DESIGN ENGINEERS, INC.

Stormwater Report
46 Charity Stevens Lane Solar Project
Fairhaven, MA 02719

Applicant:
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Atlantic Project No. 3119.01

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APPENDICES

UNDER SEPARATE COVER

- Copy of plans entitled "Site Plans for 46 Charity Stevens Lane Solar Project, Fairhaven Massachusetts" prepared by Atlantic Design Engineers, Inc., dated 8/23/19.

I. INTRODUCTION

This report analyzes the hydrological impacts of the Charity Stevens Lane Solar Project, a proposed ground-mounted, solar photovoltaic solar facility located on the ±46.5-acre property located at 46 Charity Stevens Lane in Fairhaven, Massachusetts (the "Site") (Map 40, Lot 8).

The site is a partially developed property at the end of Charity Stevens Lane. It is presently the site of the Haskell family residence and the Haskell Nursery, a nursery and landscape business that grows, sells and installs plants, trees, shrubs and flowers. An existing residence, several barns, greenhouses, and other farm-related structures are scattered throughout the center and east end of the site, including a fenced in tree farm. The western end of the site is partially cleared long grassed areas surrounded by wetlands/wooded areas. The land surrounding the site to the west and north is currently vacant/wooded Town-owned conservation land. To the south and east lies residential properties and farms.

The site lies within the Rural Residential (RR) Zoning District and does not fall within any DEP mapped surface or groundwater protection areas, or Town designated Aquifer Protection or Wetland Resource Protection Overlay Districts. It is located in the Nasketucket River Basin Overlay District. The site is not located within a FEMA Flood Zone or an Estimated Habitat of Rare Wildlife or Priority Habitat of Rare Species, as mapped by the Natural Heritage and Endangered Species Program (NHESP). The site is not located within any Area of Critical Environmental Concern (ACEC).

The property has several bordering and isolated vegetated wetland systems (BVW's and IVW's) on and adjacent to the site, mostly at the western end of the property. These wetland resource areas on the site were delineated by Goddard Consulting, LLC in May 2019, and the wetland boundaries were surveyed by Atlantic Design Engineers.

Topography slopes from the center of the site (where the existing home, barn and greenhouses are located) to neighboring property to the southeast and to the wetland areas to the west. The grade is fairly flat and gradual.

The proposed ±11-acre solar development project is comprised of two separate solar arrays, perimeter fencing, photovoltaic solar panels, racking systems, inverters and transformers with accommodating concrete pads, energy storage systems, above and below ground utilities, stormwater facilities, and gravel roads to access to the solar fields.

Presently the areas selected for the ground-mounted solar arrays are comprised of an existing, sparsely vegetated tree farm area on the east side of the property, an open grassed area on the west side of the site, and small portions of wooded areas to the north and south. The existing gravel driveways throughout the site will be utilized for access to the arrays, with small gravel extensions leading into the fenced-in areas.

1.0 PROPOSED STORMWATER MANAGEMENT SYSTEM

The Stormwater system for the project has been evaluated and designed based upon DEP Wetland Program Policy 17.1: Photovoltaic System Solar Array Review, the Town's Stormwater Management Bylaw, as well as the DEP Stormwater Policy of encouraging environmentally-sensitive design with minimal point source discharges.

Grading proposed for the solar development will be minimal, limited to a grassed swale, small areas around the electrical equipment and energy storage system pads, and a ridge in the northeast. The topography within the solar array between subcatchments 2s and 3s will be modified slightly to incorporate a highpoint/ridge. In addition, since the solar arrays are proposed almost entirely within presently cleared, vegetated grassed areas, there will be no increase in runoff from the site as a result of the arrays either retaining the current vegetation/ground cover or being vegetated with a meadow style seed mix. There are small areas of new gravel access roads, concrete equipment pads and energy storage systems that are considered in the calculations, but based on the results of the analysis, there will be no increase in runoff rates after development of the project and, as a result, typical stormwater basins to attenuate peak rate increases are not required. Stormwater measures will therefore be limited to an infiltration trenches to provide the recharge volume required by the DEP for the minimal increase in impervious area on the project site.

2.0 COMPLIANCE WITH DEP STORMWATER MANAGEMENT STANDARDS

Standard 1: No New Untreated Discharges

There are no new impervious surfaces proposed as part of the solar project that will generate suspended solids or other measurable stormwater contaminants. The only measurable impervious surface on the site is the concrete electrical equipment pads and energy storage systems and these surfaces are either structures or are limited to foot traffic only. All new access roads will be gravel which, DEP Program Policy 17.1 does not consider impervious and the area under the arrays will retain existing vegetated ground cover or will be comprised of meadow-style grasses. Therefore, there will be no untreated discharge and it is our opinion that Standard 1 has been met.

Standard 2: Peak Rate Attenuation

Based upon the existing contours and runoff patterns on the site, as well as any sensitive areas off site, a total of 3 Design Points were evaluated for peak rate attenuation. Pre- and Post-Development stormwater calculations were performed for the 2, 10, 25 and 100-year, Type III storm events. A comparison of the Pre- vs. Post-Development peak runoff rates for each storm event at each of the Design Points is summarized in the tables below:

Design Point #1 – South Western Wetlands				
	RATE		***VOLUME***	
Storm Event	***Pre-Development***	***Post-Development***	***Pre-Development***	***Post-Development***
2-year	6.54 cfs	6.54 cfs		
10-year	16.22 cfs	16.22 cfs	1.6 af	1.6 af
25-year	23.14 cfs	23.14 cfs		
100-year	34.45 cfs	34.45 cfs		

Design Point #2 – South East Off-Site				
	RATE		***VOLUME***	
Storm Event	***Pre-Development***	***Post-Development***	***Pre-Development***	***Post-Development***
2-year	9.34 cfs	9.14 cfs		
10-year	19.32 cfs	18.90 cfs	2.5 af	2.5 af
25-year	26.09 cfs	25.54 cfs		
100-year	36.83 cfs	36.03 cfs		

Design Point #3 – North East Off-site				
	RATE		***VOLUME***	
Storm Event	***Pre-Development***	***Post-Development***	***Pre-Development***	***Post-Development***
2-year	2.14 cfs	2.14 cfs		
10-year	5.00 cfs	4.88 cfs	0.6 af	0.5 af
25-year	7.01 cfs	6.79 cfs		
100-year	10.25 cfs	9.86 cfs		

As shown in the tables, the peak rates for stormwater runoff generated under Post Development condition will be equal to or less than the peak rates generated under Pre-Development conditions for the all storm events. In addition, as required by the Town of Fairhaven Stormwater Management By-Laws, the Post-Development volume of runoff generated for the 10-year storm is less than or equal to the Pre-Development conditions. The calculations will demonstrate that a 6% ground cover change in the western array (Subcatchment 1s) will not result in an increase in the peak rate of runoff or volume. Areas of selective coppicing will retain the original ground cover and therefore the curve number remain the same for these areas. For the eastern solar array the peak rates and volumes are mitigated by reconfiguring the highpoint and implementing a shallow swale that significantly increases the time of concentration for the enlarged subcatchment 2s while significantly reducing subcatchment 3s.

Complete runoff calculations for the 2, 10, 25 and 100-year Type III storm events including ground cover, soils types and times of concentration paths for the Pre-Development conditions and Post-Development conditions are provided in Appendix B.

Standard 3: Groundwater Recharge

Based upon a review of the Web Soil Survey, soils within the proposed development area have been identified as Woodbridge Fine Sandy Loam, Paxton Fine Sandy Loam, Gloucester Hinkley which have been classified as Hydrologic Soil Groups C/D, C and A respectfully. The groundwater recharge volume required for the proposed impervious surfaces is calculated by the following formula:

$$R_v = (F)(A_{IMP})$$

R_v = *Required Recharge Volume*

F=Target Depth Factor: 0.25 inch for C soils

A_{IMP} = *Proposed Impervious Area*

The only measurable impervious surface on the site is the concrete electrical equipment pads and energy storage systems. The calculations in Appendix C show that the BMP recharge volume provided of 48 CF exceeds the required recharging volume of 46 CF. As a result, it is our opinion that Standard 3 has been met. Additionally, calculations have been provided showing the infiltration stone trenches drawdown within 72 hours (See appendix C).

Standard 4: Water Quality

There are no new impervious surfaces proposed as part of the solar project that will generate suspended solids or other measurable stormwater contaminants. The only measurable impervious surface on the site is the concrete electrical equipment pads and energy storage systems and these surfaces will be either structures or limited to foot traffic only. All new access roads will be gravel, which DEP Program Policy 17.1 does not consider impervious, and the area under the arrays will be comprised of meadow-style grasses. Therefore, it is our opinion that Standard 4 has been met.

Standard 5: Land Uses with Higher Pollutant Loads (LUHPPLs)

The proposed development is not a LUHPPL and therefore Standard 5 is not applicable.

Standard 6: Critical Areas

The project does not have any discharges within a Zone II, Interim Wellhead Protection Areas or near or to any Critical Areas as defined by the Massachusetts Stormwater Handbook. Therefore, it is our opinion that Standard 6 is not applicable.

Standard 7: Redevelopment Projects

The proposed project is not a redevelopment project and therefore Standard 7 is not applicable.

Standard 8: Construction Period Pollution Prevention and Erosion and Sedimentation Control

A Construction Period Erosion and Sedimentation Control Plan is provided on the Site plans along with notes/instructions for the contractor and details/location of all erosion control measures.

Standard 9: Long Term Operation and Maintenance Plan

A Long Term Pollution Prevention and Stormwater Operation and Maintenance Plan is provided in Appendix E.

Standard 10: Prohibition of Illicit Discharges

To our knowledge, there are no existing illicit discharges to existing stormwater systems on the Site and measures to prevent illicit discharges from the proposed development to proposed stormwater systems on the Site will be included within the Long Term Pollution Prevention Plan. As required, an Illicit Discharge Compliance Statement will be submitted prior to the discharge of any stormwater to the post-construction stormwater Best Management Practices (BMPs).

APPENDIX A

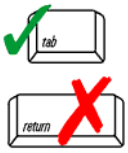
Checklist for Stormwater Report

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.

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[1] The Stormwater Report may also include the Illicit Discharge Compliance Statement required by Standard 10. If not included in the Stormwater Report, the Illicit Discharge Compliance Statement must be submitted prior to the discharge of stormwater runoff to the post-construction best management practices.

[2] For some complex projects, it may not be possible to include the Construction Period Erosion and Sedimentation Control Plan in the Stormwater Report. In that event, the issuing authority has the discretion to issue an Order of Conditions that approves the project and includes a condition requiring the proponent to submit the Construction Period Erosion and Sedimentation Control Plan before commencing any land disturbance activity on the site.

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

Checklist for Stormwater Report

B. Stormwater Checklist and Certification

The following checklist is intended to serve as a guide for applicants as to the elements that ordinarily need to be addressed in a complete Stormwater Report. The checklist is also intended to provide conservation commissions and other reviewing authorities with a summary of the components necessary for a comprehensive Stormwater Report that addresses the ten Stormwater Standards.

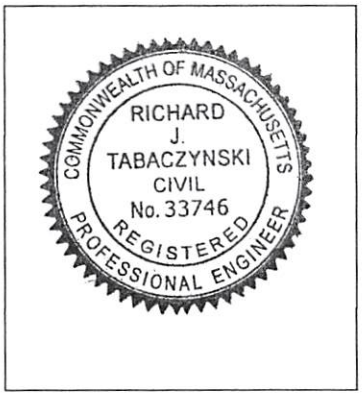
Note: Because stormwater requirements vary from project to project, it is possible that a complete Stormwater Report may not include information on some of the subjects specified in the Checklist. If it is determined that a specific item does not apply to the project under review, please note that the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

A complete checklist must include the Certification set forth below signed by the Registered Professional Engineer who prepared the Stormwater Report.

Registered Professional Engineer's Certification

I have reviewed the Stormwater Report, including the soil evaluation, computations, Long-term Pollution Prevention Plan, the Construction Period Erosion and Sedimentation Control Plan (if included), the Long-term Post-Construction Operation and Maintenance Plan, the Illicit Discharge Compliance Statement (if included) and the plans showing the stormwater management system, and have determined that they have been prepared in accordance with the requirements of the Stormwater Management Standards as further elaborated by the Massachusetts Stormwater Handbook. I have also determined that the information presented in the Stormwater Checklist is accurate and that the information presented in the Stormwater Report accurately reflects conditions at the site as of the date of this permit application.

Registered Professional Engineer Block and Signature



8/23/19

Signature and Date

Checklist

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

☒ New development

☐ Redevelopment

☐ Mix of New Development and Redevelopment

Checklist for Stormwater Report

Checklist (continued)

LID Measures: Stormwater Standards require LID measures to be considered. Document what environmentally sensitive design and LID Techniques were considered during the planning and design of the project:

☒ No disturbance to any Wetland Resource Areas

☐ Site Design Practices (e.g. clustered development, reduced frontage setbacks)

☐ Reduced Impervious Area (Redevelopment Only)

☒ Minimizing disturbance to existing trees and shrubs

☐ LID Site Design Credit Requested:

- ☐ Credit 1
- ☐ Credit 2
- ☐ Credit 3

☒ Use of "country drainage" versus curb and gutter conveyance and pipe

☐ Bioretention Cells (includes Rain Gardens)

☐ Constructed Stormwater Wetlands (includes Gravel Wetlands designs)

☐ Treebox Filter

☐ Water Quality Swale

☒ Grass Channel

☐ Green Roof

☒ Other (describe): Infiltration Trench

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

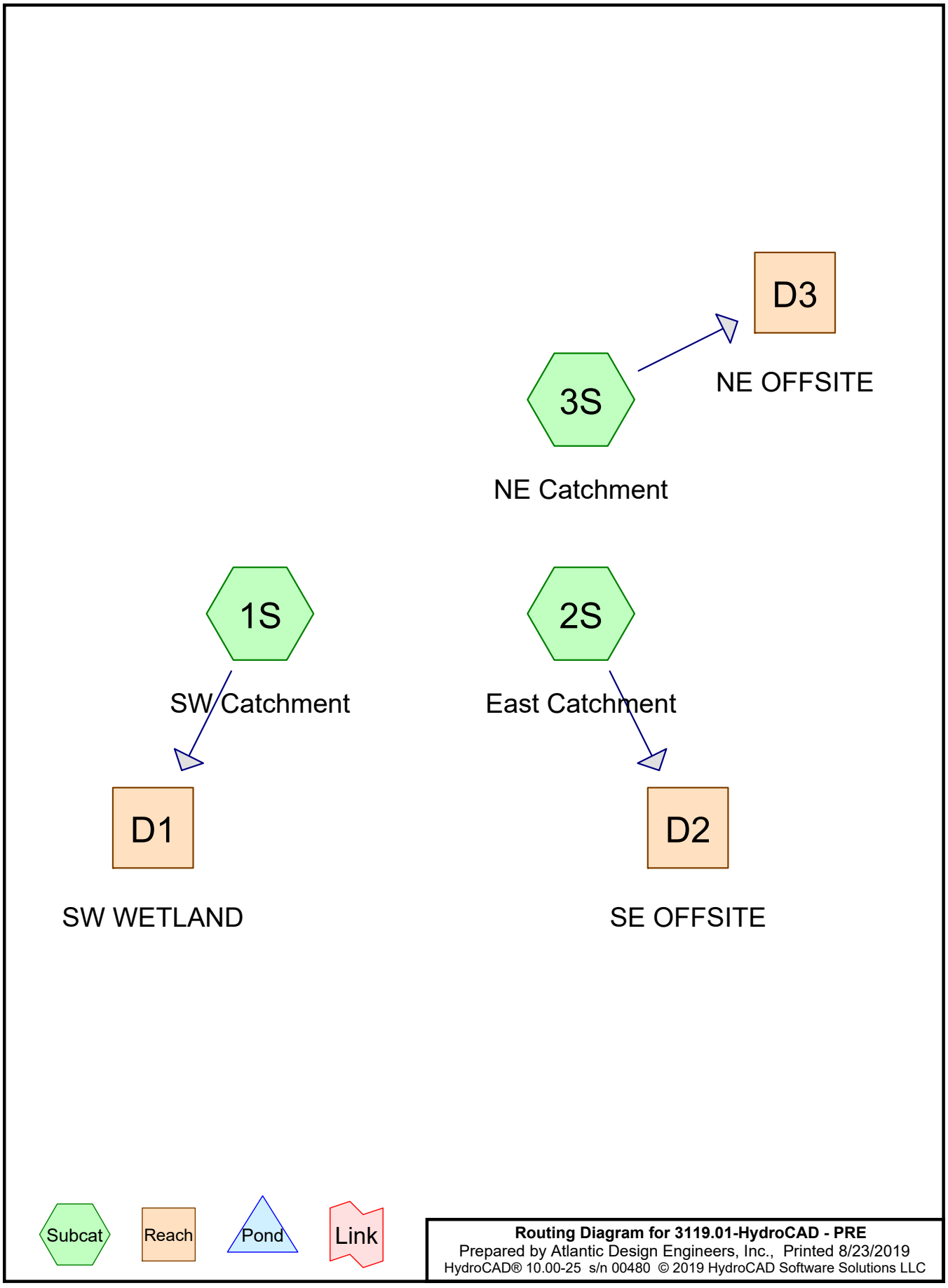
☒ The Long-Term Pollution Prevention Plan includes measures to prevent illicit discharges;

☐ 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.

