

Stormwater Management Report

ROCKY MAPLE SOLAR

**18 North Carver Road
Wareham and Carver, Massachusetts**

Prepared for:

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Presented by:



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December 16, 2020

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Eric J. Las 12/16/2020

Eric J. Las, PE

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1.0 INTRODUCTION

The proposed project (the Project) includes the installation of solar arrays above cranberry bogs on North Carver Road in Wareham and Carver, MA. The project has been designed based on MassDEP’s “Guidance on Agriculture and Solar Energy under the Wetlands Protection Act and the Solar Massachusetts Renewable Target (SMART) Program”.

The stormwater impact of the Project will be negligible as there will not be any grading involved and no addition of significant impervious areas. The Site access is sufficiently stabilized to accommodate construction vehicles. Therefore, the proposed work will not modify the stormwater flow pattern or the existing watershed. Ultimately all areas will be restored to pre-development conditions.

Stormwater from the Site has been evaluated in accordance with:

- The 2008 Massachusetts Department of Environmental Protection (DEP) Stormwater Management Handbook,
- The Massachusetts Wetland Protection Act (310 CMR 10.00),

The pre- and post-development hydrologic conditions were modeled using HydroCAD™ version 10.00 to demonstrate that post-development stormwater runoff rates and volumes will be less than or equal to the pre-development rates and volumes. Watershed maps with soil types as well as detailed analysis of the model results are also included. The following tables summarizes the peak runoff rates and volumes for the pre- and post-development conditions.

Table 1: Pre- & Post-development Peak Runoff Rate Comparison, units are in cubic feet per second (cfs).

Design Point 1	1-Year	2-Year	10-Year	25-Year	50-Year	100-Year
<i>Pre</i>	9.63	22.39	78.61	132.13	186.23	254.59
Post	9.57	22.25	78.10	131.27	185.02	252.94

Table 2: Pre- & Post-development Stormwater Volume Comparison, units are in acre-feet (af).

Design Point 1	1-Year	2-Year	10-Year	25-Year	50-Year	100-Year
<i>Pre</i>	1.70	2.97	7.80	12.39	17.06	23.01
Post	1.69	2.96	7.75	12.31	16.95	22.86

2.0 PRE-DEVELOPMENT CONDITIONS

2.1 Site Conditions

The Site is currently developed and contains actively farmed cranberry bogs, blueberry patches, and other previously disturbed areas located off the east side of North Carver Road in Wareham and Carver, Massachusetts. Runoff from the Site generally stays on site and infiltrates into the cranberry bogs; however, some stormwater drains to the south and east to the Weweantic River.

Wetland buffer zones surround the existing cranberry bogs. Portions of the Site to the North, South, and East contain 200' Riverfront Areas. The majority of the Site is within the 100-year FEMA floodplain and associated flood plain buffer zone.

The Site does not contain, nor is it tributary to any Critical Areas.

The Site is within the broader Buzzards Bay watershed which ultimately has a TMDL for Pathogens, however the Project will not generate Pathogens.

2.2 Soil Description

The Natural Resources Conservation Service (NRCS) lists the on-site soils as Plymouth loamy coarse sand and Hinckley loamy sand (NRCS hydrologic class A), Udipsamments (NRCS hydrologic class A/D), and Freetown coarse sand and Swansea coarse sand (NRCS hydrologic class B/D).

2.3 Hydrologic Analysis

Sub-catchment areas were delineated based on existing runoff patterns and topographic information. This information is shown on the *Pre-Development Conditions Hydrologic Areas Map* included in Attachment 2. Summaries of each area with respect to Curve Number and Time of Concentration calculations can be found in the model results also in Attachment 2.

3.0 POST-DEVELOPMENT CONDITIONS

3.1 Design Strategy

The Project by its very nature (dual-use solar on active cranberry bogs, with minimal increase in impervious area), conserves environmentally sensitive features and minimizes impacts on the existing hydrology. Minimal grading is required to accommodate the Project. Minimizing earthwork helps to maintain the existing drainage patterns to the maximum extent practicable under post-development conditions. Site proposed impervious surfaces are limited in nature, thereby reducing the impact that the project may have on the existing watershed.

The construction of and use of the proposed solar arrays will not impact the functionality of the existing cranberry bogs on-site.

3.2 Hydrologic Analysis

The established design points used in the pre-development conditions analysis were used in the post-development analysis for direct comparison. The tributary areas and flow paths were modified to reflect post-development conditions. See Attachment 3 for the *Post-Development Conditions Hydrologic Areas Map*. Summaries of each area with respect to Curve Number and Time of Concentration calculations can be found in the model results in Attachment 3.

3.3 Compliance with DEP Stormwater Management Standards

The proposed stormwater management system was designed in compliance with the ten (10) DEP Stormwater Management Standards. The following summary provides key information related to the proposed stormwater management system, its design elements, and mitigation measures for potential impacts.

STANDARD 1: **No new stormwater conveyance (e.g. outfalls) may discharge untreated stormwater directly to or cause erosion in wetlands or waters of the Commonwealth.**

There will be no direct discharge of untreated stormwater from the Site. Sediment control barriers along the limit of work for the Project shall remain in place throughout construction and until the Site is stabilized.

STANDARD 2: **Stormwater management systems shall be designed so that post-development peak discharge rates do not exceed pre-development peak discharge rates.**

The stormwater management design will control post-development peak discharge rates and total stormwater volumes for the 1-, 2-, 10-, 25-, 50-, and 100-year, 24-hour storms so as to maintain pre-development peak discharge rates and total volumes. Refer to Section 1.0 Introduction for a summary of the peak runoff rates and total stormwater volumes.

STANDARD 3: **Loss of annual recharge to groundwater shall be eliminated or minimized through the use of environmentally sensitive site design, low impact development techniques, stormwater management practices and good operation and maintenance. At a minimum, the annual recharge from the post-development site shall approximate the annual recharge from pre-development conditions based on soil types. This Standard is met when the stormwater management system is designed to infiltrate the required recharge volume as determined in accordance with the Massachusetts Stormwater Handbook.**

The proposed solar panels, while covering a large footprint, will allow water to sheet flow to the ground below where it can be absorbed similarly to existing conditions. Therefore, recharge of the groundwater will be maintained under the post-development conditions.

STANDARD 4: Stormwater management systems shall be designed to remove 80% of the average annual post-construction load of Total Suspended Solids (TSS).

New impervious areas are not proposed as part of the Project. Additionally, the proposed gravel access driveways will not be sanded or salted during winter months eliminating the TSS load for the Project. Therefore, this standard does not apply.

The Site Owner's Manual complies with the Long-Term Pollution Prevention Plan (Standard 4) and the Long-Term Operation and Maintenance Plan (Standard 9) requirements of the 2008 Massachusetts Department of Environmental Protection (MassDEP) Stormwater Management Standards. The Manual outlines source control and pollution prevention measures and maintenance requirements of stormwater best management practices (BMPs) associated with the proposed development. The Manual is attached in Attachment 5.

STANDARD 5: For land uses with higher potential pollutant loads (LUHPPLs), source control and pollution prevention shall be implemented in accordance with the Massachusetts Stormwater Handbook to eliminate or reduce the discharge of stormwater runoff from such land uses to the maximum extent practicable.

The Project is not associated with stormwater discharges from land uses with higher potential pollutant loads.

STANDARD 6: Stormwater discharges to critical areas must utilize certain stormwater management BMPs approved for critical areas. Critical areas are Outstanding Resource Waters, shellfish beds, swimming beaches, coldwater fisheries and recharge areas for public water supplies.

There are no stormwater discharges to critical areas associated with the Project.

STANDARD 7: **Redevelopment of previously developed sites must meet the Stormwater Management Standards to the maximum extent practicable. However, if it is not practicable to meet all the Standards, new (retrofitted or expanded) stormwater management systems must be designed to improve existing conditions.**

The Project is new development, and therefore this standard does not apply.

STANDARD 8: **A plan to control construction-related impacts during erosion, sedimentation and other pollutant sources during construction and land disturbance activities (construction period erosion, sedimentation, and pollution prevention plan) shall be developed and implemented.**

The SWPPP will be finalized and submitted to the Planning Board for review prior to construction to comply with Section 3 of the NPDES Construction General Permit for Stormwater Discharges; therefore the requirements of Standard 8 are fulfilled.

STANDARD 9: **A Long-Term Operation and Maintenance (O&M) Plan shall be developed and implemented to ensure that stormwater management systems function as designed.**

The Site Owner's Manual complies with the Long-Term Pollution Prevention Plan (Standard 4) and the Long-Term Operation and Maintenance Plan (Standard 9) requirements of the 2008 Massachusetts Department of Environmental Protection (MassDEP) Stormwater Management Standards. The Manual outlines source control and pollution prevention measures associated with the Project.

STANDARD 10: **All illicit discharges to the stormwater management system are prohibited.**

There will be no illicit discharges to the proposed stormwater management system associated with the Project. An Illicit Discharge Compliance Statement is provided on the following page and will be signed by the Owner prior to construction.



Checklist for Stormwater Report

B. Stormwater Checklist and Certification

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

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

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

Registered Professional Engineer's Certification

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

Registered Professional Engineer Block and Signature



Signature and Date

Checklist

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

- New development
- Redevelopment
- Mix of New Development and Redevelopment



Checklist for Stormwater Report

Checklist (continued)

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

- No disturbance to any Wetland Resource Areas
- Site Design Practices (e.g. clustered development, reduced frontage setbacks)
- Reduced Impervious Area (Redevelopment Only)
- Minimizing disturbance to existing trees and shrubs
- LID Site Design Credit Requested:
 - Credit 1
 - Credit 2
 - Credit 3
- Use of "country drainage" versus curb and gutter conveyance and pipe
- Bioretention Cells (includes Rain Gardens)
- Constructed Stormwater Wetlands (includes Gravel Wetlands designs)
- Treebox Filter
- Water Quality Swale
- Grass Channel
- Green Roof
- Other (describe): _____

Standard 1: No New Untreated Discharges

- No new untreated discharges
- Outlets have been designed so there is no erosion or scour to wetlands and waters of the Commonwealth
- Supporting calculations specified in Volume 3 of the Massachusetts Stormwater Handbook included.



Checklist for Stormwater Report

Checklist (continued)

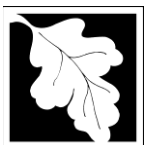
Standard 2: Peak Rate Attenuation

- Standard 2 waiver requested because the project is located in land subject to coastal storm flowage and stormwater discharge is to a wetland subject to coastal flooding.
- Evaluation provided to determine whether off-site flooding increases during the 100-year 24-hour storm.
- Calculations provided to show that post-development peak discharge rates do not exceed pre-development rates for the 2-year and 10-year 24-hour storms. If evaluation shows that off-site flooding increases during the 100-year 24-hour storm, calculations are also provided to show that post-development peak discharge rates do not exceed pre-development rates for the 100-year 24-hour storm.

Standard 3: Recharge

- Soil Analysis provided.
- Required Recharge Volume calculation provided.
- Required Recharge volume reduced through use of the LID site Design Credits.
- Sizing the infiltration, BMPs is based on the following method: Check the method used.
 - Static
 - Simple Dynamic
 - Dynamic Field¹
- Runoff from all impervious areas at the site discharging to the infiltration BMP.
- Runoff from all impervious areas at the site is *not* discharging to the infiltration BMP and calculations are provided showing that the drainage area contributing runoff to the infiltration BMPs is sufficient to generate the required recharge volume.
- Recharge BMPs have been sized to infiltrate the Required Recharge Volume.
- Recharge BMPs have been sized to infiltrate the Required Recharge Volume *only* to the maximum extent practicable for the following reason:
 - Site is comprised solely of C and D soils and/or bedrock at the land surface
 - M.G.L. c. 21E sites pursuant to 310 CMR 40.0000
 - Solid Waste Landfill pursuant to 310 CMR 19.000
 - Project is otherwise subject to Stormwater Management Standards only to the maximum extent practicable.
- Calculations showing that the infiltration BMPs will drain in 72 hours are provided.
- Property includes a M.G.L. c. 21E site or a solid waste landfill and a mounding analysis is included.

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



Checklist for Stormwater Report

Checklist (continued)

Standard 3: Recharge (continued)

- The infiltration BMP is used to attenuate peak flows during storms greater than or equal to the 10-year 24-hour storm and separation to seasonal high groundwater is less than 4 feet and a mounding analysis is provided.
- Documentation is provided showing that infiltration BMPs do not adversely impact nearby wetland resource areas.

Standard 4: Water Quality

The Long-Term Pollution Prevention Plan typically includes the following:

- Good housekeeping practices;
 - Provisions for storing materials and waste products inside or under cover;
 - Vehicle washing controls;
 - Requirements for routine inspections and maintenance of stormwater BMPs;
 - Spill prevention and response plans;
 - Provisions for maintenance of lawns, gardens, and other landscaped areas;
 - Requirements for storage and use of fertilizers, herbicides, and pesticides;
 - Pet waste management provisions;
 - Provisions for operation and management of septic systems;
 - Provisions for solid waste management;
 - Snow disposal and plowing plans relative to Wetland Resource Areas;
 - Winter Road Salt and/or Sand Use and Storage restrictions;
 - Street sweeping schedules;
 - Provisions for prevention of illicit discharges to the stormwater management system;
 - Documentation that Stormwater BMPs are designed to provide for shutdown and containment in the event of a spill or discharges to or near critical areas or from LUHPPL;
 - Training for staff or personnel involved with implementing Long-Term Pollution Prevention Plan;
 - List of Emergency contacts for implementing Long-Term Pollution Prevention Plan.
- A Long-Term Pollution Prevention Plan is attached to Stormwater Report and is included as an attachment to the Wetlands Notice of Intent.
 - Treatment BMPs subject to the 44% TSS removal pretreatment requirement and the one inch rule for calculating the water quality volume are included, and discharge:
 - is within the Zone II or Interim Wellhead Protection Area
 - is near or to other critical areas
 - is within soils with a rapid infiltration rate (greater than 2.4 inches per hour)
 - involves runoff from land uses with higher potential pollutant loads.
 - The Required Water Quality Volume is reduced through use of the LID site Design Credits.
 - Calculations documenting that the treatment train meets the 80% TSS removal requirement and, if applicable, the 44% TSS removal pretreatment requirement, are provided.



Checklist for Stormwater Report

Checklist (continued)

Standard 4: Water Quality (continued)

- The BMP is sized (and calculations provided) based on:
 - The ½" or 1" Water Quality Volume or
 - The equivalent flow rate associated with the Water Quality Volume and documentation is provided showing that the BMP treats the required water quality volume.
- The applicant proposes to use proprietary BMPs, and documentation supporting use of proprietary BMP and proposed TSS removal rate is provided. This documentation may be in the form of the propriety BMP checklist found in Volume 2, Chapter 4 of the Massachusetts Stormwater Handbook and submitting copies of the TARP Report, STEP Report, and/or other third party studies verifying performance of the proprietary BMPs.
- A TMDL exists that indicates a need to reduce pollutants other than TSS and documentation showing that the BMPs selected are consistent with the TMDL is provided.

Standard 5: Land Uses With Higher Potential Pollutant Loads (LUHPPLs)

- The NPDES Multi-Sector General Permit covers the land use and the Stormwater Pollution Prevention Plan (SWPPP) has been included with the Stormwater Report.
- The NPDES Multi-Sector General Permit covers the land use and the SWPPP will be submitted **prior to** the discharge of stormwater to the post-construction stormwater BMPs.
- The NPDES Multi-Sector General Permit does **not** cover the land use.
- LUHPPLs are located at the site and industry specific source control and pollution prevention measures have been proposed to reduce or eliminate the exposure of LUHPPLs to rain, snow, snow melt and runoff, and been included in the long term Pollution Prevention Plan.
- All exposure has been eliminated.
- All exposure has **not** been eliminated and all BMPs selected are on MassDEP LUHPPL list.
- The LUHPPL has the potential to generate runoff with moderate to higher concentrations of oil and grease (e.g. all parking lots with >1000 vehicle trips per day) and the treatment train includes an oil grit separator, a filtering bioretention area, a sand filter or equivalent.

Standard 6: Critical Areas

- The discharge is near or to a critical area and the treatment train includes only BMPs that MassDEP has approved for stormwater discharges to or near that particular class of critical area.
- Critical areas and BMPs are identified in the Stormwater Report.



Checklist for Stormwater Report

Checklist (continued)

Standard 7: Redevelopments and Other Projects Subject to the Standards only to the maximum extent practicable

- The project is subject to the Stormwater Management Standards only to the maximum Extent Practicable as a:
 - Limited Project
 - Small Residential Projects: 5-9 single family houses or 5-9 units in a multi-family development provided there is no discharge that may potentially affect a critical area.
 - Small Residential Projects: 2-4 single family houses or 2-4 units in a multi-family development with a discharge to a critical area
 - Marina and/or boatyard provided the hull painting, service and maintenance areas are protected from exposure to rain, snow, snow melt and runoff
 - Bike Path and/or Foot Path
 - Redevelopment Project
 - Redevelopment portion of mix of new and redevelopment.
- Certain standards are not fully met (Standard No. 1, 8, 9, and 10 must always be fully met) and an explanation of why these standards are not met is contained in the Stormwater Report.
- The project involves redevelopment and a description of all measures that have been taken to improve existing conditions is provided in the Stormwater Report. The redevelopment checklist found in Volume 2 Chapter 3 of the Massachusetts Stormwater Handbook may be used to document that the proposed stormwater management system (a) complies with Standards 2, 3 and the pretreatment and structural BMP requirements of Standards 4-6 to the maximum extent practicable and (b) improves existing conditions.

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

A Construction Period Pollution Prevention and Erosion and Sedimentation Control Plan must include the following information:

- Narrative;
 - Construction Period Operation and Maintenance Plan;
 - Names of Persons or Entity Responsible for Plan Compliance;
 - Construction Period Pollution Prevention Measures;
 - Erosion and Sedimentation Control Plan Drawings;
 - Detail drawings and specifications for erosion control BMPs, including sizing calculations;
 - Vegetation Planning;
 - Site Development Plan;
 - Construction Sequencing Plan;
 - Sequencing of Erosion and Sedimentation Controls;
 - Operation and Maintenance of Erosion and Sedimentation Controls;
 - Inspection Schedule;
 - Maintenance Schedule;
 - Inspection and Maintenance Log Form.
- A Construction Period Pollution Prevention and Erosion and Sedimentation Control Plan containing the information set forth above has been included in the Stormwater Report.



Checklist for Stormwater Report

Checklist (continued)

Standard 8: Construction Period Pollution Prevention and Erosion and Sedimentation Control (continued)

- The project is highly complex and information is included in the Stormwater Report that explains why it is not possible to submit the Construction Period Pollution Prevention and Erosion and Sedimentation Control Plan with the application. A Construction Period Pollution Prevention and Erosion and Sedimentation Control has **not** been included in the Stormwater Report but will be submitted **before** land disturbance begins.
- The project is **not** covered by a NPDES Construction General Permit.
- The project is covered by a NPDES Construction General Permit and a copy of the SWPPP is in the Stormwater Report.
- The project is covered by a NPDES Construction General Permit but no SWPPP been submitted. The SWPPP will be submitted BEFORE land disturbance begins.

Standard 9: Operation and Maintenance Plan

- The Post Construction Operation and Maintenance Plan is included in the Stormwater Report and includes the following information:
 - Name of the stormwater management system owners;
 - Party responsible for operation and maintenance;
 - Schedule for implementation of routine and non-routine maintenance tasks;
 - Plan showing the location of all stormwater BMPs maintenance access areas;
 - Description and delineation of public safety features;
 - Estimated operation and maintenance budget; and
 - Operation and Maintenance Log Form.
- The responsible party is **not** the owner of the parcel where the BMP is located and the Stormwater Report includes the following submissions:
 - A copy of the legal instrument (deed, homeowner's association, utility trust or other legal entity) that establishes the terms of and legal responsibility for the operation and maintenance of the project site stormwater BMPs;
 - A plan and easement deed that allows site access for the legal entity to operate and maintain BMP functions.

Standard 10: Prohibition of Illicit Discharges

- The Long-Term Pollution Prevention Plan includes measures to prevent illicit discharges;
- An Illicit Discharge Compliance Statement is attached;
- NO Illicit Discharge Compliance Statement is attached but will be submitted **prior to** the discharge of any stormwater to post-construction BMPs.

3.4 Illicit Discharge Compliance Statement

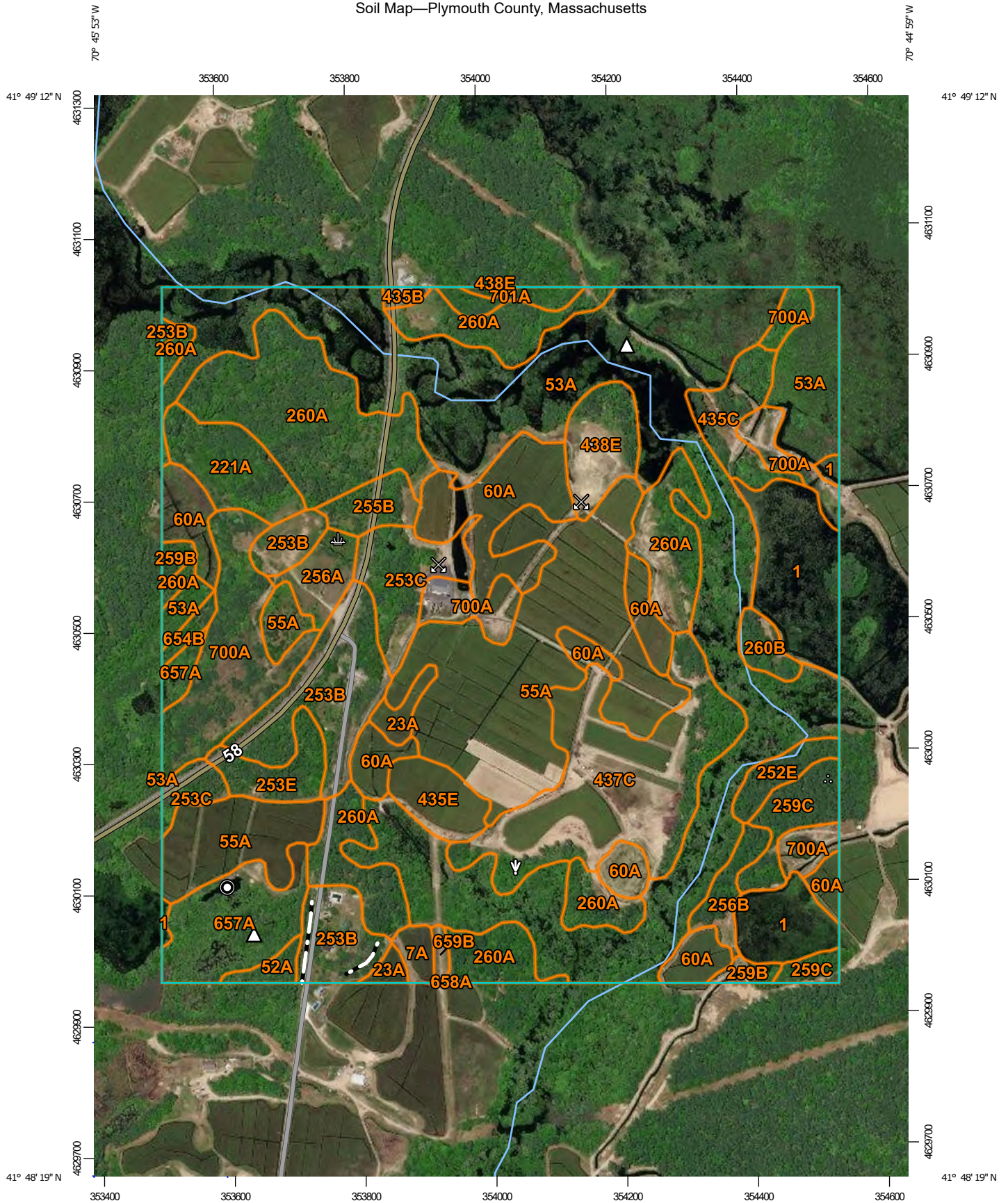
An illicit discharge is any discharge to a stormwater management system that is not comprised entirely of stormwater, discharges from fire-fighting activities, and certain non-designated non-stormwater discharges.

