Exhibit H

Stormwater Management Report

ALL-POINTS
TECHNOLOGY CORPORATION

STORMWATER MANAGEMENT REPORT

PROPOSED

BRISTOL SOLAR PROJECT

MATTHEWS STREET & HILL STREET

(VOL. 2109 PG. 436)

BRISTOL, CONNECTICUT

HARTFORD COUNTY

Prepared for:

All Green It, LLC

128 Farmington Avenue
Suite 162
Bristol, CT 06010

Prepared by:

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

May, 2020

Table of Contents

Tables

Appendices

Introduction

At the request of All Green It, LLC, All-Points Technology Corporation, P.C. ("APT") has undertaken the analysis of and design to address stormwater impacts resulting from the development of a proposed solar-based electric generating facility having an output of ±1.37 megawatts in Bristol, Connecticut (collectively, the "Project"). The Project, known as the Bristol Solar, involves the installation of solar panels and associated equipment at a property located off Matthews Street behind 125 Hill Street in Bristol, Connecticut ("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 Site is a privately-owned and residentially zoned parcel located off Matthews Street behind 125 Hill Street in Bristol, Connecticut, that consists of approximately 11.94± acres of undeveloped farm land. The property has an existing access drive off of Matthews Street and is mostly cleared.

The Site's existing topography generally slopes downward from the northeast. Slopes throughout the Project area range from approximately 0 to 12 percent. Elevations within the Site range from approximately 665 feet AMSL in the northeast corner of the site to approximately 626 feet AMSL on the southwest corner of the site.

Developed Site Conditions

The Project will be constructed in the center of the Site, west of the existing apple orchard; access to the site will be provided via the existing curb cut off of Matthews Street. The Project includes the installation of 3,432 solar panels and associated fencing, access drive, utility and stormwater management features. Of the ±11.94 acres, ±5.98 acres will require clearing and grubbing for the Project.

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. In order to account for the change in ground cover, time of concentration, and the reduction of hydrologic soil group, two (2) grass lined stormwater management basins are proposed along the extents of the proposed Project area.

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 2 Precipitation 2-, 25-, 50-, and 100-year storm event with rainfall depths of 3.62, 7.13, 8.12, and 9.22 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 solar panels, roadways, gravel surfaces, and transformer pads are effectively impervious cover. See Appendix F.

Existing Drainage Patterns

The proposed Project area drains from a high point in the northeast corner of the site to the west & south, ultimately draining to an existing small waterway.

The Site was modeled at one (1) Analysis Points ("AP-1"). AP-1 is at the southwest portion of the property at the existing waterway. Peak discharges have been computed at this point 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 consist of Map Unit Symbol 38C, named "Hinckley loamy sand, 3 to 15 percent slopes"; 34A, named "Merrimac fine sandy loam, 0 to 3 percent slopes"; 234B, named "Merrimac-Urban land complex, 0 to 8 percent slopes"; and 12, named "Raypol silt loam". Map Unit Symbols 38C, 34A and 234B are classified in the "A" hydrologic soil group rating. Map Unit Symbol 12 is classified in the "C/D" hydrologic soil group rating.

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	2.99	16.45	21.15	26.64

Proposed Drainage Patterns

The Project will require clearing and grubbing in the immediate area for the proposed solar installation, including the necessary utilities, access drive, and stormwater management features, resulting in approximately ±5.98 acres of disturbance. Overall, hydrologically, through the addition of catchment areas associated with the individual drainage areas of each proposed basin, the post-developed condition is designed to mimic the pre-developed condition.

To manage the increase in post-development runoff due to the change in cover type associated with converting woods to meadow and the reductions in one full HSG within the proposed limit of disturbance, two (2) grass-lined stormwater management basins are proposed along the edges of the project area. The basins manage the stormwater runoff through a combination of infiltration and a broad crested overflow weir. These basins also provide the necessary water quality treatment volume for the additional impervious area, as recommended by Appendix I. See Appendix C for post-construction stormwater calculations.

Infiltration rates for the two (2) grass-lined stormwater management basins are modeled with a maximum rate of 5.00 inches/hour as allowed under the 2004 Stormwater Quality Manual. The infiltration rates were identified by the United States Department of Agriculture (USDA) Natural Resources Conservation Service. The results are included in Appendix E. Each basin is designed with a rip-rap overflow weir and level spreader.

Swales are proposed along the western and southern limits of disturbance to facilitate all the flow reaching the two stormwater management basins. The swales are designed to convey the 100-year storm event without overtopping. A biodegradable erosion control blanket will be installed within the swales to protect against erosion until turf has been established.

Since the proposed development mimics the existing conditions, the post-development condition was modeled using the same Analysis Point. 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

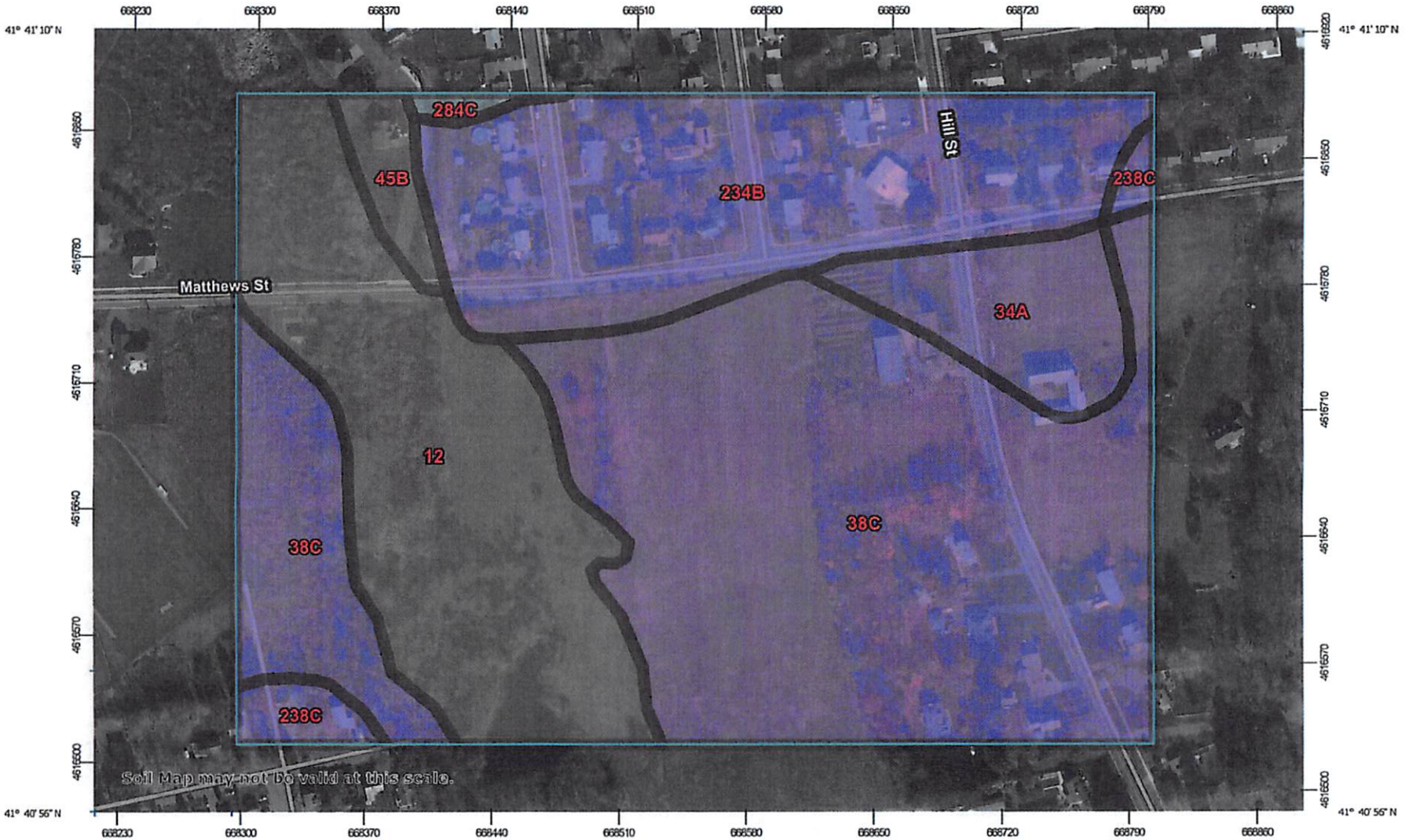
Analysis Point	**Post-developed Peak Storm Runoff (Q), cubic feet per second (cfs)**			
	2-year	**25-year**	**50-year**	**100-year**
AP-1	2.99	8.69	10.36	18.76

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 equal to or 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

Hydrologic Soil Group—State of Connecticut
(Sunjet - Bristol)



Map Scale: 1:3,050 if printed on A landscape (11" x 8.5") sheet.

N

Meters: 0 45 90 180 270

Feet: 0 100 200 400 600

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.

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

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

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

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

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

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

Soil Survey Area: State of Connecticut
Survey Area Data: Version 19, Sep 13, 2019

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

Date(s) aerial images were photographed: Sep 25, 2019—Nov 9, 2019

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	9.9	21.9%
34A	Merrimac fine sandy loam, 0 to 3 percent slopes	A	2.6	5.8%
38C	Hinckley loamy sand, 3 to 15 percent slopes	A	21.0	46.3%
45B	Woodbridge fine sandy loam, 3 to 8 percent slopes	C/D	0.8	1.9%
234B	Merrimac-Urban land complex, 0 to 8 percent slopes	A	9.8	21.7%
238C	Hinckley-Urban land complex, 3 to 15 percent slopes	A	0.8	1.9%
284C	Paxton-Urban land complex, 8 to 15 percent slopes	C	0.2	0.5%
Totals for Area of Interest			45.3	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

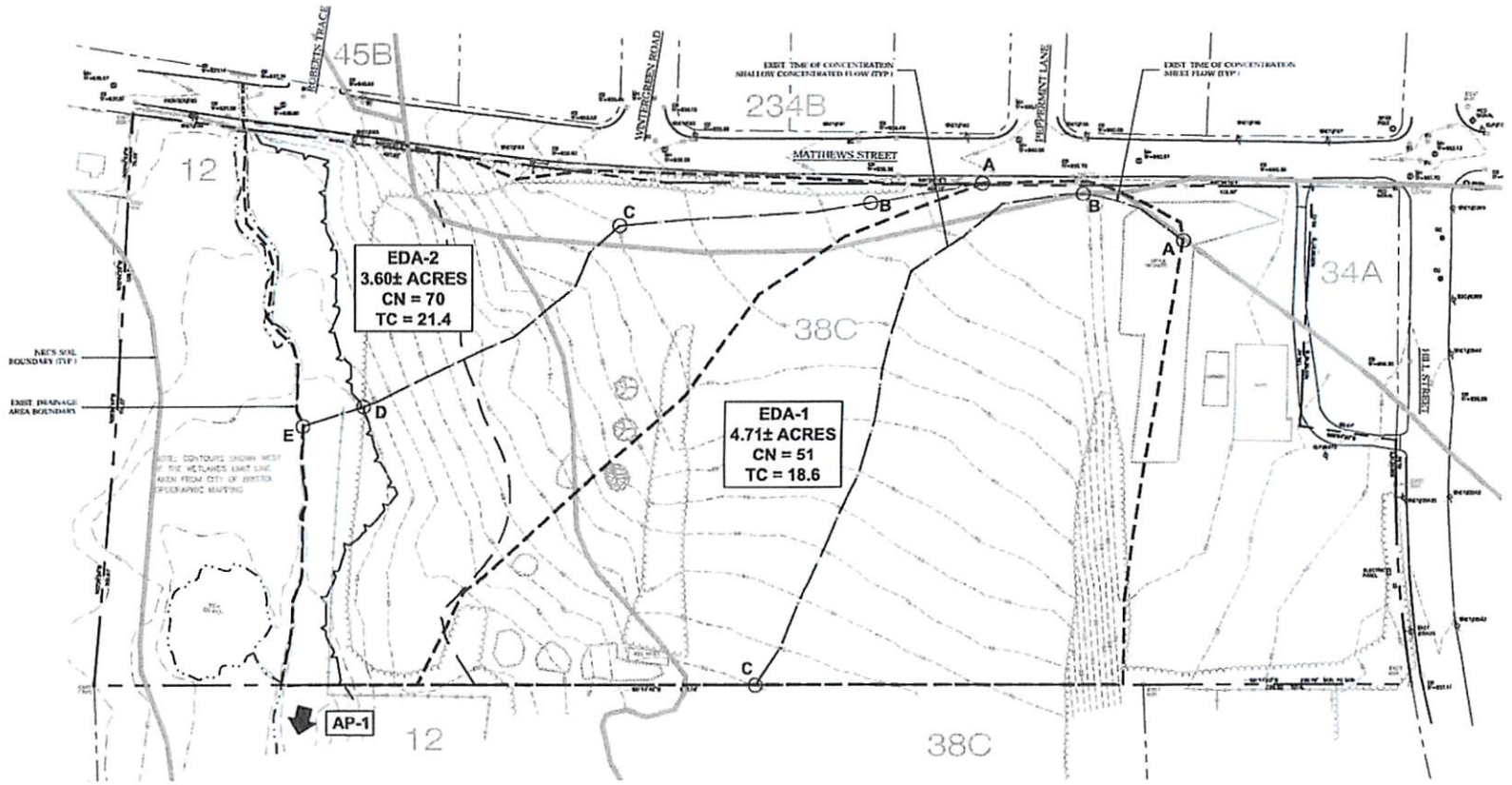
Component Percent Cutoff: None Specified

Tie-break Rule: Higher

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

EXISTING DRAINAGE AREAS

	TOTAL AREA (ACRES)	COMPOSITE CN	TC (MINS.)
EDA-1	4.71±	51	18.6
EDA-2	3.60±	70	21.4



1 EDA-1 EXISTING DRAINAGE AREA MAP
SCALE: 1" = 50'-0"

(IN FEET) 1 inch = 50 ft.

SUNJET

ALL-POINTS TECHNOLOGY CORPORATION

CSC PERMIT SET

NO	DATE	REVISION
0	05/19/20	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 VAUXHALL STREET EXTENSION - SUITE 311 WATERFORD, CT 06385

OWNER: LINDA ARBESMAN, KATHLEEN FERRIER, H.C. TR ALLAIRE & LAUREN VALENTINO
ADDRESS: 441 MATTHEWS STREET BRISTOL, CT 06010

BRISTOL SOLAR

SITE ADDRESS: MATTHEWS ST. & HILL ST. BRISTOL, CT 06010

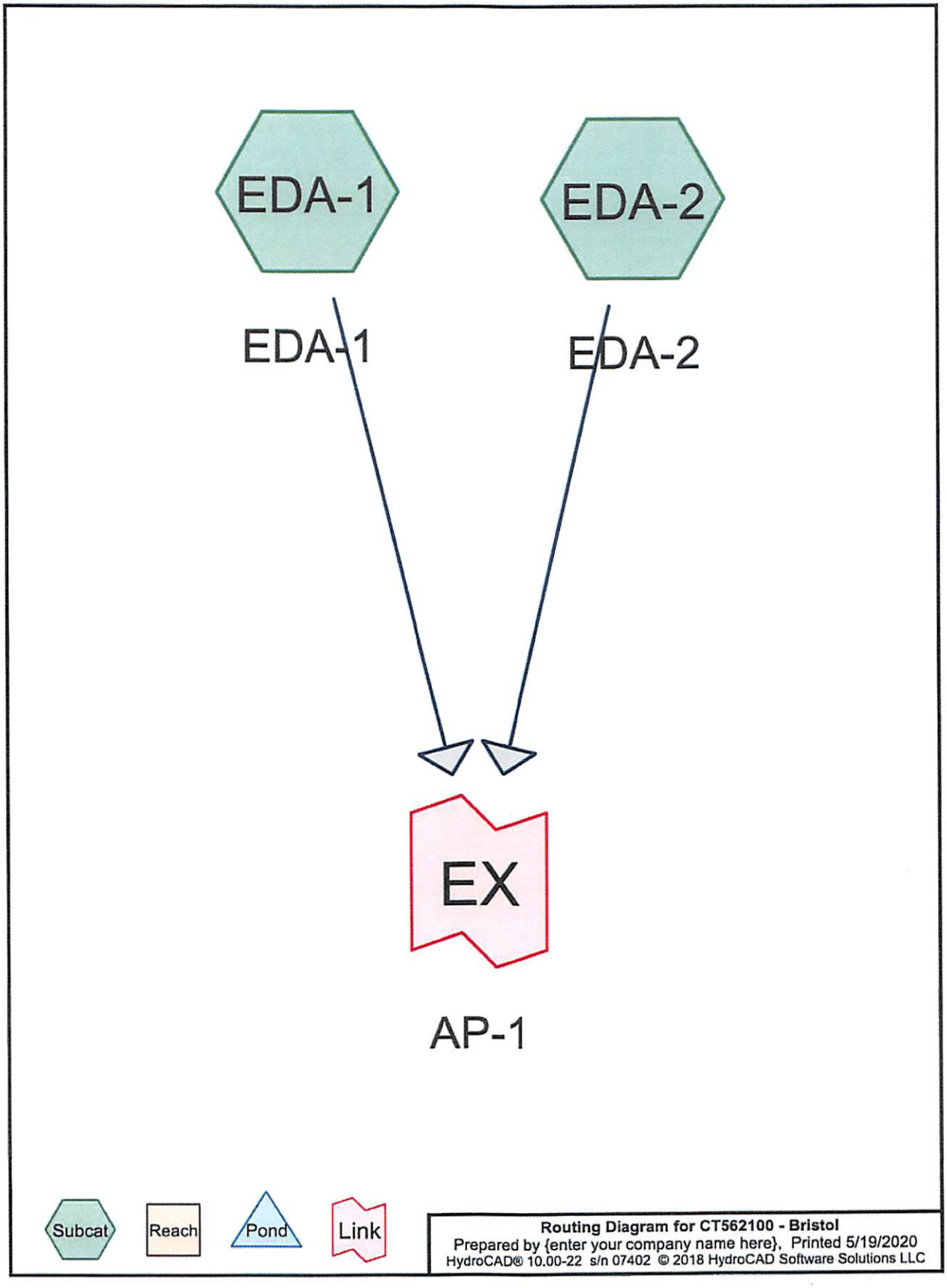
APT FILING NUMBER: CT562100

DRAWN BY: CSH

DATE: 05/19/20 CHECKED BY: BJP

SHEET TITLE:
EXISTING DRAINAGE AREA MAP

SHEET NUMBER:
EDA-1


EDA-1
EDA-2
EDA-1
EDA-2
EX
AP-1
Subcat
Reach
Pond
Link
Routing Diagram for CT562100 - Bristol
Prepared by {enter your company name here}, Printed 5/19/2020
HydroCAD® 10.00-22 s/n 07402 © 2018 HydroCAD Software Solutions LLC

Area Listing (selected nodes)

Area (acres)	CN	Description (subcatchment-numbers)
4.918	49	Pasture/grassland/range, Fair, HSG A (EDA-1, EDA-2)
1.754	84	Pasture/grassland/range, Fair, HSG D (EDA-1, EDA-2)
0.596	36	Woods, Fair, HSG A (EDA-1, EDA-2)
1.039	79	Woods, Fair, HSG D (EDA-1, EDA-2)
8.306	**59**	**TOTAL AREA**

Soil Listing (selected nodes)

Area (acres)	Soil Group	Subcatchment Numbers
5.513	HSG A	EDA-1, EDA-2
0.000	HSG B	
0.000	HSG C	
2.793	HSG D	EDA-1, EDA-2
0.000	Other	
8.306		**TOTAL AREA**

Ground Covers (selected nodes)

HSG-A (acres)	HSG-B (acres)	HSG-C (acres)	HSG-D (acres)	Other (acres)	Total (acres)	Ground Cover	Subcatchment Numbers
4.918	0.000	0.000	1.754	0.000	6.672	Pasture/grassland/range, Fair	EDA-1, EDA-2
0.596	0.000	0.000	1.039	0.000	1.634	Woods, Fair	EDA-1, EDA-2
5.513	**0.000**	**0.000**	**2.793**	**0.000**	**8.306**	**TOTAL AREA**	

Time span=5.00-20.00 hrs, dt=0.05 hrs, 301 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Subcatchment EDA-1: EDA-1 Runoff Area=204,963 sf 0.00% Impervious Runoff Depth>0.21"
Flow Length=676' Tc=18.6 min CN=51 Runoff=0.39 cfs 0.082 af

Subcatchment EDA-2: EDA-2 Runoff Area=156,857 sf 0.00% Impervious Runoff Depth>0.98"
Flow Length=736' Tc=21.4 min CN=70 Runoff=2.76 cfs 0.293 af

Link EX: AP-1 Inflow=2.99 cfs 0.376 af
Primary=2.99 cfs 0.376 af

Total Runoff Area = 8.306 ac Runoff Volume = 0.376 af Average Runoff Depth = 0.54"
100.00% Pervious = 8.306 ac 0.00% Impervious = 0.000 ac

Summary for Subcatchment EDA-1: EDA-1

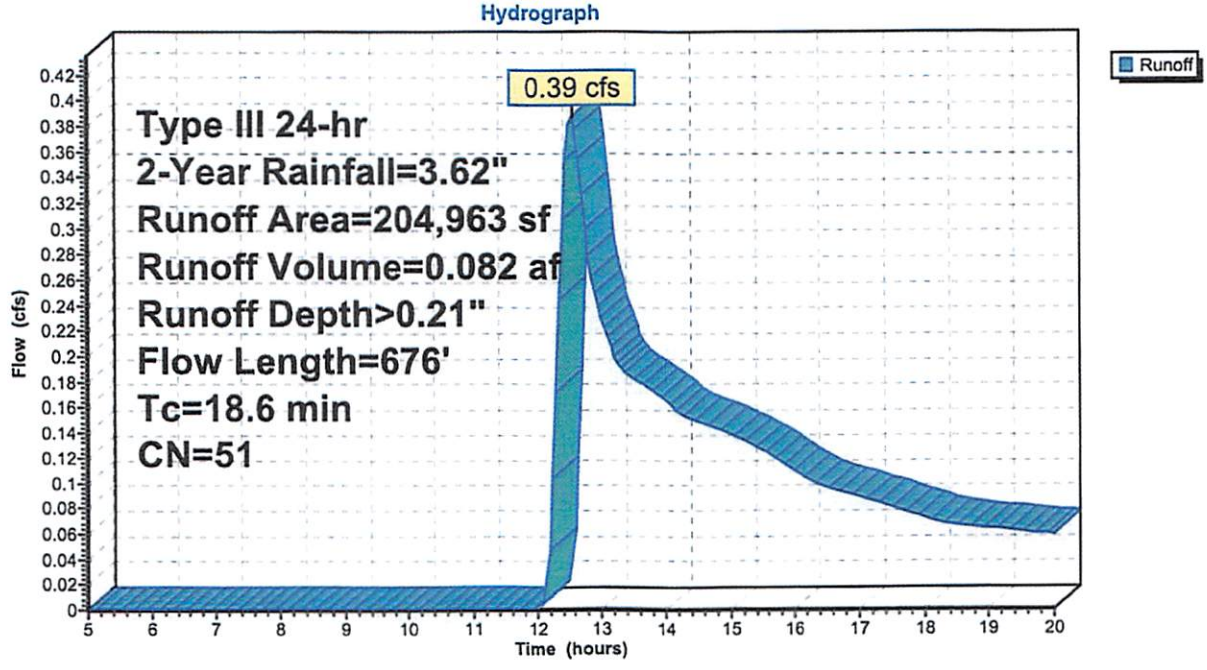
Runoff = 0.39 cfs @ 12.55 hrs, Volume= 0.082 af, Depth> 0.21"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type III 24-hr 2-Year Rainfall=3.62"

Area (sf)	CN	Description
165,498	49	Pasture/grassland/range, Fair, HSG A
18,209	36	Woods, Fair, HSG A
14,305	84	Pasture/grassland/range, Fair, HSG D
6,951	79	Woods, Fair, HSG D
204,963	51	Weighted Average
204,963		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
11.6	100	0.0300	0.14		**Sheet Flow, A-B** Grass: Dense n= 0.240 P2= 3.52"
7.0	576	0.0382	1.37		**Shallow Concentrated Flow, B-C** Short Grass Pasture Kv= 7.0 fps
18.6	676	Total			

