DGT Associates
Surveying &
Engineering

1071 Worcester Rd.
Framingham, MA 01701
508.879.0030
www.dgtassociates.com

25457

STORMWATER MANAGEMENT DESIGN AND RUNOFF CALCULATIONS REPORT

for

4 Marc Road

Medway, Massachusetts 02053

Prepared by:
DGT Associates
1071 Worcester Road
Framingham, MA 01701
508-879-0030

July 25, 2019

25457

TABLE OF CONTENTS

APPENDICES

25457

SECTION 1

STORMWATER MANAGEMENT REPORT

NARRATIVE AND SUMMARY

for

4 Marc Road
Medway, Massachusetts 02053

25457

SECTION 1

STORMWATER NARRATIVE & SUMMARY

This report contains the hydrologic computations and design information relative to the existing and proposed stormwater runoff conditions for the proposed development at #4 Marc Road in Medway, MA.

It includes information on the proposed stormwater management system design and assessment of stormwater impacts of the proposed project.

The report also includes the following documents:

- Stormwater Summary Calculations (Section 2)
- Soils Information (Appendix 1)
- Long-Term Pollution Prevention Plan (Appendix 2)
- Stormwater Operation and Maintenance Plan (Appendix 5)

An Erosion and Sediment Control Plan is included as part of the site plan set. However, this project is not subject to the U.S. EPA's Construction General Permit under the NPDES Program. Therefore, a full Stormwater Pollution Prevention Plan (SWPPP) will not be required.

The hydrologic model for existing and proposed stormwater runoff conditions at the site are included in Sections 3 and 4 respectively. The watershed maps for the models are in Appendices 3 and 4.

General Project Description

The proposed project includes interior modifications to an existing building, the construction of a 3,000 square foot concrete mechanical pad, with associated stormwater management improvements to include maintenance to an existing drainage ditch tributary to a wetland resource area located at the northeast portion of the subject property.

The property has an area of 290,884± square feet (6.68± acres). Under existing conditions, the site is currently developed with a 29,718± square foot industrial manufacturing building, with associated driveway access, parking areas, landscape improvements, utilities, and some stormwater management features. A large portion of the site remains undeveloped containing wooded areas and wetland resource areas at the northeast portion of the site. Currently the existing site contains 68,012 square feet of impervious surface (23.4%). Under proposed conditions, the site will contain 71,012 square feet of impervious surface (24.4%).

There are wetland resource areas on and adjacent to the northeast portion of the property. Per request of the Medway Conservation Commission, there is some work proposed within the buffer zone and resource area on the subject property. As such, the proposed project is subject to the Massachusetts Wetlands Protection Act and the Rules and Regulations of the Town of Medway Conservation Commission and the Town of Medway Conservation Commission General Wetland Protection By-Law.

The proposed site work for the project is shown on the site plans and includes the following:

- Interior renovations to the existing industrial building.
- Construction of a 3,000 square foot concrete mechanical pad to house the odor pollution control equipment, as well as some HVAC equipment.
- Construction of several stormwater Best Management Practices (BMPs) including a one (1) recharge (infiltration) system and three (3) proprietary stormwater treatment units (CDS Technologies – referred to a Water Quality Units (WQU) in this report). The BMP treatment trains are designed to provide water quality improvements and to provide groundwater recharge.
- Installation of oil and debris traps in all existing catch basins on-site.
- The performance of maintenance excavation in the existing manmade drainage ditch (approximately 160 linear feet), to promote drainage flow, as well as the performance of general clean up in and around the drainage ditch to restore a more natural and clean landscape in the area of proposed work. This work is to include the installation of a rip-rap plunge pool at the existing outfall from the existing site drainage infrastructure to the drainage ditch.
- Installation of construction period erosion and sedimentation controls.

Existing Site Description

The existing conditions of the site are shown on the "Existing Conditions Plan" in the site plan set and on the "Existing Conditions Watershed Map" included with this report.

The site is located on the north side of the cul-de-sac at the end of Marc Road. The site is currently developed with a 29,718± square foot industrial manufacturing building, with associated driveway access, parking areas, landscape improvements, utilities, and some stormwater management features. A large portion of the site remains undeveloped containing wooded areas and wetland resource areas at the northeast portion of the site. The total area of the site is 290,884± square feet (6.68± acres). Currently the existing site contains 68,012 square feet of impervious surface (23.4%).

The existing site is bound by Marc Road to the south as well as an undeveloped industrial zoned lot, an unpaved 30 foot wide private way with undeveloped agricultural / residential zoned lots to the west, undeveloped agricultural / residential zoned lots containing wetlands and a vernal pool to the north, and another industrial use building to the east.

The parcel is known as Parcel ID: 32-026 in the assessor's records and is located in the I-1 zoning district within the East Industrial Underlying Zoning District. A portion of the site at the northeast and east of the site is also located within the Groundwater Protection District. This district coincides with the portion of the lot located within a Zone II Wellhead Protection Area, which is a Critical Area per the Massachusetts Stormwater Regulations.

The property lies in zone "x-unshaded" (areas determined to be outside the 0.2% annual chance floodplain) as shown on FEMA Flood Insurance Rate Map number 25021C0142E

Dated July 17, 2012. So the land is not within an "Area Subject to Flooding" under the Wetland Protection Act.

Existing Stormwater Runoff
Assessment of stormwater runoff conditions is based on the topographic information shown on the Existing Conditions Plan and field reconnaissance by DGT Associates. Roof runoff and runoff from a majority of the existing paved impervious surfaces is captured and directed into the existing drainage infrastructure. This infrastructure outlets into a drainage ditch which leads to a jurisdictional intermittent stream located between the bordering vegetated wetland areas at the northeast portion of the site. These wetland resource areas also receive runoff from surrounding landscaped and wooded areas directly. The areas of runoff outlined above that leads to the wetland areas are described as subcatchment (E-1) in the hydrologic model. A small portion of the existing site flows overland to Marc Road. This flow is described as subcatchment (E-2) in the hydrologic model.

The Stormwater Model includes these two "Design Points" for analysis. Design Point 1 (DP-1) is the flow to the wetland at the northeast of the property. Design Point 2 (DP-2) is the flow to Marc Road at the south side of the property.

The peak rates of runoff and volumes to these locations for existing and proposed conditions flows for the 2, 10, 25 and 100-year storms are shown on the summary tables in Section 2 of this report. Other points of interest can also be determined from the model printouts in Sections 3 and 4.

Soils and Groundwater
According to the Natural Resources Conservation Service (NRCS) Soils Mapping, the soil in the area of testing is Charlton-Hollis-Rock outcrop complex. The testing generally confirmed the NRCS data. The substratum soil is a gravelly sandy loam, derived from ablation till. The major limitation for these soils is that they can vary in depth to ledge, limiting the area that can be used for stormwater infiltration. For runoff computation purposes, the Hydrologic Soil Groups are categorized as HSG "A".

As previously mentioned above, the site's existing stormwater infrastructure outfalls to a Critical Area (Zone II), therefore the water quality volume calculations are based on 1 inch.

DGT Associates performed on-site soil testing on July 16, 2019. A copy of the Soil Report is included in Appendix 1. The testing revealed varied results throughout the three areas of testing. In general, two of the three areas tested do not support the design of a stormwater recharger (infiltration) system.

The substratum soil within the area that does support an infiltration system (proposed recharger system) was consistent with a firm sandy loam. No signs of the Estimated Seasonal High Groundwater Table (ESHGWT) were observed during the testing, and monitor wells were installed for the future monitoring of the groundwater. Ledge was observed 9 feet below grade in one of the two test pits performed in the area of the

proposed recharger. The elevation of the bottom of the test pits are used as the design ESHGWT at this time.

A permeability test utilizing the US Army Corps of Engineers method "In-situ Permeability Testing in the Vadose Zone" was performed in the substratum of one of the test pits. The observed permeability rate was 1.7 inches per hour. The design permeability rate that will be used for stormwater infiltration will be based on the RAWLS rate published in the Massachusetts Stormwater Handbook of 1.02 inches per hour (sandy loam).

Proposed Stormwater Management Design
The proposed project includes several stormwater Best Management Practices. Limited Impact Development (LID) concepts have been considered for this project.

The following summarizes the features of the proposed stormwater management design:

1. A recharge (infiltration) system receives pretreated runoff through a series of area drains and a water quality unit (CDS) from a concrete mechanical pad to provide groundwater recharge as well as water quality treatment.

2. Existing catch basins will be fitted with "Eliminator" oil and debris traps and two (2) existing drain manholes will be removed and replaced with proprietary water quality units (CDS) for pretreatment prior to discharging to the drainage ditch.

3. The performance of maintenance excavation in the existing drainage ditch (approximately 160 linear feet), to promote drainage flow, as well as the performance of general clean up in and around the drainage ditch to restore a more natural and clean landscape in the area of proposed work. This work is to include the installation of a rip-rap plunge pool at the existing outfall from the existing site drainage infrastructure to the drainage ditch.

Proposed Stormwater Runoff
Assessment of stormwater runoff conditions is based on the proposed site layout as shown on the Site Plans. The existing and proposed subcatchment are relatively similar due to the minimal amount of proposed site work. Runoff from the proposed concrete mechanical pad (subcatchment P-1b) is routed to the infiltration system through a series of area drains and a water quality unit (CDS). Overflow from the recharger is routed into the existing drainage infrastructure and outfalls at the drainage ditch at the northeast portion of the site (DP-1). All other runoff from the site that leads to the drainage ditch at the northeast portion of the site remains unchanged (subcatchment P-1a). A small portion of the existing site continues to flows overland to Marc Road. This flow is described as subcatchment (P-2) in the hydrologic model (note: E-2=P-2).

The peak rates of runoff and volumes to these locations for existing and proposed conditions flows for the 2, 10, 25 and 100-year storms are shown on the summary tables in Section 2 of this report. For simplicity, both the existing and proposed hydrologic models use a time of concentration equal to 5 minutes.

For all storm events, the peak flows and volumes are reduced to DP-1 and remain unchanged to DP-2.

Watershed Modeling and Best Management Practices Design

The hydrologic analysis of the existing conditions and proposed watershed was based on the nationally recognized watershed modeling techniques developed by the USDA, Soil Conservation Service (SCS). The techniques and runoff models are described in the following SCS publications:

"Urban Hydrology for Small Watersheds, Technical Release Number 55", 1986 and Technical Release 20.

National Engineering Handbook, Hydrology, Section 4, 1972.

"A Method for Estimating Volume and Rate of Runoff in Small Watersheds, Technical Release No. 149" 1973.

"Hydrology Handbook for Conservation Commissions" March 2002, Mass. DEP.

The watershed modeling was performed using computer software "HydroCAD" version 10.0 by Applied Microcomputer Systems, which is based on the publications referenced above.

Best management practices were designed utilizing the following publications: DEP "Stormwater Management Standards Handbook", February, 2008

Rainfall depths for 24-hour duration storms per the NOAA Atlas 14, Volume 10, Version 3 selected for the hydrologic analysis computations are as follows:

2 year storm	3.37 inches
10 year storm	5.26 inches
25 year storm	6.45 inches
100 year storm	8.27 inches

25457

SECTION 2

Stormwater Summary
MA DEP "Checklist for Stormwater Report"
Standards Summary
Illicit Discharge Statement
Standard 3 – Recharge Calculations and
Standard 4 -TSS Removal Calculations
Water Quality Unit Design Calculations

for

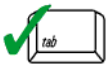
4 Marc Road
Medway, Massachusetts 02053

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.

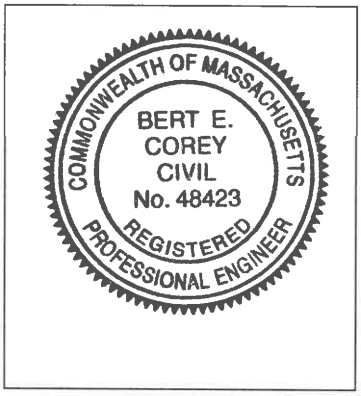
Note: Because stormwater requirements vary from project to project, it is possible that a complete Stormwater Report may not include information on some of the subjects specified in the Checklist. If it is determined that a specific item does not apply to the project under review, please note that the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



Bert E Cory 7/25/19
Signature and Date

Checklist

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

☐ New development

☐ Redevelopment

☒ Mix of New Development and Redevelopment

Checklist for Stormwater Report

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): Subsurface Recharger

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.

4 MARC ROAD, MEDWAY

Stormwater Standards Summary

MassDEP Stormwater Management Standards:

Standard 1: (Untreated Discharges)

There are no new stormwater conveyances proposed that discharge untreated stormwater directly to or cause erosion in wetlands or waters of the Commonwealth.

Standard 2: (Peak rate control and flood protection)

Under proposed conditions, there is a 3,000 square foot increase in impervious area (existing: 68,012 sf; proposed: 71,012 sf). The proposed stormwater system is designed to mitigate all peak flows and runoff volumes from any storm event up to and including the 100-year storm. The computations have been made for the 2, 10, 25 and 100-year design storm events. The infiltration BMP proposed for the new construction is over sized and results in a net positive impact on peak flows and volumes for the entire site.

TABLE 1 - Existing vs. Proposed Peak Flows and Volumes at Design Points

		DP#1 (Wetlands to the Northeast)			
Storm Event	24 hr Rainfall	Peak Flow (cfs)		Volume (Acre feet)	
		Existing	Proposed	Existing	Proposed
2 year	3.37 in	0.26	0.25	0.081	0.080
10 year	5.26 in	3.92	3.88	0.394	0.390
25 year	6.45 in	8.18	8.09	0.674	0.670
100 year	8.27 in	16.06	15.88	1.189	1.187

		DP#2 (Marc Road)			
Storm Event	24 hr Rainfall	Peak Flow (cfs)		Volume (Acre feet)	
		Existing	Proposed	Existing	Proposed
2 year	3.37 in	0.00	0.00	0.000	0.000
10 year	5.26 in	0.02	0.02	0.010	0.010
25 year	6.45 in	0.11	0.11	0.026	0.026
100 year	8.27 in	0.50	0.50	0.064	0.064

Standard 3: (Recharge to Groundwater)

There are no known infiltration or stormwater treatment BMP's under existing conditions.

Published NRCS soil data indicates "Charlton-Hollis-Rock outcrop complex." This classification was confirmed with the on-site soil testing. A permeability test utilizing the US Army Corps of Engineers method "In-situ Permeability Testing in the Vadose Zone" was performed in the substratum of one of the test pits within the area of the proposed recharger (infiltration) system. The observed permeability rate was 1.7 inches per hour. The design permeability rate that will be used for stormwater will be based on the

RAWLS rate published in the Massachusetts Stormwater Handbook of 1.02 inches per hour (sandy loam). No signs of the Estimated Season High Groundwater Table (ESHGWT), including Redoximorphic Features and weeping or standing groundwater, were observed in test holes within the area of the proposed recharger, therefore the design ESHGWT for the will be the bottom of the test holes.

For hydrologic purposes, the soil is classified as HSG "A." Under MassDEP Stormwater standards, the required recharge volume is based on a target factor of 0.6." This equates to a required recharge volume of is 146.7 cubic feet. However, because the stormwater discharges to a Critical Area (Zone II), a Water Quality Volume (WQV) of 1" is required. Therefore, the required recharger volume for water quality is 250.0 cubic feet.

Runoff from the proposed concrete mechanical pad will be directed to a series of in-line area drains, which will then be routed through a proposed water quality unit prior to entering the proposed recharger system. The recharger system consists of four (4) rows of two (2) underground plastic Cultec 330XLHD chambers which are approximately four (4) feet wide by eight and a half (8.5) feet long by two and a half (2.5) feet high (note: the rechargers overlap by approximately 1.5 feet per row). The recharge volume captured by the recharger is 800 cubic feet, which exceeds the required recharger volume. The proposed infiltration BMP will drain in less than 72 hours. Overflow is directed to a raised manifold with an outlet pipe and cleanout that is directed to an existing drain manhole before ultimately discharging into the existing drainage ditch at the north east portion of the site.

Standard 4: (80% TSS Removal)

Runoff from the new proposed impervious concrete mechanical pad will be directed to a series of in-line area drains, which will then be routed through a proposed water quality unit to provide the proper pretreatment prior to entering the proposed recharger system to provide 80% TSS removal for this treatment train.

Improvements to the stormwater runoff generated from the existing impervious surface have also been included as part of this projects scope. Existing catch basins located within the driveway entrance to the site and parking lot areas will be fitted with "Eliminator" oil and debris traps to provide some TSS removal prior to discharging to two (2) proposed water quality units to provide 50% TSS removal for these treatment trains, before ultimately discharging to the drainage ditch at the north east portion of the site.

A Long-Term Pollution Prevention Plan LTPPP is included in Appendix 2.

Standard 5: (Land Use with Higher Potential Pollutant Load)

Not Applicable.

Standard 6: (Critical Areas)

Stormwater does discharge near or to a Critical Area (Zone II). Therefore, The New Construction portion of the site is designed to meet the 1" of water quality volume and 44% TSS removal prior to entering the recharger system (note: both minimum requirements have been exceeded in our design). This treatment train is designed for 80% TSS removal. For the redevelopment portion of the site, a 50% TSS removal treatment

train has been provided for the portion of the existing impervious area captured by the existing catch basins prior to discharging to the critical area.

Also, as part of the proposed work for this project, the applicant will be performing maintenance excavation and cleaning in / around the drainage ditch to help promote drainage flow and to help restore a more natural / clean channel.

Standard 7: (Redevelopment)

The project is a partial New Construction, partial Redevelopment project. As required, all of the Stormwater Standards have been met fully for the New Construction Portion of the site and an effort has been put forth to comply with Standards 1, 2, 3, and 4 for the Redevelopment portion of the site.

The project reduces the peak flows and volume to the Wetland at the northeast portion of the site while maintaining the existing peak flows and volume to Marc Road. For the redevelopment portion of the site, a 50% TSS removal treatment train has been provided for the portion of the existing impervious site captured by the existing catch basins prior to discharging to the critical area.

Also, as part of the proposed work for this project, the applicant will be performing maintenance excavation and cleaning in / around the drainage ditch to help promote drainage flow and to help restore a more natural / clean landscape.

A Long-Term pollution plan, a stormwater operation and maintenance plan, an erosion control plan, and an illicit discharge statement are included in the Stormwater Report.

Standard 8: (Erosion, Sediment Control)

Erosion and sediment control BMPs are included in the Erosion and Sediment Control Plan as part of the Site Plan set.

Standard 9: (Operation & Maintenance)

An Operation and Maintenance Plan for the stormwater system (infiltration) is included in Appendix 5.

Standard 10: (Illicit Discharges)

An Illicit Discharge Statement is included with this Stormwater Report.

DGT Associates
Surveying &
Engineering

1071 Worcester Rd.
Framingham, MA 01701
508.879.0030
www.dgtassociates.com

July 25, 2019

Job No.: 25457

Town of Medway Conservation Commission
155 Village Street
Medway, MA 02053

RE: Illicit Discharge Compliance Statement

The following statements are made regarding the proposed site development at #4 Marc Road in Medway, MA:

- The proposed site development design will be in compliance with state and local building codes. There are no illicit discharges designed or proposed.
- Sewage generated from the building will continue to enter the Medway public sewer.
- The design of the proposed stormwater system includes no proposed illicit discharges and no illicit discharge connections.
- A Long-Term Pollution Prevention Plan for the stormwater system has been included in the Stormwater Report.

Please feel free to contact me if you have any questions.

Sincerely yours,
DGT Associates

Bert E. Corey, P.E.
Engineering Group Manager

Standard 3
Recharge Calculations

and

Standard 4
Water Quality & TSS Removal Calculations

DGT Associates
Surveying & Engineering

1071 Worcester Rd.
Framingham, MA 01701
508.879.0030
www.dgtassociates.com

Stormwater Calculations - Recharge

4 Marc Road, Medway, MA

Proposed Impervious Area	= 71,012 sf
Existing Impervious Area	= 68,012 sf
Increase in Impervious Area	= 3,000 sf

Soils HSG: A → Recharge = 0.6 inches of runoff

Minimum Required Recharge:
(3,000 sf)(0.6 in ÷ 12in/ft) = 150 ft^3

All proposed impervious surfaces will be collected and routed to the proposed recharge (infiltration) system.

The existing drainage network drains to a Critical Area (Zone II). Therefore, all recharge facilities are designed for 1 inch capture volume to meet the Water Quality Volume (WQV) requirements. Below are the recharger calculations based on 1 inch of WQV:

(3,000 sf)(1 in ÷ 12in/ft) = 250 ft^3

Capture Volume provided by infiltration system: 800 cf > 250 cf ←Okay

Note: See attached HydroCAD print out for provided Capture Volume Calculations

Recharger #1 Drawdown Calculation:
$Time_{drawdown}$ = (800 ft^3) ÷ (435 ft^2)(1.02 in/hr)(1/12 in/ft) = 21.6 hrs ≤ 72 hours ← Okay

Stage-Area-Storage for Pond Pd-1: Recharger

Elevation (feet)	Horizontal (sq-ft)	Storage (cubic-feet)
167.96	**435**	0
168.01	435	9
168.06	435	17
168.11	435	26
168.16	435	35
168.21	435	44
168.26	435	52
168.31	435	61
168.36	435	70
168.41	435	78
168.46	**435**	87
168.51	435	103
168.56	435	119
168.61	435	135
168.66	435	151
168.71	435	167
168.76	435	183
168.81	435	199
168.86	435	215
168.91	435	231
168.96	435	247
169.01	435	263
169.06	435	278
169.11	435	294
169.16	435	310
169.21	435	325
169.26	435	341
169.31	435	356
169.36	435	372
169.41	435	387
169.46	435	403
169.51	435	418
169.56	435	433
169.61	435	449
169.66	435	464
169.71	435	479
169.76	435	494
169.81	435	509
169.86	435	524
169.91	435	539
169.96	435	553
170.01	435	568
170.06	435	582
170.11	435	596
170.16	435	610
170.21	435	624
170.26	435	638
170.31	435	651
170.36	435	664
170.41	435	678
170.46	435	690
170.51	435	703
170.56	435	715
170.61	435	727
170.66	435	739
170.71	435	750
170.76	435	761
170.81	435	772
170.86	435	781
170.91	435	791
170.96	435	800
171.01	435	808
171.06	435	817
171.11	435	826
171.16	435	835
171.21	435	843
171.26	435	852
171.31	435	861
171.36	435	869
171.41	435	878
171.46	435	**887**

DGT Associates
Surveying & Engineering

1071 Worcester Rd.
Framingham, MA 01701
508.879.0030
www.dgtassociates.com

Stormwater Calculations – Water Quality Treatment

4 Marc Road, Medway, MA

PROPOSED CONDITIONS

Required Water Quality Volume

Increase of Proposed Impervious Areas:

Paved Area	=	3,000 sf (0.07 acres)
Total Impervious Area	=	3,000 sf (0.07 acres)

The required water quality volume equals 1 inch of runoff times the new impervious area of the post-development site.

