Drainage Report
Maxson Hill Road Solar

40 Maxson Hill Road, Hopkinton, RI 02804

APPLICANT/OWNER:
Ronnie Sposato
40 Maxson Hill Road
Hopkinton, RI 02804

PREPARED BY:
ESS Group, Inc.
404 Wyman Street, Suite 375
Waltham, Massachusetts 02451

ESS Project No.C641-000

May 11, 2020

JASON M. GOLD
No. 7788
REGISTERED
PROFESSIONAL ENGINEER
CIVIL

2020.05.11
23:16:38 -04'00'

www.essgroup.com

TABLE OF CONTENTS

SECTION **PAGE**

EXECUTIVE SUMMARY

1.0 PROJECT SCOPE AND DESCRIPTION 1

2.0 EXISTING CONDITIONS 1
- 2.1 Existing Site Use 1
- 2.2 Wetland Delineation 1
  - 2.2.1 Wetland A 1
  - 2.2.2 Watercourse 2
  - 2.2.3 Soils 2
  - 2.2.4 Adjacent Upland Vegetation Characterization 2

3.0 HYDROLOGIC AND HYDRAULIC ANALYSIS 2
- 3.1 Methodology 2
- 3.2 Existing Conditions Drainage Area 3
- 3.3 Proposed Conditions Drainage Area 3
- 3.4 Results 3

4.0 STORMWATER MANAGEMENT STANDARDS 4
- 4.1 Minimum Standard 1: LID Site Planning and Design Strategies 4
- 4.2 Minimum Standard 2: Groundwater Recharge 4
- 4.3 Minimum Standard 3: Water Quality 4
- 4.4 Minimum Standard 4: Conveyance and Natural Channel Protection 5
- 4.5 Minimum Standard 5: Overbank Flood Protection 5
- 4.6 Minimum Standard 6: Redevelopment and Infill Projects 5
- 4.7 Minimum Standard 7: Pollution Prevention 5
- 4.8 Minimum Standard 8: Land Uses with Higher Potential Pollutant Loads 6
- 4.9 Minimum Standard 9: Illicit Discharges 6
- 4.10 Minimum Standard 10: Construction Activity SESC and Pollution Prevention Control Measure 6
- 4.11 Minimum Standard 11: Stormwater Management System Operation and Maintenance 6

TABLES

Table 1: Rainfall Frequency Values 2
Table 2: Existing Drainage Area Characteristics 3
Table 3: Proposed Drainage Area Characteristics 3
Table 4 Design Point 1 Peak Runoff Rate, cfs 4

APPENDICES

A - Wetland Delineation Data Forms
B - HydroCAD Summary Report
C - NRCS Soils Map
D – Drainage Area Maps

© 2019 ESS Group, Inc. – This document or any part may not be reproduced or transmitted in any form or by any means, electronic, or mechanical, including photocopying, microfilming, and recording without the express written consent of ESS Group, Inc. All rights reserved.

EXECUTIVE SUMMARY

The 25± acre primarily wooded Site is located on the southern side of Maxson Hill Road in Hopkinton, RI. It is identified as Assessor's Plat 4, Lot 38. The northern portion of the Site is accessed by a 1,100± foot long paved and gravel driveway that terminates at a residence, consisting of a single-family home, 3 sheds and a fenced inground pool. A cleared area located approximately half-way up the driveway is occupied by a 1,750± SF garage, vehicles, and equipment storage. Machinery, trucks, and equipment are stored along the shoulders of the driveway. Jurisdictional resource areas include a wetland in the southwestern portion of the Site.

The property is located within flood zone "X" per FIRM Map 44009C0142H. Flood zone "X" refers to areas of minimal flood hazard above the 500-year flood level. The Site is mapped by Natural Resources Conservation Service (NRCS) as Bridgehampton silt loam, Canton and Charlton fine sandy loams, Hinckley loamy sand, Scarboro mucky fine sandy loam, and Woodbridge fine sandy loam. Refer to the enclosed soils map. A portion of the property is considered prime farmland. Land use of the Site is classified as Farm/Forest Mdl 01 based on the latest property listing report.

The property is located primarily within a Primary Protection Zone with the exception of the eastern corner which is within a Secondary Protection Zone per Hopkinton GIS "Map 3 Groundwater and Wellhead Protection Areas, Hopkinton, RI."

The Applicant proposes to construct a 0.5± MW direct current (DC) ground-mounted solar installation on 1.3± acres of the property with 1,470± modules and associated electrical equipment and utilities. Access to the array will be provided via a 15-foot wide crushed stone driveway. Proposed changes in ground cover in addition to the driveway will be limited to clearing and seeding of roughly 1.8± acres within the fence to accommodate the solar arrays. Shade trees between the fence and 4.6± acre Limits of Disturbance will be cut but not grubbed, leaving the existing ground cover intact. The perimeter wetlands on the southern portion of the property will not be altered or encroached upon, as all proposed work is located in the northern portion of the Site.

The proposed project will not alter existing drainage areas, flow paths, or runoff curve numbers. The results of the stormwater analysis indicate that the proposed conditions peak runoff rates and volumes generated by the 1.2" storm event, and the 1, 2, 10, 25, and 100-year storms will not exceed existing conditions.

The 11 Minimum Stormwater Management Standards required by the Rhode Island Stormwater Design and Installation Standards Manual (RISDISM) have been met. The proposed design will not have a significant effect on downgradient properties.

1.0 PROJECT SCOPE AND DESCRIPTION

The Applicant proposes to construct a 0.5± MW DC ground-mounted solar installation and corresponding electrical utilities and equipment on a 25± acre property in Hopkinton, RI.

The goal of this analysis is to evaluate pre- and post-construction stormwater conditions and develop a site design consistent with the Rhode Island Stormwater Management, Design and Installation Rules (250-RICR-150-10-8).

