STORMWATER MANAGEMENT REPORT

Lodge Ave
Block 124, Lot 2
Borough of Paulsboro
Gloucester County, New Jersey

Prepared by

TRISTATE ENGINEERING & SURVEYING

DRAFT

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Job #22-068
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I. SUMMARY

SITE DESCRIPTION

The purpose of this report is to provide a stormwater management analysis for the proposed stormwater management at Lodge Avenue. The subject ±3.76 acre parcel is located across Block 124 in the Borough of Paulsboro. According to the Test Pit data report, the site contains miscellaneous fill & trash debris (0"-60"), yellowish brown fine Loamy Sand (60"-80"), greenish gray fine Sand/ Loamy sand (80"-132"), for Test Pit #1. According to the Test Pit Data report, the site contains Topsoil (0"-6"), strong brown Sandy Loam (6"-53"), strong brown medium to fine Sand-Gravel 10% (53"-93") for Test Pit #2. According to infiltration testing performed on-site, the conductive capacity (Ksat) for loamy soils ranges from 0.60 to 6.00 in/hr.

The project proposes 26,111 sq. ft. of paved parking area, and an 8,000 sq. ft. facility. Because this project is considered a major development, stormwater management measures are required.

A small-scale Infiltration Basin is proposed to meet the stormwater requirements associated with the increase in stormwater runoff while also improving the water quality, from the proposed paved parking area and the proposed facility. Said infiltration basin is located on the southeast corner of the property nearest to the exit ramps.

The combined stormwater measures have been designed to limit post-developed peak discharge rates in compliance with Borough of Paulsboro Ordinances and the Standards for Soil Erosion & Sediment Control In New Jersey at the following rates: 2-year storm at 50% of the pre-development peak, 10-year storm at 75% of the pre-development peak, and 100-year storm at 80% of the pre-development peak.

Pre-development peak discharges at the point of interest, pre- and post-development curve numbers and pre- and post-developed time of concentration were calculated using the U.S.D.A. Natural Resource Conservation Service (NRCS) Technical Release No. 55 (TR-55). Existing and proposed hydrographs were calculated using the Delmarva Unit Hydrograph method as included in the *HydroCAD (version 10.00-25)* computer software.

Stormwater storage volumes within the stormwater facilities were calculated using storage calculations within in the *HydroCAD* computer software.

DESIGN DATA

The 2-, 10-, and 100-year pre-developed watershed peak discharges and post-development inflow hydrographs were generated using the following data:

Pre-Development Conditions

Pervious Area (8S)
D.A.: 20,038 sq. ft.
CN: 39
t_c: 12.8 min.

Pervious Area (9S)
D.A.: 155,074 sq. ft.
CN: 39
t_c: 15.2 min.

Post-Development Conditions

Pervious Area to Existing Outflow(13S)
D.A.: 10,618sq. ft.
CN: 39
t_c: 10.0 min.

Pervious Area to Basin (16S)
D.A.: 130,383 sq. ft.
CN: 39
t_c: 10.0 min.

Impervious Area to Basin (16S)
D.A.: 34,111 sq. ft.
CN: 98
t_c: 10 min.

BASIN CALCULATIONS

Outflow from the basin will be through an overflow spillway at the top of the basin at elevation of 14.0, the invert elevation will be set to 13.20. Additionally, a headwall will be placed at the bottom of the basin with an invert of 7.94.

Flows through the outlets were calculated using *HydroCAD (version 10.00-20)* computer software.

STORMWATER RUNOFF QUANTITY

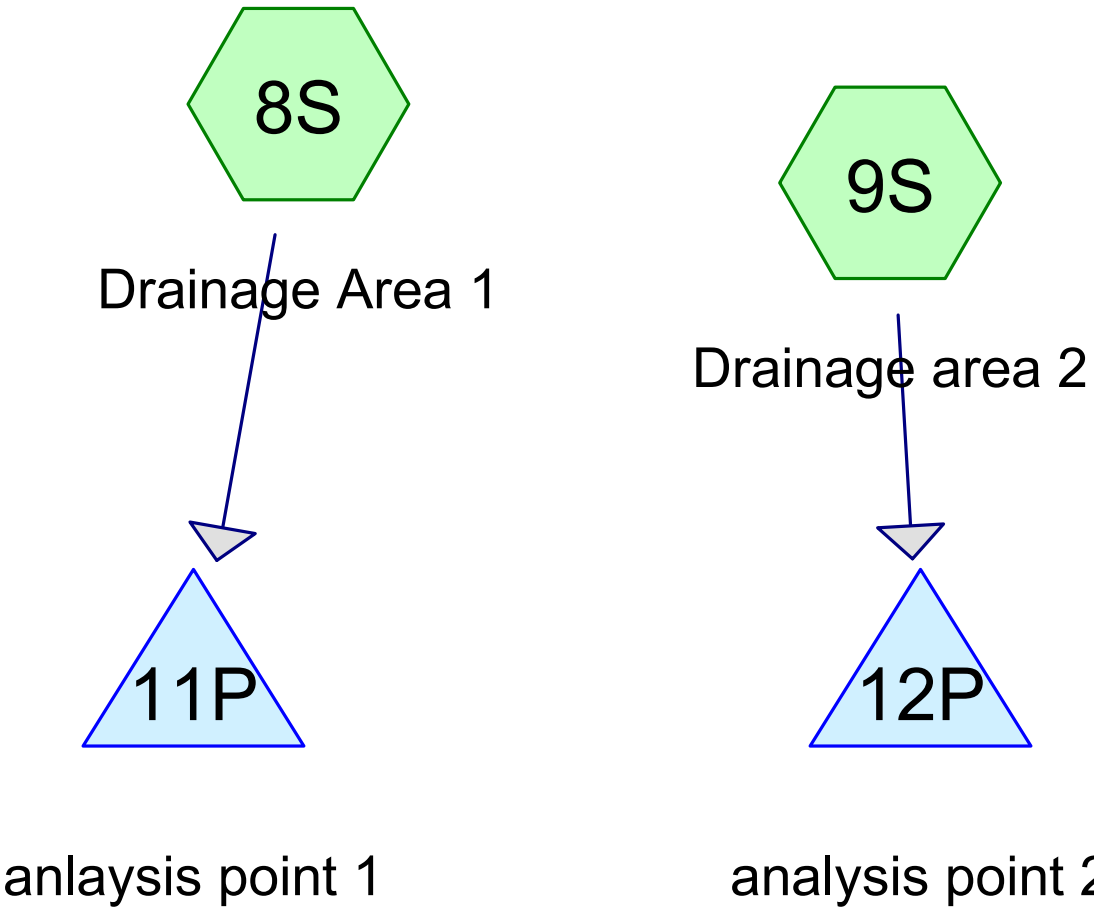
The 2-, 10-year storm events were routed through the detention basin to demonstrate that they comply with the Standards for Soil Erosion & Sediment Control In New Jersey requirements for peak design outflow. More specifically, the section in the Standards on off-site stability analysis states that:

> *"Design stormwater management measures so that the post-construction peak runoff rates for the two-, ten- and 100-year storm events are 50%, 75% and 80%, respectively, of the preconstruction peak runoff rates. The percentages apply only to the post-construction stormwater runoff that is attributable to the portion of the site on which the proposed development or project is to be constructed…."*

In addition, the 100-year storm event was routing through the infiltration basin to demonstrate that the pre-development peak discharge is maintained. The following table compares the pre- and post-development peak discharges for the site. The allowable post-developed total peak discharge was calculated as described above for each storm event.

Storm Event (yr)	**Pre-Developed Peak Discharge (cfs) DA#1**	**Pre-Developed Peak Discharge (cfs) DA#2**	**Allowable Peak Discharge (cfs) DA#1**	**Allowable Peak Discharge (cfs) DA#2**	**Post-Development Peak Discharge (cfs) DA#1**	**Post-Development Peak Discharge (cfs) DA#2**	**Percent Reduction DA#1**	**Percent Reduction DA#2**
2	0.00	0.00	0.00	0.00	**0.00**	**0.00**	**0%**	**0%**
10	0.02	0.16	0.15	0.12	**0.01**	**0.00**	**50%**	**0%**
100	0.36	2.56	2.88	2.04	**0.22**	**2.01**	**61%**	**79%**

II. PRE-DEVELOPED CONDITIONS



Subcat Reach Pond Link

Routing Diagram for 22-068 Pre Dev drainage calc
Prepared by Microsoft, Printed 7/13/2023

Area Listing (selected nodes)

Area (acres)	CN	Description (subcatchment-numbers)
4.020	39	>75% Grass cover, Good, HSG A (8S, 9S)
4.020	**39**	**TOTAL AREA**

Soil Listing (selected nodes)

Area (acres)	Soil Group	Subcatchment Numbers
4.020	HSG A	8S, 9S
0.000	HSG B	
0.000	HSG C	
0.000	HSG D	
0.000	Other	
4.020		**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
4.020	0.000	0.000	0.000	0.000	4.020	>75% Grass cover, Good	8S, 9S
4.020	**0.000**	**0.000**	**0.000**	**0.000**	**4.020**	**TOTAL AREA**	

Summary for Subcatchment 8S: Drainage Area 1

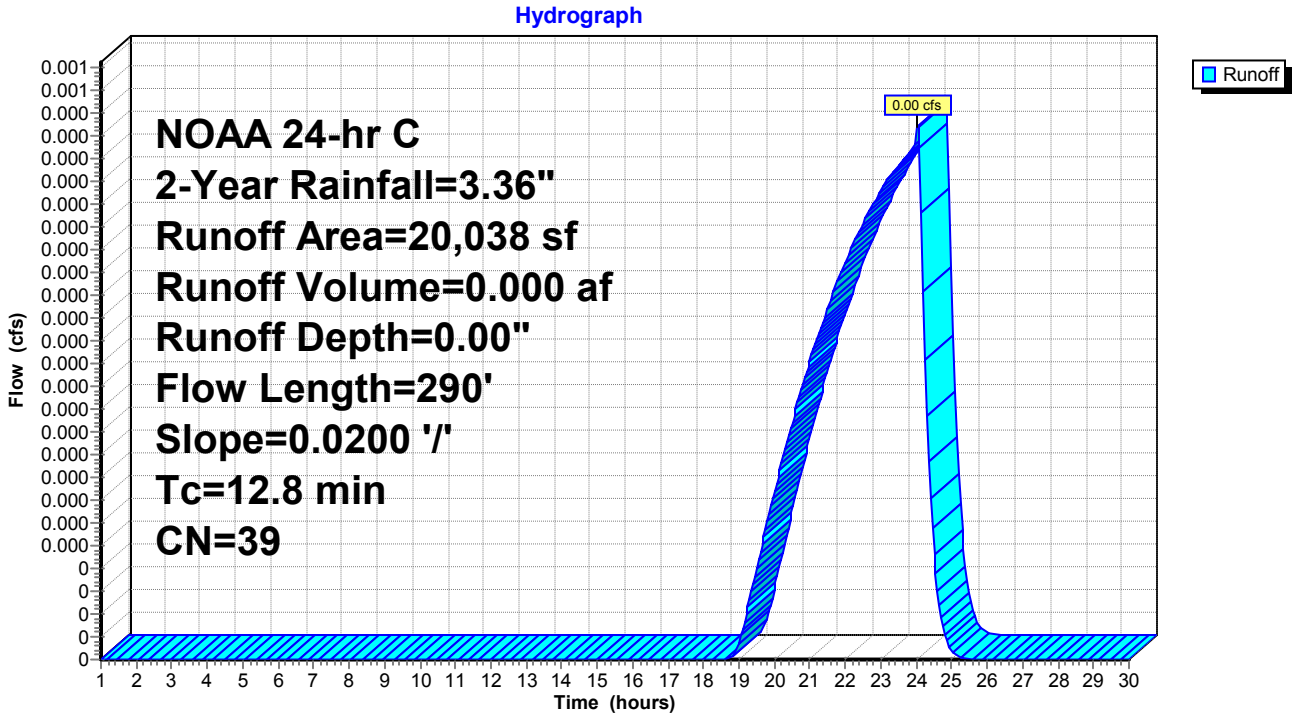
Runoff = 0.00 cfs @ 24.04 hrs, Volume= 0.000 af, Depth= 0.00"

Runoff by SCS TR-20 method, UH=Delmarva, Weighted-CN, Time Span= 1.00-30.00 hrs, dt= 0.05 hrs
NOAA 24-hr C 2-Year Rainfall=3.36"

Area (sf)	CN	Description
20,038	39	>75% Grass cover, Good, HSG A
20,038		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
9.6	100	0.0200	0.17		**Sheet Flow,** Grass: Short n= 0.150 P2= 3.36"
3.2	190	0.0200	0.99		**Shallow Concentrated Flow,** Short Grass Pasture Kv= 7.0 fps
12.8	290	Total			

Subcatchment 8S: Drainage Area 1



Summary for Subcatchment 9S: Drainage area 2

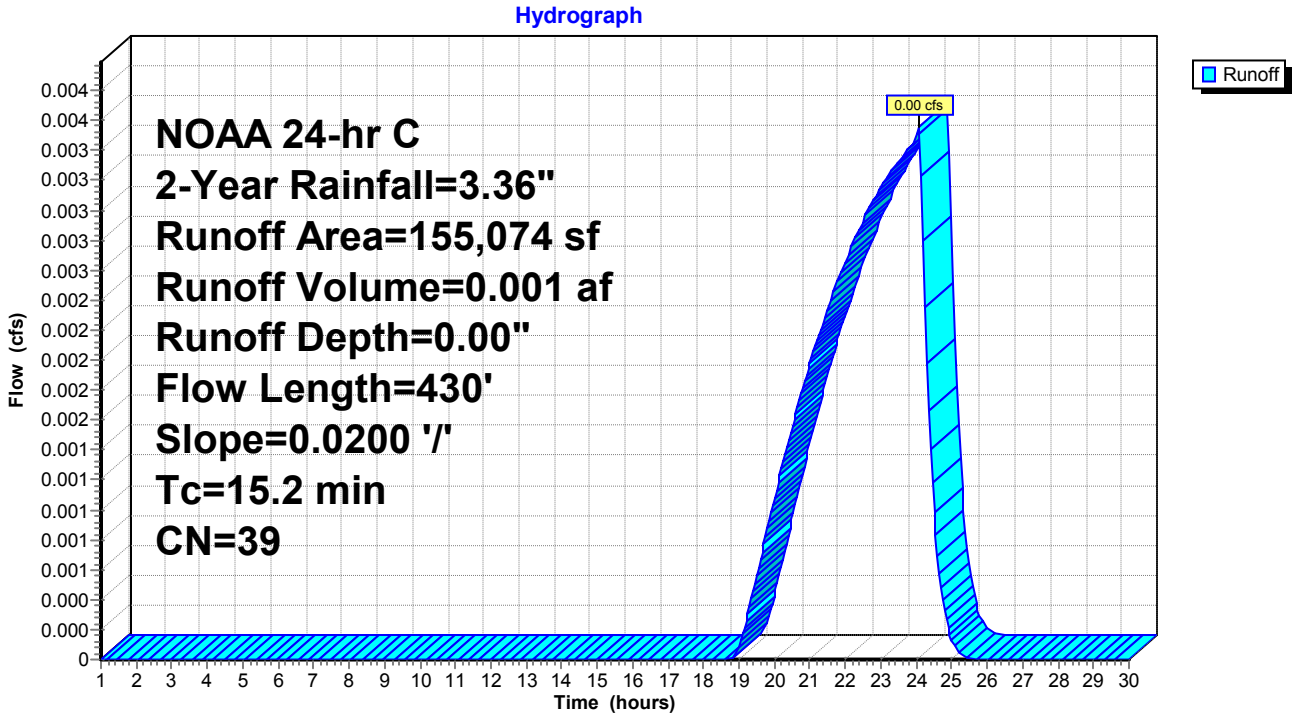
Runoff = 0.00 cfs @ 24.05 hrs, Volume= 0.001 af, Depth= 0.00"

Runoff by SCS TR-20 method, UH=Delmarva, Weighted-CN, Time Span= 1.00-30.00 hrs, dt= 0.05 hrs
NOAA 24-hr C 2-Year Rainfall=3.36"

Area (sf)	CN	Description
155,074	39	>75% Grass cover, Good, HSG A
155,074		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
9.6	100	0.0200	0.17		**Sheet Flow,** Grass: Short n= 0.150 P2= 3.36"
5.6	330	0.0200	0.99		**Shallow Concentrated Flow,** Short Grass Pasture Kv= 7.0 fps
15.2	430	Total			

Subcatchment 9S: Drainage area 2



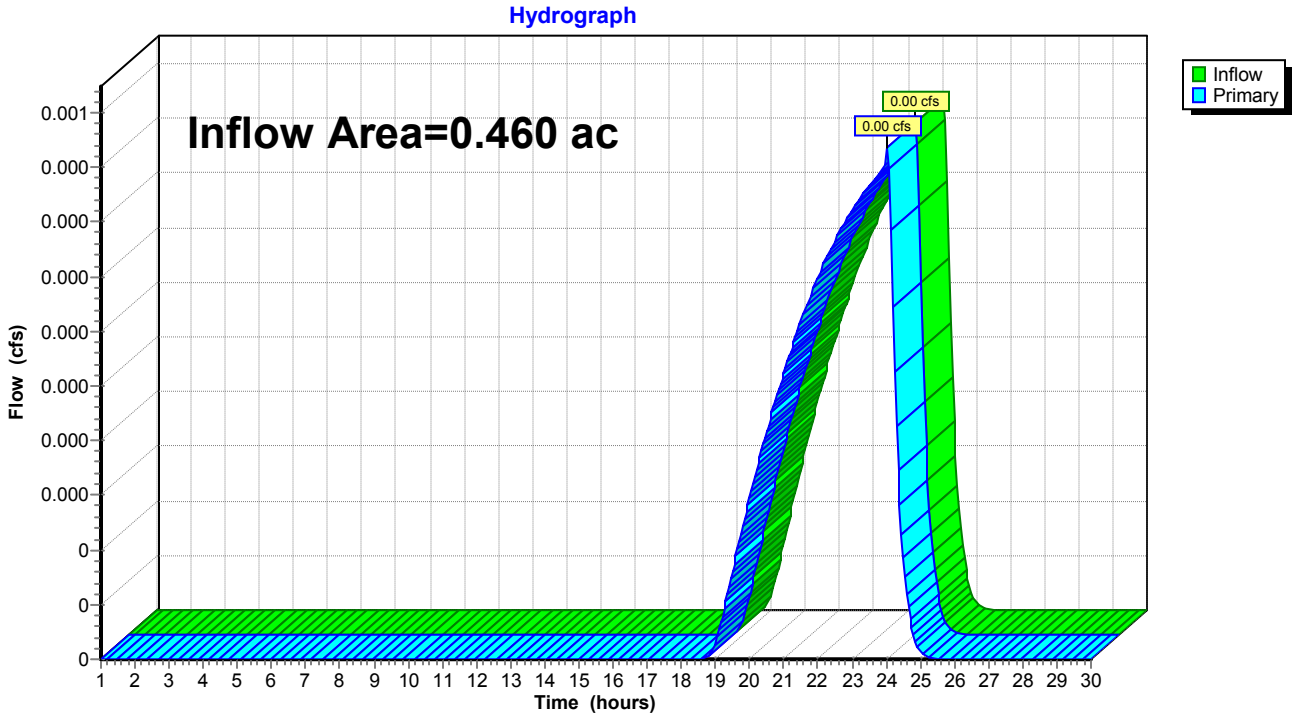
Summary for Pond 11P: anlaysis point 1

[40] Hint: Not Described (Outflow=Inflow)

Inflow Area = 0.460 ac, 0.00% Impervious, Inflow Depth = 0.00" for 2-Year event
Inflow = 0.00 cfs @ 24.04 hrs, Volume= 0.000 af
Primary = 0.00 cfs @ 24.04 hrs, Volume= 0.000 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind method, Time Span= 1.00-30.00 hrs, dt= 0.05 hrs

Pond 11P: anlaysis point 1



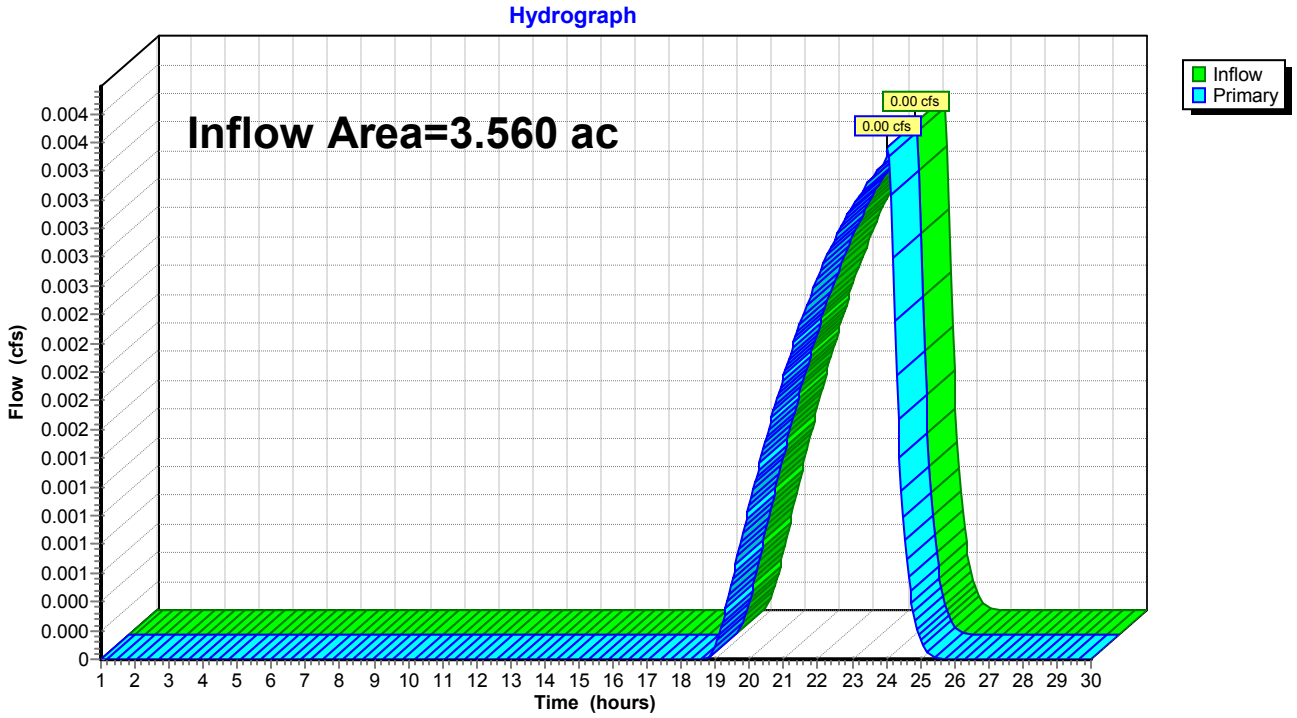
Summary for Pond 12P: analysis point 2

[40] Hint: Not Described (Outflow=Inflow)

Inflow Area = 3.560 ac, 0.00% Impervious, Inflow Depth = 0.00" for 2-Year event
Inflow = 0.00 cfs @ 24.05 hrs, Volume= 0.001 af
Primary = 0.00 cfs @ 24.05 hrs, Volume= 0.001 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind method, Time Span= 1.00-30.00 hrs, dt= 0.05 hrs