APPENDIX B

Pre and Post -Development HydroCAD Stormwater Analysis



Routing Diagram for 3119.01-HydroCAD - PRE
Prepared by Atlantic Design Engineers, Inc., Printed 8/23/2019

Time span=1.00-36.00 hrs, dt=0.05 hrs, 701 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Stor-Ind method - Pond routing by Stor-Ind method

Subcatchment 1S: SW Catchment Runoff Area=450,989 sf 4.22% Impervious Runoff Depth=0.84"
Flow Length=586' Slope=0.0180 '/' Tc=16.2 min CN=68 Runoff=6.54 cfs 0.7 af

Subcatchment 2S: East Catchment Runoff Area=525,152 sf 2.29% Impervious Runoff Depth=1.23"
Flow Length=1,213' Tc=30.9 min CN=75 Runoff=9.34 cfs 1.2 af

Subcatchment 3S: NE Catchment Runoff Area=141,188 sf 0.00% Impervious Runoff Depth=0.95"
Flow Length=185' Tc=21.3 min CN=70 Runoff=2.14 cfs 0.3 af

Reach D1: SW WETLAND Inflow=6.54 cfs 0.7 af
Outflow=6.54 cfs 0.7 af

Reach D2: SE OFFSITE Inflow=9.34 cfs 1.2 af
Outflow=9.34 cfs 1.2 af

Reach D3: NE OFFSITE Inflow=2.14 cfs 0.3 af
Outflow=2.14 cfs 0.3 af

Total Runoff Area = 25.650 ac Runoff Volume = 2.2 af Average Runoff Depth = 1.04"
97.22% Pervious = 24.938 ac 2.78% Impervious = 0.712 ac

Summary for Subcatchment 1S: SW Catchment

Runoff = 6.54 cfs @ 12.26 hrs, Volume= 0.7 af, Depth= 0.84"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 1.00-36.00 hrs, dt= 0.05 hrs
Type III 24-hr 2-yr Rainfall=3.40"

	Area (sf)	CN	Description
	12,034	39	>75% Grass cover, Good, HSG A
	260,745	74	>75% Grass cover, Good, HSG C
	73,846	30	Woods, Good, HSG A
	49,231	70	Woods, Good, HSG C
	8,073	77	Woods, Good, HSG D
*	5,122	98	Unconnected Impervious, HSG C
*	13,889	98	Wetland
	2,077	87	Dirt roads, HSG C
	514	96	Gravel surface, HSG A
	25,458	96	Gravel surface, HSG C
	450,989	68	Weighted Average
	431,978		95.78% Pervious Area
	19,011		4.22% Impervious Area
	5,122		26.94% Unconnected

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
12.1	50	0.0180	0.07		**Sheet Flow,** Woods: Light underbrush n= 0.400 P2= 3.60"
4.1	536	0.0180	2.16		**Shallow Concentrated Flow,** Unpaved Kv= 16.1 fps
16.2	586	Total			

Summary for Subcatchment 2S: East Catchment

Runoff = 9.34 cfs @ 12.46 hrs, Volume= 1.2 af, Depth= 1.23"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 1.00-36.00 hrs, dt= 0.05 hrs
Type III 24-hr 2-yr Rainfall=3.40"

Area (sf)	CN	Description
465,820	74	>75% Grass cover, Good, HSG C
22,382	96	Gravel surface, HSG C
12,000	98	Unconnected pavement, HSG C
24,950	70	Woods, Good, HSG C
525,152	75	Weighted Average
513,152		97.71% Pervious Area
12,000		2.29% Impervious Area
12,000		100.00% Unconnected

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
20.2	50	0.0050	0.04		**Sheet Flow,** Woods: Light underbrush n= 0.400 P2= 3.60"
10.7	1,163	0.0127	1.81		**Shallow Concentrated Flow,** Unpaved Kv= 16.1 fps
30.9	1,213	Total			

Summary for Subcatchment 3S: NE Catchment

Runoff = 2.14 cfs @ 12.33 hrs, Volume= 0.3 af, Depth= 0.95"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 1.00-36.00 hrs, dt= 0.05 hrs
Type III 24-hr 2-yr Rainfall=3.40"

Area (sf)	CN	Description
141,188	70	Woods, Good, HSG C
141,188		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
20.2	50	0.0050	0.04		**Sheet Flow,** Woods: Light underbrush n= 0.400 P2= 3.60"
1.1	135	0.0170	2.10		**Shallow Concentrated Flow,** Unpaved Kv= 16.1 fps
21.3	185	Total			

Summary for Reach D1: SW WETLAND

Inflow Area = 10.353 ac, 4.22% Impervious, Inflow Depth = 0.84" for 2-yr event
Inflow = 6.54 cfs @ 12.26 hrs, Volume= 0.7 af
Outflow = 6.54 cfs @ 12.26 hrs, Volume= 0.7 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind method, Time Span= 1.00-36.00 hrs, dt= 0.05 hrs

Summary for Reach D2: SE OFFSITE

Inflow Area = 12.056 ac, 2.29% Impervious, Inflow Depth = 1.23" for 2-yr event
Inflow = 9.34 cfs @ 12.46 hrs, Volume= 1.2 af
Outflow = 9.34 cfs @ 12.46 hrs, Volume= 1.2 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind method, Time Span= 1.00-36.00 hrs, dt= 0.05 hrs

Summary for Reach D3: NE OFFSITE

Inflow Area = 3.241 ac, 0.00% Impervious, Inflow Depth = 0.95" for 2-yr event
Inflow = 2.14 cfs @ 12.33 hrs, Volume= 0.3 af
Outflow = 2.14 cfs @ 12.33 hrs, Volume= 0.3 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind method, Time Span= 1.00-36.00 hrs, dt= 0.05 hrs

Time span=1.00-36.00 hrs, dt=0.05 hrs, 701 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Stor-Ind method - Pond routing by Stor-Ind method

Subcatchment 1S: SW Catchment Runoff Area=450,989 sf 4.22% Impervious Runoff Depth=1.89"
Flow Length=586' Slope=0.0180 '/' Tc=16.2 min CN=68 Runoff=16.22 cfs 1.6 af

Subcatchment 2S: East Catchment Runoff Area=525,152 sf 2.29% Impervious Runoff Depth=2.47"
Flow Length=1,213' Tc=30.9 min CN=75 Runoff=19.32 cfs 2.5 af

Subcatchment 3S: NE Catchment Runoff Area=141,188 sf 0.00% Impervious Runoff Depth=2.05"
Flow Length=185' Tc=21.3 min CN=70 Runoff=5.00 cfs 0.6 af

Reach D1: SW WETLAND Inflow=16.22 cfs 1.6 af
Outflow=16.22 cfs 1.6 af

Reach D2: SE OFFSITE Inflow=19.32 cfs 2.5 af
Outflow=19.32 cfs 2.5 af

Reach D3: NE OFFSITE Inflow=5.00 cfs 0.6 af
Outflow=5.00 cfs 0.6 af

Total Runoff Area = 25.650 ac Runoff Volume = 4.7 af Average Runoff Depth = 2.18"
97.22% Pervious = 24.938 ac 2.78% Impervious = 0.712 ac

Summary for Subcatchment 1S: SW Catchment

Runoff = 16.22 cfs @ 12.24 hrs, Volume= 1.6 af, Depth= 1.89"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 1.00-36.00 hrs, dt= 0.05 hrs
Type III 24-hr 10-yr Rainfall=5.02"

	Area (sf)	CN	Description
	12,034	39	>75% Grass cover, Good, HSG A
	260,745	74	>75% Grass cover, Good, HSG C
	73,846	30	Woods, Good, HSG A
	49,231	70	Woods, Good, HSG C
	8,073	77	Woods, Good, HSG D
*	5,122	98	Unconnected Impervious, HSG C
*	13,889	98	Wetland
	2,077	87	Dirt roads, HSG C
	514	96	Gravel surface, HSG A
	25,458	96	Gravel surface, HSG C
	450,989	68	Weighted Average
	431,978		95.78% Pervious Area
	19,011		4.22% Impervious Area
	5,122		26.94% Unconnected

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
12.1	50	0.0180	0.07		**Sheet Flow,** Woods: Light underbrush n= 0.400 P2= 3.60"
4.1	536	0.0180	2.16		**Shallow Concentrated Flow,** Unpaved Kv= 16.1 fps
16.2	586	Total			

Summary for Subcatchment 2S: East Catchment

Runoff = 19.32 cfs @ 12.44 hrs, Volume= 2.5 af, Depth= 2.47"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 1.00-36.00 hrs, dt= 0.05 hrs
Type III 24-hr 10-yr Rainfall=5.02"

Area (sf)	CN	Description
465,820	74	>75% Grass cover, Good, HSG C
22,382	96	Gravel surface, HSG C
12,000	98	Unconnected pavement, HSG C
24,950	70	Woods, Good, HSG C
525,152	75	Weighted Average
513,152		97.71% Pervious Area
12,000		2.29% Impervious Area
12,000		100.00% Unconnected

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
20.2	50	0.0050	0.04		**Sheet Flow,** Woods: Light underbrush n= 0.400 P2= 3.60"
10.7	1,163	0.0127	1.81		**Shallow Concentrated Flow,** Unpaved Kv= 16.1 fps
30.9	1,213	Total			

Summary for Subcatchment 3S: NE Catchment

Runoff = 5.00 cfs @ 12.31 hrs, Volume= 0.6 af, Depth= 2.05"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 1.00-36.00 hrs, dt= 0.05 hrs
Type III 24-hr 10-yr Rainfall=5.02"

Area (sf)	CN	Description
141,188	70	Woods, Good, HSG C
141,188		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
20.2	50	0.0050	0.04		**Sheet Flow,** Woods: Light underbrush n= 0.400 P2= 3.60"
1.1	135	0.0170	2.10		**Shallow Concentrated Flow,** Unpaved Kv= 16.1 fps
21.3	185	Total			

Summary for Reach D1: SW WETLAND

Inflow Area = 10.353 ac, 4.22% Impervious, Inflow Depth = 1.89" for 10-yr event
Inflow = 16.22 cfs @ 12.24 hrs, Volume= 1.6 af
Outflow = 16.22 cfs @ 12.24 hrs, Volume= 1.6 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind method, Time Span= 1.00-36.00 hrs, dt= 0.05 hrs

Summary for Reach D2: SE OFFSITE

Inflow Area = 12.056 ac, 2.29% Impervious, Inflow Depth = 2.47" for 10-yr event
Inflow = 19.32 cfs @ 12.44 hrs, Volume= 2.5 af
Outflow = 19.32 cfs @ 12.44 hrs, Volume= 2.5 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind method, Time Span= 1.00-36.00 hrs, dt= 0.05 hrs

Summary for Reach D3: NE OFFSITE

Inflow Area = 3.241 ac, 0.00% Impervious, Inflow Depth = 2.05" for 10-yr event
Inflow = 5.00 cfs @ 12.31 hrs, Volume= 0.6 af
Outflow = 5.00 cfs @ 12.31 hrs, Volume= 0.6 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind method, Time Span= 1.00-36.00 hrs, dt= 0.05 hrs

Time span=1.00-36.00 hrs, dt=0.05 hrs, 701 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Stor-Ind method - Pond routing by Stor-Ind method

Subcatchment 1S: SW Catchment Runoff Area=450,989 sf 4.22% Impervious Runoff Depth=2.65"
Flow Length=586' Slope=0.0180 '/' Tc=16.2 min CN=68 Runoff=23.14 cfs 2.3 af

Subcatchment 2S: East Catchment Runoff Area=525,152 sf 2.29% Impervious Runoff Depth=3.32"
Flow Length=1,213' Tc=30.9 min CN=75 Runoff=26.09 cfs 3.3 af

Subcatchment 3S: NE Catchment Runoff Area=141,188 sf 0.00% Impervious Runoff Depth=2.84"
Flow Length=185' Tc=21.3 min CN=70 Runoff=7.01 cfs 0.8 af

Reach D1: SW WETLAND Inflow=23.14 cfs 2.3 af
Outflow=23.14 cfs 2.3 af

Reach D2: SE OFFSITE Inflow=26.09 cfs 3.3 af
Outflow=26.09 cfs 3.3 af

Reach D3: NE OFFSITE Inflow=7.01 cfs 0.8 af
Outflow=7.01 cfs 0.8 af

Total Runoff Area = 25.650 ac Runoff Volume = 6.4 af Average Runoff Depth = 2.99"
97.22% Pervious = 24.938 ac 2.78% Impervious = 0.712 ac

Summary for Subcatchment 1S: SW Catchment

Runoff = 23.14 cfs @ 12.23 hrs, Volume= 2.3 af, Depth= 2.65"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 1.00-36.00 hrs, dt= 0.05 hrs
Type III 24-hr 25-yr Rainfall=6.04"

	Area (sf)	CN	Description
	12,034	39	>75% Grass cover, Good, HSG A
	260,745	74	>75% Grass cover, Good, HSG C
	73,846	30	Woods, Good, HSG A
	49,231	70	Woods, Good, HSG C
	8,073	77	Woods, Good, HSG D
*	5,122	98	Unconnected Impervious, HSG C
*	13,889	98	Wetland
	2,077	87	Dirt roads, HSG C
	514	96	Gravel surface, HSG A
	25,458	96	Gravel surface, HSG C
	450,989	68	Weighted Average
	431,978		95.78% Pervious Area
	19,011		4.22% Impervious Area
	5,122		26.94% Unconnected