2.0 EXISTING CONDITIONS

2.1 Existing Site Use

The primarily wooded Site is located on the southern side of Maxson Hill Road in Hopkinton, RI. It is identified as Assessor's Plat 4, Lot 38. The northern portion of the Site is accessed by a 1,100± foot long paved and gravel driveway that terminates at a residence, consisting of a single-family home, 3 sheds and a fenced inground pool. A cleared area located approximately half-way up the driveway is occupied by a 1,750± SF garage, vehicles, and equipment storage. Machinery, trucks, and equipment are stored along the shoulders of the driveway. Jurisdictional resource areas include a wetland in the southwestern portion of the Site. Abutting land use includes residences to the north, south, east, and west.

2.2 Wetland Delineation

Wetlands were delineated by ESS on May 30, 2019, in accordance with RIDEM *Rules and Regulations Governing the Administration and Enforcement of the Fresh Water Wetland Act* (2014[1]) and the United States Army Corps of Engineers (USACE 1989[2]) *Federal Manual for Identifying and Delineating Jurisdictional Wetlands* and the *Northeast Regional Supplement* (2012[3]). State-regulated wetland resource areas present on the property were identified based on vegetative composition, presence of hydric soils, and evidence of wetland hydrology. Refer to Appendix A for Wetland Delineation Forms.

Note that the wetlands described below are located in the southern portion of the Site, approximately 422 feet from the proposed development in the northern portion of the Site. Also note that the proposed project does not drain directly to the wetland, rather stormwater runoff is collected by a catch basin in Maxson Hill Road.

2.2.1 Wetland A

Wetland A is delineated by the A-flag series (A1 open - A21 open) and the B flag series (B1 open – B55 open) and is located along the south-western portion of the property. This wetland would be classified as a swamp under the Freshwater Wetlands Act and would meet the classification as a seasonally saturated palustrine broad-leaved deciduous forest (PFO1) per National Wetland Inventory (Cowardin et al. 1979). An unnamed intermittent stream less than 10 feet in width was observed following in a southerly direction interior of the delineated swamp. Due to its classification, a 100-foot Riverbank Wetland would be applied to each stream bank. The edges of this stream were not delineated in the field, as field delineation of rivers and streams is not required per 250-RICR-150-1.7A4(b)(4).

---

[1] USACE (U.S. Army Corps of Engineers). 2012a. Regional Supplement to the Corps of Engineers Wetland Delineation Manual: Northcentral and Northeast Region (Version 2.0). Prepared by Environmental Laboratory.
[2] Environmental Laboratory. (1987). "Corps of Engineers Wetlands Delineation Manual," Technical Report Y-87-1, U.S. Army Engineer Waterways Experiment Station, Vicksburg, MS.
[3] Rules and Regulations Governing the Administration and Enforcement of the Fresh Water Wetlands Act. 2014.

2.2.2 Watercourse

Additionally, a drainage channel was observed to the west of the A flag series, directing flow in a southerly direction towards the aforementioned swamp and intermittent stream. This channel (ASSFCL1 – ASSFCL3) would be classified as an Area Subject to Strom Flowage (ASSF).

2.2.3 Soils

Wetland A is mapped by Natural Resource Conservation Service (NRCS) to be underlain by hydric Scarboro mucky fine sandy loam (Sb). These very poorly drained soils are often found along depressions, outwash deltas, drainageways, and outwash terraces. The slow to very slow permeability and high-water table make these soils generally poorly suited for development.

2.2.4 Adjacent Upland Vegetation Characterization

The upland areas found are primarily forested, with some areas of cleared land and some residential buildings.

3.0 HYDROLOGIC AND HYDRAULIC ANALYSIS

3.1 Methodology

The hydrologic model created to analyze the Site was developed using the Soil Conservation Service (SCS) Technical Release No. 20 (SCS unit hydrograph procedures) and SCS Technical Release No. 55 (for times of concentration and curve numbers). HydroCAD® software (developed by Applied Microcomputer Systems) was used to perform the hydrologic analysis. The HydroCAD® program calculates runoff based on rainfall and watershed characteristics and produces a runoff hydrograph (a runoff rate versus time curve). The stage-storage-discharge curves for a specific detention area are used to compute an outflow hydrograph by hydraulically routing an inflow hydrograph through a basin. This procedure calculates the relationship of the inflow hydrograph with the characteristics of the detention area to determine the outflow, stage, and storage capacity of the detention area for a given time during the specified storm event. All drainage analyses utilized Type III, 24-hour rainfall data from the Northeast Regional Climate Center (NRCC) and the Natural Resources Conservation Service's (NRCS) web tool "Extreme Precipitation in New York and New England" for Hopkinton, Rhode Island. The rainfall frequency values obtained from NRCC and used in this drainage analysis are listed in the table below.

Table 1: Rainfall Frequency Values

Frequency	1-Yr	2-Yr	10-Yr	100-Yr
Inches of Rainfall	2.69	3.30	4.82	8.31

Hydrographs were generated based on drainage area, cover characteristics, hydrologic soil group, curve number (CN) values, times of concentration (Tc), and rainfall amount. The CN values for each Drainage Area were estimated by determining the composite value of the CN for the soil groups and ground cover mixture. Stormwater model simulations were performed for the 24-hour rainfall for the 1.2" event, and the 1, 2, 10, 25, and 100-year storm events using a Type III storm distribution.

The watershed characteristics for existing conditions, including flow patterns, were estimated based on topographic information determined in the existing conditions survey, as well as 2011 LIDAR survey data. Refer to Appendix B for a report of the HydroCAD calculations.

3.2 Existing Conditions Drainage Area

The proposed development is located within a drainage area that flows to a single design point, identified as 101. Refer to the enclosed plan set, Drawing WS-1, the Pre-Development Drainage Area Plan. Design Point 1 represents a catch basin at the bottom of the driveway that discharges to a drainage ditch along Maxson Hill Road. Drainage characteristics of the area are listed below in Table 2.

The groundcover within Drainage Area 101 is primarily wooded with the exception of a long paved and graveled driveway, several rooftops, and a gravel area surrounding the garage. Soils within the drainage area include Canton and Charlton fine sandy loams, Bridgehampton silt loam, and Woodbridge fine sandy loam. The time of concentration flow path extends from a high point on the northeastern portion of the drainage area and west to the catch basin.