Pond 12P: analysis point 2



Summary for Subcatchment 8S: Drainage Area 1

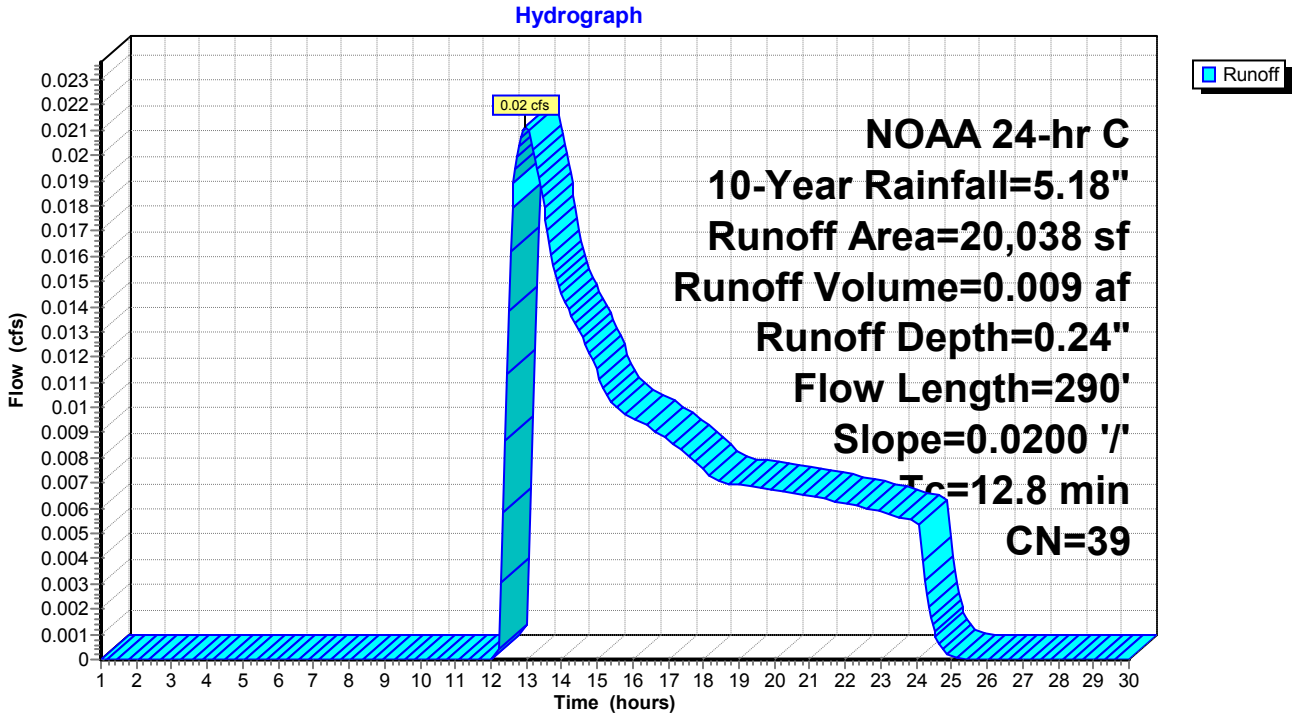
Runoff = 0.02 cfs @ 12.99 hrs, Volume= 0.009 af, Depth= 0.24"

Runoff by SCS TR-20 method, UH=Delmarva, Weighted-CN, Time Span= 1.00-30.00 hrs, dt= 0.05 hrs
NOAA 24-hr C 10-Year Rainfall=5.18"

Area (sf)	CN	Description
20,038	39	>75% Grass cover, Good, HSG A
20,038		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
9.6	100	0.0200	0.17		**Sheet Flow,** Grass: Short n= 0.150 P2= 3.36"
3.2	190	0.0200	0.99		**Shallow Concentrated Flow,** Short Grass Pasture Kv= 7.0 fps
12.8	290	Total			

Subcatchment 8S: Drainage Area 1



Summary for Subcatchment 9S: Drainage area 2

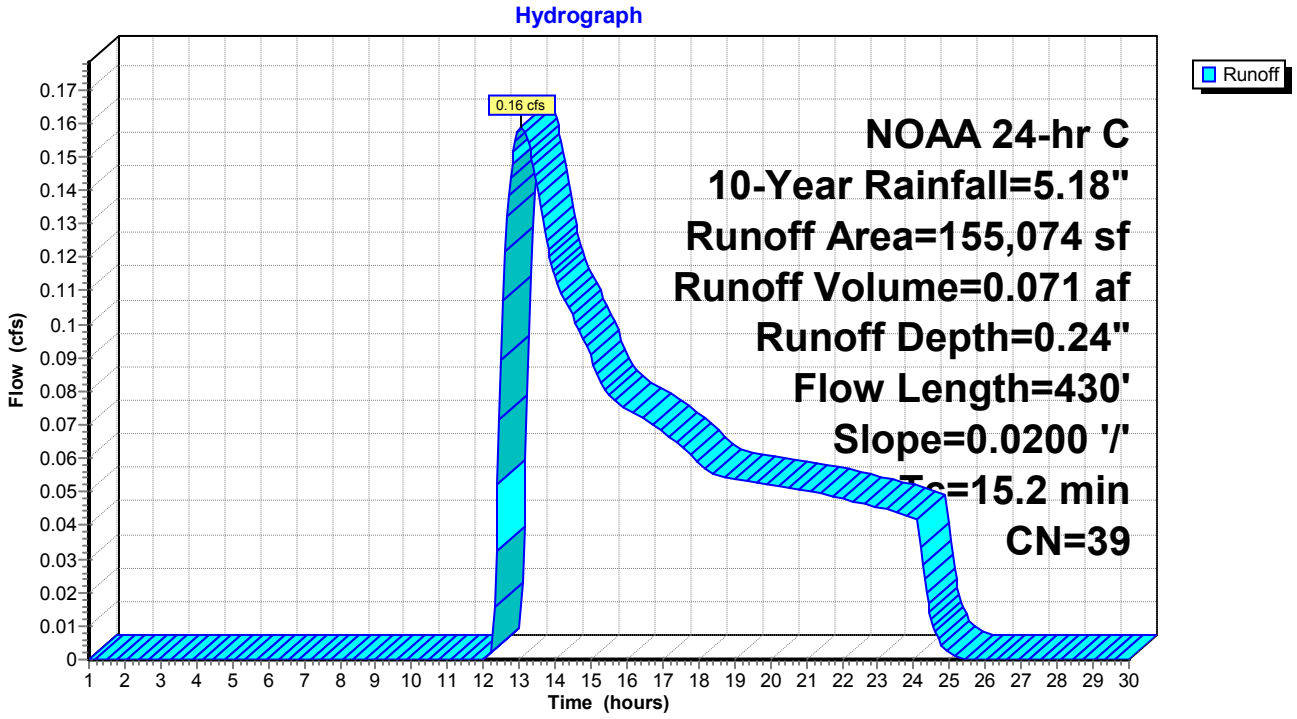
Runoff = 0.16 cfs @ 13.06 hrs, Volume= 0.071 af, Depth= 0.24"

Runoff by SCS TR-20 method, UH=Delmarva, Weighted-CN, Time Span= 1.00-30.00 hrs, dt= 0.05 hrs
NOAA 24-hr C 10-Year Rainfall=5.18"

Area (sf)	CN	Description
155,074	39	>75% Grass cover, Good, HSG A
155,074		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
9.6	100	0.0200	0.17		**Sheet Flow,** Grass: Short n= 0.150 P2= 3.36"
5.6	330	0.0200	0.99		**Shallow Concentrated Flow,** Short Grass Pasture Kv= 7.0 fps
15.2	430	Total			

Subcatchment 9S: Drainage area 2



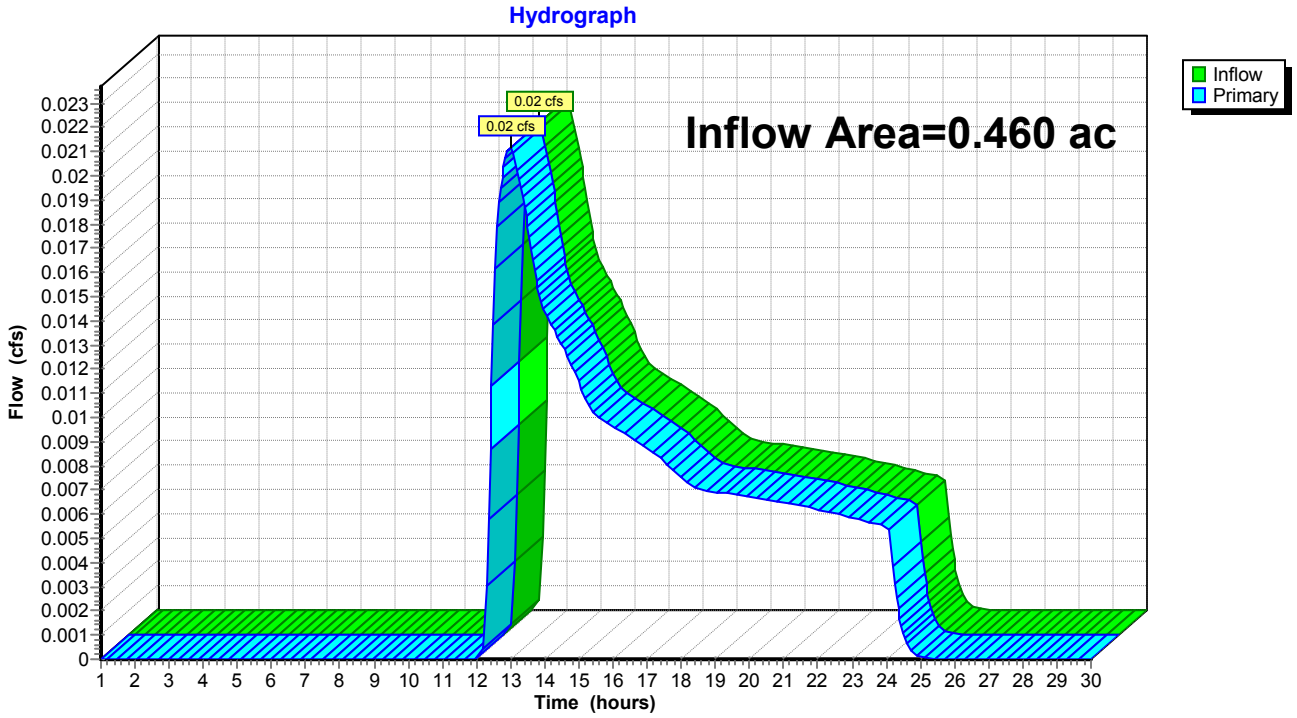
Summary for Pond 11P: anlaysis point 1

[40] Hint: Not Described (Outflow=Inflow)

Inflow Area = 0.460 ac, 0.00% Impervious, Inflow Depth = 0.24" for 10-Year event
Inflow = 0.02 cfs @ 12.99 hrs, Volume= 0.009 af
Primary = 0.02 cfs @ 12.99 hrs, Volume= 0.009 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind method, Time Span= 1.00-30.00 hrs, dt= 0.05 hrs

Pond 11P: anlaysis point 1



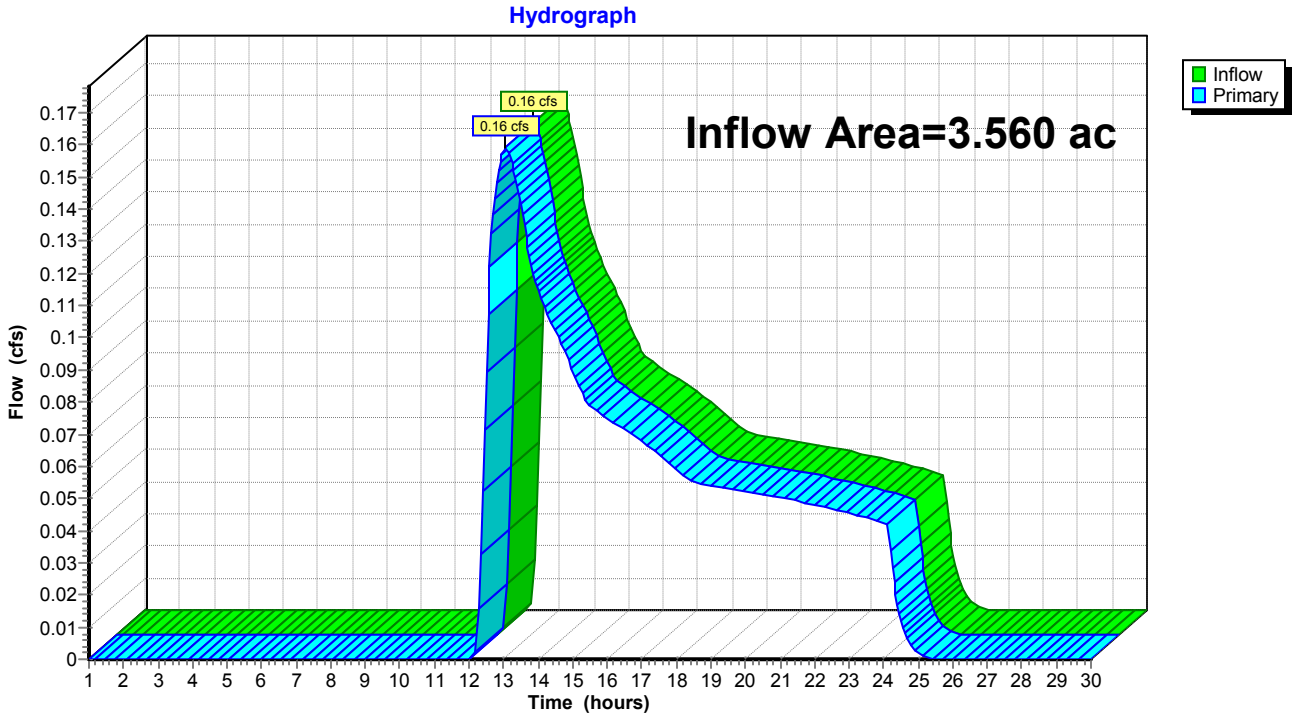
Summary for Pond 12P: analysis point 2

[40] Hint: Not Described (Outflow=Inflow)

Inflow Area = 3.560 ac, 0.00% Impervious, Inflow Depth = 0.24" for 10-Year event
Inflow = 0.16 cfs @ 13.06 hrs, Volume= 0.071 af
Primary = 0.16 cfs @ 13.06 hrs, Volume= 0.071 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind method, Time Span= 1.00-30.00 hrs, dt= 0.05 hrs

Pond 12P: analysis point 2



Summary for Subcatchment 8S: Drainage Area 1

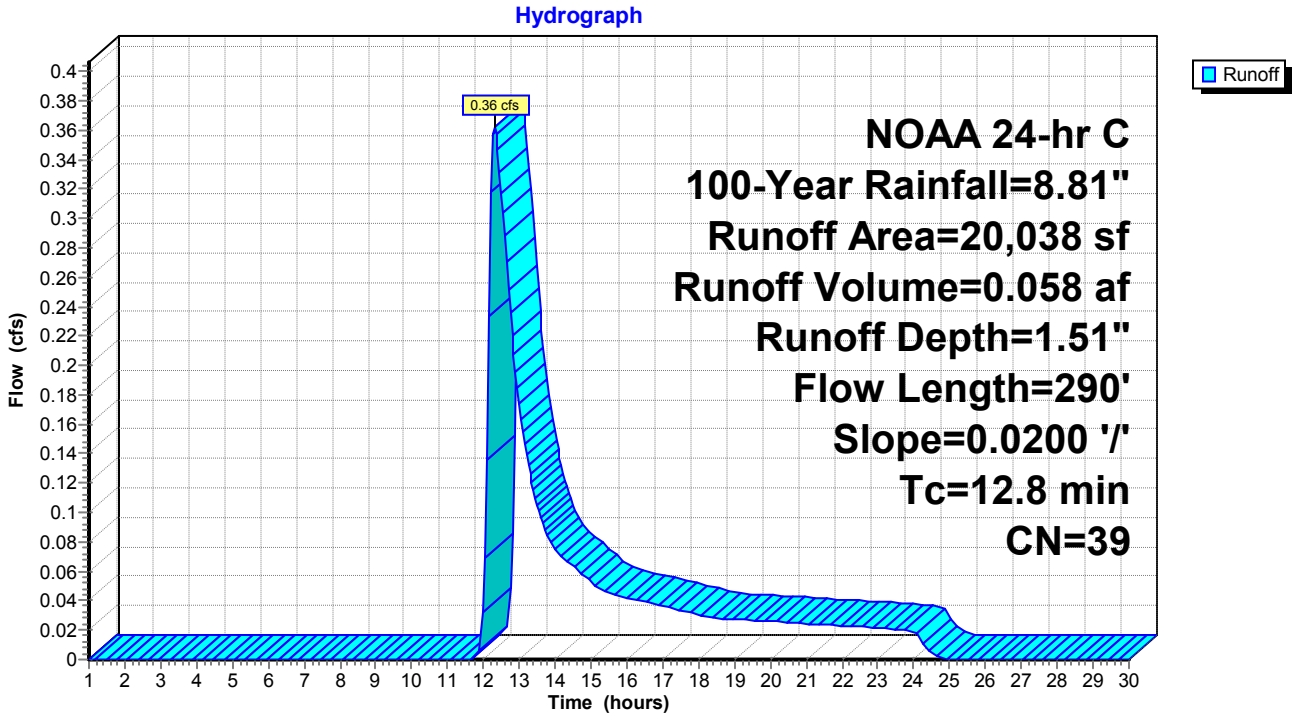
Runoff = 0.36 cfs @ 12.30 hrs, Volume= 0.058 af, Depth= 1.51"

Runoff by SCS TR-20 method, UH=Delmarva, Weighted-CN, Time Span= 1.00-30.00 hrs, dt= 0.05 hrs
NOAA 24-hr C 100-Year Rainfall=8.81"

Area (sf)	CN	Description
20,038	39	>75% Grass cover, Good, HSG A
20,038		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
9.6	100	0.0200	0.17		**Sheet Flow,** Grass: Short n= 0.150 P2= 3.36"
3.2	190	0.0200	0.99		**Shallow Concentrated Flow,** Short Grass Pasture Kv= 7.0 fps
12.8	290	Total			

Subcatchment 8S: Drainage Area 1



Summary for Subcatchment 9S: Drainage area 2

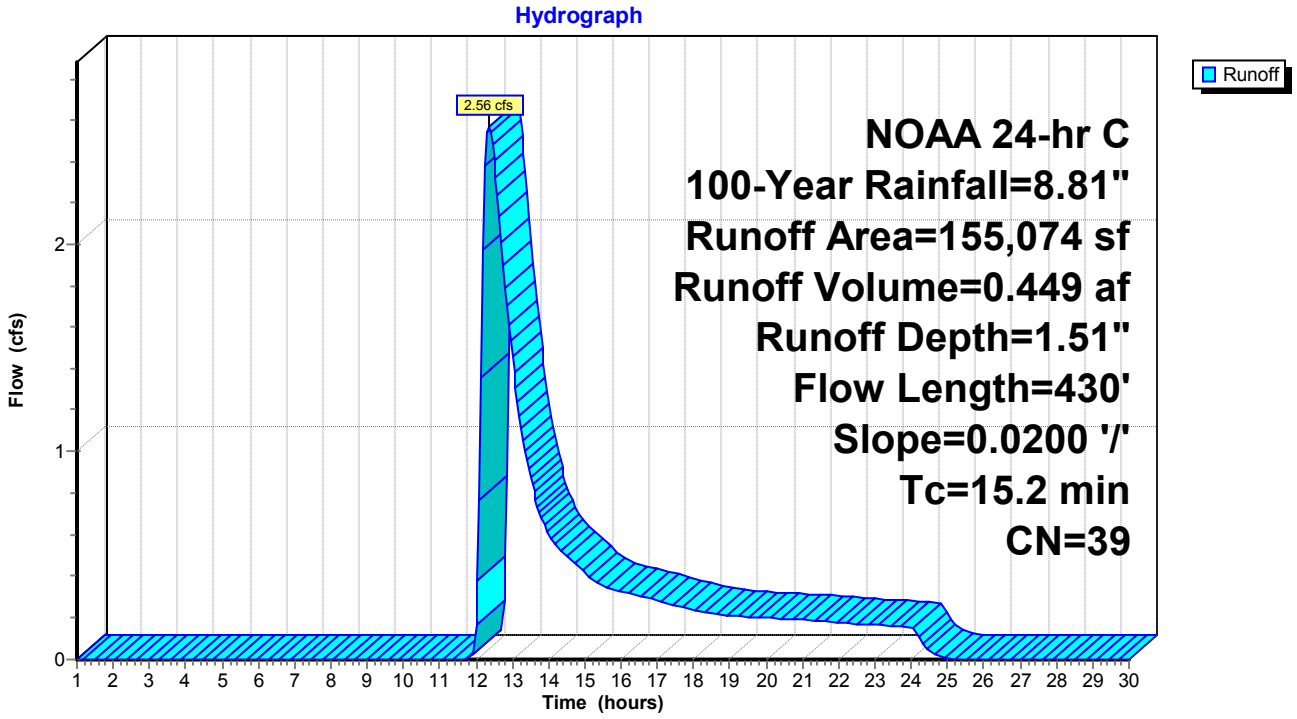
Runoff = 2.56 cfs @ 12.35 hrs, Volume= 0.449 af, Depth= 1.51"

Runoff by SCS TR-20 method, UH=Delmarva, Weighted-CN, Time Span= 1.00-30.00 hrs, dt= 0.05 hrs
NOAA 24-hr C 100-Year Rainfall=8.81"

Area (sf)	CN	Description
155,074	39	>75% Grass cover, Good, HSG A
155,074		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
9.6	100	0.0200	0.17		**Sheet Flow,** Grass: Short n= 0.150 P2= 3.36"
5.6	330	0.0200	0.99		**Shallow Concentrated Flow,** Short Grass Pasture Kv= 7.0 fps
15.2	430	Total			

Subcatchment 9S: Drainage area 2



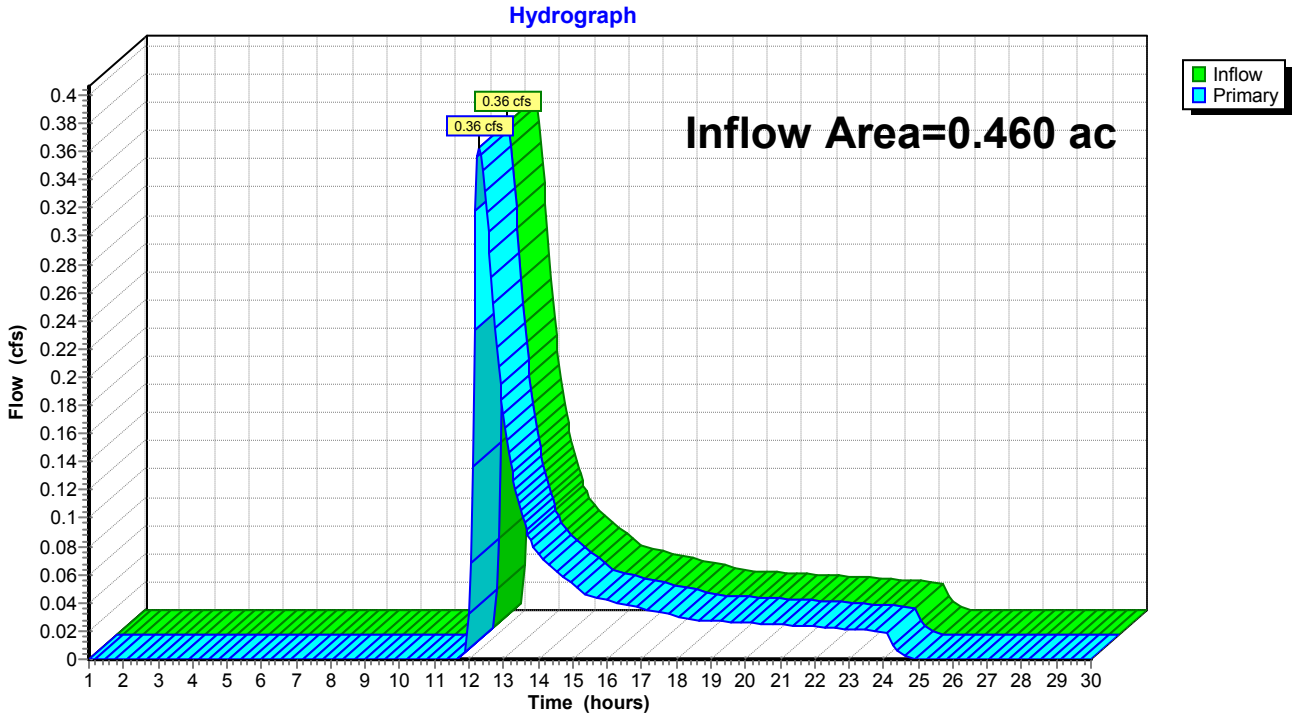
Summary for Pond 11P: anlaysis point 1

[40] Hint: Not Described (Outflow=Inflow)