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
12.1	50	0.0180	0.07		**Sheet Flow,** Woods: Light underbrush n= 0.400 P2= 3.60"
4.1	536	0.0180	2.16		**Shallow Concentrated Flow,** Unpaved Kv= 16.1 fps
16.2	586	Total			

Summary for Subcatchment 2S: East Catchment

Runoff = 26.09 cfs @ 12.43 hrs, Volume= 3.3 af, Depth= 3.32"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 1.00-36.00 hrs, dt= 0.05 hrs
Type III 24-hr 25-yr Rainfall=6.04"

Area (sf)	CN	Description
465,820	74	>75% Grass cover, Good, HSG C
22,382	96	Gravel surface, HSG C
12,000	98	Unconnected pavement, HSG C
24,950	70	Woods, Good, HSG C
525,152	75	Weighted Average
513,152		97.71% Pervious Area
12,000		2.29% Impervious Area
12,000		100.00% Unconnected

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
20.2	50	0.0050	0.04		**Sheet Flow,** Woods: Light underbrush n= 0.400 P2= 3.60"
10.7	1,163	0.0127	1.81		**Shallow Concentrated Flow,** Unpaved Kv= 16.1 fps
30.9	1,213	Total			

Summary for Subcatchment 3S: NE Catchment

Runoff = 7.01 cfs @ 12.30 hrs, Volume= 0.8 af, Depth= 2.84"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 1.00-36.00 hrs, dt= 0.05 hrs
Type III 24-hr 25-yr Rainfall=6.04"

Area (sf)	CN	Description
141,188	70	Woods, Good, HSG C
141,188		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
20.2	50	0.0050	0.04		**Sheet Flow,** Woods: Light underbrush n= 0.400 P2= 3.60"
1.1	135	0.0170	2.10		**Shallow Concentrated Flow,** Unpaved Kv= 16.1 fps
21.3	185	Total			

Summary for Reach D1: SW WETLAND

Inflow Area = 10.353 ac, 4.22% Impervious, Inflow Depth = 2.65" for 25-yr event
Inflow = 23.14 cfs @ 12.23 hrs, Volume= 2.3 af
Outflow = 23.14 cfs @ 12.23 hrs, Volume= 2.3 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind method, Time Span= 1.00-36.00 hrs, dt= 0.05 hrs

Summary for Reach D2: SE OFFSITE

Inflow Area = 12.056 ac, 2.29% Impervious, Inflow Depth = 3.32" for 25-yr event
Inflow = 26.09 cfs @ 12.43 hrs, Volume= 3.3 af
Outflow = 26.09 cfs @ 12.43 hrs, Volume= 3.3 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind method, Time Span= 1.00-36.00 hrs, dt= 0.05 hrs

Summary for Reach D3: NE OFFSITE

Inflow Area = 3.241 ac, 0.00% Impervious, Inflow Depth = 2.84" for 25-yr event
Inflow = 7.01 cfs @ 12.30 hrs, Volume= 0.8 af
Outflow = 7.01 cfs @ 12.30 hrs, Volume= 0.8 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind method, Time Span= 1.00-36.00 hrs, dt= 0.05 hrs

Time span=1.00-36.00 hrs, dt=0.05 hrs, 701 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Stor-Ind method - Pond routing by Stor-Ind method

Subcatchment 1S: SW Catchment Runoff Area=450,989 sf 4.22% Impervious Runoff Depth=3.90"
Flow Length=586' Slope=0.0180 '/' Tc=16.2 min CN=68 Runoff=34.45 cfs 3.4 af

Subcatchment 2S: East Catchment Runoff Area=525,152 sf 2.29% Impervious Runoff Depth=4.68"
Flow Length=1,213' Tc=30.9 min CN=75 Runoff=36.83 cfs 4.7 af

Subcatchment 3S: NE Catchment Runoff Area=141,188 sf 0.00% Impervious Runoff Depth=4.12"
Flow Length=185' Tc=21.3 min CN=70 Runoff=10.25 cfs 1.1 af

Reach D1: SW WETLAND Inflow=34.45 cfs 3.4 af
Outflow=34.45 cfs 3.4 af

Reach D2: SE OFFSITE Inflow=36.83 cfs 4.7 af
Outflow=36.83 cfs 4.7 af

Reach D3: NE OFFSITE Inflow=10.25 cfs 1.1 af
Outflow=10.25 cfs 1.1 af

Total Runoff Area = 25.650 ac Runoff Volume = 9.2 af Average Runoff Depth = 4.30"
97.22% Pervious = 24.938 ac 2.78% Impervious = 0.712 ac

Summary for Subcatchment 1S: SW Catchment

Runoff = 34.45 cfs @ 12.23 hrs, Volume= 3.4 af, Depth= 3.90"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 1.00-36.00 hrs, dt= 0.05 hrs
Type III 24-hr 100-yr Rainfall=7.60"

	Area (sf)	CN	Description
	12,034	39	>75% Grass cover, Good, HSG A
	260,745	74	>75% Grass cover, Good, HSG C
	73,846	30	Woods, Good, HSG A
	49,231	70	Woods, Good, HSG C
	8,073	77	Woods, Good, HSG D
*	5,122	98	Unconnected Impervious, HSG C
*	13,889	98	Wetland
	2,077	87	Dirt roads, HSG C
	514	96	Gravel surface, HSG A
	25,458	96	Gravel surface, HSG C
	450,989	68	Weighted Average
	431,978		95.78% Pervious Area
	19,011		4.22% Impervious Area
	5,122		26.94% Unconnected

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
12.1	50	0.0180	0.07		**Sheet Flow,** Woods: Light underbrush n= 0.400 P2= 3.60"
4.1	536	0.0180	2.16		**Shallow Concentrated Flow,** Unpaved Kv= 16.1 fps
16.2	586	Total			

Summary for Subcatchment 2S: East Catchment

Runoff = 36.83 cfs @ 12.42 hrs, Volume= 4.7 af, Depth= 4.68"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 1.00-36.00 hrs, dt= 0.05 hrs
Type III 24-hr 100-yr Rainfall=7.60"

Area (sf)	CN	Description
465,820	74	>75% Grass cover, Good, HSG C
22,382	96	Gravel surface, HSG C
12,000	98	Unconnected pavement, HSG C
24,950	70	Woods, Good, HSG C
525,152	75	Weighted Average
513,152		97.71% Pervious Area
12,000		2.29% Impervious Area
12,000		100.00% Unconnected

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
20.2	50	0.0050	0.04		**Sheet Flow,** Woods: Light underbrush n= 0.400 P2= 3.60"
10.7	1,163	0.0127	1.81		**Shallow Concentrated Flow,** Unpaved Kv= 16.1 fps
30.9	1,213	Total			

Summary for Subcatchment 3S: NE Catchment

Runoff = 10.25 cfs @ 12.30 hrs, Volume= 1.1 af, Depth= 4.12"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 1.00-36.00 hrs, dt= 0.05 hrs
Type III 24-hr 100-yr Rainfall=7.60"

Area (sf)	CN	Description
141,188	70	Woods, Good, HSG C
141,188		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
20.2	50	0.0050	0.04		**Sheet Flow,** Woods: Light underbrush n= 0.400 P2= 3.60"
1.1	135	0.0170	2.10		**Shallow Concentrated Flow,** Unpaved Kv= 16.1 fps
21.3	185	Total			

Summary for Reach D1: SW WETLAND

Inflow Area = 10.353 ac, 4.22% Impervious, Inflow Depth = 3.90" for 100-yr event
Inflow = 34.45 cfs @ 12.23 hrs, Volume= 3.4 af
Outflow = 34.45 cfs @ 12.23 hrs, Volume= 3.4 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind method, Time Span= 1.00-36.00 hrs, dt= 0.05 hrs

Summary for Reach D2: SE OFFSITE

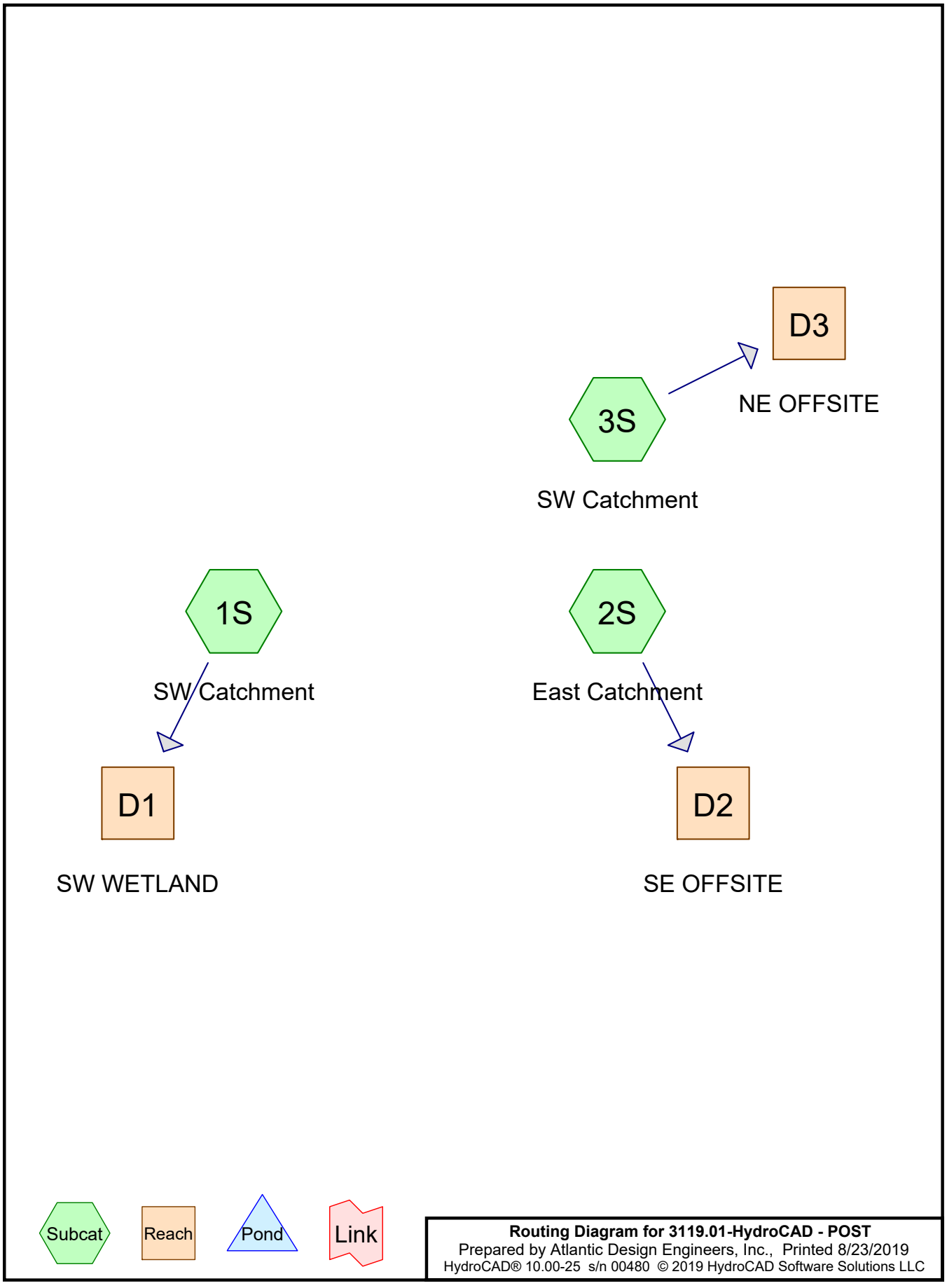
Inflow Area = 12.056 ac, 2.29% Impervious, Inflow Depth = 4.68" for 100-yr event
Inflow = 36.83 cfs @ 12.42 hrs, Volume= 4.7 af
Outflow = 36.83 cfs @ 12.42 hrs, Volume= 4.7 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind method, Time Span= 1.00-36.00 hrs, dt= 0.05 hrs

Summary for Reach D3: NE OFFSITE

Inflow Area = 3.241 ac, 0.00% Impervious, Inflow Depth = 4.12" for 100-yr event
Inflow = 10.25 cfs @ 12.30 hrs, Volume= 1.1 af
Outflow = 10.25 cfs @ 12.30 hrs, Volume= 1.1 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind method, Time Span= 1.00-36.00 hrs, dt= 0.05 hrs



Routing Diagram for 3119.01-HydroCAD - POST
Prepared by Atlantic Design Engineers, Inc., Printed 8/23/2019

Time span=1.00-36.00 hrs, dt=0.05 hrs, 701 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Subcatchment 1S: SW Catchment Runoff Area=450,989 sf 4.46% Impervious Runoff Depth=0.84"
Flow Length=586' Slope=0.0180 '/' Tc=16.2 min UI Adjusted CN=68 Runoff=6.54 cfs 0.7 af

Subcatchment 2S: East Catchment Runoff Area=534,150 sf 2.45% Impervious Runoff Depth=1.23"
Flow Length=1,271' Tc=33.6 min UI Adjusted CN=75 Runoff=9.14 cfs 1.3 af

Subcatchment 3S: SW Catchment Runoff Area=132,189 sf 0.00% Impervious Runoff Depth=1.00"
Flow Length=185' Tc=21.3 min CN=71 Runoff=2.14 cfs 0.3 af

Reach D1: SW WETLAND Inflow=6.54 cfs 0.7 af
Outflow=6.54 cfs 0.7 af

Reach D2: SE OFFSITE Inflow=9.14 cfs 1.3 af
Outflow=9.14 cfs 1.3 af

Reach D3: NE OFFSITE Inflow=2.14 cfs 0.3 af
Outflow=2.14 cfs 0.3 af

Total Runoff Area = 25.650 ac Runoff Volume = 2.2 af Average Runoff Depth = 1.05"
97.03% Pervious = 24.888 ac 2.97% Impervious = 0.762 ac

Summary for Subcatchment 1S: SW Catchment

Runoff = 6.54 cfs @ 12.26 hrs, Volume= 0.7 af, Depth= 0.84"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 1.00-36.00 hrs, dt= 0.05 hrs
Type III 24-hr 2-yr Rainfall=3.40"

	Area (sf)	CN	Adj	Description
	53,315	30		Woods, Good, HSG A
	49,625	70		Woods, Good, HSG C
	8,073	77		Woods, Good, HSG D
*	6,221	98		Unconnected Impervious, HSG C
*	13,889	98		Wetlands
	28,373	39		>75% Grass cover, Good, HSG A
	264,346	74		>75% Grass cover, Good, HSG C
	5,468	96		Gravel surface, HSG A
	21,679	96		Gravel surface, HSG C
	450,989	69	68	Weighted Average, UI Adjusted
	430,879			95.54% Pervious Area
	20,110			4.46% Impervious Area
	6,221			30.93% Unconnected

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
12.1	50	0.0180	0.07		**Sheet Flow,** Woods: Light underbrush n= 0.400 P2= 3.60"
4.1	536	0.0180	2.16		**Shallow Concentrated Flow,** Unpaved Kv= 16.1 fps
16.2	586	Total			