Table 2: Existing Drainage Area Characteristics

Drainage Area (acres)	Curve Number	Time of Conc. (minutes)
14.57	70	35.9

3.3 Proposed Conditions Drainage Area

The Applicant proposes to construct a 0.5± MW DC ground-mounted solar installation on 1.3± acres of the property with 1,470± modules. A 1.8± acre, 7-foot-high chain link fence will surround the solar array. Access to the array will be provided via a short 51± foot long, 15-foot-wide crushed stone driveway. Proposed changes in ground cover in addition to the driveway will be limited to clearing and seeding of woods within the fenced area to accommodate the solar arrays. Shade trees between the 4.6± acre Limit Of Disturbance and the fence line will be cut but not grubbed and stumps and existing ground cover will remain. Refer to the enclosed plan set, Drawing C-1 for the Layout and Grading Plan.

The proposed conditions drainage area is identified as 201, corresponding to Drainage Area 101 as described above in Section 3.2. No grading is proposed; therefore, the pre-development time of concentration flow path will not change. Refer to the enclosed plan set Drawing WS-2 for the Post-Development Drainage Plan and Table 2 below for a summary of proposed drainage area characteristics.

Table 3: Proposed Drainage Area Characteristics

Drainage Area (acres)	Curve Number	Time of Conc. (minutes)
14.57	70	35.9

3.4 Results

The results of the stormwater model are summarized in the following table. The results of the stormwater analysis indicate that the proposed conditions peak runoff rates and volumes generated by the 1, 2, 10, 25- and 100-year storms and will not exceed existing conditions. The proposed array is small relative to the drainage area and does not result in a change to curve number, time of concentration, or existing flow patterns. The results are summarized in the tables below. Refer to Appendix B for a summary report of the HydroCAD calculations

Table 4 Design Point 1 Peak Runoff Rate, cfs

Design Storm	Existing Conditions	Proposed Conditions
1.2" Event	0.05	0.05
1 yr	4.03	4.03
2 yr	7.13	7.13
10 yr	16.47	16.47
25 yr	24.54	24.54
100 yr	42.06	42.06

4.0 STORMWATER MANAGEMENT STANDARDS

4.1 Minimum Standard 1: LID Site Planning and Design Strategies

LID site planning and design strategies are proposed to the maximum extent practicable in order to reduce the volume of stormwater runoff generated. These measures are described in the sections above and include minimization of site disturbance and minimization of ground cover changes to preserve the natural characteristics of the Site. Grading is not proposed, and clearing will be limited to the area occupied by the solar array. Groundcover outside of the array will be maintained. Shade trees will be cut, but not grubbed.

4.2 Minimum Standard 2: Groundwater Recharge

The only impervious areas proposed are a 527± square foot, concrete equipment pad. The required recharge volume for features is only 4 cubic feet, over a drainage area 14.57 acres in size. This number was calculated using the formula given in 250-RICR-150-10-8.8D:

$$Re_v = 1" * F * I / 12$$

Where:

F = 0.1 (Hydrologic Soils Group D)

I = 527 sf (Proposed Impervious Area)

Re_v = recharge volume (cubic feet)

The 766± square foot crushed stone driveway will be constructed of washed crushed stone and will be used infrequently; therefore, it is expected to remain pervious. The long-term Operations and Maintenance Plan requires regrading the driveway as necessary to maintain its pervious characteristics if the water quality volume (one inch of runoff) does not infiltrate.

4.3 Minimum Standard 3: Water Quality

The Water Quality Volume (WQv) is minimal, only 44 cubic feet. LID stormwater credits for a Qualified Pervious Area (QPA) cannot be applied per 250-RICR-150-10-8.18(B)(1) due to the soils classified as Hydrologic Soil Group D.

The minimum water quality volume of 0.2 inches is not warranted as the disturbed area will consist of low maintenance vegetation that requires little to no fertilization. This volume was calculated using the formula provided by 250-RICR-150-10-8.9(E):

$$WQ_v = 1" * I / 12$$

Where:

I = 527 sf (Proposed Impervious Area)

WQ_v = Water Quality Volume (cubic feet)

Runoff from the Site discharges into Ashaway River, which is identified as an impaired water body due to bacteria levels. According to the TMDL, potential bacterial loadings include onsite wastewater treatment systems (OWTS), agricultural practices, wildlife, and stormwater runoff from developed areas. Recommended steps to mitigate bacterial impairments within the Ashaway River watershed include:

1. Onsite wastewater management plans to establish enforceable mechanisms to ensure the existing OWTS are properly operated and maintained;
2. Conservation plans for farming activities within the watershed;
3. Wildlife waste management;
4. Stormwater management plans;
5. And woodland and wetland area land use protections.

No OWTS, agricultural activities, or unmitigated paved surfaces are proposed. The proposed use of the Site is consistent with the TMDL recommendation to preserve woodland and wetland land areas.

4.4 Minimum Standard 4: Conveyance and Natural Channel Protection

Not Applicable per section 3.3.4 of the RISDISM – Proposed impervious cover is less than 1 acre.

4.5 Minimum Standard 5: Overbank Flood Protection

Without attenuation, the post-development peak flow rates from the required storm events match those of the pre-development flow rates.

4.6 Minimum Standard 6: Redevelopment and Infill Projects

Not Applicable - The proposed project is not a Redevelopment and Infill Project.

4.7 Minimum Standard 7: Pollution Prevention

The proposed project work will include low impact use of the project Site. No paving activities, solid waste generation, significant snow removal, or hazardous waste use is proposed. Low maintenance grasses that require little to no fertilization will be used.

4.8 Minimum Standard 8: Land Uses with Higher Potential Pollutant Loads

Not Applicable -The proposed project is not a Land Use with Higher Potential Pollutant Loads.

4.9 Minimum Standard 9: Illicit Discharges

No illicit discharges have been identified or are proposed.

4.10 Minimum Standard 10: Construction Activity SESC and Pollution Prevention Control Measure

A Soil Erosion and Sediment Control (SESC) Plan has been prepared.