Inflow Area = 0.460 ac, 0.00% Impervious, Inflow Depth = 1.51" for 100-Year event
Inflow = 0.36 cfs @ 12.30 hrs, Volume= 0.058 af
Primary = 0.36 cfs @ 12.30 hrs, Volume= 0.058 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind method, Time Span= 1.00-30.00 hrs, dt= 0.05 hrs

Pond 11P: anlaysis point 1



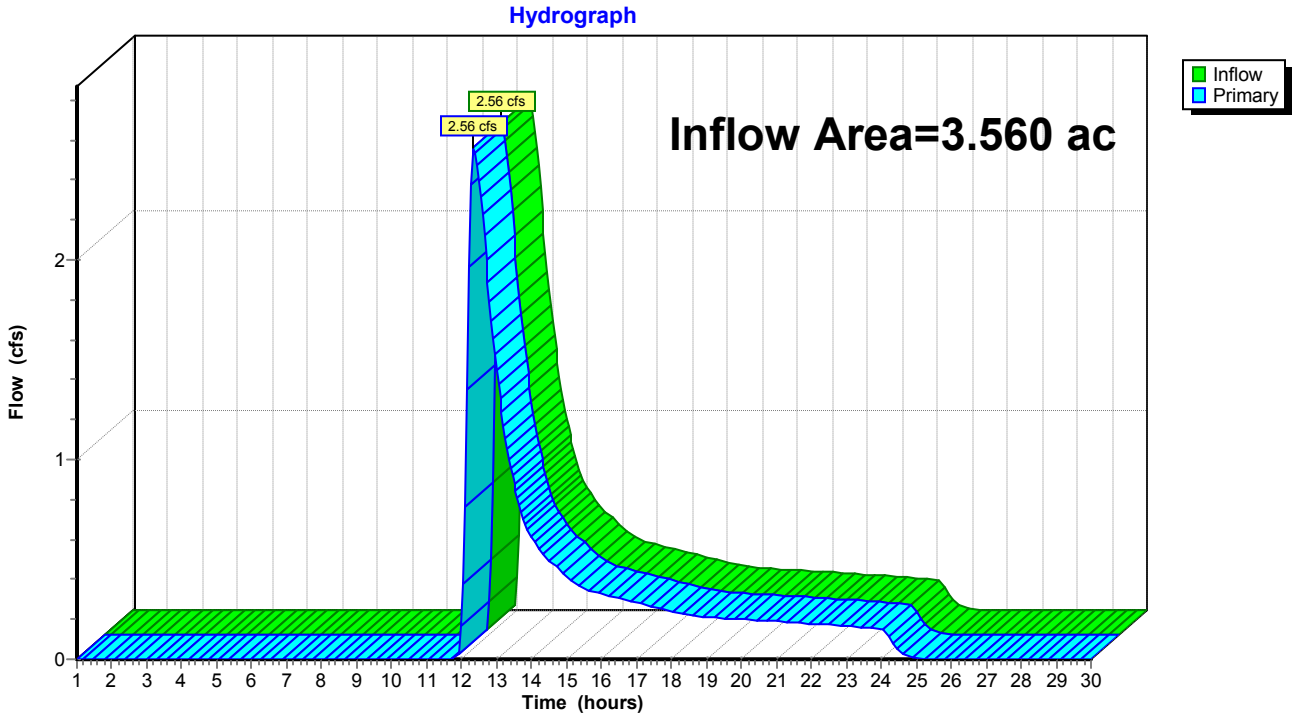
Summary for Pond 12P: analysis point 2

[40] Hint: Not Described (Outflow=Inflow)

Inflow Area = 3.560 ac, 0.00% Impervious, Inflow Depth = 1.51" for 100-Year event
Inflow = 2.56 cfs @ 12.35 hrs, Volume= 0.449 af
Primary = 2.56 cfs @ 12.35 hrs, Volume= 0.449 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind method, Time Span= 1.00-30.00 hrs, dt= 0.05 hrs

Pond 12P: analysis point 2



Summary for Subcatchment 8S: Drainage Area 1

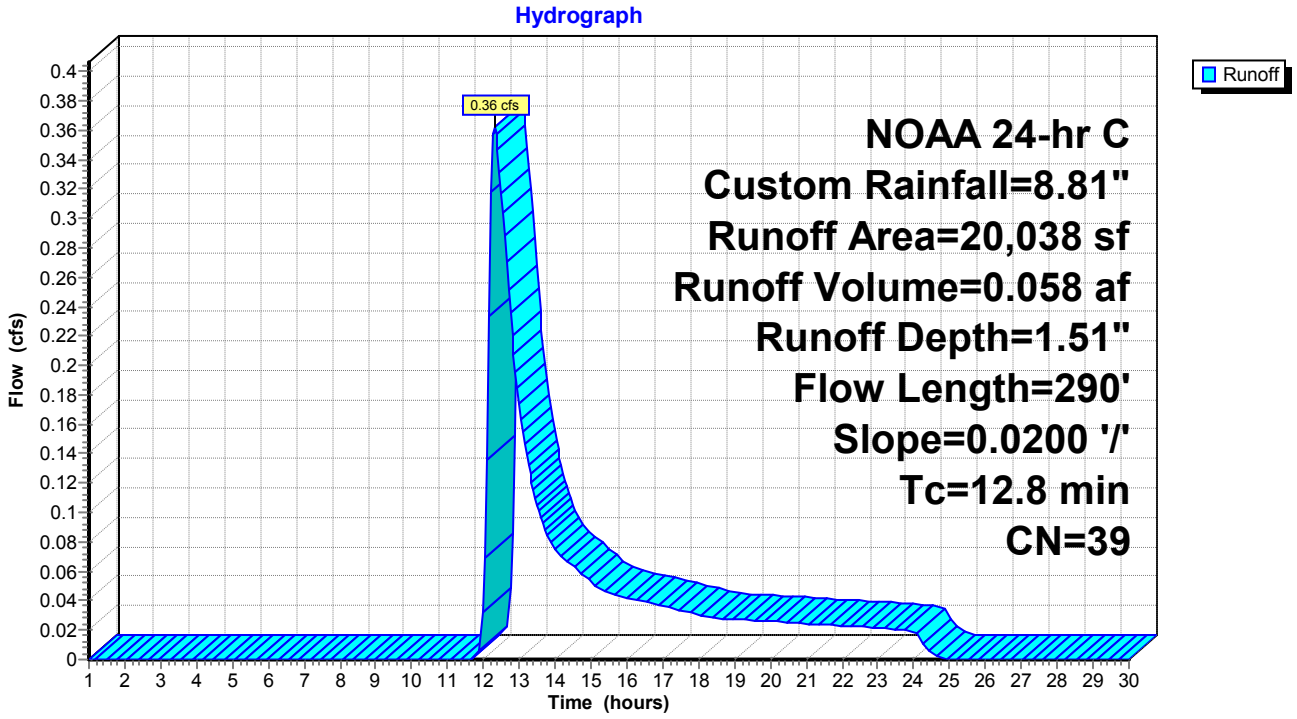
Runoff = 0.36 cfs @ 12.30 hrs, Volume= 0.058 af, Depth= 1.51"

Runoff by SCS TR-20 method, UH=Delmarva, Weighted-CN, Time Span= 1.00-30.00 hrs, dt= 0.05 hrs
NOAA 24-hr C Custom Rainfall=8.81"

Area (sf)	CN	Description
20,038	39	>75% Grass cover, Good, HSG A
20,038		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
9.6	100	0.0200	0.17		**Sheet Flow,** Grass: Short n= 0.150 P2= 3.36"
3.2	190	0.0200	0.99		**Shallow Concentrated Flow,** Short Grass Pasture Kv= 7.0 fps
12.8	290	Total			

Subcatchment 8S: Drainage Area 1



Summary for Subcatchment 9S: Drainage area 2

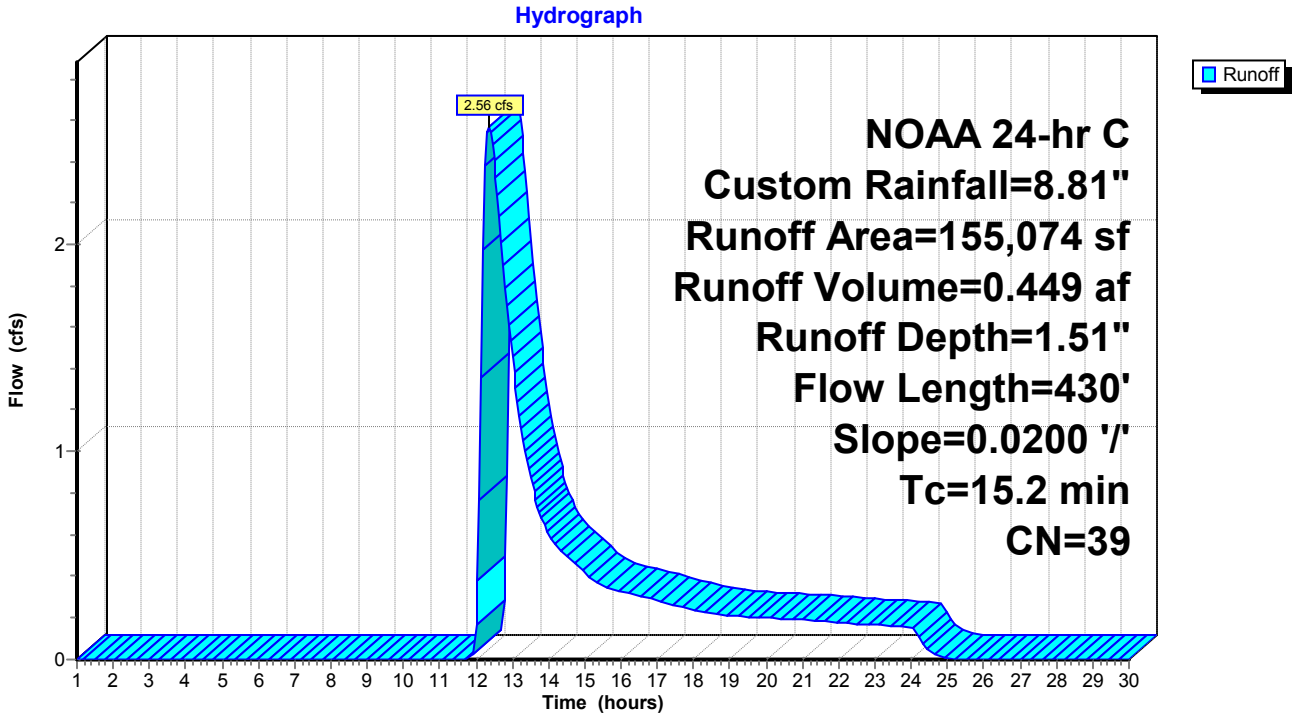
Runoff = 2.56 cfs @ 12.35 hrs, Volume= 0.449 af, Depth= 1.51"

Runoff by SCS TR-20 method, UH=Delmarva, Weighted-CN, Time Span= 1.00-30.00 hrs, dt= 0.05 hrs
NOAA 24-hr C Custom Rainfall=8.81"

Area (sf)	CN	Description
155,074	39	>75% Grass cover, Good, HSG A
155,074		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
9.6	100	0.0200	0.17		**Sheet Flow,** Grass: Short n= 0.150 P2= 3.36"
5.6	330	0.0200	0.99		**Shallow Concentrated Flow,** Short Grass Pasture Kv= 7.0 fps
15.2	430	Total			

Subcatchment 9S: Drainage area 2



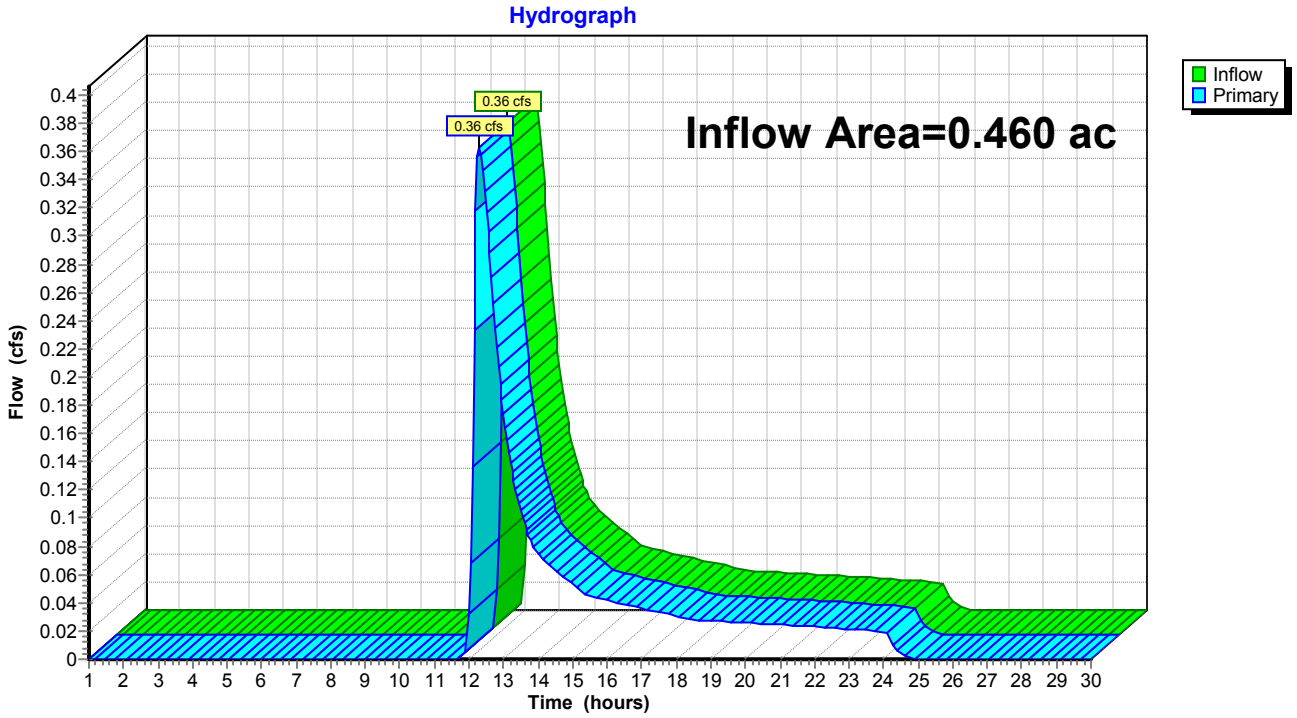
Summary for Pond 11P: anlaysis point 1

[40] Hint: Not Described (Outflow=Inflow)

Inflow Area = 0.460 ac, 0.00% Impervious, Inflow Depth = 1.51" for Custom event
Inflow = 0.36 cfs @ 12.30 hrs, Volume= 0.058 af
Primary = 0.36 cfs @ 12.30 hrs, Volume= 0.058 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind method, Time Span= 1.00-30.00 hrs, dt= 0.05 hrs

Pond 11P: anlaysis point 1



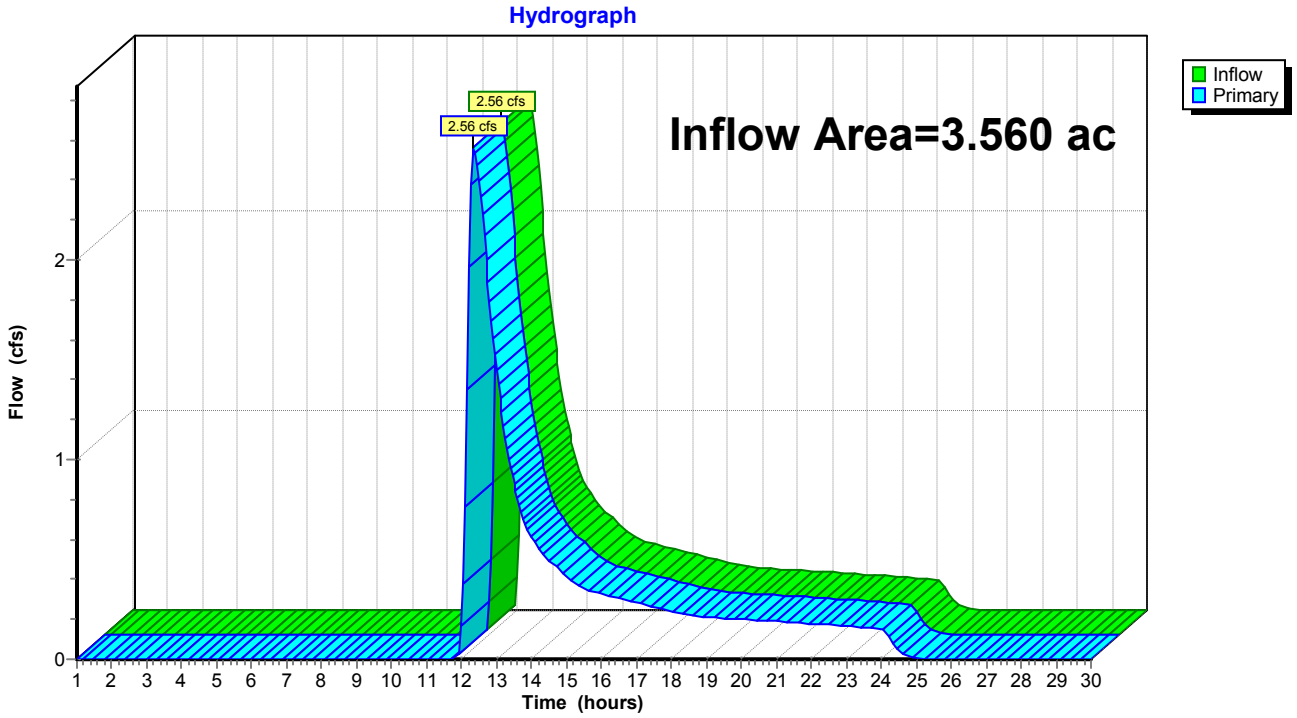
Summary for Pond 12P: analysis point 2

[40] Hint: Not Described (Outflow=Inflow)

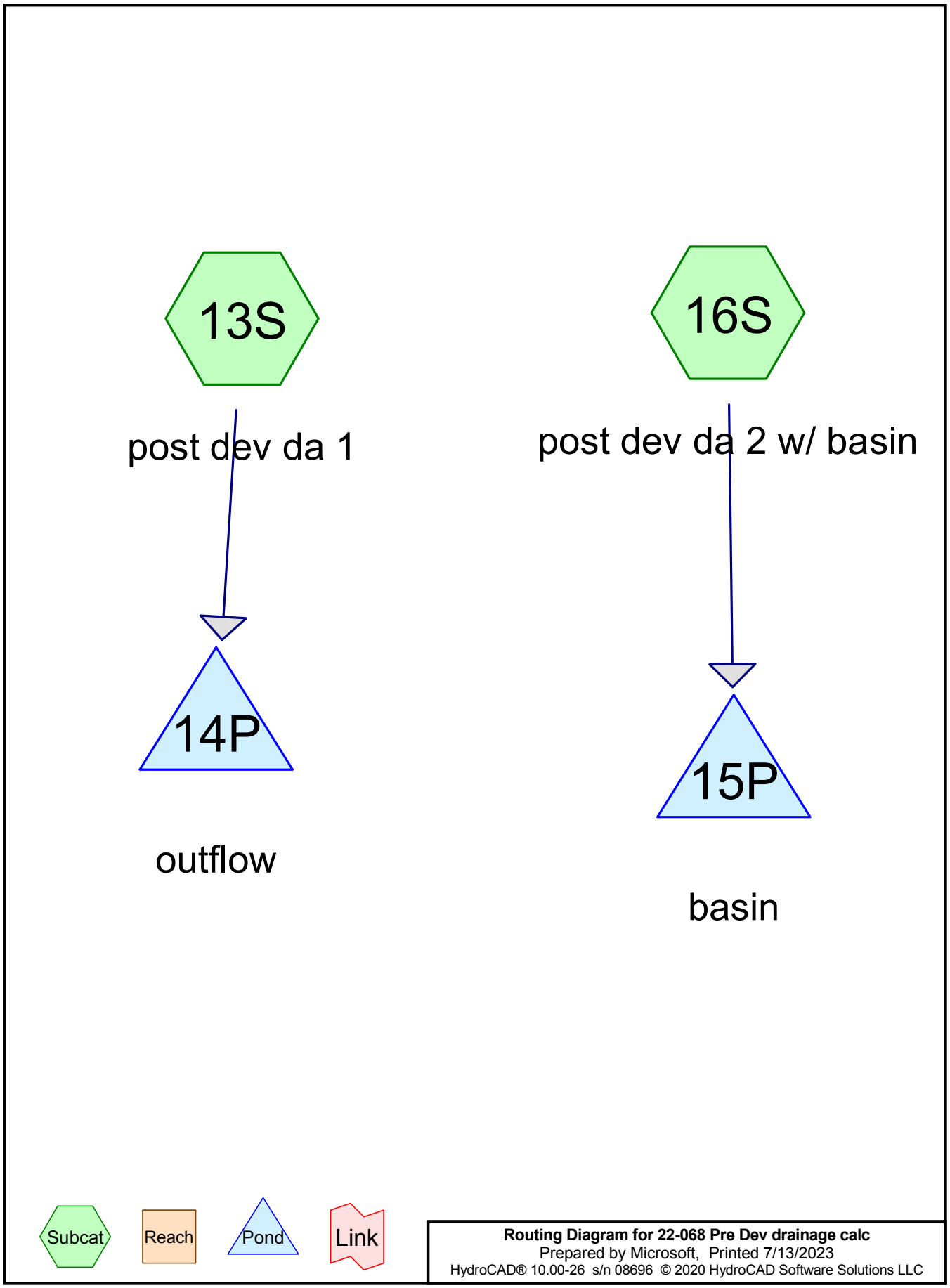
Inflow Area = 3.560 ac, 0.00% Impervious, Inflow Depth = 1.51" for Custom event
Inflow = 2.56 cfs @ 12.35 hrs, Volume= 0.449 af
Primary = 2.56 cfs @ 12.35 hrs, Volume= 0.449 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind method, Time Span= 1.00-30.00 hrs, dt= 0.05 hrs