WQV = (3,000 sf)(1 in)(1 ft/12in) = 250 cf

Capture volume provided by Rechargers: 800 cf > 250 cf ← Okay

TSS Removal Rate

Refer to attached TSS Removal Calculation Worksheets

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

Non-automated: Mar. 4, 2008

Location: Subcatchment P-1b (concrete Pad)

TSS Removal Calculation Worksheet

A BMP[1]	B TSS Removal Rate[1]	C Starting TSS Load*	D Amount Removed (B*C)	E Remaining Load (C-D)
Proposed Recharger w/Pretreatment	0.80	1.00	0.80	0.20
Note: Pretreatment Provided by area drains and a Water Quality Unit (CDS)				

Total TSS Removal = 0.80

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

Project: 4 Marc Road, Medway
Prepared By: DGT Associates
Date: July 25, 2019

*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

INSTRUCTIONS:

Non-automated: Mar. 4, 2008

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: Flow to Ex CBs #132 (Portion of P-2c)

TSS Removal Calculation Worksheet

A BMP[1]	B TSS Removal Rate[1]	C Starting TSS Load*	D Amount Removed (B*C)	E Remaining Load (C-D)
Water Quality Unit #3	0.50	1.00	0.50	0.50
Note: some prior TSS removal will				
be provided by the "Eliminator"				
Oil & Debris Trap installed in the CBs				

Total TSS Removal = 0.50

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

Project: 4 Mare Road, Medway

Prepared By: DGT Associates

Date: July 25, 2019

*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

INSTRUCTIONS:

Non-automated: Mar. 4, 2008

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: Flow to ExCBs #4-7 (Bottom of P-1a)

TSS Removal Calculation Worksheet

A BMP[1]	B TSS Removal Rate[1]	C Starting TSS Load*	D Amount Removed (B*C)	E Remaining Load (C-D)
Water Quality Unit #2	0.50	1.00	0.50	0.50
Note: Some prior TSS removal will				
be provided by the "Eliminator"				
0.13 Debris Trap installed in the CBs				

Total TSS Removal = 0.50

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

Project: 4 Marc Road, Medway

Prepared By: DGT Associates

Date: July 25, 2019

*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

DGT Associates
Surveying & Engineering

1071 Worcester Rd.
Framingham, MA 01701
508.879.0030
www.dgtassociates.com

Water Quality Unit Design

4 Marc Road, Medway, MA

Computational method to convert Water Quality Volume (WQV) to Equivalent Peak Water Quality Flow Rate (WQF)

Reference: MassDEP Notice dated November 1, 2010

$WQF = (q_u)(A)(WQV)$

Where q_u = unit peak discharge (cfs / (mi^2 x in x s))
A = impervious surface drainage area (mi^2)
WQV = water quality volume (1.0 inch)
WQF = water quality flow rate (cfs)

T_c = 5.0 minutes (for all subcatchments)
From Figure 2: q_u = 800 cfs / (mi^2 x in x s)

Stormwater Treatment Unit	q_u	A (sf)	A (mi^2)	WQV (in)	WQF (cfs)	Unit Proposed
WQU #1	773	3,000	0.0001	1.0	0.077	CDS-3
WQU #2	773	42,029	0.0015	1.0	1.160	CDS-5
WQU #3	773	6,236	0.0002	1.0	0.154	CDS-3

State of New Jersey
DEPARTMENT OF ENVIRONMENTAL PROTECTION
Bureau of Nonpoint Pollution Control
Division of Water Quality
401-02B
Post Office Box 420
Trenton, New Jersey 08625-0420
609-633-7021 Fax: 609-777-0432
http://www.state.nj.us/dep/dwq/bnpc_home.htm

CHRIS CHRISTIE
Governor

KIM GUADAGNO
Lt. Governor

BOB MARTIN
Commissioner

March 21, 2017

Derek M. Berg
Contech Engineered Solutions, LLC
71 US Route 1, Suite F
Scarborough, ME 04074

Re: Revised MTD Lab Certification
Continuous Deflective Separator (CDS®) Stormwater Treatment Device by Contech Engineered Solutions, LLC
On-line Installation

TSS Removal Rate 50%

Dear Mr. Berg:

This revised certification letter supersedes the Department's prior certification dated January 9, 2015. This revision was completed to reflect the updated Manufactured Treatment Device (MTD) scaling methodology as agreed upon by the manufacturers' working group on September 19, 2016. In part, the updated scaling for hydrodynamic MTDs is based on the depth of the reference (tested) MTD from the top of the false floor utilized during removal efficiency testing, not from the physical bottom of the unit. Based on the above decision, Table A-2 of the NJCAT Technology Verification report located at http://www.njcat.org/uploads/newDocs/CDSVerificationReportFinal1.pdf has been revised, and Table 1 noted below has been added.

The Stormwater Management rules under N.J.A.C. 7:8-5.5(b) and 5.7 (c) allow the use of manufactured treatment devices (MTDs) for compliance with the design and performance standards at N.J.A.C. 7:8-5 if the pollutant removal rates have been verified by the New Jersey Corporation for Advanced Technology (NJCAT) and have been certified by the New Jersey Department of Environmental Protection (NJDEP). Contech Engineered Solutions, LLC has requested an MTD Laboratory Certification for the CDS® Stormwater Treatment Device.

The verification is subject to the "Procedure for Obtaining Verification of a Stormwater Manufactured Treatment Device from New Jersey Corporation for Advance Technology" dated January 25, 2013. The applicable protocol is the "New Jersey Laboratory Testing Protocol to Assess Total Suspended Solids Removal by a Hydrodynamic Sedimentation Manufactured Treatment Device" dated January 25, 2013.

NJCAT verification documents submitted to the NJDEP indicate that the requirements of the aforementioned protocol have been met or exceeded. The NJCAT letter also included a recommended certification TSS removal rate and the required maintenance plan. The NJCAT Verification Report with the Verification

Appendix dated September 2014 (Revised January 2017) for this device is published online at http://www.njcat.org/verification-process/technology-verification-database.html.

The NJDEP certifies the use of the CDS® Stormwater Treatment Device by Contech Engineered Solutions, LLC at a TSS removal rate of 50% when designed, operated, and maintained in accordance with the information provided in the Verification Appendix and the following conditions:

1. The maximum treatment flow rate (MTFR) for the manufactured treatment device (MTD) is calculated using the New Jersey Water Quality Design Storm (1.25 inches in 2 hrs) in N.J.A.C. 7:8-5.5.

2. The CDS® Stormwater Treatment Device shall be installed using the same configuration reviewed by NJCAT and shall be sized in accordance with the criteria specified in item 6 below.

3. This CDS® Stormwater Treatment Device cannot be used in series with another MTD or a media filter (such as a sand filter) to achieve an enhanced removal rate for total suspended solids (TSS) removal under N.J.A.C. 7:8-5.5.

4. Additional design criteria for MTDs can be found in Chapter 9.6 of the New Jersey Stormwater Best Management Practices (NJ Stormwater BMP) Manual which can be found on-line at www.njstormwater.org.

5. The maintenance plan for a site using this device shall incorporate, at a minimum, the maintenance requirements for the CDS® Stormwater Treatment Device. A copy of the maintenance plan is attached to this certification. However, it is recommended to review the maintenance website at http://www.conteches.com/products/stormwater-management/treatment/cds.aspx#1822141-technical-info for any changes to the maintenance requirements.

6. Sizing Requirements:

   The example below demonstrates the sizing procedure for the CDS®:

   Example: A 0.25-acre impervious site is to be treated to 50% TSS removal using a CDS®. The impervious site runoff (Q) based on the New Jersey Water Quality Design Storm was determined to be 0.79 cfs.

   Maximum Treatment Flow Rate (MTFR) Evaluation:

   The site runoff (Q) was based on the following:
   time of concentration = 10 minutes
   i=3.2 in/hr (page 5-8, Fig. 5-3 of the NJ Stormwater BMP Manual)
   c=0.99 (runoff coefficient for impervious)
   Q=ciA=0.99x3.2x0.25=0.79 cfs

   Given the site runoff is 0.79 cfs and based on Table 1 below, the CDS® Model CDS-4 with an MTFR of 0.93 cfs would be the smallest model approved that could be used for this site that could remove 50% of the TSS from the impervious area without exceeding the MTFR.

The sizing table corresponding to the available system models is noted below. Additional specifications regarding each model can be found in the Verification Appendix under Table A-1 and A-2.

Table 1 CDS Models

CDS Model	Manhole Diameter (ft.)	Treatment Chamber Depth (ft.)	MTFR (cfs)
CDS-3	3	3.50	0.52
CDS-4	4	3.50	0.93
CDS-5	5	3.75	1.5
CDS-6	6	4.50	2.1
CDS-7	7	5.25	2.8
CDS-8	8	6.00	3.7
CDS-10	10	7.50	5.8
CDS-12	12	9.00	8.4

- Treatment Chamber Depth is defined as the depth below the invert to the top of the false floor installed at 50% sediment depth.

A detailed maintenance plan is mandatory for any project with a Stormwater BMP subject to the Stormwater Management Rules, N.J.A.C. 7:8. The plan must include all of the items identified in the Stormwater Management Rules, N.J.A.C. 7:8-5.8. Such items include, but are not limited to, the list of inspection and maintenance equipment and tools, specific corrective and preventative maintenance tasks, indication of problems in the system, and training of maintenance personnel. Additional information can be found in Chapter 8: Maintenance and Retrofit of Stormwater Management Measures.

If you have any questions regarding the above information, please contact Mr. Shashi Nayak of my office at (609) 633-7021.

Sincerely,

James J. Murphy, Chief
Bureau of Nonpoint Pollution Control

Attachment: Maintenance Plan

c: Chron File
Richard Magee, NJCAT
Vince Mazzei, NJDEP - DLUR
Ravi Patraju, NJDEP - BES
Gabriel Mahon, NJDEP - BNPC
Shashi Nayak, NJDEP – BNPC

25457

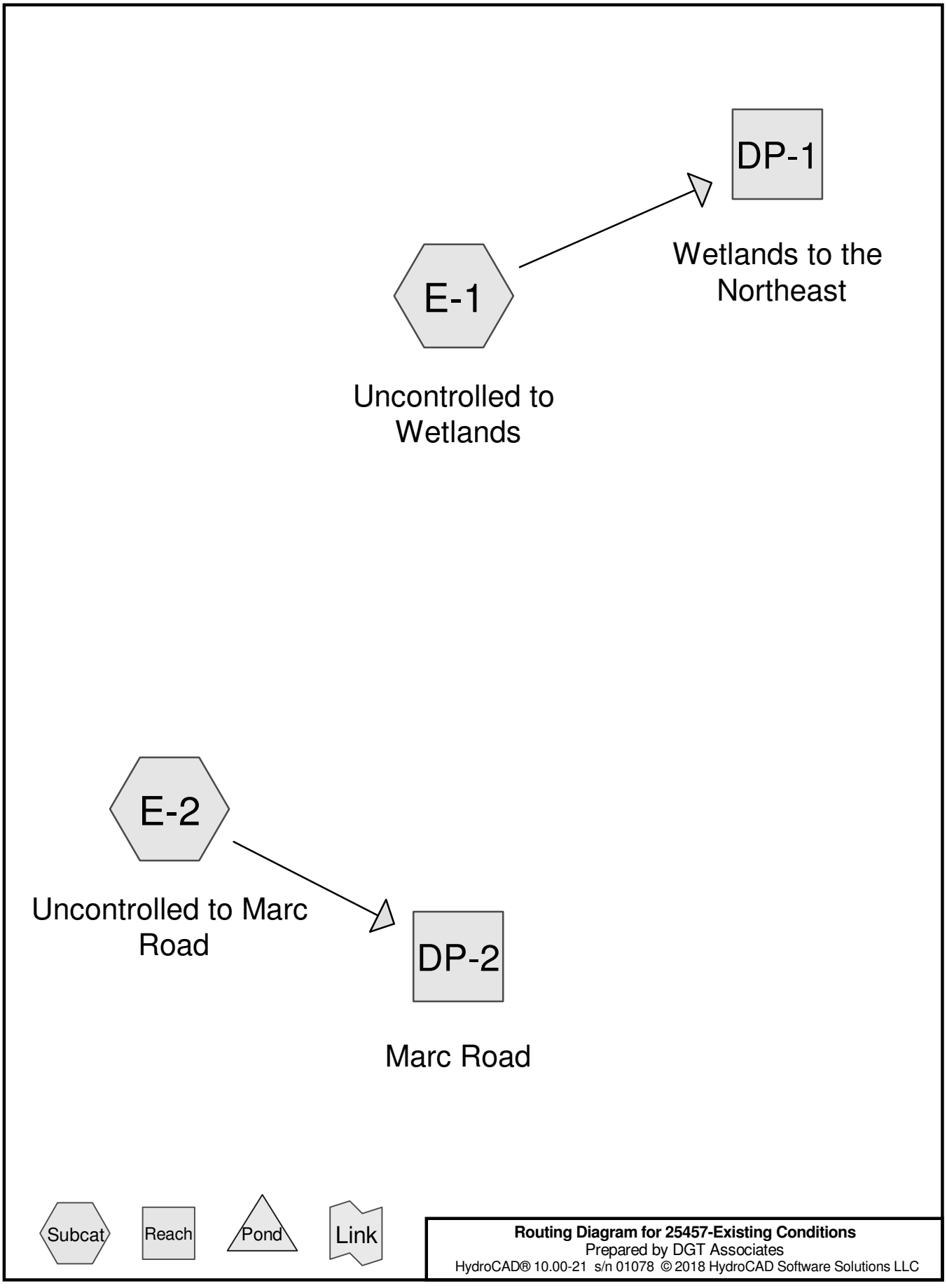
SECTION 3

Existing Conditions Stormwater Model
showing Stormwater Flows and Flood Routing
Computations using HydroCAD version 10.00

for

4 Marc Road

Medway, Massachusetts 02053



Routing Diagram for 25457-Existing Conditions
Prepared by DGT Associates

Area Listing (all nodes)

Area (acres)	CN	Description (subcatchment-numbers)
0.217	68	<50% Grass cover, Poor, HSG A (E-1)
0.911	39	>75% Grass cover, Good, HSG A (E-1, E-2)
0.038	96	Gravel surface, HSG A (E-1)
0.830	98	Paved parking, HSG A (E-1, E-2)
0.682	98	Roofs, HSG A (E-1)
0.049	98	Unconnected pavement, HSG A (E-1, E-2)
3.950	30	Woods, Good, HSG A (E-1, E-2)
6.678	**49**	**TOTAL AREA**

Time span=0.00-30.00 hrs, dt=0.01 hrs, 3001 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Subcatchment E-1: Uncontrolled to Wetlands Runoff Area=257,179 sf 25.63% Impervious Runoff Depth=0.17"
Tc=5.0 min CN=50 Runoff=0.26 cfs 0.081 af

Subcatchment E-2: Uncontrolled to Marc Road Runoff Area=33,705 sf 6.24% Impervious Runoff Depth=0.00"
Tc=5.0 min CN=36 Runoff=0.00 cfs 0.000 af

Reach DP-1: Wetlands to the Northeast Inflow=0.26 cfs 0.081 af
Outflow=0.26 cfs 0.081 af

Reach DP-2: Marc Road Inflow=0.00 cfs 0.000 af
Outflow=0.00 cfs 0.000 af

Total Runoff Area = 6.678 ac Runoff Volume = 0.081 af Average Runoff Depth = 0.15"
76.62% Pervious = 5.116 ac 23.38% Impervious = 1.561 ac

Time span=0.00-30.00 hrs, dt=0.01 hrs, 3001 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Subcatchment E-1: Uncontrolled to Wetlands Runoff Area=257,179 sf 25.63% Impervious Runoff Depth=0.80"
Tc=5.0 min CN=50 Runoff=3.92 cfs 0.394 af

Subcatchment E-2: Uncontrolled to Marc Road Runoff Area=33,705 sf 6.24% Impervious Runoff Depth=0.15"
Tc=5.0 min CN=36 Runoff=0.02 cfs 0.010 af

Reach DP-1: Wetlands to the Northeast Inflow=3.92 cfs 0.394 af
Outflow=3.92 cfs 0.394 af

Reach DP-2: Marc Road Inflow=0.02 cfs 0.010 af
Outflow=0.02 cfs 0.010 af

Total Runoff Area = 6.678 ac Runoff Volume = 0.404 af Average Runoff Depth = 0.73"
76.62% Pervious = 5.116 ac 23.38% Impervious = 1.561 ac

Time span=0.00-30.00 hrs, dt=0.01 hrs, 3001 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Subcatchment E-1: Uncontrolled to Wetlands Runoff Area=257,179 sf 25.63% Impervious Runoff Depth=1.37"
Tc=5.0 min CN=50 Runoff=8.18 cfs 0.674 af

Subcatchment E-2: Uncontrolled to Marc Road Runoff Area=33,705 sf 6.24% Impervious Runoff Depth=0.41"
Tc=5.0 min CN=36 Runoff=0.11 cfs 0.026 af

Reach DP-1: Wetlands to the Northeast Inflow=8.18 cfs 0.674 af
Outflow=8.18 cfs 0.674 af

Reach DP-2: Marc Road Inflow=0.11 cfs 0.026 af
Outflow=0.11 cfs 0.026 af

Total Runoff Area = 6.678 ac Runoff Volume = 0.700 af Average Runoff Depth = 1.26"
76.62% Pervious = 5.116 ac 23.38% Impervious = 1.561 ac

Time span=0.00-30.00 hrs, dt=0.01 hrs, 3001 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Subcatchment E-1: Uncontrolled to Wetlands Runoff Area=257,179 sf 25.63% Impervious Runoff Depth=2.42"
Tc=5.0 min CN=50 Runoff=16.06 cfs 1.189 af

Subcatchment E-2: Uncontrolled to Marc Road Runoff Area=33,705 sf 6.24% Impervious Runoff Depth=0.99"
Tc=5.0 min CN=36 Runoff=0.50 cfs 0.064 af

Reach DP-1: Wetlands to the Northeast Inflow=16.06 cfs 1.189 af
Outflow=16.06 cfs 1.189 af

Reach DP-2: Marc Road Inflow=0.50 cfs 0.064 af
Outflow=0.50 cfs 0.064 af

Total Runoff Area = 6.678 ac Runoff Volume = 1.253 af Average Runoff Depth = 2.25"
76.62% Pervious = 5.116 ac 23.38% Impervious = 1.561 ac

Summary for Subcatchment E-1: Uncontrolled to Wetlands

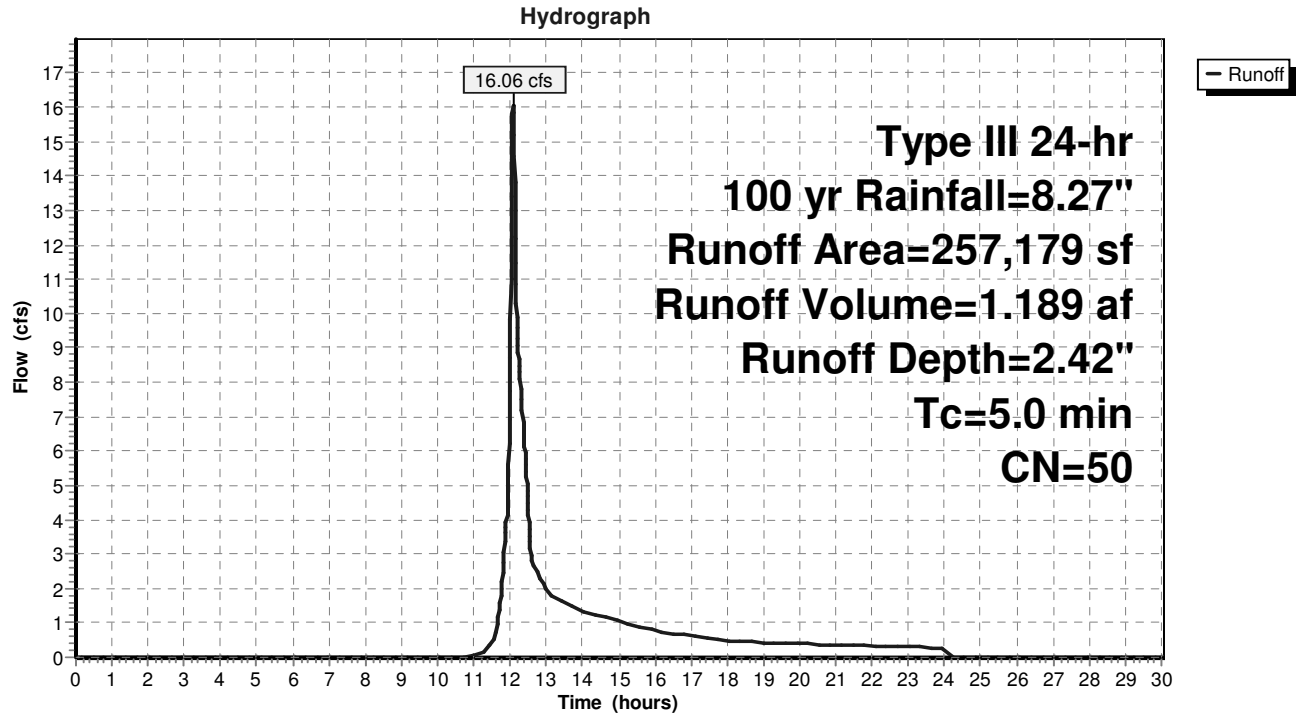
Runoff = 16.06 cfs @ 12.08 hrs, Volume= 1.189 af, Depth= 2.42"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.01 hrs
Type III 24-hr 100 yr Rainfall=8.27"

Area (sf)	CN	Description
29,718	98	Roofs, HSG A
1,947	98	Unconnected pavement, HSG A
34,245	98	Paved parking, HSG A
33,769	39	>75% Grass cover, Good, HSG A
9,448	68	<50% Grass cover, Poor, HSG A
146,376	30	Woods, Good, HSG A
1,676	96	Gravel surface, HSG A
257,179	50	Weighted Average
191,269		74.37% Pervious Area
65,910		25.63% Impervious Area
1,947		2.95% Unconnected

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.0					**Direct Entry,**

Subcatchment E-1: Uncontrolled to Wetlands



Summary for Subcatchment E-2: Uncontrolled to Marc Road

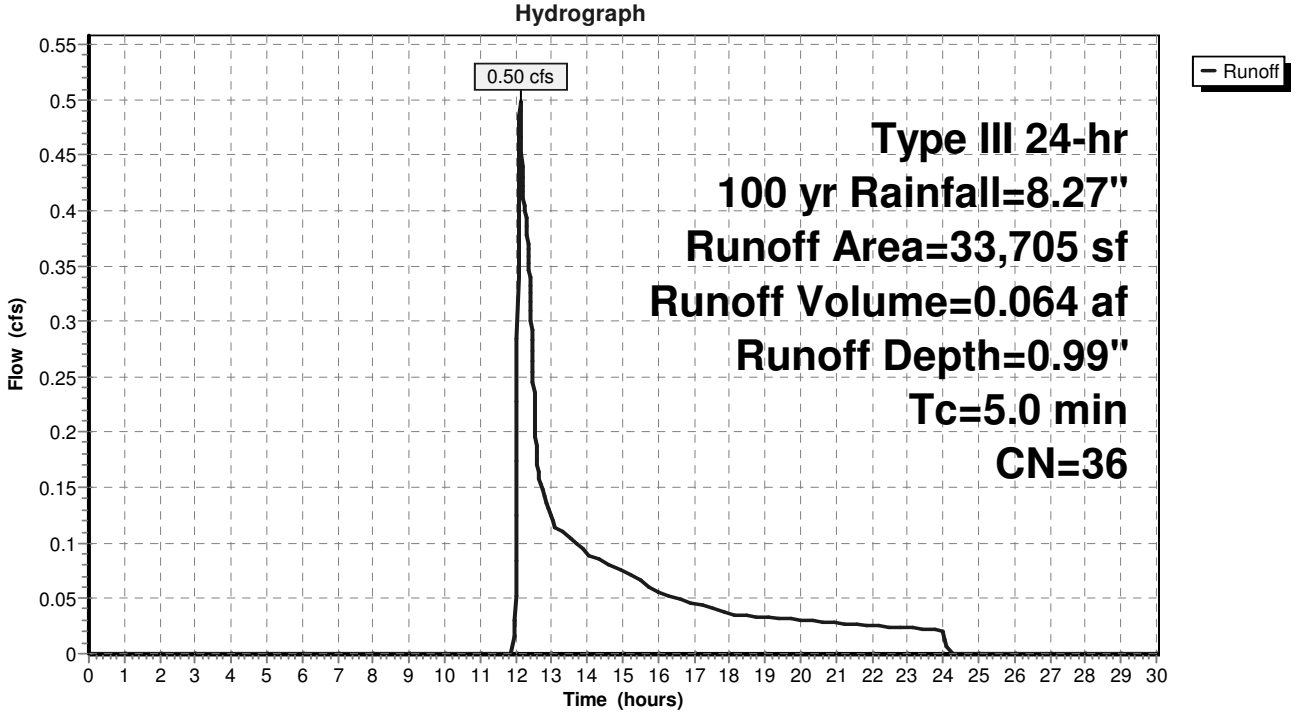
Runoff = 0.50 cfs @ 12.12 hrs, Volume= 0.064 af, Depth= 0.99"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.01 hrs
Type III 24-hr 100 yr Rainfall=8.27"

Area (sf)	CN	Description
1,893	98	Paved parking, HSG A
209	98	Unconnected pavement, HSG A
25,684	30	Woods, Good, HSG A
5,919	39	>75% Grass cover, Good, HSG A
33,705	36	Weighted Average
31,603		93.76% Pervious Area
2,102		6.24% Impervious Area
209		9.94% Unconnected