4.11 Minimum Standard 11: Stormwater Management System Operation and Maintenance

Not Applicable - Structural stormwater management practices are not warranted.

Appendix A

Wetland Delineation Data Forms

Wetland Edge Delineation Data Form (WETLAND)

Applicant: Wetland No. varies

Project: Sposato Solar Flag No. Sequence: B1-B55, A1- A2,

City / Town: Hopkinton Date: 5/30/2019 ASSFCL1-ASSFCL3

Vegetation: List the three dominant species in each vegetative strata along with their NWI status.

Tree	Indicator Status	Herbs	Indicator Status
1. *Acer rubrum*	*FAC*	1. *Osmundastrum cinnamomeum*	*FACW*
2. *Betula alleghaniensis*	*FAC*	2. Sphagnum moss	OBL
3.		3.	

Saplings/Shrubs		Woody Vines	
1. *Lindera benzoin*	*FACW*	1. *Toxicodendron radicans*	*FAC*
2. *Rhododendron viscosum*	*FACW*	2. *Smilax rotundifolia*	*FAC*
3. *Vaccinium corymbosum*	*FACW*	3.	

List other vegetative species noted which may have affected determination of the wetland edge:

Soil: SCS Soil Survey Mapping Unit: Sb
On Hydric Soils List ? (Y / N) Y

Soil Profile: (Note wetland flag no. nearest soil test pit): B52

Horizon	Depth	Matrix Color	Mottling Description	Depth to Saturation	Depth to Free Water
	0-3''	10 YR 2/2			
	3-15"	10YR2/1			
	15-18"	10YR4/4	10YR 3/3 40% 10YR 2/1 10%		

Other indicators of wetland hydrology (eg. water marks, drainage patterns, root rhizospheres, etc.):

Landscape Position:
Altered / atypical situation? (describe)

Comments:

Wetland Edge Delineation Data Form (UPLAND)

Applicant: Wetland No. varies

Project: Cherenzia Solar Flag No. Sequence: B1-B55, A1- A2,

City / Town: Hopkinton Date: 5/30/2019 ASSFCL1-ASSFCL3

Vegetation: List the three dominant species in each vegetative strata along with their NWI status.

Tree	Indicator Status	Herbs	Indicator Status
1. *Fagus grandifolia*	*FACU*	1. *Dennstaedtia punctilobula*	*UPL*
2. *Betula alleghaniensis*	*FAC*	2. *Maianthemum canadense*	*FACU*
3. *Quercus rubra*	*FACU*	3. *Sassafras albidum*	*FACU*

Saplings/Shrubs		Woody Vines	
1. *Castanea dentata*	*NI*	1. *Smilax rotundifolia*	*FAC*
2.		2.	
3.		3.	

List other vegetative species noted which may have affected determination of the wetland edge:

Soil: SCS Soil Survey Mapping Unit: HkA, BmB, HkC
On Hydric Soils List ? (Y / N) N

Soil Profile: (Note wetland flag no. nearest soil test pit): B52

Horizon	Depth	Matrix Color	Mottling Description	Depth to Saturation	Depth to Free Water
	0-2''	10YR 3/2			
	2-14"	10YR 3/4			
	14-18"	10YR 4/4			

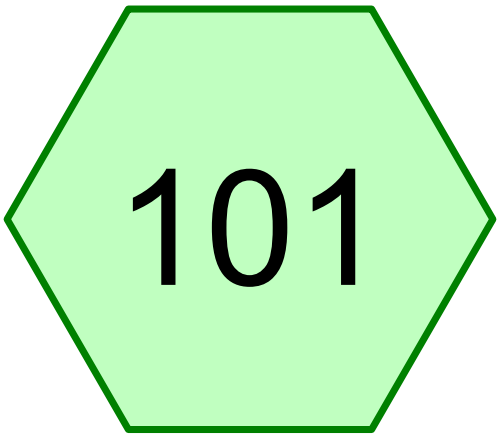
Other indicators of wetland hydrology (eg. water marks, drainage patterns, root rhizospheres, etc.):

Landscape Position:
Altered / atypical situation? (describe)

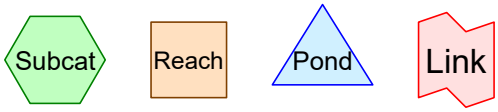
Comments:

Appendix B

HydroCAD Summary Report



Subcat 101



Routing Diagram for C641-000 Maxson Hill Existing
Prepared by ESS Group, Inc., Printed 5/11/2020
HydroCAD® 10.00-26 s/n 01446 © 2020 HydroCAD Software Solutions LLC

Area Listing (all nodes)

Area (acres)	CN	Description (subcatchment-numbers)
0.237	61	>75% Grass cover, Good, HSG B (101)
0.588	80	>75% Grass cover, Good, HSG D (101)
0.064	96	Gravel surface, HSG B (101)
0.593	96	Gravel surface, HSG D (101)
0.082	98	Paved parking, HSG B (101)
0.342	98	Paved parking, HSG D (101)
5.729	55	Woods, Good, HSG B (101)
6.933	77	Woods, Good, HSG D (101)
14.569	**70**	**TOTAL AREA**

Soil Listing (all nodes)

Area (acres)	Soil Group	Subcatchment Numbers
0.000	HSG A	
6.112	HSG B	101
0.000	HSG C	
8.456	HSG D	101
0.000	Other	
14.569		**TOTAL AREA**

Ground Covers (all nodes)

HSG-A (acres)	HSG-B (acres)	HSG-C (acres)	HSG-D (acres)	Other (acres)	Total (acres)	Ground Cover	Subcatchment Numbers
0.000	0.237	0.000	0.588	0.000	0.824	>75% Grass cover, Good	101
0.000	0.064	0.000	0.593	0.000	0.658	Gravel surface	101
0.000	0.082	0.000	0.342	0.000	0.424	Paved parking	101
0.000	5.729	0.000	6.933	0.000	12.662	Woods, Good	101
0.000	**6.112**	**0.000**	**8.456**	**0.000**	**14.569**	**TOTAL AREA**	