To the best of my knowledge, no detectable illicit discharge exists on site. The site plans included with this report detail the storm sewers that convey stormwater on the site and demonstrate that these systems do not include the entry of an illicit discharge. A Site Owner's Manual is also included, which contains the Long Term Pollution Plan that outlines measures to prevent future illicit discharges. As the Site Owner, I will ultimately be responsible for implementing the Long Term Pollution Prevention Plan.

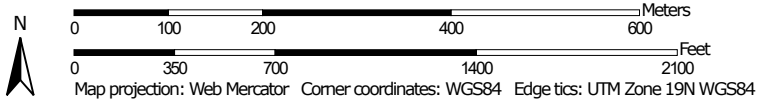
Signature: Adam Schumaker
Owner's Name

Attachment 1
Soil Data

Soil Map—Plymouth County, Massachusetts



Map Scale: 1:8,020 if printed on A portrait (8.5" x 11") sheet.



Natural Resources
Conservation Service

Web Soil Survey
National Cooperative Soil Survey

6/3/2020
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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 1:12,000.

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: Plymouth County, Massachusetts

Survey Area Data: Version 12, Sep 12, 2019

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

Map Unit Symbol	Map Unit Name	Acres in AOI	Percent of AOI
1	Water	12.3	4.5%
7A	Rainberry coarse sand, 0 to 3 percent slopes, sanded surface	1.1	0.4%
23A	Tihonet coarse sand, 0 to 3 percent slopes	1.7	0.6%
52A	Freetown muck, 0 to 1 percent slopes	0.9	0.3%
53A	Freetown muck, ponded, 0 to 1 percent slopes	68.1	25.0%
55A	Freetown coarse sand, 0 to 3 percent slopes, sanded surface	33.2	12.2%
60A	Swansea coarse sand, 0 to 2 percent slopes	18.1	6.6%
221A	Eldridge fine sandy loam, 0 to 3 percent slopes	5.2	1.9%
252E	Carver coarse sand, 15 to 35 percent slopes	2.0	0.7%
253B	Hinckley loamy sand, 3 to 8 percent slopes	14.5	5.3%
253C	Hinckley loamy sand, 8 to 15 percent slopes	6.7	2.5%
253E	Hinckley loamy sand, 15 to 35 percent slopes	3.2	1.2%
255B	Windsor loamy sand, 3 to 8 percent slopes	2.4	0.9%
256A	Deerfield loamy fine sand, 0 to 3 percent slopes	2.6	0.9%
256B	Deerfield loamy fine sand, 3 to 8 percent slopes	2.1	0.8%
259B	Carver loamy coarse sand, 3 to 8 percent slopes	1.3	0.5%
259C	Carver loamy coarse sand, 8 to 15 percent slopes	4.3	1.6%
260A	Sudbury fine sandy loam, 0 to 3 percent slopes	33.2	12.2%
260B	Sudbury fine sandy loam, 3 to 8 percent slopes	1.5	0.6%
435B	Plymouth loamy coarse sand, 3 to 8 percent slopes	0.5	0.2%
435C	Plymouth loamy coarse sand, 8 to 15 percent slopes	4.0	1.5%
435E	Plymouth loamy coarse sand, 15 to 35 percent slopes	3.3	1.2%

Map Unit Symbol	Map Unit Name	Acres in AOI	Percent of AOI
437C	Plymouth loamy coarse sand, 8 to 15 percent slopes, bouldery	18.4	6.8%
438E	Plymouth loamy coarse sand, 15 to 35 percent slopes, extremely bouldery	4.5	1.6%
654B	Udorthents, loamy, 0 to 8 percent slopes	0.7	0.3%
657A	Aquepts, 0 to 3 percent slopes	8.3	3.1%
658A	Endoaquents, 0 to 3 percent slopes, sanded surface	0.0	0.0%
659B	Udorthents, 0 to 8 percent slopes, gravelly	0.5	0.2%
700A	Udipsamments, wet substratum, 0 to 3 percent slopes	16.5	6.0%
701A	Rainberry coarse sand, 0 to 3 percent slope, sanded surface, inactive	1.4	0.5%
Totals for Area of Interest		272.3	100.0%

Attachment 2
Pre-Development Hydrologic Analysis

<i>JOB NO./LOCATION:</i>	3203.00 Carver & Wareham, MA
<i>CLIENT/PROJECT:</i>	BE RE, LLC Rocky Maple Solar
<i>SUBJECT/TITLE:</i>	Pre-Development Conditions Hydrology
<i>OBJECTIVE OF CALCULATION:</i>	<ul style="list-style-type: none"> To determine the pre-development peak rates of runoff and stormwater volumes from the site for the 1, 2, 10, 25, 50, & 100-year storm events at the design points.
<i>CALCULATION METHOD(S):</i>	<ul style="list-style-type: none"> Runoff curve numbers (CN), time-of-concentration (Tc), and runoff rates were calculated based on TR-55 methodology.d AutoCAD 2019 computer program was utilized for digitizing ground cover areas. Peak runoff rates and volumes were computed using HydroCAD version 10.00.
<i>ASSUMPTIONS:</i>	<ul style="list-style-type: none"> The ground cover types were determined using aerial imagery. Hydrologic soil groups based on United States Department of Agriculture, NRCS Soil Survey map information. Stormwater runoff from offsite tributary areas was not included in the calculations. Wetlands were excluded from this calculation.
<i>SOURCES OF DATA/EQUATIONS:</i>	<ul style="list-style-type: none"> Pre-Development Conditions Hydrologic Areas Map prepared by Beals and Thomas, Inc. File No. 320300P004A-001. NRCS Soil Survey for Plymouth County, downloaded from Web Soil Survey on 06/03/2020. TR-55 urban Hydrology for Small Watersheds, SCS, 1986. Massachusetts DEP Stormwater Management Handbook, February 2008.

REV	CALC. BY	DATE	CHECKED BY	DATE	APPROVED BY	DATE
0	N. Bautz	12/15/2020	N. Santangelo	12/15/2020	E. Las	12/16/2020

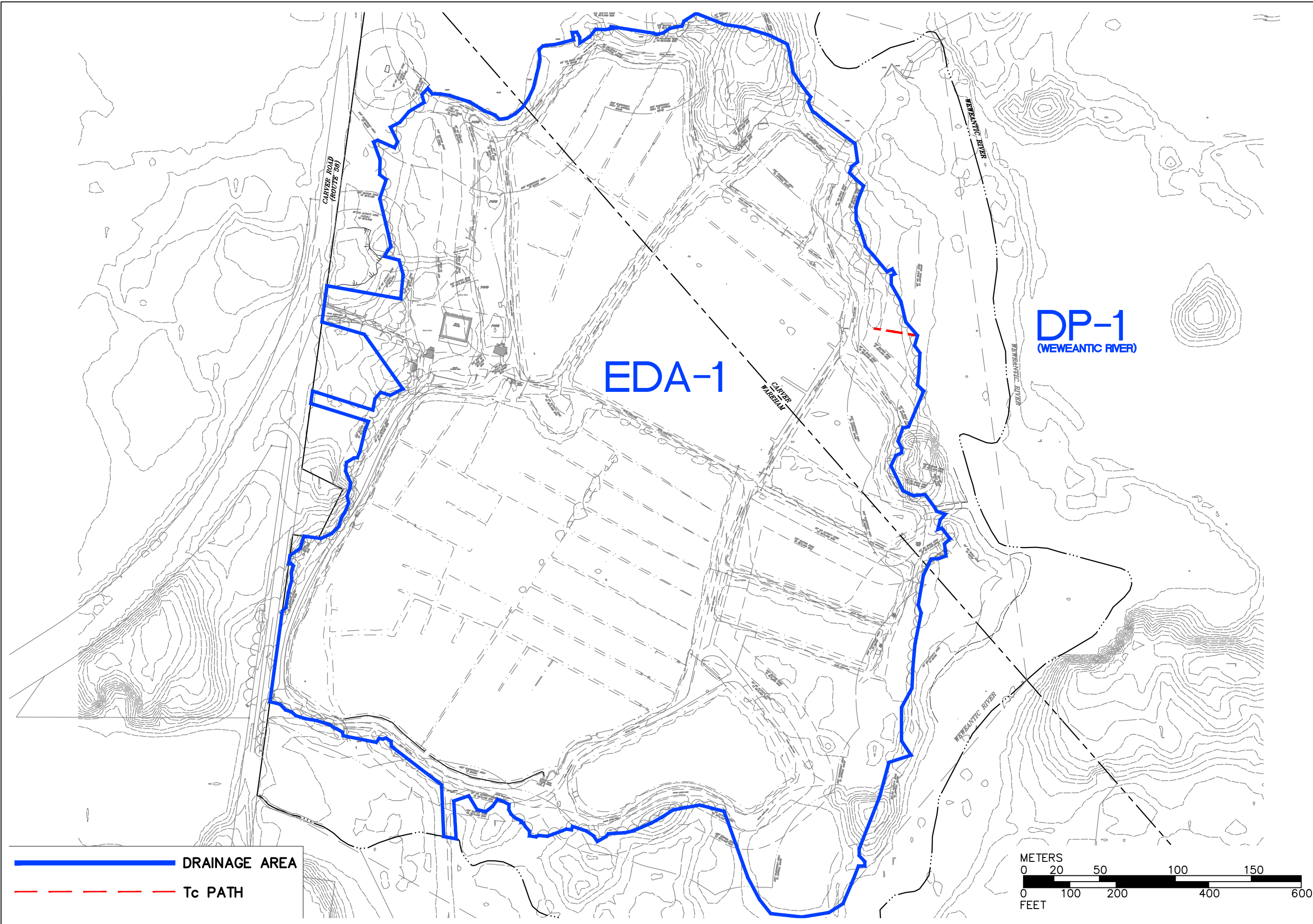
CONCLUSIONS:
Peak Runoff Rates (CFS):

Storm Event	DP-1
1-Year	9.63
2-Year	22.39
10-Year	78.61
25-Year	132.13
50-Year	186.23
100-Year	254.59

Total Runoff Volumes (AF):

Storm Event	DP-1
1-Year	1.70
2-Year	2.97
10-Year	7.80
25-Year	12.39
50-Year	17.06
100-Year	23.01

REV	CALC. BY	DATE	CHECKED BY	DATE	APPROVED BY	DATE
0	N. Bautz	12/15/2020	N. Santangelo	12/15/2020	E. Las	12/16/2020

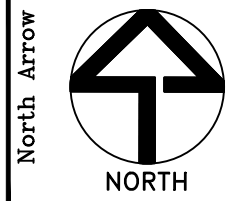


**Pre-Development Conditions
Hydrologic Areas Map
Figure Number 001**

Scale: 1" = 250' Date: 12/15/2020
Plan No. 320300P004A-001
B+T Project No. 3203.00

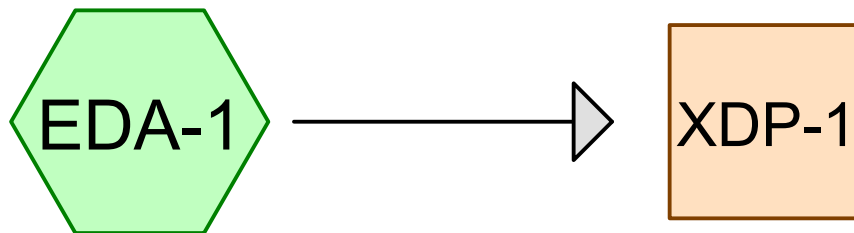
Rocky Maple Solar
Wareham and Carver, Massachusetts

BE RE, LLC
PO Box 974
Edwards, Colorado

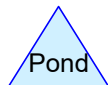
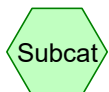


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Pre-Development Conditions Hydrology



Weweantic River



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Area Listing (selected nodes)

Area (acres)	CN	Description (subcatchment-numbers)
20.523	30	Brush, Good, HSG A (EDA-1)
44.365	73	Brush, Good, HSG D (EDA-1)
4.176	96	Gravel surface, HSG A (EDA-1)
0.218	98	Impervious, HSG A (EDA-1)
0.144	98	Roofs, HSG A (EDA-1)
0.691	30	Woods, Good, HSG A (EDA-1)
70.117	61	TOTAL AREA

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Type III 24-hr Custom Rainfall=2.80"

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

Subcatchment EDA-1:

Runoff Area=70.117 ac 0.52% Impervious Runoff Depth>0.29"
Flow Length=117' Tc=12.9 min CN=61 Runoff=9.63 cfs 1.700 af

Reach XDP-1: Weweantic River

Inflow=9.63 cfs 1.700 af
Outflow=9.63 cfs 1.700 af

Total Runoff Area = 70.117 ac Runoff Volume = 1.700 af Average Runoff Depth = 0.29"
99.48% Pervious = 69.755 ac 0.52% Impervious = 0.362 ac

Summary for Subcatchment EDA-1:

Runoff = 9.63 cfs @ 12.37 hrs, Volume= 1.700 af, Depth> 0.29"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type III 24-hr Custom Rainfall=2.80"

Area (ac)	CN	Description
0.691	30	Woods, Good, HSG A
20.523	30	Brush, Good, HSG A
44.365	73	Brush, Good, HSG D
* 0.218	98	Impervious, HSG A
0.144	98	Roofs, HSG A
4.176	96	Gravel surface, HSG A
70.117	61	Weighted Average
69.755		99.48% Pervious Area
0.362		0.52% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
11.6	50	0.0100	0.07		Sheet Flow, Tc-1
					Grass: Dense n= 0.240 P2= 2.80"
1.3	67	0.0150	0.86		Shallow Concentrated Flow, Tc-2
					Short Grass Pasture Kv= 7.0 fps
12.9	117	Total			

Summary for Reach XDP-1: Weweantic River

Inflow Area = 70.117 ac, 0.52% Impervious, Inflow Depth > 0.29" for Custom event

Inflow = 9.63 cfs @ 12.37 hrs, Volume= 1.700 af

Outflow = 9.63 cfs @ 12.37 hrs, Volume= 1.700 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs

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Type III 24-hr Plymouth-001yr Rainfall=2.80"

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

Subcatchment EDA-1:

Runoff Area=70.117 ac 0.52% Impervious Runoff Depth>0.29"
Flow Length=117' Tc=12.9 min CN=61 Runoff=9.63 cfs 1.700 af

Reach XDP-1: Weweantic River

Inflow=9.63 cfs 1.700 af
Outflow=9.63 cfs 1.700 af

Total Runoff Area = 70.117 ac Runoff Volume = 1.700 af Average Runoff Depth = 0.29"
99.48% Pervious = 69.755 ac 0.52% Impervious = 0.362 ac

Summary for Subcatchment EDA-1:

Runoff = 9.63 cfs @ 12.37 hrs, Volume= 1.700 af, Depth> 0.29"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
 Type III 24-hr Plymouth-001yr Rainfall=2.80"

Area (ac)	CN	Description
0.691	30	Woods, Good, HSG A
20.523	30	Brush, Good, HSG A
44.365	73	Brush, Good, HSG D
* 0.218	98	Impervious, HSG A
0.144	98	Roofs, HSG A
4.176	96	Gravel surface, HSG A
70.117	61	Weighted Average
69.755		99.48% Pervious Area
0.362		0.52% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
11.6	50	0.0100	0.07		Sheet Flow, Tc-1
					Grass: Dense n= 0.240 P2= 2.80"
1.3	67	0.0150	0.86		Shallow Concentrated Flow, Tc-2
					Short Grass Pasture Kv= 7.0 fps
12.9	117	Total			

Summary for Reach XDP-1: Weweantic River

Inflow Area = 70.117 ac, 0.52% Impervious, Inflow Depth > 0.29" for Plymouth-001yr event
 Inflow = 9.63 cfs @ 12.37 hrs, Volume= 1.700 af
 Outflow = 9.63 cfs @ 12.37 hrs, Volume= 1.700 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs

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Type III 24-hr Plymouth-002yr Rainfall=3.36"

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

Subcatchment EDA-1:

Runoff Area=70.117 ac 0.52% Impervious Runoff Depth>0.51"
Flow Length=117' Tc=12.9 min CN=61 Runoff=22.39 cfs 2.974 af

Reach XDP-1: Weweantic River

Inflow=22.39 cfs 2.974 af
Outflow=22.39 cfs 2.974 af

Total Runoff Area = 70.117 ac Runoff Volume = 2.974 af Average Runoff Depth = 0.51"
99.48% Pervious = 69.755 ac 0.52% Impervious = 0.362 ac

Summary for Subcatchment EDA-1:

Runoff = 22.39 cfs @ 12.25 hrs, Volume= 2.974 af, Depth> 0.51"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
 Type III 24-hr Plymouth-002yr Rainfall=3.36"

Area (ac)	CN	Description
0.691	30	Woods, Good, HSG A
20.523	30	Brush, Good, HSG A
44.365	73	Brush, Good, HSG D
* 0.218	98	Impervious, HSG A
0.144	98	Roofs, HSG A
4.176	96	Gravel surface, HSG A
70.117	61	Weighted Average
69.755		99.48% Pervious Area
0.362		0.52% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
11.6	50	0.0100	0.07		Sheet Flow, Tc-1
					Grass: Dense n= 0.240 P2= 2.80"
1.3	67	0.0150	0.86		Shallow Concentrated Flow, Tc-2
					Short Grass Pasture Kv= 7.0 fps
12.9	117	Total			

Summary for Reach XDP-1: Weweantic River

Inflow Area = 70.117 ac, 0.52% Impervious, Inflow Depth > 0.51" for Plymouth-002yr event
 Inflow = 22.39 cfs @ 12.25 hrs, Volume= 2.974 af
 Outflow = 22.39 cfs @ 12.25 hrs, Volume= 2.974 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs

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Type III 24-hr Plymouth-010yr Rainfall=4.95"

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

Subcatchment EDA-1:

Runoff Area=70.117 ac 0.52% Impervious Runoff Depth>1.33"
Flow Length=117' Tc=12.9 min CN=61 Runoff=78.61 cfs 7.799 af

Reach XDP-1: Weweantic River

Inflow=78.61 cfs 7.799 af
Outflow=78.61 cfs 7.799 af

Total Runoff Area = 70.117 ac Runoff Volume = 7.799 af Average Runoff Depth = 1.33"
99.48% Pervious = 69.755 ac 0.52% Impervious = 0.362 ac

Summary for Subcatchment EDA-1:

Runoff = 78.61 cfs @ 12.20 hrs, Volume= 7.799 af, Depth> 1.33"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
 Type III 24-hr Plymouth-010yr Rainfall=4.95"

Area (ac)	CN	Description
0.691	30	Woods, Good, HSG A
20.523	30	Brush, Good, HSG A
44.365	73	Brush, Good, HSG D
* 0.218	98	Impervious, HSG A
0.144	98	Roofs, HSG A
4.176	96	Gravel surface, HSG A
70.117	61	Weighted Average
69.755		99.48% Pervious Area
0.362		0.52% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
11.6	50	0.0100	0.07		Sheet Flow, Tc-1
					Grass: Dense n= 0.240 P2= 2.80"
1.3	67	0.0150	0.86		Shallow Concentrated Flow, Tc-2
					Short Grass Pasture Kv= 7.0 fps
12.9	117	Total			

Summary for Reach XDP-1: Weweantic River

Inflow Area = 70.117 ac, 0.52% Impervious, Inflow Depth > 1.33" for Plymouth-010yr event
 Inflow = 78.61 cfs @ 12.20 hrs, Volume= 7.799 af
 Outflow = 78.61 cfs @ 12.20 hrs, Volume= 7.799 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs

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Type III 24-hr Plymouth-025yr Rainfall=6.18"

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

Subcatchment EDA-1:

Runoff Area=70.117 ac 0.52% Impervious Runoff Depth>2.12"
Flow Length=117' Tc=12.9 min CN=61 Runoff=132.13 cfs 12.391 af

Reach XDP-1: Weweantic River

Inflow=132.13 cfs 12.391 af
Outflow=132.13 cfs 12.391 af

Total Runoff Area = 70.117 ac Runoff Volume = 12.391 af Average Runoff Depth = 2.12"
99.48% Pervious = 69.755 ac 0.52% Impervious = 0.362 ac

Summary for Subcatchment EDA-1:

Runoff = 132.13 cfs @ 12.19 hrs, Volume= 12.391 af, Depth> 2.12"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
 Type III 24-hr Plymouth-025yr Rainfall=6.18"

Area (ac)	CN	Description
0.691	30	Woods, Good, HSG A
20.523	30	Brush, Good, HSG A
44.365	73	Brush, Good, HSG D
* 0.218	98	Impervious, HSG A
0.144	98	Roofs, HSG A
4.176	96	Gravel surface, HSG A
70.117	61	Weighted Average
69.755		99.48% Pervious Area
0.362		0.52% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
11.6	50	0.0100	0.07		Sheet Flow, Tc-1
					Grass: Dense n= 0.240 P2= 2.80"
1.3	67	0.0150	0.86		Shallow Concentrated Flow, Tc-2
					Short Grass Pasture Kv= 7.0 fps
12.9	117	Total			

Summary for Reach XDP-1: Weweantic River

Inflow Area = 70.117 ac, 0.52% Impervious, Inflow Depth > 2.12" for Plymouth-025yr event
 Inflow = 132.13 cfs @ 12.19 hrs, Volume= 12.391 af
 Outflow = 132.13 cfs @ 12.19 hrs, Volume= 12.391 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs

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Type III 24-hr Plymouth-050yr Rainfall=7.31"

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

Subcatchment EDA-1:

Runoff Area=70.117 ac 0.52% Impervious Runoff Depth>2.92"
Flow Length=117' Tc=12.9 min CN=61 Runoff=186.23 cfs 17.060 af

Reach XDP-1: Weweantic River

Inflow=186.23 cfs 17.060 af
Outflow=186.23 cfs 17.060 af

Total Runoff Area = 70.117 ac Runoff Volume = 17.060 af Average Runoff Depth = 2.92"
99.48% Pervious = 69.755 ac 0.52% Impervious = 0.362 ac

Summary for Subcatchment EDA-1:

Runoff = 186.23 cfs @ 12.19 hrs, Volume= 17.060 af, Depth> 2.92"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
 Type III 24-hr Plymouth-050yr Rainfall=7.31"

Area (ac)	CN	Description
0.691	30	Woods, Good, HSG A
20.523	30	Brush, Good, HSG A
44.365	73	Brush, Good, HSG D
* 0.218	98	Impervious, HSG A
0.144	98	Roofs, HSG A
4.176	96	Gravel surface, HSG A
70.117	61	Weighted Average
69.755		99.48% Pervious Area
0.362		0.52% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
11.6	50	0.0100	0.07		Sheet Flow, Tc-1
					Grass: Dense n= 0.240 P2= 2.80"
1.3	67	0.0150	0.86		Shallow Concentrated Flow, Tc-2
					Short Grass Pasture Kv= 7.0 fps
12.9	117	Total			

Summary for Reach XDP-1: Weweantic River

Inflow Area = 70.117 ac, 0.52% Impervious, Inflow Depth > 2.92" for Plymouth-050yr event
 Inflow = 186.23 cfs @ 12.19 hrs, Volume= 17.060 af
 Outflow = 186.23 cfs @ 12.19 hrs, Volume= 17.060 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs

320300HC001A

Type III 24-hr Plymouth-100yr Rainfall=8.65"

Prepared by Beals and Thomas, Inc.