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.0					**Direct Entry,**

Subcatchment E-2: Uncontrolled to Marc Road

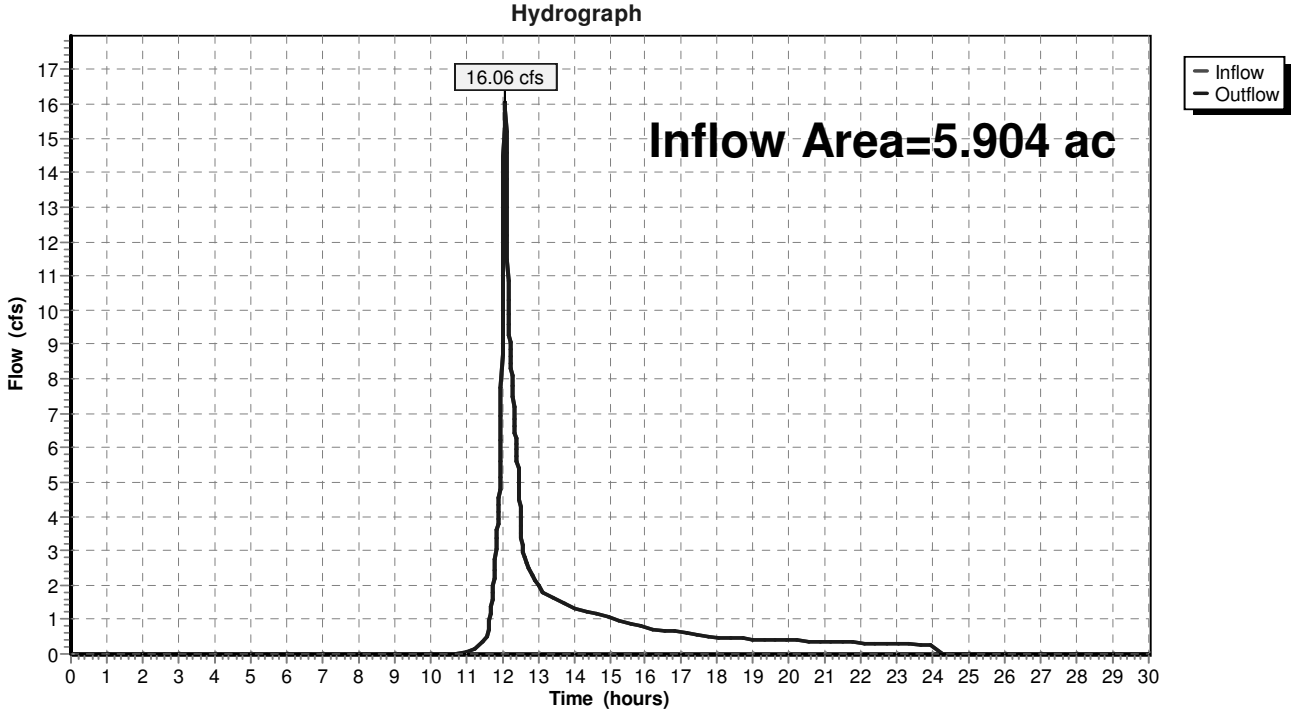


Summary for Reach DP-1: Wetlands to the Northeast

Inflow Area = 5.904 ac, 25.63% Impervious, Inflow Depth = 2.42" for 100 yr event
Inflow = 16.06 cfs @ 12.08 hrs, Volume= 1.189 af
Outflow = 16.06 cfs @ 12.08 hrs, Volume= 1.189 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-30.00 hrs, dt= 0.01 hrs

Reach DP-1: Wetlands to the Northeast

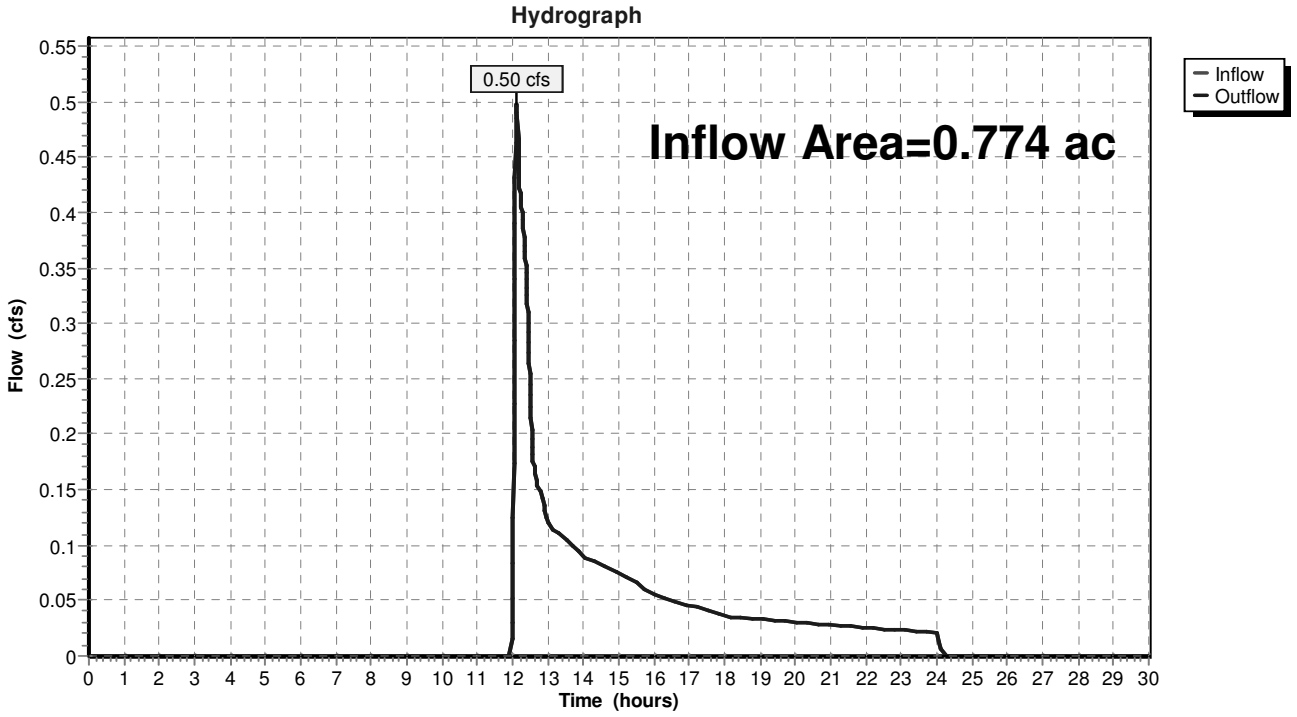


Summary for Reach DP-2: Marc Road

Inflow Area = 0.774 ac, 6.24% Impervious, Inflow Depth = 0.99" for 100 yr event
Inflow = 0.50 cfs @ 12.12 hrs, Volume= 0.064 af
Outflow = 0.50 cfs @ 12.12 hrs, Volume= 0.064 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-30.00 hrs, dt= 0.01 hrs

Reach DP-2: Marc Road



25457

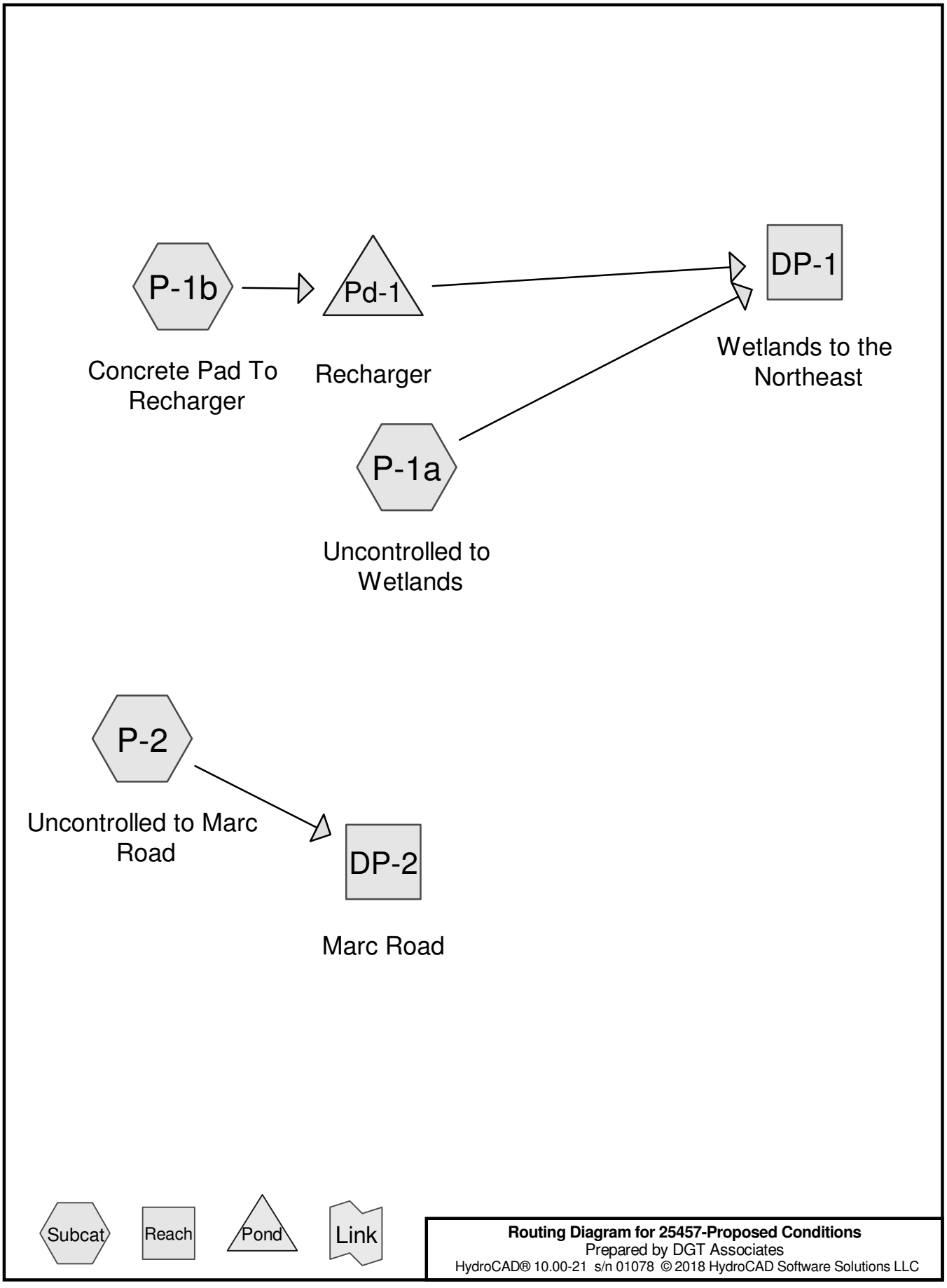
SECTION 4

Proposed Conditions Stormwater Model
showing Stormwater Flows and Flood Routing
Computations using HydroCAD version 10.00

for

4 Marc Road

Medway, Massachusetts 02053



Routing Diagram for 25457-Proposed Conditions
Prepared by DGT Associates

Area Listing (all nodes)

Area (acres)	CN	Description (subcatchment-numbers)
0.148	68	<50% Grass cover, Poor, HSG A (P-1a)
0.911	39	>75% Grass cover, Good, HSG A (P-1a, P-2)
0.038	96	Gravel surface, HSG A (P-1a)
0.830	98	Paved parking, HSG A (P-1a, P-2)
0.682	98	Roofs, HSG A (P-1a)
0.118	98	Unconnected pavement, HSG A (P-1a, P-1b, P-2)
3.950	30	Woods, Good, HSG A (P-1a, P-2)
6.678	**49**	**TOTAL AREA**

Time span=0.00-30.00 hrs, dt=0.01 hrs, 3001 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Subcatchment P-1a: Uncontrolled to Wetlands Runoff Area=254,179 sf 25.93% Impervious Runoff Depth=0.17"
Tc=5.0 min CN=50 Runoff=0.25 cfs 0.080 af

Subcatchment P-1b: Concrete Pad To Runoff Area=3,000 sf 100.00% Impervious Runoff Depth=3.14"
Tc=5.0 min CN=98 Runoff=0.23 cfs 0.018 af

Subcatchment P-2: Uncontrolled to Marc Road Runoff Area=33,705 sf 6.24% Impervious Runoff Depth=0.00"
Tc=5.0 min CN=36 Runoff=0.00 cfs 0.000 af

Reach DP-1: Wetlands to the Northeast Inflow=0.25 cfs 0.080 af
Outflow=0.25 cfs 0.080 af

Reach DP-2: Marc Road Inflow=0.00 cfs 0.000 af
Outflow=0.00 cfs 0.000 af

Pond Pd-1: Recharger Peak Elev=169.37' Storage=374 cf Inflow=0.23 cfs 0.018 af
Discarded=0.01 cfs 0.018 af Primary=0.00 cfs 0.000 af Outflow=0.01 cfs 0.018 af

Total Runoff Area = 6.678 ac Runoff Volume = 0.098 af Average Runoff Depth = 0.18"
75.59% Pervious = 5.048 ac 24.41% Impervious = 1.630 ac

Time span=0.00-30.00 hrs, dt=0.01 hrs, 3001 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Subcatchment P-1a: Uncontrolled to Wetlands Runoff Area=254,179 sf 25.93% Impervious Runoff Depth=0.80"
Tc=5.0 min CN=50 Runoff=3.88 cfs 0.390 af

Subcatchment P-1b: Concrete Pad To Runoff Area=3,000 sf 100.00% Impervious Runoff Depth=5.02"
Tc=5.0 min CN=98 Runoff=0.37 cfs 0.029 af

Subcatchment P-2: Uncontrolled to Marc Road Runoff Area=33,705 sf 6.24% Impervious Runoff Depth=0.15"
Tc=5.0 min CN=36 Runoff=0.02 cfs 0.010 af

Reach DP-1: Wetlands to the Northeast Inflow=3.88 cfs 0.390 af
Outflow=3.88 cfs 0.390 af

Reach DP-2: Marc Road Inflow=0.02 cfs 0.010 af
Outflow=0.02 cfs 0.010 af

Pond Pd-1: Recharger Peak Elev=170.56' Storage=715 cf Inflow=0.37 cfs 0.029 af
Discarded=0.01 cfs 0.021 af Primary=0.00 cfs 0.000 af Outflow=0.01 cfs 0.021 af

Total Runoff Area = 6.678 ac Runoff Volume = 0.428 af Average Runoff Depth = 0.77"
75.59% Pervious = 5.048 ac 24.41% Impervious = 1.630 ac

Time span=0.00-30.00 hrs, dt=0.01 hrs, 3001 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Subcatchment P-1a: Uncontrolled to Wetlands Runoff Area=254,179 sf 25.93% Impervious Runoff Depth=1.37"
Tc=5.0 min CN=50 Runoff=8.09 cfs 0.666 af

Subcatchment P-1b: Concrete Pad To Runoff Area=3,000 sf 100.00% Impervious Runoff Depth=6.21"
Tc=5.0 min CN=98 Runoff=0.45 cfs 0.036 af

Subcatchment P-2: Uncontrolled to Marc Road Runoff Area=33,705 sf 6.24% Impervious Runoff Depth=0.41"
Tc=5.0 min CN=36 Runoff=0.11 cfs 0.026 af

Reach DP-1: Wetlands to the Northeast Inflow=8.09 cfs 0.670 af
Outflow=8.09 cfs 0.670 af

Reach DP-2: Marc Road Inflow=0.11 cfs 0.026 af
Outflow=0.11 cfs 0.026 af

Pond Pd-1: Recharger Peak Elev=171.10' Storage=823 cf Inflow=0.45 cfs 0.036 af
Discarded=0.01 cfs 0.022 af Primary=0.02 cfs 0.003 af Outflow=0.03 cfs 0.025 af

Total Runoff Area = 6.678 ac Runoff Volume = 0.728 af Average Runoff Depth = 1.31"
75.59% Pervious = 5.048 ac 24.41% Impervious = 1.630 ac

Time span=0.00-30.00 hrs, dt=0.01 hrs, 3001 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Subcatchment P-1a: Uncontrolled to Wetlands Runoff Area=254,179 sf 25.93% Impervious Runoff Depth=2.42"
Tc=5.0 min CN=50 Runoff=15.88 cfs 1.175 af

Subcatchment P-1b: Concrete Pad To Runoff Area=3,000 sf 100.00% Impervious Runoff Depth=8.03"
Tc=5.0 min CN=98 Runoff=0.58 cfs 0.046 af

Subcatchment P-2: Uncontrolled to Marc Road Runoff Area=33,705 sf 6.24% Impervious Runoff Depth=0.99"
Tc=5.0 min CN=36 Runoff=0.50 cfs 0.064 af

Reach DP-1: Wetlands to the Northeast Inflow=15.88 cfs 1.187 af
Outflow=15.88 cfs 1.187 af

Reach DP-2: Marc Road Inflow=0.50 cfs 0.064 af
Outflow=0.50 cfs 0.064 af

Pond Pd-1: Recharger Peak Elev=171.32' Storage=863 cf Inflow=0.58 cfs 0.046 af
Discarded=0.01 cfs 0.022 af Primary=0.20 cfs 0.012 af Outflow=0.21 cfs 0.034 af

Total Runoff Area = 6.678 ac Runoff Volume = 1.285 af Average Runoff Depth = 2.31"
75.59% Pervious = 5.048 ac 24.41% Impervious = 1.630 ac

Summary for Subcatchment P-1a: Uncontrolled to Wetlands

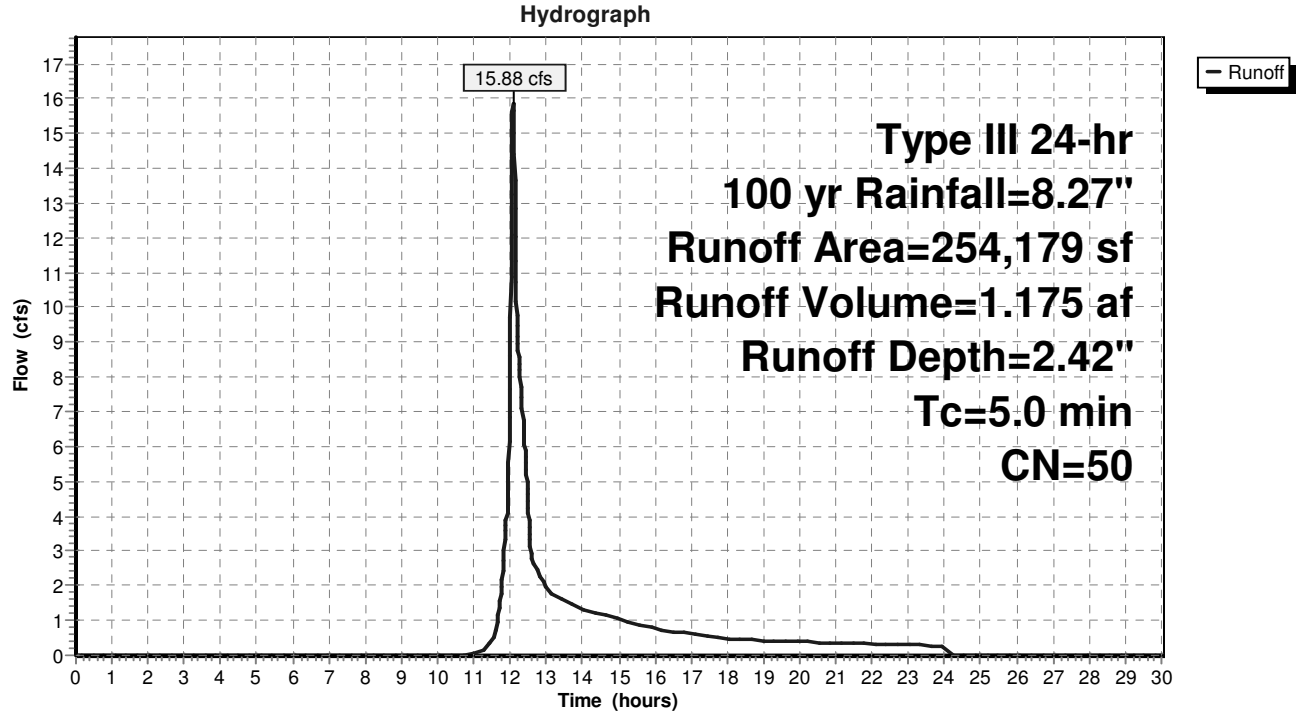
Runoff = 15.88 cfs @ 12.08 hrs, Volume= 1.175 af, Depth= 2.42"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.01 hrs
Type III 24-hr 100 yr Rainfall=8.27"

Area (sf)	CN	Description
29,718	98	Roofs, HSG A
1,947	98	Unconnected pavement, HSG A
34,245	98	Paved parking, HSG A
33,769	39	>75% Grass cover, Good, HSG A
6,459	68	<50% Grass cover, Poor, HSG A
146,365	30	Woods, Good, HSG A
1,676	96	Gravel surface, HSG A
254,179	50	Weighted Average
188,269		74.07% Pervious Area
65,910		25.93% Impervious Area
1,947		2.95% Unconnected

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.0					**Direct Entry,**

Subcatchment P-1a: Uncontrolled to Wetlands



Summary for Subcatchment P-1b: Concrete Pad To Recharger

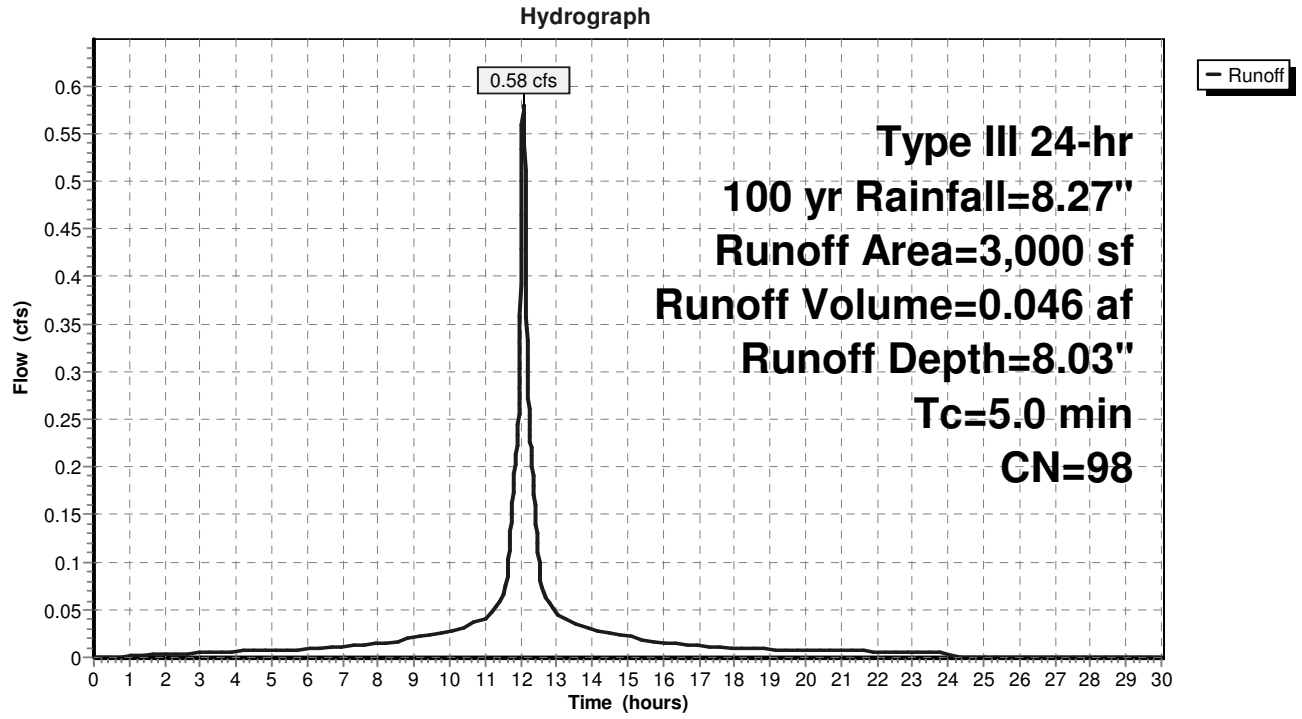
Runoff = 0.58 cfs @ 12.07 hrs, Volume= 0.046 af, Depth= 8.03"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.01 hrs
Type III 24-hr 100 yr Rainfall=8.27"

Area (sf)	CN	Description
3,000	98	Unconnected pavement, HSG A
3,000		100.00% Impervious Area
3,000		100.00% Unconnected