Subcatchment EDA-1: EDA-1



Summary for Subcatchment EDA-2: EDA-2

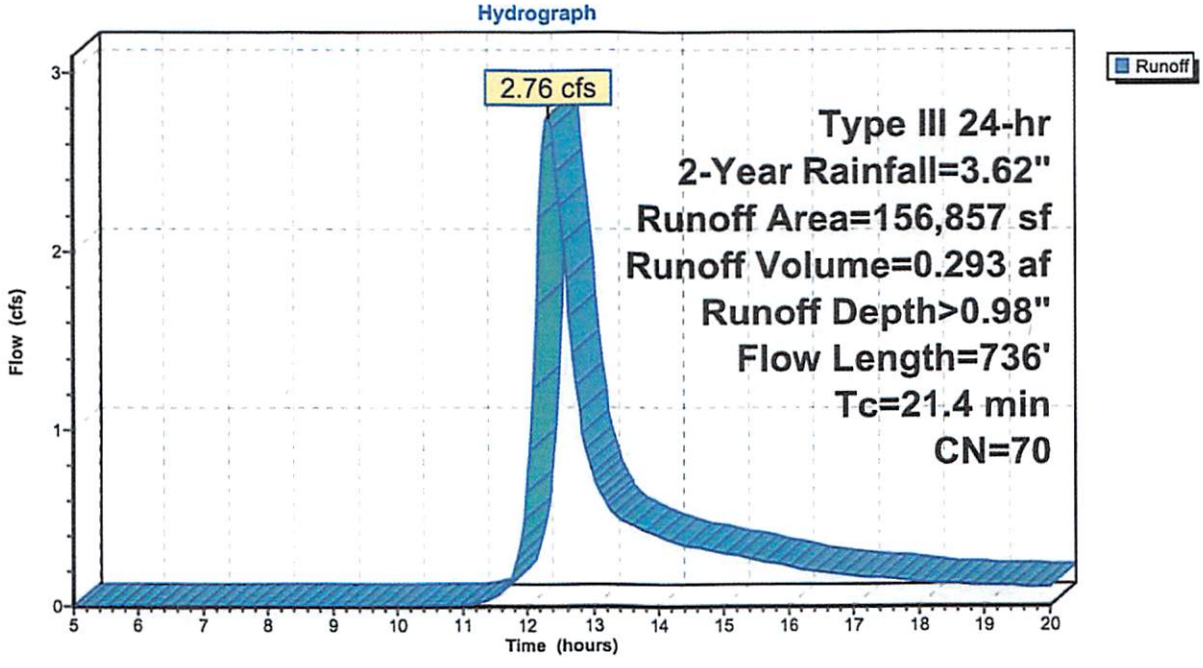
Runoff = 2.76 cfs @ 12.33 hrs, Volume= 0.293 af, Depth> 0.98"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type III 24-hr 2-Year Rainfall=3.62"

Area (sf)	CN	Description
48,714	49	Pasture/grassland/range, Fair, HSG A
7,742	36	Woods, Fair, HSG A
62,114	84	Pasture/grassland/range, Fair, HSG D
38,287	79	Woods, Fair, HSG D
156,857	70	Weighted Average
156,857		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
13.6	100	0.0200	0.12		**Sheet Flow, A-B** Grass: Dense n= 0.240 P2= 3.52"
3.6	226	0.0221	1.04		**Shallow Concentrated Flow, B-C** Short Grass Pasture Kv= 7.0 fps
3.3	350	0.0628	1.75		**Shallow Concentrated Flow, C-D** Short Grass Pasture Kv= 7.0 fps
0.9	60	0.0500	1.12		**Shallow Concentrated Flow, D-E** Woodland Kv= 5.0 fps
21.4	736	Total			

Subcatchment EDA-2: EDA-2

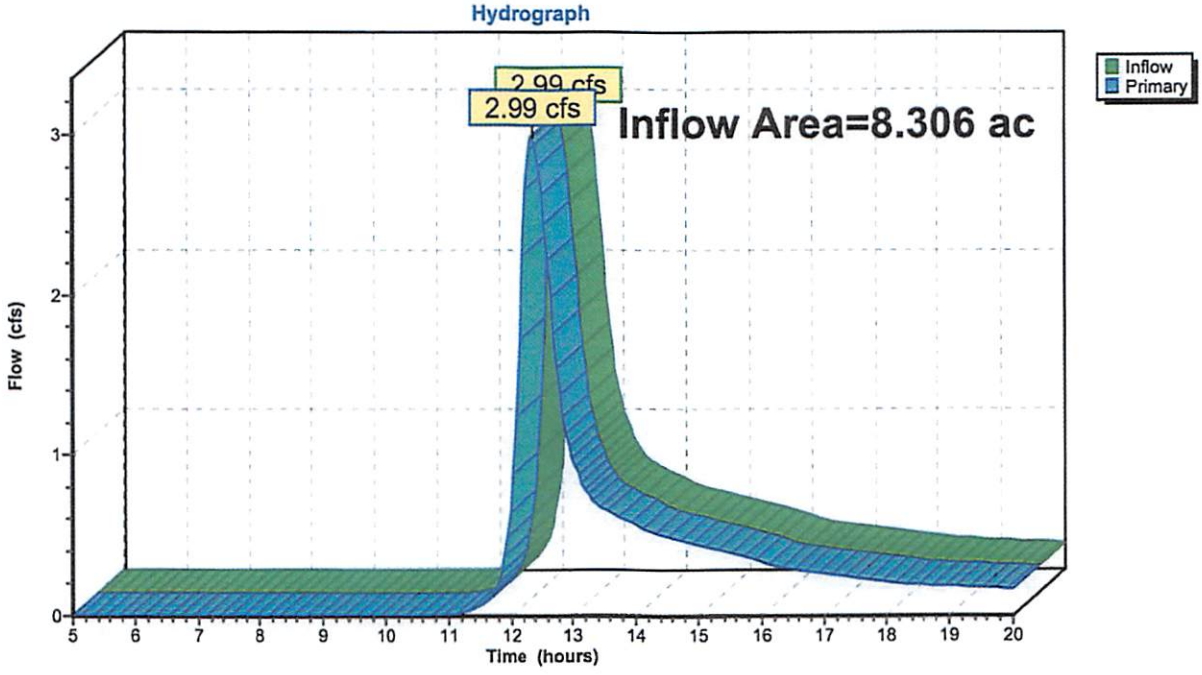


Summary for Link EX: AP-1

Inflow Area = 8.306 ac, 0.00% Impervious, Inflow Depth > 0.54" for 2-Year event
Inflow = 2.99 cfs @ 12.35 hrs, Volume= 0.376 af
Primary = 2.99 cfs @ 12.35 hrs, Volume= 0.376 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs

Link EX: AP-1



Time span=5.00-20.00 hrs, dt=0.05 hrs, 301 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Subcatchment EDA-1: EDA-1 Runoff Area=204,963 sf 0.00% Impervious Runoff Depth>1.64"
Flow Length=676' Tc=18.6 min CN=51 Runoff=6.18 cfs 0.644 af

Subcatchment EDA-2: EDA-2 Runoff Area=156,857 sf 0.00% Impervious Runoff Depth>3.45"
Flow Length=736' Tc=21.4 min CN=70 Runoff=10.27 cfs 1.035 af

Link EX: AP-1 Inflow=16.45 cfs 1.679 af
Primary=16.45 cfs 1.679 af

Total Runoff Area = 8.306 ac Runoff Volume = 1.679 af Average Runoff Depth = 2.43"
100.00% Pervious = 8.306 ac 0.00% Impervious = 0.000 ac

Summary for Subcatchment EDA-1: EDA-1

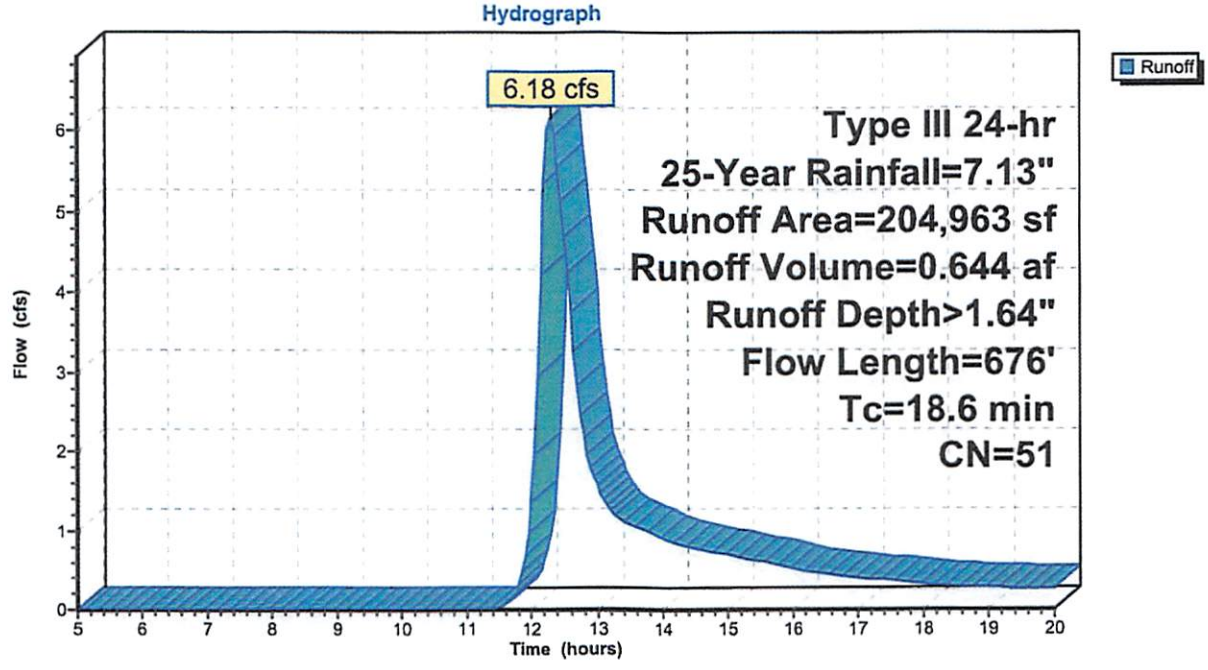
Runoff = 6.18 cfs @ 12.29 hrs, Volume= 0.644 af, Depth> 1.64"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type III 24-hr 25-Year Rainfall=7.13"

Area (sf)	CN	Description
165,498	49	Pasture/grassland/range, Fair, HSG A
18,209	36	Woods, Fair, HSG A
14,305	84	Pasture/grassland/range, Fair, HSG D
6,951	79	Woods, Fair, HSG D
204,963	51	Weighted Average
204,963		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
11.6	100	0.0300	0.14		**Sheet Flow, A-B** Grass: Dense n= 0.240 P2= 3.52"
7.0	576	0.0382	1.37		**Shallow Concentrated Flow, B-C** Short Grass Pasture Kv= 7.0 fps
18.6	676	Total			

Subcatchment EDA-1: EDA-1



Summary for Subcatchment EDA-2: EDA-2

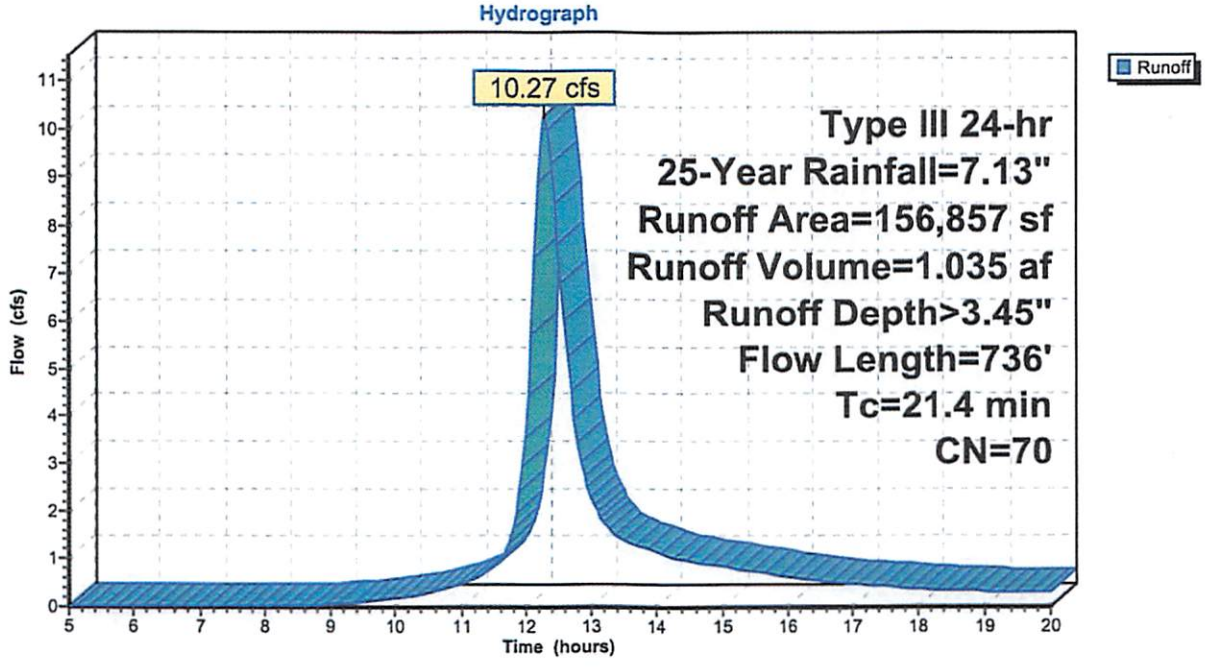
Runoff = 10.27 cfs @ 12.30 hrs, Volume= 1.035 af, Depth> 3.45"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type III 24-hr 25-Year Rainfall=7.13"

Area (sf)	CN	Description
48,714	49	Pasture/grassland/range, Fair, HSG A
7,742	36	Woods, Fair, HSG A
62,114	84	Pasture/grassland/range, Fair, HSG D
38,287	79	Woods, Fair, HSG D
156,857	70	Weighted Average
156,857		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
13.6	100	0.0200	0.12		**Sheet Flow, A-B** Grass: Dense n= 0.240 P2= 3.52"
3.6	226	0.0221	1.04		**Shallow Concentrated Flow, B-C** Short Grass Pasture Kv= 7.0 fps
3.3	350	0.0628	1.75		**Shallow Concentrated Flow, C-D** Short Grass Pasture Kv= 7.0 fps
0.9	60	0.0500	1.12		**Shallow Concentrated Flow, D-E** Woodland Kv= 5.0 fps
21.4	736	Total			

Subcatchment EDA-2: EDA-2

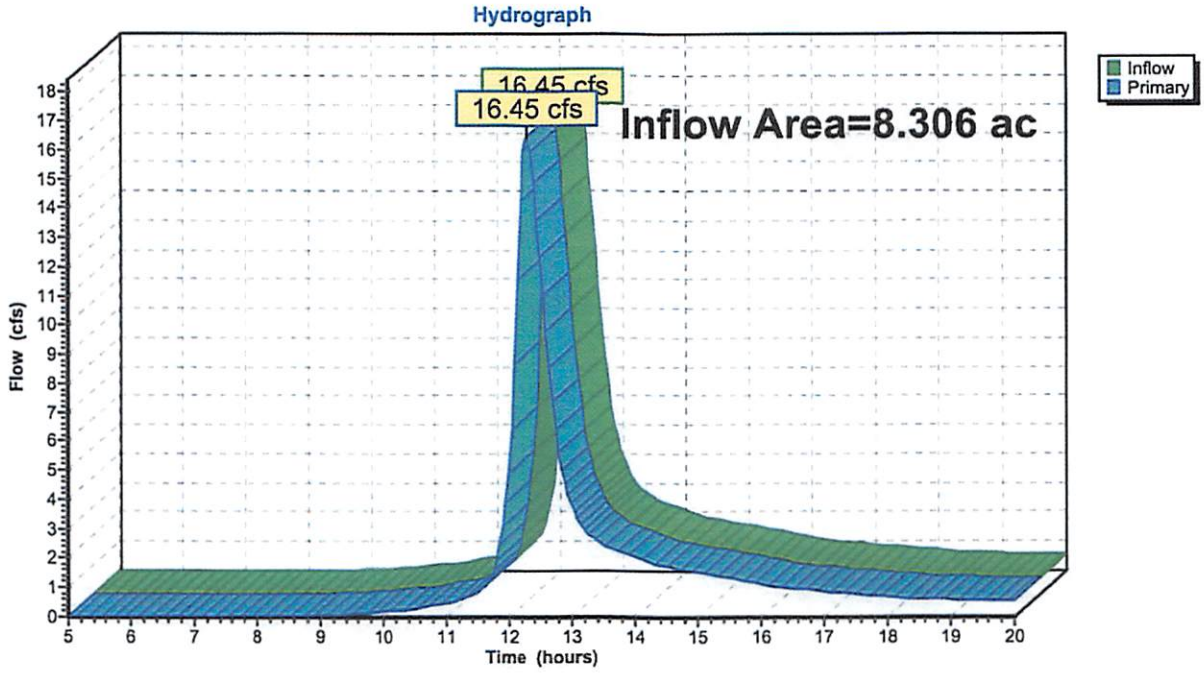


Summary for Link EX: AP-1

Inflow Area = 8.306 ac, 0.00% Impervious, Inflow Depth > 2.43" for 25-Year event
Inflow = 16.45 cfs @ 12.30 hrs, Volume= 1.679 af
Primary = 16.45 cfs @ 12.30 hrs, Volume= 1.679 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs

Link EX: AP-1



Time span=5.00-20.00 hrs, dt=0.05 hrs, 301 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Subcatchment EDA-1: EDA-1 Runoff Area=204,963 sf 0.00% Impervious Runoff Depth>2.20"
Flow Length=676' Tc=18.6 min CN=51 Runoff=8.56 cfs 0.861 af

Subcatchment EDA-2: EDA-2 Runoff Area=156,857 sf 0.00% Impervious Runoff Depth>4.24"
Flow Length=736' Tc=21.4 min CN=70 Runoff=12.61 cfs 1.272 af

Link EX: AP-1 Inflow=21.15 cfs 2.133 af
Primary=21.15 cfs 2.133 af

Total Runoff Area = 8.306 ac Runoff Volume = 2.133 af Average Runoff Depth = 3.08"
100.00% Pervious = 8.306 ac 0.00% Impervious = 0.000 ac

Summary for Subcatchment EDA-1: EDA-1

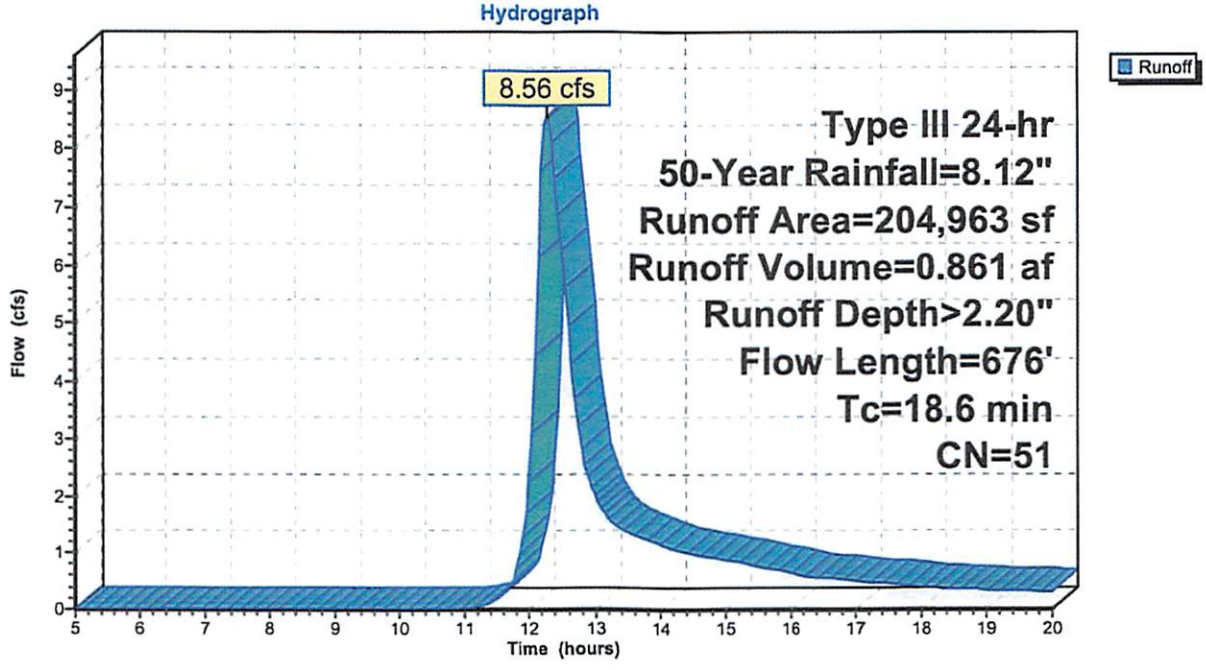
Runoff = 8.56 cfs @ 12.28 hrs, Volume= 0.861 af, Depth> 2.20"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type III 24-hr 50-Year Rainfall=8.12"

Area (sf)	CN	Description
165,498	49	Pasture/grassland/range, Fair, HSG A
18,209	36	Woods, Fair, HSG A
14,305	84	Pasture/grassland/range, Fair, HSG D
6,951	79	Woods, Fair, HSG D
204,963	51	Weighted Average
204,963		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
11.6	100	0.0300	0.14		**Sheet Flow, A-B** Grass: Dense n= 0.240 P2= 3.52"
7.0	576	0.0382	1.37		**Shallow Concentrated Flow, B-C** Short Grass Pasture Kv= 7.0 fps
18.6	676	Total			

Subcatchment EDA-1: EDA-1



Summary for Subcatchment EDA-2: EDA-2

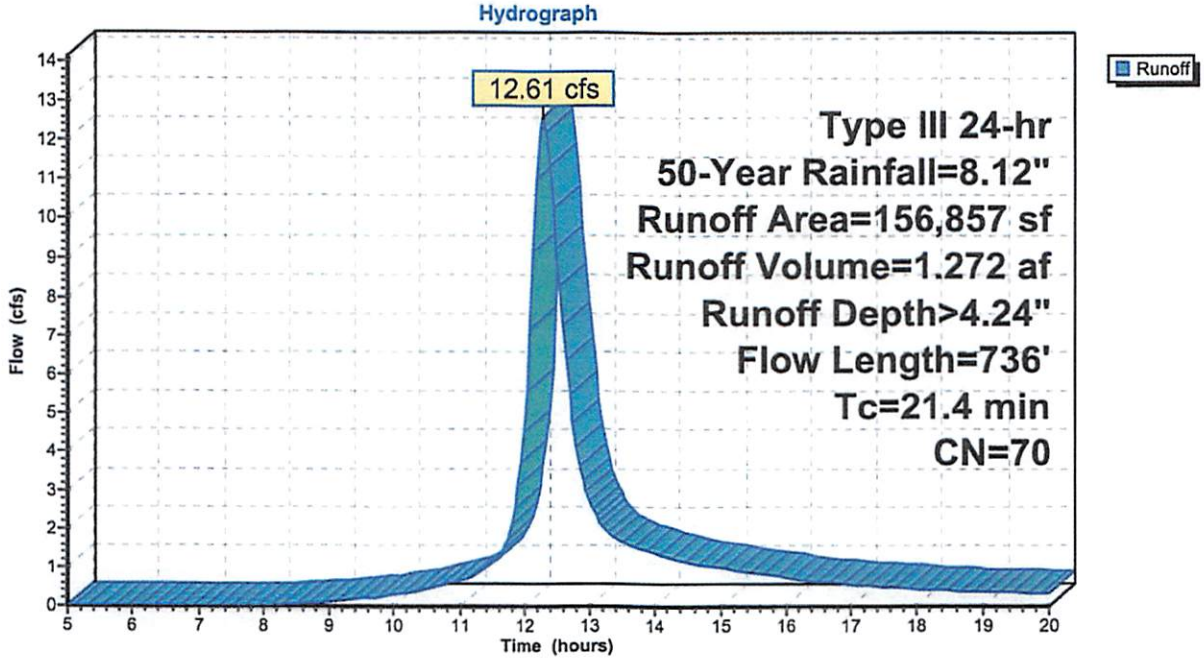
Runoff = 12.61 cfs @ 12.30 hrs, Volume= 1.272 af, Depth> 4.24"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type III 24-hr 50-Year Rainfall=8.12"