Summary for Subcatchment 2S: East Catchment

Runoff = 9.14 cfs @ 12.50 hrs, Volume= 1.3 af, Depth= 1.23"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 1.00-36.00 hrs, dt= 0.05 hrs
Type III 24-hr 2-yr Rainfall=3.40"

	Area (sf)	CN	Adj	Description
	491,881	74		>75% Grass cover, Good, HSG C
	24,117	96		Gravel surface, HSG C
*	13,099	98		Unconnected Impervious, HSG C
	5,053	70		Woods, Good, HSG C
	534,150	76	75	Weighted Average, UI Adjusted
	521,051			97.55% Pervious Area
	13,099			2.45% Impervious Area
	13,099			100.00% Unconnected

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
20.2	50	0.0050	0.04		**Sheet Flow,** Woods: Light underbrush n= 0.400 P2= 3.60"
0.2	45	0.0600	3.94		**Shallow Concentrated Flow,** Unpaved Kv= 16.1 fps
3.5	240	0.0050	1.14		**Shallow Concentrated Flow,** Unpaved Kv= 16.1 fps
9.7	936	0.0100	1.61		**Shallow Concentrated Flow,** Unpaved Kv= 16.1 fps
33.6	1,271	Total			

Summary for Subcatchment 3S: SW Catchment

Runoff = 2.14 cfs @ 12.33 hrs, Volume= 0.3 af, Depth= 1.00"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 1.00-36.00 hrs, dt= 0.05 hrs
Type III 24-hr 2-yr Rainfall=3.40"

Area (sf)	CN	Description
109,864	70	Woods, Good, HSG C
22,325	74	>75% Grass cover, Good, HSG C
132,189	71	Weighted Average
132,189		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
20.2	50	0.0050	0.04		**Sheet Flow,** Woods: Light underbrush n= 0.400 P2= 3.60"
1.1	135	0.0170	2.10		**Shallow Concentrated Flow,** Unpaved Kv= 16.1 fps
21.3	185	Total			

Summary for Reach D1: SW WETLAND

Inflow Area = 10.353 ac, 4.46% Impervious, Inflow Depth = 0.84" for 2-yr event
Inflow = 6.54 cfs @ 12.26 hrs, Volume= 0.7 af
Outflow = 6.54 cfs @ 12.26 hrs, Volume= 0.7 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 1.00-36.00 hrs, dt= 0.05 hrs

Summary for Reach D2: SE OFFSITE

Inflow Area = 12.262 ac, 2.45% Impervious, Inflow Depth = 1.23" for 2-yr event
Inflow = 9.14 cfs @ 12.50 hrs, Volume= 1.3 af
Outflow = 9.14 cfs @ 12.50 hrs, Volume= 1.3 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 1.00-36.00 hrs, dt= 0.05 hrs

Summary for Reach D3: NE OFFSITE

Inflow Area = 3.035 ac, 0.00% Impervious, Inflow Depth = 1.00" for 2-yr event
Inflow = 2.14 cfs @ 12.33 hrs, Volume= 0.3 af
Outflow = 2.14 cfs @ 12.33 hrs, Volume= 0.3 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 1.00-36.00 hrs, dt= 0.05 hrs

Time span=1.00-36.00 hrs, dt=0.05 hrs, 701 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Subcatchment 1S: SW Catchment Runoff Area=450,989 sf 4.46% Impervious Runoff Depth=1.89"
Flow Length=586' Slope=0.0180 '/' Tc=16.2 min UI Adjusted CN=68 Runoff=16.22 cfs 1.6 af

Subcatchment 2S: East Catchment Runoff Area=534,150 sf 2.45% Impervious Runoff Depth=2.47"
Flow Length=1,271' Tc=33.6 min UI Adjusted CN=75 Runoff=18.90 cfs 2.5 af

Subcatchment 3S: SW Catchment Runoff Area=132,189 sf 0.00% Impervious Runoff Depth=2.13"
Flow Length=185' Tc=21.3 min CN=71 Runoff=4.88 cfs 0.5 af

Reach D1: SW WETLAND Inflow=16.22 cfs 1.6 af
Outflow=16.22 cfs 1.6 af

Reach D2: SE OFFSITE Inflow=18.90 cfs 2.5 af
Outflow=18.90 cfs 2.5 af

Reach D3: NE OFFSITE Inflow=4.88 cfs 0.5 af
Outflow=4.88 cfs 0.5 af

Total Runoff Area = 25.650 ac Runoff Volume = 4.7 af Average Runoff Depth = 2.20"
97.03% Pervious = 24.888 ac 2.97% Impervious = 0.762 ac

Summary for Subcatchment 1S: SW Catchment

Runoff = 16.22 cfs @ 12.24 hrs, Volume= 1.6 af, Depth= 1.89"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 1.00-36.00 hrs, dt= 0.05 hrs
Type III 24-hr 10-yr Rainfall=5.02"

	Area (sf)	CN	Adj	Description
	53,315	30		Woods, Good, HSG A
	49,625	70		Woods, Good, HSG C
	8,073	77		Woods, Good, HSG D
*	6,221	98		Unconnected Impervious, HSG C
*	13,889	98		Wetlands
	28,373	39		>75% Grass cover, Good, HSG A
	264,346	74		>75% Grass cover, Good, HSG C
	5,468	96		Gravel surface, HSG A
	21,679	96		Gravel surface, HSG C
	450,989	69	68	Weighted Average, UI Adjusted
	430,879			95.54% Pervious Area
	20,110			4.46% Impervious Area
	6,221			30.93% Unconnected

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
12.1	50	0.0180	0.07		**Sheet Flow,** Woods: Light underbrush n= 0.400 P2= 3.60"
4.1	536	0.0180	2.16		**Shallow Concentrated Flow,** Unpaved Kv= 16.1 fps
16.2	586	Total			

Summary for Subcatchment 2S: East Catchment

Runoff = 18.90 cfs @ 12.48 hrs, Volume= 2.5 af, Depth= 2.47"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 1.00-36.00 hrs, dt= 0.05 hrs
Type III 24-hr 10-yr Rainfall=5.02"

	Area (sf)	CN	Adj	Description
	491,881	74		>75% Grass cover, Good, HSG C
	24,117	96		Gravel surface, HSG C
*	13,099	98		Unconnected Impervious, HSG C
	5,053	70		Woods, Good, HSG C
	534,150	76	75	Weighted Average, UI Adjusted
	521,051			97.55% Pervious Area
	13,099			2.45% Impervious Area
	13,099			100.00% Unconnected

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
20.2	50	0.0050	0.04		**Sheet Flow,** Woods: Light underbrush n= 0.400 P2= 3.60"
0.2	45	0.0600	3.94		**Shallow Concentrated Flow,** Unpaved Kv= 16.1 fps
3.5	240	0.0050	1.14		**Shallow Concentrated Flow,** Unpaved Kv= 16.1 fps
9.7	936	0.0100	1.61		**Shallow Concentrated Flow,** Unpaved Kv= 16.1 fps
33.6	1,271	Total			

Summary for Subcatchment 3S: SW Catchment

Runoff = 4.88 cfs @ 12.31 hrs, Volume= 0.5 af, Depth= 2.13"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 1.00-36.00 hrs, dt= 0.05 hrs
Type III 24-hr 10-yr Rainfall=5.02"

Area (sf)	CN	Description
109,864	70	Woods, Good, HSG C
22,325	74	>75% Grass cover, Good, HSG C
132,189	71	Weighted Average
132,189		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
20.2	50	0.0050	0.04		**Sheet Flow,** Woods: Light underbrush n= 0.400 P2= 3.60"
1.1	135	0.0170	2.10		**Shallow Concentrated Flow,** Unpaved Kv= 16.1 fps
21.3	185	Total			

Summary for Reach D1: SW WETLAND

Inflow Area = 10.353 ac, 4.46% Impervious, Inflow Depth = 1.89" for 10-yr event
Inflow = 16.22 cfs @ 12.24 hrs, Volume= 1.6 af
Outflow = 16.22 cfs @ 12.24 hrs, Volume= 1.6 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 1.00-36.00 hrs, dt= 0.05 hrs

Summary for Reach D2: SE OFFSITE

Inflow Area = 12.262 ac, 2.45% Impervious, Inflow Depth = 2.47" for 10-yr event
Inflow = 18.90 cfs @ 12.48 hrs, Volume= 2.5 af
Outflow = 18.90 cfs @ 12.48 hrs, Volume= 2.5 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 1.00-36.00 hrs, dt= 0.05 hrs

Summary for Reach D3: NE OFFSITE

Inflow Area = 3.035 ac, 0.00% Impervious, Inflow Depth = 2.13" for 10-yr event
Inflow = 4.88 cfs @ 12.31 hrs, Volume= 0.5 af
Outflow = 4.88 cfs @ 12.31 hrs, Volume= 0.5 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 1.00-36.00 hrs, dt= 0.05 hrs

Time span=1.00-36.00 hrs, dt=0.05 hrs, 701 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Subcatchment 1S: SW Catchment Runoff Area=450,989 sf 4.46% Impervious Runoff Depth=2.65"
Flow Length=586' Slope=0.0180 '/' Tc=16.2 min UI Adjusted CN=68 Runoff=23.14 cfs 2.3 af

Subcatchment 2S: East Catchment Runoff Area=534,150 sf 2.45% Impervious Runoff Depth=3.32"
Flow Length=1,271' Tc=33.6 min UI Adjusted CN=75 Runoff=25.54 cfs 3.4 af

Subcatchment 3S: SW Catchment Runoff Area=132,189 sf 0.00% Impervious Runoff Depth=2.93"
Flow Length=185' Tc=21.3 min CN=71 Runoff=6.79 cfs 0.7 af

Reach D1: SW WETLAND Inflow=23.14 cfs 2.3 af
Outflow=23.14 cfs 2.3 af

Reach D2: SE OFFSITE Inflow=25.54 cfs 3.4 af
Outflow=25.54 cfs 3.4 af

Reach D3: NE OFFSITE Inflow=6.79 cfs 0.7 af
Outflow=6.79 cfs 0.7 af

Total Runoff Area = 25.650 ac Runoff Volume = 6.4 af Average Runoff Depth = 3.00"
97.03% Pervious = 24.888 ac 2.97% Impervious = 0.762 ac

Summary for Subcatchment 1S: SW Catchment

Runoff = 23.14 cfs @ 12.23 hrs, Volume= 2.3 af, Depth= 2.65"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 1.00-36.00 hrs, dt= 0.05 hrs
Type III 24-hr 25-yr Rainfall=6.04"

	Area (sf)	CN	Adj	Description
	53,315	30		Woods, Good, HSG A
	49,625	70		Woods, Good, HSG C
	8,073	77		Woods, Good, HSG D
*	6,221	98		Unconnected Impervious, HSG C
*	13,889	98		Wetlands
	28,373	39		>75% Grass cover, Good, HSG A
	264,346	74		>75% Grass cover, Good, HSG C
	5,468	96		Gravel surface, HSG A
	21,679	96		Gravel surface, HSG C
	450,989	69	68	Weighted Average, UI Adjusted
	430,879			95.54% Pervious Area
	20,110			4.46% Impervious Area
	6,221			30.93% Unconnected

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
12.1	50	0.0180	0.07		**Sheet Flow,** Woods: Light underbrush n= 0.400 P2= 3.60"
4.1	536	0.0180	2.16		**Shallow Concentrated Flow,** Unpaved Kv= 16.1 fps
16.2	586	Total			

Summary for Subcatchment 2S: East Catchment

Runoff = 25.54 cfs @ 12.47 hrs, Volume= 3.4 af, Depth= 3.32"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 1.00-36.00 hrs, dt= 0.05 hrs
Type III 24-hr 25-yr Rainfall=6.04"

	Area (sf)	CN	Adj	Description
	491,881	74		>75% Grass cover, Good, HSG C
	24,117	96		Gravel surface, HSG C
*	13,099	98		Unconnected Impervious, HSG C
	5,053	70		Woods, Good, HSG C
	534,150	76	75	Weighted Average, UI Adjusted
	521,051			97.55% Pervious Area
	13,099			2.45% Impervious Area
	13,099			100.00% Unconnected

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
20.2	50	0.0050	0.04		**Sheet Flow,** Woods: Light underbrush n= 0.400 P2= 3.60"
0.2	45	0.0600	3.94		**Shallow Concentrated Flow,** Unpaved Kv= 16.1 fps
3.5	240	0.0050	1.14		**Shallow Concentrated Flow,** Unpaved Kv= 16.1 fps
9.7	936	0.0100	1.61		**Shallow Concentrated Flow,** Unpaved Kv= 16.1 fps
33.6	1,271	Total			

Summary for Subcatchment 3S: SW Catchment

Runoff = 6.79 cfs @ 12.30 hrs, Volume= 0.7 af, Depth= 2.93"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 1.00-36.00 hrs, dt= 0.05 hrs
Type III 24-hr 25-yr Rainfall=6.04"

Area (sf)	CN	Description
109,864	70	Woods, Good, HSG C
22,325	74	>75% Grass cover, Good, HSG C
132,189	71	Weighted Average
132,189		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
20.2	50	0.0050	0.04		**Sheet Flow,** Woods: Light underbrush n= 0.400 P2= 3.60"
1.1	135	0.0170	2.10		**Shallow Concentrated Flow,** Unpaved Kv= 16.1 fps
21.3	185	Total			

Summary for Reach D1: SW WETLAND

Inflow Area = 10.353 ac, 4.46% Impervious, Inflow Depth = 2.65" for 25-yr event
Inflow = 23.14 cfs @ 12.23 hrs, Volume= 2.3 af
Outflow = 23.14 cfs @ 12.23 hrs, Volume= 2.3 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 1.00-36.00 hrs, dt= 0.05 hrs

Summary for Reach D2: SE OFFSITE

Inflow Area = 12.262 ac, 2.45% Impervious, Inflow Depth = 3.32" for 25-yr event
Inflow = 25.54 cfs @ 12.47 hrs, Volume= 3.4 af
Outflow = 25.54 cfs @ 12.47 hrs, Volume= 3.4 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 1.00-36.00 hrs, dt= 0.05 hrs

Summary for Reach D3: NE OFFSITE

Inflow Area = 3.035 ac, 0.00% Impervious, Inflow Depth = 2.93" for 25-yr event
Inflow = 6.79 cfs @ 12.30 hrs, Volume= 0.7 af
Outflow = 6.79 cfs @ 12.30 hrs, Volume= 0.7 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 1.00-36.00 hrs, dt= 0.05 hrs

Time span=1.00-36.00 hrs, dt=0.05 hrs, 701 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Subcatchment 1S: SW Catchment Runoff Area=450,989 sf 4.46% Impervious Runoff Depth=3.90"
Flow Length=586' Slope=0.0180 '/' Tc=16.2 min UI Adjusted CN=68 Runoff=34.45 cfs 3.4 af

Subcatchment 2S: East Catchment Runoff Area=534,150 sf 2.45% Impervious Runoff Depth=4.68"
Flow Length=1,271' Tc=33.6 min UI Adjusted CN=75 Runoff=36.03 cfs 4.8 af

Subcatchment 3S: SW Catchment Runoff Area=132,189 sf 0.00% Impervious Runoff Depth=4.23"
Flow Length=185' Tc=21.3 min CN=71 Runoff=9.86 cfs 1.1 af

