Stormwater Management Report

Lots 1 & 2 (Map R07, Parcel 1-0)
Harwood Avenue
Littleton, MA

April 2025 (Revised 6/11/25)

6/30/25

Prepared for:
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GPR Engineering Solutions for Land & Structures

Project No. 241121
241121_Stormwater Report_REV

Contents

Attachments

1. Introduction

The Project includes a stormwater management system designed to provide water quality treatment and promote groundwater recharge in accordance with applicable stormwater regulations and the local bylaws of the Town of Littleton. The proposed development consists of two single-family homes that are not part of a larger common plan and do not discharge to a critical area. However, since the project disturbs over an acre of land, the project shall meet the Town of Littleton local requirements of Chapter 38, Stormwater Bylaw. The Project incorporates stormwater control measures that meet the Standards of the Massachusetts Stormwater Handbook by mitigating peak runoff rates, enhancing water quality, and provide groundwater recharge.

2. Existing Conditions

The Site consists primarily of grassy meadow with some woodland vegetation. Previously developed areas include a portion of a driveway located on Lot 2. The Site's topography features a north and west facing hillside that slopes downward to the Street for Lot 1, and slopes to the west for Lot 2. Runoff from the site currently drains to two primary locations: the right-of-way (Harwood Ave) located to the north and to the west, towards vegetated wetlands located off-site.

2.1. Regional Watershed

The site is located within the Concord River Watershed, specifically within the Fort Pond Brook sub-watershed. The Concord River Watershed is listed within the statewide TMDL for pathogens. The Project has been designed to comply with the Statewide Total Maximum Daily Load (TMDL) for pathogens through the implementation of multiple measures to prevent and control pollutant sources. Wastewater will be managed through a Title 5-compliant on-site septic system. The Project includes no illicit discharges or connections to the stormwater system. Stormwater runoff from impervious surfaces will be directed to infiltration-based best management practices, which promote groundwater recharge and reduce the potential for pathogen transport. In addition, the Long-Term Pollution Prevention Plan includes homeowner education measures and ongoing maintenance that promote responsible pet waste management.

2.2. Impaired Waters

The Project ultimately discharges stormwater runoff to Long Pond, located to the northeast of the site. Long Pond is listed as a category 5 impaired water (a waterbody requiring a TMDL) on the 2022 303(d) list. The impairments include algae, dissolved oxygen, and total phosphorus. The Project is designed to comply with the Town of Littleton standards to remove a minimum of 60% total phosphorus.

2.3. Resource Areas

The site is tributary to the bordering vegetated wetland located off-site to the west.

2.4. Soils

The on-site soils are classified by the National Resource Conservation Service (NRCS) as Paxton fine sandy loam, slow draining when thoroughly wet, a Hydrologic Class C soil. These soils consist of loamy eolian mantled material underlain by lodgement (dense) till derived from schist, gneiss and granite.

A Site visit conducted by a *Competent Soils Individual* was performed to confirm NRCS soil textures, bedrock depths, estimated seasonal high groundwater elevations, and permeability data for stormwater management system design. Soil inspections revealed topsoil and subsoil layers

with sandy loam textures, underlain by glacial till of fine sandy loam texture. Seasonal high groundwater was observed at 23” below existing grade.

3. Proposed Conditions

The site design prioritizes preserving environmentally sensitive features and minimizing disruptions to natural hydrology. To help retain natural drainage patterns the grading was limited, and the layout was tailored to closely follow the existing terrain wherever feasible.

The stormwater management system addresses flow rate reduction, provides groundwater recharge, and treats runoff from the proposed impervious surfaces. To provide water quality treatment and groundwater subsurface infiltration systems are proposed for roof runoff, a rain garden (bioretention) is proposed for treatment of driveway runoff in Lot 1, and an infiltration basin with associated sediment forebay is proposed for treatment of driveway runoff in Lot 2. Numerous soil borings located throughout Lots 1 and 2 confirm two feet of separation from seasonal high groundwater. The systems contain overflow outlets that discharge into off-site areas during larger storms. All stormwater control measures (SCMs) are designed to treat at least the first 1.0 inch of runoff from impervious areas.

3.1. Stormwater Control Measures

Subsurface Infiltration System

The subsurface infiltration system consists of underground Stormtech Chambers. The design of the chambers includes a permeable bottom that allows for maximum exfiltration of runoff from the system to the groundwater.

The infiltration system was designed using the Static/Simple Method outlined in Chapter 3 of the Massachusetts Stormwater Handbook. The system utilizes a Rawl's exfiltration rate of 0.27 inches per hour and is sized to meet the water quality volume, ensuring full dewatering within 72 hours.

Sediment Forebay

The sediment forebay consists of an excavated area designed to slow incoming stormwater runoff and facilitating the gravity separation of suspended solids. The sediment forbeay provides pretreatment of runoff before delivery to other treatment SCMs.
The Sediment Forebay was sized to hold 10% of the WQV for pretreatment.

Rain Garden (Bioretention)

The rain garden consists of a shallow depression filled with sandy soil topped with a layer of mulch and planted with dense native vegetation. The runoff percolates through the soil media that acts as a filter.

The rain garden was designed using the Static/Simple Method outlined in Chapter 3 of the Massachusetts Stormwater Handbook. The system utilizes a Rawl's exfiltration rate of 0.27 inches per hour and is sized to meet the water quality volume, and provide 6" of ponding.

Infiltration Basin

The infiltration basin consists of an excavated impoundment designed to exfiltrate incoming stormwater runoff. Runoff from the storm is stored until it exfiltrates through the soil of the basin floor.

The infiltration basin was designed using the Static/Simple Method outlined in Chapter 3 of the Massachusetts Stormwater Handbook. The system utilizes a Rawl's exfiltration rate of 0.27 inches per hour and is sized to recharge the water quality volume, ensuring full dewatering within 72 hours.

4. Compliance with the 2008 Handbook Standards

The stormwater management system complies with the ten (10) Standards outlined in the 2008 Handbook, as summarized below.

STANDARD 1: No New Untreated Discharges or Erosions to Wetlands

Untreated stormwater will not be discharged directly into nearby wetlands or waters of the Commonwealth. Runoff from all impervious surfaces will be routed through SCMs designed for flow rate reduction, groundwater recharge, and water quality treatment being released to the adjacent wetlands.

STANDARD 2: Peak Runoff Rate Attenuation

The stormwater management system is designed to ensure that peak discharge rates for the 2-, 10-, and 100-year, 24-hour storm events under proposed conditions do not exceed existing levels. A hydrologic analysis of existing and proposed conditions is included in Attachments 2 and 3. Rainfall intensities from NOAA 10 were utilized for the modeling. A summary of peak runoff rates is provided in Table 1:

Table 1: Peak Runoff Rate Comparison (cfs)

	2-Year		10-Year		100-Year	
	Existing	Proposed	Existing	Proposed	Existing	Proposed
AP-1	0.8	0.5	2.0	1.7	4.1	3.4
AP-2	1.9	1.7	4.6	4.6	9.5	9.2

The site has been designed to maintain pre-development drainage patterns and avoid concentrated discharges to abutting properties or public rights-of-way. Grading and low-impact stormwater practices have been incorporated to promote water quality treatment and groundwater recharge.

STANDARD 3: Groundwater Recharge

The stormwater management system includes subsurface infiltration systems, a rain garden, and an infiltration basin designed to recharge groundwater on-site. Infiltration SCMs were sized using the simple dynamic method to meet the required recharge volume for the post-development site so that the annual recharge from the post-development site will approximate pre-development conditions. Refer to Attachment 4 for SCM groundwater recharge calculations.

STANDARD 4: Water Quality

The project will comply with Standard 4 water quality requirements through on-site

treatment trains achieving 80% TSS removal. See Attachment 5 for TSS removal and TP removal worksheets. SCMs, such as sediment forebays and the infiltration basin, are designed to capture and treat the first 1.0 inch of runoff from proposed impervious surfaces. All SCMs will be operated and maintained to ensure ongoing water quality treatment.

A Long-Term Pollution Prevention Plan has been developed to outline source control and pollution prevention measures. This plan is integrated with the Operation and Maintenance Plan (Standard 9), which specifies maintenance requirements for the SCMs.

In addition to meeting state standards, the Project satisfies the Town of Littleton's regulatory requirement for phosphorus control by achieving a 60% TP removal rate and a 90% TSS removal rate.

STANDARD 5: Land Uses with Higher Potential Pollutant Loads (LUHPPLs)

This standard does not apply since the project does not involve any LUHPPLs.

STANDARD 6: Critical Areas

The Project does not discharge to a critical area.

STANDARD 7: Redevelopment

This standard does not apply since the Project is not a redevelopment.

STANDARD 8: Construction Period Pollution Prevention

The project will disturb more than one acre of land, requiring coverage under the Environmental Protection Agency's Construction General Permit and the development of a Stormwater Pollution Prevention Plan (SWPPP). A SWPPP has been developed or will be developed prior to construction.

STANDARD 9: A Long-Term Operation and Maintenance (O&M) Plan

An Operation and Maintenance Plan has been developed which specifies maintenance requirements for the SCMs in conjunction with the Long-Term Pollution Prevention Plan which outlines source control and pollution prevention measures.

STANDARD 10: Prohibition of Illicit Discharges

There will be no illicit discharges to the proposed stormwater management system associated with the proposed project. See the following section for an illicit discharge statement.

4.1. Illicit Discharge Compliance Statement

Standard 10 states: All illicit discharges to the stormwater management system are prohibited.

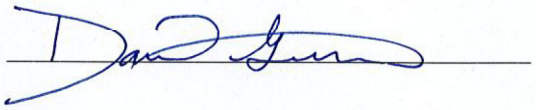
An illicit Discharge is any discharge that is not entirely comprised of stormwater, except pursuant to a National Pollutant Discharge Elimination System (NPDES) permit (other than the NPDES permit for discharges from a municipal separate storm sewer) and discharges resulting from firefighting activities. Notwithstanding the foregoing, an illicit discharge does not include discharges from the following activities or facilities: firefighting, water line flushing, landscape irrigation, uncontaminated ground water, potable water sources, foundation drains, air conditioning condensation, footing drains, individual resident car washing, flows from riparian habitats and wetlands, dechlorinated water from swimming pools, water used for street washing and water used to clean residential buildings without detergents.

The Site Owner is ultimately responsible for identifying and eliminating illicit discharges.

This statement is to verify:

1. Based on the available information to the best of my knowledge, no known or suspected illicit discharges to the stormwater management system on-site.

2. The design of the stormwater system includes no proposed illicit discharges.

Signature: 

Name: David Guerra

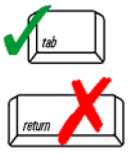
Date: June 11, 2025

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

06/30/25

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): Infiltration basin

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

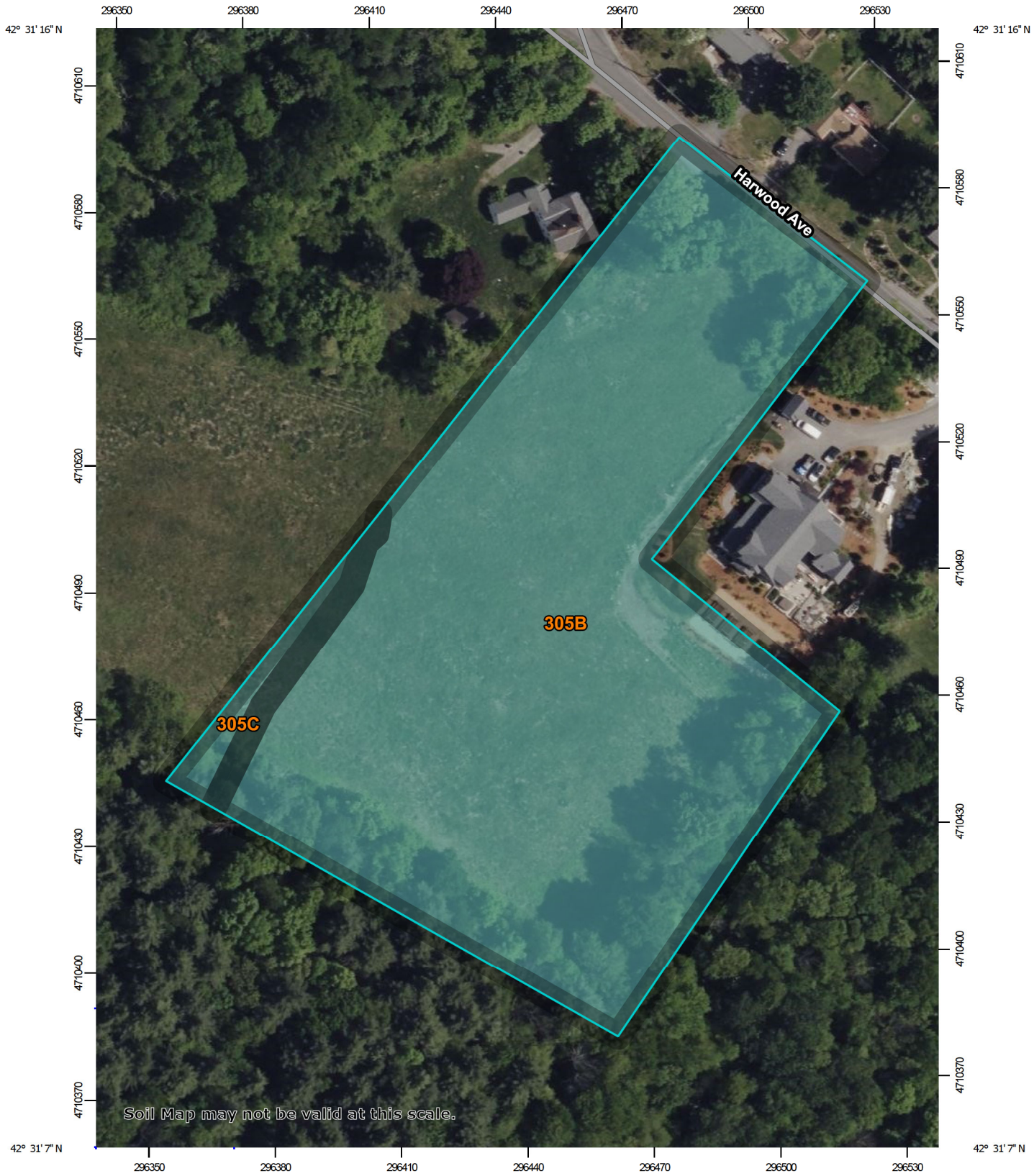
☒ The Long-Term Pollution Prevention Plan includes measures to prevent illicit discharges;

☒ 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.

Attachment 1: Soil Information

Hydrologic Soil Group—Middlesex County, Massachusetts



Map Scale: 1:1,290 if printed on A portrait (8.5" x 11") sheet.

N

Meters: 0 15 30 60 90

Feet: 0 50 100 200 300

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 Rating Polygons

- A
- A/D
- B
- B/D
- C
- C/D
- D
- Not rated or not available

Soil Rating Lines

- A
- A/D
- B
- B/D
- C
- C/D
- D
- Not rated or not available

Soil Rating Points

- A
- A/D
- B
- B/D
- C
- C/D
- D
- Not rated or not available

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 1:24,000.

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: Middlesex County, Massachusetts
Survey Area Data: Version 24, Aug 27, 2024

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

Date(s) aerial images were photographed: May 22, 2022—Jun 5, 2022

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.

Hydrologic Soil Group

Map unit symbol	Map unit name	Rating	Acres in AOI	Percent of AOI
305B	Paxton fine sandy loam, 3 to 8 percent slopes	C	4.1	96.8%
305C	Paxton fine sandy loam, 8 to 15 percent slopes	C	0.1	3.2%
Totals for Area of Interest			**4.2**	**100.0%**

Description

Hydrologic soil groups are based on estimates of runoff potential. Soils are assigned to one of four groups according to the rate of water infiltration when the soils are not protected by vegetation, are thoroughly wet, and receive precipitation from long-duration storms.

The soils in the United States are assigned to four groups (A, B, C, and D) and three dual classes (A/D, B/D, and C/D). The groups are defined as follows:

Group A. Soils having a high infiltration rate (low runoff potential) when thoroughly wet. These consist mainly of deep, well drained to excessively drained sands or gravelly sands. These soils have a high rate of water transmission.

Group B. Soils having a moderate infiltration rate when thoroughly wet. These consist chiefly of moderately deep or deep, moderately well drained or well drained soils that have moderately fine texture to moderately coarse texture. These soils have a moderate rate of water transmission.

Group C. Soils having a slow infiltration rate when thoroughly wet. These consist chiefly of soils having a layer that impedes the downward movement of water or soils of moderately fine texture or fine texture. These soils have a slow rate of water transmission.

Group D. Soils having a very slow infiltration rate (high runoff potential) when thoroughly wet. These consist chiefly of clays that have a high shrink-swell potential, soils that have a high water table, soils that have a claypan or clay layer at or near the surface, and soils that are shallow over nearly impervious material. These soils have a very slow rate of water transmission.

If a soil is assigned to a dual hydrologic group (A/D, B/D, or C/D), the first letter is for drained areas and the second is for undrained areas. Only the soils that in their natural condition are in group D are assigned to dual classes.

Rating Options

Aggregation Method: Dominant Condition

Component Percent Cutoff: None Specified

Tie-break Rule: Higher

FORM 11 - SOIL EVALUATOR FORM

No. 171088 Date: 8/8/18

Commonwealth of Massachusetts
Littleton Massachusetts

Soil Suitability Assessment for On-Site Sewage Disposal

Performed by: Jude Gauvin, GPR Inc Date: 7/11-12/18 7/18-19/18
Witnessed by: Jim Garreffi, NABH

Location Address:	Owner's Name: Glavey Family Trust
or Lot No. 195 Tahattawan Rd Littleton, MA 01460	Address: 195 Tahattawan Road Littleton, MA 01460
	Telephone No.

New Construction ☑ Upgrade ☐ Repair ☐

Office Review

Published Soil Survey Available: No ☑ Yes ☐

Year Published Internet Publication Scale na Soil Map Unit 305B,420B,311B
Soil Name Paxton fine sandy loam Soil Limitations Depth to restrictive features
Soil Name Woodbridge fine sandy loam Soil Limitations Very stony, Depth to restictive features
Soil Name Canton fine sandy loam Soil Limitations Depth to restrictive features

Surficial Geologic Report Available: No ☑ Yes ☐

Year Published MASS GIS Publication Scale
Geologic Material(Map Unit) Glacial Till
Landform Ground Morraine

Flood Insurance Rate Map: 25017C0238F

Above 500 Year Flood Boundary	No ☐	Yes ☑
Within 500 Year Flood Boundary	No ☑	Yes ☐
Within 100 Year Flood Boundary	No ☑	Yes ☐
Within Velocity Zone	No ☑	Yes ☐

Wetland Area:

National Wetlands Inventory Map (map unit) N/A
Wetlands Conservancy Program Map (map unit) N/A

Current Water Resource Conditions (USGS): Month August

Range: Above Normal ☐ Normal ☑ Below Normal ☐
Other Reference Reviewed USGS

Site Info.

FORM 11 - SOIL EVALUATOR FORM

Location Address or Lot #: 195 Tahattawan Rd
Littleton, MA 01460

On-Site Review

Deep Hole #: 718-1 Date: 07/11/18 Time: 12:30 PM Weather: Sunny 80°
Location (identify on site plan) See Attached Sketch
Land Use Grass/ Field Slope (%) 2% Surfaces Stones few
(eg woodland, agricultural field, vacant lot etc…)
Vegatation grass
Landform Ground Morraine
Position on landscape See attached Sketch
Distances from:

Open Water Body >100 feet
Possible Wet Area >100 feet
Drinking Water Well >100 feet
Drainage Way >100 feet
Property Line >20' feet
Other:
feet

Deep Observation Hole Log

Hole # 718-1 NB 30/34 Suface El. 310.1

Depth from Surface (inches)	Soil Horizon	Soil Texture (USDA)	Soil Color (MUNSELL)	Soil Mottling	Other (Stucture, Stones, Boulders, Consistency, % Gravel)
0-7	A	SL	10YR3/2		loose, cr
7-18	B	SL	10YR 5/4		vfr, roots
18-92	C	fsl	2.5 Y 6/4	@20"	abk,vfr, 5% cob, 10%gr

*MINIMUM OF 2 HOLES REQUIRED AT EVERY PROPOSED DISPOSAL AREA

Parent Material (geologic) Glacial Till Depth to Bedrock: >92"
Depth to Groundwater: Standing Water in the Hole 92" Weeping from Pit Face: 78"
Estimated Seasonal High Groundwater in the Hole 20"
Aditional Notes

FORM 11 - SOIL EVALUATOR FORM

Location Address or Lot #: 195 Tahattawan Rd
Littleton, MA 01460

On-Site Review

Deep Hole #: 718-2 Date: 07/11/18 Time: 12:45 PM Weather: Sunny 80°
Location (identify on site plan) See Attached Sketch
Land Use Grass/ Field Slope (%) 2% Surfaces Stones few
(eg woodland, agricultural field, vacant lot etc…)
Vegatation grass
Landform Ground Morraine
Position on landscape See attached Sketch
Distances from:

Open Water Body	>100 feet	Drainage Way	>100 feet
Possible Wet Area	>100 feet	Property Line	>20' feet
Drinking Water Well	>100 feet	Other:	
			feet

Deep Observation Hole Log

Hole # 718-2 NB 30/34 Suface El. 309.9

Depth from Surface (inches)	Soil Horizon	Soil Texture (USDA)	Soil Color (MUNSELL)	Soil Mottling	Other (Stucture, Stones, Boulders, Consistency, % Gravel)
0-7	A	SL	10YR3/2		loose, cr
7-23	B	SL	10YR 5/4		vfr, roots
23-106	C	fsl	2.5 Y 6/4	@23"	abk,vfr, 5% cob, 10%gr

*MINIMUM OF 2 HOLES REQUIRED AT EVERY PROPOSED DISPOSAL AREA

Parent Material (geologic) Glacial Till Depth to Bedrock: >106"
Depth to Groundwater: Standing Water in the Hole N/A Weeping from Pit Face: 80"
Estimated Seasonal High Groundwater in the Hole 23"
Aditional Notes

FORM 11 - SOIL EVALUATOR FORM

Location Address or Lot #: 195 Tahattawan Rd
Littleton, MA 01460

On-Site Review

Deep Hole #: 718-3 Date: 07/11/18 Time: 1:00 PM Weather: Sunny 80°
Location (identify on site plan) See Attached Sketch
Land Use Grass/ Field Slope (%) 2% Surfaces Stones few
(eg woodland, agricultural field, vacant lot etc…)
Vegatation grass
Landform Ground Morraine
Position on landscape See attached Sketch
Distances from:

Open Water Body	>100 feet	Drainage Way	>100 feet
Possible Wet Area	>100 feet	Property Line	>20' feet
Drinking Water Well	>100 feet	Other:	
			feet

Deep Observation Hole Log

Hole # 718-3 NB 30/34 Suface El. 309.4

Depth from Surface (inches)	Soil Horizon	Soil Texture (USDA)	Soil Color (MUNSELL)	Soil Mottling	Other (Stucture, Stones, Boulders, Consistency, % Gravel)
0-7	A	SL	10YR3/2		loose, cr
7-21	B	SL	10YR 5/4		vfr, roots
23-108	C	fsl	2.5 Y 6/4	@23"	abk,vfr, 5% cob, 10%gr

*MINIMUM OF 2 HOLES REQUIRED AT EVERY PROPOSED DISPOSAL AREA

Parent Material (geologic) Glacial Till Depth to Bedrock: >108"
Depth to Groundwater: Standing Water in the Hole 108" Weeping from Pit Face: N/A
Estimated Seasonal High Groundwater in the Hole 23"
Aditional Notes

FORM 11 - SOIL EVALUATOR FORM

Location Address or Lot #: 195 Tahattawan Rd
Littleton, MA 01460

On-Site Review

Deep Hole #: 718-4 Date: 07/11/18 Time: 1:15 PM Weather: Sunny 80°
Location (identify on site plan) See Attached Sketch
Land Use Grass/ Field Slope (%) 2% Surfaces Stones few
(eg woodland, agricultural field, vacant lot etc…)
Vegatation grass
Landform Ground Morraine
Position on landscape See attached Sketch
Distances from:

Open Water Body	>100 feet	Drainage Way	>100 feet
Possible Wet Area	>100 feet	Property Line	>20' feet
Drinking Water Well	>100 feet	Other:	
			feet

