Stormwater Management Report

for

The Fairways – Phase 2B
Major Site Plan Townhomes

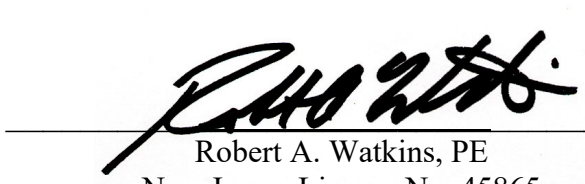
Block 335.01 – Lot 5.04

Township of Middle
Cape May County, New Jersey

Prepared By:

MOTT WATKINS ASSOCIATES, LLC
CONSULTING ENGINEERS & PLAN
3120 Fire Road, Suite B201
Egg Harbor Township, NJ 08234

March 30, 2020



Robert A. Watkins, PE
New Jersey License No. 45865

Introduction

The proposed major site plan will be located on Block 335.01, Lot 5.04 in the Township of Middle, Cape May County, New Jersey. The scope of the project is to construct thirteen (13) townhomes on Lot 5.04 where presently twelve (12) townhomes were previously approved on the site.

The proposed project is located off of Bay Breeze Boulevard approximately 1,500 feet east of the intersection of Bayberry Drive and Bay Breeze Boulevard.

The proposed project will utilize a stormwater management system, which has been designed in accordance with the Township of Middle (218-73) and the New Jersey Residential Site Improvement Standards (N.J.A.C. 5:21-7.1). All stormwater management calculations contained within this report are in accordance with the U.S.D.A. Soil Conservation Service Technical Release No. 55 (TR-55). Stormwater management facilities are designed to attenuate the 2, 5, 10 and 50 year, 24-hour Type III storm events and the 2, 10 and 100 year, 24-hour Type III storm events at 50%, 75% and 80% of pre-development levels respectively.

I. Pre-Development Conditions

The existing stormwater management area consists of five (5) drainage areas flowing into the existing five (5) lakes which control stormwater measures which were part of a larger development approved as Fairways Phase 2A. There are eight (8) units along Bay Berry Drive with paved drive aisle to service the units, there are five (5) units located off of Bay Breeze Boulevard and the remaining twelve (12) units are located off of Mallard Pond Lane, a cul-de-sac off of Bay Breeze Boulevard with an extension of the cul-de-sac traveling southerly towards Lake #3. Each townhome unit is 72' long by 28' wide. A total impervious coverage for the townhomes is approximately 82,656 s.f. The proposed roadway system will consist of an asphalt drive ranging from 20 feet in width to 28 feet in length. The proposed drainage areas for the site drain into various storm sewer inlets or grass swales which direct stormwater runoff to the existing lakes. There is porous asphalt parking spaces and underground roof drain collection systems to provide water quality BMP measures.

Each lake discharges into one another until the most eastern lake system, Lake #4 and #5, which act as one lake but are separated by Lake #3. The existing lakes are connected by a series of weirs which they overflow into one another and then eventually overflows into to Slab Creek which discharges into Jenkins Sound. Jenkins Sound finally discharges into the Atlantic Ocean.

The existing land-use for the site is divided by each of the drainage areas. The charts below show the individual drainage areas and their drainage information:

	Pre-Development		
Drainage Areas	**D.A. "1" Pervious**	**D.A "1" Imp.**	**Totals**
Area	5.38 Ac.	2.48 Ac.	7.86 Ac.
CN	62	98	
Time of Concentration	15 min	10 min	
	Pre-Development		
Drainage Areas	**D.A. "2" Pervious**	**D.A "2" Imp.**	**Totals**
Area	3.11 Ac.	1.67 Ac.	4.78 Ac.
CN	55	98	
Time of Concentration	12.7 min	10 min	
	Pre-Development		
Drainage Areas	**D.A. "3" Pervious**	**D.A "3" Imp.**	**Totals**
Area	1.56 Ac.	1.97 Ac.	3.53 Ac.
CN	66	98	
Time of Concentration	18.5 min	10 min	
	Pre-Development		
Drainage Areas	**D.A. "4" Pervious**	**D.A "4" Imp.**	**Totals**
Area	3.95 Ac.	1.58 Ac.	5.53 Ac.
CN	67	98	
Time of Concentration	18.5 min	10 min	
	Pre-Development Off-Site		
Drainage Areas	**D.A. "5" Pervious**	**D.A "5" Imp.**	**Totals**
Area	3.27 Ac.	0 Ac.	3.27 Ac.
CN	74	n/a	
Time of Concentration	12.5 min	n/a	

Total Drainage Area = 24.97 Ac.
Total Impervious Area = 7.70 Ac. (30.84%)

Table #2
Pre-Development Runoff Calculations (DA #1-#4 Routed through all lakes)

Storm Event (Year)	Post-Dev. Peak Discharge Q (cfs)	Peak Storage Elevation (Lake 4 & 5)	Peak Runoff Discharge Volume from Lakes (C.F.)
2	0	7.74	0
5	0	8.47	0
10	0.89	9.21	8,712
50	9.02	9.30	153,331
100	14.99	9.34	237,838

Lakes 4 & 5 Weir elevations: 9.20 Broadcrested Weir at 100 ft width (discharges over cart path)
8.60 Orifice Weir, 6" diameter (discharges to the north towards a ditch on Lot 5.01)

The final discharge for pre-development is released over a 100 foot long earthen broad crested weir structure at the rear of Lake #5, the most southeastern lake. This discharges across an existing cart path and then flows into the meadows.

The NJDEP stormwater regulation rules (NJAC 7:8) are designed to regulate the stormwater groundwater recharge by using various Best Management Practices (BMP's). The rules state in NJAC 7:8-5.4(a)2(i)2 that the stormwater facility should be designed to infiltrate the increase of stormwater runoff volume from the pre-construction to post-construction two (2)- year design storm event. The facility is designed to complied with storing the difference of the Pre-Development DA and the Post-Development DA in the proposed infiltration basin and infiltrating that storm within 72 hours.

In section NJAC 7:8-5.4(a)3 the stormwater facility shall meet one of the following criteria:

i. Demonstrate through hydrologic and hydraulic analysis that for stormwater leaving the site, post-construction runoff hydrographs for the two, 10, and 100-year storm events do not exceed, at any point in time, the pre-construction runoff hydrographs for the same storm events;

ii. Demonstrate through hydrologic and hydraulic analysis that there is no increase, as compared to the pre-construction condition, in the peak runoff rates of stormwater leaving the site for the two, 10, and 100-year storm events and that the increased volume or change in timing of stormwater runoff will not increase flood damage at or downstream of the site. This analysis shall include the analysis of impacts of existing land uses and projected land uses assuming full development under existing zoning and land use ordinances in the drainage area;

iii. Design stormwater management measures so that the post-construction peak runoff rates for the two, 10 and 100-year storm events are 50, 75 and 80 percent, respectively, of the pre-construction peak runoff rates. The percentages apply only to the

postconstruction stormwater runoff that is attributable to the portion of the site on which the proposed development or project is to be constructed; or

iv. In tidal flood hazard areas, stormwater runoff quantity analysis in accordance with i, ii, and iii above shall only be applied if the increased volume of stormwater runoff could increase flood damages below the point of discharge. **Due to the project discharging into a tidal water body, the project does not need to meet the runoff quantity analysis.**

As per the RSIS standards in sections 5:21-7.5, 7.6 and 7.7 Stormwater Management: quantity control, water quality and recharge respectively the requirements are to meet NJAC 7:8-5 and 6. As listed above due to this project discharging into a tidal water body water quantity is not required to be met, water quality is to be met and recharge is exempt due to the project being in the regional center urban development zone.

II. Post-Development Conditions

The proposed development consists of thirteen (13) townhome units for phase 2B which are located within 3 different buildings. The buildings are located off of the existing cul-de-sac of Bay Breeze Boulevard with an extension of the cul-de-sac traveling easterly and then southerly towards Lake #5. Each townhome unit is 72' long by 28' wide. A total impervious coverage for the townhomes is approximately 26,076 s.f. The proposed roadway system will consist of an asphalt drive with a width of 28 feet. The proposed drainage areas for the site drain into various storm sewer inlets or grass swales which direct stormwater runoff to the existing lakes. We have proposed porous asphalt parking spaces and underground roof drain collection systems to provide water quality BMP measures.

III. Site Coverage for Drainage Area Calculations

The following provides a breakdown of the site impervious coverage:

	Post-Development		
Drainage Areas	**D.A. "1" Pervious**	**D.A "1" Imp.**	**Totals**
Area	5.38 Ac.	2.48 Ac.	7.86 Ac.
CN	62	98	
Time of Concentration	15 min	10 min	
	Post-Development		
Drainage Areas	**D.A. "2" Pervious**	**D.A "2" Imp.**	**Totals**
Area	3.11 Ac.	1.67 Ac.	4.78 Ac.
CN	55	98	

Time of Concentration	12.7 min	10 min	
	Post-Development		
Drainage Areas	**D.A. "3" Pervious**	**D.A "3" Imp.**	**Totals**
Area	1.56 Ac.	1.97 Ac.	3.53 Ac.
CN	66	98	
Time of Concentration	18.5 min	10 min	
	Post-Development		
Drainage Areas	**D.A. "4" Pervious**	**D.A "4" Imp.**	**Totals**
Area	3.24 Ac.	2.85 Ac.	6.09 Ac.
CN	68	98	
Time of Concentration	18.5 min	10 min	
	Post-Development Off-Site		
Drainage Areas	**D.A. "5" Pervious**	**D.A "5" Imp.**	**Totals**
Area	2.81 Ac.	0.09 Ac.	2.90 Ac.
CN	74	98	
Time of Concentration	12.5 min	10 min	

Total Drainage Area = 24.97 Ac.
Total Impervious Area = 8.87 Ac. (36%)

IV. Drainage Design/Basin Characteristic

The proposed stormwater management system will attenuate the post-development stormwater runoff for the 2, 10 and 100-Yr. Storm events to 50%, 75% and 80% of pre-development levels respectively. Also the 2, 5, 10 and 50 year storms will be reduced to pre-development discharge rates.

Tables #3 and #4 show a break down of the post-development stormwater runoff rates and volumes for both D.A. #1-4 routed through the basin and D.A. #5 Off-Site runoff respectively:

Table #3
Post Development DA #1-#4 Routed through all lakes

Storm Event (Year)	Post-Dev. Peak Discharge Q (cfs)	Peak Storage Elevation (Lake 4 & 5)	Peak Runoff Discharge Volume from Lakes (C.F.)
2	0	8.49	0
5	0.49	9.11	1,309

10	2.17	9.22	38,768
50	8.90	9.29	179,903
100	15.77	9.33	265,063

Lakes 4 & 5 Weir elevations:
Discharge #1 = 9.00 Sharp crested Weir, 4 ft wide (discharges to the east by Road A cul-de-sac)
Discharge #2 = 9.20 Broadcrested Weir at 100 ft width (discharges over cart path)

V. NJDEP Stormwater Regulations Rules

The NJDEP stormwater regulation rules (NJAC 7:8) are designed to regulate the stormwater groundwater recharge by using various Best Management Practices (BMP's). The rules state in NJAC 7:8-5.4(a)2(i)2 that the stormwater facility should be designed to infiltrate the increase of stormwater runoff volume from the pre-construction to post-construction two (2)- year design storm event. The facility designed has complied with design by storing the difference of the Pre-Development DA and the Post-Development DA in the proposed infiltration basin and infiltrating that storm within 72 hours.

iv. In tidal flood hazard areas, stormwater runoff quantity analysis in accordance with i, ii, and iii above shall only be applied if the increased volume of stormwater runoff could increase flood damages below the point of discharge. **Due to the project discharging into a tidal water body, the project does not need to meet the runoff quantity analysis but as a safety factor, the designed lake system does in fact meet runoff quantities.**

In section NJAC 7:8-5.5 stormwater management measures shall be designed to reduce the post-construction load of total suspended solids (TSS) in stormwater runoff generated from the water quality design storm by 80 percent of the anticipated load from the developed site, expressed as an annual average. The water quality design storm is 1.25 inches of rainfall in two hours. The adopted TSS removal rate for wet ponds depends on the detention period for the water quality design storm event but 80 percent as stated in the NJBMP Manual 2004 edition, Chapter 9.5 shall be met if the permanent pool volumes are three (3) times the stormwater quality design storm runoff volume. Therefore, the wet ponds as designed meets the 80% TSS removal rate.

The chart below shows each ponds permanent pool volumes:

Lake Number	**Permanent Pool Volume (CF)**
1 (Elev: 6.20 to 10.70)	181,815
2 (Elev: 5.67 to 9.00)	193,825
3 (Elev: 4.60 to 8.00)	86,450
4 & 5 (Elev: 3.50 to 7.00)	78,170

The water quality design storm will generate an average of 0.38 inches of excess runoff, which in turn will produce approximately 34,412 CF of runoff volume.
Due to the project being in the regional center urban development zone, ground water recharge is exempt.

