Stormwater Analysis and Design Report
Pomham Solar Access Road

AP 16, Lots 18 & 19
Off Iron Mine Hill Road,
North Smithfield, RI 02896

PREPARED FOR:
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ESS Project No. P322-001

Jason Gold 2021.09.29 14:52:01 -04'00'

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EXECUTIVE SUMMARY

The Site is located on two parcels in North Smithfield, Rhode Island on the southern side of Iron Mine Hill Road. The first 7.20± acre parcel is accessed by an existing gravel driveway off of Iron Mine Hill Road and is identified as Assessor's Plat 16, Lot 18. The second 22.24± acre parcel is identified as Assessor's Plat 16, Lot 19. Lot 18 contains a single family residence and Lot 19 is undeveloped and wooded. While wetlands have been delineated in the southeastern corner of Lot 19, the proposed construction does not drain to it. An off-site wetland may be located southeast of the Site according to the RIDEM Environmental Resource Map. However, this potential wetland is located over 600 feet from the proposed project.

The Applicant proposes to construct a 20-foot wide access road off of Iron Mine Hill Road to provide access to Lot 19. The total Limit of Disturbance, including proposed stockpile area, is approximately 1.03± acres. Since the proposed stockpile location consists of existing lawn that will not be disturbed, the total land disturbance is 0.98± acres. While the proposed land disturbance is less than 1 acre, the project is part of a "larger common plan of development" that will disturb more than 1 acre. The road will eventually be used to access a solar array to be designed and permitted in a later phase. National Grid has requested construction of the road prior to the array to facilitate the interconnection design.

The results of the stormwater analysis indicate that the post-development conditions peak runoff rates generated by the 10 and 100-year storms will not significantly exceed pre-development conditions. A grass channel and dry swale are proposed to convey stormwater along the side of the majority of the new road and to provide water quality treatment and groundwater recharge. The 11 Minimum Stormwater Management Standards required by the Rhode Island Stormwater Management, Design and Installation Rules have been met.

1.0 PROJECT SCOPE AND DESCRIPTION

The goal of this analysis is to evaluate pre- and post-development stormwater conditions and develop a site design consistent with the Rhode Island Stormwater Management, Design and Installation Rules (250-RICR-150-10-8) and the requirements of the Rhode Island Pollutant Discharge Elimination System (RIPDES) General Permit for Stormwater Discharges associated with construction activity.

2.0 EXISTING CONDITIONS

2.1 Existing Site Use

The Site is located on two parcels in North Smithfield, Rhode Island on the southern side of Iron Mine Hill Road. The first 7.20± acre parcel is accessed by an existing gravel driveway off of Iron Mine Hill Road and is identified as Assessor's Plat 16, Lot 18. The second 22.24± acre parcel is identified as Assessor's Plat 16, Lot 19. Lot 18 contains a single family residence and Lot 19 is undeveloped and wooded.

2.2 Hydrology

The Site is located within the Crookfall Brook watershed (Waterbody ID RI0001004R-01) and drains to Woonsocket Reservoir Number Three (RI0001004L-01). This waterbody is listed as a coldwater fishery in 250-RICR-150-05-1 (Water Quality Regulations), section 1.25 E.4. Crookfall Brook has an approved TMDL according to the 2016 Impaired Waters Report, dated March 2018. The listed cause of impairment is enterococcus.

2.3 Wetland Delineation

While wetlands have been delineated in the southeastern corner of Lot 19, the proposed construction does not drain to it. An off-site wetland may be located southeast of the Site according to the RIDEM Environmental Resource Map. However, this potential wetland is located over 600 feet from the proposed project.

Wetlands were delineated by Tetra Tech in November 2018 and ESS in September 2019. The field survey resulted in the identification and delineation of two wetland features, in the south-western portion of Lot 19.

Wetland A (by Tetra Tech) is delineated by the DS-flag series (DS-1 – DS-18) and is located in the south-western portion of Lot 19. This wetland would be classified as a forested wetland under the Freshwater Wetlands Act and would meet the classification as a seasonally flooded/saturated palustrine broad-leaved deciduous forest (PFO1) per National Wetland Inventory.

Wetland B (by ESS) is delineated by the W-flag series (W1-W18) and is located in the south-western portion of Lot 19. This wetland would be classified as a forested wetland under the Freshwater Wetlands Act and would meet the classification as a seasonally flooded/saturated palustrine broad-leaved deciduous forest (PFO1) per National Wetland Inventory.

2.4 Test Boring

Test borings were completed in November 2020, as documented in a "Geotechnical Engineering Report" prepared by Terracon, dated January 21, 2021. Boring IB-4 is located in the general vicinity of the proposed Dry Swale. The boring log is included in Appendix D and summarized in the following table.

Table 1: Boring Observations

ID	SHGW Depth	Restrictive Layer Depth (Probable Bedrock)
IB-4	*	6’

* Groundwater was not observed

Loose sandy silt (ML) was observed to a depth of 2 ft, underlain by very dense silty gravel with sand (GM) to a depth of 6 ft. Auger refusal was encountered at 6 ft. Based on the grain size distribution provided in the geotechnical report, the silty gravel with sand is classified as loamy sand using the NRCS classification system. The corresponding Rawls infiltration rate is 2.41 in/hr per Stormwater Rule 8.21 E.4.a.

3.0 PROPOSED DEVELOPMENT

The Applicant proposes to construct a 20-foot wide access road off of Iron Mine Hill Road to provide access to Lot 19. A portion of an existing 10± ft wide gravel driveway that services the residence on Lot 18 will be improved and widened to 20 feet. The total Limit of Disturbance, including proposed stockpile area, is approximately 1.03± acres. Since the proposed stockpile location consists of existing lawn, the total land disturbance is 0.98± acres. While the proposed land disturbance is less than 1 acre, the project is part of a “larger common plan of development” that will disturb more than 1 acre. The road will eventually be used to access a solar array to be designed and permitted in a later phase. National Grid has requested construction of the road prior to the array to facilitate the interconnection design.

4.0 HYDROLOGIC AND HYDRAULIC ANALYSIS

4.1 Methodology

HydroCAD® software (developed by Applied Microcomputer Systems) was used to create a hydraulic and hydrologic model utilizing the methods prescribed in Soil Conservation Service (SCS) Technical Release No. 20 and SCS Technical Release No. 55. 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 Rhode Island Stormwater Management, Design and Installation Rules (250-RICR-150-10-8.6E) for Providence County. The rainfall frequency values used in this drainage analysis are listed in the table below.

Table 2: Rainfall Frequency Values

Frequency	10-Yr	100-Yr
Inches of Rainfall	4.90	8.70

Hydrographs were generated based on drainage area, 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 10 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 by field survey and aerial photography. Refer to the HydroCAD calculations included in Appendix A.

4.2 Design Points

5 design points were evaluated based on existing drainage patterns and site characteristics. Each design point is summarized below and illustrated on the drainage area maps included in Appendix E.

- Design Point 1 (DP-1) represents the edge of pavement on Iron Mine Hill Road in the northern portion of Lot 18.
- Design Point 2 (DP-2) represents abutting property AP 16, Lot 37 to the east of Lot 18.
- Design Point 3 (DP-3) represents abutting property AP 16, Lot 93 to the northwest of Lot 18.
- Design Point 4 (DP-4) represents abutting property AP 16, Lot 58 to the east of Lots 18 & 19.
- Design Point 4A (DP-4A) represents abutting property AP 16, Lot 36 to the east of Lots 18.
    - The area draining to Design Point 4A ultimately discharges to Design Point 4. Design Point 4A was analyzed separately to evaluate runoff to AP 16, Lot 36.

4.3 Pre-Development Drainage Areas

Design Points 1 through 4A receive stormwater runoff from drainage areas 101 through 104A, respectively. The drainage areas are summarized below and illustrated on drawing DA-1, included in Appendix E. Table 3 lists key characteristics of the hydrologic model for each drainage area.

Drainage Area 101 is primarily grass, with a small portion of woods and gravel surface.

Drainage Area 102 is primarily wooded with a small portion of gravel surface and grass.

Drainage Area 103 contains grass, with a small portion of woods and gravel surface.

Drainage Area 104 is mostly wooded, and contains some grass, gravel and roof surfaces.

Drainage Area 104A is mostly wooded, and contains some grass and roof surfaces.

All drainage areas contain Charlton fine sandy loams. These soils are classified as Hydrologic Soil Group (HSG) B soils.

Table 3: Pre-Development Drainage Area Characteristics

Drainage Area ID	Design Point	Area (acres)	Curve Number	Time of Conc. (minutes)
101	1	0.08	66	6
102	2	0.12	62	10.7
103	3	0.31	63	12.7
104	4	9.39	56	21.1
104A	4A	0.72	57	9.9

4.4 Post-Development Drainage Areas

The post-development conditions stormwater runoff has been modeled as five drainage areas that flow to the five design points described above. The drainage areas are summarized below and illustrated on drawing DA-2, included in Appendix E. Table 4 lists key characteristics of the hydrologic model for each drainage area.

Drainage Area 201 is slightly larger than 101 due to the grading design of the access road and drains unattenuated to Design Point 1.

Drainage Area 202 is slightly smaller than 102 and drains unattenuated to Design Point 2.

Drainage Area 203 is nearly identical to 103 due to the grading design of the access road and drains unattenuated to Design Point 3.

Drainage Area 204 is nearly identical to 104 and consists of areas of tree clearing, existing woods, most of proposed access road, the grass channel and dry swale..

Drainage Area 204A is slightly smaller 104A due to the design of access road and drains unattenuated to Design Point 4A.

Table 4: Post-Development Drainage Area Characteristics

Drainage Area ID	Design Point	Area (acres)	Curve Number	Time of Conc. (minutes)
201	1	0.09	72	6
202	2	0.09	66	9.8
203	3	0.33	65	12.7
204	4	9.39	57	22.9
204A	4A	0.56	59	9.9

4.5 Proposed Stormwater Design

A 1.5 foot deep grass channel draining to a dry swale is proposed along the side of the proposed road. They have been designed with a 4 foot bottom width, 3:1 side slopes, stone check dams, and a turf reinforcement mat. A 28 inch thick layer of bioretention soil installed beneath the surface of the dry swale will provide water quality treatment. The dry swale has been designed as an exfilter to provide groundwater recharge.

The typical bioretention soil depth has been reduced from 30 inches to 28 inches in accordance with Rule 8.25.D.5 to provide 2 feet for vertical separation to bedrock. Accordingly, the bioretention soil will include 20% (by volume) of well-aged (6-12 months), well-aerated, leaf compost (or approved equivalent).

A portion of the new gravel area associated with the widened existing driveway drains to wooded areas located outside of the limit of disturbance. These areas meet the criteria for Qualifying Pervious Area as described in 250-RICR-150-10-8.18.

4.6 Results

The results of the stormwater analysis indicate that the post-development conditions peak runoff rates generated by the design storms will not significantly exceed pre-development conditions. The minor increase shown for design points 1, 3, and 4 are only a fraction of a cfs and do not warrant the additional land disturbance that would be required to provide attenuation. Furthermore, stormwater runoff associated with Design Point 4 will be attenuated at later phases of this project. None of the design points represent direct discharges to wetlands or water bodies. The results are summarized in the tables below. HydroCAD calculations are provided in Appendix A.

Table 5: Design Point 1 Peak Runoff Rate, cfs

Design Storm	Pre-Dev	Post-Dev
10 yr	0.15	0.23
100 yr	0.44	0.58

Table 6: Design Point 2 Peak Runoff Rate, cfs

Design Storm	Pre-Dev	Post-Dev
10 yr	0.15	0.15
100 yr	0.47	0.43

Table 7: Design Point 3 Peak Runoff Rate, cfs

Design Storm	Pre-Dev	Post-Dev
10 yr	0.39	0.47
100 yr	1.2	1.4

Table 8: Design Point 4 Peak Runoff Rate, cfs

Design Storm	Pre-Dev	Post-Dev
10 yr	5.8	6.2
100 yr	24.0	24.0

Table 9: Design Point 4A Peak Runoff Rate, cfs

Design Storm	Pre-Dev	Post-Dev
10 yr	0.64	0.58
100 yr	2.5	2.1

5.0 STORMWATER MANAGEMENT STANDARDS

5.1 Minimum Standard 1: LID Site Planning and Design Strategies

LID site planning and design strategies must be used to the maximum extent practicable in order to reduce the generation of the water runoff volume for both new and redevelopment projects.