Area (sf)	CN	Description
48,714	49	Pasture/grassland/range, Fair, HSG A
7,742	36	Woods, Fair, HSG A
62,114	84	Pasture/grassland/range, Fair, HSG D
38,287	79	Woods, Fair, HSG D
156,857	70	Weighted Average
156,857		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
13.6	100	0.0200	0.12		**Sheet Flow, A-B** Grass: Dense n= 0.240 P2= 3.52"
3.6	226	0.0221	1.04		**Shallow Concentrated Flow, B-C** Short Grass Pasture Kv= 7.0 fps
3.3	350	0.0628	1.75		**Shallow Concentrated Flow, C-D** Short Grass Pasture Kv= 7.0 fps
0.9	60	0.0500	1.12		**Shallow Concentrated Flow, D-E** Woodland Kv= 5.0 fps
21.4	736	Total			

Subcatchment EDA-2: EDA-2

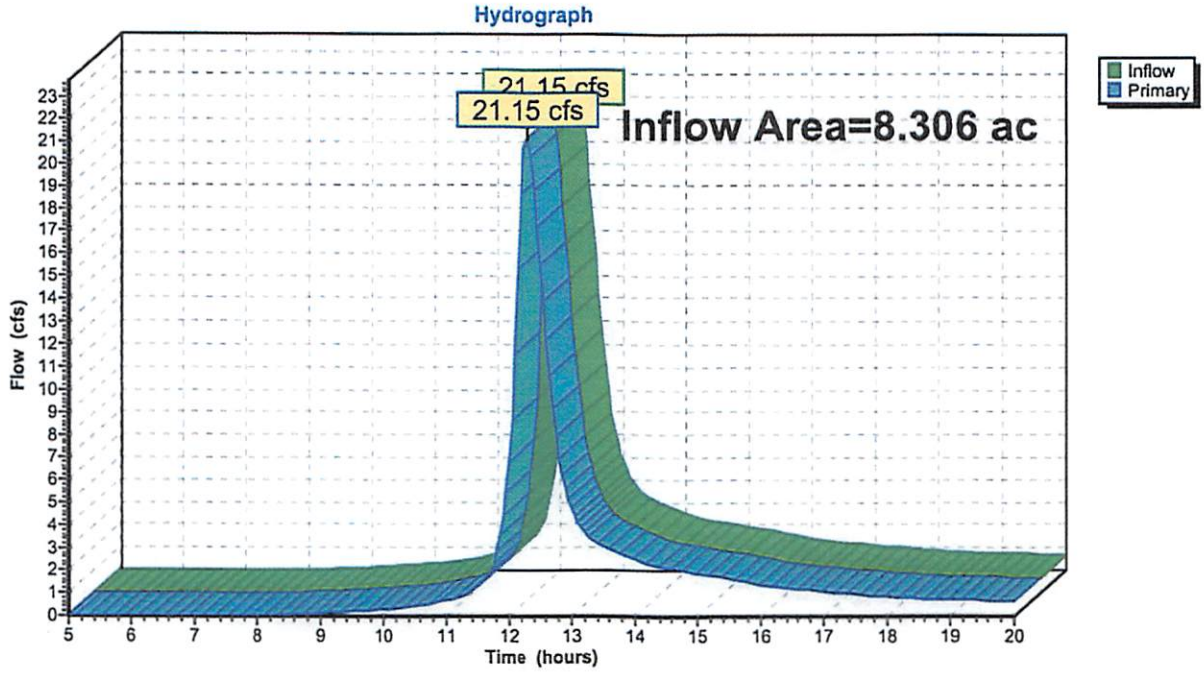


Summary for Link EX: AP-1

Inflow Area = 8.306 ac, 0.00% Impervious, Inflow Depth > 3.08" for 50-Year event
Inflow = 21.15 cfs @ 12.29 hrs, Volume= 2.133 af
Primary = 21.15 cfs @ 12.29 hrs, Volume= 2.133 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs

Link EX: AP-1



Time span=5.00-20.00 hrs, dt=0.05 hrs, 301 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Subcatchment EDA-1: EDA-1 Runoff Area=204,963 sf 0.00% Impervious Runoff Depth>2.86"
Flow Length=676' Tc=18.6 min CN=51 Runoff=11.41 cfs 1.123 af

Subcatchment EDA-2: EDA-2 Runoff Area=156,857 sf 0.00% Impervious Runoff Depth>5.15"
Flow Length=736' Tc=21.4 min CN=70 Runoff=15.25 cfs 1.544 af

Link EX: AP-1 Inflow=26.64 cfs 2.668 af
Primary=26.64 cfs 2.668 af

Total Runoff Area = 8.306 ac Runoff Volume = 2.668 af Average Runoff Depth = 3.85"
100.00% Pervious = 8.306 ac 0.00% Impervious = 0.000 ac

Summary for Subcatchment EDA-1: EDA-1

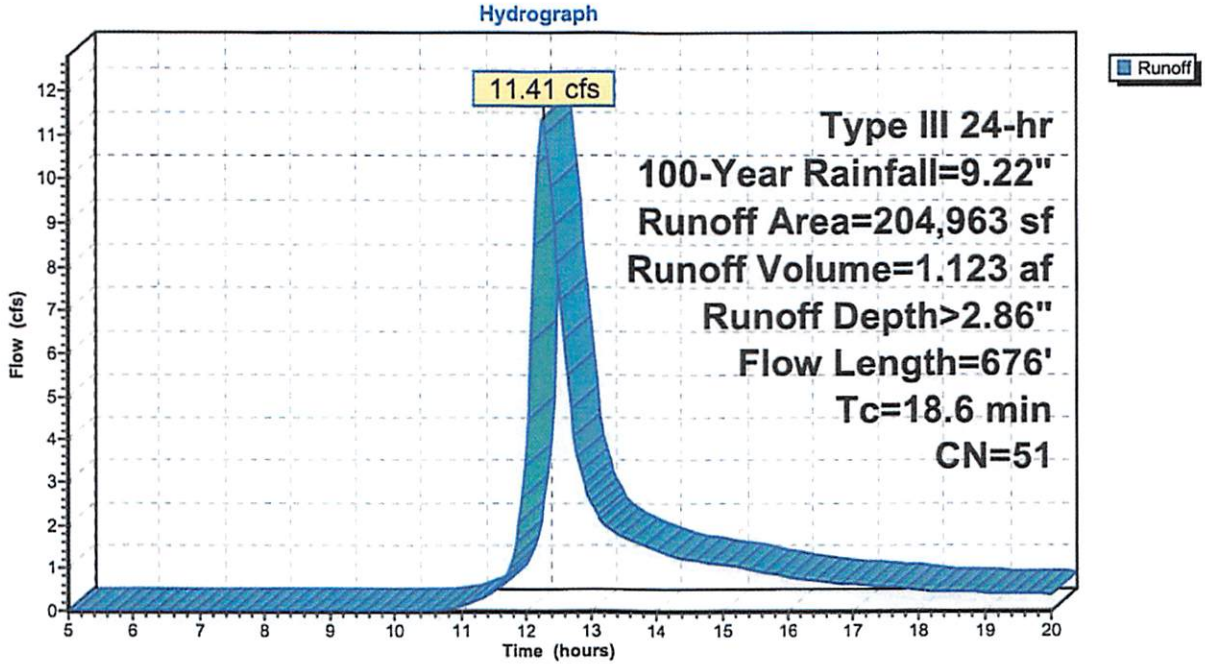
Runoff = 11.41 cfs @ 12.28 hrs, Volume= 1.123 af, Depth> 2.86"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type III 24-hr 100-Year Rainfall=9.22"

Area (sf)	CN	Description
165,498	49	Pasture/grassland/range, Fair, HSG A
18,209	36	Woods, Fair, HSG A
14,305	84	Pasture/grassland/range, Fair, HSG D
6,951	79	Woods, Fair, HSG D
204,963	51	Weighted Average
204,963		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
11.6	100	0.0300	0.14		**Sheet Flow, A-B** Grass: Dense n= 0.240 P2= 3.52"
7.0	576	0.0382	1.37		**Shallow Concentrated Flow, B-C** Short Grass Pasture Kv= 7.0 fps
18.6	676	Total			

Subcatchment EDA-1: EDA-1



Summary for Subcatchment EDA-2: EDA-2

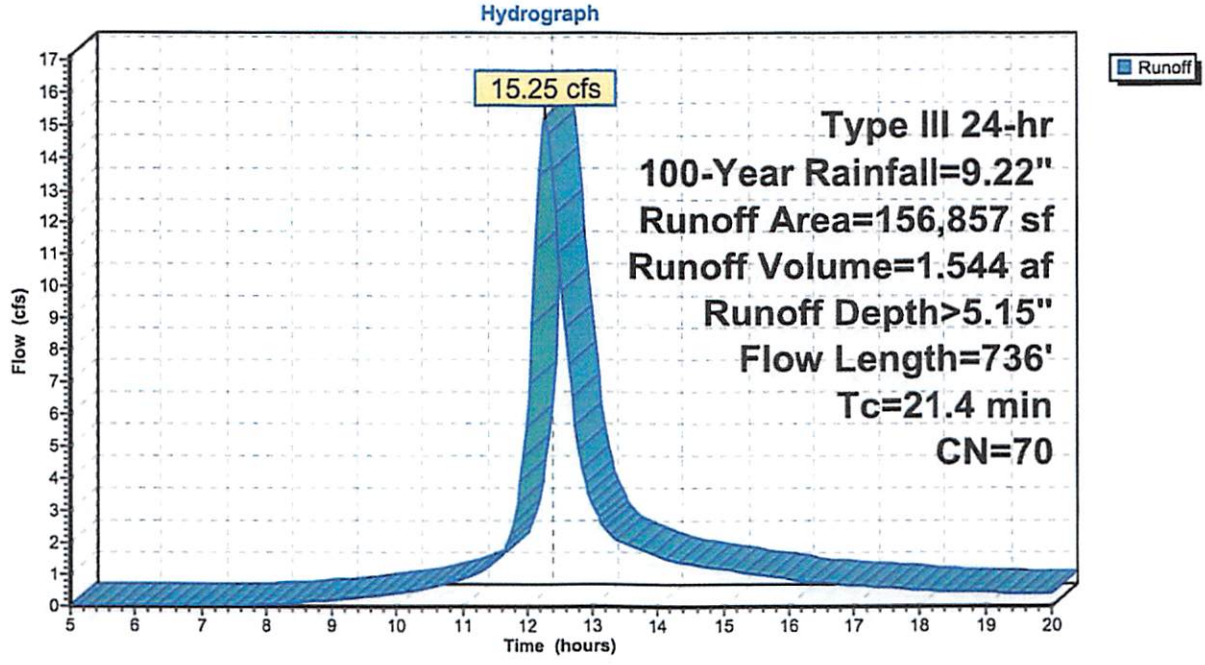
Runoff = 15.25 cfs @ 12.30 hrs, Volume= 1.544 af, Depth> 5.15"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type III 24-hr 100-Year Rainfall=9.22"

Area (sf)	CN	Description
48,714	49	Pasture/grassland/range, Fair, HSG A
7,742	36	Woods, Fair, HSG A
62,114	84	Pasture/grassland/range, Fair, HSG D
38,287	79	Woods, Fair, HSG D
156,857	70	Weighted Average
156,857		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
13.6	100	0.0200	0.12		**Sheet Flow, A-B** Grass: Dense n= 0.240 P2= 3.52"
3.6	226	0.0221	1.04		**Shallow Concentrated Flow, B-C** Short Grass Pasture Kv= 7.0 fps
3.3	350	0.0628	1.75		**Shallow Concentrated Flow, C-D** Short Grass Pasture Kv= 7.0 fps
0.9	60	0.0500	1.12		**Shallow Concentrated Flow, D-E** Woodland Kv= 5.0 fps
21.4	736	Total			

Subcatchment EDA-2: EDA-2

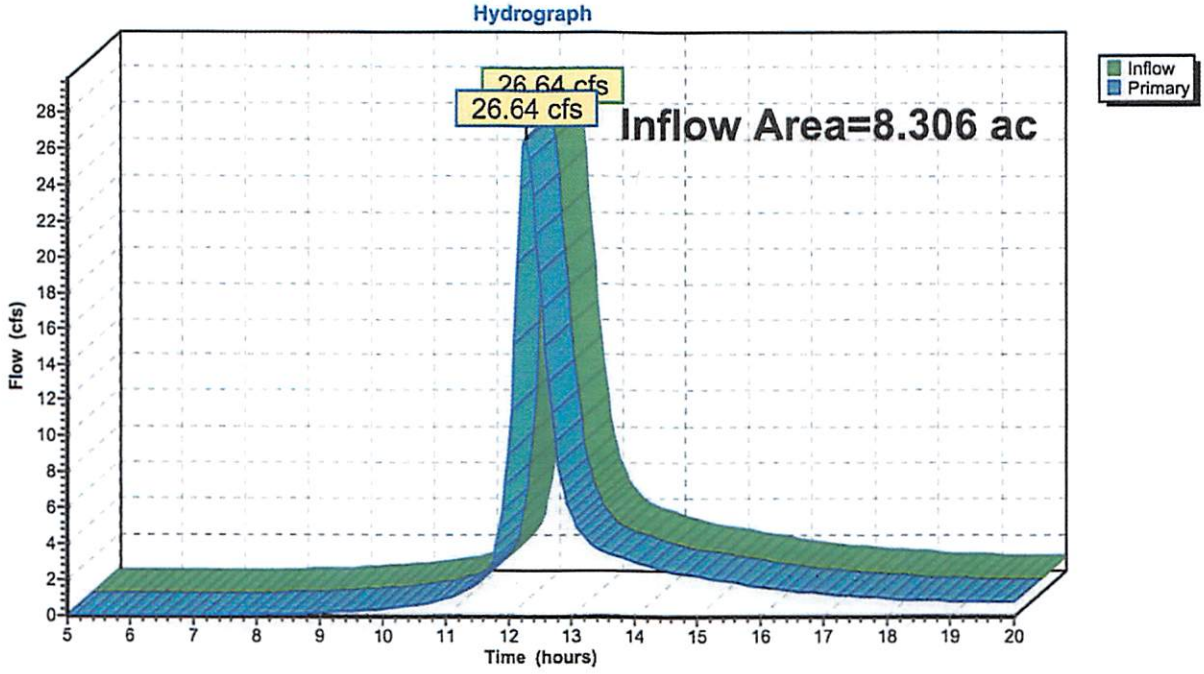


Summary for Link EX: AP-1

Inflow Area = 8.306 ac, 0.00% Impervious, Inflow Depth > 3.85" for 100-Year event
Inflow = 26.64 cfs @ 12.29 hrs, Volume= 2.668 af
Primary = 26.64 cfs @ 12.29 hrs, Volume= 2.668 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs

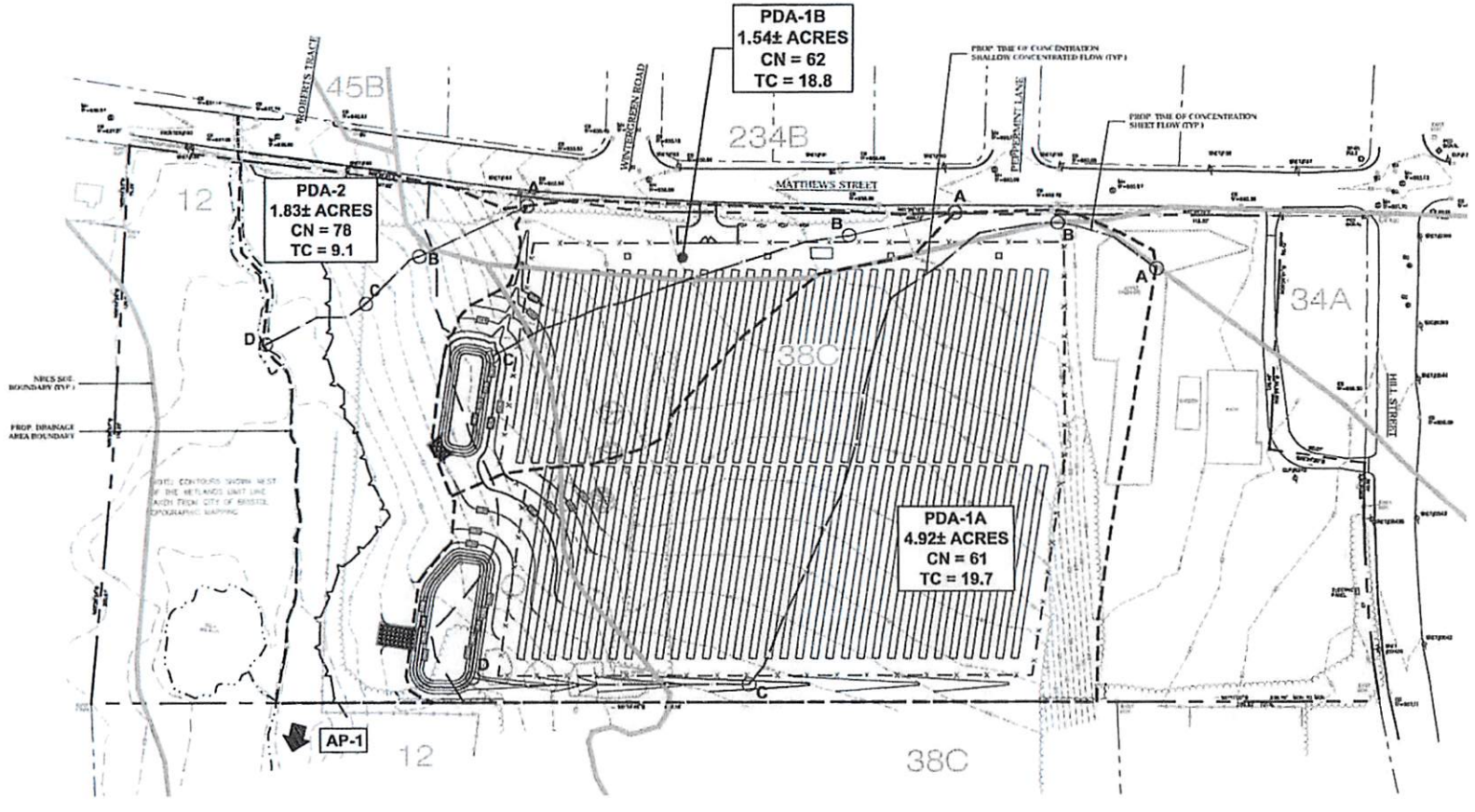
Link EX: AP-1



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

PROPOSED DRAINAGE AREAS

	TOTAL AREA (ACRES)	COMPOSITE CN	TC (MINS)
PDA-1A	4.92±	61	19.7
PDA-1B	1.54±	62	18.8
PDA-2	1.83±	78	9.1



1 PROPOSED DRAINAGE AREA MAP
PDA-1 SCALE: 1" = 50'-0"

(IN FEET) 1 inch = 50 ft.

SUNJET

ALL-POINTS TECHNOLOGY CORPORATION

CSC PERMIT SET

NO	DATE	REVISION
0	05/19/20	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 VAUXHALL STREET EXTENSION - SUITE 311 WATERFORD, CT 06385

OWNER: LINDA ARDESMAN, KATHLEEN FERRIER, H.C. TR ALLAIRE & LAUREN VALENTINO
ADDRESS: 491 MATTHEWS STREET BRISTOL, CT 06010

BRISTOL SOLAR

SITE ADDRESS: MATTHEWS ST. & HILL ST. BRISTOL, CT 06010

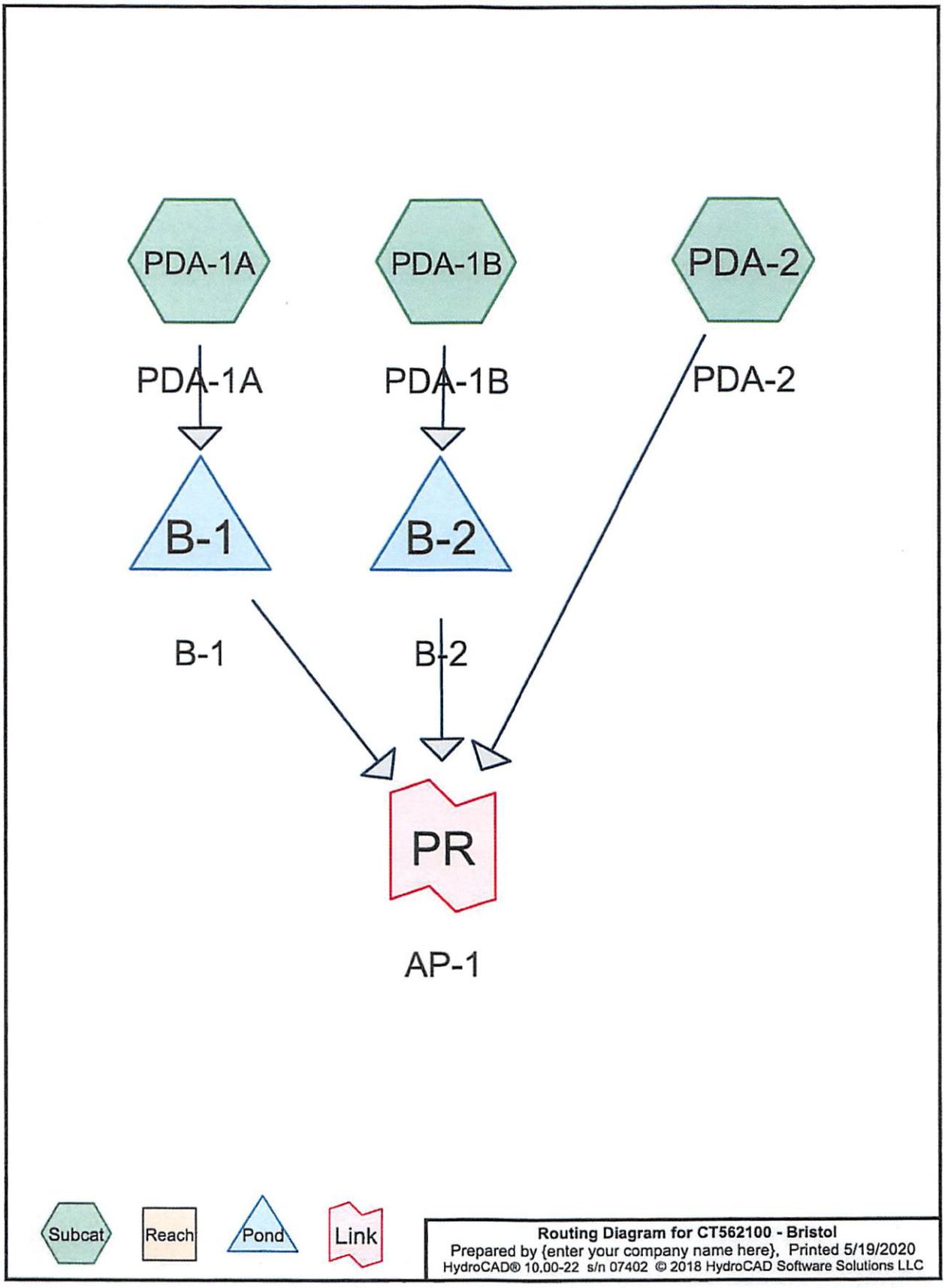
APT FILING NUMBER: CT5621100

DRAWN BY: CSH

DATE: 05/19/20 CHECKED BY: BJP

SHEET TITLE:
PROPOSED DRAINAGE AREA MAP

SHEET NUMBER:
PDA-1


PDA-1A
PDA-1B
PDA-2
PDA-1A
PDA-1B
PDA-2
B-1
B-2
B-1
B-2
PR
AP-1
Subcat
Reach
Pond
Link
Routing Diagram for CT562100 - Bristol
Prepared by {enter your company name here}, Printed 5/19/2020
HydroCAD® 10.00-22 s/n 07402 © 2018 HydroCAD Software Solutions LLC

Area Listing (selected nodes)

Area (acres)	CN	Description (subcatchment-numbers)
0.027	96	Gravel surface, HSG B (PDA-1B)
5.249	58	Meadow, non-grazed, HSG B (PDA-1A, PDA-1B)
1.104	78	Meadow, non-grazed, HSG D (PDA-1A, PDA-1B)
0.085	49	Pasture/grassland/range, Fair, HSG A (PDA-2)
0.784	84	Pasture/grassland/range, Fair, HSG D (PDA-2)
0.006	98	Paved parking, HSG B (PDA-1B)
0.146	36	Woods, Fair, HSG A (PDA-1B, PDA-2)
0.905	79	Woods, Fair, HSG D (PDA-2)
8.306	**65**	**TOTAL AREA**