In addition to meeting this TSS removal rate, the project site has over 15,000 square feet of porous paving to be installed along with roof drain collections systems with underground perforated piping with a stone trench for the townhomes.

The following calculations show the infiltration time frame of the net increase of the two year design storm from pre-development to post-development:

Pre-Development Combined DA, 2-year storm volume = 127,718 CF
Post-Development Combined DA, 2-year storm volume = 135,907 CF
The difference is 10,585 CF.

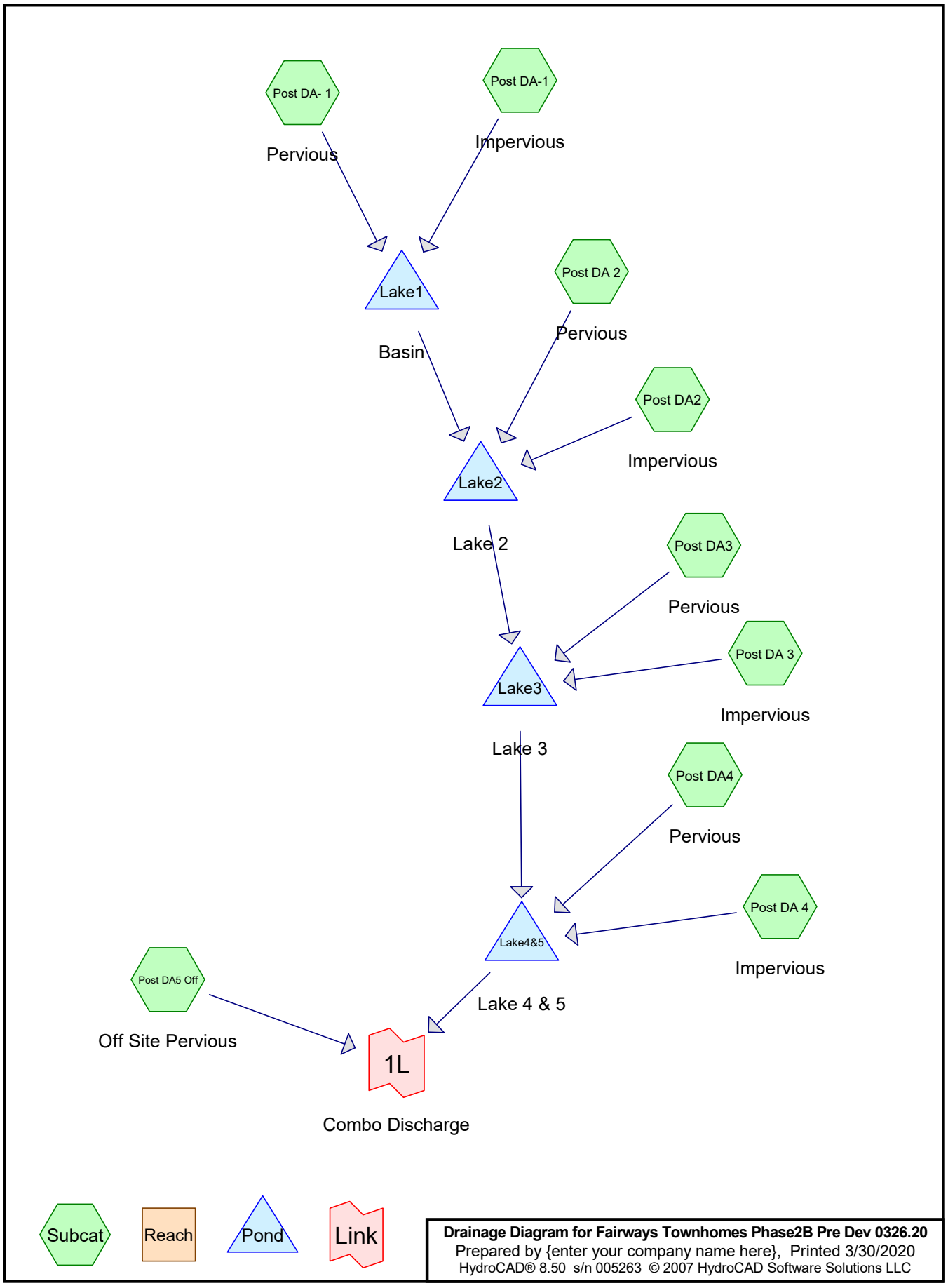
Lakes 4 & 5 act as one pond and they provide 97,507 CF @ elevation 9.00 which the post-development 2-year storm event peaks at. This is 1.32 feet higher than the permanent water elevation of 7.00 in Lakes 4 and 5. Therefore the lake system holds the difference of runoff volume for the pre and post development conditions and is less than the two (2) feet the NJBMP manual suggests. (Chapter 9.5). This also satisfies the ground water recharge requirement by infiltrating the 2-year storm event for post development as no discharge of the storm event is released. The estimated seasonal high water table was found to be at elevation 5.00 which is 2 feet above the water surface elevation of Lakes 4 and 5, which is the lowest water elevation within the lake system.

VI. Conclusion

Inspection of the above data shows the proposed stormwater management system meets the design requirements set forth by the Township of Middle, New Jersey R.S.I.S. and NJDEP NJAC 7:8 standards water quality design storm of having less than 2 feet of water at Lakes 4 & 5 where the permanent water elevation is 7.00 and the elevation of the WQ storm event is 7.51.

This drainage design meets and exceeds standards enforced by NJDEP and Middle Township with water quality and quantity due to the volume of storage the ponds provided for stormwater runoff.

Pre-Development Calculations



Drainage Diagram for Fairways Townhomes Phase2B Pre Dev 0326.20
Prepared by {enter your company name here}, Printed 3/30/2020

Area Listing (all nodes)

Area (acres)	CN	Description (subcatchment-numbers)
0.080	30	Woods, Good, HSG A (Post DA 2)
1.010	39	>75% Grass cover, Good, HSG A (Post DA 2,Post DA- 1)
0.650	55	Woods, Good, HSG B (Post DA 2,Post DA4)
0.370	58	Woods/grass comb., Good, HSG B (Post DA- 1)
7.320	61	>75% Grass cover, Good, HSG B (Post DA 2,Post DA- 1,Post DA3,Post DA4)
0.220	70	Woods, Good, HSG C (Post DA4)
0.100	72	Woods/grass comb., Good, HSG C (Post DA5 Off)
7.520	74	>75% Grass cover, Good, HSG C (Post DA 2,Post DA- 1,Post DA3,Post DA4,Post DA5 Off)
0.350	98	Cart Paths (Post DA 4,Post DA2)
2.840	98	Paved parking & roofs (Post DA 3,Post DA 4,Post DA-1)
0.090	98	Townhouse (Post DA2)
4.420	98	Water Surface (Post DA 3,Post DA 4,Post DA-1,Post DA2)
24.970		**TOTAL AREA**

Soil Listing (all nodes)

Area (acres)	Soil Goup	Subcatchment Numbers
1.090	HSG A	Post DA 2, Post DA- 1
8.340	HSG B	Post DA 2, Post DA- 1, Post DA3, Post DA4
7.840	HSG C	Post DA 2, Post DA- 1, Post DA3, Post DA4, Post DA5 Off
0.000	HSG D	
7.700	Other	Post DA 3, Post DA 4, Post DA-1, Post DA2
24.970		**TOTAL AREA**

Time span=0.00-24.00 hrs, dt=0.07 hrs, 344 points
Runoff by SCS TR-20 method, UH=Delmarva
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Subcatchment Post DA 2: Pervious Runoff Area=3.110 ac 0.00% Impervious Runoff Depth=0.00"
Flow Length=100' Slope=0.0100 '/' Tc=12.7 min CN=55 Runoff=0.00 cfs 0.000 af

Subcatchment Post DA 3: Impervious Runoff Area=1.970 ac 100.00% Impervious Runoff Depth=1.03"
Tc=10.0 min CN=98 Runoff=3.61 cfs 0.170 af

Subcatchment Post DA 4: Impervious Runoff Area=1.580 ac 100.00% Impervious Runoff Depth=1.03"
Tc=10.0 min CN=98 Runoff=2.90 cfs 0.136 af

Subcatchment Post DA- 1: Pervious Runoff Area=5.380 ac 0.00% Impervious Runoff Depth=0.00"
Tc=15.0 min CN=62 Runoff=0.00 cfs 0.000 af

Subcatchment Post DA-1: Impervious Runoff Area=2.480 ac 100.00% Impervious Runoff Depth=1.03"
Tc=10.0 min CN=98 Runoff=4.55 cfs 0.214 af

Subcatchment Post DA2: Impervious Runoff Area=1.670 ac 100.00% Impervious Runoff Depth=1.03"
Tc=10.0 min CN=98 Runoff=3.06 cfs 0.144 af

Subcatchment Post DA3: Pervious Runoff Area=1.560 ac 0.00% Impervious Runoff Depth=0.01"
Flow Length=100' Slope=0.0100 '/' Tc=18.5 min CN=66 Runoff=0.02 cfs 0.001 af

Subcatchment Post DA4: Pervious Runoff Area=3.950 ac 0.00% Impervious Runoff Depth=0.03"
Flow Length=100' Slope=0.0100 '/' Tc=12.7 min CN=69 Runoff=0.13 cfs 0.008 af

Subcatchment Post DA5 Off: Off Site Runoff Area=3.270 ac 0.00% Impervious Runoff Depth=0.07"
Flow Length=75' Slope=0.0150 '/' Tc=12.5 min CN=74 Runoff=0.27 cfs 0.020 af

Pond Lake1: Basin Peak Elev=10.87' Storage=8,887 cf Inflow=4.55 cfs 0.214 af
Outflow=0.11 cfs 0.123 af

Pond Lake2: Lake 2 Peak Elev=9.79' Storage=7,281 cf Inflow=3.09 cfs 0.267 af
Outflow=0.06 cfs 0.114 af

Pond Lake3: Lake 3 Peak Elev=8.83' Storage=6,523 cf Inflow=3.62 cfs 0.285 af
Outflow=0.32 cfs 0.235 af

Pond Lake4&5: Lake 4 & 5 Peak Elev=7.43' Storage=16,541 cf Inflow=2.98 cfs 0.380 af
Outflow=0.00 cfs 0.000 af

Link 1L: Combo Discharge Inflow=0.27 cfs 0.020 af
Primary=0.27 cfs 0.020 af

Total Runoff Area = 24.970 ac Runoff Volume = 0.694 af Average Runoff Depth = 0.33"
69.16% Pervious = 17.270 ac 30.84% Impervious = 7.700 ac

Summary for Subcatchment Post DA 2: Pervious

[45] Hint: Runoff=Zero

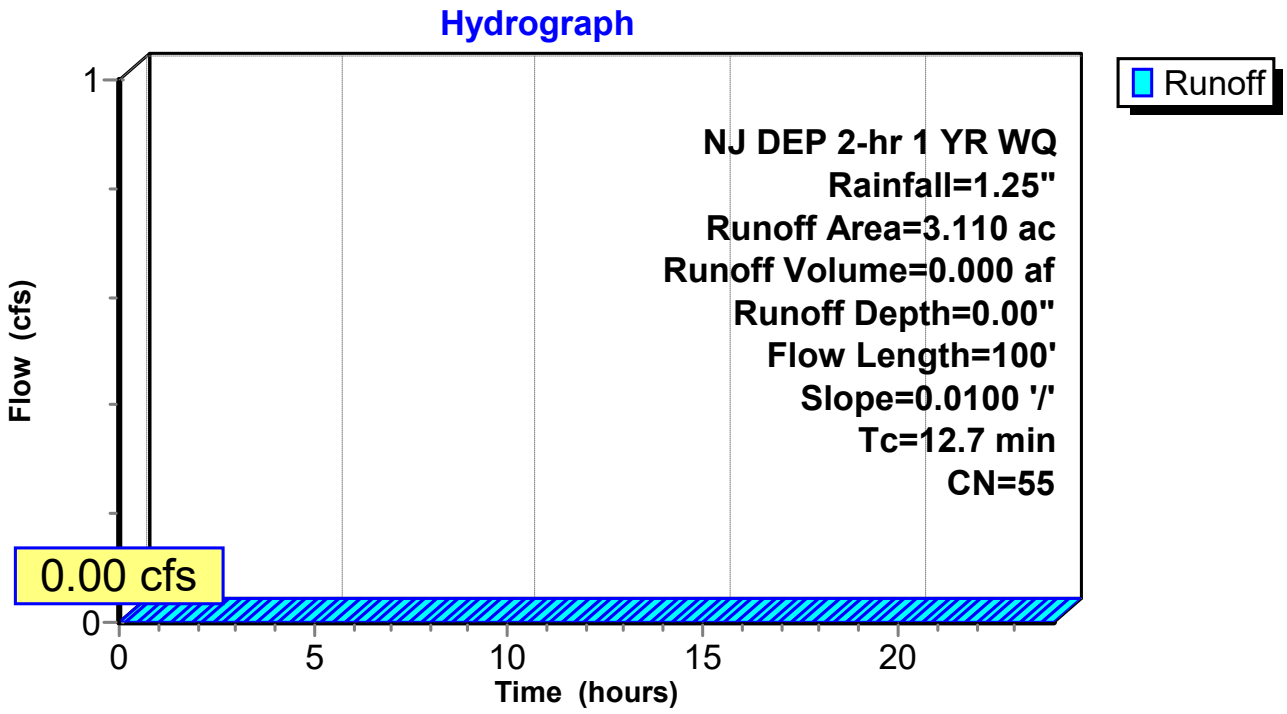
Runoff = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af, Depth= 0.00"

