

STORMWATER MANAGEMENT REPORT

for

**62 MAPLE STREET
WENHAM, MASSACHUSETTS**

Applicant:

Maple Woods Housing, LLC
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STORMWATER NARRATIVE

Project Narrative:

The locus property is part of an existing 16.1± acre parcel located at 62 Maple Street in Wenham, MA. The site is bordered on the north by existing wooded and wetland areas and to the south by residentially developed properties along Maple Street. Burley Brook cuts through the property on the western side.

The site primarily consists of wooded areas with paths. A portion of the property closest to Maple Street is occupied with an existing driveway servicing an adjacent dwelling on one side and auto shop/nursery on the other. Existing lawn area associated with the dwelling is also located on the property.

The applicant is proposing a multi-family residential apartment building under a comprehensive permit. The proposal will be developed on a new lot divided out of the locus parcel containing approximately 3.5 acres. A 24' wide access driveway is proposed from Maple Street to an associated parking lot. Area to the north of the proposed building will remain undeveloped. The proposed project includes conventional techniques for treatment and recharge of stormwater. Incorporated in this design is a subsurface infiltration facility, Stormceptor vortex units and deep sump catchbasins.

The following are the DEP Stormwater Standards as outlined in the Wetlands Regulations:

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

There is one new outfall directly discharging stormwater to an existing bordering vegetated wetland proposed with the completion of this project. The outfall is a flared end pipe provided for excess stormwater from the proposed infiltration facility. Although the facility has been designed to capture and recharge stormwater for the 100 year storm event, an emergency outlet is proposed as part of the design. Any excess stormwater exiting from the outlet pipe will pass over a riprap apron to slow exiting velocity and dissipate the flow to prevent erosion at the outfall.

Treatment measures are provided for all stormwater generated onsite. All stormwater generated from paved surfaces directed to the infiltration facility will be pretreated through a system of deep sump catchbasins and stormceptor vortex units. Additional treatment of stormwater is provided within the infiltration facility. These treatment measures along with the use of riprap apron at the flared end outlet provide compliance with this standard.

Standard 2: Peak Rate Attenuation - Stormwater management systems shall be designed so that post-development peak discharge rates do not exceed pre-development peak discharge rates. This standard may be waived for

discharges to land subject to coastal storm flowage as defined in 310 CMR 10.04.

Reference is made to the report entitled "Stormwater Analysis and Calculations for Maple Street".

The Stormwater Analysis utilizes the Soil Conservation Service Technical Report No. 55 and the U.S. Department of Commerce Technical Paper No. 40 to calculate peak runoff rates. Full detail of peak rate attenuation along with supplemental stormwater calculations utilizing HydroCAD as well as existing and post development drainage plans can be found in the referenced report.

The table below illustrates the predicted existing and post development stormwater flows for the 2, 10 and 100-year storm events.

	<u>2-Year 24-Hour Storm Event</u>	<u>10-Year 24-Hour Storm Event</u>	<u>100-Year 24-Hour Storm Event</u>
Existing	0.0 CFS	0.11 CFS	1.42 CFS
Proposed	0.0 CFS	0.00 CFS	0.14 CFS

The details of this report show that the peak rates of runoff for the 2, 10, and 100 year events have been either matched or reduced from pre to post conditions as required. We anticipate no adverse impacts or downstream flooding with the completion of this project.

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

Loss of annual recharge to groundwater has been minimized through the use of stormwater Best Management Practices (BMP's), subsurface infiltration facilities, and a proposed operation and maintenance program. Based on soil maps provided by U.S. Department of Agriculture Soil Conservation Service the locus property consists of hydrologic soil group A.

Utilizing the current regulations, the required recharge volume (Rv) is based on the following calculation:

- Rv = Fx
- Rv = Required Recharge Volume
- F = Target Depth Factor associated with hydrologic soil groups located in table 2.3.2 in Volume 3 of the Stormwater Management Handbook
- x = total onsite impervious area
- F = 0.6 inches
- x = 79,370 square feet (sf)

$$R_v = 3,970 \text{ cf}$$

Volume of storage provided under the outlet of the proposed infiltration facility for recharge:

$$\text{Facility \#1} = 16,465 \text{ cf}$$

The Stormwater Handbook also requires recharge facilities be installed in soils capable of absorbing the recharge volume with the ability to drain within 72 hours. The formula for drawdown is as follows:

General Formula:

$$T_{DR} = \frac{\text{required storage volume}^*}{(\text{Rawls Rate})(\text{Bottom Surface Area of System})}$$

(*Required storage volume is equal to the larger of the calculated required recharge or treatment volumes. In this case, treatment volume is greater as indicated in Standard 4).

Subsurface Facility #1:

$$\text{Volume to Treat} = 6,615 \text{ cf}$$

$$T_{DR} = \frac{6,615}{\left(\frac{8.27 \text{ in/hr}}{12 \text{ in/ft}}\right)(8,240 \text{ sf})} = 1.2 \text{ hrs}$$

$$1.2 \text{ hrs} < 72 \text{ hrs}$$

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

As discussed above, there are no untreated stormwater discharges from the proposed project. The stormwater management system has been designed to remove a minimum of 80% of the average annual post-construction load of Total Suspended Solids (TSS) through the use of deep sump catchbasins, stormceptor vortex units, and a subsurface infiltration facility. Additionally, stormwater runoff from paved surfaces will be directed through pretreatment BMPs to remove a minimum of 44% TSS prior to discharge into the infiltration facility.