Soil Listing (selected nodes)

Area (acres)	Soil Group	Subcatchment Numbers
0.231	HSG A	PDA-1B, PDA-2
5.283	HSG B	PDA-1A, PDA-1B
0.000	HSG C	
2.793	HSG D	PDA-1A, PDA-1B, PDA-2
0.000	Other	
8.306		**TOTAL AREA**

Ground Covers (selected nodes)

HSG-A (acres)	HSG-B (acres)	HSG-C (acres)	HSG-D (acres)	Other (acres)	Total (acres)	Ground Cover	Subcatchment Numbers
0.000	0.027	0.000	0.000	0.000	0.027	Gravel surface	PDA-1B
0.000	5.249	0.000	1.104	0.000	6.353	Meadow, non-grazed	PDA-1A, PDA-1B
0.085	0.000	0.000	0.784	0.000	0.869	Pasture/grassland/range, Fair	PDA-2
0.000	0.006	0.000	0.000	0.000	0.006	Paved parking	PDA-1B
0.146	0.000	0.000	0.905	0.000	1.051	Woods, Fair	PDA-1B, PDA-2
0.231	**5.283**	**0.000**	**2.793**	**0.000**	**8.306**	**TOTAL AREA**	

Time span=5.00-20.00 hrs, dt=0.05 hrs, 301 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Subcatchment PDA-1A: PDA-1A Runoff Area=214,655 sf 0.00% Impervious Runoff Depth>0.55"
Flow Length=900' Tc=19.7 min CN=61 Runoff=1.84 cfs 0.226 af

Subcatchment PDA-1B: PDA-1B Runoff Area=67,070 sf 0.41% Impervious Runoff Depth>0.59"
Flow Length=683' Tc=18.8 min CN=62 Runoff=0.65 cfs 0.076 af

Subcatchment PDA-2: PDA-2 Runoff Area=80,093 sf 0.00% Impervious Runoff Depth>1.47"
Flow Length=281' Tc=9.1 min CN=78 Runoff=2.99 cfs 0.225 af

Pond B-1: B-1 Peak Elev=628.59' Storage=2,511 cf Inflow=1.84 cfs 0.226 af
Discarded=0.52 cfs 0.225 af Primary=0.00 cfs 0.000 af Outflow=0.52 cfs 0.225 af

Pond B-2: B-2 Peak Elev=635.35' Storage=682 cf Inflow=0.65 cfs 0.076 af
Discarded=0.24 cfs 0.076 af Primary=0.00 cfs 0.000 af Outflow=0.24 cfs 0.076 af

Link PR: AP-1 Inflow=2.99 cfs 0.225 af
Primary=2.99 cfs 0.225 af

Total Runoff Area = 8.306 ac Runoff Volume = 0.527 af Average Runoff Depth = 0.76"
99.92% Pervious = 8.300 ac 0.08% Impervious = 0.006 ac

Summary for Subcatchment PDA-1A: PDA-1A

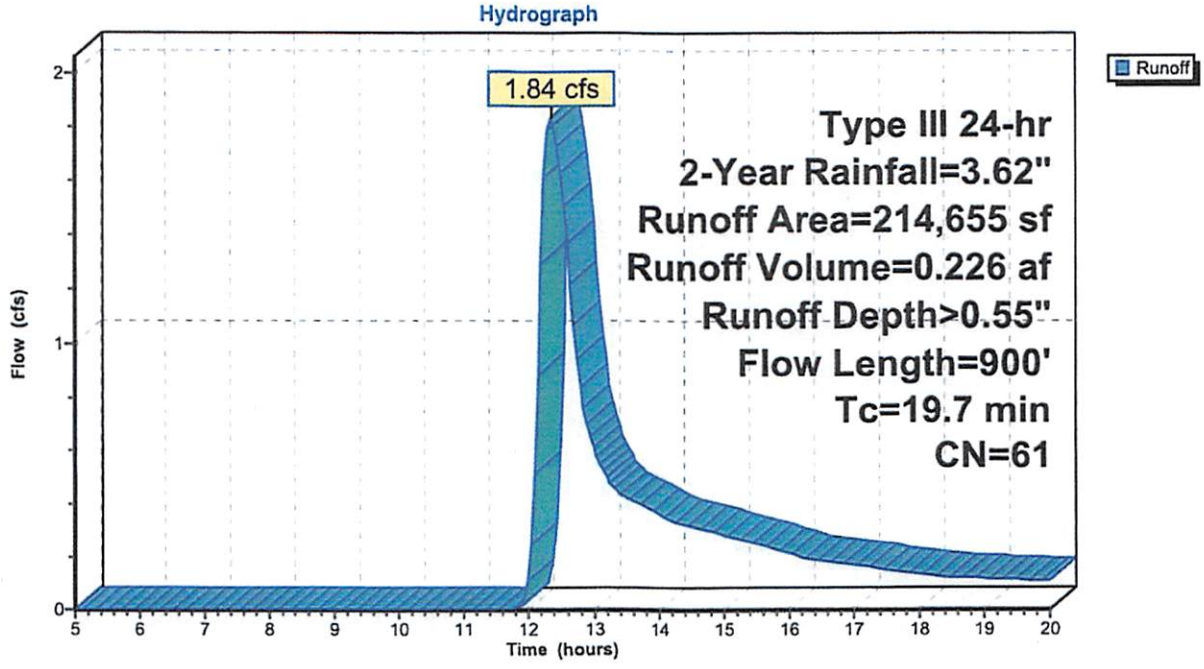
Runoff = 1.84 cfs @ 12.35 hrs, Volume= 0.226 af, Depth> 0.55"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type III 24-hr 2-Year Rainfall=3.62"

Area (sf)	CN	Description
182,159	58	Meadow, non-grazed, HSG B
32,496	78	Meadow, non-grazed, HSG D
214,655	61	Weighted Average
214,655		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
11.6	100	0.0300	0.14		**Sheet Flow, A-B** Grass: Dense n= 0.240 P2= 3.52"
6.8	557	0.0382	1.37		**Shallow Concentrated Flow, B-C** Short Grass Pasture Kv= 7.0 fps
1.3	243	0.0453	3.19		**Shallow Concentrated Flow, C-D** Grassed Waterway Kv= 15.0 fps
19.7	900	Total			

Subcatchment PDA-1A: PDA-1A



Summary for Subcatchment PDA-1B: PDA-1B

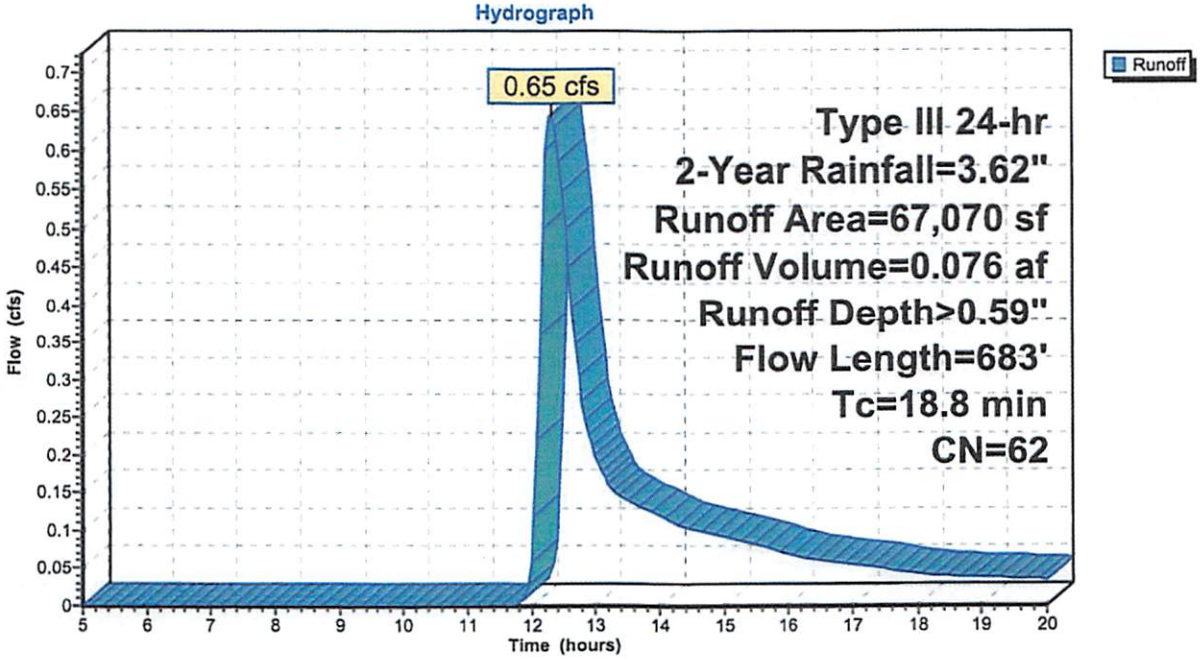
Runoff = 0.65 cfs @ 12.33 hrs, Volume= 0.076 af, Depth> 0.59"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type III 24-hr 2-Year Rainfall=3.62"

Area (sf)	CN	Description
46,506	58	Meadow, non-grazed, HSG B
3,535	36	Woods, Fair, HSG A
15,577	78	Meadow, non-grazed, HSG D
275	98	Paved parking, HSG B
1,177	96	Gravel surface, HSG B
67,070	62	Weighted Average
66,795		99.59% Pervious Area
275		0.41% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
13.6	100	0.0200	0.12		**Sheet Flow, A-B** Grass: Dense n= 0.240 P2= 3.52"
3.9	340	0.0441	1.47		**Shallow Concentrated Flow, B-C** Short Grass Pasture Kv= 7.0 fps
1.3	243	0.0453	3.19		**Shallow Concentrated Flow, C-D** Grassed Waterway Kv= 15.0 fps
18.8	683	Total			

Subcatchment PDA-1B: PDA-1B



Summary for Subcatchment PDA-2: PDA-2

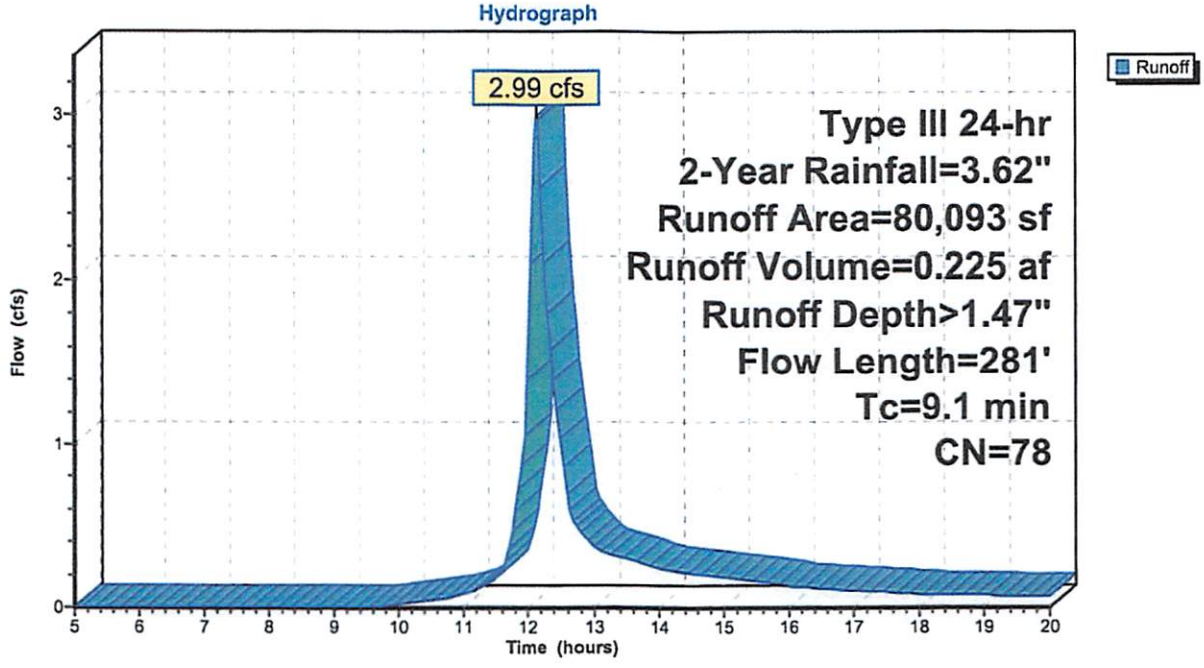
Runoff = 2.99 cfs @ 12.14 hrs, Volume= 0.225 af, Depth> 1.47"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type III 24-hr 2-Year Rainfall=3.62"

Area (sf)	CN	Description
3,700	49	Pasture/grassland/range, Fair, HSG A
2,809	36	Woods, Fair, HSG A
34,145	84	Pasture/grassland/range, Fair, HSG D
39,439	79	Woods, Fair, HSG D
80,093	78	Weighted Average
80,093		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
7.2	110	0.1200	0.26		**Sheet Flow, A-B** Grass: Dense n= 0.240 P2= 3.52"
0.5	67	0.0909	2.11		**Shallow Concentrated Flow, B-C** Short Grass Pasture Kv= 7.0 fps
1.4	104	0.0576	1.20		**Shallow Concentrated Flow, C-D** Woodland Kv= 5.0 fps
9.1	281	Total			

Subcatchment PDA-2: PDA-2



Summary for Pond B-1: B-1

Inflow Area = 4.928 ac, 0.00% Impervious, Inflow Depth > 0.55" for 2-Year event
Inflow = 1.84 cfs @ 12.35 hrs, Volume= 0.226 af
Outflow = 0.52 cfs @ 13.15 hrs, Volume= 0.225 af, Atten= 72%, Lag= 47.9 min
Discarded = 0.52 cfs @ 13.15 hrs, Volume= 0.225 af
Primary = 0.00 cfs @ 5.00 hrs, Volume= 0.000 af

Routing by Stor-Ind method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Peak Elev= 628.59' @ 13.15 hrs Surf.Area= 4,511 sf Storage= 2,511 cf

Plug-Flow detention time= 44.1 min calculated for 0.225 af (99% of inflow)
Center-of-Mass det. time= 42.6 min (898.8 - 856.2)

Volume	Invert	Avail.Storage	Storage Description
#1	628.00'	23,269 cf	**Custom Stage Data (Prismatic)**Listed below (Recalc)

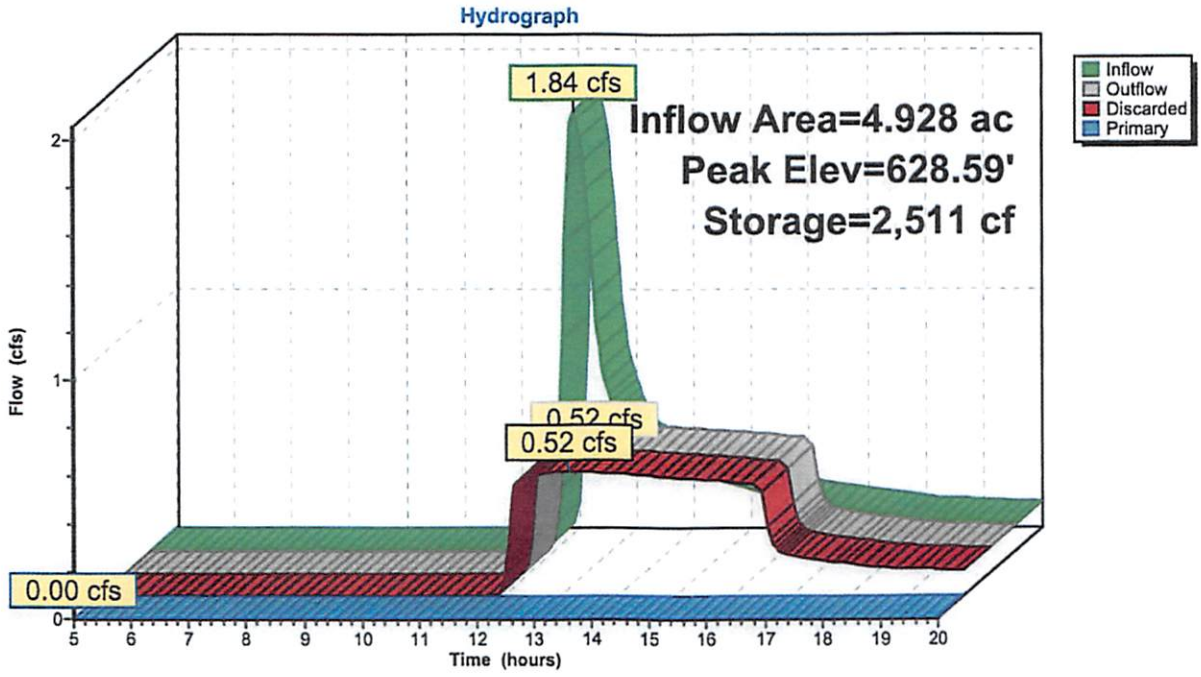
Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
628.00	4,006	0	0
629.00	4,862	4,434	4,434
630.00	5,775	5,319	9,753
631.00	6,744	6,260	16,012
632.00	7,770	7,257	23,269

Device	Routing	Invert	Outlet Devices
#1	Discarded	628.00'	**5.000 in/hr Exfiltration over Surface area**
#2	Primary	631.50'	**15.0' long x 35.0' 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) 2.68 2.70 2.70 2.64 2.63 2.64 2.64 2.63

Discarded OutFlow Max=0.52 cfs @ 13.15 hrs HW=628.59' (Free Discharge)
↑**1=Exfiltration** (Exfiltration Controls 0.52 cfs)

Primary OutFlow Max=0.00 cfs @ 5.00 hrs HW=628.00' (Free Discharge)
↑**2=Broad-Crested Rectangular Weir** (Controls 0.00 cfs)

Pond B-1: B-1


Hydrograph
1.84 cfs
Inflow Area=4.928 ac
Peak Elev=628.59'
Storage=2,511 cf
0.52 cfs
0.52 cfs
0.00 cfs
Inflow
Outflow
Discarded
Primary
Flow (cfs)
0
1
2
5
6
7
8
9
10
11
12
13
14
15
16
17
18
19
20
Time (hours)

Summary for Pond B-2: B-2

Inflow Area = 1.540 ac, 0.41% Impervious, Inflow Depth > 0.59" for 2-Year event
Inflow = 0.65 cfs @ 12.33 hrs, Volume= 0.076 af
Outflow = 0.24 cfs @ 12.87 hrs, Volume= 0.076 af, Atten= 63%, Lag= 32.7 min
Discarded = 0.24 cfs @ 12.87 hrs, Volume= 0.076 af
Primary = 0.00 cfs @ 5.00 hrs, Volume= 0.000 af

Routing by Stor-Ind method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Peak Elev= 635.35' @ 12.87 hrs Surf.Area= 2,075 sf Storage= 682 cf

Plug-Flow detention time= 21.2 min calculated for 0.076 af (100% of inflow)
Center-of-Mass det. time= 20.3 min (872.7 - 852.4)

Volume	Invert	Avail.Storage	Storage Description
#1	635.00'	8,588 cf	**Custom Stage Data (Prismatic)**Listed below (Recalc)

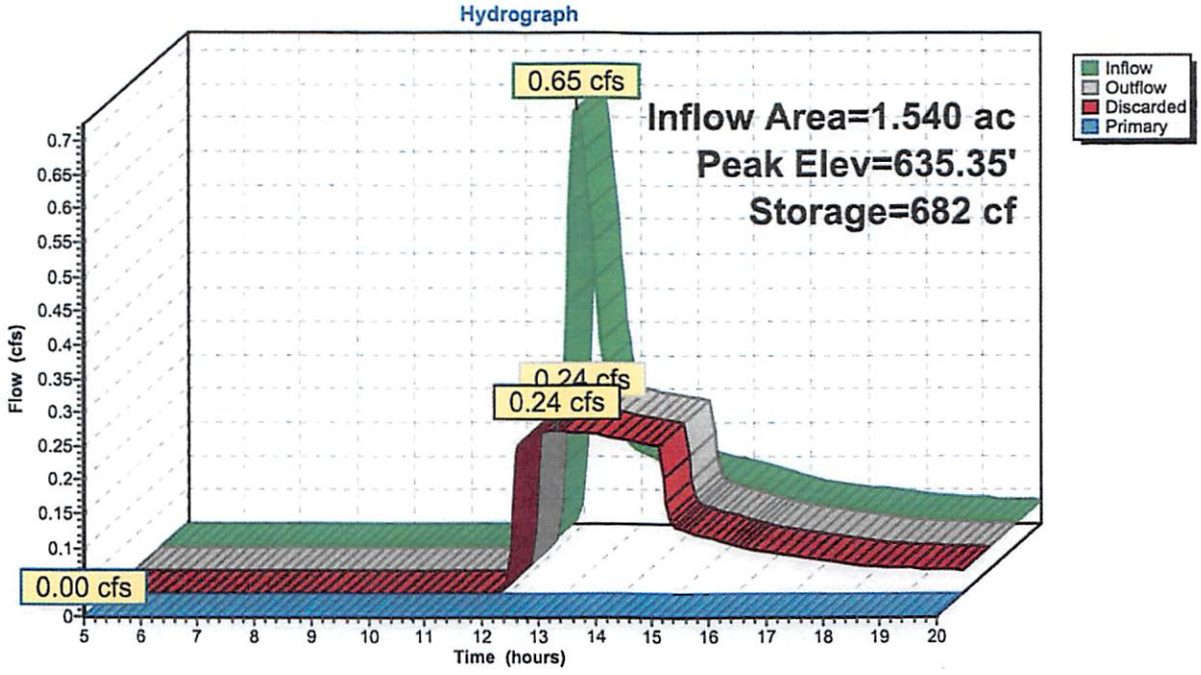
Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
635.00	1,852	0	0
636.00	2,494	2,173	2,173
637.00	3,193	2,844	5,017
638.00	3,949	3,571	8,588

Device	Routing	Invert	Outlet Devices
#1	Discarded	635.00'	**5.000 in/hr Exfiltration over Surface area**
#2	Primary	637.50'	**15.0' long x 10.0' 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) 2.49 2.56 2.70 2.69 2.68 2.69 2.67 2.64

Discarded OutFlow Max=0.24 cfs @ 12.87 hrs HW=635.35' (Free Discharge)
↑**1=Exfiltration** (Exfiltration Controls 0.24 cfs)

Primary OutFlow Max=0.00 cfs @ 5.00 hrs HW=635.00' (Free Discharge)
↑**2=Broad-Crested Rectangular Weir** (Controls 0.00 cfs)

Pond B-2: B-2

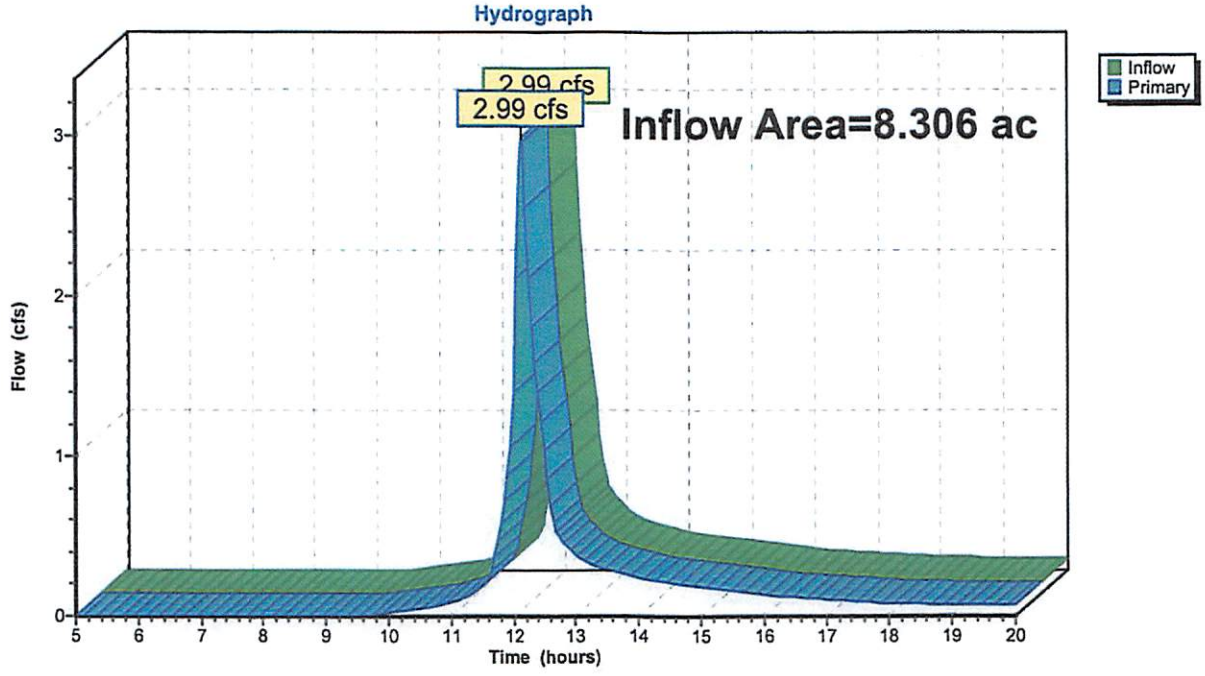

Hydrograph
0.65 cfs
Inflow Area=1.540 ac
Peak Elev=635.35'
Storage=682 cf
0.24 cfs
0.24 cfs
0.00 cfs
Inflow
Outflow
Discarded
Primary
Flow (cfs)
0
0.1
0.15
0.2
0.25
0.3
0.35
0.4
0.45
0.5
0.55
0.6
0.65
0.7
5
6
7
8
9
10
11
12
13
14
15
16
17
18
19
20
Time (hours)