Runoff by SCS TR-20 method, UH=Delmarva, Time Span= 0.00-24.01 hrs, dt= 0.07 hrs
NJ DEP 2-hr 1 YR WQ Rainfall=1.25"

Area (ac)	CN	Description
1.000	39	>75% Grass cover, Good, HSG A
1.340	61	>75% Grass cover, Good, HSG B
0.590	74	>75% Grass cover, Good, HSG C
0.080	30	Woods, Good, HSG A
0.100	55	Woods, Good, HSG B
3.110	55	Weighted Average
3.110		Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
12.7	100	0.0100	0.13		**Sheet Flow, Unpaved** Grass: Short n= 0.150 P2= 3.30"

Subcatchment Post DA 2: Pervious



Summary for Subcatchment Post DA 3: Impervious

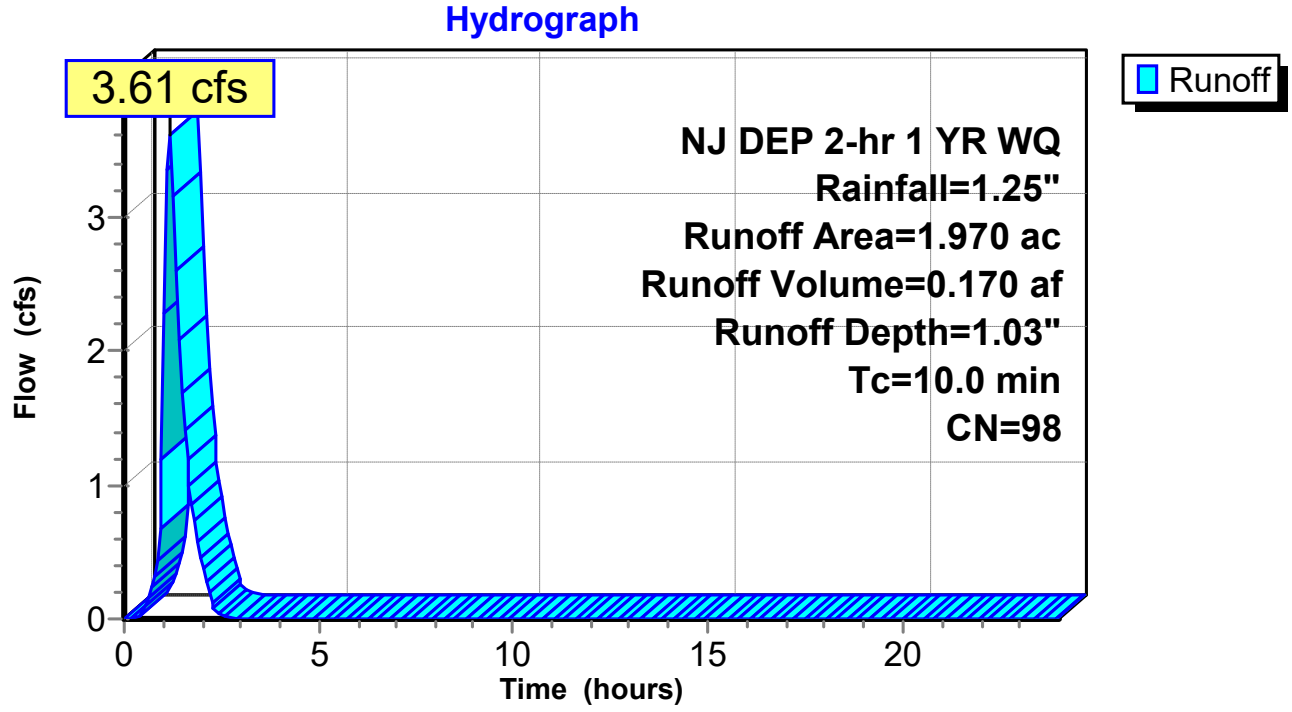
Runoff = 3.61 cfs @ 1.18 hrs, Volume= 0.170 af, Depth= 1.03"

Runoff by SCS TR-20 method, UH=Delmarva, Time Span= 0.00-24.01 hrs, dt= 0.07 hrs
NJ DEP 2-hr 1 YR WQ Rainfall=1.25"

Area (ac)	CN	Description
0.630	98	Water Surface
1.340	98	Paved parking & roofs
1.970	98	Weighted Average
1.970		Impervious Area

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

Subcatchment Post DA 3: Impervious



Summary for Subcatchment Post DA 4: Impervious

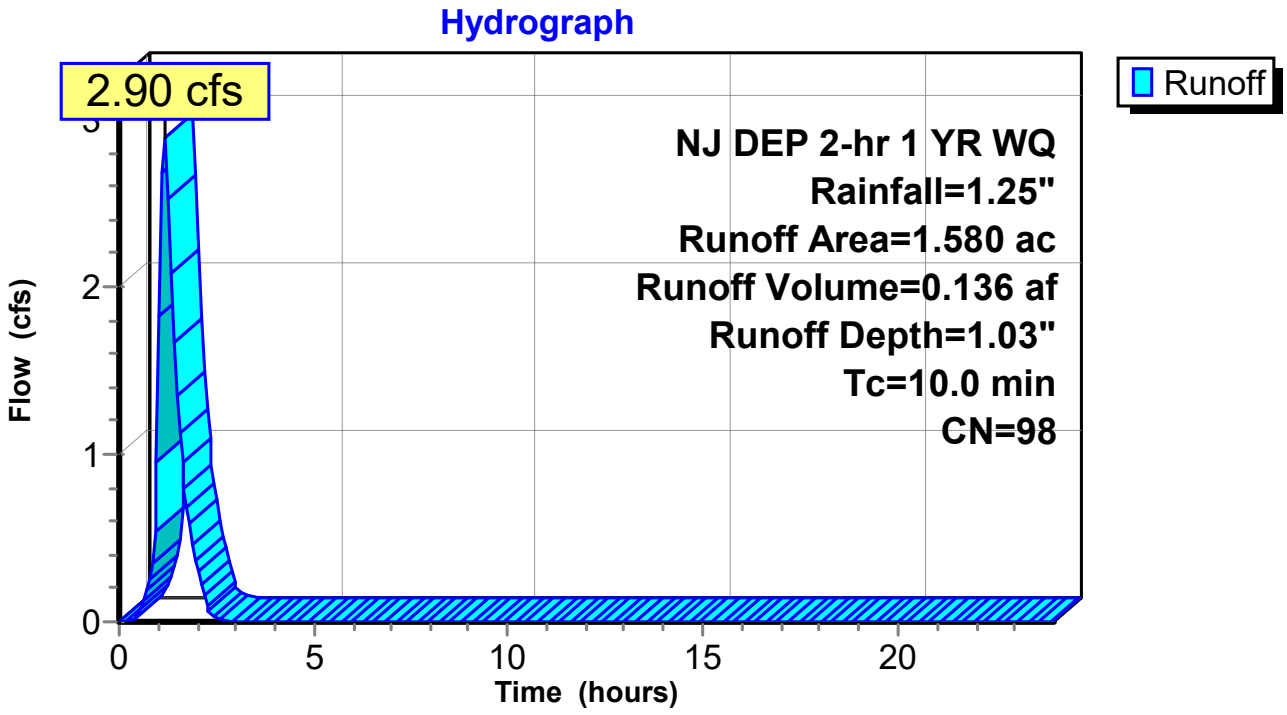
Runoff = 2.90 cfs @ 1.18 hrs, Volume= 0.136 af, Depth= 1.03"

Runoff by SCS TR-20 method, UH=Delmarva, Time Span= 0.00-24.01 hrs, dt= 0.07 hrs
NJ DEP 2-hr 1 YR WQ Rainfall=1.25"

	Area (ac)	CN	Description
*	0.100	98	Cart Paths
	0.180	98	Paved parking & roofs
	1.300	98	Water Surface
	1.580	98	Weighted Average
	1.580		Impervious Area

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

Subcatchment Post DA 4: Impervious



Summary for Subcatchment Post DA- 1: Pervious

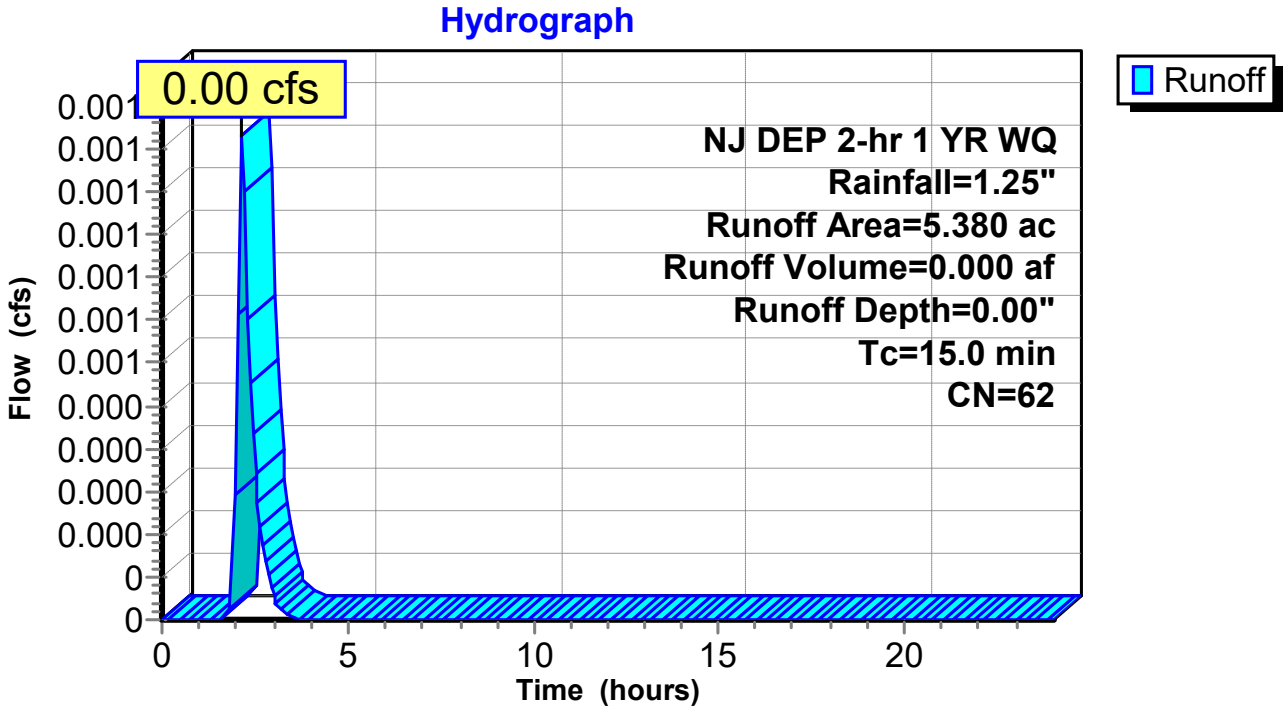
Runoff = 0.00 cfs @ 2.14 hrs, Volume= 0.000 af, Depth= 0.00"

Runoff by SCS TR-20 method, UH=Delmarva, Time Span= 0.00-24.01 hrs, dt= 0.07 hrs
NJ DEP 2-hr 1 YR WQ Rainfall=1.25"

Area (ac)	CN	Description
0.010	39	>75% Grass cover, Good, HSG A
4.320	61	>75% Grass cover, Good, HSG B
0.680	74	>75% Grass cover, Good, HSG C
0.370	58	Woods/grass comb., Good, HSG B
5.380	62	Weighted Average
5.380		Pervious Area