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

Subcatchment EDA-1:

Runoff Area=70.117 ac 0.52% Impervious Runoff Depth>3.94"
Flow Length=117' Tc=12.9 min CN=61 Runoff=254.59 cfs 23.006 af

Reach XDP-1: Weweantic River

Inflow=254.59 cfs 23.006 af
Outflow=254.59 cfs 23.006 af

Total Runoff Area = 70.117 ac Runoff Volume = 23.006 af Average Runoff Depth = 3.94"
99.48% Pervious = 69.755 ac 0.52% Impervious = 0.362 ac

Summary for Subcatchment EDA-1:

Runoff = 254.59 cfs @ 12.19 hrs, Volume= 23.006 af, Depth> 3.94"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
 Type III 24-hr Plymouth-100yr Rainfall=8.65"

Area (ac)	CN	Description
0.691	30	Woods, Good, HSG A
20.523	30	Brush, Good, HSG A
44.365	73	Brush, Good, HSG D
* 0.218	98	Impervious, HSG A
0.144	98	Roofs, HSG A
4.176	96	Gravel surface, HSG A
70.117	61	Weighted Average
69.755		99.48% Pervious Area
0.362		0.52% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
11.6	50	0.0100	0.07		Sheet Flow, Tc-1
					Grass: Dense n= 0.240 P2= 2.80"
1.3	67	0.0150	0.86		Shallow Concentrated Flow, Tc-2
					Short Grass Pasture Kv= 7.0 fps
12.9	117	Total			

Summary for Reach XDP-1: Weweantic River

Inflow Area = 70.117 ac, 0.52% Impervious, Inflow Depth > 3.94" for Plymouth-100yr event
 Inflow = 254.59 cfs @ 12.19 hrs, Volume= 23.006 af
 Outflow = 254.59 cfs @ 12.19 hrs, Volume= 23.006 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs

Attachment 3
Post-Development Hydrologic Analysis

JOB NO./LOCATION:	3203.00 Carver & Wareham, MA
CLIENT/PROJECT:	BE RE, LLC Rocky Maple Solar
SUBJECT/TITLE:	Post-Development Conditions Hydrology
OBJECTIVE OF CALCULATION:	<ul style="list-style-type: none"> To determine the post-development peak rates of runoff and stormwater volumes from the site for the 1, 2, 10, 25, 50, & 100-year storm events at the design points.
CALCULATION METHOD(S):	<ul style="list-style-type: none"> Runoff curve numbers (CN), time-of-concentration (Tc), and runoff rates were calculated based on TR-55 methodology. AutoCAD 2019 computer program was utilized for digitizing ground cover areas. Peak runoff rates were computed using HydroCAD version 10.00.
ASSUMPTIONS:	<ul style="list-style-type: none"> The ground cover types were determined using aerial imagery. Hydrologic soil groups based on United States Department of Agriculture, NRCS Soil Survey map information. Stormwater runoff from offsite tributary areas was included in the calculations. Wetlands were excluded from this calculation.
SOURCES OF DATA/EQUATIONS:	<ul style="list-style-type: none"> Post-Development Conditions Hydrologic Areas Map prepared by Beals and Thomas, Inc. File No. 320300P004A-002. NRCS Soil Survey for Plymouth County, downloaded from Web Soil Survey on 06/03/2020. TR-55 urban Hydrology for Small Watersheds, SCS, 1986. Massachusetts DEP Stormwater Management Handbook, February 2008.

REV	CALC. BY	DATE	CHECKED BY	DATE	APPROVED BY	DATE
0	N. Bautz	12/15/2020	N. Santangelo	12/15/2020	E. Las	12/16/2020

CONCLUSIONS:
Peak Runoff Rates (CFS):

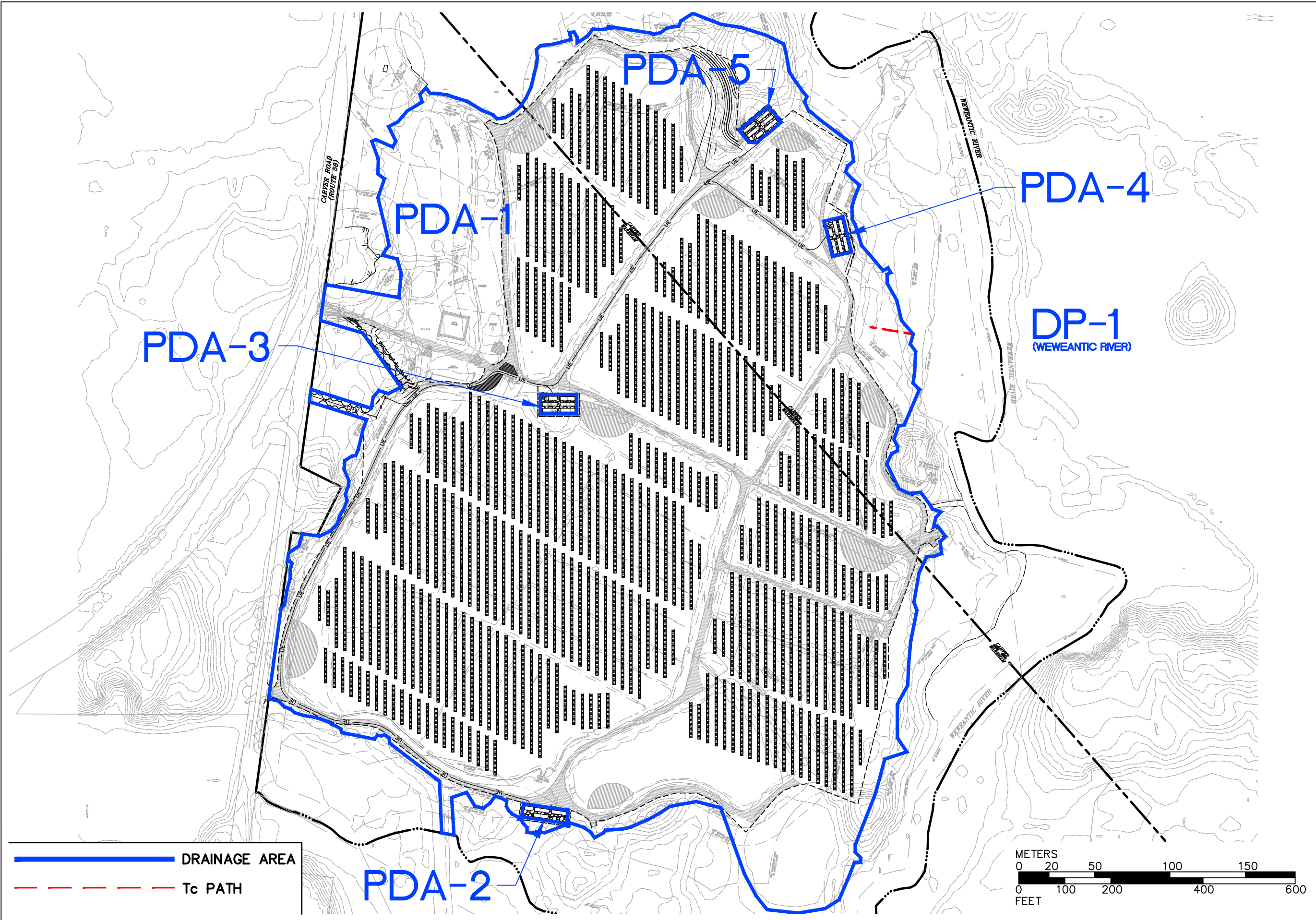
Storm Event	DP-1
1-Year	9.57
2-Year	22.25
10-Year	78.10
25-Year	131.27
50-Year	185.02
100-Year	252.94

Total Runoff Volumes (AF):

Storm Event	DP-1
1-Year	1.69
2-Year	2.96
10-Year	7.75
25-Year	12.31
50-Year	16.95
100-Year	22.86

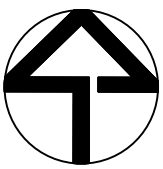
Conclusion: Overall runoff rates and volumes from the project area will be less than existing conditions in accordance with Standard 2 of the MassDEP Stormwater Management Regulations and local bylaws.

REV	CALC. BY	DATE	CHECKED BY	DATE	APPROVED BY	DATE
0	N. Bautz	12/15/2020	N. Santangelo	12/15/2020	E. Las	12/16/2020

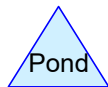
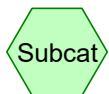
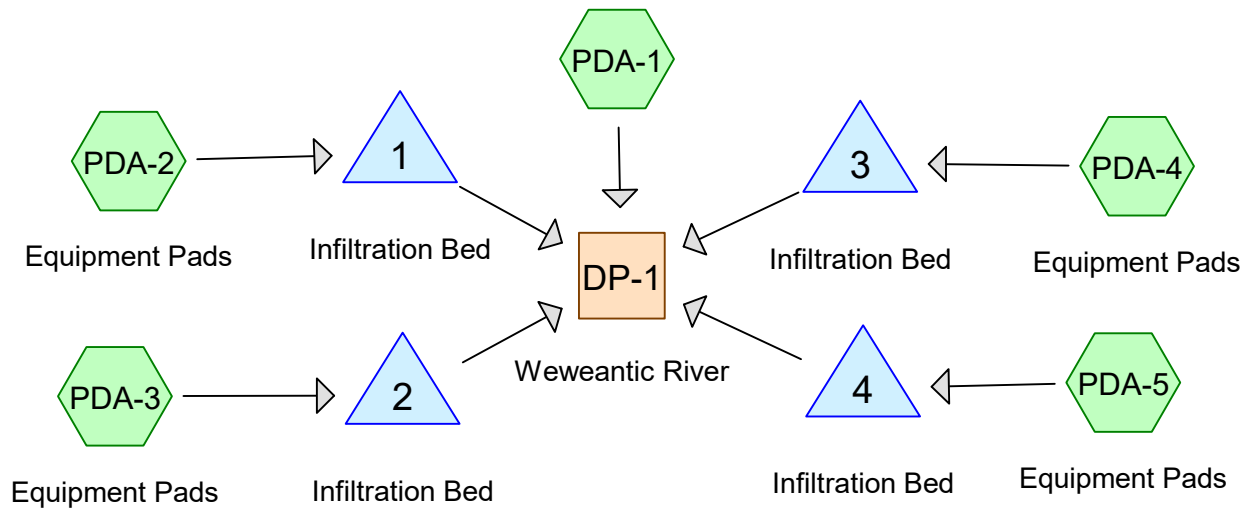


**Post-Development Conditions
 Hydrologic Areas Map**
 Figure Number 002
 Scale: 1" = 250' Date: 12/15/2020
 Plan No. 320300P004A-002
 B+T Project No. 3203.00

Rocky Maple Solar
 Wareham and Carver, Massachusetts
BE RE, LLC
 PO Box 974
 Edwards, Colorado

North Arrow

 NORTH
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Post-Development
Conditions Hydrology



Area Listing (selected nodes)

Area (acres)	CN	Description (subcatchment-numbers)
0.020	39	>75% Grass cover, Good, HSG A (PDA-1)
20.523	30	Brush, Good, HSG A (PDA-1)
44.124	73	Brush, Good, HSG D (PDA-1)
0.186	98	Equipment Pads, HSG A (PDA-2, PDA-3, PDA-4, PDA-5)
4.176	96	Existing Gravel surface, HSG A (PDA-1)
0.218	98	Existing Impervious HSG A (PDA-1)
0.069	76	Gravel roads, HSG A (PDA-2)
0.201	96	Gravel surface, HSG A (PDA-3, PDA-4, PDA-5)
0.090	96	Proposed Gravel surface, HSG A (PDA-1)
0.510	30	Woods, Good, HSG A (PDA-1)
70.117	62	TOTAL AREA

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Type III 24-hr Custom Rainfall=2.80"

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

Subcatchment PDA-1:	Runoff Area=69.661 ac 0.31% Impervious Runoff Depth>0.29" Flow Length=117' Tc=12.9 min CN=61 Runoff=9.57 cfs 1.689 af
Subcatchment PDA-2: Equipment Pads	Runoff Area=0.102 ac 32.35% Impervious Runoff Depth>1.29" Tc=6.0 min CN=83 Runoff=0.15 cfs 0.011 af
Subcatchment PDA-3: Equipment Pads	Runoff Area=0.119 ac 42.86% Impervious Runoff Depth>2.46" Tc=6.0 min CN=97 Runoff=0.31 cfs 0.024 af
Subcatchment PDA-4: Equipment Pads	Runoff Area=0.119 ac 42.86% Impervious Runoff Depth>2.46" Tc=6.0 min CN=97 Runoff=0.31 cfs 0.024 af
Subcatchment PDA-5: Equipment Pads	Runoff Area=0.116 ac 43.97% Impervious Runoff Depth>2.46" Tc=6.0 min CN=97 Runoff=0.30 cfs 0.024 af
Reach DP-1: Weweantic River	Inflow=9.57 cfs 1.689 af Outflow=9.57 cfs 1.689 af
Pond 1: Infiltration Bed	Peak Elev=61.01' Storage=0.000 af Inflow=0.15 cfs 0.011 af Outflow=0.15 cfs 0.011 af
Pond 2: Infiltration Bed	Peak Elev=63.01' Storage=0.001 af Inflow=0.31 cfs 0.024 af Outflow=0.29 cfs 0.024 af
Pond 3: Infiltration Bed	Peak Elev=63.01' Storage=0.001 af Inflow=0.31 cfs 0.024 af Outflow=0.29 cfs 0.024 af
Pond 4: Infiltration Bed	Peak Elev=63.01' Storage=0.001 af Inflow=0.30 cfs 0.024 af Outflow=0.28 cfs 0.024 af

Total Runoff Area = 70.117 ac Runoff Volume = 1.772 af Average Runoff Depth = 0.30"
99.42% Pervious = 69.713 ac 0.58% Impervious = 0.404 ac

Summary for Subcatchment PDA-1:

Runoff = 9.57 cfs @ 12.37 hrs, Volume= 1.689 af, Depth> 0.29"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type III 24-hr Custom Rainfall=2.80"

Area (ac)	CN	Description
0.510	30	Woods, Good, HSG A
20.523	30	Brush, Good, HSG A
44.124	73	Brush, Good, HSG D
* 0.218	98	Existing Impervious HSG A
* 4.176	96	Existing Gravel surface, HSG A
* 0.090	96	Proposed Gravel surface, HSG A
0.020	39	>75% Grass cover, Good, HSG A
69.661	61	Weighted Average
69.443		99.69% Pervious Area
0.218		0.31% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
11.6	50	0.0100	0.07		Sheet Flow, Tc-1
					Grass: Dense n= 0.240 P2= 2.80"
1.3	67	0.0150	0.86		Shallow Concentrated Flow, Tc-2
					Short Grass Pasture Kv= 7.0 fps
12.9	117	Total			

Summary for Subcatchment PDA-2: Equipment Pads

Runoff = 0.15 cfs @ 12.10 hrs, Volume= 0.011 af, Depth> 1.29"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type III 24-hr Custom Rainfall=2.80"

Area (ac)	CN	Description
* 0.033	98	Equipment Pads, HSG A
0.069	76	Gravel roads, HSG A
0.102	83	Weighted Average
0.069		67.65% Pervious Area
0.033		32.35% Impervious Area

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

Summary for Subcatchment PDA-3: Equipment Pads

Runoff = 0.31 cfs @ 12.09 hrs, Volume= 0.024 af, Depth> 2.46"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type III 24-hr Custom Rainfall=2.80"

Area (ac)	CN	Description
* 0.051	98	Equipment Pads, HSG A
0.068	96	Gravel surface, HSG A
0.119	97	Weighted Average
0.068		57.14% Pervious Area
0.051		42.86% Impervious Area

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

Summary for Subcatchment PDA-4: Equipment Pads

Runoff = 0.31 cfs @ 12.09 hrs, Volume= 0.024 af, Depth> 2.46"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type III 24-hr Custom Rainfall=2.80"

Area (ac)	CN	Description
* 0.051	98	Equipment Pads, HSG A
0.068	96	Gravel surface, HSG A
0.119	97	Weighted Average
0.068		57.14% Pervious Area
0.051		42.86% Impervious Area

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

Summary for Subcatchment PDA-5: Equipment Pads

Runoff = 0.30 cfs @ 12.09 hrs, Volume= 0.024 af, Depth> 2.46"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type III 24-hr Custom Rainfall=2.80"

Area (ac)	CN	Description
* 0.051	98	Equipment Pads, HSG A
0.065	96	Gravel surface, HSG A
0.116	97	Weighted Average
0.065		56.03% Pervious Area
0.051		43.97% Impervious Area

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

Summary for Reach DP-1: Weweantic River

Inflow Area = 70.117 ac, 0.58% Impervious, Inflow Depth > 0.29" for Custom event
 Inflow = 9.57 cfs @ 12.37 hrs, Volume= 1.689 af
 Outflow = 9.57 cfs @ 12.37 hrs, Volume= 1.689 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs

Summary for Pond 1: Infiltration Bed

Inflow Area = 0.102 ac, 32.35% Impervious, Inflow Depth > 1.29" for Custom event
 Inflow = 0.15 cfs @ 12.10 hrs, Volume= 0.011 af
 Outflow = 0.15 cfs @ 12.11 hrs, Volume= 0.011 af, Atten= 3%, Lag= 1.2 min
 Discarded = 0.15 cfs @ 12.11 hrs, Volume= 0.011 af

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
 Peak Elev= 61.01' @ 12.11 hrs Surf.Area= 0.102 ac Storage= 0.000 af

Plug-Flow detention time= 1.2 min calculated for 0.011 af (100% of inflow)
 Center-of-Mass det. time= 1.0 min (839.8 - 838.8)

Volume	Invert	Avail.Storage	Storage Description
#1	61.00'	0.041 af	36.00'W x 123.00'L x 1.00'H Prismatic 0.102 af Overall x 40.0% Voids

Device	Routing	Invert	Outlet Devices
#1	Discarded	61.00'	2.410 in/hr Exfiltration over Surface area

Discarded OutFlow Max=0.25 cfs @ 12.11 hrs HW=61.01' (Free Discharge)
 ↑**1=Exfiltration** (Exfiltration Controls 0.25 cfs)

Summary for Pond 2: Infiltration Bed

Inflow Area = 0.119 ac, 42.86% Impervious, Inflow Depth > 2.46" for Custom event
 Inflow = 0.31 cfs @ 12.09 hrs, Volume= 0.024 af
 Outflow = 0.29 cfs @ 12.12 hrs, Volume= 0.024 af, Atten= 6%, Lag= 2.2 min
 Discarded = 0.29 cfs @ 12.12 hrs, Volume= 0.024 af

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
 Peak Elev= 63.01' @ 12.11 hrs Surf.Area= 0.118 ac Storage= 0.001 af

Plug-Flow detention time= 1.2 min calculated for 0.024 af (100% of inflow)
 Center-of-Mass det. time= 1.1 min (770.1 - 769.1)

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Type III 24-hr Custom Rainfall=2.80"

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Volume	Invert	Avail.Storage	Storage Description
#1	63.00'	0.047 af	52.00'W x 99.00'L x 1.00'H Prismaoid 0.118 af Overall x 40.0% Voids

Device	Routing	Invert	Outlet Devices
#1	Discarded	63.00'	2.410 in/hr Exfiltration over Surface area

Discarded OutFlow Max=0.29 cfs @ 12.12 hrs HW=63.01' (Free Discharge)
 ↑**1=Exfiltration** (Exfiltration Controls 0.29 cfs)

Summary for Pond 3: Infiltration Bed

Inflow Area = 0.119 ac, 42.86% Impervious, Inflow Depth > 2.46" for Custom event
 Inflow = 0.31 cfs @ 12.09 hrs, Volume= 0.024 af
 Outflow = 0.29 cfs @ 12.12 hrs, Volume= 0.024 af, Atten= 6%, Lag= 2.2 min
 Discarded = 0.29 cfs @ 12.12 hrs, Volume= 0.024 af

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
 Peak Elev= 63.01' @ 12.11 hrs Surf.Area= 0.118 ac Storage= 0.001 af

Plug-Flow detention time= 1.2 min calculated for 0.024 af (100% of inflow)
 Center-of-Mass det. time= 1.1 min (770.1 - 769.1)

Volume	Invert	Avail.Storage	Storage Description
#1	63.00'	0.047 af	52.00'W x 99.00'L x 1.00'H Prismaoid 0.118 af Overall x 40.0% Voids

Device	Routing	Invert	Outlet Devices
#1	Discarded	63.00'	2.410 in/hr Exfiltration over Surface area

Discarded OutFlow Max=0.29 cfs @ 12.12 hrs HW=63.01' (Free Discharge)
 ↑**1=Exfiltration** (Exfiltration Controls 0.29 cfs)

Summary for Pond 4: Infiltration Bed

Inflow Area = 0.116 ac, 43.97% Impervious, Inflow Depth > 2.46" for Custom event
 Inflow = 0.30 cfs @ 12.09 hrs, Volume= 0.024 af
 Outflow = 0.28 cfs @ 12.12 hrs, Volume= 0.024 af, Atten= 5%, Lag= 1.9 min
 Discarded = 0.28 cfs @ 12.12 hrs, Volume= 0.024 af

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
 Peak Elev= 63.01' @ 12.11 hrs Surf.Area= 0.116 ac Storage= 0.001 af

Plug-Flow detention time= 1.2 min calculated for 0.024 af (100% of inflow)
 Center-of-Mass det. time= 1.1 min (770.1 - 769.1)

Volume	Invert	Avail.Storage	Storage Description
#1	63.00'	0.046 af	51.00'W x 99.00'L x 1.00'H Prismaoid 0.116 af Overall x 40.0% Voids

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Type III 24-hr Custom Rainfall=2.80"

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Device	Routing	Invert	Outlet Devices
#1	Discarded	63.00'	2.410 in/hr Exfiltration over Surface area

Discarded OutFlow Max=0.28 cfs @ 12.12 hrs HW=63.01' (Free Discharge)
↑**1=Exfiltration** (Exfiltration Controls 0.28 cfs)

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Type III 24-hr Plymouth-001yr Rainfall=2.80"