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

The following are water quality treatment sizing calculations:

General Equation from Stormwater Management Handbook

$$V_{wq} = (D_{wq})(A)$$

V_{wq} = required water quality volume

D_{wq} = water quality depth (1" for critical areas & rapid infiltration rates, 0.5" for non-critical areas)

A = impervious area

Area to Infiltration Facility #1:

D_{wq} = 1" (from rapid infiltration rates)

A = 79,370 sf

$V_{wq} = (1"/12) \times 79,370$ sf

$V_{wq} = 6,615$ cf

Volume within infiltration basin = 16,465 cf

A separate document entitled "Operation and Long Term Maintenance Plan" dated November 6, 2014 is included in the appendix of this report. Suitable practices for source control and long term pollution prevention have been identified and shall be implemented as discussed.

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

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

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

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

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

Standard 6 is not applicable to this project given that stormwater will not be discharged to a critical area. Critical areas are defined as Outstanding

Resource Waters and Special Resource Waters as designated in 314 CMR 4.0, recharge areas for public water supplies as defined in 310 CMR 22.02 (including Zone II and Interim Wellhead Protection Areas), bathing beaches as defined in 105 CMR 445.000, cold-water fisheries and shellfish growing areas as defined in 314 CMR 9.02 and 310 CMR 10.04. Note that online GIS mapping does not show current Zone II delineation. See revised Zone II layout map from DEP included in the appendix for approved boundary of Zone II.

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

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

The proposed project will create an increase in impervious area onsite which renders this standard inapplicable to the project.

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

A Construction Period Pollution Prevention Plan for a Proposed Stormwater Management System report is included in the Appendix of this report. This program details the construction period operation and maintenance plan and sequencing for pollution prevention measures and erosion and sedimentation controls. Locations of erosion control measures for the project are depicted on the site plan set accompanying this report.

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

An Operation and Long Term Maintenance Plan is included in the Appendix of this report. This long term operation and maintenance program provides details and the schedule for routine and non-routine maintenance tasks to be implemented at the completion of the project.

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

Illicit discharges to the stormwater management system are discharges that are not entirely comprised of stormwater. Discharges to the stormwater management system from the following activities or facilities are permissible: Firefighting, water line flushing, landscape irrigation, uncontaminated groundwater, potable water sources, foundation drains, air conditioning condensation, footing drains, individual resident car washing, flows from riparian habitats and wetlands, dechlorinated water from swimming pools,

water used for street washing and water used to clean residential buildings without detergents. All other illicit discharges are prohibited.

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

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CHECKLIST FOR STORMWATER REPORT



Checklist for Stormwater Report

A. Introduction

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



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

The Stormwater Report must include:

- The Stormwater Checklist completed and stamped by a Registered Professional Engineer (see page 2) that certifies that the Stormwater Report contains all required submittals.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 8²
- 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.



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



Signature and Date

[Handwritten Signature]
11.6.14

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 Field¹
- 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.

5652-POST - DEG

Type III 24-hr 100 yr Rainfall=6.50"

Prepared by Meridian Associates, Inc.

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HydroCAD® 10.00 s/n 00814 © 2011 HydroCAD Software Solutions LLC

Stage-Area-Storage for Pond 4P: cultecs - 330

Elevation (feet)	Wetted (sq-ft)	Storage (cubic-feet)	Elevation (feet)	Wetted (sq-ft)	Storage (cubic-feet)
55.20	8,473	0	57.80	9,470	15,955
55.25	8,492	169	57.85	9,489	16,215
55.30	8,511	339	57.90	9,508	16,466
55.35	8,530	508	57.95	9,527	16,704
55.40	8,550	678	58.00	9,546	16,930
55.45	8,569	847	58.05	9,565	17,143
55.50	8,588	1,017	58.10	9,585	17,344
55.55	8,607	1,186	58.15	9,604	17,532
55.60	8,626	1,356	58.20	9,623	17,709
55.65	8,645	1,525	58.25	9,642	17,879
55.70	8,665	1,695	58.30	9,661	18,048
55.75	8,684	2,065	58.35	9,680	18,218
55.80	8,703	2,435	58.40	9,700	18,387
55.85	8,722	2,803	58.45	9,719	18,557
55.90	8,741	3,171	58.50	9,738	18,726
55.95	8,760	3,538	58.55	9,757	18,896
56.00	8,780	3,904	58.60	9,776	19,065
56.05	8,799	4,270	58.65	9,795	19,235
56.10	8,818	4,636	58.70	9,815	19,404
56.15	8,837	5,001	58.75	9,831	19,545
56.20	8,856	5,366	58.80	9,831	19,545
56.25	8,875	5,730	58.85	9,831	19,545
56.30	8,895	6,092	58.90	9,831	19,545
56.35	8,914	6,452			
56.40	8,933	6,809			
56.45	8,952	7,164			
56.50	8,971	7,519			
56.55	8,990	7,873			
56.60	9,010	8,226			
56.65	9,029	8,579			
56.70	9,048	8,931			
56.75	9,067	9,282			
56.80	9,086	9,632			
56.85	9,105	9,981			
56.90	9,125	10,330			
56.95	9,144	10,675			
57.00	9,163	11,018			
57.05	9,182	11,356			
57.10	9,201	11,691			
57.15	9,220	12,023			
57.20	9,240	12,351			
57.25	9,259	12,676			
57.30	9,278	12,997			
57.35	9,297	13,315			
57.40	9,316	13,628			
57.45	9,335	13,938			
57.50	9,355	14,243			
57.55	9,374	14,543			
57.60	9,393	14,838			
57.65	9,412	15,127			
57.70	9,431	15,410			
57.75	9,450	15,686			