Summary for Link PR: AP-1

Inflow Area = 8.306 ac, 0.08% Impervious, Inflow Depth > 0.32" for 2-Year event
Inflow = 2.99 cfs @ 12.14 hrs, Volume= 0.225 af
Primary = 2.99 cfs @ 12.14 hrs, Volume= 0.225 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs

Link PR: AP-1



Time span=5.00-20.00 hrs, dt=0.05 hrs, 301 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Subcatchment PDA-1A: PDA-1A Runoff Area=214,655 sf 0.00% Impervious Runoff Depth>2.56"
Flow Length=900' Tc=19.7 min CN=61 Runoff=10.62 cfs 1.050 af

Subcatchment PDA-1B: PDA-1B Runoff Area=67,070 sf 0.41% Impervious Runoff Depth>2.65"
Flow Length=683' Tc=18.8 min CN=62 Runoff=3.53 cfs 0.341 af

Subcatchment PDA-2: PDA-2 Runoff Area=80,093 sf 0.00% Impervious Runoff Depth>4.31"
Flow Length=281' Tc=9.1 min CN=78 Runoff=8.69 cfs 0.660 af

Pond B-1: B-1 Peak Elev=631.63' Storage=20,430 cf Inflow=10.62 cfs 1.050 af
Discarded=0.85 cfs 0.576 af Primary=1.80 cfs 0.139 af Outflow=2.65 cfs 0.715 af

Pond B-2: B-2 Peak Elev=637.52' Storage=6,783 cf Inflow=3.53 cfs 0.341 af
Discarded=0.42 cfs 0.266 af Primary=0.12 cfs 0.006 af Outflow=0.53 cfs 0.272 af

Link PR: AP-1 Inflow=8.69 cfs 0.805 af
Primary=8.69 cfs 0.805 af

Total Runoff Area = 8.306 ac Runoff Volume = 2.050 af Average Runoff Depth = 2.96"
99.92% Pervious = 8.300 ac 0.08% Impervious = 0.006 ac

Summary for Subcatchment PDA-1A: PDA-1A

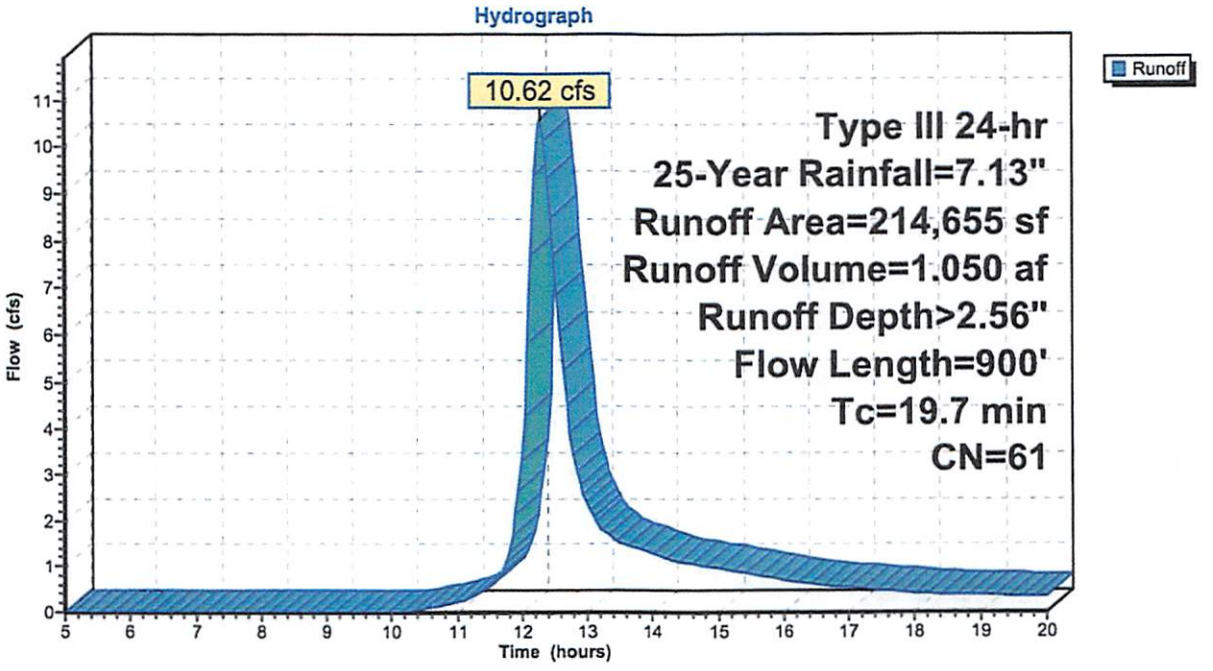
Runoff = 10.62 cfs @ 12.29 hrs, Volume= 1.050 af, Depth> 2.56"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type III 24-hr 25-Year Rainfall=7.13"

Area (sf)	CN	Description
182,159	58	Meadow, non-grazed, HSG B
32,496	78	Meadow, non-grazed, HSG D
214,655	61	Weighted Average
214,655		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
11.6	100	0.0300	0.14		**Sheet Flow, A-B** Grass: Dense n= 0.240 P2= 3.52"
6.8	557	0.0382	1.37		**Shallow Concentrated Flow, B-C** Short Grass Pasture Kv= 7.0 fps
1.3	243	0.0453	3.19		**Shallow Concentrated Flow, C-D** Grassed Waterway Kv= 15.0 fps
19.7	900	Total			

Subcatchment PDA-1A: PDA-1A



Summary for Subcatchment PDA-1B: PDA-1B

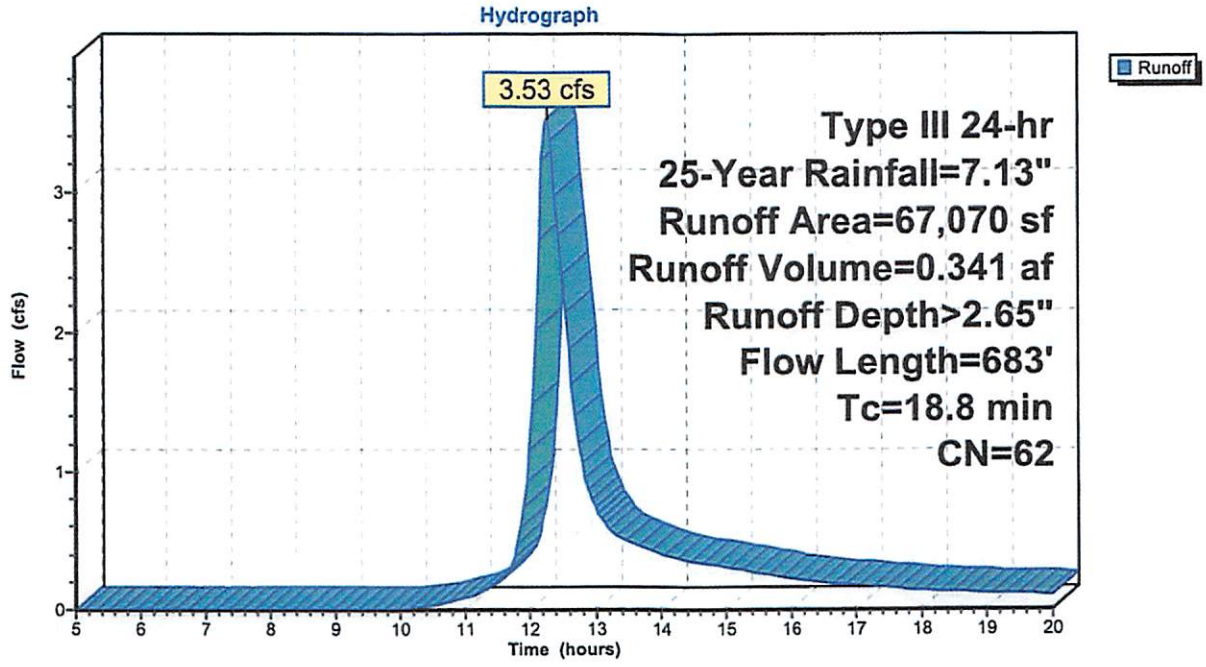
Runoff = 3.53 cfs @ 12.27 hrs, Volume= 0.341 af, Depth> 2.65"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type III 24-hr 25-Year Rainfall=7.13"

Area (sf)	CN	Description
46,506	58	Meadow, non-grazed, HSG B
3,535	36	Woods, Fair, HSG A
15,577	78	Meadow, non-grazed, HSG D
275	98	Paved parking, HSG B
1,177	96	Gravel surface, HSG B
67,070	62	Weighted Average
66,795		99.59% Pervious Area
275		0.41% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
13.6	100	0.0200	0.12		**Sheet Flow, A-B** Grass: Dense n= 0.240 P2= 3.52"
3.9	340	0.0441	1.47		**Shallow Concentrated Flow, B-C** Short Grass Pasture Kv= 7.0 fps
1.3	243	0.0453	3.19		**Shallow Concentrated Flow, C-D** Grassed Waterway Kv= 15.0 fps
18.8	683	Total			

Subcatchment PDA-1B: PDA-1B



Summary for Subcatchment PDA-2: PDA-2

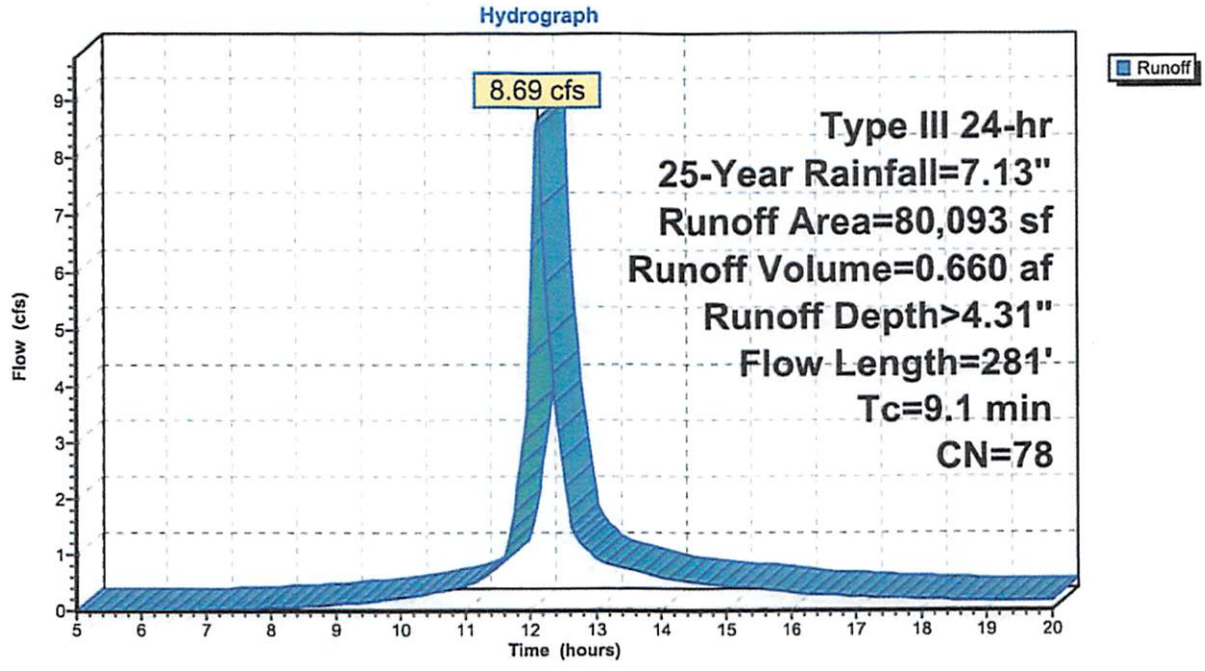
Runoff = 8.69 cfs @ 12.13 hrs, Volume= 0.660 af, Depth> 4.31"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type III 24-hr 25-Year Rainfall=7.13"

Area (sf)	CN	Description
3,700	49	Pasture/grassland/range, Fair, HSG A
2,809	36	Woods, Fair, HSG A
34,145	84	Pasture/grassland/range, Fair, HSG D
39,439	79	Woods, Fair, HSG D
80,093	78	Weighted Average
80,093		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
7.2	110	0.1200	0.26		**Sheet Flow, A-B** Grass: Dense n= 0.240 P2= 3.52"
0.5	67	0.0909	2.11		**Shallow Concentrated Flow, B-C** Short Grass Pasture Kv= 7.0 fps
1.4	104	0.0576	1.20		**Shallow Concentrated Flow, C-D** Woodland Kv= 5.0 fps
9.1	281	Total			

Subcatchment PDA-2: PDA-2



Summary for Pond B-1: B-1

Inflow Area = 4.928 ac, 0.00% Impervious, Inflow Depth > 2.56" for 25-Year event
Inflow = 10.62 cfs @ 12.29 hrs, Volume= 1.050 af
Outflow = 2.65 cfs @ 12.94 hrs, Volume= 0.715 af, Atten= 75%, Lag= 39.0 min
Discarded = 0.85 cfs @ 12.94 hrs, Volume= 0.576 af
Primary = 1.80 cfs @ 12.94 hrs, Volume= 0.139 af

Routing by Stor-Ind method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Peak Elev= 631.63' @ 12.94 hrs Surf.Area= 7,386 sf Storage= 20,430 cf

Plug-Flow detention time= 167.5 min calculated for 0.715 af (68% of inflow)
Center-of-Mass det. time= 97.1 min (916.9 - 819.9)

Volume	Invert	Avail.Storage	Storage Description
#1	628.00'	23,269 cf	**Custom Stage Data (Prismatic)**Listed below (Recalc)

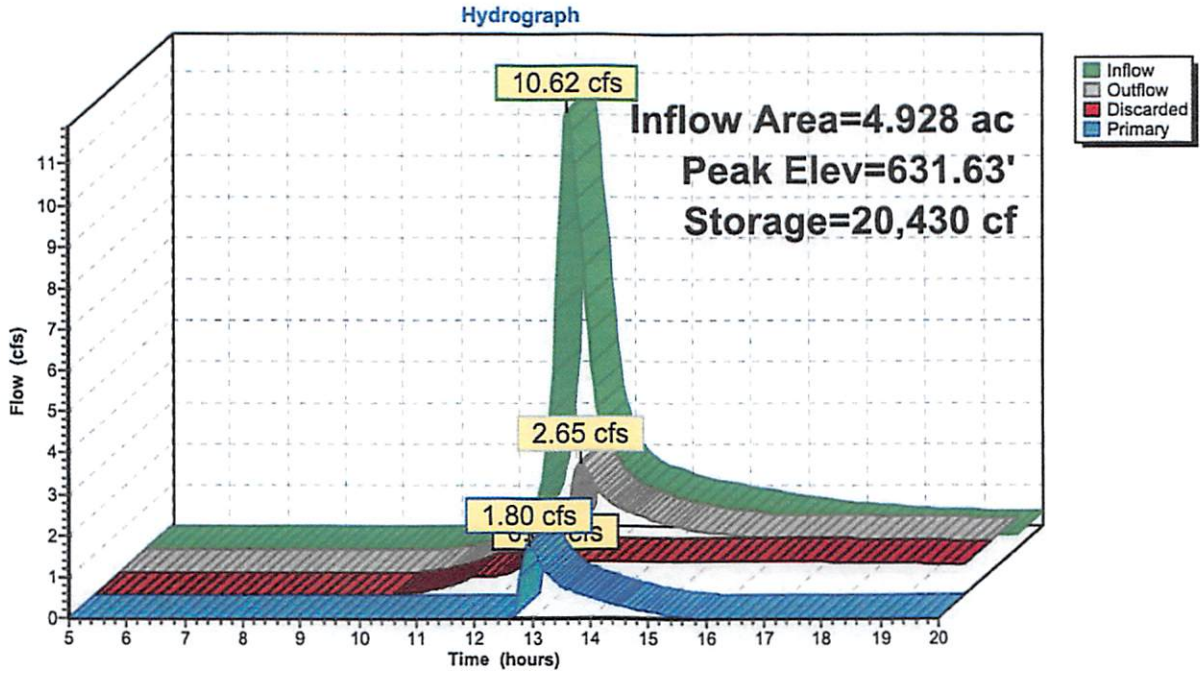
Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
628.00	4,006	0	0
629.00	4,862	4,434	4,434
630.00	5,775	5,319	9,753
631.00	6,744	6,260	16,012
632.00	7,770	7,257	23,269

Device	Routing	Invert	Outlet Devices
#1	Discarded	628.00'	**5.000 in/hr Exfiltration over Surface area**
#2	Primary	631.50'	**15.0' long x 35.0' 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) 2.68 2.70 2.70 2.64 2.63 2.64 2.64 2.63

Discarded OutFlow Max=0.85 cfs @ 12.94 hrs HW=631.62' (Free Discharge)
1=Exfiltration (Exfiltration Controls 0.85 cfs)

Primary OutFlow Max=1.78 cfs @ 12.94 hrs HW=631.62' (Free Discharge)
2=Broad-Crested Rectangular Weir (Weir Controls 1.78 cfs @ 0.95 fps)

Pond B-1: B-1


Hydrograph
10.62 cfs
Inflow Area=4.928 ac
Peak Elev=631.63'
Storage=20,430 cf
2.65 cfs
1.80 cfs
Inflow
Outflow
Discarded
Primary
Flow (cfs)
Time (hours)
0
1
2
3
4
5
6
7
8
9
10
11
5
6
7
8
9
10
11
12
13
14
15
16
17
18
19
20

Summary for Pond B-2: B-2

Inflow Area = 1.540 ac, 0.41% Impervious, Inflow Depth > 2.65" for 25-Year event
Inflow = 3.53 cfs @ 12.27 hrs, Volume= 0.341 af
Outflow = 0.53 cfs @ 13.34 hrs, Volume= 0.272 af, Atten= 85%, Lag= 64.0 min
Discarded = 0.42 cfs @ 13.34 hrs, Volume= 0.266 af
Primary = 0.12 cfs @ 13.34 hrs, Volume= 0.006 af

Routing by Stor-Ind method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Peak Elev= 637.52' @ 13.34 hrs Surf.Area= 3,587 sf Storage= 6,783 cf

Plug-Flow detention time= 170.5 min calculated for 0.272 af (80% of inflow)
Center-of-Mass det. time= 117.3 min (934.8 - 817.4)

Volume	Invert	Avail.Storage	Storage Description
#1	635.00'	8,588 cf	**Custom Stage Data (Prismatic)**Listed below (Recalc)

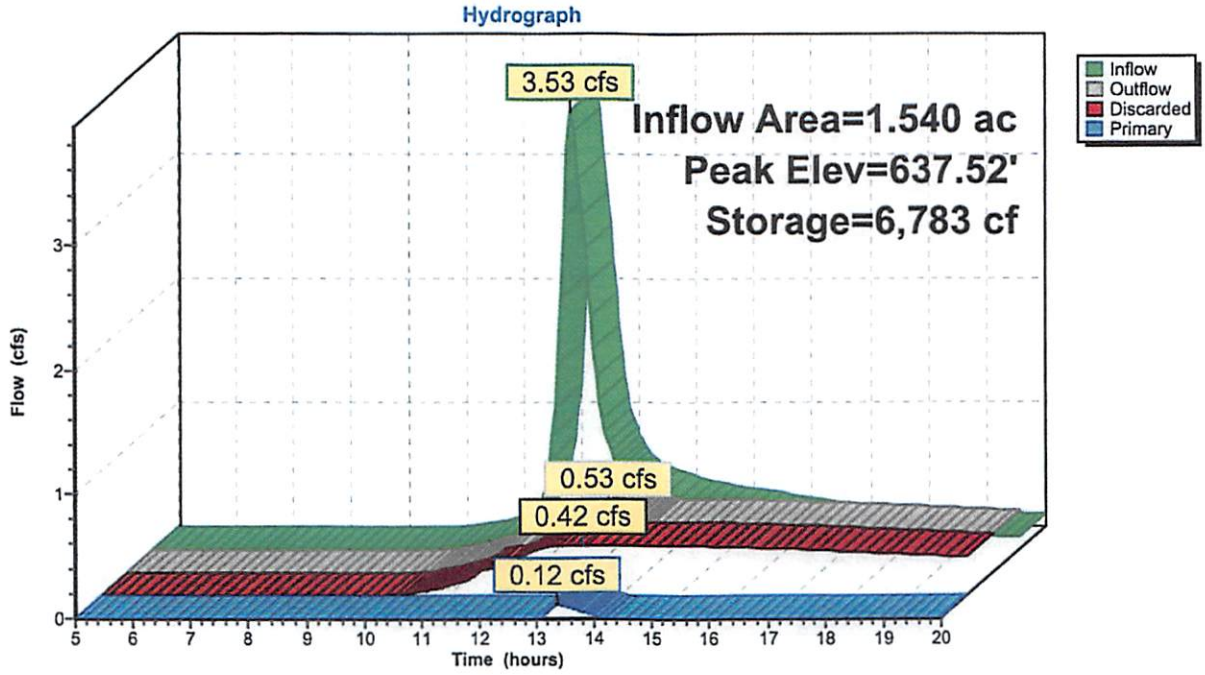
Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
635.00	1,852	0	0
636.00	2,494	2,173	2,173
637.00	3,193	2,844	5,017
638.00	3,949	3,571	8,588

Device	Routing	Invert	Outlet Devices
#1	Discarded	635.00'	**5.000 in/hr Exfiltration over Surface area**
#2	Primary	637.50'	**15.0' long x 10.0' 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) 2.49 2.56 2.70 2.69 2.68 2.69 2.67 2.64

Discarded OutFlow Max=0.42 cfs @ 13.34 hrs HW=637.52' (Free Discharge)
↑**1=Exfiltration** (Exfiltration Controls 0.42 cfs)

Primary OutFlow Max=0.11 cfs @ 13.34 hrs HW=637.52' (Free Discharge)
↑**2=Broad-Crested Rectangular Weir** (Weir Controls 0.11 cfs @ 0.36 fps)