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

Subcatchment PDA-1:	Runoff Area=69.661 ac 0.31% Impervious Runoff Depth>0.29" Flow Length=117' Tc=12.9 min CN=61 Runoff=9.57 cfs 1.689 af
Subcatchment PDA-2: Equipment Pads	Runoff Area=0.102 ac 32.35% Impervious Runoff Depth>1.29" Tc=6.0 min CN=83 Runoff=0.15 cfs 0.011 af
Subcatchment PDA-3: Equipment Pads	Runoff Area=0.119 ac 42.86% Impervious Runoff Depth>2.46" Tc=6.0 min CN=97 Runoff=0.31 cfs 0.024 af
Subcatchment PDA-4: Equipment Pads	Runoff Area=0.119 ac 42.86% Impervious Runoff Depth>2.46" Tc=6.0 min CN=97 Runoff=0.31 cfs 0.024 af
Subcatchment PDA-5: Equipment Pads	Runoff Area=0.116 ac 43.97% Impervious Runoff Depth>2.46" Tc=6.0 min CN=97 Runoff=0.30 cfs 0.024 af
Reach DP-1: Weweantic River	Inflow=9.57 cfs 1.689 af Outflow=9.57 cfs 1.689 af
Pond 1: Infiltration Bed	Peak Elev=61.01' Storage=0.000 af Inflow=0.15 cfs 0.011 af Outflow=0.15 cfs 0.011 af
Pond 2: Infiltration Bed	Peak Elev=63.01' Storage=0.001 af Inflow=0.31 cfs 0.024 af Outflow=0.29 cfs 0.024 af
Pond 3: Infiltration Bed	Peak Elev=63.01' Storage=0.001 af Inflow=0.31 cfs 0.024 af Outflow=0.29 cfs 0.024 af
Pond 4: Infiltration Bed	Peak Elev=63.01' Storage=0.001 af Inflow=0.30 cfs 0.024 af Outflow=0.28 cfs 0.024 af

Total Runoff Area = 70.117 ac Runoff Volume = 1.772 af Average Runoff Depth = 0.30"
99.42% Pervious = 69.713 ac 0.58% Impervious = 0.404 ac

Summary for Subcatchment PDA-1:

Runoff = 9.57 cfs @ 12.37 hrs, Volume= 1.689 af, Depth> 0.29"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type III 24-hr Plymouth-001yr Rainfall=2.80"

Area (ac)	CN	Description
0.510	30	Woods, Good, HSG A
20.523	30	Brush, Good, HSG A
44.124	73	Brush, Good, HSG D
* 0.218	98	Existing Impervious HSG A
* 4.176	96	Existing Gravel surface, HSG A
* 0.090	96	Proposed Gravel surface, HSG A
0.020	39	>75% Grass cover, Good, HSG A
69.661	61	Weighted Average
69.443		99.69% Pervious Area
0.218		0.31% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
11.6	50	0.0100	0.07		Sheet Flow, Tc-1
					Grass: Dense n= 0.240 P2= 2.80"
1.3	67	0.0150	0.86		Shallow Concentrated Flow, Tc-2
					Short Grass Pasture Kv= 7.0 fps
12.9	117	Total			

Summary for Subcatchment PDA-2: Equipment Pads

Runoff = 0.15 cfs @ 12.10 hrs, Volume= 0.011 af, Depth> 1.29"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type III 24-hr Plymouth-001yr Rainfall=2.80"

Area (ac)	CN	Description
* 0.033	98	Equipment Pads, HSG A
0.069	76	Gravel roads, HSG A
0.102	83	Weighted Average
0.069		67.65% Pervious Area
0.033		32.35% Impervious Area

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

Summary for Subcatchment PDA-3: Equipment Pads

Runoff = 0.31 cfs @ 12.09 hrs, Volume= 0.024 af, Depth> 2.46"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type III 24-hr Plymouth-001yr Rainfall=2.80"

Area (ac)	CN	Description
* 0.051	98	Equipment Pads, HSG A
0.068	96	Gravel surface, HSG A
0.119	97	Weighted Average
0.068		57.14% Pervious Area
0.051		42.86% Impervious Area

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

Summary for Subcatchment PDA-4: Equipment Pads

Runoff = 0.31 cfs @ 12.09 hrs, Volume= 0.024 af, Depth> 2.46"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type III 24-hr Plymouth-001yr Rainfall=2.80"

Area (ac)	CN	Description
* 0.051	98	Equipment Pads, HSG A
0.068	96	Gravel surface, HSG A
0.119	97	Weighted Average
0.068		57.14% Pervious Area
0.051		42.86% Impervious Area

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

Summary for Subcatchment PDA-5: Equipment Pads

Runoff = 0.30 cfs @ 12.09 hrs, Volume= 0.024 af, Depth> 2.46"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type III 24-hr Plymouth-001yr Rainfall=2.80"

Area (ac)	CN	Description
* 0.051	98	Equipment Pads, HSG A
0.065	96	Gravel surface, HSG A
0.116	97	Weighted Average
0.065		56.03% Pervious Area
0.051		43.97% Impervious Area

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

Summary for Reach DP-1: Weweantic River

Inflow Area = 70.117 ac, 0.58% Impervious, Inflow Depth > 0.29" for Plymouth-001yr event
 Inflow = 9.57 cfs @ 12.37 hrs, Volume= 1.689 af
 Outflow = 9.57 cfs @ 12.37 hrs, Volume= 1.689 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs

Summary for Pond 1: Infiltration Bed

Inflow Area = 0.102 ac, 32.35% Impervious, Inflow Depth > 1.29" for Plymouth-001yr event
 Inflow = 0.15 cfs @ 12.10 hrs, Volume= 0.011 af
 Outflow = 0.15 cfs @ 12.11 hrs, Volume= 0.011 af, Atten= 3%, Lag= 1.2 min
 Discarded = 0.15 cfs @ 12.11 hrs, Volume= 0.011 af

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
 Peak Elev= 61.01' @ 12.11 hrs Surf.Area= 0.102 ac Storage= 0.000 af

Plug-Flow detention time= 1.2 min calculated for 0.011 af (100% of inflow)
 Center-of-Mass det. time= 1.0 min (839.8 - 838.8)

Volume	Invert	Avail.Storage	Storage Description
#1	61.00'	0.041 af	36.00'W x 123.00'L x 1.00'H Prismatic 0.102 af Overall x 40.0% Voids

Device	Routing	Invert	Outlet Devices
#1	Discarded	61.00'	2.410 in/hr Exfiltration over Surface area

Discarded OutFlow Max=0.25 cfs @ 12.11 hrs HW=61.01' (Free Discharge)
 ↑**1=Exfiltration** (Exfiltration Controls 0.25 cfs)

Summary for Pond 2: Infiltration Bed

Inflow Area = 0.119 ac, 42.86% Impervious, Inflow Depth > 2.46" for Plymouth-001yr event
 Inflow = 0.31 cfs @ 12.09 hrs, Volume= 0.024 af
 Outflow = 0.29 cfs @ 12.12 hrs, Volume= 0.024 af, Atten= 6%, Lag= 2.2 min
 Discarded = 0.29 cfs @ 12.12 hrs, Volume= 0.024 af

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
 Peak Elev= 63.01' @ 12.11 hrs Surf.Area= 0.118 ac Storage= 0.001 af

Plug-Flow detention time= 1.2 min calculated for 0.024 af (100% of inflow)
 Center-of-Mass det. time= 1.1 min (770.1 - 769.1)

Volume	Invert	Avail.Storage	Storage Description
#1	63.00'	0.047 af	52.00'W x 99.00'L x 1.00'H Prismaoid 0.118 af Overall x 40.0% Voids

Device	Routing	Invert	Outlet Devices
#1	Discarded	63.00'	2.410 in/hr Exfiltration over Surface area

Discarded OutFlow Max=0.29 cfs @ 12.12 hrs HW=63.01' (Free Discharge)
 ↑1=Exfiltration (Exfiltration Controls 0.29 cfs)

Summary for Pond 3: Infiltration Bed

Inflow Area = 0.119 ac, 42.86% Impervious, Inflow Depth > 2.46" for Plymouth-001yr event
 Inflow = 0.31 cfs @ 12.09 hrs, Volume= 0.024 af
 Outflow = 0.29 cfs @ 12.12 hrs, Volume= 0.024 af, Atten= 6%, Lag= 2.2 min
 Discarded = 0.29 cfs @ 12.12 hrs, Volume= 0.024 af

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
 Peak Elev= 63.01' @ 12.11 hrs Surf.Area= 0.118 ac Storage= 0.001 af

Plug-Flow detention time= 1.2 min calculated for 0.024 af (100% of inflow)
 Center-of-Mass det. time= 1.1 min (770.1 - 769.1)

Volume	Invert	Avail.Storage	Storage Description
#1	63.00'	0.047 af	52.00'W x 99.00'L x 1.00'H Prismaoid 0.118 af Overall x 40.0% Voids

Device	Routing	Invert	Outlet Devices
#1	Discarded	63.00'	2.410 in/hr Exfiltration over Surface area

Discarded OutFlow Max=0.29 cfs @ 12.12 hrs HW=63.01' (Free Discharge)
 ↑1=Exfiltration (Exfiltration Controls 0.29 cfs)

Summary for Pond 4: Infiltration Bed

Inflow Area = 0.116 ac, 43.97% Impervious, Inflow Depth > 2.46" for Plymouth-001yr event
 Inflow = 0.30 cfs @ 12.09 hrs, Volume= 0.024 af
 Outflow = 0.28 cfs @ 12.12 hrs, Volume= 0.024 af, Atten= 5%, Lag= 1.9 min
 Discarded = 0.28 cfs @ 12.12 hrs, Volume= 0.024 af

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
 Peak Elev= 63.01' @ 12.11 hrs Surf.Area= 0.116 ac Storage= 0.001 af

Plug-Flow detention time= 1.2 min calculated for 0.024 af (100% of inflow)
 Center-of-Mass det. time= 1.1 min (770.1 - 769.1)

Volume	Invert	Avail.Storage	Storage Description
#1	63.00'	0.046 af	51.00'W x 99.00'L x 1.00'H Prismaoid 0.116 af Overall x 40.0% Voids

320300HC001A

Type III 24-hr Plymouth-001yr Rainfall=2.80"

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Device	Routing	Invert	Outlet Devices
#1	Discarded	63.00'	2.410 in/hr Exfiltration over Surface area

Discarded OutFlow Max=0.28 cfs @ 12.12 hrs HW=63.01' (Free Discharge)
↑**1=Exfiltration** (Exfiltration Controls 0.28 cfs)

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

Subcatchment PDA-1: Runoff Area=69.661 ac 0.31% Impervious Runoff Depth>0.51"
Flow Length=117' Tc=12.9 min CN=61 Runoff=22.25 cfs 2.955 af

Subcatchment PDA-2: Equipment Pads Runoff Area=0.102 ac 32.35% Impervious Runoff Depth>1.74"
Tc=6.0 min CN=83 Runoff=0.20 cfs 0.015 af

Subcatchment PDA-3: Equipment Pads Runoff Area=0.119 ac 42.86% Impervious Runoff Depth>3.01"
Tc=6.0 min CN=97 Runoff=0.37 cfs 0.030 af

Subcatchment PDA-4: Equipment Pads Runoff Area=0.119 ac 42.86% Impervious Runoff Depth>3.01"
Tc=6.0 min CN=97 Runoff=0.37 cfs 0.030 af

Subcatchment PDA-5: Equipment Pads Runoff Area=0.116 ac 43.97% Impervious Runoff Depth>3.01"
Tc=6.0 min CN=97 Runoff=0.36 cfs 0.029 af

Reach DP-1: Weweantic River Inflow=22.25 cfs 2.955 af
Outflow=22.25 cfs 2.955 af

Pond 1: Infiltration Bed Peak Elev=61.01' Storage=0.000 af Inflow=0.20 cfs 0.015 af
Outflow=0.20 cfs 0.015 af

Pond 2: Infiltration Bed Peak Elev=63.02' Storage=0.001 af Inflow=0.37 cfs 0.030 af
Outflow=0.29 cfs 0.030 af

Pond 3: Infiltration Bed Peak Elev=63.02' Storage=0.001 af Inflow=0.37 cfs 0.030 af
Outflow=0.29 cfs 0.030 af

Pond 4: Infiltration Bed Peak Elev=63.02' Storage=0.001 af Inflow=0.36 cfs 0.029 af
Outflow=0.28 cfs 0.029 af

Total Runoff Area = 70.117 ac Runoff Volume = 3.058 af Average Runoff Depth = 0.52"
99.42% Pervious = 69.713 ac 0.58% Impervious = 0.404 ac

Summary for Subcatchment PDA-1:

Runoff = 22.25 cfs @ 12.25 hrs, Volume= 2.955 af, Depth> 0.51"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type III 24-hr Plymouth-002yr Rainfall=3.36"

Area (ac)	CN	Description
0.510	30	Woods, Good, HSG A
20.523	30	Brush, Good, HSG A
44.124	73	Brush, Good, HSG D
* 0.218	98	Existing Impervious HSG A
* 4.176	96	Existing Gravel surface, HSG A
* 0.090	96	Proposed Gravel surface, HSG A
0.020	39	>75% Grass cover, Good, HSG A
69.661	61	Weighted Average
69.443		99.69% Pervious Area
0.218		0.31% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
11.6	50	0.0100	0.07		Sheet Flow, Tc-1
					Grass: Dense n= 0.240 P2= 2.80"
1.3	67	0.0150	0.86		Shallow Concentrated Flow, Tc-2
					Short Grass Pasture Kv= 7.0 fps
12.9	117	Total			

Summary for Subcatchment PDA-2: Equipment Pads

Runoff = 0.20 cfs @ 12.09 hrs, Volume= 0.015 af, Depth> 1.74"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type III 24-hr Plymouth-002yr Rainfall=3.36"

Area (ac)	CN	Description
* 0.033	98	Equipment Pads, HSG A
0.069	76	Gravel roads, HSG A
0.102	83	Weighted Average
0.069		67.65% Pervious Area
0.033		32.35% Impervious Area

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

Summary for Subcatchment PDA-3: Equipment Pads

Runoff = 0.37 cfs @ 12.09 hrs, Volume= 0.030 af, Depth> 3.01"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type III 24-hr Plymouth-002yr Rainfall=3.36"

Area (ac)	CN	Description
* 0.051	98	Equipment Pads, HSG A
0.068	96	Gravel surface, HSG A
0.119	97	Weighted Average
0.068		57.14% Pervious Area
0.051		42.86% Impervious Area

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

Summary for Subcatchment PDA-4: Equipment Pads

Runoff = 0.37 cfs @ 12.09 hrs, Volume= 0.030 af, Depth> 3.01"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type III 24-hr Plymouth-002yr Rainfall=3.36"

Area (ac)	CN	Description
* 0.051	98	Equipment Pads, HSG A
0.068	96	Gravel surface, HSG A
0.119	97	Weighted Average
0.068		57.14% Pervious Area
0.051		42.86% Impervious Area

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

Summary for Subcatchment PDA-5: Equipment Pads

Runoff = 0.36 cfs @ 12.09 hrs, Volume= 0.029 af, Depth> 3.01"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type III 24-hr Plymouth-002yr Rainfall=3.36"

Area (ac)	CN	Description
* 0.051	98	Equipment Pads, HSG A
0.065	96	Gravel surface, HSG A
0.116	97	Weighted Average
0.065		56.03% Pervious Area
0.051		43.97% Impervious Area

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

Summary for Reach DP-1: Weweantic River

Inflow Area = 70.117 ac, 0.58% Impervious, Inflow Depth > 0.51" for Plymouth-002yr event
 Inflow = 22.25 cfs @ 12.25 hrs, Volume= 2.955 af
 Outflow = 22.25 cfs @ 12.25 hrs, Volume= 2.955 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs

Summary for Pond 1: Infiltration Bed

Inflow Area = 0.102 ac, 32.35% Impervious, Inflow Depth > 1.74" for Plymouth-002yr event
 Inflow = 0.20 cfs @ 12.09 hrs, Volume= 0.015 af
 Outflow = 0.20 cfs @ 12.11 hrs, Volume= 0.015 af, Atten= 3%, Lag= 1.2 min
 Discarded = 0.20 cfs @ 12.11 hrs, Volume= 0.015 af

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
 Peak Elev= 61.01' @ 12.11 hrs Surf.Area= 0.102 ac Storage= 0.000 af

Plug-Flow detention time= 1.2 min calculated for 0.015 af (100% of inflow)
 Center-of-Mass det. time= 1.0 min (831.1 - 830.1)

Volume	Invert	Avail.Storage	Storage Description
#1	61.00'	0.041 af	36.00'W x 123.00'L x 1.00'H Prismatic 0.102 af Overall x 40.0% Voids

Device	Routing	Invert	Outlet Devices
#1	Discarded	61.00'	2.410 in/hr Exfiltration over Surface area

Discarded OutFlow Max=0.25 cfs @ 12.11 hrs HW=61.01' (Free Discharge)
 ↑**1=Exfiltration** (Exfiltration Controls 0.25 cfs)

Summary for Pond 2: Infiltration Bed

Inflow Area = 0.119 ac, 42.86% Impervious, Inflow Depth > 3.01" for Plymouth-002yr event
 Inflow = 0.37 cfs @ 12.09 hrs, Volume= 0.030 af
 Outflow = 0.29 cfs @ 12.05 hrs, Volume= 0.030 af, Atten= 23%, Lag= 0.0 min
 Discarded = 0.29 cfs @ 12.05 hrs, Volume= 0.030 af

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
 Peak Elev= 63.02' @ 12.15 hrs Surf.Area= 0.118 ac Storage= 0.001 af

Plug-Flow detention time= 1.3 min calculated for 0.030 af (100% of inflow)
 Center-of-Mass det. time= 1.2 min (765.6 - 764.4)

Volume	Invert	Avail.Storage	Storage Description
#1	63.00'	0.047 af	52.00'W x 99.00'L x 1.00'H Prismaoid 0.118 af Overall x 40.0% Voids

Device	Routing	Invert	Outlet Devices
#1	Discarded	63.00'	2.410 in/hr Exfiltration over Surface area

Discarded OutFlow Max=0.29 cfs @ 12.05 hrs HW=63.01' (Free Discharge)
 ↑**1=Exfiltration** (Exfiltration Controls 0.29 cfs)

Summary for Pond 3: Infiltration Bed

Inflow Area = 0.119 ac, 42.86% Impervious, Inflow Depth > 3.01" for Plymouth-002yr event
 Inflow = 0.37 cfs @ 12.09 hrs, Volume= 0.030 af
 Outflow = 0.29 cfs @ 12.05 hrs, Volume= 0.030 af, Atten= 23%, Lag= 0.0 min
 Discarded = 0.29 cfs @ 12.05 hrs, Volume= 0.030 af

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
 Peak Elev= 63.02' @ 12.15 hrs Surf.Area= 0.118 ac Storage= 0.001 af

Plug-Flow detention time= 1.3 min calculated for 0.030 af (100% of inflow)
 Center-of-Mass det. time= 1.2 min (765.6 - 764.4)

Volume	Invert	Avail.Storage	Storage Description
#1	63.00'	0.047 af	52.00'W x 99.00'L x 1.00'H Prismaoid 0.118 af Overall x 40.0% Voids

Device	Routing	Invert	Outlet Devices
#1	Discarded	63.00'	2.410 in/hr Exfiltration over Surface area

Discarded OutFlow Max=0.29 cfs @ 12.05 hrs HW=63.01' (Free Discharge)
 ↑**1=Exfiltration** (Exfiltration Controls 0.29 cfs)

Summary for Pond 4: Infiltration Bed

Inflow Area = 0.116 ac, 43.97% Impervious, Inflow Depth > 3.01" for Plymouth-002yr event
 Inflow = 0.36 cfs @ 12.09 hrs, Volume= 0.029 af
 Outflow = 0.28 cfs @ 12.05 hrs, Volume= 0.029 af, Atten= 23%, Lag= 0.0 min
 Discarded = 0.28 cfs @ 12.05 hrs, Volume= 0.029 af

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
 Peak Elev= 63.02' @ 12.15 hrs Surf.Area= 0.116 ac Storage= 0.001 af

Plug-Flow detention time= 1.3 min calculated for 0.029 af (100% of inflow)
 Center-of-Mass det. time= 1.2 min (765.6 - 764.4)

Volume	Invert	Avail.Storage	Storage Description
#1	63.00'	0.046 af	51.00'W x 99.00'L x 1.00'H Prismaoid 0.116 af Overall x 40.0% Voids

320300HC001A

Type III 24-hr Plymouth-002yr Rainfall=3.36"

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Device	Routing	Invert	Outlet Devices
#1	Discarded	63.00'	2.410 in/hr Exfiltration over Surface area

Discarded OutFlow Max=0.28 cfs @ 12.05 hrs HW=63.01' (Free Discharge)
↑**1=Exfiltration** (Exfiltration Controls 0.28 cfs)

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

Subcatchment PDA-1: Runoff Area=69.661 ac 0.31% Impervious Runoff Depth>1.33"
Flow Length=117' Tc=12.9 min CN=61 Runoff=78.10 cfs 7.748 af

Subcatchment PDA-2: Equipment Pads Runoff Area=0.102 ac 32.35% Impervious Runoff Depth>3.13"
Tc=6.0 min CN=83 Runoff=0.36 cfs 0.027 af

Subcatchment PDA-3: Equipment Pads Runoff Area=0.119 ac 42.86% Impervious Runoff Depth>4.59"
Tc=6.0 min CN=97 Runoff=0.56 cfs 0.046 af

Subcatchment PDA-4: Equipment Pads Runoff Area=0.119 ac 42.86% Impervious Runoff Depth>4.59"
Tc=6.0 min CN=97 Runoff=0.56 cfs 0.046 af

Subcatchment PDA-5: Equipment Pads Runoff Area=0.116 ac 43.97% Impervious Runoff Depth>4.59"
Tc=6.0 min CN=97 Runoff=0.54 cfs 0.044 af

Reach DP-1: Weweantic River Inflow=78.10 cfs 7.748 af
Outflow=78.10 cfs 7.748 af

Pond 1: Infiltration Bed Peak Elev=61.03' Storage=0.001 af Inflow=0.36 cfs 0.027 af
Outflow=0.25 cfs 0.027 af

Pond 2: Infiltration Bed Peak Elev=63.07' Storage=0.004 af Inflow=0.56 cfs 0.046 af
Outflow=0.29 cfs 0.046 af

Pond 3: Infiltration Bed Peak Elev=63.07' Storage=0.004 af Inflow=0.56 cfs 0.046 af
Outflow=0.29 cfs 0.046 af

Pond 4: Infiltration Bed Peak Elev=63.07' Storage=0.003 af Inflow=0.54 cfs 0.044 af
Outflow=0.28 cfs 0.044 af

Total Runoff Area = 70.117 ac Runoff Volume = 7.910 af Average Runoff Depth = 1.35"
99.42% Pervious = 69.713 ac 0.58% Impervious = 0.404 ac

Summary for Subcatchment PDA-1:

Runoff = 78.10 cfs @ 12.20 hrs, Volume= 7.748 af, Depth> 1.33"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type III 24-hr Plymouth-010yr Rainfall=4.95"

