STORMWATER MANAGEMENT REPORT

PROPOSED

EAST WINDSOR SOLAR ONE, LLC

SOLAR PROJECT

341 EAST ROAD
EAST WINDSOR AND ELLINGTON, CONNECTICUT
HARTFORD COUNTY

Prepared for:

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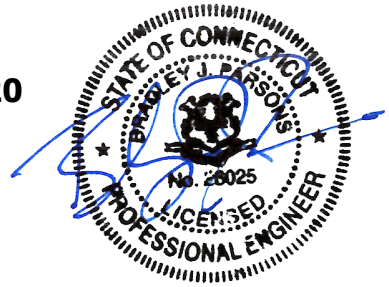
July 2020



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Introduction

At the request of East Windsor Solar One, LLC, All-Points Technology Corporation, P.C. ("APT") has undertaken analysis of and design to address stormwater impacts resulting from development of a proposed five (4.95±) MW alternating current (AC) solar electric generating facility in East Windsor, Connecticut (the "Project"). The Project, known as the East Windsor Solar One, LLC project, involves the installation of solar panels and associated equipment on a parcel at 341 East Road in both East Windsor and Ellington, Connecticut. The proposed solar array will be located specifically in the northwestern corner of the parcel and isolated in the Town of East Windsor ("Site").

The purpose of this report is to provide an analysis of the potential stormwater drainage impacts associated with the Project, as well as a description of the design to mitigate such potential stormwater drainage impacts. The design is intended to be in full compliance with the State and Town regulations while taking prevailing site conditions and practical factors into account.

Existing Site Conditions

The property is a privately-owned irregular shaped parcel located at 341 East Road in both East Windsor and Ellington, Connecticut, that consists of approximately 147.81± acres of undeveloped land. The parcel is bisected by the town boundary between East Windsor and Ellington in a north/south direction. An existing CL&P right-of-way also bisects the property on the Ellington side in the north/south direction as well.

The Site's existing topography generally slopes downward from northwest to southeast, and the topography includes slopes that range from approximately 0 to 5 percent throughout. Elevations within the project area of the Site range from approximately 206 feet AMSL near the northwestern corner of the site at the corner of Middle and East Road to approximately 192 feet AMSL along the southern limits of disturbance.

Developed Site Conditions

The Project will be constructed in the northwestern area of the property. Proposed access to the Site will off of East Road, approximately 554 feet south of the intersection of East Road and Middle Road. The Project includes the installation of 19,344 solar panels (15,990 Trina Solar TSM-DEG15MC.20(II) 395W modules and 3,354 Risen Solar RSM144-6-380BMDG 380W modules) and associated fencing, access road, utility, and stormwater management features, within 29.13± acres of the property. The 29.13± acres within the Project limits of disturbance is in an existing agricultural field that has been and is currently being tended to as an agricultural field. The project area has recently been turned and planted with a cover legume crop.

The proposed solar panels will be installed on a post driven ground mounted racking system, with minimal changes to the existing grades. As a result, the post-development site conditions will mimic the pre-developed site conditions. Areas of clearing and grubbing and any existing ground cover that is disturbed during construction will be reseeded with a low growth seed mix. A grass-lined stormwater management basin/temporary sediment basin is proposed along the

southern limits of the Project area to treat the WQV and provide sediment laden runoff control during construction.

Stormwater Management

Analysis Methodology

The hydrologic analysis was performed using the HydroCAD stormwater modeling system computer program developed by HydroCAD Software Solutions, LLC.

Hydrographs for each watershed were developed using the SCS Synthetic Unit Hydrograph Method with a Type III rainfall distribution. Hydrographs were developed for the NOAA Atlas 14, Volume 10, Version 3 Precipitation 2-, 25-, 50-, and 100-year storm event with rainfall depths of 3.17, 6.17, 7.01, and 7.95 inches respectively.

The existing and proposed drainage areas used in the calculations are illustrated on the Existing and Proposed Drainage Area Plans (EDA-1 & PDA-1). These maps and the corresponding HydroCAD output are attached.

Utilizing Appendix I, Stormwater Management at Solar Array Construction Projects, provided by Connecticut Department of Energy & Environmental Projection ("CT DEEP"), this hydrologic analysis will reflect a reduction of the Hydrologic Soil Group ("HSG") present on-site by one (1) step (e.g. soils of HSG B shall be considered HSG C). This reduction, as indicated by CT DEEP, is intended to account for the compaction of soils that results from extensive machinery traffic during construction of the array. The Water Quality Volume ("WQV") for the site will be calculated assuming that the roadways, gravel surfaces, and transformer pads are effectively impervious cover, see Appendix F. The solar panels are not considered effective impervious cover for this site because the post construction slopes are less than 15% and conditions (a)-(e) are being met.

Existing Drainage Patterns

The proposed Project area drains typically from the northwest to the southeast, ultimately into either the wooded area to the south of the property or the existing wetland and watercourse system to the east. The Site is modeled at the two (2) Analysis Points ("AP-1" and "AP-2") associated with same, with AP-1 representing the wooded area to the south of the property and AP-2 representing the existing wetland and watercourse system to the east. Peak discharges have been computed at the points of study for the 2-, 25-, 50-, and 100-year storm events.

The Project Site soils identified by the United States Department of Agriculture (USDA) Natural Resources Conservation Service (NRCS) consist of Map Unit Symbol 37C, named "Manchester gravelly sandy loam, 3 to 15 percent slopes", 704A, named "Enfield silt loam, 0 to 3 percent slopes", and 704B, named "Enfield silt loam, 3 to 8 percent slopes". Map Unit Symbol 37C is classified in the HSG rating of "A", while 704A and 704B are classified in the HSG rating of "B". A site-specific soil survey has been conducted to verify the NRCS soil classifications and resulted in a classification of the site soils to be a mix of Manchester, Haven and Enfield, and

Ninigret and Tisbury soils. Manchester soils have an HSG rating of "A" while Haven and Enfield and Ninigret and Tisbury soils have an HSG rating of "B", which do align with the NRCS classifications. The site-specific soil survey boundaries are used, when applicable, for modeling purposes.

The pre-developed discharges at the Analysis Point are tabulated in Table 1-1.

Table 1-1

Analysis Point	**Pre-developed Peak Storm Runoff (Q), cubic feet per second (cfs)**			
	2-year	**25-year**	**50-year**	**100-year**
AP-1	0.52	1.95	2.39	2.90
AP-2	8.58	45.13	57.34	71.62

Proposed Drainage Patterns

The Project will require little to no clearing and grubbing within the existing agricultural field in the immediate area for the proposed solar installation, including the necessary utilities, access road, and stormwater management features, resulting in approximately 29.13± acres of disturbance. Earthwork will principally be associated with the installation of the proposed stormwater basin, B-1. The surface flow paths are designed to mimic existing conditions hydrologically so the proposed condition is modeled with the same catchment areas and two (2) analysis points ("AP-1" and "AP-2").

The overall curve number associated with the proposed condition cover type of meadow when dropped an HSG rating within areas of extensive machinery during construction per Appendix I is lower in comparison to the existing condition cover type of straight row legumes. However, in order to provide treatment for the WQV as well as potential sediment runoff generated during construction, one (1) grass-lined stormwater management infiltration basin/temporary sediment basin (B-1/TSB-1) is proposed along the southern project area. Basin B-1 is conservatively modeled with the maximum allowable infiltration rate of 5 inches/hour and an overflow weir to provide the necessary WQV, calculations provided in Appendix F. In comparison, a geotechnical evaluation with associated boring (B-6) and lab testing resulted in an infiltration rate of 25.4 inches/hour for the soils located within the proposed Basin B-1, see Appendix E. The overflow from Basin B-1 will discharge to Analysis Point AP-2.

Since the proposed development is designed mimic existing conditions with the addition of Basin B-1, the post-development condition is modeled with the same three (3) catchment areas and two (2) Analysis Points ("AP-1" and "AP-2"). Peak discharges have been computed at the point of study for the 2-year, 25-year, 50-year, and 100-year storm events. The post-development discharges at each point of study are tabulated in Table 1-2.

Table 1-2

Analysis Point	**Post-developed Peak Storm Runoff (Q), cubic feet per second (cfs)**			
	2-year	**25-year**	**50-year**	**100-year**
AP-1	0.42	1.65	2.03	2.47
AP-2	2.16	8.43	17.70	29.02

Conclusion

The stormwater management for the proposed site has been designed such that the post-development peak discharges to the waters of the State of Connecticut for the 2-, 25-, 50-, and 100- year storm events are less than the pre-development peak discharges. As a result, the proposed solar array will not result in any adverse conditions to the surrounding areas and properties.

APPENDIX A: NRCS SOIL SURVEY

Map Scale: 1:6,220 if printed on A portrait (8.5" x 11") sheet.

N

Meters: 0 50 100 200 300

Feet: 0 300 600 1200 1800

Map projection: Web Mercator Corner coordinates: WGS84 Edge tics: UTM Zone 18N 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.

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 Connecticut
Survey Area Data: Version 18, Dec 6, 2018

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

Date(s) aerial images were photographed: Aug 27, 2016—Oct 30, 2017

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

Hydrologic Soil Group

Map unit symbol	Map unit name	Rating	Acres in AOI	Percent of AOI
12	Raypol silt loam	C/D	10.3	5.0%
15	Scarboro muck, 0 to 3 percent slopes	A/D	3.6	1.8%
23A	Sudbury sandy loam, 0 to 5 percent slopes	B	13.1	6.4%
29A	Agawam fine sandy loam, 0 to 3 percent slopes	B	1.9	0.9%
29B	Agawam fine sandy loam, 3 to 8 percent slopes	B	2.7	1.3%
35B	Penwood loamy sand, 3 to 8 percent slopes	A	1.2	0.6%
37C	Manchester gravelly sandy loam, 3 to 15 percent slopes	A	21.4	10.4%
108	Saco silt loam	B/D	8.1	3.9%
701A	Ninigret fine sandy loam, 0 to 3 percent slopes	C	3.4	1.6%
702A	Tisbury silt loam, 0 to 3 percent slopes	C	10.9	5.3%
702B	Tisbury silt loam, 3 to 8 percent slopes	C	2.6	1.3%
704A	Enfield silt loam, 0 to 3 percent slopes	B	92.5	45.1%
704B	Enfield silt loam, 3 to 8 percent slopes	B	30.1	14.7%
W	Water		3.5	1.7%
Totals for Area of Interest			**205.3**	**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

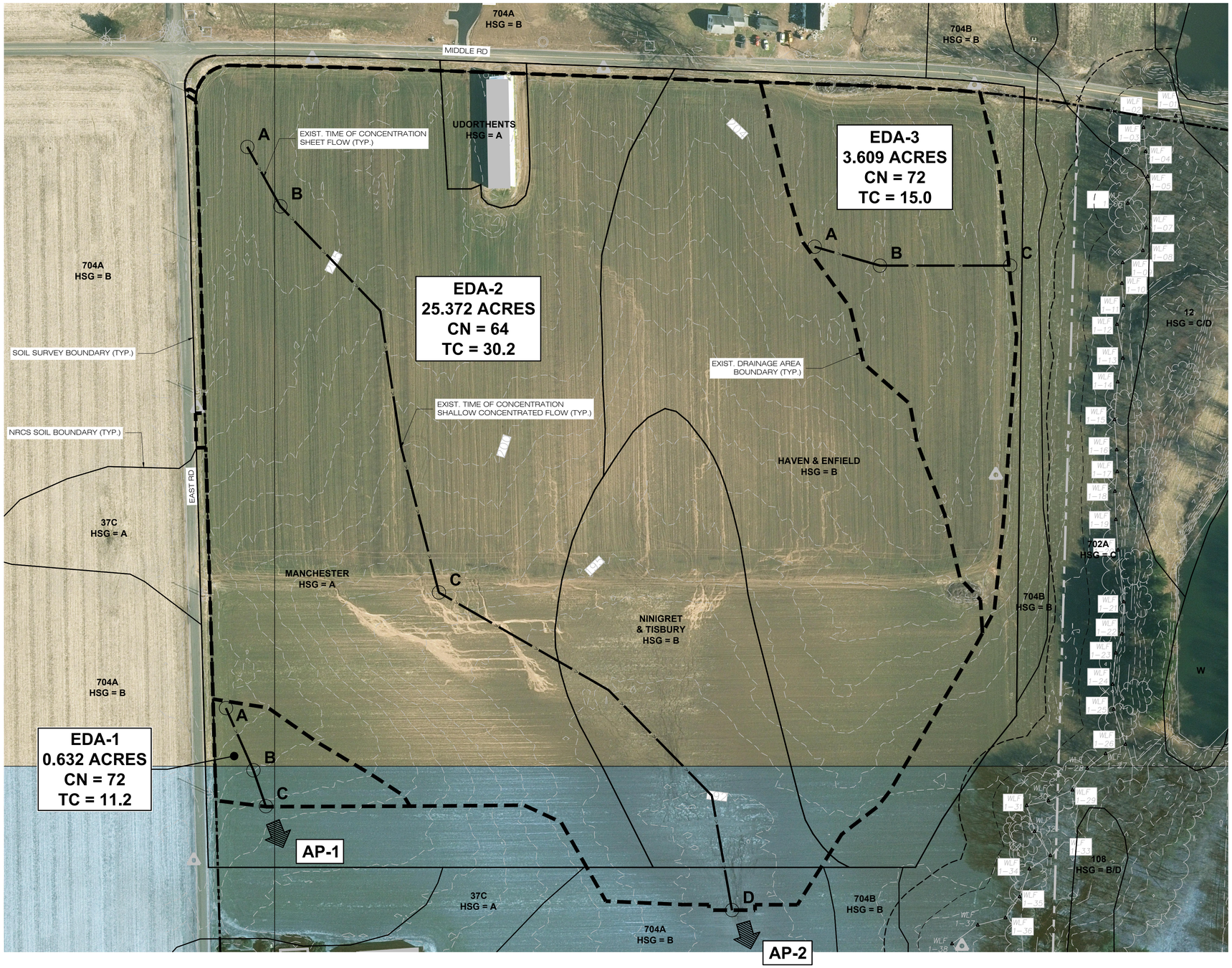
APPENDIX B: EXISTING DRAINAGE AREA MAP (EDA-1) & HYDROLOGIC COMPUTATION (HYDROCAD)

EXISTING DRAINAGE AREAS

WATERSHED	TOTAL AREA (ACRES)	COMPOSITE CN	TC (MINS.)
EDA-1	0.632	72	11.2
EDA-2	25.372	64	30.2
EDA-3	3.609	72	15.0

EXISTING CONDITION PEAK FLOWS

ANALYSIS POINT	2-YEAR (CFS)	25-YEAR (CFS)	50-YEAR (CFS)	100-YEAR (CFS)
AP-1	0.52	1.95	2.39	2.90
AP-2	8.58	45.13	57.34	71.62



1 EDA-1 **EXISTING DRAINAGE AREA MAP**
SCALE : 1" = 80'-0"

80 0 40 80 160
(IN FEET) 1 inch = 80 ft.

EAST WINDSOR SOLAR ONE, LLC

150 TRUMBULL STREET 4TH FLOOR HARTFORD, CT, 06103

ALL-POINTS TECHNOLOGY CORPORATION

567 VAUXHAUL STREET EXTENSION - SUITE 311
WATERFORD, CT 06385 PHONE: (860)-663-1697
WWW.ALLPOINTSTECH.COM FAX: (860)-663-0935

PERMIT SET

NO	DATE	REVISION
0	07/24/20	FOR REVIEW: BJP
1		
2		
3		
4		
5		
6		

DESIGN PROFESSIONAL OF RECORD

PROF: BRADLEY J. PARSONS P.E.
COMP: ALL-POINTS TECHNOLOGY CORPORATION
ADD: 567 VAUXHAUL STREET EXTENSION - SUITE 311 WATERFORD, CT 06385

OWNER: ASSOCIATION OF THE CATHOLIC CEMETERIES
ADDRESS: 341 EAST ROAD EAST WINDSOR&ELLINGTON,CT

EAST WINDSOR SOLAR ONE, LLC

SITE ADDRESS: 341 EAST ROAD EAST WINDSOR, CT

APT FILING NUMBER: CT590210

DRAWN BY: JT

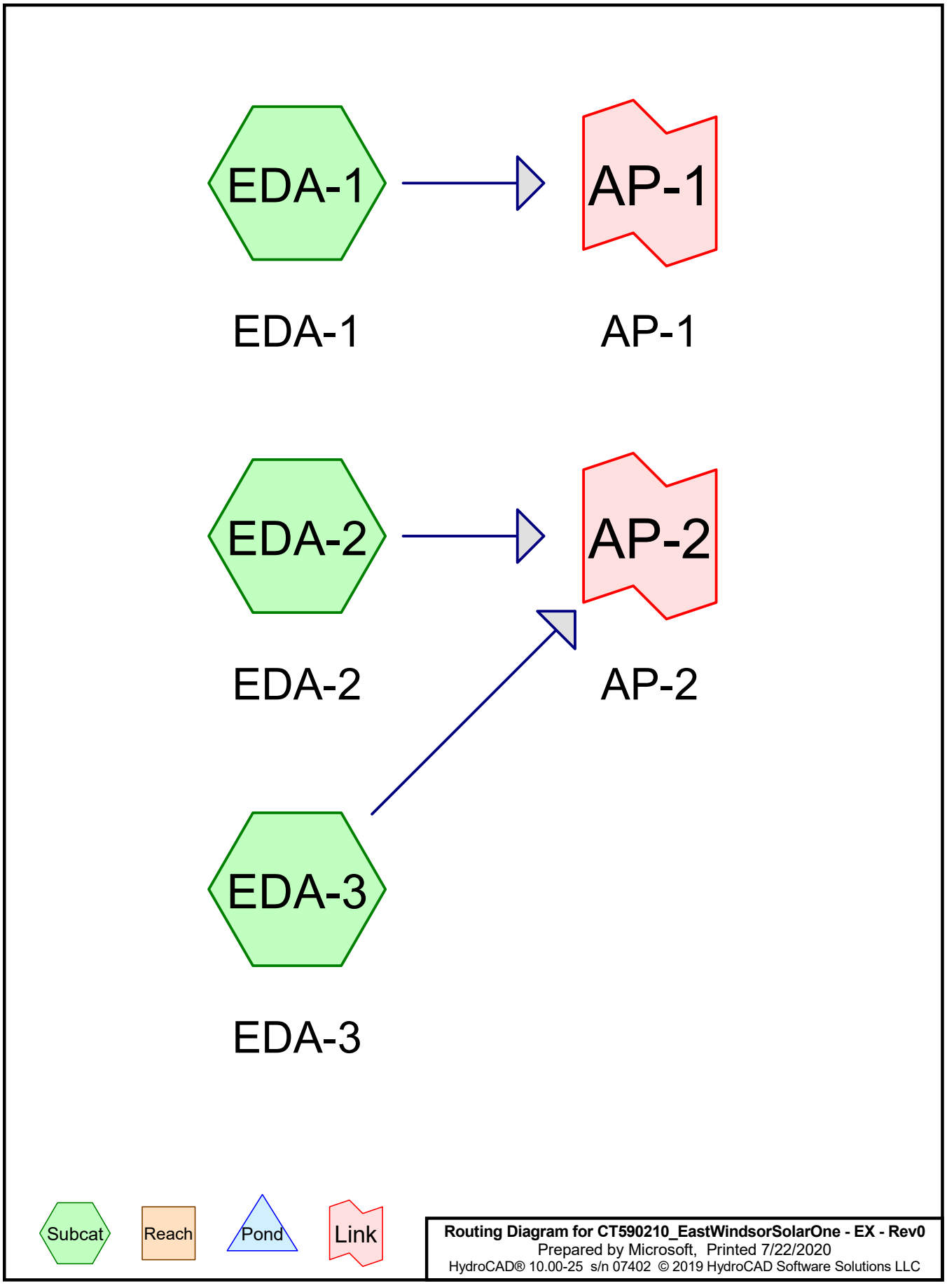
DATE: 07/24/20 CHECKED BY: BJP

SHEET TITLE:

EXISTING DRAINAGE AREA MAP

SHEET NUMBER:

EDA-1



Routing Diagram for CT590210_EastWindsorSolarOne - EX - Rev0
Prepared by Microsoft, Printed 7/22/2020

Area Listing (all nodes)

Area (acres)	CN	Description (subcatchment-numbers)
13.849	58	Legumes, straight row, Good, HSG A (EDA-2)
15.646	72	Legumes, straight row, Good, HSG B (EDA-1, EDA-2, EDA-3)
0.118	98	Unconnected roofs, HSG A (EDA-2)
29.613	**66**	**TOTAL AREA**

Soil Listing (all nodes)

Area (acres)	Soil Group	Subcatchment Numbers
13.967	HSG A	EDA-2
15.646	HSG B	EDA-1, EDA-2, EDA-3
0.000	HSG C	
0.000	HSG D	
0.000	Other	
29.613		**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
13.849	15.646	0.000	0.000	0.000	29.495	Legumes, straight row, Good	EDA-1, EDA-2, EDA-3
0.118	0.000	0.000	0.000	0.000	0.118	Unconnected roofs	EDA-2
13.967	**15.646**	**0.000**	**0.000**	**0.000**	**29.613**	**TOTAL AREA**	

Time span=0.00-72.00 hrs, dt=0.01 hrs, 7201 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Dyn-Stor-Ind method - Pond routing by Dyn-Stor-Ind method

Subcatchment EDA-1: EDA-1 Runoff Area=0.632 ac 0.00% Impervious Runoff Depth=0.91"
Flow Length=156' Tc=11.2 min CN=72 Runoff=0.52 cfs 0.048 af

Subcatchment EDA-2: EDA-2 Runoff Area=25.372 ac 0.47% Impervious Runoff Depth=0.55"
Flow Length=1,414' Tc=30.2 min CN=64 Runoff=6.99 cfs 1.153 af

Subcatchment EDA-3: EDA-3 Runoff Area=3.609 ac 0.00% Impervious Runoff Depth=0.91"
Flow Length=292' Tc=15.0 min CN=72 Runoff=2.66 cfs 0.274 af

Link AP-1: AP-1 Inflow=0.52 cfs 0.048 af
Primary=0.52 cfs 0.048 af

Link AP-2: AP-2 Inflow=8.58 cfs 1.427 af
Primary=8.58 cfs 1.427 af

Total Runoff Area = 29.613 ac Runoff Volume = 1.475 af Average Runoff Depth = 0.60"
99.60% Pervious = 29.495 ac 0.40% Impervious = 0.118 ac

Summary for Subcatchment EDA-1: EDA-1

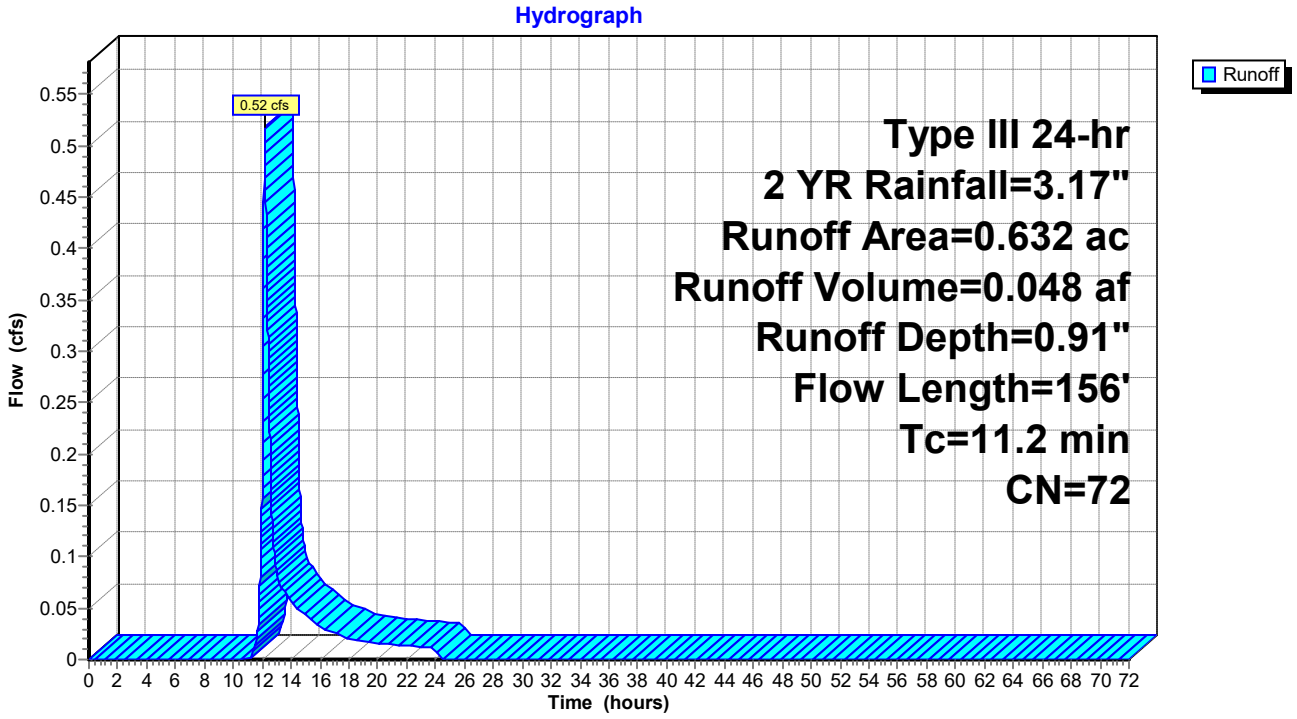
Runoff = 0.52 cfs @ 12.17 hrs, Volume= 0.048 af, Depth= 0.91"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Type III 24-hr 2 YR Rainfall=3.17"

Area (ac)	CN	Description
0.632	72	Legumes, straight row, Good, HSG B
0.632		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
10.8	100	0.0158	0.15		**Sheet Flow, A-B** Grass: Short n= 0.150 P2= 3.17"
0.4	56	0.0234	2.29		**Shallow Concentrated Flow, B-C** Grassed Waterway Kv= 15.0 fps
11.2	156	Total			

Subcatchment EDA-1: EDA-1



Summary for Subcatchment EDA-2: EDA-2

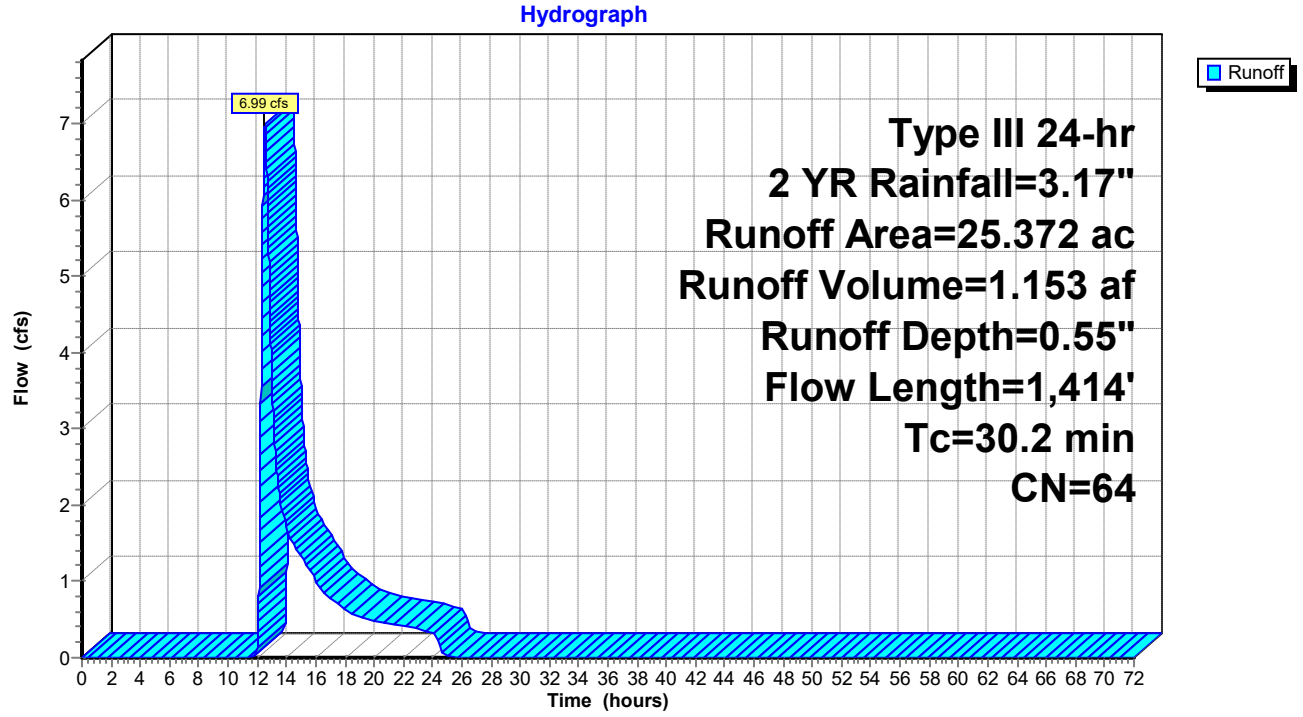
Runoff = 6.99 cfs @ 12.52 hrs, Volume= 1.153 af, Depth= 0.55"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Type III 24-hr 2 YR Rainfall=3.17"

Area (ac)	CN	Description
13.849	58	Legumes, straight row, Good, HSG A
0.118	98	Unconnected roofs, HSG A
11.405	72	Legumes, straight row, Good, HSG B
25.372	64	Weighted Average
25.254		99.53% Pervious Area
0.118		0.47% Impervious Area
0.118		100.00% Unconnected

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
15.8	100	0.0061	0.11		**Sheet Flow, A-B** Grass: Short n= 0.150 P2= 3.17"
5.8	637	0.0147	1.82		**Shallow Concentrated Flow, B-C** Grassed Waterway Kv= 15.0 fps
8.6	677	0.0076	1.31		**Shallow Concentrated Flow, C-D** Grassed Waterway Kv= 15.0 fps
30.2	1,414	Total			

Subcatchment EDA-2: EDA-2



Summary for Subcatchment EDA-3: EDA-3

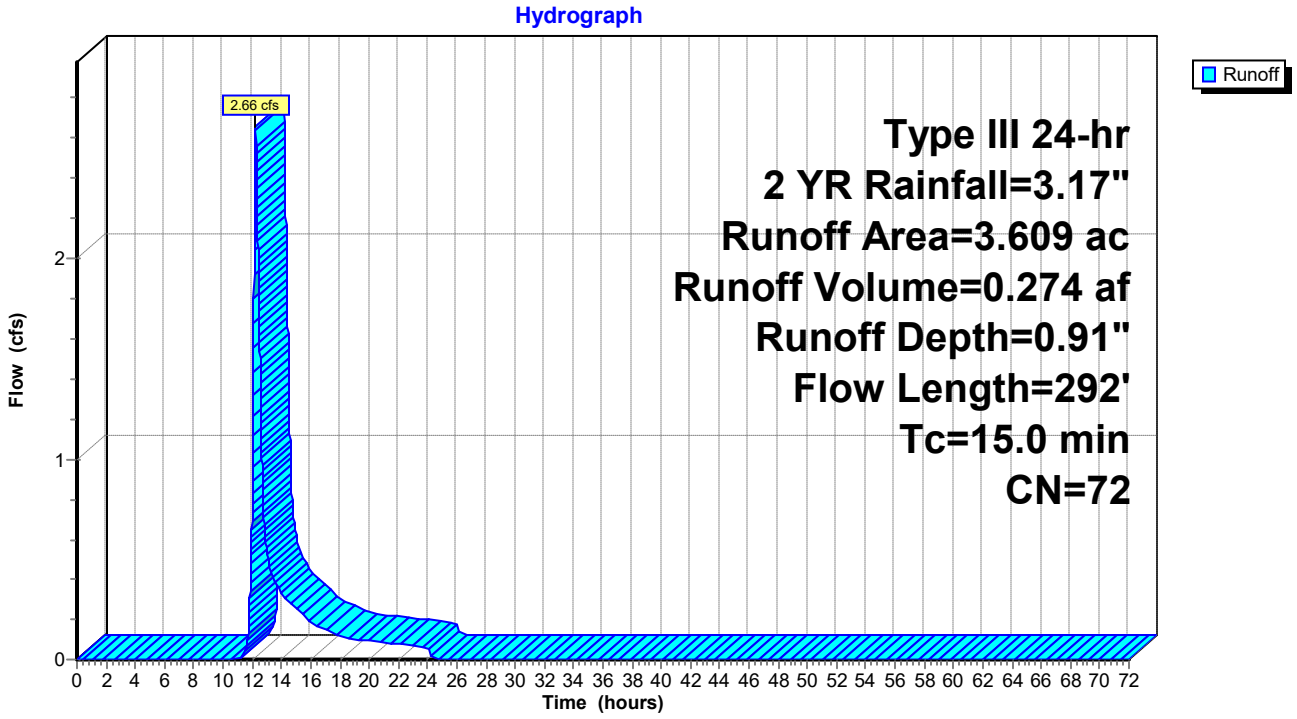
Runoff = 2.66 cfs @ 12.22 hrs, Volume= 0.274 af, Depth= 0.91"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Type III 24-hr 2 YR Rainfall=3.17"

Area (ac)	CN	Description
3.609	72	Legumes, straight row, Good, HSG B
3.609		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
13.4	100	0.0092	0.12		**Sheet Flow, A-B** Grass: Short n= 0.150 P2= 3.17"
1.6	192	0.0169	1.95		**Shallow Concentrated Flow, B-C** Grassed Waterway Kv= 15.0 fps
15.0	292	Total			

Subcatchment EDA-3: EDA-3

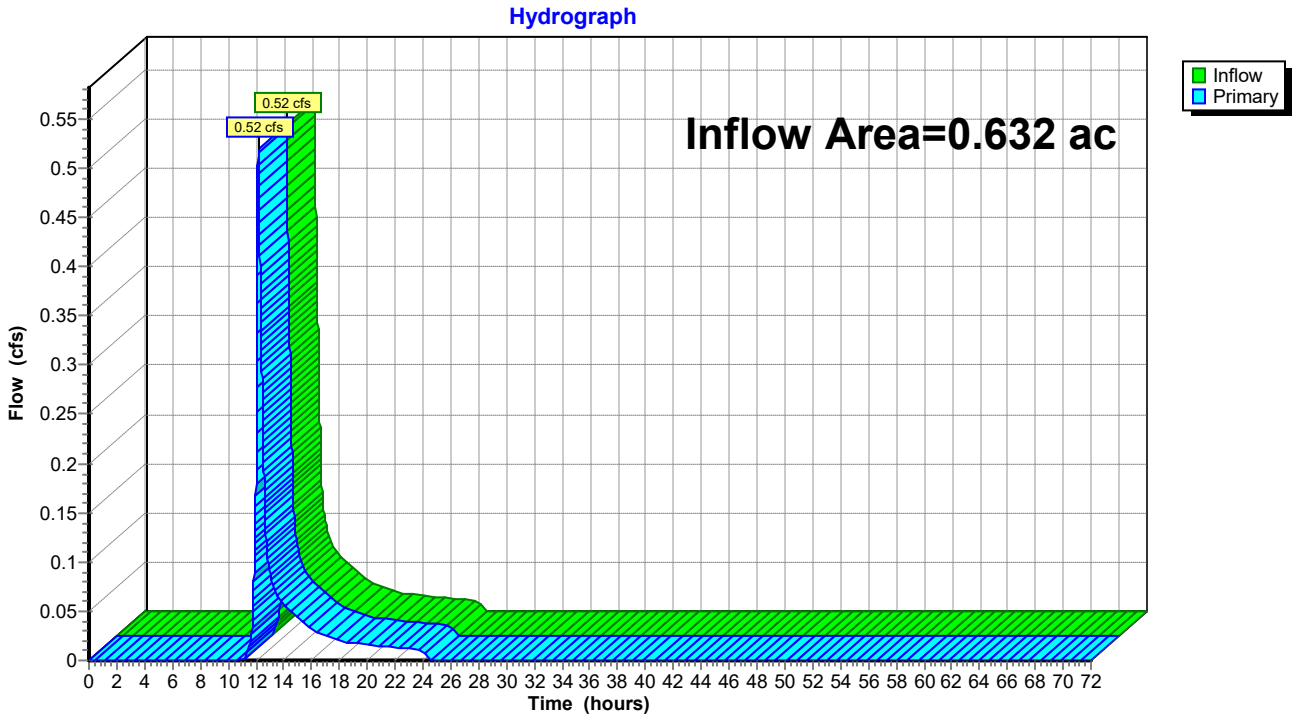


Summary for Link AP-1: AP-1

Inflow Area = 0.632 ac, 0.00% Impervious, Inflow Depth = 0.91" for 2 YR event
Inflow = 0.52 cfs @ 12.17 hrs, Volume= 0.048 af
Primary = 0.52 cfs @ 12.17 hrs, Volume= 0.048 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs

Link AP-1: AP-1

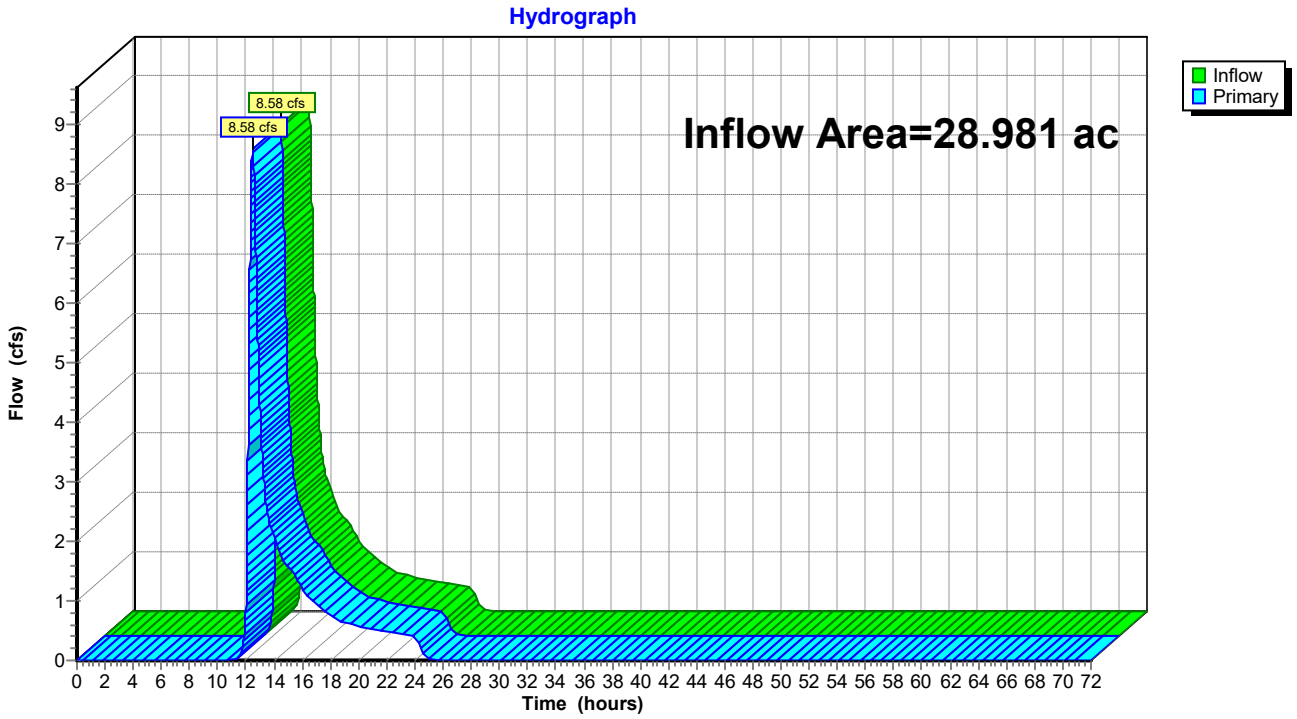


Summary for Link AP-2: AP-2

Inflow Area = 28.981 ac, 0.41% Impervious, Inflow Depth = 0.59" for 2 YR event
Inflow = 8.58 cfs @ 12.48 hrs, Volume= 1.427 af
Primary = 8.58 cfs @ 12.48 hrs, Volume= 1.427 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs

Link AP-2: AP-2



Time span=0.00-72.00 hrs, dt=0.01 hrs, 7201 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Dyn-Stor-Ind method - Pond routing by Dyn-Stor-Ind method

Subcatchment EDA-1: EDA-1 Runoff Area=0.632 ac 0.00% Impervious Runoff Depth=3.13"
Flow Length=156' Tc=11.2 min CN=72 Runoff=1.95 cfs 0.165 af

Subcatchment EDA-2: EDA-2 Runoff Area=25.372 ac 0.47% Impervious Runoff Depth=2.39"
Flow Length=1,414' Tc=30.2 min CN=64 Runoff=38.94 cfs 5.043 af

Subcatchment EDA-3: EDA-3 Runoff Area=3.609 ac 0.00% Impervious Runoff Depth=3.13"
Flow Length=292' Tc=15.0 min CN=72 Runoff=10.00 cfs 0.942 af

Link AP-1: AP-1 Inflow=1.95 cfs 0.165 af
Primary=1.95 cfs 0.165 af

Link AP-2: AP-2 Inflow=45.13 cfs 5.986 af
Primary=45.13 cfs 5.986 af

Total Runoff Area = 29.613 ac Runoff Volume = 6.151 af Average Runoff Depth = 2.49"
99.60% Pervious = 29.495 ac 0.40% Impervious = 0.118 ac

Summary for Subcatchment EDA-1: EDA-1

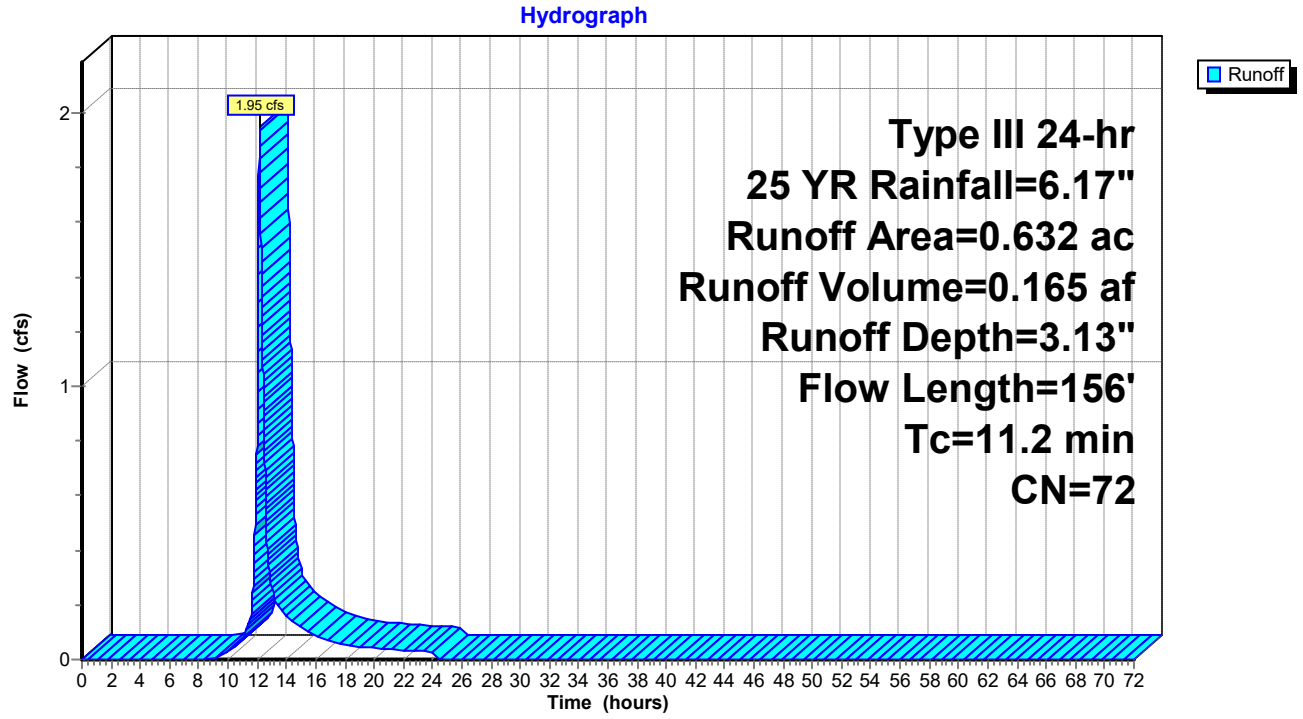
Runoff = 1.95 cfs @ 12.16 hrs, Volume= 0.165 af, Depth= 3.13"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Type III 24-hr 25 YR Rainfall=6.17"

Area (ac)	CN	Description
0.632	72	Legumes, straight row, Good, HSG B
0.632		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
10.8	100	0.0158	0.15		**Sheet Flow, A-B** Grass: Short n= 0.150 P2= 3.17"
0.4	56	0.0234	2.29		**Shallow Concentrated Flow, B-C** Grassed Waterway Kv= 15.0 fps
11.2	156	Total			

Subcatchment EDA-1: EDA-1



Summary for Subcatchment EDA-2: EDA-2

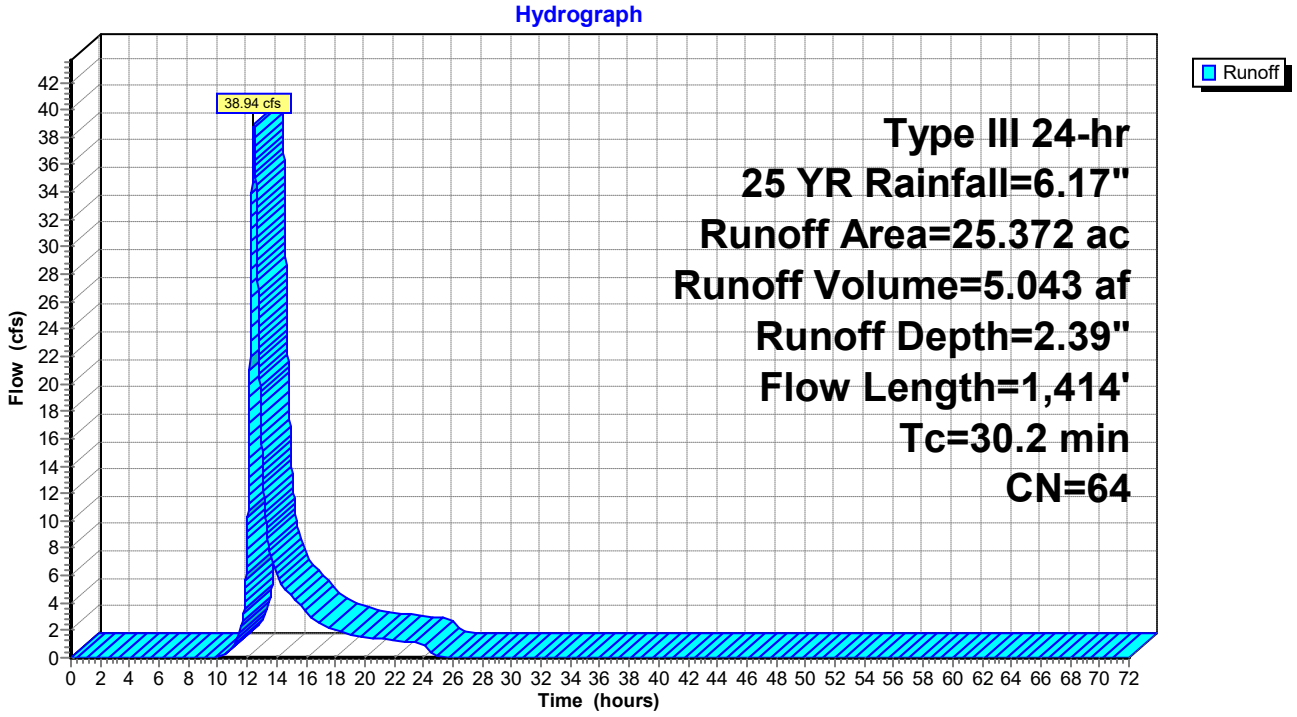
Runoff = 38.94 cfs @ 12.45 hrs, Volume= 5.043 af, Depth= 2.39"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Type III 24-hr 25 YR Rainfall=6.17"

Area (ac)	CN	Description
13.849	58	Legumes, straight row, Good, HSG A
0.118	98	Unconnected roofs, HSG A
11.405	72	Legumes, straight row, Good, HSG B
25.372	64	Weighted Average
25.254		99.53% Pervious Area
0.118		0.47% Impervious Area
0.118		100.00% Unconnected

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
15.8	100	0.0061	0.11		**Sheet Flow, A-B** Grass: Short n= 0.150 P2= 3.17"
5.8	637	0.0147	1.82		**Shallow Concentrated Flow, B-C** Grassed Waterway Kv= 15.0 fps
8.6	677	0.0076	1.31		**Shallow Concentrated Flow, C-D** Grassed Waterway Kv= 15.0 fps
30.2	1,414	Total			

Subcatchment EDA-2: EDA-2



Summary for Subcatchment EDA-3: EDA-3

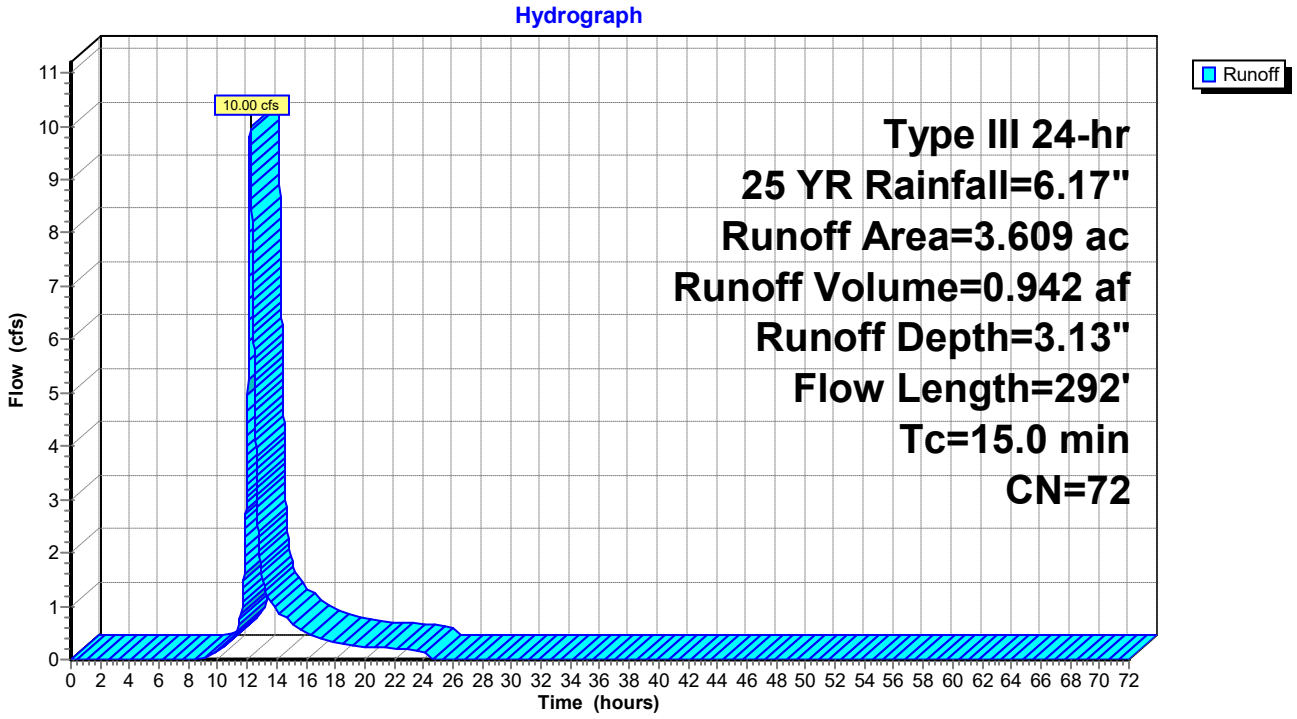
Runoff = 10.00 cfs @ 12.21 hrs, Volume= 0.942 af, Depth= 3.13"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Type III 24-hr 25 YR Rainfall=6.17"

Area (ac)	CN	Description
3.609	72	Legumes, straight row, Good, HSG B
3.609		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
13.4	100	0.0092	0.12		**Sheet Flow, A-B** Grass: Short n= 0.150 P2= 3.17"
1.6	192	0.0169	1.95		**Shallow Concentrated Flow, B-C** Grassed Waterway Kv= 15.0 fps
15.0	292	Total			

Subcatchment EDA-3: EDA-3

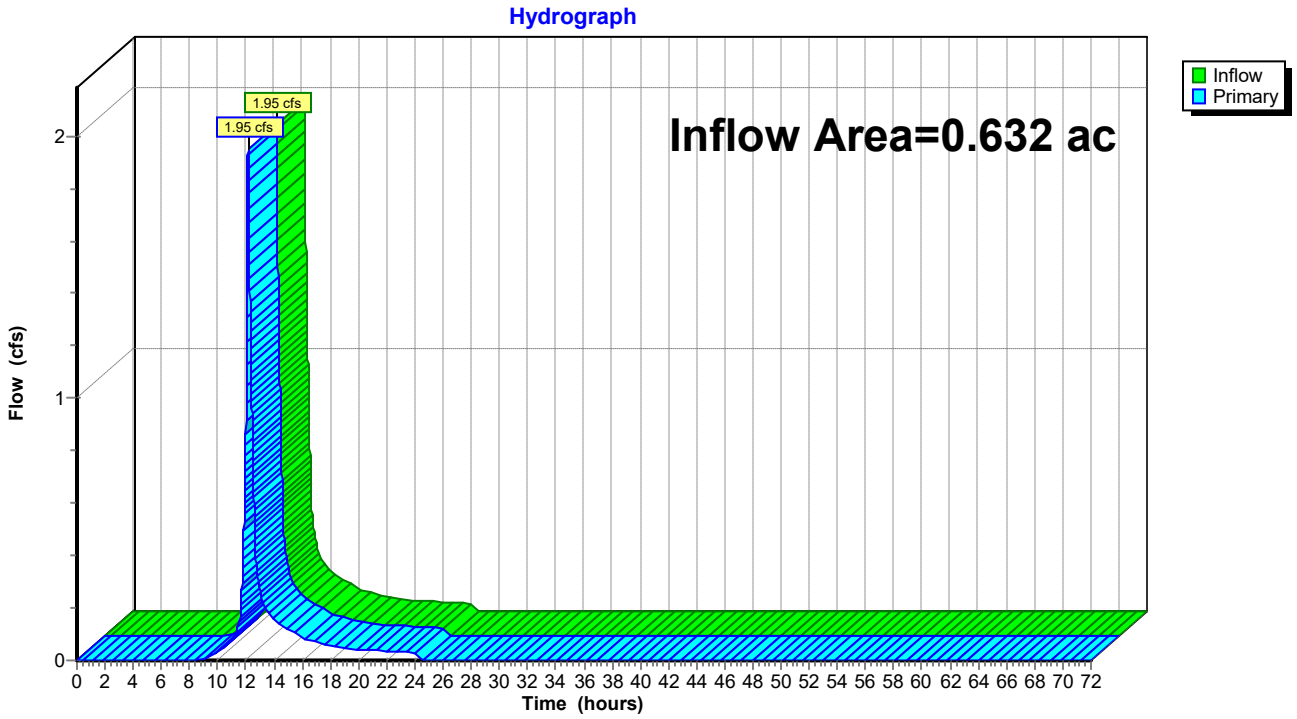


Summary for Link AP-1: AP-1

Inflow Area = 0.632 ac, 0.00% Impervious, Inflow Depth = 3.13" for 25 YR event
Inflow = 1.95 cfs @ 12.16 hrs, Volume= 0.165 af
Primary = 1.95 cfs @ 12.16 hrs, Volume= 0.165 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs

Link AP-1: AP-1

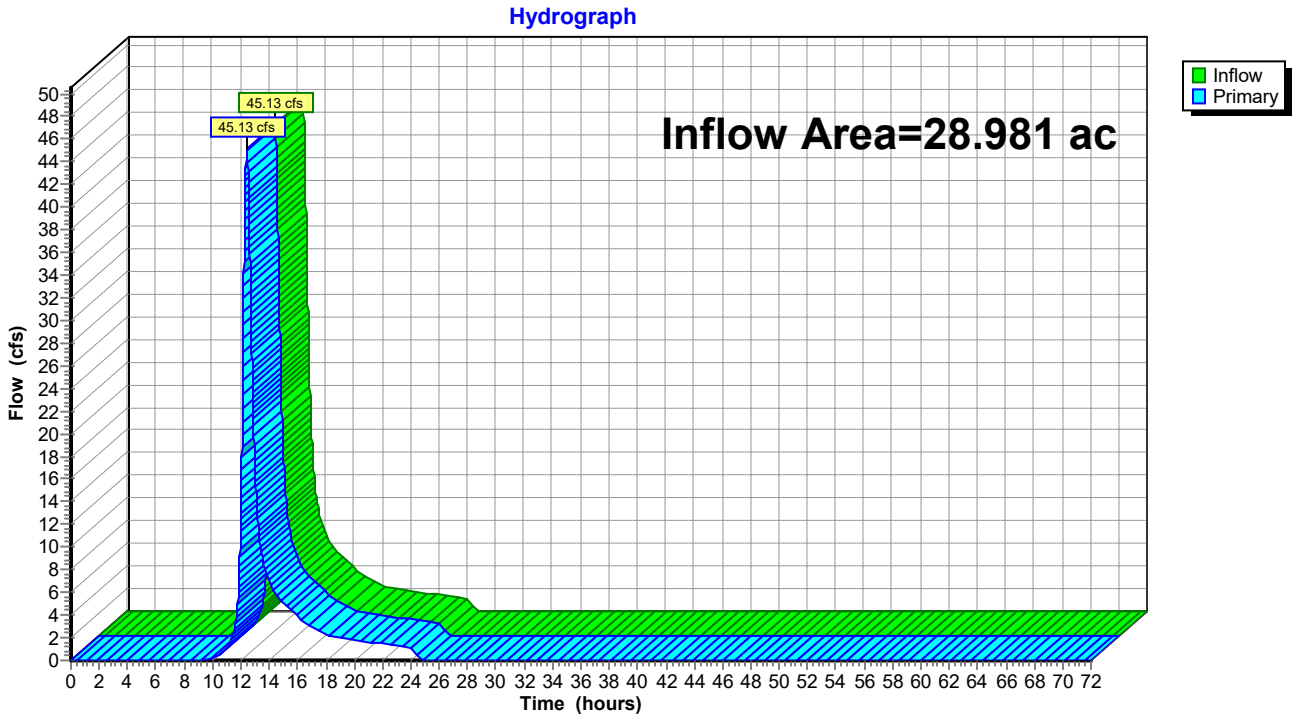


Summary for Link AP-2: AP-2

Inflow Area = 28.981 ac, 0.41% Impervious, Inflow Depth = 2.48" for 25 YR event
Inflow = 45.13 cfs @ 12.41 hrs, Volume= 5.986 af
Primary = 45.13 cfs @ 12.41 hrs, Volume= 5.986 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs

Link AP-2: AP-2



Time span=0.00-72.00 hrs, dt=0.01 hrs, 7201 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Dyn-Stor-Ind method - Pond routing by Dyn-Stor-Ind method

Subcatchment EDA-1: EDA-1 Runoff Area=0.632 ac 0.00% Impervious Runoff Depth=3.84"
Flow Length=156' Tc=11.2 min CN=72 Runoff=2.39 cfs 0.202 af

Subcatchment EDA-2: EDA-2 Runoff Area=25.372 ac 0.47% Impervious Runoff Depth=3.01"
Flow Length=1,414' Tc=30.2 min CN=64 Runoff=49.70 cfs 6.362 af

Subcatchment EDA-3: EDA-3 Runoff Area=3.609 ac 0.00% Impervious Runoff Depth=3.84"
Flow Length=292' Tc=15.0 min CN=72 Runoff=12.28 cfs 1.154 af

Link AP-1: AP-1 Inflow=2.39 cfs 0.202 af
Primary=2.39 cfs 0.202 af

Link AP-2: AP-2 Inflow=57.34 cfs 7.516 af
Primary=57.34 cfs 7.516 af

Total Runoff Area = 29.613 ac Runoff Volume = 7.718 af Average Runoff Depth = 3.13"
99.60% Pervious = 29.495 ac 0.40% Impervious = 0.118 ac

Summary for Subcatchment EDA-1: EDA-1

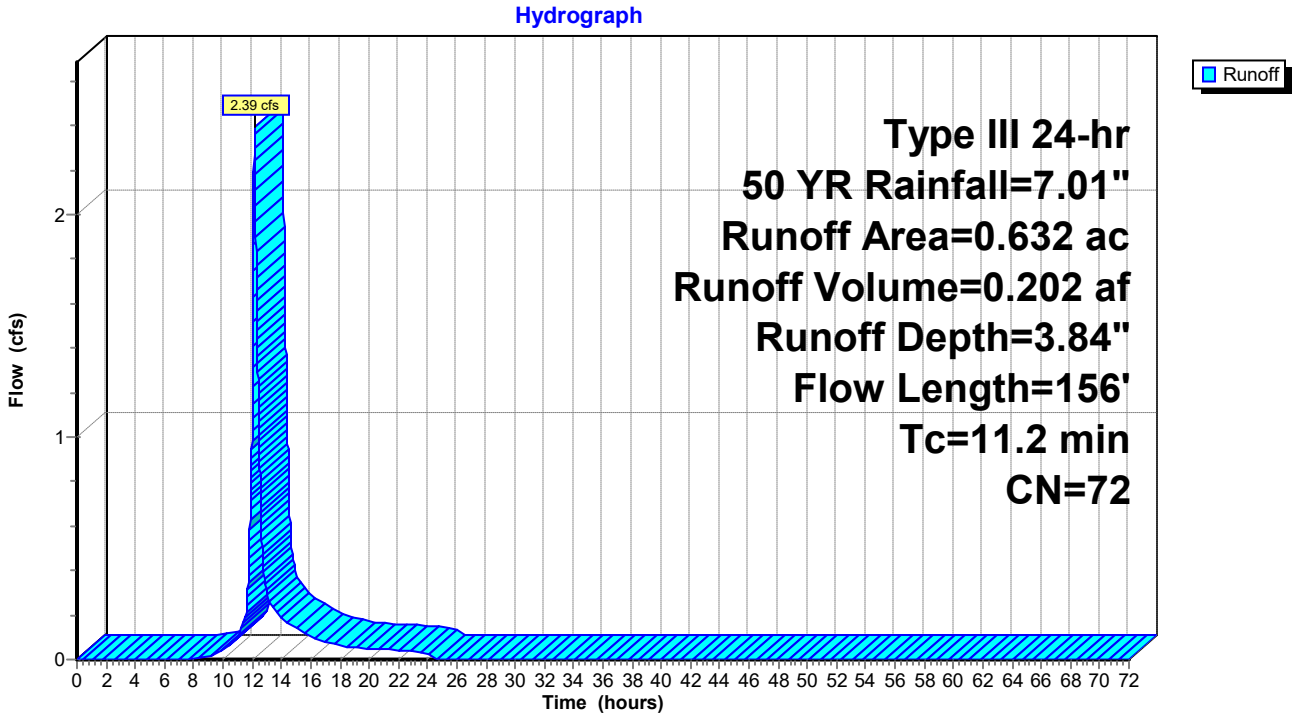
Runoff = 2.39 cfs @ 12.16 hrs, Volume= 0.202 af, Depth= 3.84"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Type III 24-hr 50 YR Rainfall=7.01"

Area (ac)	CN	Description
0.632	72	Legumes, straight row, Good, HSG B
0.632		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
10.8	100	0.0158	0.15		**Sheet Flow, A-B** Grass: Short n= 0.150 P2= 3.17"
0.4	56	0.0234	2.29		**Shallow Concentrated Flow, B-C** Grassed Waterway Kv= 15.0 fps
11.2	156	Total			

Subcatchment EDA-1: EDA-1



Summary for Subcatchment EDA-2: EDA-2

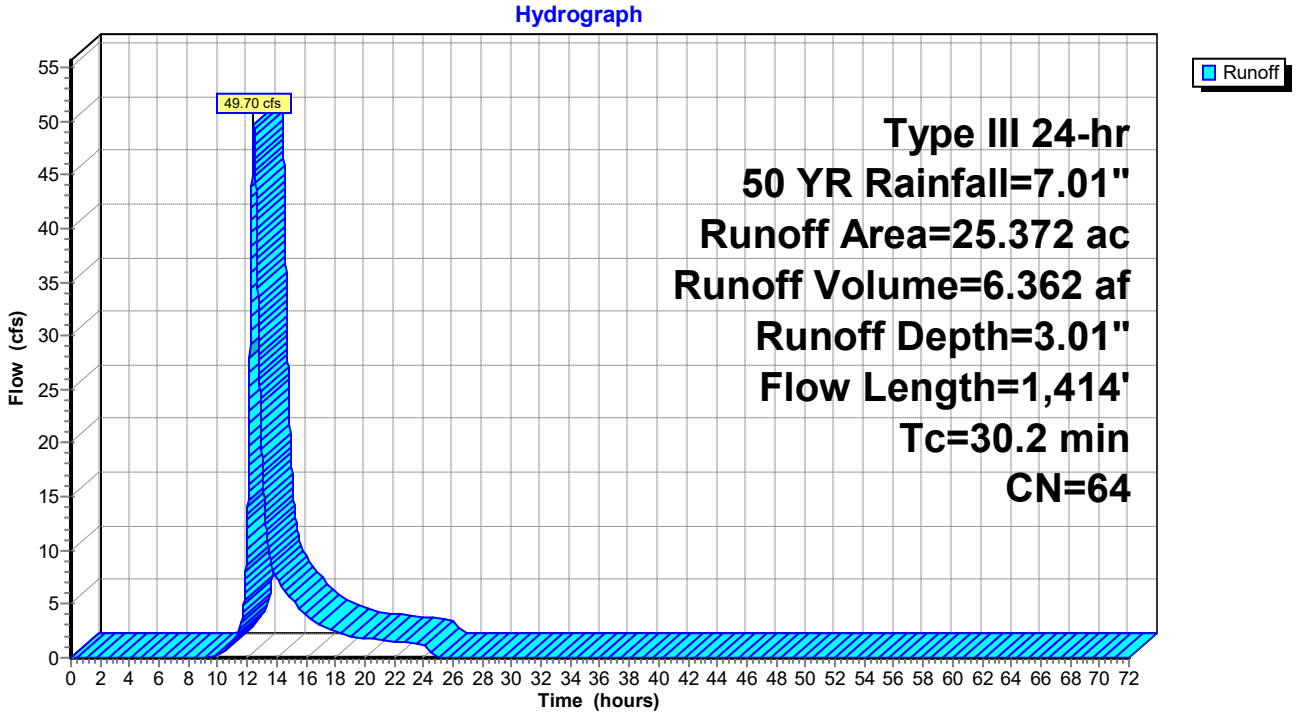
Runoff = 49.70 cfs @ 12.45 hrs, Volume= 6.362 af, Depth= 3.01"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Type III 24-hr 50 YR Rainfall=7.01"

Area (ac)	CN	Description
13.849	58	Legumes, straight row, Good, HSG A
0.118	98	Unconnected roofs, HSG A
11.405	72	Legumes, straight row, Good, HSG B
25.372	64	Weighted Average
25.254		99.53% Pervious Area
0.118		0.47% Impervious Area
0.118		100.00% Unconnected

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
15.8	100	0.0061	0.11		**Sheet Flow, A-B** Grass: Short n= 0.150 P2= 3.17"
5.8	637	0.0147	1.82		**Shallow Concentrated Flow, B-C** Grassed Waterway Kv= 15.0 fps
8.6	677	0.0076	1.31		**Shallow Concentrated Flow, C-D** Grassed Waterway Kv= 15.0 fps
30.2	1,414	Total			

Subcatchment EDA-2: EDA-2



Summary for Subcatchment EDA-3: EDA-3

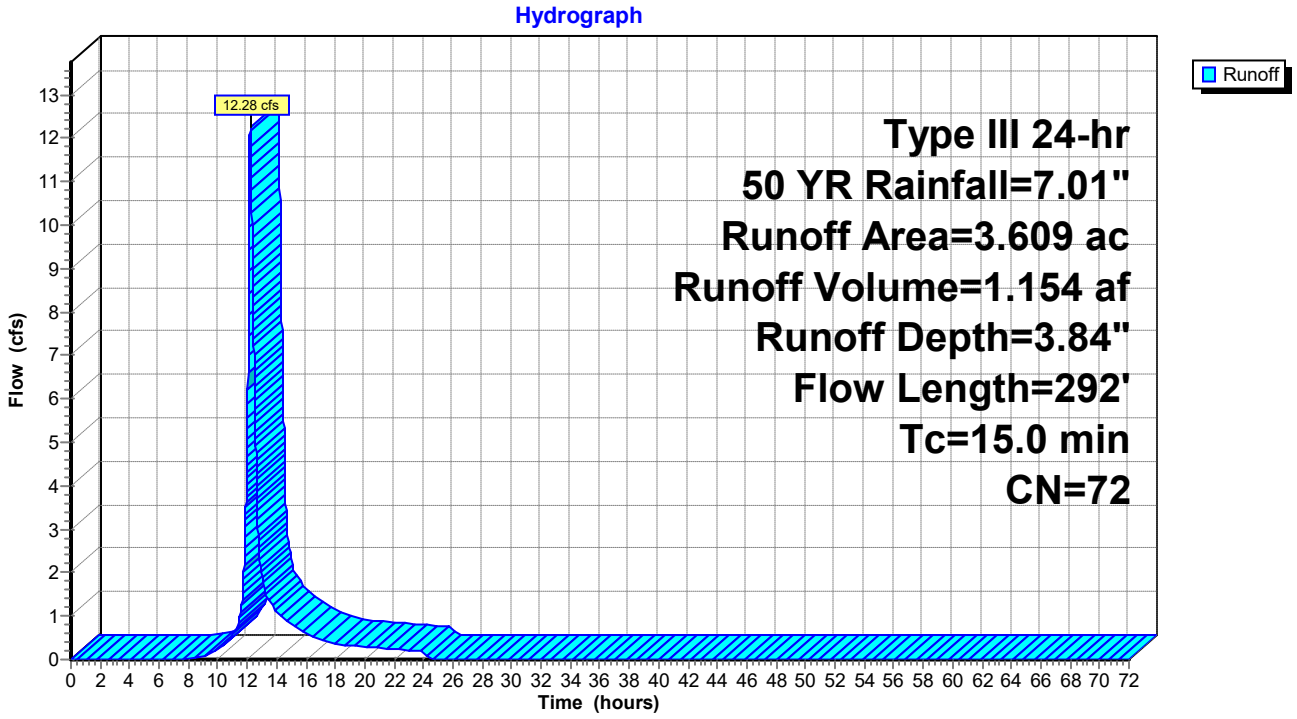
Runoff = 12.28 cfs @ 12.21 hrs, Volume= 1.154 af, Depth= 3.84"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Type III 24-hr 50 YR Rainfall=7.01"

Area (ac)	CN	Description
3.609	72	Legumes, straight row, Good, HSG B
3.609		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
13.4	100	0.0092	0.12		**Sheet Flow, A-B** Grass: Short n= 0.150 P2= 3.17"
1.6	192	0.0169	1.95		**Shallow Concentrated Flow, B-C** Grassed Waterway Kv= 15.0 fps
15.0	292	Total			

Subcatchment EDA-3: EDA-3

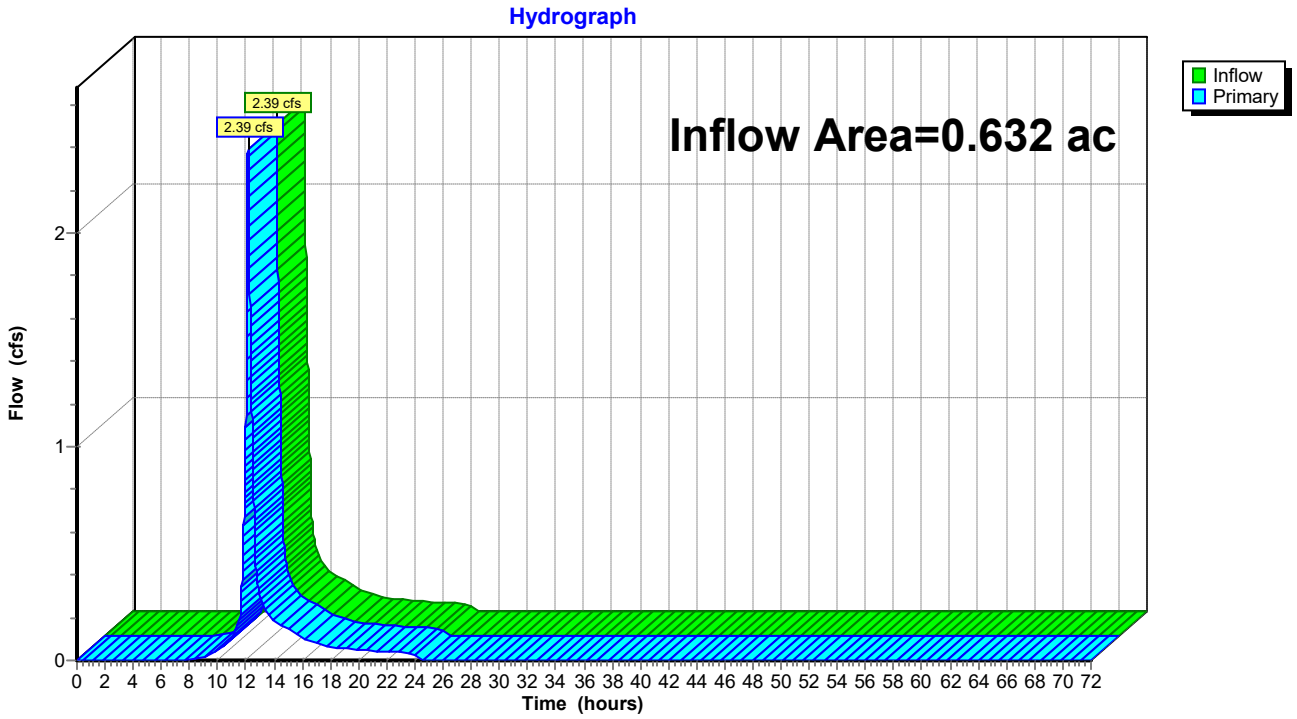


Summary for Link AP-1: AP-1

Inflow Area = 0.632 ac, 0.00% Impervious, Inflow Depth = 3.84" for 50 YR event
Inflow = 2.39 cfs @ 12.16 hrs, Volume= 0.202 af
Primary = 2.39 cfs @ 12.16 hrs, Volume= 0.202 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs

Link AP-1: AP-1

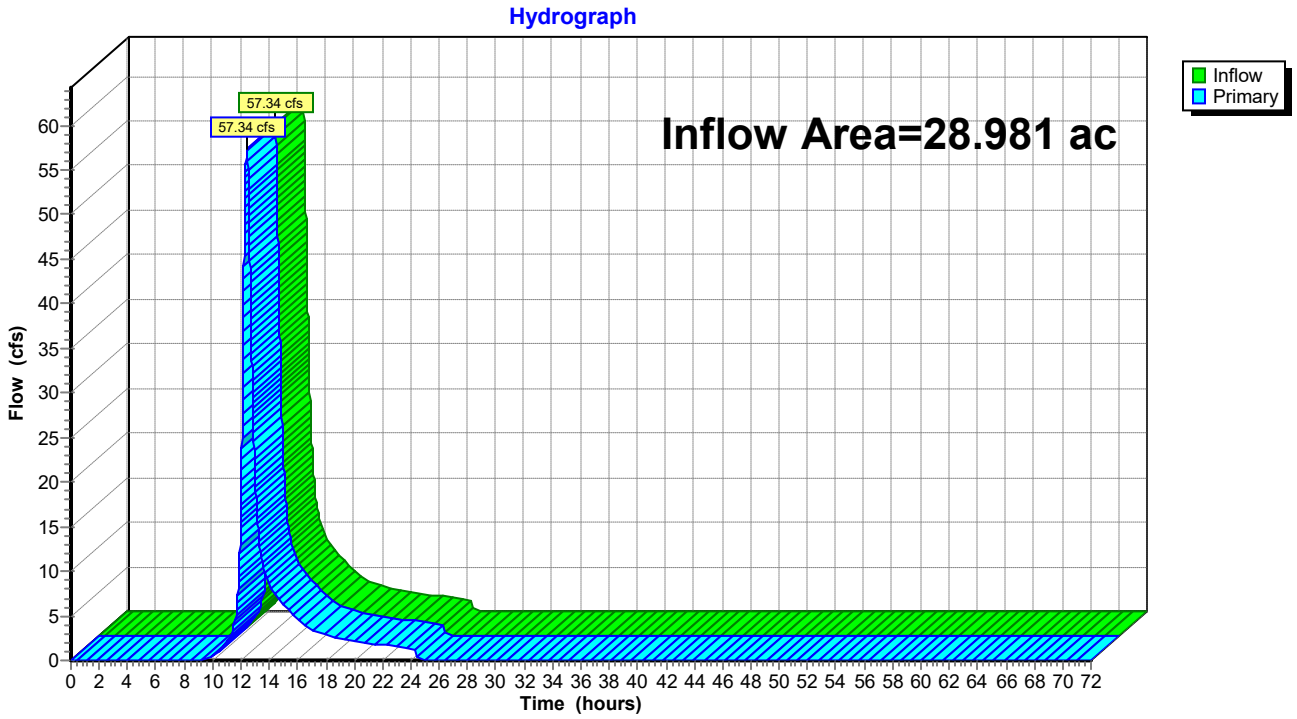


Summary for Link AP-2: AP-2

Inflow Area = 28.981 ac, 0.41% Impervious, Inflow Depth = 3.11" for 50 YR event
Inflow = 57.34 cfs @ 12.41 hrs, Volume= 7.516 af
Primary = 57.34 cfs @ 12.41 hrs, Volume= 7.516 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs

Link AP-2: AP-2



Time span=0.00-72.00 hrs, dt=0.01 hrs, 7201 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Dyn-Stor-Ind method - Pond routing by Dyn-Stor-Ind method

Subcatchment EDA-1: EDA-1 Runoff Area=0.632 ac 0.00% Impervious Runoff Depth=4.65"
Flow Length=156' Tc=11.2 min CN=72 Runoff=2.90 cfs 0.245 af

Subcatchment EDA-2: EDA-2 Runoff Area=25.372 ac 0.47% Impervious Runoff Depth=3.74"
Flow Length=1,414' Tc=30.2 min CN=64 Runoff=62.23 cfs 7.911 af

Subcatchment EDA-3: EDA-3 Runoff Area=3.609 ac 0.00% Impervious Runoff Depth=4.65"
Flow Length=292' Tc=15.0 min CN=72 Runoff=14.89 cfs 1.399 af

Link AP-1: AP-1 Inflow=2.90 cfs 0.245 af
Primary=2.90 cfs 0.245 af

Link AP-2: AP-2 Inflow=71.62 cfs 9.309 af
Primary=71.62 cfs 9.309 af

Total Runoff Area = 29.613 ac Runoff Volume = 9.554 af Average Runoff Depth = 3.87"
99.60% Pervious = 29.495 ac 0.40% Impervious = 0.118 ac

Summary for Subcatchment EDA-1: EDA-1

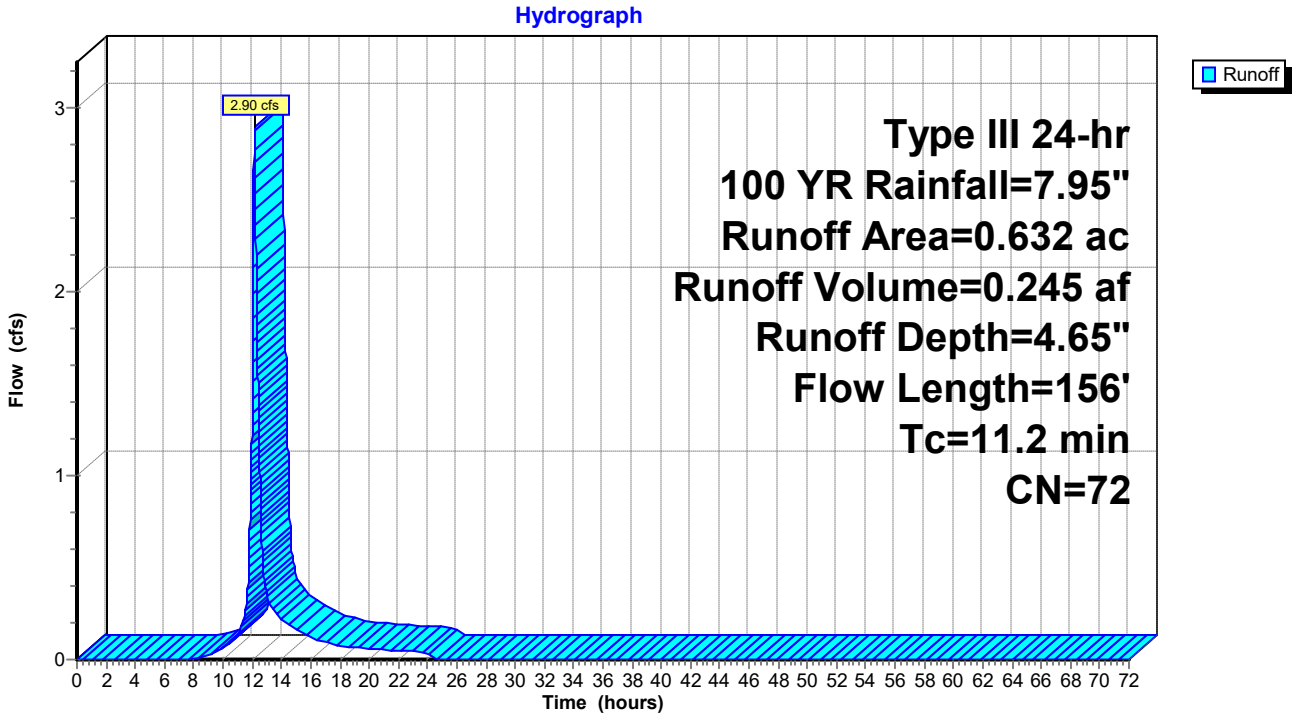
Runoff = 2.90 cfs @ 12.16 hrs, Volume= 0.245 af, Depth= 4.65"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Type III 24-hr 100 YR Rainfall=7.95"

Area (ac)	CN	Description
0.632	72	Legumes, straight row, Good, HSG B
0.632		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
10.8	100	0.0158	0.15		**Sheet Flow, A-B** Grass: Short n= 0.150 P2= 3.17"
0.4	56	0.0234	2.29		**Shallow Concentrated Flow, B-C** Grassed Waterway Kv= 15.0 fps
11.2	156	Total			

Subcatchment EDA-1: EDA-1



Summary for Subcatchment EDA-2: EDA-2

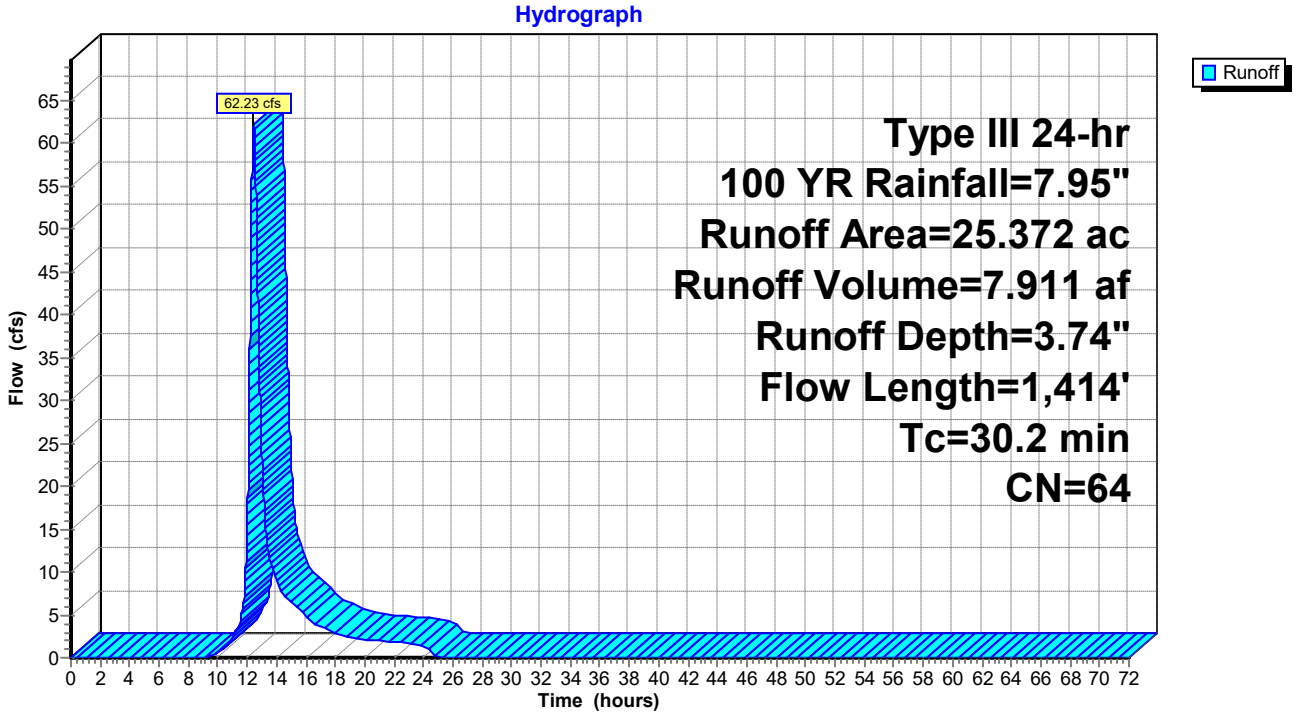
Runoff = 62.23 cfs @ 12.44 hrs, Volume= 7.911 af, Depth= 3.74"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Type III 24-hr 100 YR Rainfall=7.95"

Area (ac)	CN	Description
13.849	58	Legumes, straight row, Good, HSG A
0.118	98	Unconnected roofs, HSG A
11.405	72	Legumes, straight row, Good, HSG B
25.372	64	Weighted Average
25.254		99.53% Pervious Area
0.118		0.47% Impervious Area
0.118		100.00% Unconnected

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
15.8	100	0.0061	0.11		**Sheet Flow, A-B** Grass: Short n= 0.150 P2= 3.17"
5.8	637	0.0147	1.82		**Shallow Concentrated Flow, B-C** Grassed Waterway Kv= 15.0 fps
8.6	677	0.0076	1.31		**Shallow Concentrated Flow, C-D** Grassed Waterway Kv= 15.0 fps
30.2	1,414	Total			

Subcatchment EDA-2: EDA-2



Summary for Subcatchment EDA-3: EDA-3

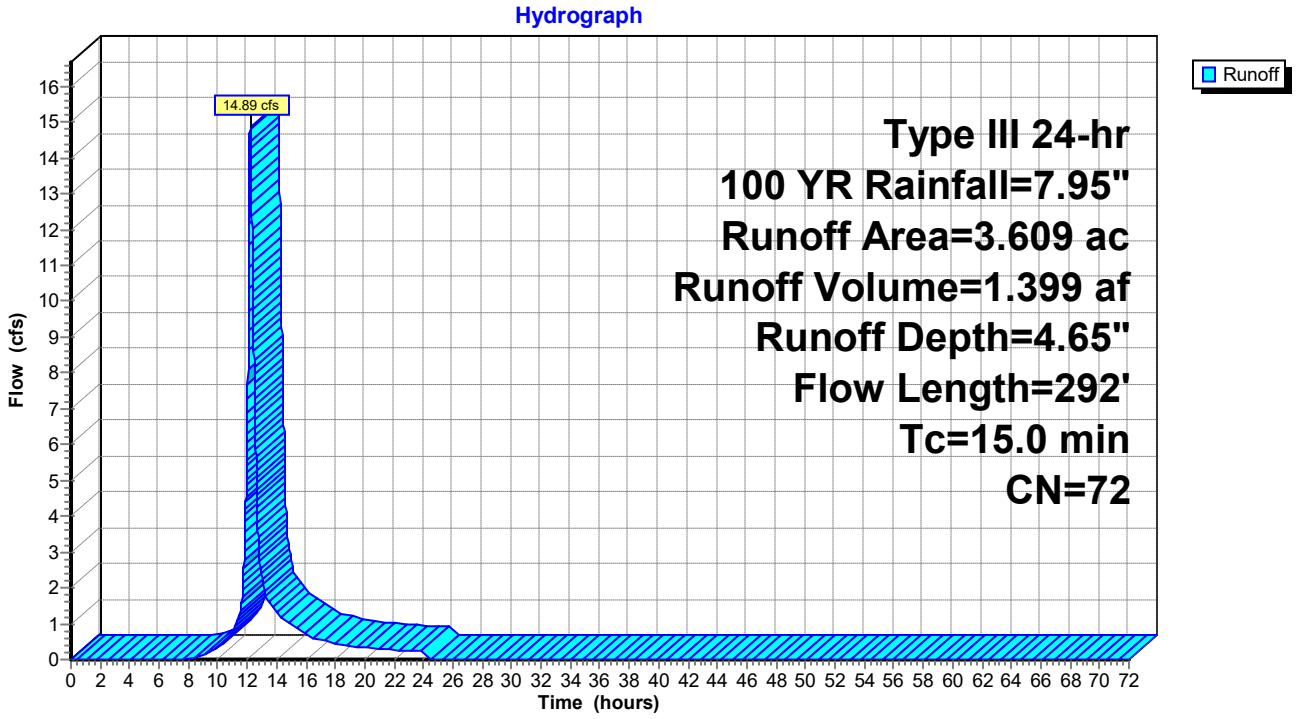
Runoff = 14.89 cfs @ 12.21 hrs, Volume= 1.399 af, Depth= 4.65"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Type III 24-hr 100 YR Rainfall=7.95"

Area (ac)	CN	Description
3.609	72	Legumes, straight row, Good, HSG B
3.609		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
13.4	100	0.0092	0.12		**Sheet Flow, A-B** Grass: Short n= 0.150 P2= 3.17"
1.6	192	0.0169	1.95		**Shallow Concentrated Flow, B-C** Grassed Waterway Kv= 15.0 fps
15.0	292	Total			

Subcatchment EDA-3: EDA-3

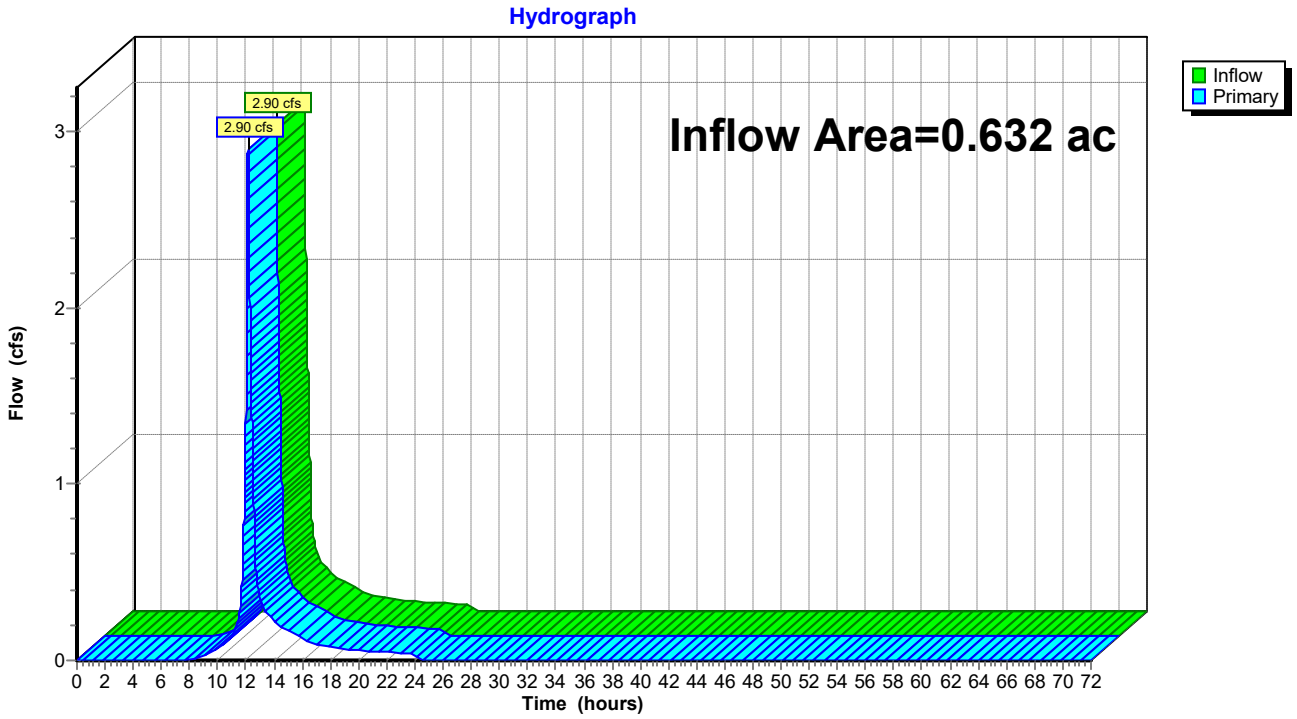


Summary for Link AP-1: AP-1

Inflow Area = 0.632 ac, 0.00% Impervious, Inflow Depth = 4.65" for 100 YR event
Inflow = 2.90 cfs @ 12.16 hrs, Volume= 0.245 af
Primary = 2.90 cfs @ 12.16 hrs, Volume= 0.245 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs

Link AP-1: AP-1

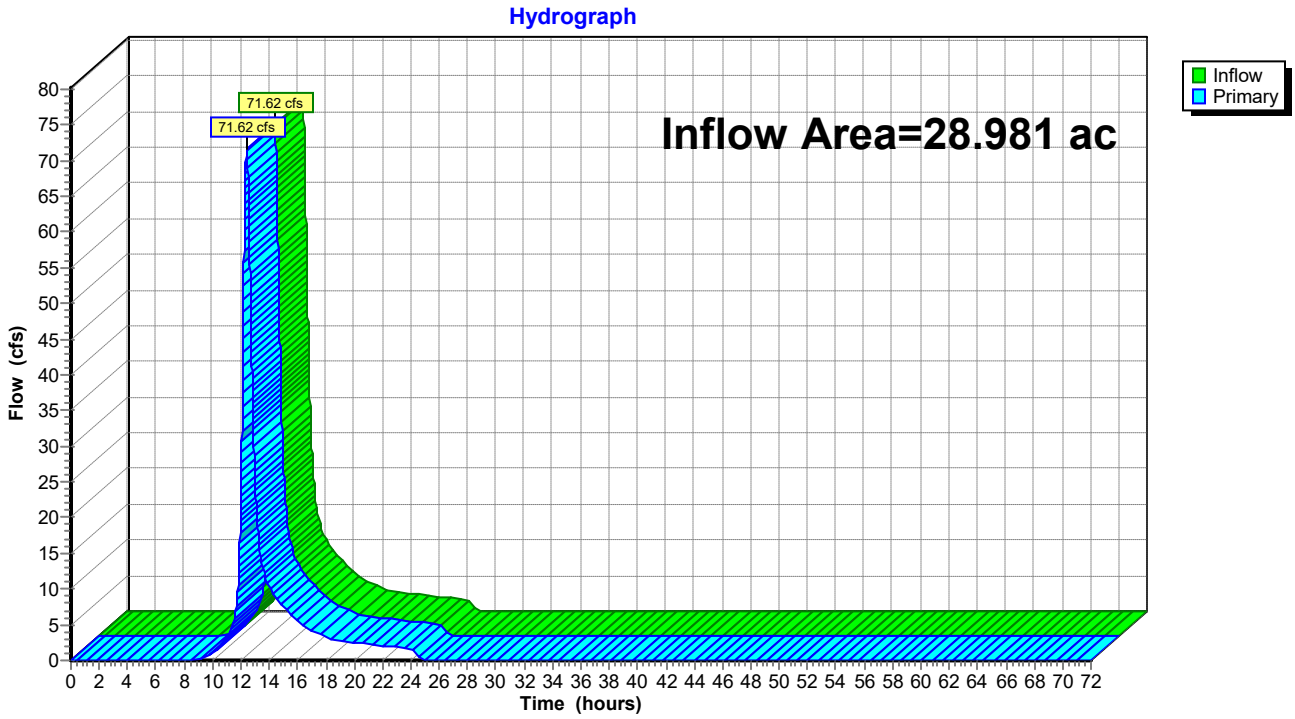


Summary for Link AP-2: AP-2

Inflow Area = 28.981 ac, 0.41% Impervious, Inflow Depth = 3.85" for 100 YR event
Inflow = 71.62 cfs @ 12.39 hrs, Volume= 9.309 af
Primary = 71.62 cfs @ 12.39 hrs, Volume= 9.309 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs

Link AP-2: AP-2



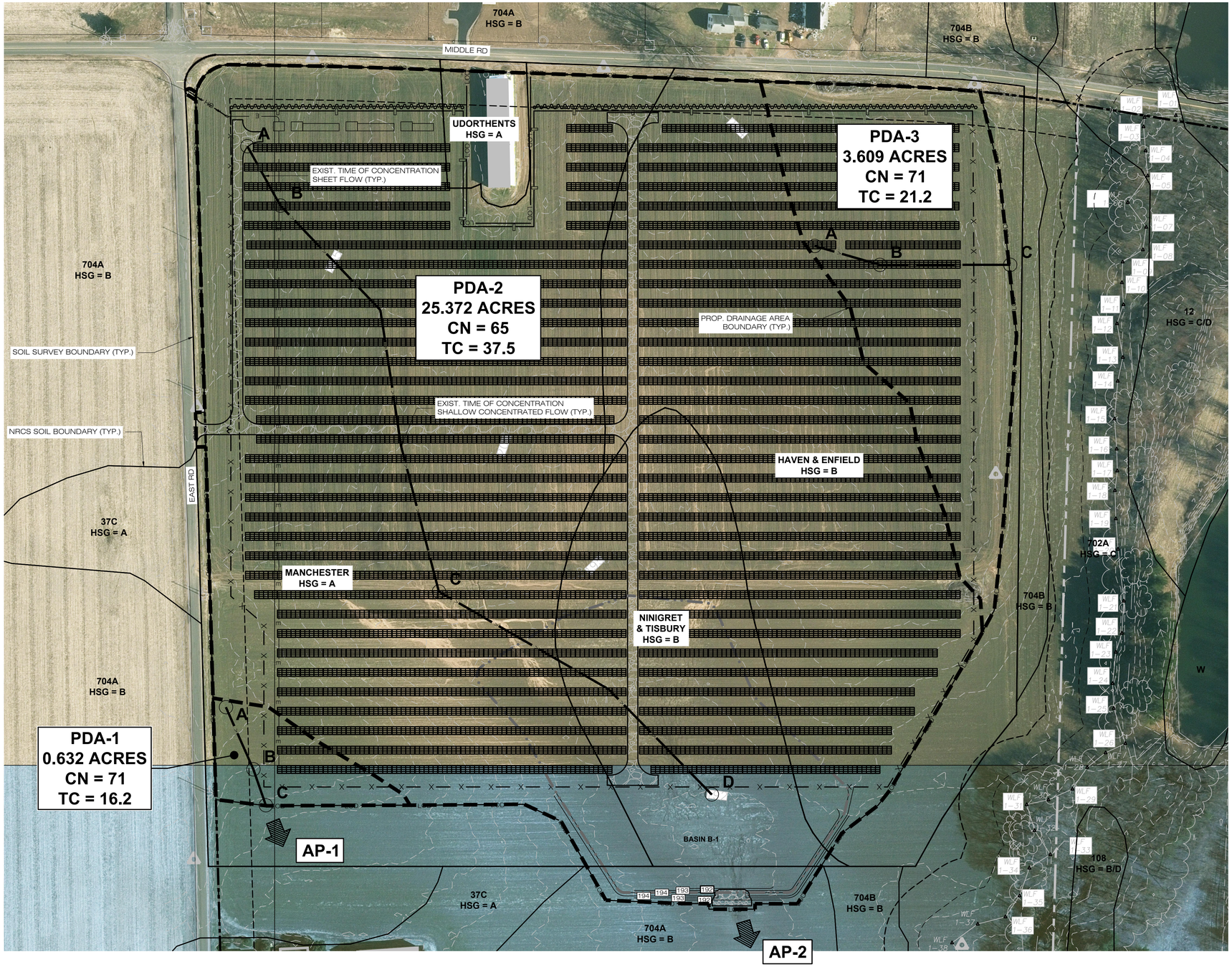
APPENDIX C: PROPOSED DRAINAGE AREA MAP (PDA-1) & HYDROLOGIC COMPUTATION (HYDROCAD)

PROPOSED DRAINAGE AREAS

	TOTAL AREA (ACRES)	COMPOSITE CN	TC (MINS.)
PDA-1	0.632	71	16.2
PDA-2	25.372	65	37.5
PDA-3	3.609	71	21.2

PROPOSED CONDITION PEAK FLOWS

ANALYSIS POINT	2-YEAR (CFS)	25-YEAR (CFS)	50-YEAR (CFS)	100-YEAR (CFS)
AP-1	0.42	1.65	2.03	2.47
AP-2	2.16	8.43	17.70	29.02



1 PDA-1 **PROPOSED DRAINAGE AREA MAP**
SCALE : 1" = 80'-0"

80 0 40 80 160
(IN FEET) 1 inch = 80 ft.

EAST WINDSOR SOLAR ONE, LLC

150 TRUMBULL STREET 4TH FLOOR HARTFORD, CT, 06103

ALL-POINTS TECHNOLOGY CORPORATION

567 VAUXHAUL STREET EXTENSION - SUITE 311
WATERFORD, CT 06385 PHONE: (860)-663-1697
WWW.ALLPOINTSTECH.COM FAX: (860)-663-0935

PERMIT SET

NO	DATE	REVISION
0	07/24/20	FOR REVIEW: BJP
1		
2		
3		
4		
5		
6		

DESIGN PROFESSIONAL OF RECORD

PROF: BRADLEY J. PARSONS P.E.
COMP: ALL-POINTS TECHNOLOGY CORPORATION
ADD: 567 VAUXHAUL STREET EXTENSION - SUITE 311 WATERFORD, CT 06385

OWNER: ASSOCIATION OF THE CATHOLIC CEMETERIES
ADDRESS: 341 EAST ROAD EAST WINDSOR&ELLINGTON,CT

EAST WINDSOR SOLAR ONE, LLC

SITE ADDRESS: 341 EAST ROAD EAST WINDSOR, CT

APT FILING NUMBER: CT590210

DRAWN BY: JT

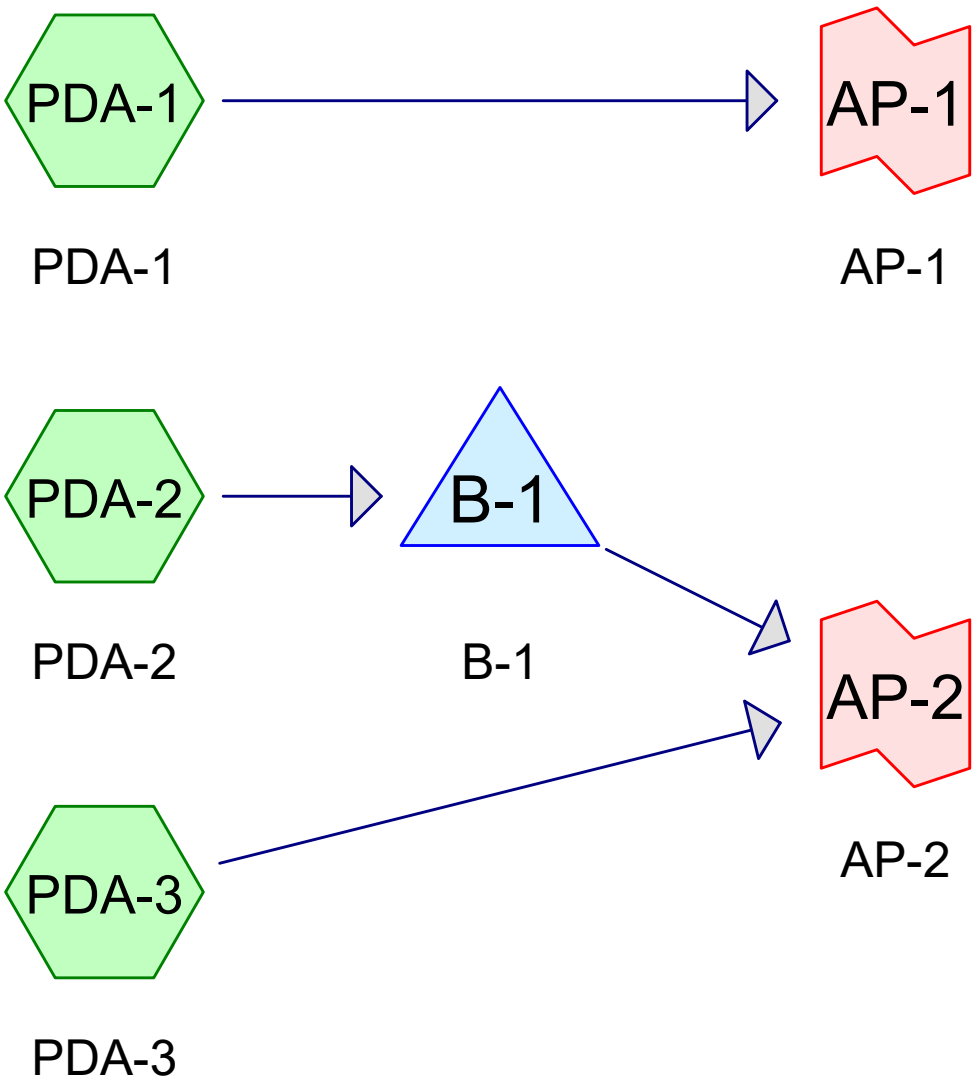
DATE: 07/24/20 CHECKED BY: BJP

SHEET TITLE:

PROPOSED DRAINAGE AREA MAP

SHEET NUMBER:

PDA-1



Subcat Reach Pond Link

Routing Diagram for CT590210_EastWindsorSolarOne - PR - Rev0
Prepared by Microsoft, Printed 7/22/2020

Area Listing (all nodes)

Area (acres)	CN	Description (subcatchment-numbers)
0.495	96	Gravel surface, HSG B (PDA-2)
0.361	96	Gravel surface, HSG C (PDA-2)
13.355	58	Meadow, non-grazed, HSG B (PDA-2)
15.284	71	Meadow, non-grazed, HSG C (PDA-1, PDA-2, PDA-3)
0.118	98	Unconnected roofs, HSG A (PDA-2)
29.613	**66**	**TOTAL AREA**

Soil Listing (all nodes)

Area (acres)	Soil Group	Subcatchment Numbers
0.118	HSG A	PDA-2
13.850	HSG B	PDA-2
15.645	HSG C	PDA-1, PDA-2, PDA-3
0.000	HSG D	
0.000	Other	
29.613		**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	0.495	0.361	0.000	0.000	0.856	Gravel surface	PDA-2
0.000	13.355	15.284	0.000	0.000	28.639	Meadow, non-grazed	PDA-1, PDA-2, PDA-3
0.118	0.000	0.000	0.000	0.000	0.118	Unconnected roofs	PDA-2
0.118	**13.850**	**15.645**	**0.000**	**0.000**	**29.613**	**TOTAL AREA**	

Time span=0.00-72.00 hrs, dt=0.01 hrs, 7201 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Dyn-Stor-Ind method - Pond routing by Dyn-Stor-Ind method

Subcatchment PDA-1: PDA-1 Runoff Area=0.632 ac 0.00% Impervious Runoff Depth=0.86"
Flow Length=156' Tc=16.2 min CN=71 Runoff=0.42 cfs 0.045 af

Subcatchment PDA-2: PDA-2 Runoff Area=25.372 ac 0.47% Impervious Runoff Depth=0.59"
Flow Length=1,414' Tc=37.5 min CN=65 Runoff=7.04 cfs 1.239 af

Subcatchment PDA-3: PDA-3 Runoff Area=3.609 ac 0.00% Impervious Runoff Depth=0.86"
Flow Length=292' Tc=21.2 min CN=71 Runoff=2.16 cfs 0.259 af

Pond B-1: B-1 Peak Elev=192.28' Storage=7,203 cf Inflow=7.04 cfs 1.239 af
Discarded=3.84 cfs 1.239 af Primary=0.00 cfs 0.000 af Outflow=3.84 cfs 1.239 af

Link AP-1: AP-1 Inflow=0.42 cfs 0.045 af
Primary=0.42 cfs 0.045 af

Link AP-2: AP-2 Inflow=2.16 cfs 0.259 af
Primary=2.16 cfs 0.259 af

Total Runoff Area = 29.613 ac Runoff Volume = 1.543 af Average Runoff Depth = 0.63"
99.60% Pervious = 29.495 ac 0.40% Impervious = 0.118 ac

Summary for Subcatchment PDA-1: PDA-1

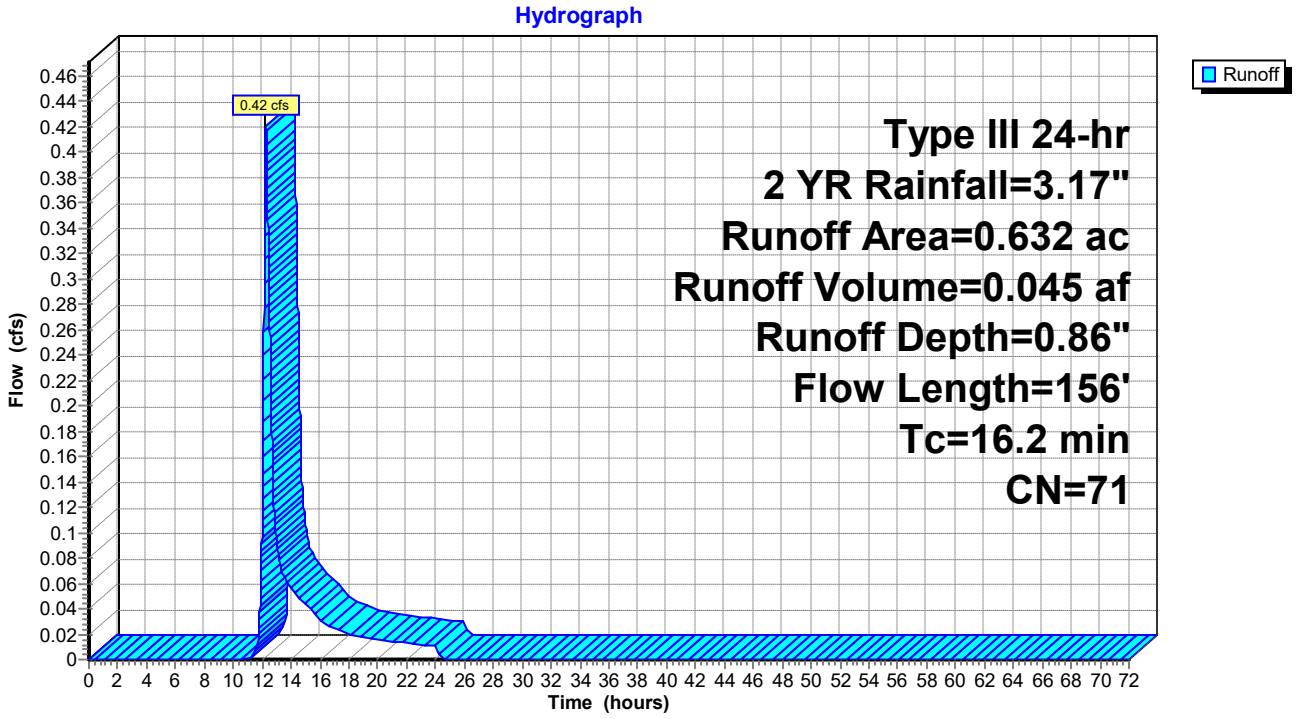
Runoff = 0.42 cfs @ 12.25 hrs, Volume= 0.045 af, Depth= 0.86"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Type III 24-hr 2 YR Rainfall=3.17"

Area (ac)	CN	Description
0.632	71	Meadow, non-grazed, HSG C
0.632		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
15.8	100	0.0158	0.11		**Sheet Flow, A-B** Grass: Dense n= 0.240 P2= 3.17"
0.4	56	0.0234	2.29		**Shallow Concentrated Flow, B-C** Grassed Waterway Kv= 15.0 fps
16.2	156	Total			

Subcatchment PDA-1: PDA-1



Summary for Subcatchment PDA-2: PDA-2

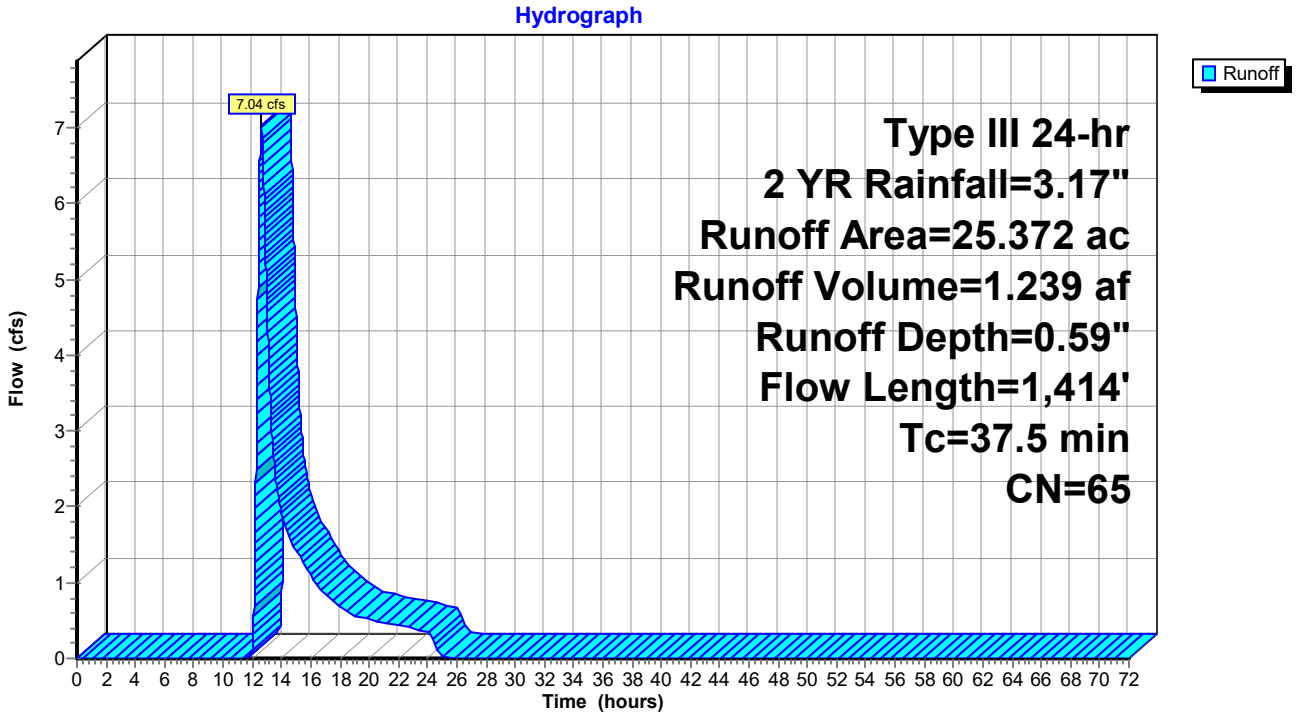
Runoff = 7.04 cfs @ 12.63 hrs, Volume= 1.239 af, Depth= 0.59"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Type III 24-hr 2 YR Rainfall=3.17"