Pond 12P: analysis point 2



III. POST-DEVELOPED CONDITIONS



Routing Diagram for 22-068 Pre Dev drainage calc
Prepared by Microsoft, Printed 7/13/2023

Area Listing (selected nodes)

Area (acres)	CN	Description (subcatchment-numbers)
3.237	39	>75% Grass cover, Good, HSG A (13S, 16S)
0.599	98	Paved parking, HSG A (16S)
0.184	98	Roofs, HSG B (16S)
4.020	**50**	**TOTAL AREA**

Soil Listing (selected nodes)

Area (acres)	Soil Group	Subcatchment Numbers
3.836	HSG A	13S, 16S
0.184	HSG B	16S
0.000	HSG C	
0.000	HSG D	
0.000	Other	
4.020		**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
3.237	0.000	0.000	0.000	0.000	3.237	>75% Grass cover, Good	13S, 16S
0.599	0.000	0.000	0.000	0.000	0.599	Paved parking	16S
0.000	0.184	0.000	0.000	0.000	0.184	Roofs	16S
3.836	**0.184**	**0.000**	**0.000**	**0.000**	**4.020**	**TOTAL AREA**	

Summary for Subcatchment 13S: post dev da 1

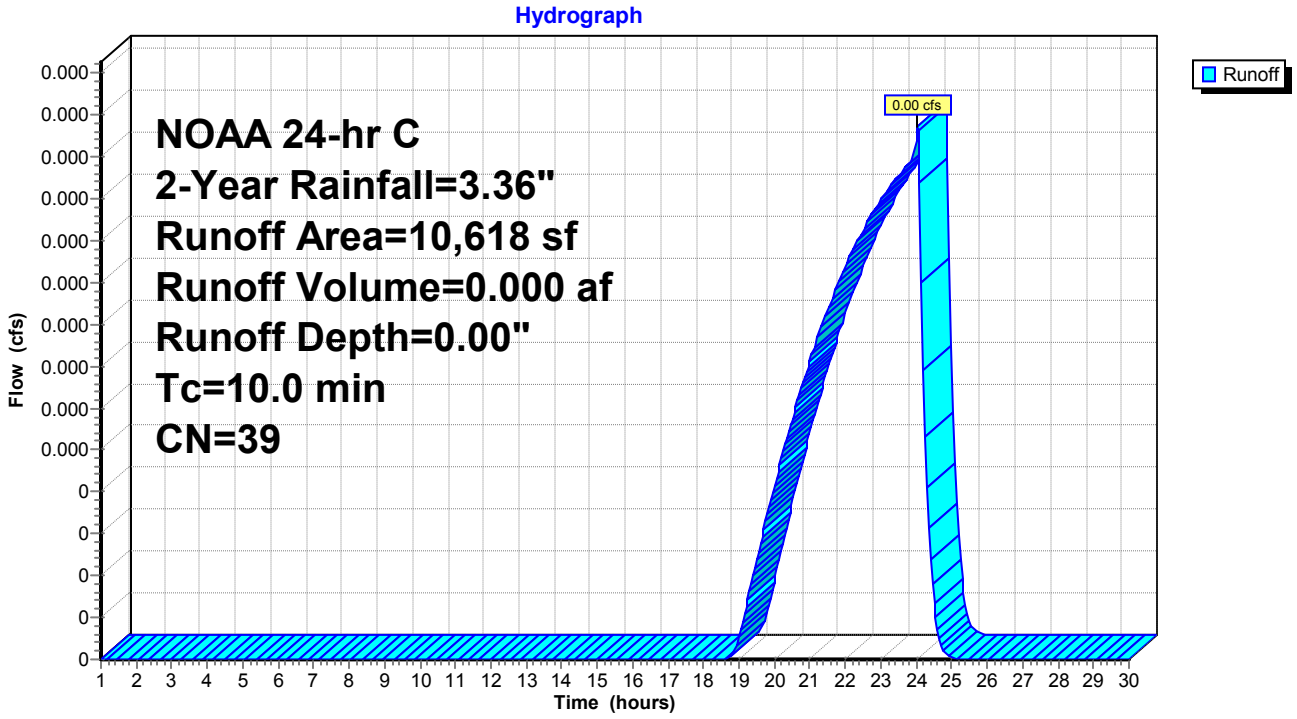
Runoff = 0.00 cfs @ 24.03 hrs, Volume= 0.000 af, Depth= 0.00"

Runoff by SCS TR-20 method, UH=Delmarva, Weighted-CN, Time Span= 1.00-30.00 hrs, dt= 0.05 hrs
NOAA 24-hr C 2-Year Rainfall=3.36"

Area (sf)	CN	Description
10,618	39	>75% Grass cover, Good, HSG A
10,618		100.00% Pervious Area

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

Subcatchment 13S: post dev da 1



Summary for Subcatchment 16S: post dev da 2 w/ basin

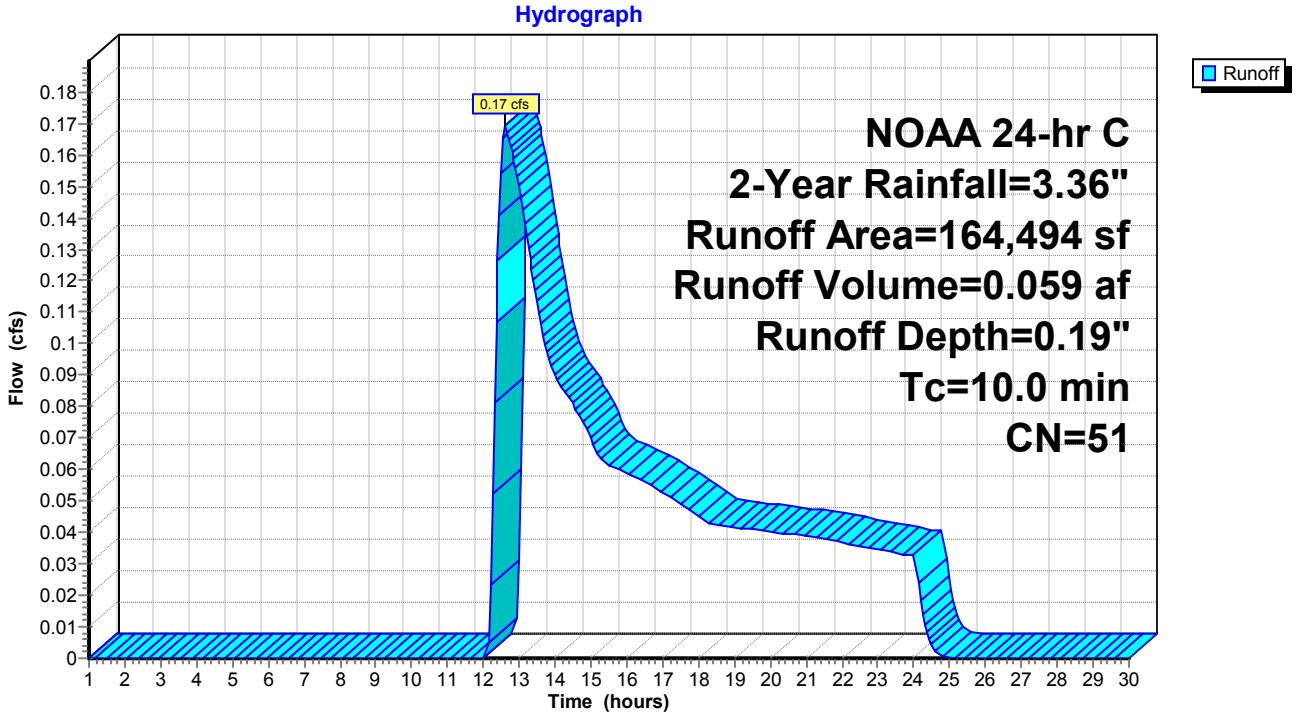
Runoff = 0.17 cfs @ 12.61 hrs, Volume= 0.059 af, Depth= 0.19"

Runoff by SCS TR-20 method, UH=Delmarva, Weighted-CN, Time Span= 1.00-30.00 hrs, dt= 0.05 hrs
NOAA 24-hr C 2-Year Rainfall=3.36"

Area (sf)	CN	Description
130,383	39	>75% Grass cover, Good, HSG A
8,000	98	Roofs, HSG B
26,111	98	Paved parking, HSG A
164,494	51	Weighted Average
130,383		79.26% Pervious Area
34,111		20.74% Impervious Area

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

Subcatchment 16S: post dev da 2 w/ basin



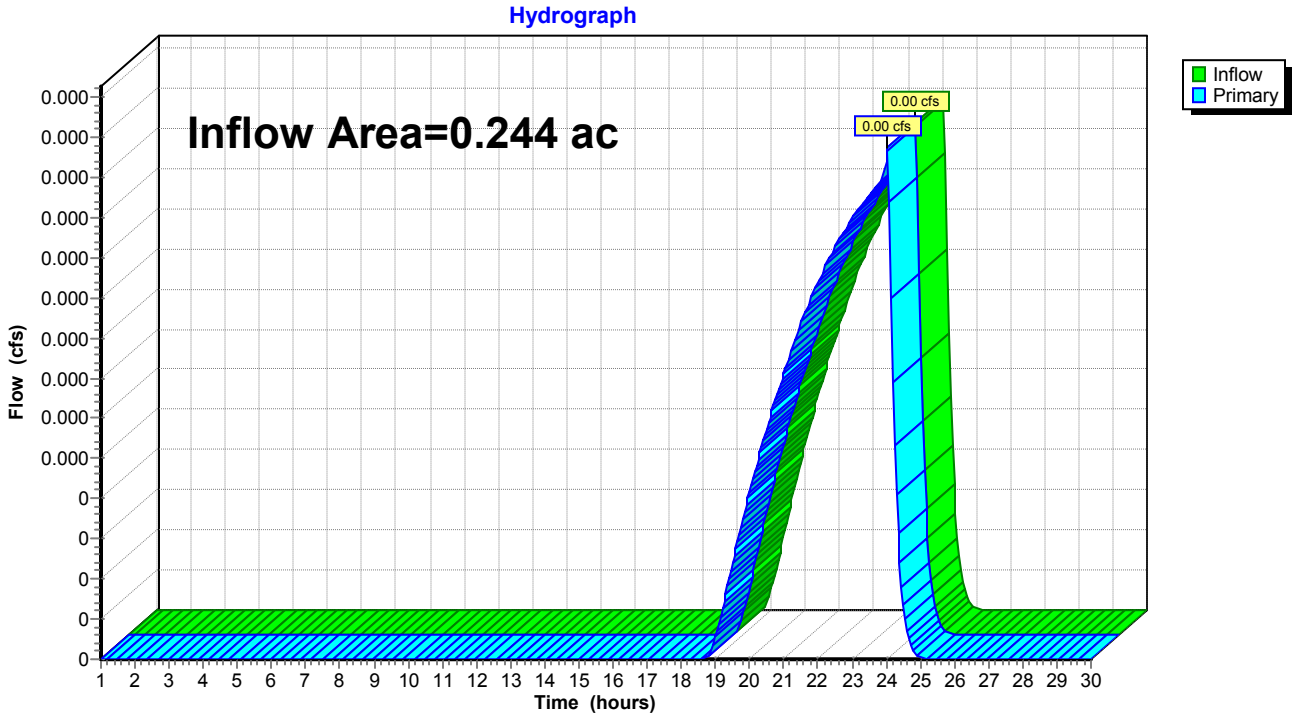
Summary for Pond 14P: outflow

[40] Hint: Not Described (Outflow=Inflow)

Inflow Area = 0.244 ac, 0.00% Impervious, Inflow Depth = 0.00" for 2-Year event
Inflow = 0.00 cfs @ 24.03 hrs, Volume= 0.000 af
Primary = 0.00 cfs @ 24.03 hrs, Volume= 0.000 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind method, Time Span= 1.00-30.00 hrs, dt= 0.05 hrs

Pond 14P: outflow



Summary for Pond 15P: basin

Inflow Area = 3.776 ac, 20.74% Impervious, Inflow Depth = 0.19" for 2-Year event
Inflow = 0.17 cfs @ 12.61 hrs, Volume= 0.059 af
Outflow = 0.00 cfs @ 1.00 hrs, Volume= 0.000 af, Atten= 100%, Lag= 0.0 min
Primary = 0.00 cfs @ 1.00 hrs, Volume= 0.000 af

Routing by Stor-Ind method, Time Span= 1.00-30.00 hrs, dt= 0.05 hrs
Peak Elev= 9.45' @ 25.15 hrs Surf.Area= 2,268 sf Storage= 2,567 cf

Plug-Flow detention time= (not calculated: initial storage exceeds outflow)
Center-of-Mass det. time= (not calculated: no outflow)

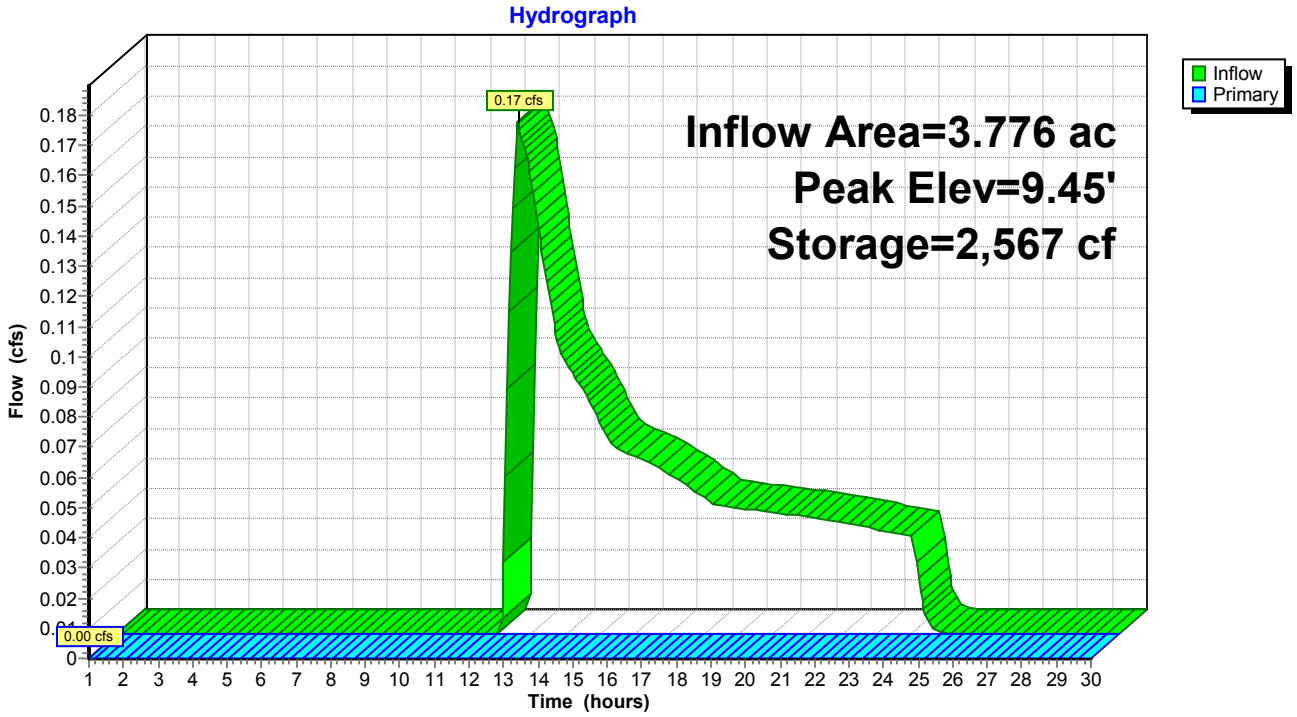
Volume	Invert	Avail.Storage	Storage Description
#1	8.00'	21,108 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
8.00	1,292	0	0
9.00	1,948	1,620	1,620
10.00	2,660	2,304	3,924
11.00	3,428	3,044	6,968
12.00	4,254	3,841	10,809
13.00	5,135	4,695	15,504
14.00	6,073	5,604	21,108

Device	Routing	Invert	Outlet Devices
#1	Primary	13.20'	**3.0' long Sharp-Crested Rectangular Weir** 2 End Contraction(s)

Primary OutFlow Max=0.00 cfs @ 1.00 hrs HW=8.00' (Free Discharge)
1=Sharp-Crested Rectangular Weir (Controls 0.00 cfs)

Pond 15P: basin



Summary for Subcatchment 13S: post dev da 1

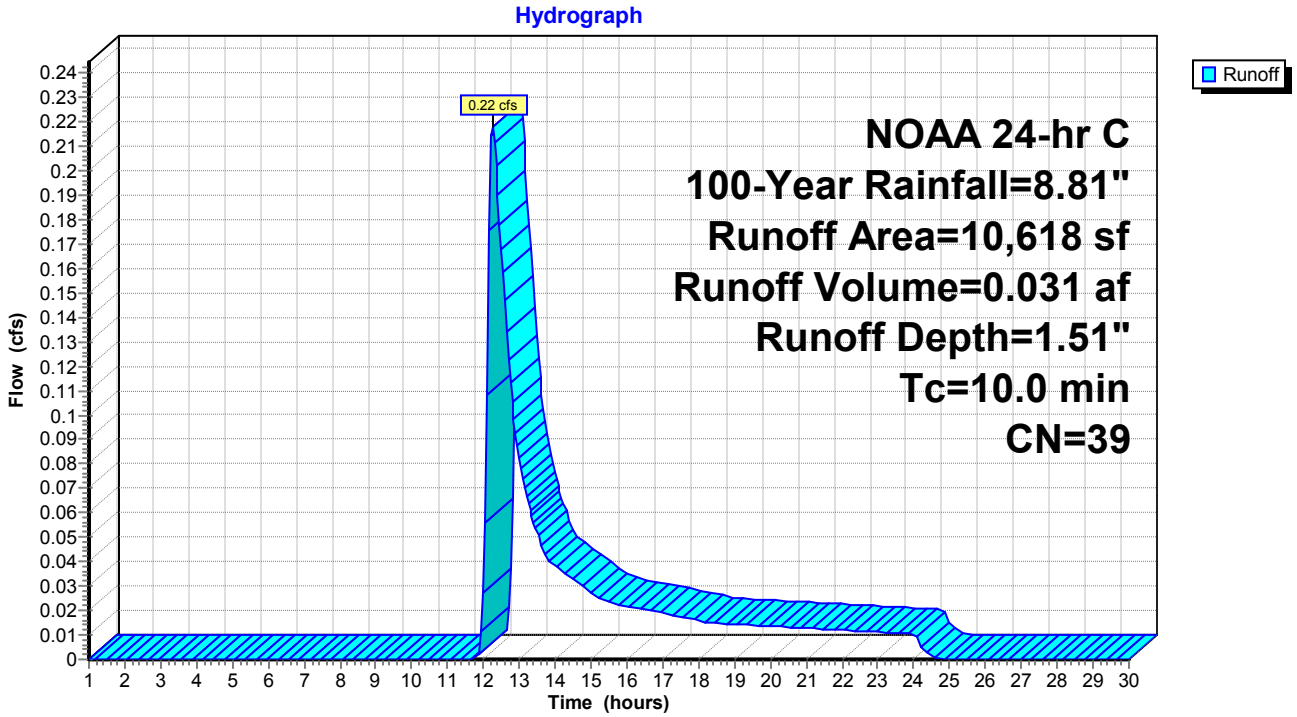
Runoff = 0.22 cfs @ 12.24 hrs, Volume= 0.031 af, Depth= 1.51"

Runoff by SCS TR-20 method, UH=Delmarva, Weighted-CN, Time Span= 1.00-30.00 hrs, dt= 0.05 hrs
NOAA 24-hr C 100-Year Rainfall=8.81"

Area (sf)	CN	Description
10,618	39	>75% Grass cover, Good, HSG A
10,618		100.00% Pervious Area

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

Subcatchment 13S: post dev da 1



Summary for Subcatchment 16S: post dev da 2 w/ basin

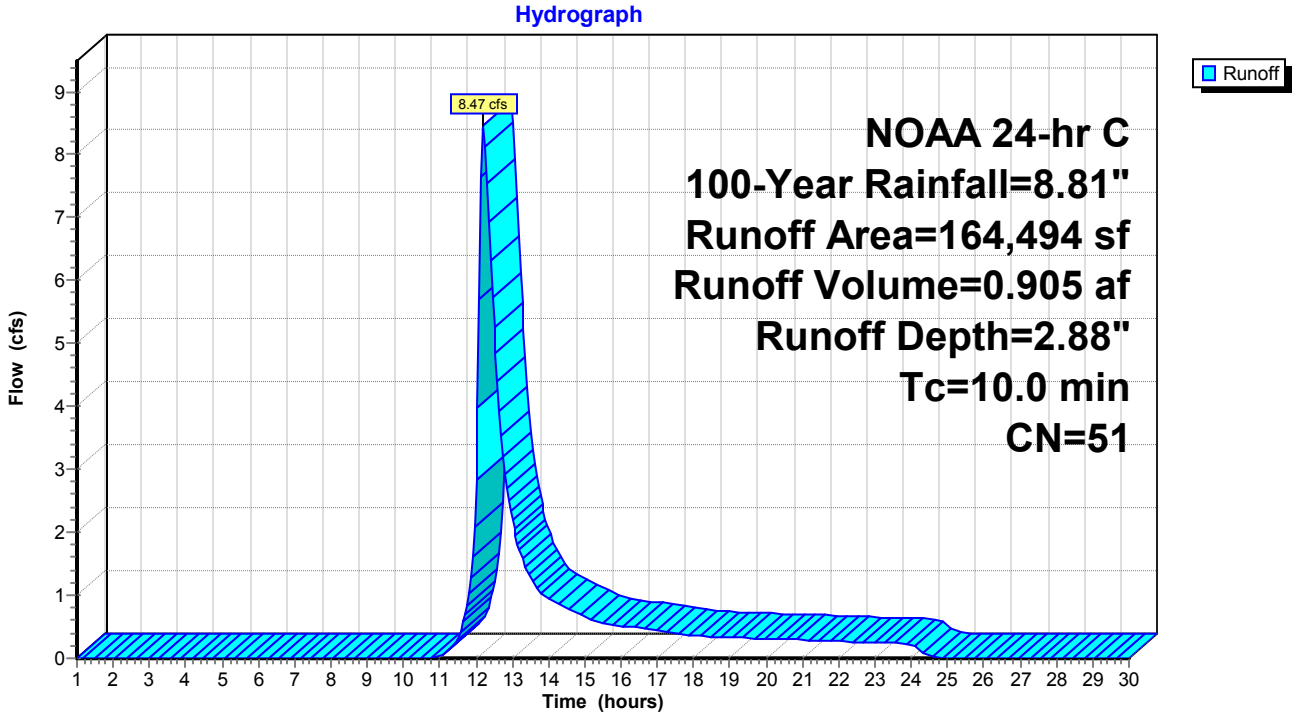
Runoff = 8.47 cfs @ 12.21 hrs, Volume= 0.905 af, Depth= 2.88"

Runoff by SCS TR-20 method, UH=Delmarva, Weighted-CN, Time Span= 1.00-30.00 hrs, dt= 0.05 hrs
NOAA 24-hr C 100-Year Rainfall=8.81"

Area (sf)	CN	Description
130,383	39	>75% Grass cover, Good, HSG A
8,000	98	Roofs, HSG B
26,111	98	Paved parking, HSG A
164,494	51	Weighted Average
130,383		79.26% Pervious Area
34,111		20.74% Impervious Area