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

Subcatchment Post DA- 1: Pervious



Summary for Subcatchment Post DA-1: Impervious

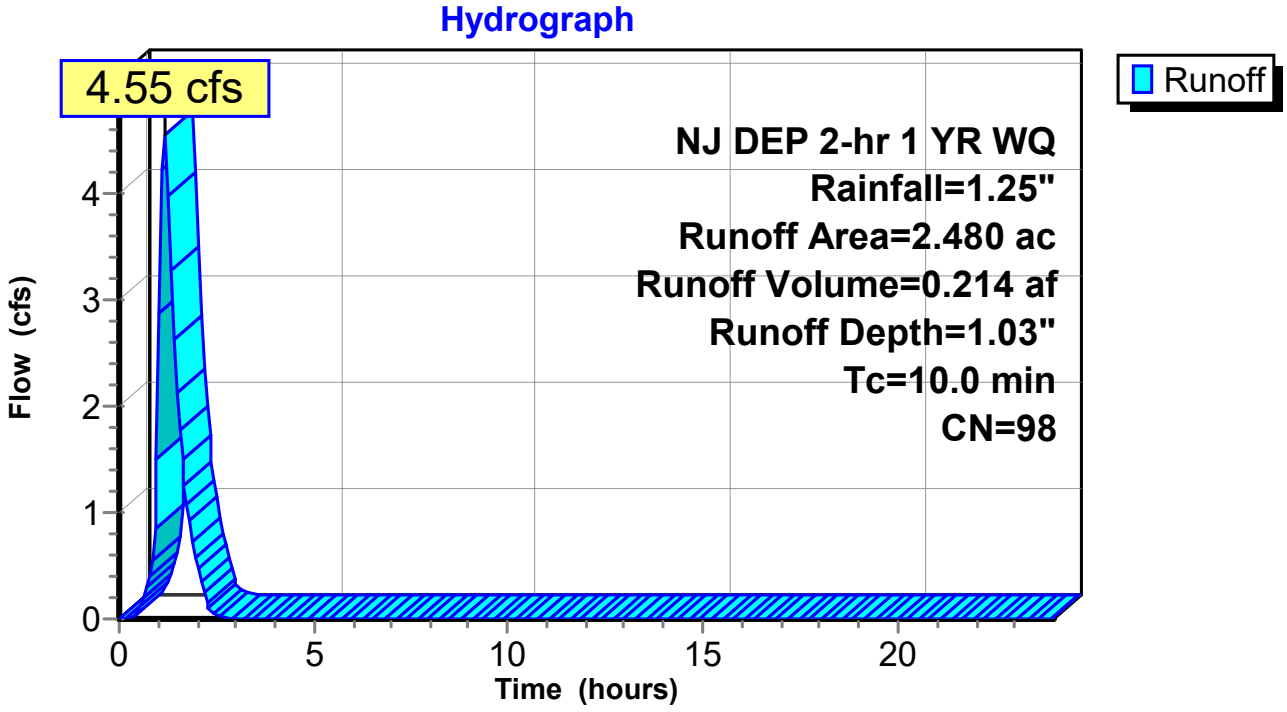
Runoff = 4.55 cfs @ 1.18 hrs, Volume= 0.214 af, Depth= 1.03"

Runoff by SCS TR-20 method, UH=Delmarva, Time Span= 0.00-24.01 hrs, dt= 0.07 hrs
NJ DEP 2-hr 1 YR WQ Rainfall=1.25"

Area (ac)	CN	Description
1.160	98	Water Surface
1.320	98	Paved parking & roofs
2.480	98	Weighted Average
2.480		Impervious Area

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

Subcatchment Post DA-1: Impervious



Summary for Subcatchment Post DA2: Impervious

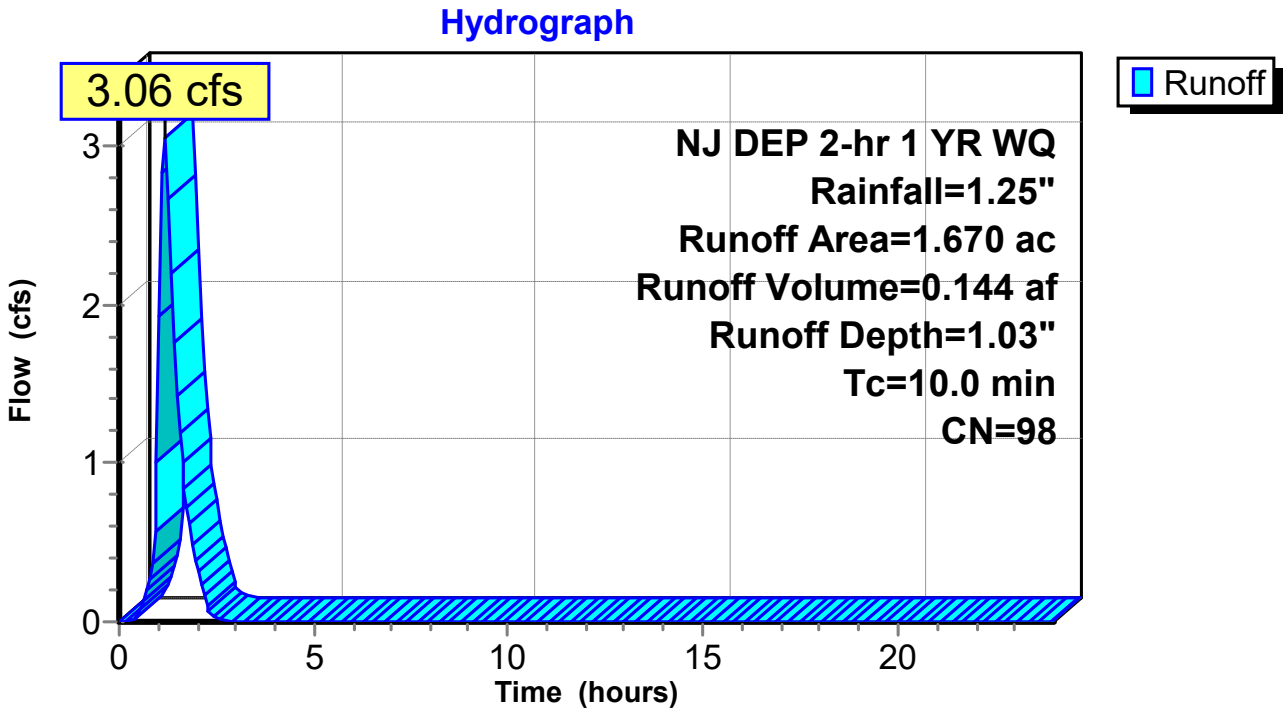
Runoff = 3.06 cfs @ 1.18 hrs, Volume= 0.144 af, Depth= 1.03"

Runoff by SCS TR-20 method, UH=Delmarva, Time Span= 0.00-24.01 hrs, dt= 0.07 hrs
NJ DEP 2-hr 1 YR WQ Rainfall=1.25"

	Area (ac)	CN	Description
*	0.250	98	Cart Paths
	1.330	98	Water Surface
*	0.090	98	Townhouse
	1.670	98	Weighted Average
	1.670		Impervious Area

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

Subcatchment Post DA2: Impervious



Summary for Subcatchment Post DA3: Pervious

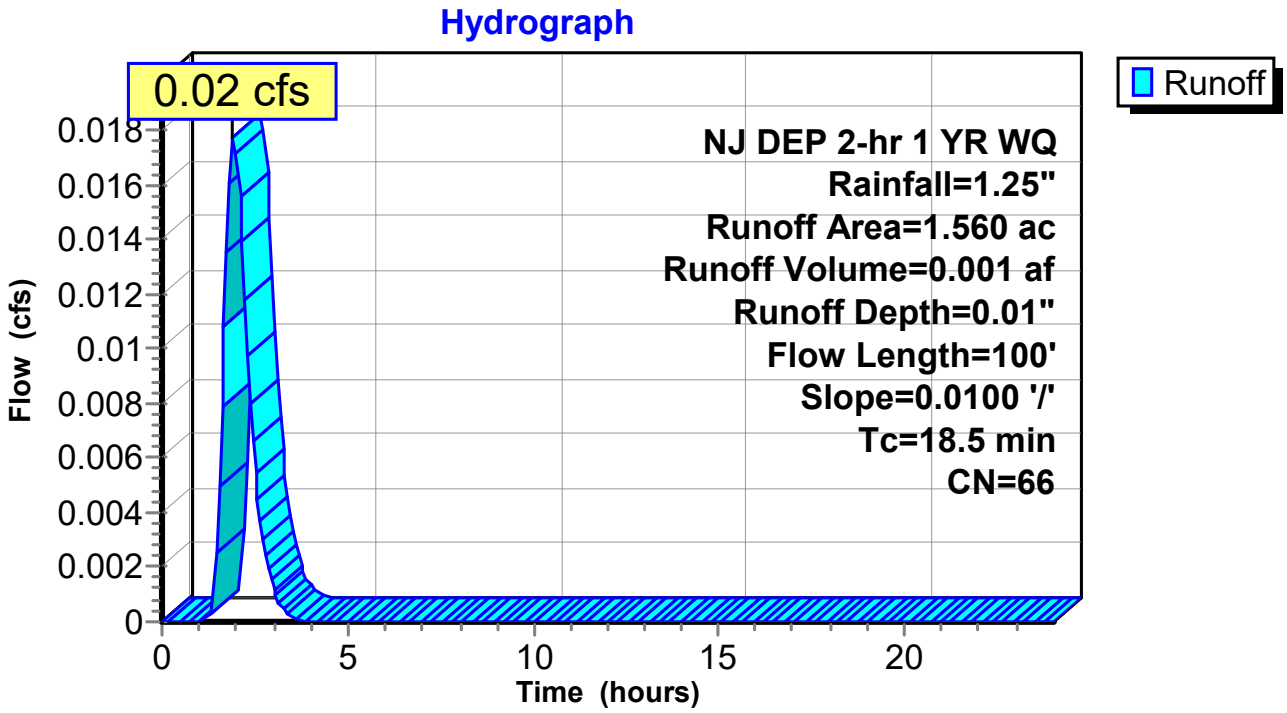
Runoff = 0.02 cfs @ 1.92 hrs, Volume= 0.001 af, Depth= 0.01"

Runoff by SCS TR-20 method, UH=Delmarva, Time Span= 0.00-24.01 hrs, dt= 0.07 hrs
NJ DEP 2-hr 1 YR WQ Rainfall=1.25"

Area (ac)	CN	Description
1.000	61	>75% Grass cover, Good, HSG B
0.560	74	>75% Grass cover, Good, HSG C
1.560	66	Weighted Average
1.560		Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
18.5	100	0.0100	0.09		**Sheet Flow, Unpaved** Grass: Dense n= 0.240 P2= 3.30"

Subcatchment Post DA3: Pervious



Summary for Subcatchment Post DA4: Pervious

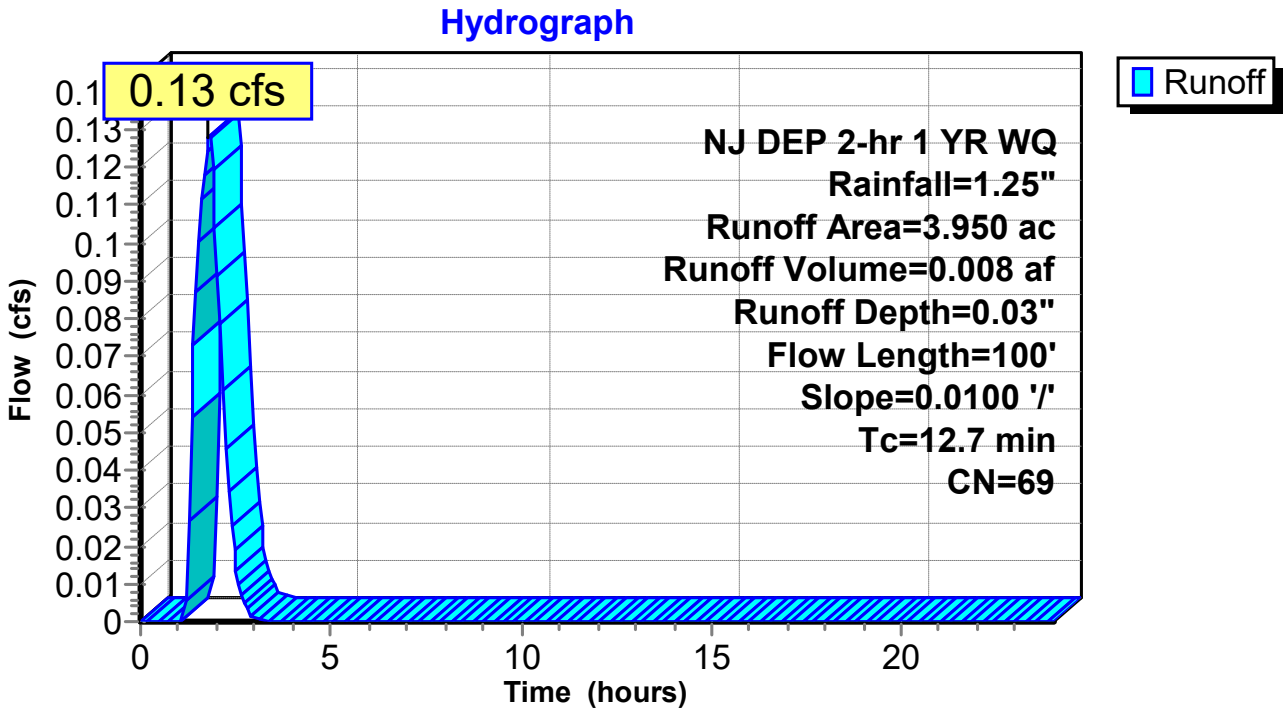
Runoff = 0.13 cfs @ 1.81 hrs, Volume= 0.008 af, Depth= 0.03"