INSTRUCTIONS:

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

Location: 62 Maple Street, Wenham, MA

Train: Paved Impervious Surface-Pretreatment

A BMP	B TSS Removal Rate	C Starting TSS Load*	D Amount Removed (B*C)	E Remaining Load (C-D)
Deep Sump Catchbasin	25%	1.00	0.25	0.75
Stormceptor Units**	77%	0.75	0.58	0.17

Total TSS Removal =

83.0% Separate Form Needs to be Completed for Each Outlet or BMP Train

Project: 5652
Prepared By: Meridian Associates, Inc.
Date: 11/6/2014

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

** See portion of STEP Fact Sheet for removal rate

TSS Removal Calculation Worksheet

INSTRUCTIONS:

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

Location: 62 Maple Street

Train: Impervious Surface-Treatment

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

Total TSS Removal =

80.0%
Separate Form Needs to be Completed for Each Outlet or BMP Train

Project: 5652
Prepared By: Meridian Associates, Inc.
Date: 11/6/2014

*Equals remaining load from previous BMP(E) which enters the BMP
 ** See portion of STEP Fact Sheet for removal rate

TSS Removal Calculation Worksheet

**PROPRIETARY STRUCTURE SIZING
BASED ON DEP NOTICE – OCTOBER 15, 2013**

Per Notice: Treatment requirement based on 1" rule [WQV] see following Stormceptor page for 77% TSS removal design flow rates.

Structure STC#3

Impervious area directed to structure = 22,040± s.f.

Discharge rate (Q) conversion:

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

qu → unit peak discharge in cfs/mi²/watershed inches
(qu based on Figure 3 & 4 la/P tables with a t_c value of 0.1 hrs.)
A → impervious surface drainage area (in. sq. mi*)
*conversion factor: 0.0015625 mi²/acre

$$\begin{aligned} qu &= 774 \text{ cfs/mi}^2/\text{in.} \\ A &= 22,040 \text{ s.f./}43,560 \text{ s.f./acre} = 0.51 \text{ acres} \\ &(0.51 \text{ acres})(0.0015625 \text{ mi}^2/\text{acre}) = 0.00079 \text{ mi}^2 \\ Q &= (774 \text{ cfs/mi}^2/\text{in.})(0.00079 \text{ mi}^2)(1 \text{ in.}) \\ Q &= 0.61 \text{ cfs} \end{aligned}$$

Design flow rate for STC 900 = 0.89 cfs

Structure STC#7

Impervious area directed to structure = 37,421± s.f.

Discharge rate (Q) conversion:

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

qu → unit peak discharge in cfs/mi²/watershed inches
(qu based on Figure 3 & 4 la/P tables with a t_c value of 0.1 hrs.)
A → impervious surface drainage area (in. sq. mi*)
*conversion factor: 0.0015625 mi²/acre

$$\begin{aligned} qu &= 774 \text{ cfs/mi}^2/\text{in.} \\ A &= 37,421 \text{ s.f./}43,560 \text{ s.f./acre} = 0.86 \text{ acres} \\ &(0.86 \text{ acres})(0.0015625 \text{ mi}^2/\text{acre}) = 0.0013 \text{ mi}^2 \\ Q &= (774 \text{ cfs/mi}^2/\text{in.})(0.0013 \text{ mi}^2)(1 \text{ in.}) \\ Q &= 1.0 \text{ cfs} \end{aligned}$$