Deep Observation Hole Log

Hole # 718-4 NB 30/37 Suface El. 309.3

Depth from Surface (inches)	Soil Horizon	Soil Texture (USDA)	Soil Color (MUNSELL)	Soil Mottling	Other (Stucture, Stones, Boulders, Consistency, % Gravel)
0-7	A	SL	10YR3/2		loose, cr
7-21	B	SL	10YR 5/4		vfr, roots
23-110	C	fsl	2.5 Y 6/4	@25"	abk,vfr, 5% cob, 10%gr

*MINIMUM OF 2 HOLES REQUIRED AT EVERY PROPOSED DISPOSAL AREA

Parent Material (geologic) Glacial Till Depth to Bedrock: >110"
Depth to Groundwater: Standing Water in the Hole N/A Weeping from Pit Face: N/A
Estimated Seasonal High Groundwater in the Hole 25"
Aditional Notes

FORM 11 - SOIL EVALUATOR FORM

Location Address or Lot #: 195 Tahattawan Rd
Littleton, MA 01460

On-Site Review

Deep Hole #: 718-5 Date: 07/11/18 Time: 1:30 PM Weather: Sunny 80°
Location (identify on site plan) See Attached Sketch
Land Use Grass/ Field Slope (%) 2% Surfaces Stones few
(eg woodland, agricultural field, vacant lot etc…)
Vegatation grass
Landform Ground Morraine
Position on landscape See attached Sketch
Distances from:

Open Water Body	>100 feet	Drainage Way	>100 feet
Possible Wet Area	>100 feet	Property Line	>20' feet
Drinking Water Well	>100 feet	Other:	
			feet

Deep Observation Hole Log

Hole # 718-5 NB 30/37 Suface El. 308.1

Depth from Surface (inches)	Soil Horizon	Soil Texture (USDA)	Soil Color (MUNSELL)	Soil Mottling	Other (Stucture, Stones, Boulders, Consistency, % Gravel)
0-8	A	SL	10YR3/2		loose, cr
8-20	B	SL	10YR 5/4		vfr, roots
20-112	C	fsl	2.5 Y 6/4	@29"	abk,vfr, 5% cob, 10%gr

*MINIMUM OF 2 HOLES REQUIRED AT EVERY PROPOSED DISPOSAL AREA

Parent Material (geologic) Glacial Till Depth to Bedrock: >112"
Depth to Groundwater: Standing Water in the Hole N/A Weeping from Pit Face: N/A
Estimated Seasonal High Groundwater in the Hole 29"
Aditional Notes

FORM 11 - SOIL EVALUATOR FORM

Location Address or Lot #: 195 Tahattawan Rd
Littleton, MA 01460

On-Site Review

Deep Hole #: 718-6 Date: 07/11/18 Time: 1:45 PM Weather: Sunny 80°
Location (identify on site plan) See Attached Sketch
Land Use Grass/ Field Slope (%) 2% Surfaces Stones few
(eg woodland, agricultural field, vacant lot etc…)
Vegatation grass
Landform Ground Morraine
Position on landscape See attached Sketch
Distances from:

Open Water Body >100 feet
Possible Wet Area >100 feet
Drinking Water Well >100 feet
Drainage Way >100 feet
Property Line >20' feet
Other:
feet

Deep Observation Hole Log

Hole # 718-6 NB 30/37 Suface El. 308.9

Depth from Surface (inches)	Soil Horizon	Soil Texture (USDA)	Soil Color (MUNSELL)	Soil Mottling	Other (Stucture, Stones, Boulders, Consistency, % Gravel)
0-9	A	SL	10YR3/2		loose, cr
9-30	B	SL	10YR 5/4		vfr, roots
30-104	C	fsl	2.5 Y 6/4	@25"	abk,vfr, 5% cob, 10%gr

*MINIMUM OF 2 HOLES REQUIRED AT EVERY PROPOSED DISPOSAL AREA

Parent Material (geologic) Glacial Till Depth to Bedrock: >104"
Depth to Groundwater: Standing Water in the Hole N/A Weeping from Pit Face: N/A
Estimated Seasonal High Groundwater in the Hole 25"
Aditional Notes

FORM 11 - SOIL EVALUATOR FORM

Location Address or Lot #: 195 Tahattawan Rd
Littleton, MA 01460

On-Site Review

Deep Hole #: 718-7 Date: 07/12/18 Time: 10:00 AM Weather: Sunny 85°
Location (identify on site plan) See Attached Sketch
Land Use Grass/ Field Slope (%) 2% Surfaces Stones few
(eg woodland, agricultural field, vacant lot etc…)
Vegatation grass
Landform Ground Morraine
Position on landscape See attached Sketch
Distances from:

Open Water Body	>100 feet	Drainage Way	>100 feet
Possible Wet Area	>100 feet	Property Line	>20' feet
Drinking Water Well	>100 feet	Other:	
			feet

Deep Observation Hole Log

Hole # 718-7 NB 30/38 Suface El. 308.2

Depth from Surface (inches)	Soil Horizon	Soil Texture (USDA)	Soil Color (MUNSELL)	Soil Mottling	Other (Stucture, Stones, Boulders, Consistency, % Gravel)
0-8	A	SL	10YR3/2		loose, cr
8-24	B	SL	10YR 5/4		vfr, roots
24-102	C	fsl	2.5 Y 6/4	@24"	abk,vfr, 5% cob, 10%gr

*MINIMUM OF 2 HOLES REQUIRED AT EVERY PROPOSED DISPOSAL AREA

Parent Material (geologic) Glacial Till Depth to Bedrock: >102"
Depth to Groundwater: Standing Water in the Hole N/A Weeping from Pit Face: N/A
Estimated Seasonal High Groundwater in the Hole 24"
Aditional Notes

FORM 11 - SOIL EVALUATOR FORM

Location Address or Lot #: 195 Tahattawan Rd
Littleton, MA 01460

On-Site Review

Deep Hole #: 718-8 Date: 07/12/18 Time: 10:15 AM Weather: Sunny 85°
Location (identify on site plan) See Attached Sketch
Land Use Grass/ Field Slope (%) 2% Surfaces Stones few
(eg woodland, agricultural field, vacant lot etc…)
Vegatation grass
Landform Ground Morraine
Position on landscape See attached Sketch
Distances from:

Open Water Body >100 feet
Possible Wet Area >100 feet
Drinking Water Well >100 feet
Drainage Way >100 feet
Property Line >20' feet
Other:
feet

Deep Observation Hole Log

Hole # 718-8 NB 30/38 Suface El. 306.9

Depth from Surface (inches)	Soil Horizon	Soil Texture (USDA)	Soil Color (MUNSELL)	Soil Mottling	Other (Stucture, Stones, Boulders, Consistency, % Gravel)
0-9	A	SL	10YR3/2		loose, cr
9-24	B	SL	10YR 5/4		vfr, roots
24-96	C	fsl	2.5 Y 6/4	@24"	abk,vfr, 5% cob, 10%gr

*MINIMUM OF 2 HOLES REQUIRED AT EVERY PROPOSED DISPOSAL AREA

Parent Material (geologic) Glacial Till Depth to Bedrock: >96"
Depth to Groundwater: Standing Water in the Hole N/A Weeping from Pit Face: N/A
Estimated Seasonal High Groundwater in the Hole 24"
Aditional Notes

FORM 11 - SOIL EVALUATOR FORM

Location Address or Lot #: 195 Tahattawan Rd
Littleton, MA 01460

On-Site Review

Deep Hole #: 718-9 Date: 07/12/18 Time: 10:30 AM Weather: Sunny 85°
Location (identify on site plan) See Attached Sketch
Land Use Grass/ Field Slope (%) 2% Surfaces Stones few
(eg woodland, agricultural field, vacant lot etc…)
Vegatation grass
Landform Ground Morraine
Position on landscape See attached Sketch
Distances from:

Open Water Body >100 feet
Possible Wet Area >100 feet
Drinking Water Well >100 feet
Drainage Way >100 feet
Property Line >20' feet
Other: feet

Deep Observation Hole Log

Hole # 718-9 NB 30/38 Suface El. 295.4

Depth from Surface (inches)	Soil Horizon	Soil Texture (USDA)	Soil Color (MUNSELL)	Soil Mottling	Other (Stucture, Stones, Boulders, Consistency, % Gravel)
0-8	A	SL	10YR3/2		loose, cr
8-22	B	SL	10YR 5/4		vfr, roots
22-100	C	fsl	2.5 Y 6/4	@20"	abk,vfr, 5% cob, 10%gr

*MINIMUM OF 2 HOLES REQUIRED AT EVERY PROPOSED DISPOSAL AREA

Parent Material (geologic) Glacial Till Depth to Bedrock: >100"
Depth to Groundwater: Standing Water in the Hole N/A Weeping from Pit Face: N/A
Estimated Seasonal High Groundwater in the Hole 20"
Aditional Notes

FORM 11 - SOIL EVALUATOR FORM

Location Address or Lot #: 195 Tahattawan Rd
Littleton, MA 01460

On-Site Review

Deep Hole #: 718-10 Date: 07/12/18 Time: 10:45 AM Weather: Sunny 85°
Location (identify on site plan) See Attached Sketch
Land Use Grass/ Field Slope (%) 2% Surfaces Stones few
(eg woodland, agricultural field, vacant lot etc…)
Vegatation grass
Landform Ground Morraine
Position on landscape See attached Sketch
Distances from:

Open Water Body	>100 feet	Drainage Way	>100 feet
Possible Wet Area	>100 feet	Property Line	>20' feet
Drinking Water Well	>100 feet	Other:	
			feet

Deep Observation Hole Log

Hole # 718-10 NB 30/38 Suface El. 297.2

Depth from Surface (inches)	Soil Horizon	Soil Texture (USDA)	Soil Color (MUNSELL)	Soil Mottling	Other (Stucture, Stones, Boulders, Consistency, % Gravel)
0-9	A	SL	10YR3/2		loose, cr
9-26	B	SL	10YR 5/4		vfr, roots
26-96	C	fsl	2.5 Y 6/4	@26"	abk,vfr, 5% cob, 10%gr

*MINIMUM OF 2 HOLES REQUIRED AT EVERY PROPOSED DISPOSAL AREA

Parent Material (geologic) Glacial Till Depth to Bedrock: >96"
Depth to Groundwater: Standing Water in the Hole N/A Weeping from Pit Face: N/A
Estimated Seasonal High Groundwater in the Hole 26"
Aditional Notes

FORM 11 - SOIL EVALUATOR FORM

Location Address or Lot #: 195 Tahattawan Rd
Littleton, MA 01460

On-Site Review

Deep Hole #: 718-11 Date: 07/12/18 Time: 11:00 AM Weather: Sunny 85°
Location (identify on site plan) See Attached Sketch
Land Use Grass/ Field Slope (%) 2% Surfaces Stones few
(eg woodland, agricultural field, vacant lot etc…)
Vegatation grass
Landform Ground Morraine
Position on landscape See attached Sketch
Distances from:

Open Water Body	>100 feet	Drainage Way	>100 feet
Possible Wet Area	>100 feet	Property Line	>20' feet
Drinking Water Well	>100 feet	Other:	
			feet

Deep Observation Hole Log

Hole # 718-11 NB 30/39 Suface El. 295.1

Depth from Surface (inches)	Soil Horizon	Soil Texture (USDA)	Soil Color (MUNSELL)	Soil Mottling	Other (Stucture, Stones, Boulders, Consistency, % Gravel)
0-9	A	SL	10YR3/2		loose, cr
9-30	B	SL	10YR 5/4		vfr, roots
30-99	C	fsl	2.5 Y 6/4	@24"	abk,vfr, 5% cob, 10%gr

*MINIMUM OF 2 HOLES REQUIRED AT EVERY PROPOSED DISPOSAL AREA

Parent Material (geologic) Glacial Till Depth to Bedrock: >99"
Depth to Groundwater: Standing Water in the Hole N/A Weeping from Pit Face: N/A
Estimated Seasonal High Groundwater in the Hole 24"
Aditional Notes

FORM 11 - SOIL EVALUATOR FORM

Location Address or Lot #: 195 Tahattawan Rd
Littleton, MA 01460

On-Site Review

Deep Hole #: 718-12 Date: 07/12/18 Time: 11:15 AM Weather: Sunny 85°
Location (identify on site plan) See Attached Sketch
Land Use Grass/ Field Slope (%) 2% Surfaces Stones few
(eg woodland, agricultural field, vacant lot etc…)
Vegatation grass
Landform Ground Morraine
Position on landscape See attached Sketch
Distances from:

Open Water Body	>100 feet	Drainage Way	>100 feet
Possible Wet Area	>100 feet	Property Line	>20' feet
Drinking Water Well	>100 feet	Other:	
			feet

Deep Observation Hole Log

Hole # 718-12 NB 30/39 Suface El. 293.5

Depth from Surface (inches)	Soil Horizon	Soil Texture (USDA)	Soil Color (MUNSELL)	Soil Mottling	Other (Stucture, Stones, Boulders, Consistency, % Gravel)
0-8	A	SL	10YR3/2		loose, cr
8-20	B	SL	10YR 5/4		vfr, roots
20-96	C	fsl	2.5 Y 6/4	@24"	abk,vfr, 5% cob, 10%gr

*MINIMUM OF 2 HOLES REQUIRED AT EVERY PROPOSED DISPOSAL AREA

Parent Material (geologic) Glacial Till Depth to Bedrock: >96"
Depth to Groundwater: Standing Water in the Hole N/A Weeping from Pit Face: N/A
Estimated Seasonal High Groundwater in the Hole 24"
Aditional Notes

FORM 11 - SOIL EVALUATOR FORM

Location Address or Lot #: 195 Tahattawan Rd
Littleton, MA 01460

On-Site Review

Deep Hole #: 718.13 Date: 07/12/18 Time: 11:30 AM Weather: Sunny 85°
Location (identify on site plan) See Attached Sketch
Land Use Grass/ Field Slope (%) 2% Surfaces Stones few
(eg woodland, agricultural field, vacant lot etc…)
Vegatation grass
Landform Ground Morraine
Position on landscape See attached Sketch
Distances from:

Open Water Body	>100 feet	Drainage Way	>100 feet
Possible Wet Area	>100 feet	Property Line	>20' feet
Drinking Water Well	>100 feet	Other:	
			feet

Deep Observation Hole Log

Hole # 718.13 NB 30/39 Suface El. 303.4

Depth from Surface (inches)	Soil Horizon	Soil Texture (USDA)	Soil Color (MUNSELL)	Soil Mottling	Other (Stucture, Stones, Boulders, Consistency, % Gravel)
0-7	A	SL	10YR3/2		loose, cr
7-26	B	SL	10YR 5/4		vfr, roots
26-88	C	fsl	2.5 Y 6/4	@20"	abk,vfr, 5% cob, 10%gr

*MINIMUM OF 2 HOLES REQUIRED AT EVERY PROPOSED DISPOSAL AREA

Parent Material (geologic) Glacial Till Depth to Bedrock: >88"
Depth to Groundwater: Standing Water in the Hole N/A Weeping from Pit Face: N/A
Estimated Seasonal High Groundwater in the Hole 20"
Aditional Notes

FORM 11 - SOIL EVALUATOR FORM

Location Address or Lot #: 195 Tahattawan Rd
Littleton, MA 01460

On-Site Review

Deep Hole #: 718-14 Date: 07/12/18 Time: 11:45 AM Weather: Sunny 85°
Location (identify on site plan) See Attached Sketch
Land Use Grass/ Field Slope (%) 2% Surfaces Stones few
(eg woodland, agricultural field, vacant lot etc…)
Vegatation grass
Landform Ground Morraine
Position on landscape See attached Sketch
Distances from:

Open Water Body	>100 feet	Drainage Way	>100 feet
Possible Wet Area	>100 feet	Property Line	>20' feet
Drinking Water Well	>100 feet	Other:	
			feet

Deep Observation Hole Log

Hole # 718-14 NB 30/39 Suface El. 306.2

Depth from Surface (inches)	Soil Horizon	Soil Texture (USDA)	Soil Color (MUNSELL)	Soil Mottling	Other (Stucture, Stones, Boulders, Consistency, % Gravel)
0-9	A	SL	10YR3/2		loose, cr
9-26	B	SL	10YR 5/4		vfr, roots
26-90	C	fsl	2.5 Y 6/4	@28"	abk,vfr, 5% cob, 10%gr

*MINIMUM OF 2 HOLES REQUIRED AT EVERY PROPOSED DISPOSAL AREA

Parent Material (geologic) Glacial Till Depth to Bedrock: >90"
Depth to Groundwater: Standing Water in the Hole N/A Weeping from Pit Face: N/A
Estimated Seasonal High Groundwater in the Hole 28"
Aditional Notes

FORM 11 - SOIL EVALUATOR FORM

Location Address or Lot #: 195 Tahattawan Rd
Littleton, MA 01460

On-Site Review

Deep Hole #: 718-15 Date: 07/12/18 Time: 12:00 PM Weather: Sunny 85°
Location (identify on site plan) See Attached Sketch
Land Use Grass/ Field Slope (%) 2% Surfaces Stones few
(eg woodland, agricultural field, vacant lot etc…)
Vegatation grass
Landform Ground Morraine
Position on landscape See attached Sketch
Distances from:

Open Water Body	>100 feet	Drainage Way	>100 feet
Possible Wet Area	>100 feet	Property Line	>20' feet
Drinking Water Well	>100 feet	Other:	
			feet

Deep Observation Hole Log

Hole # 718-15 NB 30/40 Suface El. 306.1

Depth from Surface (inches)	Soil Horizon	Soil Texture (USDA)	Soil Color (MUNSELL)	Soil Mottling	Other (Stucture, Stones, Boulders, Consistency, % Gravel)
0-8	A	SL	10YR3/2		loose, cr
8-26	B	SL	10YR 5/4		vfr, roots
26-92	C	fsl	2.5 Y 6/4	@25"	abk,vfr, 5% cob, 10%gr

*MINIMUM OF 2 HOLES REQUIRED AT EVERY PROPOSED DISPOSAL AREA

Parent Material (geologic) Glacial Till Depth to Bedrock: >92"
Depth to Groundwater: Standing Water in the Hole N/A Weeping from Pit Face: N/A
Estimated Seasonal High Groundwater in the Hole 25"
Aditional Notes

FORM 11 - SOIL EVALUATOR FORM

Location Address or Lot #: 195 Tahattawan Rd
Littleton, MA 01460

On-Site Review

Deep Hole #: 718-16 Date: 07/12/18 Time: 12:45 PM Weather: Sunny 85°
Location (identify on site plan) See Attached Sketch
Land Use Grass/ Field Slope (%) 2% Surfaces Stones few
(eg woodland, agricultural field, vacant lot etc…)
Vegatation grass
Landform Ground Morraine
Position on landscape See attached Sketch
Distances from:

Open Water Body	>100 feet	Drainage Way	>100 feet
Possible Wet Area	>100 feet	Property Line	>20' feet
Drinking Water Well	>100 feet	Other:	
			feet

Deep Observation Hole Log

Hole # 718-16 NB 30/40 Suface El. 303.3

Depth from Surface (inches)	Soil Horizon	Soil Texture (USDA)	Soil Color (MUNSELL)	Soil Mottling	Other (Stucture, Stones, Boulders, Consistency, % Gravel)
0-8	A	SL	10YR3/2		loose, cr
8-28	B	SL	10YR 5/4		vfr, roots
28-106	C	fsl	2.5 Y 6/4	@25"	abk,vfr, 5% cob, 10%gr

*MINIMUM OF 2 HOLES REQUIRED AT EVERY PROPOSED DISPOSAL AREA

Parent Material (geologic) Glacial Till Depth to Bedrock: >106"
Depth to Groundwater: Standing Water in the Hole N/A Weeping from Pit Face: N/A
Estimated Seasonal High Groundwater in the Hole 25"
Aditional Notes

FORM 11 - SOIL EVALUATOR FORM

Location Address or Lot #: 195 Tahattawan Rd
Littleton, MA 01460

On-Site Review

Deep Hole #: 718-17 Date: 07/12/18 Time: 1:00 PM Weather: Sunny 85°
Location (identify on site plan) See Attached Sketch
Land Use Grass/ Field Slope (%) 2% Surfaces Stones few
(eg woodland, agricultural field, vacant lot etc…)
Vegatation grass
Landform Ground Morraine
Position on landscape See attached Sketch
Distances from:

Open Water Body >100 feet
Possible Wet Area >100 feet
Drinking Water Well >100 feet
Drainage Way >100 feet
Property Line >20' feet
Other: feet

Deep Observation Hole Log

Hole # 718-17 NB 30/40 Suface El. 306.2

Depth from Surface (inches)	Soil Horizon	Soil Texture (USDA)	Soil Color (MUNSELL)	Soil Mottling	Other (Stucture, Stones, Boulders, Consistency, % Gravel)
0-9	A	SL	10YR3/2		loose, cr
9-29	B	SL	10YR 5/4		vfr, roots
29-109	C	fsl	2.5 Y 6/4	@24"	abk,vfr, 5% cob, 10%gr

*MINIMUM OF 2 HOLES REQUIRED AT EVERY PROPOSED DISPOSAL AREA

Parent Material (geologic) Glacial Till Depth to Bedrock: >109"
Depth to Groundwater: Standing Water in the Hole N/A Weeping from Pit Face: N/A
Estimated Seasonal High Groundwater in the Hole 24"
Aditional Notes

FORM 11 - SOIL EVALUATOR FORM

Location Address or Lot #: 195 Tahattawan Rd
Littleton, MA 01460

On-Site Review

Deep Hole #: 718-18 Date: 07/12/18 Time: 1:15 PM Weather: Sunny 85°
Location (identify on site plan) See Attached Sketch
Land Use Grass/ Field Slope (%) 2% Surfaces Stones few
(eg woodland, agricultural field, vacant lot etc…)
Vegatation grass
Landform Ground Morraine
Position on landscape See attached Sketch
Distances from:

Open Water Body	>100 feet	Drainage Way	>100 feet
Possible Wet Area	>100 feet	Property Line	>20' feet
Drinking Water Well	>100 feet	Other:	
			feet

Deep Observation Hole Log

Hole # 718-18 NB 30/41 Suface El. 307.3

Depth from Surface (inches)	Soil Horizon	Soil Texture (USDA)	Soil Color (MUNSELL)	Soil Mottling	Other (Stucture, Stones, Boulders, Consistency, % Gravel)
0-8	A	SL	10YR3/2		loose, cr
8-26	B	SL	10YR 5/4		vfr, roots
26-100	C	fsl	2.5 Y 6/4	@23"	abk,vfr, 5% cob, 10%gr

*MINIMUM OF 2 HOLES REQUIRED AT EVERY PROPOSED DISPOSAL AREA

Parent Material (geologic) Glacial Till Depth to Bedrock: >100"
Depth to Groundwater: Standing Water in the Hole N/A Weeping from Pit Face: N/A
Estimated Seasonal High Groundwater in the Hole 23"
Aditional Notes

FORM 11 - SOIL EVALUATOR FORM

Location Address or Lot #: 195 Tahattawan Rd
Littleton, MA 01460

On-Site Review

Deep Hole #: 718-19 Date: 07/12/18 Time: 1:30 PM Weather: Sunny 85°
Location (identify on site plan) See Attached Sketch
Land Use Grass/ Field Slope (%) 2% Surfaces Stones few
(eg woodland, agricultural field, vacant lot etc…)
Vegatation grass
Landform Ground Morraine
Position on landscape See attached Sketch
Distances from:

Open Water Body	>100 feet	Drainage Way	>100 feet
Possible Wet Area	>100 feet	Property Line	>20' feet
Drinking Water Well	>100 feet	Other:	
			feet

Deep Observation Hole Log

Hole # 718-19 NB 30/41 Suface El. 306.2

Depth from Surface (inches)	Soil Horizon	Soil Texture (USDA)	Soil Color (MUNSELL)	Soil Mottling	Other (Stucture, Stones, Boulders, Consistency, % Gravel)
0-9	A	SL	10YR3/2		loose, cr
9-18	B	SL	10YR 5/4		vfr, roots
18-101	C	fsl	2.5 Y 6/4	@23"	abk,vfr, 5% cob, 10%gr

*MINIMUM OF 2 HOLES REQUIRED AT EVERY PROPOSED DISPOSAL AREA

Parent Material (geologic) Glacial Till Depth to Bedrock: >101"
Depth to Groundwater: Standing Water in the Hole N/A Weeping from Pit Face: N/A
Estimated Seasonal High Groundwater in the Hole 23"
Aditional Notes