Time span=0.00-36.00 hrs, dt=0.01 hrs, 3601 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 101: Subcat 101 Runoff Area=14.569 ac 2.91% Impervious Runoff Depth=0.55"
Flow Length=1,986' Tc=35.9 min CN=70 Runoff=4.03 cfs 0.667 af

Total Runoff Area = 14.569 ac Runoff Volume = 0.667 af Average Runoff Depth = 0.55"
97.09% Pervious = 14.145 ac 2.91% Impervious = 0.424 ac

Summary for Subcatchment 101: Subcat 101

Runoff = 4.03 cfs @ 12.60 hrs, Volume= 0.667 af, Depth= 0.55"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs
Type III 24-hr 1-yr Rainfall=2.69"

Area (ac)	CN	Description
0.237	61	>75% Grass cover, Good, HSG B
0.588	80	>75% Grass cover, Good, HSG D
0.064	96	Gravel surface, HSG B
0.593	96	Gravel surface, HSG D
0.082	98	Paved parking, HSG B
0.342	98	Paved parking, HSG D
5.729	55	Woods, Good, HSG B
6.933	77	Woods, Good, HSG D
14.569	70	Weighted Average
14.145		97.09% Pervious Area
0.424		2.91% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
28.5	100	0.0095	0.06		**Sheet Flow, SF-101** Woods: Light underbrush n= 0.400 P2= 3.30"
6.1	1,289	0.0480	3.53		**Shallow Concentrated Flow, SCF-101** Unpaved Kv= 16.1 fps
1.3	597	0.0640	7.49	5.00	**Parabolic Channel,** W=2.00' D=0.50' Area=0.7 sf Perim=2.3' n= 0.022 Earth, clean & straight
35.9	1,986	Total			

Summary for Subcatchment 101: Subcat 101

Runoff = 0.05 cfs @ 15.36 hrs, Volume= 0.031 af, Depth= 0.03"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs
Type III 24-hr 1.2 Town Rainfall=1.20"

Area (ac)	CN	Description
0.237	61	>75% Grass cover, Good, HSG B
0.588	80	>75% Grass cover, Good, HSG D
0.064	96	Gravel surface, HSG B
0.593	96	Gravel surface, HSG D
0.082	98	Paved parking, HSG B
0.342	98	Paved parking, HSG D
5.729	55	Woods, Good, HSG B
6.933	77	Woods, Good, HSG D
14.569	70	Weighted Average
14.145		97.09% Pervious Area
0.424		2.91% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
28.5	100	0.0095	0.06		**Sheet Flow, SF-101** Woods: Light underbrush n= 0.400 P2= 3.30"
6.1	1,289	0.0480	3.53		**Shallow Concentrated Flow, SCF-101** Unpaved Kv= 16.1 fps
1.3	597	0.0640	7.49	5.00	**Parabolic Channel,** W=2.00' D=0.50' Area=0.7 sf Perim=2.3' n= 0.022 Earth, clean & straight
35.9	1,986	Total			

Summary for Subcatchment 101: Subcat 101

Runoff = 7.13 cfs @ 12.56 hrs, Volume= 1.077 af, Depth= 0.89"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs
Type III 24-hr 2-yr Rainfall=3.30"

Area (ac)	CN	Description
0.237	61	>75% Grass cover, Good, HSG B
0.588	80	>75% Grass cover, Good, HSG D
0.064	96	Gravel surface, HSG B
0.593	96	Gravel surface, HSG D
0.082	98	Paved parking, HSG B
0.342	98	Paved parking, HSG D
5.729	55	Woods, Good, HSG B
6.933	77	Woods, Good, HSG D
14.569	70	Weighted Average
14.145		97.09% Pervious Area
0.424		2.91% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
28.5	100	0.0095	0.06		**Sheet Flow, SF-101** Woods: Light underbrush n= 0.400 P2= 3.30"
6.1	1,289	0.0480	3.53		**Shallow Concentrated Flow, SCF-101** Unpaved Kv= 16.1 fps
1.3	597	0.0640	7.49	5.00	**Parabolic Channel,** W=2.00' D=0.50' Area=0.7 sf Perim=2.3' n= 0.022 Earth, clean & straight
35.9	1,986	Total			

Summary for Subcatchment 101: Subcat 101

Runoff = 16.47 cfs @ 12.52 hrs, Volume= 2.311 af, Depth= 1.90"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs
Type III 24-hr 10-yr Rainfall=4.82"

Area (ac)	CN	Description
0.237	61	>75% Grass cover, Good, HSG B
0.588	80	>75% Grass cover, Good, HSG D
0.064	96	Gravel surface, HSG B
0.593	96	Gravel surface, HSG D
0.082	98	Paved parking, HSG B
0.342	98	Paved parking, HSG D
5.729	55	Woods, Good, HSG B
6.933	77	Woods, Good, HSG D
14.569	70	Weighted Average
14.145		97.09% Pervious Area
0.424		2.91% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
28.5	100	0.0095	0.06		**Sheet Flow, SF-101** Woods: Light underbrush n= 0.400 P2= 3.30"
6.1	1,289	0.0480	3.53		**Shallow Concentrated Flow, SCF-101** Unpaved Kv= 16.1 fps
1.3	597	0.0640	7.49	5.00	**Parabolic Channel,** W=2.00' D=0.50' Area=0.7 sf Perim=2.3' n= 0.022 Earth, clean & straight
35.9	1,986	Total			

Summary for Subcatchment 101: Subcat 101

Runoff = 24.54 cfs @ 12.49 hrs, Volume= 3.386 af, Depth= 2.79"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs
Type III 24-hr 25-yr Rainfall=5.98"