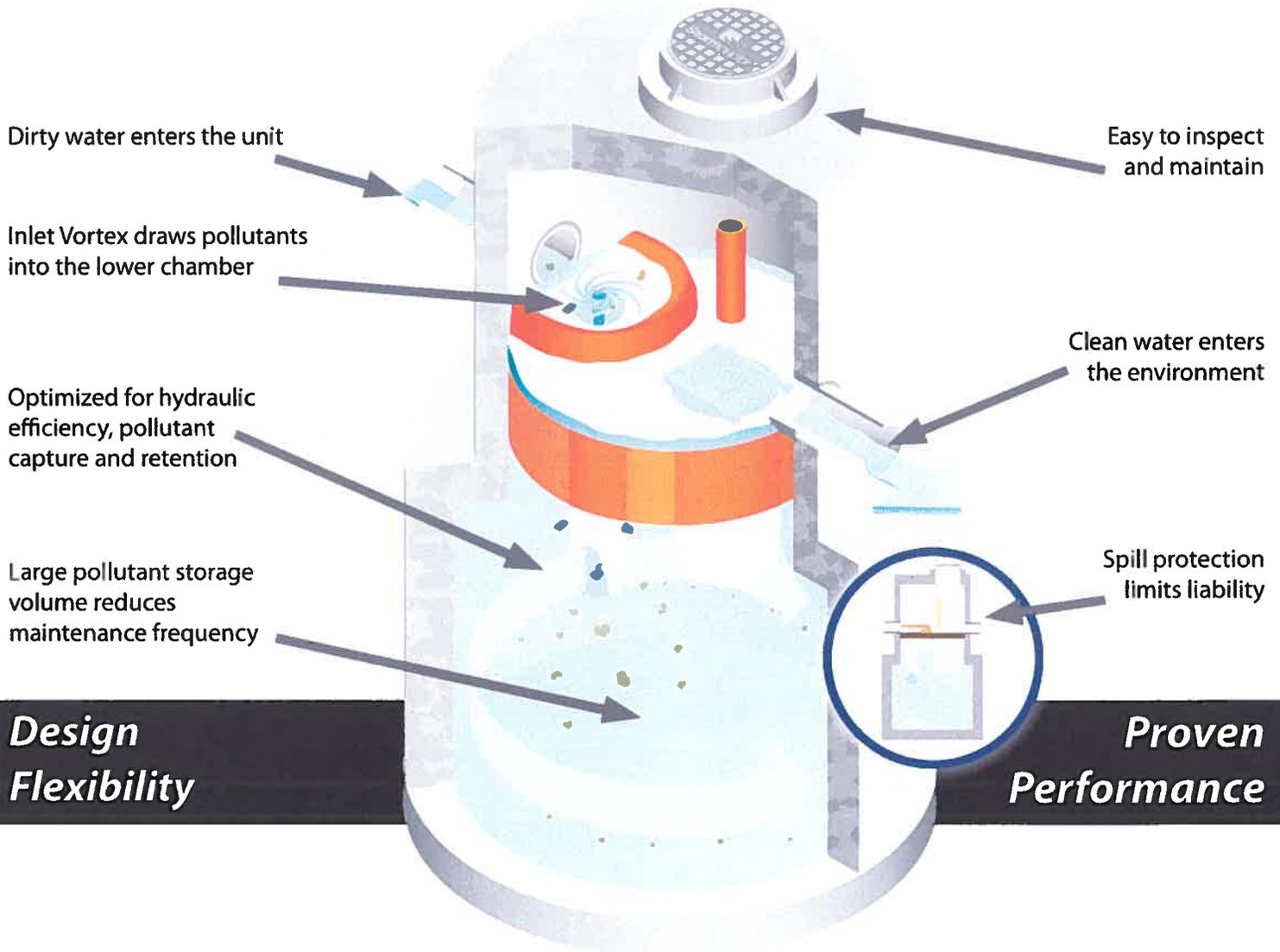
Design flow rate for STC 2400 = 1.58 cfs



Stormceptor®

Stormwater Treatment Made Simple!

TSS & Oil Removal ■ *Scour Prevention* ■ *Small Footprint*



**Design
Flexibility**

**Proven
Performance**

*Environmentally Engineered Stormwater Solutions...
that exceed your client's needs!*



Stormceptor®

-----STC

Stormceptor® is an underground stormwater quality treatment device that is unparalleled in its effectiveness for pollutant capture and retention. With thousands of systems operating worldwide, Stormceptor delivers protection every day in every storm.

With patented technology, optimal treatment occurs by allowing free oil to rise and sediment to settle. The Stormceptor design prohibits scour and release of previously captured pollutants, ensuring superior treatment and protection during even the most extreme storm events.

Stormceptor is very easy to design and provides flexibility under varying site constraints such as tight right-of-ways, zero lot lines and retrofit projects. Design flexibility allows for a cost-effective approach to stormwater treatment. Stormceptor has proven performance backed by the longest record of lab and field verification in the industry.