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 a Qualifying Pervious Area to the south of the widened existing driveway, minimization of site disturbance and minimization of ground cover changes to preserve the natural characteristics of the Site. Clearing will be limited to the area occupied by the access road and swale. Groundcover outside of the Limits of Disturbance will be maintained.

5.2 Minimum Standard 2: Groundwater Recharge

Stormwater must be recharged within the same subwatershed to maintain baseflow at pre-development recharge levels to the maximum extent practicable in accordance with the requirements described in §§

8.8(D) through (H) of this Part. Applicants may be required to provide a water budget analysis for proposed groundwater dewatering. Recharge volume is determined as a function of annual pre-development recharge for site-specific soils or surficial materials, average annual rainfall volume, and amount of impervious cover on a site. Recharge must occur in a manner that protects groundwater quality.

The groundwater recharge criterion (Re_v) is based on the 17,364± square feet of total new impervious (gravel) surfaces associated with the access road. The majority of the proposed road, 14,507± square feet, drains to the Dry Swale. A smaller portion, 2,857± square feet, along the edge of the existing driveway drains to a Qualifying Pervious Area. Both the QPA and Dry Swale are located entirely in B soils.

The total recharge volume required is 507 cubic feet, calculated using the formula given in 250-RICR-150-10-8.8D:

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

Where:

F = 0.35 (Hydrologic Soils Group B)

I = 17,364 sf (Proposed Impervious Area)

Re_v = recharge volume (cubic feet)

The recharge volume is less than the water quality volume and will be either direct to a QPA or infiltrated by the dry swale as described below.

5.3 Minimum Standard 3: Water Quality

Stormwater runoff must be treated before discharge. The amount that must be treated from each rainfall event is known as the required water quality volume (WQv). The required WQv is calculated as described in §§ 8.9(E) through (J) of this Part and excludes LID credits allowed under §8.18 of this Part.

The majority of the proposed road, 14,507± square feet, drains to the Dry Swale. A smaller portion, 2,857± square feet, along the edge of the existing driveway drains to a Qualifying Pervious Area.

The required Water Quality Volume (WQv) of the portion of the gravel road draining to the Dry Swale is 1,209± cubic feet, calculated using the formula provided by 250-RICR-150-10-8.9(E):

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

Where:

I = 14,507 sf (Proposed Impervious Area)

WQ_v = Water Quality Volume (cubic feet)

The Water Quality Volume (WQv) treated and infiltrated by the dry swale is 1,533± cubic feet. Refer to the Water Quality Calculations included in Appendix B.

5.4 Minimum Standard 4: Conveyance and Natural Channel Protection

Open drainage and pipe conveyance systems must be designed to provide adequate passage for flows leading to, from, and through stormwater management facilities for at least the peak flow from the 10-year, 24-hour Type III design storm event. Protection for natural channels downstream must be supplied by providing 24-hour extended detention of the 1-year, 24-hour Type III design storm event runoff volume.

The CPv criterion can be waived since the site is a "small facility with impervious cover of less than 1 acre" (Rule 8.10 D.2).

5.5 Minimum Standard 5: Overbank Flood Protection

Downstream overbank flood protection must be provided by attenuating the post development peak discharge rate to the pre-development levels for the 10-year and 100-year, 24-hour Type III design storm events. In addition, designers must demonstrate that runoff from the site for storms up to the 100-year, 24-hour Type III design storm events actually reach proposed structural practices designed to meet this criterion.

The results of the stormwater analysis indicate that the 10-year and 100-year post-development conditions peak runoff rates generated by the design storms will not significantly exceed pre-development conditions. Refer to Section 4.6 .

5.6 Minimum Standard 6: Redevelopment and Infill Projects

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

5.7 Minimum Standard 7: Pollution Prevention

All development sites require the use of source control and pollution prevention measures to minimize the impact that the land use may have on stormwater runoff quality. These measures shall be outlined in a stormwater pollution prevention plan.

The proposed project work will include low impact use of the project Site. No significant paving activities, solid waste generation, significant snow removal, or hazardous waste use is proposed.

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

Stormwater discharges from land uses with higher potential pollutant loads (LUHPPLs) require the use of specific source control and pollution prevention measures and the specific stormwater BMPs approved for such use. Allowable BMPs for LUHPPLs are included in the Table in § 8.14(D) of this Part. Many LUHPPLs require additional special permits such as a RIPDES Multi-Sector General Permit, and sector-specific required BMPs are included in Section VI of the Multi-Sector General Permit.

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

5.9 Minimum Standard 9: Illicit Discharges

All illicit discharges to stormwater management systems are prohibited, including discharges from OWTS, and sub-drains and French drains near OWTS that do not meet the State's Rules Establishing Minimum Standards Relating to Location, Design, Construction and Maintenance of Onsite Wastewater Treatment Systems.

No illicit discharges have been identified or are proposed.

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

Soil Erosion and sedimentation control measures must be utilized during the construction phase as well as during any land disturbing activities.

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

5.11 Minimum Standard 11: Stormwater Management System Operation and Maintenance

The stormwater management system, including all structural stormwater controls and conveyances, must have an Operation and Maintenance Plan to ensure that it continues to function as designed. The Operation and Maintenance Plan shall identify measures for implementing maintenance activities in a manner that minimizes stormwater runoff impacts.

A long term Operation and Maintenance Plan has been prepared.

Appendix A

HydroCAD Summary Report

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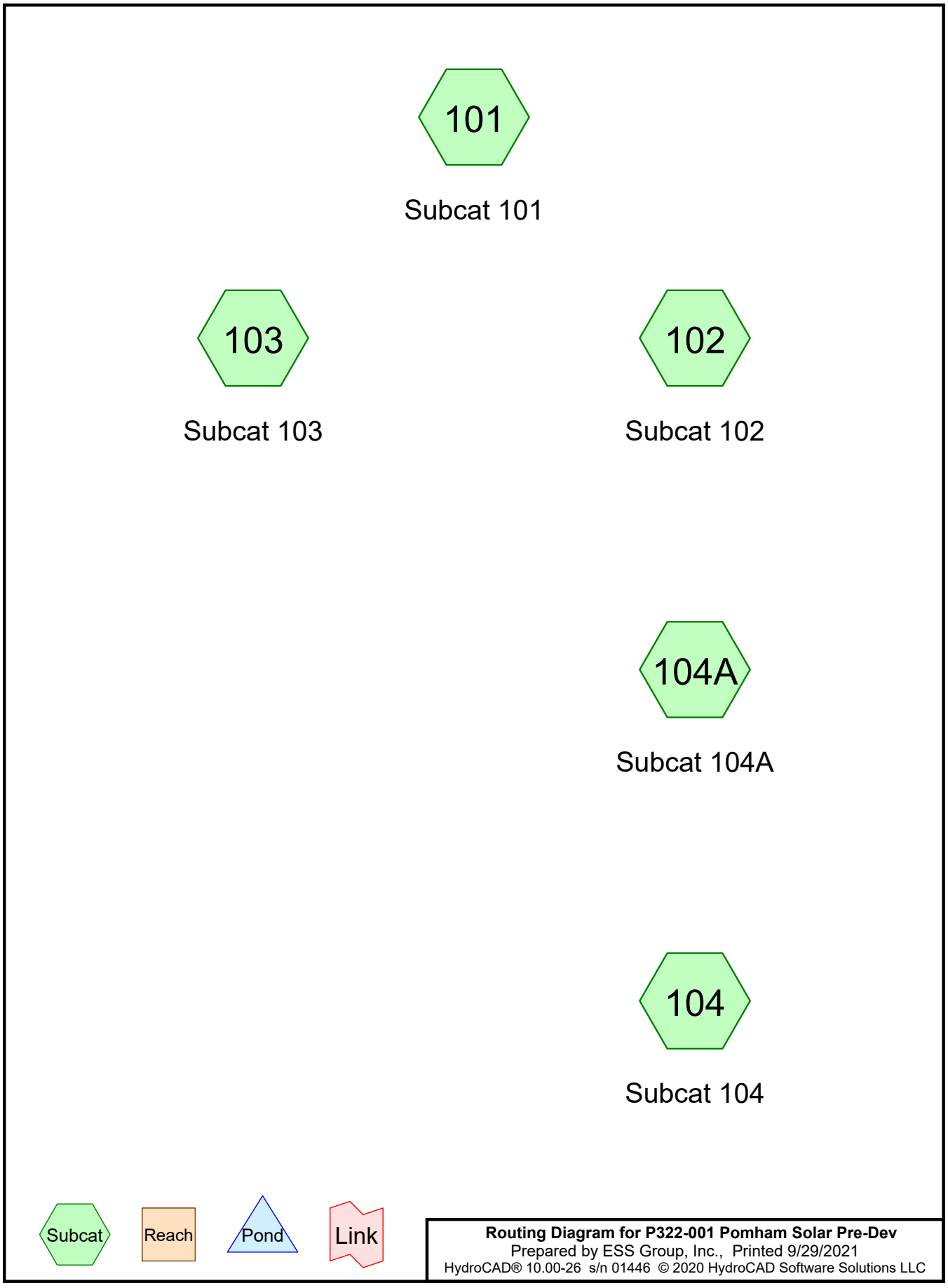


Routing Diagram for P322-001 Pomham Solar Pre-Dev
Prepared by ESS Group, Inc., Printed 9/29/2021

Time span=0.00-36.00 hrs, dt=0.01 hrs, 3601 points
Runoff by SCS TR-20 method, UH=SCS, Split Pervious/Imperv.
Reach routing by Muskingum-Cunge method - Pond routing by Stor-Ind method

Subcatchment 101: Subcat 101 Runoff Area=0.082 ac 0.00% Impervious Runoff Depth=0.01"
Flow Length=81' Tc=6.0 min CN=66/0 Runoff=0.00 cfs 0.000 af

Subcatchment 102: Subcat 102 Runoff Area=0.116 ac 0.00% Impervious Runoff Depth=0.00"
Flow Length=112' Tc=10.7 min CN=62/0 Runoff=0.00 cfs 0.000 af

Subcatchment 103: Subcat 103 Runoff Area=0.313 ac 0.00% Impervious Runoff Depth=0.00"
Flow Length=168' Tc=12.7 min CN=63/0 Runoff=0.00 cfs 0.000 af

Subcatchment 104: Subcat 104 Runoff Area=9.393 ac 0.28% Impervious Runoff Depth=0.00"
Flow Length=535' Tc=21.1 min CN=56/98 Runoff=0.02 cfs 0.002 af

Subcatchment 104A: Subcat 104A Runoff Area=0.717 ac 3.77% Impervious Runoff Depth=0.04"
Flow Length=214' Tc=9.9 min CN=56/98 Runoff=0.03 cfs 0.002 af

Summary for Subcatchment 101: Subcat 101

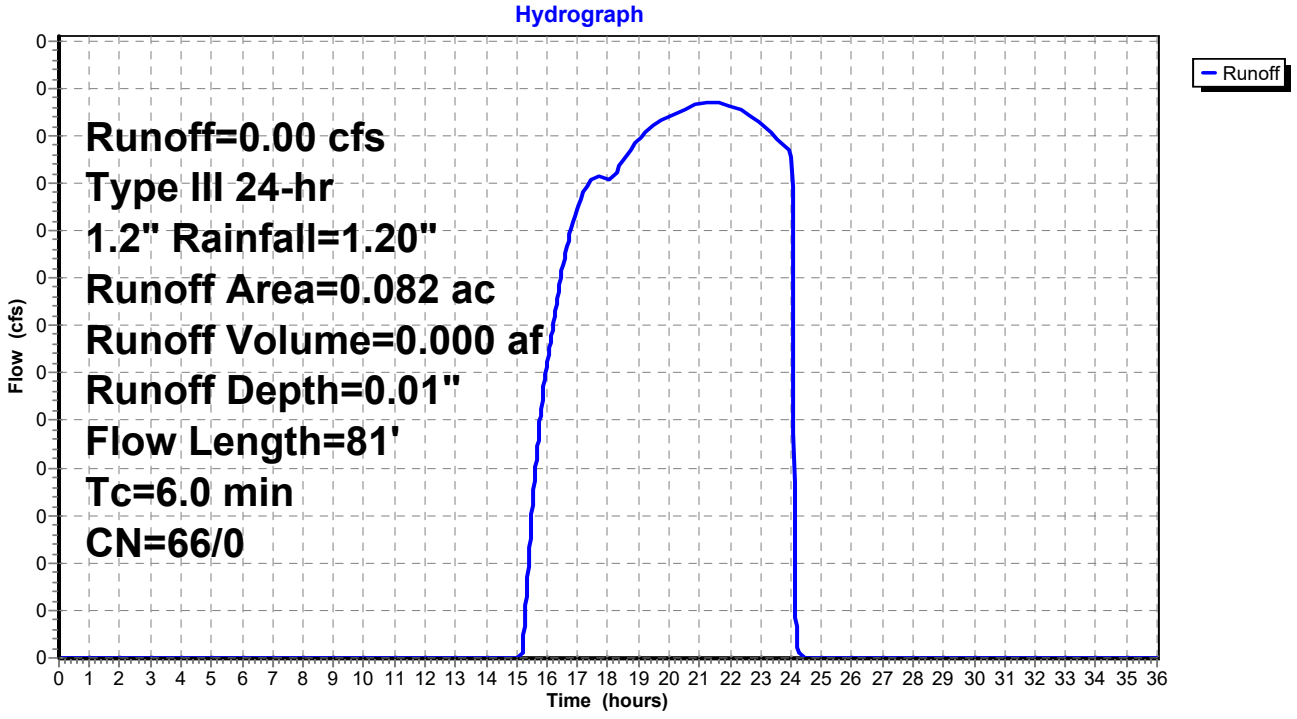
Runoff = 0.00 cfs @ 21.38 hrs, Volume= 0.000 af, Depth= 0.01"