Area (ac)	CN	Description
0.510	30	Woods, Good, HSG A
20.523	30	Brush, Good, HSG A
44.124	73	Brush, Good, HSG D
* 0.218	98	Existing Impervious HSG A
* 4.176	96	Existing Gravel surface, HSG A
* 0.090	96	Proposed Gravel surface, HSG A
0.020	39	>75% Grass cover, Good, HSG A
69.661	61	Weighted Average
69.443		99.69% Pervious Area
0.218		0.31% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
11.6	50	0.0100	0.07		Sheet Flow, Tc-1
					Grass: Dense n= 0.240 P2= 2.80"
1.3	67	0.0150	0.86		Shallow Concentrated Flow, Tc-2
					Short Grass Pasture Kv= 7.0 fps
12.9	117	Total			

Summary for Subcatchment PDA-2: Equipment Pads

Runoff = 0.36 cfs @ 12.09 hrs, Volume= 0.027 af, Depth> 3.13"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type III 24-hr Plymouth-010yr Rainfall=4.95"

Area (ac)	CN	Description
* 0.033	98	Equipment Pads, HSG A
0.069	76	Gravel roads, HSG A
0.102	83	Weighted Average
0.069		67.65% Pervious Area
0.033		32.35% Impervious Area

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

Summary for Subcatchment PDA-3: Equipment Pads

Runoff = 0.56 cfs @ 12.09 hrs, Volume= 0.046 af, Depth> 4.59"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type III 24-hr Plymouth-010yr Rainfall=4.95"

Area (ac)	CN	Description
* 0.051	98	Equipment Pads, HSG A
0.068	96	Gravel surface, HSG A
0.119	97	Weighted Average
0.068		57.14% Pervious Area
0.051		42.86% Impervious Area

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

Summary for Subcatchment PDA-4: Equipment Pads

Runoff = 0.56 cfs @ 12.09 hrs, Volume= 0.046 af, Depth> 4.59"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type III 24-hr Plymouth-010yr Rainfall=4.95"

Area (ac)	CN	Description
* 0.051	98	Equipment Pads, HSG A
0.068	96	Gravel surface, HSG A
0.119	97	Weighted Average
0.068		57.14% Pervious Area
0.051		42.86% Impervious Area

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

Summary for Subcatchment PDA-5: Equipment Pads

Runoff = 0.54 cfs @ 12.09 hrs, Volume= 0.044 af, Depth> 4.59"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type III 24-hr Plymouth-010yr Rainfall=4.95"

Area (ac)	CN	Description
* 0.051	98	Equipment Pads, HSG A
0.065	96	Gravel surface, HSG A
0.116	97	Weighted Average
0.065		56.03% Pervious Area
0.051		43.97% Impervious Area

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

Summary for Reach DP-1: Weweantic River

Inflow Area = 70.117 ac, 0.58% Impervious, Inflow Depth > 1.33" for Plymouth-010yr event
 Inflow = 78.10 cfs @ 12.20 hrs, Volume= 7.748 af
 Outflow = 78.10 cfs @ 12.20 hrs, Volume= 7.748 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs

Summary for Pond 1: Infiltration Bed

Inflow Area = 0.102 ac, 32.35% Impervious, Inflow Depth > 3.13" for Plymouth-010yr event
 Inflow = 0.36 cfs @ 12.09 hrs, Volume= 0.027 af
 Outflow = 0.25 cfs @ 12.05 hrs, Volume= 0.027 af, Atten= 32%, Lag= 0.0 min
 Discarded = 0.25 cfs @ 12.05 hrs, Volume= 0.027 af

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
 Peak Elev= 61.03' @ 12.18 hrs Surf.Area= 0.102 ac Storage= 0.001 af

Plug-Flow detention time= 1.6 min calculated for 0.027 af (100% of inflow)
 Center-of-Mass det. time= 1.5 min (814.8 - 813.3)

Volume	Invert	Avail.Storage	Storage Description
#1	61.00'	0.041 af	36.00'W x 123.00'L x 1.00'H Prismatic 0.102 af Overall x 40.0% Voids

Device	Routing	Invert	Outlet Devices
#1	Discarded	61.00'	2.410 in/hr Exfiltration over Surface area

Discarded OutFlow Max=0.25 cfs @ 12.05 hrs HW=61.01' (Free Discharge)
 ↑**1=Exfiltration** (Exfiltration Controls 0.25 cfs)

Summary for Pond 2: Infiltration Bed

Inflow Area = 0.119 ac, 42.86% Impervious, Inflow Depth > 4.59" for Plymouth-010yr event
 Inflow = 0.56 cfs @ 12.09 hrs, Volume= 0.046 af
 Outflow = 0.29 cfs @ 12.00 hrs, Volume= 0.046 af, Atten= 49%, Lag= 0.0 min
 Discarded = 0.29 cfs @ 12.00 hrs, Volume= 0.046 af

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
 Peak Elev= 63.07' @ 12.23 hrs Surf.Area= 0.118 ac Storage= 0.004 af

Plug-Flow detention time= 2.6 min calculated for 0.046 af (100% of inflow)
 Center-of-Mass det. time= 2.5 min (758.0 - 755.5)

Volume	Invert	Avail.Storage	Storage Description
#1	63.00'	0.047 af	52.00'W x 99.00'L x 1.00'H Prismaoid 0.118 af Overall x 40.0% Voids

Device	Routing	Invert	Outlet Devices
#1	Discarded	63.00'	2.410 in/hr Exfiltration over Surface area

Discarded OutFlow Max=0.29 cfs @ 12.00 hrs HW=63.01' (Free Discharge)
 ↑1=Exfiltration (Exfiltration Controls 0.29 cfs)

Summary for Pond 3: Infiltration Bed

Inflow Area = 0.119 ac, 42.86% Impervious, Inflow Depth > 4.59" for Plymouth-010yr event
 Inflow = 0.56 cfs @ 12.09 hrs, Volume= 0.046 af
 Outflow = 0.29 cfs @ 12.00 hrs, Volume= 0.046 af, Atten= 49%, Lag= 0.0 min
 Discarded = 0.29 cfs @ 12.00 hrs, Volume= 0.046 af

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
 Peak Elev= 63.07' @ 12.23 hrs Surf.Area= 0.118 ac Storage= 0.004 af

Plug-Flow detention time= 2.6 min calculated for 0.046 af (100% of inflow)
 Center-of-Mass det. time= 2.5 min (758.0 - 755.5)

Volume	Invert	Avail.Storage	Storage Description
#1	63.00'	0.047 af	52.00'W x 99.00'L x 1.00'H Prismaoid 0.118 af Overall x 40.0% Voids

Device	Routing	Invert	Outlet Devices
#1	Discarded	63.00'	2.410 in/hr Exfiltration over Surface area

Discarded OutFlow Max=0.29 cfs @ 12.00 hrs HW=63.01' (Free Discharge)
 ↑1=Exfiltration (Exfiltration Controls 0.29 cfs)

Summary for Pond 4: Infiltration Bed

Inflow Area = 0.116 ac, 43.97% Impervious, Inflow Depth > 4.59" for Plymouth-010yr event
 Inflow = 0.54 cfs @ 12.09 hrs, Volume= 0.044 af
 Outflow = 0.28 cfs @ 12.00 hrs, Volume= 0.044 af, Atten= 48%, Lag= 0.0 min
 Discarded = 0.28 cfs @ 12.00 hrs, Volume= 0.044 af

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
 Peak Elev= 63.07' @ 12.23 hrs Surf.Area= 0.116 ac Storage= 0.003 af

Plug-Flow detention time= 2.6 min calculated for 0.044 af (100% of inflow)
 Center-of-Mass det. time= 2.4 min (758.0 - 755.5)

Volume	Invert	Avail.Storage	Storage Description
#1	63.00'	0.046 af	51.00'W x 99.00'L x 1.00'H Prismaoid 0.116 af Overall x 40.0% Voids

320300HC001A

Type III 24-hr Plymouth-010yr Rainfall=4.95"

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Device	Routing	Invert	Outlet Devices
#1	Discarded	63.00'	2.410 in/hr Exfiltration over Surface area

Discarded OutFlow Max=0.28 cfs @ 12.00 hrs HW=63.01' (Free Discharge)
↑**1=Exfiltration** (Exfiltration Controls 0.28 cfs)

320300HC001A

Type III 24-hr Plymouth-025yr Rainfall=6.18"

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

Subcatchment PDA-1:	Runoff Area=69.661 ac 0.31% Impervious Runoff Depth>2.12" Flow Length=117' Tc=12.9 min CN=61 Runoff=131.27 cfs 12.310 af
Subcatchment PDA-2: Equipment Pads	Runoff Area=0.102 ac 32.35% Impervious Runoff Depth>4.26" Tc=6.0 min CN=83 Runoff=0.49 cfs 0.036 af
Subcatchment PDA-3: Equipment Pads	Runoff Area=0.119 ac 42.86% Impervious Runoff Depth>5.82" Tc=6.0 min CN=97 Runoff=0.70 cfs 0.058 af
Subcatchment PDA-4: Equipment Pads	Runoff Area=0.119 ac 42.86% Impervious Runoff Depth>5.82" Tc=6.0 min CN=97 Runoff=0.70 cfs 0.058 af
Subcatchment PDA-5: Equipment Pads	Runoff Area=0.116 ac 43.97% Impervious Runoff Depth>5.82" Tc=6.0 min CN=97 Runoff=0.68 cfs 0.056 af
Reach DP-1: Weweantic River	Inflow=131.27 cfs 12.310 af Outflow=131.27 cfs 12.310 af
Pond 1: Infiltration Bed	Peak Elev=61.08' Storage=0.003 af Inflow=0.49 cfs 0.036 af Outflow=0.25 cfs 0.036 af
Pond 2: Infiltration Bed	Peak Elev=63.13' Storage=0.006 af Inflow=0.70 cfs 0.058 af Outflow=0.29 cfs 0.058 af
Pond 3: Infiltration Bed	Peak Elev=63.13' Storage=0.006 af Inflow=0.70 cfs 0.058 af Outflow=0.29 cfs 0.058 af
Pond 4: Infiltration Bed	Peak Elev=63.13' Storage=0.006 af Inflow=0.68 cfs 0.056 af Outflow=0.28 cfs 0.056 af

Total Runoff Area = 70.117 ac Runoff Volume = 12.518 af Average Runoff Depth = 2.14"
99.42% Pervious = 69.713 ac 0.58% Impervious = 0.404 ac

Summary for Subcatchment PDA-1:

Runoff = 131.27 cfs @ 12.19 hrs, Volume= 12.310 af, Depth> 2.12"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type III 24-hr Plymouth-025yr Rainfall=6.18"

Area (ac)	CN	Description
0.510	30	Woods, Good, HSG A
20.523	30	Brush, Good, HSG A
44.124	73	Brush, Good, HSG D
* 0.218	98	Existing Impervious HSG A
* 4.176	96	Existing Gravel surface, HSG A
* 0.090	96	Proposed Gravel surface, HSG A
0.020	39	>75% Grass cover, Good, HSG A
69.661	61	Weighted Average
69.443		99.69% Pervious Area
0.218		0.31% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
11.6	50	0.0100	0.07		Sheet Flow, Tc-1
					Grass: Dense n= 0.240 P2= 2.80"
1.3	67	0.0150	0.86		Shallow Concentrated Flow, Tc-2
					Short Grass Pasture Kv= 7.0 fps
12.9	117	Total			

Summary for Subcatchment PDA-2: Equipment Pads

Runoff = 0.49 cfs @ 12.09 hrs, Volume= 0.036 af, Depth> 4.26"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type III 24-hr Plymouth-025yr Rainfall=6.18"

Area (ac)	CN	Description
* 0.033	98	Equipment Pads, HSG A
0.069	76	Gravel roads, HSG A
0.102	83	Weighted Average
0.069		67.65% Pervious Area
0.033		32.35% Impervious Area

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

Summary for Subcatchment PDA-3: Equipment Pads

Runoff = 0.70 cfs @ 12.09 hrs, Volume= 0.058 af, Depth> 5.82"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type III 24-hr Plymouth-025yr Rainfall=6.18"

Area (ac)	CN	Description
* 0.051	98	Equipment Pads, HSG A
0.068	96	Gravel surface, HSG A
0.119	97	Weighted Average
0.068		57.14% Pervious Area
0.051		42.86% Impervious Area

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

Summary for Subcatchment PDA-4: Equipment Pads

Runoff = 0.70 cfs @ 12.09 hrs, Volume= 0.058 af, Depth> 5.82"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type III 24-hr Plymouth-025yr Rainfall=6.18"

Area (ac)	CN	Description
* 0.051	98	Equipment Pads, HSG A
0.068	96	Gravel surface, HSG A
0.119	97	Weighted Average
0.068		57.14% Pervious Area
0.051		42.86% Impervious Area

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

Summary for Subcatchment PDA-5: Equipment Pads

Runoff = 0.68 cfs @ 12.09 hrs, Volume= 0.056 af, Depth> 5.82"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type III 24-hr Plymouth-025yr Rainfall=6.18"

Area (ac)	CN	Description
* 0.051	98	Equipment Pads, HSG A
0.065	96	Gravel surface, HSG A
0.116	97	Weighted Average
0.065		56.03% Pervious Area
0.051		43.97% Impervious Area

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

Summary for Reach DP-1: Weweantic River

Inflow Area = 70.117 ac, 0.58% Impervious, Inflow Depth > 2.11" for Plymouth-025yr event
 Inflow = 131.27 cfs @ 12.19 hrs, Volume= 12.310 af
 Outflow = 131.27 cfs @ 12.19 hrs, Volume= 12.310 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs

Summary for Pond 1: Infiltration Bed

Inflow Area = 0.102 ac, 32.35% Impervious, Inflow Depth > 4.26" for Plymouth-025yr event
 Inflow = 0.49 cfs @ 12.09 hrs, Volume= 0.036 af
 Outflow = 0.25 cfs @ 12.00 hrs, Volume= 0.036 af, Atten= 50%, Lag= 0.0 min
 Discarded = 0.25 cfs @ 12.00 hrs, Volume= 0.036 af

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
 Peak Elev= 61.08' @ 12.25 hrs Surf.Area= 0.102 ac Storage= 0.003 af

Plug-Flow detention time= 2.9 min calculated for 0.036 af (100% of inflow)
 Center-of-Mass det. time= 2.8 min (807.4 - 804.6)

Volume	Invert	Avail.Storage	Storage Description
#1	61.00'	0.041 af	36.00'W x 123.00'L x 1.00'H Prismatic 0.102 af Overall x 40.0% Voids

Device	Routing	Invert	Outlet Devices
#1	Discarded	61.00'	2.410 in/hr Exfiltration over Surface area

Discarded OutFlow Max=0.25 cfs @ 12.00 hrs HW=61.01' (Free Discharge)
 ↑**1=Exfiltration** (Exfiltration Controls 0.25 cfs)

Summary for Pond 2: Infiltration Bed

Inflow Area = 0.119 ac, 42.86% Impervious, Inflow Depth > 5.82" for Plymouth-025yr event
 Inflow = 0.70 cfs @ 12.09 hrs, Volume= 0.058 af
 Outflow = 0.29 cfs @ 11.95 hrs, Volume= 0.058 af, Atten= 59%, Lag= 0.0 min
 Discarded = 0.29 cfs @ 11.95 hrs, Volume= 0.058 af

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
 Peak Elev= 63.13' @ 12.30 hrs Surf.Area= 0.118 ac Storage= 0.006 af

Plug-Flow detention time= 4.3 min calculated for 0.058 af (100% of inflow)
 Center-of-Mass det. time= 4.1 min (755.3 - 751.2)

Volume	Invert	Avail.Storage	Storage Description
#1	63.00'	0.047 af	52.00'W x 99.00'L x 1.00'H Prismaoid 0.118 af Overall x 40.0% Voids

Device	Routing	Invert	Outlet Devices
#1	Discarded	63.00'	2.410 in/hr Exfiltration over Surface area

Discarded OutFlow Max=0.29 cfs @ 11.95 hrs HW=63.01' (Free Discharge)
 ↑1=Exfiltration (Exfiltration Controls 0.29 cfs)

Summary for Pond 3: Infiltration Bed

Inflow Area = 0.119 ac, 42.86% Impervious, Inflow Depth > 5.82" for Plymouth-025yr event
 Inflow = 0.70 cfs @ 12.09 hrs, Volume= 0.058 af
 Outflow = 0.29 cfs @ 11.95 hrs, Volume= 0.058 af, Atten= 59%, Lag= 0.0 min
 Discarded = 0.29 cfs @ 11.95 hrs, Volume= 0.058 af

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
 Peak Elev= 63.13' @ 12.30 hrs Surf.Area= 0.118 ac Storage= 0.006 af

Plug-Flow detention time= 4.3 min calculated for 0.058 af (100% of inflow)
 Center-of-Mass det. time= 4.1 min (755.3 - 751.2)

Volume	Invert	Avail.Storage	Storage Description
#1	63.00'	0.047 af	52.00'W x 99.00'L x 1.00'H Prismaoid 0.118 af Overall x 40.0% Voids

Device	Routing	Invert	Outlet Devices
#1	Discarded	63.00'	2.410 in/hr Exfiltration over Surface area

Discarded OutFlow Max=0.29 cfs @ 11.95 hrs HW=63.01' (Free Discharge)
 ↑1=Exfiltration (Exfiltration Controls 0.29 cfs)

Summary for Pond 4: Infiltration Bed

Inflow Area = 0.116 ac, 43.97% Impervious, Inflow Depth > 5.82" for Plymouth-025yr event
 Inflow = 0.68 cfs @ 12.09 hrs, Volume= 0.056 af
 Outflow = 0.28 cfs @ 11.95 hrs, Volume= 0.056 af, Atten= 59%, Lag= 0.0 min
 Discarded = 0.28 cfs @ 11.95 hrs, Volume= 0.056 af

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
 Peak Elev= 63.13' @ 12.29 hrs Surf.Area= 0.116 ac Storage= 0.006 af

Plug-Flow detention time= 4.2 min calculated for 0.056 af (100% of inflow)
 Center-of-Mass det. time= 4.1 min (755.3 - 751.2)

Volume	Invert	Avail.Storage	Storage Description
#1	63.00'	0.046 af	51.00'W x 99.00'L x 1.00'H Prismaoid 0.116 af Overall x 40.0% Voids

320300HC001A

Type III 24-hr Plymouth-025yr Rainfall=6.18"

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Device	Routing	Invert	Outlet Devices
#1	Discarded	63.00'	2.410 in/hr Exfiltration over Surface area

Discarded OutFlow Max=0.28 cfs @ 11.95 hrs HW=63.01' (Free Discharge)
↑**1=Exfiltration** (Exfiltration Controls 0.28 cfs)

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

Subcatchment PDA-1: Runoff Area=69.661 ac 0.31% Impervious Runoff Depth>2.92"
Flow Length=117' Tc=12.9 min CN=61 Runoff=185.02 cfs 16.949 af

Subcatchment PDA-2: Equipment Pads Runoff Area=0.102 ac 32.35% Impervious Runoff Depth>5.32"
Tc=6.0 min CN=83 Runoff=0.61 cfs 0.045 af

Subcatchment PDA-3: Equipment Pads Runoff Area=0.119 ac 42.86% Impervious Runoff Depth>6.95"
Tc=6.0 min CN=97 Runoff=0.83 cfs 0.069 af

Subcatchment PDA-4: Equipment Pads Runoff Area=0.119 ac 42.86% Impervious Runoff Depth>6.95"
Tc=6.0 min CN=97 Runoff=0.83 cfs 0.069 af

Subcatchment PDA-5: Equipment Pads Runoff Area=0.116 ac 43.97% Impervious Runoff Depth>6.95"
Tc=6.0 min CN=97 Runoff=0.81 cfs 0.067 af

Reach DP-1: Weweantic River Inflow=185.02 cfs 16.949 af
Outflow=185.02 cfs 16.949 af

Pond 1: Infiltration Bed Peak Elev=61.13' Storage=0.005 af Inflow=0.61 cfs 0.045 af
Outflow=0.25 cfs 0.045 af

Pond 2: Infiltration Bed Peak Elev=63.20' Storage=0.009 af Inflow=0.83 cfs 0.069 af
Outflow=0.29 cfs 0.069 af

Pond 3: Infiltration Bed Peak Elev=63.20' Storage=0.009 af Inflow=0.83 cfs 0.069 af
Outflow=0.29 cfs 0.069 af

Pond 4: Infiltration Bed Peak Elev=63.19' Storage=0.009 af Inflow=0.81 cfs 0.067 af
Outflow=0.28 cfs 0.067 af

Total Runoff Area = 70.117 ac Runoff Volume = 17.199 af Average Runoff Depth = 2.94"
99.42% Pervious = 69.713 ac 0.58% Impervious = 0.404 ac

Summary for Subcatchment PDA-1:

Runoff = 185.02 cfs @ 12.19 hrs, Volume= 16.949 af, Depth> 2.92"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type III 24-hr Plymouth-050yr Rainfall=7.31"

Area (ac)	CN	Description
0.510	30	Woods, Good, HSG A
20.523	30	Brush, Good, HSG A
44.124	73	Brush, Good, HSG D
* 0.218	98	Existing Impervious HSG A
* 4.176	96	Existing Gravel surface, HSG A
* 0.090	96	Proposed Gravel surface, HSG A
0.020	39	>75% Grass cover, Good, HSG A
69.661	61	Weighted Average
69.443		99.69% Pervious Area
0.218		0.31% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
11.6	50	0.0100	0.07		Sheet Flow, Tc-1
					Grass: Dense n= 0.240 P2= 2.80"
1.3	67	0.0150	0.86		Shallow Concentrated Flow, Tc-2
					Short Grass Pasture Kv= 7.0 fps
12.9	117	Total			

Summary for Subcatchment PDA-2: Equipment Pads

Runoff = 0.61 cfs @ 12.09 hrs, Volume= 0.045 af, Depth> 5.32"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type III 24-hr Plymouth-050yr Rainfall=7.31"

Area (ac)	CN	Description
* 0.033	98	Equipment Pads, HSG A
0.069	76	Gravel roads, HSG A
0.102	83	Weighted Average
0.069		67.65% Pervious Area
0.033		32.35% Impervious Area

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

Summary for Subcatchment PDA-3: Equipment Pads

Runoff = 0.83 cfs @ 12.09 hrs, Volume= 0.069 af, Depth> 6.95"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type III 24-hr Plymouth-050yr Rainfall=7.31"

Area (ac)	CN	Description
* 0.051	98	Equipment Pads, HSG A
0.068	96	Gravel surface, HSG A
0.119	97	Weighted Average
0.068		57.14% Pervious Area
0.051		42.86% Impervious Area

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

Summary for Subcatchment PDA-4: Equipment Pads

Runoff = 0.83 cfs @ 12.09 hrs, Volume= 0.069 af, Depth> 6.95"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type III 24-hr Plymouth-050yr Rainfall=7.31"

Area (ac)	CN	Description
* 0.051	98	Equipment Pads, HSG A
0.068	96	Gravel surface, HSG A
0.119	97	Weighted Average
0.068		57.14% Pervious Area
0.051		42.86% Impervious Area

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

Summary for Subcatchment PDA-5: Equipment Pads

Runoff = 0.81 cfs @ 12.09 hrs, Volume= 0.067 af, Depth> 6.95"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type III 24-hr Plymouth-050yr Rainfall=7.31"