Area (ac)	CN	Description
13.355	58	Meadow, non-grazed, HSG B
0.495	96	Gravel surface, HSG B
0.118	98	Unconnected roofs, HSG A
11.043	71	Meadow, non-grazed, HSG C
0.361	96	Gravel surface, HSG C
25.372	65	Weighted Average
25.254		99.53% Pervious Area
0.118		0.47% Impervious Area
0.118		100.00% Unconnected

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
23.1	100	0.0061	0.07		**Sheet Flow, A-B** Grass: Dense n= 0.240 P2= 3.17"
5.8	637	0.0147	1.82		**Shallow Concentrated Flow, B-C** Grassed Waterway Kv= 15.0 fps
8.6	677	0.0076	1.31		**Shallow Concentrated Flow, C-D** Grassed Waterway Kv= 15.0 fps
37.5	1,414	Total			

Subcatchment PDA-2: PDA-2



Summary for Subcatchment PDA-3: PDA-3

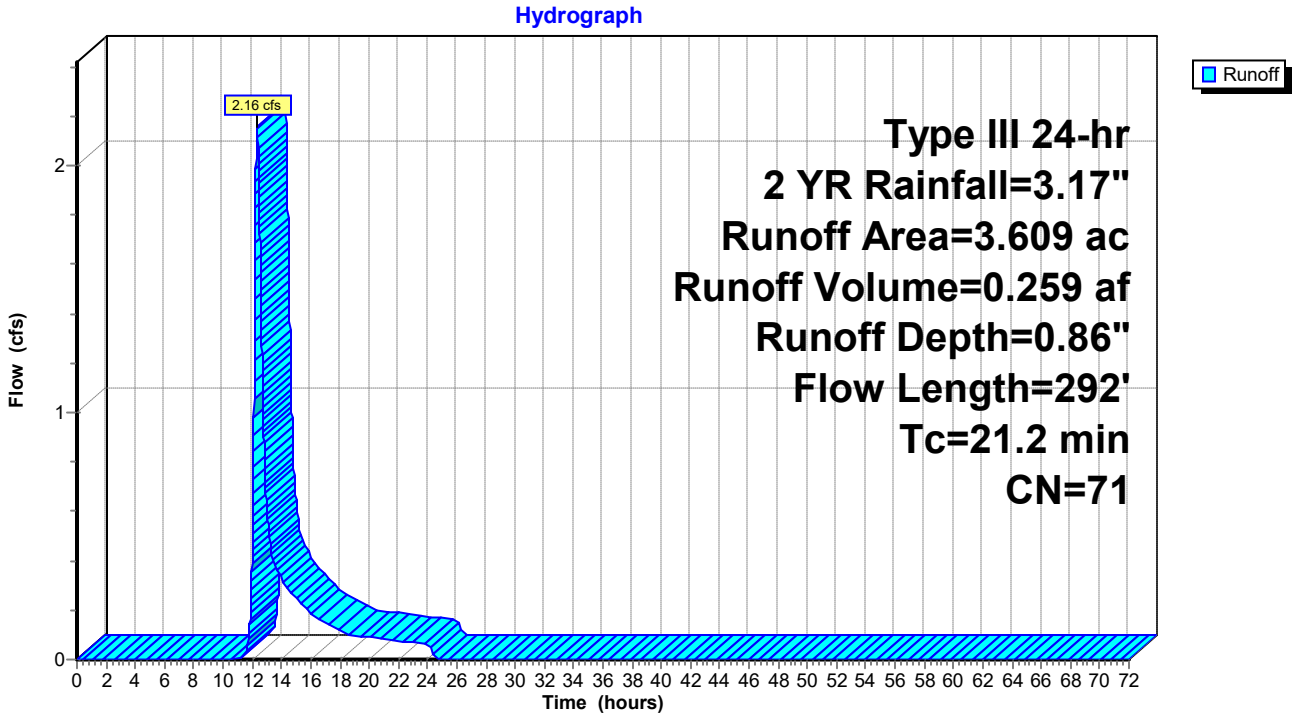
Runoff = 2.16 cfs @ 12.32 hrs, Volume= 0.259 af, Depth= 0.86"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Type III 24-hr 2 YR Rainfall=3.17"

Area (ac)	CN	Description
3.609	71	Meadow, non-grazed, HSG C
3.609		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
19.6	100	0.0092	0.09		**Sheet Flow, A-B** Grass: Dense n= 0.240 P2= 3.17"
1.6	192	0.0169	1.95		**Shallow Concentrated Flow, B-C** Grassed Waterway Kv= 15.0 fps
21.2	292	Total			

Subcatchment PDA-3: PDA-3



Summary for Pond B-1: B-1

[87] Warning: Oscillations may require smaller dt or Finer Routing (severity=509)

Inflow Area = 25.372 ac, 0.47% Impervious, Inflow Depth = 0.59" for 2 YR event
Inflow = 7.04 cfs @ 12.63 hrs, Volume= 1.239 af
Outflow = 3.84 cfs @ 13.13 hrs, Volume= 1.239 af, Atten= 45%, Lag= 30.4 min
Discarded = 3.84 cfs @ 13.13 hrs, Volume= 1.239 af
Primary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Peak Elev= 192.28' @ 13.13 hrs Surf.Area= 33,219 sf Storage= 7,203 cf

Plug-Flow detention time= (not calculated: outflow precedes inflow)
Center-of-Mass det. time= 11.9 min (937.5 - 925.5)

Volume	Invert	Avail.Storage	Storage Description
#1	192.00'	166,735 cf	**Custom Stage Data (Irregular)** Listed below (Recalc)

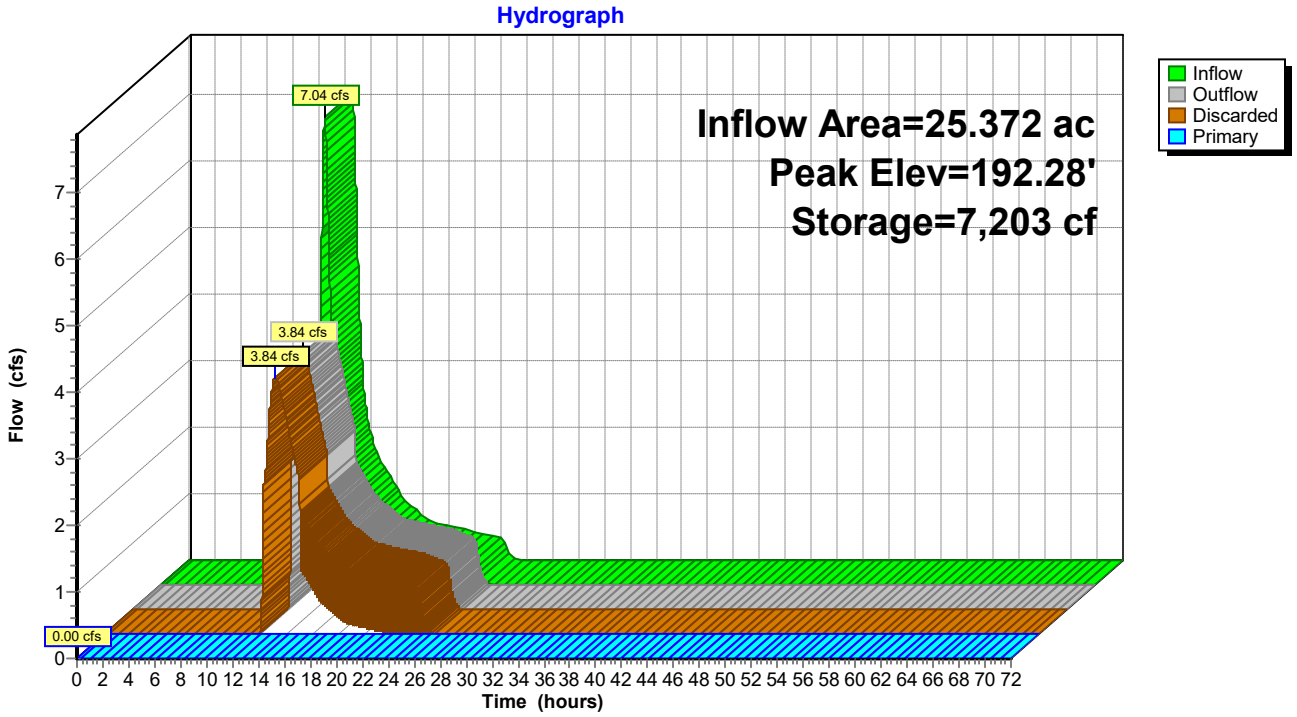
Elevation (feet)	Surf.Area (sq-ft)	Perim. (feet)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)	Wet.Area (sq-ft)
192.00	19,648	581.0	0	0	19,648
193.00	85,795	1,132.6	48,833	48,833	94,871
194.00	153,247	1,536.5	117,902	166,735	180,670

Device	Routing	Invert	Outlet Devices
#1	Discarded	192.00'	**5.000 in/hr Exfiltration over Surface area**
#2	Primary	193.00'	**41.0' long x 11.0' breadth Broad-Crested Rectangular Weir**
			Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60
			Coef. (English) 2.53 2.59 2.70 2.68 2.67 2.68 2.66 2.64

Discarded OutFlow Max=3.84 cfs @ 13.13 hrs HW=192.28' (Free Discharge)
↑—**1=Exfiltration** (Exfiltration Controls 3.84 cfs)

Primary OutFlow Max=0.00 cfs @ 0.00 hrs HW=192.00' TW=0.00' (Dynamic Tailwater)
↑—**2=Broad-Crested Rectangular Weir** (Controls 0.00 cfs)

Pond B-1: B-1

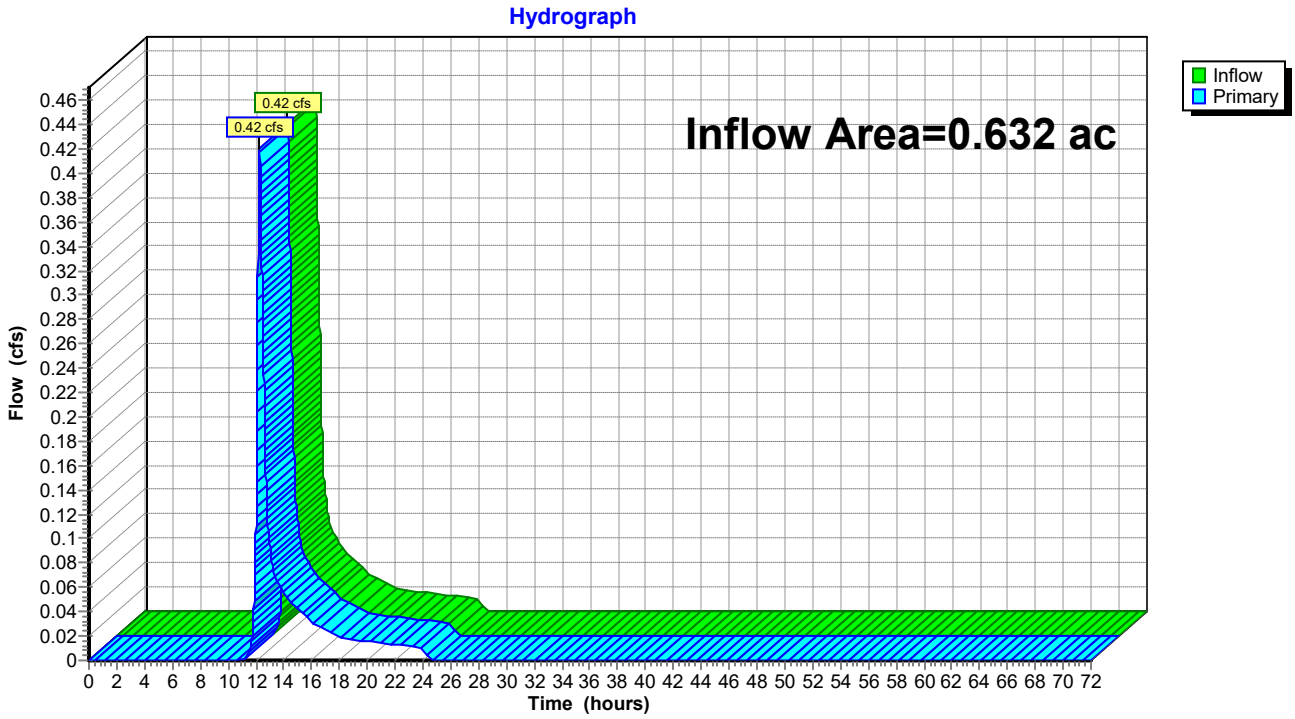

Hydrograph
Inflow Area=25.372 ac
Peak Elev=192.28'
Storage=7,203 cf
7.04 cfs
3.84 cfs
3.84 cfs
0.00 cfs
Inflow
Outflow
Discarded
Primary
Flow (cfs)
0 1 2 3 4 5 6 7
Time (hours)
0 2 4 6 8 10 12 14 16 18 20 22 24 26 28 30 32 34 36 38 40 42 44 46 48 50 52 54 56 58 60 62 64 66 68 70 72

Summary for Link AP-1: AP-1

Inflow Area = 0.632 ac, 0.00% Impervious, Inflow Depth = 0.86" for 2 YR event
Inflow = 0.42 cfs @ 12.25 hrs, Volume= 0.045 af
Primary = 0.42 cfs @ 12.25 hrs, Volume= 0.045 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs

Link AP-1: AP-1

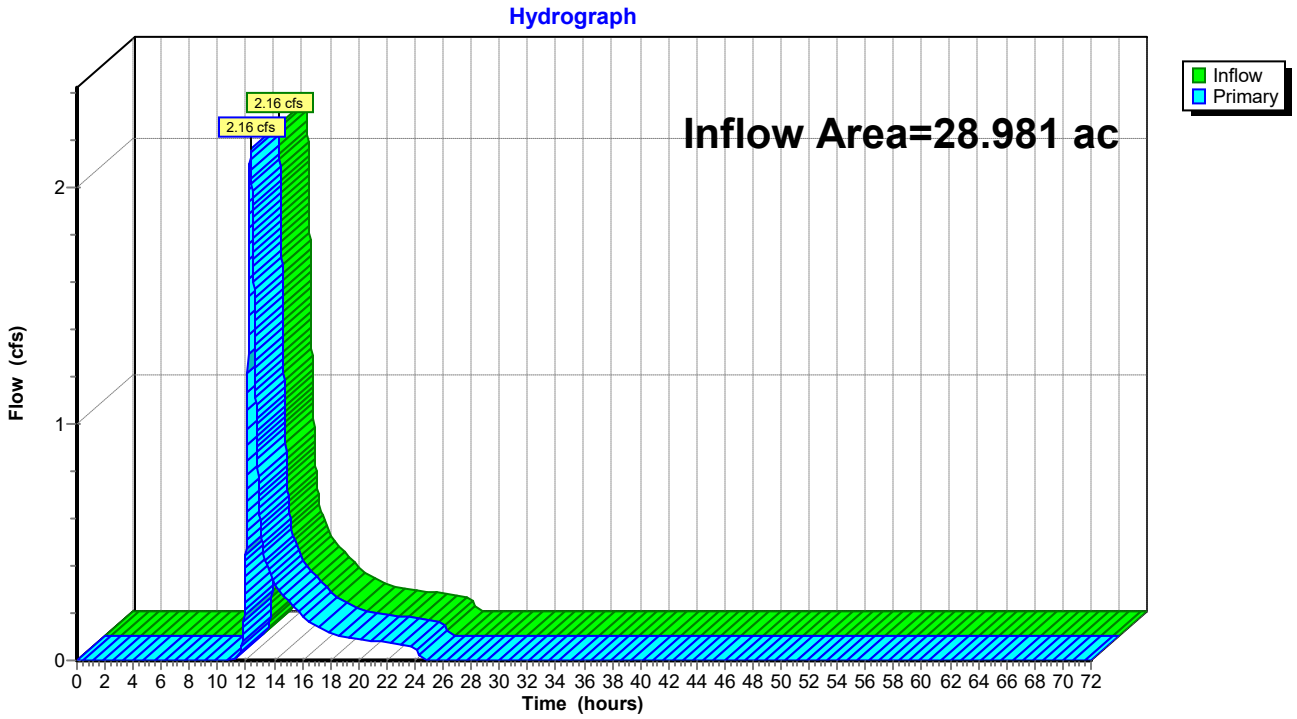


Summary for Link AP-2: AP-2

Inflow Area = 28.981 ac, 0.41% Impervious, Inflow Depth = 0.11" for 2 YR event
Inflow = 2.16 cfs @ 12.32 hrs, Volume= 0.259 af
Primary = 2.16 cfs @ 12.32 hrs, Volume= 0.259 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs

Link AP-2: AP-2



Time span=0.00-72.00 hrs, dt=0.01 hrs, 7201 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Dyn-Stor-Ind method - Pond routing by Dyn-Stor-Ind method

Subcatchment PDA-1: PDA-1 Runoff Area=0.632 ac 0.00% Impervious Runoff Depth=3.04"
Flow Length=156' Tc=16.2 min CN=71 Runoff=1.65 cfs 0.160 af

Subcatchment PDA-2: PDA-2 Runoff Area=25.372 ac 0.47% Impervious Runoff Depth=2.48"
Flow Length=1,414' Tc=37.5 min CN=65 Runoff=36.69 cfs 5.234 af

Subcatchment PDA-3: PDA-3 Runoff Area=3.609 ac 0.00% Impervious Runoff Depth=3.04"
Flow Length=292' Tc=21.2 min CN=71 Runoff=8.41 cfs 0.913 af

Pond B-1: B-1 Peak Elev=193.16' Storage=63,353 cf Inflow=36.69 cfs 5.234 af
Discarded=11.03 cfs 4.837 af Primary=6.66 cfs 0.398 af Outflow=17.70 cfs 5.234 af

Link AP-1: AP-1 Inflow=1.65 cfs 0.160 af
Primary=1.65 cfs 0.160 af

Link AP-2: AP-2 Inflow=8.43 cfs 1.311 af
Primary=8.43 cfs 1.311 af

Total Runoff Area = 29.613 ac Runoff Volume = 6.308 af Average Runoff Depth = 2.56"
99.60% Pervious = 29.495 ac 0.40% Impervious = 0.118 ac

Summary for Subcatchment PDA-1: PDA-1

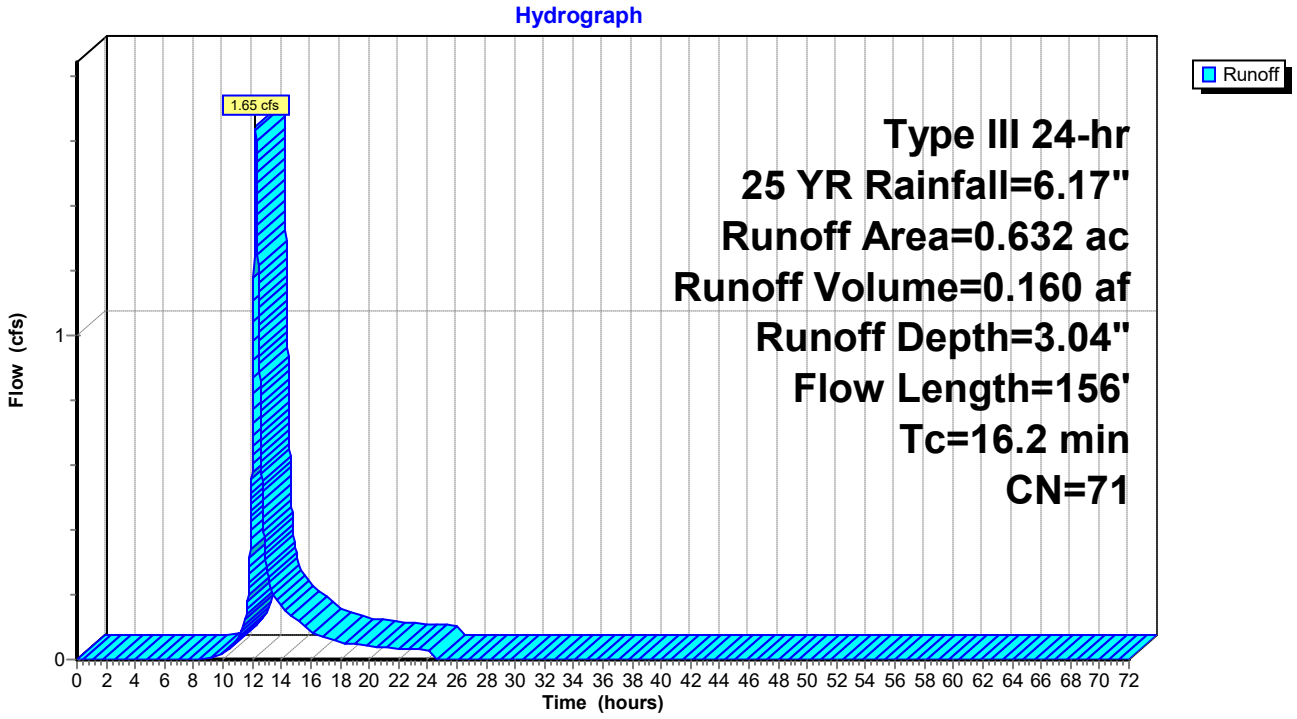
Runoff = 1.65 cfs @ 12.22 hrs, Volume= 0.160 af, Depth= 3.04"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Type III 24-hr 25 YR Rainfall=6.17"

Area (ac)	CN	Description
0.632	71	Meadow, non-grazed, HSG C
0.632		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
15.8	100	0.0158	0.11		**Sheet Flow, A-B** Grass: Dense n= 0.240 P2= 3.17"
0.4	56	0.0234	2.29		**Shallow Concentrated Flow, B-C** Grassed Waterway Kv= 15.0 fps
16.2	156	Total			

Subcatchment PDA-1: PDA-1



Summary for Subcatchment PDA-2: PDA-2

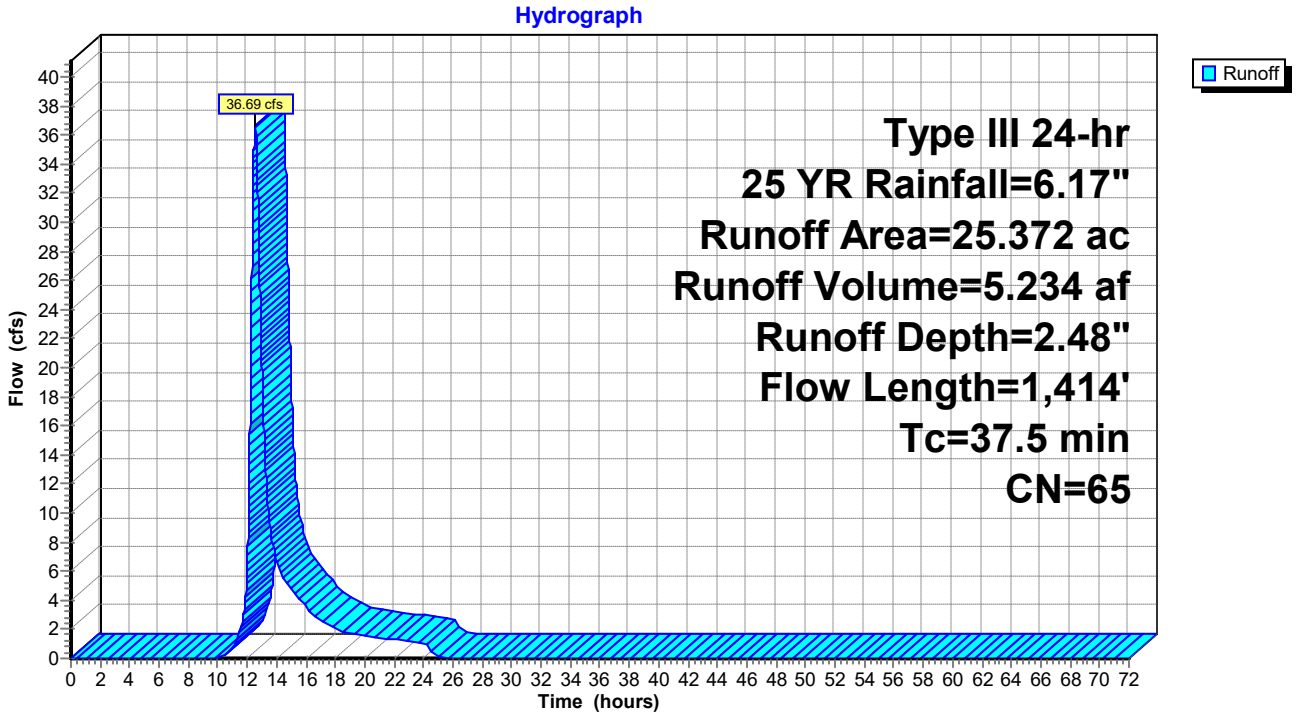
Runoff = 36.69 cfs @ 12.54 hrs, Volume= 5.234 af, Depth= 2.48"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Type III 24-hr 25 YR Rainfall=6.17"

Area (ac)	CN	Description
13.355	58	Meadow, non-grazed, HSG B
0.495	96	Gravel surface, HSG B
0.118	98	Unconnected roofs, HSG A
11.043	71	Meadow, non-grazed, HSG C
0.361	96	Gravel surface, HSG C
25.372	65	Weighted Average
25.254		99.53% Pervious Area
0.118		0.47% Impervious Area
0.118		100.00% Unconnected

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
23.1	100	0.0061	0.07		**Sheet Flow, A-B** Grass: Dense n= 0.240 P2= 3.17"
5.8	637	0.0147	1.82		**Shallow Concentrated Flow, B-C** Grassed Waterway Kv= 15.0 fps
8.6	677	0.0076	1.31		**Shallow Concentrated Flow, C-D** Grassed Waterway Kv= 15.0 fps
37.5	1,414	Total			

Subcatchment PDA-2: PDA-2



Summary for Subcatchment PDA-3: PDA-3

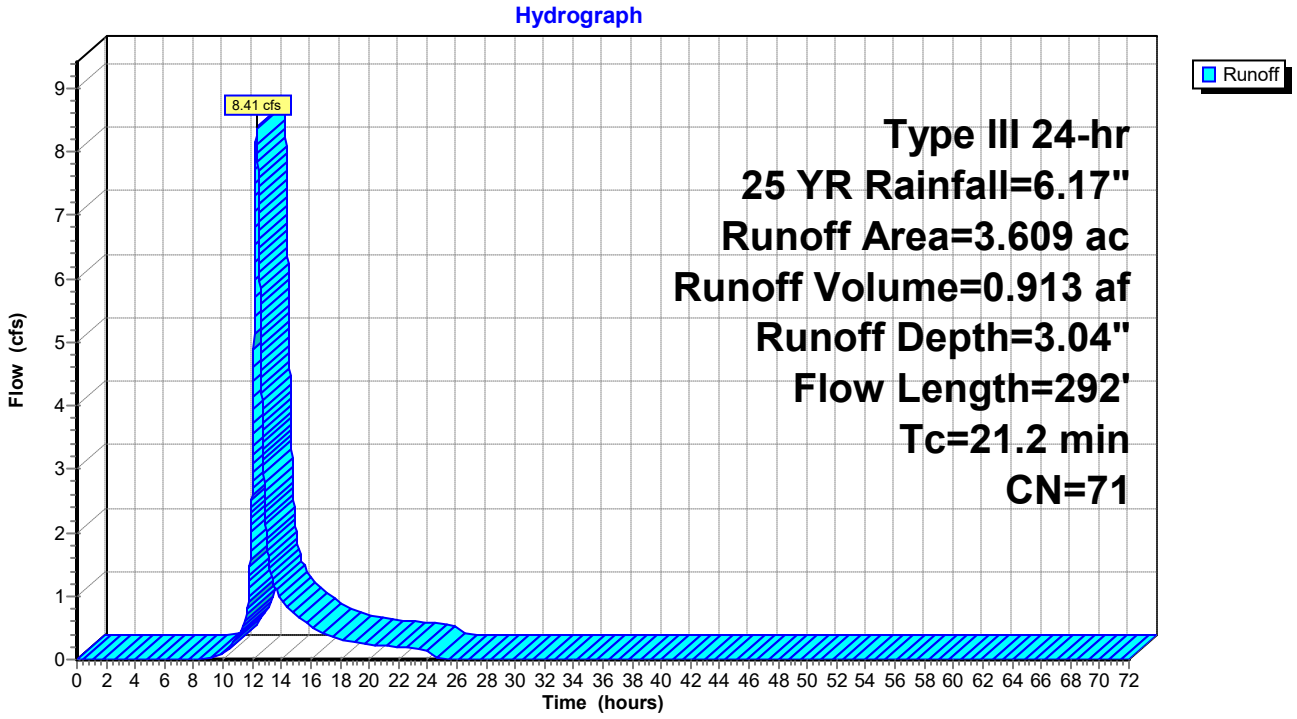
Runoff = 8.41 cfs @ 12.30 hrs, Volume= 0.913 af, Depth= 3.04"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Type III 24-hr 25 YR Rainfall=6.17"

Area (ac)	CN	Description
3.609	71	Meadow, non-grazed, HSG C
3.609		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
19.6	100	0.0092	0.09		**Sheet Flow, A-B** Grass: Dense n= 0.240 P2= 3.17"
1.6	192	0.0169	1.95		**Shallow Concentrated Flow, B-C** Grassed Waterway Kv= 15.0 fps
21.2	292	Total			

Subcatchment PDA-3: PDA-3



Summary for Pond B-1: B-1

[87] Warning: Oscillations may require smaller dt or Finer Routing (severity=271)

Inflow Area = 25.372 ac, 0.47% Impervious, Inflow Depth = 2.48" for 25 YR event
Inflow = 36.69 cfs @ 12.54 hrs, Volume= 5.234 af
Outflow = 17.70 cfs @ 13.06 hrs, Volume= 5.234 af, Atten= 52%, Lag= 31.0 min
Discarded = 11.03 cfs @ 13.06 hrs, Volume= 4.837 af
Primary = 6.66 cfs @ 13.06 hrs, Volume= 0.398 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Peak Elev= 193.16' @ 13.06 hrs Surf.Area= 95,307 sf Storage= 63,353 cf

Plug-Flow detention time= (not calculated: outflow precedes inflow)
Center-of-Mass det. time= 52.4 min (930.2 - 877.8)

Volume	Invert	Avail.Storage	Storage Description
#1	192.00'	166,735 cf	**Custom Stage Data (Irregular)** Listed below (Recalc)

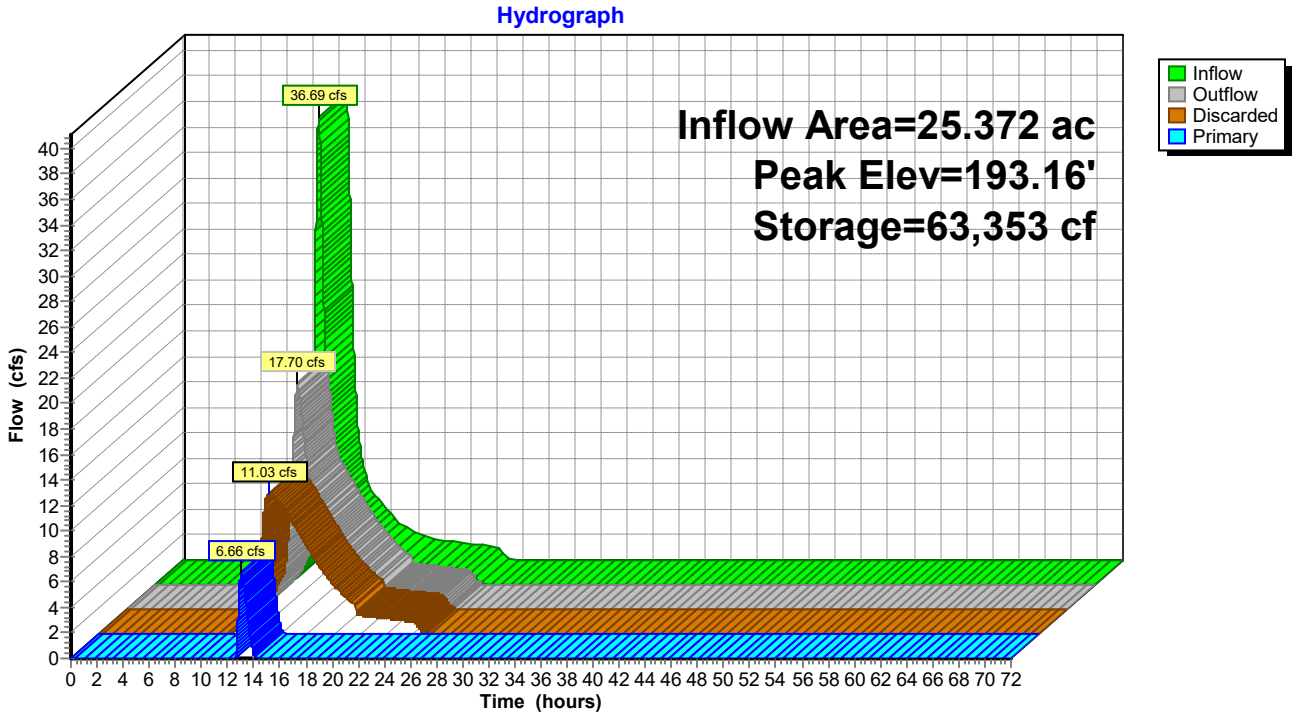
Elevation (feet)	Surf.Area (sq-ft)	Perim. (feet)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)	Wet.Area (sq-ft)
192.00	19,648	581.0	0	0	19,648
193.00	85,795	1,132.6	48,833	48,833	94,871
194.00	153,247	1,536.5	117,902	166,735	180,670

Device	Routing	Invert	Outlet Devices
#1	Discarded	192.00'	**5.000 in/hr Exfiltration over Surface area**
#2	Primary	193.00'	**41.0' long x 11.0' breadth Broad-Crested Rectangular Weir**
			Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60
			Coef. (English) 2.53 2.59 2.70 2.68 2.67 2.68 2.66 2.64

Discarded OutFlow Max=11.03 cfs @ 13.06 hrs HW=193.16' (Free Discharge)
↑—**1=Exfiltration** (Exfiltration Controls 11.03 cfs)

Primary OutFlow Max=6.66 cfs @ 13.06 hrs HW=193.16' TW=0.00' (Dynamic Tailwater)
↑—**2=Broad-Crested Rectangular Weir** (Weir Controls 6.66 cfs @ 1.01 fps)

Pond B-1: B-1

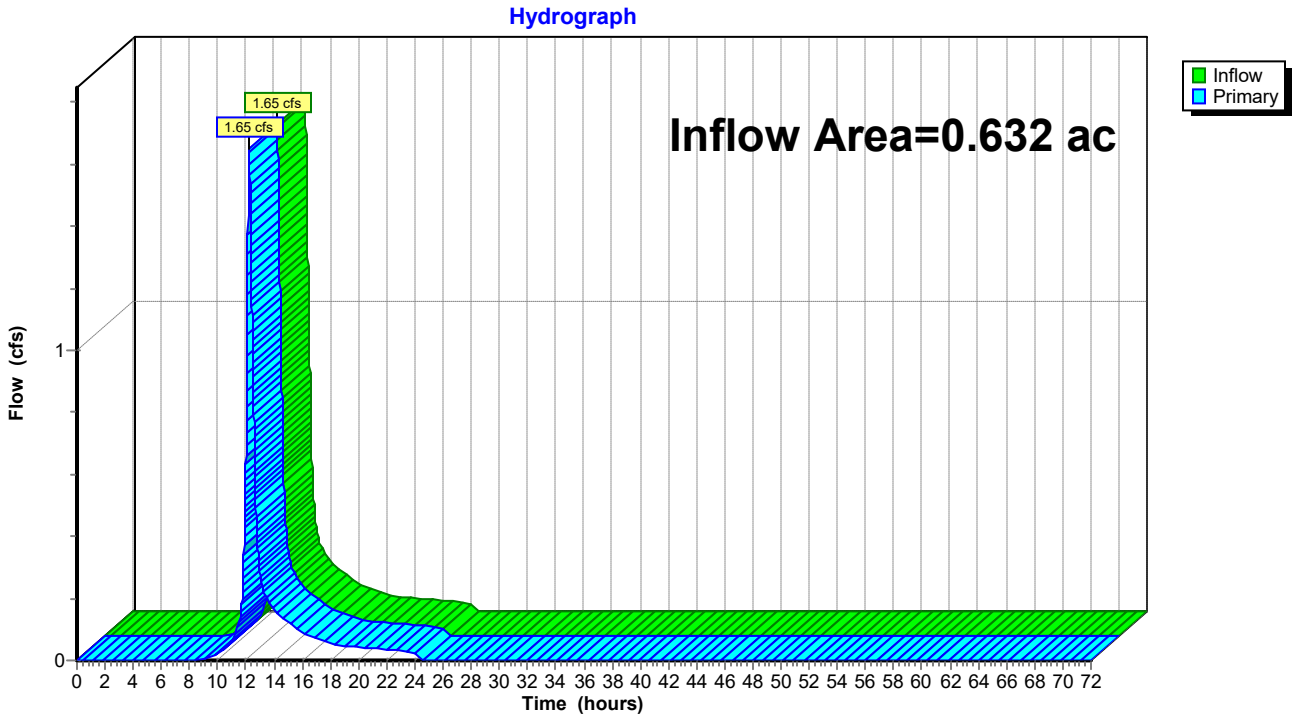

Hydrograph
Inflow Area=25.372 ac
Peak Elev=193.16'
Storage=63,353 cf
36.69 cfs
17.70 cfs
11.03 cfs
6.66 cfs
Inflow
Outflow
Discarded
Primary
Flow (cfs)
Time (hours)