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.0					**Direct Entry,**

Subcatchment P-1b: Concrete Pad To Recharger



Summary for Subcatchment P-2: Uncontrolled to Marc Road

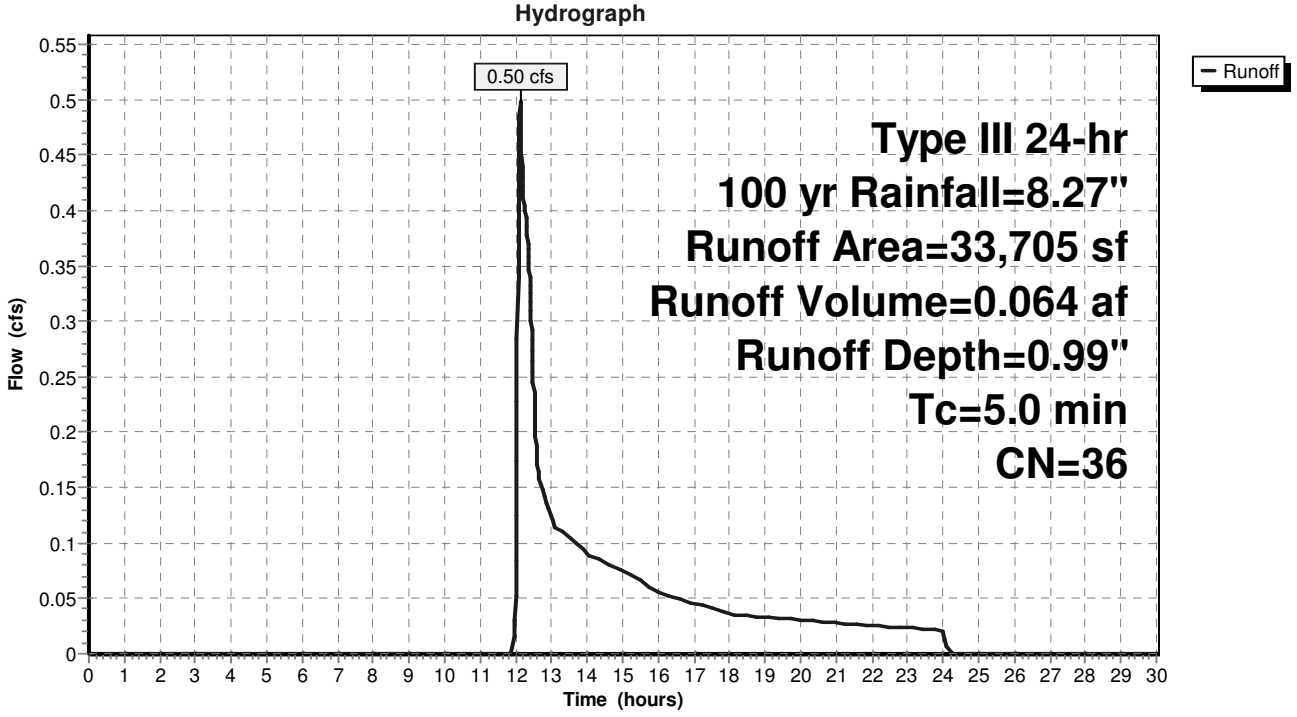
Runoff = 0.50 cfs @ 12.12 hrs, Volume= 0.064 af, Depth= 0.99"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.01 hrs
Type III 24-hr 100 yr Rainfall=8.27"

Area (sf)	CN	Description
1,893	98	Paved parking, HSG A
209	98	Unconnected pavement, HSG A
25,684	30	Woods, Good, HSG A
5,919	39	>75% Grass cover, Good, HSG A
33,705	36	Weighted Average
31,603		93.76% Pervious Area
2,102		6.24% Impervious Area
209		9.94% Unconnected

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.0					**Direct Entry,**

Subcatchment P-2: Uncontrolled to Marc Road

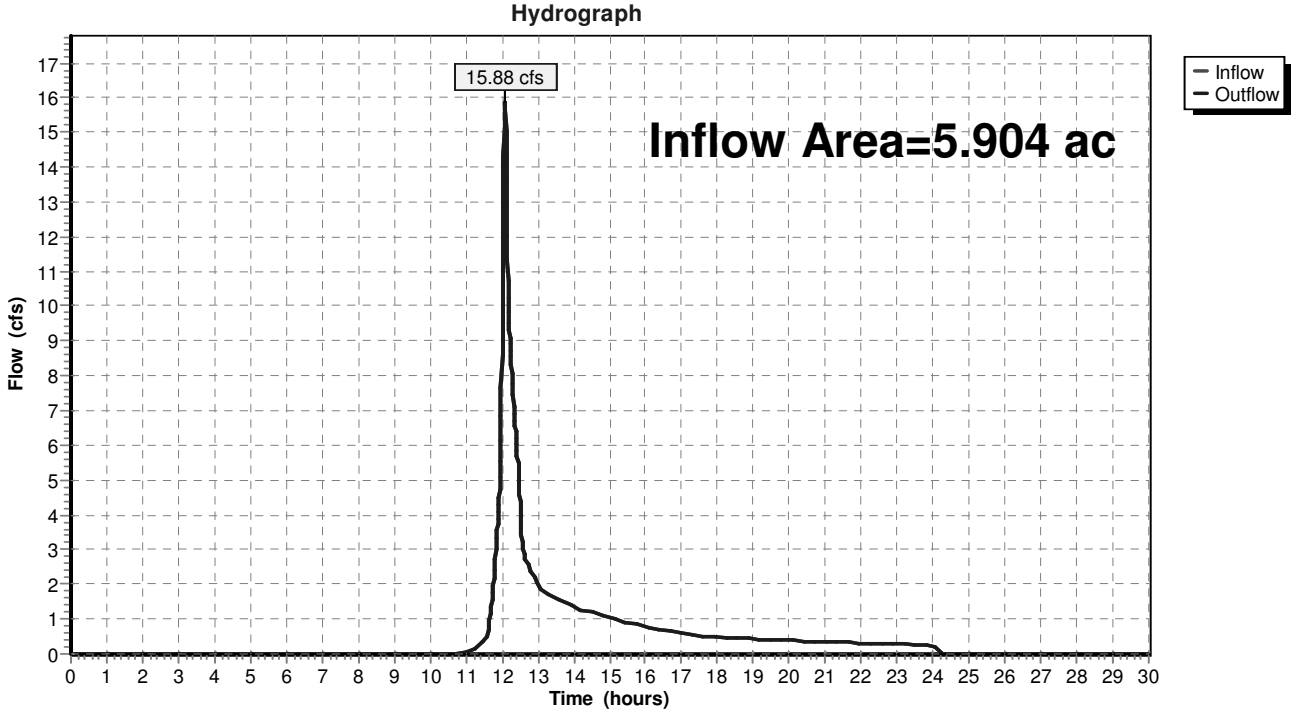


Summary for Reach DP-1: Wetlands to the Northeast

Inflow Area = 5.904 ac, 26.79% Impervious, Inflow Depth = 2.41" for 100 yr event
Inflow = 15.88 cfs @ 12.08 hrs, Volume= 1.187 af
Outflow = 15.88 cfs @ 12.08 hrs, Volume= 1.187 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-30.00 hrs, dt= 0.01 hrs

Reach DP-1: Wetlands to the Northeast

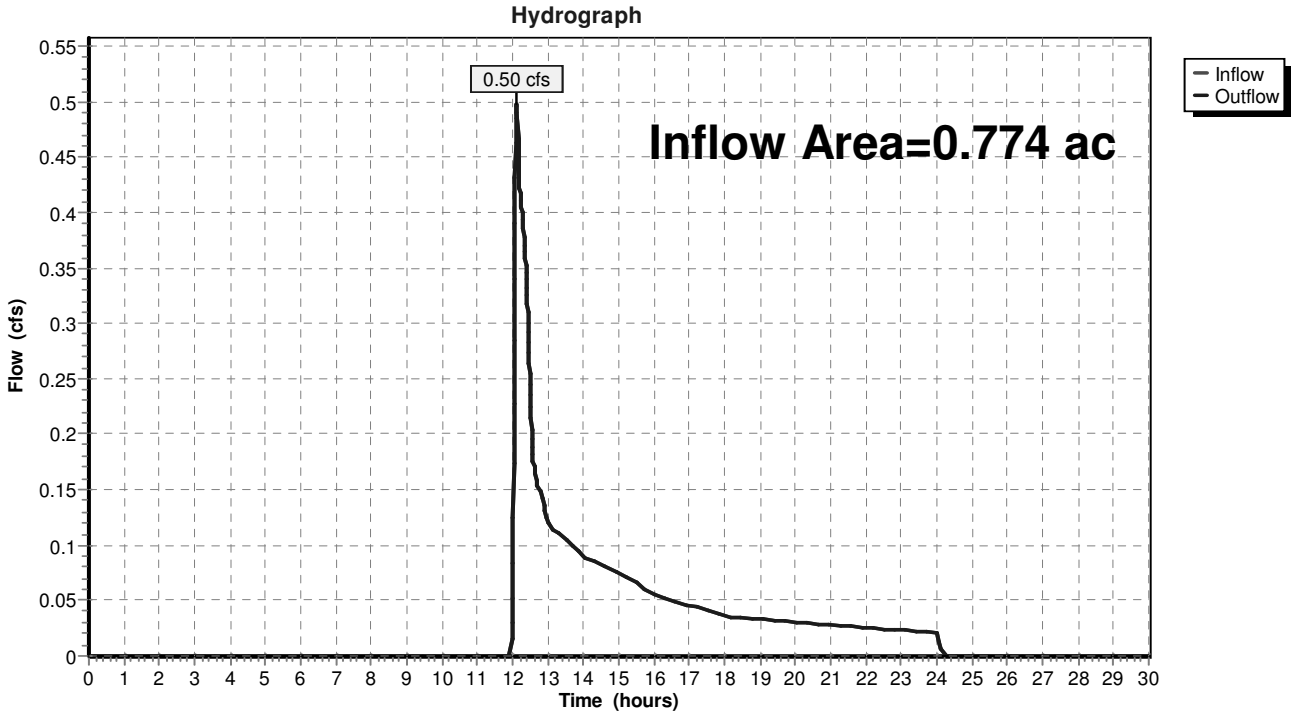


Summary for Reach DP-2: Marc Road

Inflow Area = 0.774 ac, 6.24% Impervious, Inflow Depth = 0.99" for 100 yr event
Inflow = 0.50 cfs @ 12.12 hrs, Volume= 0.064 af
Outflow = 0.50 cfs @ 12.12 hrs, Volume= 0.064 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-30.00 hrs, dt= 0.01 hrs

Reach DP-2: Marc Road



Summary for Pond Pd-1: Recharger

Inflow Area = 0.069 ac,100.00% Impervious, Inflow Depth = 8.03" for 100 yr event
Inflow = 0.58 cfs @ 12.07 hrs, Volume= 0.046 af
Outflow = 0.21 cfs @ 12.29 hrs, Volume= 0.034 af, Atten= 63%, Lag= 13.5 min
Discarded = 0.01 cfs @ 6.85 hrs, Volume= 0.022 af
Primary = 0.20 cfs @ 12.29 hrs, Volume= 0.012 af

Routing by Stor-Ind method, Time Span= 0.00-30.00 hrs, dt= 0.01 hrs / 3
Peak Elev= 171.32' @ 12.29 hrs Surf.Area= 435 sf Storage= 863 cf

Plug-Flow detention time= 280.7 min calculated for 0.034 af (74% of inflow)
Center-of-Mass det. time= 191.3 min (931.2 - 739.9)

Volume	Invert	Avail.Storage	Storage Description
#1A	167.96'	432 cf	**22.33'W x 19.50'L x 3.54'H Field A** 1,542 cf Overall - 462 cf Embedded = 1,080 cf x 40.0% Voids
#2A	168.46'	462 cf	**Cultec R-330XLHD** x 8 Inside #1 Effective Size= 47.8"W x 30.0"H => 7.45 sf x 7.00'L = 52.2 cf Overall Size= 52.0"W x 30.5"H x 8.50'L with 1.50' Overlap Row Length Adjustment= +1.50' x 7.45 sf x 4 rows
		894 cf	Total Available Storage

Storage Group A created with Chamber Wizard

Device	Routing	Invert	Outlet Devices
#1	Discarded	167.96'	**1.020 in/hr Exfiltration over Horizontal area**
#2	Primary	171.00'	**6.0" Round Culvert** L= 95.0' CPP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 171.00' / 164.30' S= 0.0705 '/' Cc= 0.900 n= 0.010 PVC, smooth interior, Flow Area= 0.20 sf

Discarded OutFlow Max=0.01 cfs @ 6.85 hrs HW=168.00' (Free Discharge)
↑—**1=Exfiltration** (Exfiltration Controls 0.01 cfs)

Primary OutFlow Max=0.20 cfs @ 12.29 hrs HW=171.32' (Free Discharge)
↑—**2=Culvert** (Inlet Controls 0.20 cfs @ 1.52 fps)

Pond Pd-1: Recharger - Chamber Wizard Field A

Chamber Model = Cultec R-330XLHD (Cultec Recharger® 330XLHD)
Effective Size= 47.8"W x 30.0"H => 7.45 sf x 7.00'L = 52.2 cf
Overall Size= 52.0"W x 30.5"H x 8.50'L with 1.50' Overlap
Row Length Adjustment= +1.50' x 7.45 sf x 4 rows

52.0" Wide + 4.0" Spacing = 56.0" C-C Row Spacing

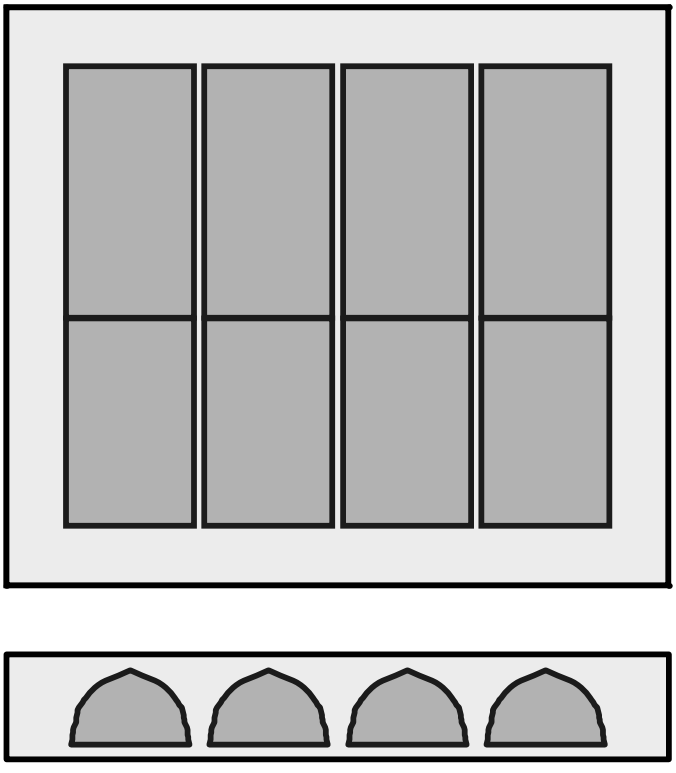
2 Chambers/Row x 7.00' Long +1.50' Row Adjustment = 15.50' Row Length +24.0" End Stone x 2 = 19.50' Base Length
4 Rows x 52.0" Wide + 4.0" Spacing x 3 + 24.0" Side Stone x 2 = 22.33' Base Width
6.0" Base + 30.5" Chamber Height + 6.0" Cover = 3.54' Field Height

8 Chambers x 52.2 cf +1.50' Row Adjustment x 7.45 sf x 4 Rows = 462.0 cf Chamber Storage

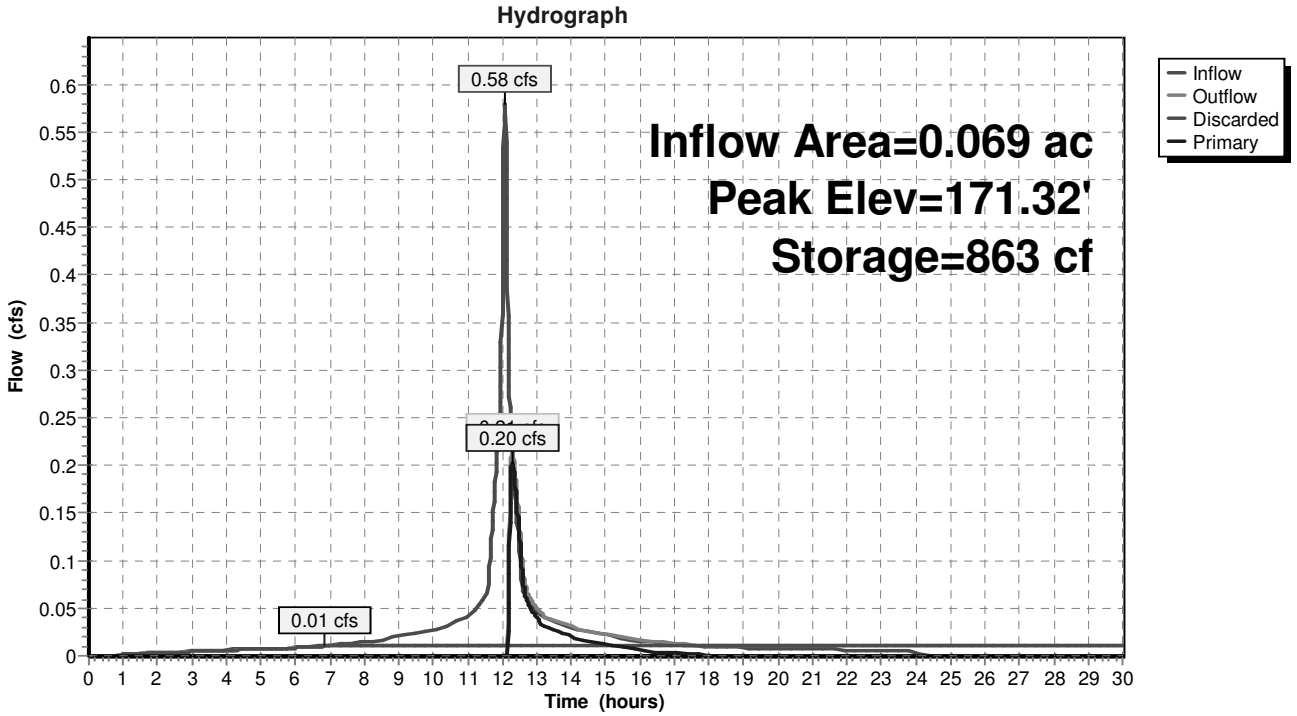
1,542.4 cf Field - 462.0 cf Chambers = 1,080.4 cf Stone x 40.0% Voids = 432.2 cf Stone Storage

Chamber Storage + Stone Storage = 894.1 cf = 0.021 af
Overall Storage Efficiency = 58.0%
Overall System Size = 19.50' x 22.33' x 3.54'

8 Chambers
57.1 cy Field
40.0 cy Stone



Pond Pd-1: Recharger



25457

APPENDIX 1

Soil Test Report, prepared by DGT Associates, dated 7/22/19

for

4 Marc Road
Medway, Massachusetts 02053

DGT Associates
Surveying &
Engineering

1071 Worcester Rd.
Framingham, MA 01701
508.879.0030
www.dgtassociates.com

July 22, 2019

Job: 25457

Town of Medway Conservation Commission
Attn: Ms. Bridget Graziano
155 Village Street
Medway, MA 02053

RE: 4 Marc Road, Medway – Soil Testing

Dear Ms. Graziano:

This report contains the results of the on-site soil testing conducted by DGT Associates on July 16, 2019 at the subject property. The testing consisted of six (6) deep hole test pits and a permeability test. DJ Morris Contracting Co. Inc. provided the backhoe service.

The purpose of the testing was to assess the suitability of the soils for stormwater management design for the proposed development at the subject property. Testing was performed by Massachusetts Licensed Soil Evaluator (Joseph A. Losanno, EIT) of DGT.

According to the Natural Resources Conservation Service (NRCS) Soils Mapping, the soil in the area of testing is Charlton-Hollis-Rock outcrop complex. The testing generally confirmed the NRCS data. For Hydrologic purposes, the soil is classified as HSG "A". Attachment 2 contains the NRCS Map for the site and descriptions of the soil type.

The testing had varied results within the different areas of testing. Test holes TH 19-01 and TH 19-02 revealed a fine sandy loam topsoil, over layers of fine to coarse sand substratum, over shallow ledge ranging from 36-56" below grade. Test holes TH 19-03 and TH 19-04 revealed a shallow layer of organics comprised of forest litter, cobbles and stones, over a layer of fine to medium sand, over shallow ledge ranging from 50-70" below grade. Test holes TH 19-05 and TH 19-06 revealed a fine sandy loam topsoil, over a sandy loam subsoil, over a gravelly, firm sandy loam substratum. Test hole TH 19-05 contained a fine to medium sand layer above the substratum described above, while TH 19-06 contained a loamy sand BC-layer over, a layer of fractured rock containing 15% of a sandy loam soil, over the under laying substratum. No ledge was observed in TH 19-05, however ledge was observed at 108" below grade in TH 19-06. Deep observation hole logs are contained in Attachment 1.

No signs of the Estimated Season High Groundwater Table (ESHGWT), including redoximorphic features, weeping or standing groundwater, were observed in test holes TH 19-01, TH 19-02, TH 19-05 and TH 19-06. Test holes TH 19-03 and TH 19-04 revealed weeping groundwater at 64" and 30" below grade and standing water at 64" and 50" below grade respectively.

Based on variable depth the ledge and the ESHGWT in the testing area for TH 19-01, TH 19-02, TH 19-03 and TH 19-04, it was determined that the best location for a subsurface recharger (infiltration) system would be in the area of TH 19-05 and TH 19-06. The design ESHGWT for the proposed recharger system will be the bottom of those test holes. Note: monitor wells were installed in TH 19-03, TH 19-05 and TH 19-06 for future monitoring of groundwater.

DGT Associates
Surveying &
Engineering

1071 Worcester Rd.
Framingham, MA 01701
508.879.0030
www.dgtassociates.com

A permeability test utilizing the US Army Corps of Engineers method "In-situ Permeability Testing in the Vadose Zone" was performed in the substratum of test pit TH 19-05. The observed permeability rate was 1.7 inches per hour. The design permeability rate that will be used for stormwater will be based on the RAWLS rate published in the Massachusetts Stormwater Handbook of 1.02 inches per hour (sandy loam). The tabulation of these tests are included at the end of Attachment 1.

Please contact me if you have any questions regarding this report.