Runoff by SCS TR-20 method, UH=SCS, Split Pervious/Imperv., Time Span= 0.00-36.00 hrs, dt= 0.01 hrs
Type III 24-hr 1.2" Rainfall=1.20"

Area (ac)	CN	Description
0.057	61	>75% Grass cover, Good, HSG B
0.014	96	Gravel surface, HSG B
0.012	55	Woods, Good, HSG B
0.082	66	Weighted Average
0.082	66	100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
3.9	41	0.0324	0.18		**Sheet Flow,** Grass: Short n= 0.150 P2= 3.30"
0.2	40	0.0477	3.52		**Shallow Concentrated Flow,** Unpaved Kv= 16.1 fps
4.1	81	Total, Increased to minimum Tc = 6.0 min			

Subcatchment 101: Subcat 101



Summary for Subcatchment 102: Subcat 102

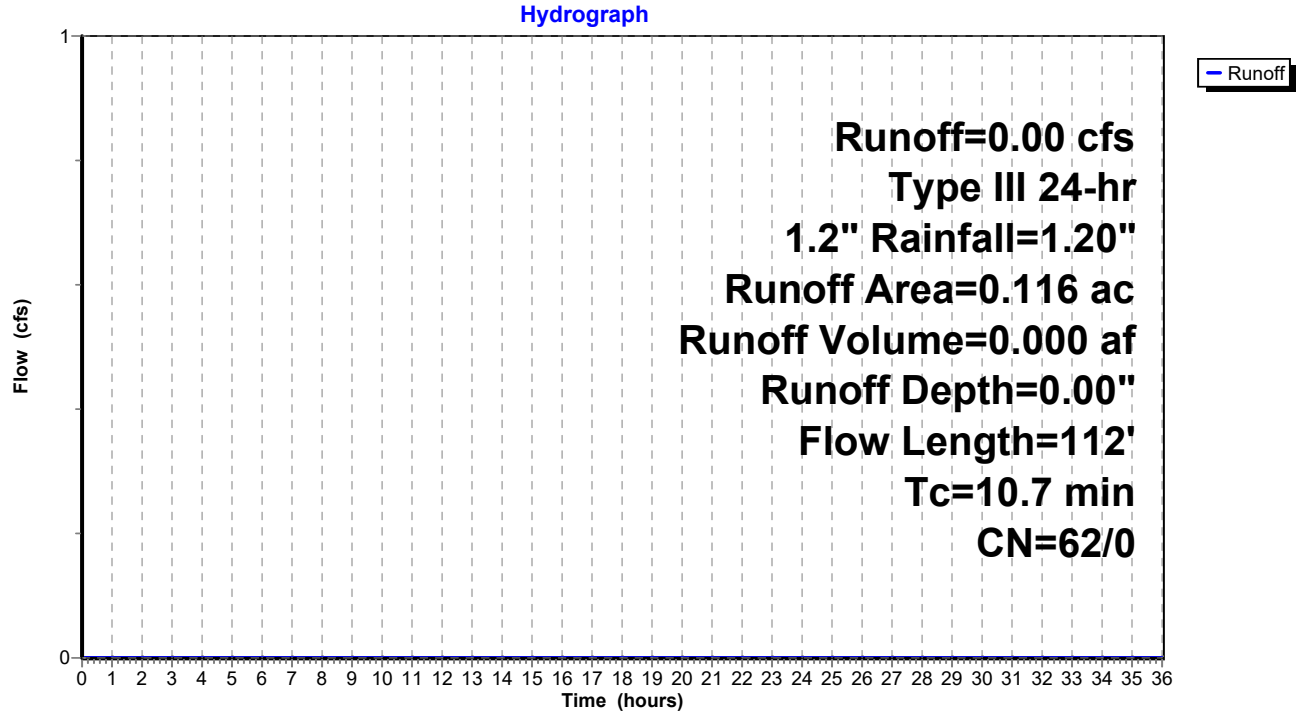
Runoff = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af, Depth= 0.00"

Runoff by SCS TR-20 method, UH=SCS, Split Pervious/Imperv., Time Span= 0.00-36.00 hrs, dt= 0.01 hrs
Type III 24-hr 1.2" Rainfall=1.20"

Area (ac)	CN	Description
0.027	61	>75% Grass cover, Good, HSG B
0.016	96	Gravel surface, HSG B
0.072	55	Woods, Good, HSG B
0.116	62	Weighted Average
0.116	62	100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
10.3	57	0.0389	0.09		**Sheet Flow,** Woods: Light underbrush n= 0.400 P2= 3.30"
0.4	55	0.0164	2.06		**Shallow Concentrated Flow,** Unpaved Kv= 16.1 fps
10.7	112	Total			

Subcatchment 102: Subcat 102



Summary for Subcatchment 103: Subcat 103

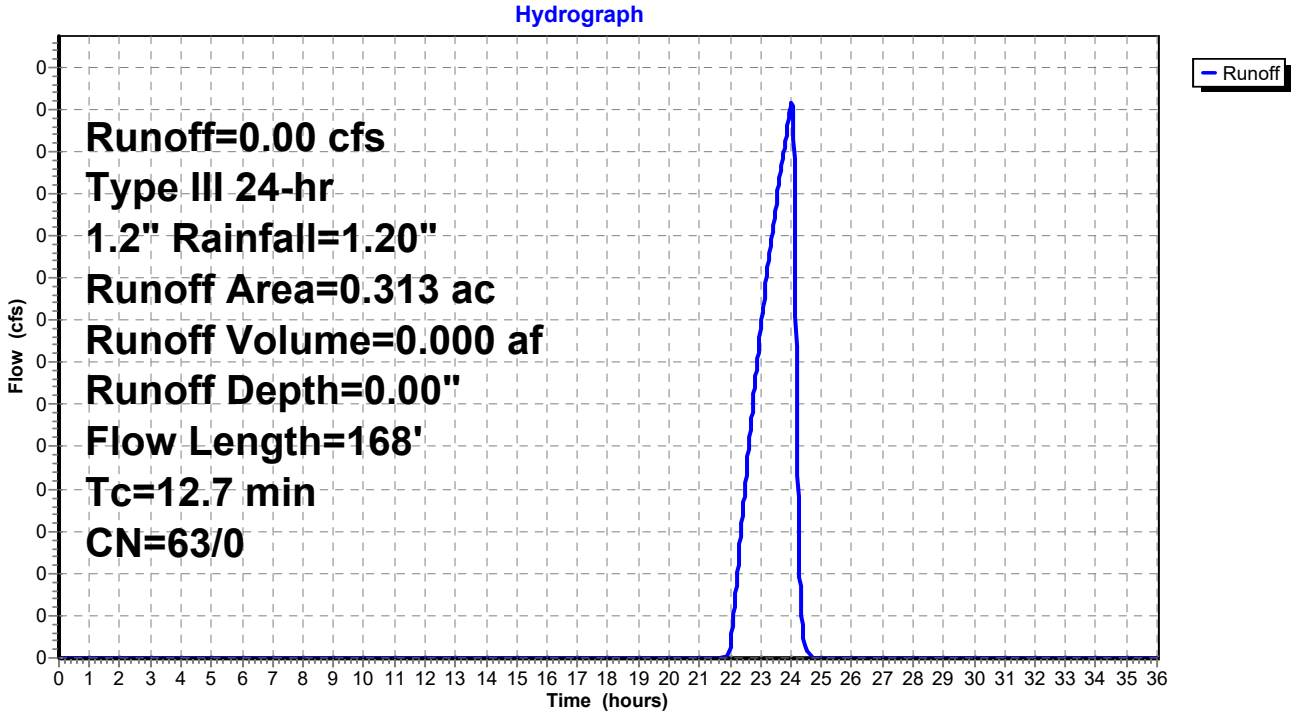
Runoff = 0.00 cfs @ 24.03 hrs, Volume= 0.000 af, Depth= 0.00"

Runoff by SCS TR-20 method, UH=SCS, Split Pervious/Imperv., Time Span= 0.00-36.00 hrs, dt= 0.01 hrs
Type III 24-hr 1.2" Rainfall=1.20"

Area (ac)	CN	Description
0.287	61	>75% Grass cover, Good, HSG B
0.017	96	Gravel surface, HSG B
0.009	55	Woods, Good, HSG B
0.313	63	Weighted Average
0.313	63	100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
12.1	31	0.0077	0.04		**Sheet Flow,** Woods: Light underbrush n= 0.400 P2= 3.30"
0.6	137	0.0506	3.62		**Shallow Concentrated Flow,** Unpaved Kv= 16.1 fps
12.7	168	Total			

Subcatchment 103: Subcat 103



Summary for Subcatchment 104: Subcat 104

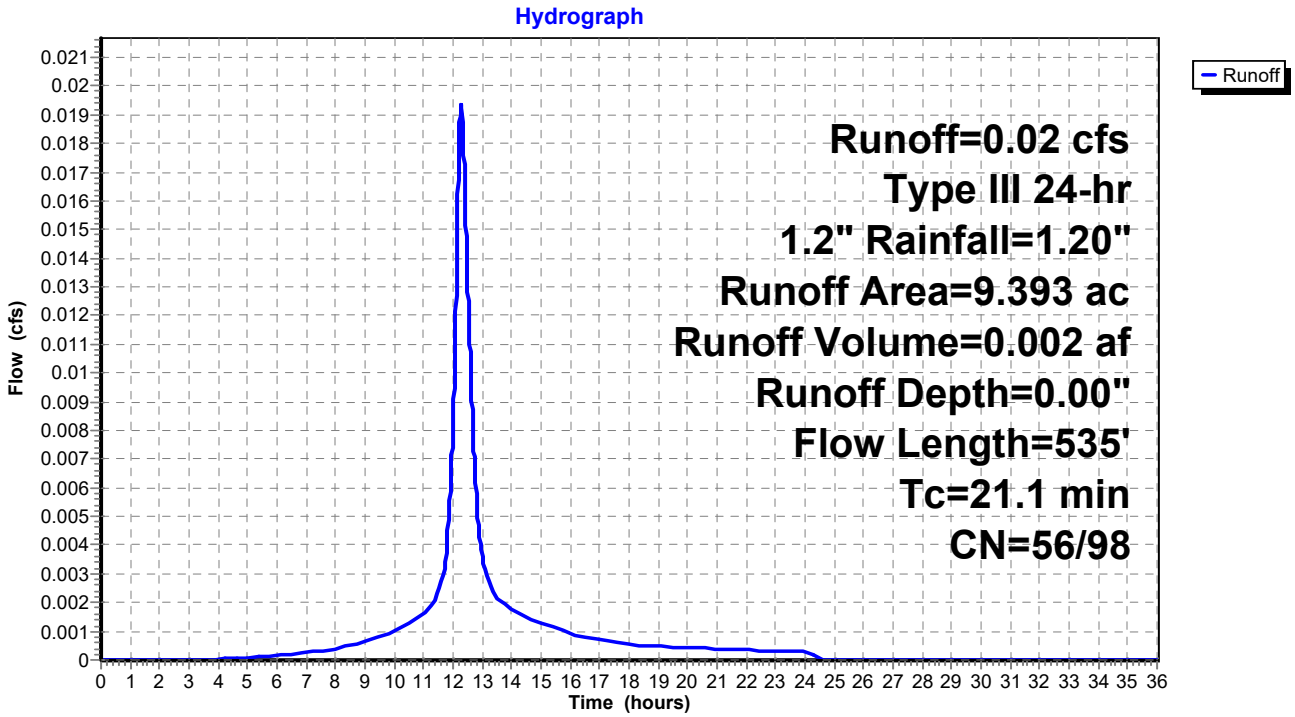
Runoff = 0.02 cfs @ 12.27 hrs, Volume= 0.002 af, Depth= 0.00"