Reach D1: SW WETLAND Inflow=34.45 cfs 3.4 af
Outflow=34.45 cfs 3.4 af

Reach D2: SE OFFSITE Inflow=36.03 cfs 4.8 af
Outflow=36.03 cfs 4.8 af

Reach D3: NE OFFSITE Inflow=9.86 cfs 1.1 af
Outflow=9.86 cfs 1.1 af

Total Runoff Area = 25.650 ac Runoff Volume = 9.2 af Average Runoff Depth = 4.31"
97.03% Pervious = 24.888 ac 2.97% Impervious = 0.762 ac

Summary for Subcatchment 1S: SW Catchment

Runoff = 34.45 cfs @ 12.23 hrs, Volume= 3.4 af, Depth= 3.90"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 1.00-36.00 hrs, dt= 0.05 hrs
Type III 24-hr 100-yr Rainfall=7.60"

	Area (sf)	CN	Adj	Description
	53,315	30		Woods, Good, HSG A
	49,625	70		Woods, Good, HSG C
	8,073	77		Woods, Good, HSG D
*	6,221	98		Unconnected Impervious, HSG C
*	13,889	98		Wetlands
	28,373	39		>75% Grass cover, Good, HSG A
	264,346	74		>75% Grass cover, Good, HSG C
	5,468	96		Gravel surface, HSG A
	21,679	96		Gravel surface, HSG C
	450,989	69	68	Weighted Average, UI Adjusted
	430,879			95.54% Pervious Area
	20,110			4.46% Impervious Area
	6,221			30.93% Unconnected

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
12.1	50	0.0180	0.07		**Sheet Flow,** Woods: Light underbrush n= 0.400 P2= 3.60"
4.1	536	0.0180	2.16		**Shallow Concentrated Flow,** Unpaved Kv= 16.1 fps
16.2	586	Total			

Summary for Subcatchment 2S: East Catchment

Runoff = 36.03 cfs @ 12.46 hrs, Volume= 4.8 af, Depth= 4.68"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 1.00-36.00 hrs, dt= 0.05 hrs
Type III 24-hr 100-yr Rainfall=7.60"

	Area (sf)	CN	Adj	Description
	491,881	74		>75% Grass cover, Good, HSG C
	24,117	96		Gravel surface, HSG C
*	13,099	98		Unconnected Impervious, HSG C
	5,053	70		Woods, Good, HSG C
	534,150	76	75	Weighted Average, UI Adjusted
	521,051			97.55% Pervious Area
	13,099			2.45% Impervious Area
	13,099			100.00% Unconnected

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
20.2	50	0.0050	0.04		**Sheet Flow,** Woods: Light underbrush n= 0.400 P2= 3.60"
0.2	45	0.0600	3.94		**Shallow Concentrated Flow,** Unpaved Kv= 16.1 fps
3.5	240	0.0050	1.14		**Shallow Concentrated Flow,** Unpaved Kv= 16.1 fps
9.7	936	0.0100	1.61		**Shallow Concentrated Flow,** Unpaved Kv= 16.1 fps
33.6	1,271	Total			

Summary for Subcatchment 3S: SW Catchment

Runoff = 9.86 cfs @ 12.30 hrs, Volume= 1.1 af, Depth= 4.23"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 1.00-36.00 hrs, dt= 0.05 hrs
Type III 24-hr 100-yr Rainfall=7.60"

Area (sf)	CN	Description
109,864	70	Woods, Good, HSG C
22,325	74	>75% Grass cover, Good, HSG C
132,189	71	Weighted Average
132,189		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
20.2	50	0.0050	0.04		**Sheet Flow,** Woods: Light underbrush n= 0.400 P2= 3.60"
1.1	135	0.0170	2.10		**Shallow Concentrated Flow,** Unpaved Kv= 16.1 fps
21.3	185	Total			

Summary for Reach D1: SW WETLAND

Inflow Area = 10.353 ac, 4.46% Impervious, Inflow Depth = 3.90" for 100-yr event
Inflow = 34.45 cfs @ 12.23 hrs, Volume= 3.4 af
Outflow = 34.45 cfs @ 12.23 hrs, Volume= 3.4 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 1.00-36.00 hrs, dt= 0.05 hrs

Summary for Reach D2: SE OFFSITE

Inflow Area = 12.262 ac, 2.45% Impervious, Inflow Depth = 4.68" for 100-yr event
Inflow = 36.03 cfs @ 12.46 hrs, Volume= 4.8 af
Outflow = 36.03 cfs @ 12.46 hrs, Volume= 4.8 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 1.00-36.00 hrs, dt= 0.05 hrs

Summary for Reach D3: NE OFFSITE

Inflow Area = 3.035 ac, 0.00% Impervious, Inflow Depth = 4.23" for 100-yr event
Inflow = 9.86 cfs @ 12.30 hrs, Volume= 1.1 af
Outflow = 9.86 cfs @ 12.30 hrs, Volume= 1.1 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 1.00-36.00 hrs, dt= 0.05 hrs

APPENDIX C
Miscellaneous Calculations

Required Recharge Volume

Design Engineer:	Atlantic Design Engineers, INC	Job No.:	3119.01
Project Name:	46 CHARITY STEVENS LANE SOLAR PROJECT	Calc'd By:	PMJ
Location:	Fairhaven, MA	Date:	8/22/2019

The groundwater recharge volume is required for the proposed **impervious** surfaces.

Rv = (F) (Aimp)
Rv = Required Recharge Volume
Aimp= Impervious Area on site
F = Target Depth Factor: 0.25 inch for C soils

Subcatchment Area: 1S

Total New Impervious Area for the Design Point=	1,100	sf			
Required Recharge Volume (Rv)=	1,100	* 0.25" * (1/12)=	22.91	cf	
Volume Provided in stormwater BMP=			24.00	cf	Infiltration Trench (2' x 1' D x 30' L) 40% Voids

Subcatchment Area: 2S

Total New Impervious Area for the Design Point=	1,100	sf			
Required Recharge Volume (Rv)=	1,100	* 0.25" * (1/12)=	22.91	cf	
Volume Provided in stormwater BMP=			24.00	cf	Infiltration Trench (2' x 1' D x 30' L) 40% Voids

Total Required Recharge Volume on Site=	**22.91**	**cf**
Total Recharge Volume Provided in stormwater BMPs on Site=	**24.00**	**cf**

Infiltration Trench 72 Hour Drawdown Calculations

Design Engineer:	Atlantic Design Engineers, INC	Job No.:	3119.01
Project Name:	46 Charity Stevens Lane Solar Project	Calc'd By:	PMJ
Location:	Fairhaven, MA	Date:	8/22/2019

Time Drawdown (Tdd)=Rv/[(K)(A)(n)]

Rv = Storage Volume
K = Saturated Hydraulic Conductivity (0.17 in/hr or 0.0142 ft/hr applied as conservative approach)
A = Bottom Area of Trench (LxW)
n = Porosity of Stone (n=0.40 for 40% void ratio)

Rv considers calculated volume provided within trench as conservative approach

Infiltration Trench

Trench Dimensions	30	ft Long	
	2	ft Wide	
	1	ft Deep	
Storage Volume Provided in Trench (Rv)=	24	cf = (30x2x1x0.4)	
Time to Drawdown (Tdd)=	24/(0.0142*30*2))=		**28 hrs < 72 hrs - Requirement Met**

APPENDIX D

Pre and Post-Development Watershed Plans

FILE: 3119.01-WSHD

Atlantic® DESIGN ENGINEERS, INC.
P.O. Box 1051, Sandwich, MA 02563 (508) 888 – 9282

Designed by :
Drawn by :
Checked by :
Survey chk. by :
Approved by :

SCALE
SCALE 1" = 80'
0 20 40 80 160

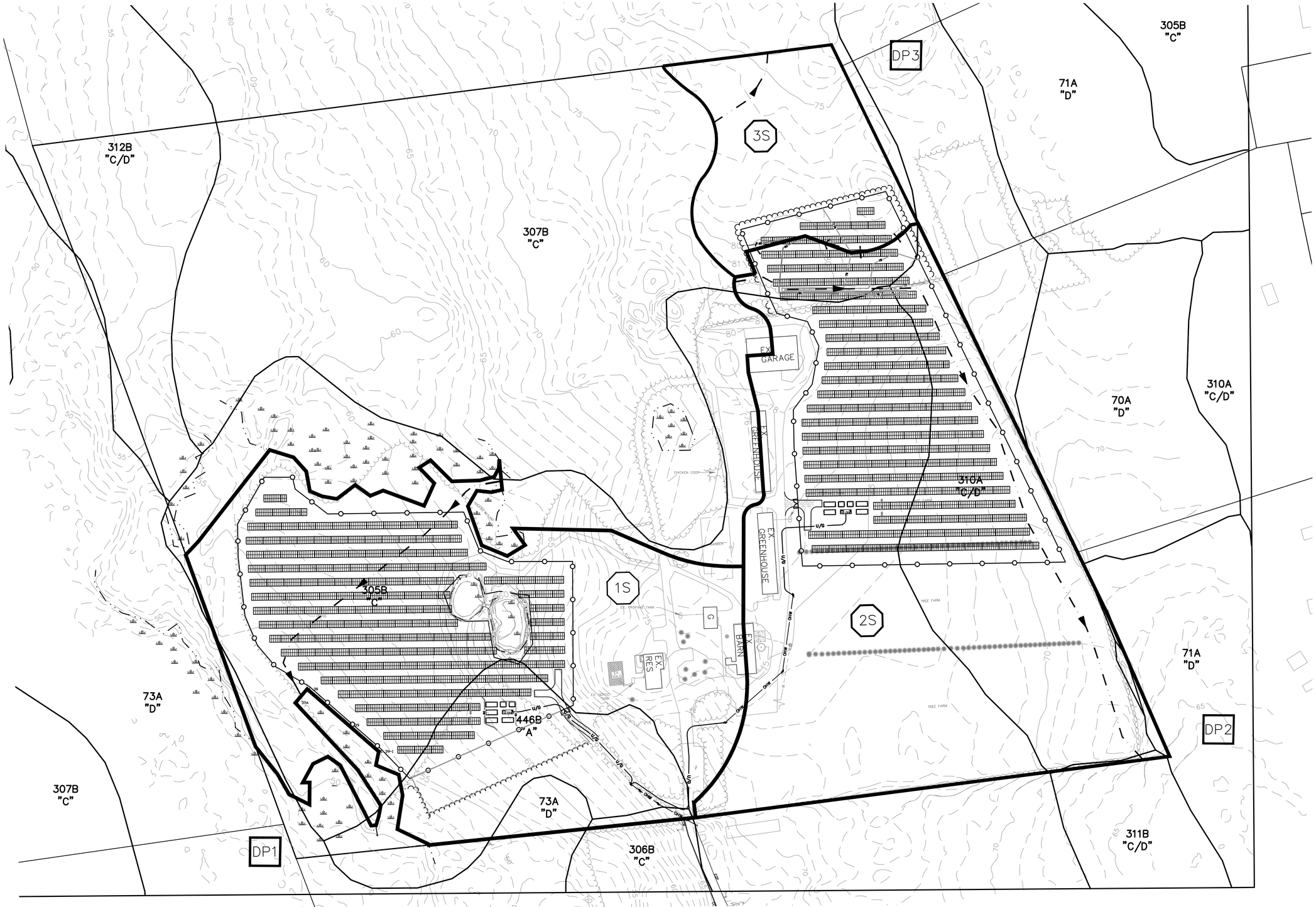
DATE

NO.	BY	DATE	REVISION

PREPARED FOR:
FAIRHAVEN MA 4, LLC
c/o CLEAN ENERGY COLLECTIVE, LLC.
27 B MIDSTATE DR, SUITE 106
AUBURN, MASSACHUSETTS 01501

PRE-DEVELOPMENT WATERSHED PLAN
FOR
46 CHARITY STEVENS LANE SOLAR PROJECT
FAIRHAVEN, MASSACHUSETTS
AUGUST 23, 2019

Sheet 1 of 1
JOB NUMBER 3119.01



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Atlantic® DESIGN ENGINEERS, INC.
P.O. Box 1051, Sandwich, MA 02563 (508) 888 – 9282

Designed by :
Drawn by :
Checked by :
Survey chk. by :
Approved by :

SCALE
SCALE 1" = 80'
0 20 40 80 160

DATE

NO.	BY	DATE	REVISION

PREPARED FOR:
FAIRHAVEN MA 4, LLC
c/o CLEAN ENERGY COLLECTIVE, LLC.
27 B MIDSTATE DR, SUITE 106
AUBURN, MASSACHUSETTS 01501

POST-DEVELOPMENT WATERSHED PLAN
FOR
46 CHARITY STEVENS LANE SOLAR PROJECT
FAIRHAVEN, MASSACHUSETTS
AUGUST 23, 2019

Sheet 1 of 1
JOB NUMBER 3119.01

APPENDIX E

Long Term Operation and Maintenance Plan

46 Charity Stevens Lane Solar Project

At

46 Charity Stevens Lane, Fairhaven, MA 02719

Post-Construction

Long Term Stormwater Operation & Maintenance Plan

August 23, 2019

A. GENERAL NOTES

1. The contractor shall be responsible for the proper inspection and maintenance of all stormwater and erosion control facilities until the project construction is completed. The contractor shall clean all components of the stormwater management system at the completion of construction, immediately prior to turning over operation and maintenance responsibility to the owner. Erosion control should be removed after the vegetation meets the established standards.

2. Upon completion of construction, the operation and maintenance of all components of the stormwater management system will be the responsibility of the system owner:

Fairhaven MA 4, LLC
c/o Clean Energy Collective, LLC
27B Midstate Drive, Suite 106
Auburn, MA 01501

3. The owner/contractor shall file an inspection report with the Town of Fairhaven Conservation Commission following each site inspection as recommended in the Operation & Maintenance (O&M) Schedule. The inspection report shall identify the date of inspection, name, and contact number of responsible party, specific structures inspected, specific maintenance and/or repairs required and general observations. Any deficiencies noted in the inspection report shall be corrected to the Town of Fairhaven Conservation Commission's satisfaction.

4. Disposal of accumulated sediment and hydrocarbons to be in accordance with the applicable local, state, and federal guidelines and regulations.

5. There shall be no illicit discharge of any waste or waste water into the stormwater management system. The maintenance of the facility shall be undertaken in such a manner as to prevent any discharge of waste or waste water into the stormwater management system. Any waste oil or other waste products generated during the maintenance shall be properly disposed of offsite.

B. STORMWATER SYSTEM/BMPs

Erosion Control Barriers:

Erosion control barriers (haybales, silt fence, etc.) should be inspected immediately after each run-off producing rainfall event and at least daily during prolonged rainfall. Sediment deposits must be removed when the level of deposition reaches approximately one-half the height of the barrier. Sediment shall be disposed of in a suitable area and protected from erosion by either structural or vegetative means. Erosion control should be removed after the vegetation meets the established standards.

Stone Trench:

Inspect after every major storm event (2" or greater) during construction. Once site is stabilized and re-vegetated, cut away/remove temporary cover fold and inspect and for the first few months after construction to ensure proper stabilization and function, thereafter inspect at least twice per year during wet weather to ensure the system is working properly. Remove sediment as necessary during construction and at least every five years after construction. Once construction is completed check for accumulation of sediment, debris and leaf litter at least twice a year thereafter.