Area (ac)	CN	Description
* 0.051	98	Equipment Pads, HSG A
0.065	96	Gravel surface, HSG A
0.116	97	Weighted Average
0.065		56.03% Pervious Area
0.051		43.97% Impervious Area

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

Summary for Reach DP-1: Weweantic River

Inflow Area = 70.117 ac, 0.58% Impervious, Inflow Depth > 2.90" for Plymouth-050yr event
 Inflow = 185.02 cfs @ 12.19 hrs, Volume= 16.949 af
 Outflow = 185.02 cfs @ 12.19 hrs, Volume= 16.949 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs

Summary for Pond 1: Infiltration Bed

Inflow Area = 0.102 ac, 32.35% Impervious, Inflow Depth > 5.32" for Plymouth-050yr event
 Inflow = 0.61 cfs @ 12.09 hrs, Volume= 0.045 af
 Outflow = 0.25 cfs @ 11.95 hrs, Volume= 0.045 af, Atten= 59%, Lag= 0.0 min
 Discarded = 0.25 cfs @ 11.95 hrs, Volume= 0.045 af

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
 Peak Elev= 61.13' @ 12.32 hrs Surf.Area= 0.102 ac Storage= 0.005 af

Plug-Flow detention time= 4.7 min calculated for 0.045 af (100% of inflow)
 Center-of-Mass det. time= 4.6 min (803.0 - 798.4)

Volume	Invert	Avail.Storage	Storage Description
#1	61.00'	0.041 af	36.00'W x 123.00'L x 1.00'H Prismatic 0.102 af Overall x 40.0% Voids

Device	Routing	Invert	Outlet Devices
#1	Discarded	61.00'	2.410 in/hr Exfiltration over Surface area

Discarded OutFlow Max=0.25 cfs @ 11.95 hrs HW=61.01' (Free Discharge)
 ↑**1=Exfiltration** (Exfiltration Controls 0.25 cfs)

Summary for Pond 2: Infiltration Bed

Inflow Area = 0.119 ac, 42.86% Impervious, Inflow Depth > 6.95" for Plymouth-050yr event
 Inflow = 0.83 cfs @ 12.09 hrs, Volume= 0.069 af
 Outflow = 0.29 cfs @ 11.90 hrs, Volume= 0.069 af, Atten= 65%, Lag= 0.0 min
 Discarded = 0.29 cfs @ 11.90 hrs, Volume= 0.069 af

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
 Peak Elev= 63.20' @ 12.36 hrs Surf.Area= 0.118 ac Storage= 0.009 af

Plug-Flow detention time= 6.3 min calculated for 0.069 af (100% of inflow)
 Center-of-Mass det. time= 6.1 min (754.3 - 748.2)

Volume	Invert	Avail.Storage	Storage Description
#1	63.00'	0.047 af	52.00'W x 99.00'L x 1.00'H Prismaoid 0.118 af Overall x 40.0% Voids

Device	Routing	Invert	Outlet Devices
#1	Discarded	63.00'	2.410 in/hr Exfiltration over Surface area

Discarded OutFlow Max=0.29 cfs @ 11.90 hrs HW=63.01' (Free Discharge)
 ↑1=Exfiltration (Exfiltration Controls 0.29 cfs)

Summary for Pond 3: Infiltration Bed

Inflow Area = 0.119 ac, 42.86% Impervious, Inflow Depth > 6.95" for Plymouth-050yr event
 Inflow = 0.83 cfs @ 12.09 hrs, Volume= 0.069 af
 Outflow = 0.29 cfs @ 11.90 hrs, Volume= 0.069 af, Atten= 65%, Lag= 0.0 min
 Discarded = 0.29 cfs @ 11.90 hrs, Volume= 0.069 af

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
 Peak Elev= 63.20' @ 12.36 hrs Surf.Area= 0.118 ac Storage= 0.009 af

Plug-Flow detention time= 6.3 min calculated for 0.069 af (100% of inflow)
 Center-of-Mass det. time= 6.1 min (754.3 - 748.2)

Volume	Invert	Avail.Storage	Storage Description
#1	63.00'	0.047 af	52.00'W x 99.00'L x 1.00'H Prismaoid 0.118 af Overall x 40.0% Voids

Device	Routing	Invert	Outlet Devices
#1	Discarded	63.00'	2.410 in/hr Exfiltration over Surface area

Discarded OutFlow Max=0.29 cfs @ 11.90 hrs HW=63.01' (Free Discharge)
 ↑1=Exfiltration (Exfiltration Controls 0.29 cfs)

Summary for Pond 4: Infiltration Bed

Inflow Area = 0.116 ac, 43.97% Impervious, Inflow Depth > 6.95" for Plymouth-050yr event
 Inflow = 0.81 cfs @ 12.09 hrs, Volume= 0.067 af
 Outflow = 0.28 cfs @ 11.90 hrs, Volume= 0.067 af, Atten= 65%, Lag= 0.0 min
 Discarded = 0.28 cfs @ 11.90 hrs, Volume= 0.067 af

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
 Peak Elev= 63.19' @ 12.35 hrs Surf.Area= 0.116 ac Storage= 0.009 af

Plug-Flow detention time= 6.2 min calculated for 0.067 af (100% of inflow)
 Center-of-Mass det. time= 6.0 min (754.2 - 748.2)

Volume	Invert	Avail.Storage	Storage Description
#1	63.00'	0.046 af	51.00'W x 99.00'L x 1.00'H Prismaoid 0.116 af Overall x 40.0% Voids

320300HC001A

Type III 24-hr Plymouth-050yr Rainfall=7.31"

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Device	Routing	Invert	Outlet Devices
#1	Discarded	63.00'	2.410 in/hr Exfiltration over Surface area

Discarded OutFlow Max=0.28 cfs @ 11.90 hrs HW=63.01' (Free Discharge)
↑**1=Exfiltration** (Exfiltration Controls 0.28 cfs)

320300HC001A

Type III 24-hr Plymouth-100yr Rainfall=8.65"

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

Subcatchment PDA-1:	Runoff Area=69.661 ac 0.31% Impervious Runoff Depth>3.94" Flow Length=117' Tc=12.9 min CN=61 Runoff=252.94 cfs 22.856 af
Subcatchment PDA-2: Equipment Pads	Runoff Area=0.102 ac 32.35% Impervious Runoff Depth>6.60" Tc=6.0 min CN=83 Runoff=0.75 cfs 0.056 af
Subcatchment PDA-3: Equipment Pads	Runoff Area=0.119 ac 42.86% Impervious Runoff Depth>8.28" Tc=6.0 min CN=97 Runoff=0.98 cfs 0.082 af
Subcatchment PDA-4: Equipment Pads	Runoff Area=0.119 ac 42.86% Impervious Runoff Depth>8.28" Tc=6.0 min CN=97 Runoff=0.98 cfs 0.082 af
Subcatchment PDA-5: Equipment Pads	Runoff Area=0.116 ac 43.97% Impervious Runoff Depth>8.28" Tc=6.0 min CN=97 Runoff=0.96 cfs 0.080 af
Reach DP-1: Weweantic River	Inflow=252.94 cfs 22.856 af Outflow=252.94 cfs 22.856 af
Pond 1: Infiltration Bed	Peak Elev=61.22' Storage=0.009 af Inflow=0.75 cfs 0.056 af Outflow=0.25 cfs 0.056 af
Pond 2: Infiltration Bed	Peak Elev=63.28' Storage=0.013 af Inflow=0.98 cfs 0.082 af Outflow=0.29 cfs 0.082 af
Pond 3: Infiltration Bed	Peak Elev=63.28' Storage=0.013 af Inflow=0.98 cfs 0.082 af Outflow=0.29 cfs 0.082 af
Pond 4: Infiltration Bed	Peak Elev=63.28' Storage=0.013 af Inflow=0.96 cfs 0.080 af Outflow=0.28 cfs 0.080 af

Total Runoff Area = 70.117 ac Runoff Volume = 23.157 af Average Runoff Depth = 3.96"
99.42% Pervious = 69.713 ac 0.58% Impervious = 0.404 ac

Summary for Subcatchment PDA-1:

Runoff = 252.94 cfs @ 12.19 hrs, Volume= 22.856 af, Depth> 3.94"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type III 24-hr Plymouth-100yr Rainfall=8.65"

Area (ac)	CN	Description
0.510	30	Woods, Good, HSG A
20.523	30	Brush, Good, HSG A
44.124	73	Brush, Good, HSG D
* 0.218	98	Existing Impervious HSG A
* 4.176	96	Existing Gravel surface, HSG A
* 0.090	96	Proposed Gravel surface, HSG A
0.020	39	>75% Grass cover, Good, HSG A
69.661	61	Weighted Average
69.443		99.69% Pervious Area
0.218		0.31% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
11.6	50	0.0100	0.07		Sheet Flow, Tc-1
					Grass: Dense n= 0.240 P2= 2.80"
1.3	67	0.0150	0.86		Shallow Concentrated Flow, Tc-2
					Short Grass Pasture Kv= 7.0 fps
12.9	117	Total			

Summary for Subcatchment PDA-2: Equipment Pads

Runoff = 0.75 cfs @ 12.09 hrs, Volume= 0.056 af, Depth> 6.60"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type III 24-hr Plymouth-100yr Rainfall=8.65"

Area (ac)	CN	Description
* 0.033	98	Equipment Pads, HSG A
0.069	76	Gravel roads, HSG A
0.102	83	Weighted Average
0.069		67.65% Pervious Area
0.033		32.35% Impervious Area

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

Summary for Subcatchment PDA-3: Equipment Pads

Runoff = 0.98 cfs @ 12.09 hrs, Volume= 0.082 af, Depth> 8.28"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type III 24-hr Plymouth-100yr Rainfall=8.65"

Area (ac)	CN	Description
* 0.051	98	Equipment Pads, HSG A
0.068	96	Gravel surface, HSG A
0.119	97	Weighted Average
0.068		57.14% Pervious Area
0.051		42.86% Impervious Area

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

Summary for Subcatchment PDA-4: Equipment Pads

Runoff = 0.98 cfs @ 12.09 hrs, Volume= 0.082 af, Depth> 8.28"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type III 24-hr Plymouth-100yr Rainfall=8.65"

Area (ac)	CN	Description
* 0.051	98	Equipment Pads, HSG A
0.068	96	Gravel surface, HSG A
0.119	97	Weighted Average
0.068		57.14% Pervious Area
0.051		42.86% Impervious Area

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

Summary for Subcatchment PDA-5: Equipment Pads

Runoff = 0.96 cfs @ 12.09 hrs, Volume= 0.080 af, Depth> 8.28"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type III 24-hr Plymouth-100yr Rainfall=8.65"

Area (ac)	CN	Description
* 0.051	98	Equipment Pads, HSG A
0.065	96	Gravel surface, HSG A
0.116	97	Weighted Average
0.065		56.03% Pervious Area
0.051		43.97% Impervious Area

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

Summary for Reach DP-1: Weweantic River

Inflow Area = 70.117 ac, 0.58% Impervious, Inflow Depth > 3.91" for Plymouth-100yr event
 Inflow = 252.94 cfs @ 12.19 hrs, Volume= 22.856 af
 Outflow = 252.94 cfs @ 12.19 hrs, Volume= 22.856 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs

Summary for Pond 1: Infiltration Bed

Inflow Area = 0.102 ac, 32.35% Impervious, Inflow Depth > 6.60" for Plymouth-100yr event
 Inflow = 0.75 cfs @ 12.09 hrs, Volume= 0.056 af
 Outflow = 0.25 cfs @ 11.90 hrs, Volume= 0.056 af, Atten= 67%, Lag= 0.0 min
 Discarded = 0.25 cfs @ 11.90 hrs, Volume= 0.056 af

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
 Peak Elev= 61.22' @ 12.39 hrs Surf.Area= 0.102 ac Storage= 0.009 af

Plug-Flow detention time= 7.5 min calculated for 0.056 af (100% of inflow)
 Center-of-Mass det. time= 7.4 min (799.8 - 792.4)

Volume	Invert	Avail.Storage	Storage Description
#1	61.00'	0.041 af	36.00'W x 123.00'L x 1.00'H Prismatic 0.102 af Overall x 40.0% Voids

Device	Routing	Invert	Outlet Devices
#1	Discarded	61.00'	2.410 in/hr Exfiltration over Surface area

Discarded OutFlow Max=0.25 cfs @ 11.90 hrs HW=61.01' (Free Discharge)
 ↑**1=Exfiltration** (Exfiltration Controls 0.25 cfs)

Summary for Pond 2: Infiltration Bed

Inflow Area = 0.119 ac, 42.86% Impervious, Inflow Depth > 8.28" for Plymouth-100yr event
 Inflow = 0.98 cfs @ 12.09 hrs, Volume= 0.082 af
 Outflow = 0.29 cfs @ 11.80 hrs, Volume= 0.082 af, Atten= 71%, Lag= 0.0 min
 Discarded = 0.29 cfs @ 11.80 hrs, Volume= 0.082 af

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
 Peak Elev= 63.28' @ 12.41 hrs Surf.Area= 0.118 ac Storage= 0.013 af

Plug-Flow detention time= 9.2 min calculated for 0.082 af (100% of inflow)
 Center-of-Mass det. time= 9.1 min (754.6 - 745.5)

Volume	Invert	Avail.Storage	Storage Description
#1	63.00'	0.047 af	52.00'W x 99.00'L x 1.00'H Prismaoid 0.118 af Overall x 40.0% Voids

Device	Routing	Invert	Outlet Devices
#1	Discarded	63.00'	2.410 in/hr Exfiltration over Surface area

Discarded OutFlow Max=0.29 cfs @ 11.80 hrs HW=63.01' (Free Discharge)
 ↑1=Exfiltration (Exfiltration Controls 0.29 cfs)

Summary for Pond 3: Infiltration Bed

Inflow Area = 0.119 ac, 42.86% Impervious, Inflow Depth > 8.28" for Plymouth-100yr event
 Inflow = 0.98 cfs @ 12.09 hrs, Volume= 0.082 af
 Outflow = 0.29 cfs @ 11.80 hrs, Volume= 0.082 af, Atten= 71%, Lag= 0.0 min
 Discarded = 0.29 cfs @ 11.80 hrs, Volume= 0.082 af

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
 Peak Elev= 63.28' @ 12.41 hrs Surf.Area= 0.118 ac Storage= 0.013 af

Plug-Flow detention time= 9.2 min calculated for 0.082 af (100% of inflow)
 Center-of-Mass det. time= 9.1 min (754.6 - 745.5)

Volume	Invert	Avail.Storage	Storage Description
#1	63.00'	0.047 af	52.00'W x 99.00'L x 1.00'H Prismaoid 0.118 af Overall x 40.0% Voids

Device	Routing	Invert	Outlet Devices
#1	Discarded	63.00'	2.410 in/hr Exfiltration over Surface area

Discarded OutFlow Max=0.29 cfs @ 11.80 hrs HW=63.01' (Free Discharge)
 ↑1=Exfiltration (Exfiltration Controls 0.29 cfs)

Summary for Pond 4: Infiltration Bed

Inflow Area = 0.116 ac, 43.97% Impervious, Inflow Depth > 8.28" for Plymouth-100yr event
 Inflow = 0.96 cfs @ 12.09 hrs, Volume= 0.080 af
 Outflow = 0.28 cfs @ 11.80 hrs, Volume= 0.080 af, Atten= 71%, Lag= 0.0 min
 Discarded = 0.28 cfs @ 11.80 hrs, Volume= 0.080 af

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
 Peak Elev= 63.28' @ 12.41 hrs Surf.Area= 0.116 ac Storage= 0.013 af

Plug-Flow detention time= 9.1 min calculated for 0.080 af (100% of inflow)
 Center-of-Mass det. time= 9.0 min (754.4 - 745.5)

Volume	Invert	Avail.Storage	Storage Description
#1	63.00'	0.046 af	51.00'W x 99.00'L x 1.00'H Prismaoid 0.116 af Overall x 40.0% Voids

320300HC001A

Type III 24-hr Plymouth-100yr Rainfall=8.65"

Prepared by Beals and Thomas, Inc.

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Device	Routing	Invert	Outlet Devices
#1	Discarded	63.00'	2.410 in/hr Exfiltration over Surface area

Discarded OutFlow Max=0.28 cfs @ 11.80 hrs HW=63.01' (Free Discharge)
↑**1=Exfiltration** (Exfiltration Controls 0.28 cfs)

Attachment 4
Flood Storage Calculations

<i>JOB NO./LOCATION:</i>	3203.00 Carver & Wareham, MA
<i>CLIENT/PROJECT:</i>	BE RE, LLC Rocky Maple Solar
<i>SUBJECT/TITLE:</i>	Flood Storage Analysis
<i>OBJECTIVE OF CALCULATION:</i>	<ul style="list-style-type: none"> Determine the existing and proposed flood storage volume within the area of the proposed work in the 100 Year Flood Zone AE. Compare the proposed incremental flood storage volumes to the existing volumes.
<i>CALCULATION METHOD(S):</i>	<ul style="list-style-type: none"> Storage volume was calculated using Paydirt Sitework (grid method) for one-foot increments between elevation 62.00 and 65.00.
<i>ASSUMPTIONS:</i>	<ul style="list-style-type: none"> Existing flood storage calculated using contours reflected on B+T Topographic Plan No. 320300P001A-001-009. Proposed flood storage calculated using proposed contours inside the limit of work within and adjacent to the 100 Year Flood Zone AE.
<i>SOURCES OF DATA/EQUATIONS:</i>	<ul style="list-style-type: none"> Existing conditions topographic plan prepared by Beals and Thomas, Inc., File No. 295800P001A-001-009. 100 Year Flood Zone AE and elevation based upon a FIRM MAP prepared by FEMA, dated July 17, 2012.
<i>CONCLUSIONS:</i>	<ul style="list-style-type: none"> Adequate compensatory flood storage exists on a cumulative and an incremental basis at the elevations of proposed work within the floodplain. See attached worksheets for flood storage volumes.

REV	CALC. BY	DATE	CHECKED BY	DATE	APPROVED BY	DATE
0	NPS	12/14/2020	NBB	12/15/2020	EJL	12/16/2020

Flood Storage Volume Analysis

Cumulative Storage Volumes

Flood Elevation	Existing Conditions		Proposed Design		Adjusted Design*	
	Volume (yd ³)	Volume (ac-ft)	Volume (yd ³)	Volume (ac-ft)	Volume (yd ³)	Volume (ac-ft)
62.00	0	0.000	0	0.000	0	0.000
63.00	295	0.183	911	0.564	818	0.507
64.00	711	0.564	1,941	1.203	1,848	1.146
65.00	1,290	0.800	3,151	1.953	3,058	1.896

Incremental Storage Volumes

Flood Storage Interval	Existing Conditions		Proposed Design		Adjusted Design*		Incremental Volume Difference (Adjusted* vs. Existing) (ac-ft)
	Volume (yd ³)	Volume (ac-ft)	Volume (yd ³)	Volume (ac-ft)	Volume (yd ³)	Volume (ac-ft)	
62.0-63.0	295	0.183	911	0.564	818	0.507	0.324
63.0-64.0	415	0.258	1,030	0.639	1,030	0.639	0.381
64.0-65.0	579	0.359	1,210	0.750	1,210	0.750	0.391
Total	1,290	0.800	3,151	1.953	3,058	1.896	1.096

*Adjusted Design includes the volume of the solar array posts. See attached calculation.

JOB NO. 3203.00
 FILE 320300EN001

COMPUTED BY NPS
 DATE 12/14/20

CHECKED BY NBB
 DATE 12/15/20

Solar Array Post Volume:

Array Posts will be comprised of 15" diameter timber utility poles.

$$\text{Volume} = \pi(\text{radius})^2 \times \text{height}$$

$$V = \pi \left(\frac{7.5''}{12''} \right)^2 \times (1')$$

$$V = 1.23 \text{ cf} \approx \underline{1.25 \text{ cubic feet}}$$

Array includes \pm 2,000 posts

Volume of Posts per Elevation

$$62 = 2,000 \text{ posts} \times 1.25 \text{ cubic feet} = 2,500 \text{ cubic feet} = \underline{93 \text{ cubic yards}}$$

$$63 = 2,000 \times 1.25 \text{ cf} = \underline{93 \text{ CY}}$$

$$64 = 2,000 \times 1.25 \text{ cf} = \underline{93 \text{ CY}}$$

$$65 = 2,000 \times 1.25 \text{ cf} = \underline{93 \text{ CY}}$$

JOB NO. 3203.00

CALC BY: NPS

DATE: 12/14/2020

TOWN: Carver / Wareham

CHECKED BY: NBB

DATE: 12/15/2020

PROJECT: Rocky Maple Solar

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320300PD001A: Existing vs. 62

<u>Excavation Volumes</u>	<u>Bank Cut (cu yd)</u>	<u>Bank Fill (cu yd)</u>	<u>Cut Swell (%)</u>	<u>Fill Shrink (%)</u>	<u>Adjusted Cut (cu yd)</u>	<u>Adjusted Fill (cu yd)</u>
AOI	5947.77	0.00	0.00	0.00	5947.77	0.00
<u>Excavation Areas</u>	<u>Cut Area (sq ft)</u>	<u>Fill Area (sq ft)</u>	<u>Total Area (sq ft)</u>			
AOI	40895.03	1979.97	43528.00			

Project Totals

<u>Excavation Volumes</u>	<u>Bank Cut (cu yd)</u>	<u>Bank Fill (cu yd)</u>	<u>Cut Swell (%)</u>	<u>Fill Shrink (%)</u>	<u>Adjusted Cut (cu yd)</u>	<u>Adjusted Fill (cu yd)</u>
320300PD001A : AOI	5947.77	0.00	0.00	0.00	5947.77	0.00
Project Totals:	5947.77	0.00	0.00	0.00	5947.77	0.00
Export:	5947.77				5947.77	

<u>Excavation Areas</u>	<u>Cut Area (sq ft)</u>	<u>Fill Area (sq ft)</u>	<u>Total Area (sq ft)</u>
320300PD001A : AOI	40895.03	1979.97	43528.00
Project Totals:	40895.03	1979.97	43528.00

<u>Removal Quantities</u>	<u>Boundary (ft)</u>	<u>Area (sq ft)</u>	<u>Volume (cu yd)</u>
Project Totals:	0.00	0.00	0.00

* Only Drawing Master AOI's or single selected Drawing AOI's are used for Project Excavation Totals.

* Removal Quantities are clipped to Drawing Master AOI or the individually selected AOI.

320300PD001A: Existing vs. 63

	Bank Cut (cu yd)	Bank Fill (cu yd)	Cut Swell (%)	Fill Shrink (%)	Adjusted Cut (cu yd)	Adjusted Fill (cu yd)
Excavation Volumes						
AOI	4630.74	295.12	0.00	0.00	4630.74	295.12
Excavation Areas	Cut Area (sq ft)	Fill Area (sq ft)	Total Area (sq ft)			
AOI	33980.31	9547.69	43528.00			

Project Totals

	Bank Cut (cu yd)	Bank Fill (cu yd)	Cut Swell (%)	Fill Shrink (%)	Adjusted Cut (cu yd)	Adjusted Fill (cu yd)
Excavation Volumes						
320300PD001A : AOI	4630.74	295.12	0.00	0.00	4630.74	295.12
Project Totals:	4630.74	295.12	0.00	0.00	4630.74	295.12
Export:	4335.62				4335.62	

	Cut Area (sq ft)	Fill Area (sq ft)	Total Area (sq ft)
Excavation Areas			
320300PD001A : AOI	33980.31	9547.69	43528.00
Project Totals:	33980.31	9547.69	43528.00

	Boundary (ft)	Area (sq ft)	Volume (cu yd)
Removal Quantities			
Project Totals:	0.00	0.00	0.00

* Only Drawing Master AOI's or single selected Drawing AOI's are used for Project Excavation Totals.