Tested Performance

- Fine particle capture
- Prevents scour or release
- 95%+ Oil removal

Massachusetts – Water Quality (Q) Flow Rate

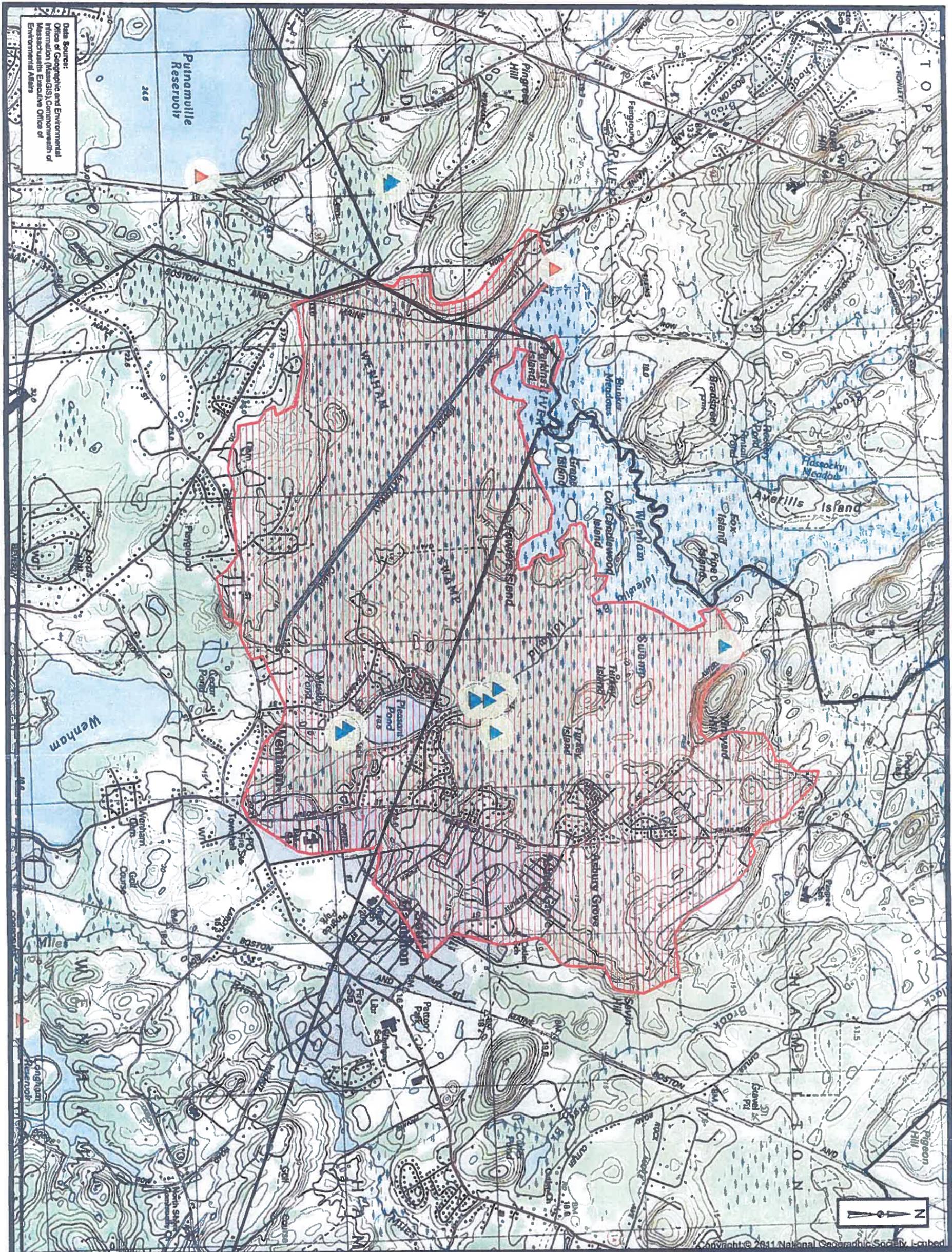
Stormceptor STC Model	Inside Diameter	Typical Depth Below Inlet Pipe Invert ¹	Water Quality Flow Rate Q ²	Peak Conveyance Flow Rate ³	Hydrocarbon Capacity ⁴	Maximum Sediment Capacity ⁴
	(ft)	(in)	(cfs)	(cfs)	(Gallons)	(ft ³)
STC 450i	4	68	0.40	5.5	86	46
STC 900	6	63	0.89	22	251	89
STC 2400	8	104	1.58	22	840	205
STC 4800	10	140	2.47	22	909	543
STC 7200	12	148	3.56	22	1,059	839
STC 11000	2 x 10	142	4.94	48	2,792	1,086
STC 16000	2 x 12	148	7.12	48	3,055	1,677

¹ Depth Below Pipe Inlet Invert to the Bottom of Base Slab, and Maximum Sediment Capacity can vary to accommodate specific site designs and pollutant loads. Depths can vary to accommodate special designs or site conditions. Contact your local representative for assistance.

² Water Quality Flow Rate (Q) is based on 80% annual average TSS removal of the OK110 particle size distribution.

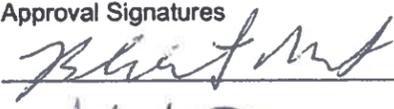
³ Peak Conveyance Flow Rate is based upon ideal velocity of 3 feet per second and outlet pipe diameters of 18-inch, 36-inch, and 54-inch diameters.

⁴ Hydrocarbon & Sediment capacities can be modified to accommodate specific site design requirements, contact your local representative for assistance.



Data Sources:
 Office of Geographic and Environmental
 Information (MassGIS), Commonwealth of
 Massachusetts Executive Office of
 Environmental Affairs

Municipality: Hamilton, MA
 PWSID#: 3119000
 Well Name: Caisson; Idlewood #1 & #2
 Purveyor: Hamilton Water Department
 Source No.: -04G, -05G, -06G
 Well No.: N/A
 Program: Drinking Water
 USGS Quad: Salem/Ipswich/Georgetown
 Long./Lat.: 70 Deg. 53' 48" W, 42 Deg. 37' 6" N
 Consultant: Weston & Sampson
 Date of Study: January 2013

Approval Signatures



Date:
 1/30/2013
 1/30/2013

- Legend**
-  Community Ground Water
 -  Community Surface Water
 -  Surface Distribution Site
 -  Non-Transient Non-Community
 -  Transient Non-Community
 -  Proposed Well
 -  Zone I
 -  Zone II Boundary

Scale = 1" : 2,000'

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CATCHBASIN INLET CALCULATIONS

Allowable Flow to Square Catchbasin Rim

$$QA = cAv\sqrt{2gh} \times \text{clogging factor}$$

Where: c = orifice coefficient (0.6 for openings w/ square edges)
 A = net area in square feet (pass area of grate – R-3210-L from catalog cut)
 g = 32.2 ft/s²
 h = allowable head over catchbasin rim (use 0.33' for 100 year storm)
 clogging factor = 2/3

$$QA = (0.6)(1.5 \text{ sf}) \sqrt{2(32.2 \text{ ft/s}^2)(0.33 \text{ ft})} \times 2/3$$
$$QA = 2.76 \text{ cfs}$$