Grassed Swale:

During construction grassed lined swales shall be inspected immediately after each run-off producing rainfall event and at least daily during prolonged rainfall. After construction, inspect at a minimum of twice a year, or after major storm events (2” or greater). Repair eroded spots immediately after inspection. Additional inspections should be scheduled during the first few months to ensure that the vegetation in the channels is established adequately. Accumulated sediment shall be removed at least once a year or before it exceeds 0.5' in depth, whichever occurs first. Swales shall be mowed as needed. Clippings to be removed from swales, areas immediately up-gradient and properly disposed of.

APPENDIX F

NRCS Soil Survey Maps and Soil Group Descriptions

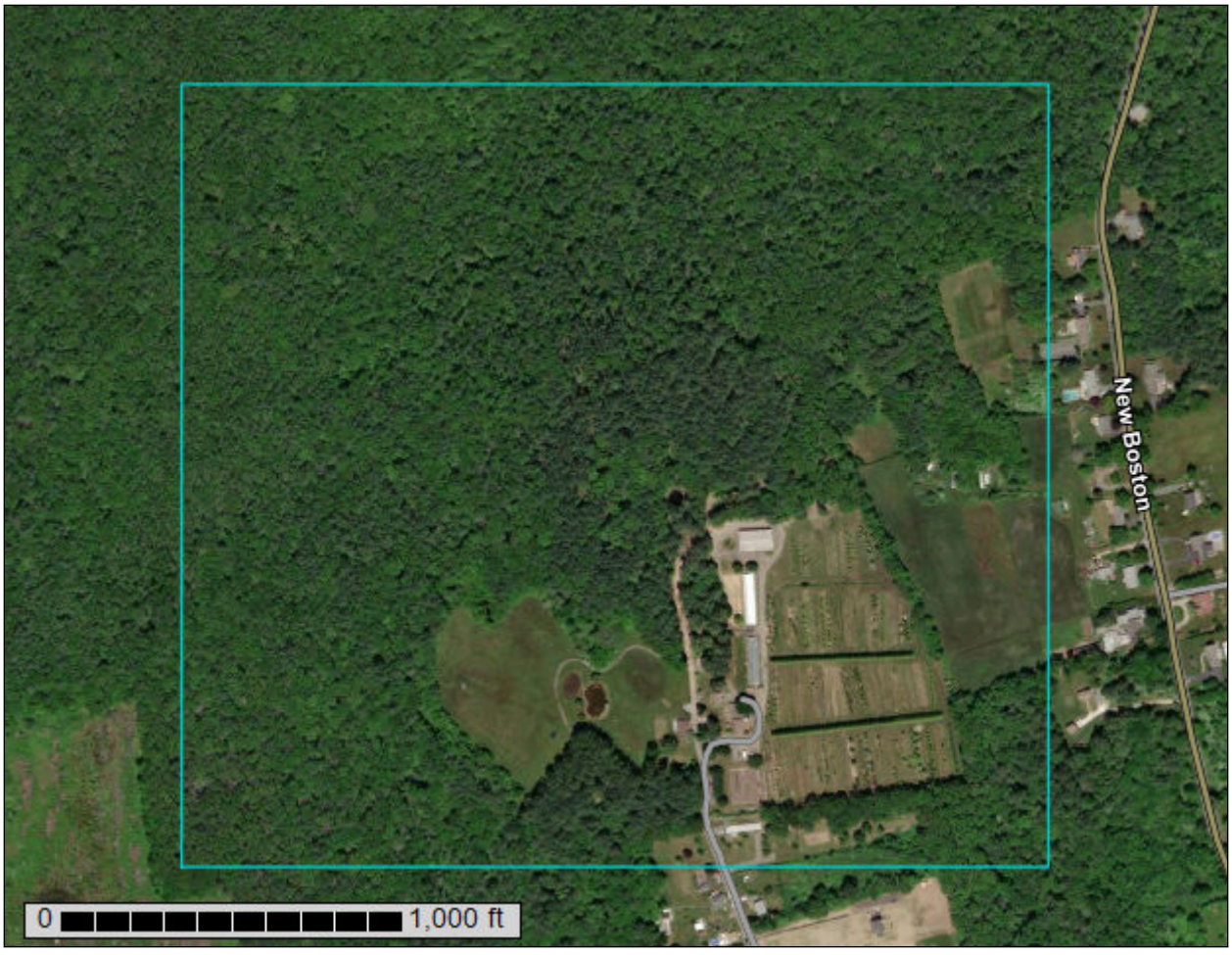
United States Department of Agriculture

NRCS

Natural Resources Conservation Service

A product of the National Cooperative Soil Survey, a joint effort of the United States Department of Agriculture and other Federal agencies, State agencies including the Agricultural Experiment Stations, and local participants

Custom Soil Resource Report for Bristol County, Massachusetts, Southern Part



July 25, 2019

Preface

Soil surveys contain information that affects land use planning in survey areas. They highlight soil limitations that affect various land uses and provide information about the properties of the soils in the survey areas. Soil surveys are designed for many different users, including farmers, ranchers, foresters, agronomists, urban planners, community officials, engineers, developers, builders, and home buyers. Also, conservationists, teachers, students, and specialists in recreation, waste disposal, and pollution control can use the surveys to help them understand, protect, or enhance the environment.

Various land use regulations of Federal, State, and local governments may impose special restrictions on land use or land treatment. Soil surveys identify soil properties that are used in making various land use or land treatment decisions. The information is intended to help the land users identify and reduce the effects of soil limitations on various land uses. The landowner or user is responsible for identifying and complying with existing laws and regulations.

Although soil survey information can be used for general farm, local, and wider area planning, onsite investigation is needed to supplement this information in some cases. Examples include soil quality assessments (http://www.nrcs.usda.gov/wps/portal/nrcs/main/soils/health/) and certain conservation and engineering applications. For more detailed information, contact your local USDA Service Center (https://offices.sc.egov.usda.gov/locator/app?agency=nrcs) or your NRCS State Soil Scientist (http://www.nrcs.usda.gov/wps/portal/nrcs/detail/soils/contactus/?cid=nrcs142p2_053951).

Great differences in soil properties can occur within short distances. Some soils are seasonally wet or subject to flooding. Some are too unstable to be used as a foundation for buildings or roads. Clayey or wet soils are poorly suited to use as septic tank absorption fields. A high water table makes a soil poorly suited to basements or underground installations.

The National Cooperative Soil Survey is a joint effort of the United States Department of Agriculture and other Federal agencies, State agencies including the Agricultural Experiment Stations, and local agencies. The Natural Resources Conservation Service (NRCS) has leadership for the Federal part of the National Cooperative Soil Survey.

Information about soils is updated periodically. Updated information is available through the NRCS Web Soil Survey, the site for official soil survey information.

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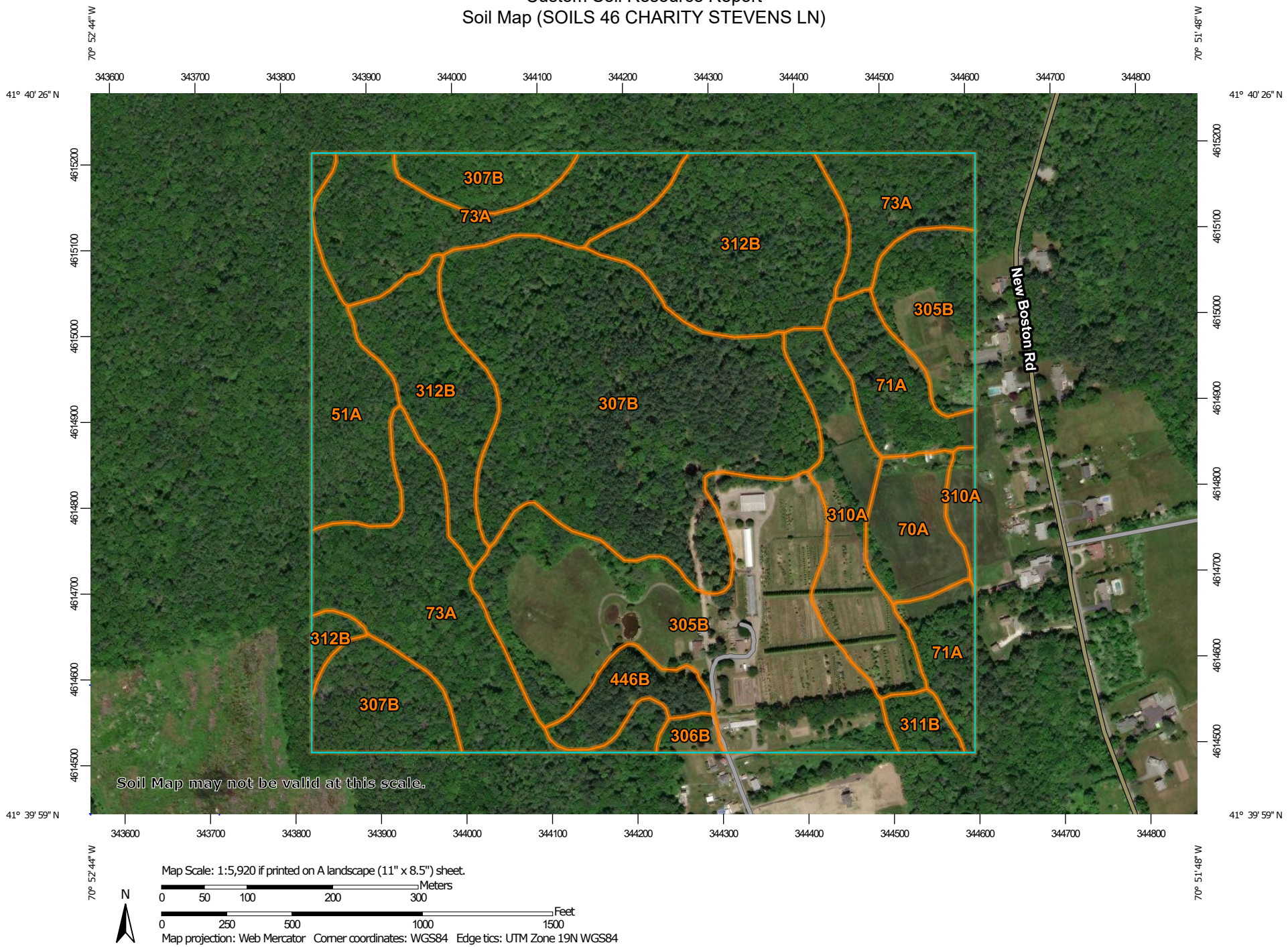
Contents

Soil Map

The soil map section includes the soil map for the defined area of interest, a list of soil map units on the map and extent of each map unit, and cartographic symbols displayed on the map. Also presented are various metadata about data used to produce the map, and a description of each soil map unit.

Custom Soil Resource Report
Soil Map (SOILS 46 CHARITY STEVENS LN)



MAP LEGEND

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

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

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

Water Features
- Streams and Canals

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

Background
- Aerial Photography

MAP INFORMATION

The soil surveys that comprise your AOI were mapped at 1:20,000.

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: Bristol County, Massachusetts, Southern Part
Survey Area Data: Version 12, Sep 7, 2018

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

Date(s) aerial images were photographed: Dec 31, 2009—Jul 3, 2017

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

Map Unit Legend (SOILS 46 CHARITY STEVENS LN)

Map Unit Symbol	Map Unit Name	Acres in AOI	Percent of AOI
51A	Swansea muck, 0 to 1 percent slopes	6.2	4.6%
70A	Ridgebury fine sandy loam, 0 to 3 percent slopes	4.0	2.9%
71A	Ridgebury fine sandy loam, 0 to 3 percent slopes, extremely stony	6.8	5.1%
73A	Whitman fine sandy loam, 0 to 3 percent slopes, extremely stony	25.0	18.6%
305B	Paxton fine sandy loam, 3 to 8 percent slopes	26.7	19.9%
306B	Paxton fine sandy loam, 0 to 8 percent slopes, very stony	0.7	0.5%
307B	Paxton fine sandy loam, 0 to 8 percent slopes, extremely stony	34.7	25.8%
310A	Woodbridge fine sandy loam, 0 to 3 percent slopes	7.8	5.8%
311B	Woodbridge fine sandy loam, 0 to 8 percent slopes, very stony	1.2	0.9%
312B	Woodbridge fine sandy loam, 0 to 8 percent slopes, extremely stony	18.5	13.8%
446B	Gloucester-Hinckley complex, 3 to 8 percent slopes, very stony	2.8	2.1%
Totals for Area of Interest		**134.5**	**100.0%**

Map Unit Descriptions (SOILS 46 CHARITY STEVENS LN)

The map units delineated on the detailed soil maps in a soil survey represent the soils or miscellaneous areas in the survey area. The map unit descriptions, along with the maps, can be used to determine the composition and properties of a unit.

A map unit delineation on a soil map represents an area dominated by one or more major kinds of soil or miscellaneous areas. A map unit is identified and named according to the taxonomic classification of the dominant soils. Within a taxonomic class there are precisely defined limits for the properties of the soils. On the landscape, however, the soils are natural phenomena, and they have the

characteristic variability of all natural phenomena. Thus, the range of some observed properties may extend beyond the limits defined for a taxonomic class. Areas of soils of a single taxonomic class rarely, if ever, can be mapped without including areas of other taxonomic classes. Consequently, every map unit is made up of the soils or miscellaneous areas for which it is named and some minor components that belong to taxonomic classes other than those of the major soils.

Most minor soils have properties similar to those of the dominant soil or soils in the map unit, and thus they do not affect use and management. These are called noncontrasting, or similar, components. They may or may not be mentioned in a particular map unit description. Other minor components, however, have properties and behavioral characteristics divergent enough to affect use or to require different management. These are called contrasting, or dissimilar, components. They generally are in small areas and could not be mapped separately because of the scale used. Some small areas of strongly contrasting soils or miscellaneous areas are identified by a special symbol on the maps. If included in the database for a given area, the contrasting minor components are identified in the map unit descriptions along with some characteristics of each. A few areas of minor components may not have been observed, and consequently they are not mentioned in the descriptions, especially where the pattern was so complex that it was impractical to make enough observations to identify all the soils and miscellaneous areas on the landscape.

The presence of minor components in a map unit in no way diminishes the usefulness or accuracy of the data. The objective of mapping is not to delineate pure taxonomic classes but rather to separate the landscape into landforms or landform segments that have similar use and management requirements. The delineation of such segments on the map provides sufficient information for the development of resource plans. If intensive use of small areas is planned, however, onsite investigation is needed to define and locate the soils and miscellaneous areas.

An identifying symbol precedes the map unit name in the map unit descriptions. Each description includes general facts about the unit and gives important soil properties and qualities.

Soils that have profiles that are almost alike make up a *soil series*. Except for differences in texture of the surface layer, all the soils of a series have major horizons that are similar in composition, thickness, and arrangement.

Soils of one series can differ in texture of the surface layer, slope, stoniness, salinity, degree of erosion, and other characteristics that affect their use. On the basis of such differences, a soil series is divided into *soil phases*. Most of the areas shown on the detailed soil maps are phases of soil series. The name of a soil phase commonly indicates a feature that affects use or management. For example, Alpha silt loam, 0 to 2 percent slopes, is a phase of the Alpha series.