* Removal Quantities are clipped to Drawing Master AOI or the individually selected AOI.

320300PD001A: Existing vs. 64

<u>Excavation Volumes</u>	<u>Bank Cut (cu yd)</u>	<u>Bank Fill (cu yd)</u>	<u>Cut Swell (%)</u>	<u>Fill Shrink (%)</u>	<u>Adjusted Cut (cu yd)</u>	<u>Adjusted Fill (cu yd)</u>
AOI	3434.08	710.61	0.00	0.00	3434.08	710.61
<u>Excavation Areas</u>	<u>Cut Area (sq ft)</u>	<u>Fill Area (sq ft)</u>	<u>Total Area (sq ft)</u>			
AOI	30179.43	13285.57	43528.00			

Project Totals

<u>Excavation Volumes</u>	<u>Bank Cut (cu yd)</u>	<u>Bank Fill (cu yd)</u>	<u>Cut Swell (%)</u>	<u>Fill Shrink (%)</u>	<u>Adjusted Cut (cu yd)</u>	<u>Adjusted Fill (cu yd)</u>
320300PD001A : AOI	3434.08	710.61	0.00	0.00	3434.08	710.61
Project Totals:	3434.08	710.61	0.00	0.00	3434.08	710.61
Export:	2723.47				2723.47	

<u>Excavation Areas</u>	<u>Cut Area (sq ft)</u>	<u>Fill Area (sq ft)</u>	<u>Total Area (sq ft)</u>
320300PD001A : AOI	30179.43	13285.57	43528.00
Project Totals:	30179.43	13285.57	43528.00

<u>Removal Quantities</u>	<u>Boundary (ft)</u>	<u>Area (sq ft)</u>	<u>Volume (cu yd)</u>
Project Totals:	0.00	0.00	0.00

* Only Drawing Master AOI's or single selected Drawing AOI's are used for Project Excavation Totals.

* Removal Quantities are clipped to Drawing Master AOI or the individually selected AOI.

320300PD001A: Existing vs. 65

	Bank Cut (cu yd)	Bank Fill (cu yd)	Cut Swell (%)	Fill Shrink (%)	Adjusted Cut (cu yd)	Adjusted Fill (cu yd)
<u>Excavation Volumes</u>						
AOI	2401.20	1289.88	0.00	0.00	2401.20	1289.88
	Cut Area (sq ft)	Fill Area (sq ft)	Total Area (sq ft)			
<u>Excavation Areas</u>						
AOI	26231.08	17296.92	43528.00			

Project Totals

	Bank Cut (cu yd)	Bank Fill (cu yd)	Cut Swell (%)	Fill Shrink (%)	Adjusted Cut (cu yd)	Adjusted Fill (cu yd)
<u>Excavation Volumes</u>						
320300PD001A : AOI	2401.20	1289.88	0.00	0.00	2401.20	1289.88
Project Totals:	2401.20	1289.88	0.00	0.00	2401.20	1289.88
Export:	1111.32				1111.32	

	Cut Area (sq ft)	Fill Area (sq ft)	Total Area (sq ft)
<u>Excavation Areas</u>			
320300PD001A : AOI	26231.08	17296.92	43528.00
Project Totals:	26231.08	17296.92	43528.00

	Boundary (ft)	Area (sq ft)	Volume (cu yd)
<u>Removal Quantities</u>			
Project Totals:	0.00	0.00	0.00

* Only Drawing Master AOI's or single selected Drawing AOI's are used for Project Excavation Totals.

* Removal Quantities are clipped to Drawing Master AOI or the individually selected AOI.

320300PD001A: Proposed vs. 62

<u>Excavation Volumes</u>	<u>Bank Cut (cu yd)</u>	<u>Bank Fill (cu yd)</u>	<u>Cut Swell (%)</u>	<u>Fill Shrink (%)</u>	<u>Adjusted Cut (cu yd)</u>	<u>Adjusted Fill (cu yd)</u>
AOI	2024.43	0.00	0.00	0.00	2024.43	0.00
<u>Excavation Areas</u>	<u>Cut Area (sq ft)</u>	<u>Fill Area (sq ft)</u>	<u>Total Area (sq ft)</u>			
AOI	30894.05	8117.95	43528.00			

Project Totals

<u>Excavation Volumes</u>	<u>Bank Cut (cu yd)</u>	<u>Bank Fill (cu yd)</u>	<u>Cut Swell (%)</u>	<u>Fill Shrink (%)</u>	<u>Adjusted Cut (cu yd)</u>	<u>Adjusted Fill (cu yd)</u>
320300PD001A : AOI	2024.43	0.00	0.00	0.00	2024.43	0.00
Project Totals:	2024.43	0.00	0.00	0.00	2024.43	0.00
Export:	2024.43				2024.43	

<u>Excavation Areas</u>	<u>Cut Area (sq ft)</u>	<u>Fill Area (sq ft)</u>	<u>Total Area (sq ft)</u>
320300PD001A : AOI	30894.05	8117.95	43528.00
Project Totals:	30894.05	8117.95	43528.00

<u>Removal Quantities</u>	<u>Boundary (ft)</u>	<u>Area (sq ft)</u>	<u>Volume (cu yd)</u>
Project Totals:	0.00	0.00	0.00

* Only Drawing Master AOI's or single selected Drawing AOI's are used for Project Excavation Totals.

* Removal Quantities are clipped to Drawing Master AOI or the individually selected AOI.

320300PD001A: Proposed vs. 63

<u>Excavation Volumes</u>	<u>Bank Cut (cu yd)</u>	<u>Bank Fill (cu yd)</u>	<u>Cut Swell (%)</u>	<u>Fill Shrink (%)</u>	<u>Adjusted Cut (cu yd)</u>	<u>Adjusted Fill (cu yd)</u>
AOI	1322.92	910.64	0.00	0.00	1322.92	910.64
<u>Excavation Areas</u>	<u>Cut Area (sq ft)</u>	<u>Fill Area (sq ft)</u>	<u>Total Area (sq ft)</u>			
AOI	17261.26	26266.74	43528.00			

Project Totals

<u>Excavation Volumes</u>	<u>Bank Cut (cu yd)</u>	<u>Bank Fill (cu yd)</u>	<u>Cut Swell (%)</u>	<u>Fill Shrink (%)</u>	<u>Adjusted Cut (cu yd)</u>	<u>Adjusted Fill (cu yd)</u>
320300PD001A : AOI	1322.92	910.64	0.00	0.00	1322.92	910.64
Project Totals:	1322.92	910.64	0.00	0.00	1322.92	910.64
Export:	412.28				412.28	

<u>Excavation Areas</u>	<u>Cut Area (sq ft)</u>	<u>Fill Area (sq ft)</u>	<u>Total Area (sq ft)</u>
320300PD001A : AOI	17261.26	26266.74	43528.00
Project Totals:	17261.26	26266.74	43528.00

<u>Removal Quantities</u>	<u>Boundary (ft)</u>	<u>Area (sq ft)</u>	<u>Volume (cu yd)</u>
Project Totals:	0.00	0.00	0.00

* Only Drawing Master AOI's or single selected Drawing AOI's are used for Project Excavation Totals.

* Removal Quantities are clipped to Drawing Master AOI or the individually selected AOI.

320300PD001A: Proposed vs. 64

<u>Excavation Volumes</u>	<u>Bank Cut (cu yd)</u>	<u>Bank Fill (cu yd)</u>	<u>Cut Swell (%)</u>	<u>Fill Shrink (%)</u>	<u>Adjusted Cut (cu yd)</u>	<u>Adjusted Fill (cu yd)</u>
AOI	741.26	1941.13	0.00	0.00	741.26	1941.13
<u>Excavation Areas</u>	<u>Cut Area (sq ft)</u>	<u>Fill Area (sq ft)</u>	<u>Total Area (sq ft)</u>			
AOI	13982.00	29542.00	43528.00			

Project Totals

<u>Excavation Volumes</u>	<u>Bank Cut (cu yd)</u>	<u>Bank Fill (cu yd)</u>	<u>Cut Swell (%)</u>	<u>Fill Shrink (%)</u>	<u>Adjusted Cut (cu yd)</u>	<u>Adjusted Fill (cu yd)</u>
320300PD001A : AOI	741.26	1941.13	0.00	0.00	741.26	1941.13
Project Totals:	741.26	1941.13	0.00	0.00	741.26	1941.13
Import:		1199.87				1199.87

<u>Excavation Areas</u>	<u>Cut Area (sq ft)</u>	<u>Fill Area (sq ft)</u>	<u>Total Area (sq ft)</u>
320300PD001A : AOI	13982.00	29542.00	43528.00
Project Totals:	13982.00	29542.00	43528.00

<u>Removal Quantities</u>	<u>Boundary (ft)</u>	<u>Area (sq ft)</u>	<u>Volume (cu yd)</u>
Project Totals:	0.00	0.00	0.00

* Only Drawing Master AOI's or single selected Drawing AOI's are used for Project Excavation Totals.

* Removal Quantities are clipped to Drawing Master AOI or the individually selected AOI.

320300PD001A: Proposed vs. 65

	Bank Cut (cu yd)	Bank Fill (cu yd)	Cut Swell (%)	Fill Shrink (%)	Adjusted Cut (cu yd)	Adjusted Fill (cu yd)
<u>Excavation Volumes</u>						
AOI	339.44	3151.46	0.00	0.00	339.44	3151.46
	Cut Area (sq ft)	Fill Area (sq ft)	Total Area (sq ft)			
<u>Excavation Areas</u>						
AOI	8282.52	35245.48	43528.00			

Project Totals

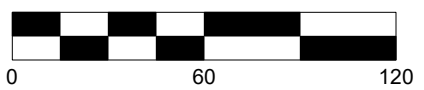
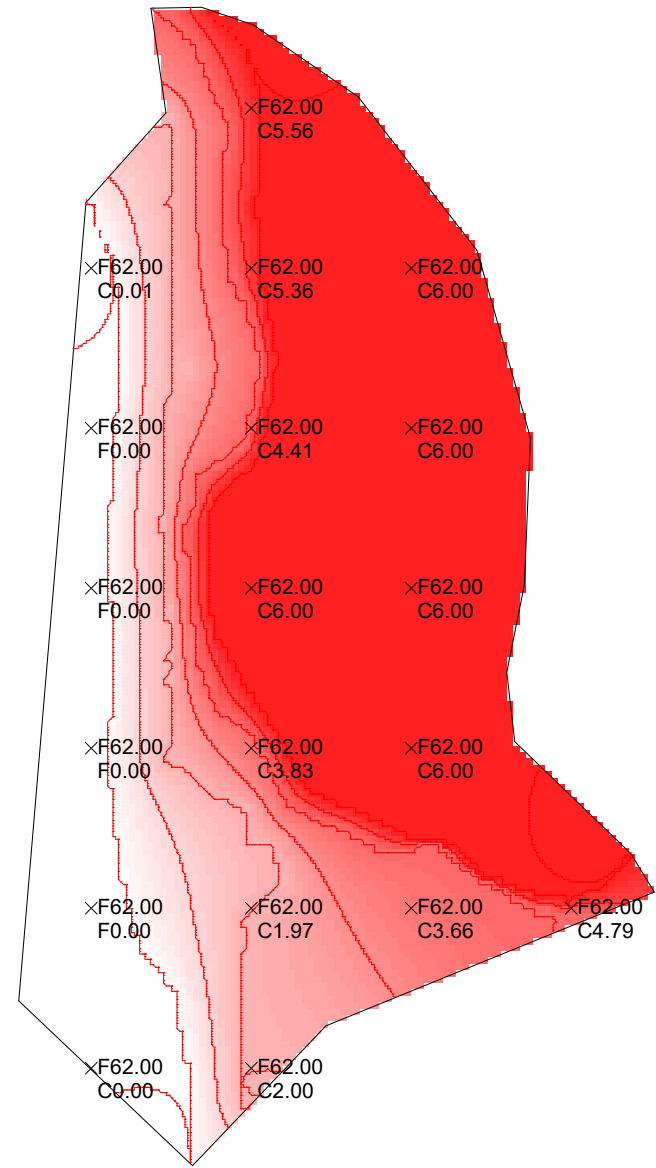
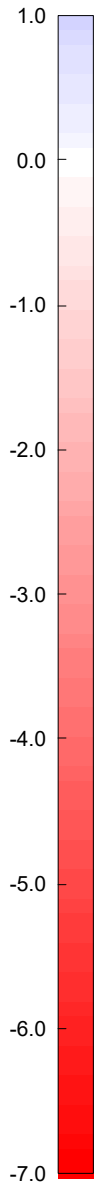
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<u>Excavation Volumes</u>						
320300PD001A : AOI	339.44	3151.46	0.00	0.00	339.44	3151.46
Project Totals:	339.44	3151.46	0.00	0.00	339.44	3151.46
Import:		2812.02				2812.02

	Cut Area (sq ft)	Fill Area (sq ft)	Total Area (sq ft)
<u>Excavation Areas</u>			
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Project Totals:	8282.52	35245.48	43528.00

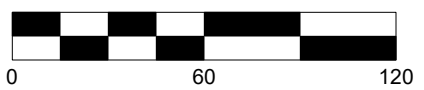
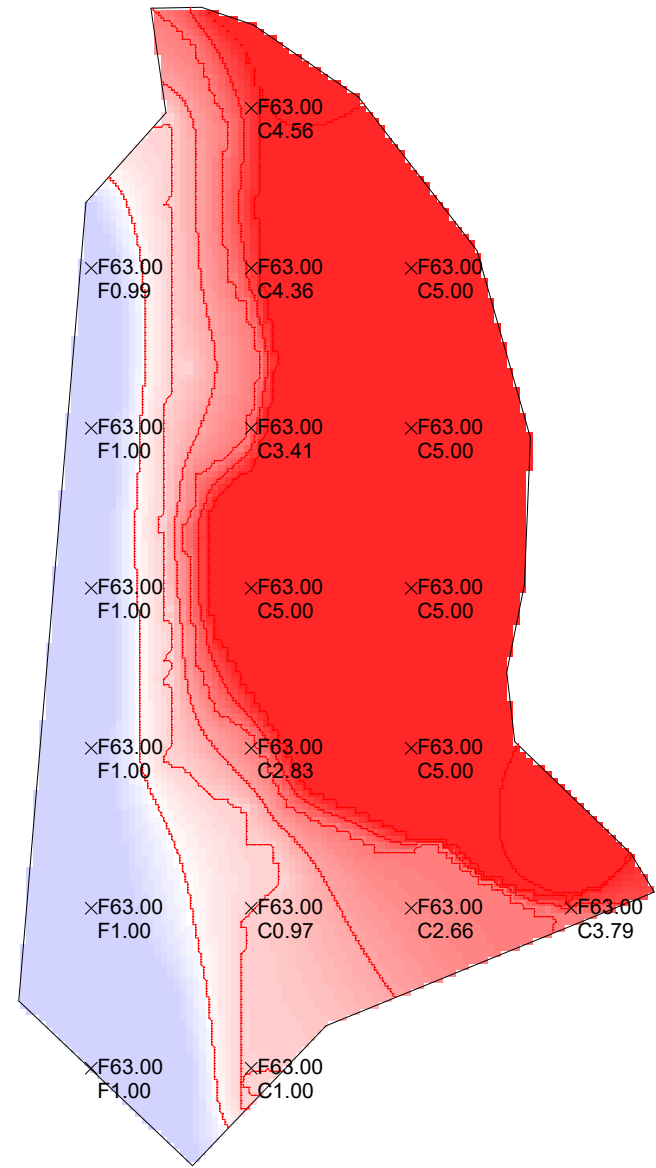
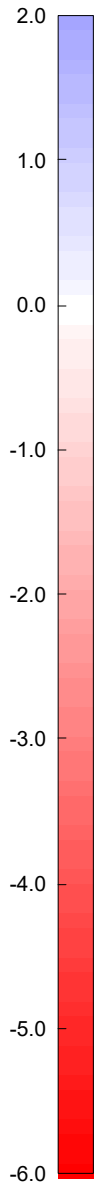
	Boundary (ft)	Area (sq ft)	Volume (cu yd)
<u>Removal Quantities</u>			
Project Totals:	0.00	0.00	0.00

* Only Drawing Master AOI's or single selected Drawing AOI's are used for Project Excavation Totals.

* Removal Quantities are clipped to Drawing Master AOI or the individually selected AOI.

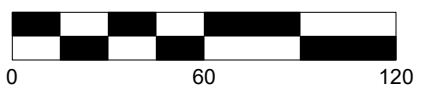
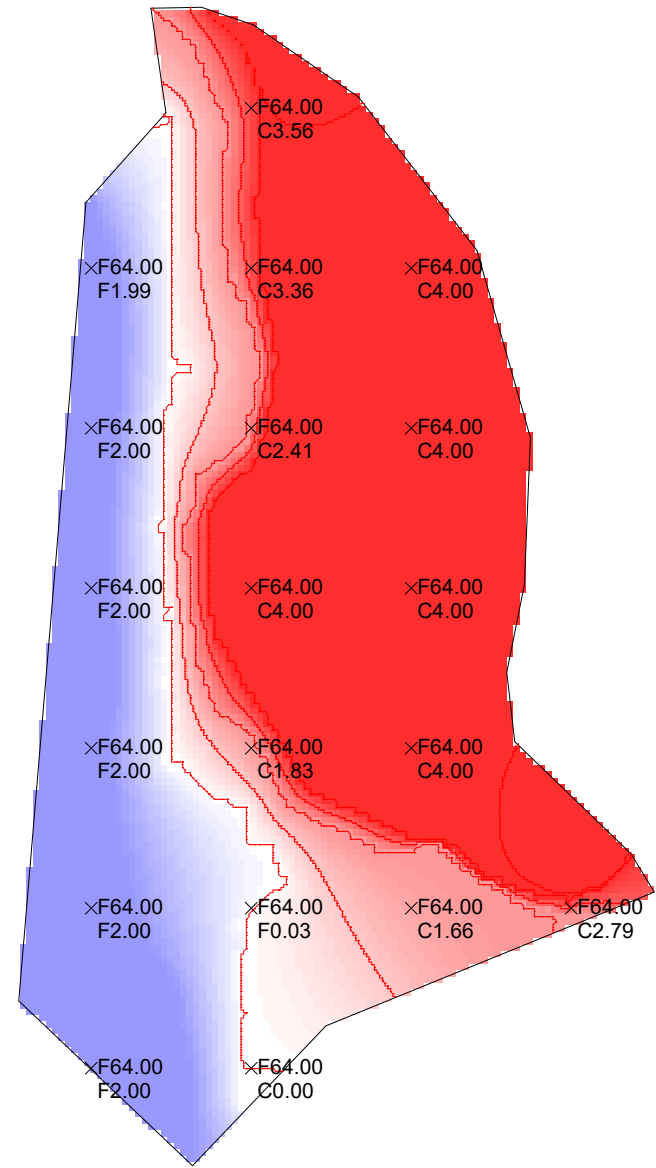
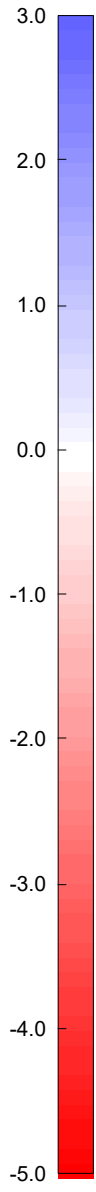


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320300PD001A: Flood Storage Calculation
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Existing vs. 62
December 11, 2020 · 02:31 PM

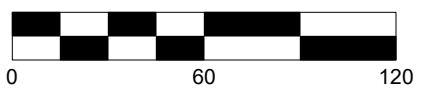
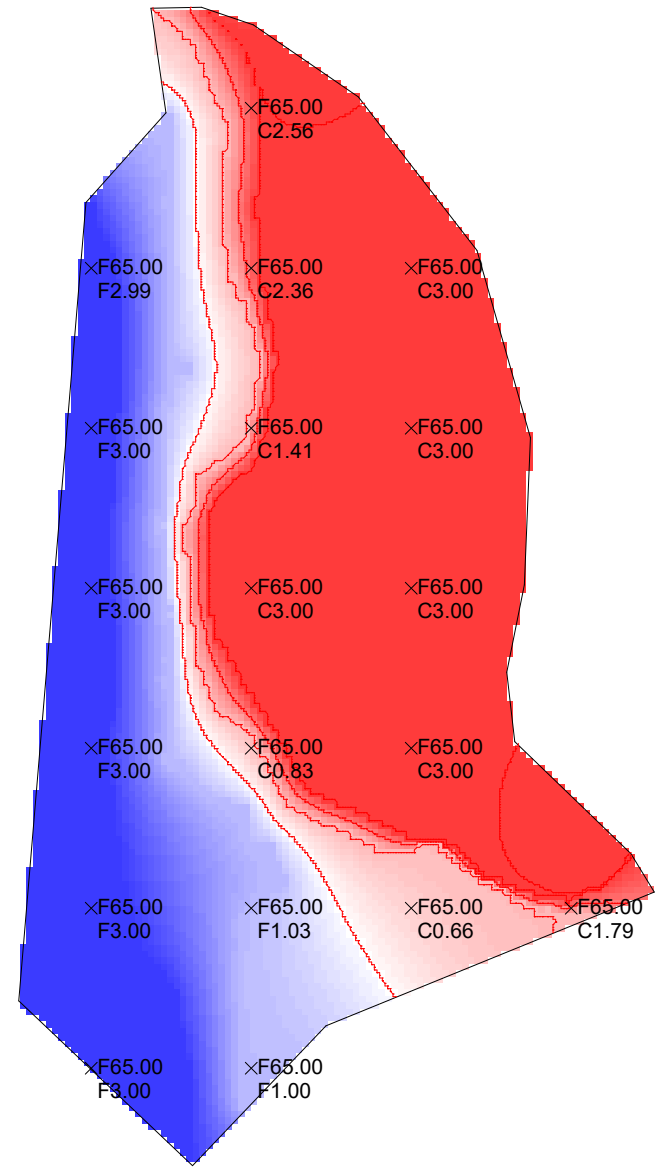
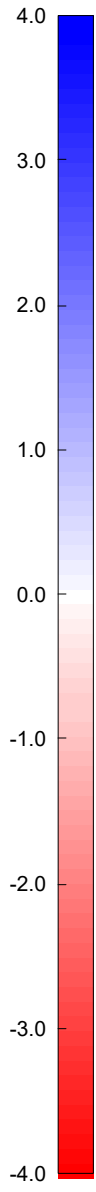