Runoff by SCS TR-20 method, UH=Delmarva, Time Span= 0.00-24.01 hrs, dt= 0.07 hrs
NJ DEP 2-hr 1 YR WQ Rainfall=1.25"

Area (ac)	CN	Description
0.660	61	>75% Grass cover, Good, HSG B
2.520	74	>75% Grass cover, Good, HSG C
0.550	55	Woods, Good, HSG B
0.220	70	Woods, Good, HSG C
3.950	69	Weighted Average
3.950		Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
12.7	100	0.0100	0.13		**Sheet Flow, Unpaved** Grass: Short n= 0.150 P2= 3.30"

Subcatchment Post DA4: Pervious



Summary for Subcatchment Post DA5 Off: Off Site Pervious

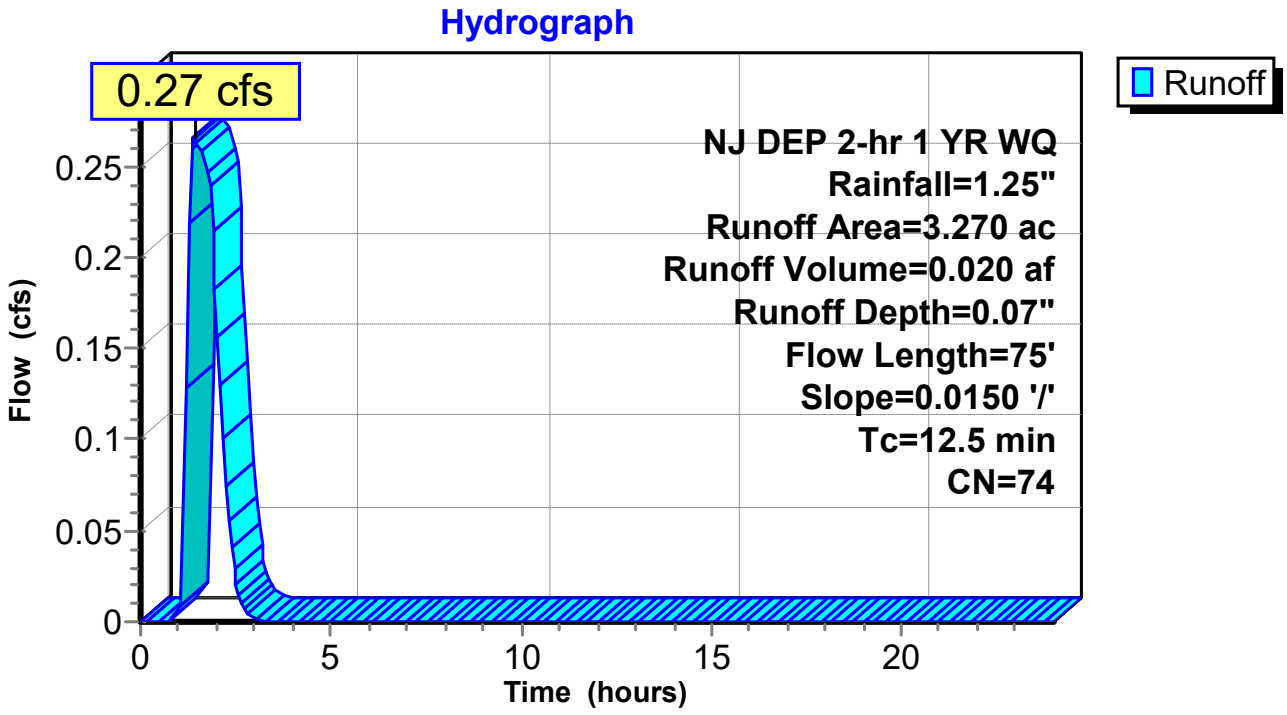
Runoff = 0.27 cfs @ 1.41 hrs, Volume= 0.020 af, Depth= 0.07"

Runoff by SCS TR-20 method, UH=Delmarva, Time Span= 0.00-24.01 hrs, dt= 0.07 hrs
NJ DEP 2-hr 1 YR WQ Rainfall=1.25"

Area (ac)	CN	Description
3.170	74	>75% Grass cover, Good, HSG C
0.100	72	Woods/grass comb., Good, HSG C
3.270	74	Weighted Average
3.270		Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
12.5	75	0.0150	0.10		**Sheet Flow, Unpaved** Grass: Dense n= 0.240 P2= 3.30"

Subcatchment Post DA5 Off: Off Site Pervious



Summary for Pond Lake1: Basin

Inflow Area = 7.860 ac, 31.55% Impervious, Inflow Depth = 0.33" for 1 YR WQ event
Inflow = 4.55 cfs @ 1.18 hrs, Volume= 0.214 af
Outflow = 0.11 cfs @ 2.31 hrs, Volume= 0.123 af, Atten= 98%, Lag= 68.0 min
Primary = 0.11 cfs @ 2.31 hrs, Volume= 0.123 af

Routing by Stor-Ind method, Time Span= 0.00-24.01 hrs, dt= 0.07 hrs
Peak Elev= 10.87' @ 2.31 hrs Surf.Area= 0 sf Storage= 8,887 cf

Plug-Flow detention time= 559.5 min calculated for 0.123 af (57% of inflow)
Center-of-Mass det. time= 546.5 min (626.6 - 80.1)

Volume	Invert	Avail.Storage	Storage Description
#1	10.70'	137,878 cf	**Custom Stage Data** Listed below

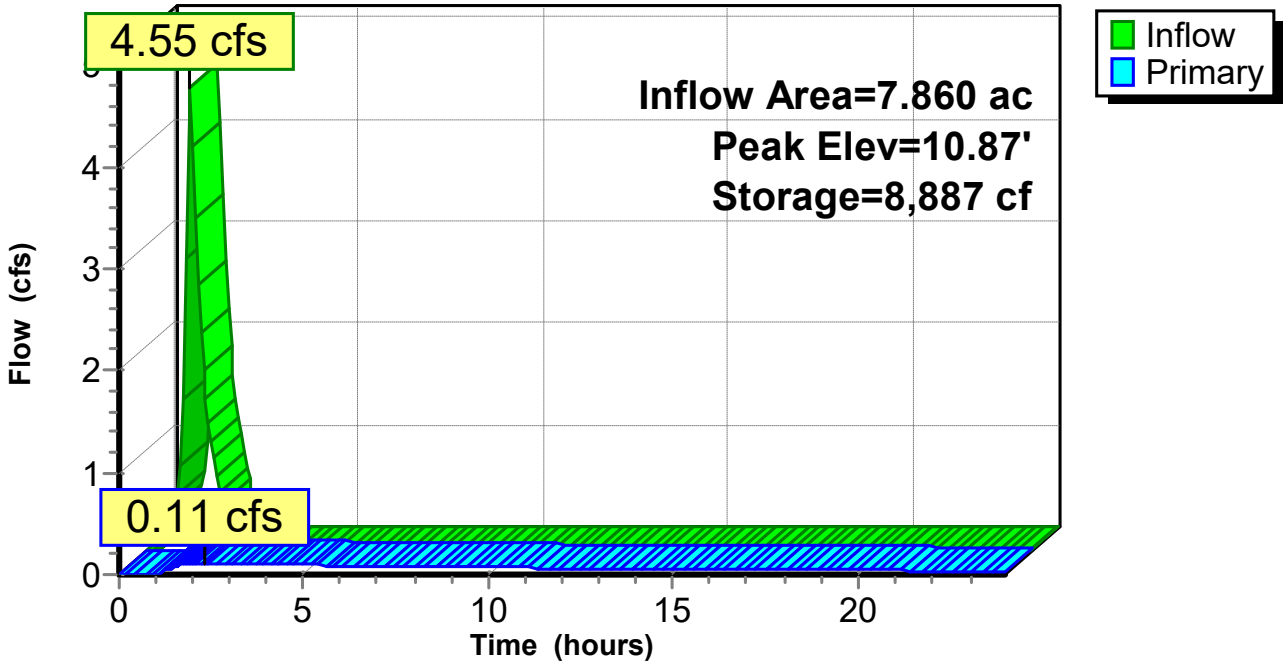
Elevation (feet)	Cum.Store (cubic-feet)
10.70	0
11.00	15,300
12.00	65,780
13.00	118,459
13.70	137,878

Device	Routing	Invert	Outlet Devices
#1	Primary	11.35'	**2.0' long Sharp-Crested Rectangular Weir** 2 End Contraction(s)
#2	Primary	10.70'	**0.5' long Sharp-Crested Rectangular Weir** 2 End Contraction(s)

Primary OutFlow Max=0.11 cfs @ 2.31 hrs HW=10.87' (Free Discharge)
↑ **1=Sharp-Crested Rectangular Weir** (Controls 0.00 cfs)
└ **2=Sharp-Crested Rectangular Weir** (Weir Controls 0.11 cfs @ 1.37 fps)

Pond Lake1: Basin

Hydrograph



Summary for Pond Lake2: Lake 2

Inflow Area = 12.640 ac, 32.83% Impervious, Inflow Depth > 0.25" for 1 YR WQ event
Inflow = 3.09 cfs @ 1.18 hrs, Volume= 0.267 af
Outflow = 0.06 cfs @ 11.62 hrs, Volume= 0.114 af, Atten= 98%, Lag= 626.1 min
Primary = 0.06 cfs @ 11.62 hrs, Volume= 0.114 af

Routing by Stor-Ind method, Time Span= 0.00-24.01 hrs, dt= 0.07 hrs
Peak Elev= 9.79' @ 11.62 hrs Surf.Area= 0 sf Storage= 7,281 cf

Plug-Flow detention time= 694.5 min calculated for 0.114 af (43% of inflow)
Center-of-Mass det. time= 434.9 min (766.6 - 331.7)

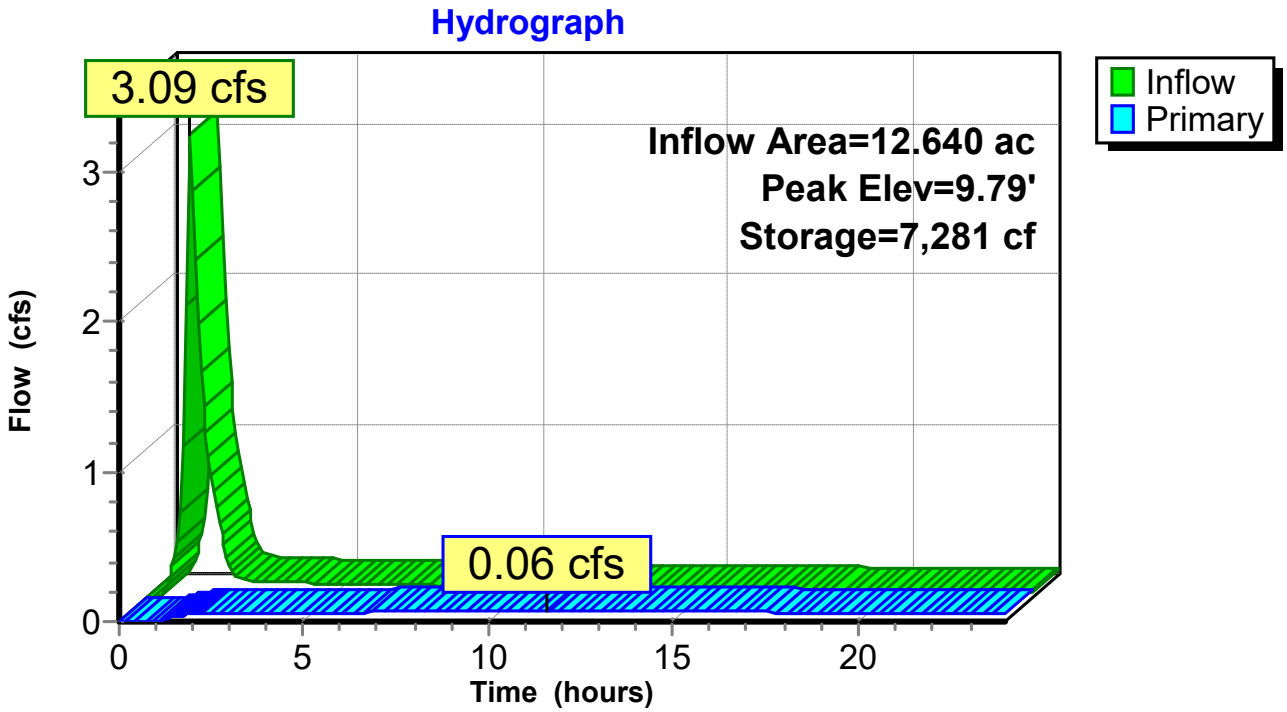
Volume	Invert	Avail.Storage	Storage Description
#1	9.67'	87,360 cf	**Custom Stage Data** Listed below