FORM 11 - SOIL EVALUATOR FORM

Location Address or Lot #: 195 Tahattawan Rd
Littleton, MA 01460

On-Site Review

Deep Hole #: 718-20 Date: 07/12/18 Time: 1:45 PM Weather: Sunny 85°
Location (identify on site plan) See Attached Sketch
Land Use Grass/ Field Slope (%) 2% Surfaces Stones few
(eg woodland, agricultural field, vacant lot etc…)
Vegatation grass
Landform Ground Morraine
Position on landscape See attached Sketch
Distances from:

Open Water Body	>100 feet	Drainage Way	>100 feet
Possible Wet Area	>100 feet	Property Line	>20' feet
Drinking Water Well	>100 feet	Other:	
			feet

Deep Observation Hole Log

Hole # 718-20 NB 30/41 Suface El. 305.7

Depth from Surface (inches)	Soil Horizon	Soil Texture (USDA)	Soil Color (MUNSELL)	Soil Mottling	Other (Stucture, Stones, Boulders, Consistency, % Gravel)
0-9	A	SL	10YR3/2		loose, cr
9-24	B	SL	10YR 5/4		vfr, roots
24-98	C	fsl	2.5 Y 6/4	@26"	abk,vfr, 5% cob, 10%gr

*MINIMUM OF 2 HOLES REQUIRED AT EVERY PROPOSED DISPOSAL AREA

Parent Material (geologic) Glacial Till Depth to Bedrock: >98"
Depth to Groundwater: Standing Water in the Hole N/A Weeping from Pit Face: N/A
Estimated Seasonal High Groundwater in the Hole 26"
Aditional Notes

FORM 11 - SOIL EVALUATOR FORM

Location Address or Lot #: 195 Tahattawan Rd
Littleton, MA 01460

On-Site Review

Deep Hole #: 718-21 Date: 07/18/18 Time: 12:00 PM Weather: Sunny 85°
Location (identify on site plan) See Attached Sketch
Land Use Grass/ Field Slope (%) 2% Surfaces Stones few
(eg woodland, agricultural field, vacant lot etc…)
Vegatation grass
Landform Ground Morraine
Position on landscape See attached Sketch
Distances from:

Open Water Body	>100 feet	Drainage Way	>100 feet
Possible Wet Area	>100 feet	Property Line	>20' feet
Drinking Water Well	>100 feet	Other:	
			feet

Deep Observation Hole Log

Hole # 718-21 NB 30/45 Suface El. 305.4

Depth from Surface (inches)	Soil Horizon	Soil Texture (USDA)	Soil Color (MUNSELL)	Soil Mottling	Other (Stucture, Stones, Boulders, Consistency, % Gravel)
0-8	A	SL	10YR3/2		roots, cr, vfr
8-22	B	SL	10YR 5/4		vfr, roots
22-98	C	LS	2.5 Y 6/4	@30"	firm, 10% gr

*MINIMUM OF 2 HOLES REQUIRED AT EVERY PROPOSED DISPOSAL AREA

Parent Material (geologic) Glacial Till Depth to Bedrock (in): >98
Depth to Groundwater: Standing Water in the Hole N/A Weeping from Pit Face: N/A
Estimated Seasonal High Groundwater in the Hole (in) 26
Aditional Notes

FORM 11 - SOIL EVALUATOR FORM

Location Address or Lot #: 195 Tahattawan Rd
Littleton, MA 01460

On-Site Review

Deep Hole #: 718-22 Date: 07/18/18 Time: 12:15 PM Weather: Sunny 85°
Location (identify on site plan) See Attached Sketch
Land Use Grass/ Field Slope (%) 2% Surfaces Stones few
(eg woodland, agricultural field, vacant lot etc…)
Vegatation grass
Landform Ground Morraine
Position on landscape See attached Sketch
Distances from:

Open Water Body	>100 feet	Drainage Way	>100 feet
Possible Wet Area	>100 feet	Property Line	>20' feet
Drinking Water Well	>100 feet	Other:	
			feet

Deep Observation Hole Log

Hole # 718-22 NB 30/45 Suface El. 304.8

Depth from Surface (inches)	Soil Horizon	Soil Texture (USDA)	Soil Color (MUNSELL)	Soil Mottling	Other (Stucture, Stones, Boulders, Consistency, % Gravel)
0-8	A	SL	10YR3/2		roots, cr, vfr
8-22	B	SL	10YR 5/4		vfr, roots
22-88	C	LS	2.5 Y 6/4	@36"	firm, 10% gr

*MINIMUM OF 2 HOLES REQUIRED AT EVERY PROPOSED DISPOSAL AREA

Parent Material (geologic) Glacial Till Depth to Bedrock (in): >88
Depth to Groundwater: Standing Water in the Hole N/A Weeping from Pit Face: N/A
Estimated Seasonal High Groundwater in the Hole (in) 36
Aditional Notes

FORM 11 - SOIL EVALUATOR FORM

Location Address or Lot #: 195 Tahattawan Rd
Littleton, MA 01460

On-Site Review

Deep Hole #: 718-23 Date: 07/18/18 Time: 12:30 PM Weather: Sunny 85°
Location (identify on site plan) See Attached Sketch
Land Use Grass/ Field Slope (%) 2% Surfaces Stones few
(eg woodland, agricultural field, vacant lot etc…)
Vegatation grass
Landform Ground Morraine
Position on landscape See attached Sketch
Distances from:

Open Water Body >100 feet
Possible Wet Area >100 feet
Drinking Water Well >100 feet
Drainage Way >100 feet
Property Line >20' feet
Other: feet

Deep Observation Hole Log

Hole # 718-23 NB 30/45 Suface El. 292.5

Depth from Surface (inches)	Soil Horizon	Soil Texture (USDA)	Soil Color (MUNSELL)	Soil Mottling	Other (Stucture, Stones, Boulders, Consistency, % Gravel)
0-7	A	SL	10YR3/2		roots, cr, vfr
7-24	B	SL	10YR 5/6		vfr, roots
24-92	C	fls	2.5 Y 6/3	@30"	firm, fine sand

*MINIMUM OF 2 HOLES REQUIRED AT EVERY PROPOSED DISPOSAL AREA

Parent Material (geologic) Glacial Till Depth to Bedrock (in): >92
Depth to Groundwater: Standing Water in the Hole N/A Weeping from Pit Face: N/A
Estimated Seasonal High Groundwater in the Hole (in) 30
Aditional Notes

FORM 11 - SOIL EVALUATOR FORM

Location Address or Lot #: 195 Tahattawan Rd
Littleton, MA 01460

On-Site Review

Deep Hole #: 718-24 Date: 07/18/18 Time: 1:15 PM Weather: Sunny 85°
Location (identify on site plan) See Attached Sketch
Land Use Grass/ Field Slope (%) 2% Surfaces Stones few
(eg woodland, agricultural field, vacant lot etc…)
Vegatation grass
Landform Ground Morraine
Position on landscape See attached Sketch
Distances from:

Open Water Body >100 feet
Possible Wet Area >100 feet
Drinking Water Well >100 feet
Drainage Way >100 feet
Property Line >20' feet
Other: feet

Deep Observation Hole Log

Hole # 718-24 NB 30/45 Suface El. 294.0

Depth from Surface (inches)	Soil Horizon	Soil Texture (USDA)	Soil Color (MUNSELL)	Soil Mottling	Other (Stucture, Stones, Boulders, Consistency, % Gravel)
0-7	A	SL	10YR3/2		roots, cr, vfr
7-30	B	SL	10YR 5/6		vfr, roots
30-100	C	fls	2.5 Y 6/3	@30"	firm, fine sand

*MINIMUM OF 2 HOLES REQUIRED AT EVERY PROPOSED DISPOSAL AREA

Parent Material (geologic) Glacial Till Depth to Bedrock (in): >100
Depth to Groundwater: Standing Water in the Hole N/A Weeping from Pit Face: N/A
Estimated Seasonal High Groundwater in the Hole (in) 30
Aditional Notes

FORM 11 - SOIL EVALUATOR FORM

Location Address or Lot #: 195 Tahattawan Rd
Littleton, MA 01460

On-Site Review

Deep Hole #: 718-25 Date: 07/18/18 Time: 1:30 PM Weather: Sunny 85°
Location (identify on site plan) See Attached Sketch
Land Use Grass/ Field Slope (%) 2% Surfaces Stones few
(eg woodland, agricultural field, vacant lot etc…)
Vegatation grass
Landform Ground Morraine
Position on landscape See attached Sketch
Distances from:

Open Water Body	>100 feet	Drainage Way	>100 feet
Possible Wet Area	>100 feet	Property Line	>20' feet
Drinking Water Well	>100 feet	Other:	
			feet

Deep Observation Hole Log

Hole # 718-25 NB 30/46 Suface El. 291.2

Depth from Surface (inches)	Soil Horizon	Soil Texture (USDA)	Soil Color (MUNSELL)	Soil Mottling	Other (Stucture, Stones, Boulders, Consistency, % Gravel)
0-7	A	SL	10YR3/2		roots, cr, vfr
7-22	B	SL	10YR 5/6		vfr, roots
22-96	C	fls	2.5 Y 6/3	@30"	firm, fine sand

*MINIMUM OF 2 HOLES REQUIRED AT EVERY PROPOSED DISPOSAL AREA

Parent Material (geologic) Glacial Till Depth to Bedrock (in): >96
Depth to Groundwater: Standing Water in the Hole N/A Weeping from Pit Face: N/A
Estimated Seasonal High Groundwater in the Hole (in) 30
Aditional Notes

FORM 11 - SOIL EVALUATOR FORM

Location Address or Lot #: 195 Tahattawan Rd
Littleton, MA 01460

On-Site Review

Deep Hole #: 718-26 Date: 07/18/18 Time: 1:45 PM Weather: Sunny 85°
Location (identify on site plan) See Attached Sketch
Land Use Grass/ Field Slope (%) 2% Surfaces Stones few
(eg woodland, agricultural field, vacant lot etc…)
Vegatation grass
Landform Ground Morraine
Position on landscape See attached Sketch
Distances from:

Open Water Body	>100 feet	Drainage Way	>100 feet
Possible Wet Area	>100 feet	Property Line	>20' feet
Drinking Water Well	>100 feet	Other:	
			feet

Deep Observation Hole Log

Hole # 718-26 NB 30/46 Suface El. 292.5

Depth from Surface (inches)	Soil Horizon	Soil Texture (USDA)	Soil Color (MUNSELL)	Soil Mottling	Other (Stucture, Stones, Boulders, Consistency, % Gravel)
0-8	A	SL	10YR3/2		roots, cr, vfr
8-26	B	SL	10YR 5/4		vfr, roots
22-96	C	fls	2.5 Y 6/4	@30"	firm, fine sand

*MINIMUM OF 2 HOLES REQUIRED AT EVERY PROPOSED DISPOSAL AREA

Parent Material (geologic) Glacial Till Depth to Bedrock (in): >96
Depth to Groundwater: Standing Water in the Hole N/A Weeping from Pit Face: N/A
Estimated Seasonal High Groundwater in the Hole (in) 30
Aditional Notes

FORM 11 - SOIL EVALUATOR FORM

Location Address or Lot #: 195 Tahattawan Rd
Littleton, MA 01460

On-Site Review

Deep Hole #: 718-27 Date: 07/18/18 Time: 2:00 PM Weather: Sunny 85°
Location (identify on site plan) See Attached Sketch
Land Use Grass/ Field Slope (%) 2% Surfaces Stones few
(eg woodland, agricultural field, vacant lot etc…)
Vegatation grass
Landform Ground Morraine
Position on landscape See attached Sketch
Distances from:

Open Water Body	>100 feet	Drainage Way	>100 feet
Possible Wet Area	>100 feet	Property Line	>20' feet
Drinking Water Well	>100 feet	Other:	
			feet

Deep Observation Hole Log

Hole # 718-27 NB 30/46 Suface El. 289.5

Depth from Surface (inches)	Soil Horizon	Soil Texture (USDA)	Soil Color (MUNSELL)	Soil Mottling	Other (Stucture, Stones, Boulders, Consistency, % Gravel)
0-7	A	SL	10YR3/2		roots, cr, vfr
7-22	B	SL	10YR 5/6		vfr, roots
22-102	C	LS	2.5 Y 6/3	@32"	firm, fine sand

*MINIMUM OF 2 HOLES REQUIRED AT EVERY PROPOSED DISPOSAL AREA

Parent Material (geologic) Glacial Till Depth to Bedrock (in): >102
Depth to Groundwater: Standing Water in the Hole N/A Weeping from Pit Face: N/A
Estimated Seasonal High Groundwater in the Hole (in) 32
Aditional Notes

FORM 11 - SOIL EVALUATOR FORM

Location Address or Lot #: 195 Tahattawan Rd
Littleton, MA 01460

On-Site Review

Deep Hole #: 718-28 Date: 07/18/18 Time: 2:15 PM Weather: Sunny 85°
Location (identify on site plan) See Attached Sketch
Land Use Grass/ Field Slope (%) 2% Surfaces Stones few
(eg woodland, agricultural field, vacant lot etc…)
Vegatation grass
Landform Ground Morraine
Position on landscape See attached Sketch
Distances from:

Open Water Body	>100 feet	Drainage Way	>100 feet
Possible Wet Area	>100 feet	Property Line	>20' feet
Drinking Water Well	>100 feet	Other:	
			feet

Deep Observation Hole Log

Hole # 718-28 NB 30/46 Suface El. 286.8

Depth from Surface (inches)	Soil Horizon	Soil Texture (USDA)	Soil Color (MUNSELL)	Soil Mottling	Other (Stucture, Stones, Boulders, Consistency, % Gravel)
0-7	A	SL	10YR3/2		roots, cr, vfr
7-24	B	SL	10YR 5/6		vfr, roots
24-98	C	LS	2.5 Y 6/3	@36"	firm, fine sand

*MINIMUM OF 2 HOLES REQUIRED AT EVERY PROPOSED DISPOSAL AREA

Parent Material (geologic) Glacial Till Depth to Bedrock (in): >98
Depth to Groundwater: Standing Water in the Hole N/A Weeping from Pit Face: N/A
Estimated Seasonal High Groundwater in the Hole (in) 36
Aditional Notes

FORM 11 - SOIL EVALUATOR FORM

Location Address or Lot #: 195 Tahattawan Rd
Littleton, MA 01460

On-Site Review

Deep Hole #: 718-29 Date: 07/19/18 Time: 11:00 AM Weather: Sunny 85°
Location (identify on site plan) See Attached Sketch
Land Use Grass/ Field Slope (%) 2% Surfaces Stones few
(eg woodland, agricultural field, vacant lot etc…)
Vegatation grass
Landform Ground Morraine
Position on landscape See attached Sketch
Distances from:

Open Water Body	>100 feet	Drainage Way	>100 feet
Possible Wet Area	>100 feet	Property Line	>20' feet
Drinking Water Well	>100 feet	Other:	
			feet

Deep Observation Hole Log

Hole # 718-29 NB 30/48 Suface El. 258.7

Depth from Surface (inches)	Soil Horizon	Soil Texture (USDA)	Soil Color (MUNSELL)	Soil Mottling	Other (Stucture, Stones, Boulders, Consistency, % Gravel)
0-8	A	SL	10YR3/2		roots, cr, vfr
8-30	B	SL	10YR 5/6		vfr, roots
30-94	C	LS	10YR 5/4	@36"	cobbles, lrg bldrs, firm

*MINIMUM OF 2 HOLES REQUIRED AT EVERY PROPOSED DISPOSAL AREA

Parent Material (geologic) Glacial Till Depth to Bedrock (in): >94
Depth to Groundwater: Standing Water in the Hole N/A Weeping from Pit Face: N/A
Estimated Seasonal High Groundwater in the Hole (in) 36
Aditional Notes

FORM 11 - SOIL EVALUATOR FORM

Location Address or Lot #: 195 Tahattawan Rd
Littleton, MA 01460

On-Site Review

Deep Hole #: 718-30 Date: 07/19/18 Time: 11:15 AM Weather: Sunny 85°
Location (identify on site plan) See Attached Sketch
Land Use Grass/ Field Slope (%) 2% Surfaces Stones few
(eg woodland, agricultural field, vacant lot etc…)
Vegatation grass
Landform Ground Morraine
Position on landscape See attached Sketch
Distances from:

Open Water Body	>100 feet	Drainage Way	>100 feet
Possible Wet Area	>100 feet	Property Line	>20' feet
Drinking Water Well	>100 feet	Other:	
			feet

Deep Observation Hole Log

Hole # 718-30 NB 30/48 Suface El. 258.8

Depth from Surface (inches)	Soil Horizon	Soil Texture (USDA)	Soil Color (MUNSELL)	Soil Mottling	Other (Stucture, Stones, Boulders, Consistency, % Gravel)
0-8	A	SL	10YR3/2		roots, cr, vfr
8-30	B	SL	10YR 5/6		vfr, roots
30-94	C	LS	10YR 5/4	@28"	cobbles, lrg bldrs, firm

*MINIMUM OF 2 HOLES REQUIRED AT EVERY PROPOSED DISPOSAL AREA

Parent Material (geologic) Glacial Till Depth to Bedrock (in): >94
Depth to Groundwater: Standing Water in the Hole N/A Weeping from Pit Face: N/A
Estimated Seasonal High Groundwater in the Hole (in) 28
Aditional Notes

FORM 11 - SOIL EVALUATOR FORM

Location Address or Lot #: 195 Tahattawan Rd
Littleton, MA 01460

On-Site Review

Deep Hole #: 718-31 Date: 07/19/18 Time: 11:30 AM Weather: Sunny 85°
Location (identify on site plan) See Attached Sketch
Land Use Grass/ Field Slope (%) 2% Surfaces Stones few
(eg woodland, agricultural field, vacant lot etc…)
Vegatation grass
Landform Ground Morraine
Position on landscape See attached Sketch
Distances from:

Open Water Body	>100 feet	Drainage Way	>100 feet
Possible Wet Area	>100 feet	Property Line	>20' feet
Drinking Water Well	>100 feet	Other:	
			feet

Deep Observation Hole Log

Hole # 718-31 NB 30/49 Suface El. 261.1

Depth from Surface (inches)	Soil Horizon	Soil Texture (USDA)	Soil Color (MUNSELL)	Soil Mottling	Other (Stucture, Stones, Boulders, Consistency, % Gravel)
0-7	A	SL	10YR3/2		roots, cr, vfr
7-28	B	SL	10YR 5/6		vfr, roots
28-84	C	LS	10YR 5/4	@36"	cobbles, lrg bldrs, firm

*MINIMUM OF 2 HOLES REQUIRED AT EVERY PROPOSED DISPOSAL AREA

Parent Material (geologic) Glacial Till Depth to Bedrock (in): >84
Depth to Groundwater: Standing Water in the Hole N/A Weeping from Pit Face: N/A
Estimated Seasonal High Groundwater in the Hole (in) 36
Aditional Notes

FORM 11 - SOIL EVALUATOR FORM

Location Address or Lot #: 195 Tahattawan Rd
Littleton, MA 01460

On-Site Review

Deep Hole #: 718-32 Date: 07/19/18 Time: 12:00 PM Weather: Sunny 85°
Location (identify on site plan) See Attached Sketch
Land Use Grass/ Field Slope (%) 2% Surfaces Stones few
(eg woodland, agricultural field, vacant lot etc…)
Vegatation grass
Landform Ground Morraine
Position on landscape See attached Sketch
Distances from:

Open Water Body	>100 feet	Drainage Way	>100 feet
Possible Wet Area	>100 feet	Property Line	>20' feet
Drinking Water Well	>100 feet	Other:	
			feet

Deep Observation Hole Log

Hole # 718-32 NB 30/49 Suface El. 259.5

Depth from Surface (inches)	Soil Horizon	Soil Texture (USDA)	Soil Color (MUNSELL)	Soil Mottling	Other (Stucture, Stones, Boulders, Consistency, % Gravel)
0-8	A	SL	10YR3/2		roots, cr, vfr
8-38	B	SL	10YR 5/6		vfr, roots
38-88	C	LS	10YR 5/4	@36"	cobbles, lrg bldrs, firm

*MINIMUM OF 2 HOLES REQUIRED AT EVERY PROPOSED DISPOSAL AREA

Parent Material (geologic) Glacial Till Depth to Bedrock (in): >88
Depth to Groundwater: Standing Water in the Hole N/A Weeping from Pit Face: N/A
Estimated Seasonal High Groundwater in the Hole (in) 36
Aditional Notes

FORM 11 - SOIL EVALUATOR FORM

Location Address or Lot#: 195 Tahattawan Rd
Littleton, MA 01460

Determination for Seasonal High Water Table

Method Used:

- ☐ Depth observed standing in observation hole ------ inches ----------
- ☐ Depth weeping from side of observation hole ------ inches ----------
- ☑ Depth to soil mottles ------ * inches See individual Reports
- ☐ Ground water adjustment ------ feet ----------

Index Well Number ---------- Reading Date ---------- Index Well Level ----------

Adjustment Factor ---------- Adjusted Ground Water Level ----------

Depth of Naturally Occuring Pervious Material

Does at least four feet of naturally occuring pervious material exist in all areas observed throughout the area proposed for the soil absorption system? Yes

If not, what is the depth of naturally occuring pervious material? _____ Feet

Certification

I certify that I am currently approved by the Department of Environmental Protection pursuant to 310 CMR 15.017 to conduct soil evaluations and that the above analysis has been performed by me consistent with the training, expertise and experience described in 310 CMR 15.017. I further certify that the results of my soil evaluation, as indicated, on the attached soil evaluation form, are accurate and in accordance with 310 CMR 15.100 through 15.107.