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

Subcatchment 16S: post dev da 2 w/ basin



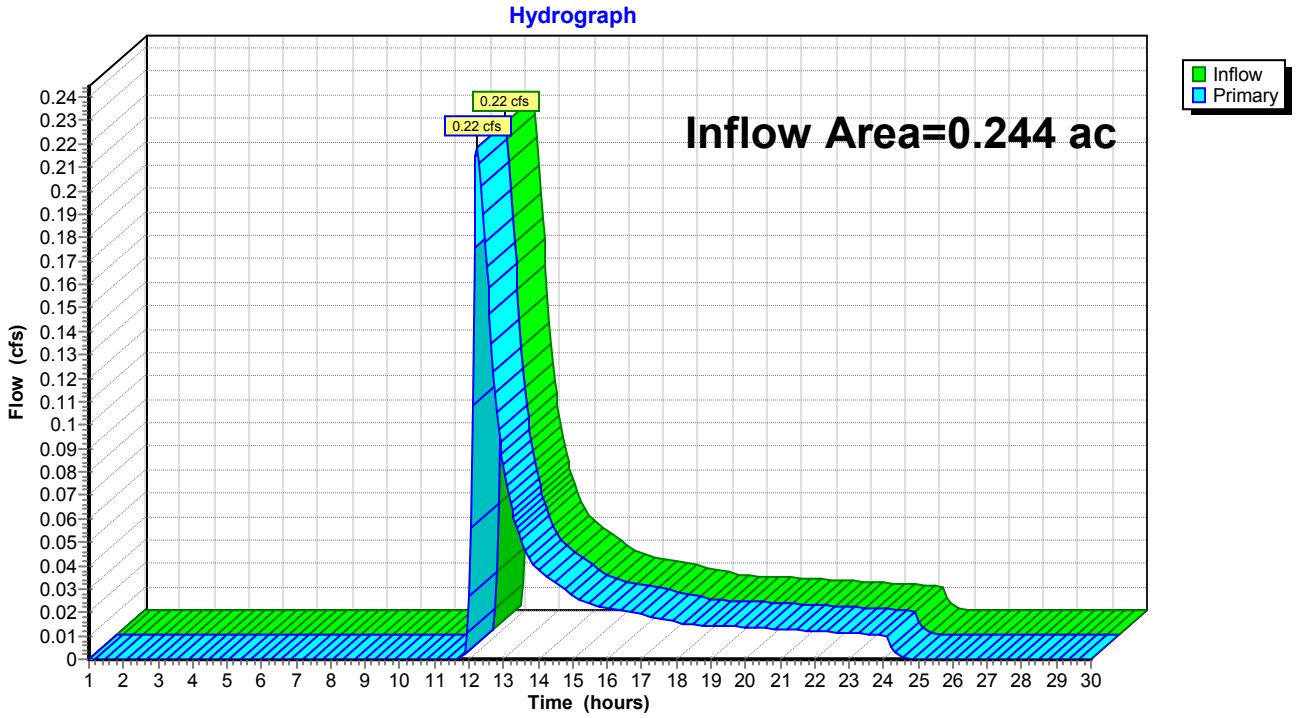
Summary for Pond 14P: outflow

[40] Hint: Not Described (Outflow=Inflow)

Inflow Area = 0.244 ac, 0.00% Impervious, Inflow Depth = 1.51" for 100-Year event
Inflow = 0.22 cfs @ 12.24 hrs, Volume= 0.031 af
Primary = 0.22 cfs @ 12.24 hrs, Volume= 0.031 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind method, Time Span= 1.00-30.00 hrs, dt= 0.05 hrs

Pond 14P: outflow



Summary for Pond 15P: basin

Inflow Area = 3.776 ac, 20.74% Impervious, Inflow Depth = 2.88" for 100-Year event
Inflow = 8.47 cfs @ 12.21 hrs, Volume= 0.905 af
Outflow = 2.01 cfs @ 13.07 hrs, Volume= 0.525 af, Atten= 76%, Lag= 51.8 min
Primary = 2.01 cfs @ 13.07 hrs, Volume= 0.525 af

Routing by Stor-Ind method, Time Span= 1.00-30.00 hrs, dt= 0.05 hrs
Peak Elev= 13.55' @ 13.07 hrs Surf.Area= 5,653 sf Storage= 18,482 cf

Plug-Flow detention time= 251.1 min calculated for 0.524 af (58% of inflow)
Center-of-Mass det. time= 124.7 min (999.8 - 875.1)

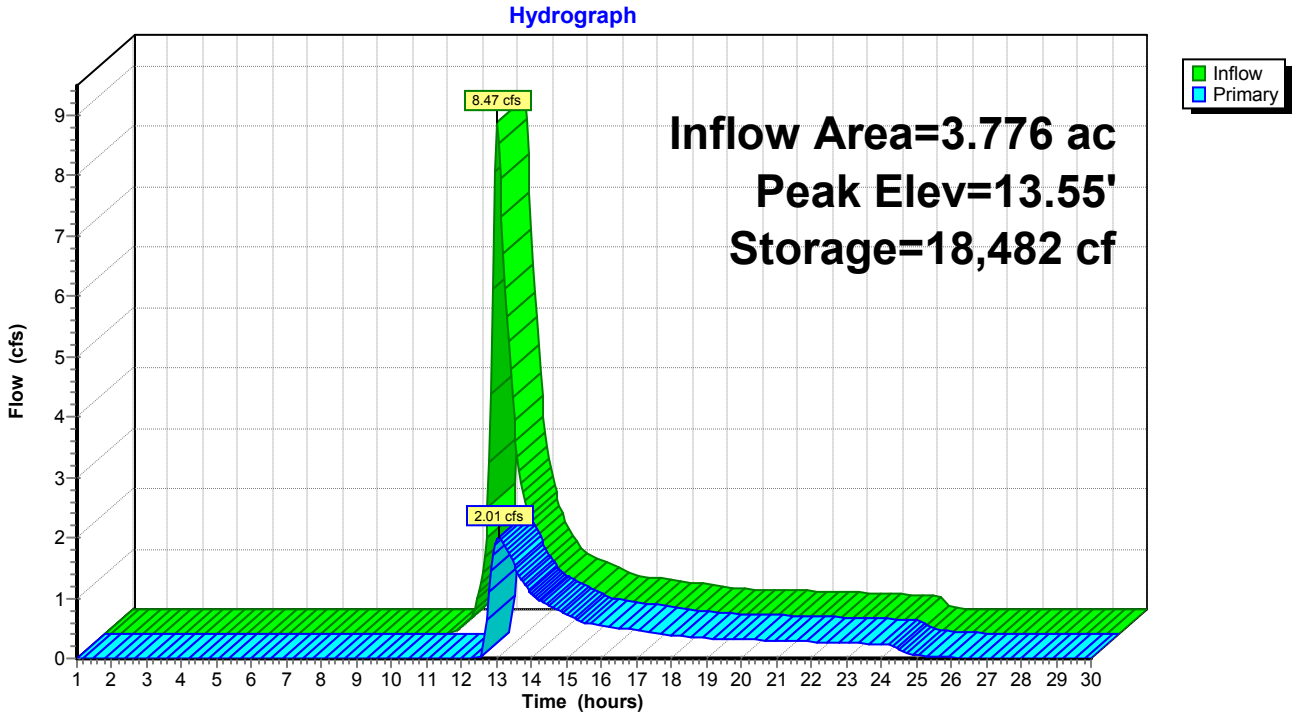
Volume	Invert	Avail.Storage	Storage Description
#1	8.00'	21,108 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
8.00	1,292	0	0
9.00	1,948	1,620	1,620
10.00	2,660	2,304	3,924
11.00	3,428	3,044	6,968
12.00	4,254	3,841	10,809
13.00	5,135	4,695	15,504
14.00	6,073	5,604	21,108

Device	Routing	Invert	Outlet Devices
#1	Primary	13.20'	**3.0' long Sharp-Crested Rectangular Weir** 2 End Contraction(s)

Primary OutFlow Max=2.00 cfs @ 13.07 hrs HW=13.55' (Free Discharge)
1=Sharp-Crested Rectangular Weir (Weir Controls 2.00 cfs @ 1.94 fps)

Pond 15P: basin



Summary for Subcatchment 13S: post dev da 1

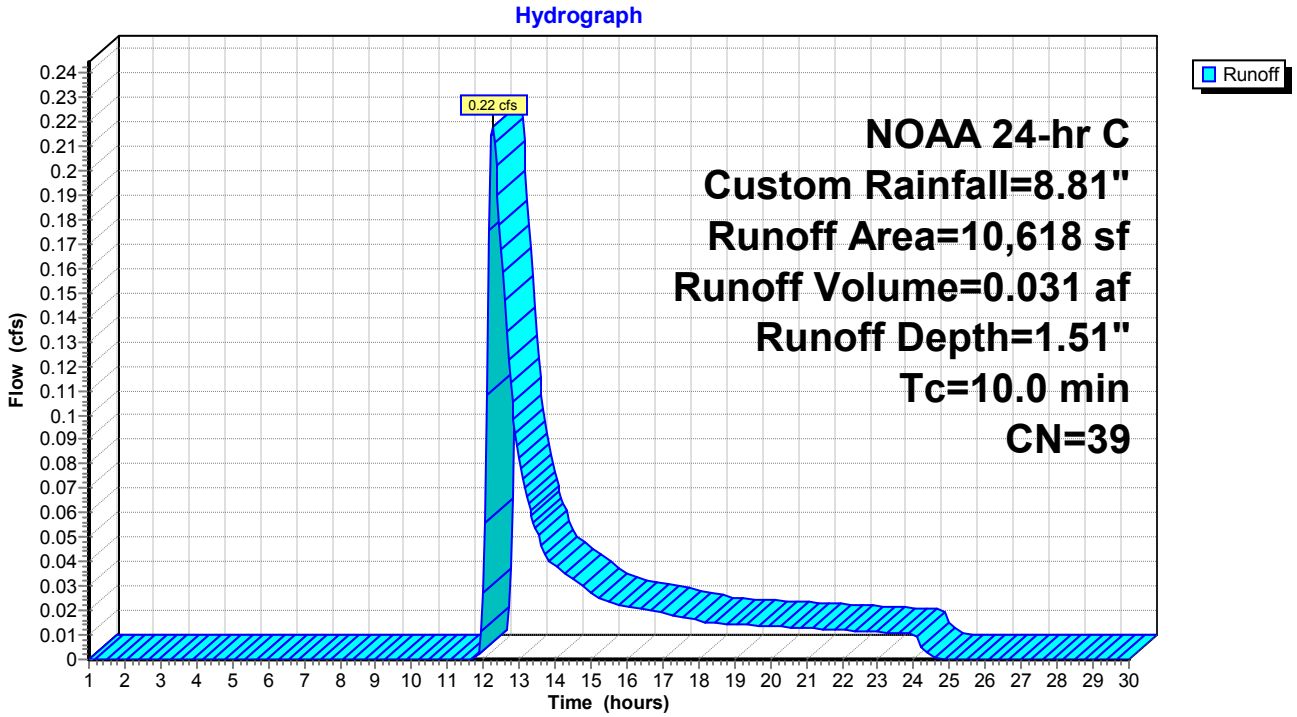
Runoff = 0.22 cfs @ 12.24 hrs, Volume= 0.031 af, Depth= 1.51"

Runoff by SCS TR-20 method, UH=Delmarva, Weighted-CN, Time Span= 1.00-30.00 hrs, dt= 0.05 hrs
NOAA 24-hr C Custom Rainfall=8.81"

Area (sf)	CN	Description
10,618	39	>75% Grass cover, Good, HSG A
10,618		100.00% Pervious Area

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

Subcatchment 13S: post dev da 1



Summary for Subcatchment 16S: post dev da 2 w/ basin

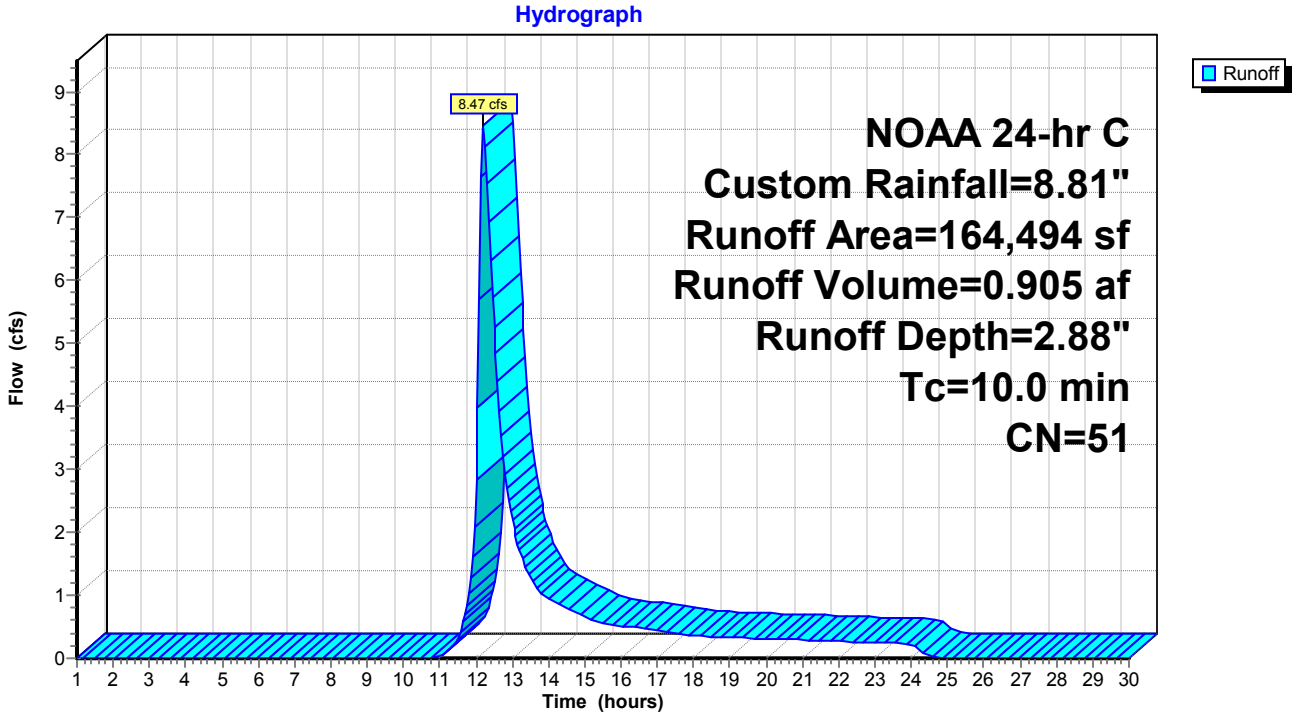
Runoff = 8.47 cfs @ 12.21 hrs, Volume= 0.905 af, Depth= 2.88"

Runoff by SCS TR-20 method, UH=Delmarva, Weighted-CN, Time Span= 1.00-30.00 hrs, dt= 0.05 hrs
NOAA 24-hr C Custom Rainfall=8.81"

Area (sf)	CN	Description
130,383	39	>75% Grass cover, Good, HSG A
8,000	98	Roofs, HSG B
26,111	98	Paved parking, HSG A
164,494	51	Weighted Average
130,383		79.26% Pervious Area
34,111		20.74% Impervious Area

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

Subcatchment 16S: post dev da 2 w/ basin



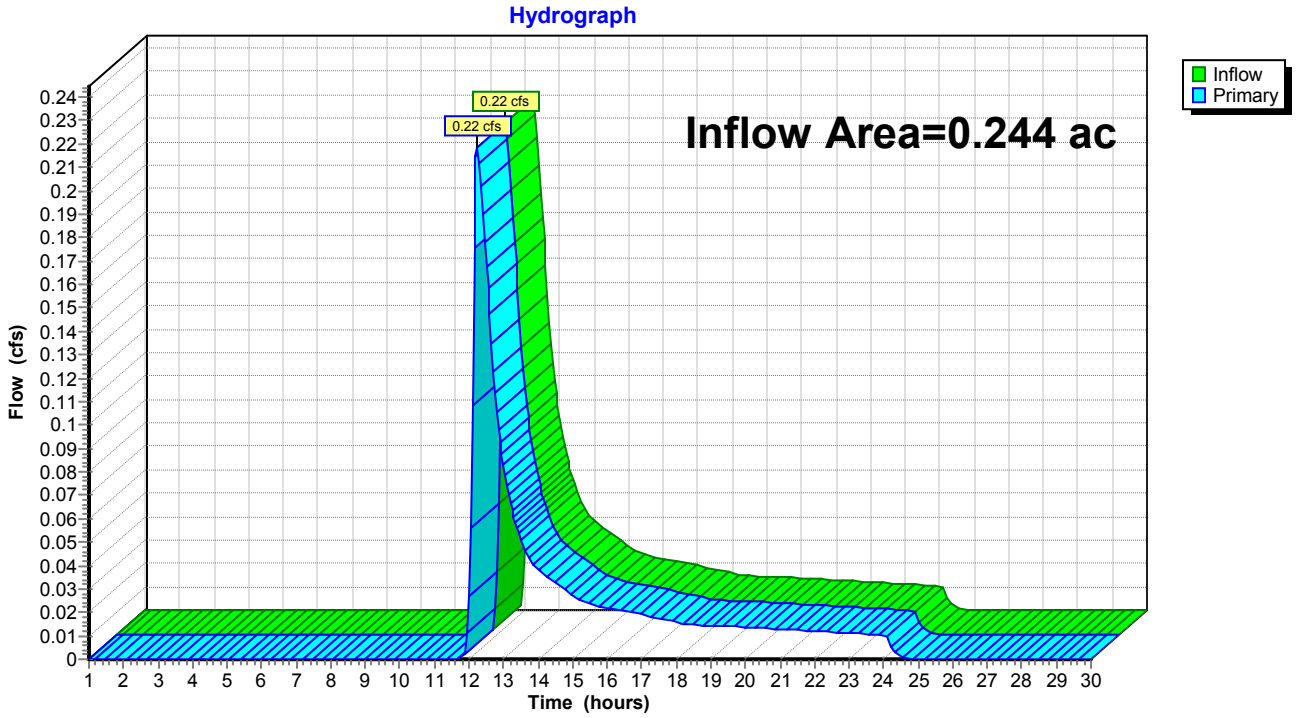
Summary for Pond 14P: outflow

[40] Hint: Not Described (Outflow=Inflow)

Inflow Area = 0.244 ac, 0.00% Impervious, Inflow Depth = 1.51" for Custom event
Inflow = 0.22 cfs @ 12.24 hrs, Volume= 0.031 af
Primary = 0.22 cfs @ 12.24 hrs, Volume= 0.031 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind method, Time Span= 1.00-30.00 hrs, dt= 0.05 hrs

Pond 14P: outflow



Summary for Pond 15P: basin

Inflow Area = 3.776 ac, 20.74% Impervious, Inflow Depth = 2.88" for Custom event
Inflow = 8.47 cfs @ 12.21 hrs, Volume= 0.905 af
Outflow = 2.01 cfs @ 13.07 hrs, Volume= 0.525 af, Atten= 76%, Lag= 51.8 min
Primary = 2.01 cfs @ 13.07 hrs, Volume= 0.525 af

Routing by Stor-Ind method, Time Span= 1.00-30.00 hrs, dt= 0.05 hrs
Peak Elev= 13.55' @ 13.07 hrs Surf.Area= 5,653 sf Storage= 18,482 cf

Plug-Flow detention time= 251.1 min calculated for 0.524 af (58% of inflow)
Center-of-Mass det. time= 124.7 min (999.8 - 875.1)

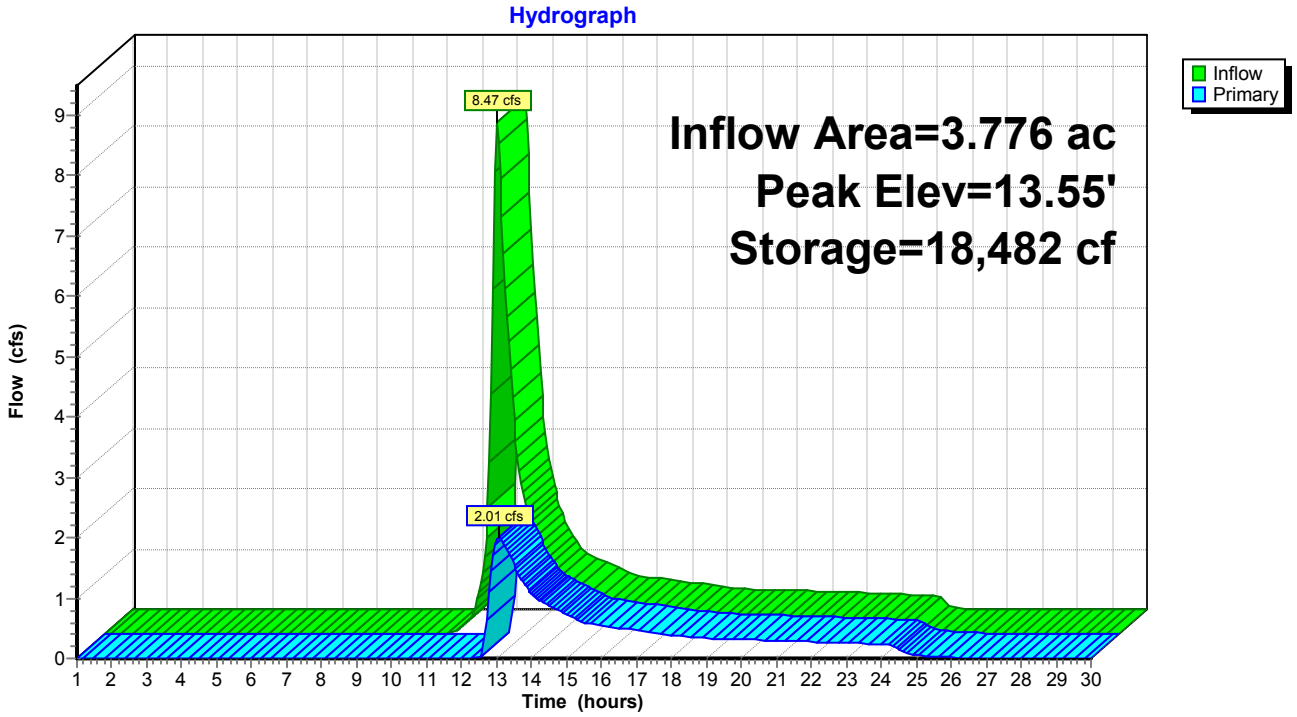
Volume	Invert	Avail.Storage	Storage Description
#1	8.00'	21,108 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
8.00	1,292	0	0
9.00	1,948	1,620	1,620
10.00	2,660	2,304	3,924
11.00	3,428	3,044	6,968
12.00	4,254	3,841	10,809
13.00	5,135	4,695	15,504
14.00	6,073	5,604	21,108

