**0.75**
Proprietary Treatment Practice	**0.80**	**0.75**	**0.60**	**0.15**
	0.00	**0.15**	**0.00**	**0.15**
	0.00	**0.15**	**0.00**	**0.15**
	0.00	**0.15**	**0.00**	**0.15**

Total TSS Removal = **85%**

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

Non-automated TSS Calculation Sheet
must be used if Proprietary BMP Proposed
1. From MassDEP Stormwater Handbook Vol. 1

ILLICIT DISCHARGE

STATEMENT

Illicit Discharge Compliance Statement

I, Scott P. Cameron, P.E., hereby notify the Beverly Planning Board that I have not witnessed, nor am aware of any existing illicit discharges at the site known as 1 Water Street in Beverly, Massachusetts. I also hereby certify that the development of said property as illustrated on the final plans entitled "Site Redevelopment Plans Mission Boathouse Restaurant," prepared by The Morin-Cameron Group, Inc. dated August 12, 2019 and as revised and approved by the Beverly Planning Board and maintenance thereof in accordance with the "Stormwater Pollution Prevention Plan" and "Long-Term Pollution Prevention Plan" prepared by The Morin-Cameron Group, Inc dated August 12, 2019 and as revised and approved by the Beverly Planning Board will not create any new illicit discharges. There is no warranty implied regarding future illicit discharges that may occur as a result of improper construction or maintenance of the stormwater management system or unforeseen accidents.

Name: Scott P. Cameron, P.E.

Company: The Morin-Cameron Group, Inc.

Title: Owner's Representative

Signature:

Date: 8-12-19