Area (ac)	CN	Description
0.237	61	>75% Grass cover, Good, HSG B
0.588	80	>75% Grass cover, Good, HSG D
0.064	96	Gravel surface, HSG B
0.593	96	Gravel surface, HSG D
0.082	98	Paved parking, HSG B
0.342	98	Paved parking, HSG D
5.729	55	Woods, Good, HSG B
6.933	77	Woods, Good, HSG D
14.569	70	Weighted Average
14.145		97.09% Pervious Area
0.424		2.91% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
28.5	100	0.0095	0.06		**Sheet Flow, SF-101** Woods: Light underbrush n= 0.400 P2= 3.30"
6.1	1,289	0.0480	3.53		**Shallow Concentrated Flow, SCF-101** Unpaved Kv= 16.1 fps
1.3	597	0.0640	7.49	5.00	**Parabolic Channel,** W=2.00' D=0.50' Area=0.7 sf Perim=2.3' n= 0.022 Earth, clean & straight
35.9	1,986	Total			

Summary for Subcatchment 101: Subcat 101

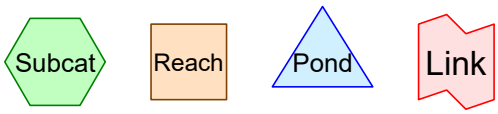
Runoff = 42.06 cfs @ 12.49 hrs, Volume= 5.745 af, Depth= 4.73"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs
Type III 24-hr 100-yr Rainfall=8.31"

Area (ac)	CN	Description
0.237	61	>75% Grass cover, Good, HSG B
0.588	80	>75% Grass cover, Good, HSG D
0.064	96	Gravel surface, HSG B
0.593	96	Gravel surface, HSG D
0.082	98	Paved parking, HSG B
0.342	98	Paved parking, HSG D
5.729	55	Woods, Good, HSG B
6.933	77	Woods, Good, HSG D
14.569	70	Weighted Average
14.145		97.09% Pervious Area
0.424		2.91% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
28.5	100	0.0095	0.06		**Sheet Flow, SF-101** Woods: Light underbrush n= 0.400 P2= 3.30"
6.1	1,289	0.0480	3.53		**Shallow Concentrated Flow, SCF-101** Unpaved Kv= 16.1 fps
1.3	597	0.0640	7.49	5.00	**Parabolic Channel,** W=2.00' D=0.50' Area=0.7 sf Perim=2.3' n= 0.022 Earth, clean & straight
35.9	1,986	Total			

Subcat 201



Routing Diagram for C641-000 Maxson Hill Proposed
Prepared by ESS Group, Inc., Printed 5/11/2020
HydroCAD® 10.00-26 s/n 01446 © 2020 HydroCAD Software Solutions LLC

Area Listing (all nodes)

Area (acres)	CN	Description (subcatchment-numbers)
0.236	61	>75% Grass cover, Good, HSG B (201)
2.364	80	>75% Grass cover, Good, HSG D (201)
0.064	96	Gravel surface, HSG B (201)
0.611	96	Gravel surface, HSG D (201)
0.082	98	Paved parking, HSG B (201)
0.366	98	Paved parking, HSG D (201)
5.730	55	Woods, Good, HSG B (201)
5.115	77	Woods, Good, HSG D (201)
14.569	**70**	**TOTAL AREA**

Soil Listing (all nodes)

Area (acres)	Soil Group	Subcatchment Numbers
0.000	HSG A	
6.112	HSG B	201
0.000	HSG C	
8.456	HSG D	201
0.000	Other	
14.569		**TOTAL AREA**

Ground Covers (all nodes)

HSG-A (acres)	HSG-B (acres)	HSG-C (acres)	HSG-D (acres)	Other (acres)	Total (acres)	Ground Cover	Subcatchment Numbers
0.000	0.236	0.000	2.364	0.000	2.600	>75% Grass cover, Good	201
0.000	0.064	0.000	0.611	0.000	0.675	Gravel surface	201
0.000	0.082	0.000	0.366	0.000	0.448	Paved parking	201
0.000	5.730	0.000	5.115	0.000	10.845	Woods, Good	201
0.000	**6.112**	**0.000**	**8.456**	**0.000**	**14.569**	**TOTAL AREA**	

Time span=0.00-36.00 hrs, dt=0.01 hrs, 3601 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 201: Subcat 201 Runoff Area=14.569 ac 3.07% Impervious Runoff Depth=0.55"
Flow Length=1,986' Tc=35.9 min CN=70 Runoff=4.03 cfs 0.667 af

Total Runoff Area = 14.569 ac Runoff Volume = 0.667 af Average Runoff Depth = 0.55"
96.93% Pervious = 14.121 ac 3.07% Impervious = 0.448 ac

Summary for Subcatchment 201: Subcat 201

Runoff = 4.03 cfs @ 12.60 hrs, Volume= 0.667 af, Depth= 0.55"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs
Type III 24-hr 1-yr Rainfall=2.69"

Area (ac)	CN	Description
0.236	61	>75% Grass cover, Good, HSG B
2.364	80	>75% Grass cover, Good, HSG D
0.064	96	Gravel surface, HSG B
0.611	96	Gravel surface, HSG D
0.082	98	Paved parking, HSG B
0.366	98	Paved parking, HSG D
5.730	55	Woods, Good, HSG B
5.115	77	Woods, Good, HSG D
14.569	70	Weighted Average
14.121		96.93% Pervious Area
0.448		3.07% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
28.5	100	0.0095	0.06		**Sheet Flow, SF-201** Woods: Light underbrush n= 0.400 P2= 3.30"
6.1	1,289	0.0480	3.53		**Shallow Concentrated Flow, SF-201** Unpaved Kv= 16.1 fps
1.3	597	0.0640	7.49	5.00	**Parabolic Channel, CF-201** W=2.00' D=0.50' Area=0.7 sf Perim=2.3' n= 0.022 Earth, clean & straight
35.9	1,986	Total			

Summary for Subcatchment 201: Subcat 201

Runoff = 0.05 cfs @ 15.36 hrs, Volume= 0.031 af, Depth= 0.03"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs
Type III 24-hr 1.2 Town Rainfall=1.20"