Signature _____ Date 8/8/18

Notes: _____

Signature

FORM 11 - SOIL EVALUATOR FORM

Location Address or Lot #: 195 Tahattawan Road
Littleton, MA

On-Site Review

Deep Hole #: 1124-1 Date: 11/25/24 Time: 9:00 AM Weather: Sunny 50°
Location (identify on site plan) See Attached Sketch
Land Use Woodland Slope (%) 4% Surfaces Stones few
(eg woodland, agricultural field, vacant lot etc…)
Vegatation mixed hardwoods and grass
Landform Ground Morraine
Position on landscape See attached Sketch
Distances from:

Open Water Body	>100 feet	Drainage Way	>100 feet
Possible Wet Area	>100 feet	Property Line	67± feet
Drinking Water Well	>100 feet	Other:	
			feet

Deep Observation Hole Log

Hole # 1124-1 NB E-31-50 Suface El. 307.3

Depth from Surface (inches)	Soil Horizon	Soil Texture (USDA)	Soil Color (MUNSELL)	Soil Mottling	Other (Stucture, Stones, Boulders, Consistency, % Gravel)
0-12	A	SL	10YR 3/2		
12-28	B	SL	10YR 5/4		
28-141	C	FSL	2.5Y 6/4	@28"	

*MINIMUM OF 2 HOLES REQUIRED AT EVERY PROPOSED DISPOSAL AREA

Parent Material (geologic) Glacial Till Depth to Bedrock: 141"
Depth to Groundwater: Standing Water in the Hole None Weeping from Pit Face: None
Estimated Seasonal High Groundwater in the Hole 28"
Aditional Notes

FORM 11 - SOIL EVALUATOR FORM

Location Address or Lot #: 195 Tahattawan Road
Littleton, MA

On-Site Review

Deep Hole #: 1124-2 Date: 11/25/24 Time: 9:00 AM Weather: Sunny 50°
Location (identify on site plan) See Attached Sketch
Land Use Woodland Slope (%) 4% Surfaces Stones few
(eg woodland, agricultural field, vacant lot etc…)
Vegatation mixed hardwoods and grass
Landform Ground Morraine
Position on landscape See attached Sketch
Distances from:

Open Water Body	>100 feet	Drainage Way	>100 feet
Possible Wet Area	>100 feet	Property Line	46± feet
Drinking Water Well	>100 feet	Other:	
			feet

Deep Observation Hole Log

Hole # 1124-2 NB E-31-50 Suface El. 307.2

Depth from Surface (inches)	Soil Horizon	Soil Texture (USDA)	Soil Color (MUNSELL)	Soil Mottling	Other (Stucture, Stones, Boulders, Consistency, % Gravel)
0-12	A	SL	10YR 3/2		
12-26	B	SL	10YR 6/4		
26-136	C	FSL	2.5Y 6/4	@26"	

*MINIMUM OF 2 HOLES REQUIRED AT EVERY PROPOSED DISPOSAL AREA

Parent Material (geologic) Glacial Till Depth to Bedrock: 136"
Depth to Groundwater: Standing Water in the Hole None Weeping from Pit Face: None
Estimated Seasonal High Groundwater in the Hole 26"
Aditional Notes

FORM 11 - SOIL EVALUATOR FORM

Location Address or Lot #: 195 Tahattawan Road
Littleton, MA

On-Site Review

Deep Hole #: 1124-3 Date: 11/25/24 Time: 9:00 AM Weather: Sunny 50°
Location (identify on site plan) See Attached Sketch
Land Use Woodland Slope (%) 4% Surfaces Stones few
(eg woodland, agricultural field, vacant lot etc…)
Vegatation mixed hardwoods and grass
Landform Ground Morraine
Position on landscape See attached Sketch
Distances from:

Open Water Body	>100 feet	Drainage Way	>100 feet
Possible Wet Area	>100 feet	Property Line	52± feet
Drinking Water Well	>100 feet	Other:	
			feet

Deep Observation Hole Log

Hole # 1124-3 NB E-31-50 Suface El. 305.1

Depth from Surface (inches)	Soil Horizon	Soil Texture (USDA)	Soil Color (MUNSELL)	Soil Mottling	Other (Stucture, Stones, Boulders, Consistency, % Gravel)
0-12	A	SL	10YR 3/2		
12-26	B	SL	10YR 5/4		
26-132	C	FSL	2.5Y 6/4	@26"	

*MINIMUM OF 2 HOLES REQUIRED AT EVERY PROPOSED DISPOSAL AREA

Parent Material (geologic) Glacial Till Depth to Bedrock: 132"
Depth to Groundwater: Standing Water in the Hole None Weeping from Pit Face: None
Estimated Seasonal High Groundwater in the Hole 26"
Aditional Notes

FORM 11 - SOIL EVALUATOR FORM

Location Address or Lot #: 195 Tahattawan Road
Littleton, MA

On-Site Review

Deep Hole #: 1124-4 Date: 11/25/24 Time: 9:00 AM Weather: Sunny 50°
Location (identify on site plan) See Attached Sketch
Land Use Woodland Slope (%) 4% Surfaces Stones few
(eg woodland, agricultural field, vacant lot etc…)
Vegatation mixed hardwoods and grass
Landform Ground Morraine
Position on landscape See attached Sketch
Distances from:

Open Water Body	>100 feet	Drainage Way	>100 feet
Possible Wet Area	>100 feet	Property Line	62± feet
Drinking Water Well	>100 feet	Other:	
			feet

Deep Observation Hole Log

Hole # 1124-4 NB E-31-50 Suface El. 304.9

Depth from Surface (inches)	Soil Horizon	Soil Texture (USDA)	Soil Color (MUNSELL)	Soil Mottling	Other (Stucture, Stones, Boulders, Consistency, % Gravel)
0-12	A	SL	10YR 3/2		
12-26	B	SL	10YR 5/4		
26-151	C	FSL	2.5Y 6/4	@26"	

*MINIMUM OF 2 HOLES REQUIRED AT EVERY PROPOSED DISPOSAL AREA

Parent Material (geologic) Glacial Till Depth to Bedrock: 151"
Depth to Groundwater: Standing Water in the Hole None Weeping from Pit Face: None
Estimated Seasonal High Groundwater in the Hole 26"
Aditional Notes

FORM 11 - SOIL EVALUATOR FORM

Location Address or Lot #: 195 Tahattawan Road
Littleton, MA

On-Site Review

Deep Hole #: 1124-5 Date: 11/25/24 Time: 9:00 AM Weather: Sunny 50°
Location (identify on site plan) See Attached Sketch
Land Use Woodland Slope (%) 1% Surfaces Stones few
(eg woodland, agricultural field, vacant lot etc…)
Vegatation mixed hardwoods and grass
Landform Ground Morraine
Position on landscape See attached Sketch
Distances from:

Open Water Body	>100 feet	Drainage Way	>100 feet
Possible Wet Area	>100 feet	Property Line	36± feet
Drinking Water Well	>100 feet	Other:	
			feet

Deep Observation Hole Log

Hole # 1124-5 NB E-31-52 Suface El. 304.0

Depth from Surface (inches)	Soil Horizon	Soil Texture (USDA)	Soil Color (MUNSELL)	Soil Mottling	Other (Stucture, Stones, Boulders, Consistency, % Gravel)
0-14	A	SL	10YR 3/2		
14-25	B	SL	10YR 5/4		
25-144	C	FSL	2.5Y 6/6	@25"	

*MINIMUM OF 2 HOLES REQUIRED AT EVERY PROPOSED DISPOSAL AREA

Parent Material (geologic) Glacial Till Depth to Bedrock: 144"
Depth to Groundwater: Standing Water in the Hole None Weeping from Pit Face: None
Estimated Seasonal High Groundwater in the Hole 25"
Aditional Notes

FORM 11 - SOIL EVALUATOR FORM

Location Address or Lot #: 195 Tahattawan Road
Littleton, MA

On-Site Review

Deep Hole #: 1124-6 Date: 11/25/24 Time: 9:00 AM Weather: Sunny 50°
Location (identify on site plan) See Attached Sketch
Land Use Woodland Slope (%) 2% Surfaces Stones few
(eg woodland, agricultural field, vacant lot etc…)
Vegatation mixed hardwoods and pines
Landform Ground Morraine
Position on landscape See attached Sketch
Distances from:

Open Water Body	>100 feet	Drainage Way	>100 feet
Possible Wet Area	>100 feet	Property Line	20± feet
Drinking Water Well	>100 feet	Other:	
			feet

Deep Observation Hole Log

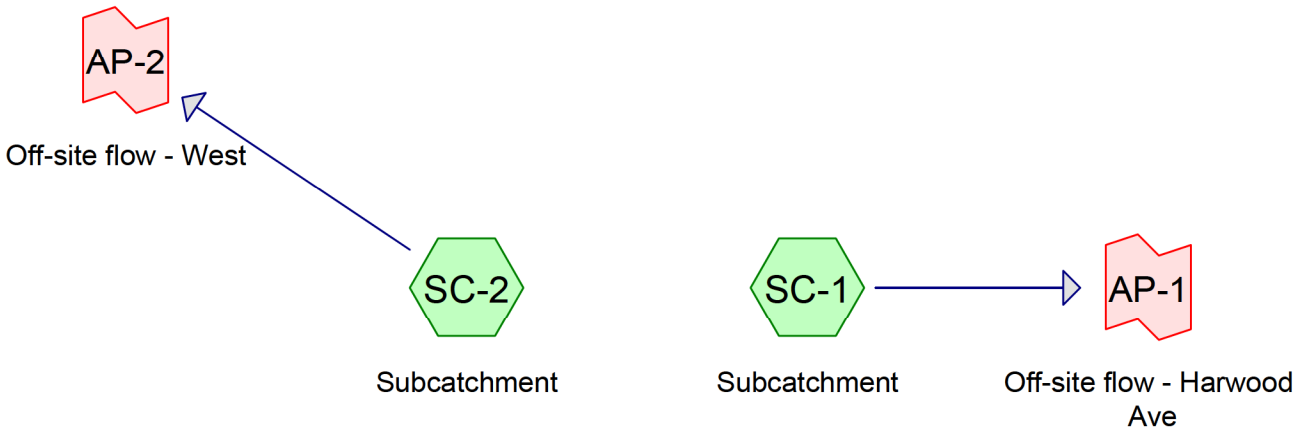
Hole # 1124-6 NB E-31-52 Suface El. 305.3

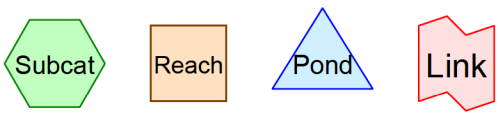
Depth from Surface (inches)	Soil Horizon	Soil Texture (USDA)	Soil Color (MUNSELL)	Soil Mottling	Other (Stucture, Stones, Boulders, Consistency, % Gravel)
0-14	A	SL	10YR 3/2		
14-28	B	SL	10YR 5/4		
28-88	C1	FSL	2.5Y 6/4	@28"	
88-142	C2	S	2.5Y 6/5		

*MINIMUM OF 2 HOLES REQUIRED AT EVERY PROPOSED DISPOSAL AREA

Parent Material (geologic) Glacial Till Depth to Bedrock: 142"
Depth to Groundwater: Standing Water in the Hole None Weeping from Pit Face: None
Estimated Seasonal High Groundwater in the Hole 28"
Aditional Notes

Attachment 2: Existing Conditions Hydrologic Calculations





Routing Diagram for PRE
Prepared by Goldsmith, Prest & Ringwall, Inc, Printed 6/5/2025

Area Listing (all nodes)

Area (acres)	CN	Description (subcatchment-numbers)
2.558	74	Pasture/grassland/range, Good, HSG C (SC-1, SC-2)
0.015	98	Paved parking, HSG C (SC-1)
0.757	70	Woods, Good, HSG C (SC-1, SC-2)
3.330	**73**	**TOTAL AREA**

Time span=0.00-24.00 hrs, dt=0.05 hrs, 481 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Dyn-Stor-Ind method - Pond routing by Dyn-Stor-Ind method

Subcatchment SC-1: Subcatchment Runoff Area=40,525 sf 1.62% Impervious Runoff Depth>0.98"
Flow Length=106' Tc=12.6 min CN=73 Runoff=0.8 cfs 0.076 af

Subcatchment SC-2: Subcatchment Runoff Area=104,539 sf 0.00% Impervious Runoff Depth>0.98"
Flow Length=402' Tc=15.7 min CN=73 Runoff=1.9 cfs 0.197 af

Link AP-1: Off-site flow - Harwood Ave Inflow=0.8 cfs 0.076 af
Primary=0.8 cfs 0.076 af

Link AP-2: Off-site flow - West Inflow=1.9 cfs 0.197 af
Primary=1.9 cfs 0.197 af

Total Runoff Area = 3.330 ac Runoff Volume = 0.273 af Average Runoff Depth = 0.98"
99.55% Pervious = 3.315 ac 0.45% Impervious = 0.015 ac

Summary for Subcatchment SC-1: Subcatchment

Runoff = 0.8 cfs @ 12.21 hrs, Volume= 0.076 af, Depth> 0.98"
Routed to Link AP-1 : Off-site flow - Harwood Ave

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
NOAA10 24-hr D 2-Year Rainfall=3.21"

Area (sf)	CN	Description
23,108	74	Pasture/grassland/range, Good, HSG C
16,761	70	Woods, Good, HSG C
656	98	Paved parking, HSG C
40,525	73	Weighted Average
39,869		98.38% Pervious Area
656		1.62% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
11.3	50	0.0250	0.07		**Sheet Flow, A to B** Woods: Light underbrush n= 0.400 P2= 3.21"
1.3	56	0.0200	0.71		**Shallow Concentrated Flow, B to C** Woodland Kv= 5.0 fps
12.6	106	Total			

Summary for Subcatchment SC-2: Subcatchment

Runoff = 1.9 cfs @ 12.25 hrs, Volume= 0.197 af, Depth> 0.98"
Routed to Link AP-2 : Off-site flow - West

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
NOAA10 24-hr D 2-Year Rainfall=3.21"

Area (sf)	CN	Description
16,204	70	Woods, Good, HSG C
88,335	74	Pasture/grassland/range, Good, HSG C
104,539	73	Weighted Average
104,539		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
7.8	39	0.0380	0.08		**Sheet Flow, A to B** Woods: Light underbrush n= 0.400 P2= 3.21"
2.3	11	0.0070	0.08		**Sheet Flow, B to C** Range n= 0.130 P2= 3.21"
3.5	124	0.0070	0.59		**Shallow Concentrated Flow, C to D** Short Grass Pasture Kv= 7.0 fps
2.1	228	0.0640	1.77		**Shallow Concentrated Flow, D to E** Short Grass Pasture Kv= 7.0 fps
15.7	402	Total			

Summary for Link AP-1: Off-site flow - Harwood Ave

Inflow Area = 0.930 ac, 1.62% Impervious, Inflow Depth > 0.98" for 2-Year event
Inflow = 0.8 cfs @ 12.21 hrs, Volume= 0.076 af
Primary = 0.8 cfs @ 12.21 hrs, Volume= 0.076 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs

Summary for Link AP-2: Off-site flow - West

Inflow Area = 2.400 ac, 0.00% Impervious, Inflow Depth > 0.98" for 2-Year event
Inflow = 1.9 cfs @ 12.25 hrs, Volume= 0.197 af
Primary = 1.9 cfs @ 12.25 hrs, Volume= 0.197 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs

Time span=0.00-24.00 hrs, dt=0.05 hrs, 481 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Dyn-Stor-Ind method - Pond routing by Dyn-Stor-Ind method

Subcatchment SC-1: Subcatchment Runoff Area=40,525 sf 1.62% Impervious Runoff Depth>2.28"
Flow Length=106' Tc=12.6 min CN=73 Runoff=2.0 cfs 0.177 af

Subcatchment SC-2: Subcatchment Runoff Area=104,539 sf 0.00% Impervious Runoff Depth>2.28"
Flow Length=402' Tc=15.7 min CN=73 Runoff=4.6 cfs 0.456 af

Link AP-1: Off-site flow - Harwood Ave Inflow=2.0 cfs 0.177 af
Primary=2.0 cfs 0.177 af

Link AP-2: Off-site flow - West Inflow=4.6 cfs 0.456 af
Primary=4.6 cfs 0.456 af

Total Runoff Area = 3.330 ac Runoff Volume = 0.632 af Average Runoff Depth = 2.28"
99.55% Pervious = 3.315 ac 0.45% Impervious = 0.015 ac

Summary for Subcatchment SC-1: Subcatchment

Runoff = 2.0 cfs @ 12.21 hrs, Volume= 0.177 af, Depth> 2.28"
Routed to Link AP-1 : Off-site flow - Harwood Ave

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
NOAA10 24-hr D 10-Year Rainfall=5.01"

Area (sf)	CN	Description
23,108	74	Pasture/grassland/range, Good, HSG C
16,761	70	Woods, Good, HSG C
656	98	Paved parking, HSG C
40,525	73	Weighted Average
39,869		98.38% Pervious Area
656		1.62% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
11.3	50	0.0250	0.07		**Sheet Flow, A to B** Woods: Light underbrush n= 0.400 P2= 3.21"
1.3	56	0.0200	0.71		**Shallow Concentrated Flow, B to C** Woodland Kv= 5.0 fps
12.6	106	Total			

Summary for Subcatchment SC-2: Subcatchment

Runoff = 4.6 cfs @ 12.25 hrs, Volume= 0.456 af, Depth> 2.28"
Routed to Link AP-2 : Off-site flow - West

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
NOAA10 24-hr D 10-Year Rainfall=5.01"

Area (sf)	CN	Description
16,204	70	Woods, Good, HSG C
88,335	74	Pasture/grassland/range, Good, HSG C
104,539	73	Weighted Average
104,539		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
7.8	39	0.0380	0.08		**Sheet Flow, A to B** Woods: Light underbrush n= 0.400 P2= 3.21"
2.3	11	0.0070	0.08		**Sheet Flow, B to C** Range n= 0.130 P2= 3.21"
3.5	124	0.0070	0.59		**Shallow Concentrated Flow, C to D** Short Grass Pasture Kv= 7.0 fps
2.1	228	0.0640	1.77		**Shallow Concentrated Flow, D to E** Short Grass Pasture Kv= 7.0 fps
15.7	402	Total			

Summary for Link AP-1: Off-site flow - Harwood Ave

Inflow Area = 0.930 ac, 1.62% Impervious, Inflow Depth > 2.28" for 10-Year event
Inflow = 2.0 cfs @ 12.21 hrs, Volume= 0.177 af
Primary = 2.0 cfs @ 12.21 hrs, Volume= 0.177 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs

Summary for Link AP-2: Off-site flow - West

Inflow Area = 2.400 ac, 0.00% Impervious, Inflow Depth > 2.28" for 10-Year event
Inflow = 4.6 cfs @ 12.25 hrs, Volume= 0.456 af
Primary = 4.6 cfs @ 12.25 hrs, Volume= 0.456 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs

Time span=0.00-24.00 hrs, dt=0.05 hrs, 481 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Dyn-Stor-Ind method - Pond routing by Dyn-Stor-Ind method

Subcatchment SC-1: Subcatchment Runoff Area=40,525 sf 1.62% Impervious Runoff Depth>4.67"
Flow Length=106' Tc=12.6 min CN=73 Runoff=4.1 cfs 0.362 af

Subcatchment SC-2: Subcatchment Runoff Area=104,539 sf 0.00% Impervious Runoff Depth>4.67"
Flow Length=402' Tc=15.7 min CN=73 Runoff=9.5 cfs 0.933 af

Link AP-1: Off-site flow - Harwood Ave Inflow=4.1 cfs 0.362 af
Primary=4.1 cfs 0.362 af

Link AP-2: Off-site flow - West Inflow=9.5 cfs 0.933 af
Primary=9.5 cfs 0.933 af

Total Runoff Area = 3.330 ac Runoff Volume = 1.296 af Average Runoff Depth = 4.67"
99.55% Pervious = 3.315 ac 0.45% Impervious = 0.015 ac

Summary for Subcatchment SC-1: Subcatchment

Runoff = 4.1 cfs @ 12.20 hrs, Volume= 0.362 af, Depth> 4.67"
Routed to Link AP-1 : Off-site flow - Harwood Ave

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
NOAA10 24-hr D 100-Year Rainfall=7.86"

Area (sf)	CN	Description
23,108	74	Pasture/grassland/range, Good, HSG C
16,761	70	Woods, Good, HSG C
656	98	Paved parking, HSG C
40,525	73	Weighted Average
39,869		98.38% Pervious Area
656		1.62% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
11.3	50	0.0250	0.07		**Sheet Flow, A to B** Woods: Light underbrush n= 0.400 P2= 3.21"
1.3	56	0.0200	0.71		**Shallow Concentrated Flow, B to C** Woodland Kv= 5.0 fps
12.6	106	Total			

Summary for Subcatchment SC-2: Subcatchment

Runoff = 9.5 cfs @ 12.24 hrs, Volume= 0.933 af, Depth> 4.67"
Routed to Link AP-2 : Off-site flow - West

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
NOAA10 24-hr D 100-Year Rainfall=7.86"

Area (sf)	CN	Description
16,204	70	Woods, Good, HSG C
88,335	74	Pasture/grassland/range, Good, HSG C
104,539	73	Weighted Average
104,539		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
7.8	39	0.0380	0.08		**Sheet Flow, A to B** Woods: Light underbrush n= 0.400 P2= 3.21"
2.3	11	0.0070	0.08		**Sheet Flow, B to C** Range n= 0.130 P2= 3.21"
3.5	124	0.0070	0.59		**Shallow Concentrated Flow, C to D** Short Grass Pasture Kv= 7.0 fps
2.1	228	0.0640	1.77		**Shallow Concentrated Flow, D to E** Short Grass Pasture Kv= 7.0 fps
15.7	402	Total			

Summary for Link AP-1: Off-site flow - Harwood Ave

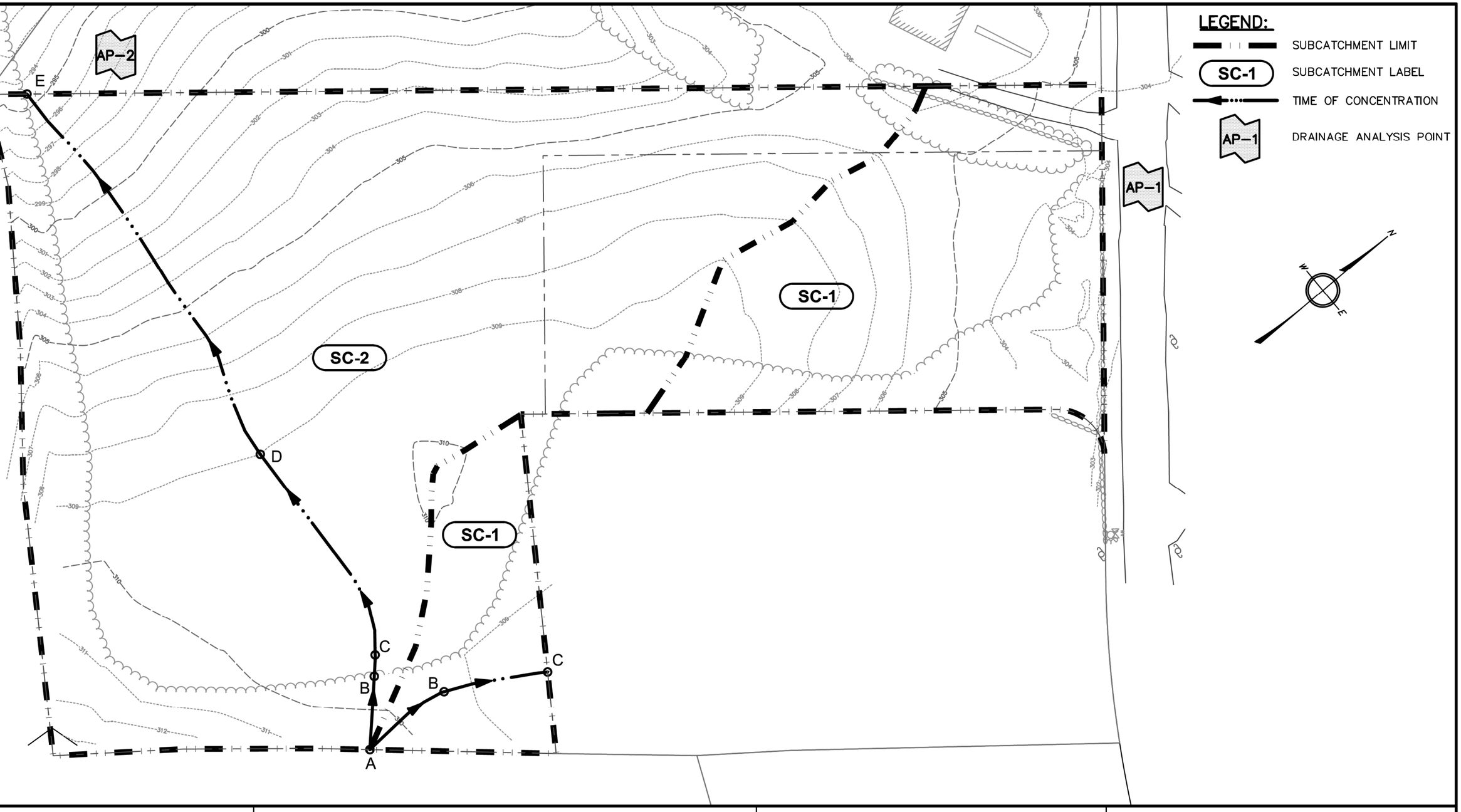
Inflow Area = 0.930 ac, 1.62% Impervious, Inflow Depth > 4.67" for 100-Year event
Inflow = 4.1 cfs @ 12.20 hrs, Volume= 0.362 af
Primary = 4.1 cfs @ 12.20 hrs, Volume= 0.362 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs

Summary for Link AP-2: Off-site flow - West

Inflow Area = 2.400 ac, 0.00% Impervious, Inflow Depth > 4.67" for 100-Year event
Inflow = 9.5 cfs @ 12.24 hrs, Volume= 0.933 af
Primary = 9.5 cfs @ 12.24 hrs, Volume= 0.933 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs



GRAPHIC SCALE

50 0 25 50 100

(IN FEET)

1 INCH = 50 FEET

GPR

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PREPARED FOR:

DECA CORP
2 STARWOOD CROSSING
ANDOVER, MA 01810

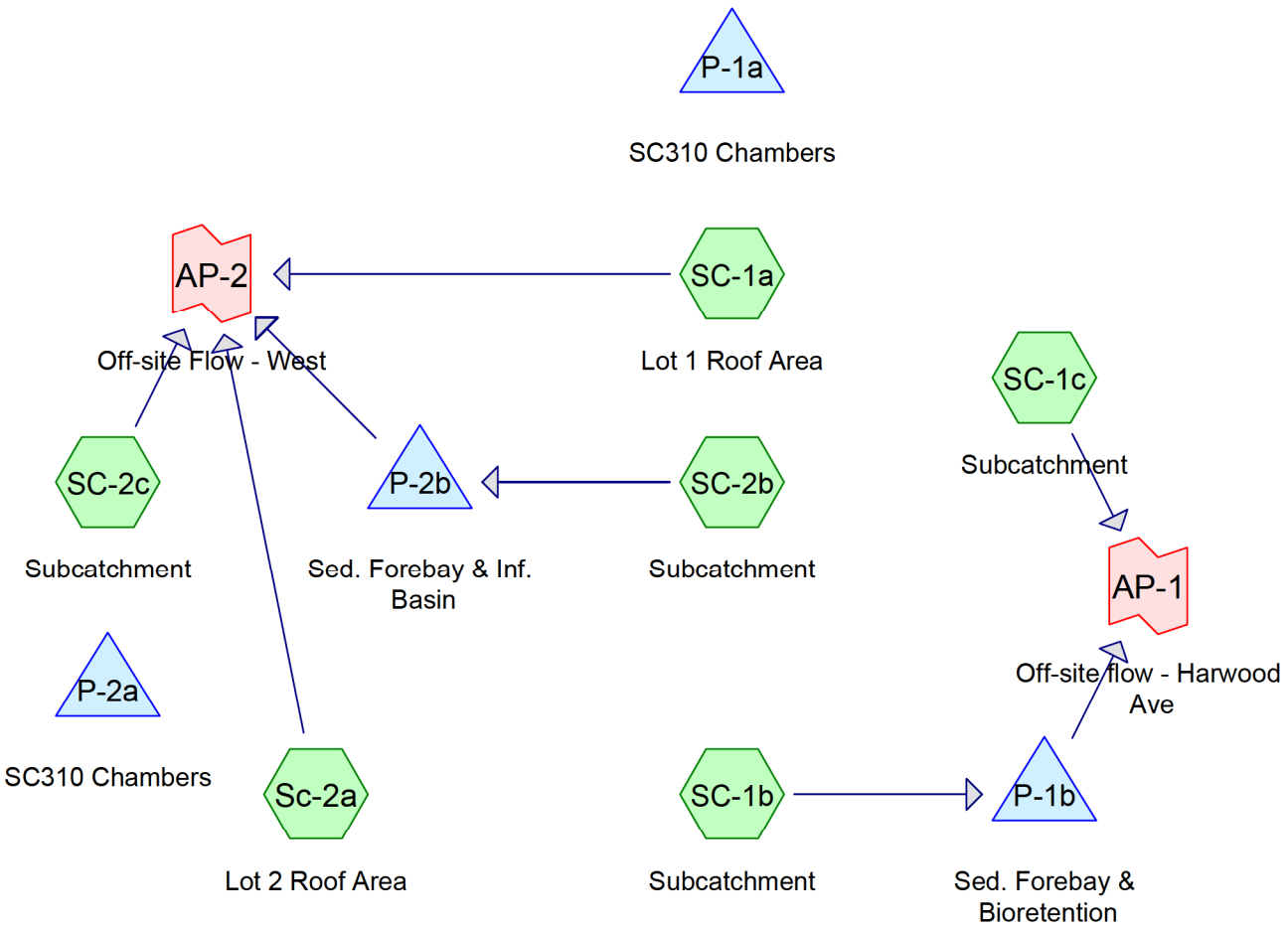
PRE-DEVELOPMENT WATERSHED MAP

LOTS 1 & 2 (MAP R07, PARCEL 1-0)
HARWOOD AVE
LITTLETON, MA 01460

DES'D BY: DJG	CHK'D BY: EAC
DATE: JUNE 2025	PROJECT: 241121

P:\24---\241121\DWG\PERMIT\241121_SW SITE PLAN_REV1.DWG 06-05-25 11:51:36 AM - LAYOUT PRE

Attachment 3: Proposed Conditions Hydrologic Calculations



Subcat Reach Pond Link

Routing Diagram for POST - DIA
Prepared by Goldsmith, Prest & Ringwall, Inc, Printed 6/11/2025

Area Listing (all nodes)

Area (acres)	CN	Description (subcatchment-numbers)
2.535	74	>75% Grass cover, Good, HSG C (SC-1b, SC-1c, SC-2b, SC-2c)
0.029	98	Paved parking, HSG C (SC-1c)
0.194	98	Unconnected pavement, HSG C (SC-1b, SC-2b)
0.115	98	Unconnected roofs, HSG C (SC-1a, Sc-2a)
0.313	73	Woods, Fair, HSG C (SC-2c)
0.153	70	Woods, Good, HSG C (SC-1c, SC-2b)
3.340	**76**	**TOTAL AREA**

Summary for Subcatchment SC-1a: Lot 1 Roof Area

Runoff = 0.2 cfs @ 12.11 hrs, Volume= 0.013 af, Depth> 2.98"
Routed to Link AP-2 : Off-site Flow - West

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.10 hrs
NOAA10 24-hr D 2-Year Rainfall=3.21"

Area (sf)	CN	Description
2,360	98	Unconnected roofs, HSG C
2,360		100.00% Impervious Area
2,360		100.00% Unconnected

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

Summary for Subcatchment SC-1b: Subcatchment

Runoff = 0.3 cfs @ 12.12 hrs, Volume= 0.026 af, Depth> 1.16"
Routed to Pond P-1b : Sed. Forebay & Bioretention

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.10 hrs
NOAA10 24-hr D 2-Year Rainfall=3.21"

Area (sf)	CN	Adj	Description
2,111	98		Unconnected pavement, HSG C
9,635	74		>75% Grass cover, Good, HSG C
11,746	78	76	Weighted Average, UI Adjusted
9,635			82.03% Pervious Area
2,111			17.97% Impervious Area
2,111			100.00% Unconnected

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

Summary for Subcatchment SC-1c: Subcatchment

Runoff = 0.5 cfs @ 12.21 hrs, Volume= 0.044 af, Depth> 1.04"
Routed to Link AP-1 : Off-site flow - Harwood Ave

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.10 hrs
NOAA10 24-hr D 2-Year Rainfall=3.21"

Area (sf)	CN	Description
1,285	98	Paved parking, HSG C
5,287	70	Woods, Good, HSG C
15,514	74	>75% Grass cover, Good, HSG C
22,086	74	Weighted Average
20,801		94.18% Pervious Area
1,285		5.82% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
11.3	50	0.0250	0.07		**Sheet Flow, A to B** Woods: Light underbrush n= 0.400 P2= 3.21"
1.1	50	0.0250	0.79		**Shallow Concentrated Flow, B to C** Woodland Kv= 5.0 fps
12.4	100	Total			

Summary for Subcatchment Sc-2a: Lot 2 Roof Area

Runoff = 0.2 cfs @ 12.11 hrs, Volume= 0.015 af, Depth> 2.98"
Routed to Link AP-2 : Off-site Flow - West

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.10 hrs
NOAA10 24-hr D 2-Year Rainfall=3.21"

Area (sf)	CN	Description
2,661	98	Unconnected roofs, HSG C
2,661		100.00% Impervious Area
2,661		100.00% Unconnected

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

Summary for Subcatchment SC-2b: Subcatchment

Runoff = 1.1 cfs @ 12.26 hrs, Volume= 0.114 af, Depth> 1.10"
Routed to Pond P-2b : Sed. Forebay & Inf. Basin

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.10 hrs
NOAA10 24-hr D 2-Year Rainfall=3.21"

Area (sf)	CN	Adj	Description
6,325	98		Unconnected pavement, HSG C
1,395	70		Woods, Good, HSG C
46,851	74		>75% Grass cover, Good, HSG C
54,571	77	75	Weighted Average, UI Adjusted
48,246			88.41% Pervious Area
6,325			11.59% Impervious Area
6,325			100.00% Unconnected

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
12.8	37	0.0100	0.05		**Sheet Flow, A to B** Woods: Light underbrush n= 0.400 P2= 3.21"
1.6	13	0.0320	0.14		**Sheet Flow, B to C** Grass: Short n= 0.150 P2= 3.21"
1.5	103	0.0280	1.17		**Shallow Concentrated Flow, C to D** Short Grass Pasture Kv= 7.0 fps
0.1	12	0.0100	2.03		**Shallow Concentrated Flow, D to E** Paved Kv= 20.3 fps
16.0	165	Total			

Summary for Subcatchment SC-2c: Subcatchment

Runoff = 1.0 cfs @ 12.26 hrs, Volume= 0.104 af, Depth> 1.04"
Routed to Link AP-2 : Off-site Flow - West

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.10 hrs
NOAA10 24-hr D 2-Year Rainfall=3.21"

Area (sf)	CN	Description
13,648	73	Woods, Fair, HSG C
38,430	74	>75% Grass cover, Good, HSG C
52,078	74	Weighted Average
52,078		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
8.0	37	0.0320	0.08		**Sheet Flow, A to B** Woods: Light underbrush n= 0.400 P2= 3.21"
2.6	13	0.0070	0.08		**Sheet Flow, B to C** Range n= 0.130 P2= 3.21"
3.4	119	0.0070	0.59		**Shallow Concentrated Flow, C to D** Short Grass Pasture Kv= 7.0 fps
0.7	145	0.0590	3.64		**Shallow Concentrated Flow, D to E** Grassed Waterway Kv= 15.0 fps
1.0	80	0.0750	1.37		**Shallow Concentrated Flow, E to F** Woodland Kv= 5.0 fps
15.7	394	Total			

Summary for Pond P-1a: SC310 Chambers

Volume	Invert	Avail.Storage	Storage Description
#1	306.77'	155 cf	**8.00'W x 25.50'L x 2.33'H Prismatoid** 475 cf Overall - 88 cf Embedded = 387 cf x 40.0% Voids
#2	307.27'	88 cf	**ADS_StormTech SC-310 +Cap** x 6 Inside #1 Effective Size= 28.9"W x 16.0"H => 2.07 sf x 7.12'L = 14.7 cf Overall Size= 34.0"W x 16.0"H x 7.56'L with 0.44' Overlap 6 Chambers in 2 Rows
		243 cf	Total Available Storage

Device	Routing	Invert	Outlet Devices
#1	Primary	309.10'	**4.0" Vert. Orifice/Grate** C= 0.600 Limited to weir flow at low heads
#2	Discarded	306.77'	**0.270 in/hr Exfiltration over Wetted area**

Discarded OutFlow Max=0.0 cfs @ 0.00 hrs HW=0.00' (Free Discharge)
↑—**2=Exfiltration** (Controls 0.0 cfs)

Primary OutFlow Max=0.0 cfs @ 0.00 hrs HW=0.00' (Free Discharge)
↑—**1=Orifice/Grate** (Controls 0.0 cfs)

Summary for Pond P-1b: Sed. Forebay & Bioretention

Inflow Area = 0.270 ac, 17.97% Impervious, Inflow Depth > 1.16" for 2-Year event
Inflow = 0.3 cfs @ 12.12 hrs, Volume= 0.026 af
Outflow = 0.0 cfs @ 18.08 hrs, Volume= 0.011 af, Atten= 96%, Lag= 357.7 min
Discarded = 0.0 cfs @ 18.08 hrs, Volume= 0.009 af
Primary = 0.0 cfs @ 18.08 hrs, Volume= 0.001 af
Routed to Link AP-1 : Off-site flow - Harwood Ave

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.10 hrs / 2
Peak Elev= 307.00' @ 18.08 hrs Surf.Area= 937 sf Storage= 683 cf

Plug-Flow detention time= 362.2 min calculated for 0.011 af (40% of inflow)
Center-of-Mass det. time= 188.0 min (1,081.2 - 893.2)

Volume	Invert	Avail.Storage	Storage Description
#1	306.50'	108 cf	**Sed. Forebay (Irregular)**Listed below (Recalc)
#2	304.00'	745 cf	**Bioretention (Irregular)**Listed below (Recalc)
		854 cf	Total Available Storage

Elevation (feet)	Surf.Area (sq-ft)	Perim. (feet)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)	Wet.Area (sq-ft)
306.50	156	60.0	0	0	156
307.00	284	94.0	108	108	574

Elevation (feet)	Surf.Area (sq-ft)	Perim. (feet)	Voids (%)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)	Wet.Area (sq-ft)
304.00	471	113.0	0.0	0	0	471
306.50	471	113.0	25.0	294	294	754
307.00	647	122.0	100.0	278	573	932
307.20	1,100	214.0	100.0	173	745	3,392

Device	Routing	Invert	Outlet Devices
#1	Primary	307.00'	**8.0' long x 4.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50 3.00 3.50 4.00 4.50 5.00 5.50 Coef. (English) 2.38 2.54 2.69 2.68 2.67 2.67 2.65 2.66 2.66 2.68 2.72 2.73 2.76 2.79 2.88 3.07 3.32
#2	Discarded	304.00'	**0.270 in/hr Exfiltration over Wetted area**

Discarded OutFlow Max=0.0 cfs @ 18.08 hrs HW=307.00' (Free Discharge)
└**2=Exfiltration** (Exfiltration Controls 0.0 cfs)

Primary OutFlow Max=0.0 cfs @ 18.08 hrs HW=307.00' (Free Discharge)
└**1=Broad-Crested Rectangular Weir** (Weir Controls 0.0 cfs @ 0.13 fps)

Summary for Pond P-2a: SC310 Chambers

Volume	Invert	Avail.Storage	Storage Description
#1	304.00'	155 cf	**8.00'W x 25.50'L x 2.33'H Prismatoid** 475 cf Overall - 88 cf Embedded = 387 cf x 40.0% Voids
#2	304.50'	88 cf	**ADS_StormTech SC-310 +Cap** x 6 Inside #1 Effective Size= 28.9"W x 16.0"H => 2.07 sf x 7.12'L = 14.7 cf Overall Size= 34.0"W x 16.0"H x 7.56'L with 0.44' Overlap 6 Chambers in 2 Rows
		243 cf	Total Available Storage

Device	Routing	Invert	Outlet Devices
#1	Primary	306.33'	**4.0" Vert. Orifice/Grate** C= 0.600 Limited to weir flow at low heads
#2	Discarded	304.00'	**0.270 in/hr Exfiltration over Wetted area**

Discarded OutFlow Max=0.0 cfs @ 0.00 hrs HW=0.00' (Free Discharge)
└**2=Exfiltration** (Controls 0.0 cfs)

Primary OutFlow Max=0.0 cfs @ 0.00 hrs HW=0.00' (Free Discharge)
└**1=Orifice/Grate** (Controls 0.0 cfs)

Summary for Pond P-2b: Sed. Forebay & Inf. Basin

Inflow Area = 1.253 ac, 11.59% Impervious, Inflow Depth > 1.10" for 2-Year event
Inflow = 1.1 cfs @ 12.26 hrs, Volume= 0.114 af
Outflow = 0.8 cfs @ 12.39 hrs, Volume= 0.098 af, Atten= 24%, Lag= 8.1 min
Discarded = 0.0 cfs @ 12.39 hrs, Volume= 0.008 af
Primary = 0.8 cfs @ 12.39 hrs, Volume= 0.090 af
Routed to Link AP-2 : Off-site Flow - West

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.10 hrs / 2
Peak Elev= 301.41' @ 12.39 hrs Surf.Area= 1,366 sf Storage= 1,011 cf

Plug-Flow detention time= 103.6 min calculated for 0.098 af (86% of inflow)
Center-of-Mass det. time= 39.3 min (944.0 - 904.7)

Volume	Invert	Avail.Storage	Storage Description
#1	301.00'	571 cf	**Sed. Forebay (Irregular)**Listed below (Recalc)
#2	300.00'	3,481 cf	**Inf. Basin (Irregular)**Listed below (Recalc)
		4,053 cf	Total Available Storage

Elevation (feet)	Surf.Area (sq-ft)	Perim. (feet)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)	Wet.Area (sq-ft)
301.00	358	87.0	0	0	358
302.00	816	139.0	571	571	1,300

Elevation (feet)	Surf.Area (sq-ft)	Perim. (feet)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)	Wet.Area (sq-ft)
300.00	362	83.0	0	0	362
301.00	690	105.0	517	517	704
302.00	1,090	128.0	882	1,400	1,146
303.00	3,268	370.0	2,082	3,481	10,740

Device	Routing	Invert	Outlet Devices
#1	Primary	301.10'	**12.0" Round Culvert X 3.00** L= 18.0' CPP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 301.10' / 301.00' S= 0.0056 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 0.79 sf
#2	Primary	302.50'	**6.0' long x 9.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50 3.00 3.50 4.00 4.50 5.00 5.50 Coef. (English) 2.46 2.55 2.70 2.69 2.68 2.68 2.67 2.64 2.64 2.64 2.65 2.64 2.65 2.65 2.66 2.67 2.69
#3	Discarded	300.00'	**0.270 in/hr Exfiltration over Wetted area**

Discarded OutFlow Max=0.0 cfs @ 12.39 hrs HW=301.41' (Free Discharge)
└**3=Exfiltration** (Exfiltration Controls 0.0 cfs)

Primary OutFlow Max=0.8 cfs @ 12.39 hrs HW=301.41' (Free Discharge)
├**1=Culvert** (Barrel Controls 0.8 cfs @ 1.90 fps)
└**2=Broad-Crested Rectangular Weir** (Controls 0.0 cfs)

Summary for Link AP-1: Off-site flow - Harwood Ave

Inflow Area = 0.777 ac, 10.04% Impervious, Inflow Depth > 0.70" for 2-Year event
Inflow = 0.5 cfs @ 12.21 hrs, Volume= 0.045 af
Primary = 0.5 cfs @ 12.21 hrs, Volume= 0.045 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-24.00 hrs, dt= 0.10 hrs

Summary for Link AP-2: Off-site Flow - West

Inflow Area = 2.564 ac, 10.16% Impervious, Inflow Depth > 1.04" for 2-Year event
Inflow = 1.7 cfs @ 12.32 hrs, Volume= 0.222 af
Primary = 1.7 cfs @ 12.32 hrs, Volume= 0.222 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-24.00 hrs, dt= 0.10 hrs

Summary for Subcatchment SC-1a: Lot 1 Roof Area

Runoff = 0.2 cfs @ 12.11 hrs, Volume= 0.022 af, Depth> 4.77"
Routed to Link AP-2 : Off-site Flow - West

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.10 hrs
NOAA10 24-hr D 10-Year Rainfall=5.01"

Area (sf)	CN	Description
2,360	98	Unconnected roofs, HSG C
2,360		100.00% Impervious Area
2,360		100.00% Unconnected

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

Summary for Subcatchment SC-1b: Subcatchment

Runoff = 0.7 cfs @ 12.12 hrs, Volume= 0.057 af, Depth> 2.54"
Routed to Pond P-1b : Sed. Forebay & Bioretention

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.10 hrs
NOAA10 24-hr D 10-Year Rainfall=5.01"

Area (sf)	CN	Adj	Description
2,111	98		Unconnected pavement, HSG C
9,635	74		>75% Grass cover, Good, HSG C
11,746	78	76	Weighted Average, UI Adjusted
9,635			82.03% Pervious Area
2,111			17.97% Impervious Area
2,111			100.00% Unconnected

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

Summary for Subcatchment SC-1c: Subcatchment

Runoff = 1.1 cfs @ 12.21 hrs, Volume= 0.100 af, Depth> 2.37"
Routed to Link AP-1 : Off-site flow - Harwood Ave

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.10 hrs
NOAA10 24-hr D 10-Year Rainfall=5.01"

Area (sf)	CN	Description
1,285	98	Paved parking, HSG C
5,287	70	Woods, Good, HSG C
15,514	74	>75% Grass cover, Good, HSG C
22,086	74	Weighted Average
20,801		94.18% Pervious Area
1,285		5.82% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
11.3	50	0.0250	0.07		**Sheet Flow, A to B** Woods: Light underbrush n= 0.400 P2= 3.21"
1.1	50	0.0250	0.79		**Shallow Concentrated Flow, B to C** Woodland Kv= 5.0 fps
12.4	100	Total			

Summary for Subcatchment Sc-2a: Lot 2 Roof Area

Runoff = 0.3 cfs @ 12.11 hrs, Volume= 0.024 af, Depth> 4.77"
Routed to Link AP-2 : Off-site Flow - West

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.10 hrs
NOAA10 24-hr D 10-Year Rainfall=5.01"

Area (sf)	CN	Description
2,661	98	Unconnected roofs, HSG C
2,661		100.00% Impervious Area
2,661		100.00% Unconnected

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

Summary for Subcatchment SC-2b: Subcatchment

Runoff = 2.5 cfs @ 12.25 hrs, Volume= 0.256 af, Depth> 2.45"
Routed to Pond P-2b : Sed. Forebay & Inf. Basin

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.10 hrs
NOAA10 24-hr D 10-Year Rainfall=5.01"

Area (sf)	CN	Adj	Description
6,325	98		Unconnected pavement, HSG C
1,395	70		Woods, Good, HSG C
46,851	74		>75% Grass cover, Good, HSG C
54,571	77	75	Weighted Average, UI Adjusted
48,246			88.41% Pervious Area
6,325			11.59% Impervious Area
6,325			100.00% Unconnected

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
12.8	37	0.0100	0.05		**Sheet Flow, A to B** Woods: Light underbrush n= 0.400 P2= 3.21"
1.6	13	0.0320	0.14		**Sheet Flow, B to C** Grass: Short n= 0.150 P2= 3.21"
1.5	103	0.0280	1.17		**Shallow Concentrated Flow, C to D** Short Grass Pasture Kv= 7.0 fps
0.1	12	0.0100	2.03		**Shallow Concentrated Flow, D to E** Paved Kv= 20.3 fps
16.0	165	Total			

Summary for Subcatchment SC-2c: Subcatchment

Runoff = 2.3 cfs @ 12.25 hrs, Volume= 0.235 af, Depth> 2.36"
Routed to Link AP-2 : Off-site Flow - West

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.10 hrs
NOAA10 24-hr D 10-Year Rainfall=5.01"

Area (sf)	CN	Description
13,648	73	Woods, Fair, HSG C
38,430	74	>75% Grass cover, Good, HSG C
52,078	74	Weighted Average
52,078		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
8.0	37	0.0320	0.08		**Sheet Flow, A to B** Woods: Light underbrush n= 0.400 P2= 3.21"
2.6	13	0.0070	0.08		**Sheet Flow, B to C** Range n= 0.130 P2= 3.21"
3.4	119	0.0070	0.59		**Shallow Concentrated Flow, C to D** Short Grass Pasture Kv= 7.0 fps
0.7	145	0.0590	3.64		**Shallow Concentrated Flow, D to E** Grassed Waterway Kv= 15.0 fps
1.0	80	0.0750	1.37		**Shallow Concentrated Flow, E to F** Woodland Kv= 5.0 fps
15.7	394	Total			

Summary for Pond P-1a: SC310 Chambers

Volume	Invert	Avail.Storage	Storage Description
#1	306.77'	155 cf	**8.00'W x 25.50'L x 2.33'H Prismatoid** 475 cf Overall - 88 cf Embedded = 387 cf x 40.0% Voids
#2	307.27'	88 cf	**ADS_StormTech SC-310 +Cap** x 6 Inside #1 Effective Size= 28.9"W x 16.0"H => 2.07 sf x 7.12'L = 14.7 cf Overall Size= 34.0"W x 16.0"H x 7.56'L with 0.44' Overlap 6 Chambers in 2 Rows
		243 cf	Total Available Storage

Device	Routing	Invert	Outlet Devices
#1	Primary	309.10'	**4.0" Vert. Orifice/Grate** C= 0.600 Limited to weir flow at low heads
#2	Discarded	306.77'	**0.270 in/hr Exfiltration over Wetted area**

Discarded OutFlow Max=0.0 cfs @ 0.00 hrs HW=0.00' (Free Discharge)
↑—**2=Exfiltration** (Controls 0.0 cfs)

Primary OutFlow Max=0.0 cfs @ 0.00 hrs HW=0.00' (Free Discharge)
↑—**1=Orifice/Grate** (Controls 0.0 cfs)

Summary for Pond P-1b: Sed. Forebay & Bioretention

Inflow Area = 0.270 ac, 17.97% Impervious, Inflow Depth > 2.54" for 10-Year event
Inflow = 0.7 cfs @ 12.12 hrs, Volume= 0.057 af
Outflow = 0.6 cfs @ 12.22 hrs, Volume= 0.042 af, Atten= 22%, Lag= 6.2 min
Discarded = 0.0 cfs @ 12.23 hrs, Volume= 0.011 af
Primary = 0.6 cfs @ 12.22 hrs, Volume= 0.030 af
Routed to Link AP-1 : Off-site flow - Harwood Ave