Summary for Link AP-1: AP-1

Inflow Area = 0.632 ac, 0.00% Impervious, Inflow Depth = 3.04" for 25 YR event
Inflow = 1.65 cfs @ 12.22 hrs, Volume= 0.160 af
Primary = 1.65 cfs @ 12.22 hrs, Volume= 0.160 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs

Link AP-1: AP-1

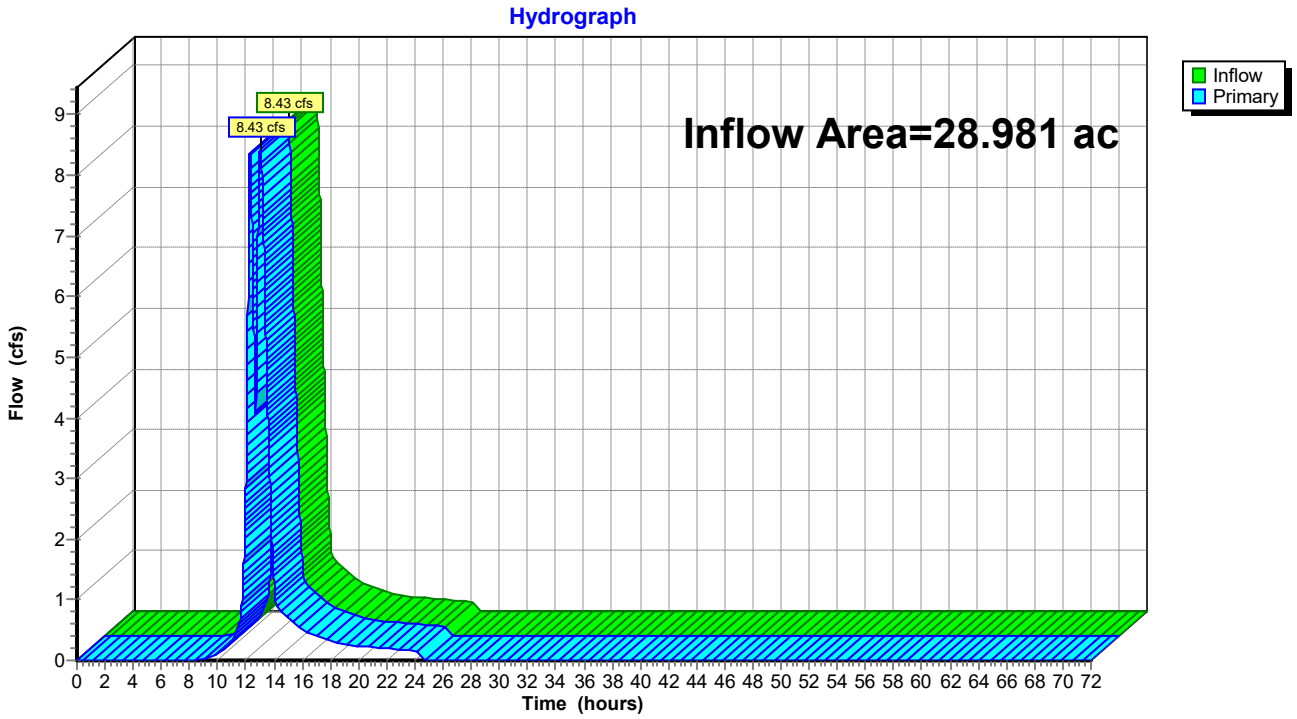


Summary for Link AP-2: AP-2

Inflow Area = 28.981 ac, 0.41% Impervious, Inflow Depth = 0.54" for 25 YR event
Inflow = 8.43 cfs @ 13.03 hrs, Volume= 1.311 af
Primary = 8.43 cfs @ 13.03 hrs, Volume= 1.311 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs

Link AP-2: AP-2



Time span=0.00-72.00 hrs, dt=0.01 hrs, 7201 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Dyn-Stor-Ind method - Pond routing by Dyn-Stor-Ind method

Subcatchment PDA-1: PDA-1 Runoff Area=0.632 ac 0.00% Impervious Runoff Depth=3.73"
Flow Length=156' Tc=16.2 min CN=71 Runoff=2.03 cfs 0.197 af

Subcatchment PDA-2: PDA-2 Runoff Area=25.372 ac 0.47% Impervious Runoff Depth=3.11"
Flow Length=1,414' Tc=37.5 min CN=65 Runoff=46.59 cfs 6.576 af

Subcatchment PDA-3: PDA-3 Runoff Area=3.609 ac 0.00% Impervious Runoff Depth=3.73"
Flow Length=292' Tc=21.2 min CN=71 Runoff=10.37 cfs 1.122 af

Pond B-1: B-1 Peak Elev=193.28' Storage=74,767 cf Inflow=46.59 cfs 6.576 af
Discarded=11.86 cfs 5.533 af Primary=15.17 cfs 1.043 af Outflow=27.02 cfs 6.576 af

Link AP-1: AP-1 Inflow=2.03 cfs 0.197 af
Primary=2.03 cfs 0.197 af

Link AP-2: AP-2 Inflow=17.70 cfs 2.165 af
Primary=17.70 cfs 2.165 af

Total Runoff Area = 29.613 ac Runoff Volume = 7.895 af Average Runoff Depth = 3.20"
99.60% Pervious = 29.495 ac 0.40% Impervious = 0.118 ac

Summary for Subcatchment PDA-1: PDA-1

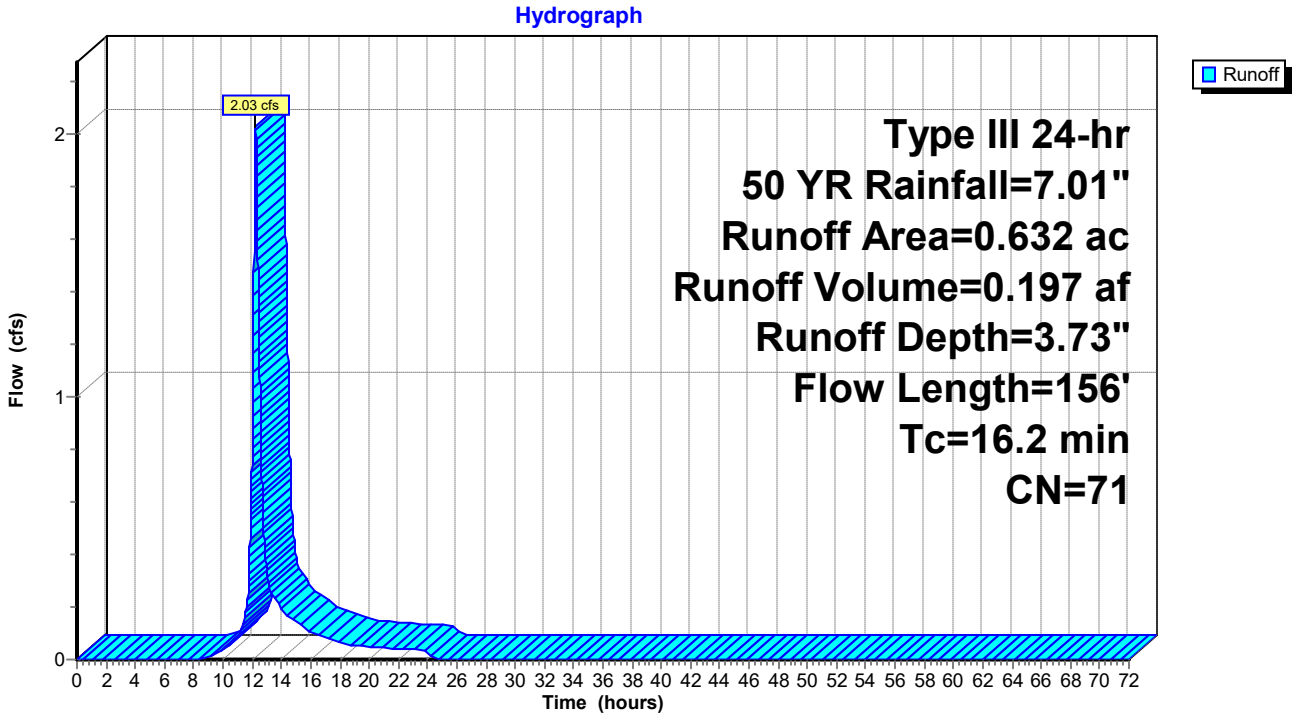
Runoff = 2.03 cfs @ 12.22 hrs, Volume= 0.197 af, Depth= 3.73"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Type III 24-hr 50 YR Rainfall=7.01"

Area (ac)	CN	Description
0.632	71	Meadow, non-grazed, HSG C
0.632		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
15.8	100	0.0158	0.11		**Sheet Flow, A-B** Grass: Dense n= 0.240 P2= 3.17"
0.4	56	0.0234	2.29		**Shallow Concentrated Flow, B-C** Grassed Waterway Kv= 15.0 fps
16.2	156	Total			

Subcatchment PDA-1: PDA-1



Summary for Subcatchment PDA-2: PDA-2

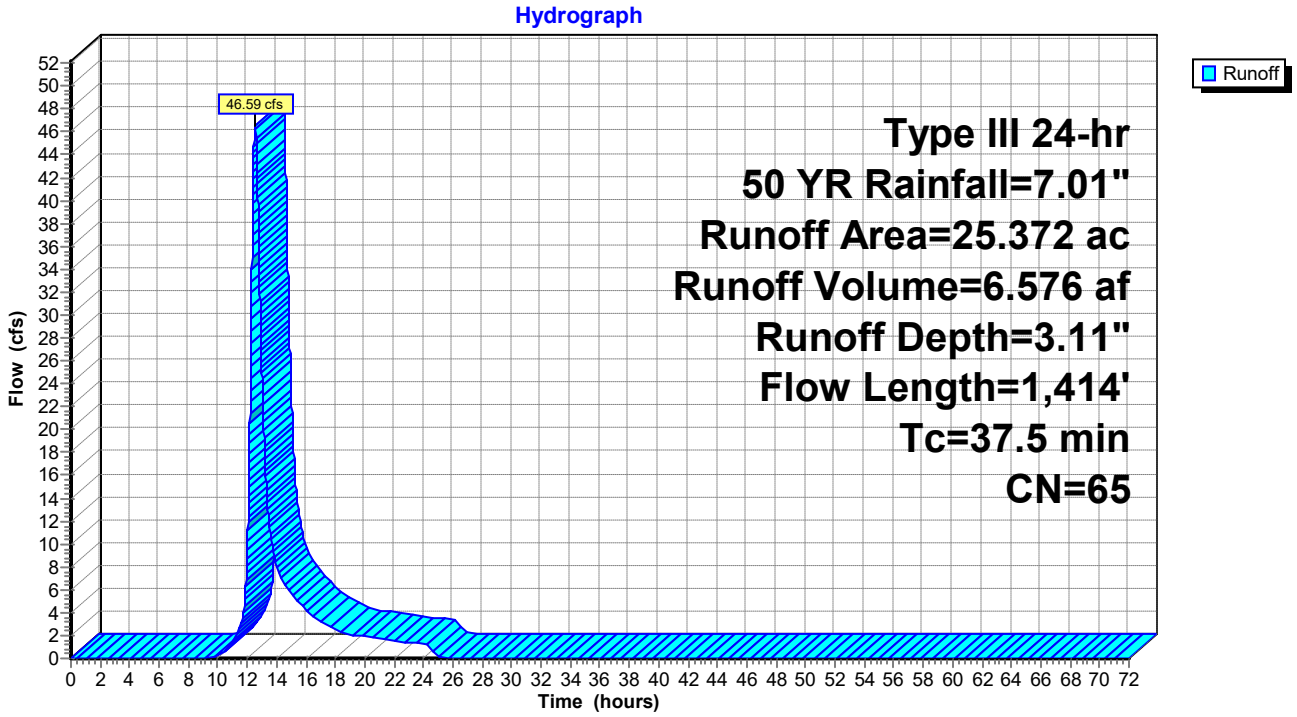
Runoff = 46.59 cfs @ 12.54 hrs, Volume= 6.576 af, Depth= 3.11"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Type III 24-hr 50 YR Rainfall=7.01"

Area (ac)	CN	Description
13.355	58	Meadow, non-grazed, HSG B
0.495	96	Gravel surface, HSG B
0.118	98	Unconnected roofs, HSG A
11.043	71	Meadow, non-grazed, HSG C
0.361	96	Gravel surface, HSG C
25.372	65	Weighted Average
25.254		99.53% Pervious Area
0.118		0.47% Impervious Area
0.118		100.00% Unconnected

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
23.1	100	0.0061	0.07		**Sheet Flow, A-B** Grass: Dense n= 0.240 P2= 3.17"
5.8	637	0.0147	1.82		**Shallow Concentrated Flow, B-C** Grassed Waterway Kv= 15.0 fps
8.6	677	0.0076	1.31		**Shallow Concentrated Flow, C-D** Grassed Waterway Kv= 15.0 fps
37.5	1,414	Total			

Subcatchment PDA-2: PDA-2



Summary for Subcatchment PDA-3: PDA-3

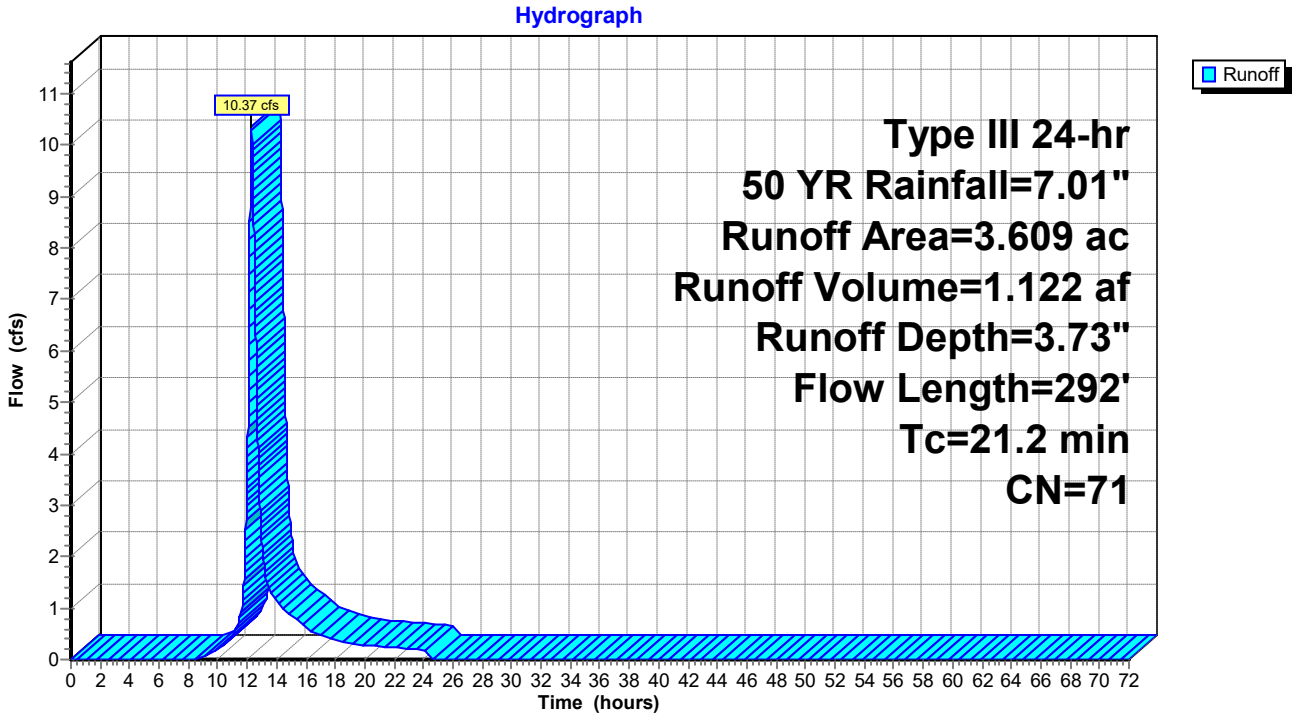
Runoff = 10.37 cfs @ 12.29 hrs, Volume= 1.122 af, Depth= 3.73"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Type III 24-hr 50 YR Rainfall=7.01"

Area (ac)	CN	Description
3.609	71	Meadow, non-grazed, HSG C
3.609		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
19.6	100	0.0092	0.09		**Sheet Flow, A-B** Grass: Dense n= 0.240 P2= 3.17"
1.6	192	0.0169	1.95		**Shallow Concentrated Flow, B-C** Grassed Waterway Kv= 15.0 fps
21.2	292	Total			

Subcatchment PDA-3: PDA-3



Summary for Pond B-1: B-1

[87] Warning: Oscillations may require smaller dt or Finer Routing (severity=221)

Inflow Area = 25.372 ac, 0.47% Impervious, Inflow Depth = 3.11" for 50 YR event
Inflow = 46.59 cfs @ 12.54 hrs, Volume= 6.576 af
Outflow = 27.02 cfs @ 12.95 hrs, Volume= 6.576 af, Atten= 42%, Lag= 24.5 min
Discarded = 11.86 cfs @ 12.95 hrs, Volume= 5.533 af
Primary = 15.17 cfs @ 12.95 hrs, Volume= 1.043 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Peak Elev= 193.28' @ 12.95 hrs Surf.Area= 102,463 sf Storage= 74,767 cf

Plug-Flow detention time= (not calculated: outflow precedes inflow)
Center-of-Mass det. time= 50.8 min (921.9 - 871.1)

Volume	Invert	Avail.Storage	Storage Description
#1	192.00'	166,735 cf	**Custom Stage Data (Irregular)** Listed below (Recalc)

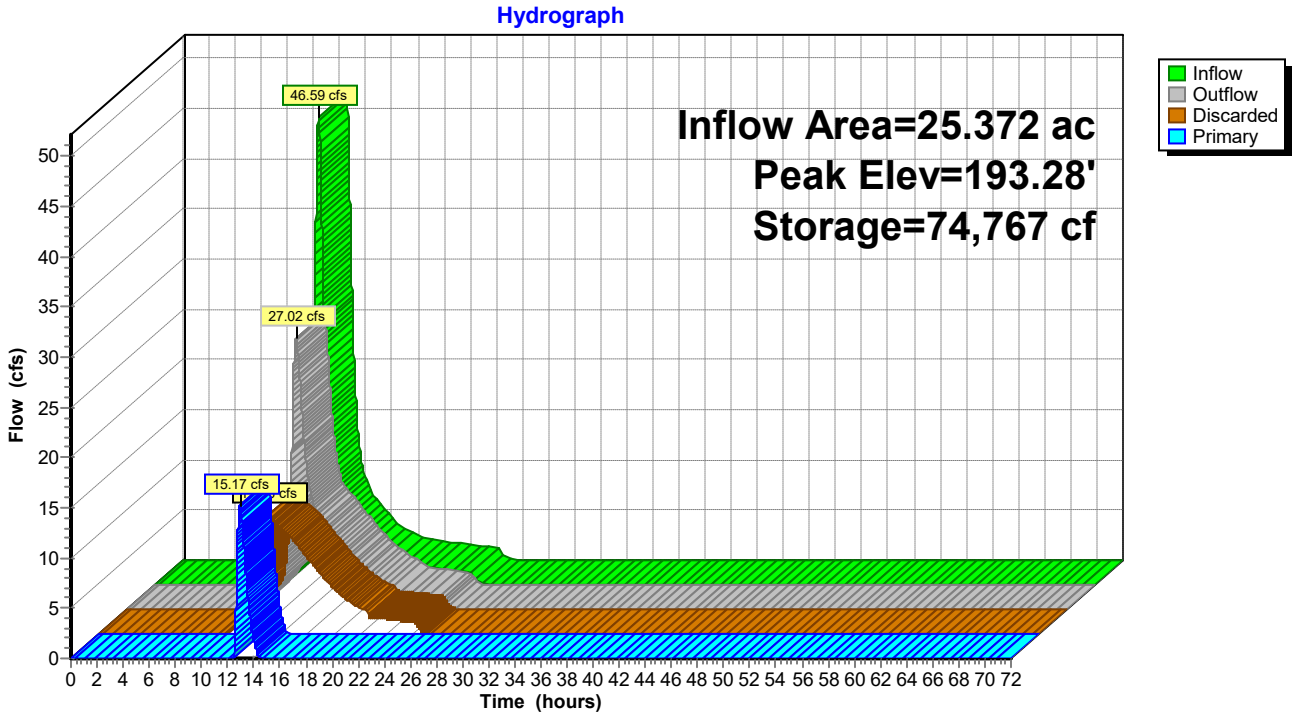
Elevation (feet)	Surf.Area (sq-ft)	Perim. (feet)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)	Wet.Area (sq-ft)
192.00	19,648	581.0	0	0	19,648
193.00	85,795	1,132.6	48,833	48,833	94,871
194.00	153,247	1,536.5	117,902	166,735	180,670

Device	Routing	Invert	Outlet Devices
#1	Discarded	192.00'	**5.000 in/hr Exfiltration over Surface area**
#2	Primary	193.00'	**41.0' long x 11.0' breadth Broad-Crested Rectangular Weir**
			Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60
			Coef. (English) 2.53 2.59 2.70 2.68 2.67 2.68 2.66 2.64

Discarded OutFlow Max=11.86 cfs @ 12.95 hrs HW=193.28' (Free Discharge)
↑—**1=Exfiltration** (Exfiltration Controls 11.86 cfs)

Primary OutFlow Max=15.16 cfs @ 12.95 hrs HW=193.28' TW=0.00' (Dynamic Tailwater)
↑—**2=Broad-Crested Rectangular Weir** (Weir Controls 15.16 cfs @ 1.34 fps)

Pond B-1: B-1

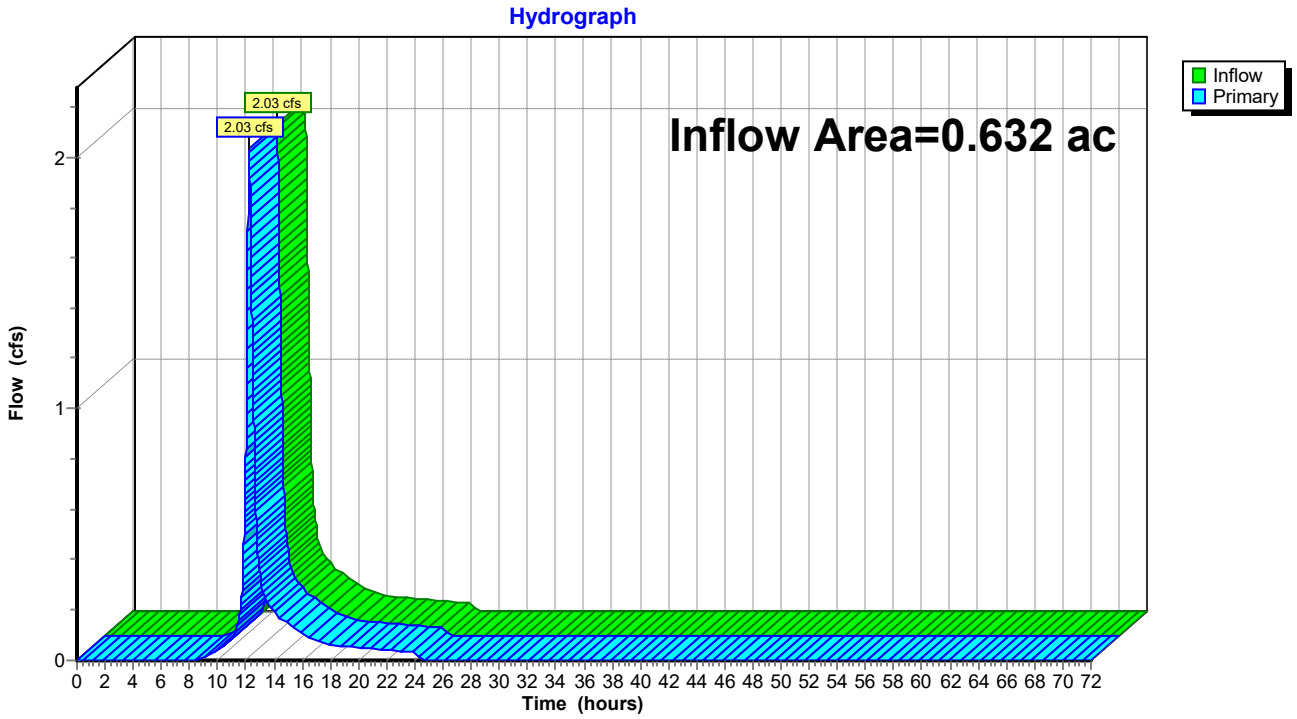

Hydrograph
Inflow Area=25.372 ac
Peak Elev=193.28'
Storage=74,767 cf
46.59 cfs
27.02 cfs
15.17 cfs
Inflow
Outflow
Discarded
Primary
Flow (cfs)
Time (hours)

Summary for Link AP-1: AP-1

Inflow Area = 0.632 ac, 0.00% Impervious, Inflow Depth = 3.73" for 50 YR event
Inflow = 2.03 cfs @ 12.22 hrs, Volume= 0.197 af
Primary = 2.03 cfs @ 12.22 hrs, Volume= 0.197 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs

Link AP-1: AP-1

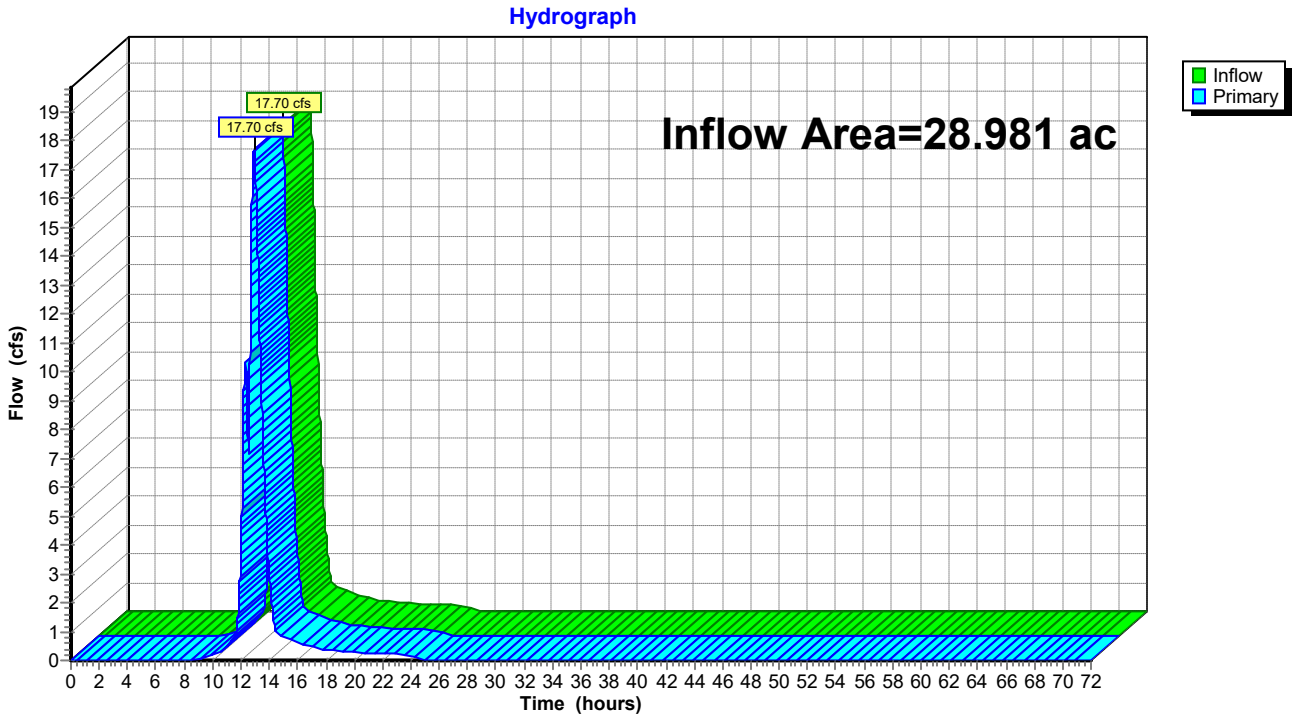


Summary for Link AP-2: AP-2

Inflow Area = 28.981 ac, 0.41% Impervious, Inflow Depth = 0.90" for 50 YR event
Inflow = 17.70 cfs @ 12.92 hrs, Volume= 2.165 af
Primary = 17.70 cfs @ 12.92 hrs, Volume= 2.165 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs

Link AP-2: AP-2



Time span=0.00-72.00 hrs, dt=0.01 hrs, 7201 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Dyn-Stor-Ind method - Pond routing by Dyn-Stor-Ind method

Subcatchment PDA-1: PDA-1 Runoff Area=0.632 ac 0.00% Impervious Runoff Depth=4.54"
Flow Length=156' Tc=16.2 min CN=71 Runoff=2.47 cfs 0.239 af

Subcatchment PDA-2: PDA-2 Runoff Area=25.372 ac 0.47% Impervious Runoff Depth=3.85"
Flow Length=1,414' Tc=37.5 min CN=65 Runoff=58.10 cfs 8.148 af

Subcatchment PDA-3: PDA-3 Runoff Area=3.609 ac 0.00% Impervious Runoff Depth=4.54"
Flow Length=292' Tc=21.2 min CN=71 Runoff=12.62 cfs 1.364 af

Pond B-1: B-1 Peak Elev=193.39' Storage=86,514 cf Inflow=58.10 cfs 8.148 af
Discarded=12.68 cfs 6.254 af Primary=25.50 cfs 1.894 af Outflow=38.18 cfs 8.148 af

Link AP-1: AP-1 Inflow=2.47 cfs 0.239 af
Primary=2.47 cfs 0.239 af

Link AP-2: AP-2 Inflow=29.02 cfs 3.259 af
Primary=29.02 cfs 3.259 af

Total Runoff Area = 29.613 ac Runoff Volume = 9.751 af Average Runoff Depth = 3.95"
99.60% Pervious = 29.495 ac 0.40% Impervious = 0.118 ac

Summary for Subcatchment PDA-1: PDA-1

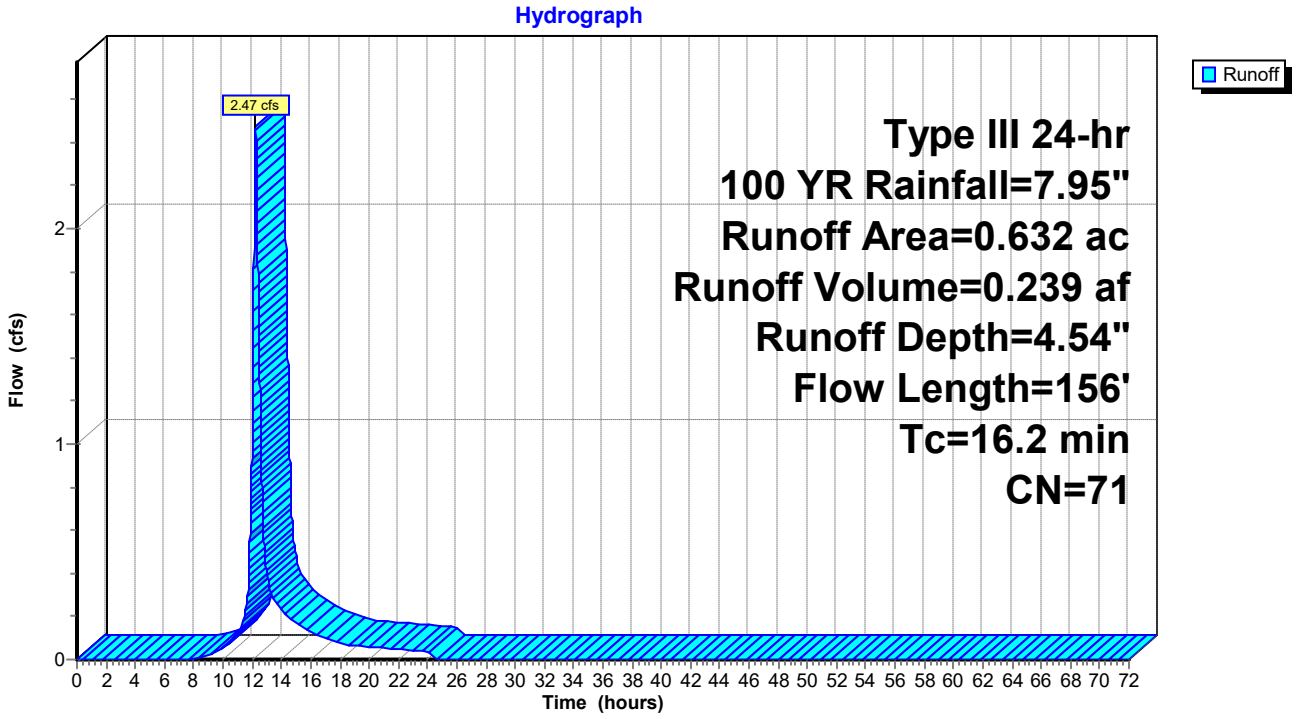
Runoff = 2.47 cfs @ 12.22 hrs, Volume= 0.239 af, Depth= 4.54"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Type III 24-hr 100 YR Rainfall=7.95"

Area (ac)	CN	Description
0.632	71	Meadow, non-grazed, HSG C
0.632		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
15.8	100	0.0158	0.11		**Sheet Flow, A-B** Grass: Dense n= 0.240 P2= 3.17"
0.4	56	0.0234	2.29		**Shallow Concentrated Flow, B-C** Grassed Waterway Kv= 15.0 fps
16.2	156	Total			

Subcatchment PDA-1: PDA-1



Summary for Subcatchment PDA-2: PDA-2

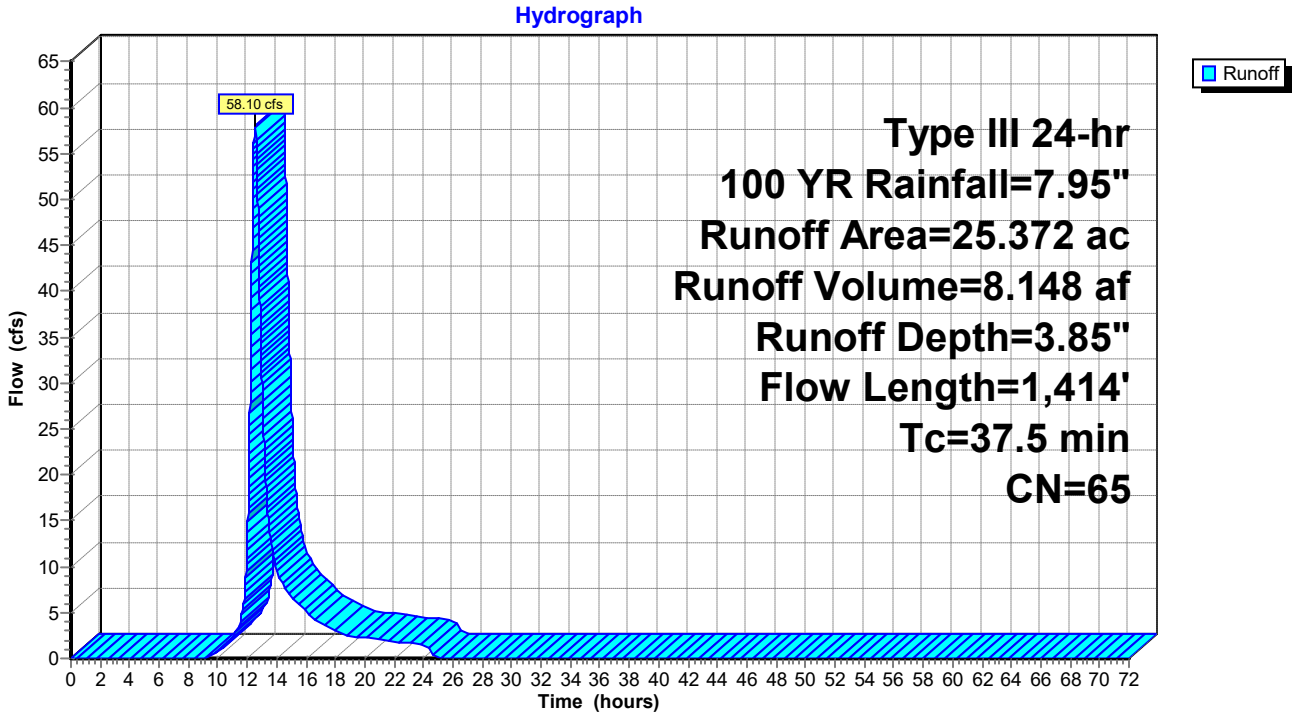
Runoff = 58.10 cfs @ 12.54 hrs, Volume= 8.148 af, Depth= 3.85"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Type III 24-hr 100 YR Rainfall=7.95"

Area (ac)	CN	Description
13.355	58	Meadow, non-grazed, HSG B
0.495	96	Gravel surface, HSG B
0.118	98	Unconnected roofs, HSG A
11.043	71	Meadow, non-grazed, HSG C
0.361	96	Gravel surface, HSG C
25.372	65	Weighted Average
25.254		99.53% Pervious Area
0.118		0.47% Impervious Area
0.118		100.00% Unconnected

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
23.1	100	0.0061	0.07		**Sheet Flow, A-B** Grass: Dense n= 0.240 P2= 3.17"
5.8	637	0.0147	1.82		**Shallow Concentrated Flow, B-C** Grassed Waterway Kv= 15.0 fps
8.6	677	0.0076	1.31		**Shallow Concentrated Flow, C-D** Grassed Waterway Kv= 15.0 fps
37.5	1,414	Total			