Sincerely,
DGT Associates

Joseph A. Losanno, EIT (SE 13870)
Project Engineer

Attachments:

1. Deep Hole and Permeability Test Logs
2. NRCS Soils Map and Information
3. Soil Test Hole Location Plan
4. USGS Surficial Geology Map and Explanatory Text

Location Address or Lot No. 4 Marc Road, Medway

On-site Review

Deep Hole Number 19-01 Date: 7/16/19 Time: AM Weather 85° Sunny

Location (identify on site plan) See sketch

Land Use Landscaped Industrial Slope (%) 0-3 Surface Stones Some

Vegetation Grass and Exposed Soil

Landform Hills

Position on landscape (sketch on the back) see sketch

Distances from:

Open Water Body	See sketch	Feet	Drainageway	See sketch	Feet
Possible Wet Area	See sketch	Feet	Property Line	See sketch	Feet
Drinking Water Well	See sketch	Feet	Other		

DEEP OBSERVATION HOLE LOG

Depth from Surface (inches)	Soil Horizon	Soil Texture (USDA)	Soil Color (Munsell)	Soil Mottling	Other (Structure, Stones, Boulders, Consistency, % Gravel)
0 – 3”	A	Sandy Loam	2.5 Y 4/4	None Observed	Massive-Friable, gravelly
3 – 21”	C_1	Sand (Fine – Medium)	2.5 Y 3/3	None Observed	Loose-Single Grained, gravelly w/ boulders
21 – 53”	C_2	Sand (Fine – Coarse)	2.5 Y 5/3	None Observed	Loose-Single Grained, gravelly w/ cobbles, stones & boulders
53”	R	Ledge / Bedrock / Refusal			Refusal observed @ 36” below grade @ south side of Test Hole Refusal observed @ 42” below grade @ north side of Test Hole

Parent Material (geologic) Coarse-Loamy Melt-out Till Depth to Bedrock: @ 53”

Depth to Groundwater: Standing Water in the Hole: None Observed Weeping from Pit Face: None Observed

Estimated Seasonal High Ground Water: Inconclusive

Location Address or Lot No. 4 Marc Road, Medway

On-site Review

Deep Hole Number 19-02 Date: 7/16/19 Time: AM Weather 85° Sunny

Location (identify on site plan) See sketch

Land Use Landscaped Industrial Slope (%) 0-3 Surface Stones Some

Vegetation Grass and Exposed Soil

Landform Hills

Position on landscape (sketch on the back) see sketch

Distances from:

Open Water Body	See sketch	Feet	Drainageway	See sketch	Feet
Possible Wet Area	See sketch	Feet	Property Line	See sketch	Feet
Drinking Water Well	See sketch	Feet	Other		

DEEP OBSERVATION HOLE LOG

Depth from Surface (inches)	Soil Horizon	Soil Texture (USDA)	Soil Color (Munsell)	Soil Mottling	Other (Structure, Stones, Boulders, Consistency, % Gravel)
0 – 3”	A	Sandy Loam	2.5 Y 4/4	None Observed	Massive-Friable, gravelly
3 – 28”	C_1	Sand (Fine – Medium)	2.5 Y 3/3	None Observed	Loose-Single Grained, gravelly w/ boulders
28 – 56”	C_2	Sand (Fine – Coarse)	2.5 Y 5/3	None Observed	Loose-Single Grained, gravelly, w/ Cobbles, stone, & boulders, 70% fractured rock
56”	R	Ledge / Bedrock / Refusal			

Parent Material (geologic) Coarse-Loamy Melt-out Till Depth to Bedrock: @ 56”

Depth to Groundwater: Standing Water in the Hole: None Observed Weeping from Pit Face: None Observed

Estimated Seasonal High Ground Water: Inconclusive

Location Address or Lot No. 4 Marc Road, Medway

On-site Review

Deep Hole Number 19-03 Date: 7/16/19 Time: AM Weather 85° Sunny

Location (identify on site plan) See sketch

Land Use Landscaped Industrial Slope (%) 0-3 Surface Stones Some

Vegetation Wooded with some Pine Trees

Landform Hills

Position on landscape (sketch on the back) see sketch

Distances from:

Open Water Body	See sketch	Feet	Drainageway	See sketch	Feet
Possible Wet Area	See sketch	Feet	Property Line	See sketch	Feet
Drinking Water Well	See sketch	Feet	Other		

DEEP OBSERVATION HOLE LOG

Depth from Surface (inches)	Soil Horizon	Soil Texture (USDA)	Soil Color (Munsell)	Soil Mottling	Other (Structure, Stones, Boulders, Consistency, % Gravel)
0 – 4”	O	Organic	-	-	Some stones & Forest Litter
4 – 70”	C	Sand (Fine – Medium)	2.5 Y 6/2	None Observed	Loose-Single Grained, gravelly w/ many boulders, cobbles & stones, 85% rock

Parent Material (geologic) Coarse-Loamy Melt-out Till Depth to Bedrock: None Observed

Depth to Groundwater: Standing Water in the Hole: @ 64” Weeping from Pit Face: @ 64”

Estimated Seasonal High Ground Water: @ 64” based on standing / weeping groundwater - Monitor Well Installed

Location Address or Lot No. 4 Marc Road, Medway

On-site Review

Deep Hole Number 19-04 Date: 7/16/19 Time: AM Weather 85° Sunny

Location (identify on site plan) See sketch

Land Use Landscaped Industrial Slope (%) 0-3 Surface Stones Some

Vegetation Wooded with some Pine Trees

Landform Hills

Position on landscape (sketch on the back) see sketch

Distances from:

Open Water Body	See sketch	Feet	Drainageway	See sketch	Feet
Possible Wet Area	See sketch	Feet	Property Line	See sketch	Feet
Drinking Water Well	See sketch	Feet	Other		

DEEP OBSERVATION HOLE LOG

Depth from Surface (inches)	Soil Horizon	Soil Texture (USDA)	Soil Color (Munsell)	Soil Mottling	Other (Structure, Stones, Boulders, Consistency, % Gravel)
0 – 4”	O	Organic	-	-	Some stones & Forest Litter
4 – 50”	C	Sand (Fine – Medium)	2.5 Y 5/3	None Observed	Loose-Single Grained, gravelly w/ cobbles, stones, boulders & lenses of loamy sand, 40% rock
50”	R	Ledge / Bedrock / Refusal			

Parent Material (geologic) Coarse-Loamy Melt-out Till Depth to Bedrock: @ 50”

Depth to Groundwater: Standing Water in the Hole: @ 50” Weeping from Pit Face: @ 30”

Estimated Seasonal High Ground Water: @ 30” based on weeping groundwater

Location Address or Lot No. 4 Marc Road, Medway

On-site Review

Deep Hole Number 19-05 Date: 7/16/19 Time: PM Weather 85° Sunny

Location (identify on site plan) See sketch

Land Use Landscaped Industrial Slope (%) 3-5 Surface Stones None

Vegetation Grass

Landform Hills

Position on landscape (sketch on the back) see sketch

Distances from:

Open Water Body	See sketch	Feet	Drainageway	See sketch	Feet
Possible Wet Area	See sketch	Feet	Property Line	See sketch	Feet
Drinking Water Well	See sketch	Feet	Other		

DEEP OBSERVATION HOLE LOG

Depth from Surface (inches)	Soil Horizon	Soil Texture (USDA)	Soil Color (Munsell)	Soil Mottling	Other (Structure, Stones, Boulders, Consistency, % Gravel)
0 – 4”	A	Sandy Loam (Fine)	10 YR 3/3	None Observed	Massive-Friable
4 – 13”	B_w	Sandy Loam	10 YR 4/6	None Observed	Massive-Firm, gravelly
13 – 37”	C_1	Sand (Fine – Medium)	2.5 Y 4/4	None Observed	Loose-Single Grained, gravelly w/ cobbles
37 - 120”	C_2	Sandy Loam	2.5 Y 4/2	None Observed	Massive-Very Firm, gravelly w/ cobbles & stones

Parent Material (geologic) Coarse-Loamy Melt-out Till Depth to Bedrock: None Observed

Depth to Groundwater: Standing Water in the Hole: None Observed Weeping from Pit Face: None Observed

Estimated Seasonal High Ground Water: Inconclusive - Monitor Well Installed

Location Address or Lot No. 4 Marc Road, Medway

On-site Review

Deep Hole Number 19-06 Date: 7/16/19 Time: PM Weather 85° Sunny

Location (identify on site plan) See sketch

Land Use Landscaped Industrial Slope (%) 3-5 Surface Stones None

Vegetation Grass

Landform Hills

Position on landscape (sketch on the back) see sketch

Distances from:

Open Water Body See sketch Feet Drainageway See sketch Feet

Possible Wet Area See sketch Feet Property Line See sketch Feet

Drinking Water Well See sketch Feet Other

DEEP OBSERVATION HOLE LOG

Depth from Surface (inches)	Soil Horizon	Soil Texture (USDA)	Soil Color (Munsell)	Soil Mottling	Other (Structure, Stones, Boulders, Consistency, % Gravel)
0 – 6”	A	Sandy Loam (Fine)	10 YR 3/3	None Observed	Massive-Friable
6 – 18”	B_w	Sandy Loam	10 YR 4/6	None Observed	Massive-Friable, gravelly
18 – 24”	BC	Loamy Sand	2.5 Y 5/4	None Observed	Massive-Friable, gravelly w/ some stones & cobbles
24 – 84”	C_1	Fractured Rock	2.5 Y 4/2	None Observed	Massive-Firm w/ lenses of sandy loam 85% Fractured Rock
84 – 108”	C_2	Sandy Loam	2.5 Y 4/2	None Observed	Massive-Firm, gravelly w/ stones & cobbles
108”	R	Ledge / Bedrock / Refusal			

Parent Material (geologic) Coarse-Loamy Melt-out Till Depth to Bedrock: @ 108”

Depth to Groundwater: Standing Water in the Hole: None Observed Weeping from Pit Face: None Observed

Estimated Seasonal High Ground Water: Inconclusive - Monitor Well Installed

Permeability Test @ TH 19-05

Date Performed: 16-Jul-19
Soil Horizon of Perm Test: C
Depth to water level = 39"
Depth to bottom of tube = 50"
Start Soak: 1:41 P.M.
Start Test: 1:56 P.M.

	Time Interval (Minutes)	Incremental Volume(L)
	3	0.250
	3	0.250
	3	0.250
	3	0.250
	3	0.250
	3	0.250
	3	0.250
	3	0.250
	3	0.250
	3	0.250
Cumulative Time/Volume	**30**	**2.500**

Q=Cumulative Volume cm^3 / Total time in seconds

Q= 1.389 cm^3/sec

Computation of Permeability(k)

k=Q / 5.5 r Hw=

k=coefficient of permeability (cm/sec)
r=inside radius of pipe in centimeters= 7.6 (6" DIA.)
Hw=applied head in centimeters= 28 cm (11 inches)
Q=Computed flow rate in CC/sec= 1.389 cm^3/sec

k=Q / 5.5 r Hw= 0.00119 cm/sec 1.682 IN/HR

Soil Map—Norfolk and Suffolk Counties, Massachusetts
(4 Marc Road, Medway)

71° 24' 2" W 71° 23' 35" W
42° 9' 37" N 42° 9' 25" N
301710 301770 301830 301890 301950 302010 302070 302130 302190 302250
4670360 4670300 4670240 4670180 4670120 4670060 4670000

Map Scale: 1:2,770 if printed on A landscape (11" x 8.5") sheet.

N

Meters: 0 40 80 160 240

Feet: 0 100 200 400 600

Map projection: Web Mercator Corner coordinates: WGS84 Edge tics: UTM Zone 19N WGS84

MAP LEGEND

Area of Interest (AOI)
- Area of Interest (AOI)

Soils
- Soil Map Unit Polygons
- Soil Map Unit Lines
- Soil Map Unit Points

Special Point Features
- Blowout
- Borrow Pit
- Clay Spot
- Closed Depression
- Gravel Pit
- Gravelly Spot
- Landfill
- Lava Flow
- Marsh or swamp
- Mine or Quarry
- Miscellaneous Water
- Perennial Water
- Rock Outcrop
- Saline Spot
- Sandy Spot
- Severely Eroded Spot
- Sinkhole
- Slide or Slip
- Sodic Spot
- Spoil Area
- Stony Spot
- Very Stony Spot
- Wet Spot
- Other
- Special Line Features

Water Features
- Streams and Canals

Transportation
- Rails
- Interstate Highways
- US Routes
- Major Roads
- Local Roads

Background
- Aerial Photography

MAP INFORMATION

The soil surveys that comprise your AOI were mapped at 1:25,000.

Warning: Soil Map may not be valid at this scale.

Enlargement of maps beyond the scale of mapping can cause misunderstanding of the detail of mapping and accuracy of soil line placement. The maps do not show the small areas of contrasting soils that could have been shown at a more detailed scale.

Please rely on the bar scale on each map sheet for map measurements.

Source of Map: Natural Resources Conservation Service
Web Soil Survey URL:
Coordinate System: Web Mercator (EPSG:3857)

Maps from the Web Soil Survey are based on the Web Mercator projection, which preserves direction and shape but distorts distance and area. A projection that preserves area, such as the Albers equal-area conic projection, should be used if more accurate calculations of distance or area are required.

This product is generated from the USDA-NRCS certified data as of the version date(s) listed below.

Soil Survey Area: Norfolk and Suffolk Counties, Massachusetts
Survey Area Data: Version 14, Sep 12, 2018

Soil map units are labeled (as space allows) for map scales 1:50,000 or larger.

Date(s) aerial images were photographed: May 14, 2010—Apr 1, 2017

The orthophoto or other base map on which the soil lines were compiled and digitized probably differs from the background imagery displayed on these maps. As a result, some minor shifting of map unit boundaries may be evident.

Map Unit Legend

Map Unit Symbol	Map Unit Name	Acres in AOI	Percent of AOI
31A	Walpole sandy loam, 0 to 3 percent slopes	2.4	8.2%
103C	Charlton-Hollis-Rock outcrop complex, 8 to 15 percent slopes	6.1	21.2%
245B	Hinckley loamy sand, 3 to 8 percent slopes	0.6	2.2%
260B	Sudbury fine sandy loam, 2 to 8 percent slopes	8.3	28.7%
420B	Canton fine sandy loam, 3 to 8 percent slopes	8.1	28.1%
653	Udorthents, sandy	3.3	11.6%
Totals for Area of Interest		**28.8**	**100.0%**

Norfolk and Suffolk Counties, Massachusetts

103C—Charlton-Hollis-Rock outcrop complex, 8 to 15 percent slopes

Map Unit Setting

National map unit symbol: 2wzp1
Elevation: 0 to 1,390 feet
Mean annual precipitation: 36 to 71 inches
Mean annual air temperature: 39 to 55 degrees F
Frost-free period: 140 to 240 days
Farmland classification: Not prime farmland

Map Unit Composition

Charlton, extremely stony, and similar soils: 50 percent
Hollis, extremely stony, and similar soils: 20 percent
Rock outcrop: 10 percent
Minor components: 20 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Charlton, Extremely Stony

Setting

Landform: Hills, ridges
Landform position (two-dimensional): Backslope
Landform position (three-dimensional): Side slope
Down-slope shape: Linear, convex
Across-slope shape: Convex
Parent material: Coarse-loamy melt-out till derived from granite, gneiss, and/or schist

Typical profile

Oe - 0 to 2 inches: moderately decomposed plant material
A - 2 to 4 inches: fine sandy loam
Bw - 4 to 27 inches: gravelly fine sandy loam
C - 27 to 65 inches: gravelly fine sandy loam

Properties and qualities

Slope: 8 to 15 percent
Percent of area covered with surface fragments: 9.0 percent
Depth to restrictive feature: More than 80 inches
Natural drainage class: Well drained
Runoff class: Low
Capacity of the most limiting layer to transmit water (Ksat): Moderately low to high (0.14 to 14.17 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Salinity, maximum in profile: Nonsaline (0.0 to 1.9 mmhos/cm)
Available water storage in profile: Moderate (about 8.7 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 7s
Hydrologic Soil Group: B
Hydric soil rating: No

Description of Hollis, Extremely Stony

Setting

Landform: Hills, ridges
Landform position (two-dimensional): Backslope, shoulder, summit
Landform position (three-dimensional): Crest, side slope, nose slope
Down-slope shape: Convex
Across-slope shape: Linear, convex
Parent material: Coarse-loamy melt-out till derived from granite, gneiss, and/or schist

Typical profile

Oi - 0 to 2 inches: slightly decomposed plant material
A - 2 to 7 inches: gravelly fine sandy loam
Bw - 7 to 16 inches: gravelly fine sandy loam
2R - 16 to 26 inches: bedrock

Properties and qualities

Slope: 8 to 15 percent
Percent of area covered with surface fragments: 9.0 percent
Depth to restrictive feature: 8 to 23 inches to lithic bedrock
Natural drainage class: Somewhat excessively drained
Runoff class: Very high
Capacity of the most limiting layer to transmit water (Ksat): Very low (0.00 to 0.00 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Salinity, maximum in profile: Nonsaline (0.0 to 1.9 mmhos/cm)
Available water storage in profile: Very low (about 2.7 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 7s
Hydrologic Soil Group: D
Hydric soil rating: No

Description of Rock Outcrop

Setting

Landform: Hills, ridges
Parent material: Igneous and metamorphic rock

Typical profile

R - 0 to 79 inches: bedrock

Properties and qualities

Slope: 8 to 15 percent
Depth to restrictive feature: 0 inches to lithic bedrock
Runoff class: Very high
Capacity of the most limiting layer to transmit water (Ksat): Very low (0.00 to 0.00 in/hr)
Available water storage in profile: Very low (about 0.0 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 8
Hydrologic Soil Group: D
Hydric soil rating: No

Minor Components

Woodbridge, extremely stony

Percent of map unit: 8 percent
Landform: Hills, ground moraines, drumlins
Landform position (two-dimensional): Backslope, footslope
Landform position (three-dimensional): Side slope
Down-slope shape: Convex
Across-slope shape: Linear
Hydric soil rating: No

Chatfield, extremely stony

Percent of map unit: 5 percent
Landform: Hills, ridges
Landform position (two-dimensional): Summit, backslope, shoulder
Landform position (three-dimensional): Crest, side slope, nose slope
Down-slope shape: Convex
Across-slope shape: Linear, convex
Hydric soil rating: No

Canton, extremely stony

Percent of map unit: 5 percent
Landform: Ridges, hills, moraines
Landform position (two-dimensional): Backslope
Landform position (three-dimensional): Side slope
Down-slope shape: Convex, linear
Across-slope shape: Convex
Hydric soil rating: No

Ridgebury, extremely stony

Percent of map unit: 2 percent
Landform: Hills, ground moraines, depressions, drumlins, drainageways
Landform position (two-dimensional): Toeslope, footslope
Landform position (three-dimensional): Base slope, head slope
Down-slope shape: Concave
Across-slope shape: Concave

Hydric soil rating: Yes

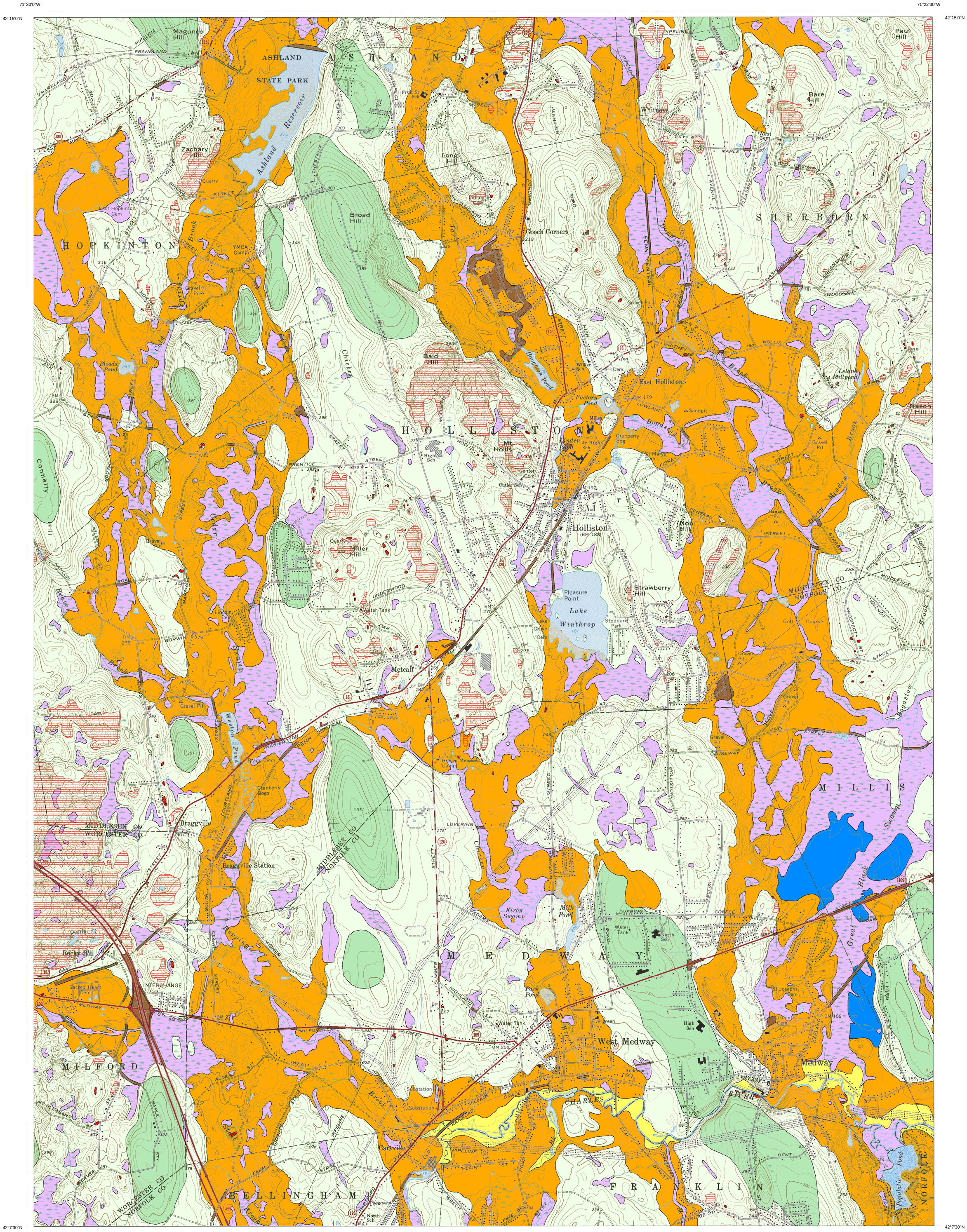
Data Source Information

Soil Survey Area: Norfolk and Suffolk Counties, Massachusetts
Survey Area Data: Version 14, Sep 12, 2018

HOLLISTON QUADRANGLE

Excerpted from: Surficial Geologic Map of the Clinton-Concord-Grafton-Medfield 12-Quadrangle Area in East Central Massachusetts
By Janet R. Stone and Byron D. Stone
Open-File Report 2006-1260A

Explanatory pamphlet accompanies map



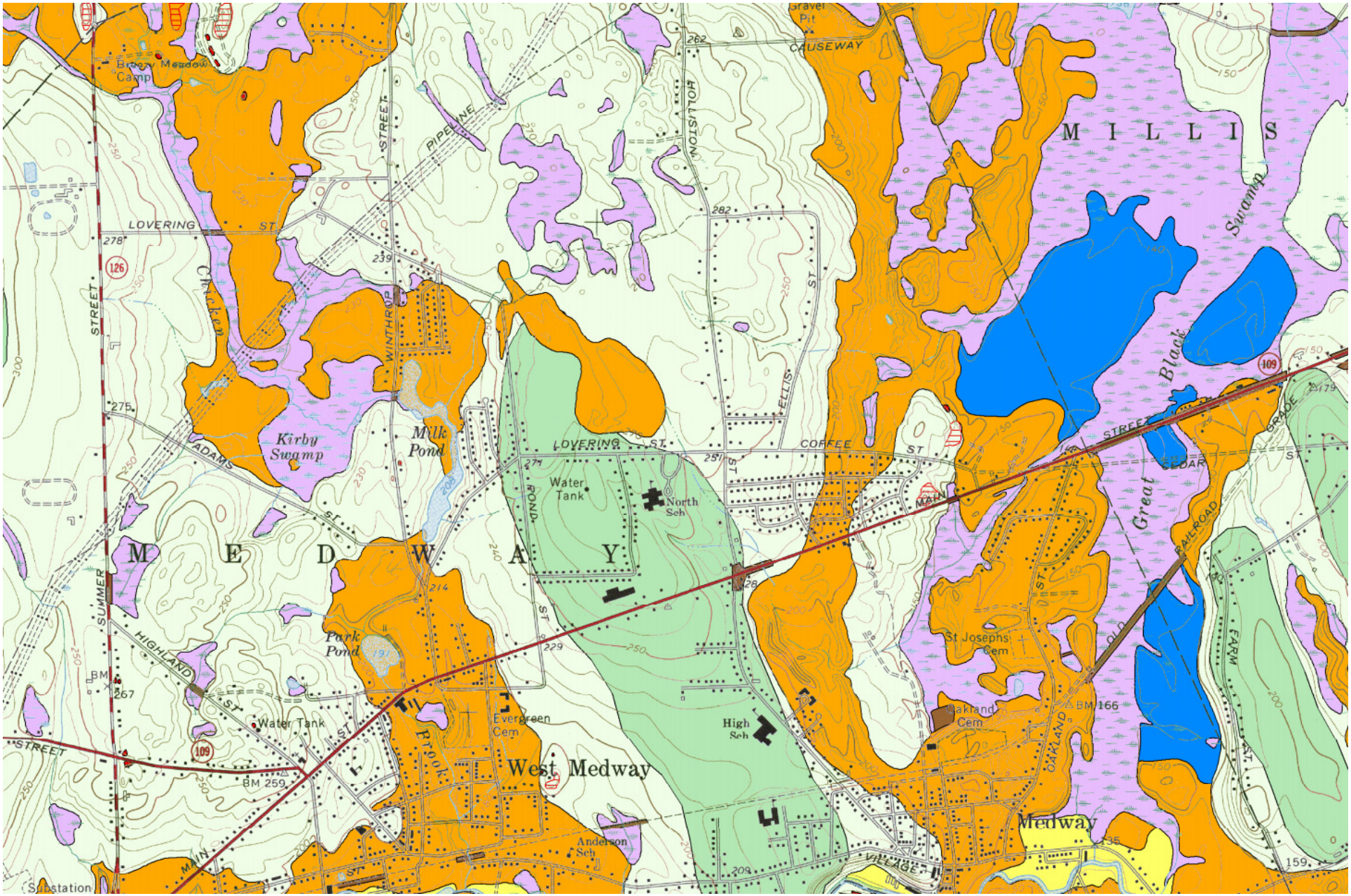
Scale 1:24,000

1 0.5 0 1 2 Miles

1 0.5 0 1 2 Kilometers

USGS science for a changing world

OFFICE OF THE STATE GEOLOGIST • UNIVERSITY OF MASSACHUSETTS •

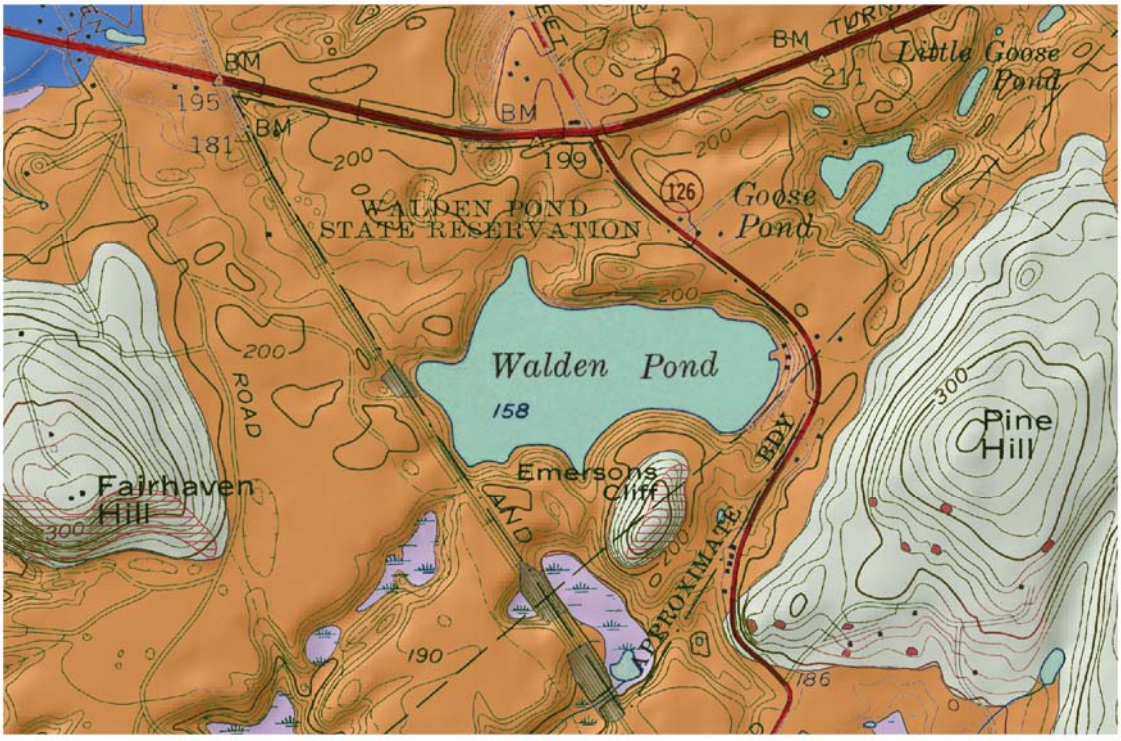

MILLIS
MEDWAY
West Medway
Medway
Kirby Swamp
Milk Pond
Park Pond
Great Black Swamp
Water Tank
North Sch
High Sch
Anderson Sch
Evergreen Cem
St Josephs Cem
Oakland Cem
Gravel Pit
Brady Meadow Camp
Substation
BM 267
BM 259
BM 166
LOVERING ST
COFFEE ST
MAIN ST
ADAMS ST
HIGHLAND ST
VILLAGE ST
CAUSEWAY
PIPELINE
WINTHROP STREET
SUMMER STREET
CHARLES STREET
POND ST
ELLIS ST
OAKLAND ST
CEDAR ST
FARM ST
RAILROAD
GRADE
Chicken Brook
126
109