Runoff by SCS TR-20 method, UH=SCS, Split Pervious/Imperv., Time Span= 0.00-36.00 hrs, dt= 0.01 hrs
Type III 24-hr 1.2" Rainfall=1.20"

Area (ac)	CN	Description
0.417	61	>75% Grass cover, Good, HSG B
0.089	96	Gravel surface, HSG B
0.027	98	Roofs, HSG B
8.861	55	Woods, Good, HSG B
9.393	56	Weighted Average
9.366	56	99.72% Pervious Area
0.027	98	0.28% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
18.7	95	0.0244	0.08		**Sheet Flow,** Woods: Light underbrush n= 0.400 P2= 3.30"
2.4	440	0.0374	3.11		**Shallow Concentrated Flow,** Unpaved Kv= 16.1 fps
21.1	535	Total			

Subcatchment 104: Subcat 104



Summary for Subcatchment 104A: Subcat 104A

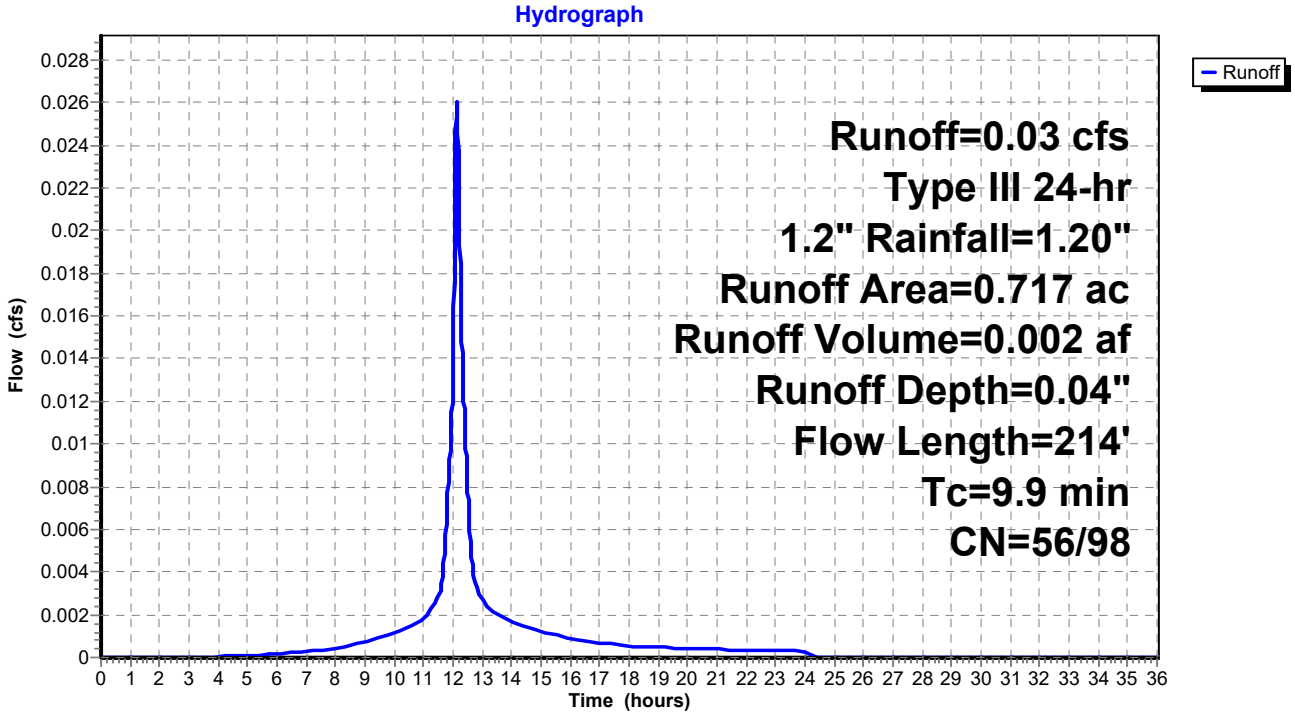
Runoff = 0.03 cfs @ 12.13 hrs, Volume= 0.002 af, Depth= 0.04"

Runoff by SCS TR-20 method, UH=SCS, Split Pervious/Imperv., Time Span= 0.00-36.00 hrs, dt= 0.01 hrs
Type III 24-hr 1.2" Rainfall=1.20"

Area (ac)	CN	Description
0.090	61	>75% Grass cover, Good, HSG B
0.027	98	Roofs, HSG B
0.600	55	Woods, Good, HSG B
0.717	57	Weighted Average
0.690	56	96.23% Pervious Area
0.027	98	3.77% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
9.0	49	0.0412	0.09		**Sheet Flow,** Woods: Light underbrush n= 0.400 P2= 3.30"
0.9	165	0.0369	3.09		**Shallow Concentrated Flow,** Unpaved Kv= 16.1 fps
9.9	214	Total			

Subcatchment 104A: Subcat 104A



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 Muskingum-Cunge method - Pond routing by Stor-Ind method

Subcatchment 101: Subcat 101 Runoff Area=0.082 ac 0.00% Impervious Runoff Depth=0.41"
Flow Length=81' Tc=6.0 min CN=66 Runoff=0.03 cfs 0.003 af

Subcatchment 102: Subcat 102 Runoff Area=0.116 ac 0.00% Impervious Runoff Depth=0.29"
Flow Length=112' Tc=10.7 min CN=62 Runoff=0.02 cfs 0.003 af

Subcatchment 103: Subcat 103 Runoff Area=0.313 ac 0.00% Impervious Runoff Depth=0.31"
Flow Length=168' Tc=12.7 min CN=63 Runoff=0.05 cfs 0.008 af

Subcatchment 104: Subcat 104 Runoff Area=9.393 ac 0.28% Impervious Runoff Depth=0.14"
Flow Length=535' Tc=21.1 min CN=56 Runoff=0.30 cfs 0.111 af

Subcatchment 104A: Subcat 104A Runoff Area=0.717 ac 3.77% Impervious Runoff Depth=0.16"
Flow Length=214' Tc=9.9 min CN=57 Runoff=0.04 cfs 0.010 af

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 Muskingum-Cunge method - Pond routing by Stor-Ind method

Subcatchment 101: Subcat 101 Runoff Area=0.082 ac 0.00% Impervious Runoff Depth=1.66"
Flow Length=81' Tc=6.0 min CN=66 Runoff=0.15 cfs 0.011 af

Subcatchment 102: Subcat 102 Runoff Area=0.116 ac 0.00% Impervious Runoff Depth=1.38"
Flow Length=112' Tc=10.7 min CN=62 Runoff=0.15 cfs 0.013 af

Subcatchment 103: Subcat 103 Runoff Area=0.313 ac 0.00% Impervious Runoff Depth=1.45"
Flow Length=168' Tc=12.7 min CN=63 Runoff=0.39 cfs 0.038 af

Subcatchment 104: Subcat 104 Runoff Area=9.393 ac 0.28% Impervious Runoff Depth=0.99"
Flow Length=535' Tc=21.1 min CN=56 Runoff=5.83 cfs 0.775 af

Subcatchment 104A: Subcat 104A Runoff Area=0.717 ac 3.77% Impervious Runoff Depth=1.05"
Flow Length=214' Tc=9.9 min CN=57 Runoff=0.64 cfs 0.063 af

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 Muskingum-Cunge method - Pond routing by Stor-Ind method

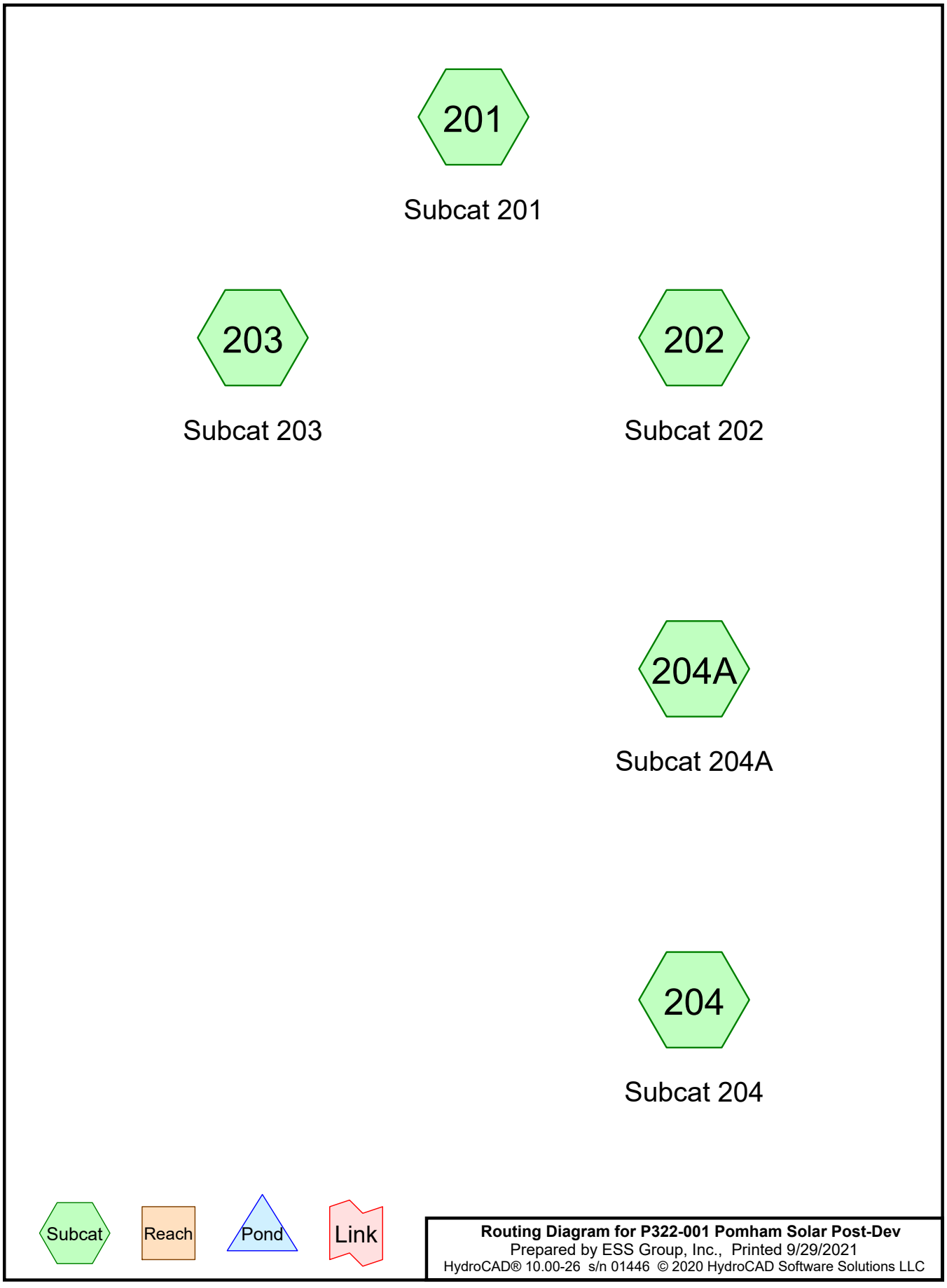
Subcatchment 101: Subcat 101 Runoff Area=0.082 ac 0.00% Impervious Runoff Depth=4.59"
Flow Length=81' Tc=6.0 min CN=66 Runoff=0.44 cfs 0.031 af

Subcatchment 102: Subcat 102 Runoff Area=0.116 ac 0.00% Impervious Runoff Depth=4.11"
Flow Length=112' Tc=10.7 min CN=62 Runoff=0.47 cfs 0.040 af

Subcatchment 103: Subcat 103 Runoff Area=0.313 ac 0.00% Impervious Runoff Depth=4.23"
Flow Length=168' Tc=12.7 min CN=63 Runoff=1.24 cfs 0.110 af