Subcatchment PDA-2: PDA-2



Summary for Subcatchment PDA-3: PDA-3

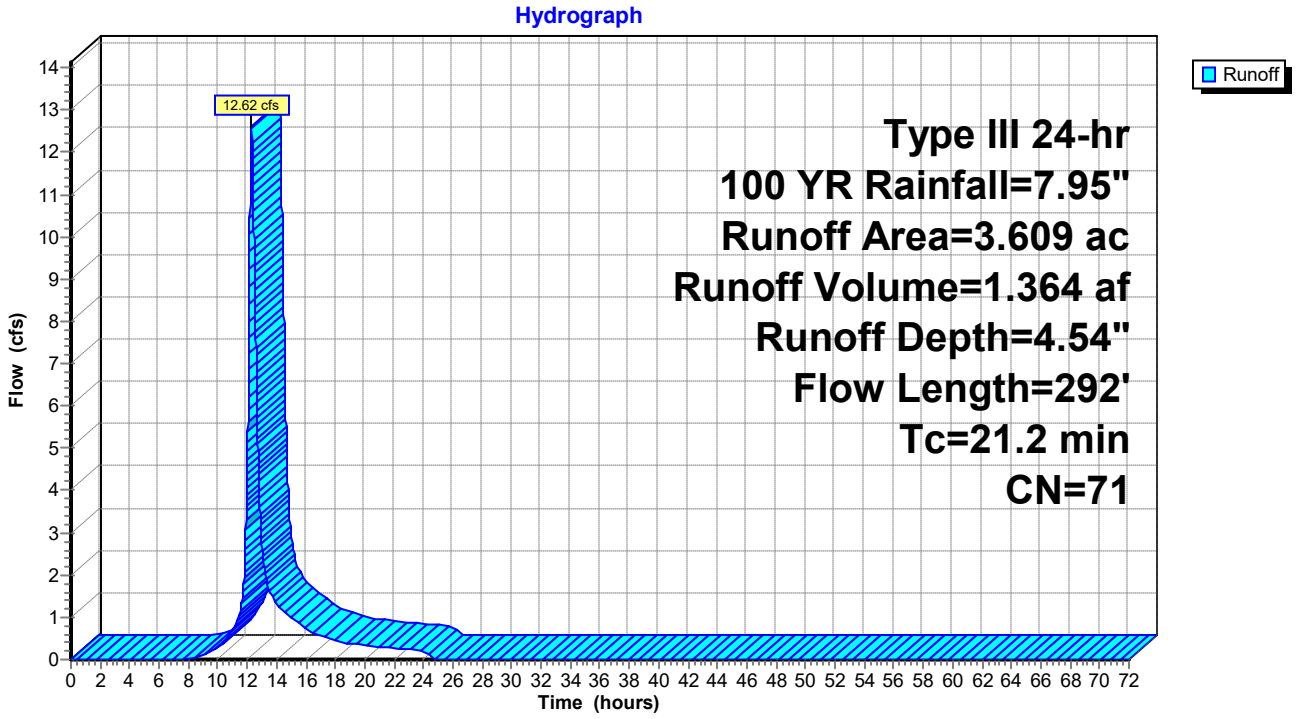
Runoff = 12.62 cfs @ 12.29 hrs, Volume= 1.364 af, Depth= 4.54"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Type III 24-hr 100 YR Rainfall=7.95"

Area (ac)	CN	Description
3.609	71	Meadow, non-grazed, HSG C
3.609		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
19.6	100	0.0092	0.09		**Sheet Flow, A-B** Grass: Dense n= 0.240 P2= 3.17"
1.6	192	0.0169	1.95		**Shallow Concentrated Flow, B-C** Grassed Waterway Kv= 15.0 fps
21.2	292	Total			

Subcatchment PDA-3: PDA-3



Summary for Pond B-1: B-1

[87] Warning: Oscillations may require smaller dt or Finer Routing (severity=1)

Inflow Area = 25.372 ac, 0.47% Impervious, Inflow Depth = 3.85" for 100 YR event
Inflow = 58.10 cfs @ 12.54 hrs, Volume= 8.148 af
Outflow = 38.18 cfs @ 12.87 hrs, Volume= 8.148 af, Atten= 34%, Lag= 20.1 min
Discarded = 12.68 cfs @ 12.87 hrs, Volume= 6.254 af
Primary = 25.50 cfs @ 12.87 hrs, Volume= 1.894 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Peak Elev= 193.39' @ 12.87 hrs Surf.Area= 109,574 sf Storage= 86,514 cf

Plug-Flow detention time= (not calculated: outflow precedes inflow)
Center-of-Mass det. time= 48.8 min (913.7 - 864.9)

Volume	Invert	Avail.Storage	Storage Description
#1	192.00'	166,735 cf	**Custom Stage Data (Irregular)** Listed below (Recalc)

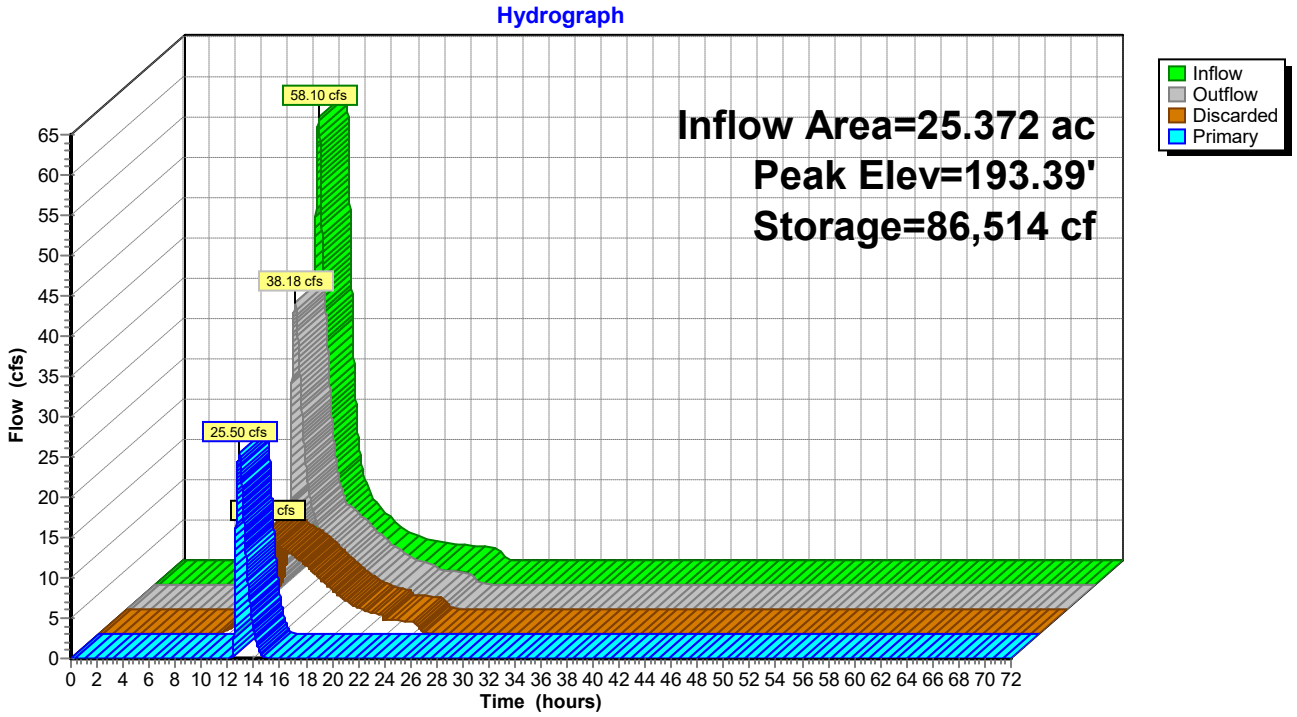
Elevation (feet)	Surf.Area (sq-ft)	Perim. (feet)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)	Wet.Area (sq-ft)
192.00	19,648	581.0	0	0	19,648
193.00	85,795	1,132.6	48,833	48,833	94,871
194.00	153,247	1,536.5	117,902	166,735	180,670

Device	Routing	Invert	Outlet Devices
#1	Discarded	192.00'	**5.000 in/hr Exfiltration over Surface area**
#2	Primary	193.00'	**41.0' long x 11.0' breadth Broad-Crested Rectangular Weir**
			Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60
			Coef. (English) 2.53 2.59 2.70 2.68 2.67 2.68 2.66 2.64

Discarded OutFlow Max=12.68 cfs @ 12.87 hrs HW=193.39' (Free Discharge)
↑—**1=Exfiltration** (Exfiltration Controls 12.68 cfs)

Primary OutFlow Max=25.49 cfs @ 12.87 hrs HW=193.39' TW=0.00' (Dynamic Tailwater)
↑—**2=Broad-Crested Rectangular Weir** (Weir Controls 25.49 cfs @ 1.61 fps)

Pond B-1: B-1

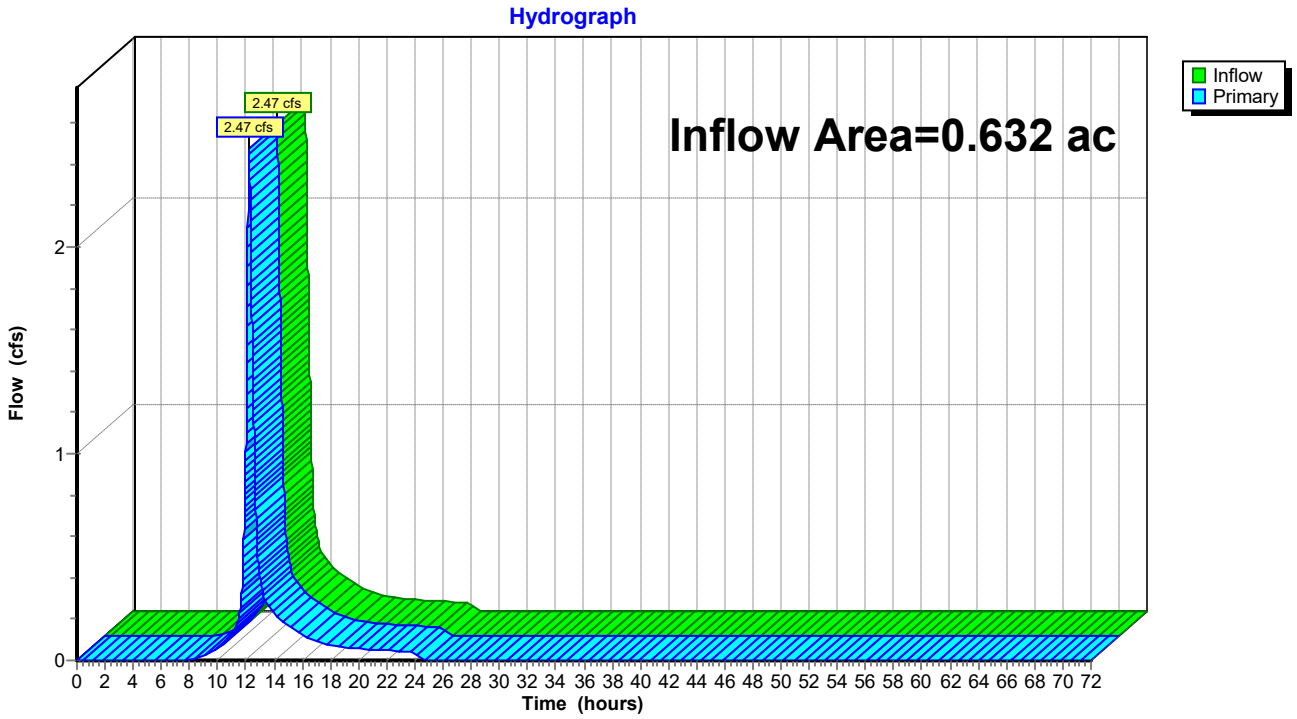

Hydrograph
Inflow Area=25.372 ac
Peak Elev=193.39'
Storage=86,514 cf
58.10 cfs
38.18 cfs
25.50 cfs
cfs
Inflow
Outflow
Discarded
Primary
Flow (cfs)
Time (hours)
0 5 10 15 20 25 30 35 40 45 50 55 60 65
0 2 4 6 8 10 12 14 16 18 20 22 24 26 28 30 32 34 36 38 40 42 44 46 48 50 52 54 56 58 60 62 64 66 68 70 72

Summary for Link AP-1: AP-1

Inflow Area = 0.632 ac, 0.00% Impervious, Inflow Depth = 4.54" for 100 YR event
Inflow = 2.47 cfs @ 12.22 hrs, Volume= 0.239 af
Primary = 2.47 cfs @ 12.22 hrs, Volume= 0.239 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs

Link AP-1: AP-1

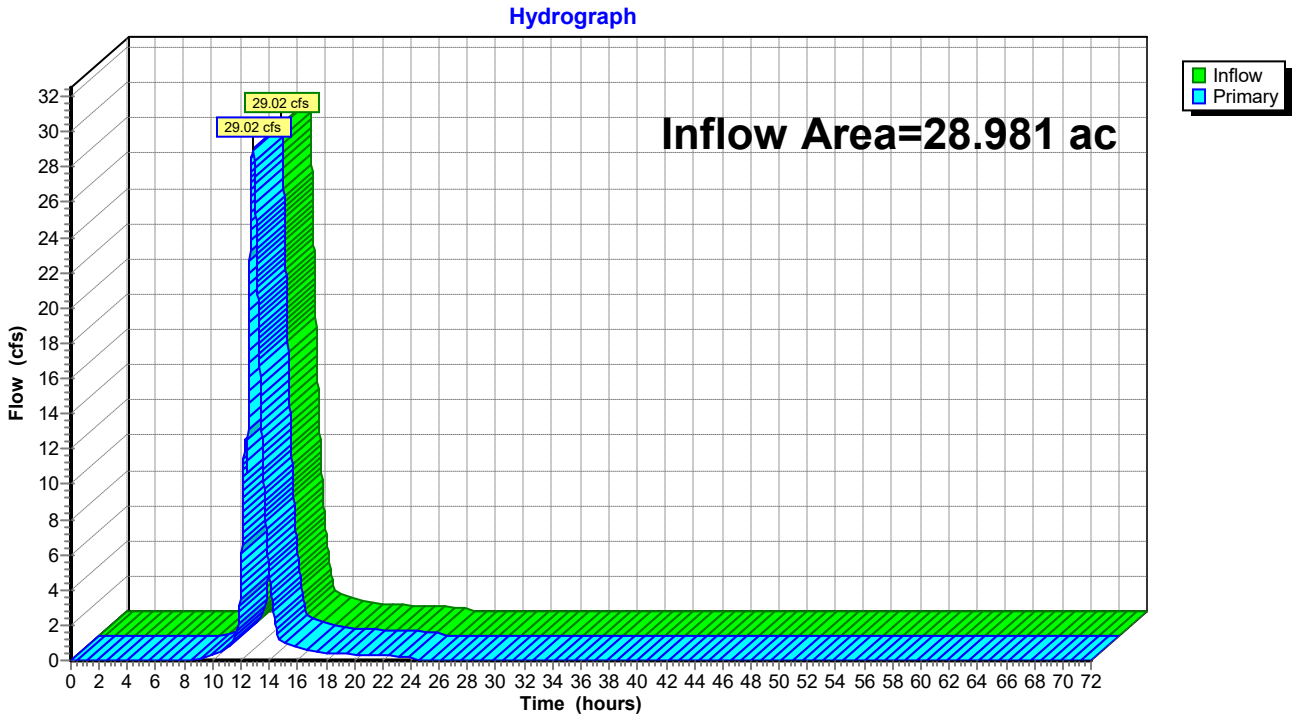


Summary for Link AP-2: AP-2

Inflow Area = 28.981 ac, 0.41% Impervious, Inflow Depth = 1.35" for 100 YR event
Inflow = 29.02 cfs @ 12.84 hrs, Volume= 3.259 af
Primary = 29.02 cfs @ 12.84 hrs, Volume= 3.259 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs

Link AP-2: AP-2



APPENDIX D: NOAA ATLAS 14 PRECIPITATION FREQUENCY TABLE

NOAA Atlas 14, Volume 10, Version 3
Location name: Broad Brook, Connecticut, USA*
Latitude: 41.8903°, Longitude: -72.5185°
Elevation: 197.28 ft**
* source: ESRI Maps
** source: USGS

POINT PRECIPITATION FREQUENCY ESTIMATES

Sanja Perica, Sandra Pavlovic, Michael St. Laurent, Carl Trypaluk, Dale Unruh, Orlan Wilhite

NOAA, National Weather Service, Silver Spring, Maryland

PF_tabular | PF_graphical | Maps_&_aerials

PF tabular

PDS-based point precipitation frequency estimates with 90% confidence intervals (in inches)[1]

Duration	Average recurrence interval (years)									
	1	2	5	10	25	50	100	200	500	1000
5-min	0.335 (0.256-0.438)	0.406 (0.310-0.531)	0.522 (0.397-0.685)	0.617 (0.467-0.815)	0.749 (0.551-1.03)	0.848 (0.613-1.20)	0.952 (0.670-1.39)	1.07 (0.716-1.60)	1.24 (0.801-1.91)	1.38 (0.870-2.17)
10-min	0.475 (0.363-0.621)	0.575 (0.439-0.752)	0.738 (0.562-0.969)	0.874 (0.661-1.15)	1.06 (0.780-1.46)	1.20 (0.867-1.69)	1.35 (0.950-1.97)	1.51 (1.01-2.26)	1.75 (1.13-2.71)	1.95 (1.23-3.07)
15-min	0.559 (0.427-0.730)	0.676 (0.516-0.885)	0.868 (0.661-1.14)	1.03 (0.778-1.36)	1.25 (0.918-1.72)	1.41 (1.02-1.99)	1.59 (1.12-2.32)	1.78 (1.19-2.66)	2.06 (1.33-3.19)	2.29 (1.45-3.61)
30-min	0.754 (0.576-0.985)	0.914 (0.698-1.20)	1.18 (0.896-1.55)	1.40 (1.06-1.84)	1.70 (1.25-2.34)	1.92 (1.39-2.71)	2.16 (1.52-3.15)	2.42 (1.62-3.62)	2.81 (1.82-4.34)	3.12 (1.97-4.92)
60-min	0.949 (0.725-1.24)	1.15 (0.880-1.51)	1.49 (1.13-1.95)	1.76 (1.34-2.33)	2.14 (1.58-2.96)	2.43 (1.76-3.42)	2.73 (1.92-3.99)	3.07 (2.05-4.58)	3.55 (2.30-5.49)	3.95 (2.50-6.23)
2-hr	1.22 (0.936-1.59)	1.47 (1.13-1.92)	1.89 (1.44-2.47)	2.23 (1.70-2.93)	2.70 (2.00-3.72)	3.05 (2.22-4.30)	3.43 (2.44-5.03)	3.88 (2.61-5.76)	4.55 (2.95-7.00)	5.12 (3.25-8.03)
3-hr	1.40 (1.08-1.82)	1.69 (1.30-2.20)	2.17 (1.66-2.82)	2.56 (1.95-3.36)	3.10 (2.31-4.26)	3.50 (2.56-4.93)	3.94 (2.82-5.78)	4.47 (3.01-6.62)	5.28 (3.43-8.09)	5.98 (3.80-9.34)
6-hr	1.77 (1.37-2.28)	2.14 (1.66-2.77)	2.75 (2.12-3.57)	3.26 (2.50-4.25)	3.96 (2.96-5.43)	4.47 (3.30-6.28)	5.04 (3.64-7.38)	5.75 (3.88-8.46)	6.85 (4.46-10.4)	7.81 (4.98-12.1)
12-hr	2.17 (1.69-2.79)	2.66 (2.07-3.42)	3.47 (2.68-4.47)	4.13 (3.18-5.35)	5.05 (3.79-6.88)	5.72 (4.23-7.99)	6.46 (4.68-9.42)	7.39 (5.00-10.8)	8.85 (5.78-13.4)	10.1 (6.48-15.6)
24-hr	2.55 (1.99-3.26)	3.17 (2.47-4.05)	4.18 (3.25-5.36)	5.01 (3.88-6.47)	6.17 (4.66-8.38)	7.01 (5.22-9.76)	7.95 (5.80-11.6)	9.14 (6.21-13.3)	11.0 (7.23-16.6)	12.7 (8.16-19.5)
2-day	2.87 (2.25-3.64)	3.60 (2.83-4.58)	4.81 (3.76-6.14)	5.81 (4.52-7.46)	7.19 (5.47-9.74)	8.19 (6.14-11.4)	9.32 (6.86-13.6)	10.8 (7.35-15.6)	13.2 (8.67-19.7)	15.3 (9.87-23.3)
3-day	3.12 (2.46-3.96)	3.93 (3.09-4.98)	5.25 (4.12-6.68)	6.35 (4.95-8.12)	7.85 (5.99-10.6)	8.95 (6.73-12.4)	10.2 (7.53-14.8)	11.8 (8.06-17.0)	14.5 (9.52-21.6)	16.8 (10.9-25.5)
4-day	3.36 (2.65-4.25)	4.22 (3.33-5.34)	5.63 (4.42-7.14)	6.79 (5.31-8.67)	8.40 (6.42-11.3)	9.57 (7.20-13.2)	10.9 (8.05-15.8)	12.6 (8.62-18.1)	15.4 (10.2-22.9)	18.0 (11.6-27.2)
7-day	4.01 (3.18-5.05)	4.98 (3.95-6.28)	6.57 (5.19-8.30)	7.89 (6.19-10.0)	9.70 (7.43-13.0)	11.0 (8.32-15.1)	12.5 (9.26-18.0)	14.4 (9.89-20.6)	17.5 (11.6-25.9)	20.3 (13.1-30.5)
10-day	4.66 (3.70-5.85)	5.69 (4.52-7.15)	7.38 (5.84-9.30)	8.78 (6.91-11.1)	10.7 (8.21-14.3)	12.1 (9.14-16.5)	13.7 (10.1-19.5)	15.7 (10.8-22.3)	18.8 (12.5-27.8)	21.6 (14.0-32.4)
20-day	6.70 (5.36-8.37)	7.80 (6.23-9.75)	9.60 (7.64-12.0)	11.1 (8.77-14.0)	13.1 (10.1-17.3)	14.7 (11.0-19.7)	16.3 (12.0-22.7)	18.2 (12.6-25.8)	21.1 (14.1-30.9)	23.6 (15.4-35.2)
30-day	8.44 (6.77-10.5)	9.56 (7.66-11.9)	11.4 (9.10-14.2)	12.9 (10.3-16.2)	15.0 (11.5-19.6)	16.6 (12.5-22.1)	18.3 (13.3-25.1)	20.1 (13.9-28.3)	22.7 (15.1-33.0)	24.7 (16.1-36.7)
45-day	10.6 (8.53-13.2)	11.8 (9.45-14.6)	13.7 (10.9-17.0)	15.2 (12.1-19.1)	17.4 (13.4-22.5)	19.0 (14.3-25.1)	20.7 (15.0-28.1)	22.4 (15.6-31.3)	24.6 (16.5-35.6)	26.2 (17.1-38.8)
60-day	12.4 (10.0-15.4)	13.6 (11.0-16.9)	15.6 (12.5-19.4)	17.2 (13.7-21.5)	19.4 (14.9-25.0)	21.1 (15.9-27.7)	22.8 (16.5-30.6)	24.4 (17.0-34.0)	26.3 (17.7-38.0)	27.7 (18.1-40.8)

[1] Precipitation frequency (PF) estimates in this table are based on frequency analysis of partial duration series (PDS).

Numbers in parenthesis are PF estimates at lower and upper bounds of the 90% confidence interval. The probability that precipitation frequency estimates (for a given duration and average recurrence interval) will be greater than the upper bound (or less than the lower bound) is 5%. Estimates at upper bounds are not checked against probable maximum precipitation (PMP) estimates and may be higher than currently valid PMP values.

Please refer to NOAA Atlas 14 document for more information.

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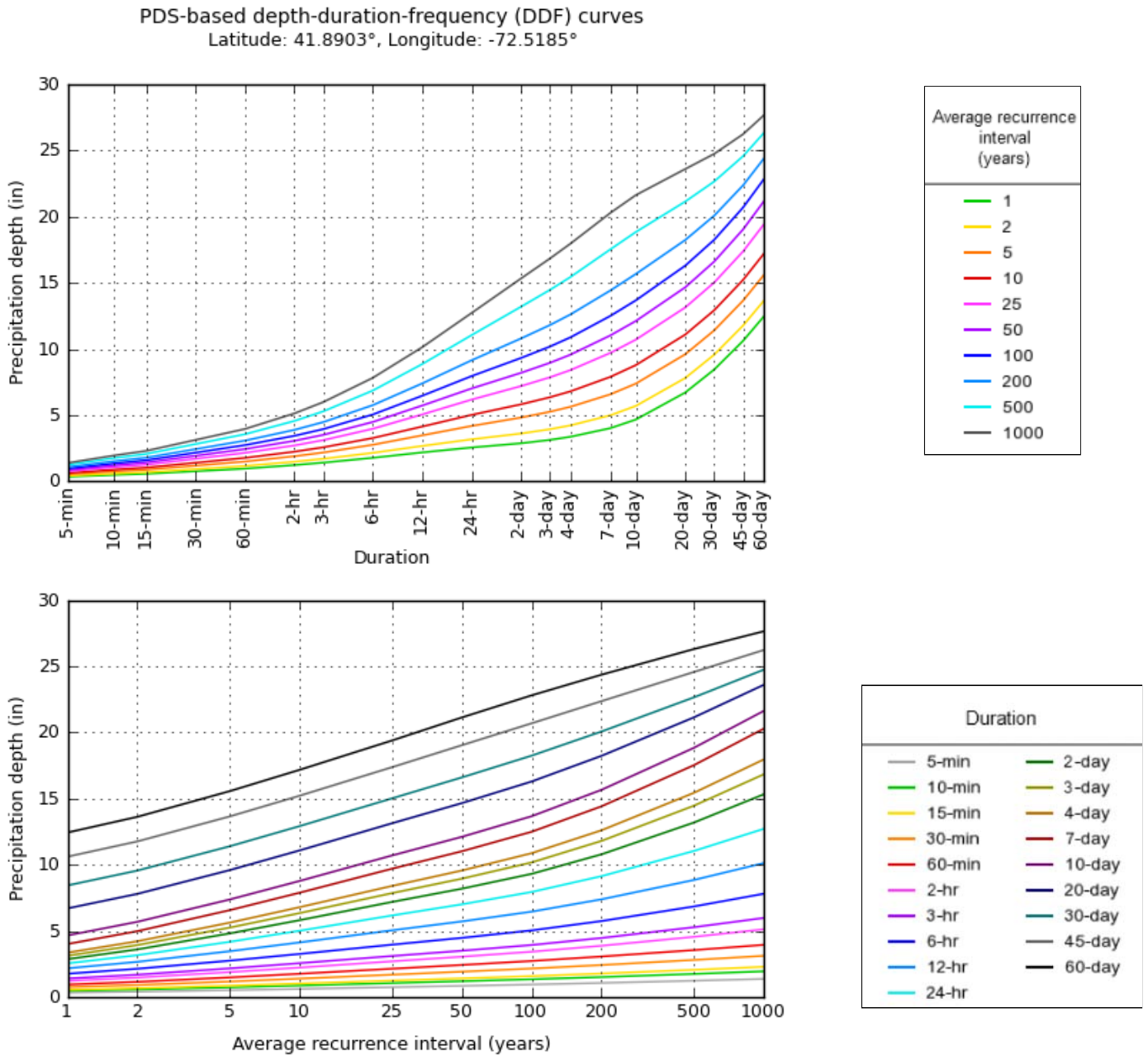
PF graphical



NOAA Atlas 14, Volume 10, Version 3

Created (GMT): Thu May 30 16:13:56 2019

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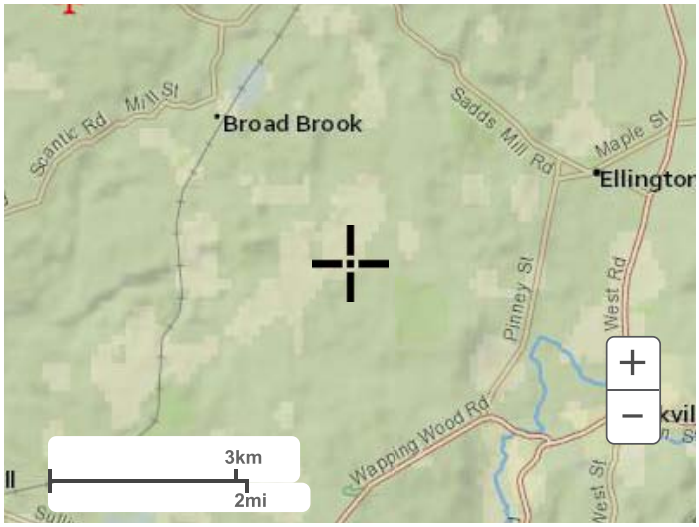
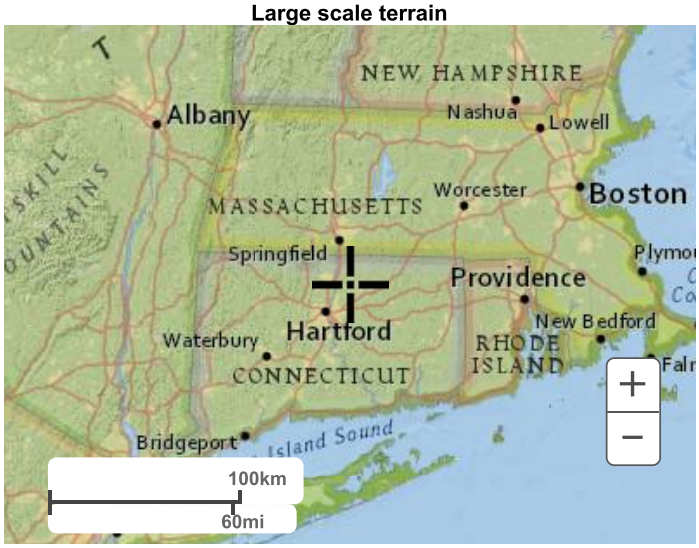
Maps & aerials

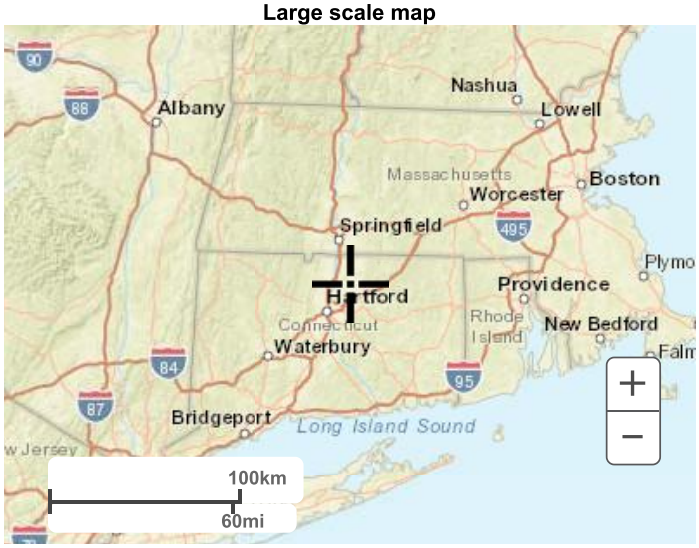
Small scale terrain



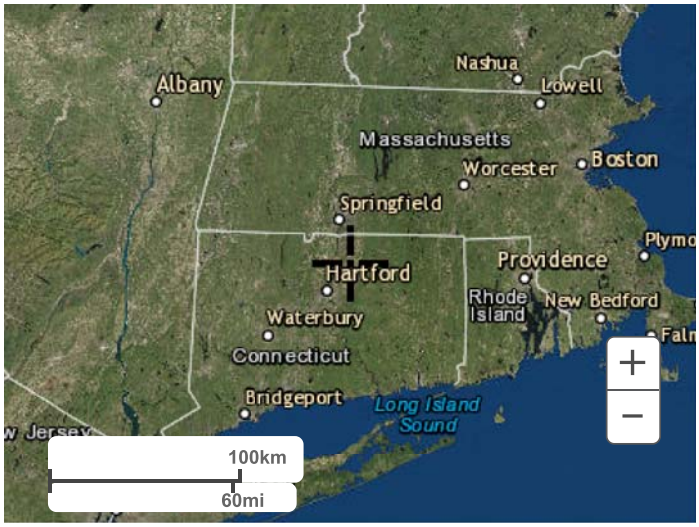
Large scale terrain



Large scale map



Large scale aerial



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US Department of Commerce
National Oceanic and Atmospheric Administration
National Weather Service
National Water Center
1325 East West Highway
Silver Spring, MD 20910
Questions?: HDSC.Questions@noaa.gov

Disclaimer

APPENDIX E: GEOTECHNICAL REPORT

DOWN TO EARTH CONSULTING, LLC
GEOTECHNICAL AND ENVIRONMENTAL ENGINEERING

GEOTECHNICAL ENGINEERING REPORT
PROPOSED SOLAR ARRAY
EAST WINDSOR SOLAR ONE
341 EAST ROAD
EAST WINDSOR, CONNECTICUT

Prepared for:

All-Points Technology Corporation, P.C.
567 Vauxhaul Street Extension – Suite 311
Waterford, Connecticut 06385

Prepared by:

Down To Earth Consulting, LLC
122 Church Street
Naugatuck, Connecticut 06770

File No. 0032-034.00
May 2020

DOWN TO EARTH CONSULTING, LLC
GEOTECHNICAL AND ENVIRONMENTAL ENGINEERING

May 18, 2020
File No. 0032-034.00

Mr. Bradley J. Parsons, PE
All-Points Technology Corporation
567 Vauxhaul Street Extension – Suite 311
Waterford, Connecticut 06385

Via email: bparsons@allpointstech.com

Re: Geotechnical Engineering Report
East Windsor Solar One
341 East Road, East Windsor, Connecticut

Down To Earth Consulting, LLC (DTE) is pleased to submit this geotechnical engineering report for the East Windsor Solar One Project that will be located at 341 East Road in East Windsor, Connecticut (Site) for All-Points Technology Corporation (Client). Our services were completed in general accordance with our current Master Services Agreement. We appreciate this opportunity to work with you and look forward to our continued involvement. Please call if you have any questions.

Sincerely,

Down To Earth Consulting, LLC

Raymond P. Janeiro, P.E.
Principal

TABLE OF CONTENTS

APPENDICES

1.0 INTRODUCTION

Down To Earth Consulting, LLC, completed a subsurface exploration program and geotechnical engineering evaluation for the proposed solar array foundations. Our geotechnical engineering services included: reviewing provided project plans, completing borings and soils testing, characterizing subsurface conditions within the proposed solar array limits, performing geotechnical engineering analyses, and providing geotechnical design and construction recommendations for the project. Refer to Figures 1 and 2 (in Appendix 1) for an area plan and site plan, respectively. Our services were based, in part, on a provided *Concept Plan*, prepared by the Client, revision dated November 15, 2019.

2.0 BACKGROUND

The East Windsor Solar One parcel is generally bordered by Middle Road to the north, East Road to the west, Pecks Brook to the east, and an open field to the south. A proposed ground-mount solar array will be constructed that will consist of about 19,500 modules. Nominal cuts on the order of 2-feet or less are anticipated to achieve design grades, as the solar array structures will generally conform to existing Site topography. We understand that deeper cuts will be required to accommodate proposed detention basins. Refer to Figure 2 (Appendix 1) for existing site features and the proposed solar array location.

3.0 SUBSURFACE DATA

3.1 GENERAL SITE GEOLOGY

Published surficial and bedrock geological map data (*1:125,000 scale, Surficial Materials Map of Connecticut, Janet Radway Stone, 1992 and 1:125,000 scale, Bedrock Geological Map of Connecticut, John Rodgers, 1985*) was reviewed. The Site surficial material is mapped as deltaic deposits (Sand and Silt) of the Windsorville Formation. The underlying bedrock is classified as reddish-brown arkose (brownstone) of the Portland Formation.

3.2 TEST BORINGS

We observed and logged six test borings (B-1 through B-6) drilled by our subcontractor General Borings, Inc. on April 29, 2020. Boring locations are depicted on Figure 2 (Appendix 1) and the logs are included in Appendix 2. Borings were located in the field by taping/pacing from existing site features, thus their locations should be considered approximate.

The borings were drilled to explore the soil, bedrock, and groundwater conditions in the proposed solar array areas. Hollow-stem auger drilling methods were used to advance borings to depths ranging from approximately 10 to 22 feet below existing grades.

Representative soil samples were obtained in the borings for soil classification and laboratory testing by split barrel sampling procedures in general accordance with ASTM D-1586. The split-spoon sampling procedure utilizes a standard 2-inch O.D. split-barrel sampler that is driven into the bottom of the boring with a 140-pound hammer falling a distance of 30 inches. The number of blows required to advance the sampler the middle 12-inches of a normal 24-inch penetration is

recorded as the Standard Penetration Resistance Value (N). The blows (i.e., "N-Value") are indicated on the boring logs at their depth of occurrence and provide an indication of the relative consistency of the material.

Groundwater levels were measured using a weighted tape in open drill holes and/or inferred from wet soil samples during drilling.

4.0 SUBSURFACE CONDITIONS

4.1 SUBSURFACE PROFILE

The generalized subsurface profile, as inferred from the subsurface data, consists of Subsoil overlying Deltaic Deposits and Bedrock. An approximate 12- to 15-inch layer of Topsoil was encountered at the surface of the explorations. The following is a more detailed description of the subsurface materials encountered:

4.1.1 Subsoil

Subsoil was encountered at some of the boring locations (B-2, B-3 and B-4) directly below the Topsoil. This stratum ranged in thickness from about 1 to 2 feet and generally consisted of loose, light-brown, silt with varying amounts of fine sand (about 20 to 35%). The subsoil did not have an organic odor, but trace (0 to 5%) amounts of organic material (e.g., rootlets) was observed in many samples.

4.1.2 Deltaic Deposits (Sand, Silty Sand, Silt)

Deltaic Deposits was observed below the Topsoil and/or Subsoil in the borings. This material generally consisted of fine sand with trace amounts of silt at higher elevations with an increasing silt content at depth. Silt with minor (about 10 to 20%) amounts of fine sand was encountered at about 5 to 15 feet below grade. In some instances, the presence of cobbles and boulders were inferred by "rig chatter" and refusal during drilling and sampling. Two of the explorations (B-1 and B-5) were terminated upon split spoon or auger refusal on inferred bedrock.

4.1.3 Weathered Rock

Weathered Rock was observed in split spoon samples at Borings B-1, B-3, and B-5 at about 5 to 11 feet below existing grades. Bedrock was inferred from split spoon and/or auger refusal at those borings at depths ranging at about 10 to 17 feet below existing grades. Inferred Bedrock was classified in the boring logs as Arkose Sandstone based on auger cuttings and retrieved samples.

4.2 GROUNDWATER

Groundwater was measured in the boreholes during drilling or inferred from wet soil samples and ranged from about 4.5 to 15 feet below existing grades. Groundwater levels measured in the boreholes may not have had sufficient time to stabilize and should be considered approximate. Groundwater levels will vary depending on factors such as temperature, season, precipitation, construction activity, and other conditions, which may be different from those at the time of these measurements.

5.0 SOILS TESTING

5.1 LABORATORY TESTING

Soils laboratory testing was completed on samples obtained from the borings. Two soil samples were collected within the proposed detention basins (at proposed cut depths indicated by the Client) for grain size distribution testing. This data was used to estimate hydraulic conductivity values for the sampled materials (see Section 5.2).