Elevation (feet)	Cum.Store (cubic-feet)
9.67	0
10.00	20,120
11.00	87,360

Device	Routing	Invert	Outlet Devices
#1	Primary	10.00'	**4.0' long Sharp-Crested Rectangular Weir** 2 End Contraction(s)
#2	Primary	9.67'	**0.5' long Sharp-Crested Rectangular Weir** 2 End Contraction(s)

Primary OutFlow Max=0.06 cfs @ 11.62 hrs HW=9.79' (Free Discharge)
1=Sharp-Crested Rectangular Weir (Controls 0.00 cfs)
2=Sharp-Crested Rectangular Weir (Weir Controls 0.06 cfs @ 1.13 fps)

Pond Lake2: Lake 2



Summary for Pond Lake3: Lake 3

Inflow Area = 16.170 ac, 37.85% Impervious, Inflow Depth > 0.21" for 1 YR WQ event
Inflow = 3.62 cfs @ 1.18 hrs, Volume= 0.285 af
Outflow = 0.32 cfs @ 2.12 hrs, Volume= 0.235 af, Atten= 91%, Lag= 56.6 min
Primary = 0.32 cfs @ 2.12 hrs, Volume= 0.235 af

Routing by Stor-Ind method, Time Span= 0.00-24.01 hrs, dt= 0.07 hrs
Peak Elev= 8.83' @ 2.12 hrs Surf.Area= 0 sf Storage= 6,523 cf

Plug-Flow detention time= 378.5 min calculated for 0.235 af (83% of inflow)
Center-of-Mass det. time= 213.0 min (567.8 - 354.8)

Volume	Invert	Avail.Storage	Storage Description
#1	8.60'	69,310 cf	**Custom Stage Data** Listed below

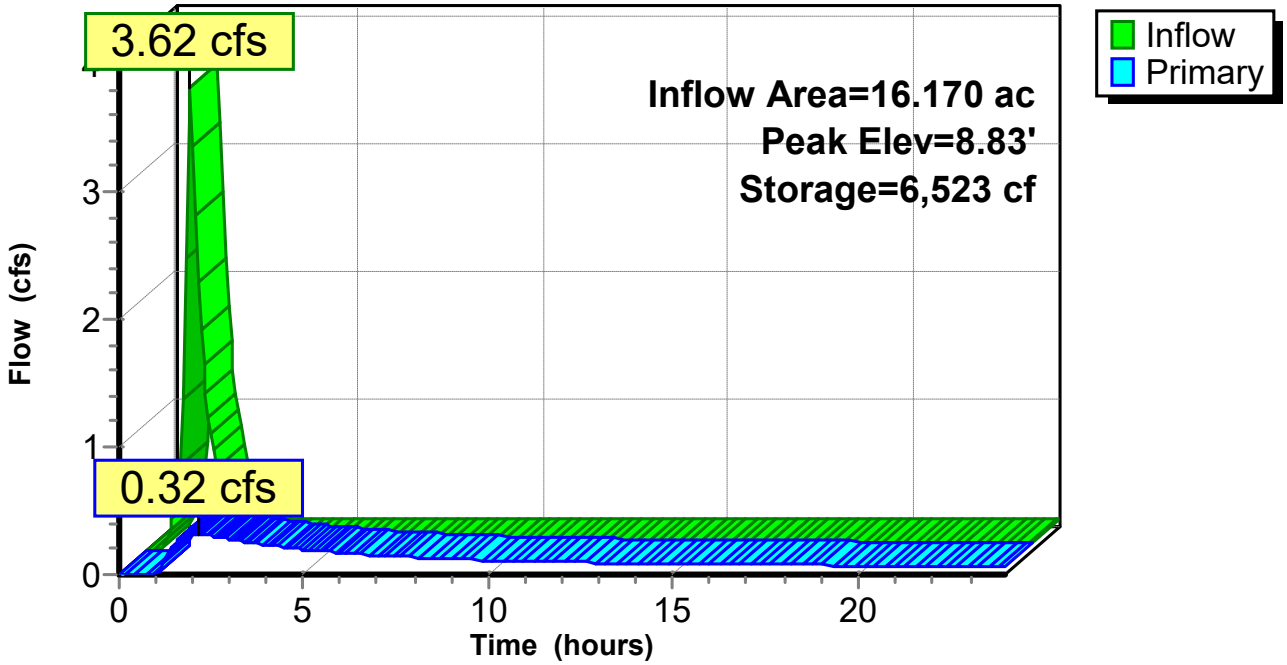
Elevation (feet)	Cum.Store (cubic-feet)
8.60	0
9.00	11,585
10.00	42,767
10.80	69,310

Device	Routing	Invert	Outlet Devices
#1	Primary	9.60'	**12.0' long Sharp-Crested Rectangular Weir** 2 End Contraction(s)
#2	Primary	9.60'	**4.0' long Sharp-Crested Rectangular Weir** 2 End Contraction(s)
#3	Primary	8.60'	**0.5' long Sharp-Crested Rectangular Weir** 2 End Contraction(s)
#4	Primary	8.60'	**0.5' long Sharp-Crested Rectangular Weir** 2 End Contraction(s)

Primary OutFlow Max=0.32 cfs @ 2.12 hrs HW=8.83' (Free Discharge)
- **1=Sharp-Crested Rectangular Weir** (Controls 0.00 cfs)
- **2=Sharp-Crested Rectangular Weir** (Controls 0.00 cfs)
- **3=Sharp-Crested Rectangular Weir** (Weir Controls 0.16 cfs @ 1.55 fps)
- **4=Sharp-Crested Rectangular Weir** (Weir Controls 0.16 cfs @ 1.55 fps)

Pond Lake3: Lake 3

Hydrograph



Summary for Pond Lake4&5: Lake 4 & 5

Inflow Area = 21.700 ac, 35.48% Impervious, Inflow Depth > 0.21" for 1 YR WQ event
Inflow = 2.98 cfs @ 1.19 hrs, Volume= 0.380 af
Outflow = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af, Atten= 100%, Lag= 0.0 min
Primary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af

Routing by Stor-Ind method, Time Span= 0.00-24.01 hrs, dt= 0.07 hrs
Peak Elev= 7.43' @ 24.01 hrs Surf.Area= 46,803 sf Storage= 16,541 cf

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

Volume	Invert	Avail.Storage	Storage Description
#1	7.00'	126,192 cf	**Custom Stage Data (Prismatic)** Listed below

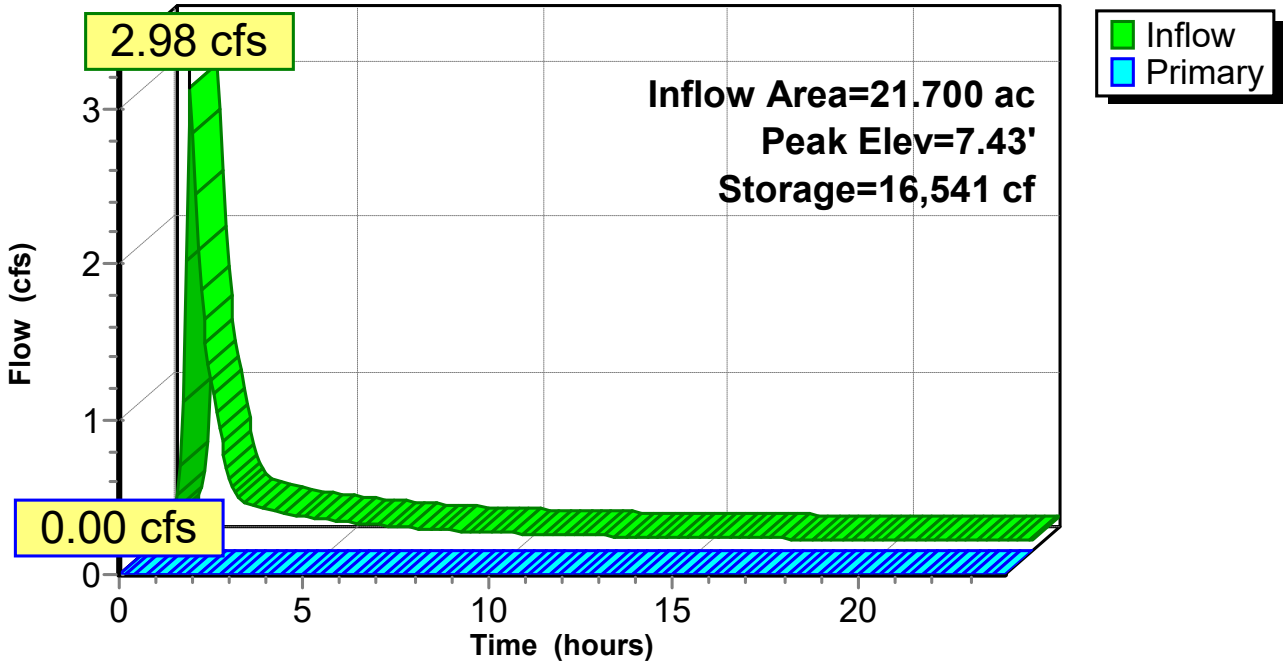
Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
7.00	27,767	0	0
7.40	46,551	14,864	14,864
8.00	50,946	29,249	44,113
9.00	55,842	53,394	97,507
9.50	58,900	28,686	126,192

Device	Routing	Invert	Outlet Devices
#1	Primary	9.20'	**100.0' long x 20.0' 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
#2	Primary	8.60'	**12.0" Vert. Orifice/Grate** C= 0.600

Primary OutFlow Max=0.00 cfs @ 0.00 hrs HW=7.00' (Free Discharge)
└**1=Broad-Crested Rectangular Weir** (Controls 0.00 cfs)
└**2=Orifice/Grate** (Controls 0.00 cfs)

Pond Lake4&5: Lake 4 & 5

Hydrograph

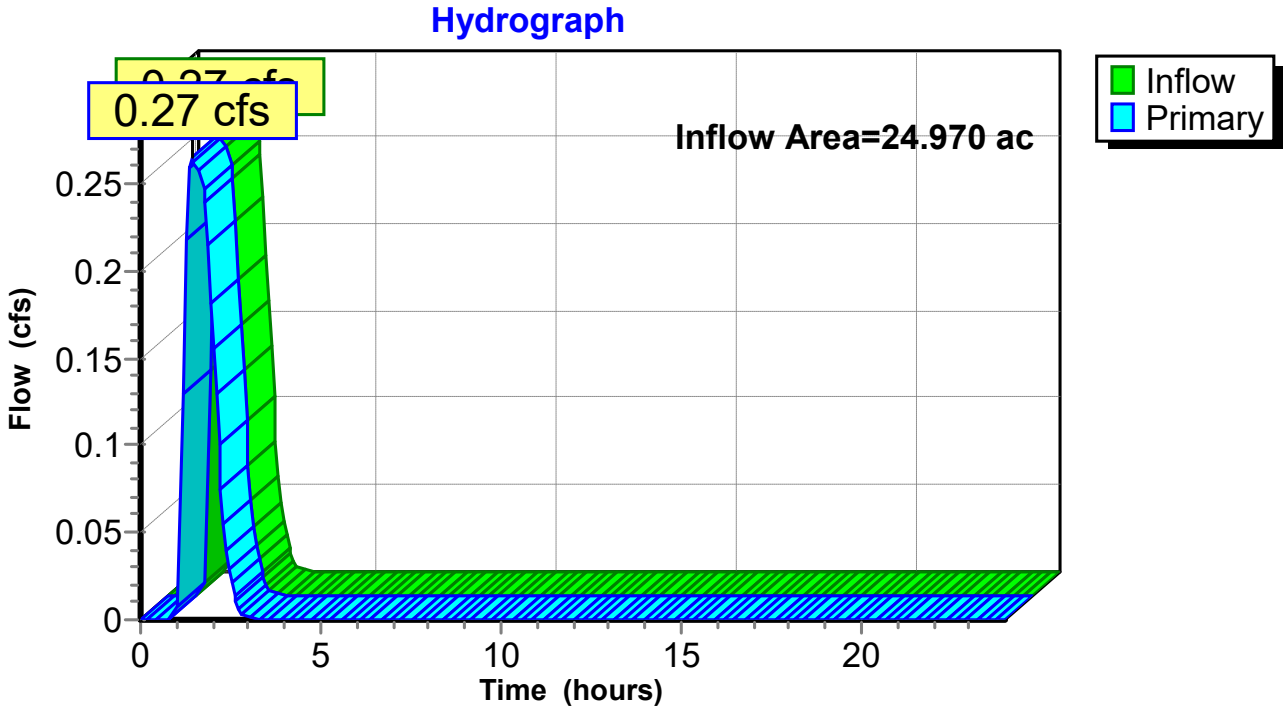


Summary for Link 1L: Combo Discharge

Inflow Area = 24.970 ac, 30.84% Impervious, Inflow Depth = 0.01" for 1 YR WQ event
Inflow = 0.27 cfs @ 1.41 hrs, Volume= 0.020 af
Primary = 0.27 cfs @ 1.41 hrs, Volume= 0.020 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-24.01 hrs, dt= 0.07 hrs