USGS
science for a changing world

Prepared in cooperation with the Commonwealth of Massachusetts
Office of the State Geologist and Executive Office of Environmental Affairs

Surficial Geologic Map of the Clinton-Concord-Grafton-Medfield 12-quadrangle area in East Central Massachusetts

Compiled by Janet R. Stone and Byron D. Stone



Open-File Report 2006-1260A

U.S. Department of the Interior
U.S. Geological Survey

U.S. Department of the Interior
Dirk Kempthorne, Secretary

U.S. Geological Survey
Mark D. Myers, Director

U.S. Geological Survey, Reston, Virginia 2006

For product and ordering information:
World Wide Web: http://www.usgs.gov/pubprod
Telephone: 1-888-ASK-USGS

For more information on the USGS—the Federal source for science about the Earth,
its natural and living resources, natural hazards, and the environment:
World Wide Web: http://www.usgs.gov
Telephone: 1-888-ASK-USGS

Suggested citation:
Stone, J.R., and Stone, B.D., 2006, Surficial Geologic Map of the Clinton-Concord-Grafton-Medfield 12-quadrangle area in East Central Massachusetts: U.S. Geological Survey Open-File Report 2006-1260A.

Cover figure. A portion of the surficial geologic map of the Concord quadrangle, shown with semi-transparent shaded relief on a scanned topographic base map.

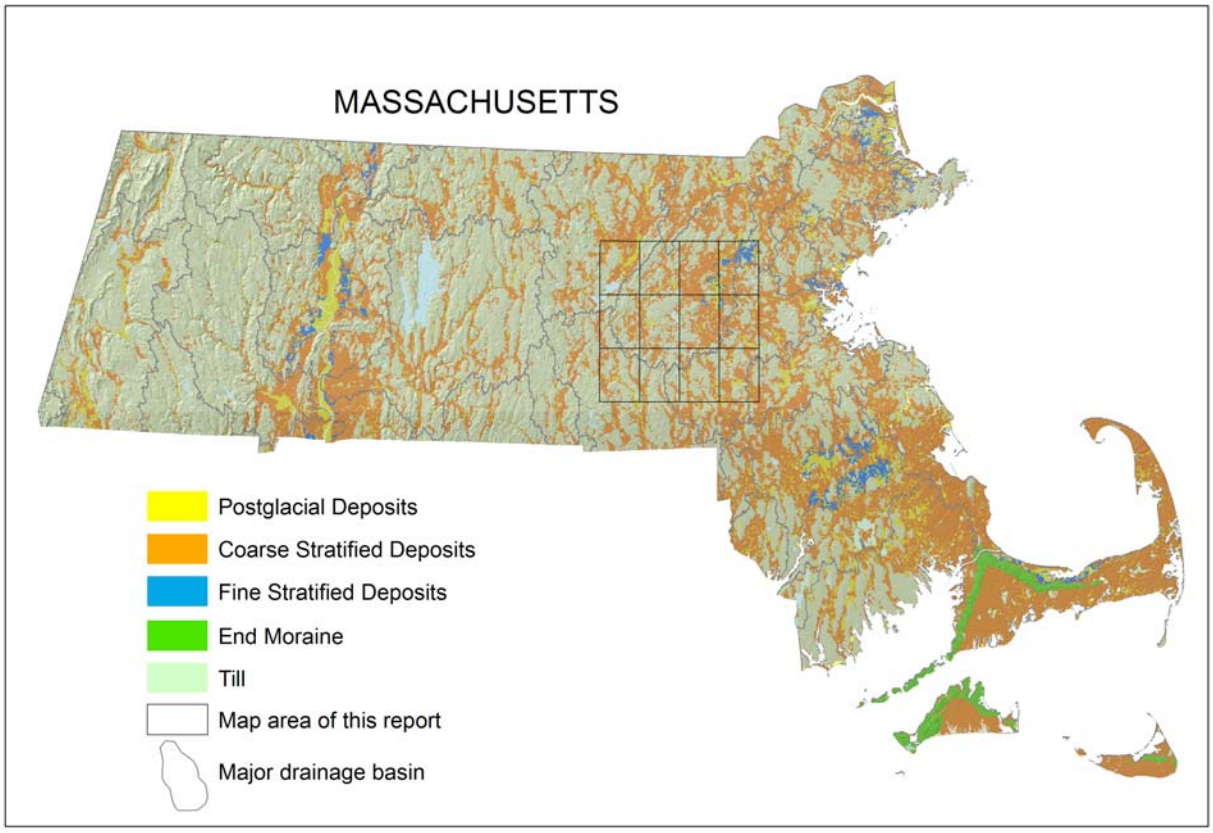


Figure 1. General distribution of glacial and postglacial deposits in Massachusetts (Stone and Beinikis, 1993, MassGIS, 1999) and map area covered by this report.

Surficial Materials in Massachusetts

Most of the surficial materials in Massachusetts are deposits of the last two continental ice sheets that covered all of New England in the latter part of the Pleistocene ice age (Schafer and Hartshorn, 1965; Stone and Borns, 1986; Oldale and others, 1982). The glacial deposits are divided into two broad categories, ***glacial till*** and ***glacial stratified deposits***. Till, the most widespread glacial deposit, was laid down directly by glacier ice. Glacial stratified deposits are concentrated in valleys and lowland areas and were laid down by glacial meltwater in streams, lakes, and the sea in front of the retreating ice margin during the last deglaciation. Postglacial sediments, primarily floodplain alluvium and swamp deposits, make up a lesser proportion of the unconsolidated materials.

Glacial till deposits consist of nonsorted, generally nonstratified mixtures of mineral and rock particles ranging in grain size from clay to large boulders. The matrix of most tills is composed dominantly of fine sand and silt. Boulders within and on the surface of tills range from sparse to abundant. Some tills contain lenses of sorted sand and gravel and less commonly, masses of laminated fine-grained sediments. The color and lithologic characteristics of till deposits vary across Massachusetts, but generally reflect the composition of the local underlying and northerly adjacent bedrock from which the till was derived. Till blankets the bedrock surface in variable thickness, ranging from a few inches to more than 200 ft, and commonly underlies stratified

altitude of fluvial sediments in each morphosequence was controlled by a specific base level, either a glacial-lake or marine water plane or a valley knickpoint. Few morphosequences extend distally more than 10 km, and most are less than 2 km in length. In any one basin, individual morphosequences were deposited sequentially as the ice margin retreated systematically northward. Consequently, in many places the distal, finer grained facies of a younger morphosequence stratigraphically overlies the proximal, coarse-grained facies of a preceding morphosequence. Figure 2 shows the variability of sediment types in the subsurface of glacial stratified deposits. The figure schematically shows the relationship between coarse-grained deltaic deposits and extensive fine-grained lake (or marine) deposits in the subsurface. Such coarse- and fine-grained units are common in most of the valleys and lowlands of Massachusetts (Langer, 1979, Stone and others, 1979; Stone and others, 1992; Stone and others, 2005). On this interim map, coarse-grained and fine-grained textural variations within glacial stratified deposits are shown only where they occur at land surface. Subsurface textural variations are not shown.

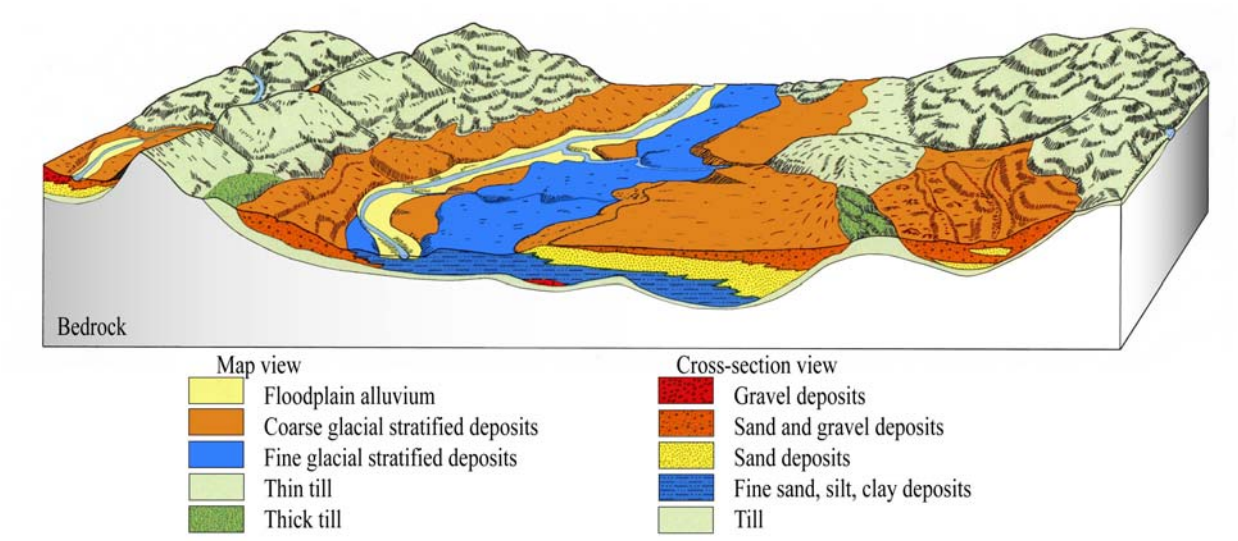


Figure 2. Block diagram illustrating the typical areal and vertical distribution of glacial and postglacial deposits overlying bedrock (modified from Stone and others, 1992).

The areal distribution of till and stratified deposits across Massachusetts is related regional physiography (fig. 1). The thickness of these materials varies considerably because of such factors as the high relief of the bedrock surface, changing environments of deposition during deglaciation, and various effects of postglacial erosion and removal of glacial sediments. In highland areas, notably in the western and central parts of the State, till is the major surficial material and is present as a discontinuous mantle of variable thickness over the bedrock surface. Till is thickest in drumlins (reportedly as much as 230 ft thick) and on the northwest slopes of most bedrock hills. Glacial meltwater deposits that average 50 feet in thickness (Stone and Beinikis, 1993) overlie the till in small upland valleys and north-sloping basins between bedrock hills. Glacial stratified deposits are the predominant surficial materials in the Connecticut River valley, the northeastern and southeastern lowlands, and on Cape Cod and the islands. These deposits generally overlie till; however, well logs indicate that in some places till is not present and the stratified deposits lie

directly on bedrock. On Cape Cod and the islands, in the southeastern lowland, and in parts of the Connecticut River valley these deposits completely cover the till-draped bedrock surface.

Postglacial deposits locally overlie the glacial deposits throughout the State. Alluvium underlies the floodplains of most streams and rivers. Swamps occur in low-lying, poorly drained areas in upland and lowland settings, but swamp deposits are shown only where they are estimated to be at least 3 ft thick. Salt-marsh and estuarine deposits are present mainly along the tidal portions of streams and rivers entering the offshore areas. Beach deposits occur along the shoreline.

Description of Map Units

Postglacial Deposits

Artificial fill—Earth materials and manmade materials that have been artificially emplaced, primarily in highway and railroad embankments, and in dams; may also include landfills, urban development areas, and filled coastal wetlands.

Floodplain alluvium—Sand, gravel, silt, and some organic material, stratified and well sorted to poorly sorted, beneath the floodplains of modern streams. The texture of alluvium commonly varies over short distances both laterally and vertically, and generally is similar to the texture of adjacent glacial deposits. Along smaller streams, alluvium is commonly less than 5 ft thick. The most extensive deposit of alluvium on the map is along the Charles, Assabet, and Concord Rivers where the texture is predominantly sand, fine gravel, and silt, and total thickness is as much as 25 ft. Alluvium typically overlies thicker glacial stratified deposits.

Swamp deposits—Organic muck and peat that contain minor amounts of sand, silt, and clay, stratified and poorly sorted, in kettle depressions or poorly drained areas. Most swamp deposits are less than about 10 ft thick. Swamp deposits overlie glacial deposits or bedrock. They locally overlie glacial till even where they occur within thin glacial meltwater deposits.

Glacial Stratified Deposits

Sorted and stratified sediments composed of gravel, sand, silt, and clay (as defined in particle size diagram, fig. 3) deposited in layers by glacial meltwater. These sediments occur as four basic textural units—gravel deposits, sand and gravel deposits, sand deposits, and fine deposits. On this interim map, gravel, sand and gravel, and sand deposits are not differentiated and are shown as *Coarse Deposits* where they occur at land surface. *Fine Deposits* also are shown where they occur at land surface. **Textural changes occur both areally and vertically (fig. 2), however subsurface textural variations are not shown on this interim map.**

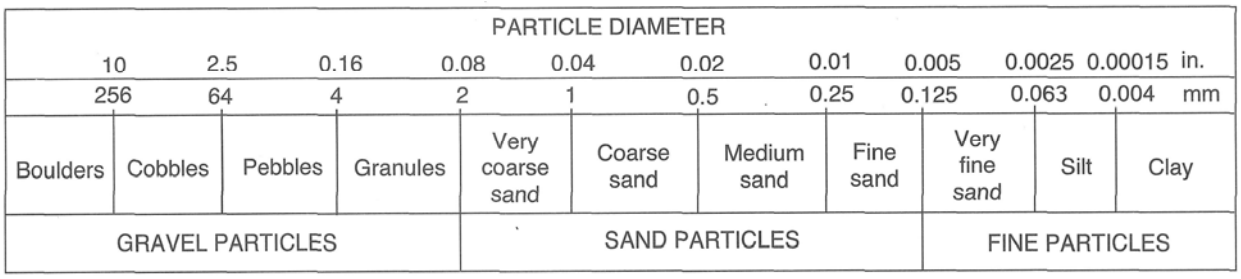


Figure 3. Grain-size classification used in this report, modified from Wentworth (1922).

Coarse deposits include: *Gravel deposits* composed mainly of gravel-sized clasts; cobbles and boulders predominate; minor amounts of sand within gravel beds, and sand comprises few separate layers. Gravel layers generally are poorly sorted and bedding commonly is distorted and faulted due to postdepositional collapse related to melting of ice. *Sand and gravel deposits* composed of mixtures of gravel and sand within individual layers and as alternating layers. Sand and gravel layers generally range from 25 to 50 percent gravel particles and from 50 to 75 percent sand particles. Layers are well to poorly sorted; bedding may be distorted and faulted due to postdepositional collapse. *Sand deposits* composed mainly of very coarse to fine sand, commonly in well-sorted layers. Coarser layers may contain up to 25 percent gravel particles, generally granules and pebbles; finer layers may contain some very fine sand, silt, and clay.

Fine deposits include very fine sand, silt, and clay that occurs as well-sorted, thin layers of alternating silt and clay, or thicker layers of very fine sand and silt. Very fine sand commonly occurs at the surface and grades downward into rhythmically bedded silt and clay varves. Locally, this map unit may include areas underlain by fine sand.

Glacial Till Deposits

Thin till—Nonsorted, nonstratified matrix of sand, some silt, and little clay containing scattered gravel clasts and few large boulders; in areas where till is generally less than 10-15 ft thick and including areas of bedrock outcrop where till is absent. Predominantly upper till of the last glaciation; loose to moderately compact, generally sandy, commonly stony. Two facies are present in some places; a looser, coarser-grained ablation facies, melted out from supraglacial position; and an underlying more compact, finer-grained lodgement facies deposited subglacially. In general, both ablation and lodgement facies of upper till derived from fine-grained bedrock are finer grained, more compact, less stony and have fewer surface boulders than upper till derived from coarser grained crystalline rocks. Fine-grained bedrock sources include the red Mesozoic sedimentary rocks of the Connecticut River lowland, marble in the western river valleys, and fine-grained schists in upland areas.

Thick till—Nonsorted, nonstratified matrix of sand, some silt, and little clay containing scattered gravel clasts and few large boulders at the surface; in the shallow subsurface, compact, nonsorted matrix of silt, very fine sand, and some clay containing scattered small gravel clasts in areas where till is greater than 10-15 ft thick, chiefly in drumlin landforms in which till thickness commonly exceeds 100 ft (maximum recorded thickness is 230 ft). Although upper till is the surface deposit, the lower till constitutes the bulk of the material in these areas. Lower till is moderately to very compact, and is commonly finer grained and less stony than upper till. An oxidized zone, the lower part of a soil profile formed during a period of interglacial weathering, is generally present in the upper part of the lower till. This zone commonly shows closely spaced joints that are stained with iron and manganese oxides.

Bedrock Areas

Bedrock outcrops and areas of abundant outcrop or shallow bedrock— Solid color shows extent of individual bedrock outcrops; line pattern indicates areas of shallow bedrock or areas where small outcrops are too numerous to map individually; in areas of shallow bedrock, surficial materials are less than 5-10 ft thick.

Map Compilation

This compilation is the first in a series of interim products showing surficial geology in twelve 7.5-minute quadrangles in east-central Massachusetts: Clinton, Hudson, Maynard, Concord, Shrewsbury, Marlborough, Framingham, Natick, Grafton, Milford, Holliston, and Medfield (fig. 4, fig 5 area A). Figure 5 shows all of the compilation areas for surficial geology in Massachusetts. These maps will be produced sequentially by letter designation.

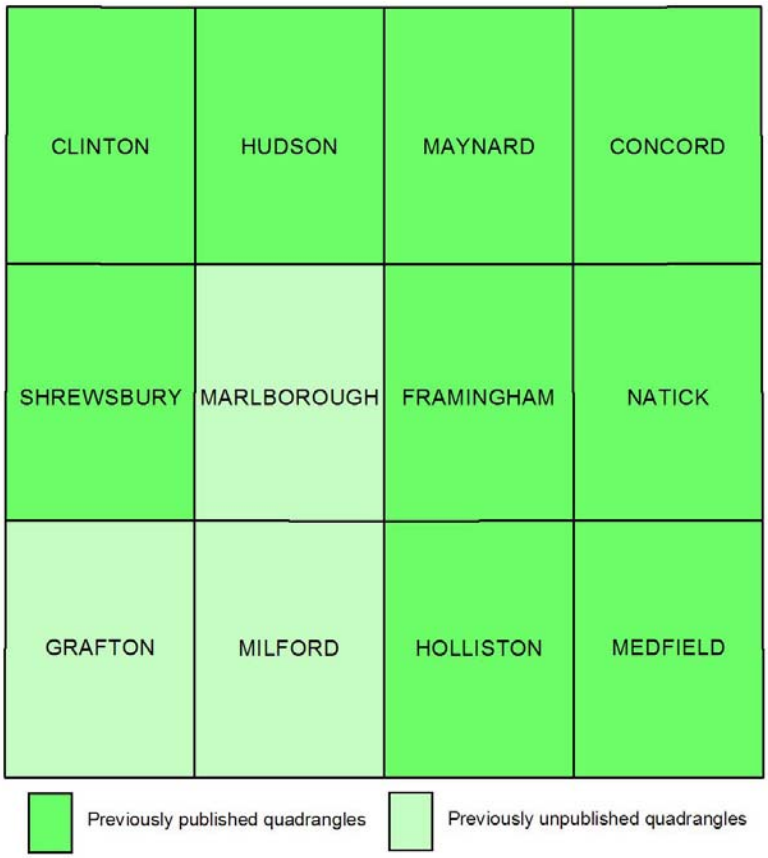


Figure 4. 7.5-minute quadrangles in this compilation.

This map was compiled in several steps: 1) Paper copies of the published surficial geologic maps for nine quadrangles were scanned and georeferenced by MASSGIS. 2) The Office of the Massachusetts State Geologist vectorized the georeferenced images in order to digitally retain the original line work of the published maps (Mabee and others, 2004). 3) Digital geologic map units were compiled and grouped into nine basic units in four broader categories: *Postglacial deposits*

including artificial fill, swamp deposits, and floodplain alluvium; *glacial stratified deposits* including coarse-grained and fine-grained deposits; *glacial till* including thin till and thick till (drumlins); and *bedrock areas* including outcrops and areas of shallow bedrock). The distribution of glacial stratified deposits beneath adjacent overlying postglacial deposits and water bodies was inferred by the compilers. 4) The same basic units for three unpublished quadrangles were compiled and digitized from scanned field maps by U.S. Geological Survey personnel. 5) The 12 individual quadrangles were joined and edge-matched in order to form a seamless geologic map. Discrepancies along quadrangle boundaries were resolved, and thick till areas were added by the compilers in quadrangles where this unit was not previously mapped.

All geologic mapping was completed at 1:24,000-scale; however the browse graphic is presented at 1:50,000 scale with shaded relief base. The 1:24,000-scale, 10-ft contour interval topographic base maps used for this mapping effort are included as part of the digital data package in the TOPOS folder. The GEOLOGY folder included with this report contains 3 ARCGIS shapefiles which are geologic units that cover the entire map area, and are intended for use at quadrangle scale; the shapefiles can be clipped by quadrangle or town boundaries. Unlike conventional geologic maps, the digital mapping is arranged in layers according to superposition. The till-bedrock shapefile should be placed on the bottom, and overlain by the stratified deposits shapefile; these materials are shown everywhere that they occur including beneath postglacial deposits, such as swamp deposits, floodplain alluvium, and water bodies. The postglacial shapefile should be placed on top because these materials overlie the other two layers. Instructions for using the digital files are included in the README file and metadata.