Subcatchment 104: Subcat 104 Runoff Area=9.393 ac 0.28% Impervious Runoff Depth=3.39"
Flow Length=535' Tc=21.1 min CN=56 Runoff=23.96 cfs 2.654 af

Subcatchment 104A: Subcat 104A Runoff Area=0.717 ac 3.77% Impervious Runoff Depth=3.51"
Flow Length=214' Tc=9.9 min CN=57 Runoff=2.53 cfs 0.210 af



Routing Diagram for P322-001 Pomham Solar Post-Dev
Prepared by ESS Group, Inc., Printed 9/29/2021

Time span=0.00-36.00 hrs, dt=0.01 hrs, 3601 points
Runoff by SCS TR-20 method, UH=SCS, Split Pervious/Imperv.
Reach routing by Muskingum-Cunge method - Pond routing by Stor-Ind method

Subcatchment 201: Subcat 201 Runoff Area=0.093 ac 0.00% Impervious Runoff Depth=0.04"
Flow Length=81' Tc=6.0 min CN=72/0 Runoff=0.00 cfs 0.000 af

Subcatchment 202: Subcat 202 Runoff Area=0.090 ac 0.00% Impervious Runoff Depth=0.01"
Flow Length=105' Tc=9.8 min CN=66/0 Runoff=0.00 cfs 0.000 af

Subcatchment 203: Subcat 203 Runoff Area=0.333 ac 0.00% Impervious Runoff Depth=0.00"
Flow Length=168' Tc=12.7 min CN=65/0 Runoff=0.00 cfs 0.000 af

Subcatchment 204: Subcat 204 Runoff Area=9.388 ac 0.28% Impervious Runoff Depth=0.00"
Flow Length=992' Tc=22.9 min CN=57/98 Runoff=0.02 cfs 0.002 af

Subcatchment 204A: Subcat 204A Runoff Area=0.558 ac 4.84% Impervious Runoff Depth=0.05"
Flow Length=214' Tc=9.9 min CN=57/98 Runoff=0.03 cfs 0.002 af

Summary for Subcatchment 201: Subcat 201

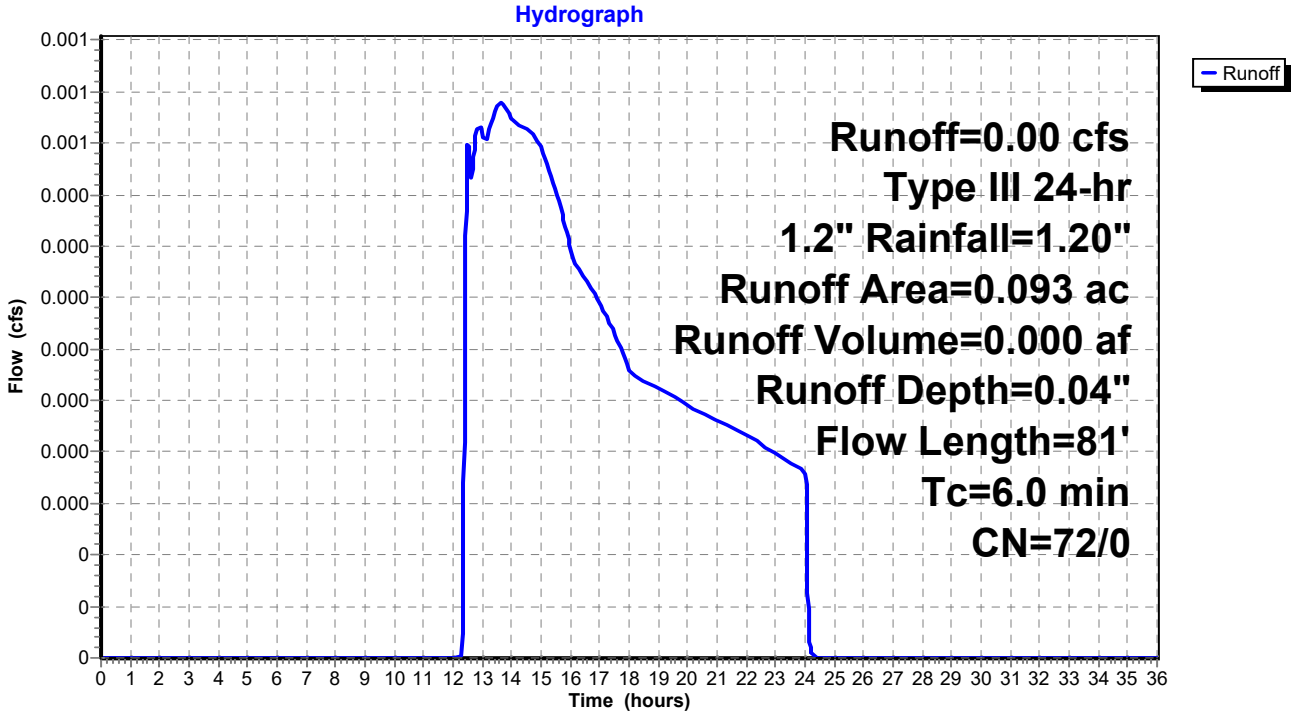
Runoff = 0.00 cfs @ 13.66 hrs, Volume= 0.000 af, Depth= 0.04"

Runoff by SCS TR-20 method, UH=SCS, Split Pervious/Imperv., Time Span= 0.00-36.00 hrs, dt= 0.01 hrs
Type III 24-hr 1.2" Rainfall=1.20"

Area (ac)	CN	Description
0.053	61	>75% Grass cover, Good, HSG B
0.030	96	Gravel surface, HSG B
0.010	55	Woods, Good, HSG B
0.093	72	Weighted Average
0.093	72	100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
3.9	41	0.0324	0.18		**Sheet Flow,** Grass: Short n= 0.150 P2= 3.30"
0.2	40	0.0477	3.52		**Shallow Concentrated Flow,** Unpaved Kv= 16.1 fps
4.1	81	Total, Increased to minimum Tc = 6.0 min			

Subcatchment 201: Subcat 201



Summary for Subcatchment 202: Subcat 202

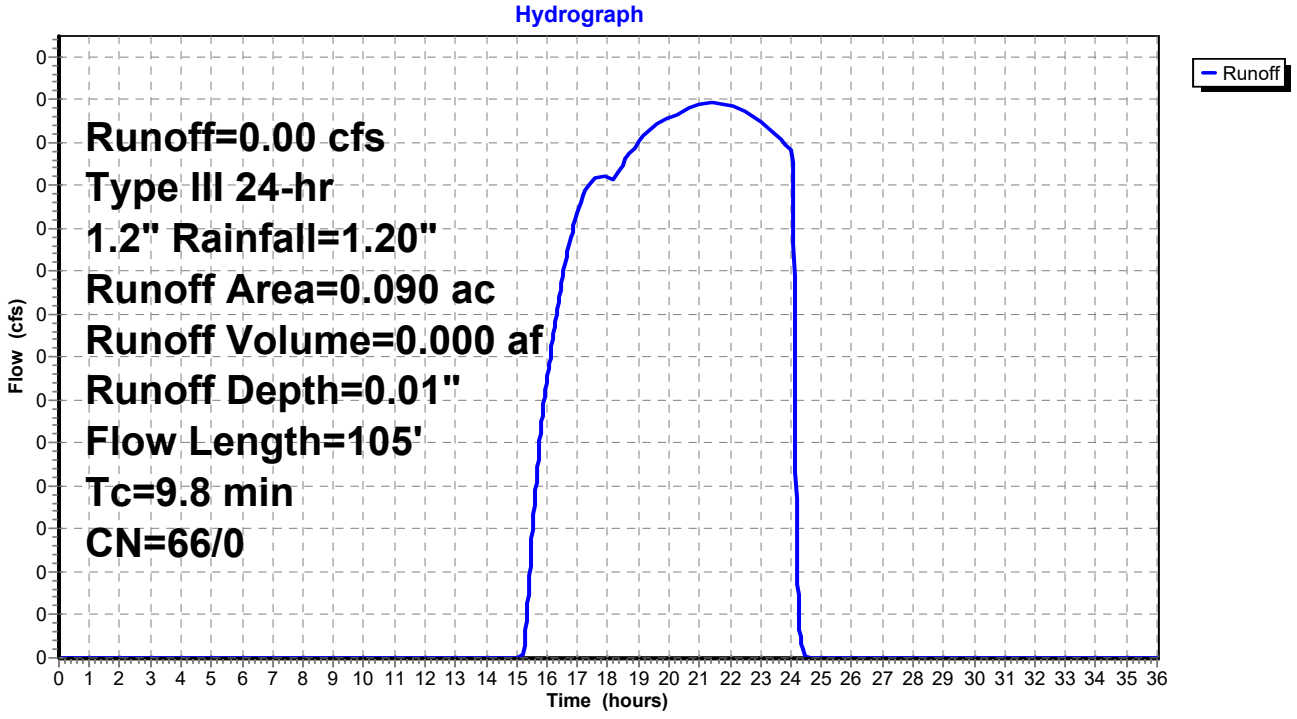
Runoff = 0.00 cfs @ 21.44 hrs, Volume= 0.000 af, Depth= 0.01"

Runoff by SCS TR-20 method, UH=SCS, Split Pervious/Imperv., Time Span= 0.00-36.00 hrs, dt= 0.01 hrs
Type III 24-hr 1.2" Rainfall=1.20"

Area (ac)	CN	Description
0.005	61	>75% Grass cover, Good, HSG B
0.024	96	Gravel surface, HSG B
0.061	55	Woods, Good, HSG B
0.090	66	Weighted Average
0.090	66	100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
9.4	50	0.0384	0.09		**Sheet Flow,** Woods: Light underbrush n= 0.400 P2= 3.30"
0.4	55	0.0164	2.06		**Shallow Concentrated Flow,** Unpaved Kv= 16.1 fps
9.8	105	Total			

Subcatchment 202: Subcat 202



Summary for Subcatchment 203: Subcat 203

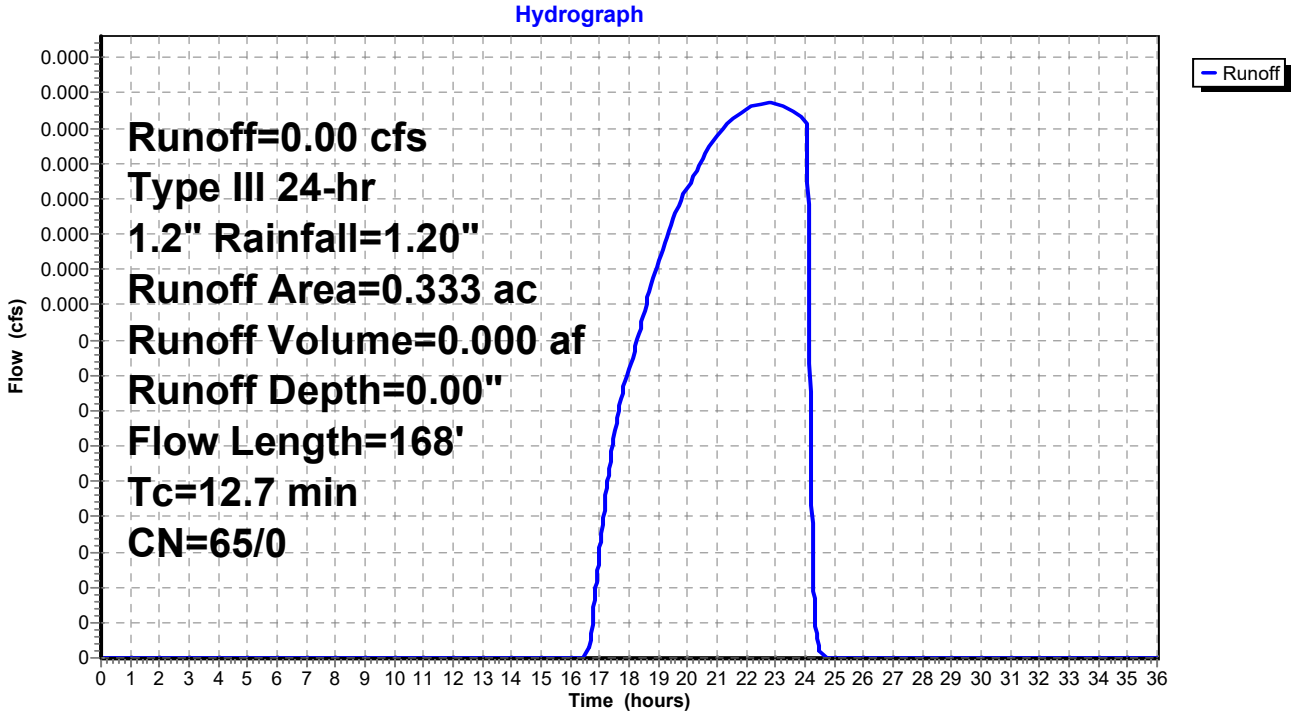
Runoff = 0.00 cfs @ 22.76 hrs, Volume= 0.000 af, Depth= 0.00"