Link 1L: Combo Discharge



Time span=0.00-24.00 hrs, dt=0.07 hrs, 344 points
Runoff by SCS TR-20 method, UH=Delmarva
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Subcatchment Post DA 2: Pervious Runoff Area=3.110 ac 0.00% Impervious Runoff Depth>0.28"
Flow Length=100' Slope=0.0100 '/' Tc=12.7 min CN=55 Runoff=0.28 cfs 0.072 af

Subcatchment Post DA 3: Impervious Runoff Area=1.970 ac 100.00% Impervious Runoff Depth>3.06"
Tc=10.0 min CN=98 Runoff=4.15 cfs 0.503 af

Subcatchment Post DA 4: Impervious Runoff Area=1.580 ac 100.00% Impervious Runoff Depth>3.06"
Tc=10.0 min CN=98 Runoff=3.33 cfs 0.403 af

Subcatchment Post DA- 1: Pervious Runoff Area=5.380 ac 0.00% Impervious Runoff Depth>0.52"
Tc=15.0 min CN=62 Runoff=1.26 cfs 0.233 af

Subcatchment Post DA-1: Impervious Runoff Area=2.480 ac 100.00% Impervious Runoff Depth>3.06"
Tc=10.0 min CN=98 Runoff=5.23 cfs 0.633 af

Subcatchment Post DA2: Impervious Runoff Area=1.670 ac 100.00% Impervious Runoff Depth>3.06"
Tc=10.0 min CN=98 Runoff=3.52 cfs 0.426 af

Subcatchment Post DA3: Pervious Runoff Area=1.560 ac 0.00% Impervious Runoff Depth>0.69"
Flow Length=100' Slope=0.0100 '/' Tc=18.5 min CN=66 Runoff=0.50 cfs 0.089 af

Subcatchment Post DA4: Pervious Runoff Area=3.950 ac 0.00% Impervious Runoff Depth>0.83"
Flow Length=100' Slope=0.0100 '/' Tc=12.7 min CN=69 Runoff=1.93 cfs 0.274 af

Subcatchment Post DA5 Off: Off Site Runoff Area=3.270 ac 0.00% Impervious Runoff Depth>1.10"
Flow Length=75' Slope=0.0150 '/' Tc=12.5 min CN=74 Runoff=2.30 cfs 0.299 af

Pond Lake1: Basin Peak Elev=11.19' Storage=24,838 cf Inflow=6.09 cfs 0.866 af
Outflow=0.45 cfs 0.407 af

Pond Lake2: Lake 2 Peak Elev=10.05' Storage=23,609 cf Inflow=3.77 cfs 0.905 af
Outflow=0.48 cfs 0.369 af

Pond Lake3: Lake 3 Peak Elev=9.07' Storage=13,892 cf Inflow=4.56 cfs 0.961 af
Outflow=0.86 cfs 0.724 af

Pond Lake4&5: Lake 4 & 5 Peak Elev=8.32' Storage=60,950 cf Inflow=5.61 cfs 1.401 af
Outflow=0.00 cfs 0.000 af

Link 1L: Combo Discharge Inflow=2.30 cfs 0.299 af
Primary=2.30 cfs 0.299 af

Total Runoff Area = 24.970 ac Runoff Volume = 2.932 af Average Runoff Depth = 1.41"
69.16% Pervious = 17.270 ac 30.84% Impervious = 7.700 ac

Summary for Subcatchment Post DA 2: Pervious

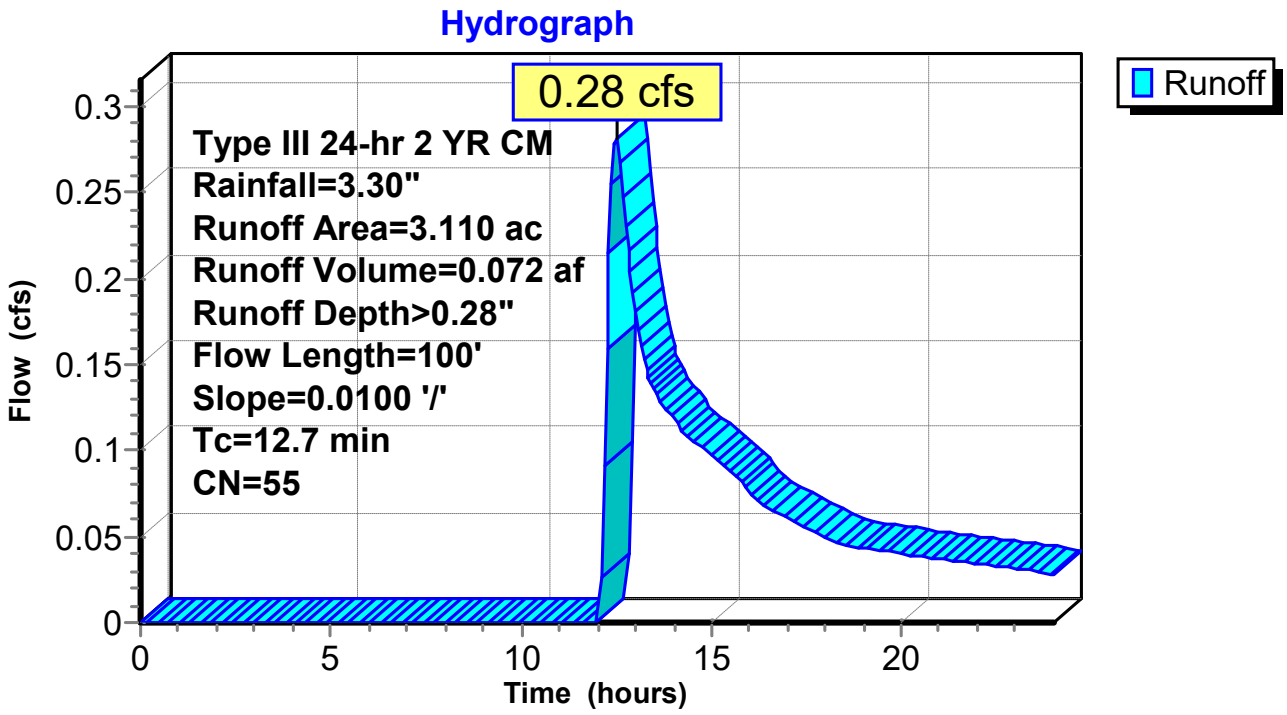
Runoff = 0.28 cfs @ 12.51 hrs, Volume= 0.072 af, Depth> 0.28"

Runoff by SCS TR-20 method, UH=Delmarva, Time Span= 0.00-24.01 hrs, dt= 0.07 hrs
Type III 24-hr 2 YR CM Rainfall=3.30"

Area (ac)	CN	Description
1.000	39	>75% Grass cover, Good, HSG A
1.340	61	>75% Grass cover, Good, HSG B
0.590	74	>75% Grass cover, Good, HSG C
0.080	30	Woods, Good, HSG A
0.100	55	Woods, Good, HSG B
3.110	55	Weighted Average
3.110		Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
12.7	100	0.0100	0.13		**Sheet Flow, Unpaved** Grass: Short n= 0.150 P2= 3.30"

Subcatchment Post DA 2: Pervious



Summary for Subcatchment Post DA 3: Impervious

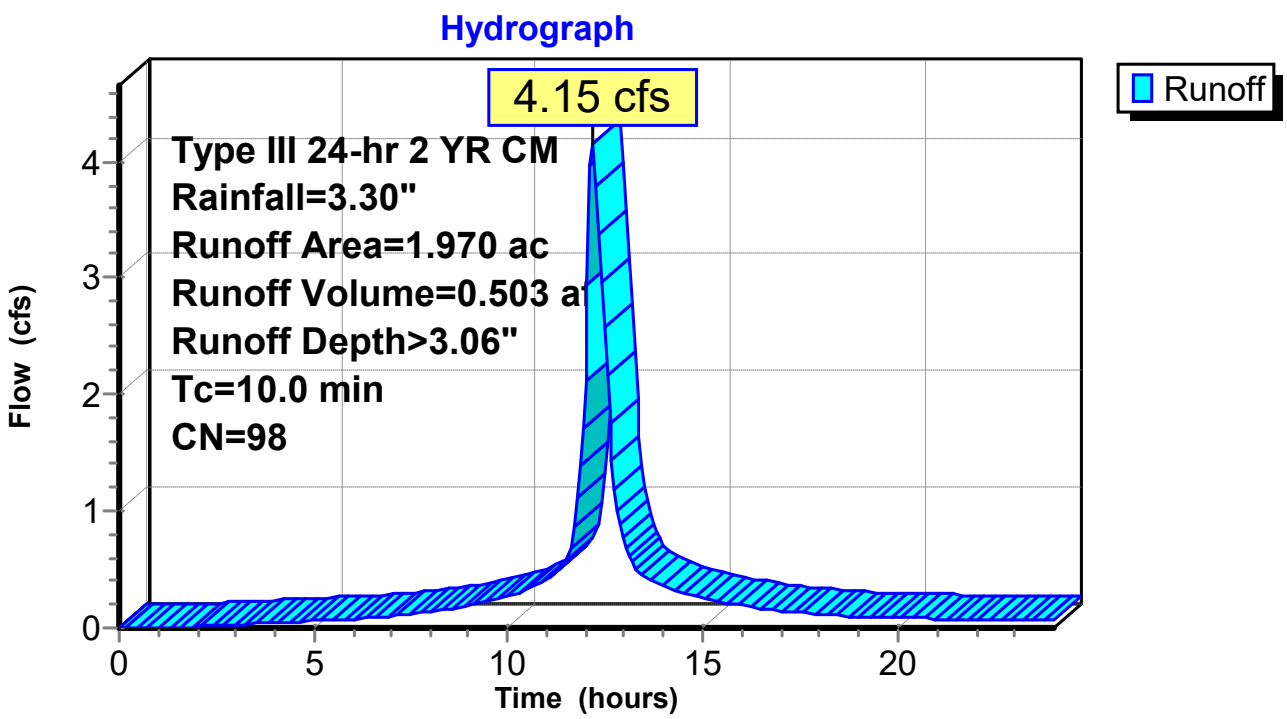
Runoff = 4.15 cfs @ 12.17 hrs, Volume= 0.503 af, Depth> 3.06"

Runoff by SCS TR-20 method, UH=Delmarva, Time Span= 0.00-24.01 hrs, dt= 0.07 hrs
Type III 24-hr 2 YR CM Rainfall=3.30"

Area (ac)	CN	Description
0.630	98	Water Surface
1.340	98	Paved parking & roofs
1.970	98	Weighted Average
1.970		Impervious Area