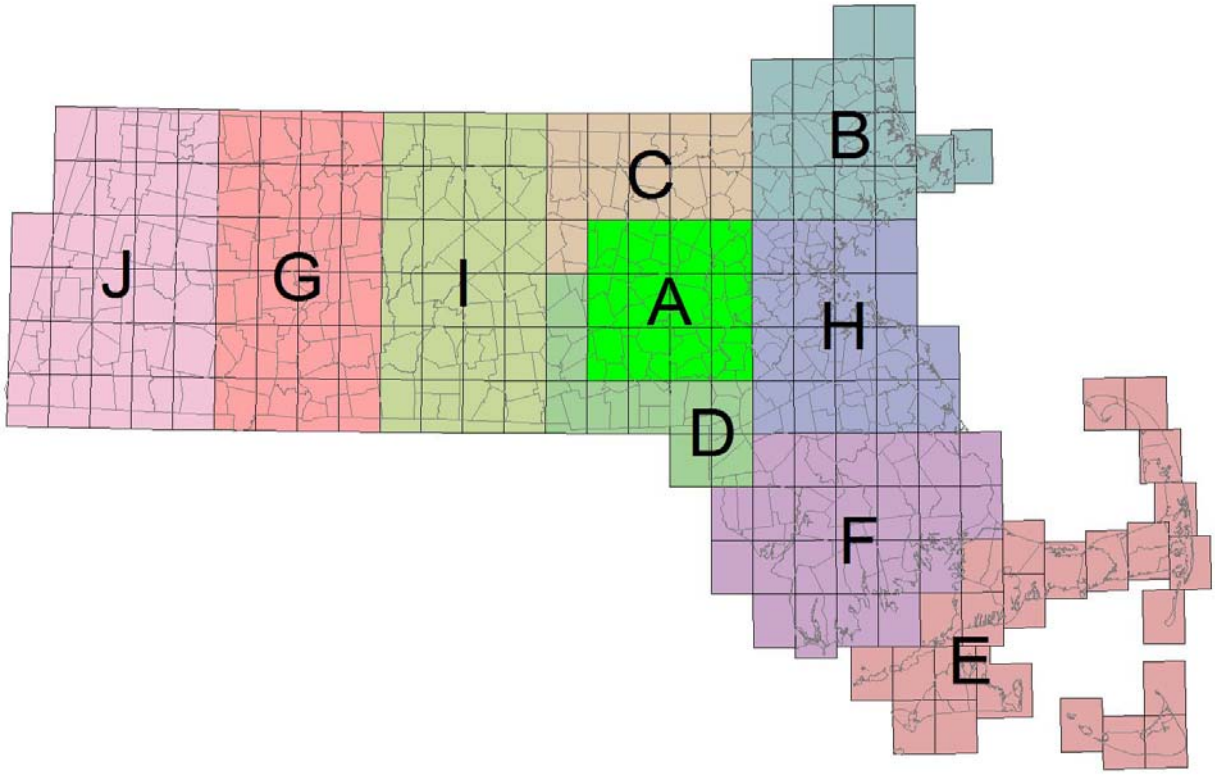


Figure 5. Compilation areas in Massachusetts.

25457

APPENDIX 2

Long-Term Pollution Prevention Plan

Attachment 1
MassDEP Snow Disposal Guidance

for

4 Marc Road
Medway, Massachusetts 02053

25457

LONG-TERM POLLUTION PREVENTION PLAN

For

4 Marc Road
Medway, Massachusetts 02053

Long-Term Pollution Prevention Plan July 25, 2019
4 Marc Road
Medway, MA 02053

TABLE OF CONTENTS

1.0 INTRODUCTION

This document is a Long-Term Pollution Prevention Plan (LTPPP) prepared by DGT Associates for anticipated property management and use relative to the proposed development at 4 Marc Road in Medway, Massachusetts. The plan has been prepared to provide the detailed information on practices for pollution prevention and source control to be implemented at the property following construction.

The property owner will implement this Long-Term Pollution Prevention Plan and proactively conduct operations at the site in an environmentally responsible manner.

Compliance with this Long-Term Pollution Prevention Plan does not in any way dismiss the owner from compliance with other applicable Federal, State or local laws.

1.1 LONG-TERM POLLUTION PREVENTION PLAN - IMPLEMENTATION

The owner is responsible for the implementation of the Long-Term Pollution Prevention Plan and will reevaluate and amend this Long-Term Pollution Prevention Plan whenever an improvement or modification to operations can be implemented.

1.2 AVAILABILITY OF PLAN DOCUMENTS

The owner shall maintain a copy of the Long-Term Pollution Prevention Plan and related inspection reports, amendments, etc. at their offices. Copies will be made available for review to authorized personnel of the Town of Medway Conservation Commission, and other authorized public officials upon request.

2.0 LONG-TERM POLLUTION PREVENTION PLAN RESPONSIBILITIES

2.1 RESPONSIBLE PARTY AND CONTACT INFORMATION

At the completion of the project, the site will be the responsibility of the owner/applicant. Presently, the responsible party for the implementation of the Long-Term Pollution Prevention Plan is:

Neo Alternatives, LLC
365 Boston Post Road
Sudbury, MA 01776

2.2 RESPONSIBILTIES FOR IMPLEMENTATION

The following responsibilities for the implementation of the Long-Term Pollution Prevention Plan are as follows:

- Oversee property management activities on the site.
- Oversee inspection, monitoring, and reporting compliance.
- Ensure property management contracts include both this Long-Term Pollution Prevention Plan as well as the Stormwater Operations and Maintenance Plan, and any other requirements

issued by the Town of Medway Conservation Commission to assure compliance with this Long-Term Pollution Prevent Plan and the Operations and Maintenance Plan.

- Provide training, if necessary, to those responsible for the inspection, monitoring, and maintenance of the site.
- Identify other potential pollutant sources or deficiencies in the BMP's (Best Management Practices) and amend the Long-Term Pollution Prevention Plan as appropriate to address those issues.

3.0 PROJECT DESCRIPTION

3. 1 EXISTING SITE DESCRIPTION

The site is located on the north side of the cul-de-sac at the end of Marc Road. The site is currently developed with a 29,718± square foot industrial manufacturing building, with associated driveway access, parking areas, landscape improvements, utilities, and some stormwater management features. A large portion of the site remains undeveloped containing wooded areas and wetland resource areas at the northeast portion of the site. The total area of the site is 290,884± square feet (6.68± acres). Currently the existing site contains 68,012 square feet of impervious surface (23.4%).

The existing site is bound by Marc Road to the south as well as an undeveloped industrial zoned lot, an unpaved 30 foot wide private way with undeveloped agricultural / residential zoned lots to the west, undeveloped agricultural / residential zoned lots containing wetlands and a vernal pool to the north, and another industrial use building to the east.

The parcel is known as Parcel ID: 32-026 in the assessor's records and is located in the I-1 zoning district within the East Industrial Underlying Zoning District. A portion of the site at the northeast and east of the site is also located within the Groundwater Protection District. This district coincides with the portion of the lot located within a Zone II Wellhead Protection Area, which is a Critical Area per the Massachusetts Stormwater Regulations.

The property lies in zone "x-unshaded" (areas determined to be outside the 0.2% annual chance floodplain) as shown on FEMA Flood Insurance Rate Map number 25021C0142E Dated July 17, 2012. So the land is not within an "Area Subject to Flooding" under the Wetland Protection Act.

3. 2 PROPOSED PROJECT

The proposed site work for the project is shown on the site plans and includes the following:

- Interior renovations to the existing industrial building.

- Construction of a 3,000 square foot concrete mechanical pad to house the odor pollution contorl equipment, as well as some HVAC equipment.
- Construction of several stormwater Best Management Practices (BMPs) including a one (1) recharge (infiltration) system and three (3) proprietary stormwater treatment units (CDS Technologies – referred to a Water Quality Units (WQU) in this report). The BMP treatment trains are designed to provide water quality improvements and to provide groundwater recharge.
- Installation of oil and debris traps in all existing catch basins on-site.
- The performance of maintenance excavation in the existing manmade drainage ditch (approximately 160 linear feet), to promote drainage flow, as well as the performance of general clean up in and around the drainage ditch to restore a more natural and clean landscape in the area of proposed work. This work is to include the installation of a rip-rap plunge pool at the existing outfall from the existing site drainage infrastructure to the drainage ditch.
- Installation of construction period erosion and sedimentation controls.

The new stormwater management system is designed to assure that the stormwater runoff peak flows after development will be the same or less than the existing conditions. This is to assure that there will be no impact to the downstream drainage systems. Maintenance requirements for the stormwater management features are included in the Stormwater Operations and Maintenance Plan (Appendix 5).

4.0 PRACTICES FOR SOURCE CONTROL AND POLLUTION PREVENTION

4.1 Good Housekeeping:
Good housekeeping procedures to reduce the possibility of accidental releases and to reduce safety hazards will include but not be limited to the following:

- Proper handling and storage of solid wastes,
- Proper handling, storage and inventory of household chemicals, and
- Prompt cleanup and removal of de minimus releases.
- The owner of the facility will contract for solid waste disposal and recycling.

4.2 Storage and Proper Disposal of Hazardous Chemicals:
The owner / property manager should be aware of not only the potential hazards of various chemicals to the human body but also to the environment. Tenants need to be instructed on the proper disposal of hazardous waste and should use the town programs such as the Hazardous Waste Days for the disposal of various chemicals, including automobile fluids, paints, solvents, cleaners, etc.

4.3 Vehicle Washing:
The washing of personal vehicles on the property is not allowed. The owner should communicate the impacts of outdoor washing of vehicles on the stormwater drainage system. High loads of nutrients, metals, and hydrocarbons can enter the stormwater drainage system and have negative impacts on downstream environments. The use of commercial car wash facilities equipped for the washing of vehicles and equipment should be encouraged. Employees should assess the integrity of vehicle fluid systems for personal vehicles that could leak significant materials on the property and into the storm drainage system. The property manager shall be observant at all times to look for evidence of leaks from vehicles and notify the vehicle owner to repair the leaks.

4.4 Routine Inspections and Maintenance of Stormwater BMP's:
Detailed information regarding stormwater BMPs, including descriptions and maintenance requirements is contained in the Stormwater Operation and Maintenance Plan (Appendix 5).

4.5 Spill Prevention and Response:
The property manager will implement release response procedures for releases of significant materials such as fuels, oils, or chemical materials onto the ground or other area that could reasonably be expected to discharge to surface or groundwater.

Reportable quantities will immediately be reported to the applicable Federal, State and local agencies as required by law.

Applicable containment and cleanup procedures will be performed immediately. Impacted material collected during the response must be removed promptly and disposed of in accordance with Federal, State and local requirements. A licensed emergency response contractor may be required to assist in cleanup of releases depending on the size and location of the release, and the ability of the Contractor to perform the required response.

Reportable quantities are established under the following:

1. 40 CFR Part 110 addressing the discharge of oil in such quantities as may be harmful pursuant to Section 311 (b) (4) of the Clean Water Act.
2. 40 CFR Part 117 addresses the determination of such quantities of hazardous substances that may be harmful pursuant to Section 311 (b) (3) of the Clean Water Act.
3. 40 CFR Part 302 addresses the designation, reportable quantities, and notification requirements for the release of substances designated under section 311 (b) (2) (A) of the Clean Water Act.

4.6 Maintenance of Lawns and Landscaped Areas:
The property manager should consult with landscape professionals to develop a comprehensive plan for lawn and planting maintenance, which will include timing and application amounts of various turf chemicals, fertilizers, maintenance plantings and lawn repairs, and disposal of leaves and lawn trimmings. The landscape design for most of the turf and planted areas should minimize the need for fertilizers, herbicides and pesticides. However, it will require regular monitoring and maintenance to keep the plantings in healthy condition.

4.7 Storage of Fertilizers, Herbicides, and Pesticides:
These chemicals should be stored inside or under cover with adequate containment.

4.8 Pet Waste Management:
The owner should require and implement "pooper-scooper" requirements for pets on the property to maintain the property free of pet waste.

4.9 Operation and Maintenance of Sewer System
The sewage collection system at the building connects to the public sewer in Marc Road. Many common chemicals can be a threat to the environment if disposed improperly. Hazardous chemicals must NOT be "poured down the drain."

4.10 Solid Waste Management:
All waste materials are to be stored in securely lidded containers as applicable to the material. Said containers will be monitored by the property manager and emptied by a licensed waste disposal contractor on a regular basis.

4.11 Snow Disposal and Use of Deicing Chemicals:
Maintenance personnel and any contractors selected for snow plowing and deicing shall be made fully aware of the requirements of this section. During typical snow plowing operations, snow shall be pushed to the shoulders of the driveway entrance. If the plowed snow is impacting public safety, the snow shall be removed from the site and properly disposed of in accordance with the MassDEP Snow Disposal Guidance. (See Attachment 1).

Care must be taken to avoid damage of structures and landscaping.

Deicing materials such as sand and salt for roadway deicing are typically not stored at the site. These materials are supplied during snow plowing and deicing operations. Small amounts to handle individual walkways can be stored on site under cover and on an impervious surface or in proper containers within the building.

Alternatives to sodium chloride (commonly used salt) such as sand or calcium chloride, and reduced applications, should be considered and implemented if public safety is not jeopardized.

Before winter begins, the property manager and the contractor should review snow plowing and deicing procedures. After winter but no later than May 15, the debris left from snow plowing and any damage to the turf, vegetation, fences, etc., should be repaired.

4.12 Street Sweeping

The driveway should be maintained to limit the amount of roadway debris and pollutants that could have a negative effect on the components of the Stormwater Management System. Sweeping a minimum of two (2) times per year is recommended. Frequency should be based on the time of year as well as the weather. The first sweeping should be during the month of March before the spring rains wash off the residual sand from winter applications. This will allow for the highest removal of street dirt and pollutants before they are washed into the other BMP's of the Stormwater Management System. The second sweeping should take place during the month of November to allow for the removal of leaves, twigs, and other debris caused by the late year storms and before the snow arrives. Any other sweeping should be determined by the property manager on an as needed basis. Once removed from paved surfaces, the sweepings must be handled and disposed of properly.

4.13 Stormwater System:

In conjunction with the Long-Term Pollution Prevention Plan, the requirements of the Stormwater Operations and Maintenance Plan (Appendix 5) shall be implemented and the owner will oversee the inspections and preparation of the required inspection reports for compliance with that document.

5.0 INSPECTIONS AND REPORT PREPARATION

The owner shall maintain inspection and maintenance logs of the maintenance and repair of the site for items as contained in this Long Term Pollution Prevention Plan and Stormwater Operation and Maintenance Plan. Generally, forms need to be completed when inspections, maintenance and repairs are performed and typically on a monthly basis.

6.0 COORDINATION WITH OTHER PERMITS AND REQUIREMENTS

Conditions of approvals from various town offices affecting the long term management of the property shall be considered part of this Long-Term Pollution Prevention Plan. The owner and property manager shall become familiar with those documents and perform their work in compliance thereto.

Attachment 1

MassDEP SNOW DISPOSAL GUIDANCE

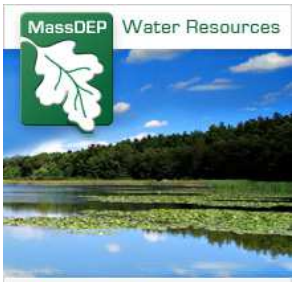
Snow Disposal Guidance

Snow Disposal - Storm Preparation

The snow disposal guidelines below offer information on the proper steps to take when locating sites and coming up with options for disposing of snow. Finding a place to dispose of collected snow poses a challenge to municipalities and businesses as they clear roads, parking lots, bridges, and sidewalks. Public safety is of the utmost importance. However, care must be taken to ensure that collected snow, which may be contaminated with road salt, sand, litter, and automotive pollutants such as oil, is disposed of in a manner that will minimize threats to nearby waterbodies. This guidance describes appropriate measures to be taken, including in cases of emergency when other options are not available.

If you have questions on MassDEP's snow disposal guidance, you may contact one of MassDEP's Regional Offices:

Northeast Regional Office, Wilmington, 978-694-3249
Southeast Regional Office, Lakeville, 508-946-2714
Central Regional Office, Worcester, 508-767-2722
Western Regional Office, Springfield, 413-784-1100.



A to Z Quick Links

Water Resources Index

Effective Date: March 8, 2001

Guideline No. BRPG01-01

Applicability: Applies to all federal, state, regional and local agencies, as well as to private businesses.

Supersedes: BRP Snow Disposal Guideline BRPG97-1 issued 12/19/97, and all previous snow disposal guidance

Approved by: Glenn Haas, Assistant Commissioner for Resource Protection

PURPOSE: To provide guidelines to all government agencies and private businesses regarding snow disposal site selection, site preparation and maintenance, and emergency snow disposal options that are acceptable to the Department of Environmental Protection, Bureau of Resource Protection.

APPLICABILITY: These Guidelines are issued by the Bureau of Resource Protection on behalf of all Bureau Programs (including Drinking Water Supply, Wetlands and Waterways, Wastewater Management, and Watershed Planning and Permitting). They apply to public agencies and private businesses disposing of snow in the Commonwealth of Massachusetts.

INTRODUCTION

Finding a place to dispose of collected snow poses a challenge to municipalities and businesses as they clear roads, parking lots, bridges, and sidewalks. While we are all aware of the threats to public safety caused by snow, collected snow that is contaminated with road salt, sand, litter, and automotive pollutants such as oil also threatens public health and the environment.

As snow melts, road salt, sand, litter, and other pollutants are transported into surface water or through the soil where they may eventually reach the groundwater. Road salt and other pollutants can contaminate water supplies and are toxic to aquatic life at certain levels. Sand washed into waterbodies can create sand bars or fill in wetlands and ponds, impacting aquatic life, causing flooding, and affecting our use of these resources.

There are several steps that communities can take to minimize the impacts of snow disposal on public health and the environment. These steps will help communities avoid the costs of a contaminated water supply, degraded waterbodies, and flooding. Everything we do on the land has the potential to impact our water resources. Given the authority of local government over the use of the land, municipal officials and staff have a critically important role to play in protecting our water resources.

The purpose of these guidelines is to help municipalities and businesses select, prepare, and maintain appropriate snow disposal sites before the snow begins to accumulate through the winter.

RECOMMENDED GUIDELINES

These snow disposal guidelines address: (1) site selection; (2) site preparation and maintenance; and (3) emergency snow disposal.

1. SITE SELECTION

The key to selecting effective snow disposal sites is to locate them adjacent to or on pervious surfaces in upland areas away from water resources and wells. At these locations, the snow meltwater can filter in to the soil, leaving behind sand and debris which can be removed in the springtime. The following areas should be avoided:

- Avoid dumping of snow into any waterbody, including rivers, the ocean, reservoirs, ponds, or wetlands. In addition to water quality impacts and flooding, snow disposed of in open water can cause navigational hazards when it freezes into ice blocks.
- Do not dump snow within a Zone II or Interim Wellhead Protection Area (IWPA) of a public water supply well or within 75 feet of a private well, where road salt may contaminate water supplies.
- Avoid dumping snow on MassDEP-designated high and medium-yield aquifers where it may contaminate groundwater (see the next page for information on ordering maps from MassGIS showing the locations of aquifers, Zone II's, and IWPAs in your community).
- Avoid dumping snow in sanitary landfills and gravel pits. Snow meltwater will create more contaminated leachate in landfills posing a greater risk to groundwater, and in gravel pits, there is little opportunity for pollutants to be filtered out of the meltwater because groundwater is close to the land surface.
- Avoid disposing of snow on top of storm drain catch basins or in stormwater drainage swales or ditches. Snow combined with sand and debris may block a storm drainage system, causing localized flooding. A high volume of sand, sediment, and litter released from melting snow also may be quickly transported through the system into surface water.

Site Selection Procedures

a. It is important that the municipal Department of Public Works or Highway Department, Conservation Commission, and Board of Health work together to select appropriate snow disposal sites. The following steps should be taken:
b. Estimate how much snow disposal capacity is needed for the season so that an adequate number of disposal sites can be selected and prepared.
c. Identify sites that could potentially be used for snow disposal such as municipal open space (e.g., parking lots or parks).
d. Sites located in upland locations that are not likely to impact sensitive environmental resources should be selected first.
e. If more storage space is still needed, prioritize the sites with the least environmental impact (using the site selection criteria, and local or MassGIS maps as a guide).

MassGIS Maps of Open Space and Water Resources

If local maps do not show the information you need to select appropriate snow disposal sites, you may order maps from MassGIS (Massachusetts Geographic Information System) which show publicly owned open spaces and approximate locations of sensitive environmental resources (locations should be field-verified where possible). Different coverages or map themes depicting sensitive environmental resources are available from MassGIS on the map you order. At a minimum, you should order the Priority Resources Map. The Priority Resources Map includes aquifers, public water supplies, MassDEP-approved Zone II's, Interim Wellhead Protection Areas, Wetlands, Open Space, Areas of Critical Environmental Concern, NHESP Wetlands Habitats, MassDEP Permitted Solid Waste facilities, Surface Water Protection areas (Zone A's) and base map features. The cost of this map is $25.00. Other coverages or map themes you may consider, depending on the location of your city or town, include Outstanding Resource Waters and MassDEP Eelgrass Resources. These are available at $25.00 each, with each map theme being depicted on a separate map. Maps should be ordered from MassGIS . Maps may also be ordered by fax at 617-626-1249 (order form available from the MassGIS web site) or mail. For further information, contact MassGIS at 617-626-1189.

2. SITE PREPARATION AND MAINTENANCE

In addition to carefully selecting disposal sites before the winter begins, it is important to prepare and maintain these sites to maximize their effectiveness. The following maintenance measures should be undertaken for all snow disposal sites:

- A silt fence or equivalent barrier should be placed securely on the downgradient side of the snow disposal site.
- To filter pollutants out of the meltwater, a 50-foot vegetative buffer strip should be maintained during the growth season between the disposal site and adjacent waterbodies.
- Debris should be cleared from the site prior to using the site for snow disposal.
- Debris should be cleared from the site and properly disposed of at the end of the snow season and no later than May 15.

3. EMERGENCY SNOW DISPOSAL

As mentioned earlier, it is important to estimate the amount of snow disposal capacity you will need so that an adequate number of upland disposal sites can be selected and prepared.

If despite your planning, upland disposal sites have been exhausted, snow may be disposed of near waterbodies. A vegetated buffer of at least 50 feet should still be maintained between the site and the waterbody in these situations. Furthermore, it is essential that the other guidelines for preparing and maintaining snow disposal sites be followed to minimize the threat to adjacent waterbodies.

Under extraordinary conditions, when all land-based snow disposal options are exhausted, disposal of snow that is not obviously contaminated with road salt, sand, and other pollutants may be allowed in certain waterbodies under certain conditions. In these dire situations, notify your Conservation Commission and the appropriate MassDEP Regional Service Center before disposing of snow in a waterbody.

Use the following guidelines in these emergency situations:

- Dispose of snow in open water with adequate flow and mixing to prevent ice dams from forming.
- Do not dispose of snow in saltmarshes, vegetated wetlands, certified vernal pools, shellfish beds, mudflats, drinking water reservoirs and their tributaries, Zone IIs or IWPAs of public water supply wells, Outstanding Resource Waters, or Areas of Critical Environmental Concern.
- Do not dispose of snow where trucks may cause shoreline damage or erosion.
- Consult with the municipal Conservation Commission to ensure that snow disposal in open water complies with local ordinances and bylaws.

FOR MORE INFORMATION

If you have questions on MassDEP's snow disposal guidance, you may contact one of MassDEP's Regional Offices:

Northeast Regional Office, Wilmington, 978-694-3249
Southeast Regional Office, Lakeville, 508-946-2714
Central Regional Office, Worcester, 508-767-2722
Western Regional Office, Springfield, 413-784-1100.