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.10 hrs / 2
Peak Elev= 307.11' @ 12.24 hrs Surf.Area= 1,155 sf Storage= 761 cf

Plug-Flow detention time= 177.7 min calculated for 0.042 af (73% of inflow)
Center-of-Mass det. time= 65.2 min (927.2 - 862.0)

Volume	Invert	Avail.Storage	Storage Description
#1	306.50'	108 cf	**Sed. Forebay (Irregular)**Listed below (Recalc)
#2	304.00'	745 cf	**Bioretention (Irregular)**Listed below (Recalc)
		854 cf	Total Available Storage

Elevation (feet)	Surf.Area (sq-ft)	Perim. (feet)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)	Wet.Area (sq-ft)
306.50	156	60.0	0	0	156
307.00	284	94.0	108	108	574

Elevation (feet)	Surf.Area (sq-ft)	Perim. (feet)	Voids (%)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)	Wet.Area (sq-ft)
304.00	471	113.0	0.0	0	0	471
306.50	471	113.0	25.0	294	294	754
307.00	647	122.0	100.0	278	573	932
307.20	1,100	214.0	100.0	173	745	3,392

Device	Routing	Invert	Outlet Devices
#1	Primary	307.00'	**8.0' long x 4.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50 3.00 3.50 4.00 4.50 5.00 5.50 Coef. (English) 2.38 2.54 2.69 2.68 2.67 2.67 2.65 2.66 2.66 2.68 2.72 2.73 2.76 2.79 2.88 3.07 3.32
#2	Discarded	304.00'	**0.270 in/hr Exfiltration over Wetted area**

Discarded OutFlow Max=0.0 cfs @ 12.23 hrs HW=307.09' (Free Discharge)
└**2=Exfiltration** (Exfiltration Controls 0.0 cfs)

Primary OutFlow Max=0.5 cfs @ 12.22 hrs HW=307.09' (Free Discharge)
└**1=Broad-Crested Rectangular Weir** (Weir Controls 0.5 cfs @ 0.70 fps)

Summary for Pond P-2a: SC310 Chambers

Volume	Invert	Avail.Storage	Storage Description
#1	304.00'	155 cf	**8.00'W x 25.50'L x 2.33'H Prismatoid** 475 cf Overall - 88 cf Embedded = 387 cf x 40.0% Voids
#2	304.50'	88 cf	**ADS_StormTech SC-310 +Cap** x 6 Inside #1 Effective Size= 28.9"W x 16.0"H => 2.07 sf x 7.12'L = 14.7 cf Overall Size= 34.0"W x 16.0"H x 7.56'L with 0.44' Overlap 6 Chambers in 2 Rows
		243 cf	Total Available Storage

Device	Routing	Invert	Outlet Devices
#1	Primary	306.33'	**4.0" Vert. Orifice/Grate** C= 0.600 Limited to weir flow at low heads
#2	Discarded	304.00'	**0.270 in/hr Exfiltration over Wetted area**

Discarded OutFlow Max=0.0 cfs @ 0.00 hrs HW=0.00' (Free Discharge)
└**2=Exfiltration** (Controls 0.0 cfs)

Primary OutFlow Max=0.0 cfs @ 0.00 hrs HW=0.00' (Free Discharge)
└**1=Orifice/Grate** (Controls 0.0 cfs)

Summary for Pond P-2b: Sed. Forebay & Inf. Basin

Inflow Area = 1.253 ac, 11.59% Impervious, Inflow Depth > 2.45" for 10-Year event
Inflow = 2.5 cfs @ 12.25 hrs, Volume= 0.256 af
Outflow = 2.2 cfs @ 12.31 hrs, Volume= 0.239 af, Atten= 9%, Lag= 3.9 min
Discarded = 0.0 cfs @ 12.31 hrs, Volume= 0.010 af
Primary = 2.2 cfs @ 12.31 hrs, Volume= 0.229 af
Routed to Link AP-2 : Off-site Flow - West

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.10 hrs / 2
Peak Elev= 301.65' @ 12.31 hrs Surf.Area= 1,574 sf Storage= 1,363 cf

Plug-Flow detention time= 57.2 min calculated for 0.239 af (94% of inflow)
Center-of-Mass det. time= 23.5 min (896.4 - 873.0)

Volume	Invert	Avail.Storage	Storage Description
#1	301.00'	571 cf	**Sed. Forebay (Irregular)** Listed below (Recalc)
#2	300.00'	3,481 cf	**Inf. Basin (Irregular)** Listed below (Recalc)
		4,053 cf	Total Available Storage

Elevation (feet)	Surf.Area (sq-ft)	Perim. (feet)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)	Wet.Area (sq-ft)
301.00	358	87.0	0	0	358
302.00	816	139.0	571	571	1,300

Elevation (feet)	Surf.Area (sq-ft)	Perim. (feet)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)	Wet.Area (sq-ft)
300.00	362	83.0	0	0	362
301.00	690	105.0	517	517	704
302.00	1,090	128.0	882	1,400	1,146
303.00	3,268	370.0	2,082	3,481	10,740

Device	Routing	Invert	Outlet Devices
#1	Primary	301.10'	**12.0" Round Culvert X 3.00** L= 18.0' CPP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 301.10' / 301.00' S= 0.0056 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 0.79 sf
#2	Primary	302.50'	**6.0' long x 9.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50 3.00 3.50 4.00 4.50 5.00 5.50 Coef. (English) 2.46 2.55 2.70 2.69 2.68 2.68 2.67 2.64 2.64 2.64 2.65 2.64 2.65 2.65 2.66 2.67 2.69
#3	Discarded	300.00'	**0.270 in/hr Exfiltration over Wetted area**

Discarded OutFlow Max=0.0 cfs @ 12.31 hrs HW=301.64' (Free Discharge)
└**3=Exfiltration** (Exfiltration Controls 0.0 cfs)

Primary OutFlow Max=2.2 cfs @ 12.31 hrs HW=301.64' (Free Discharge)
├**1=Culvert** (Barrel Controls 2.2 cfs @ 2.42 fps)
└**2=Broad-Crested Rectangular Weir** (Controls 0.0 cfs)

Summary for Link AP-1: Off-site flow - Harwood Ave

Inflow Area = 0.777 ac, 10.04% Impervious, Inflow Depth > 2.01" for 10-Year event
Inflow = 1.7 cfs @ 12.21 hrs, Volume= 0.130 af
Primary = 1.7 cfs @ 12.21 hrs, Volume= 0.130 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-24.00 hrs, dt= 0.10 hrs

Summary for Link AP-2: Off-site Flow - West

Inflow Area = 2.564 ac, 10.16% Impervious, Inflow Depth > 2.39" for 10-Year event
Inflow = 4.6 cfs @ 12.27 hrs, Volume= 0.510 af
Primary = 4.6 cfs @ 12.27 hrs, Volume= 0.510 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-24.00 hrs, dt= 0.10 hrs

Summary for Subcatchment SC-1a: Lot 1 Roof Area

Runoff = 0.4 cfs @ 12.11 hrs, Volume= 0.034 af, Depth> 7.62"
Routed to Link AP-2 : Off-site Flow - West

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.10 hrs
NOAA10 24-hr D 100-Year Rainfall=7.86"

Area (sf)	CN	Description
2,360	98	Unconnected roofs, HSG C
2,360		100.00% Impervious Area
2,360		100.00% Unconnected

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

Summary for Subcatchment SC-1b: Subcatchment

Runoff = 1.5 cfs @ 12.11 hrs, Volume= 0.113 af, Depth> 5.03"
Routed to Pond P-1b : Sed. Forebay & Bioretention

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.10 hrs
NOAA10 24-hr D 100-Year Rainfall=7.86"

Area (sf)	CN	Adj	Description
2,111	98		Unconnected pavement, HSG C
9,635	74		>75% Grass cover, Good, HSG C
11,746	78	76	Weighted Average, UI Adjusted
9,635			82.03% Pervious Area
2,111			17.97% Impervious Area
2,111			100.00% Unconnected

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

Summary for Subcatchment SC-1c: Subcatchment

Runoff = 2.2 cfs @ 12.20 hrs, Volume= 0.202 af, Depth> 4.79"
Routed to Link AP-1 : Off-site flow - Harwood Ave

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.10 hrs
NOAA10 24-hr D 100-Year Rainfall=7.86"

Area (sf)	CN	Description
1,285	98	Paved parking, HSG C
5,287	70	Woods, Good, HSG C
15,514	74	>75% Grass cover, Good, HSG C
22,086	74	Weighted Average
20,801		94.18% Pervious Area
1,285		5.82% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
11.3	50	0.0250	0.07		**Sheet Flow, A to B** Woods: Light underbrush n= 0.400 P2= 3.21"
1.1	50	0.0250	0.79		**Shallow Concentrated Flow, B to C** Woodland Kv= 5.0 fps
12.4	100	Total			

Summary for Subcatchment Sc-2a: Lot 2 Roof Area

Runoff = 0.4 cfs @ 12.11 hrs, Volume= 0.039 af, Depth> 7.62"
Routed to Link AP-2 : Off-site Flow - West

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.10 hrs
NOAA10 24-hr D 100-Year Rainfall=7.86"

Area (sf)	CN	Description
2,661	98	Unconnected roofs, HSG C
2,661		100.00% Impervious Area
2,661		100.00% Unconnected

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

Summary for Subcatchment SC-2b: Subcatchment

Runoff = 4.9 cfs @ 12.24 hrs, Volume= 0.511 af, Depth> 4.90"
Routed to Pond P-2b : Sed. Forebay & Inf. Basin

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.10 hrs
NOAA10 24-hr D 100-Year Rainfall=7.86"

Area (sf)	CN	Adj	Description
6,325	98		Unconnected pavement, HSG C
1,395	70		Woods, Good, HSG C
46,851	74		>75% Grass cover, Good, HSG C
54,571	77	75	Weighted Average, UI Adjusted
48,246			88.41% Pervious Area
6,325			11.59% Impervious Area
6,325			100.00% Unconnected

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
12.8	37	0.0100	0.05		**Sheet Flow, A to B** Woods: Light underbrush n= 0.400 P2= 3.21"
1.6	13	0.0320	0.14		**Sheet Flow, B to C** Grass: Short n= 0.150 P2= 3.21"
1.5	103	0.0280	1.17		**Shallow Concentrated Flow, C to D** Short Grass Pasture Kv= 7.0 fps
0.1	12	0.0100	2.03		**Shallow Concentrated Flow, D to E** Paved Kv= 20.3 fps
16.0	165	Total			

Summary for Subcatchment SC-2c: Subcatchment

Runoff = 4.7 cfs @ 12.24 hrs, Volume= 0.477 af, Depth> 4.78"
Routed to Link AP-2 : Off-site Flow - West

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.10 hrs
NOAA10 24-hr D 100-Year Rainfall=7.86"

Area (sf)	CN	Description
13,648	73	Woods, Fair, HSG C
38,430	74	>75% Grass cover, Good, HSG C
52,078	74	Weighted Average
52,078		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
8.0	37	0.0320	0.08		**Sheet Flow, A to B** Woods: Light underbrush n= 0.400 P2= 3.21"
2.6	13	0.0070	0.08		**Sheet Flow, B to C** Range n= 0.130 P2= 3.21"
3.4	119	0.0070	0.59		**Shallow Concentrated Flow, C to D** Short Grass Pasture Kv= 7.0 fps
0.7	145	0.0590	3.64		**Shallow Concentrated Flow, D to E** Grassed Waterway Kv= 15.0 fps
1.0	80	0.0750	1.37		**Shallow Concentrated Flow, E to F** Woodland Kv= 5.0 fps
15.7	394	Total			

Summary for Pond P-1a: SC310 Chambers

Volume	Invert	Avail.Storage	Storage Description
#1	306.77'	155 cf	**8.00'W x 25.50'L x 2.33'H Prismatoid** 475 cf Overall - 88 cf Embedded = 387 cf x 40.0% Voids
#2	307.27'	88 cf	**ADS_StormTech SC-310 +Cap** x 6 Inside #1 Effective Size= 28.9"W x 16.0"H => 2.07 sf x 7.12'L = 14.7 cf Overall Size= 34.0"W x 16.0"H x 7.56'L with 0.44' Overlap 6 Chambers in 2 Rows
		243 cf	Total Available Storage

Device	Routing	Invert	Outlet Devices
#1	Primary	309.10'	**4.0" Vert. Orifice/Grate** C= 0.600 Limited to weir flow at low heads
#2	Discarded	306.77'	**0.270 in/hr Exfiltration over Wetted area**

Discarded OutFlow Max=0.0 cfs @ 0.00 hrs HW=0.00' (Free Discharge)
↑—**2=Exfiltration** (Controls 0.0 cfs)

Primary OutFlow Max=0.0 cfs @ 0.00 hrs HW=0.00' (Free Discharge)
↑—**1=Orifice/Grate** (Controls 0.0 cfs)

Summary for Pond P-1b: Sed. Forebay & Bioretention

Inflow Area = 0.270 ac, 17.97% Impervious, Inflow Depth > 5.03" for 100-Year event
Inflow = 1.5 cfs @ 12.11 hrs, Volume= 0.113 af
Outflow = 1.3 cfs @ 12.13 hrs, Volume= 0.097 af, Atten= 10%, Lag= 1.1 min
Discarded = 0.0 cfs @ 12.13 hrs, Volume= 0.013 af
Primary = 1.3 cfs @ 12.13 hrs, Volume= 0.084 af
Routed to Link AP-1 : Off-site flow - Harwood Ave

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.10 hrs / 2
Peak Elev= 307.17' @ 12.13 hrs Surf.Area= 1,299 sf Storage= 818 cf

Plug-Flow detention time= 109.4 min calculated for 0.097 af (86% of inflow)
Center-of-Mass det. time= 39.9 min (874.9 - 835.0)

Volume	Invert	Avail.Storage	Storage Description
#1	306.50'	108 cf	**Sed. Forebay (Irregular)**Listed below (Recalc)
#2	304.00'	745 cf	**Bioretention (Irregular)**Listed below (Recalc)
		854 cf	Total Available Storage

Elevation (feet)	Surf.Area (sq-ft)	Perim. (feet)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)	Wet.Area (sq-ft)
306.50	156	60.0	0	0	156
307.00	284	94.0	108	108	574

Elevation (feet)	Surf.Area (sq-ft)	Perim. (feet)	Voids (%)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)	Wet.Area (sq-ft)
304.00	471	113.0	0.0	0	0	471
306.50	471	113.0	25.0	294	294	754
307.00	647	122.0	100.0	278	573	932
307.20	1,100	214.0	100.0	173	745	3,392

Device	Routing	Invert	Outlet Devices
#1	Primary	307.00'	**8.0' long x 4.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50 3.00 3.50 4.00 4.50 5.00 5.50 Coef. (English) 2.38 2.54 2.69 2.68 2.67 2.67 2.65 2.66 2.66 2.68 2.72 2.73 2.76 2.79 2.88 3.07 3.32
#2	Discarded	304.00'	**0.270 in/hr Exfiltration over Wetted area**

Discarded OutFlow Max=0.0 cfs @ 12.13 hrs HW=307.16' (Free Discharge)
└**2=Exfiltration** (Exfiltration Controls 0.0 cfs)

Primary OutFlow Max=1.2 cfs @ 12.13 hrs HW=307.16' (Free Discharge)
└**1=Broad-Crested Rectangular Weir** (Weir Controls 1.2 cfs @ 0.95 fps)

Summary for Pond P-2a: SC310 Chambers

Volume	Invert	Avail.Storage	Storage Description
#1	304.00'	155 cf	**8.00'W x 25.50'L x 2.33'H Prismatoid** 475 cf Overall - 88 cf Embedded = 387 cf x 40.0% Voids
#2	304.50'	88 cf	**ADS_StormTech SC-310 +Cap** x 6 Inside #1 Effective Size= 28.9"W x 16.0"H => 2.07 sf x 7.12'L = 14.7 cf Overall Size= 34.0"W x 16.0"H x 7.56'L with 0.44' Overlap 6 Chambers in 2 Rows
		243 cf	Total Available Storage

Device	Routing	Invert	Outlet Devices
#1	Primary	306.33'	**4.0" Vert. Orifice/Grate** C= 0.600 Limited to weir flow at low heads
#2	Discarded	304.00'	**0.270 in/hr Exfiltration over Wetted area**

Discarded OutFlow Max=0.0 cfs @ 0.00 hrs HW=0.00' (Free Discharge)
└**2=Exfiltration** (Controls 0.0 cfs)

Primary OutFlow Max=0.0 cfs @ 0.00 hrs HW=0.00' (Free Discharge)
└**1=Orifice/Grate** (Controls 0.0 cfs)

Summary for Pond P-2b: Sed. Forebay & Inf. Basin

Inflow Area = 1.253 ac, 11.59% Impervious, Inflow Depth > 4.90" for 100-Year event
Inflow = 4.9 cfs @ 12.24 hrs, Volume= 0.511 af
Outflow = 4.5 cfs @ 12.31 hrs, Volume= 0.494 af, Atten= 9%, Lag= 3.7 min
Discarded = 0.0 cfs @ 12.31 hrs, Volume= 0.012 af
Primary = 4.5 cfs @ 12.31 hrs, Volume= 0.482 af
Routed to Link AP-2 : Off-site Flow - West

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.10 hrs / 2
Peak Elev= 301.94' @ 12.31 hrs Surf.Area= 1,843 sf Storage= 1,851 cf

Plug-Flow detention time= 36.3 min calculated for 0.494 af (97% of inflow)
Center-of-Mass det. time= 17.5 min (863.1 - 845.7)

Volume	Invert	Avail.Storage	Storage Description
#1	301.00'	571 cf	**Sed. Forebay (Irregular)** Listed below (Recalc)
#2	300.00'	3,481 cf	**Inf. Basin (Irregular)** Listed below (Recalc)
		4,053 cf	Total Available Storage

Elevation (feet)	Surf.Area (sq-ft)	Perim. (feet)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)	Wet.Area (sq-ft)
301.00	358	87.0	0	0	358
302.00	816	139.0	571	571	1,300

Elevation (feet)	Surf.Area (sq-ft)	Perim. (feet)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)	Wet.Area (sq-ft)
300.00	362	83.0	0	0	362
301.00	690	105.0	517	517	704
302.00	1,090	128.0	882	1,400	1,146
303.00	3,268	370.0	2,082	3,481	10,740

Device	Routing	Invert	Outlet Devices
#1	Primary	301.10'	**12.0" Round Culvert X 3.00** L= 18.0' CPP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 301.10' / 301.00' S= 0.0056 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 0.79 sf
#2	Primary	302.50'	**6.0' long x 9.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50 3.00 3.50 4.00 4.50 5.00 5.50 Coef. (English) 2.46 2.55 2.70 2.69 2.68 2.68 2.67 2.64 2.64 2.64 2.65 2.64 2.65 2.65 2.66 2.67 2.69
#3	Discarded	300.00'	**0.270 in/hr Exfiltration over Wetted area**

Discarded OutFlow Max=0.0 cfs @ 12.31 hrs HW=301.93' (Free Discharge)
└**3=Exfiltration** (Exfiltration Controls 0.0 cfs)

Primary OutFlow Max=4.5 cfs @ 12.31 hrs HW=301.93' (Free Discharge)
├**1=Culvert** (Barrel Controls 4.5 cfs @ 2.89 fps)
└**2=Broad-Crested Rectangular Weir** (Controls 0.0 cfs)

Summary for Link AP-1: Off-site flow - Harwood Ave

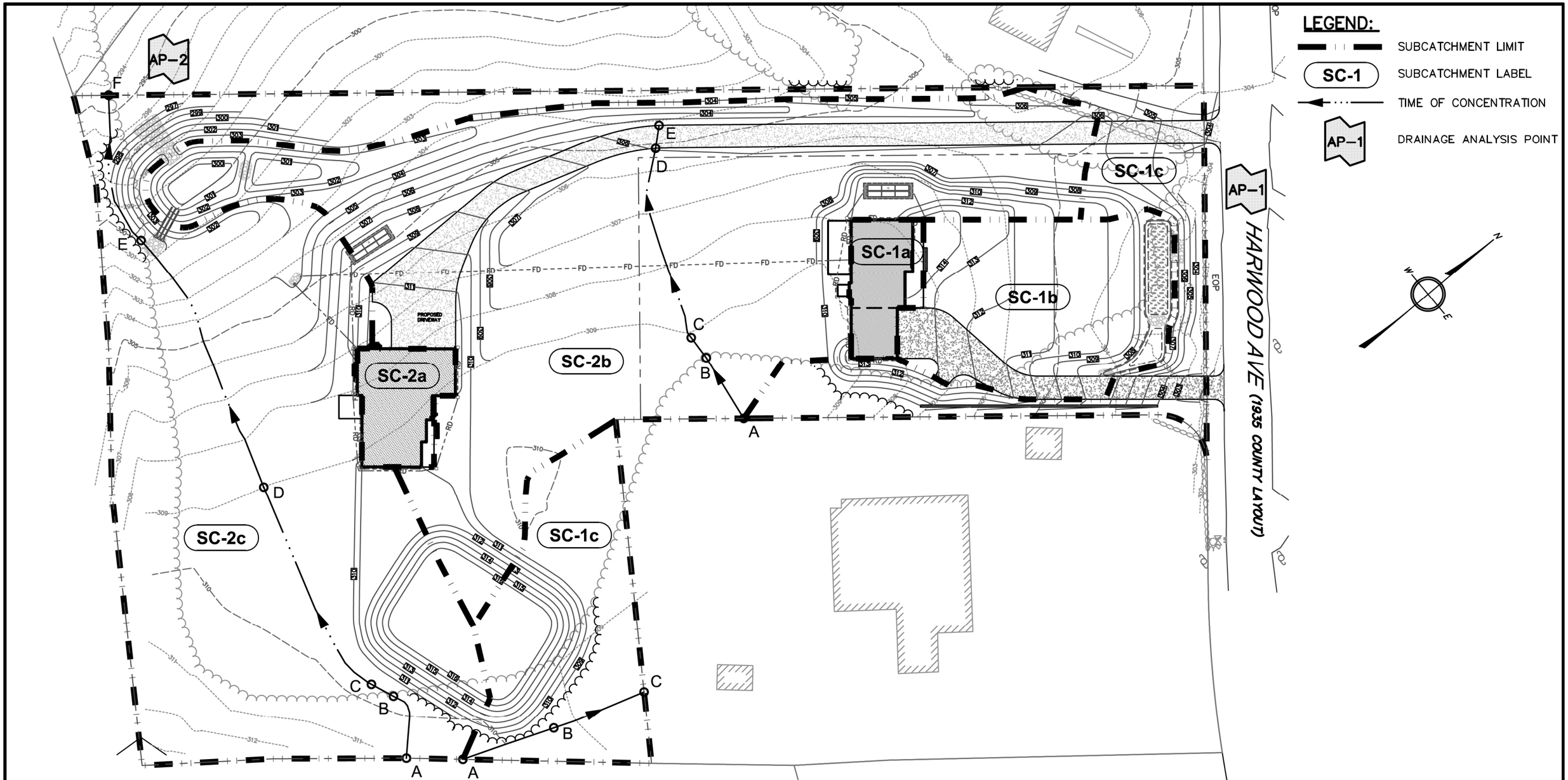
Inflow Area = 0.777 ac, 10.04% Impervious, Inflow Depth > 4.42" for 100-Year event
Inflow = 3.4 cfs @ 12.18 hrs, Volume= 0.286 af
Primary = 3.4 cfs @ 12.18 hrs, Volume= 0.286 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-24.00 hrs, dt= 0.10 hrs

Summary for Link AP-2: Off-site Flow - West

Inflow Area = 2.564 ac, 10.16% Impervious, Inflow Depth > 4.83" for 100-Year event
Inflow = 9.2 cfs @ 12.26 hrs, Volume= 1.032 af
Primary = 9.2 cfs @ 12.26 hrs, Volume= 1.032 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-24.00 hrs, dt= 0.10 hrs



GRAPHIC SCALE

50 0 25 50 100

(IN FEET)

1 INCH = 50 FEET

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ANDOVER, MA 01810

POST-DEVELOPMENT WATERSHED MAP

LOTS 1 & 2 (MAP R07, PARCEL 1-0)
HARWOOD AVE
LITTLETON, MA 01460

DES'D BY: DJG	CHK'D BY: EAC	
DATE: JUNE 2025	PROJECT: 241121	2 OF 2

P:\24---\241121\DWG\PERMIT\241121_SW SITE PLAN_REV1.DWG 06-11-25 4:46:37 PM - LAYOUT POST

Attachment 4: Hydraulic Calculations

Stormwater Management Standard 3: Groundwater Recharge

Calculated By: DJG | Checked By: EAC | DECA - Littleton
Date: 6/5/2025 | Date: 6/5/2025 | Job 241121

1. Required Recharge Volume: Rv = F x Impervious Area

Where: Rv = Required Recharge Volume [Ac-ft]
F = Target Depth Factor associated with each Hydrologic Soil Group [in]

Hydrologic Soil Group	F [in]	Impervious Area [Acres]	Required Recharge Volume [Ac-ft]
HSG A	0.6	0.000	0.000
HSG B	0.35	0.000	0.000
HSG C	0.25	0.340	0.007
HSG D	0.1	0.000	0.000

Total Required Recharge Volume (Rv_1) = 0.007 Ac-ft

2. Provided Groundwater Recharge

Stormwater Control Measure	Tributary Impervious Area [Acres]	Provided Recharge Volume [Ac-ft]
Infiltration Basin	0.15	0.01
Rain Garden	0.05	0.01
Lot 1 Chambers	0.05	0.006
Lot 2 Chambers	0.06	0.006

Total Provided Recharge Volume (Rv_2) = 0.032 Ac-ft

3. Capture Area Adjustment

1. When only a portion of a Site's impervious area drains to infiltrative SCMS a Capture Area Adjustment Calculation is required to ensure sufficient runoff is recharged.