Runoff by SCS TR-20 method, UH=SCS, Split Pervious/Imperv., Time Span= 0.00-36.00 hrs, dt= 0.01 hrs
Type III 24-hr 1.2" Rainfall=1.20"

Area (ac)	CN	Description
0.293	61	>75% Grass cover, Good, HSG B
0.038	96	Gravel surface, HSG B
0.002	55	Woods, Good, HSG B
0.333	65	Weighted Average
0.333	65	100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
12.1	31	0.0077	0.04		**Sheet Flow,** Woods: Light underbrush n= 0.400 P2= 3.30"
0.6	137	0.0506	3.62		**Shallow Concentrated Flow,** Unpaved Kv= 16.1 fps
12.7	168	Total			

Subcatchment 203: Subcat 203



Summary for Subcatchment 204: Subcat 204

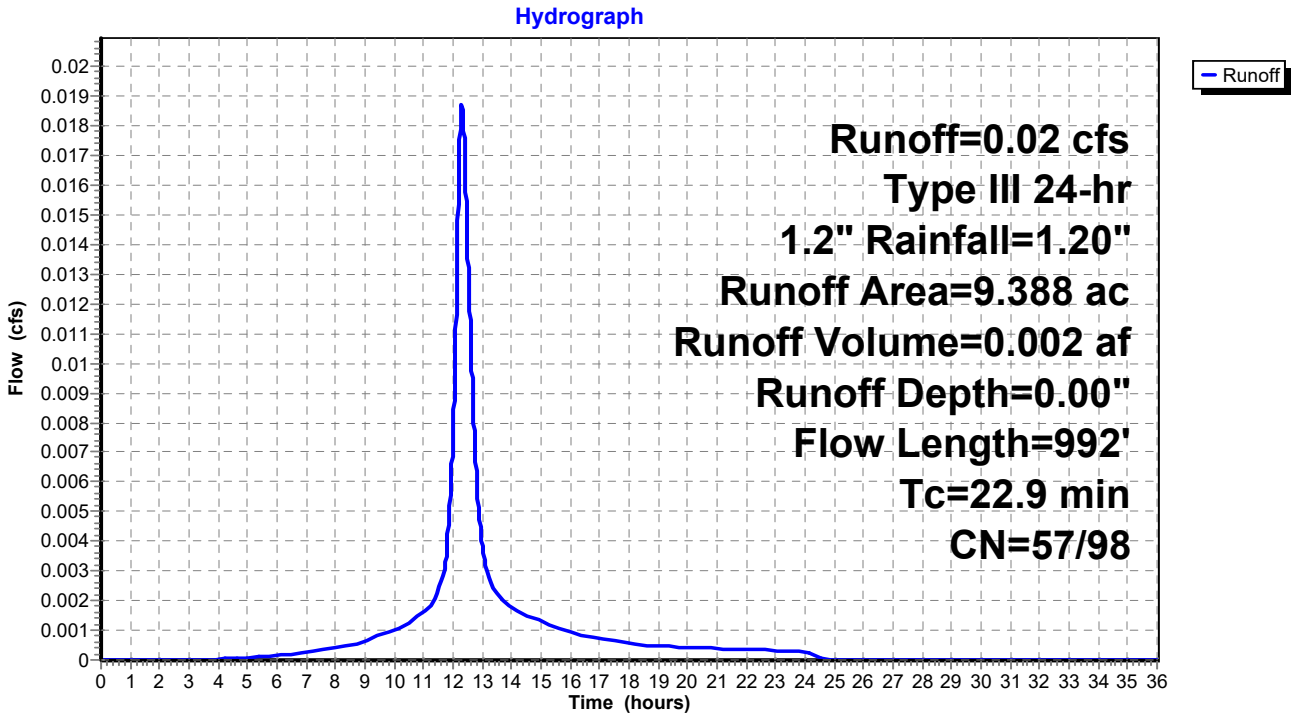
Runoff = 0.02 cfs @ 12.29 hrs, Volume= 0.002 af, Depth= 0.00"

Runoff by SCS TR-20 method, UH=SCS, Split Pervious/Imperv., Time Span= 0.00-36.00 hrs, dt= 0.01 hrs
Type III 24-hr 1.2" Rainfall=1.20"

Area (ac)	CN	Description
0.693	61	>75% Grass cover, Good, HSG B
0.442	96	Gravel surface, HSG B
0.027	98	Roofs, HSG B
8.226	55	Woods, Good, HSG B
9.388	57	Weighted Average
9.361	57	99.72% Pervious Area
0.027	98	0.28% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
18.7	95	0.0244	0.08		**Sheet Flow,** Woods: Light underbrush n= 0.400 P2= 3.30"
4.2	897	0.0479	3.52		**Shallow Concentrated Flow,** Unpaved Kv= 16.1 fps
22.9	992	Total			

Subcatchment 204: Subcat 204



Summary for Subcatchment 204A: Subcat 204A

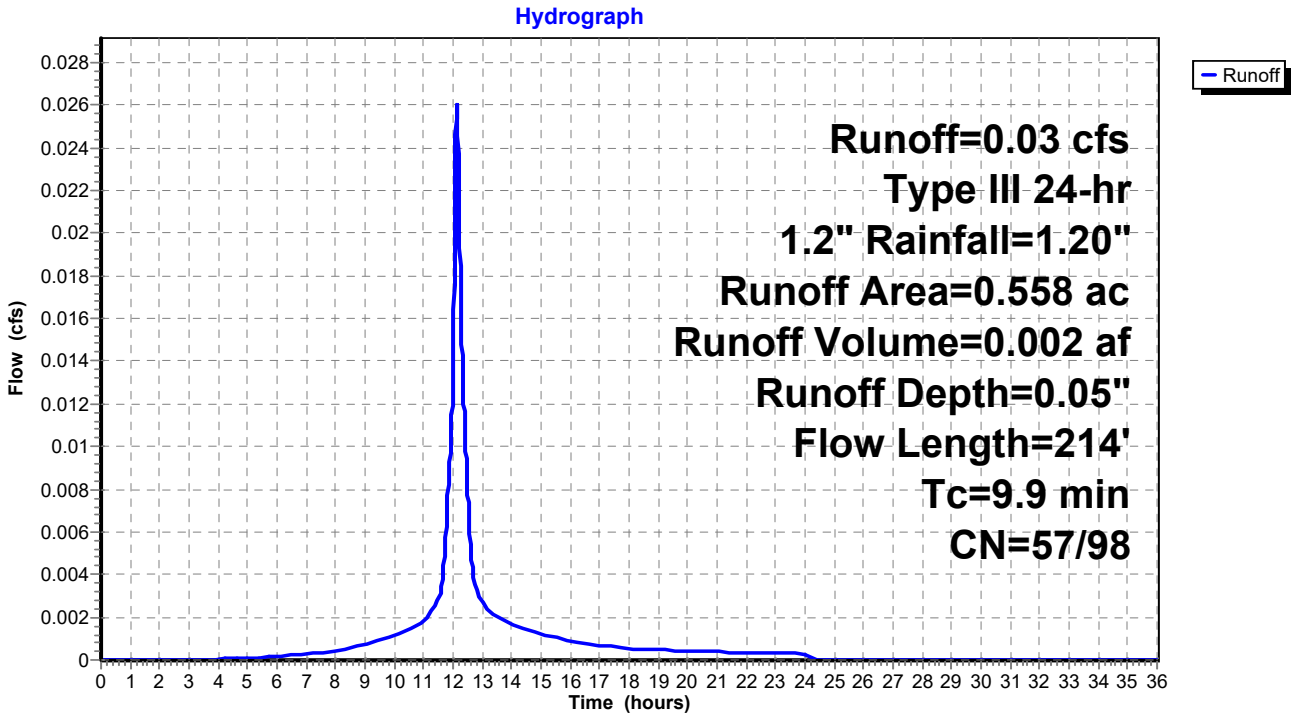
Runoff = 0.03 cfs @ 12.13 hrs, Volume= 0.002 af, Depth= 0.05"

Runoff by SCS TR-20 method, UH=SCS, Split Pervious/Imperv., Time Span= 0.00-36.00 hrs, dt= 0.01 hrs
Type III 24-hr 1.2" Rainfall=1.20"

Area (ac)	CN	Description
0.069	61	>75% Grass cover, Good, HSG B
0.021	96	Gravel surface, HSG B
0.027	98	Roofs, HSG B
0.441	55	Woods, Good, HSG B
0.558	59	Weighted Average
0.531	57	95.16% Pervious Area
0.027	98	4.84% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
9.0	49	0.0412	0.09		**Sheet Flow,** Woods: Light underbrush n= 0.400 P2= 3.30"
0.9	165	0.0369	3.09		**Shallow Concentrated Flow,** Unpaved Kv= 16.1 fps
9.9	214	Total			

Subcatchment 204A: Subcat 204A



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 Muskingum-Cunge method - Pond routing by Stor-Ind method

Subcatchment 201: Subcat 201 Runoff Area=0.093 ac 0.00% Impervious Runoff Depth=0.64"
Flow Length=81' Tc=6.0 min CN=72 Runoff=0.06 cfs 0.005 af

Subcatchment 202: Subcat 202 Runoff Area=0.090 ac 0.00% Impervious Runoff Depth=0.41"
Flow Length=105' Tc=9.8 min CN=66 Runoff=0.03 cfs 0.003 af

Subcatchment 203: Subcat 203 Runoff Area=0.333 ac 0.00% Impervious Runoff Depth=0.38"
Flow Length=168' Tc=12.7 min CN=65 Runoff=0.07 cfs 0.010 af

Subcatchment 204: Subcat 204 Runoff Area=9.388 ac 0.28% Impervious Runoff Depth=0.16"
Flow Length=992' Tc=22.9 min CN=57 Runoff=0.39 cfs 0.127 af

Subcatchment 204A: Subcat 204A Runoff Area=0.558 ac 4.84% Impervious Runoff Depth=0.21"
Flow Length=214' Tc=9.9 min CN=59 Runoff=0.05 cfs 0.010 af

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 Muskingum-Cunge method - Pond routing by Stor-Ind method

Subcatchment 201: Subcat 201 Runoff Area=0.093 ac 0.00% Impervious Runoff Depth=2.12"
Flow Length=81' Tc=6.0 min CN=72 Runoff=0.23 cfs 0.016 af

Subcatchment 202: Subcat 202 Runoff Area=0.090 ac 0.00% Impervious Runoff Depth=1.66"
Flow Length=105' Tc=9.8 min CN=66 Runoff=0.15 cfs 0.012 af

Subcatchment 203: Subcat 203 Runoff Area=0.333 ac 0.00% Impervious Runoff Depth=1.59"
Flow Length=168' Tc=12.7 min CN=65 Runoff=0.47 cfs 0.044 af

Subcatchment 204: Subcat 204 Runoff Area=9.388 ac 0.28% Impervious Runoff Depth=1.05"
Flow Length=992' Tc=22.9 min CN=57 Runoff=6.15 cfs 0.823 af

Subcatchment 204A: Subcat 204A Runoff Area=0.558 ac 4.84% Impervious Runoff Depth=1.18"
Flow Length=214' Tc=9.9 min CN=59 Runoff=0.58 cfs 0.055 af

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 Muskingum-Cunge method - Pond routing by Stor-Ind method

Subcatchment 201: Subcat 201 Runoff Area=0.093 ac 0.00% Impervious Runoff Depth=5.31"
Flow Length=81' Tc=6.0 min CN=72 Runoff=0.58 cfs 0.041 af

Subcatchment 202: Subcat 202 Runoff Area=0.090 ac 0.00% Impervious Runoff Depth=4.59"
Flow Length=105' Tc=9.8 min CN=66 Runoff=0.43 cfs 0.035 af

Subcatchment 203: Subcat 203 Runoff Area=0.333 ac 0.00% Impervious Runoff Depth=4.47"
Flow Length=168' Tc=12.7 min CN=65 Runoff=1.40 cfs 0.124 af