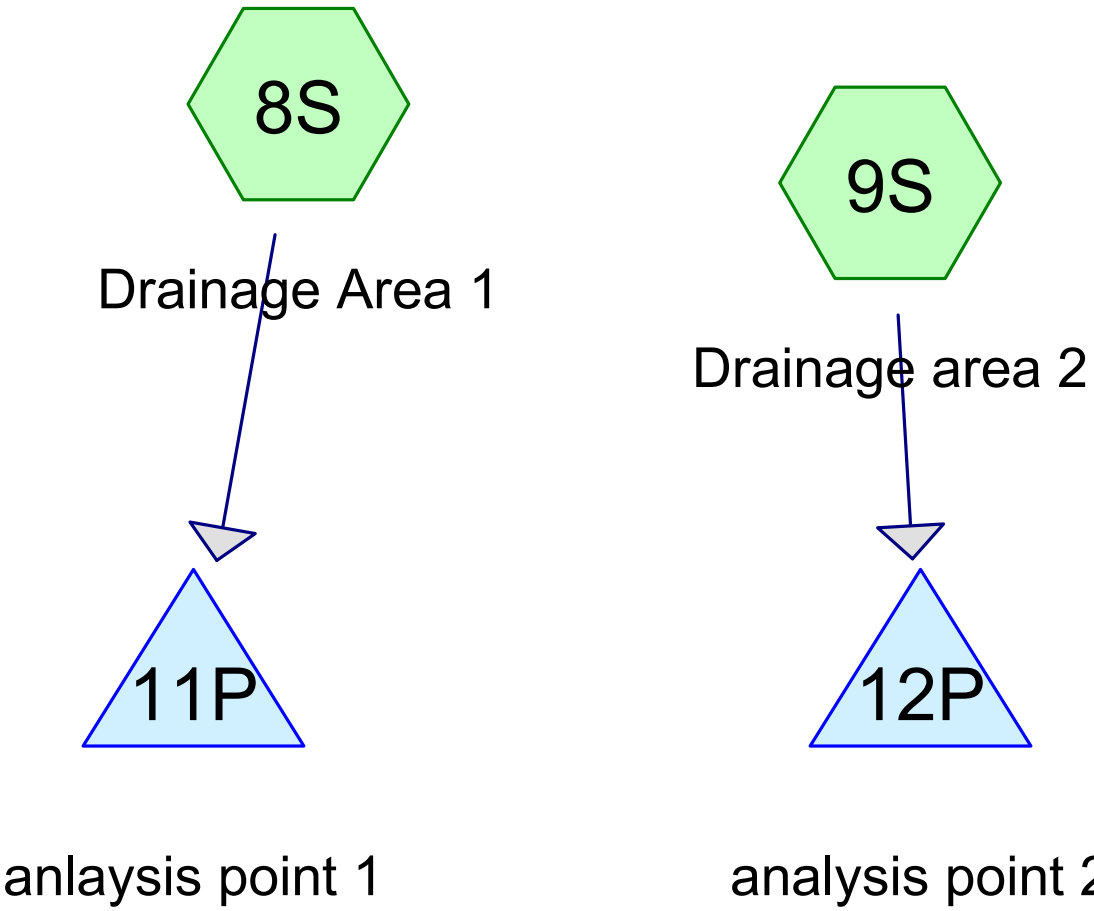
Device	Routing	Invert	Outlet Devices
#1	Primary	13.20'	**3.0' long Sharp-Crested Rectangular Weir** 2 End Contraction(s)

Primary OutFlow Max=2.00 cfs @ 13.07 hrs HW=13.55' (Free Discharge)
1=Sharp-Crested Rectangular Weir (Weir Controls 2.00 cfs @ 1.94 fps)

Pond 15P: basin



WATER QUALITY STORM



Subcat Reach Pond Link

Routing Diagram for 22-068 Pre Dev drainage calc
Prepared by Microsoft, Printed 7/13/2023

Area Listing (selected nodes)

Area (acres)	CN	Description (subcatchment-numbers)
4.020	39	>75% Grass cover, Good, HSG A (8S, 9S)

Soil Listing (selected nodes)

Area (acres)	Soil Group	Subcatchment Numbers
4.020	HSG A	8S, 9S
0.000	HSG B	
0.000	HSG C	
0.000	HSG D	
0.000	Other	

Ground Covers (selected nodes)

HSG-A (acres)	HSG-B (acres)	HSG-C (acres)	HSG-D (acres)	Other (acres)	Total (acres)	Ground Cover	Subcatchment Numbers
4.020	0.000	0.000	0.000	0.000	4.020	>75% Grass cover, Good	8S, 9S

Summary for Subcatchment 8S: Drainage Area 1

[45] Hint: Runoff=Zero

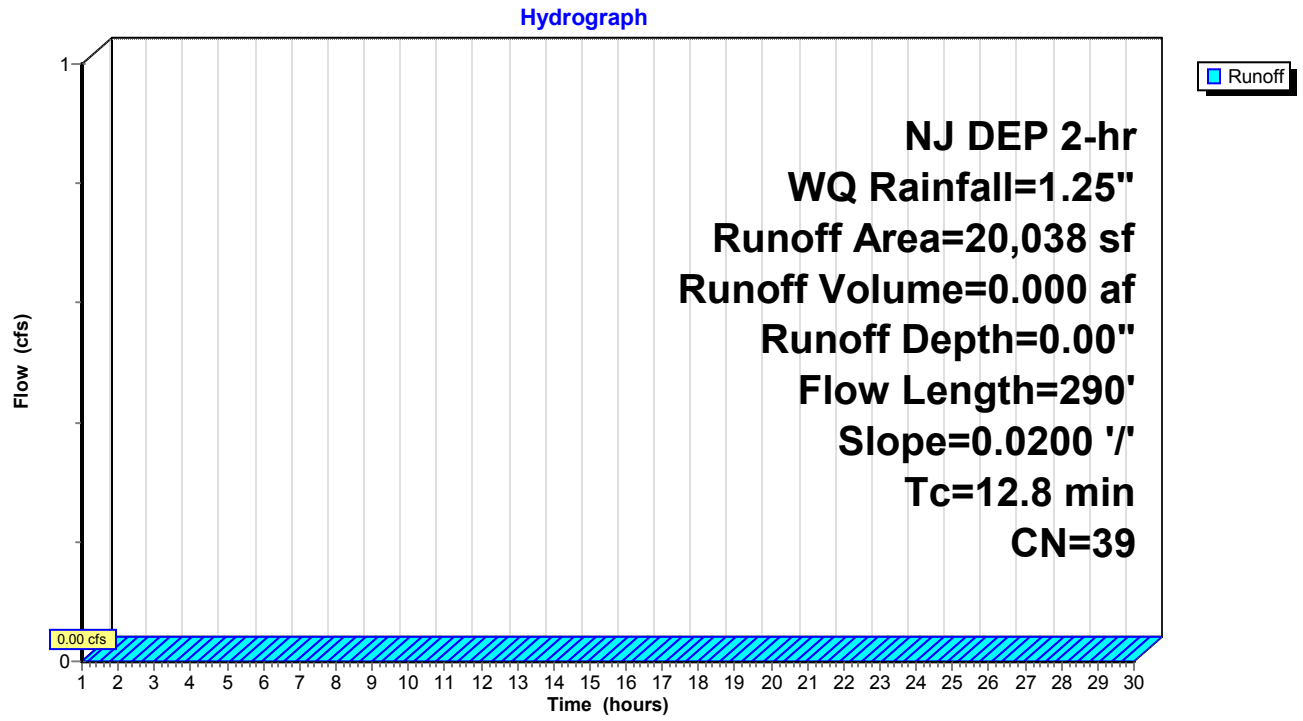
Runoff = 0.00 cfs @ 1.00 hrs, Volume= 0.000 af, Depth= 0.00"

Runoff by SCS TR-20 method, UH=Delmarva, Weighted-CN, Time Span= 1.00-30.00 hrs, dt= 0.05 hrs
NJ DEP 2-hr WQ Rainfall=1.25"

Area (sf)	CN	Description
20,038	39	>75% Grass cover, Good, HSG A
20,038		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
9.6	100	0.0200	0.17		**Sheet Flow,** Grass: Short n= 0.150 P2= 3.36"
3.2	190	0.0200	0.99		**Shallow Concentrated Flow,** Short Grass Pasture Kv= 7.0 fps
12.8	290	Total			

Subcatchment 8S: Drainage Area 1



Summary for Subcatchment 9S: Drainage area 2

[45] Hint: Runoff=Zero

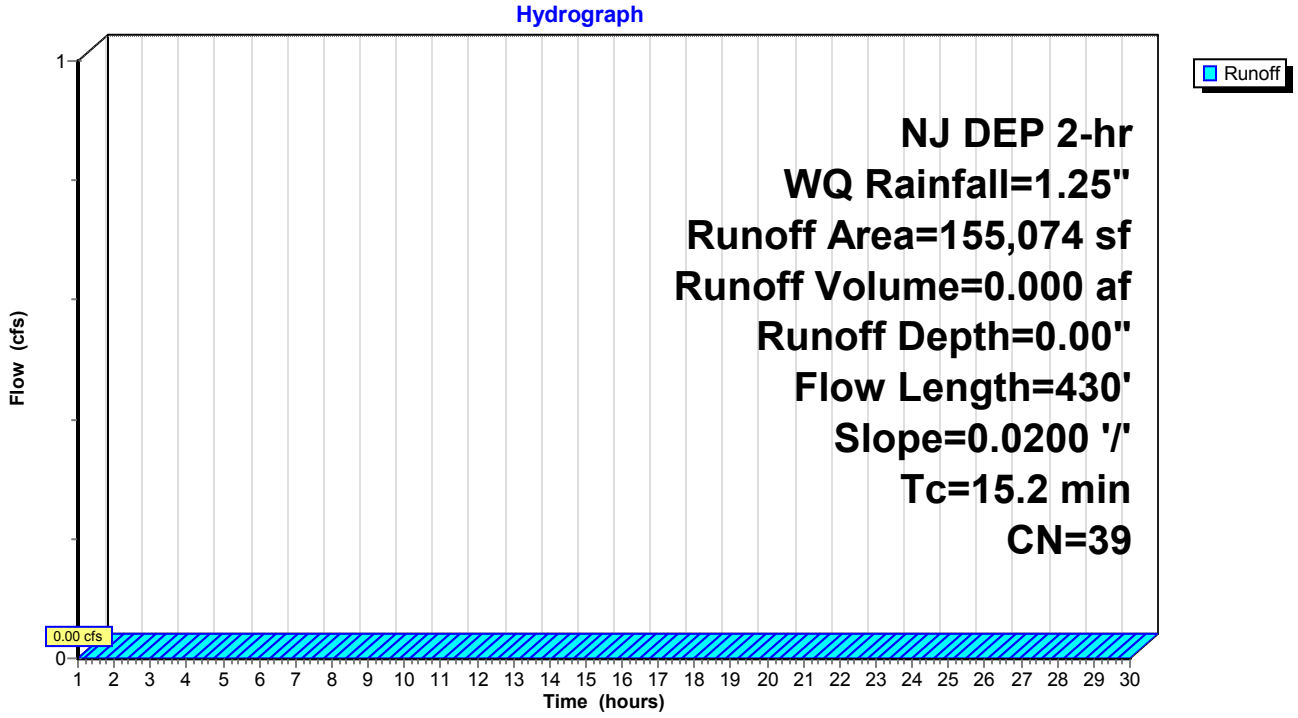
Runoff = 0.00 cfs @ 1.00 hrs, Volume= 0.000 af, Depth= 0.00"

Runoff by SCS TR-20 method, UH=Delmarva, Weighted-CN, Time Span= 1.00-30.00 hrs, dt= 0.05 hrs
NJ DEP 2-hr WQ Rainfall=1.25"

Area (sf)	CN	Description
155,074	39	>75% Grass cover, Good, HSG A
155,074		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
9.6	100	0.0200	0.17		**Sheet Flow,** Grass: Short n= 0.150 P2= 3.36"
5.6	330	0.0200	0.99		**Shallow Concentrated Flow,** Short Grass Pasture Kv= 7.0 fps
15.2	430	Total			

Subcatchment 9S: Drainage area 2



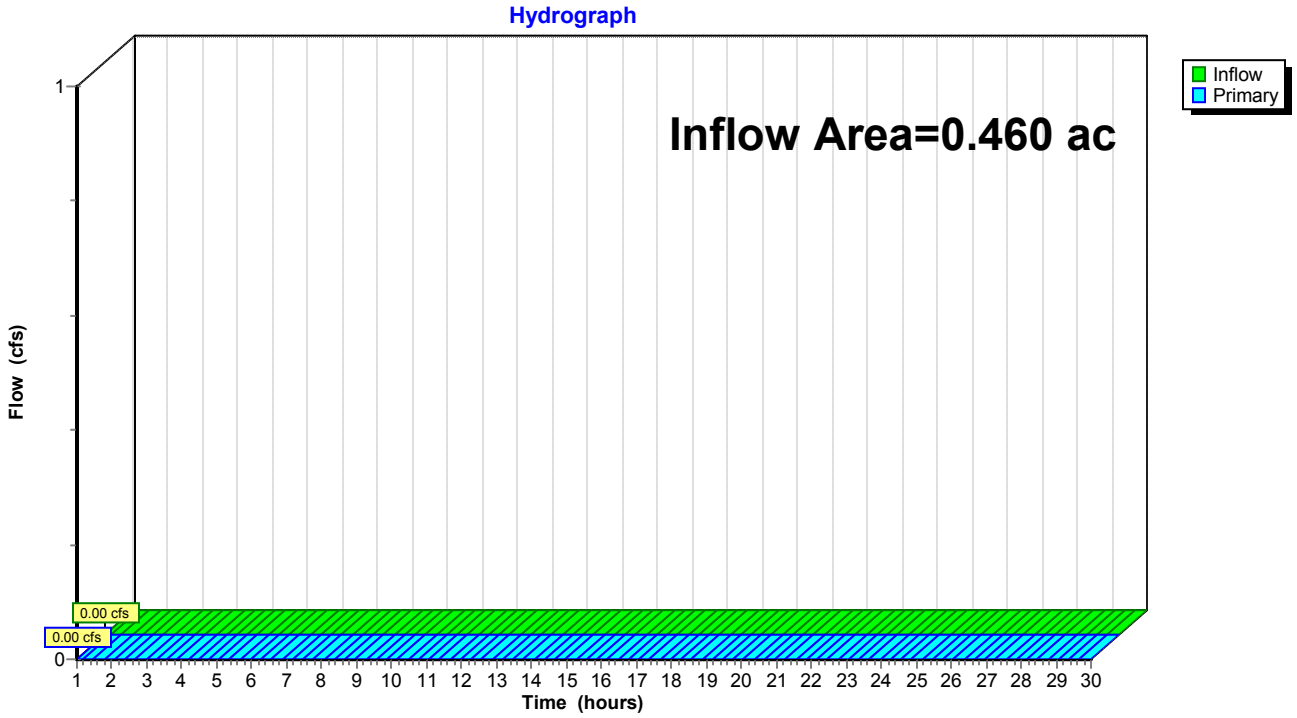
Summary for Pond 11P: anlaysis point 1

[40] Hint: Not Described (Outflow=Inflow)

Inflow Area = 0.460 ac, 0.00% Impervious, Inflow Depth = 0.00" for WQ event
Inflow = 0.00 cfs @ 1.00 hrs, Volume= 0.000 af
Primary = 0.00 cfs @ 1.00 hrs, Volume= 0.000 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind method, Time Span= 1.00-30.00 hrs, dt= 0.05 hrs

Pond 11P: anlaysis point 1



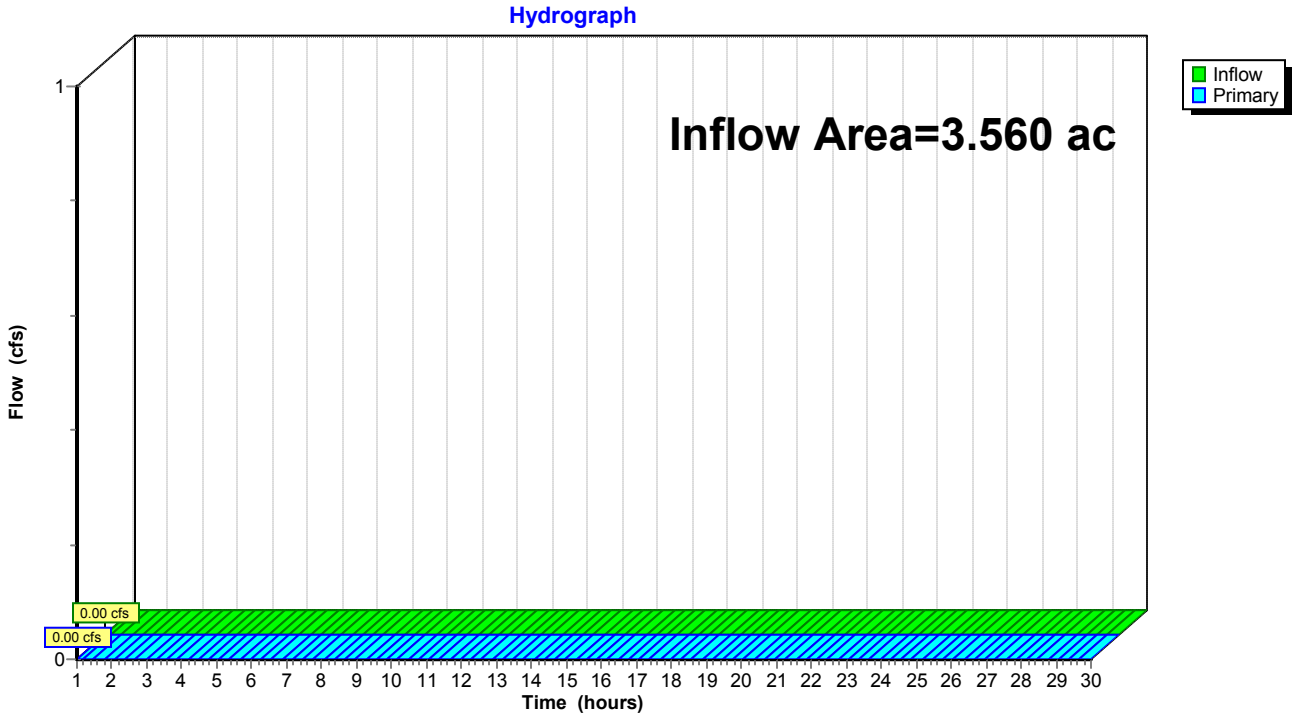
Summary for Pond 12P: analysis point 2

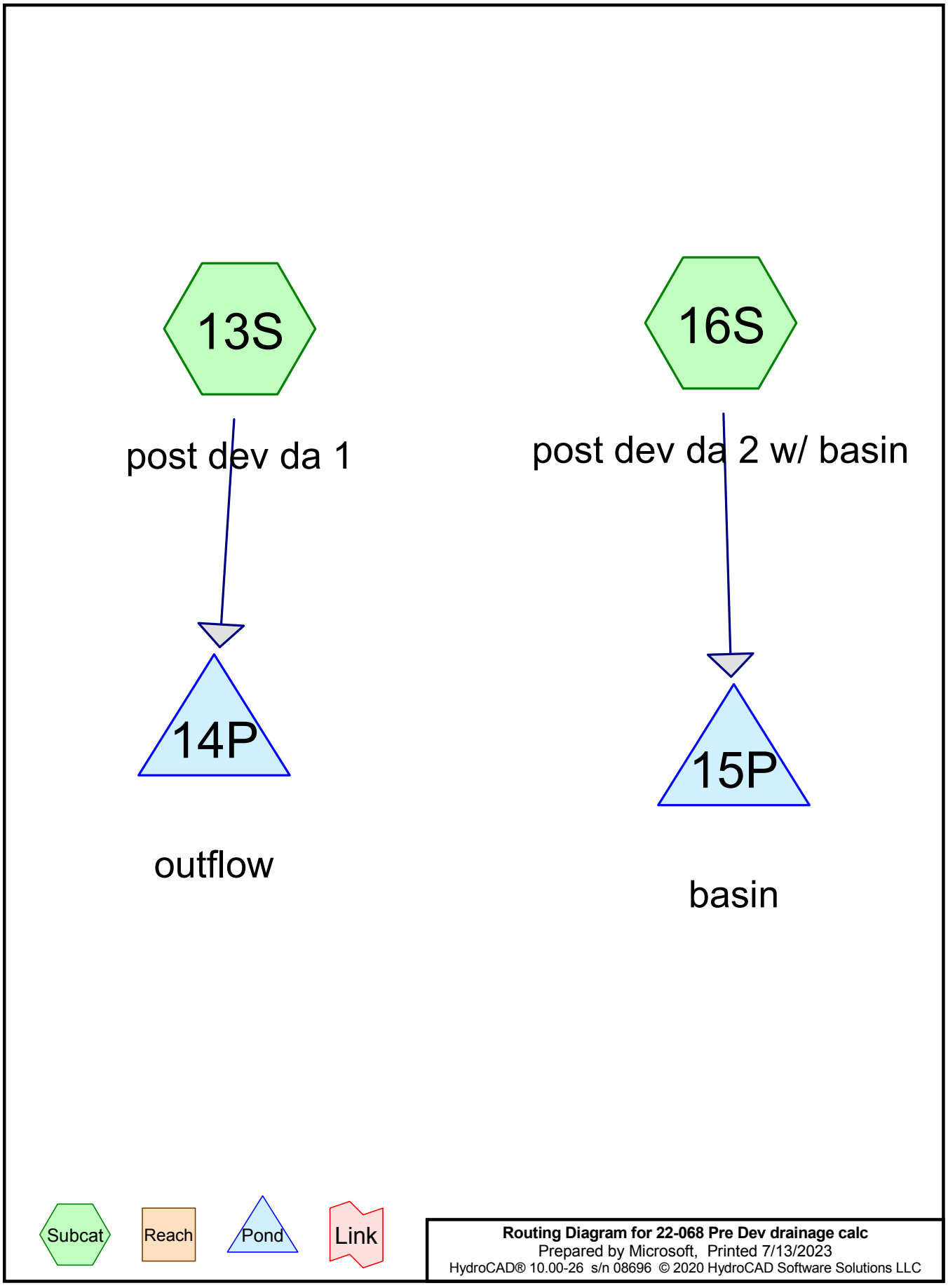
[40] Hint: Not Described (Outflow=Inflow)

Inflow Area = 3.560 ac, 0.00% Impervious, Inflow Depth = 0.00" for WQ event
Inflow = 0.00 cfs @ 1.00 hrs, Volume= 0.000 af
Primary = 0.00 cfs @ 1.00 hrs, Volume= 0.000 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind method, Time Span= 1.00-30.00 hrs, dt= 0.05 hrs

Pond 12P: analysis point 2





Routing Diagram for 22-068 Pre Dev drainage calc
Prepared by Microsoft, Printed 7/13/2023

Area Listing (selected nodes)

Area (acres)	CN	Description (subcatchment-numbers)
3.237	39	>75% Grass cover, Good, HSG A (13S, 16S)
0.599	98	Paved parking, HSG A (16S)
0.184	98	Roofs, HSG B (16S)

Soil Listing (selected nodes)

Area (acres)	Soil Group	Subcatchment Numbers
3.836	HSG A	13S, 16S
0.184	HSG B	16S
0.000	HSG C	
0.000	HSG D	
0.000	Other	

Ground Covers (selected nodes)

HSG-A (acres)	HSG-B (acres)	HSG-C (acres)	HSG-D (acres)	Other (acres)	Total (acres)	Ground Cover	Subcatchment Numbers
3.237	0.000	0.000	0.000	0.000	3.237	>75% Grass cover, Good	13S, 16S
0.599	0.000	0.000	0.000	0.000	0.599	Paved parking	16S
0.000	0.184	0.000	0.000	0.000	0.184	Roofs	16S