Pond B-2: B-2

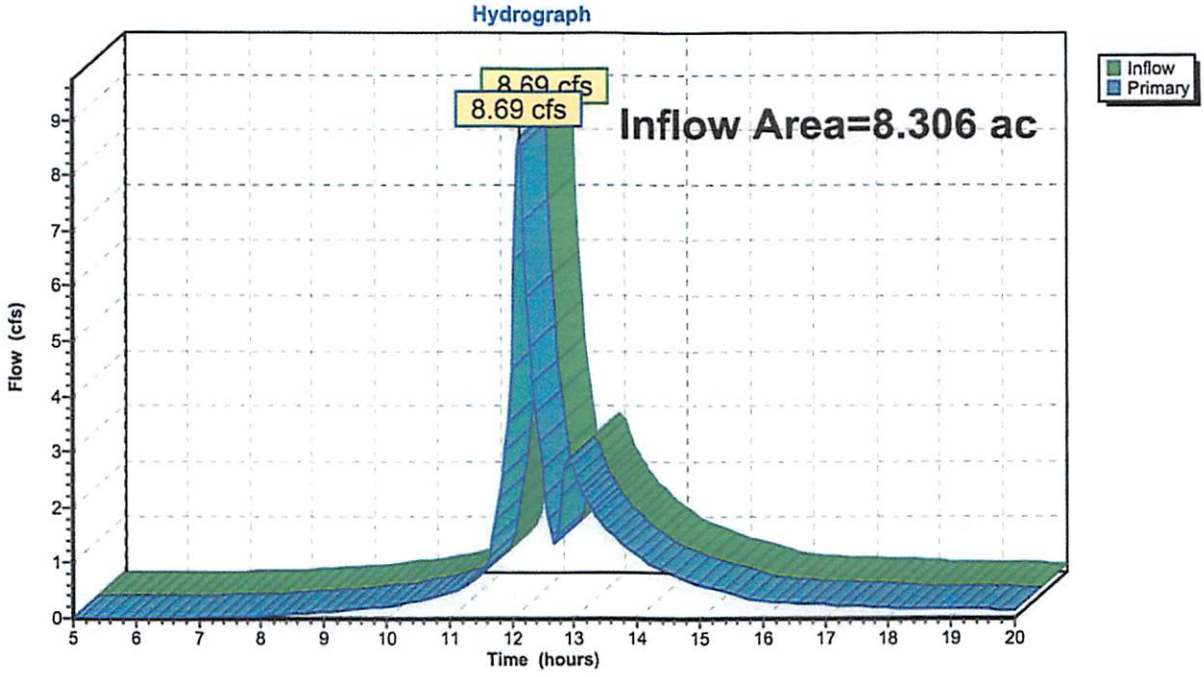

Hydrograph
3.53 cfs
Inflow Area=1.540 ac
Peak Elev=637.52'
Storage=6,783 cf
0.53 cfs
0.42 cfs
0.12 cfs
Inflow
Outflow
Discarded
Primary
Flow (cfs)
0
1
2
3
5
6
7
8
9
10
11
12
13
14
15
16
17
18
19
20
Time (hours)

Summary for Link PR: AP-1

Inflow Area = 8.306 ac, 0.08% Impervious, Inflow Depth > 1.16" for 25-Year event
Inflow = 8.69 cfs @ 12.13 hrs, Volume= 0.805 af
Primary = 8.69 cfs @ 12.13 hrs, Volume= 0.805 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs

Link PR: AP-1



Time span=5.00-20.00 hrs, dt=0.05 hrs, 301 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Subcatchment PDA-1A: PDA-1A Runoff Area=214,655 sf 0.00% Impervious Runoff Depth>3.25"
Flow Length=900' Tc=19.7 min CN=61 Runoff=13.60 cfs 1.334 af

Subcatchment PDA-1B: PDA-1B Runoff Area=67,070 sf 0.41% Impervious Runoff Depth>3.36"
Flow Length=683' Tc=18.8 min CN=62 Runoff=4.49 cfs 0.431 af

Subcatchment PDA-2: PDA-2 Runoff Area=80,093 sf 0.00% Impervious Runoff Depth>5.17"
Flow Length=281' Tc=9.1 min CN=78 Runoff=10.36 cfs 0.792 af

Pond B-1: B-1 Peak Elev=631.79' Storage=21,682 cf Inflow=13.60 cfs 1.334 af
Discarded=0.87 cfs 0.602 af Primary=6.40 cfs 0.367 af Outflow=7.28 cfs 0.969 af

Pond B-2: B-2 Peak Elev=637.62' Storage=7,160 cf Inflow=4.49 cfs 0.431 af
Discarded=0.42 cfs 0.281 af Primary=1.66 cfs 0.068 af Outflow=2.08 cfs 0.348 af

Link PR: AP-1 Inflow=10.36 cfs 1.226 af
Primary=10.36 cfs 1.226 af

Total Runoff Area = 8.306 ac Runoff Volume = 2.557 af Average Runoff Depth = 3.69"
99.92% Pervious = 8.300 ac 0.08% Impervious = 0.006 ac

Summary for Subcatchment PDA-1A: PDA-1A

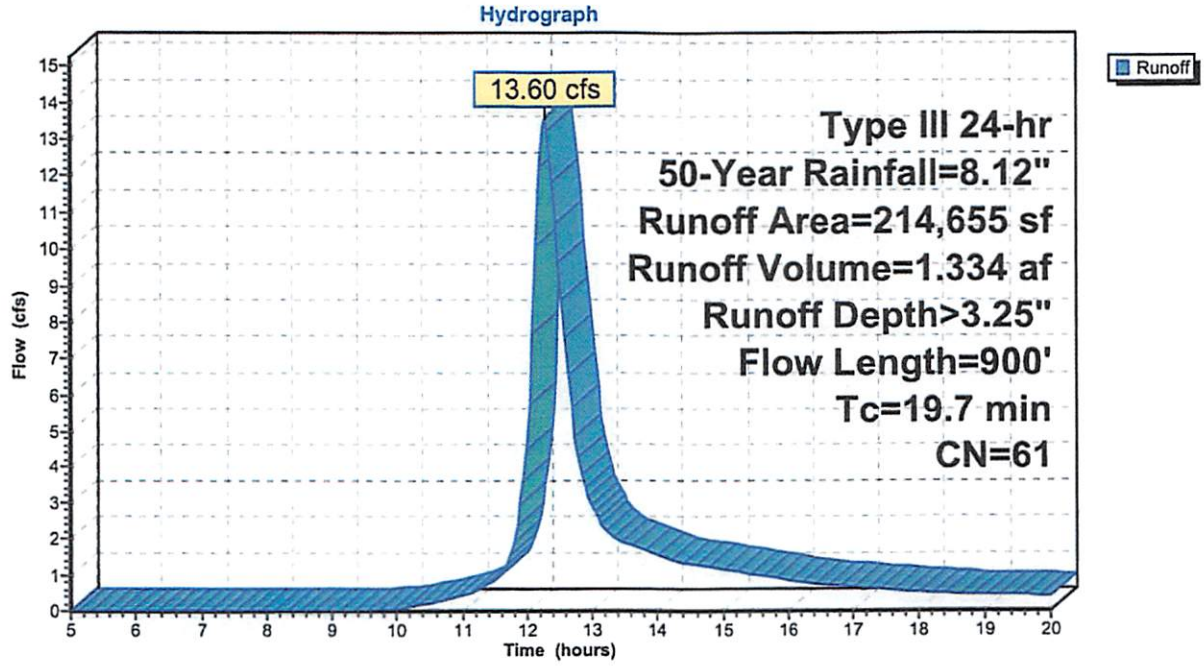
Runoff = 13.60 cfs @ 12.28 hrs, Volume= 1.334 af, Depth> 3.25"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type III 24-hr 50-Year Rainfall=8.12"

Area (sf)	CN	Description
182,159	58	Meadow, non-grazed, HSG B
32,496	78	Meadow, non-grazed, HSG D
214,655	61	Weighted Average
214,655		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
11.6	100	0.0300	0.14		**Sheet Flow, A-B** Grass: Dense n= 0.240 P2= 3.52"
6.8	557	0.0382	1.37		**Shallow Concentrated Flow, B-C** Short Grass Pasture Kv= 7.0 fps
1.3	243	0.0453	3.19		**Shallow Concentrated Flow, C-D** Grassed Waterway Kv= 15.0 fps
19.7	900	Total			

Subcatchment PDA-1A: PDA-1A



Summary for Subcatchment PDA-1B: PDA-1B

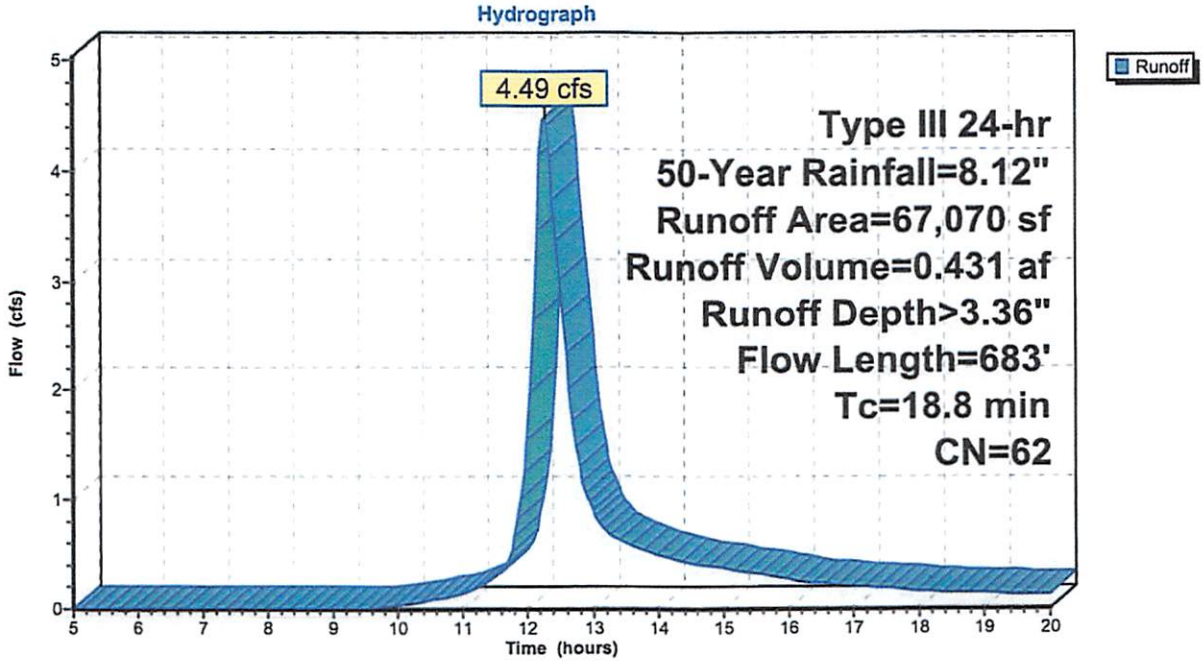
Runoff = 4.49 cfs @ 12.27 hrs, Volume= 0.431 af, Depth> 3.36"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type III 24-hr 50-Year Rainfall=8.12"

Area (sf)	CN	Description
46,506	58	Meadow, non-grazed, HSG B
3,535	36	Woods, Fair, HSG A
15,577	78	Meadow, non-grazed, HSG D
275	98	Paved parking, HSG B
1,177	96	Gravel surface, HSG B
67,070	62	Weighted Average
66,795		99.59% Pervious Area
275		0.41% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
13.6	100	0.0200	0.12		**Sheet Flow, A-B** Grass: Dense n= 0.240 P2= 3.52"
3.9	340	0.0441	1.47		**Shallow Concentrated Flow, B-C** Short Grass Pasture Kv= 7.0 fps
1.3	243	0.0453	3.19		**Shallow Concentrated Flow, C-D** Grassed Waterway Kv= 15.0 fps
18.8	683	Total			

Subcatchment PDA-1B: PDA-1B



Summary for Subcatchment PDA-2: PDA-2

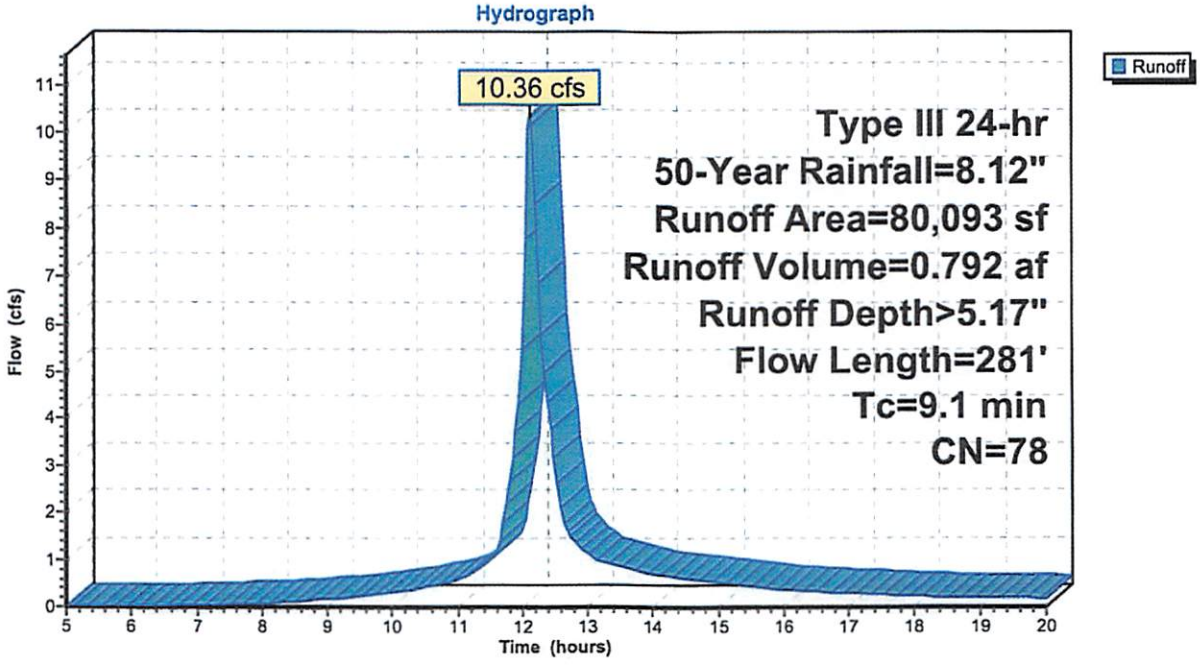
Runoff = 10.36 cfs @ 12.13 hrs, Volume= 0.792 af, Depth> 5.17"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type III 24-hr 50-Year Rainfall=8.12"

Area (sf)	CN	Description
3,700	49	Pasture/grassland/range, Fair, HSG A
2,809	36	Woods, Fair, HSG A
34,145	84	Pasture/grassland/range, Fair, HSG D
39,439	79	Woods, Fair, HSG D
80,093	78	Weighted Average
80,093		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
7.2	110	0.1200	0.26		**Sheet Flow, A-B** Grass: Dense n= 0.240 P2= 3.52"
0.5	67	0.0909	2.11		**Shallow Concentrated Flow, B-C** Short Grass Pasture Kv= 7.0 fps
1.4	104	0.0576	1.20		**Shallow Concentrated Flow, C-D** Woodland Kv= 5.0 fps
9.1	281	Total			

Subcatchment PDA-2: PDA-2



Summary for Pond B-1: B-1

Inflow Area = 4.928 ac, 0.00% Impervious, Inflow Depth > 3.25" for 50-Year event
Inflow = 13.60 cfs @ 12.28 hrs, Volume= 1.334 af
Outflow = 7.28 cfs @ 12.62 hrs, Volume= 0.969 af, Atten= 47%, Lag= 20.4 min
Discarded = 0.87 cfs @ 12.62 hrs, Volume= 0.602 af
Primary = 6.40 cfs @ 12.62 hrs, Volume= 0.367 af

Routing by Stor-Ind method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Peak Elev= 631.79' @ 12.62 hrs Surf.Area= 7,558 sf Storage= 21,682 cf

Plug-Flow detention time= 130.8 min calculated for 0.966 af (72% of inflow)
Center-of-Mass det. time= 67.5 min (882.1 - 814.6)

Volume	Invert	Avail.Storage	Storage Description
#1	628.00'	23,269 cf	**Custom Stage Data (Prismatic)**Listed below (Recalc)

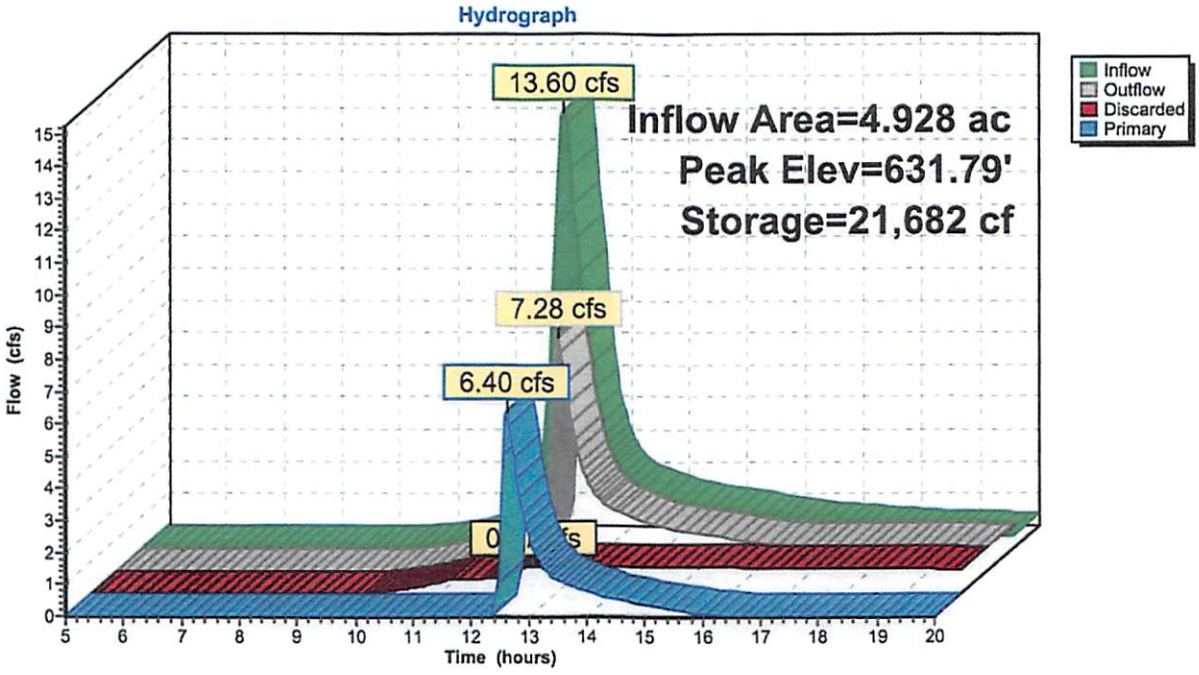
Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
628.00	4,006	0	0
629.00	4,862	4,434	4,434
630.00	5,775	5,319	9,753
631.00	6,744	6,260	16,012
632.00	7,770	7,257	23,269

Device	Routing	Invert	Outlet Devices
#1	Discarded	628.00'	**5.000 in/hr Exfiltration over Surface area**
#2	Primary	631.50'	**15.0' long x 35.0' 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) 2.68 2.70 2.70 2.64 2.63 2.64 2.64 2.63

Discarded OutFlow Max=0.87 cfs @ 12.62 hrs HW=631.79' (Free Discharge)
↑**1=Exfiltration** (Exfiltration Controls 0.87 cfs)

Primary OutFlow Max=6.24 cfs @ 12.62 hrs HW=631.79' (Free Discharge)
↑**2=Broad-Crested Rectangular Weir** (Weir Controls 6.24 cfs @ 1.44 fps)

Pond B-1: B-1


Hydrograph
13.60 cfs
Inflow Area=4.928 ac
Peak Elev=631.79'
Storage=21,682 cf
7.28 cfs
6.40 cfs
Inflow
Outflow
Discarded
Primary
Flow (cfs)
Time (hours)

Summary for Pond B-2: B-2

Inflow Area = 1.540 ac, 0.41% Impervious, Inflow Depth > 3.36" for 50-Year event
Inflow = 4.49 cfs @ 12.27 hrs, Volume= 0.431 af
Outflow = 2.08 cfs @ 12.65 hrs, Volume= 0.348 af, Atten= 54%, Lag= 23.2 min
Discarded = 0.42 cfs @ 12.65 hrs, Volume= 0.281 af
Primary = 1.66 cfs @ 12.65 hrs, Volume= 0.068 af

Routing by Stor-Ind method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Peak Elev= 637.62' @ 12.65 hrs Surf.Area= 3,665 sf Storage= 7,160 cf

Plug-Flow detention time= 140.1 min calculated for 0.347 af (81% of inflow)
Center-of-Mass det. time= 89.5 min (901.8 - 812.3)

Volume	Invert	Avail.Storage	Storage Description
#1	635.00'	8,588 cf	**Custom Stage Data (Prismatic)**Listed below (Recalc)

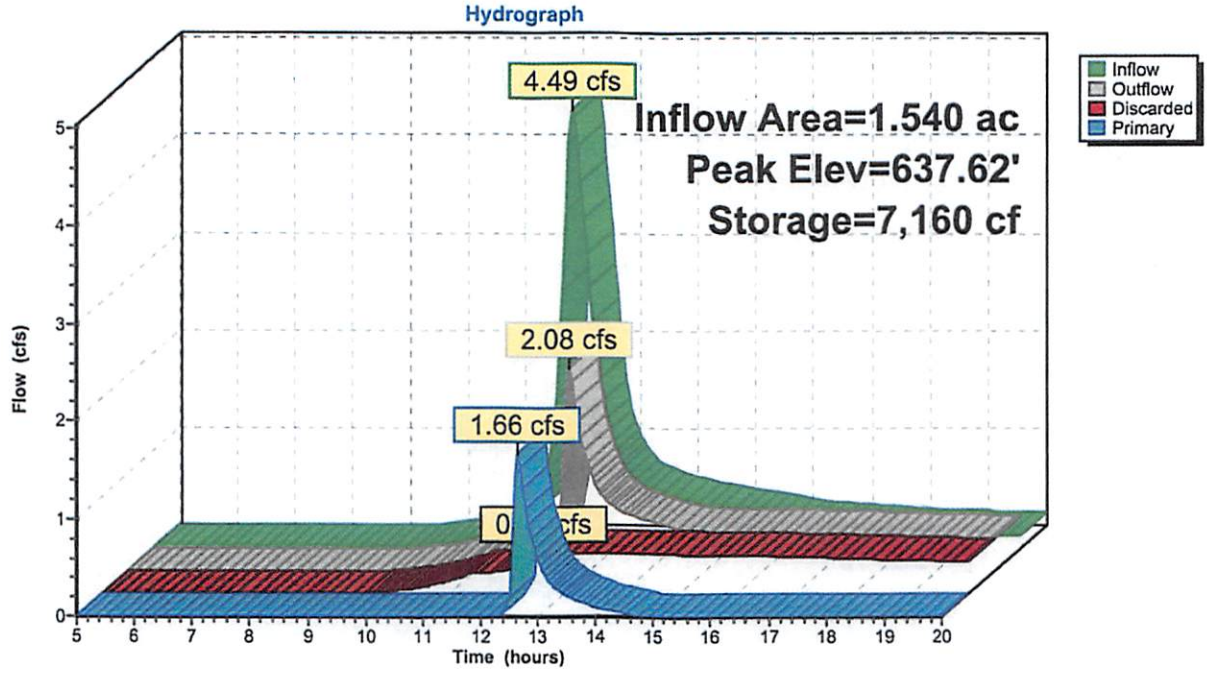
Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
635.00	1,852	0	0
636.00	2,494	2,173	2,173
637.00	3,193	2,844	5,017
638.00	3,949	3,571	8,588

Device	Routing	Invert	Outlet Devices
#1	Discarded	635.00'	**5.000 in/hr Exfiltration over Surface area**
#2	Primary	637.50'	**15.0' long x 10.0' 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) 2.49 2.56 2.70 2.69 2.68 2.69 2.67 2.64

Discarded OutFlow Max=0.42 cfs @ 12.65 hrs HW=637.62' (Free Discharge)
↑**1=Exfiltration** (Exfiltration Controls 0.42 cfs)

Primary OutFlow Max=1.64 cfs @ 12.65 hrs HW=637.62' (Free Discharge)
↑**2=Broad-Crested Rectangular Weir** (Weir Controls 1.64 cfs @ 0.88 fps)