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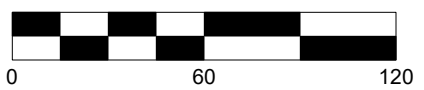
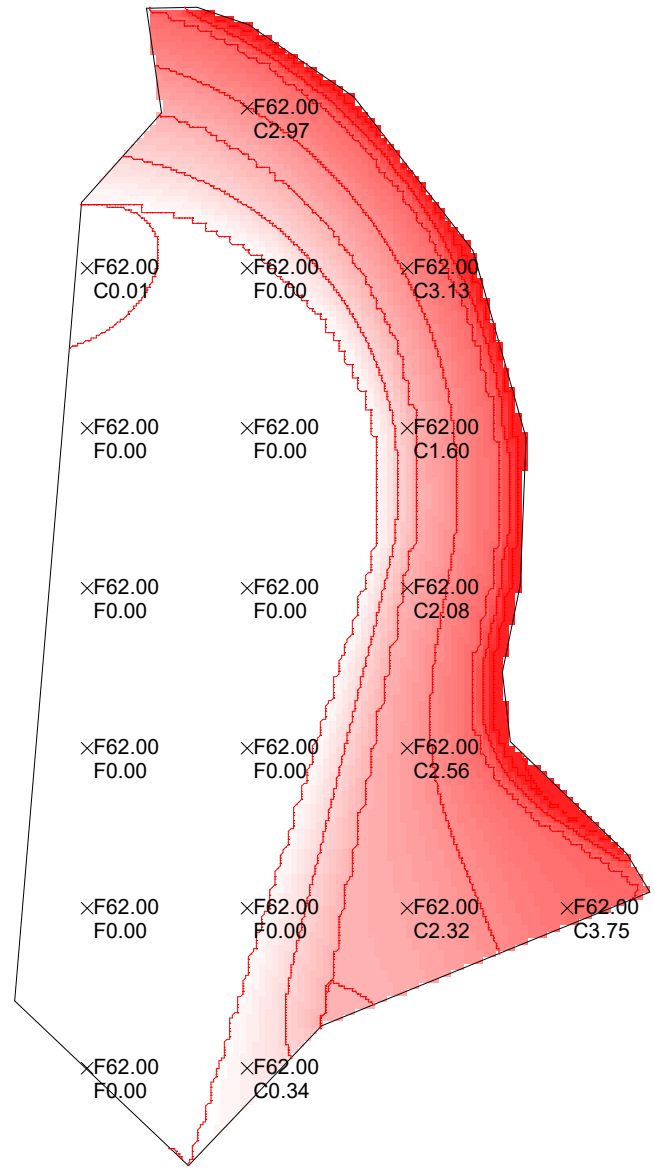
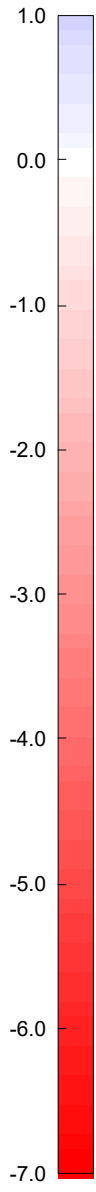
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F63.00	1.00	3.41
F63.00	1.00	5.00
F63.00	1.00	5.00
F63.00	1.00	2.83
F63.00	1.00	5.00
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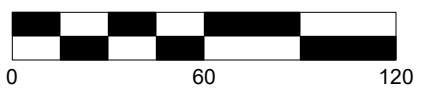
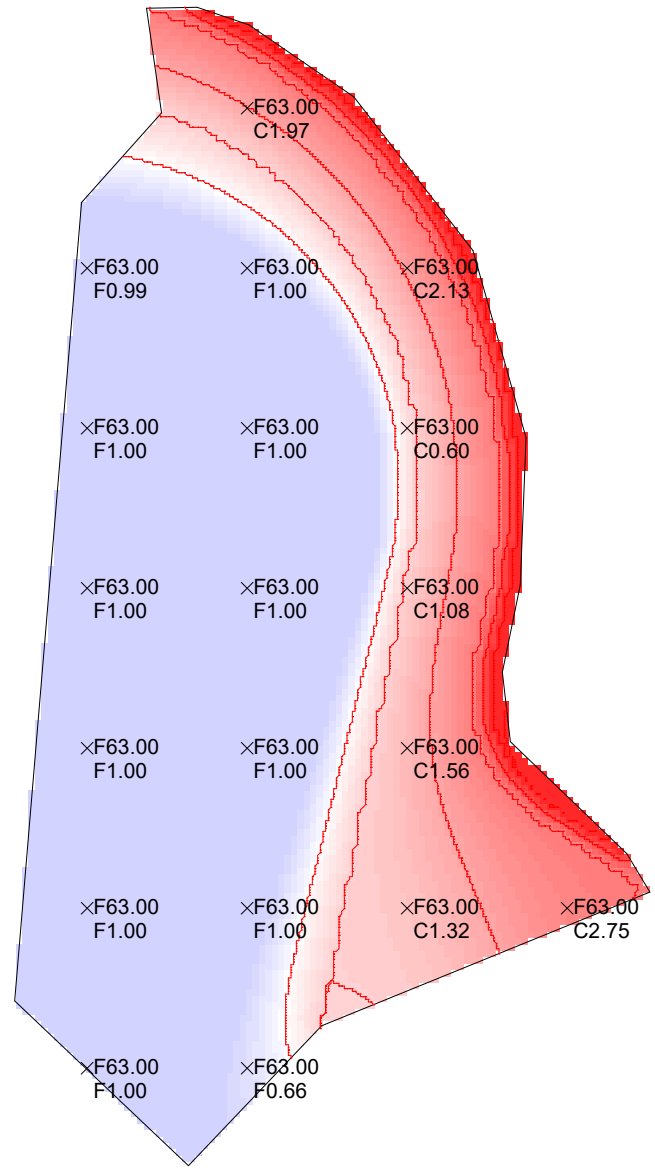
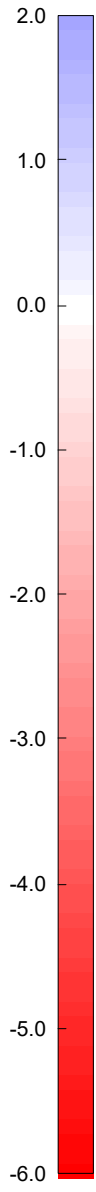
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 December 11, 2020 · 02:33 PM



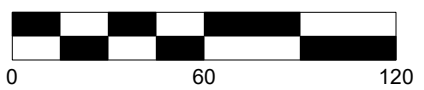
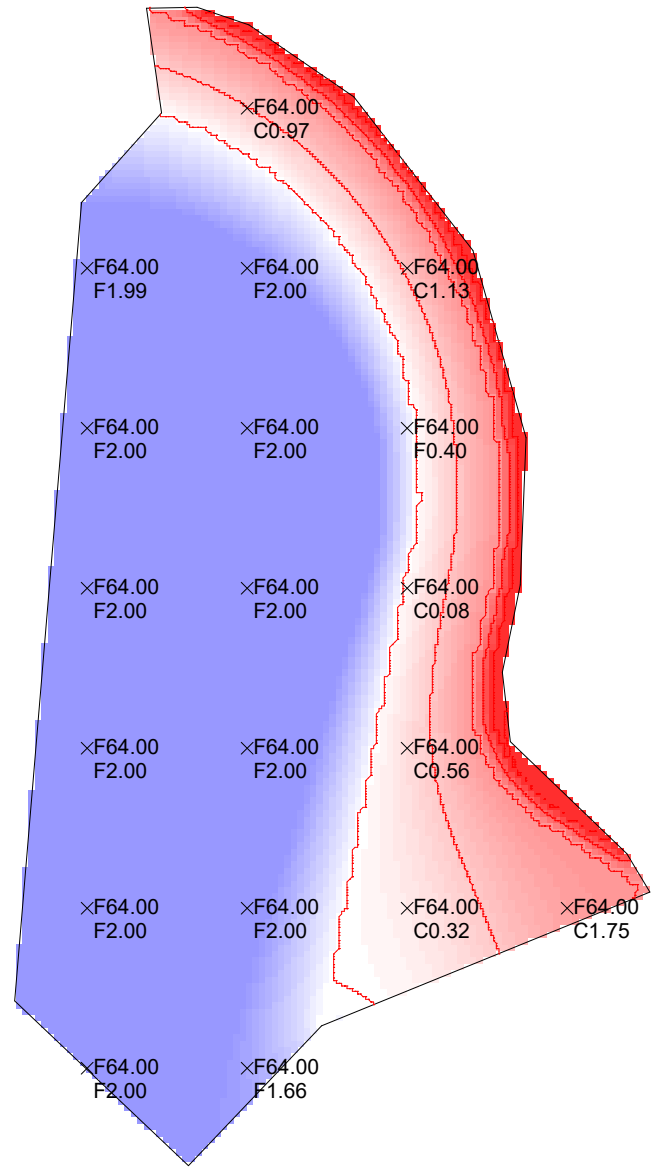
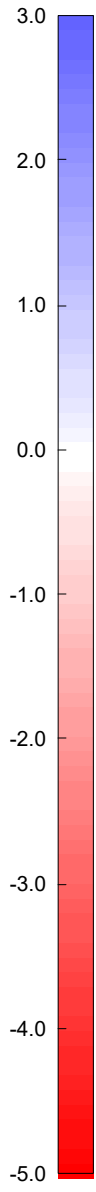
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December 11, 2020 · 02:35 PM



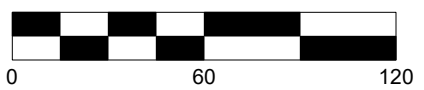
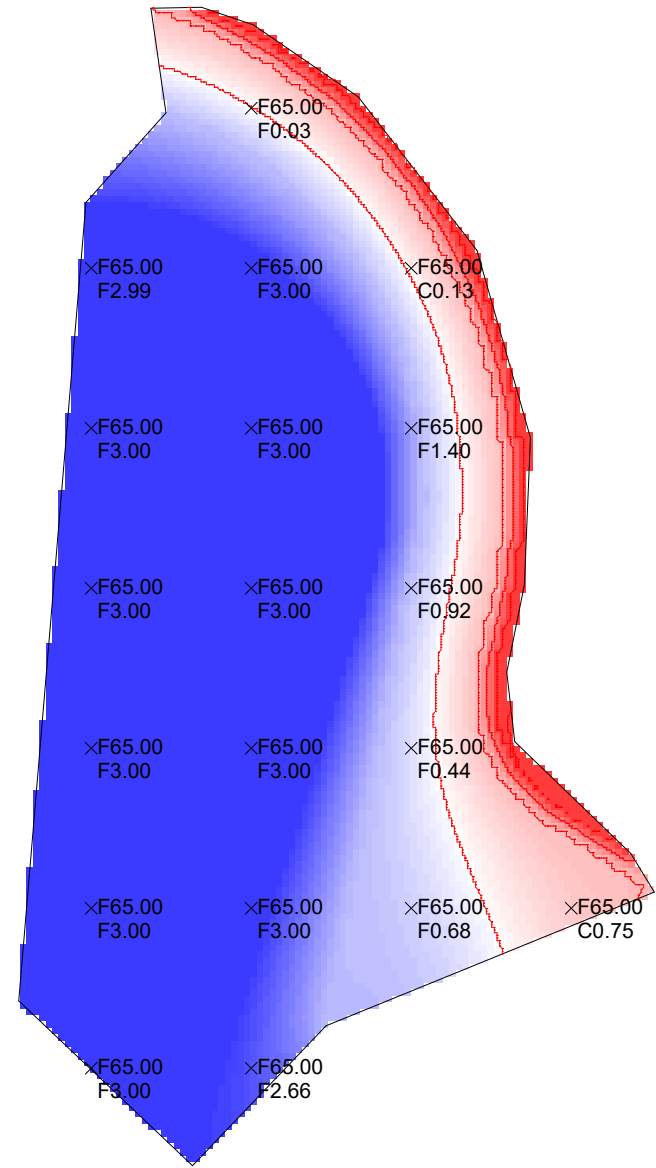
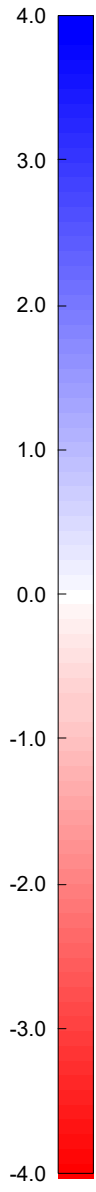
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Cut/Fill Locations Report
 320300PD001A: Flood Storage Calculation
 320300PD001A
 Proposed vs. 63
 December 11, 2020 · 03:17 PM



Cut/Fill Locations Report
320300PD001A: Flood Storage Calculation
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Proposed vs. 64
December 11, 2020 · 03:18 PM



Cut/Fill Locations Report
 320300PD001A: Flood Storage Calculation
 320300PD001A
 Proposed vs. 65
 December 11, 2020 · 03:18 PM

Attachment 5
Site Owner's Manual

Site Owner's Manual

ROCKY MAPLE SOLAR

**18 North Carver Road
Wareham and Carver, Massachusetts**

Prepared for:

**BE RE, LLC
PO Box 974
Edwards, Colorado, 81632**

Presented by:



BEALS + THOMAS

BEALS AND THOMAS, INC.
Reservoir Corporate Center
144 Turnpike Road
Southborough, MA 01772-2104

December 16, 2020

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FIGURE 1: SITE DEVELOPMENT PLANS

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APPENDIX B: LIST OF EMERGENCY CONTACTS

1.0 INTRODUCTION

The Site Owner's Manual complies with the Long-Term Pollution Prevention Plan (Standard 4) and the Long-Term Operation and Maintenance Plan (Standard 9) requirements of the 2008 Massachusetts Department of Environmental Protection (DEP) Stormwater Handbook. The Manual outlines source control and pollution prevention measures and maintenance requirements of stormwater best management practices (BMPs) associated with the proposed development.

Please note that since there are no proposed stormwater management BMPs, maintenance requirements pertaining to stormwater are not necessary. However, provisions have been provided for monitoring of erosion and sedimentation during the operation of the facility to protect wetlands and offsite drainage areas.

2.0 SITE OWNER'S AGREEMENT

2.1 Operation and Maintenance Compliance Statement

Site Owner: BE RE, LLC
PO BOX 974
Edwards, CO 81632

Responsible Party: BE RE, LLC

BE RE, LLC or their successors shall maintain ownership of the on-site stormwater management system as well as the responsibility for operation and maintenance during the post-development stages of the project. The site has been inspected for erosion and appropriate measures have been taken to permanently stabilize any eroded areas. All aspects of stormwater best management practices (BMPs) have been inspected for damage, wear and malfunction, and appropriate steps have been taken to repair or replace the system or portions of the system so that the stormwater at the site may be managed in accordance with the Stormwater Management Standards. Future responsible parties shall be notified of their continuing legal responsibility to operate and maintain the BMPs. The operation and maintenance plan for the stormwater BMPs is being implemented.

Adam Schumaker

Responsible Party Signature

December 16, 2020

Date

2.2 Stormwater Maintenance Easements

There are no off-site areas utilized for stormwater control, therefore no stormwater management easements are required. The Site Owner will have access to all stormwater practices for inspection and maintenance, including direct maintenance access by heavy equipment to structures requiring regular maintenance.

2.3 Record Keeping

The Site Owner shall maintain a rolling log in which all inspections and maintenance activities for the past three years shall be recorded. The Operation and Maintenance Log includes information pertaining to inspections, repairs, and disposal relevant to the project's stormwater management system. The Log is located in Appendix A.

The Operation and Maintenance Log shall be made available to the Conservation Commission and the DEP upon request. The Conservation Commission and the DEP shall be allowed to enter and inspect the premises to evaluate and ensure that the responsible party complies with the maintenance requirements for each BMP.

2.4 Training

Employees involved in grounds maintenance and emergency response will be educated on the general concepts of stormwater management and groundwater protection. The Site Owner's Manual will be reviewed with the maintenance staff. The staff will be trained on the proper course of action for specific events expected to be incurred during routine maintenance or emergency situations.

3.0 LONG-TERM POLLUTION PREVENTION PLAN

In compliance with Standard 4 of the 2008 DEP Stormwater Management Handbook, this section outlines source control and pollution prevention measures to be employed on-site after construction.

3.1 Storage of Materials and Waste

The site shall be kept clear of trash and debris at all times.

3.2 Vehicle Washing

No commercial vehicle washing shall take place on site.

3.3 Routine Inspections and Maintenance of Stormwater BMPs

See Section 4.0 Long-Term Operation and Maintenance Plan, for routine inspection and maintenance requirements for all proposed stormwater BMPs.

3.4 Spill Prevention and Response

A contingency plan shall be implemented to address the spill or release of petroleum products and hazardous materials and will include the following measures:

1. Equipment necessary to quickly attend to inadvertent spills or leaks shall be stored on-site in a secure but accessible location. Such equipment shall include but not be limited to the following: safety goggles, chemically resistant gloves and overshoe boots, water and chemical fire extinguishers, sand and shovels, suitable absorbent materials, storage containers and first aid equipment (i.e. Indian Valley Industries, Inc. 55-gallon Spill Containment kit or approved equivalent).
2. Spills or leaks shall be treated properly according to material type, volume of spillage and location of spill. Mitigation shall include preventing further spillage, containing the spilled material in the smallest practical area, removing spilled material in a safe and environmentally-friendly manner, and remediation of any damage to the environment.
3. For large spills, Massachusetts DEP Hazardous Waste Incident Response Group shall be notified immediately at 888-304-1133 and an emergency response contractor shall be consulted.

3.5 Maintenance of Lawns, Gardens, and other Landscaped Areas

Lawns, gardens, swales and other landscaped areas shall be maintained regularly by the facility operator. Vegetated and landscaped areas will be maintained as outlined in Section 4.0.

3.6 Storage and Use of Fertilizers, Herbicides, and Pesticides

All fertilizers, herbicides, and pesticides shall be stored in accordance with local, state, and federal regulations. The application rate and use of fertilizers, herbicides, and pesticides on the site shall at no time exceed local, state, or federal specifications.

3.7 Pet Waste Management

Pet owners shall be required to pick up after their animals and dispose of waste in the trash.

3.8 Snow and Deicing Chemical Management

Snow removal and use of deicing chemicals at the proposed development shall comply with the following requirements:

- Plowed snow shall be placed in the areas designated on the site plans and/or outside of wetland boundaries and stormwater best management practices. The following maintenance measures shall be undertaken at all snow disposal sites:
 - Debris shall be cleared from an area prior to using it for snow disposal.
 - Debris and accumulated sediments shall be cleared from the site and properly disposed of at the end of the snow season and no later than May 15.
- In accordance with the Massachusetts General Laws, Chapter 85, Section 7A, salt and other de-icing chemicals will be stored at an indoor location. Salt and other deicing chemicals shall be stored in accordance with Massachusetts General Law.
- Sand piles shall be contained and stabilized to prevent the discharge of sand to wetlands or water bodies, and, where feasible, covered.
- Salt storage piles shall be located outside of the 100-year floodplain.
- The application of salt on the proposed parking areas and driveway shall at no time exceed state or local requirements.

3.9 Gravel Access Road

Gravel access road shall be maintained regularly by the Site Owner.

4.0 LONG-TERM OPERATION AND MAINTENANCE PLAN

This section outlines the stormwater best management practices (BMPs) associated with the proposed stormwater management system and identifies the long-term inspection and maintenance requirements for each BMP.

4.1 Stormwater Management System Components

The following table outlines the type and quantity of the BMPs and their general location. Please reference the site plan(s) provided in the Figures section for exact location.

BMP Type	Quantity	Location
Infiltration Trench	4	Throughout the site at equipment pads.

4.2 Inspection and Maintenance Schedules

4.2.1 General Maintenance for Mosquito Control

If necessary to minimize mosquito breeding, a licensed pesticide applicator shall apply larvicides, such as *Bacillus sphaericus* (Bs) to all catch basins sumps, and water quality inlets. Larvicides shall be applied in compliance with all pesticide label requirements, and will be applied during or immediately after wet weather, unless the product used can withstand extended dry periods. Ensure all manhole covers, and inspection ports are secure to reduce the likelihood of mosquitoes laying eggs in standing water.

4.2.2 Infiltration Trenches

Inspections and preventative maintenance shall be performed at all infiltration trenches after major storm events (rainfall totals greater than 2.5 inches in 24 hours) during the first three months of operation and twice a year thereafter. Additionally, all pretreatment BMPs shall be inspected in accordance with the minimal requirements specified for those practices and after major storm events. Inspections and maintenance activities shall include the following measures:

- Inlet and outlet pipes shall be inspected every 6 months and after major storm events for evidence of clogging.
- Accumulated sediment, trash, debris, leaves, and clippings from mowing shall be removed every 6 months and after major storm events.
- Tree seedlings shall be removed before they become firmly established.
- The vegetated trench surface shall be mowed on a seasonal basis to maintain a vegetation height of no more than 4 inches.
- The trench shall be inspected 24 hours or several days after a rain event to look for ponded water. If there is ponded water at the surface of the

trench, the following measures shall be employed to address surficial clogging:

- Remove and replace topsoil or first layer of stone aggregate and the filter fabric.
- If there is ponded water inside the trench, the following measures shall be employed to address trench failure:
 - All accumulated sediments must be stripped from the bottom of the trench.
 - The bottom of the trench must be scarified and tilled to induce infiltration, and all of the stone aggregate and filter fabric or media shall be removed and replaced.

4.3 Estimated Operation and Maintenance Budget

An operations and maintenance budget was prepared to approximate the annual cost of the inspections required in compliance with the DEP Stormwater Management Policy. The table below estimates the annual cost to inspect and maintain each proposed BMP, based on the requirements in Section 4.2.

BMP Type	# of BMPS	Annual O&M Cost (per BMP) ¹	Total Cost
Infiltration Trench	4	\$200-\$400	\$800-\$1600
Total			\$1000-\$1600

4.4 Public Safety Features

The site is not open to the public. A locked gate is located at the entrance to the site. In addition a 7' chain-link-fence will surround the equipment pad areas. Operation and maintenance of the facility will be conducted in accordance with the safety requirements of the facility operator and applicable OSHA regulations.

¹ Annual maintenance cost is based on estimate of the cost to complete all inspection and maintenance measures outlined in Section 4.2. For BMPs that require sediment removal at regular intervals (i.e. every 5 or 10 years), the annual cost includes the annual percentage of that cost.

Figures

Figure 1: Site Development Plans

Appendices

Appendix A

Operation and Maintenance Log

Appendix B

List of Emergency Contacts

List of Emergency Contacts

Massachusetts DEP Hazardous Waste Incident Response Group
1-888-304-1133

Carver Fire Department
Emergencies: Dial 911
99 Main Street
Carver, MA 02330
Tel: (508) 866-3440
Fire Chief: Craig F. Weston

Wareham Fire Department
Emergencies: Dial 911
273 Main Street
Wareham, MA 02571
Tel: (508) 295-2973
Fire Chief: Matt Rowley

Carver Police Department
Emergencies: Dial 911
112B Main Street
Carver, MA 02330
Tel: (508) 866-2000
Chief of Police: Marc Duphily

Wareham Police Department
Emergencies: Dial 911
2515 Cranberry Highway
Wareham, MA 02571
Tel: (508) 295-9505
Chief of Police: John Walcek