From HydroCAD – Inflows at Proposed Catchbasins for 100-Year Storm

PCB#1 Q=1.23 cfs < QA = 2.76 cfs
Therefore single catchbasin rim acceptable

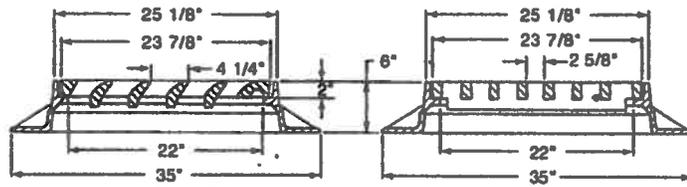
PCB#2 Q=2.29 cfs < QA = 2.76 cfs
Therefore single catchbasin rim acceptable

PCB#4 Q=2.67 cfs < QA = 2.76 cfs
Therefore single catchbasin rim acceptable

PCB#5 Q=3.33 cfs > QA = 2.76 cfs
Therefore utilize double catchbasin to capture flow

R-3210-L
Catch Basin Frame, Grate

Heavy Duty

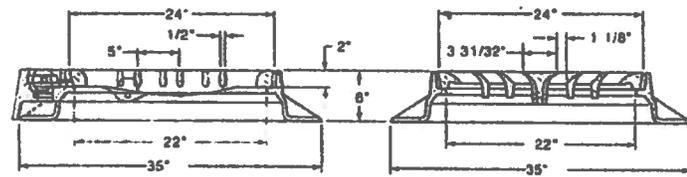


CATALOG NUMBER	GRATE TYPE	SQ. FT. OPEN	WEIR PERIMETER LINEAL FEET
R-3210-L	L	1.5	8.0

COMBINATION INLETS 3

R-3210-LLM
Catch Basin Frame, LiftMate Grate

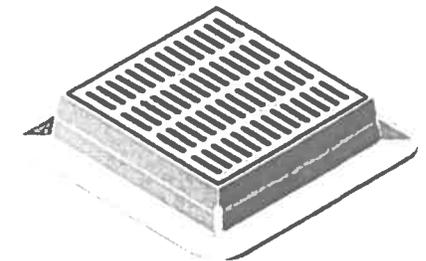
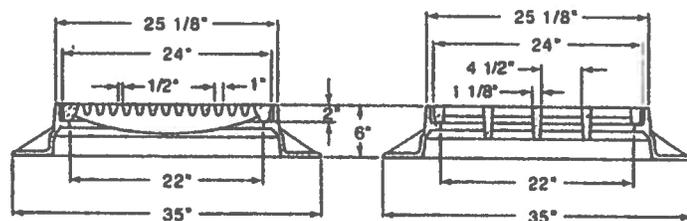
Heavy Duty



CATALOG NUMBER	GRATE TYPE	SQ. FT. OPEN	WEIR PERIMETER LINEAL FEET
R-3210-LLM	L	1.4	8.0

R-3210-Q
Catch Basin Frame, Grate

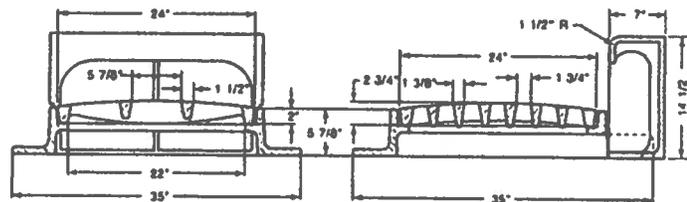
Heavy Duty



CATALOG NUMBER	GRATE TYPE	SQ. FT. OPEN	WEIR PERIMETER LINEAL FEET
R-3210-Q	Q	0.8	8.0

R-3220
Combination Inlet Frame, Convex Grate, Curb Box

Heavy Duty



Standard Grate (shown): Type C.
 Alternate Grate(s):

CATALOG NUMBER	GRATE TYPE	SQ. FT. OPEN	WEIR PERIMETER LINEAL FEET
R-3220	C	1.5	8.0
R-3220	R	1.6	8.0

Type B

Available with square curb face or radius face of 1", 1-1/2", 2" or 3".

CONSTRUCTION PERIOD POLLUTION PREVENTION PLAN

**CONSTRUCTION PERIOD POLLUTION
PREVENTION PLAN FOR A
PROPOSED STORMWATER MANAGEMENT SYSTEM**

located at

**62 MAPLE STREET
WENHAM, MASSACHUSETTS**



Applicant:

Maple Woods Housing, LLC
P.O. Box 507
Beverly, Massachusetts 01915

Prepared by:

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

November 6, 2014

Project Name: Maple Woods
Wenham, Massachusetts

Owner Name: Cedar Realty Trust
62 Maple Street
Wenham, MA

Party Responsible for Maintenance: Maple Woods Housing, LLC
P.O. Box 507
Beverly, MA 01915
(978) 922-1305

Project Description:

The applicant is proposing a multi-family residential apartment building under a comprehensive permit. The proposal will be developed on a new lot divided out of the locus parcel containing approximately 3.5 acres. A 24' wide access driveway is proposed from Maple Street to an associated parking lot. Area to the north of the proposed building will remain undeveloped. The proposed project includes conventional techniques for treatment and recharge of stormwater. Incorporated in this design is a subsurface infiltration facility, Stormceptor vortex units and deep sump catchbasins.

Erosion and Sedimentation Control Measures During Construction Activities

FilterMitt Erosion Control Sock

FilterMitt are proposed to be installed, as shown on the site plan, around the perimeter and up gradient of the wetland area. The barriers are burlap fabric mitts filled with compost blends and shall be installed prior to the commencement of any work on-site and in accordance with the design plans. An additional supply of mitts shall be on-site to replace and/or repair FilterMitts that have been disturbed. The lines of mitts shall be inspected and maintained on a weekly basis during construction. Deposited sediments shall be removed when the level of deposition reaches approximately one-half the height of the FilterMitt.