Area (ac)	CN	Description
0.236	61	>75% Grass cover, Good, HSG B
2.364	80	>75% Grass cover, Good, HSG D
0.064	96	Gravel surface, HSG B
0.611	96	Gravel surface, HSG D
0.082	98	Paved parking, HSG B
0.366	98	Paved parking, HSG D
5.730	55	Woods, Good, HSG B
5.115	77	Woods, Good, HSG D
14.569	70	Weighted Average
14.121		96.93% Pervious Area
0.448		3.07% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
28.5	100	0.0095	0.06		**Sheet Flow, SF-201** Woods: Light underbrush n= 0.400 P2= 3.30"
6.1	1,289	0.0480	3.53		**Shallow Concentrated Flow, SF-201** Unpaved Kv= 16.1 fps
1.3	597	0.0640	7.49	5.00	**Parabolic Channel, CF-201** W=2.00' D=0.50' Area=0.7 sf Perim=2.3' n= 0.022 Earth, clean & straight
35.9	1,986	Total			

Summary for Subcatchment 201: Subcat 201

Runoff = 7.13 cfs @ 12.56 hrs, Volume= 1.077 af, Depth= 0.89"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs
Type III 24-hr 2-yr Rainfall=3.30"

Area (ac)	CN	Description
0.236	61	>75% Grass cover, Good, HSG B
2.364	80	>75% Grass cover, Good, HSG D
0.064	96	Gravel surface, HSG B
0.611	96	Gravel surface, HSG D
0.082	98	Paved parking, HSG B
0.366	98	Paved parking, HSG D
5.730	55	Woods, Good, HSG B
5.115	77	Woods, Good, HSG D
14.569	70	Weighted Average
14.121		96.93% Pervious Area
0.448		3.07% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
28.5	100	0.0095	0.06		**Sheet Flow, SF-201** Woods: Light underbrush n= 0.400 P2= 3.30"
6.1	1,289	0.0480	3.53		**Shallow Concentrated Flow, SF-201** Unpaved Kv= 16.1 fps
1.3	597	0.0640	7.49	5.00	**Parabolic Channel, CF-201** W=2.00' D=0.50' Area=0.7 sf Perim=2.3' n= 0.022 Earth, clean & straight
35.9	1,986	Total			

Summary for Subcatchment 201: Subcat 201

Runoff = 16.47 cfs @ 12.52 hrs, Volume= 2.311 af, Depth= 1.90"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs
Type III 24-hr 10-yr Rainfall=4.82"

Area (ac)	CN	Description
0.236	61	>75% Grass cover, Good, HSG B
2.364	80	>75% Grass cover, Good, HSG D
0.064	96	Gravel surface, HSG B
0.611	96	Gravel surface, HSG D
0.082	98	Paved parking, HSG B
0.366	98	Paved parking, HSG D
5.730	55	Woods, Good, HSG B
5.115	77	Woods, Good, HSG D
14.569	70	Weighted Average
14.121		96.93% Pervious Area
0.448		3.07% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
28.5	100	0.0095	0.06		**Sheet Flow, SF-201** Woods: Light underbrush n= 0.400 P2= 3.30"
6.1	1,289	0.0480	3.53		**Shallow Concentrated Flow, SF-201** Unpaved Kv= 16.1 fps
1.3	597	0.0640	7.49	5.00	**Parabolic Channel, CF-201** W=2.00' D=0.50' Area=0.7 sf Perim=2.3' n= 0.022 Earth, clean & straight
35.9	1,986	Total			

Summary for Subcatchment 201: Subcat 201

Runoff = 24.54 cfs @ 12.49 hrs, Volume= 3.386 af, Depth= 2.79"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs
Type III 24-hr 25-yr Rainfall=5.98"

Area (ac)	CN	Description
0.236	61	>75% Grass cover, Good, HSG B
2.364	80	>75% Grass cover, Good, HSG D
0.064	96	Gravel surface, HSG B
0.611	96	Gravel surface, HSG D
0.082	98	Paved parking, HSG B
0.366	98	Paved parking, HSG D
5.730	55	Woods, Good, HSG B
5.115	77	Woods, Good, HSG D
14.569	70	Weighted Average
14.121		96.93% Pervious Area
0.448		3.07% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
28.5	100	0.0095	0.06		**Sheet Flow, SF-201** Woods: Light underbrush n= 0.400 P2= 3.30"
6.1	1,289	0.0480	3.53		**Shallow Concentrated Flow, SF-201** Unpaved Kv= 16.1 fps
1.3	597	0.0640	7.49	5.00	**Parabolic Channel, CF-201** W=2.00' D=0.50' Area=0.7 sf Perim=2.3' n= 0.022 Earth, clean & straight
35.9	1,986	Total			

Summary for Subcatchment 201: Subcat 201

Runoff = 42.06 cfs @ 12.49 hrs, Volume= 5.745 af, Depth= 4.73"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs
Type III 24-hr 100-yr Rainfall=8.31"

Area (ac)	CN	Description
0.236	61	>75% Grass cover, Good, HSG B
2.364	80	>75% Grass cover, Good, HSG D
0.064	96	Gravel surface, HSG B
0.611	96	Gravel surface, HSG D
0.082	98	Paved parking, HSG B
0.366	98	Paved parking, HSG D
5.730	55	Woods, Good, HSG B
5.115	77	Woods, Good, HSG D
14.569	70	Weighted Average
14.121		96.93% Pervious Area
0.448		3.07% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
28.5	100	0.0095	0.06		**Sheet Flow, SF-201** Woods: Light underbrush n= 0.400 P2= 3.30"
6.1	1,289	0.0480	3.53		**Shallow Concentrated Flow, SF-201** Unpaved Kv= 16.1 fps
1.3	597	0.0640	7.49	5.00	**Parabolic Channel, CF-201** W=2.00' D=0.50' Area=0.7 sf Perim=2.3' n= 0.022 Earth, clean & straight
35.9	1,986	Total			

Appendix C

NRCS Soils Map

Hydrologic Soil Group—State of Rhode Island: Bristol, Kent, Newport, Providence, and Washington Counties
(Maxson Hill Solar)

Map Scale: 1:5,240 if printed on A portrait (8.5" x 11") sheet.