Some map units are made up of two or more major soils or miscellaneous areas. These map units are complexes, associations, or undifferentiated groups.

A *complex* consists of two or more soils or miscellaneous areas in such an intricate pattern or in such small areas that they cannot be shown separately on the maps. The pattern and proportion of the soils or miscellaneous areas are somewhat similar in all areas. Alpha-Beta complex, 0 to 6 percent slopes, is an example.

An *association* is made up of two or more geographically associated soils or miscellaneous areas that are shown as one unit on the maps. Because of present or anticipated uses of the map units in the survey area, it was not considered

practical or necessary to map the soils or miscellaneous areas separately. The pattern and relative proportion of the soils or miscellaneous areas are somewhat similar. Alpha-Beta association, 0 to 2 percent slopes, is an example.

An *undifferentiated group* is made up of two or more soils or miscellaneous areas that could be mapped individually but are mapped as one unit because similar interpretations can be made for use and management. The pattern and proportion of the soils or miscellaneous areas in a mapped area are not uniform. An area can be made up of only one of the major soils or miscellaneous areas, or it can be made up of all of them. Alpha and Beta soils, 0 to 2 percent slopes, is an example.

Some surveys include *miscellaneous areas*. Such areas have little or no soil material and support little or no vegetation. Rock outcrop is an example.

Bristol County, Massachusetts, Southern Part

51A—Swansea muck, 0 to 1 percent slopes

Map Unit Setting

National map unit symbol: 2trl2
Elevation: 0 to 1,140 feet
Mean annual precipitation: 36 to 71 inches
Mean annual air temperature: 39 to 55 degrees F
Frost-free period: 140 to 240 days
Farmland classification: Farmland of unique importance

Map Unit Composition

Swansea and similar soils: 80 percent
Minor components: 20 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Swansea

Setting

Landform: Swamps, bogs
Landform position (three-dimensional): Dip
Down-slope shape: Concave
Across-slope shape: Concave
Parent material: Highly decomposed organic material over loose sandy and gravelly glaciofluvial deposits

Typical profile

Oa1 - 0 to 24 inches: muck
Oa2 - 24 to 34 inches: muck
Cg - 34 to 79 inches: coarse sand

Properties and qualities

Slope: 0 to 1 percent
Depth to restrictive feature: More than 80 inches
Natural drainage class: Very poorly drained
Runoff class: Negligible
Capacity of the most limiting layer to transmit water (Ksat): Moderately low to high (0.14 to 14.17 in/hr)
Depth to water table: About 0 to 6 inches
Frequency of flooding: Rare
Frequency of ponding: Frequent
Available water storage in profile: Very high (about 16.5 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 8w
Hydrologic Soil Group: B/D
Hydric soil rating: Yes

Minor Components

Freetown

Percent of map unit: 10 percent
Landform: Bogs, swamps
Landform position (three-dimensional): Dip

Down-slope shape: Concave
Across-slope shape: Concave
Hydric soil rating: Yes

Scarboro

Percent of map unit: 5 percent
Landform: Depressions, drainageways
Landform position (two-dimensional): Toeslope
Landform position (three-dimensional): Base slope, tread, dip
Down-slope shape: Concave
Across-slope shape: Concave
Hydric soil rating: Yes

Whitman

Percent of map unit: 5 percent
Landform: Depressions, drainageways
Landform position (two-dimensional): Toeslope
Landform position (three-dimensional): Base slope
Down-slope shape: Concave
Across-slope shape: Concave
Hydric soil rating: Yes

70A—Ridgebury fine sandy loam, 0 to 3 percent slopes

Map Unit Setting

National map unit symbol: 2w69f
Elevation: 0 to 1,480 feet
Mean annual precipitation: 36 to 71 inches
Mean annual air temperature: 39 to 55 degrees F
Frost-free period: 140 to 240 days
Farmland classification: Not prime farmland

Map Unit Composition

Ridgebury and similar soils: 85 percent
Minor components: 15 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Ridgebury

Setting

Landform: Ground moraines, drainageways, depressions, drumlins, hills
Landform position (two-dimensional): Toeslope, footslope
Landform position (three-dimensional): Head slope, base slope
Down-slope shape: Concave
Across-slope shape: Concave
Parent material: Coarse-loamy lodgment till derived from gneiss, granite, and/or schist

Typical profile

Oe - 0 to 1 inches: moderately decomposed plant material
A - 1 to 6 inches: fine sandy loam

Bw - 6 to 10 inches: sandy loam
Bg - 10 to 19 inches: gravelly sandy loam
Cd - 19 to 66 inches: gravelly sandy loam

Properties and qualities

Slope: 0 to 3 percent
Depth to restrictive feature: 15 to 35 inches to densic material
Natural drainage class: Poorly drained
Runoff class: Very high
Capacity of the most limiting layer to transmit water (Ksat): Very low to moderately low (0.00 to 0.14 in/hr)
Depth to water table: About 0 to 6 inches
Frequency of flooding: None
Frequency of ponding: None
Salinity, maximum in profile: Nonsaline (0.0 to 1.9 mmhos/cm)
Available water storage in profile: Low (about 3.0 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 4w
Hydrologic Soil Group: D
Hydric soil rating: Yes

Minor Components

Woodbridge

Percent of map unit: 9 percent
Landform: Drumlins, hills, ground moraines
Landform position (two-dimensional): Footslope, summit
Landform position (three-dimensional): Crest, base slope
Down-slope shape: Convex
Across-slope shape: Linear
Hydric soil rating: No

Whitman

Percent of map unit: 5 percent
Landform: Hills, depressions, ground moraines, drumlins, drainageways
Landform position (two-dimensional): Toeslope
Landform position (three-dimensional): Base slope
Down-slope shape: Concave
Across-slope shape: Concave
Hydric soil rating: Yes

Leicester

Percent of map unit: 1 percent
Landform: Drainageways, hills, ground moraines, depressions
Landform position (two-dimensional): Toeslope, footslope
Landform position (three-dimensional): Base slope
Down-slope shape: Linear, concave
Across-slope shape: Concave
Hydric soil rating: Yes

71A—Ridgebury fine sandy loam, 0 to 3 percent slopes, extremely stony

Map Unit Setting

National map unit symbol: 2w69b
Elevation: 0 to 1,480 feet
Mean annual precipitation: 36 to 71 inches
Mean annual air temperature: 39 to 55 degrees F
Frost-free period: 140 to 240 days
Farmland classification: Not prime farmland

Map Unit Composition

Ridgebury, extremely stony, and similar soils: 85 percent
Minor components: 15 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Ridgebury, Extremely Stony

Setting

Landform: Ground moraines, depressions, drumlins, drainageways, hills
Landform position (two-dimensional): Toeslope, footslope
Landform position (three-dimensional): Head slope, base slope
Down-slope shape: Concave
Across-slope shape: Concave
Parent material: Coarse-loamy lodgment till derived from gneiss, granite, and/or schist

Typical profile

Oe - 0 to 1 inches: moderately decomposed plant material
A - 1 to 6 inches: fine sandy loam
Bw - 6 to 10 inches: sandy loam
Bg - 10 to 19 inches: gravelly sandy loam
Cd - 19 to 66 inches: gravelly sandy loam

Properties and qualities

Slope: 0 to 3 percent
Percent of area covered with surface fragments: 9.0 percent
Depth to restrictive feature: 15 to 35 inches to densic material
Natural drainage class: Poorly drained
Runoff class: Very high
Capacity of the most limiting layer to transmit water (Ksat): Very low to moderately low (0.00 to 0.14 in/hr)
Depth to water table: About 0 to 6 inches
Frequency of flooding: None
Frequency of ponding: None
Salinity, maximum in profile: Nonsaline (0.0 to 1.9 mmhos/cm)
Available water storage in profile: Low (about 3.0 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 7s

Hydrologic Soil Group: D
Hydric soil rating: Yes

Minor Components

Whitman, extremely stony
Percent of map unit: 7 percent
Landform: Depressions
Down-slope shape: Concave
Across-slope shape: Concave
Hydric soil rating: Yes

Woodbridge, extremely stony
Percent of map unit: 7 percent
Landform: Drumlins, hills, ground moraines
Landform position (two-dimensional): Footslope, summit
Landform position (three-dimensional): Crest, base slope
Down-slope shape: Convex
Across-slope shape: Linear
Hydric soil rating: No

Paxton, extremely stony
Percent of map unit: 1 percent
Landform: Drumlins, hills, ground moraines
Landform position (two-dimensional): Shoulder, summit
Landform position (three-dimensional): Crest
Down-slope shape: Linear, convex
Across-slope shape: Convex, linear
Hydric soil rating: No

73A—Whitman fine sandy loam, 0 to 3 percent slopes, extremely stony

Map Unit Setting
National map unit symbol: 2w695
Elevation: 0 to 1,580 feet
Mean annual precipitation: 36 to 71 inches
Mean annual air temperature: 39 to 55 degrees F
Frost-free period: 140 to 240 days
Farmland classification: Not prime farmland

Map Unit Composition
Whitman, extremely stony, and similar soils: 81 percent
Minor components: 19 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Whitman, Extremely Stony

Setting
Landform: Ground moraines, drumlins, depressions, drainageways, hills
Landform position (two-dimensional): Toeslope
Landform position (three-dimensional): Base slope

Down-slope shape: Concave
Across-slope shape: Concave
Parent material: Coarse-loamy lodgment till derived from gneiss, granite, and/or schist

Typical profile

Oi - 0 to 1 inches: peat
A - 1 to 10 inches: fine sandy loam
Bg - 10 to 17 inches: gravelly fine sandy loam
Cdg - 17 to 61 inches: fine sandy loam

Properties and qualities

Slope: 0 to 3 percent
Percent of area covered with surface fragments: 9.0 percent
Depth to restrictive feature: 7 to 38 inches to densic material
Natural drainage class: Very poorly drained
Runoff class: Negligible
Capacity of the most limiting layer to transmit water (Ksat): Very low to moderately low (0.00 to 0.14 in/hr)
Depth to water table: About 0 to 6 inches
Frequency of flooding: None
Frequency of ponding: Frequent
Salinity, maximum in profile: Nonsaline (0.0 to 1.9 mmhos/cm)
Available water storage in profile: Low (about 3.0 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 7s
Hydrologic Soil Group: D
Hydric soil rating: Yes

Minor Components

Ridgebury, extremely stony

Percent of map unit: 10 percent
Landform: Drumlins, drainageways, hills, ground moraines, depressions
Landform position (two-dimensional): Toeslope, footslope
Landform position (three-dimensional): Base slope, head slope
Down-slope shape: Concave
Across-slope shape: Concave
Hydric soil rating: Yes

Scarboro

Percent of map unit: 5 percent
Landform: Outwash deltas, outwash terraces, depressions, drainageways
Landform position (three-dimensional): Tread
Down-slope shape: Concave
Across-slope shape: Concave
Hydric soil rating: Yes

Swansea

Percent of map unit: 3 percent
Landform: Swamps, bogs, marshes
Down-slope shape: Concave
Across-slope shape: Concave
Hydric soil rating: Yes

Woodbridge, extremely stony

Percent of map unit: 1 percent
Landform: Drumlins, hills, ground moraines
Landform position (two-dimensional): Backslope, footslope, summit
Landform position (three-dimensional): Side slope, crest
Down-slope shape: Concave
Across-slope shape: Linear
Hydric soil rating: No

305B—Paxton fine sandy loam, 3 to 8 percent slopes

Map Unit Setting

National map unit symbol: 2t2qp
Elevation: 0 to 1,570 feet
Mean annual precipitation: 36 to 71 inches
Mean annual air temperature: 39 to 55 degrees F
Frost-free period: 140 to 240 days
Farmland classification: All areas are prime farmland

Map Unit Composition

Paxton and similar soils: 80 percent
Minor components: 20 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Paxton

Setting

Landform: Ground moraines, hills, drumlins
Landform position (two-dimensional): Backslope, summit, shoulder
Landform position (three-dimensional): Side slope, crest, nose slope
Down-slope shape: Linear, convex
Across-slope shape: Convex
Parent material: Coarse-loamy lodgment till derived from gneiss, granite, and/or schist

Typical profile

Ap - 0 to 8 inches: fine sandy loam
Bw1 - 8 to 15 inches: fine sandy loam
Bw2 - 15 to 26 inches: fine sandy loam
Cd - 26 to 65 inches: gravelly fine sandy loam

Properties and qualities

Slope: 3 to 8 percent
Depth to restrictive feature: 18 to 39 inches to densic material
Natural drainage class: Well drained
Runoff class: Medium
Capacity of the most limiting layer to transmit water (Ksat): Very low to moderately low (0.00 to 0.14 in/hr)
Depth to water table: About 18 to 37 inches
Frequency of flooding: None

Frequency of ponding: None
Salinity, maximum in profile: Nonsaline (0.0 to 1.9 mmhos/cm)
Available water storage in profile: Low (about 3.1 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 2s
Hydrologic Soil Group: C
Hydric soil rating: No

Minor Components

Woodbridge

Percent of map unit: 9 percent
Landform: Drumlins, ground moraines, hills
Landform position (two-dimensional): Backslope, footslope, summit
Landform position (three-dimensional): Side slope
Down-slope shape: Concave
Across-slope shape: Linear
Hydric soil rating: No

Ridgebury

Percent of map unit: 6 percent
Landform: Ground moraines, depressions, drainageways, hills
Landform position (two-dimensional): Toeslope, backslope, footslope
Landform position (three-dimensional): Base slope, head slope, dip
Down-slope shape: Concave
Across-slope shape: Concave
Hydric soil rating: Yes

Charlton

Percent of map unit: 5 percent
Landform: Hills
Down-slope shape: Linear
Across-slope shape: Linear
Hydric soil rating: No

306B—Paxton fine sandy loam, 0 to 8 percent slopes, very stony

Map Unit Setting

National map unit symbol: 2w673
Elevation: 0 to 1,340 feet
Mean annual precipitation: 36 to 71 inches
Mean annual air temperature: 39 to 55 degrees F
Frost-free period: 140 to 240 days
Farmland classification: Farmland of statewide importance

Map Unit Composition

Paxton, very stony, and similar soils: 85 percent
Minor components: 15 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Paxton, Very Stony

Setting

Landform: Drumlins, hills, ground moraines
Landform position (two-dimensional): Summit, shoulder, backslope
Landform position (three-dimensional): Crest, side slope
Down-slope shape: Linear, convex
Across-slope shape: Convex, linear
Parent material: Coarse-loamy lodgment till derived from gneiss, granite, and/or schist

Typical profile

Oe - 0 to 2 inches: moderately decomposed plant material
A - 2 to 10 inches: fine sandy loam
Bw1 - 10 to 17 inches: fine sandy loam
Bw2 - 17 to 28 inches: fine sandy loam
Cd - 28 to 67 inches: gravelly fine sandy loam

Properties and qualities

Slope: 0 to 8 percent
Percent of area covered with surface fragments: 1.6 percent
Depth to restrictive feature: 20 to 43 inches to densic material
Natural drainage class: Well drained
Runoff class: Medium
Capacity of the most limiting layer to transmit water (Ksat): Very low to moderately low (0.00 to 0.14 in/hr)
Depth to water table: About 18 to 37 inches
Frequency of flooding: None
Frequency of ponding: None
Salinity, maximum in profile: Nonsaline (0.0 to 1.9 mmhos/cm)
Available water storage in profile: Low (about 4.7 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 6s
Hydrologic Soil Group: C
Hydric soil rating: No