Summary for Subcatchment 13S: post dev da 1

[45] Hint: Runoff=Zero

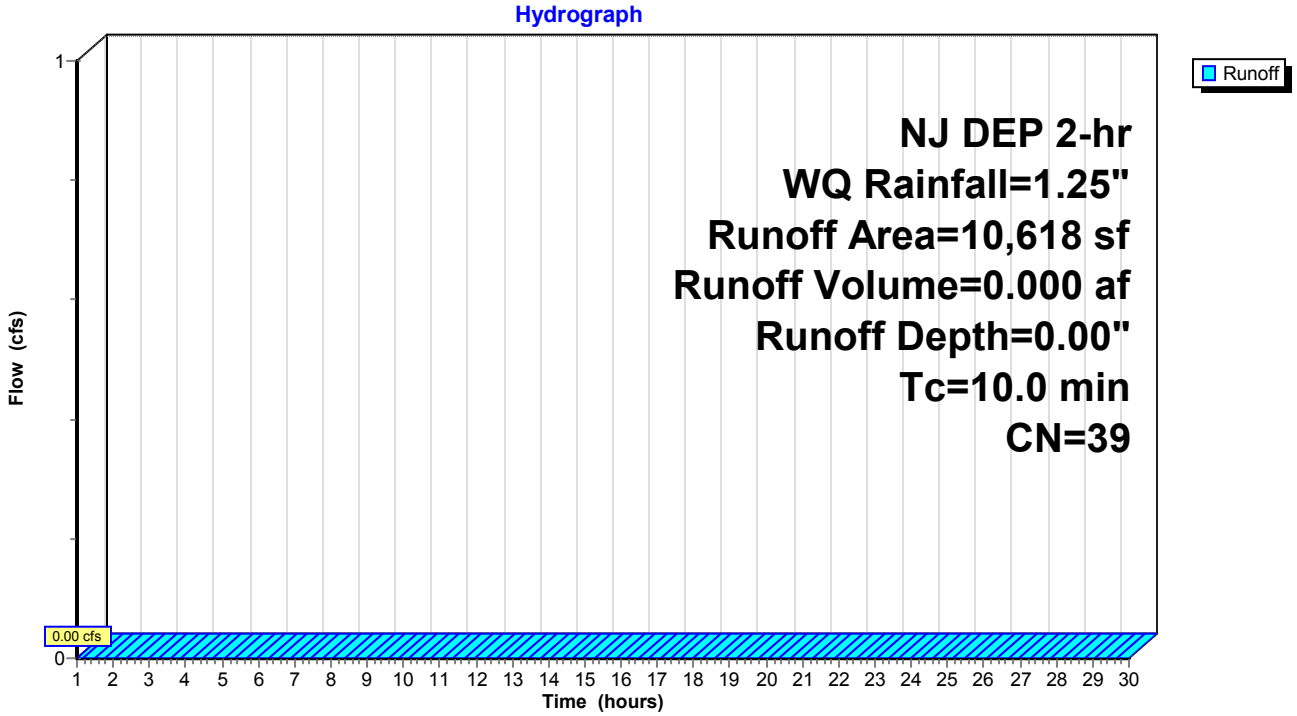
Runoff = 0.00 cfs @ 1.00 hrs, Volume= 0.000 af, Depth= 0.00"

Runoff by SCS TR-20 method, UH=Delmarva, Weighted-CN, Time Span= 1.00-30.00 hrs, dt= 0.05 hrs
NJ DEP 2-hr WQ Rainfall=1.25"

Area (sf)	CN	Description
10,618	39	>75% Grass cover, Good, HSG A
10,618		100.00% Pervious Area

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

Subcatchment 13S: post dev da 1



Summary for Subcatchment 16S: post dev da 2 w/ basin

[45] Hint: Runoff=Zero

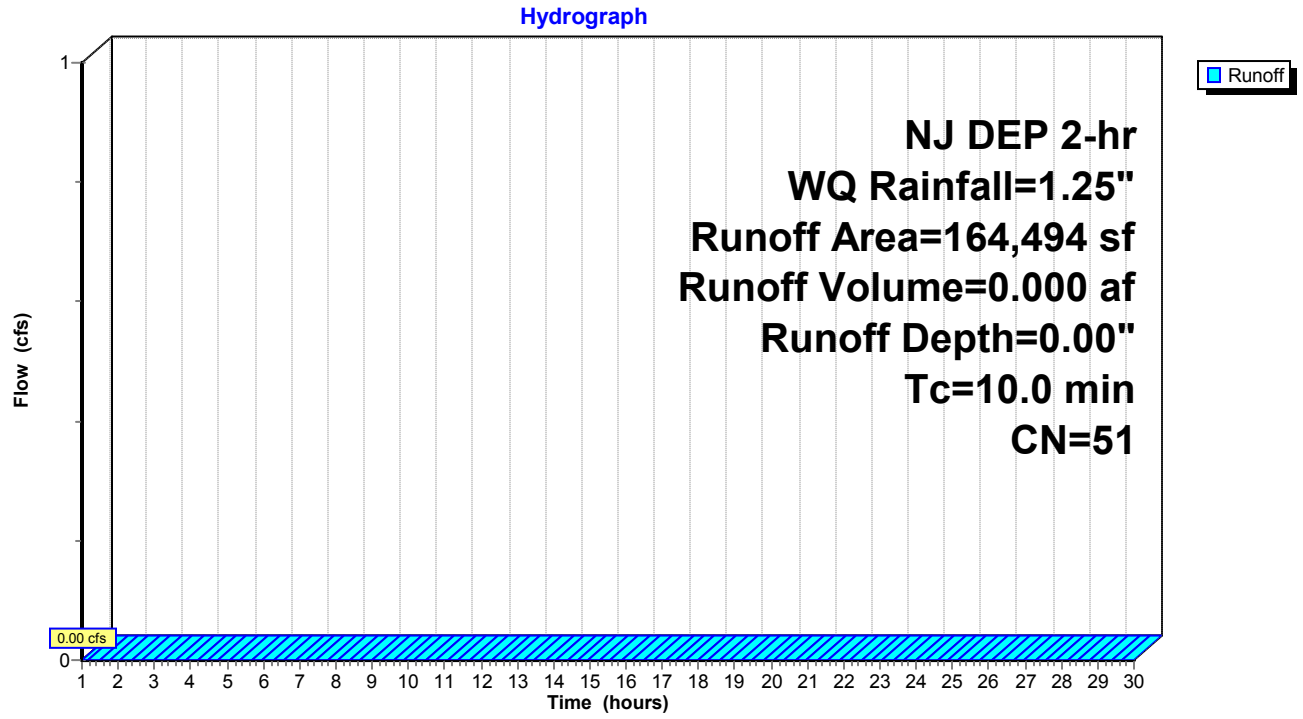
Runoff = 0.00 cfs @ 1.00 hrs, Volume= 0.000 af, Depth= 0.00"

Runoff by SCS TR-20 method, UH=Delmarva, Weighted-CN, Time Span= 1.00-30.00 hrs, dt= 0.05 hrs
NJ DEP 2-hr WQ Rainfall=1.25"

Area (sf)	CN	Description
130,383	39	>75% Grass cover, Good, HSG A
8,000	98	Roofs, HSG B
26,111	98	Paved parking, HSG A
164,494	51	Weighted Average
130,383		79.26% Pervious Area
34,111		20.74% Impervious Area

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

Subcatchment 16S: post dev da 2 w/ basin



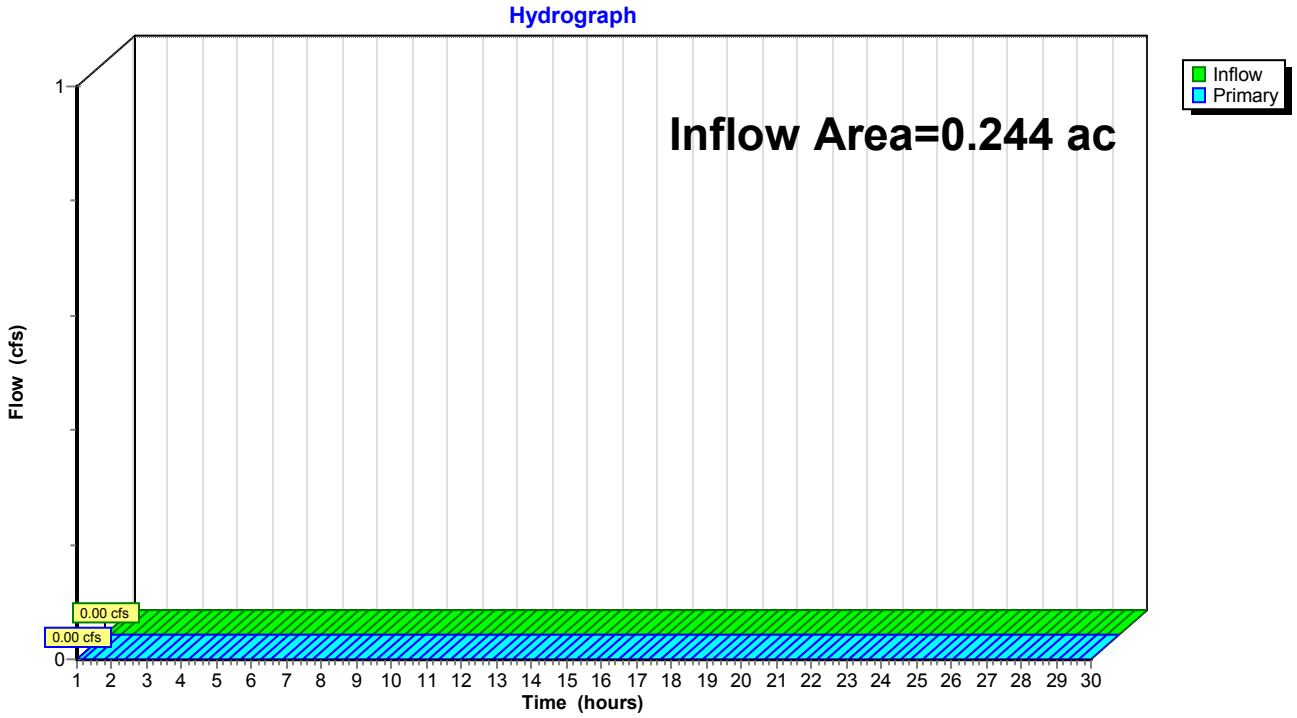
Summary for Pond 14P: outflow

[40] Hint: Not Described (Outflow=Inflow)

Inflow Area = 0.244 ac, 0.00% Impervious, Inflow Depth = 0.00" for WQ event
Inflow = 0.00 cfs @ 1.00 hrs, Volume= 0.000 af
Primary = 0.00 cfs @ 1.00 hrs, Volume= 0.000 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind method, Time Span= 1.00-30.00 hrs, dt= 0.05 hrs

Pond 14P: outflow



Summary for Pond 15P: basin

Inflow Area = 3.776 ac, 20.74% Impervious, Inflow Depth = 0.00" for WQ event
Inflow = 0.00 cfs @ 1.00 hrs, Volume= 0.000 af
Outflow = 0.00 cfs @ 1.00 hrs, Volume= 0.000 af, Atten= 0%, Lag= 0.0 min
Primary = 0.00 cfs @ 1.00 hrs, Volume= 0.000 af

Routing by Stor-Ind method, Time Span= 1.00-30.00 hrs, dt= 0.05 hrs
Peak Elev= 8.00' @ 1.00 hrs Surf.Area= 1,292 sf Storage= 0 cf

Plug-Flow detention time= (not calculated: initial storage exceeds outflow)
Center-of-Mass det. time= (not calculated: no inflow)

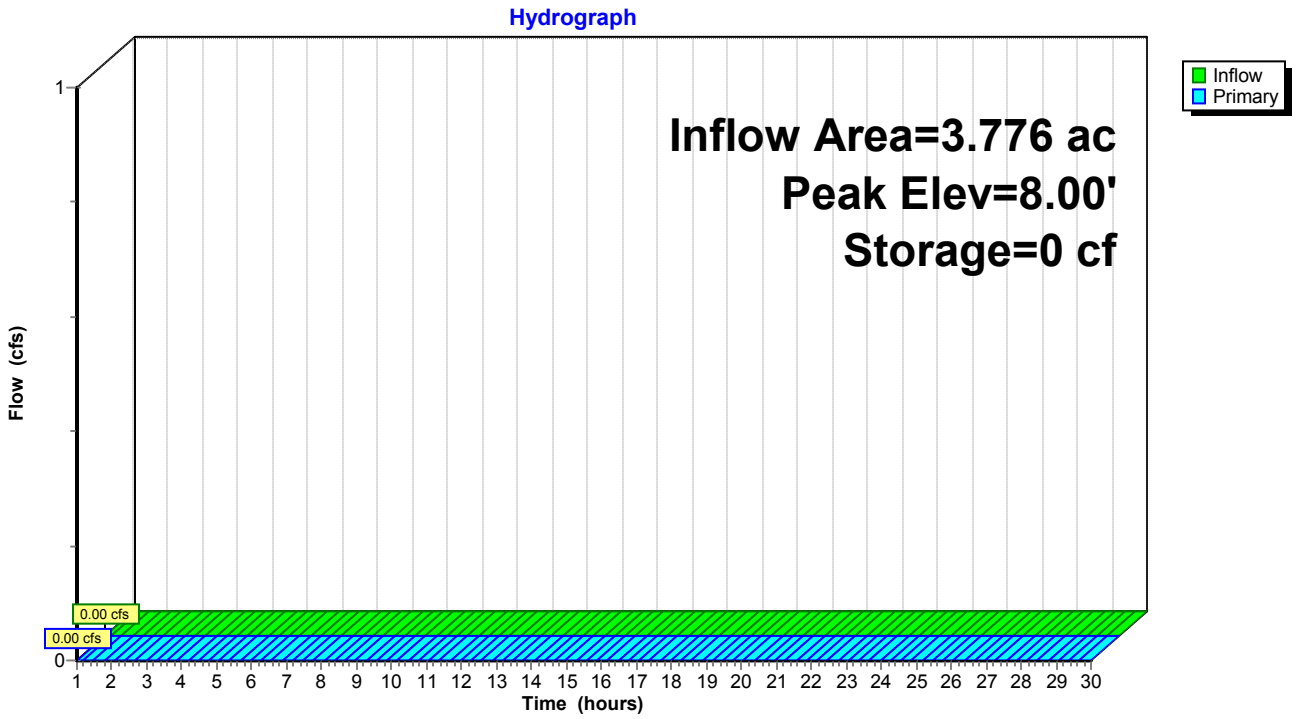
Volume	Invert	Avail.Storage	Storage Description
#1	8.00'	21,108 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
8.00	1,292	0	0
9.00	1,948	1,620	1,620
10.00	2,660	2,304	3,924
11.00	3,428	3,044	6,968
12.00	4,254	3,841	10,809
13.00	5,135	4,695	15,504
14.00	6,073	5,604	21,108

Device	Routing	Invert	Outlet Devices
#1	Primary	13.20'	**3.0' long Sharp-Crested Rectangular Weir** 2 End Contraction(s)

Primary OutFlow Max=0.00 cfs @ 1.00 hrs HW=8.00' (Free Discharge)
1=Sharp-Crested Rectangular Weir (Controls 0.00 cfs)

Pond 15P: basin



IV. STORM PIPE CALCULATIONS

Calculated By:SS
Date:July 2023
Last Revised:

Type (T, S, F, SF)	Line No.	DRAINAGE CALCULATIONS TRI-State Engineering & Surveying, PC Description	Acre A=Area	C=Runoff Coefficient	Equivolent 100% (AxC)	Subtotal 100% (AxC)	Total 100% (AxC)	Event Storm	Min. Time of Concentration	Inches/ Hour I=Intensity of Rainfall	C.F.S. Quantity CxIxA	Project: 22-068			n= 0.015			Rainfall Curve: Philadelphia				HYDRAULIC GRADIENT				
												Length L	Slope Pipe S	Type T	Inch. Dia.	C.F.S. Cap.	F/S Vel.	Invert In	Elev. Out	Grate or Rim Elev.	U/S Cover Ft.	Upstream Elev.	Downstream Elev.	Storm Event	Hydraulic Slope	Starting Water Surface Elevation
		SYSTEM #1																								
T	1	Inlet #1 to Inlet #2	0.11	0.50	0.06		0.06	10	10.0	5.36	0.3	115	0.0040	RCP	15	3.5	1.6	10.76	10.30	14.20	2.00	0.32	0.31	25	0.0000	
T	2	Inlet #2 to Inlet #3	0.10	0.50	0.05		0.11	10	11.2	5.14	0.5	95	0.0040	RCP	15	3.5	2.0	10.30	9.92	14.20	2.46	0.31	0.30	25	0.0001	
T	3	Inlet #3 to Inlet #4	0.21	0.50	0.11		0.21	10	12.0	5.00	1.0	195	0.0040	RCP	15	3.5	2.5	9.92	9.14	13.00	1.64	0.30	0.21	25	0.0005	
T	4	Inlet #4 to Headwall #1	0.11	0.50	0.06		0.27	10	13.3	4.78	1.3	301	0.0040	RCP	15	3.5	2.6	9.14	7.94	12.20	1.62	0.21		25	0.0007	

V. WEBSOIL SURVEY

United States Department of Agriculture

NRCS

Natural Resources Conservation Service

A product of the National Cooperative Soil Survey, a joint effort of the United States Department of Agriculture and other Federal agencies, State agencies including the Agricultural Experiment Stations, and local participants

Custom Soil Resource Report for Gloucester County, New Jersey

June 20, 2023

Preface

Soil surveys contain information that affects land use planning in survey areas. They highlight soil limitations that affect various land uses and provide information about the properties of the soils in the survey areas. Soil surveys are designed for many different users, including farmers, ranchers, foresters, agronomists, urban planners, community officials, engineers, developers, builders, and home buyers. Also, conservationists, teachers, students, and specialists in recreation, waste disposal, and pollution control can use the surveys to help them understand, protect, or enhance the environment.

Various land use regulations of Federal, State, and local governments may impose special restrictions on land use or land treatment. Soil surveys identify soil properties that are used in making various land use or land treatment decisions. The information is intended to help the land users identify and reduce the effects of soil limitations on various land uses. The landowner or user is responsible for identifying and complying with existing laws and regulations.

Although soil survey information can be used for general farm, local, and wider area planning, onsite investigation is needed to supplement this information in some cases. Examples include soil quality assessments (http://www.nrcs.usda.gov/wps/portal/nrcs/main/soils/health/) and certain conservation and engineering applications. For more detailed information, contact your local USDA Service Center (https://offices.sc.egov.usda.gov/locator/app?agency=nrcs) or your NRCS State Soil Scientist (http://www.nrcs.usda.gov/wps/portal/nrcs/detail/soils/contactus/?cid=nrcs142p2_053951).

Great differences in soil properties can occur within short distances. Some soils are seasonally wet or subject to flooding. Some are too unstable to be used as a foundation for buildings or roads. Clayey or wet soils are poorly suited to use as septic tank absorption fields. A high water table makes a soil poorly suited to basements or underground installations.

The National Cooperative Soil Survey is a joint effort of the United States Department of Agriculture and other Federal agencies, State agencies including the Agricultural Experiment Stations, and local agencies. The Natural Resources Conservation Service (NRCS) has leadership for the Federal part of the National Cooperative Soil Survey.

Information about soils is updated periodically. Updated information is available through the NRCS Web Soil Survey, the site for official soil survey information.

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Contents

How Soil Surveys Are Made

Soil surveys are made to provide information about the soils and miscellaneous areas in a specific area. They include a description of the soils and miscellaneous areas and their location on the landscape and tables that show soil properties and limitations affecting various uses. Soil scientists observed the steepness, length, and shape of the slopes; the general pattern of drainage; the kinds of crops and native plants; and the kinds of bedrock. They observed and described many soil profiles. A soil profile is the sequence of natural layers, or horizons, in a soil. The profile extends from the surface down into the unconsolidated material in which the soil formed or from the surface down to bedrock. The unconsolidated material is devoid of roots and other living organisms and has not been changed by other biological activity.

Currently, soils are mapped according to the boundaries of major land resource areas (MLRAs). MLRAs are geographically associated land resource units that share common characteristics related to physiography, geology, climate, water resources, soils, biological resources, and land uses (USDA, 2006). Soil survey areas typically consist of parts of one or more MLRA.

The soils and miscellaneous areas in a survey area occur in an orderly pattern that is related to the geology, landforms, relief, climate, and natural vegetation of the area. Each kind of soil and miscellaneous area is associated with a particular kind of landform or with a segment of the landform. By observing the soils and miscellaneous areas in the survey area and relating their position to specific segments of the landform, a soil scientist develops a concept, or model, of how they were formed. Thus, during mapping, this model enables the soil scientist to predict with a considerable degree of accuracy the kind of soil or miscellaneous area at a specific location on the landscape.

Commonly, individual soils on the landscape merge into one another as their characteristics gradually change. To construct an accurate soil map, however, soil scientists must determine the boundaries between the soils. They can observe only a limited number of soil profiles. Nevertheless, these observations, supplemented by an understanding of the soil-vegetation-landscape relationship, are sufficient to verify predictions of the kinds of soil in an area and to determine the boundaries.

Soil scientists recorded the characteristics of the soil profiles that they studied. They noted soil color, texture, size and shape of soil aggregates, kind and amount of rock fragments, distribution of plant roots, reaction, and other features that enable them to identify soils. After describing the soils in the survey area and determining their properties, the soil scientists assigned the soils to taxonomic classes (units). Taxonomic classes are concepts. Each taxonomic class has a set of soil characteristics with precisely defined limits. The classes are used as a basis for comparison to classify soils systematically. Soil taxonomy, the system of taxonomic classification used in the United States, is based mainly on the kind and character of soil properties and the arrangement of horizons within the profile. After the soil

scientists classified and named the soils in the survey area, they compared the individual soils with similar soils in the same taxonomic class in other areas so that they could confirm data and assemble additional data based on experience and research.

The objective of soil mapping is not to delineate pure map unit components; the objective is to separate the landscape into landforms or landform segments that have similar use and management requirements. Each map unit is defined by a unique combination of soil components and/or miscellaneous areas in predictable proportions. Some components may be highly contrasting to the other components of the map unit. The presence of minor components in a map unit in no way diminishes the usefulness or accuracy of the data. The delineation of such landforms and landform segments on the map provides sufficient information for the development of resource plans. If intensive use of small areas is planned, onsite investigation is needed to define and locate the soils and miscellaneous areas.

Soil scientists make many field observations in the process of producing a soil map. The frequency of observation is dependent upon several factors, including scale of mapping, intensity of mapping, design of map units, complexity of the landscape, and experience of the soil scientist. Observations are made to test and refine the soil-landscape model and predictions and to verify the classification of the soils at specific locations. Once the soil-landscape model is refined, a significantly smaller number of measurements of individual soil properties are made and recorded. These measurements may include field measurements, such as those for color, depth to bedrock, and texture, and laboratory measurements, such as those for content of sand, silt, clay, salt, and other components. Properties of each soil typically vary from one point to another across the landscape.

Observations for map unit components are aggregated to develop ranges of characteristics for the components. The aggregated values are presented. Direct measurements do not exist for every property presented for every map unit component. Values for some properties are estimated from combinations of other properties.