Pond B-2: B-2

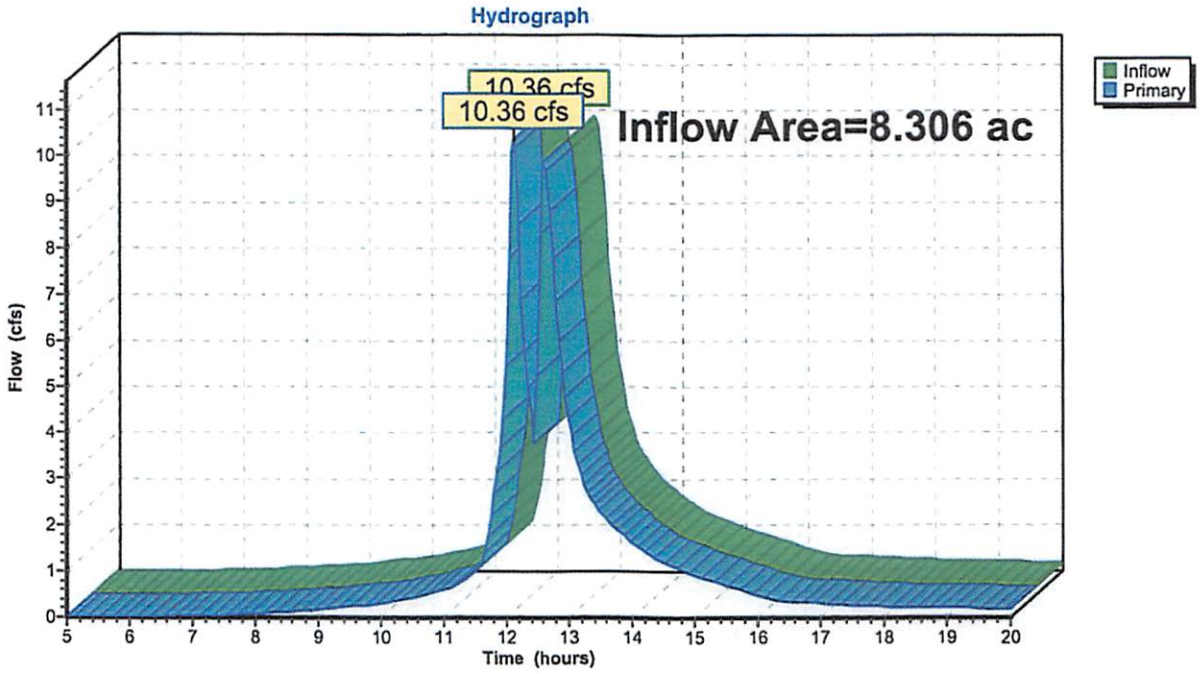

Hydrograph
4.49 cfs
Inflow Area=1.540 ac
Peak Elev=637.62'
Storage=7,160 cf
2.08 cfs
1.66 cfs
Inflow
Outflow
Discarded
Primary
Flow (cfs)
Time (hours)
0
1
2
3
4
5
5
6
7
8
9
10
11
12
13
14
15
16
17
18
19
20

Summary for Link PR: AP-1

Inflow Area = 8.306 ac, 0.08% Impervious, Inflow Depth > 1.77" for 50-Year event
Inflow = 10.36 cfs @ 12.13 hrs, Volume= 1.226 af
Primary = 10.36 cfs @ 12.13 hrs, Volume= 1.226 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs

Link PR: AP-1



Time span=5.00-20.00 hrs, dt=0.05 hrs, 301 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Subcatchment PDA-1A: PDA-1A Runoff Area=214,655 sf 0.00% Impervious Runoff Depth>4.06"
Flow Length=900' Tc=19.7 min CN=61 Runoff=17.06 cfs 1.666 af

Subcatchment PDA-1B: PDA-1B Runoff Area=67,070 sf 0.41% Impervious Runoff Depth>4.18"
Flow Length=683' Tc=18.8 min CN=62 Runoff=5.61 cfs 0.536 af

Subcatchment PDA-2: PDA-2 Runoff Area=80,093 sf 0.00% Impervious Runoff Depth>6.14"
Flow Length=281' Tc=9.1 min CN=78 Runoff=12.22 cfs 0.941 af

Pond B-1: B-1 Peak Elev=631.93' Storage=22,731 cf Inflow=17.06 cfs 1.666 af
Discarded=0.89 cfs 0.628 af Primary=11.44 cfs 0.646 af Outflow=12.33 cfs 1.274 af

Pond B-2: B-2 Peak Elev=637.70' Storage=7,449 cf Inflow=5.61 cfs 0.536 af
Discarded=0.43 cfs 0.295 af Primary=3.43 cfs 0.147 af Outflow=3.86 cfs 0.441 af

Link PR: AP-1 Inflow=18.76 cfs 1.734 af
Primary=18.76 cfs 1.734 af

Total Runoff Area = 8.306 ac Runoff Volume = 3.144 af Average Runoff Depth = 4.54"
99.92% Pervious = 8.300 ac 0.08% Impervious = 0.006 ac

Summary for Subcatchment PDA-1A: PDA-1A

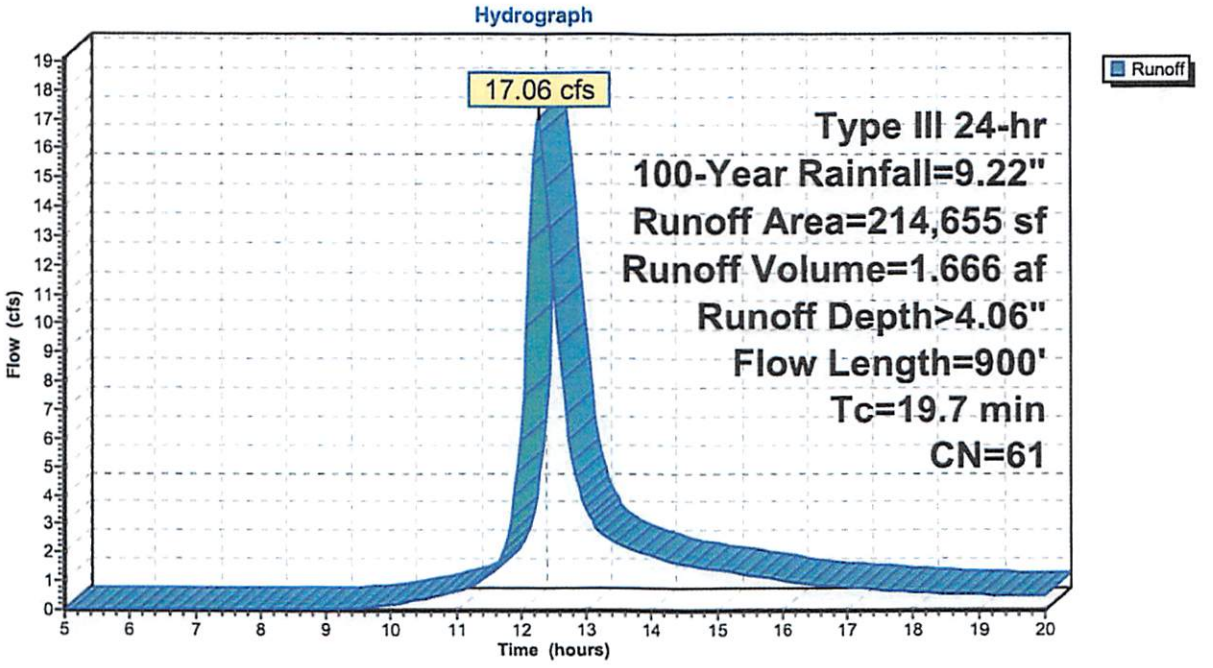
Runoff = 17.06 cfs @ 12.28 hrs, Volume= 1.666 af, Depth> 4.06"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type III 24-hr 100-Year Rainfall=9.22"

Area (sf)	CN	Description
182,159	58	Meadow, non-grazed, HSG B
32,496	78	Meadow, non-grazed, HSG D
214,655	61	Weighted Average
214,655		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
11.6	100	0.0300	0.14		**Sheet Flow, A-B** Grass: Dense n= 0.240 P2= 3.52"
6.8	557	0.0382	1.37		**Shallow Concentrated Flow, B-C** Short Grass Pasture Kv= 7.0 fps
1.3	243	0.0453	3.19		**Shallow Concentrated Flow, C-D** Grassed Waterway Kv= 15.0 fps
19.7	900	Total			

Subcatchment PDA-1A: PDA-1A



Summary for Subcatchment PDA-1B: PDA-1B

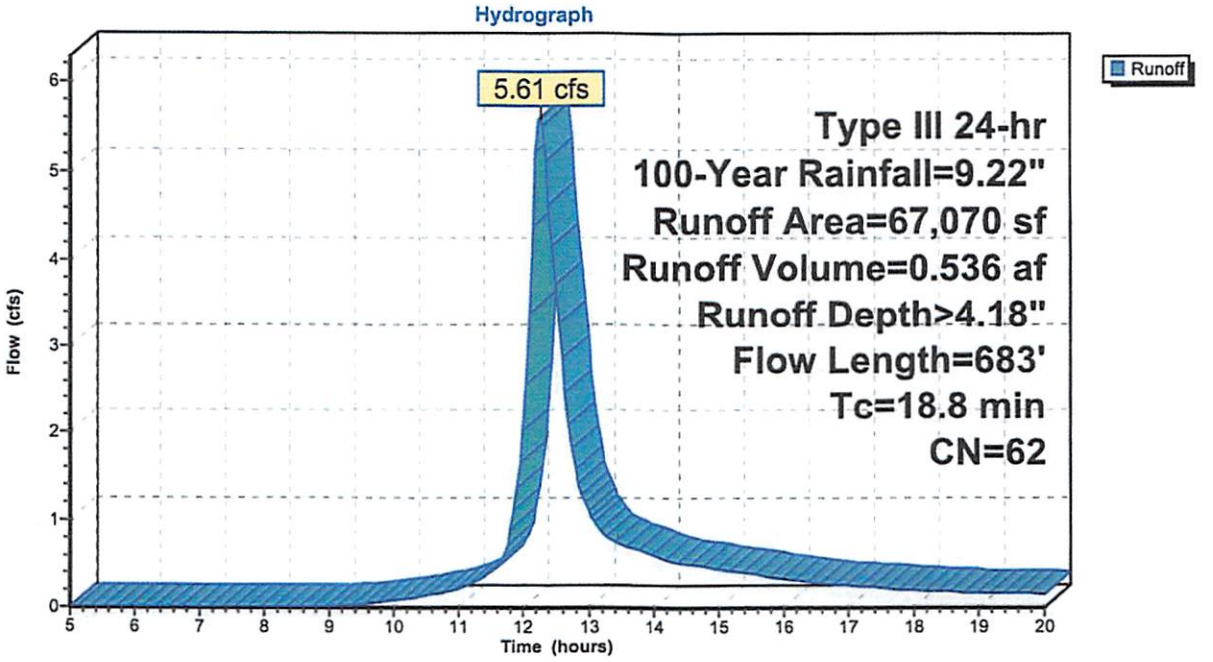
Runoff = 5.61 cfs @ 12.27 hrs, Volume= 0.536 af, Depth> 4.18"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type III 24-hr 100-Year Rainfall=9.22"

Area (sf)	CN	Description
46,506	58	Meadow, non-grazed, HSG B
3,535	36	Woods, Fair, HSG A
15,577	78	Meadow, non-grazed, HSG D
275	98	Paved parking, HSG B
1,177	96	Gravel surface, HSG B
67,070	62	Weighted Average
66,795		99.59% Pervious Area
275		0.41% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
13.6	100	0.0200	0.12		**Sheet Flow, A-B** Grass: Dense n= 0.240 P2= 3.52"
3.9	340	0.0441	1.47		**Shallow Concentrated Flow, B-C** Short Grass Pasture Kv= 7.0 fps
1.3	243	0.0453	3.19		**Shallow Concentrated Flow, C-D** Grassed Waterway Kv= 15.0 fps
18.8	683	Total			

Subcatchment PDA-1B: PDA-1B



Summary for Subcatchment PDA-2: PDA-2

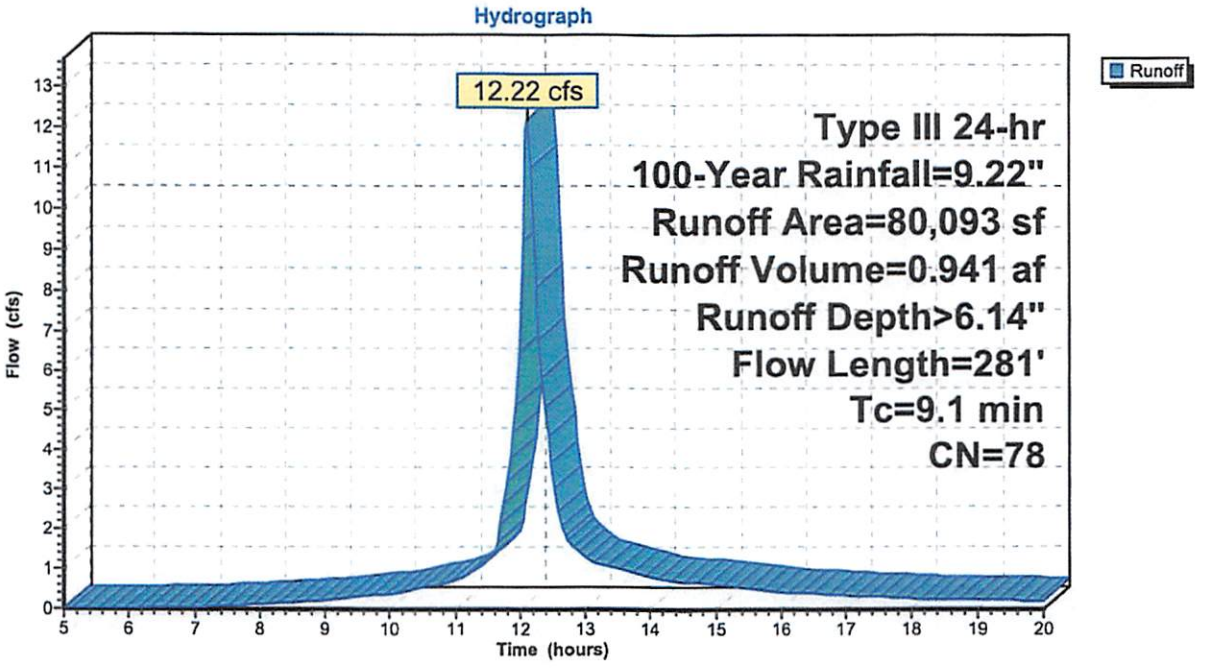
Runoff = 12.22 cfs @ 12.13 hrs, Volume= 0.941 af, Depth> 6.14"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type III 24-hr 100-Year Rainfall=9.22"

Area (sf)	CN	Description
3,700	49	Pasture/grassland/range, Fair, HSG A
2,809	36	Woods, Fair, HSG A
34,145	84	Pasture/grassland/range, Fair, HSG D
39,439	79	Woods, Fair, HSG D
80,093	78	Weighted Average
80,093		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
7.2	110	0.1200	0.26		**Sheet Flow, A-B** Grass: Dense n= 0.240 P2= 3.52"
0.5	67	0.0909	2.11		**Shallow Concentrated Flow, B-C** Short Grass Pasture Kv= 7.0 fps
1.4	104	0.0576	1.20		**Shallow Concentrated Flow, C-D** Woodland Kv= 5.0 fps
9.1	281	Total			

Subcatchment PDA-2: PDA-2



Summary for Pond B-1: B-1

Inflow Area = 4.928 ac, 0.00% Impervious, Inflow Depth > 4.06" for 100-Year event
Inflow = 17.06 cfs @ 12.28 hrs, Volume= 1.666 af
Outflow = 12.33 cfs @ 12.49 hrs, Volume= 1.274 af, Atten= 28%, Lag= 12.9 min
Discarded = 0.89 cfs @ 12.49 hrs, Volume= 0.628 af
Primary = 11.44 cfs @ 12.49 hrs, Volume= 0.646 af

Routing by Stor-Ind method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Peak Elev= 631.93' @ 12.49 hrs Surf.Area= 7,699 sf Storage= 22,731 cf

Plug-Flow detention time= 105.2 min calculated for 1.270 af (76% of inflow)
Center-of-Mass det. time= 47.8 min (857.5 - 809.7)

Volume	Invert	Avail.Storage	Storage Description
#1	628.00'	23,269 cf	**Custom Stage Data (Prismatic)**Listed below (Recalc)

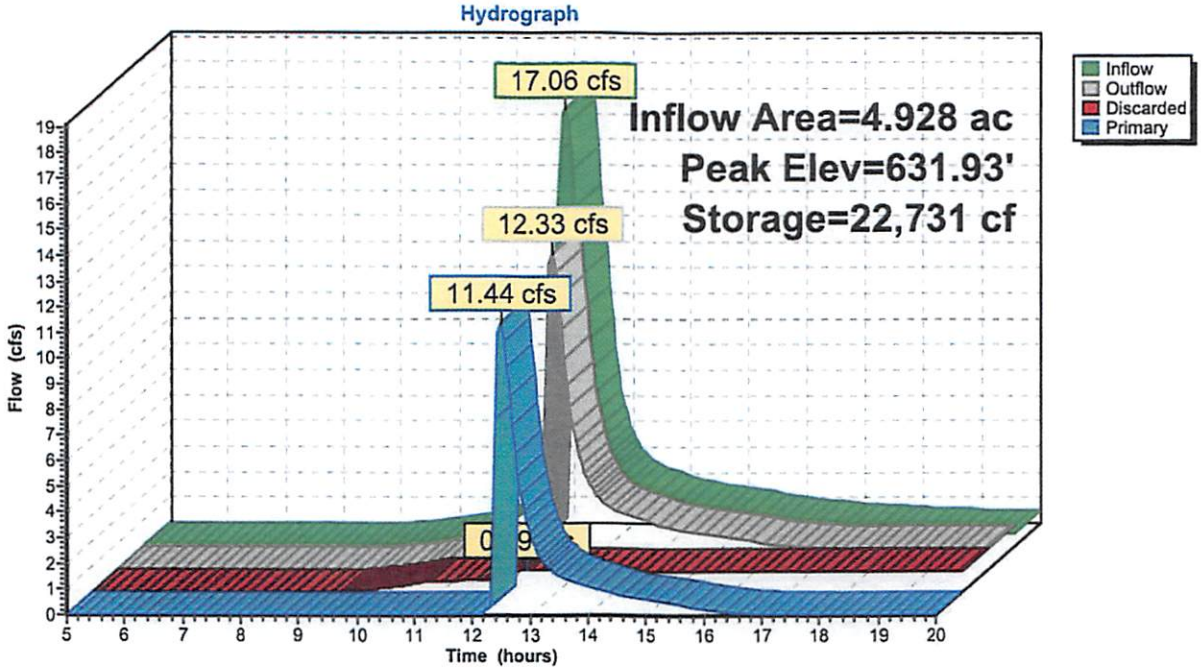
Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
628.00	4,006	0	0
629.00	4,862	4,434	4,434
630.00	5,775	5,319	9,753
631.00	6,744	6,260	16,012
632.00	7,770	7,257	23,269

Device	Routing	Invert	Outlet Devices
#1	Discarded	628.00'	**5.000 in/hr Exfiltration over Surface area**
#2	Primary	631.50'	**15.0' long x 35.0' 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) 2.68 2.70 2.70 2.64 2.63 2.64 2.64 2.63

Discarded OutFlow Max=0.89 cfs @ 12.49 hrs HW=631.93' (Free Discharge)
↑**1=Exfiltration** (Exfiltration Controls 0.89 cfs)

Primary OutFlow Max=11.39 cfs @ 12.49 hrs HW=631.93' (Free Discharge)
↑**2=Broad-Crested Rectangular Weir** (Weir Controls 11.39 cfs @ 1.77 fps)

Pond B-1: B-1


Hydrograph
17.06 cfs
12.33 cfs
11.44 cfs
Inflow Area=4.928 ac
Peak Elev=631.93'
Storage=22,731 cf
Inflow
Outflow
Discarded
Primary
Flow (cfs)
Time (hours)

Summary for Pond B-2: B-2

Inflow Area = 1.540 ac, 0.41% Impervious, Inflow Depth > 4.18" for 100-Year event
Inflow = 5.61 cfs @ 12.27 hrs, Volume= 0.536 af
Outflow = 3.86 cfs @ 12.50 hrs, Volume= 0.441 af, Atten= 31%, Lag= 14.0 min
Discarded = 0.43 cfs @ 12.50 hrs, Volume= 0.295 af
Primary = 3.43 cfs @ 12.50 hrs, Volume= 0.147 af

Routing by Stor-Ind method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Peak Elev= 637.70' @ 12.50 hrs Surf.Area= 3,725 sf Storage= 7,449 cf

Plug-Flow detention time= 115.6 min calculated for 0.441 af (82% of inflow)
Center-of-Mass det. time= 67.2 min (874.6 - 807.4)

Volume	Invert	Avail.Storage	Storage Description
#1	635.00'	8,588 cf	**Custom Stage Data (Prismatic)**Listed below (Recalc)

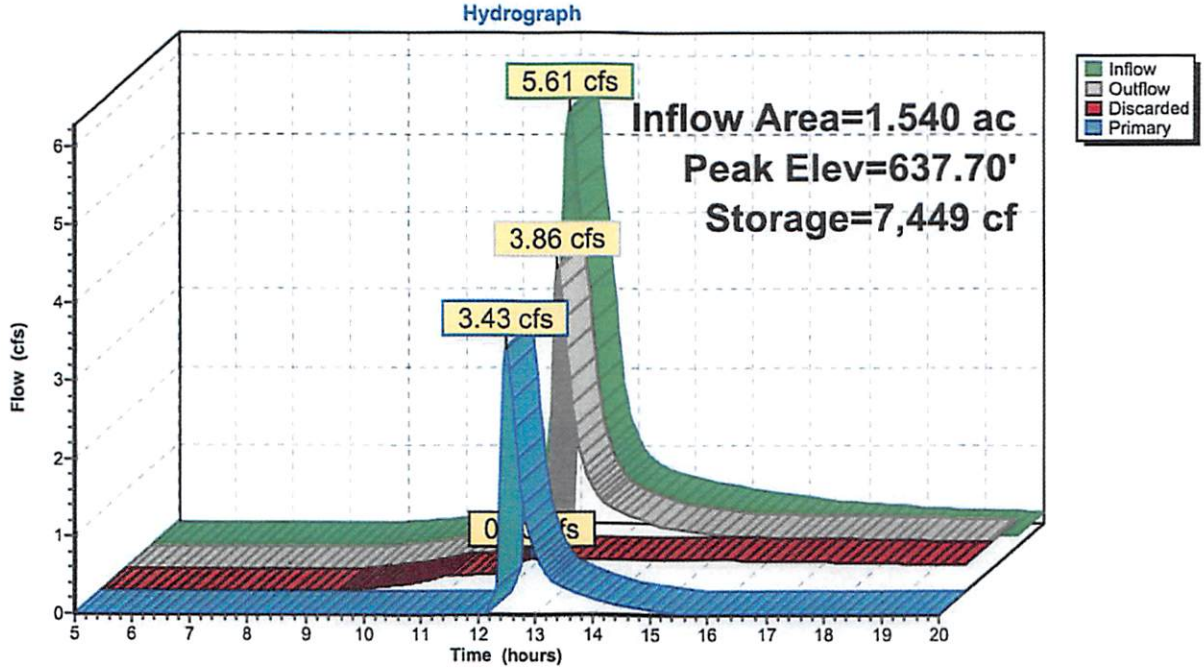
Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
635.00	1,852	0	0
636.00	2,494	2,173	2,173
637.00	3,193	2,844	5,017
638.00	3,949	3,571	8,588

Device	Routing	Invert	Outlet Devices
#1	Discarded	635.00'	**5.000 in/hr Exfiltration over Surface area**
#2	Primary	637.50'	**15.0' long x 10.0' 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) 2.49 2.56 2.70 2.69 2.68 2.69 2.67 2.64

Discarded OutFlow Max=0.43 cfs @ 12.50 hrs HW=637.70' (Free Discharge)
↑**1=Exfiltration** (Exfiltration Controls 0.43 cfs)

Primary OutFlow Max=3.42 cfs @ 12.50 hrs HW=637.70' (Free Discharge)
↑**2=Broad-Crested Rectangular Weir** (Weir Controls 3.42 cfs @ 1.12 fps)