Soil samples were also collected from 0 to 4 feet below grade at Borings B-1 and B-4 to evaluate the corrosivity potential of sampled soils. Samples were analyzed for pH, Sulfates, Chlorides, and Electrical Resistivity. Based on the laboratory test results, the soil samples are not considered to be corrosive. The results of the laboratory testing are included in Appendix 3.

5.2 ESTIMATED HYDRAULIC CONDUCTIVITY

Kozeny-Carman methodology was used to estimate the hydraulic conductivity (permeability) of the two soil samples submitted for gradation testing. The estimated hydraulic conductivity of the sample from B-5 was about 0.002 feet per day, while the sample from B-6 was about 50 feet per day. Details of the analyses are provided in Appendix 4. Note that the Kozeny-Carman methodology provides estimated hydraulic conductivity values; field infiltration tests may be required to obtain a more accurate permeability estimate of subsurface soils.

5.3 SOIL RESISTIVITY TESTING

On April 29, 2020, DTE field personnel conducted in-situ soil resistivity testing in accordance with accepted engineering practices using the Wenner electrode configuration. Electrodes were spaced at 5, 10, 20, 30, and 40 feet. One set of two approximately perpendicular resistivity lines were completed in the general vicinity of the proposed solar array area. The approximate locations and orientations of the resistivity lines are shown on the attached Figure 2. The results of the resistivity tests are as follows:

	Resistivity (ohm-cm)	
Electrode Spacing (ft)	Line 1	Line 2
5	267,908	187,287
10	171,392	163,924
20	51,935	67,982
30	11,088	14,707
40	4,290	0

Field resistivity results may be influenced by boulders, shallow groundwater, and bedrock. Resistivity results will fluctuate depending on the degree of compaction, moisture content, constituent solubility, and temperature. Field resistivity values may also vary depending upon season, precipitation, and other conditions that may differ from those at the time of testing.

6.0 ENGINEERING IMPLICATIONS OF SUBSURFACE CONDITIONS

Subsurface conditions generally consist of medium dense deltaic deposits. In some instances, these deposits were observed to contain cobbles and boulders. Relatively shallow bedrock was also encountered at the northeast corner of the proposed solar array (B-1, B-3 and B-5). Due to the presence of obstructions (e.g., cobbles, boulders, and shallow bedrock), pile driving refusal should be expected in localized areas of the proposed solar array.

In areas of pile driving difficulties, predrilling of pilot holes (up to 2/3 of the pile diameter) may be required to accommodate pile installation. The pilot holes would then be backfilled with drill cuttings (absent any cobble-sized material) prior to driving piles. Ground screws (e.g., Krinner) may also be used to support the racking systems, but similarly we recommend predrilling a pilot hole to accommodate ground screw installation in the vicinity of Borings B-1, B-3 and B-5.

Piles will need to be designed to resist compression, tension, and lateral loads. Preliminary geotechnical design parameters are provided below. The pile design capacities will need to be verified in the field based on the results of pile load testing completed at the Site.

7.0 GEOTECHNICAL ENGINEERING RECOMMENDATIONS

We offer the following geotechnical design recommendations based on the subsurface conditions encountered at the Site, available project information, and the proposed construction.

7.1 SEISMIC DESIGN

The site class is “C” per the Building Code. Based on the standard penetration test results, visual soil classification, and design peak ground acceleration at this locale, the site soils are not susceptible to liquefaction.

7.2 DRIVEN PILE FOUNDATIONS

The proposed racking systems may be supported on driven steel piles end bearing in natural Deltaic Deposits, Weathered Rock, or Bedrock. The steel piles should conform to ASTM A 572, Grade 50 and have hardened pile tips (e.g., pile driving shoes) to minimize pile damage on potential obstructions (e.g., boulders and bedrock). A minimum steel section corrosion loss of 1/16-inch all around the piles should be used. DTE recommends the following preliminary static design parameters for a driven pile foundation alternative:

DESCRIPTION	VALUE
Maximum Net Allowable Bearing Capacity[1] Soil/Weathered Rock Bedrock	 4 kips per square foot (ksf) 8 ksf
Ultimate Skin Friction Value[2] Soil (>3.5 fbg) Weathered Rock	 300 pounds per square foot (psf) 500 psf

Modulus of Lateral Subgrade Reaction[3]	
Soil (>2.5 fbg) – dry	90 pounds per cubic inch (pci)
Soil – wet	60 pci
Weathered Rock	150 pci
Angle of Internal Friction	
Soil	30
Weathered Rock	34
Total Soil Unit Weight	
Soil	120 pounds per cubic foot (pcf)
Weathered Rock	130 pcf

1. End-bearing should be neglected for uplift calculations. Provided value assumes a factor of safety of 3.
2. Contribution to pile capacity within the frost depth (i.e., above depths of 3.5 feet) should be ignored. The uplift capacity should be based on the dead weight of the pile and side resistance provided by the subsurface soils (i.e., end bearing should be neglected).
3. To analyze foundation under lateral loading (e.g., Ensoft LPILE).
4. All values provided in this table are preliminary and must be verified in the field by load testing.

Center-to-center pile spacing should not be less than 30 inches or 3 pile diameters. Final pile order lengths should be established based on the results of pile testing and the contractor should be prepared to increase anticipated pile lengths as conditions are exposed in the field.

Piles should be installed to a minimum ultimate geotechnical axial capacity of the structural load multiplied by 2 (assuming load testing is performed). Based on the recommended pile type, bearing material, and anticipated loads, we estimate negligible pile settlements.

The lateral capacity of the upper 30 inches of soil should be neglected due to loss of strength from frost action and the presence of loose surficial soils. Appropriate lateral capacity reductions associated with group effects should be used for piles having a center-to-center spacing of less than 5 times their largest cross-sectional dimension.

7.2.1 Load Testing and Drivability

Tension and lateral load tests should be performed on test piles to finalize foundation design for uplift and lateral load capacity. Compression load tests should also be completed if end bearing capacity of piles is used. Load tests should be completed near the boring explorations in order to corroborate the load test and subsurface exploration data and develop final design recommendations. The testing results should be provided to DTE to reevaluate the above design parameters.

We recommend that a drivability analysis (i.e., Wave Equation Analysis for Piles (WEAP)) be performed for the site-specific conditions and selected pile driving hammer to evaluate the proposed pile driving equipment and development of stresses in the piles. The maximum allowable driving stress in both tension and compression should not exceed 45 ksi, which is based on applying a reduction factor of 0.9 to the yield strength of Grade 50 Steel.

7.3 GROUND SCREW FOUNDATION ALTERNATIVE

The proposed racking systems may also be supported on a ground screw foundation system (Krinner or similar) that derive their capacity in the natural Deltaic Deposits and/or Weathered Rock. Tension and lateral load tests should also be performed if a ground screw foundation system is selected to assess uplift and lateral capacities. Ground screw foundations are typically designed by a design-build contractor.

7.4 EQUIPMENT FOUNDATIONS

The proposed accessory structures may be designed as mat foundations bearing on a base course of at least 12-inches of Compacted Granular Fill (CGF) or Crushed Stone overlying proof-rolled natural Deltaic Deposits, or CGF or Crushed Stone placed above a proof-rolled natural soil subgrade. Soils with appreciable organic content (i.e., Topsoil) are not considered suitable bearing materials and must be excavated from foundation areas during site preparation.

When CGF is used beneath the foundations (e.g., in fill areas, if needed), we recommend that it be placed one foot beyond the edge of the foundations and at a one horizontal to one vertical slope away and down from the bottom outside edge of the foundations (i.e., foundation zone of influence). Crushed Stone can be used in place of CGF as it is much easier to compact.

We recommend a maximum allowable design bearing pressure of four kips per square foot (4 ksf) for foundations bearing on the recommended bearing materials. Shallow foundations should be embedded 42-inches below finished grades to account for frost. Based on the recommended bearing strata and anticipated loads, we anticipate that foundations will undergo less than one inch of total settlement and less than a half inch of differential settlement. Settlements will occur as the loads are applied and are expected to be complete at the end of construction.

We recommend an ultimate coefficient of sliding friction of 0.45. A factor of safety of at least 1.5 should be applied to calculated sliding resistance.

8.0 MATERIALS RECOMMENDATIONS

8.1 COMPACTED GRANULAR FILL

Compacted Granular Fill (CGF) for use as structural fill shall consist of inorganic soil free of clay, loam, ice and snow, tree stumps, roots, and other organic matter; graded within the following limits:

Sieve Size	Percent finer by weight
4-inches	100%
No. 10	30 - 100
No. 40	10 - 90
No. 200	0 - 12*

* To be considered non-frost susceptible, granular fill should have a maximum of 3 percent of particles by weight smaller than 0.02mm in effective diameter.

8.2 CRUSHED STONE

Crushed Stone for use below foundations shall consist of sound, tough, durable, rock that is graded within the following:

Sieve Size	Percent finer by weight
5/8-inches	100%
1/2-inch	85 - 100
3/8 inch	15 - 45
No. 4	0 - 15
No. 8	0 - 5

8.3 COMPACTION REQUIRMENTS

CGF should be placed in loose lifts not exceeding 8-inches in depth and compacted to at least 95 percent of its maximum dry density, and within 2% of optimum moisture content, as determined by ASTM D1557, Method C (Modified Proctor) below foundations and other structures.

Crushed Stone is considered to be “self-compacting” and would negate the need to run laboratory proctor testing and have field density testing of in-place lifts. The crushed stone should be plate compacted to “chink up” the working surface in lifts. We recommend placing Crushed Stone in maximum 12-inch lifts and compacting the lifts with a minimum of four passes with a vibratory plate compactor weighing a minimum of 1,000 pounds and with a minimum centrifugal force of 10,000 pounds.

9.0 CONSTRUCTION RECOMMENDATIONS

9.1 DRIVEN PILES

Technical specifications should be prepared by the design team that require detailed material and construction submittals and proof of experience in pile installation. The installation method or combination of methods selected by the contractor should be submitted for review by the design team, prior to mobilization of equipment. Specifications should include provisions for removing encountered cobbles, boulders, and other obstructions as a contingency. Any pile driving refusal remedies (pre-drilling, etc.) that are adopted by the Contractor during construction will require that those piles be load tested.

9.2 GROUND SCREW FOUNDATION ALTERNATIVE

Ground screws should be designed and installed by a specialty contractor with a minimum of 5 years of experience with designing and installing ground screw systems. The specialty contractor should also be licensed by the manufacturer of the selected ground screw system. The axial capacity of the ground screws must be confirmed during installation using the designer’s recommended torque resistance. Predrilling may be required to install the ground screws in areas with cobbles, boulders, and shallow bedrock.

9.3 SHALLOW FOUNDATIONS – EQUIPMENT PADS

The proposed equipment areas should be cleared of existing vegetation and topsoil. Cobbles, boulders, and any identifiable compressible or deleterious materials should be removed. Existing fill (including re-worked parent materials), and other unsuitable materials, must be removed from beneath bearing zones of influence to the top of firm, natural Deltaic Deposits prior to construction. Over-excavation below bearing areas should include the zone of influence, defined as the area beneath 1 horizontal to 1 vertical (1H:1V) lines extending downward and outward from pad areas. Equipment pads shall bear on a prepared subgrade of firm natural Deltaic Deposits, or CGF or Crushed Stone (over firm natural soils). Refer to Section 8.0 for material and placement recommendations.

Earthwork should be performed in dry conditions so that disturbance to foundation subgrades is limited. During earthwork, the Contractor should be responsible for protecting subgrades from the elements and maintaining the soils in a suitable state until completion of the project. Backfill should not be placed over a subgrade with standing water or that is frozen. Standing water, if present, should be removed and any soft and yielding soil should be removed prior to backfill placement. Excavations to subgrade levels should be performed using a smooth-edged bucket to minimize possible disturbance to the in-place subgrade soils.

Soil subgrades should be proof-rolled under the observation of a qualified Geotechnical Engineer with at least four (4) passes of a smooth-drum vibratory roller (minimum 8,000 pounds, minimum centrifugal force of 12,500 pounds) or, where approved by the geotechnical engineer, a vibratory plate compactor with a minimum of 2,500 pounds of centrifugal force. Any soft or loose zones identified during proof-rolling should be excavated and replaced with CGF, as necessary, and as required by the Geotechnical Engineer.

9.4 TEMPORARY EXCAVATIONS

The site soils are classified as OSHA Class “C” soil and can be cut at a maximum one vertical to one and a half horizontal (1V:1.5H) slope up to a maximum excavation depth of 20 feet. These maximum slope and excavation depths assume no surcharge load (i.e., stockpiles, construction equipment, etc.) at the top of the excavations or groundwater seepage.

9.5 TEMPORARY GROUNDWATER CONTROL

Based on information obtained from the subsurface exploration program, groundwater may be encountered during construction. We anticipate that water can be managed with conventional sump pumps and trenches in the excavations. Stormwater runoff should not be permitted to accumulate on/within exposed subgrades and the runoff should be directed away from the exposed subgrade areas.

10.0 REVIEW OF FINAL DESIGN, PLANS, AND SPECIFICATIONS

When project plans are finalized, and specifications are available, they should be provided to DTE for review of conformance with our preliminary geotechnical recommendations. If any changes are made to the proposed structure locations or bearing levels, the recommendations provided in this report will need to be verified by DTE for applicability.

11.0 CONSTRUCTION QUALITY CONTROL

We further recommend that DTE be retained during earthwork construction to observe excavation to subgrade, fill placement and compaction, subgrade preparation, and deep foundation installation. The geotechnical engineer in the field should observe the work for compliance with the recommendations in this report, identify changes in subsurface conditions from those observed in the explorations should they become apparent, and assist in the development of design changes should subsurface conditions differ from those anticipated prior to the start of construction.

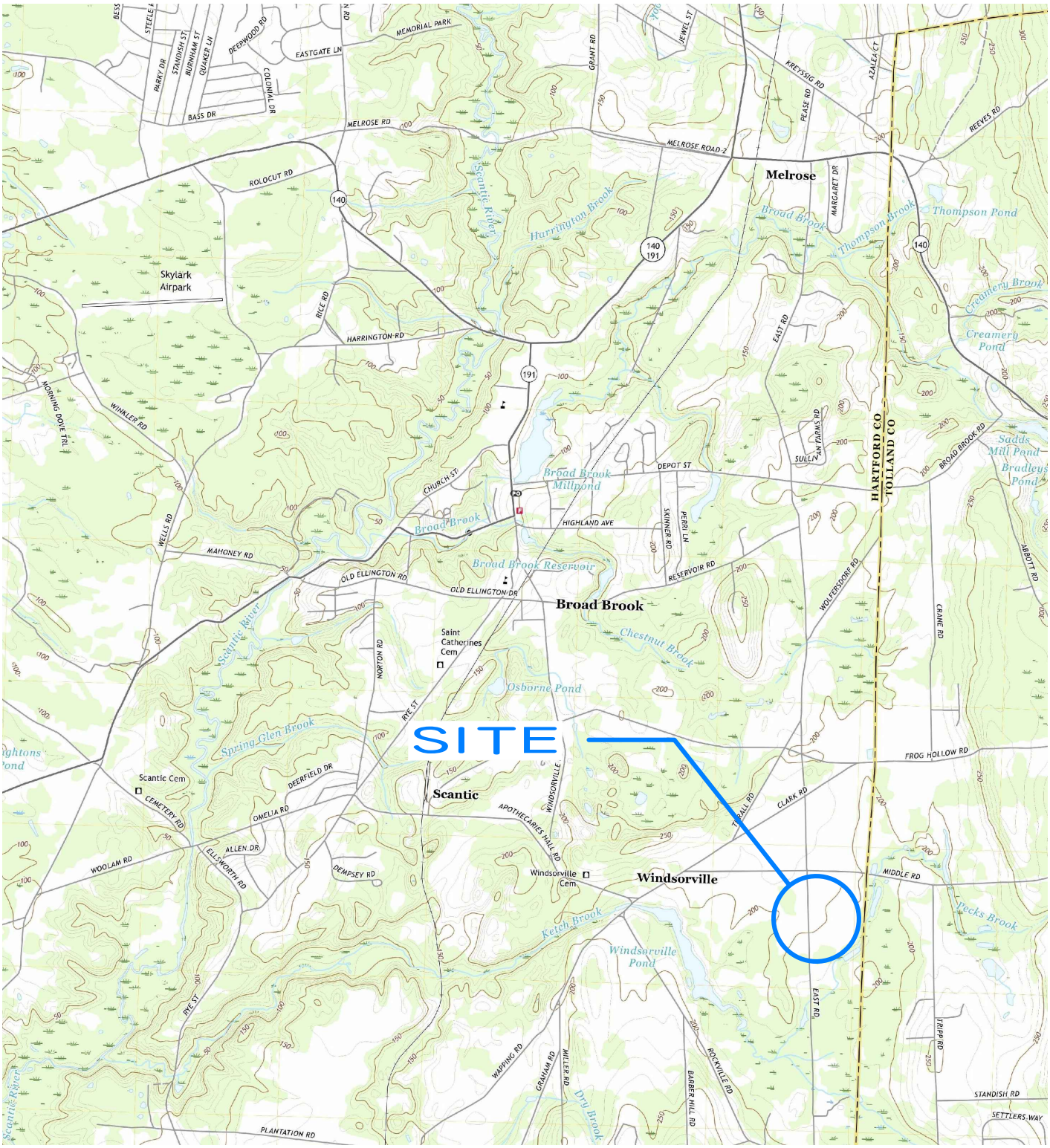
12.0 CLOSURE

We trust the information presented herein is sufficient for your use to progress design of the proposed solar array. We have enjoyed working with you on this project and look forward to our continued involvement. Please do not hesitate to call us if you have any questions.

This report is subject to the limitations included in Appendix 5.

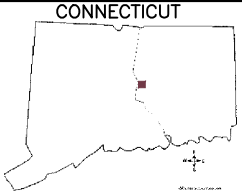
APPENDIX 1 -

FIGURES



DOWN TO EARTH CONSULTING, LLC
GEOTECHNICAL AND ENVIRONMENTAL ENGINEERING
122 CHURCH STREET
NAUGATUCK, CONNECTICUT 06770

CONNECTICUT



QUADRANGLE LOCATION

AREA PLAN
EAST WINDSOR SOLAR ONE
EAST ROAD
EAST WINDSOR, CONNECTICUT

REFERENCE:
USGS TOPOGRAPHIC QUADRANGLE: BROAD BROOK, CT

SCALE 1"= 2,000'

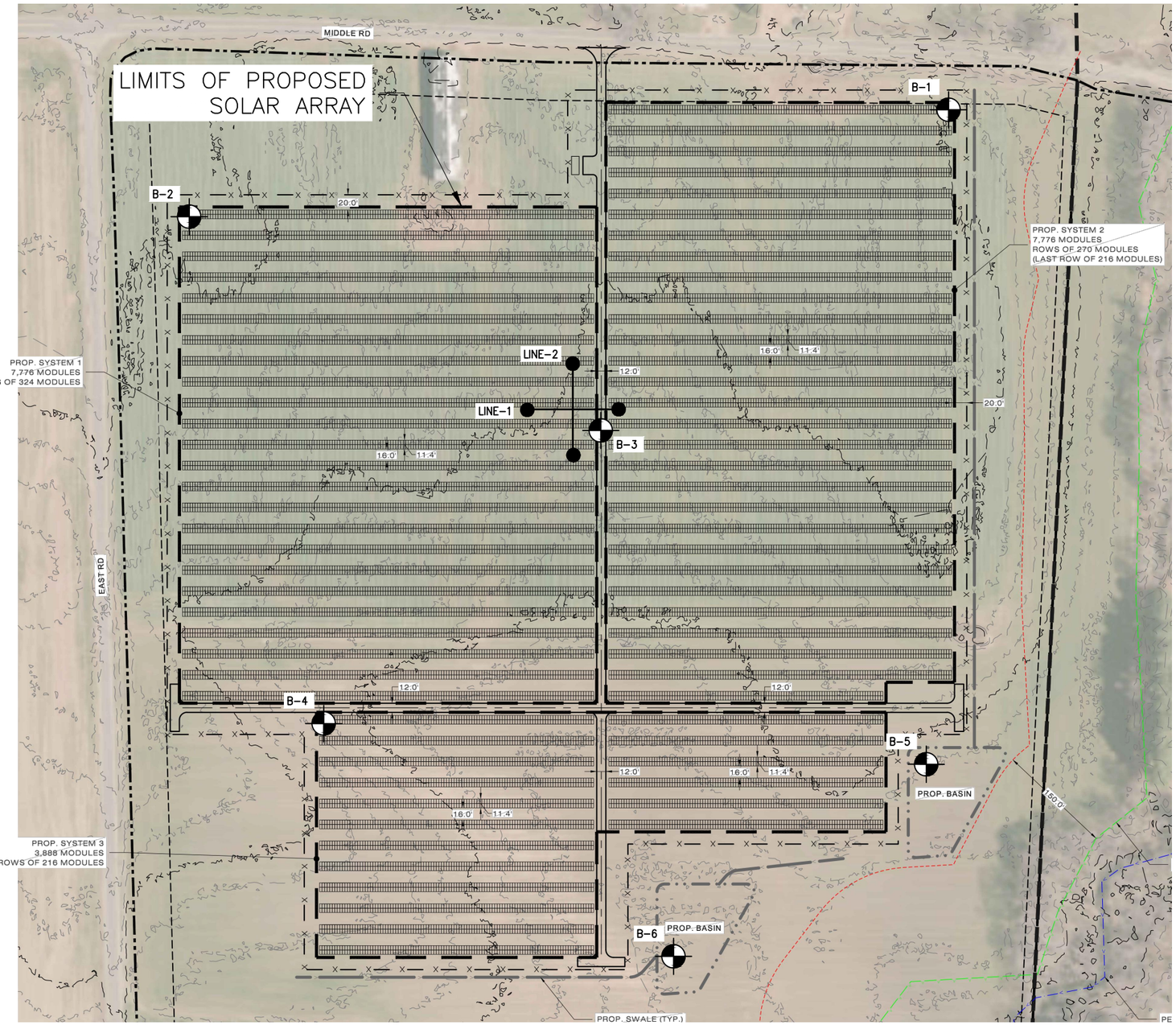
2,000' 1,000' 0 2,000'

PROJECT NO.	0032-034.00
DATE:	5/18/20
FIGURE NO.	1

DRAWN BY: MF

REVIEWED BY: RPJ

D:\1WORK 2018\DTE\Ray\CAD\32-34\0032-033.00 AREA AND SITE PLAN.dwg



LEGEND

B-1 — TEST BORING NO. AND APPROX. LOCATION

LINE-1 — RESISTIVITY TEST LOCATION (TYP.)

NOTES:

1) BASE MAP DEVELOPED FROM AN ELECTRONIC FILE PREPARED BY ALL-POINTS TECHNOLOGY, ENTITLED "CONCEPT PLAN", DATED NOVEMBER 15, 2020. ORIGINAL SCALE 1"=80'.
2) BORINGS WERE COMPLETED BY GENERAL BORINGS, INC. AND OBSERVED BY DOWN TO EARTH CONSULTING, LLC.
3) RESISTIVITY TESTING WAS PERFORMED ON APRIL 29, 2020 BY DOWN TO EARTH CONSULTING, LLC.
4) THE LOCATIONS OF THE EXPLORATIONS WERE DETERMINED BY TAPING AND VISUAL ESTIMATES FROM EXISTING SITE FEATURES. THESE LOCATIONS SHOULD BE CONSIDERED ACCURATE ONLY TO THE DEGREE IMPLIED BY THE METHOD USED.

DESIGNED BY OTHERS						
DRAWN BY ARB						
CHECKED BY RPJ						
	NO.	DATE	REVISIONS	DRWN.	CHKD	APPVD
APPROVED BY RPJ						

SCALE 1"= 160'

160' 80' 0 160'

DOWN TO EARTH CONSULTING, LLC
GEOTECHNICAL AND ENVIRONMENTAL ENGINEERING
122 CHURCH STREET
NAUGATUCK, CONNECTICUT 06770

PROJECT
EAST WINDSOR SOLAR ONE
EAST ROAD
EAST WINDSOR, CONNECTICUT

DWG. TITLE.
SITE AND EXPLORATION LOCATION PLAN

FILE NO. 0032-034.00

SCALE AS NOTED DATE 5/18/20

FIGURE NO. 2

D:\1WORK 2018\DTE\Roy\CAD\32-34\0032-033.00 AREA AND SITE PLAN.dwg mhm 5/18/2020 11:13 AM ----

APPENDIX 2 -

TEST BORING LOGS

DOWN TO EARTH CONSULTING, LLC
GEOTECHNICAL AND ENVIRONMENTAL ENGINEERING

PROJECT
EAST WINDSOR SOLAR ONE
341 EAST ROAD
EAST WINDSOR, CONNECTICUT

BORING NO. B-1
SHEET 1 of 1
FILE NO. 0032-034.00
CHKD. BY RPJ

Boring Co.	General Borings, Inc.	Boring Location	See Boring Location Plan		
Driller	Jim Caisson	Ground Surface El.	Not Available	Datum	Not Available
Logged By	Mateusz Fekieta	Date Start	4/29/2020	Date End	4/29/2020

Hammer Type:	Automatic Hammer
Sampler Size:	1-3/8" I.D. Split Spoon
Type Drill Rig:	Track
Drilling Method:	3.25-inch I.D. Hollow-Stem Augers

Groundwater Readings (from ground surface)

Date	Time	Depth (ft)	Elev.	Stabilization Time
4/29/20	-	-	-	Not Encountered

DEPTH	Casing Blows (ft)	SAMPLE INFORMATION Type & No.	REC/PEN (inches)	DEPTH (feet)	BLOWS PER 6 INCHES	Core Time (min./ft)	SAMPLE DESCRIPTION	STRATA DESCRIPTION
1		S-1	18/24	0 to 2	2-2-5-11		Loose, Top 10": dark brown to brown SILT, some fine to medium Sand, trace (-) Roots; Bottom 6": brown fine to medium SAND, trace Silt	12"+/- Topsoil
2								
3		S-2	17/24	2 to 4	14-14-15-17		Medium dense, Top 8" brown fine to coarse SAND and SILT, trace fine Gravel, trace (-) Roots; Bottom 12": reddish brown fine to coarse SAND, little Silt, with decomposed rock fragments	SAND
4								
5								
6		S-3	16/24	5 to 7	19-15-16-14		Dense, reddish brown fine to coarse SAND, some Silt, little fine Gravel	
7								
8		S-4	13/19	7 to 8.6	16-17-25-50/1"		Dense, reddish brown fine to coarse SAND, some Silt, some fine Gravel	WEATHERED ROCK
9								
10								
11		S-5	1/1	10 to 10.1	50/1"		Very dense, reddish brown fractured ARKOSE fragments	
12							END OF EXPLORATION AT 10.1 FEET BELOW GROUND SURFACE	
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SPT N-Values	SPT N-Values	Proportions	SYMBOL KEY	
0 to 4 - Very Loose	0 to 2 - Very Soft	Trace = 0 to 10%	1. S denotes split-barrel sampler.	7. WH denotes weight of hammer
5 to 10 - Loose	3 to 4 - Soft	Little = 10 to 20%	2. ST denotes 3-inch O.D. undisturbed sample.	8. WR denotes weight of rods
11 to 30 - Medium Dense	5 to 8 - Medium Stiff	Some = 20 to 35%	3. UO denotes 3-inch Osterberg undisturbed sample.	9. PP denotes Pocket Penetrometer.
31 to 50 - Dense	9 to 15 - Stiff	And = 35 to 50%	4. PEN denotes penetration length of sampler.	10. FVST denotes field vane shear test.
Over 50 - Very Dense	16 to 30 - Very Stiff		5. REC denotes recovered length of sample.	11. RQD denotes Rock Quality Designation.
	Over 30 - Hard		6. SPT denotes Standard Penetration Test.	12. C denotes core run number.

FIELD NOTES: 1) Stratification lines represent approximate boundaries between soil types, transitions may be gradual.
2) Water level readings have been made at times and under conditions stated, fluctuations may occur due to other factors.
3) Auger chatter observed from about 6 to 10 feet below ground surface on inferred decomposed Arkose.

DOWN TO EARTH CONSULTING, LLC
GEOTECHNICAL AND ENVIRONMENTAL ENGINEERING

PROJECT		BORING NO.	B-2
EAST WINDSOR SOLAR ONE		SHEET	1 of 1
341 EAST ROAD		FILE NO.	0032-034.00
EAST WINDSOR, CONNECTICUT		CHKD. BY	RPJ

Boring Co.	General Borings, Inc.	Boring Location	See Boring Location Plan		
Driller	Jim Caisson	Ground Surface El.	Not Available	Datum	Not Available
Logged By	Mateusz Fekieta	Date Start	4/29/2020	Date End	4/29/2020

Hammer Type:	Automatic Hammer
Sampler Size:	1-3/8" I.D. Split Spoon
Type Drill Rig:	Track
Drilling Method:	3.25-inch I.D. Hollow-Stem Augers

Groundwater Readings (from ground surface)

Date	Time	Depth (ft)	Elev.	Stabilization Time
4/29/20	-	15	-	wet sample
4/29/20	3:15 PM	15	-	end of boring

DEPTH	Casing Blows (ft)	SAMPLE INFORMATION Type & No.	REC/PEN (inches)	DEPTH (feet)	BLOWS PER 6 INCHES	Core Time (min./ft)	SAMPLE DESCRIPTION	STRATA DESCRIPTION
1		S-1	16/24	0 to 2	2-2-2-6		Medium dense, Top 12": dark brown SILT and fine to medium SAND, trace fine Gravel, trace (-) Roots; Bottom 4": light brown SILT, some fine SAND	15"+/- Topsoil
2								SUBSOIL
3		S-2	12/24	2 to 4	12-16-16-14		Dense, reddish brown fine to coarse SAND, some fine Gravel, trace Silt	
4								
5								
6		S-3	15/24	5 to 7	10-9-12-11		Medium dense, reddish brown fine to medium SAND, trace fine Gravel, trace Silt	
7								
8		S-4	19/24	7 to 9	6-5-5-6		Loose to medium dense, reddish brown fine SAND, trace Silt	
9								SAND
10								
11		S-5	18/24	10 to 12	5-5-6-7		Medium dense, reddish brown fine SAND, some Silt	
12								
13								
14								
15								
16		S-6	16/24	15 to 17	3-8-14-10		Medium dense, reddish brown SILT, litte fine Sand, wet	
17								
18								
19								SILT
20								
21		S-7	24/24	20 to 22	7-8-8-10		Medium dense, reddish brown SILT, trace fine Sand, wet	
22								
23							END OF EXPLORATION AT 22 FEET BELOW GROUND SURFACE	
24								
25								
26								
27								
28								
29								
30								
31								
32								
33								
34								
35								
36								
37								
38								
39								
40								

SPT N-Values	SPT N-Values	Proportions	SYMBOL KEY	
0 to 4 - Very Loose	0 to 2 - Very Soft	Trace = 0 to 10%	1. S denotes split-barrel sampler.	7. WH denotes weight of hammer
5 to 10 - Loose	3 to 4 - Soft	Little = 10 to 20%	2. ST denotes 3-inch O.D. undisturbed sample.	8. WR denotes weight of rods
11 to 30 - Medium Dense	5 to 8 - Medium Stiff	Some = 20 to 35%	3. UO denotes 3-inch Osterberg undisturbed sample.	9. PP denotes Pocket Penetrometer.
31 to 50 - Dense	9 to 15 - Stiff	And = 35 to 50%	4. PEN denotes penetration length of sampler.	10. FVST denotes field vane shear test.
Over 50 - Very Dense	16 to 30 - Very Stiff		5. REC denotes recovered length of sample.	11. RQD denotes Rock Quality Designation.
	Over 30 - Hard		6. SPT denotes Standard Penetration Test.	12. C denotes core run number.

FIELD NOTES: 1) Stratification lines represent approximate boundaries between soil types, transitions may be gradual.
2) Water level readings have been made at times and under conditions stated, fluctuations may occur due to other factors.
3) Auger refusal encounterd at 5 feet below grade (fbg) on inferred boulder. Boring relocated about 5 feet south and advanced to 5 fbg prior to collecting subsequent sample.

DOWN TO EARTH CONSULTING, LLC
GEOTECHNICAL AND ENVIRONMENTAL ENGINEERING

PROJECT
EAST WINDSOR SOLAR ONE
341 EAST ROAD
EAST WINDSOR, CONNECTICUT

BORING NO. B-3
SHEET 1 of 1
FILE NO. 0032-034.00
CHKD. BY RPJ

Boring Co.	General Borings, Inc.	Boring Location	See Boring Location Plan		
Driller	Jim Caisson	Ground Surface El.	Not Available	Datum	Not Available
Logged By	Mateusz Fekieta	Date Start	4/29/2020	Date End	4/29/2020

Hammer Type:	Automatic Hammer
Sampler Size:	1-3/8" I.D. Split Spoon
Type Drill Rig:	Track
Drilling Method:	3.25-inch I.D. Hollow-Stem Augers

Groundwater Readings (from ground surface)

Date	Time	Depth (ft)	Elev.	Stabilization Time
4/29/20	-	15	-	wet sample
4/29/20	2:34 PM	15	-	end of boring

DEPTH	Casing Blows (ft)	Type & No.	REC/PEN (inches)	DEPTH (feet)	BLOWS PER 6 INCHES	Core Time (min./ft)	SAMPLE DESCRIPTION	STRATA DESCRIPTION
1		S-1	12/24	0 to 2	2-1-2-4		Loose, dark brown to light brown SILT, some fine to medium Sand, trace fine Gravel, trace (-) Roots	12"+/- Topsoil
2								SUBSOIL
3		S-2	11/24	2 to 4	5-4-4-6		Loose, reddish brown fine SAND, little Silt	
4								
5								
6		S-3	15/24	5 to 7	5-7-7-10		Medium dense, reddish brown fine SAND, some Silt, moist	SILTY SAND
7								
8		S-4	18/24	7 to 9	7-7-8-6		Medium dense, reddish brown fine SAND, some Silt, moist	
9								
10								
11		S-5	13/24	10 to 12	7-14-26-22		Dense, reddish brown Top 8": fine SAND, some Silt; Bottom 5": fractured ARKOSE fragments	
12								
13								WEATHERED ROCK
14								
15								
16		S-6	10/24	15 to 17	21-12-50-32		Very dense, reddish brown fine to coarse SAND, some fine Gravel, some Silt	
17								
18							END OF EXPLORATION AT 17 FEET BELOW GROUND SURFACE	
19								
20								
21								
22								
23								
24								
25								
26								
27								
28								
29								
30								
31								
32								
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34								
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36								
37								
38								
39								
40								

SPT N-Values	SPT N-Values	Proportions	SYMBOL KEY	
0 to 4 - Very Loose	0 to 2 - Very Soft	Trace = 0 to 10%	1. S denotes split-barrel sampler.	7. WH denotes weight of hammer
5 to 10 - Loose	3 to 4 - Soft	Little = 10 to 20%	2. ST denotes 3-inch O.D. undisturbed sample.	8. WR denotes weight of rods
11 to 30 - Medium Dense	5 to 8 - Medium Stiff	Some = 20 to 35%	3. UO denotes 3-inch Osterberg undisturbed sample.	9. PP denotes Pocket Penetrometer.
31 to 50 - Dense	9 to 15 - Stiff	And = 35 to 50%	4. PEN denotes penetration length of sampler.	10. FVST denotes field vane shear test.
Over 50 - Very Dense	16 to 30 - Very Stiff		5. REC denotes recovered length of sample.	11. RQD denotes Rock Quality Designation.
	Over 30 - Hard		6. SPT denotes Standard Penetration Test.	12. C denotes core run number.

FIELD NOTES: 1) Stratification lines represent approximate boundaries between soil types, transitions may be gradual.
2) Water level readings have been made at times and under conditions stated, fluctuations may occur due to other factors.

DOWN TO EARTH CONSULTING, LLC
GEOTECHNICAL AND ENVIRONMENTAL ENGINEERING

PROJECT		BORING NO.	B-4
EAST WINDSOR SOLAR ONE		SHEET	1 of 1
341 EAST ROAD		FILE NO.	0032-034.00
EAST WINDSOR, CONNECTICUT		CHKD. BY	RPJ

Boring Co.	General Borings, Inc.	Boring Location	See Boring Location Plan		
Driller	Jim Caisson	Ground Surface El.	Not Available	Datum	Not Available
Logged By	Mateusz Fekieta	Date Start	4/29/2020	Date End	4/29/2020

Hammer Type:	Automatic Hammer
Sampler Size:	1-3/8" I.D. Split Spoon
Type Drill Rig:	Track
Drilling Method:	3.25-inch I.D. Hollow-Stem Augers

Groundwater Readings (from ground surface)

Date	Time	Depth (ft)	Elev.	Stabilization Time
4/29/20	-	7	-	wet sample
4/29/20	3:30 PM	7	-	6 hours

DEPTH	Casing Blows (ft)	SAMPLE INFORMATION Type & No.	REC/PEN (inches)	DEPTH (feet)	BLOWS PER 6 INCHES	Core Time (min./ft)	SAMPLE DESCRIPTION	STRATA DESCRIPTION
1		S-1	12/24	0 to 2	2-3-4-2		Loose, dark brown fine to coarse SAND and SILT, trace fine Gravel, trace (-) Roots	12"+/- Topsoil
2								
3		S-2	11/24	2 to 4	2-3-9-10		Medium dense, Top 10": light brown SILT, some fine Sand, trace (-) Roots; Bottom 1": reddish brown fine to medium SAND, trace Silt	SUBSOIL
4								SAND
5								
6		S-3	22/24	5 to 7	6-8-9-11		Medium dense, reddish brown fine SAND, little Silt, moist	
7								
8		S-4	20/24	7 to 9	11-12-12-12		Medium dense, reddish brown fine SAND, little Silt, wet	
9								
10								
11		S-5	16/24	10 to 12	5-6-7-8		Medium dense, reddish brown fine SAND, trace Silt	
12								
13								
14								
15								SILT
16		S-6	16/24	15 to 17	4-5-6-8		Medium dense, reddish brown SILT, little fine Sand	
17								
18							END OF EXPLORATION AT 17 FEET BELOW GROUND SURFACE	
19								
20								
21								
22								
23								
24								
25								
26								
27								
28								
29								
30								
31								
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40								

SPT N-Values	SPT N-Values	Proportions	SYMBOL KEY	
0 to 4 - Very Loose	0 to 2 - Very Soft	Trace = 0 to 10%	1. S denotes split-barrel sampler.	7. WH denotes weight of hammer
5 to 10 - Loose	3 to 4 - Soft	Little = 10 to 20%	2. ST denotes 3-inch O.D. undisturbed sample.	8. WR denotes weight of rods
11 to 30 - Medium Dense	5 to 8 - Medium Stiff	Some = 20 to 35%	3. UO denotes 3-inch Osterberg undisturbed sample.	9. PP denotes Pocket Penetrometer.
31 to 50 - Dense	9 to 15 - Stiff	And = 35 to 50%	4. PEN denotes penetration length of sampler.	10. FVST denotes field vane shear test.
Over 50 - Very Dense	16 to 30 - Very Stiff		5. REC denotes recovered length of sample.	11. RQD denotes Rock Quality Designation.
	Over 30 - Hard		6. SPT denotes Standard Penetration Test.	12. C denotes core run number.