Minor Components

Woodbridge, very stony

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

Ridgebury, very stony

Percent of map unit: 4 percent
Landform: Drumlins, ground moraines, hills, depressions, drainageways
Landform position (two-dimensional): Toeslope, footslope
Landform position (three-dimensional): Base slope, head slope
Down-slope shape: Concave
Across-slope shape: Concave

Hydric soil rating: Yes

Charlton, very stony

Percent of map unit: 3 percent
Landform: Hills
Landform position (two-dimensional): Shoulder, summit, backslope
Landform position (three-dimensional): Crest, side slope
Down-slope shape: Convex
Across-slope shape: Convex
Hydric soil rating: No

307B—Paxton fine sandy loam, 0 to 8 percent slopes, extremely stony

Map Unit Setting

National map unit symbol: 2w675
Elevation: 0 to 1,580 feet
Mean annual precipitation: 36 to 71 inches
Mean annual air temperature: 39 to 55 degrees F
Frost-free period: 140 to 240 days
Farmland classification: Not prime farmland

Map Unit Composition

Paxton, extremely stony, and similar soils: 80 percent
Minor components: 20 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Paxton, Extremely Stony

Setting

Landform: Ground moraines, drumlins, hills
Landform position (two-dimensional): Summit, shoulder, backslope
Landform position (three-dimensional): Crest, side slope
Down-slope shape: Linear, convex
Across-slope shape: Convex, linear
Parent material: Coarse-loamy lodgment till derived from gneiss, granite, and/or schist

Typical profile

Oe - 0 to 2 inches: moderately decomposed plant material
A - 2 to 10 inches: fine sandy loam
Bw1 - 10 to 17 inches: fine sandy loam
Bw2 - 17 to 28 inches: fine sandy loam
Cd - 28 to 67 inches: gravelly fine sandy loam

Properties and qualities

Slope: 0 to 8 percent
Percent of area covered with surface fragments: 9.0 percent
Depth to restrictive feature: 20 to 43 inches to densic material
Natural drainage class: Well drained
Runoff class: Medium

Capacity of the most limiting layer to transmit water (Ksat): Very low to moderately low (0.00 to 0.14 in/hr)
Depth to water table: About 18 to 37 inches
Frequency of flooding: None
Frequency of ponding: None
Salinity, maximum in profile: Nonsaline (0.0 to 1.9 mmhos/cm)
Available water storage in profile: Low (about 4.7 inches)

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

Minor Components

Woodbridge, extremely stony
Percent of map unit: 10 percent
Landform: Drumlins, hills, ground moraines
Landform position (two-dimensional): Backslope, footslope, summit
Landform position (three-dimensional): Side slope, crest
Down-slope shape: Concave
Across-slope shape: Linear
Hydric soil rating: No

Charlton, extremely stony
Percent of map unit: 5 percent
Landform: Hills
Landform position (two-dimensional): Shoulder, summit, backslope
Landform position (three-dimensional): Crest, side slope
Down-slope shape: Convex
Across-slope shape: Convex
Hydric soil rating: No

Ridgebury, extremely stony
Percent of map unit: 4 percent
Landform: Ground moraines, depressions, drainageways, drumlins, hills
Landform position (two-dimensional): Toeslope, footslope
Landform position (three-dimensional): Head slope, base slope
Down-slope shape: Concave
Across-slope shape: Concave
Hydric soil rating: Yes

Whitman, extremely stony
Percent of map unit: 1 percent
Landform: Depressions
Down-slope shape: Concave
Across-slope shape: Concave
Hydric soil rating: Yes

310A—Woodbridge fine sandy loam, 0 to 3 percent slopes

Map Unit Setting

National map unit symbol: 2w686
Elevation: 0 to 1,420 feet
Mean annual precipitation: 36 to 71 inches
Mean annual air temperature: 39 to 55 degrees F
Frost-free period: 140 to 240 days
Farmland classification: All areas are prime farmland

Map Unit Composition

Woodbridge and similar soils: 85 percent
Minor components: 15 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Woodbridge

Setting

Landform: Hills, ground moraines, drumlins
Landform position (two-dimensional): Footslope, summit
Landform position (three-dimensional): Crest
Down-slope shape: Convex
Across-slope shape: Linear
Parent material: Coarse-loamy lodgment till derived from gneiss, granite, and/or schist

Typical profile

Ap - 0 to 7 inches: fine sandy loam
Bw1 - 7 to 18 inches: fine sandy loam
Bw2 - 18 to 30 inches: fine sandy loam
Cd - 30 to 65 inches: gravelly fine sandy loam

Properties and qualities

Slope: 0 to 3 percent
Depth to restrictive feature: 20 to 39 inches to densic material
Natural drainage class: Moderately well drained
Runoff class: Very high
Capacity of the most limiting layer to transmit water (Ksat): Very low to moderately low (0.00 to 0.14 in/hr)
Depth to water table: About 18 to 30 inches
Frequency of flooding: None
Frequency of ponding: None
Salinity, maximum in profile: Nonsaline (0.0 to 1.9 mmhos/cm)
Available water storage in profile: Low (about 4.7 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 2w
Hydrologic Soil Group: C/D
Hydric soil rating: No

Minor Components

Paxton

Percent of map unit: 7 percent
Landform: Ground moraines, drumlins, hills
Landform position (two-dimensional): Summit, shoulder
Landform position (three-dimensional): Crest
Down-slope shape: Linear, convex
Across-slope shape: Convex
Hydric soil rating: No

Ridgebury

Percent of map unit: 6 percent
Landform: Hills, drumlins, drainageways, ground moraines, depressions
Landform position (two-dimensional): Toeslope, footslope
Landform position (three-dimensional): Head slope, base slope
Down-slope shape: Concave
Across-slope shape: Concave
Hydric soil rating: Yes

Whitman, extremely stony

Percent of map unit: 1 percent
Landform: Drainageways, depressions
Down-slope shape: Concave
Across-slope shape: Concave
Hydric soil rating: Yes

Sutton

Percent of map unit: 1 percent
Landform: Hills, ground moraines
Landform position (two-dimensional): Footslope
Landform position (three-dimensional): Base slope
Down-slope shape: Concave
Across-slope shape: Linear
Hydric soil rating: No

311B—Woodbridge fine sandy loam, 0 to 8 percent slopes, very stony

Map Unit Setting

National map unit symbol: 2t2qr
Elevation: 0 to 1,440 feet
Mean annual precipitation: 36 to 71 inches
Mean annual air temperature: 39 to 55 degrees F
Frost-free period: 140 to 240 days
Farmland classification: Farmland of statewide importance

Map Unit Composition

Woodbridge, very stony, and similar soils: 82 percent
Minor components: 18 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Woodbridge, Very Stony

Setting

Landform: Hills, ground moraines, drumlins
Landform position (two-dimensional): Backslope, footslope, summit
Landform position (three-dimensional): Side slope
Down-slope shape: Concave
Across-slope shape: Linear
Parent material: Coarse-loamy lodgment till derived from gneiss, granite, and/or schist

Typical profile

Oe - 0 to 2 inches: moderately decomposed plant material
A - 2 to 9 inches: fine sandy loam
Bw1 - 9 to 20 inches: fine sandy loam
Bw2 - 20 to 32 inches: fine sandy loam
Cd - 32 to 67 inches: gravelly fine sandy loam

Properties and qualities

Slope: 0 to 8 percent
Percent of area covered with surface fragments: 1.6 percent
Depth to restrictive feature: 20 to 43 inches to densic material
Natural drainage class: Moderately well drained
Runoff class: Medium
Capacity of the most limiting layer to transmit water (Ksat): Very low to moderately low (0.00 to 0.14 in/hr)
Depth to water table: About 19 to 27 inches
Frequency of flooding: None
Frequency of ponding: None
Salinity, maximum in profile: Nonsaline (0.0 to 1.9 mmhos/cm)
Available water storage in profile: Low (about 4.0 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 6s
Hydrologic Soil Group: C/D
Hydric soil rating: No

Minor Components

Paxton, very stony

Percent of map unit: 10 percent
Landform: Ground moraines, drumlins, hills
Landform position (two-dimensional): Shoulder, backslope, summit
Landform position (three-dimensional): Crest, side slope
Down-slope shape: Convex, linear
Across-slope shape: Convex, linear
Hydric soil rating: No

Ridgebury, very stony

Percent of map unit: 8 percent
Landform: Ground moraines, depressions, drumlins, drainageways, hills
Landform position (two-dimensional): Toeslope
Landform position (three-dimensional): Head slope, base slope
Down-slope shape: Concave
Across-slope shape: Concave

Hydric soil rating: Yes

312B—Woodbridge fine sandy loam, 0 to 8 percent slopes, extremely stony

Map Unit Setting

National map unit symbol: 2t2qs
Elevation: 0 to 1,580 feet
Mean annual precipitation: 36 to 71 inches
Mean annual air temperature: 39 to 55 degrees F
Frost-free period: 140 to 240 days
Farmland classification: Not prime farmland

Map Unit Composition

Woodbridge, extremely stony, and similar soils: 82 percent
Minor components: 18 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Woodbridge, Extremely Stony

Setting

Landform: Ground moraines, drumlins, hills
Landform position (two-dimensional): Backslope, footslope, summit
Landform position (three-dimensional): Side slope
Down-slope shape: Concave
Across-slope shape: Linear
Parent material: Coarse-loamy lodgment till derived from gneiss, granite, and/or schist

Typical profile

Oe - 0 to 2 inches: moderately decomposed plant material
A - 2 to 9 inches: fine sandy loam
Bw1 - 9 to 20 inches: fine sandy loam
Bw2 - 20 to 32 inches: fine sandy loam
Cd - 32 to 67 inches: gravelly fine sandy loam

Properties and qualities

Slope: 0 to 8 percent
Percent of area covered with surface fragments: 9.0 percent
Depth to restrictive feature: 20 to 43 inches to densic material
Natural drainage class: Moderately well drained
Runoff class: Medium
Capacity of the most limiting layer to transmit water (Ksat): Very low to moderately low (0.00 to 0.14 in/hr)
Depth to water table: About 19 to 27 inches
Frequency of flooding: None
Frequency of ponding: None
Salinity, maximum in profile: Nonsaline (0.0 to 1.9 mmhos/cm)
Available water storage in profile: Low (about 4.0 inches)

Interpretive groups

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

Minor Components

Paxton, extremely stony

Percent of map unit: 10 percent
Landform: Ground moraines, drumlins, hills
Landform position (two-dimensional): Shoulder, backslope, summit
Landform position (three-dimensional): Crest, side slope
Down-slope shape: Convex, linear
Across-slope shape: Convex, linear
Hydric soil rating: No

Ridgebury, extremely stony

Percent of map unit: 8 percent
Landform: Ground moraines, depressions, drumlins, drainageways, hills
Landform position (two-dimensional): Toeslope
Landform position (three-dimensional): Head slope, base slope
Down-slope shape: Concave
Across-slope shape: Concave
Hydric soil rating: Yes

446B—Gloucester-Hinckley complex, 3 to 8 percent slopes, very stony

Map Unit Setting

National map unit symbol: 2svln
Elevation: 0 to 270 feet
Mean annual precipitation: 36 to 71 inches
Mean annual air temperature: 39 to 55 degrees F
Frost-free period: 145 to 240 days
Farmland classification: Not prime farmland

Map Unit Composition

Gloucester, very stony, and similar soils: 35 percent
Hinckley, very stony, and similar soils: 25 percent
Minor components: 40 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Gloucester, Very Stony

Setting

Landform: Hills, moraines, ridges
Landform position (two-dimensional): Backslope
Landform position (three-dimensional): Side slope
Down-slope shape: Linear, convex
Across-slope shape: Convex

Parent material: Sandy melt-out till derived from gneiss, granite, and/or schist

Typical profile

Oa - 0 to 2 inches: highly decomposed plant material
A - 2 to 6 inches: sandy loam
Bw1 - 6 to 15 inches: gravelly sandy loam
Bw2 - 15 to 29 inches: very gravelly loamy coarse sand
C - 29 to 65 inches: very gravelly loamy coarse sand

Properties and qualities

Slope: 15 to 35 percent
Percent of area covered with surface fragments: 1.6 percent
Depth to restrictive feature: More than 80 inches
Natural drainage class: Somewhat excessively drained
Runoff class: Medium
Capacity of the most limiting layer to transmit water (Ksat): Moderately high to very high (1.42 to 99.90 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Calcium carbonate, maximum in profile: 2 percent
Salinity, maximum in profile: Nonsaline (0.0 to 1.9 mmhos/cm)
Sodium adsorption ratio, maximum in profile: 1.0
Available water storage in profile: Low (about 5.2 inches)

Interpretive groups

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

Description of Hinckley, Very Stony

Setting

Landform: Eskers, moraines, outwash terraces, outwash deltas, kame terraces, outwash plains, kames
Landform position (two-dimensional): Backslope
Landform position (three-dimensional): Crest, head slope, nose slope, side slope, riser
Down-slope shape: Convex, concave, linear
Across-slope shape: Concave, linear, convex
Parent material: Sandy and gravelly glaciofluvial deposits derived from gneiss and/or granite and/or schist

Typical profile

Oe - 0 to 1 inches: moderately decomposed plant material
A - 1 to 8 inches: loamy sand
Bw1 - 8 to 11 inches: gravelly loamy sand
Bw2 - 11 to 16 inches: gravelly loamy sand
BC - 16 to 19 inches: very gravelly loamy sand
C - 19 to 65 inches: very gravelly sand

Properties and qualities

Slope: 25 to 35 percent
Percent of area covered with surface fragments: 1.6 percent
Depth to restrictive feature: More than 80 inches
Natural drainage class: Excessively drained

Runoff class: Low
Capacity of the most limiting layer to transmit water (Ksat): Moderately high to very high (1.42 to 99.90 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Salinity, maximum in profile: Nonsaline (0.0 to 1.9 mmhos/cm)
Available water storage in profile: Low (about 3.1 inches)

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

Minor Components

Ridgebury, very stony
Percent of map unit: 10 percent
Landform: Ground moraines, hills, depressions, drumlins, drainageways
Landform position (two-dimensional): Footslope, toeslope
Landform position (three-dimensional): Base slope, head slope
Down-slope shape: Concave
Across-slope shape: Concave
Hydric soil rating: Yes

Merrimac, very stony
Percent of map unit: 10 percent
Landform: Kame terraces, kames, eskers, moraines, outwash terraces, outwash plains
Landform position (two-dimensional): Backslope
Landform position (three-dimensional): Side slope, crest, head slope, nose slope, riser
Down-slope shape: Linear, convex, concave
Across-slope shape: Convex, linear, concave
Hydric soil rating: No

Charlton, very stony
Percent of map unit: 10 percent
Landform: Ridges, hills
Landform position (two-dimensional): Backslope
Landform position (three-dimensional): Side slope
Down-slope shape: Convex, linear
Across-slope shape: Convex
Hydric soil rating: No

Paxton, very stony
Percent of map unit: 10 percent
Landform: Hills, drumlins, ground moraines
Landform position (two-dimensional): Backslope
Landform position (three-dimensional): Side slope
Down-slope shape: Convex, linear
Across-slope shape: Linear, convex
Hydric soil rating: No

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