While a soil survey is in progress, samples of some of the soils in the area generally are collected for laboratory analyses and for engineering tests. Soil scientists interpret the data from these analyses and tests as well as the field-observed characteristics and the soil properties to determine the expected behavior of the soils under different uses. Interpretations for all of the soils are field tested through observation of the soils in different uses and under different levels of management. Some interpretations are modified to fit local conditions, and some new interpretations are developed to meet local needs. Data are assembled from other sources, such as research information, production records, and field experience of specialists. For example, data on crop yields under defined levels of management are assembled from farm records and from field or plot experiments on the same kinds of soil.

Predictions about soil behavior are based not only on soil properties but also on such variables as climate and biological activity. Soil conditions are predictable over long periods of time, but they are not predictable from year to year. For example, soil scientists can predict with a fairly high degree of accuracy that a given soil will have a high water table within certain depths in most years, but they cannot predict that a high water table will always be at a specific level in the soil on a specific date.

After soil scientists located and identified the significant natural bodies of soil in the survey area, they drew the boundaries of these bodies on aerial photographs and

identified each as a specific map unit. Aerial photographs show trees, buildings, fields, roads, and rivers, all of which help in locating boundaries accurately.

Soil Map

The soil map section includes the soil map for the defined area of interest, a list of soil map units on the map and extent of each map unit, and cartographic symbols displayed on the map. Also presented are various metadata about data used to produce the map, and a description of each soil map unit.

Custom Soil Resource Report
Soil Map

Map Scale: 1:2,470 if printed on A landscape (11" x 8.5") sheet.

N

Meters: 0 35 70 140 210

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 Map Unit Polygons
- Soil Map Unit Lines
- Soil Map Unit Points

Special Point Features
- Blowout
- Borrow Pit
- Clay Spot
- Closed Depression
- Gravel Pit
- Gravelly Spot
- Landfill
- Lava Flow
- Marsh or swamp
- Mine or Quarry
- Miscellaneous Water
- Perennial Water
- Rock Outcrop
- Saline Spot
- Sandy Spot
- Severely Eroded Spot
- Sinkhole
- Slide or Slip
- Sodic Spot
- Spoil Area
- Stony Spot
- Very Stony Spot
- Wet Spot
- Other
- Special Line Features

Water Features
- Streams and Canals

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

Background
- Aerial Photography

MAP INFORMATION

The soil surveys that comprise your AOI were mapped at 1:24,000.

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: Gloucester County, New Jersey
Survey Area Data: Version 20, Aug 29, 2022

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

Date(s) aerial images were photographed: Jun 5, 2022—Jul 4, 2022

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

Map Unit Legend

Map Unit Symbol	Map Unit Name	Acres in AOI	Percent of AOI
DouB	Downer-Urban land complex, 0 to 5 percent slopes	26.9	83.2%
EvuB	Evesboro-Urban land complex, 0 to 5 percent slopes	4.6	14.2%
MamnAv	Mannington-Nanticoke complex, 0 to 1 percent slopes, very frequently flooded	0.0	0.1%
UR	Urban land	0.8	2.5%
Totals for Area of Interest		**32.3**	**100.0%**

Map Unit Descriptions

The map units delineated on the detailed soil maps in a soil survey represent the soils or miscellaneous areas in the survey area. The map unit descriptions, along with the maps, can be used to determine the composition and properties of a unit.

A map unit delineation on a soil map represents an area dominated by one or more major kinds of soil or miscellaneous areas. A map unit is identified and named according to the taxonomic classification of the dominant soils. Within a taxonomic class there are precisely defined limits for the properties of the soils. On the landscape, however, the soils are natural phenomena, and they have the characteristic variability of all natural phenomena. Thus, the range of some observed properties may extend beyond the limits defined for a taxonomic class. Areas of soils of a single taxonomic class rarely, if ever, can be mapped without including areas of other taxonomic classes. Consequently, every map unit is made up of the soils or miscellaneous areas for which it is named and some minor components that belong to taxonomic classes other than those of the major soils.

Most minor soils have properties similar to those of the dominant soil or soils in the map unit, and thus they do not affect use and management. These are called noncontrasting, or similar, components. They may or may not be mentioned in a particular map unit description. Other minor components, however, have properties and behavioral characteristics divergent enough to affect use or to require different management. These are called contrasting, or dissimilar, components. They generally are in small areas and could not be mapped separately because of the scale used. Some small areas of strongly contrasting soils or miscellaneous areas are identified by a special symbol on the maps. If included in the database for a given area, the contrasting minor components are identified in the map unit descriptions along with some characteristics of each. A few areas of minor components may not have been observed, and consequently they are not mentioned in the descriptions, especially where the pattern was so complex that it was impractical to make enough observations to identify all the soils and miscellaneous areas on the landscape.

The presence of minor components in a map unit in no way diminishes the usefulness or accuracy of the data. The objective of mapping is not to delineate pure taxonomic classes but rather to separate the landscape into landforms or landform segments that have similar use and management requirements. The delineation of such segments on the map provides sufficient information for the development of resource plans. If intensive use of small areas is planned, however, onsite investigation is needed to define and locate the soils and miscellaneous areas.

An identifying symbol precedes the map unit name in the map unit descriptions. Each description includes general facts about the unit and gives important soil properties and qualities.

Soils that have profiles that are almost alike make up a *soil series*. Except for differences in texture of the surface layer, all the soils of a series have major horizons that are similar in composition, thickness, and arrangement.

Soils of one series can differ in texture of the surface layer, slope, stoniness, salinity, degree of erosion, and other characteristics that affect their use. On the basis of such differences, a soil series is divided into *soil phases*. Most of the areas shown on the detailed soil maps are phases of soil series. The name of a soil phase commonly indicates a feature that affects use or management. For example, Alpha silt loam, 0 to 2 percent slopes, is a phase of the Alpha series.

Some map units are made up of two or more major soils or miscellaneous areas. These map units are complexes, associations, or undifferentiated groups.

A *complex* consists of two or more soils or miscellaneous areas in such an intricate pattern or in such small areas that they cannot be shown separately on the maps. The pattern and proportion of the soils or miscellaneous areas are somewhat similar in all areas. Alpha-Beta complex, 0 to 6 percent slopes, is an example.

An *association* is made up of two or more geographically associated soils or miscellaneous areas that are shown as one unit on the maps. Because of present or anticipated uses of the map units in the survey area, it was not considered practical or necessary to map the soils or miscellaneous areas separately. The pattern and relative proportion of the soils or miscellaneous areas are somewhat similar. Alpha-Beta association, 0 to 2 percent slopes, is an example.

An *undifferentiated group* is made up of two or more soils or miscellaneous areas that could be mapped individually but are mapped as one unit because similar interpretations can be made for use and management. The pattern and proportion of the soils or miscellaneous areas in a mapped area are not uniform. An area can be made up of only one of the major soils or miscellaneous areas, or it can be made up of all of them. Alpha and Beta soils, 0 to 2 percent slopes, is an example.

Some surveys include *miscellaneous areas*. Such areas have little or no soil material and support little or no vegetation. Rock outcrop is an example.

Gloucester County, New Jersey

DouB—Downer-Urban land complex, 0 to 5 percent slopes

Map Unit Setting

National map unit symbol: 15kmn
Elevation: 0 to 170 feet
Mean annual precipitation: 28 to 59 inches
Mean annual air temperature: 46 to 79 degrees F
Frost-free period: 161 to 231 days
Farmland classification: Not prime farmland

Map Unit Composition

Downer and similar soils: 60 percent
Urban land: 30 percent
Minor components: 10 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Downer

Setting

Landform: Knolls, low hills
Landform position (three-dimensional): Interfluve
Down-slope shape: Convex, linear
Across-slope shape: Linear
Parent material: Loamy fluviomarine deposits and/or gravelly fluviomarine deposits

Typical profile

Ap - 0 to 10 inches: sandy loam
Bt1 - 10 to 16 inches: sandy loam
Bt2 - 16 to 36 inches: sandy loam
C1 - 36 to 48 inches: loamy sand
C2 - 48 to 80 inches: stratified sand to sandy loam

Properties and qualities

Slope: 0 to 5 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Well drained
Runoff class: Very low
Capacity of the most limiting layer to transmit water (Ksat): Moderately high to high (0.60 to 6.00 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Available water supply, 0 to 60 inches: Moderate (about 6.6 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 2e
Hydrologic Soil Group: A
Hydric soil rating: No

Description of Urban Land

Setting

Parent material: Surface covered by pavement, concrete, buildings, and other structures underlain by disturbed and natural soil material

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 8s
Hydric soil rating: Unranked

Minor Components

Sassafras

Percent of map unit: 5 percent
Landform: Knolls, low hills
Landform position (two-dimensional): Summit, backslope
Landform position (three-dimensional): Interfluve
Down-slope shape: Convex
Across-slope shape: Linear
Hydric soil rating: No

Woodstown

Percent of map unit: 5 percent
Landform: Flats, drainageways
Landform position (two-dimensional): Toeslope
Landform position (three-dimensional): Base slope
Down-slope shape: Linear
Across-slope shape: Linear, concave
Hydric soil rating: No

EvuB—Evesboro-Urban land complex, 0 to 5 percent slopes

Map Unit Setting

National map unit symbol: 15kmx
Elevation: 10 to 150 feet
Mean annual precipitation: 28 to 59 inches
Mean annual air temperature: 46 to 79 degrees F
Frost-free period: 161 to 231 days
Farmland classification: Not prime farmland

Map Unit Composition

Evesboro and similar soils: 60 percent
Urban land: 30 percent
Minor components: 10 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Evesboro

Setting

Landform: Low hills
Landform position (three-dimensional): Interfluve, side slope
Down-slope shape: Linear
Across-slope shape: Linear
Parent material: Sandy eolian deposits and/or sandy fluviomarine deposits

Typical profile

A - 0 to 4 inches: sand
AB - 4 to 17 inches: sand
Bw - 17 to 31 inches: sand
C - 31 to 80 inches: stratified loamy sand to sand

Properties and qualities

Slope: 0 to 5 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Excessively drained
Runoff class: Very low
Capacity of the most limiting layer to transmit water (Ksat): High to very high (2.00 to 20.00 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Available water supply, 0 to 60 inches: Low (about 4.2 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 7s
Hydrologic Soil Group: A
Hydric soil rating: No

Description of Urban Land

Setting

Parent material: Surface covered by pavement, concrete, buildings, and other structures underlain by disturbed and natural soil material

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 8s
Hydric soil rating: Unranked

Minor Components

Lakehurst

Percent of map unit: 5 percent
Landform: Flats, depressions
Landform position (two-dimensional): Toeslope
Landform position (three-dimensional): Base slope
Down-slope shape: Linear, concave
Across-slope shape: Linear, concave
Hydric soil rating: No

Downer

Percent of map unit: 5 percent

Landform: Knolls, low hills
Down-slope shape: Convex
Across-slope shape: Linear
Hydric soil rating: No

MamnAv—Mannington-Nanticoke complex, 0 to 1 percent slopes, very frequently flooded

Map Unit Setting

National map unit symbol: 15kqh
Elevation: 0 to 20 feet
Mean annual precipitation: 28 to 59 inches
Mean annual air temperature: 46 to 79 degrees F
Frost-free period: 161 to 231 days
Farmland classification: Farmland of unique importance

Map Unit Composition

Mannington, very frequently flooded, and similar soils: 55 percent
Nanticoke, very frequently flooded, and similar soils: 35 percent
Minor components: 10 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Mannington, Very Frequently Flooded

Setting

Landform: Tidal marshes
Down-slope shape: Linear
Across-slope shape: Linear
Parent material: Silty estuarine deposits over organic, herbacious materials

Typical profile

Ag - 0 to 14 inches: mucky silt loam
Cg - 14 to 32 inches: silt loam
Oa - 32 to 42 inches: muck
Oe - 42 to 52 inches: mucky peat
C'g1 - 52 to 62 inches: mucky silt loam
C'g2 - 62 to 90 inches: silt loam

Properties and qualities

Slope: 0 to 1 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Very poorly drained
Runoff class: Negligible
Capacity of the most limiting layer to transmit water (Ksat): Moderately high (0.20 to 0.60 in/hr)
Depth to water table: About 0 to 6 inches
Frequency of flooding: Very frequent
Frequency of ponding: Frequent
Maximum salinity: Nonsaline to slightly saline (0.0 to 4.0 mmhos/cm)

Available water supply, 0 to 60 inches: Very high (about 17.4 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 8w
Hydrologic Soil Group: C/D
Hydric soil rating: Yes

Description of Nanticoke, Very Frequently Flooded

Setting

Landform: Tidal marshes
Down-slope shape: Linear
Across-slope shape: Linear
Parent material: Silty estuarine deposits

Typical profile

Ag - 0 to 5 inches: mucky silt loam
Cg1 - 5 to 50 inches: silt loam
Cg2 - 50 to 80 inches: silt loam

Properties and qualities

Slope: 0 to 1 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Very poorly drained
Runoff class: Negligible
Capacity of the most limiting layer to transmit water (Ksat): Moderately high (0.20 to 0.60 in/hr)
Depth to water table: About 0 to 6 inches
Frequency of flooding: Very frequent
Frequency of ponding: Frequent
Maximum salinity: Nonsaline to slightly saline (0.0 to 4.0 mmhos/cm)
Available water supply, 0 to 60 inches: High (about 9.2 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 8w
Hydrologic Soil Group: C/D
Hydric soil rating: Yes

Minor Components

Water

Percent of map unit: 5 percent

Udorthents

Percent of map unit: 5 percent
Landform: Tidal marshes
Down-slope shape: Linear
Across-slope shape: Linear
Hydric soil rating: No

UR—Urban land

Map Unit Setting

National map unit symbol: 15ksz
Elevation: 0 to 170 feet
Mean annual precipitation: 30 to 64 inches
Mean annual air temperature: 46 to 79 degrees F
Frost-free period: 131 to 178 days
Farmland classification: Not prime farmland

Map Unit Composition

Urban land: 95 percent
Minor components: 5 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Urban Land

Setting

Parent material: Surface covered by pavement, concrete, buildings, and other structures underlain by disturbed and natural soil material

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 8s
Hydric soil rating: Unranked

Minor Components

Udorthents

Percent of map unit: 5 percent
Landform: Low hills
Down-slope shape: Linear
Across-slope shape: Linear
Hydric soil rating: No

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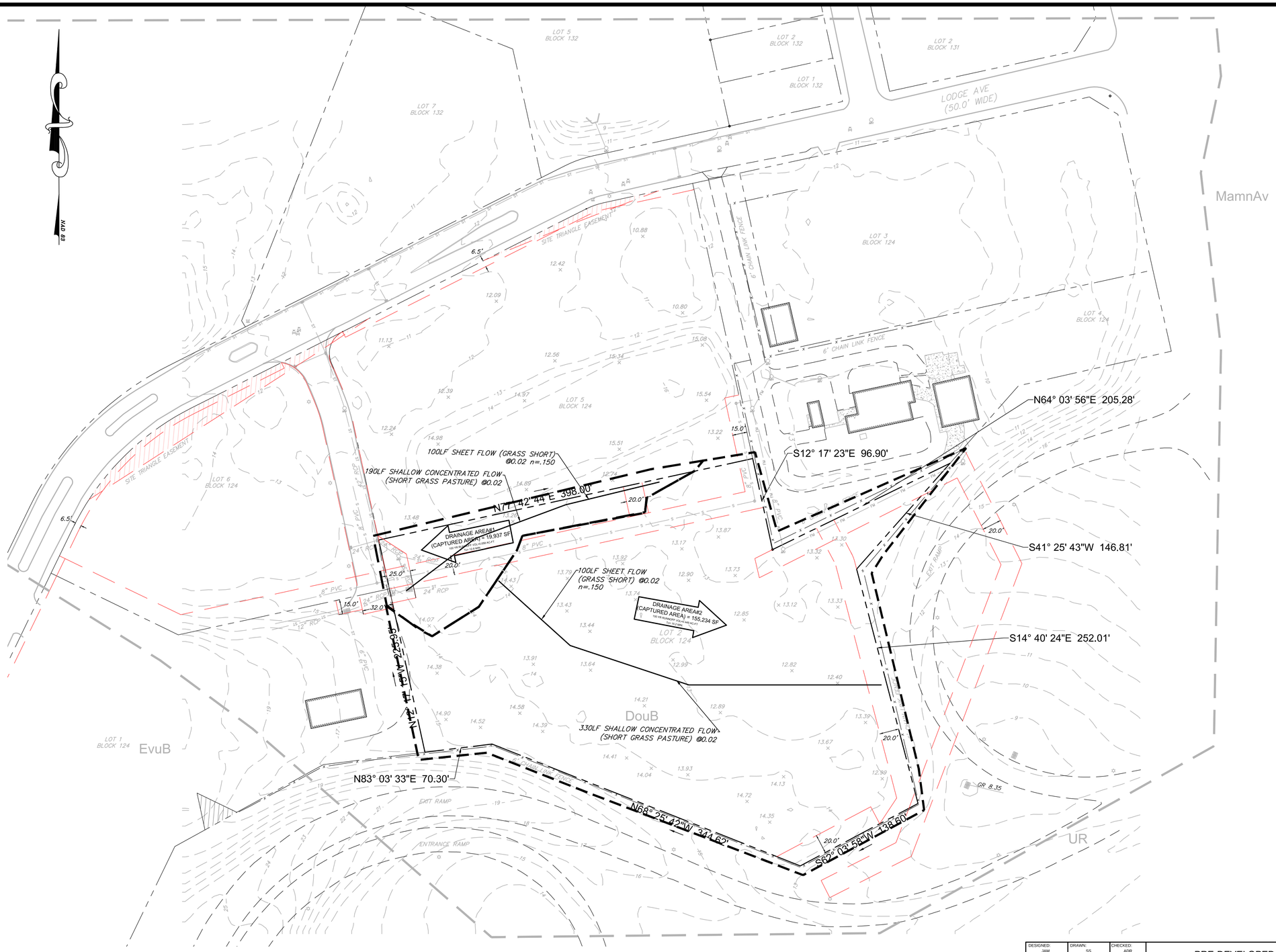
VI. PRE- AND POST-DEVELOPED DRAINAGE AREA MAPS



GRAPHIC SCALE

50 0 25 50 100 200

(IN FEET)
1 inch = 50 ft.

DESIGNED: JAM	DRAWN: SS	CHECKED: ADR	PRE-DEVELOPED DRAINAGE AREAS
DATE SIGNED:		REVISIONS NO. DATE	LODGE AVE BLOCK 124, LOT 2 BOROUGH OF PAULSBORO GLOUCESTER COUNTY, NEW JERSEY

TRISTATE ENGINEERING AND SURVEYING, PC

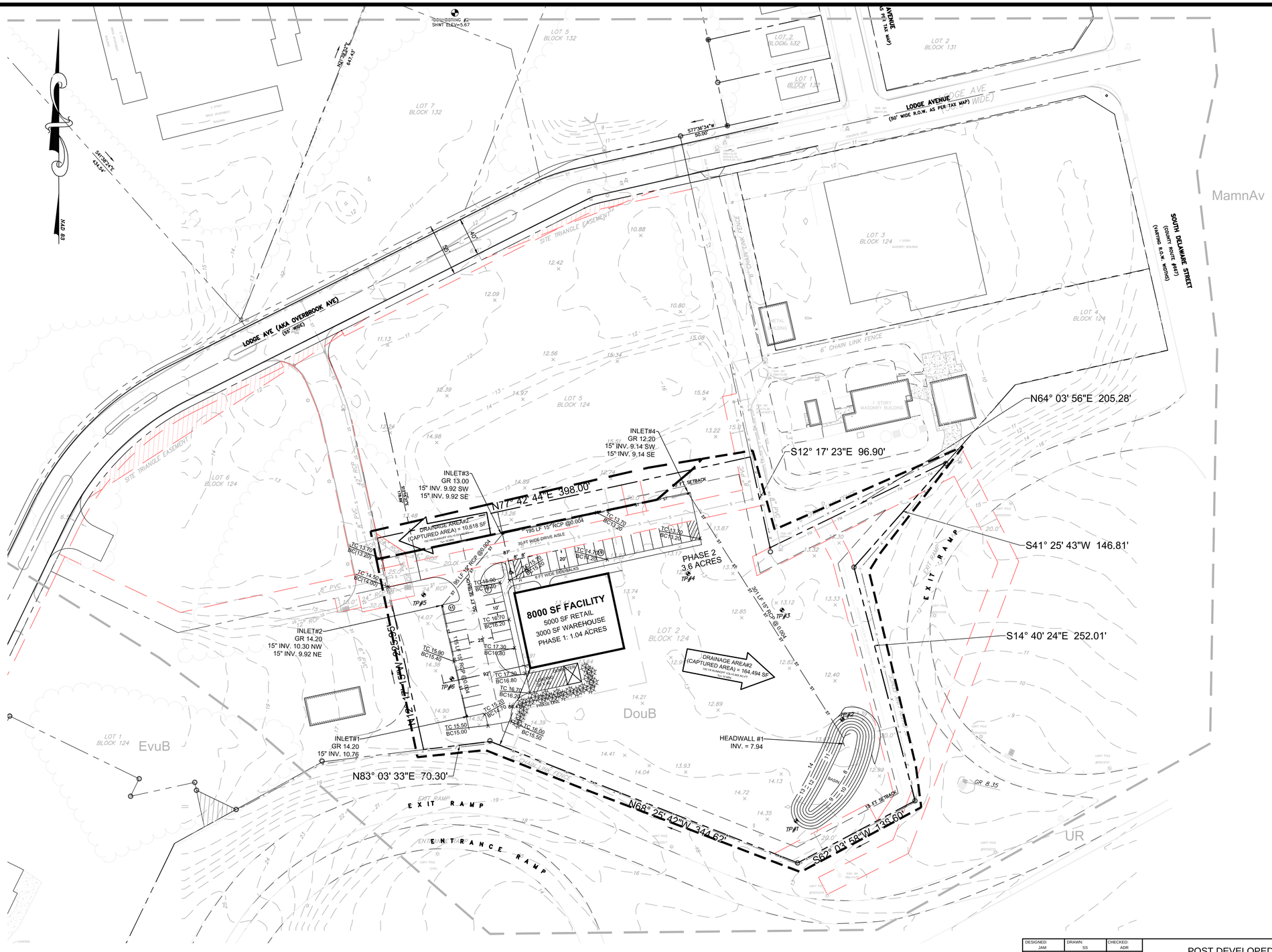
P.O. BOX 1304 BLACKWOOD, NJ 08012
OFFICE: (856) 677-8742 FAX: (856) 879-2024
www.tristatecivil.com

New Jersey Professional Engineer and Surveyor Lic. No. 24GB042570

SCALE:	DATE:	PROJECT NO.	SHEET:
1"=50'	MAY 2023	22-068	1 OF 1

Date: Jul 12, 2023, 10:25am

User ID: Administrator File: E:\Dropbox\Tri State Engineering\Projects_22-XXX jobs\22-068 Block 124 Lot 2 Paulsboro - ABCO P-884 Blackwell\Drawings\Enginee22-068 predeveloped drainage areas.dwg pre-developed drainage areas (2)



GRAPHIC SCALE

50 0 25 50 100 200

(IN FEET)

1 inch = 50 ft.

DESIGNED: JAM	DRAWN: SS	CHECKED: ADR	POST DEVELOPED DRAINAGE AREAS
DATE SIGNED:		REVISIONS NO. DATE	LODGE AVE BLOCK 124, LOT 2 BOROUGH OF PAULSBORO GLOUCESTER COUNTY, NEW JERSEY

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SCALE:	DATE:	PROJECT NO.	SHEET:
1"=50'	MAY 2023	22-068	1 OF 1

Date: Jul 12, 2023, 1:14pm

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