2. When less than 65% of impervious surfaces on a site are directed to infiltration SCM(s), the system(s) cannot capture sufficient runoff to infiltrate the Required Recharge Volume.

Total Tributary Area to Infiltrative SCMs (I_{trib}) =	0.31	Ac
Total Site Impervious Area (I_{total}) =	1.00	Ac
% Imp. Area Tributary to Infiltrative SCMs =	31.0%	✓
Capture Area Adjustment = I_{total}/ I_{trib} =	3.2	

Adjusted Req'd Recharge Volume = Rv x Capture Area Adjustment = 0.0 Ac-ft

Total Provide Recharge Vol. ≥ Adjusted Required Recharge Vol.
Design is Compliant

Stormwater Management Standard 3: Infiltration SCM Draw Down

Calculated By: DJG
Date: Revised 6/5/25

Checked By: EAC
Date: 6/5/2025

DECA - Littleton
Job 241121

$$\text{Drawdown Time} = \frac{Rv}{K \times \text{Bottom Area of Recharge System}} \leq 72 \text{ Hours}$$

Where: Rv = Volume Below Outlet [Ac-Ft]
K = Infiltration Rate [in/hr]

Infiltration Basin

Rv:	0.01	Ac-Ft
K:	0.27	in/hr
Bottom Area of Recharge System:	0.008	Acres
Drawdown Time:	**55.6**	**Hrs.**

Rain Garden

Rv:	0.01	Ac-Ft
K:	0.27	in/hr
Bottom Area of Recharge System:	0.01	Acres
Drawdown Time:	**44.4**	**Hrs.**

Lot 1 Chambers

Rv:	0.006	Ac-Ft
K:	0.27	in/hr
Bottom Area of Recharge System:	0.005	Acres
Drawdown Time:	**53.3**	Hrs.

Lot 2 Chambers

Rv:	0.006	Ac-Ft
K:	0.27	in/hr
Bottom Area of Recharge System:	0.005	Acres
Drawdown Time:	**53.3**	Hrs.

Groundwater Mounding Analysis

DECA Corp
Lots 1 & 2, Harwood Ave, Littleton, MA
Project No. 241121

Per the Massachusetts Stormwater Handbook, mounding analysis is required when ".. The vertical separation from the bottom of an exfiltration system to seasonal high groundwater is less than four (4) feet and the recharge system is proposed to attenuate the peak discharge from a 10-year or higher 24-hour storm." The mounding analysis "... must show that the REQUIRED RECHARGE VOLUME is fully dewatered within 72 hours..."

Infiltration Basin		Drawdown = 55.6 hrs, Recharge rate = 0.27 in/hr
Hydraulic Conductivity	ft/day	16 Lower Range Standard Value for "Medium Sand" material
Specific Yield		0.28 Standard Value for "Medium Sand" material
Initial Saturated Thickness	ft	5.83 Depth to bedrock, or depth of test pit if no bedrock
Design Recharge Rate	ft/day	0.54 Infiltration rate
Time	days	2.32 Drawdown duration
1/2 Length of Infiltration Area	ft	17.3
1/2 Width of Infiltration Area	ft	6.5
Maximum Water table rise[1]	**ft** **in**	**0.65** **7 6/8**

- Resulting mound will not interfere with the full draining of the infiltration area in accordance with Mass Stormwater Standards -

[1] - mounding analysis calculated using the Hantush (1967) method.

Rain Garden		Drawdown = 44.4 hrs, Recharge rate = 0.27 in/hr
Hydraulic Conductivity	ft/day	16 Lower Range Standard Value for "Medium Sand" material
Specific Yield		0.28 Standard Value for "Medium Sand" material
Initial Saturated Thickness	ft	9.92 Depth to bedrock, or depth of test pit if no bedrock
Design Recharge Rate	ft/day	0.54 Infiltration rate
Time	days	1.85 Drawdown duration
1/2 Length of Infiltration Area	ft	23.5
1/2 Width of Infiltration Area	ft	5.0
Maximum Water table rise[1]	**ft** **in**	**0.40** **4 6/8**

- Resulting mound will not interfere with the full draining of the infiltration area in accordance with Mass Stormwater Standards -

[1] - mounding analysis calculated using the Hantush (1967) method.

Sediment Forebay Sizing

Calculated By: DJG
Date: 6/5/2025

Checked By: EAC
Date: 6/5/2025

DECA - Littleton
Job 241121

Per the 2008 MassDEP Stormwater Handbook (Volume 2, Chapter 2)
Minimum storage of a sediment forebay = 0.1-inch x tributary impervious area

Sediment Forebay-1

Required Treatment Volume

Tributary Impervious Area = 0.05 acres

Required Treatment Volume = 18.15 cf

Provided Treatment Volume

Forebay Elevation Increment	Area [sf]	Storage at Elevation Increment [cf]	Cumulative Storage [cf]
306.5	156	0	0
307.0	284	108	108

Provided Treatment Volume = 108 cf

Sediment Forebay-2

Required Treatment Volume

Tributary Impervious Area = 0.15 acres

Required Treatment Volume = 54.45 cf

Provided Treatment Volume

Forebay Elevation Increment	Area [sf]	Storage at Elevation Increment [cf]	Cumulative Storage [cf]
301.0	358	0	0
302.0	816	571	571

Provided Treatment Volume = 571 cf

Attachment 5: TSS, Water Quality Volume, and Total Phosphorus Removal Calculations

Stormwater Management Standard 4: TSS Removal

TSS Removal Calculation Worksheet

Location: Lot 1 flows to bioretention

A SCM	B TSS Removal Rate	C Starting TSS Load	D Amount Removed (B*C)	E Remaining Load (C-D)
Bioretention	0.90	1.00	0.90	0.10
		-	-	-
		-	-	-
		-	-	-

Total TSS Removal = **90%**

TSS Removal Calculation Worksheet

Location: Lot 2 flows to infiltration basin

A SCM	B TSS Removal Rate	C Starting TSS Load	D Amount Removed (B*C)	E Remaining Load (C-D)
Infiltration Basin*	1.00	1.00	1.00	0.00
		-	-	-
		-	-	-
		-	-	-

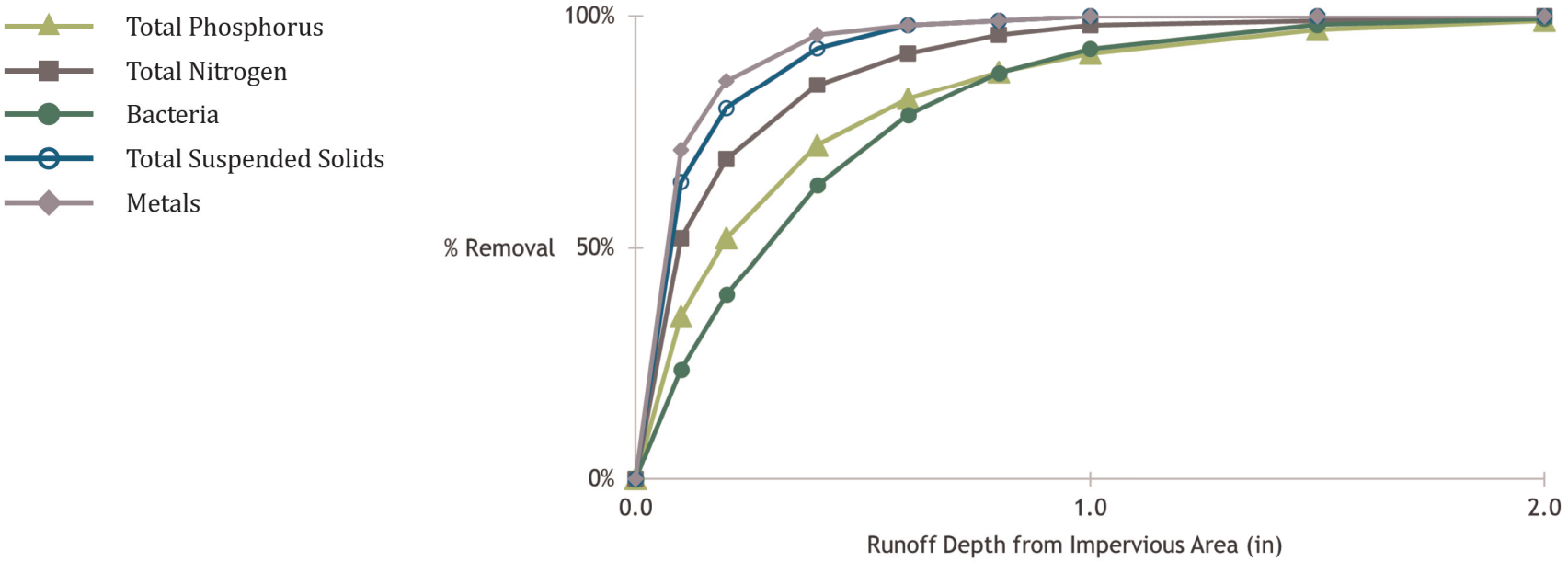
Total TSS Removal = **100%**

*Data from New England Stormwater Retrofit Manual (curve included)

GPR

Infiltration Basin (HSG C)

(Infiltration Rate = 0.17 in/hr)



Pollutant	Design Storage Volume: Runoff Depth from Impervious Area (in)								
	0	0.10	0.20	0.40	0.60	0.80	1.00	1.50	2.00
TP	0%	35%	52%	72%	82%	88%	92%	97%	99%
TN	0%	52%	69%	85%	92%	96%	98%	99%	100%
Bacteria	0%	24%	40%	63%	79%	88%	93%	98%	99%
TSS	0%	64%	80%	93%	98%	99%	100%	100%	100%
Metals	0%	71%	86%	96%	98%	99%	100%	100%	100%

Stormwater Management Standard 4: Water Quality Volume

Calculated By: DJG
Date: 4/22/2025

Checked By: EAC
Date: 4/22/2025

DECA - Littleton
Job 241121

$$V_{WQ} = \frac{D_{WQ}}{12\ in/ft}\ x\ \frac{A_{imp}}{43{,}560\ sf/acre}$$

Where: V_{WQ} = Required Water Quality Volume [cf]

D_{WQ} = Water Quality Depth [in] = **1.0** Inches

1-in for discharges within a Zone II or Interim Wellhead Protection Area, to or near another critical area, runoff from a LUHPPL, or exfiltration to soils with infiltration rate greater than 2.41 in/hr or greater; 0.5-in for other discharges.

A_{IMP} = Proposed Impervious Area (may exclude roof areas) [Ac]

1. Required Water Quality Volume:

Drainage Area/ Treatment Train	A_{IMP} [Ac]	D_{WQ} [in]	V_{WQ} [cf]
SC-1a	0.05	1.0	197
SC-1b	0.05	1.0	176
SC-2a	0.06	1.0	222
SC-2b	0.15	1.0	527

Total Required Water Quality Volume: 1,122 cf

2. Provided Water Quality Volume:

Drainage Area/ Treatment Train	Stormwater Control Measure	Water Quality Volume Provided [CF]
SC-1a	Infiltration Chambers	243
SC-1b	Rain Garden	279
SC-2a	Infiltration Chambers	243
SC-2b	Infiltration Basin	626

Total Provided Water Quality Volume: 1,391 cf

Provided Water Quality Vol. ≥ Req'd Water Quality Vol. Design is Compliant

Phosphorus Removal

Calculated By: DJG
Date: 4/18/2025

Checked By: EAC
Date: 4/22/2025

DECA - Littleton
Job 241121

Estimated Unmitigated Phosphorus Loading

Land Use	Area [ac]	Phosphorus Loading Rate [lbs/ac/yr]	Estimated Annual Phosphorus Load [lbs/yr]
Commercial and Industrial	**0.00**	1.78	-
Multi Family Residential	**0.00**	2.32	-
Medium -Density Residential	**0.00**	1.96	-
Low Density Residential	**0.34**	1.52	0.51376
Highway	**0.00**	1.34	-
Forest Pervious	**0.46**	0.13	0.06006
Agriculture Pervious	**0.00**	0.45	-
Developed Land Pervious HSG A	**0.00**	0.03	-
Developed Land Pervious HSG B	**0.00**	0.12	-
Developed Land Pervious HSG C	**2.54**	0.21	0.5334
Developed Land Pervious HSG D	**0.00**	0.37	-

Estimated Unmitigated Phosphorus Loading (TP_1): **1.10722** **lbs/yr**

Required TP Reduction: 60%

Required TP Loading Reduction: **0.664** **lbs/yr**

Phosphorus Removal

Phosphorus Loading Rate Reduction

Stormwater Control Measure	Tributary Area [ac]		Total Tributary Phosphorus Loading Rate [lbs/ac/yr]	TP Removal Rate Per Appendix F Attachment 3 of MS4 Permit	Estimated Annual TP Load Reduction [lbs/yr]
	Pervious HSG C	Impervious Low Density Residential			
Bioretention	**0.22**	**0.05**	0.12	76%	0.09
Infiltration Basin	**1.10**	**0.15**	0.45	93%	0.42
Lot 2 Chambers	**0.00**	**0.06**	0.09	92%	0.08
Lot 1 Chambers	**0.00**	**0.05**	0.08	92%	0.07

Total Estimated Annual TP Load Reduction = TP_{Red}: 0.67 lbs/yr

Estimated Annual TP Load = TP_1 - TP_{Red}: 0.44 lbs/yr

Provided Reduction: 60.2%

Attachment 6: Long Term Pollution Prevention Plan and Operation and Maintenance Manual

Long Term Pollution Prevention & Stormwater System Operation and Maintenance Plan

Lots 1 & 2 (Map R07, Parcel 1-0)
Harwood Avenue
Littleton, MA

April 2025 (Revised 6/11/25)

Prepared for:
DECA Corporation
2 Starwood Crossing
Andover, MA 01810

Prepared by:
Goldsmith, Prest & Ringwall, Inc.
39 Main Street, Suite 301
Ayer, MA 01432

GPR Engineering Solutions for Land & Structures

Contents

Attachments

1. Preface

This Long-Term Pollution Prevention and Stormwater System Operation and Maintenance Plan (O+M Plan) adheres to the 2008 Massachusetts DEP Stormwater Handbook, addressing Standard 4 (Long-Term Pollution Prevention Plan) and Standard 9 (Long-Term Operation and Maintenance Plan). The plan promotes source control awareness, outlines pollution prevention measures, and provides detailed guidance for operating and maintaining stormwater management practices. The effectiveness of Stormwater Control Measures (SCMs) relies on consistent maintenance and proper operation.

The Project's stormwater management system includes the following SCMs:

- Grass Swale
- Sediment Forebay
- Bioretention Area/Rain Garden
- Infiltration Basin
- Subsurface Chambers

1.1. Operation and Maintenance Responsibilities

- **Ownership and Responsibility:** The owner or their designated representative shall be responsible for funding, operating, and maintaining the SCMs. At a minimum, the owner shall adhere to the guidelines outlined in this O+M Plan.
- **Maintenance and Training:** Each SCM has specific maintenance requirements to ensure long-term functionality. The O+M Plan will be reviewed with maintenance staff, and training shall include instructions for routine maintenance and emergency response procedures. A qualified professional will conduct regular inspections, operations, and maintenance to ensure all SCMs remain in good working order.
- **Recordkeeping and Reporting:** An Operation and Maintenance log must be maintained for the last three years, noting inspections, repairs, replacements, and disposals for each SCM. For disposals, the log must specify the type of material and disposal location.

1.2. Estimated Annual Maintenance Costs

Regular maintenance is essential to ensure the long-term functionality of SCMs. For planning purposes, the following is an estimated annual SMC maintenance budget.

SCM	Number of SCMs	O+M Estimate per SCM	Total O+M Estimate
Sediment Forebay	2	$250	$500
Bioretention Areas and Rain Gardens	1	$500	$500
Bio Filter/Grass Swales	1	$500	$500
Infiltration Basin	1	$500	$500
Subsurface Infiltration/ Detention Structures	2	$250	$500
Total			**$2,500**

2. Site Information

2.1. Site Location

Harwood Avenue
Lot 1 & 2 (Map R07, Parcel 1-0)
Littleton, MA

2.2. Owner/ Site Supervisor

The OWNER of the SCMs is defined as the individual, trust, corporation, or entity holding title to the land where the SCMs are located. Upon transfer of the property, the new owner assumes all responsibilities outlined in this document. The owner(s) must notify the Town of Littleton Planning Board of any changes in ownership of the property or of any change to the entity or person operating or maintaining the SCMs.

DECA Corporation
2 Starwood Crossing
Andover, MA 01810

2.3. Site Contact

Name:

Phone:

Email:

3. Source Control

Source control aims to reduce pollutant generation at its origin, minimizing the entry of contaminants into stormwater systems and supporting water quality preservation.

Material and Waste Storage and Management: The site shall be kept free of trash and debris. No hazardous materials, salt, sand, deicing chemicals, herbicides or pesticides shall be stored in outdoor locations.

Vehicle Washing: No commercial vehicle washing shall occur on-site.

Spill Prevention and Response Plan: In the event of a spill or release of petroleum products or hazardous materials, implement the following:

a. Initial Notification: Immediately inform the facility supervisor or construction manager. The supervisor shall contact the Fire Department. Additional public officials such as the Police Department, Board of Health, and/ or Conservation Commission may also require notification.

   Name:

   Phone:

b. Emergency Response for Large Spills: For significant spills, immediately contact MassDEP's Emergency Response at 1-888-304-1133.

c. Spill Management: All spills or leaks shall be managed according to the material type, spill volume, and location. Mitigation efforts should include:
   - Preventing further spillage,
   - Containing the spilled material in the smallest practical area,
   - Safely removing spilled material in an environmentally responsible manner,
   - Remediating any environmental damage caused by the spill.

d. It is recommended to keep the following spill response equipment on-site in a secure yet accessible location to enable quick response to any spills:
   - Safety goggles,
   - Chemically resistant gloves and overshoe boots,
   - Water and chemical fire extinguishers,
   - Sand and shovels,

- Suitable absorbent materials, such as Sorbent Pillows, Pads or Socks,
- Storage containers, and
- First aid supplies (e.g., Indian Valley Industries, Inc. 55-gallon Spill Containment Kit or equivalent).

Maintenance of Lawns, Gardens and other Landscaped Areas: Lawn and other landscaped areas shall be maintained regularly by the site owner and kept free from trash and debris. Areas of erosion will be stabilized with loam and seed or other acceptable measures as needed.

Application and Storage of Fertilizer, Herbicides and Pesticides: Fertilizer application shall be in accordance with 330 CMR 31.00 Ban of Fertilizers containing Phosphorus.

To the extent practicable avoid the application of fertilizers, herbicides and/ or pesticides. Only apply when necessary and in accordance with manufacturer recommendations and federal, state and local requirements. If deemed necessary, apply slow-release fertilizers during anticipated dry weather conditions.

Store fertilizers, herbicides, and pesticides in accordance with manufacturer recommendations and local, state, and federal regulations. Store materials indoors and under cover so that they will not be subject to precipitation.

Pet Waste: Pet owners shall dispose of pet waste in the trash.

Soil Absorption System Maintenance: The onsite soil absorption system shall be maintained in accordance with 310 CMR 15.00 The State Environmental Code (Title 5).

Snow Disposal and Deicing Practices: Plowed snow must be placed, ensuring it remains outside stormwater control measures. Debris and accumulated sediments should be cleared from the site and properly disposed of by the end of the snow season, no later than May 15.

Deicing Chemical Storage: In compliance with Massachusetts General Laws, Chapter 85, Section 7A, salt and other deicing chemicals must be stored indoors and handled according to Massachusetts regulations.

Prohibition of On-Site Storage: Sand piles or salt storage piles are not permitted on-site.

Nutrient Management Plan: A nutrient management plan is required if a Total Maximum Daily Load (TMDL) has been developed that indicates that use of fertilizers containing nutrients or other specific pollutants must be reduced. The proposed project is located within the Fort Pond Brook watershed, which does not have a TMDL associated with it.

4. Operation & Maintenance of SCMs

For most SCMs, the maintenance requirements include visual inspections (e.g., inspection of sediment forebays) and physical upkeep (e.g., removing and disposing of sediment, and mowing water quality swales). This section identifies the proposed stormwater control measures for the project and details the associated inspection and maintenance requirements.

Sediment Disposal

Various SCMs require removal of sediment and debris. All sediments, debris or polluted water removed from SCMs shall be properly disposed of in accordance with local, state and federal requirements. Any sediment and debris deemed to be contaminated must be evaluated in accordance with the Hazardous Waste Regulations, 310 CMR 30.000, and handled as hazardous waste.

Sediment Forebays

Function	Consists of an excavated pit, bermed area or cast (in-place or pre-) structure combined with a weir, designed to slow incoming stormwater runoff and facilitating the gravity separation of suspended solids prior to flowing to a subsequent SCM.
Inspection	Inspect after every major storm event (1-inch of rain or greater) for the first six (6) months, then monthly thereafter.
Maintenance	• Remove sediment and debris four (4) times per year, starting in the spring and spaced at even time increments until the late fall season, thereafter. • If standing water is present during inspections, clean or replace the filter stone within the check dam so that the sediment forebay drains within 72 hours after a storm. • Mow grass within the sediment forebay, a minimum of twice a year, keeping the height of the grass between three (3) and six (6) inches. • Replace any vegetation damaged during cleaning or areas of rilling and gullying by reseeding or resodding. When reseeding, incorporate practices such as hydroseeding with a tackifier, blanket or similar practice to ensure that no scour occurs in the sediment forebay, while the seeds germinate and develop roots. • Remove any woody vegetation (trees or shrubs) from the sediment forebay immediately upon detection.

Bioretention Areas and Rain Gardens

Function	Bioretention cells (also called rain gardens) are shallow depressions filled with sandy soil topped with a thick layer of mulch and planted with dense native vegetation. Stormwater runoff is directed into the cell via piped or sheet flow. The runoff percolates through the soil media that acts as a filter.
Inspection	• Inspect and remove trash monthly • Inspect regularly for sediment build-up, structural damage, and standing water. • Inspect soil and repair eroded areas monthly.
Maintenance	• Remove litter and debris monthly or more frequently as needed. • If applicable, mow 2-12 times per year. • Careful plant maintenance is critical. Maintain vegetation as needed to ensure healthy plantings. Remove dead vegetation and prune vegetation twice per year (spring and fall). Replace dead vegetation as needed. Remove invasive species as needed. Treat diseased vegetation as needed. • Replace mulch every two years, in the early spring. As needed re-mulch void areas. • Fertilize in accordance with Section 3.0 of this manual and no more frequently than annually. • Remove sediment from the toe of slope or level spreader and reseed bare spots as necessary. • Periodically, remove sediment that accumulates near the top of the strip to maintain the appropriate slope and prevent formation of a “berm” that could impede the distribution of runoff as sheet flow. • Upon failure, excavate bioretention area, scarify bottom and sides, replace soil media, replant, and mulch.