Storm Drain Inlet Protection

A temporary storm inlet protection filter will be placed around all catchbasin units. The purpose of the filter is to prevent the inflow of sediments into the closed drainage system. The filter shall remain in place until a permanent vegetative cover is established and the transport of sediment is no longer visibly apparent. The filter shall be inspected and maintained on a weekly basis and after every storm of 0.25 inches or more of rainfall/precipitation.

Surface Stabilization

The surface of all disturbed areas shall be stabilized during and after construction as soon as practical but no more than fourteen (14) days after construction activity has temporarily or permanently ceased on that portion of the site. Temporary measures shall be taken during construction to prevent erosion and siltation. No construction sediment shall be allowed to enter any infiltration systems or the raingarden. All disturbed slopes will be stabilized with a permanent vegetative cover. Stabilization netting or tackifier applied with hydroseeding shall be used on all slopes 3:1 or greater. Some or all of the following measures will be utilized on this project as conditions may warrant.

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

Street Sweeping

Any sediment tracked onto public right-of-ways or parking areas shall be swept at the end of each working day.

Subsurface Infiltration

The performance of the subsurface infiltration shall be checked weekly and after every major storm event during construction. No construction period runoff should be directed into the subsurface infiltration.

Interim Erosion Control

Additional erosion control measures shall be implemented as conditions warrant during construction or as directed by the owner or owner's representative.

Removal

When construction is complete, the contractor shall remove all siltation devices after re-vegetation of disturbed areas and after written approval from the project engineer.

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

- All materials on site will be stored inside in a neat, orderly, manner in their appropriate containers with the original manufacturer's label. Appropriate cover of materials shall be provided to prevent these chemicals from contact with rainwater.
- Only store enough material necessary. Whenever possible, all of a product shall be used up before disposing of container

- Manufacturer, local, and State recommendations for proper use and disposal shall be followed.

Construction Vehicles & Equipment

- At the end of each work day, all construction vehicles shall be parked outside the 100' buffer to the bordering vegetated wetlands.
- All fueling and maintenance of vehicles and equipment shall be performed outside resource buffer zones. Storage, handling and disposal of fuels and liquids in relation to construction vehicles and equipment shall be conducted in compliance with National Pollutant Discharge Elimination System (NPDES) General Permit for Discharges from Construction Activities (CGP) 2012 Section 2.3.

Spill prevention and response plans

- Spill Control Practices shall be in conformance with the guidelines set forth in the National Pollutant Discharge Elimination System (NPDES) CGP 2012.
- Clean up spills immediately, using dry cleanup methods where possible and dispose of used materials properly. Do not clean surfaces or spills by hosing the area down. Eliminate the source of the spill to prevent a discharge or a continuation of an ongoing discharge.
- Spill kits shall be readily available onsite during construction.

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

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

Requirements for storage and use of fertilizers, herbicides and pesticides

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

Provisions for solid waste management

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

Snow disposal and plowing plans relative to Wetland Resource Area

- Snow shall be plowed and stored on gravel, grass, or other permeable surfaces to allow filtration to occur.

- Once snow melts all sand salt and debris shall be extracted from surface and properly disposed of.
- Snow shall not be disposed of in any wetland resource area or waterbody.
- Avoid disposing snow on top of storm drain catchbasins or stormwater drainage swale.

Winter Road Salt and/or Sand use and storage restrictions

- Salt storage piles should be located outside the 100-year buffer zone and shall be covered at all times.
- The amount of road salt applied should be regulated to prevent over salting of roadways and increasing runoff concentrations. Alternative materials, such as sand or gravel, should be used in especially sensitive areas.

Roadway and Parking Lot sweeping schedule

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

STORMWATER MANAGEMENT
CONSTRUCTION PHASE

INSPECTION SCHEDULE AND EVALUATION CHECKLIST

PROJECT LOCATION: 62 Maple Street, Wenham, Massachusetts

Major Event = Rainstorm of 1/4-inch or more

Inspection Date	Inspector	Area Inspected	Best Management Practice (yes/no)	Required Inspection Frequency if BMP	Comments	Recommendation	Follow-up Inspection Required (yes/no)
		FilterMitt	No	Weekly and After Major Storm Events			
		Catchbasin	Yes	Weekly and After Major Storm Events			
		Subsurface Infiltration Structure	Yes	Weekly and After Major Storm Events			
		Stormceptor	Yes	Weekly and After Major Storm Events			
		Soil Stockpile Area	No	Weekly and After Major Storm Events			

(1) Refer to the Massachusetts Stormwater Handbook, Volume Two: Stormwater Technical Handbook (February 2008) for recommendations regarding frequency for inspection and maintenance of specific BMP's.