FIELD NOTES: 1) Stratification lines represent approximate boundaries between soil types, transitions may be gradual.
2) Water level readings have been made at times and under conditions stated, fluctuations may occur due to other factors.

DOWN TO EARTH CONSULTING, LLC
GEOTECHNICAL AND ENVIRONMENTAL ENGINEERING

PROJECT
EAST WINDSOR SOLAR ONE
341 EAST ROAD
EAST WINDSOR, CONNECTICUT

BORING NO. B-5
SHEET 1 of 1
FILE NO. 0032-034.00
CHKD. BY RPJ

Boring Co.	General Borings, Inc.	Boring Location	See Boring Location Plan		
Driller	Jim Caisson	Ground Surface El.	Not Available	Datum	Not Available
Logged By	Mateusz Fekieta	Date Start	4/29/2020	Date End	4/29/2020

Hammer Type:	Automatic Hammer
Sampler Size:	1-3/8" I.D. Split Spoon
Type Drill Rig:	Track
Drilling Method:	3.25-inch I.D. Hollow-Stem Augers

Groundwater Readings (from ground surface)

Date	Time	Depth (ft)	Elev.	Stabilization Time
4/29/20	-	5	-	wet sample

DEPTH	Casing Blows (ft)	SAMPLE INFORMATION Type & No.	REC/PEN (inches)	DEPTH (feet)	BLOWS PER 6 INCHES	Core Time (min./ft)	SAMPLE DESCRIPTION	STRATA DESCRIPTION
1		S-1	16/24	0 to 2	2-2-3-4		Loose, Top 10": dark brown SILT, some fine to coarse SAND, trace fine Gravel, trace (-) Roots; Bottom 6": reddish brown fine to medium SAND, trace Silt	14"+/- Topsoil
2								
3		S-2	20/24	2 to 4	5-6-9-9		Medium dense, reddish brown fine to medium SAND, trace Silt	SAND
4								
5								
6		S-3	20/24	5 to 7	11-14-13-18		Medium dense, reddish brown SILT, some fine to medium SAND, trace fine Gravel, wet	SILT
7								
8		S-4	11/24	7 to 9	20-19-17-10		Dense, reddish brown fine to coarse SAND and fine GRAVEL, some Silt	WEATHERED ROCK
9								
10								
11		S-5	1/24	10 to 12	10-21-8-9		Medium dense, reddish brown fractured ARKOSE fragments	
12								
13								
14								
15								
16		S-6	1/1	15 to 15.1	50/1"		Very dense, reddish brown fractured ARKOSE fragments	
17							END OF EXPLORATION AT 15.1 FEET BELOW GROUND SURFACE	
18								
19								
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40								

SPT N-Values	SPT N-Values	Proportions	SYMBOL KEY	
0 to 4 - Very Loose	0 to 2 - Very Soft	Trace = 0 to 10%	1. S denotes split-barrel sampler.	7. WH denotes weight of hammer
5 to 10 - Loose	3 to 4 - Soft	Little = 10 to 20%	2. ST denotes 3-inch O.D. undisturbed sample.	8. WR denotes weight of rods
11 to 30 - Medium Dense	5 to 8 - Medium Stiff	Some = 20 to 35%	3. UO denotes 3-inch Osterberg undisturbed sample.	9. PP denotes Pocket Penetrometer.
31 to 50 - Dense	9 to 15 - Stiff	And = 35 to 50%	4. PEN denotes penetration length of sampler.	10. FVST denotes field vane shear test.
Over 50 - Very Dense	16 to 30 - Very Stiff		5. REC denotes recovered length of sample.	11. RQD denotes Rock Quality Designation.
	Over 30 - Hard		6. SPT denotes Standard Penetration Test.	12. C denotes core run number.

FIELD NOTES: 1) Stratification lines represent approximate boundaries between soil types, transitions may be gradual.
2) Water level readings have been made at times and under conditions stated, fluctuations may occur due to other factors.
3) Auger chatter observed from about 9 to 10 and 14 to 15 feet below ground surface on inferred boulders/decomposed Arkose.

DOWN TO EARTH CONSULTING, LLC
GEOTECHNICAL AND ENVIRONMENTAL ENGINEERING

PROJECT
EAST WINDSOR SOLAR ONE
341 EAST ROAD
EAST WINDSOR, CONNECTICUT

BORING NO. B-6
SHEET 1 of 1
FILE NO. 0032-034.00
CHKD. BY RPJ

Boring Co.	General Borings, Inc.	Boring Location	See Boring Location Plan		
Driller	Jim Caisson	Ground Surface El.	Not Available	Datum	Not Available
Logged By	Mateusz Fekieta	Date Start	4/29/2020	Date End	4/29/2020

Hammer Type:	Automatic Hammer
Sampler Size:	1-3/8" I.D. Split Spoon
Type Drill Rig:	Track
Drilling Method:	3.25-inch I.D. Hollow-Stem Augers

Groundwater Readings (from ground surface)

Date	Time	Depth (ft)	Elev.	Stabilization Time
4/29/20	-	5	-	wet sample
4/29/20	10:25 AM	4.5	-	15 minutes

DEPTH	Casing Blows (ft)	SAMPLE INFORMATION Type & No.	REC/PEN (inches)	DEPTH (feet)	BLOWS PER 6 INCHES	Core Time (min./ft)	SAMPLE DESCRIPTION	STRATA DESCRIPTION
1		S-1	18/24	0 to 2	2-2-2-2		Loose, Top 9": dark brown SILT, little fine to medium Sand, trace (-) Roots; Bottom 9": light brown SILT and fine to medium SAND, trace (-) Roots	15"+/- Topsoil
2								SUBSOIL
3		S-2	20/24	2 to 4	4-5-6-10		Medium dense, Top 8": light brown SILT, some fine Sand, trace (-) Roots; Bottom 12": reddish brown fine to medium SAND and SILT	
4								SAND
5								
6		S-3	16/24	5 to 7	3-8-10-15		Medium dense, reddish brown fine to medium SAND, trace Silt, trace fine Gravel, wet	
7								
8		S-4	19/24	7 to 9	6-8-8-8		Medium dense, reddish brown Top 14": fine to medium SAND, trace Silt; Bottom 5": reddish brown SILT, trace fine Sand, wet	
9								
10								
11		S-5	18/24	10 to 12	3-5-6-5		Medium dense, reddish brown SILT, trace fine Sand, wet	
12								
13								
14								
15								SILT
16		S-6	24/24	15 to 17	4-5-4-6		Loose, reddish brown SILT, little fine Sand	
17								
18								
19								
20								
21		S-7	24/24	20 to 22	9-12-20-11		Medium dense, reddish brown SILT, trace fine Sand	
22								
23							END OF EXPLORATION AT 22 FEET BELOW GROUND SURFACE	
24								
25								
26								
27								
28								
29								
30								
31								
32								
33								
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36								
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38								
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SPT N-Values	SPT N-Values	Proportions	SYMBOL KEY	
0 to 4 - Very Loose	0 to 2 - Very Soft	Trace = 0 to 10%	1. S denotes split-barrel sampler.	7. WH denotes weight of hammer
5 to 10 - Loose	3 to 4 - Soft	Little = 10 to 20%	2. ST denotes 3-inch O.D. undisturbed sample.	8. WR denotes weight of rods
11 to 30 - Medium Dense	5 to 8 - Medium Stiff	Some = 20 to 35%	3. UO denotes 3-inch Osterberg undisturbed sample.	9. PP denotes Pocket Penetrometer.
31 to 50 - Dense	9 to 15 - Stiff	And = 35 to 50%	4. PEN denotes penetration length of sampler.	10. FVST denotes field vane shear test.
Over 50 - Very Dense	16 to 30 - Very Stiff		5. REC denotes recovered length of sample.	11. RQD denotes Rock Quality Designation.
	Over 30 - Hard		6. SPT denotes Standard Penetration Test.	12. C denotes core run number.

FIELD NOTES: 1) Stratification lines represent approximate boundaries between soil types, transitions may be gradual.
2) Water level readings have been made at times and under conditions stated, fluctuations may occur due to other factors.

APPENDIX 3 -

LABORATORY TEST RESULTS

THIELSCH ENGINEERING

195 Frances Avenue
Cranston RI, 02910
Phone: (401)-467-6454
Fax: (401)-467-2398
thielsch.com
Let's Build a Solid Foundation

Client Information:
Down to Earth Consulting, LLC
Naugatuck, CT
PM: Ray Janeiro
Assigned By: Ran Janeiro
Collected By: Client

Project Information:
E. Windsor Solar One
East Windsor, CT
DTE Project Number: 0032-034.00
Summary Page: 1 of 1
Report Date: 05.15.2020

LABORATORY TESTING DATA SHEET, Report No.: 7420-E-124

Boring ID	Sample No.	Depth (ft)	Laboratory No.	Identification Tests						Corrosivity Tests								Laboratory Log and Soil Description
				As Received Water Content %	LL %	PL %	Gravel %	Sand %	Fines %	Resitivity (Mohms-cm)	Sulfate (mg/kg)	Chloride (mg/kg)	Sulfide (mg/kg)	Redox Potential (mv)	pH	Electrical Resist. As Received Ohm-cm @ 60°F	Electrial Resist. Saturated Ohm-cm @ 60°F	
				D2216	D4318		D6913			EPA	D4327		EPA		D4972	G57		
B-1	Grab	0-4	20-S-1255	9.7							52	ND			6.59	34000	12400	Corrosivity Only
B-4	Grab	0-4	20-S-1256	16.5							70	ND			6.60	14800	13000	Corrosivity Only
B-5	S-3	5-7	20-S-1257				0.5	33.9	65.6									Red Brown sandy silt
B-6	S-3	5-7	20-S-1258				0.2	97.6	2.2									Dark Red Brown poorly graded sand

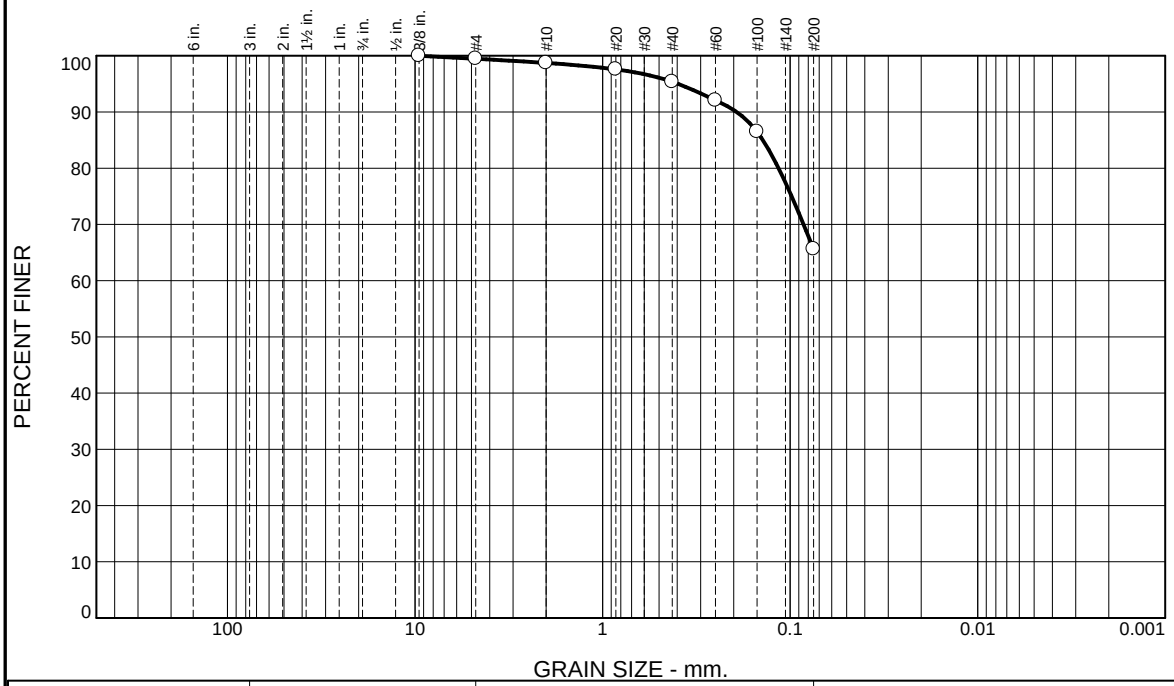
Electrical Resistivity and pH was completed by JM on 05.12.2020.

Date Received: *05.07.2020*

Reviewed By:

Date Reviewed: *05.15.2020*

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	0.0	0.5	0.8	3.3	29.8	65.6	

Test Results (D6913 & ASTM D 1140)

Opening Size	Percent Finer	Spec.* (Percent)	Pass? (X=Fail)
0.375"	100.0		
#4	99.5		
#10	98.7		
#20	97.6		
#40	95.4		
#60	92.1		
#100	86.5		
#200	65.6		

* (no specification provided)

Material Description

Red Brown sandy silt

Atterberg Limits (ASTM D 4318)

PL= NP **LL=** NV **PI=** NP

Classification

USCS (D 2487)= ML **AASHTO (M 145)=** A-4(0)

Coefficients

D_{90}= 0.1927 D_{85}= 0.1397 D_{60}=
D_{50}= D_{30}= D_{15}=
D_{10}= C_u= C_c=

Remarks

Sample visually classified as non-plastic.

Date Received: 05.07.2020 **Date Tested:** 05.12.2020

Tested By: JM

Checked By: Steven Accetta

Title: Laboratory Coordinator

Source of Sample: Borings **Depth:** 5-7' **Date Sampled:**
Sample Number: B-5 / S-3

Thielsch Engineering Inc.

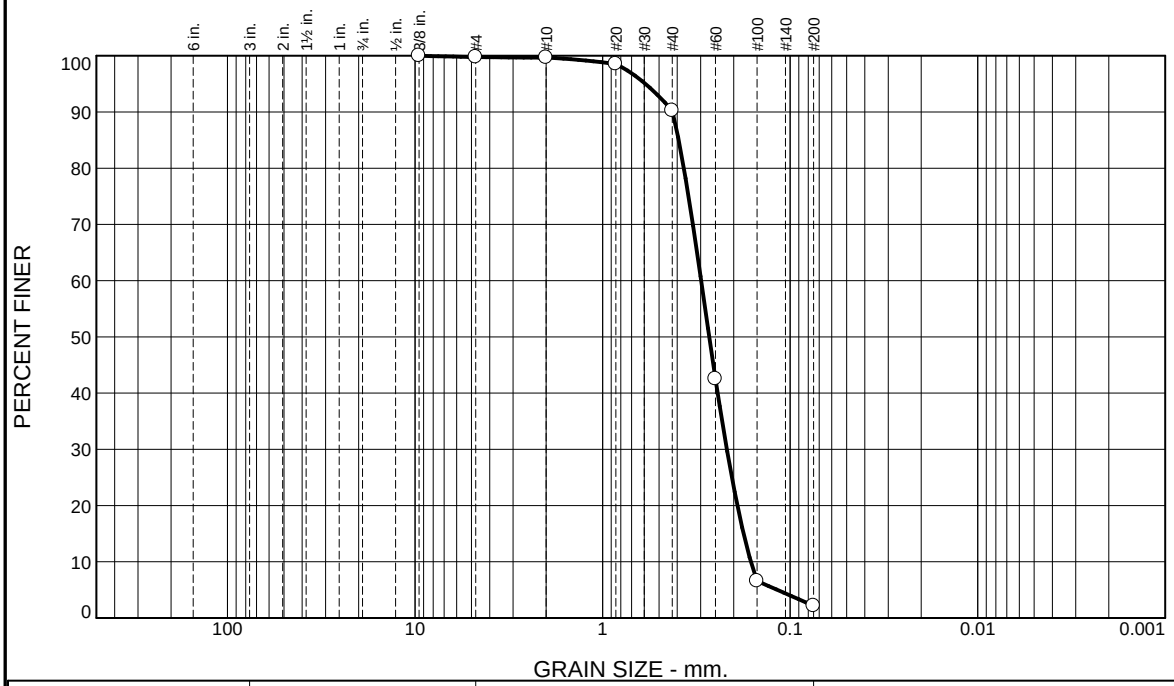
Cranston, RI

Client: Down to Earth Consulting, LLC

Project: E. Windsor Solar One
East Windsor, CT

Project No: 0032-034.00 **Figure** 20-S-1257

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	0.0	0.2	0.1	9.5	88.0	2.2	

Test Results (D6913 & ASTM D 1140)

Opening Size	Percent Finer	Spec.* (Percent)	Pass? (X=Fail)
0.375"	100.0		
#4	99.8		
#10	99.7		
#20	98.5		
#40	90.2		
#60	42.5		
#100	6.6		
#200	2.2		

* (no specification provided)

Material Description

Dark Red-Brown poorly graded sand

Atterberg Limits (ASTM D 4318)

PL= NP **LL=** NV **PI=** NP

Classification

USCS (D 2487)= SP **AASHTO (M 145)=** A-3

Coefficients

D_{90}= 0.4234 D_{85}= 0.3928 D_{60}= 0.2981
D_{50}= 0.2699 D_{30}= 0.2175 D_{15}= 0.1771
D_{10}= 0.1619 C_u= 1.84 C_c= 0.98

Remarks

Date Received: 05.07.2020 **Date Tested:** 05.12.2020

Tested By: JM

Checked By: Steven Accetta

Title: Laboratory Coordinator

Source of Sample: Borings **Depth:** 5-7' **Date Sampled:**
Sample Number: B-6 / S-3

Thielsch Engineering Inc.

Cranston, RI

Client: Down to Earth Consulting, LLC
Project: E. Windsor Solar One
East Windsor, CT
Project No: 0032-034.00 **Figure** 20-S-1258

CERTIFICATE OF ANALYSIS

Steve Accetta
Thielsch Engineering, Inc.
195 Frances Avenue
Cranston, RI 02910

RE: E Windsor Solar One Down to Earth (0032-034.00)
ESS Laboratory Work Order Number: 20E0188

This signed Certificate of Analysis is our approved release of your analytical results. These results are only representative of sample aliquots received at the laboratory. ESS Laboratory expects its clients to follow all regulatory sampling guidelines. Beginning with this page, the entire report has been paginated. This report should not be copied except in full without the approval of the laboratory. Samples will be disposed of thirty days after the final report has been delivered. If you have any questions or concerns, please feel free to call our Customer Service Department.

Laurel Stoddard
Laboratory Director

REVIEWED
By ESS Laboratory at 2:09 pm, May 15, 2020

Analytical Summary
The project as described above has been analyzed in accordance with the ESS Quality Assurance Plan. This plan utilizes the following methodologies: US EPA SW-846, US EPA Methods for Chemical Analysis of Water and Wastes per 40 CFR Part 136, APHA Standard Methods for the Examination of Water and Wastewater, American Society for Testing and Materials (ASTM), and other recognized methodologies. The analyses with these noted observations are in conformance to the Quality Assurance Plan. In chromatographic analysis, manual integration is frequently used instead of automated integration because it produces more accurate results.

The test results present in this report are in compliance with TNI and relative state standards, and/or client Quality Assurance Project Plans (QAPP). The laboratory has reviewed the following: Sample Preservations, Hold Times, Initial Calibrations, Continuing Calibrations, Method Blanks, Blank Spikes, Blank Spike Duplicates, Duplicates, Matrix Spikes, Matrix Spike Duplicates, Surrogates and Internal Standards. Any results which were found to be outside of the recommended ranges stated in our SOPs will be noted in the Project Narrative.

CERTIFICATE OF ANALYSIS

Client Name: Thielsch Engineering, Inc.
Client Project ID: E Windsor Solar One Down to Earth

ESS Laboratory Work Order: 20E0188

SAMPLE RECEIPT

The following samples were received on May 08, 2020 for the analyses specified on the enclosed Chain of Custody Record.

The client did not deliver the samples in a cooler.

Lab Number	Sample Name	Matrix	Analysis
20E0188-01	B-1 20-S-1255 0-4ft	Soil	D4327
20E0188-02	B-4 20-S-1256 0-4ft	Soil	D4327

CERTIFICATE OF ANALYSIS

Client Name: Thielsch Engineering, Inc.
Client Project ID: E Windsor Solar One Down to Earth ESS Laboratory Work Order: 20E0188

PROJECT NARRATIVE

No unusual observations noted.

End of Project Narrative.

DATA USABILITY LINKS

To ensure you are viewing the most current version of the documents below, please clear your internet cookies for www.ESSLaboratory.com. Consult your IT Support personnel for information on how to clear your internet cookies.

Definitions of Quality Control Parameters

Semivolatile Organics Internal Standard Information

Semivolatile Organics Surrogate Information

Volatile Organics Internal Standard Information

Volatile Organics Surrogate Information

EPH and VPH Alkane Lists

CERTIFICATE OF ANALYSIS

Client Name: Thielsch Engineering, Inc.
Client Project ID: E Windsor Solar One Down to Earth

ESS Laboratory Work Order: 20E0188

CURRENT SW-846 METHODOLOGY VERSIONS

Analytical Methods

1010A - Flashpoint
6010C - ICP
6020A - ICP MS
7010 - Graphite Furnace
7196A - Hexavalent Chromium
7470A - Aqueous Mercury
7471B - Solid Mercury
8011 - EDB/DBCP/TCP
8015C - GRO/DRO
8081B - Pesticides
8082A - PCB
8100M - TPH
8151A - Herbicides
8260B - VOA
8270D - SVOA
8270D SIM - SVOA Low Level
9014 - Cyanide
9038 - Sulfate
9040C - Aqueous pH
9045D - Solid pH (Corrosivity)
9050A - Specific Conductance
9056A - Anions (IC)
9060A - TOC
9095B - Paint Filter
MADEP 04-1.1 - EPH
MADEP 18-2.1 - VPH

Prep Methods

3005A - Aqueous ICP Digestion
3020A - Aqueous Graphite Furnace / ICP MS Digestion
3050B - Solid ICP / Graphite Furnace / ICP MS Digestion
3060A - Solid Hexavalent Chromium Digestion
3510C - Separatory Funnel Extraction
3520C - Liquid / Liquid Extraction
3540C - Manual Soxhlet Extraction
3541 - Automated Soxhlet Extraction
3546 - Microwave Extraction
3580A - Waste Dilution
5030B - Aqueous Purge and Trap
5030C - Aqueous Purge and Trap
5035A - Solid Purge and Trap

SW846 Reactivity Methods 7.3.3.2 (Reactive Cyanide) and 7.3.4.1 (Reactive Sulfide) have been withdrawn by EPA. These methods are reported per client request and are not NELAP accredited.

CERTIFICATE OF ANALYSIS

Client Name: Thielsch Engineering, Inc.
Client Project ID: E Windsor Solar One Down to Earth
Client Sample ID: B-1 20-S-1255 0-4ft
Date Sampled: 05/08/20 10:00
Percent Solids: 91

ESS Laboratory Work Order: 20E0188
ESS Laboratory Sample ID: 20E0188-01
Sample Matrix: Soil

Classical Chemistry

Analyte	Results (MRL)	MDL	Method	Limit	DF	Analyst	Analyzed	Units	Batch
Chloride	**WL** ND (5)		D4327		1	EEM	05/11/20 19:23	mg/kg dry	DE01114
Sulfate	**WL 52** (5)		D4327		1	EEM	05/11/20 19:23	mg/kg dry	DE01114

CERTIFICATE OF ANALYSIS

Client Name: Thielsch Engineering, Inc.
Client Project ID: E Windsor Solar One Down to Earth
Client Sample ID: B-4 20-S-1256 0-4ft
Date Sampled: 05/08/20 10:00
Percent Solids: 85

ESS Laboratory Work Order: 20E0188
ESS Laboratory Sample ID: 20E0188-02
Sample Matrix: Soil

Classical Chemistry

Analyte	Results (MRL)	MDL	Method	Limit	DF	Analyst	Analyzed	Units	Batch
Chloride	**WL** ND (6)		D4327		1	EEM	05/11/20 19:40	mg/kg dry	DE01114
Sulfate	**WL 70** (6)		D4327		1	EEM	05/11/20 19:40	mg/kg dry	DE01114

CERTIFICATE OF ANALYSIS

Client Name: Thielsch Engineering, Inc.
Client Project ID: E Windsor Solar One Down to Earth ESS Laboratory Work Order: 20E0188

Quality Control Data

Analyte	Result	MRL	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Qualifier
Classical Chemistry										
Batch DE01114 - General Preparation										
Blank										
Chloride	ND	0.5	mg/kg wet							
Sulfate	ND	0.5	mg/kg wet							
LCS										
Chloride	10		mg/L	10.00		98	85-115			
Sulfate	10		mg/L	10.00		98	80-120			

CERTIFICATE OF ANALYSIS

Client Name: Thielsch Engineering, Inc.
Client Project ID: E Windsor Solar One Down to Earth ESS Laboratory Work Order: 20E0188

Notes and Definitions

WL	Results obtained from a deionized water leach of the sample.
U	Analyte included in the analysis, but not detected
ND	Analyte NOT DETECTED at or above the MRL (LOQ), LOD for DoD Reports, MDL for J-Flagged Analytes
dry	Sample results reported on a dry weight basis
RPD	Relative Percent Difference
MDL	Method Detection Limit
MRL	Method Reporting Limit
LOD	Limit of Detection
LOQ	Limit of Quantitation
DL	Detection Limit
I/V	Initial Volume
F/V	Final Volume
§	Subcontracted analysis; see attached report
1	Range result excludes concentrations of surrogates and/or internal standards eluting in that range.
2	Range result excludes concentrations of target analytes eluting in that range.
3	Range result excludes the concentration of the C9-C10 aromatic range.
Avg	Results reported as a mathematical average.
NR	No Recovery
[CALC]	Calculated Analyte
SUB	Subcontracted analysis; see attached report
RL	Reporting Limit
EDL	Estimated Detection Limit
MF	Membrane Filtration
MPN	Most Probably Number
TNTC	Too numerous to Count
CFU	Colony Forming Units

CERTIFICATE OF ANALYSIS

Client Name: Thielsch Engineering, Inc.
Client Project ID: E Windsor Solar One Down to Earth

ESS Laboratory Work Order: 20E0188

ESS LABORATORY CERTIFICATIONS AND ACCREDITATIONS

ENVIRONMENTAL

Rhode Island Potable and Non Potable Water: LAI00179
http://www.health.ri.gov/find/labs/analytical/ESS.pdf

Connecticut Potable and Non Potable Water, Solid and Hazardous Waste: PH-0750
http://www.ct.gov/dph/lib/dph/environmental_health/environmental_laboratories/pdf/OutofStateCommercialLaboratories.pdf

Maine Potable and Non Potable Water, and Solid and Hazardous Waste: RI00002
http://www.maine.gov/dhhs/mecdc/environmental-health/dwp/partners/labCert.shtml

Massachusetts Potable and Non Potable Water: M-RI002
http://public.dep.state.ma.us/Labcert/Labcert.aspx

New Hampshire (NELAP accredited) Potable and Non Potable Water, Solid and Hazardous Waste: 2424
http://des.nh.gov/organization/divisions/water/dwgb/nhelap/index.htm

New York (NELAP accredited) Non Potable Water, Solid and Hazardous Waste: 11313
http://www.wadsworth.org/labcert/elap/comm.html

New Jersey (NELAP accredited) Non Potable Water, Solid and Hazardous Waste: RI006
http://datamine2.state.nj.us/DEP_OPRA/OpraMain/pi_main?mode=pi_by_site&sort_order=PI_NAMEA&Select+a+Site:=58715

United States Department of Agriculture Soil Permit: P330-12-00139

Pennsylvania: 68-01752
http://www.dep.pa.gov/Business/OtherPrograms/Labs/Pages/Laboratory-Accreditation-Program.aspx

ESS Laboratory

Division of Thielsch Engineering, Inc.
185 Frances Avenue, Cranston, RI 02910-2211
Tel. (401) 461-7181 Fax (401) 461-4486
www.esslaboratory.com

CHAIN OF CUSTODY

ESS LAB PROJECT ID: 20E0188

Turn Time: Standard X Rush _____ Approved By: _____

Reporting Limits -

State where samples were collected: CT

Is this project for any of the following: (please circle)
MA-MCP CT-RCP RGP DOD Other_____

Electonic Deliverable Yes X No____
Format: Excel___ Access___ PDF X Other_____

Project Manager: Steve Accetta
Company: Thielsch Engineering
Address: 195 Frances Ave
Cranston, RI 02910

Project # 0032-034.00

Project Name / Client Name:
E. Windsor Solar One
Down to Earth

Contract Pricing __x___
Special Pricing WO#: _____

ESS Lab Sample ID	Date	Collection Time	Grab -G Composite-C	Matrix	Sample Identification	# of Container	Analysis: Sulfate (D4327)	Chloride (D4327)								Comment #
1	05.08.2020	10:00	G	S	B-1, 20-S-1255, 0-4'	1	X	X								
2	05.08.2020	10:00	G	S	B-4, 20-S-1256, 0-4'	1	X	X								
Preservation Code: 1-NP, 2-HCl, 3-H2SO4, 4-HNO3, 5-NaOH, 6-MeOH, 7-Asorbic Acid, 8-ZnAct, 9-_CH_3OH____							1	1								
Container Type: P-Poly G-Glass AG-Amber Glass S-Sterile V-VOA							AG	AG								

Matrix: S-Soil SD-Solid D-Sludge WW-Wastewater GW-Groundwater SW-Surface Water DW-Drinking Water O-Oil W-Wipes F-Filter

Cooler Present ____Yes ___No
Seals Intact ____ Yes ____No NA: ____
Cooler Temperature: 20.2 no ice

Sampled by : J. McDaniel

Comments: Please send report to: Rroth@thielsch.com, Saccetta@thielsch.com, mcolman@thielsch.com

Relinquished by: (Signature)	Date/Time	Received by: (Signature)	Relinquished by: (Signature)	Date/Time	Received by: (Signature)
05.08.2020	13:12	5/8/20 1312			
Relinquished by: (Signature)	Date/Time	Received by: (Signature)	Relinquished by: (Signature)	Date/Time	Received by: (Signature)

Please E-mail all changes to Chain of Custody in writing.

Page ____ of ____

APPENDIX 4 -

KOZENY-CARMAN ANALYSES

Table 1
Kozeny - Carman Analyses
to Estimate Hydraulic Conductivity

East Windsor Solar One
East Windsor, Connecticut
Project Number: 0032-034.00

Test Boring No.	Sample No.	Sample Depth (ft.)	D_{10} (mm)	Descriptive Density	Est. Relative Density (%)	in-situ void ratio e	in-situ porosity n	Coefficient of Permability k (cm/sec)	Coefficient of Permability k (ft/day)
B-5	S-3	5'-7'	0.001	Medium Dense	40	0.716	0.42	1.01E-06	2.85E-03
B-6	S-3	5'-7'	0.162	Medium Dense	60	0.620	0.38	1.81E-02	5.14E+01

SPT (bl/ ft)	Descriptive Density	Relative Density (%)
0 to 4	Very loose	0 to 15
4 to 10	Loose	15 to 35
10 to 30	Medium Dense	35 to 65
30 to 50	Dense	65 to 85
50 +	Very dense	85 to 100

e_{min}	e_{max}	
0.5	0.8	sand
0.14	1.1	silt

APPENDIX 5 -

LIMITATIONS

LIMITATIONS

Explorations

1. The analyses and recommendations submitted in this report are based in part upon the data obtained from subsurface explorations by Down To Earth Consulting, LLC (DTE) and others. The nature and extent of variations between these explorations may not become evident until construction. If variations then appear evident, it will be necessary to reevaluate the recommendations of this report.

2. The generalized soil profile described in the text is intended to convey trends in subsurface conditions. The boundaries between strata are approximate and idealized and have been developed by interpretations of widely spaced explorations and samples; actual soil transitions are probably more erratic. For specific information, refer to the boring logs.

3. Water level readings have been made in the drill holes at times and under conditions stated on the boring logs. These data have been reviewed and interpretations have been made in the text of this report. However, it must be noted that fluctuations in the level of the groundwater may occur due to variations in rainfall, tidal, temperature, and other factors occurring since the time measurements were made.

Review

4. In the event that any changes in the nature, design or location of the proposed solar arrays are planned, the conclusions and recommendations contained in this report shall not be considered valid unless the changes are reviewed and conclusions of this report modified or verified in writing by DTE. It is recommended that this firm be provided the opportunity for a general review of final design and specifications in order that earthwork and foundation recommendations may be properly interpreted and implemented in the design and specifications.

Construction

5. It is recommended that this firm be retained to provide soil engineering services during construction of the earthworks and foundation phases of the work. This is to observe compliance with the design concepts, specifications, and recommendations and to allow design changes in the event that subsurface conditions differ from those anticipated prior to start of construction.

Use of Report

6. This report has been prepared for the exclusive use of All-Points Technology Corporation, PC for specific application to the project noted in this geotechnical report in accordance with generally accepted soil and foundation engineering practices. No other warranty, express or implied, is made.

7. This soil and foundation engineering report has been prepared for this project by DTE. This report is for design purposes only and is not sufficient to prepare an accurate bid. Contractors wishing a copy of the report may secure it with the understanding that its scope is limited to design considerations only.

8. This report may contain comparative cost estimates for the purpose of evaluating alternative foundation schemes. These estimates may also involve approximate quantity evaluations. It should be noted that quantity estimates may not be accurate enough for construction bids. Since DTE has no control over labor and materials cost and design, the estimates of construction costs have been made on the basis of experience. DTE does not guarantee the accuracy of cost estimates as compared to contractor's bids for construction costs.

APPENDIX F: WATER QUALITY VOLUME CALCULATIONS

WATER QUALITY VOLUME CALCULATIONS
FOR
EAST WINDSOR SOLAR ONE, LLC
341 EAST ROAD, EAST WINDSOR AND ELLINGTON, CT

$$WQV = \frac{(1")(R)(A)}{12}$$

where: WQV = water quality volume (ac-ft)
R = volumetric runoff coefficient = 0.05+0.009(I)
I = percent impervious cover
A = site area in acres

$V=WQV+((P)(A_b)/12)$

V=required basin storage volume (ac-ft)
WQV=Water Quality Volume (ac-ft)
P= design water quality precipitation (in)
A_b=basin surface area (ac)

	Area (ac)	Pervious (ac)	Imperv. (ac)	I	R	WQV (ac-ft)	P (in)	Ab (ac)	V (ac-ft)	Total V Req. (cf)	V Provided (cf)
Basin B-1	29.61	28.73	0.88	3%	0.08	0.19	1	0.266531	0.21	9,217.13	48,833.00
Overall	29.61	28.73	0.88	3%	0.08	0.19	1	0.266531	0.21	9,217.13	-

Overal Total V Required = 9,217.13 cf
Overal Total V Provided = 48,833.00 cf

Stage-Area-Storage for Pond B-1: B-1

Elevation (feet)	Surface (sq-ft)	Storage (cubic-feet)
192.00	19,648	0
192.02	20,514	402
192.04	21,398	821
192.06	22,301	1,258
192.08	23,223	1,713
192.10	24,163	2,187
192.12	25,122	2,679
192.14	26,100	3,192
192.16	27,096	3,724
192.18	28,111	4,276
192.20	29,145	4,848
192.22	30,197	5,442
192.24	31,268	6,056
192.26	32,358	6,692
192.28	33,466	7,351
192.30	34,593	8,031
192.32	35,739	8,734
192.34	36,903	9,461
192.36	38,086	10,211
192.38	39,288	10,984
192.40	40,508	11,782
192.42	41,747	12,605
192.44	43,005	13,452
192.46	44,281	14,325
192.48	45,576	15,224
192.50	46,889	16,148
192.52	48,222	17,099
192.54	49,573	18,077
192.56	50,942	19,082
192.58	52,330	20,115
192.60	53,737	21,176
192.62	55,163	22,265
192.64	56,607	23,382
192.66	58,070	24,529
192.68	59,552	25,705
192.70	61,052	26,911
192.72	62,571	28,148
192.74	64,108	29,414
192.76	65,665	30,712
192.78	67,239	32,041
192.80	68,833	33,402
192.82	70,445	34,794
192.84	72,076	36,220
192.86	73,726	37,678
192.88	75,394	39,169
192.90	77,081	40,694
192.92	78,786	42,252
192.94	80,510	43,845
192.96	82,253	45,473
192.98	84,015	47,135
193.00	85,795	48,833
193.02	86,954	50,561
193.04	88,120	52,312
193.06	89,294	54,086
193.08	90,476	55,883
193.10	91,666	57,705
193.12	92,863	59,550
193.14	94,069	61,419
193.16	95,282	63,313
193.18	96,503	65,231
193.20	97,731	67,173
193.22	98,968	69,140
193.24	100,212	71,132
193.26	101,464	73,149
193.28	102,723	75,190
193.30	103,991	77,258
193.32	105,266	79,350
193.34	106,549	81,468
193.36	107,840	83,612
193.38	109,138	85,782
193.40	110,444	87,978
193.42	111,758	90,200
193.44	113,080	92,448
193.46	114,410	94,723
193.48	115,747	97,025
193.50	117,092	99,353
193.52	118,445	101,708
193.54	119,806	104,091
193.56	121,175	106,501
193.58	122,551	108,938
193.60	123,935	111,403
193.62	125,327	113,895
193.64	126,726	116,416
193.66	128,133	118,964
193.68	129,549	121,541
193.70	130,971	124,146
193.72	132,402	126,780
193.74	133,840	129,442
193.76	135,287	132,134
193.78	136,741	134,854
193.80	138,202	137,603
193.82	139,672	140,382
193.84	141,149	143,190
193.86	142,634	146,028
193.88	144,127	148,896
193.90	145,628	151,793
193.92	147,136	154,721
193.94	148,652	157,679
193.96	150,176	160,667
193.98	151,708	163,686
194.00	**153,247**	**166,735**

← BASIN B-1 WEIR ELEV = 193.00'