Grassed Channels/ Bio Filter Swales

Function	Grassed Channels (formerly known as Biofilter swales) are treatment systems with a longer hydraulic residence time than drainage channels, typically designed with a sediment forebay.
Inspection	Inspect the grassed channel for the first few months after construction to make sure that there is no rilling or gullying, and that vegetation has been established. Thereafter, inspect semi-annually for the first year and then once per year to assess slope integrity, soil moisture, vegetative health, soil stability, soil compaction, soil erosion, ponding, and sediment accumulation.

Maintenance	• Sediment and debris should be removed as needed using methods to limit the disturbance of vegetation and underlying soils. • Mow as necessary to maintain the grass height between three (3) and six (6) inches. Remove grass clippings. • Reseed or re-sod with an alternative grass species if the original grass cover is not successfully established. • When reseeding, incorporate practices such as hydroseeding with a tackifier, blanket or similar practice to ensure that no scour occurs in the grass channel, while the seeds germinate and develop roots. • Protect grass channels from snow removal procedures and off-street parking.

Subsurface Infiltration Structures

Function	Underground systems that capture runoff and gradually infiltrate it into the groundwater through rock and gravel.
Inspection	Inspect to ensure proper functioning after every major storm during the first 3 months of operation. Thereafter, inspect the infiltration structures twice a year and after every major storm: check inlet pipes to determine if they are clogged.
Maintenance	• Maintain in accordance with manufacture's recommendations and requirements. See attachment 3. • Perform preventative maintenance twice a year: remove any debris that might clog the system, and if the top is grass remove tree seedlings, growing on top of the system before they become firmly established.

Infiltration Basins

Function	Infiltration basins are stormwater runoff impoundments that are constructed over permeable soils. Runoff is stored until it exfiltrates through the soil of the basin floor.
Inspection	Inspect to ensure proper functioning after every major storm during the first 3 months of operation. Observe how long water remains standing in the basin after a storm; standing water 48 to 72 hours after a storm suggests potential clogging and should be immediately addressed. Inspect twice a year thereafter and when there are discharges through the high outlet orifice. Look for signs of settlement, cracking, erosion, leakage in the embankments, tree growth on the embankments, condition of riprap, sediment accumulation and the health of the turf.

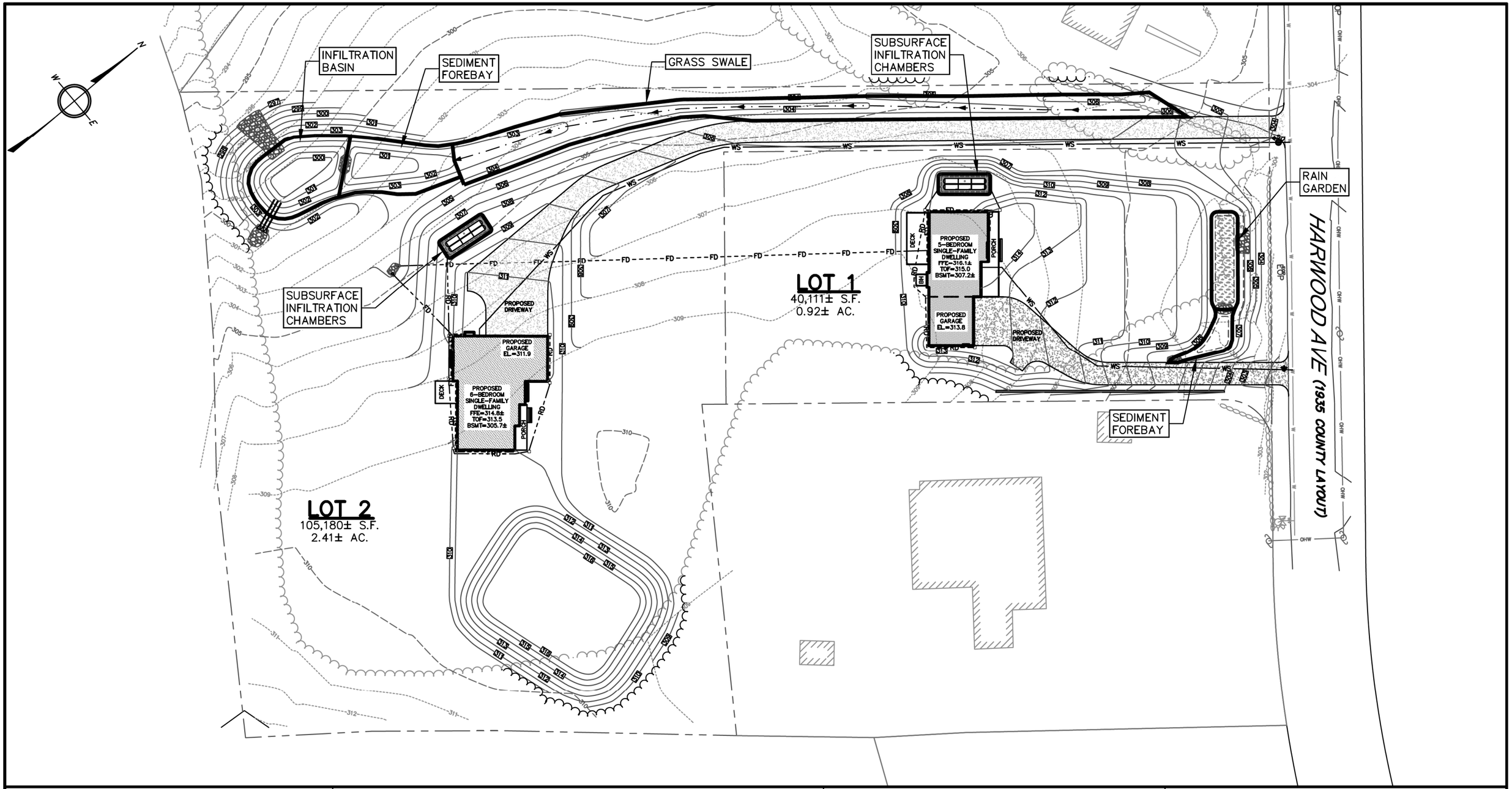
Maintenance	• Perform preventative maintenance twice a year: Mow the buffer area, side slopes, and basin bottom if grassed floor; rake if stone bottom; remove trash and debris; remove grass clippings and accumulated organic matter. • Remove tree saplings prior to establishment and any invasive plant species. • Use deep tilling to break up clogged surfaces and revegetate immediately. • Remove sediment from the basin as necessary but wait until the floor of the basin is thoroughly dry. Use light equipment to remove the top layer so as to not compact the underlying soil.

5. Emergency Contacts

Oil spills and leaks, the release of hazardous materials, the contamination of drinking water or other threats to the public are Environmental Emergencies and must be reported immediately.

1. **IMMEDIATELY** Call your local fire department: **911**
2. Call MassDEP's Emergency Response at: **1-888-304-1133**
3. Contact Site Owner

Attachment 1: SCM Locus Plan



GRAPHIC SCALE

50 0 25 50 100

(IN FEET)

1 INCH = 50 FEET

GPR

Engineering Solutions for Land & Structures

GOLDSMITH, PREST & RINGWALL, INC.

39 MAIN ST., SUITE 301, AYER, MA 01432

CIVIL ENGINEERING • LAND SURVEYING • LAND PLANNING

VOICE: 978.772.1590 FAX: 978.772.1591

www.gpr-inc.com

PREPARED FOR:

DECA CORP
2 STARWOOD CROSSING
ANDOVER, MA 01810

STORMWATER CONTOL MEASURES LOCUS PLAN

LOTS 1 & 2 (MAP R07, PARCEL 1-0)
HARWOOD AVE
LITTLETON, MA 01460

DES'D BY: DJG	CHK'D BY: EAC
DATE: APRIL 2025 (REVISED 6/11/25)	PROJECT: 241121

P:\24---\241121\DWG\PERMIT\241121_SW SITE PLAN_REV1.DWG 06-11-25 4:53:25 PM - LAYOUT BMP LOCUS

Attachment 2: Operation and Maintenance Log

The following template is designed to assist in meeting the operation and maintenance log requirements outlined in the 2008 DEP Stormwater Management Handbook. An operation and maintenance log should be completed for all inspections and maintenance and kept on file for at least three years.

Operation and Maintenance Log

Name of Inspector:

Date/ Time of Inspection: Weather Conditions:

Notes on Recent Precipitation Events:

SCM	Inspection Notes	Actions Req'd or Performed

Attachment 3:

Subsurface Infiltration Structures Operation and Maintenance Manual

Isolator Row Plus Inspection/Maintenance

Inspection

The frequency of inspection and maintenance varies by location. A routine inspection schedule needs to be established for each individual location based upon site specific variables. The type of land use (i.e. industrial, commercial, residential), anticipated pollutant load, percent imperviousness, climate, etc. all play a critical role in determining the actual frequency of inspection and maintenance practices.

At a minimum, StormTech recommends annual inspections. Initially, the Isolator Row Plus should be inspected every 6 months for the first year of operation. For subsequent years, the inspection should be adjusted based upon previous observation of sediment deposition.

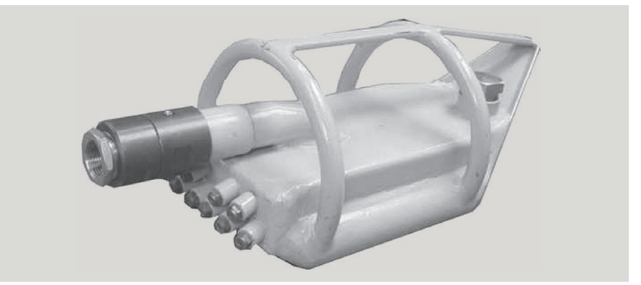
The Isolator Row Plus incorporates a combination of standard manhole(s) and strategically located inspection ports (as needed). The inspection ports allow for easy access to the system from the surface, eliminating the need to perform a confined space entry for inspection purposes.

If upon visual inspection it is found that sediment has accumulated, a stadia rod should be inserted to determine the depth of sediment. When the average depth of sediment exceeds 3" (75 mm) throughout the length of the Isolator Row Plus, clean-out should be performed.

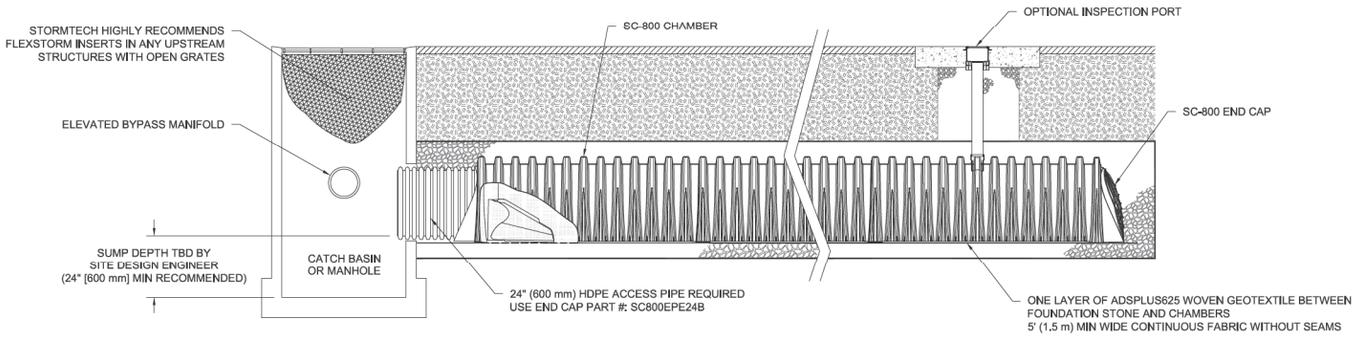
Maintenance

The Isolator Row Plus was designed to reduce the cost of periodic maintenance. By “isolating” sediments to just one row, costs are dramatically reduced by eliminating the need to clean out each row of the entire storage bed. If inspection indicates the potential need for maintenance, access is provided via a manhole(s) located on the end(s) of the row for cleanout. If entry into the manhole is required, please follow local and OSHA rules for a confined space entry.

Maintenance is accomplished with the JetVac process. The JetVac process utilizes a high pressure water nozzle to propel itself down the Isolator Row Plus while scouring and suspending sediments. As the nozzle is retrieved, the captured pollutants are flushed back into the manhole for vacuuming. Most sewer and pipe maintenance companies have vacuum/JetVac combination vehicles. Selection of an appropriate JetVac nozzle will improve maintenance efficiency. Fixed nozzles designed for culverts or large diameter pipe cleaning are preferable. Rear facing jets with an effective spread of at least 45” are best. StormTech recommends a maximum nozzle pressure of 2000 psi be utilized during cleaning. JetVac reels can vary in length. For ease of maintenance, ADS recommends Isolator Row Plus lengths up to 200' (61 m). **The JetVac process shall only be performed on StormTech Isolator Row Plus that have ADS Plus Fabric (as specified by StormTech) over their angular base stone.**



StormTech Isolator Row Plus (*not to scale*)



Isolator Row Plus Step By Step Maintenance Procedures

Step 1

Inspect Isolator Row Plus for sediment.

A) Inspection ports (if present)
   i. Remove lid from floor box frame
   ii. Remove cap from inspection riser
   iii. Using a flashlight and stadia rod,measure depth of sediment and record results on maintenance log.
   iv. If sediment is at or above 3 inch depth, proceed to Step 2. If not, proceed to Step 3.

B) All Isolator Row Plus
   i. Remove cover from manhole at upstream end of Isolator Row Plus
   ii. Using a flashlight, inspect down Isolator Row Plus through outlet pipe
      1. Mirrors on poles or cameras may be used to avoid a confined space entry
      2. Follow OSHA regulations for confined space entry if entering manhole
   iii. If sediment is at or above the lower row of sidewall holes (approximately 3 inches), proceed to Step 2.
   If not, proceed to Step 3.

Step 2

Clean out Isolator Row Plus using the JetVac process.

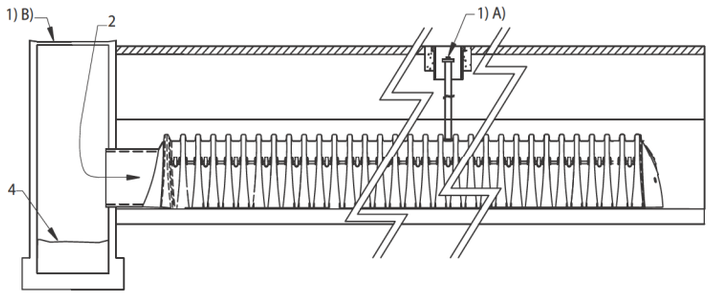
A) A fixed floor cleaning nozzle with rear facing nozzle spread of 45 inches or more is preferable
B) Apply multiple passes of JetVac until backflush water is clean
C) Vacuum manhole sump as required

Step 3

Replace all caps, lids and covers, record observations and actions.

Step 4

Inspect & clean catch basins and manholes upstream of the StormTech system.



Sample Maintenance Log

Date	Stadia Rod Readings		Sedi-ment Depth (1)–(2)	Observations/Actions	Inspector
	Fixed point to chamber bottom (1)	Fixed point to top of sediment (2)			
3/15/11	6.3 ft	none		New installation. Fixed point is CI frame at grade	DJM
9/24/11		6.2	0.1 ft	Some grit felt	SM
6/20/13		5.8	0.5 ft	Mucky feel, debris visible in manhole and in Isolator Row Plus, maintenance due	NV
7/7/13	6.3 ft		0	System jetted and vacuumed	DJM

adspipe.com
800-821-6710

Attachment 7: Certified List of Abutters

TOWN OF LITTLETON
BOARD OF ASSESSORS
P.O. BOX 1305
LITTLETON, MA 01460
(978) 540-2410 FAX: (978) 952-2321

Date: March 25, 2025

Re: Certified List of Abutters for Planning Board (300 feet - public hearings, special permits)

Applicant: DECA Corp
Name of Firm: Goldsmith, Prest & Ringwall, Inc
Mailing Address: 39 Main Sr #301 Acton MA 01720

Subject Parcel Location: 195 Tahattawan Rd
Subject Owner: Glavey Family Irrevocable Trust
Subject Parcel ID: R07 1 0

M.G.L. Chapter 40A, Section 11. "In all cases where notice of a public hearing is required notice shall be given by publication in a newspaper of general circulation in the city or town once in each of two successive weeks, the first publication to be not less than fourteen days before the day of the hearing and by posting such notice in a conspicuous place in the city or town hall for a period of not less than fourteen days before the day of such hearing. In all cases where notice to individuals or specific boards or other agencies is required, notice shall be sent by mail, postage prepaid. **"Parties in interest" as used in this chapter shall mean the petitioner, abutters, owners of land directly opposite on any public or private street or way, and abutters to the abutters within three hundred feet of the property line of the petitioner as they appear on the most recent applicable tax list, notwithstanding that the land of any such owner is located in another city or town, the planning board of the city or town, and the planning board of every abutting city or town.** The assessors maintaining any applicable tax list shall certify to the permit granting authority or special permit granting authority the **names and addresses of parties in interest and such certification shall be conclusive for all purposes.** The permit granting authority or special permit granting authority may accept a waiver of notice from or an affidavit of actual notice to any party in interest or, in his stead, any successor owner of record who may not have received a notice by mail, and may order special notice to any such person, giving not less than five nor more than ten additional days to reply." .....

I hereby certify the attached list of abutter(s) as stated in the M.G.L. Chapter 40A, Section 11.

Number of Abutter(s) 37 including the subject parcel(s).

Certified by:

Kim Prehl, Office Assistant

NOTE: This **abutters list** will be **valid** for three (3) months from the date of signature. Please be aware that per **Massachusetts** General Law (G. L. c 66, § 10) this office has up to 10 calendar days to fulfill this request.

559 B NEWTOWN RD — R05 21 0 — LUC: 932

LITTLETON TOWN OF
CONSERVATION COMM
P.O. BOX 1305
LITTLETON, MA 01460

65 GRIMES LN — R06 1 0 — LUC: 0167

PEEKE DOUGLAS E
PEEKE MARTHA JANE
65 GRIMES LN
LITTLETON, MA 01460

195 TAHATTAWAN RD — R07 1 0 — LUC: 101

GLAVEY FAMILY IRREVOCABLE TRUS
GLAVEY PAUL J - TRUSTEE
PO BOX 381
LITTLETON, MA 01460

269 HARWOOD AV — R07 1 1 — LUC: 101

OBORSKI CHRISTINE E
OBORSKI JUSTIN A
269 HARWOOD AVE
LITTLETON, MA 01460

307 HARWOOD AV — R07 1 2 — LUC: 101

HOMELIT REALTY TRUST
GALLAGHER MARK P - TRUSTEE
307 HARWOOD AV
LITTLETON, MA 01460

275 HARWOOD AV — R07 2 0 — LUC: 101

CROWLEY, RYAN S
WHITE, ELIZABETH S
275 HARWOOD AV
LITTLETON, MA 01460

273 HARWOOD AV — R07 2 1 — LUC: 101

OSMOND ROGER
273 HARWOOD AV
LITTLETON, MA 01460

271 HARWOOD AV — R07 2 2 — LUC: 101

BRIAN AND MARIE BEAM LIVING TR
BEAM BRIAN TRUSTEE
271 HARWOOD AV
LITTLETON, MA 01460

HARWOOD AV — R07 3 0 — LUC: 930

LITTLETON TOWN OF
TOWN FOREST
PO BOX 1305
LITTLETON, MA 01460

OFF HARWOOD AV — R07 4 0 — LUC: 930

LITTLETON TOWN OF
TOWN FOREST
PO BOX 1305
LITTLETON, MA 01460

OFF HARWOOD AV — R07 9 0 — LUC: 930

LITTLETON TOWN OF
TOWN FOREST
PO BOX 1305
LITTLETON, MA 01460

TAHATTAWAN RD — U31 10 0 — LUC: 950

LITTLETON CONSERVATION TRUST
P O BOX 594
LITTLETON, MA 01460

315 HARWOOD AV — U31 11 0 — LUC: 101

WEITEKAMP AARON M
WEITEKAMP JULIE E
315 HARWOOD AVE
LITTLETON, MA 01460

237 TAHATTAWAN RD — U31 7 0 — LUC: 101

FITZGERALD RICHARD
FITZGERALD COLLEEN
237 TAHATTAWAN RD
LITTLETON, MA 01460

TAHATTAWAN RD — U31 7 1 — LUC: 950

LITTLETON CONSERVATION TRUST
P O BOX 594
LITTLETON, MA 01460

219 TAHATTAWAN RD — U31 9 0 — LUC: 101

MUELLER FRANK E L/E
MUELLER LOIS A L/E
219 TAHATTAWAN RD
LITTLETON, MA 01460

181 TAHATTAWAN RD — U32 1 0 — LUC: 101

JOYCE STEVEN E
JOYCE DIANE W
181 TAHATTAWAN RD
LITTLETON, MA 01460

178 TAHATTAWAN RD — U32 15 0 — LUC: 101

TIRONE-RICHARD P+ TIRONE D TRS
MARGARET-ELLEN TIRONE IRRV TR
178 TAHATTAWAN RD
LITTLETON, MA 01460

184 TAHATTAWAN RD — U32 17 0 — LUC: 101

COONEY JOHN P
COONEY LAURIE K
184 TAHATTAWAN ROAD
LITTLETON, MA 01460

186 TAHATTAWAN RD — U32 18 0 — LUC: 101

BELANGER MICHAEL STEPHEN
MACDONALD DANIELLE ALICE
186 TAHATTAWAN RD
LITTLETON, MA 01460

192 TAHATTAWAN RD — U32 19 0 — LUC: 101

MIGHTY SMALL TRUST
MANN KYLE
13 WINGED COVE RD
LITTLETON, MA 01460

177 TAHATTAWAN RD — U32 2 0 — LUC: 101

BORGES RONALD J
LIU NINA S
177 TAHATTAWAN RD
LITTLETON, MA 01460

268 HARWOOD AV — U32 2 B — LUC: 101

BERGER KARL E
BERGER BERNADETTE DELOURDES
268 HARWOOD AVE
LITTLETON, MA 01460

300 HARWOOD AV — U32 20 0 — LUC: 101

MARY LEE DONOVAN FAMILY TRUST
TRUSTEE DONOVAN MARY LEE
300 HARWOOD AVENUE
LITTLETON, MA 01460

304 HARWOOD AV — U32 21 0 — LUC: 101

WARD ERIC
WARD CASEY
304 HARWOOD AV
LITTLETON, MA 01460

308 HARWOOD AV — U32 22 0 — LUC: 101

LYNCH PETER
VANSLETTE ROXANNE
308 HARWOOD AVE
LITTLETON, MA 01460

320 HARWOOD AV — U32 24 0 — LUC: 101

VASCONCELOS POLIANA
LIN ALEX L
320 HARWOOD AV
LITTLETON, MA 01460

20 CONCORD DR — U32 26 0 — LUC: 101

2024 PAULA BLANCHARD TRUST
BLANCHARD PAULA TRUSTEE
20 CONCORD DR
LITTLETON, MA 01460

1 WORCESTER RD — U32 28 0 — LUC: 101

CARLISLE SARA B
1 WORCESTER RD
LITTLETON, MA 01460

LEXINGTON PL — U32 28 1 — LUC: 930

LITTLETON TOWN OF
PO BOX 1305
LITTLETON, MA 01460

270 HARWOOD AV — U32 2A 1

LUC: 101

BABERS JOHN

BABERS DARCY

270 HARWOOD AVE

LITTLETON, MA 01460

272 HARWOOD AV — U32 2A 2

LUC: 101

RASSIAS MICHAEL

RASSIAS TIMALYN

272 HARWOOD AVE

LITTLETON, MA 01460

169 TAHATTAWAN RD — U32 4 0

LUC: 101

LALIBERTE KATHLEEN T

ERN ELLIOT M

169 TAHATTAWAN RD

LITTLETON, MA 01460

TAHATTAWAN RD — U32 5 0

LUC: 132

LALIBERTE KATHLEEN T

ERN ELLIOT M

169 TAHATTAWAN RD

LITTLETON, MA 01460

165 TAHATTAWAN RD — U32 6 0

LUC: 101

LUCAS DEBORAH

165 TAHATTAWAN RD

LITTLETON, MA 01460

119 TAHATTAWAN RD — U33 2 0

LUC: 932

TOWN OF LITTLETON

CONSERVATION COMMISSION

119 TAHATTAWAN RD

LITTLETON, MA 01460

146 TAHATTAWAN RD — U33 34 A

LUC: 101

CATALANOTTO LOUIS

CATALANOTTO MARY

146 TAHATTAWAN RD

LITTLETON, MA 01460