(2) Inspections to be conducted by a qualified professional knowledgeable in the principles & practice of erosion and sediment controls and pollution prevention

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

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

OPERATION AND LONG TERM MAINTENANCE PLAN

**OPERATION AND
LONG TERM MAINTENANCE PLAN**

located at

**62 MAPLE STREET
WENHAM, MASSACHUSETTS**



Applicant:

Maple Woods Housing, LLC
P.O. Box 507
Beverly, Massachusetts 01915

Prepared by:

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

November 6, 2014

Project Name: Maple Woods
Wenham, Massachusetts

Owner Name: Maple Woods Housing, LLC
P.O. Box 507
Beverly, MA

Party Responsible for Maintenance: Maple Woods Housing, LLC
P.O. Box 507
Beverly, MA 01915
(978) 922-1305

Project Description:

The applicant is proposing a multi-family residential apartment building under a comprehensive permit. The proposal will be developed on a new lot divided out of the locus parcel containing approximately 3.5 acres. A 24' wide access driveway is proposed from Maple Street to an associated parking lot. Area to the north of the proposed building will remain undeveloped. The proposed project includes conventional techniques for treatment and recharge of stormwater. Incorporated in this design is a subsurface infiltration facility, Stormceptor vortex units and deep sump catchbasins.

Inspection and Maintenance Measures After Construction

Erosion Control

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

Subsurface Infiltration Facilities

The infiltration facilities should be inspected after the first several rainfall events or first few months after construction, after all major storms (2-year), and on regular bi-annual scheduled dates. Poned water inside the system (as visible from the observation well) after several days often indicates that the bottom of the system is clogged.

Debris and Litter Removal

Trash may collect in the BMP's, potentially causing clogging of the facilities. All debris and litter shall be removed when necessary, and after each storm event.

Deep Sump Catchbasins

The catchbasins shall be inspected four (4) times per year, and if necessary, any maintenance shall be performed so that it functions as designed. The catchbasins shall be cleaned twice per year, or when sediment in the bottom of the sump reaches 24 inches below the bottom of the outlet. Inlet and outlet pipes should be checked for clogging. Catchbasin grates shall be kept free of snow and ice in the winter months and kept free of leaves, sand and debris during warmer months. At a minimum, inspection of the catchbasin shall be performed during the last week of April and the first week of October each year.

Stormceptor Water Quality Treatment Unit

The performance of all stormwater quality measures decrease as they fill with sediment. Although the maintenance frequency will be site specific, Rinker Materials recommends annual maintenance be performed when the sediment depth in the STC 900 unit reaches 8" and STC 2400 unit reaches 12". Oil is removed through the inspection/cleanout pipe and sediment is removed through the outlet riser pipe. Alternatively, oil could be removed from the outlet riser pipe if water is removed from the treatment chamber, lowering the oil level below the drop pipes.

In the event of any hazardous material spill, Rinker Materials recommends maintenance be performed immediately. Maintenance should be performed by a licensed liquid waste hauler. The appropriate regulatory agencies should also be notified.

Typically, maintenance is performed by the Vacuum Service Industry, a well-established sector of the service industry that cleans underground tanks, sewers, and catchbasins. Costs to clean a Stormceptor will vary based on the size of the unit and transportation distances.

The requirements for the disposal of material from a Stormceptor are similar to that of any other Best Management Practices (BMPs). Local guidelines should be consulted prior to disposal of the separator contents. In most areas the sediment, once dewatered, can be disposed of in a sanitary landfill. It is not anticipated that the sediment would be classified as a hazardous waste. In some areas, mixing the water with the sediment will create slurry that can be discharged into a trunk sanitary sewer. In all disposal options, approval from the disposal facility agency is required. Petroleum waste products collected in stormceptor (oil/chemical/fuel spills) should be removed by a licensed waste management company.

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

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

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

Vehicle washing controls

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

Requirements for routine inspection and maintenance of stormwater BMPs

- See Inspection and Maintenance Measures after Construction.

Spill prevention and response plans

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

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

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

Requirements for storage and use of fertilizers, herbicides and pesticides

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

Pet waste management

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

Provisions for operation and management of septic systems

- Per Town of Wenham Board of Health requirements and Title V.

Provisions for solid waste management

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

Snow disposal and plowing plans relative to Wetland Resource Area

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

Winter Road Salt and/or Sand use and storage restrictions

- Salt storage piles should be located outside the 100-year buffer zone and shall be covered at all times.
- The amount of road salt applied should be regulated to prevent over salting of roadways and increasing runoff concentrations. Alternative materials, such as sand or gravel, should be used in especially sensitive areas.

Roadway and Parking Lot sweeping schedule

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

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

- Not Applicable

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

- To be determined by the owner.

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

- To be determined by the owner.

STORMWATER MANAGEMENT
POST-CONSTRUCTION PHASE

INSPECTION SCHEDULE AND EVALUATION CHECKLIST

PROJECT LOCATION: 62 Maple Street, Wenham, Massachusetts

Inspection Date	Inspector	Area Inspected	Best Management Practice (yes/no)	Required Inspection Frequency if BMP	Recommendation	Follow-up Inspection Required (yes/no)
		Deep Sump Catchbasin	Yes	4 Times per year (Inspect and clean as necessary)		
		Stormceptor	Yes	Twice a year (1 st Year) Once a year		
		Subsurface Infiltration Structure	Yes	Twice a year		

Comments:

- (1) Refer to the Massachusetts Stormwater Handbook, Volume Two: Stormwater Technical Handbook (February 2008) for recommendations regarding frequency for inspection and maintenance of specific BMP's.
 - (2) Inspections to be conducted by a qualified professional knowledgeable in the principles & practice of erosion and sediment controls and pollution prevention
- Limited or no use of sodium chloride salts, fertilizers or pesticides recommended.
- Other notes: (Include deviations from: Con. Comm. Order of Conditions, PB Approval, Construction Sequence and Approved Plan)
- Stormwater Control Manager: _____