Subcatchment 204: Subcat 204 Runoff Area=9.388 ac 0.28% Impervious Runoff Depth=3.51"
Flow Length=992' Tc=22.9 min CN=57 Runoff=24.04 cfs 2.746 af

Subcatchment 204A: Subcat 204A Runoff Area=0.558 ac 4.84% Impervious Runoff Depth=3.75"
Flow Length=214' Tc=9.9 min CN=59 Runoff=2.12 cfs 0.174 af

Appendix B

Water Quality Calculations

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Dry Swale Water Quality Volume Calculations
Pomham Solar Road
North Smithfield, RI
9/29/2021

Water Quality Volume (WQV)		
Drainage Area, DA, (ac)	3.63	
Impervious Area,IA, (ac)	0.33	Gravel Road draining to Swale
Inch/Acre	1.00	
WQV, (cf)	1,209	IA *43,560 /12

Dry Swale Volume Provided		
Length (L), ft	233	
Width (W), ft	4	
Surface Area, A_f (sf)	932	Design (Bot. Width x Length)
Filter Depth, d_f (ft)	2.33	Design (28")
Porosity of media (n)	0.33	Default
Media volume, cf	718	Af*df*n
Ponding Depth, h_f (ft)	1	Max depth behind Check Dam
Side Slopes, (SS) x:1	3	
End Area (EA), sf	7	$W*H_f+H_f*H_f/SS$
Ponding Volume, cf	816	EA/2*L
Total Filter Volume, Fv (cf)	**1,533**	

OK, WQV provided

Check Minimum Surface Area		
Coeff. Of Permeability, k (ft/day)	1	Bioretention soil
Drain Time, t_f (days)	2	
Min. Surface Area, A_{fmin} (SF)	**423**	$WQV*d_f/[k(h_f+d_f)t_f]$

OK, Min. Area provided

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Appendix C

NRCS Soils Map

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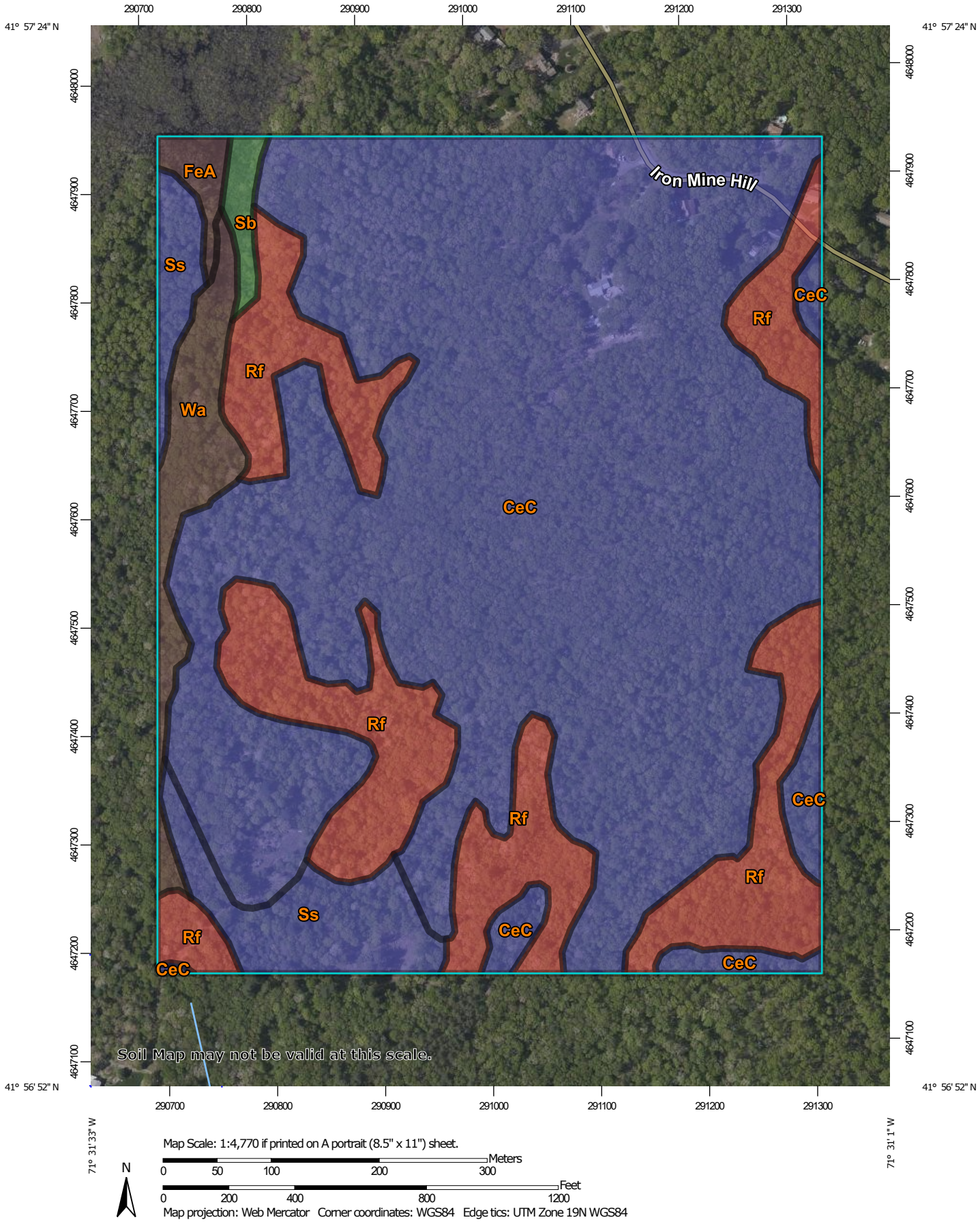
71° 31' 33" W
71° 31' 1" W
41° 57' 24" N
41° 56' 52" N
290700
290800
290900
291000
291100
291200
291300
4648000
4647900
4647800
4647700
4647600
4647500
4647400
4647300
4647200
4647100
Iron Mine Hill
FeA
Sb
Ss
Wa
Rf
CeC
Soil Map may not be valid at this scale.
Map Scale: 1:4,770 if printed on A portrait (8.5" x 11") sheet.
Meters
0 50 100 200 300
Feet
0 200 400 800 1200
N
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 20, Jun 9, 2020

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

Date(s) aerial images were photographed: May 24, 2020—Jul 18, 2020

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
CeC	Canton and Charlton fine sandy loams, 3 to 15 percent slopes, very rocky	B	81.4	69.1%
FeA	Freetown muck, 0 to 1 percent slopes	B/D	1.0	0.8%
Rf	Ridgebury, Leicester, and Whitman soils, 0 to 8 percent slopes, extremely stony	D	23.7	20.1%
Sb	Scarboro mucky fine sandy loam, 0 to 3 percent slopes	A/D	1.0	0.8%
Ss	Sudbury sandy loam	B	6.5	5.5%
Wa	Walpole sandy loam, 0 to 3 percent slopes	B/D	4.3	3.7%
Totals for Area of Interest			**117.9**	**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

Boring Log

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EXPLORATION PLAN

Islander Solar ■ North Smithfield, Rhode Island
January 21, 2021 ■ Terracon Project No. J2205052

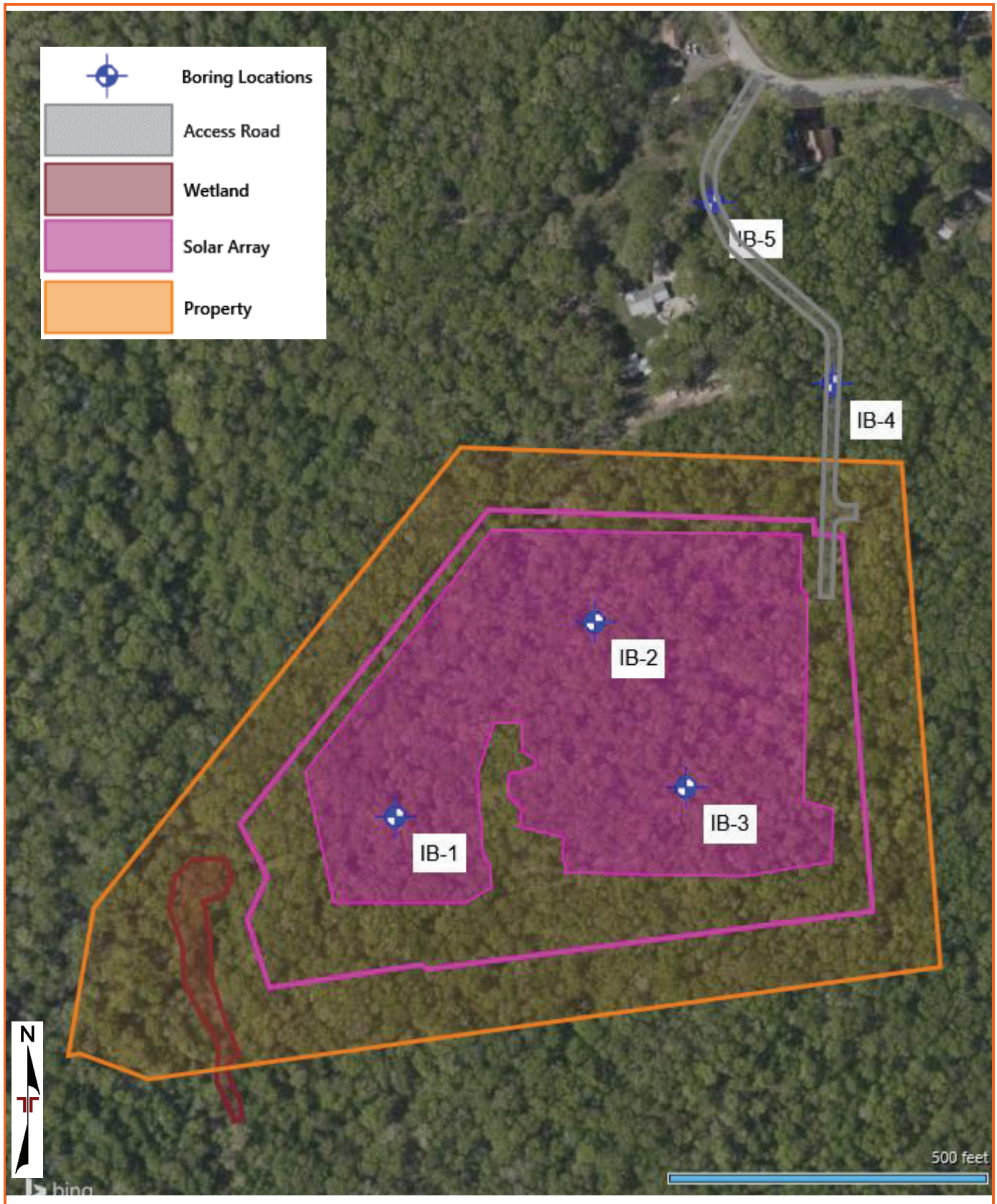


DIAGRAM IS FOR GENERAL LOCATION ONLY, AND IS NOT INTENDED FOR CONSTRUCTION PURPOSES

MAP PROVIDED BY MICROSOFT BING MAPS

BORING LOG NO. IB-4

PROJECT: Islander Solar

CLIENT: Islander Solar LLC
Summit, New Jersey

SITE: 850 Iron Mine Hill Road
North Smithfield, Rhode Island

LOCATION See Exploration Plan

Latitude: 41.9541° Longitude: -71.5191°

Approximate Surface Elev.: 453 (Ft.) +/-

MODEL LAYER	GRAPHIC LOG	DEPTH	ELEVATION (Ft.)	DEPTH (Ft.)	WATER LEVEL OBSERVATIONS	SAMPLE TYPE	RECOVERY (In.)	FIELD TEST RESULTS	WATER CONTENT (%)
1		**SANDY SILT (ML)**, trace gravel, light brown, loose, **(SUBSOIL)**					9	2-1-2-2 N=3	
		2.0	451+/-						
2		**SILTY GRAVEL WITH SAND (GM)**, light brown to gray, very dense, **(GLACIAL TILL)**					4	4-3-50/5"	4.2
				5				50/5"	
		6.0	447+/-						
		Auger Refusal on Probable Bedrock at 6 Feet							

Stratification lines are approximate. In-situ, the transition may be gradual.
Samples obtained using a 2-in. O.D. split spoon sampler

Hammer Type: Automatic

Advancement Method:
0-6 ft: Continuous flight augers

Abandonment Method:
Boring backfilled with soil cuttings upon completion.