N

Meters: 0 50 100 200 300

Feet: 0 250 500 1000 1500

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

MAP LEGEND

Area of Interest (AOI)

Area of Interest (AOI)

Soils

Soil Rating Polygons

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

Soil Rating Lines

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

Soil Rating Points

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

Water Features

Streams and Canals

Transportation

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

Background

Aerial Photography

MAP INFORMATION

The soil surveys that comprise your AOI were mapped at 1:12,000.

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

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

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

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

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

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

Soil Survey Area: State of Rhode Island: Bristol, Kent, Newport, Providence, and Washington Counties
Survey Area Data: Version 19, 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: Mar 30, 2011—May 1, 2011

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

Hydrologic Soil Group

Map unit symbol	Map unit name	Rating	Acres in AOI	Percent of AOI
BmB	Bridgehampton silt loam, till substratum, 3 to 8 percent slopes	B	17.6	12.9%
CdB	Canton and Charlton fine sandy loams, 3 to 8 percent slopes	B	16.7	12.2%
CeC	Canton and Charlton fine sandy loams, 3 to 15 percent slopes, very rocky	B	24.5	17.9%
ChB	Canton and Charlton fine sandy loams, 0 to 8 percent slopes, very stony	B	26.2	19.2%
HkA	Hinckley loamy sand, 0 to 3 percent slopes	A	6.5	4.7%
HkC	Hinckley loamy sand, 8 to 15 percent slopes	A	10.2	7.4%
Rf	Ridgebury, Leicester, and Whitman soils, 0 to 8 percent slopes, extremely stony	D	3.5	2.5%
Sb	Scarboro mucky fine sandy loam, 0 to 3 percent slopes	A/D	2.7	2.0%
SuB	Sutton fine sandy loam, 0 to 8 percent slopes, very stony	B/D	0.2	0.2%
WoB	Woodbridge fine sandy loam, 0 to 8 percent slopes, very stony	C/D	28.7	21.0%
Totals for Area of Interest			**136.8**	**100.0%**

Description

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

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

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

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

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

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

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

Rating Options

Aggregation Method: Dominant Condition

Component Percent Cutoff: None Specified

Tie-break Rule: Higher

Appendix D

Drainage Area Maps

DRAINAGE AREA 101

AREA (AC)	14.56
TIME OF CONCENTRATION (MIN)	35.9
CURVE NUMBER (CN)	70
1.2" FLOW (CFS)	0.05
1-YEAR FLOW (CFS)	4.03
2-YEAR FLOW (CFS)	7.13
10-YEAR FLOW (CFS)	16.47
25-YEAR FLOW (CFS)	24.54
100-YEAR FLOW (CFS)	42.06

NOTE:
1. LIDAR: RIGIS, 2011
2. SURVEY: "RONNIE J. SPOSATO & BONNIE KAY", DESIGN PROFESSIONALS INC, DATED 10/07/2019, LAST REVISED 1/15/2020.
3. SOILS: NRCS, 2020.

ess group
environmental consulting & engineering services
404 Wyman Street, Suite 375
Waltham, Massachusetts 02451
p 781.419.7696
www.essgroup.com

CENTRICA BUSINESS SOLUTIONS
7484 CANDLEWOOD ROAD
HANOVER, MARYLAND 21076

MAXSON HILL SOLAR
AP 4 LOT 38
40 MAXSON HILL ROAD
HOPKINTON, RI 02804

Not Valid Without Signature

0 80' 160'
SCALE: 1" = 80'

No.	REVISION	DATE	DRAWN	DESIGN	CHK

DRAWN BY: AEH DESIGNED BY: JMG CHECKED BY:

RIPDES CGP NOI
PRE-DEVELOPMENT DRAINAGE AREA

FOR PERMITTING ONLY

DRAWING NO:
WS-1

PROJECT NO: C641-000
DATE OF ISSUE: MAY 11, 2020
SHEET NO: 1 OF 2

DATE: May 11, 2020 – 1:13PM
FILENAME: J:\C641-000 Centrica – Sposato Solar\04 GRAPHICS\CAD\Drawings\RIDEM PD\C641-000 Maxson Hill_RIDEM PD_PRE-DEVELOPMENT DRAINAGE AREA.dwg

Copyright © ESS Group, Inc. 2020

DRAINAGE AREA 201

AREA (AC)	14.56
TIME OF CONCENTRATION (MIN)	35.9
CURVE NUMBER (CN)	70
1.2" FLOW (CFS)	0.05
1-YEAR FLOW (CFS)	4.03
2-YEAR FLOW (CFS)	7.13
10-YEAR FLOW (CFS)	16.47
25-YEAR FLOW (CFS)	24.54
100-YEAR FLOW (CFS)	42.06

ess group
environmental consulting & engineering services
404 Wyman Street, Suite 375
Waltham, Massachusetts 02451
p 781.419.7696
www.essgroup.com

CENTRICA BUSINESS SOLUTIONS
7484 CANDLEWOOD ROAD
HANOVER, MARYLAND 21076

MAXSON HILL SOLAR
AP 4 LOT 38
40 MAXSON HILL ROAD
HOPKINTON, RI 02804

Not Valid Without Signature

0 80' 160'
SCALE: 1" = 80'

No.	REVISION	DATE	DRAWN	DESIGN	CHK

DRAWN BY: AEH DESIGNED BY: JMG CHECKED BY:

RIPDES CGP NOI
POST DEVELOPMENT DRAINAGE AREA

FOR PERMITTING ONLY

DRAWING NO:
WS-2

PROJECT NO: C641-000
DATE OF ISSUE: May 11, 2020
SHEET NO: 2 OF 2

DATE: May 11, 2020 – 1:13PM
FILENAME: J:\C641-000 Centrica – Sposato Solar\04 GRAPHICS\CAD\Drawings\RIDEM PD\C641-000 Maxson Hill_RIDEM PD_POST-DEVELOPMENT DRAINAGE AREA.dwg

Copyright © ESS Group, Inc. 2020