Pond B-2: B-2

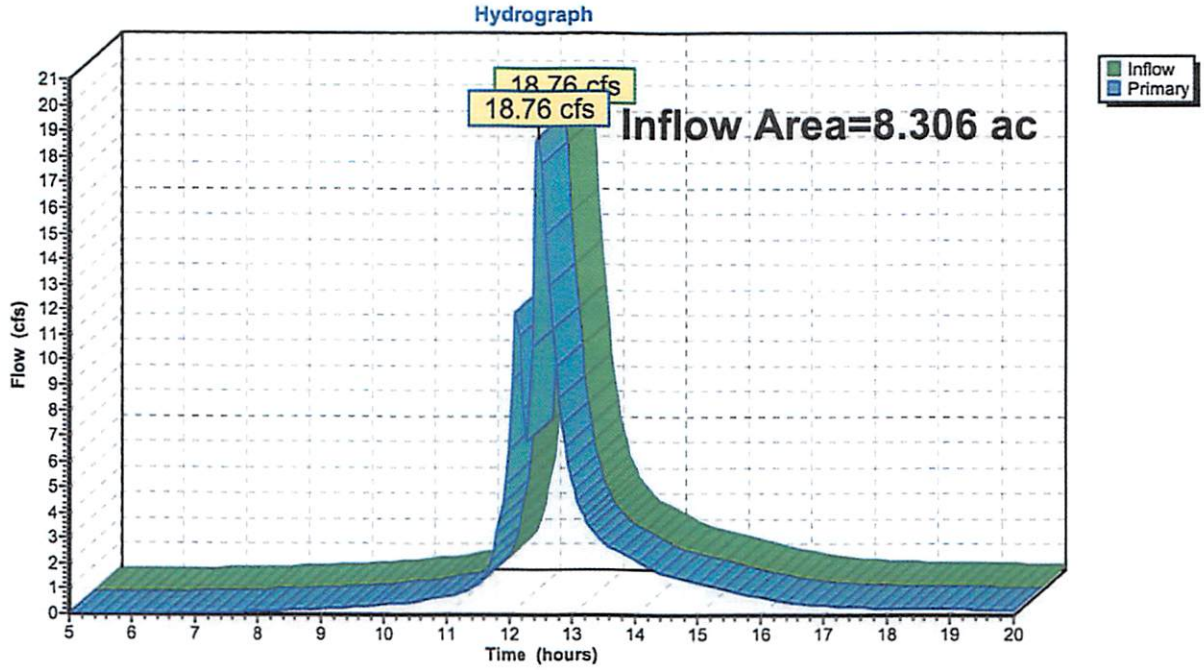

Hydrograph
5.61 cfs
3.86 cfs
3.43 cfs
Inflow Area=1.540 ac
Peak Elev=637.70'
Storage=7,449 cf
Inflow
Outflow
Discarded
Primary
Flow (cfs)
Time (hours)
0
1
2
3
4
5
6
5
6
7
8
9
10
11
12
13
14
15
16
17
18
19
20

Summary for Link PR: AP-1

Inflow Area = 8.306 ac, 0.08% Impervious, Inflow Depth > 2.51" for 100-Year event
Inflow = 18.76 cfs @ 12.48 hrs, Volume= 1.734 af
Primary = 18.76 cfs @ 12.48 hrs, Volume= 1.734 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs

Link PR: AP-1



APPENDIX D: NOAA ATLAS 14 PRECIPITATION FREQUENCY TABLE

NOAA Atlas 14, Volume 10, Version 3
Location name: Bristol, Connecticut, USA*
Latitude: 41.6847°, Longitude: -72.9733°
Elevation: 659.83 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	0.366 (0.278-0.480)	0.436 (0.331-0.573)	0.550 (0.417-0.727)	0.645 (0.487-0.855)	0.776 (0.568-1.07)	0.876 (0.629-1.23)	0.978 (0.683-1.42)	1.09 (0.728-1.62)	1.24 (0.800-1.91)	1.36 (0.858-2.14)
10-min	0.518 (0.394-0.680)	0.618 (0.469-0.811)	0.781 (0.591-1.03)	0.915 (0.690-1.21)	1.10 (0.805-1.52)	1.24 (0.891-1.74)	1.39 (0.968-2.01)	1.54 (1.03-2.30)	1.75 (1.13-2.71)	1.92 (1.22-3.03)
15-min	0.610 (0.464-0.800)	0.727 (0.552-0.954)	0.918 (0.696-1.21)	1.08 (0.811-1.43)	1.29 (0.947-1.78)	1.46 (1.05-2.05)	1.63 (1.14-2.37)	1.81 (1.21-2.71)	2.06 (1.33-3.19)	2.26 (1.43-3.56)
30-min	0.825 (0.628-1.08)	0.983 (0.747-1.29)	1.24 (0.940-1.64)	1.46 (1.10-1.93)	1.75 (1.28-2.41)	1.97 (1.42-2.78)	2.20 (1.54-3.20)	2.45 (1.64-3.66)	2.79 (1.80-4.31)	3.06 (1.94-4.82)
60-min	1.04 (0.792-1.37)	1.24 (0.942-1.63)	1.57 (1.19-2.06)	1.84 (1.38-2.43)	2.21 (1.62-3.04)	2.49 (1.79-3.50)	2.78 (1.94-4.04)	3.09 (2.07-4.62)	3.52 (2.28-5.44)	3.86 (2.44-6.08)
2-hr	1.37 (1.04-1.78)	1.61 (1.23-2.11)	2.02 (1.54-2.64)	2.35 (1.78-3.10)	2.81 (2.07-3.86)	3.16 (2.28-4.42)	3.52 (2.47-5.09)	3.91 (2.62-5.81)	4.43 (2.88-6.83)	4.85 (3.08-7.62)
3-hr	1.59 (1.22-2.07)	1.88 (1.44-2.44)	2.35 (1.79-3.06)	2.74 (2.08-3.59)	3.27 (2.41-4.48)	3.68 (2.66-5.14)	4.10 (2.88-5.92)	4.55 (3.07-6.76)	5.19 (3.37-7.97)	5.70 (3.63-8.94)
6-hr	2.02 (1.55-2.61)	2.41 (1.85-3.12)	3.05 (2.33-3.96)	3.58 (2.73-4.68)	4.31 (3.20-5.89)	4.86 (3.54-6.78)	5.44 (3.86-7.88)	6.10 (4.11-9.02)	7.06 (4.60-10.8)	7.86 (5.01-12.3)
12-hr	2.48 (1.92-3.19)	3.03 (2.34-3.90)	3.92 (3.02-5.06)	4.66 (3.57-6.06)	5.69 (4.24-7.76)	6.44 (4.73-9.00)	7.26 (5.22-10.6)	8.25 (5.58-12.2)	9.77 (6.38-14.9)	11.1 (7.08-17.2)
24-hr	2.90 (2.25-3.70)	3.62 (2.80-4.63)	4.80 (3.71-6.17)	5.78 (4.44-7.47)	7.13 (5.36-9.73)	8.12 (6.01-11.4)	9.22 (6.71-13.5)	10.6 (7.19-15.6)	12.8 (8.40-19.5)	14.8 (9.49-23.0)
2-day	3.24 (2.53-4.12)	4.13 (3.21-5.26)	5.58 (4.33-7.13)	6.79 (5.24-8.72)	8.45 (6.39-11.5)	9.65 (7.20-13.5)	11.0 (8.10-16.2)	12.8 (8.70-18.8)	15.8 (10.4-24.0)	18.4 (11.9-28.5)
3-day	3.52 (2.75-4.46)	4.50 (3.51-5.71)	6.10 (4.74-7.76)	7.43 (5.75-9.51)	9.26 (7.02-12.6)	10.6 (7.92-14.8)	12.1 (8.93-17.8)	14.1 (9.59-20.6)	17.4 (11.5-26.4)	20.5 (13.2-31.6)
4-day	3.78 (2.96-4.78)	4.83 (3.77-6.10)	6.54 (5.09-8.30)	7.95 (6.16-10.2)	9.90 (7.53-13.5)	11.3 (8.49-15.8)	12.9 (9.56-19.0)	15.1 (10.3-22.0)	18.7 (12.3-28.2)	21.9 (14.1-33.7)
7-day	4.51 (3.54-5.67)	5.68 (4.46-7.16)	7.60 (5.94-9.61)	9.19 (7.15-11.7)	11.4 (8.67-15.4)	13.0 (9.75-18.0)	14.8 (10.9-21.6)	17.1 (11.7-24.9)	21.1 (13.9-31.7)	24.5 (15.9-37.7)
10-day	5.25 (4.13-6.58)	6.48 (5.10-8.14)	8.50 (6.66-10.7)	10.2 (7.93-12.9)	12.5 (9.52-16.8)	14.2 (10.6-19.6)	16.0 (11.9-23.3)	18.5 (12.7-26.8)	22.5 (14.9-33.8)	26.0 (16.9-39.9)
20-day	7.57 (5.98-9.44)	8.85 (6.99-11.0)	10.9 (8.61-13.7)	12.7 (9.93-16.0)	15.1 (11.5-20.0)	16.8 (12.6-22.9)	18.8 (13.8-26.7)	21.2 (14.6-30.5)	24.9 (16.6-37.3)	28.2 (18.4-43.1)
30-day	9.50 (7.53-11.8)	10.8 (8.54-13.4)	12.9 (10.2-16.1)	14.7 (11.5-18.4)	17.1 (13.0-22.5)	18.9 (14.1-25.4)	20.8 (15.2-29.2)	23.1 (15.9-33.1)	26.5 (17.7-39.5)	29.4 (19.1-44.8)
45-day	11.9 (9.42-14.7)	13.2 (10.5-16.3)	15.3 (12.1-19.1)	17.1 (13.5-21.4)	19.6 (15.0-25.6)	21.5 (16.0-28.6)	23.4 (17.0-32.4)	25.5 (17.7-36.5)	28.4 (19.0-42.2)	30.8 (20.1-46.8)
60-day	13.8 (11.0-17.0)	15.2 (12.1-18.7)	17.4 (13.8-21.6)	19.2 (15.2-24.0)	21.8 (16.6-28.2)	23.7 (17.7-31.5)	25.7 (18.6-35.2)	27.6 (19.2-39.4)	30.1 (20.2-44.7)	32.0 (20.9-48.6)

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

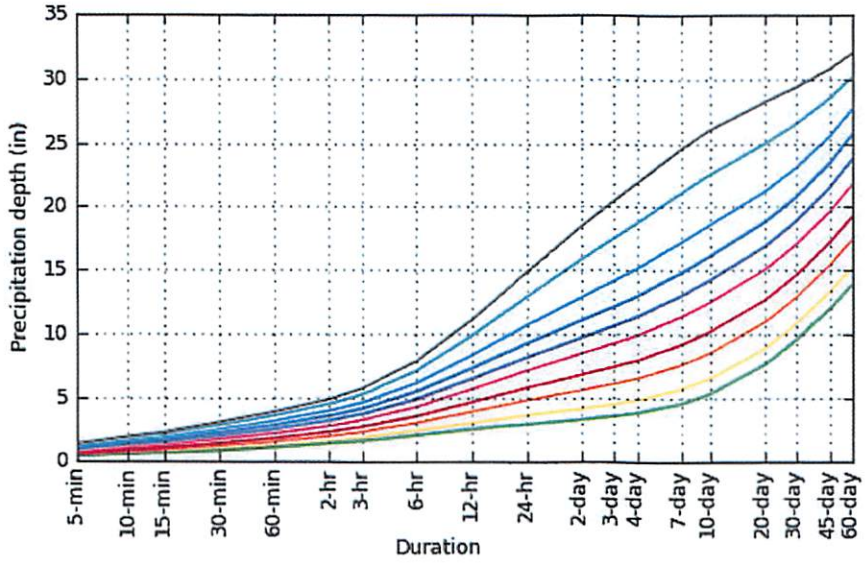
Numbers in parenthesis are PF estimates at lower and upper bounds of the 90% confidence interval. The probability that precipitation frequency estimates (for a given duration and average recurrence interval) will be greater than the upper bound (or less than the lower bound) is 5%. Estimates at upper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

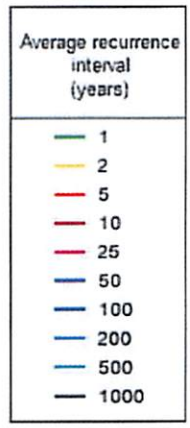
Please refer to NOAA Atlas 14 document for more information.

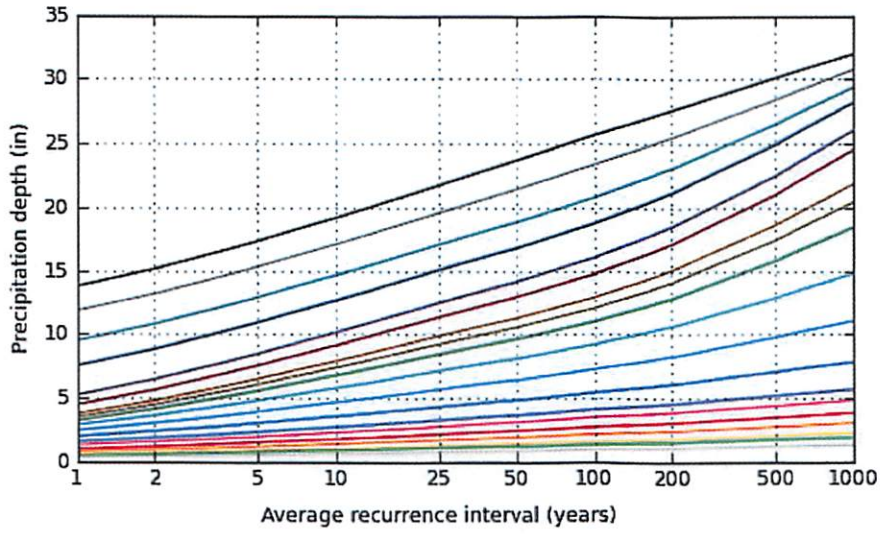
Back to Top

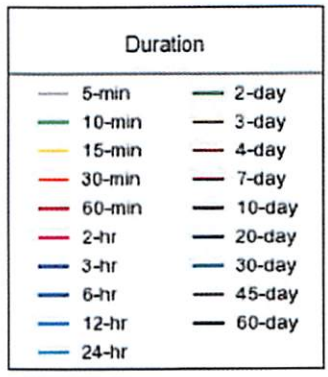
PF graphical

PDS-based depth-duration-frequency (DDF) curves
Latitude: 41.6847°, Longitude: -72.9733°









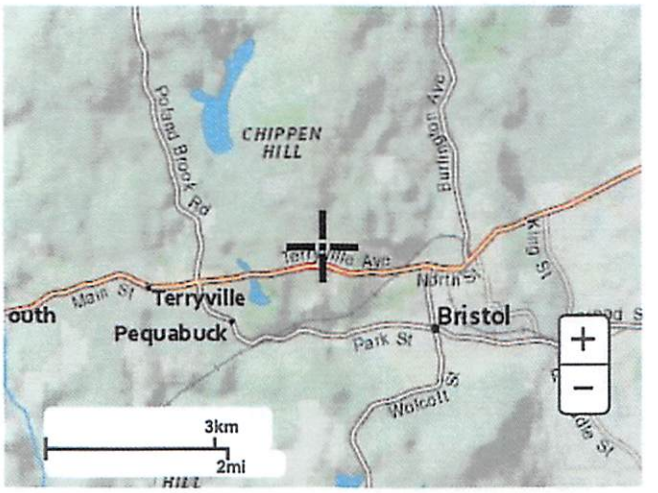
NOAA Atlas 14, Volume 10, Version 3

Created (GMT): Wed Mar 25 14:23:38 2020

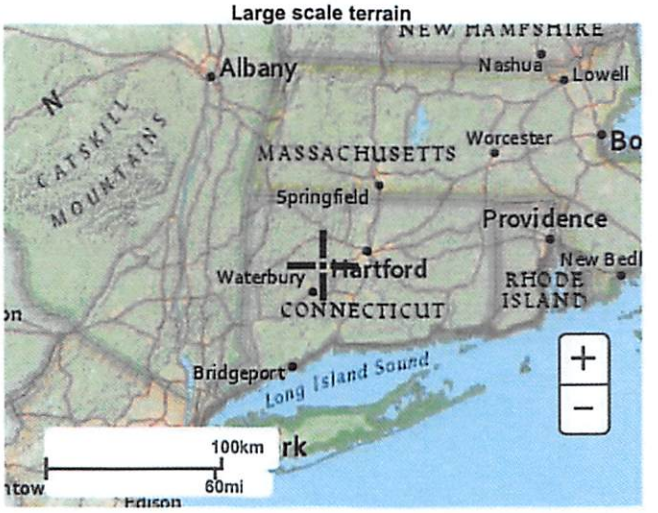
Back to Top

Maps & aerials

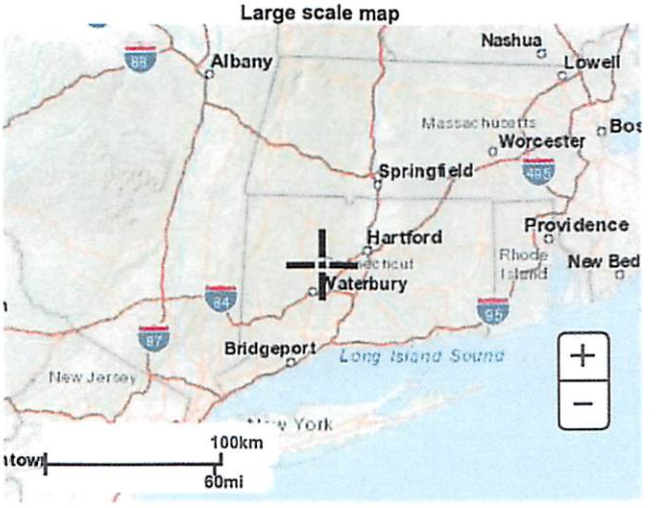
Small scale terrain



Large scale terrain



Large scale map



Large scale aerial

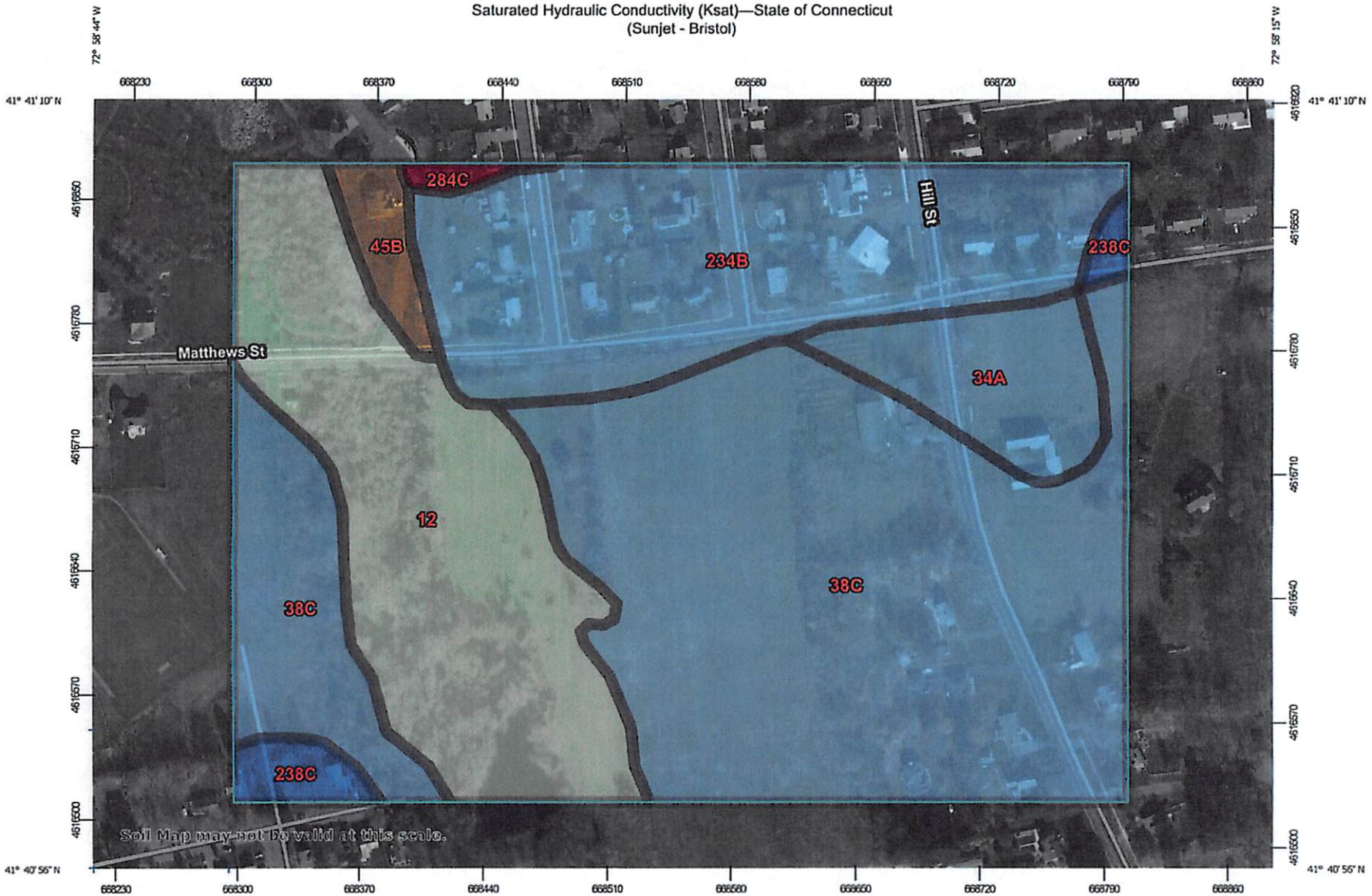
Back to Top

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: NRCS SOIL SATURATED HYDRAULIC CONDUCTIVITY

Saturated Hydraulic Conductivity (Ksat)—State of Connecticut
(Sunjet - Bristol)



Map Scale: 1:3,050 if printed on A landscape (11" x 8.5") sheet.

N

Meters: 0 45 90 180 270

Feet: 0 100 200 400 600

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
- <= 4.0600
- > 4.0600 and <= 4.6600
- > 4.6600 and <= 81.1939
- > 81.1939 and <= 100.0000
- > 100.0000 and <= 118.7566
- Not rated or not available

Soil Rating Lines
- <= 4.0600
- > 4.0600 and <= 4.6600
- > 4.6600 and <= 81.1939
- > 81.1939 and <= 100.0000
- > 100.0000 and <= 118.7566
- Not rated or not available

Soil Rating Points
- <= 4.0600
- > 4.0600 and <= 4.6600
- > 4.6600 and <= 81.1939
- > 81.1939 and <= 100.0000
- > 100.0000 and <= 118.7566
- Not rated or not available

Water Features
- Streams and Canals

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

Background
- Aerial Photography

MAP INFORMATION

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

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

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

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

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

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

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

Soil Survey Area: State of Connecticut
Survey Area Data: Version 19, Sep 13, 2019

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

Date(s) aerial images were photographed: Sep 25, 2019—Nov 9, 2019

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.

Saturated Hydraulic Conductivity (Ksat)

Map unit symbol	Map unit name	Rating (micrometers per second)	Acres in AOI	Percent of AOI
12	Raypol silt loam	81.1939	9.9	21.9%
34A	Merrimac fine sandy loam, 0 to 3 percent slopes	100.0000	2.6	5.8%
38C	Hinckley loamy sand, 3 to 15 percent slopes	100.0000	21.0	46.3%
45B	Woodbridge fine sandy loam, 3 to 8 percent slopes	4.6600	0.8	1.9%
234B	Merrimac-Urban land complex, 0 to 8 percent slopes	100.0000	9.8	21.7%
238C	Hinckley-Urban land complex, 3 to 15 percent slopes	118.7566	0.8	1.9%
284C	Paxton-Urban land complex, 8 to 15 percent slopes	4.0600	0.2	0.5%
Totals for Area of Interest			45.3	100.0%

Description

Saturated hydraulic conductivity (Ksat) refers to the ease with which pores in a saturated soil transmit water. The estimates are expressed in terms of micrometers per second. They are based on soil characteristics observed in the field, particularly structure, porosity, and texture. Saturated hydraulic conductivity is considered in the design of soil drainage systems and septic tank absorption fields.

For each soil layer, this attribute is actually recorded as three separate values in the database. A low value and a high value indicate the range of this attribute for the soil component. A "representative" value indicates the expected value of this attribute for the component. For this soil property, only the representative value is used.

The numeric Ksat values have been grouped according to standard Ksat class limits.

Rating Options

Units of Measure: micrometers per second

Aggregation Method: Dominant Component

Component Percent Cutoff: None Specified

Tie-break Rule: Fastest

Interpret Nulls as Zero: No

Layer Options (Horizon Aggregation Method): All Layers (Weighted Average)

APPENDIX F: WATER QUALITY VOLUME CALCULATIONS

WATER QUALITY VOLUME CALCULATIONS
FOR
BRISTOL SOLAR GROUND MOUNT
MATTHEWS STREET & HILL STREET, BRISTOL, 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

AREA (LOD)	=	5.98	AC
PERVIOUS AREA	=	4.21	AC
IMPERVIOUS AREA	=	1.77	AC
A	=	5.98	AC
I	=	30%	
R	=	0.32	
WQV	=	0.16	AC-FT
WQV	=	6,867.96	CF
WQV	=	254.37	CYD
PROVIDED VOLUMES		STORAGE	UNIT
INFILTRATION BASIN 1	=	722.68	CYD
INFILTRATION BASIN 2	=	248.43	CYD
TOTAL WQV REQUIRED	=	254.37	CYD
TOTAL WQV PROVIDED	=	971.10	CYD