See Exploration and Testing Procedures for a description of field and laboratory procedures used and additional data (If any).

See Supporting Information for explanation of symbols and abbreviations.

Elevations taken from Google Earth

Notes:

WATER LEVEL OBSERVATIONS

No free water observed

Terracon
201 Hammer Mill Rd
Rocky Hill, CT

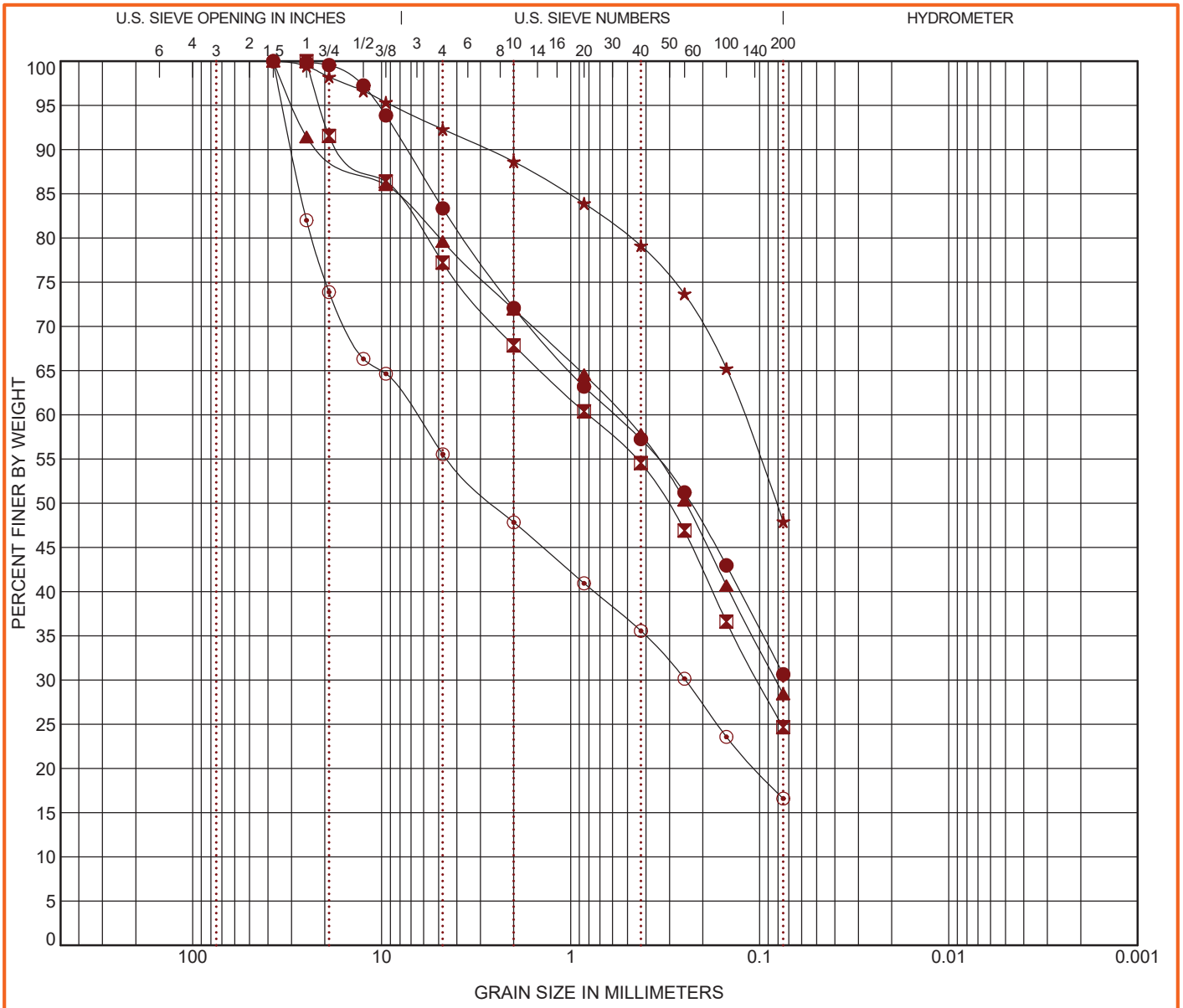
Boring Started: 11-18-2020 | Boring Completed: 11-18-2020

Drill Rig: CME-75 | Driller: P. Michaud

Project No.: J2205052

GRAIN SIZE DISTRIBUTION

ASTM D422 / ASTM C136



COBBLES	GRAVEL		SAND			SILT OR CLAY
	coarse	fine	coarse	medium	fine	

Boring ID		Depth	USCS Classification	WC (%)	LL	PL	PI	Cc	Cu
●	IB-1	1	Silty sand with gravel (SM)	7.8					
⊠	IB-1	5 - 5.9	Silty sand with gravel (SM)	4.5					
▲	IB-2	2 - 4	Silty sand with gravel (SM)	6.1					
★	IB-3	1	Sandy silt (ML)	21.2					
⊙	IB-4	2 - 3.4	Silty gravel with sand (GM)	4.2					

Boring ID		Depth	D_{100}	D_{60}	D_{30}	D_{10}	%Cobbles	%Gravel	%Sand	%Silt	%Fines	%Clay
●	IB-1	1	37.5	0.586			0.0	16.6	52.7		30.6	
⊠	IB-1	5 - 5.9	25	0.812	0.102		0.0	22.8	52.5		24.7	
▲	IB-2	2 - 4	37.5	0.533	0.082		0.0	20.4	51.2		28.4	
★	IB-3	1	37.5	0.122			0.0	7.7	44.4		47.9	
⊙	IB-4	2 - 3.4	37.5	6.671	0.247		0.0	44.5	38.9		16.6	

PROJECT: Islander Solar

PROJECT NUMBER: J2205052

SITE: 850 Iron Mine Hill Road
North Smithfield, Rhode Island

Terracon
201 Hammer Mill Rd
Rocky Hill, CT

CLIENT: Islander Solar LLC
Summit, New Jersey

LABORATORY TESTS ARE NOT VALID IF SEPARATED FROM ORIGINAL REPORT. GRAIN SIZE: USCS-2 J2205052 ISLANDER SOLAR_REV00.GPJ TERRACON_DATATEMPLATE.GDT 1/12/21

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Appendix E

Drainage Area Maps

LEGEND

- DRAINAGE AREA BOUNDARY
- PROPERTY LINE
- 115 — MAJOR CONTOUR
- MINOR CONTOUR
- TIME OF CONC. FLOW PATH

PEAK RUNOFF (CFS)

DESIGN STORM	DP 1	DP 2	DP 3	DP 4	DP 4A
10-YEAR	0.15	0.15	0.39	5.8	0.64
100-YEAR	0.44	0.47	1.2	24.0	2.5

NOTES:
1. BASE PLAN: "LIMITED CONTENT BOUNDARY SURVEY WITH EXISTING CONDITIONS AND TOPOGRAPHY", DATED DECEMBER 17, 2019, NORTHEAST ENGINEERS & CONSULTANTS
2. SOIL IS CLASSIFIED CANTON AND CHARLTON FINE SANDY LOAMS (CEC), HYDROLOGIC SOIL GROUP B, BY THE NATURAL RESOURCES CONSERVATION SERVICE.

DRAINAGE AREA 103
AREA: 0.3 AC
CN: 63
TC: 12.7 MIN

DESIGN POINT 3
(PROPERTY LINE)

DRAINAGE AREA 104
AREA: 9.4 AC
CN: 56
TC: 21.1 MIN

GRAVEL SURFACE, HSG B, CN=96

GRASS, GOOD, HSG B, CN=61

DRAINAGE AREA 104A
(WITHIN 104)
AREA: 0.72 AC
CN: 57
TC: 9.9 MIN

WOODS, GOOD, HSG B, CN=55

104A

DESIGN POINT 4A
(PROPERTY LINE)

WOODS, GOOD, HSG B, CN=55

ROOFS, HSG B, CN=98

DESIGN POINT 2
(PROPERTY LINE)

DRAINAGE AREA 102
AREA: 0.12 AC
CN: 62
TC: 10.7 MIN

DRAINAGE AREA 101
AREA: 0.08 AC
CN: 66
TC: 6 MIN

DESIGN POINT 1
(EDGE OF PAVEMENT)

DESIGN POINT 4
(PROPERTY LINE)

PROPERTY LINE

IRON MINE HILL ROAD
(PUBLIC RIGHT OF WAY)

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

ISLANDER SOLAR, LLC
396 SPRINGFIELD AVE
SUMMIT, NJ 07901

POMHAM SOLAR ACCESS ROAD
AP 16 LOTS 18 & 19
OFF IRON MINE HILL ROAD
NORTH SMITHFIELD, RI 02896

Not Valid Without Signature

0 50' 100'
SCALE: 1" = 50'

No.	REVISION	DATE	DRAWN	DESIGN	CHK

DRAWN BY: GJR | DESIGNED BY: JMG | CHECKED BY: JMG

RIPDES CONSTRUCTION GENERAL PERMIT NOI
PRE-DEVELOPMENT DRAINAGE AREAS

PERMITTING ONLY

DRAWING NO:
DA-1

PROJECT NO: P322-001
DATE OF ISSUE: 09/24/2021
SHEET NO: 1 OF 2

DATE: Sep 29, 2021 - 2:48PM
DRAWING: J:\P322-000_Islander (Pomham) Solar - Design and Permitting\04_GRAPHICS\CAD\Drawings\RIPDES Drainage Area Maps\P322-000 Pomham Solar RIPDES DA Maps.dwg

LEGEND

- DRAINAGE AREA BOUNDARY
- PROPERTY LINE
- 115 — MAJOR CONTOUR
- MINOR CONTOUR
- TIME OF CONC. FLOW PATH

PEAK RUNOFF (CFS)

DESIGN STORM	DP 1	DP 2	DP 3	DP 4	DP 4A
10-YEAR	0.23	0.15	0.47	6.2	0.58
100- YEAR	0.58	0.43	1.4	24.0	2.1

NOTES:
1. BASE PLAN: "LIMITED CONTENT BOUNDARY SURVEY WITH EXISTING CONDITIONS AND TOPOGRAPHY", DATED DECEMBER 17, 2019, NORTHEAST ENGINEERS & CONSULTANTS
2. SOIL IS CLASSIFIED CANTON AND CHARLTON FINE SANDY LOAMS (CEC), HYDROLOGIC SOIL GROUP B, BY THE NATURAL RESOURCES CONSERVATION SERVICE.

DRAINAGE AREA 204
AREA: 9.4 AC
CN: 57
TC: 22.9 MIN

DRAINAGE AREA 203
AREA: 0.33 AC
CN: 65
TC: 12.7 MIN

DRAINAGE AREA 204A
(WITHIN 204)
AREA: 0.56 AC
CN: 59
TC: 9.9 MIN

GRAVEL SURFACE, HSG B, CN=96

WOODS, GOOD, HSG B, CN=55

GRASS, GOOD, HSG B, CN=61

ROOFS, HSG B, CN=98

204A

DESIGN POINT 3
(PROPERTY LINE)

DESIGN POINT 2
(PROPERTY LINE)

DESIGN POINT 4A
(PROPERTY LINE)

DESIGN POINT 4
(PROPERTY LINE)

DESIGN POINT 1
(EDGE OF PAVEMENT)

DRAINAGE AREA 202
AREA: 0.09 AC
CN: 66
TC: 9.8 MIN

DRAINAGE AREA 201
AREA: 0.09 AC
CN: 72
TC: 6 MIN

IRON MINE HILL ROAD
(PUBLIC RIGHT OF WAY)

PROPERTY LINE

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Not Valid Without Signature

SCALE: 1" = 50'

No.	REVISION	DATE	DRAWN	DESIGN	CHK

DRAWN BY: GJR | DESIGNED BY: JMG | CHECKED BY: JMG

RIPDES CONSTRUCTION GENERAL PERMIT NOI
POST-DEVELOPMENT DRAINAGE AREAS

PERMITTING ONLY

DRAWING NO:
DA-2

PROJECT NO: P322-001
DATE OF ISSUE: 09/24/2021
SHEET NO: 2 OF 2

DATE: Sep 29, 2021 - 2:48PM
DRAWING: J:\P322-000 Islander - Pomham\ Solar - Design and Permitting\04 GRAPHICS\CAD\Drawings\RIPDES\Drainage Area Maps\P322-000 Pomham Solar RIPDES DA Maps.dwg