Did you find the information you were looking for on this page? *

○ Yes
○ No

Send Feedback

25457

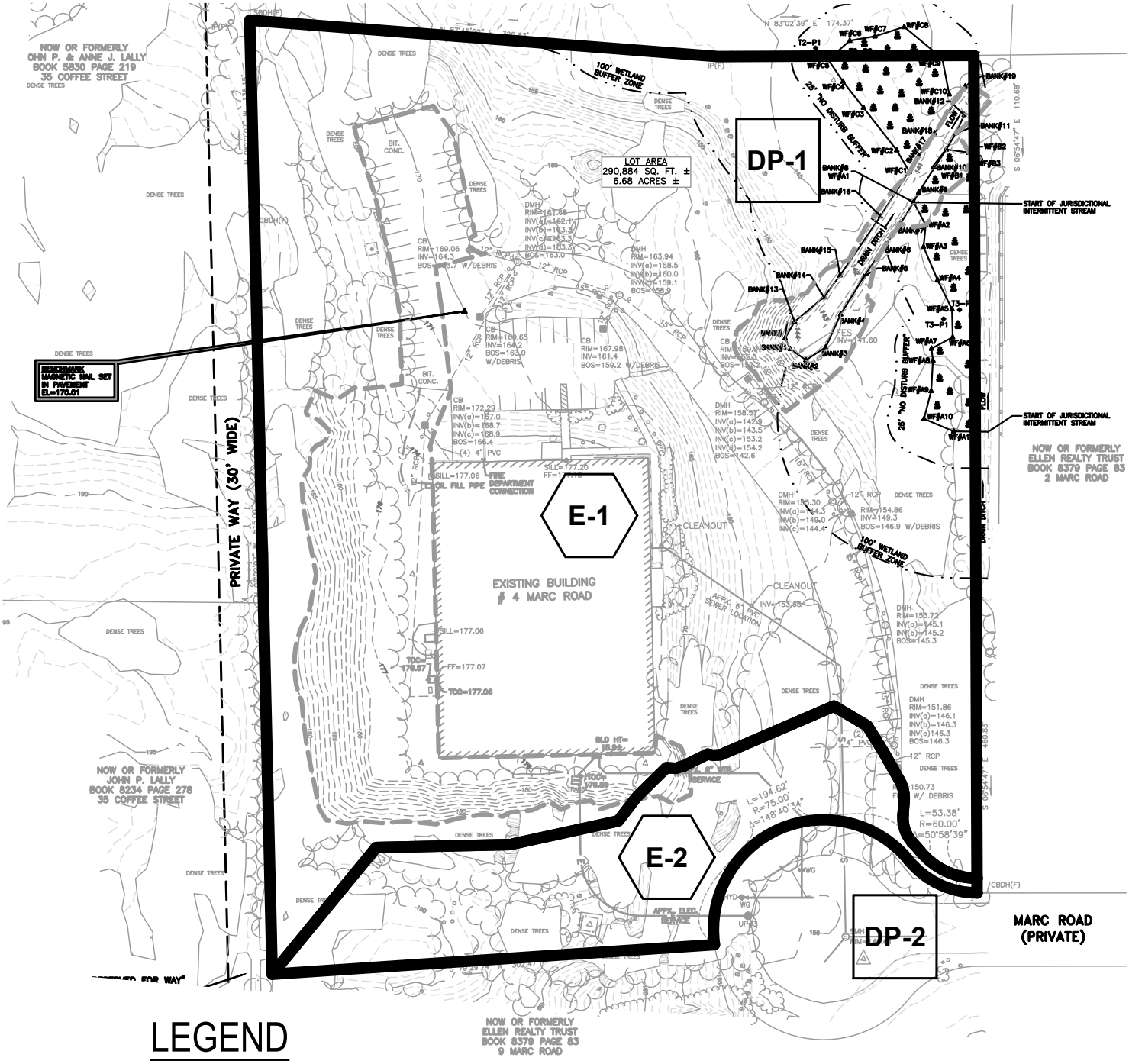
APPENDIX 3

Existing Conditions Watershed Map, WSD-EX

for

4 Marc Road

Medway, Massachusetts 02053



LEGEND

SUBCATCHMENT BOUNDARY

E-1 EXISTING SUBCATCHMENT DESIGNATION

DP-1 REACH / DESIGN POINT DESIGNATION

0 50 100 200

SCALE: 1"=100'

G:\Carlson Jobs\25457\Dwg\25457-Eng WP.dwg

EXISTING CONDITIONS WATERSHED MAP
AT
4 MARC ROAD
IN
MEDWAY, MA 02053

DGT Associates
1071 Worcester Road
Framingham, MA 01701
508-879-0030
www.DGTassociates.com

DATE: **JULY 25, 2019**

DRAWN BY: **TMM**

SCALE: **1" = 100'**

WSD-EX

25457

25457

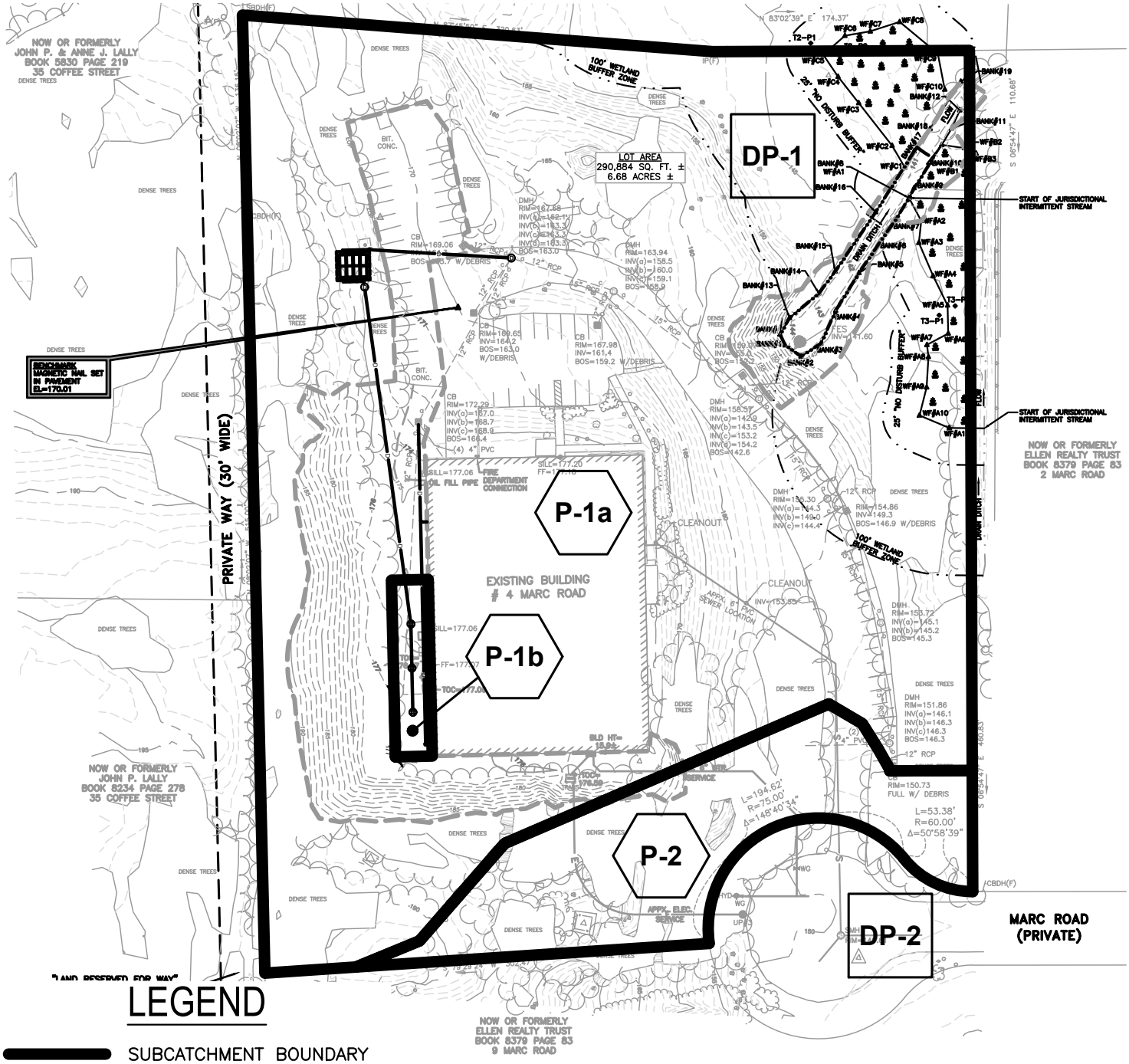
APPENDIX 4

Proposed Conditions Watershed Map, WSD-PR

for

4 Marc Road

Medway, Massachusetts 02053



LEGEND

SUBCATCHMENT BOUNDARY

P-1 PROPOSED SUBCATCHMENT DESIGNATION

DP-1 REACH / DESIGN POINT DESIGNATION

PD-1 POND DESIGNATION

PROPOSED CONDITIONS WATERSHED MAP
AT
4 MARC ROAD
IN
MEDWAY, MA 02053

DGT Associates
1071 Worcester Road
Framingham, MA 01701
508-879-0030
www.DGTassociates.com

DATE: JULY 25, 2019	**WSD-PR**
DRAWN BY: TMM	
SCALE: 1" = 100'	25457

G:\Carlson Jobs\25457\Dwg\25457-Eng WP.dwg

25457

APPENDIX 5

Stormwater Operation and Maintenance Plan

for

4 Marc Road

Medway, Massachusetts 02053

25457

STORMWATER OPERATION & MAINTENANCE PLAN

for

4 Marc Road
Medway, Massachusetts 02053

25457

STORMWATER
OPERATION AND MAINTENANCE PLAN

#4 MARC ROAD, MEDWAY, MASSACHUSETTS 02053

Construction Period Maintenance

It is important that the General Contractor follow the Construction Period Erosion and Sediment Control Plan as detailed on the Project Site Plans to minimize the introduction of sediments into the wetland resource areas, Town's drainage system, public right of ways, abutting properties, and to post-development stormwater BMP's resulting from the land disturbance activities during construction.

The existing and proposed stormwater management structures shall be protected from sediment using the erosion and sedimentation controls specified in the Project Site Plans. All proposed new stormwater management structures that infiltrate runoff are particularly sensitive to damage by sediment. Infiltration technologies are not designed to handle the high concentrations of sediments typically found in construction runoff, and must be protected from construction related sediment loadings. Site runoff from unstabilized areas shall not be discharged into the proposed infiltration systems until the tributary drainage area is stable or the runoff is treated to be essentially free from sediment to the satisfaction of the Engineer. Until then, the infiltration system shall remain off-line and protected. The contractor shall provide temporary by-pass systems as necessary to prevent construction site runoff from entering the infiltration system.

Inspections shall be conducted by the general contractor on a bi-weekly basis (every two weeks), or following significant storm events (rainfall of 0.5" or more) that can affect the sediment and erosion control practices implemented at the site. The purpose of the inspections are to evaluate the effectiveness on the controls and any required maintenance activities. If an erosion/sedimentation control measure is found to be inadequate for properly controlling sediment, an adequate measure shall be designed and implemented. A copy of the written inspection shall be kept on file at the construction site.

Post Construction and Long-Term Maintenance

In order for the stormwater management system to function properly as designed, the system must be inspected on a regular basis and routine maintenance performed. The responsibility for the maintenance and operation of the system will be as follows:

Neo Alternatives, LLC
365 Boston Post Road
Sudbury, MA 01776

Routine inspections and some of the routine maintenance tasks will be performed by the owner's maintenance personnel or hired outside contractors utilized for some items such as the removal of trapped oils and other hydrocarbons from catch basins and deep sump

manhole unit with gas and oil trap outlet and sediment removal from these units. For non-routine repairs please refer to the below referenced material.

The system contains the following Stormwater Best Management Practices (BMPs):

Catch Basins (Existing)
Recharge (Infiltration) System
Water Quality Units

OPERATION AND MAINTENANCE MANUAL AND TRAINING

Upon completion of the construction project, a complete as-built plan of the system components will be prepared and will be a part of this O&M Plan. This O&M Plan includes a description of the purpose and function of each component, inspection and maintenance tasks and schedules, check lists, and report forms. The Plan should be used as the management document for the system. All maintenance personnel shall be trained in the specifics of the entire stormwater management system in order to be able to perform the inspections, documentation and the maintenance required. The design engineer will be available to provide a training session for the supervisors and personnel if necessary.

INSPECTIONS AND MAINTENANCE

The following pages describe the inspection, routine maintenance and non routine maintenance which are required for each BMP. The inspection and maintenance requirements are based on the recommendations from the MassDEP Stormwater Management Standards Handbook, February 2008. Maintenance requirements for the Oil and Sediment Separator - Stormwater Treatment System, will be per the manufacturer's specifications.

The recommended procedures below should be followed strictly for at least the first two years of the system operation. During that period, the observations and experience gained from the monitoring and maintenance will provide the information necessary so that adjustments can be made for the most efficient operation and maintenance of the system.

NON-STORMWATER DISCHARGES

This is to provide notice to the owner and operator(s) of the subject property and stormwater system that the discharge of any non-stormwater to the subject stormwater management system is prohibited. Also, there shall be no modifications to the stormwater system for the purpose of discharging non-stormwater to the system. Non-stormwater discharges are any liquid or materials that are not the result of natural rainfall runoff or runoff from snow and ice melt. The purpose of this is to protect groundwater and surface water quality as well as to assure compliance with applicable laws.

CONFINED SPACE ENTRY

Note that any inspections or maintenance activity of underground piping, chambers, deep manholes, etc that requires entry into the system must be in accordance with OSHA confined space regulations.

CATCH BASINS

DESCRIPTION AND FUNCTION

These structures are modified catch basins that collect stormwater from small drainage areas with added features to enhance the capture of gas, oils, grease, trash, floating debris, and sediment over that of conventional catch basins and stormwater inlets. The inlet of the deep sump catch basin is a cast iron grate over the precast concrete structure. The sump below the elevation of the outlet pipe invert traps sediment. The outlet pipe includes an oil and gas trap hood that keeps floating hydrocarbons and other floating debris in the structure chamber until they settle with the sediment or is removed by a pumper as part of the routine cleaning.

INSPECTIONS

The catch basins should be inspected at least four times per year including at the end of the foliage and snow removal seasons. For a full inspection, remove the grate and inspect the general condition of the unit including the amount of floating debris and the presence of hydrocarbons if any. If the inspection finds a large presence of hydrocarbons, such as a layer of floating oil or a strong odor of gas, hydrocarbons should be removed immediately. Measure the amount of sediment that has collected. Pipe outlets should be clear of debris. If the water level is below the outlet pipe, closer inspection for possible leaks is warranted. Note that a water level somewhat below the outlet level is normal during extended periods with no precipitation due to evaporation and minor expected seepage.

ROUTINE MAINTENANCE

Initially, the catch basins should be cleaned a minimum of two times a year and additionally if necessary based on the results of the quarterly inspection. Cleaning consists of the removal of floating hydrocarbons and accumulated sediment, and clearing the inlet grate and outlet tee and pipe. Sediment should be removed from the catch basin if the measurement of the sediment is over one foot in depth. A hazardous waste disposal contractor must perform the removal of hydrocarbons.

NON-ROUTINE MAINTENANCE

These are structural repairs and replacement of system components. Typical items for this BMP may include:

- Repairing the outlet snout and/or pipe
- Filling cracks in the concrete
- Patching of mortar and brick
- Resetting of inlet grates

MAINTENANCE EQUIPMENT

- Hand tools for opening grates
- Measuring stick
- Vacuum pumping truck (haz-mat contractor for hydrocarbon removal)
- Vacuum pumping truck (for sediment removal)

RECHARGE (INFILTRATION) SYSTEM

DESCRIPTION AND FUNCTION
The subsurface (underground) recharger system proposed for this project is constructed of plastic galleys surrounded by washed stone and filter fabric. The chambers are constructed in a permeable soil suitable for infiltrating. An overflow is provided for the system once the storage volume is exceeded. Observation ports are brought to finished grade for access.

The purpose of the recharger system is to meet recharge requirements and to treat runoff from the proposed concrete mechanical pad.

INSPECTIONS
The recharger system should be inspected after every major storm for the first few months. After this time period it may be inspected once each year and should preferably be done two to three days after a significant storm event. The inspection should examine whether the chambers are draining properly following storms. The underground recharger systems should drain within a few hours following the end of a storm up to a maximum of 72 hours. Pipe inlets and outlets should be clear of debris and there should be no significant accumulation of sediment in the chambers. The annual inspection of the infiltration system should include removal of the key observation ports to view the interior of the chamber. If significant accumulation of sediment occurs, most will be near the inlet pipe(s) to the underground chamber and can be removed by vacuum pumper. A significant accumulation of sediment may indicate a problem with soil migrating into the system from the surrounding soil indicating a failure of the filter fabric protection or a pipe problem in the pipe leading into the system.

ROUTINE MAINTENANCE
The stormwater system includes a pretreatment BMP so sediment removal should rarely be required. Routine maintenance generally includes clearing debris from the inlet and outlet pipes if found during an inspection.

NON-ROUTINE MAINTENANCE
These are structural repairs and replacement of system components. Typical items for this BMP may include:

- Repairing the inlet pipes
- Removal of significant accumulation of sediment from the chambers that affects the infiltration capacity.

MAINTENANCE EQUIPMENT
Hand tools for opening inspection ports, flash light.

WATER QUALITY UNITS

INSPECTIONS

These units should be inspected on a monthly basis and after major storm events for the first year. Remove the cover and inspect the general condition of the unit including the amount of floating debris and the presence of hydrocarbons if any. If the inspection finds a large presence of hydrocarbons, such as a layer of floating oil or a strong odor of gasoline, it should be removed immediately. Measure the amount of sediment that has collected using a measuring stick or "Sludge Judge" measuring tube. Pipe inlets and outlets should be clear of debris. After the first year, the number of inspections may be reduced based on the experience during the first year monitoring but not less than 2 times per year. Two of the inspections must include one at the end of the foliage season and one at the end of the snow season.

ROUTINE MAINTENANCE

The units should be cleaned a minimum of two times during the first year or when the sediment level reaches 8 inches in depth per the manufacturer's maintenance specifications. A copy of the manufacturer's chart is provided attached to the end of this section. Cleaning consists of the removal of floating hydrocarbons and accumulated sediment, and clearing the inlet pipes. The removal of hydrocarbons must be performed by a hazardous waste disposal contractor. Removal of the sediment is by a standard vacuum truck.

NON-ROUTINE MAINTENANCE

These are structural repairs and replacement of system components. Typical items for this BMP may include:

- Repairing the inlet or outlet pipes.
- Filling cracks in the concrete
- Resetting of covers.

MAINTENANCE EQUIPMENT

- Hand tools for opening covers
- Measuring stick or "Sludge Judge".
- Vacuum pumping truck (haz-mat contractor for hydrocarbon removal)
- Contracted vacuum pumping truck (for sediment removal)

STORMWATER MANAGEMENT SYSTEM

INSPECTION AND MAINTENANCE FORMS

CONTENTS:

CATCH BASIN

Routine Inspection Checklist - Inspected quarterly Date _____

	Inlet Grate	Sediment Depth	Hydrocarbons*	Structural Integrity	Pipes Clear	Comments
CB #1						
CB #2						
CB #3						
CB #4						
CB #5						
CB #6						
CB #7						

* Presence of hydrocarbons is a clearly visible layer of oil, gasoline, grease, hydraulic fluid, etc., floating on the surface or a strong odor of gas or oil

SUBSURFACE INFILTRATION (RECHARGER) SYSTEM

Routine Inspection Checklist - Inspected annually and two to three days after a rainfall. Date _____

	Draining Properly	Sediment	Structural Integrity	Pipe Inlet/Outlet	Debris	Comments
Recharger #1						

WATER QUALITY UNITS

Routine Inspection Checklist - Inspected Semi-Annually Date _____

	Structural Integrity	Sediment Depth	Hydrocarbons*	Inlet/Outlet Pipe	Floating Debris	Comments
WQU #1						
WQU #2						
WQU #3						

* Presence of hydrocarbons is a clearly visible layer of oil, gasoline, grease, hydraulic fluid, etc., floating on the surface or a strong odor of gas or oil

STORMWATER MAINTENANCE / REPAIR RECORD FORM

Date of Maintenance: ________________ Performed By: ________________________

Maintenance / repair tasks were performed on the following on-site BMP structures:

Stormwater Structure Work Performed

Other Comments:

CONTECH®
ENGINEERED SOLUTIONS

CDS® Inspection and Maintenance Guide

CDS TECHNOLOGIES

Maintenance

The CDS system should be inspected at regular intervals and maintained when necessary to ensure optimum performance. The rate at which the system collects pollutants will depend more heavily on site activities than the size of the unit. For example, unstable soils or heavy winter sanding will cause the grit chamber to fill more quickly but regular sweeping of paved surfaces will slow accumulation.

Inspection

Inspection is the key to effective maintenance and is easily performed. Pollutant transport and deposition may vary from year to year and regular inspections will help ensure that the system is cleaned out at the appropriate time. At a minimum, inspections should be performed twice per year (e.g. spring and fall) however more frequent inspections may be necessary in climates where winter sanding operations may lead to rapid accumulations, or in equipment washdown areas. Installations should also be inspected more frequently where excessive amounts of trash are expected.

The visual inspection should ascertain that the system components are in working order and that there are no blockages or obstructions in the inlet and separation screen. The inspection should also quantify the accumulation of hydrocarbons, trash, and sediment in the system. Measuring pollutant accumulation can be done with a calibrated dipstick, tape measure or other measuring instrument. If absorbent material is used for enhanced removal of hydrocarbons, the level of discoloration of the sorbent material should also be identified during inspection. It is useful and often required as part of an operating permit to keep a record of each inspection. A simple form for doing so is provided.

Access to the CDS unit is typically achieved through two manhole access covers. One opening allows for inspection and cleanout of the separation chamber (cylinder and screen) and isolated sump. The other allows for inspection and cleanout of sediment captured and retained outside the screen. For deep units, a single manhole access point would allows both sump cleanout and access outside the screen.

The CDS system should be cleaned when the level of sediment has reached 75% of capacity in the isolated sump or when an appreciable level of hydrocarbons and trash has accumulated. If absorbent material is used, it should be replaced when significant discoloration has occurred. Performance will not be impacted until 100% of the sump capacity is exceeded however it is recommended that the system be cleaned prior to that for easier removal of sediment. The level of sediment is easily determined by measuring from finished grade down to the top of the sediment pile. To avoid underestimating the level of sediment in the chamber, the measuring device must be lowered to the top of the sediment pile carefully. Particles at the top of the pile typically offer less resistance to the end of the rod than consolidated particles toward the bottom of the pile. Once this measurement is recorded, it should be compared to the as-built drawing for the unit to determine weather the height of the sediment pile off the bottom of the sump floor exceeds 75% of the total height of isolated sump.

Cleaning

Cleaning of a CDS systems should be done during dry weather conditions when no flow is entering the system. The use of a vacuum truck is generally the most effective and convenient method of removing pollutants from the system. Simply remove the manhole covers and insert the vacuum hose into the sump. The system should be completely drained down and the sump fully evacuated of sediment. The area outside the screen should also be cleaned out if pollutant build-up exists in this area.

In installations where the risk of petroleum spills is small, liquid contaminants may not accumulate as quickly as sediment. However, the system should be cleaned out immediately in the event of an oil or gasoline spill should be cleaned out immediately. Motor oil and other hydrocarbons that accumulate on a more routine basis should be removed when an appreciable layer has been captured. To remove these pollutants, it may be preferable to use absorbent pads since they are usually less expensive to dispose than the oil/water emulsion that may be created by vacuuming the oily layer. Trash and debris can be netted out to separate it from the other pollutants. The screen should be power washed to ensure it is free of trash and debris.

Manhole covers should be securely seated following cleaning activities to prevent leakage of runoff into the system from above and also to ensure that proper safety precautions have been followed. Confined space entry procedures need to be followed if physical access is required. Disposal of all material removed from the CDS system should be done in accordance with local regulations. In many jurisdictions, disposal of the sediments may be handled in the same manner as the disposal of sediments removed from catch basins or deep sump manholes.

CDS Model	Diameter		Distance from Water Surface to Top of Sediment Pile		Sediment Storage Capacity	
	ft	m	ft	m	y^3	m^3
CDS1515	3	0.9	3.0	0.9	0.5	0.4
CDS2015	4	1.2	3.0	0.9	0.9	0.7
CDS2015	5	1.3	3.0	0.9	1.3	1.0
CDS2020	5	1.3	3.5	1.1	1.3	1.0
CDS2025	5	1.3	4.0	1.2	1.3	1.0
CDS3020	6	1.8	4.0	1.2	2.1	1.6
CDS3025	6	1.8	4.0	1.2	2.1	1.6
CDS3030	6	1.8	4.6	1.4	2.1	1.6
CDS3035	6	1.8	5.0	1.5	2.1	1.6
CDS4030	8	2.4	4.6	1.4	5.6	4.3
CDS4040	8	2.4	5.7	1.7	5.6	4.3
CDS4045	8	2.4	6.2	1.9	5.6	4.3
CDS5640	10	3.0	6.3	1.9	8.7	6.7
CDS5653	10	3.0	7.7	2.3	8.7	6.7
CDS5668	10	3.0	9.3	2.8	8.7	6.7
CDS5678	10	3.0	10.3	3.1	8.7	6.7

Table 1: CDS Maintenance Indicators and Sediment Storage Capacities

Support

- Drawings and specifications are available at www.contechstormwater.com.
- Site-specific design support is available from our engineers.

Contech Engineered Solutions LLC provides site solutions for the civil engineering industry. Contech's portfolio includes bridges, drainage, sanitary sewer, stormwater, earth stabilization and wastewater treament products. For information, visit www.ContechES.com or call 800.338.1122

CONTECH®
ENGINEERED SOLUTIONS
800.925.5240
www.ContechES.com

CDS Inspection & Maintenance Log

CDS Model: _____ Location: _____

Date	Water depth to sediment[1]	Floatable Layer Thickness[2]	Describe Maintenance Performed	Maintenance Personnel	Comments

1. The water depth to sediment is determined by taking two measurements with a stadia rod: one measurement from the manhole opening to the top of the sediment pile and the other from the manhole opening to the water surface. If the difference between these measurements is less than the values listed in table 1 the system should be cleaned out. **Note: to avoid underestimating the volume of sediment in the chamber, the measuring device must be carefully lowered to the top of the sediment pile.**

2. For optimum performance, the system should be cleaned out when the floating hydrocarbon layer accumulates to an appreciable thickness. In the event of an oil spill, the system should be cleaned immediately.