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

Subcatchment Post DA 3: Impervious



Summary for Subcatchment Post DA 4: Impervious

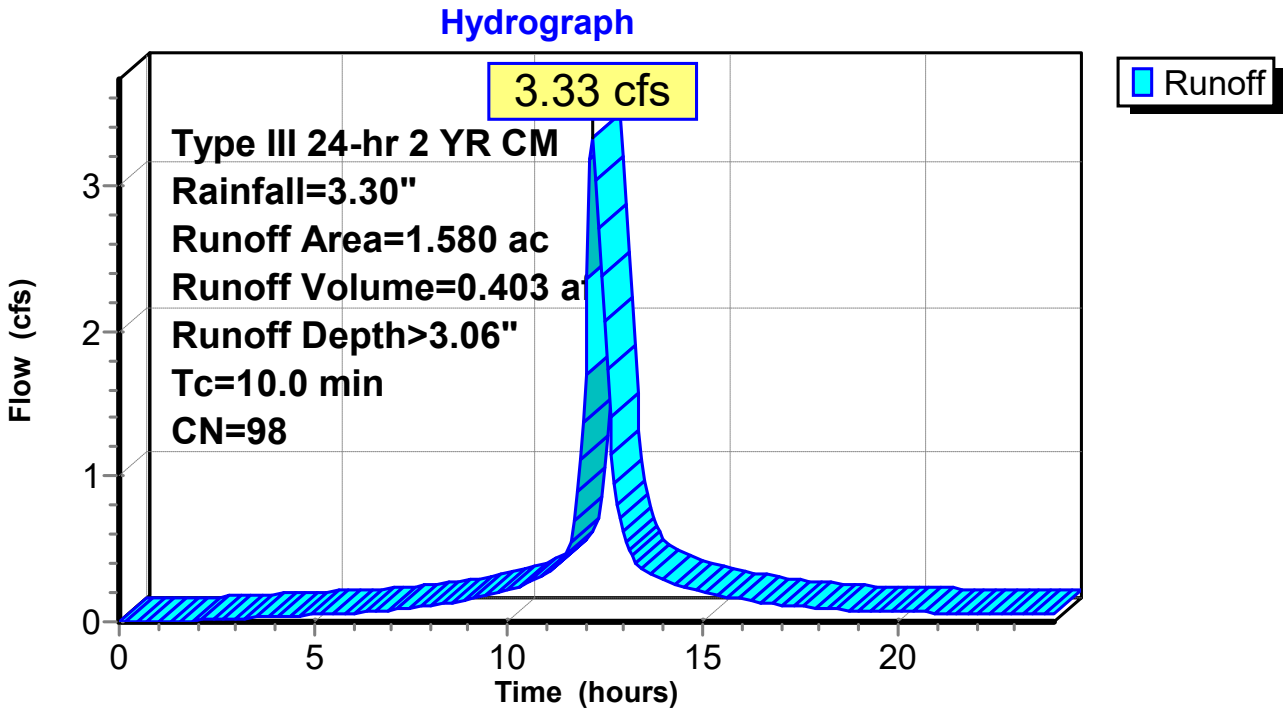
Runoff = 3.33 cfs @ 12.17 hrs, Volume= 0.403 af, Depth> 3.06"

Runoff by SCS TR-20 method, UH=Delmarva, Time Span= 0.00-24.01 hrs, dt= 0.07 hrs
Type III 24-hr 2 YR CM Rainfall=3.30"

	Area (ac)	CN	Description
*	0.100	98	Cart Paths
	0.180	98	Paved parking & roofs
	1.300	98	Water Surface
	1.580	98	Weighted Average
	1.580		Impervious Area

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

Subcatchment Post DA 4: Impervious



Summary for Subcatchment Post DA- 1: Pervious

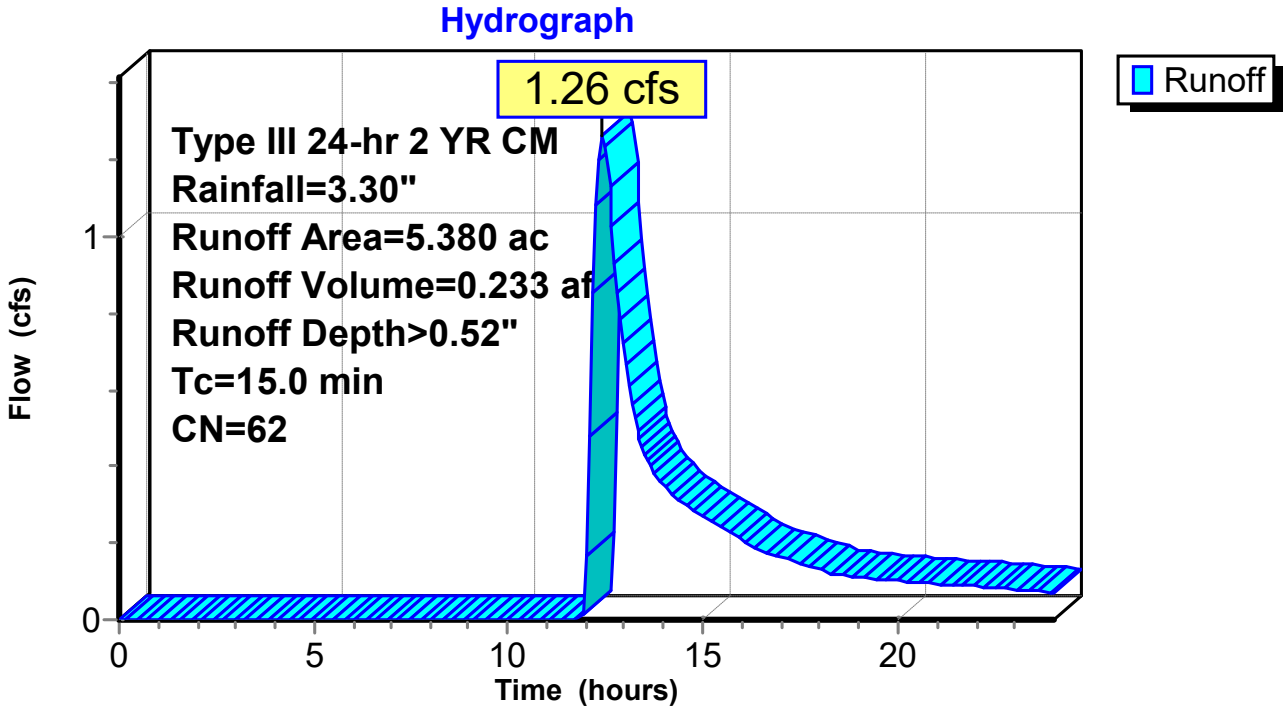
Runoff = 1.26 cfs @ 12.43 hrs, Volume= 0.233 af, Depth> 0.52"

Runoff by SCS TR-20 method, UH=Delmarva, Time Span= 0.00-24.01 hrs, dt= 0.07 hrs
Type III 24-hr 2 YR CM Rainfall=3.30"

Area (ac)	CN	Description
0.010	39	>75% Grass cover, Good, HSG A
4.320	61	>75% Grass cover, Good, HSG B
0.680	74	>75% Grass cover, Good, HSG C
0.370	58	Woods/grass comb., Good, HSG B
5.380	62	Weighted Average
5.380		Pervious Area

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

Subcatchment Post DA- 1: Pervious



Summary for Subcatchment Post DA-1: Impervious

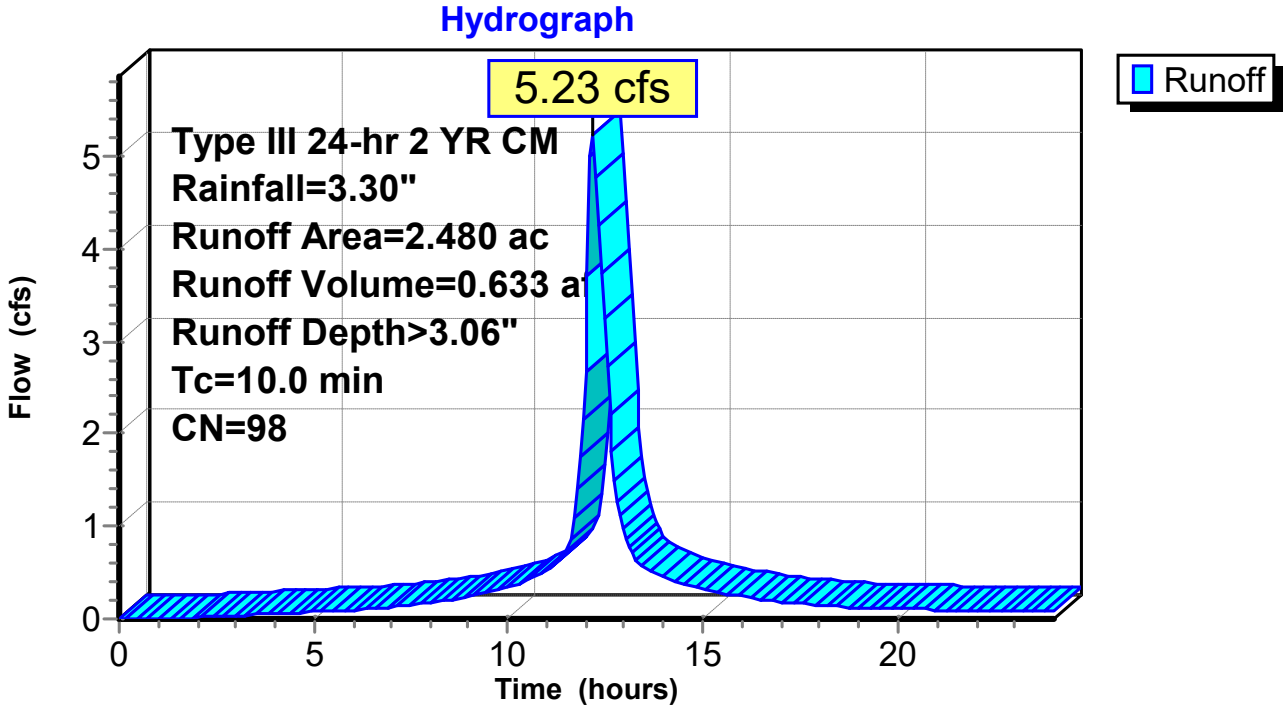
Runoff = 5.23 cfs @ 12.17 hrs, Volume= 0.633 af, Depth> 3.06"

Runoff by SCS TR-20 method, UH=Delmarva, Time Span= 0.00-24.01 hrs, dt= 0.07 hrs
Type III 24-hr 2 YR CM Rainfall=3.30"

Area (ac)	CN	Description
1.160	98	Water Surface
1.320	98	Paved parking & roofs
2.480	98	Weighted Average
2.480		Impervious Area

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

Subcatchment Post DA-1: Impervious



Summary for Subcatchment Post DA2: Impervious

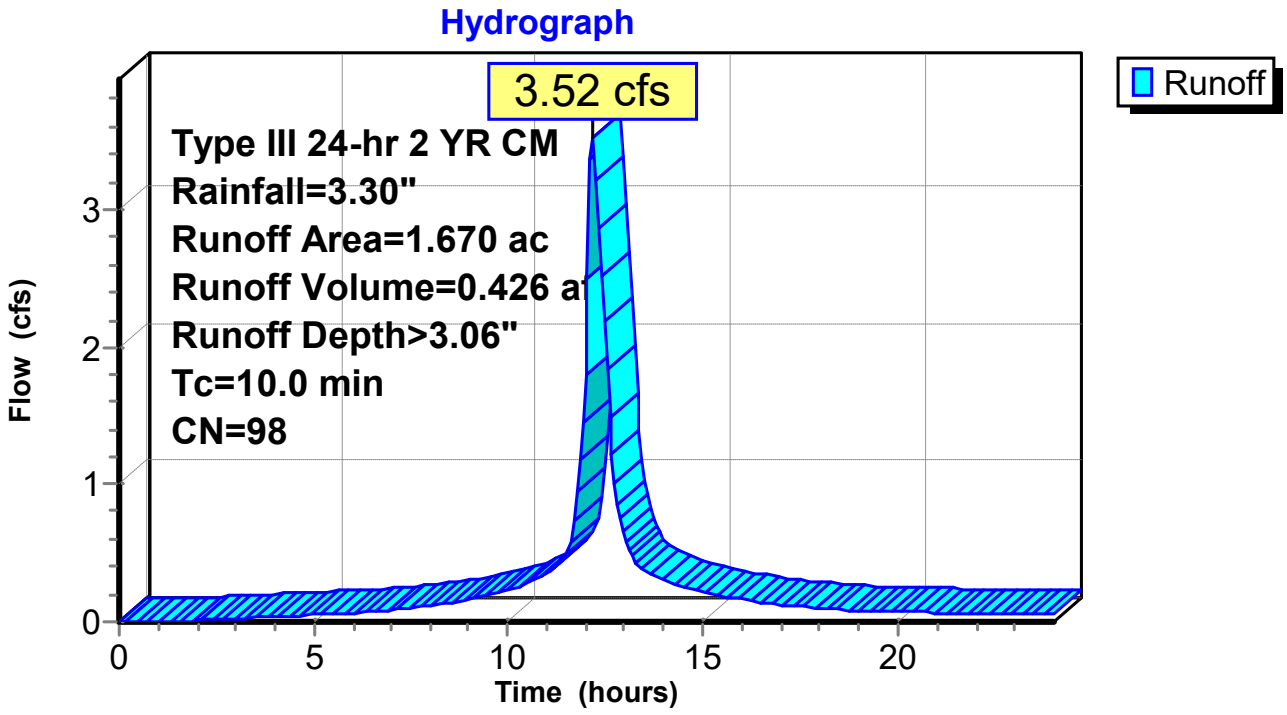
Runoff = 3.52 cfs @ 12.17 hrs, Volume= 0.426 af, Depth> 3.06"

Runoff by SCS TR-20 method, UH=Delmarva, Time Span= 0.00-24.01 hrs, dt= 0.07 hrs
Type III 24-hr 2 YR CM Rainfall=3.30"

	Area (ac)	CN	Description
*	0.250	98	Cart Paths
	1.330	98	Water Surface
*	0.090	98	Townhouse
	1.670	98	Weighted Average
	1.670		Impervious Area

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

Subcatchment Post DA2: Impervious



Summary for Subcatchment Post DA3: Pervious

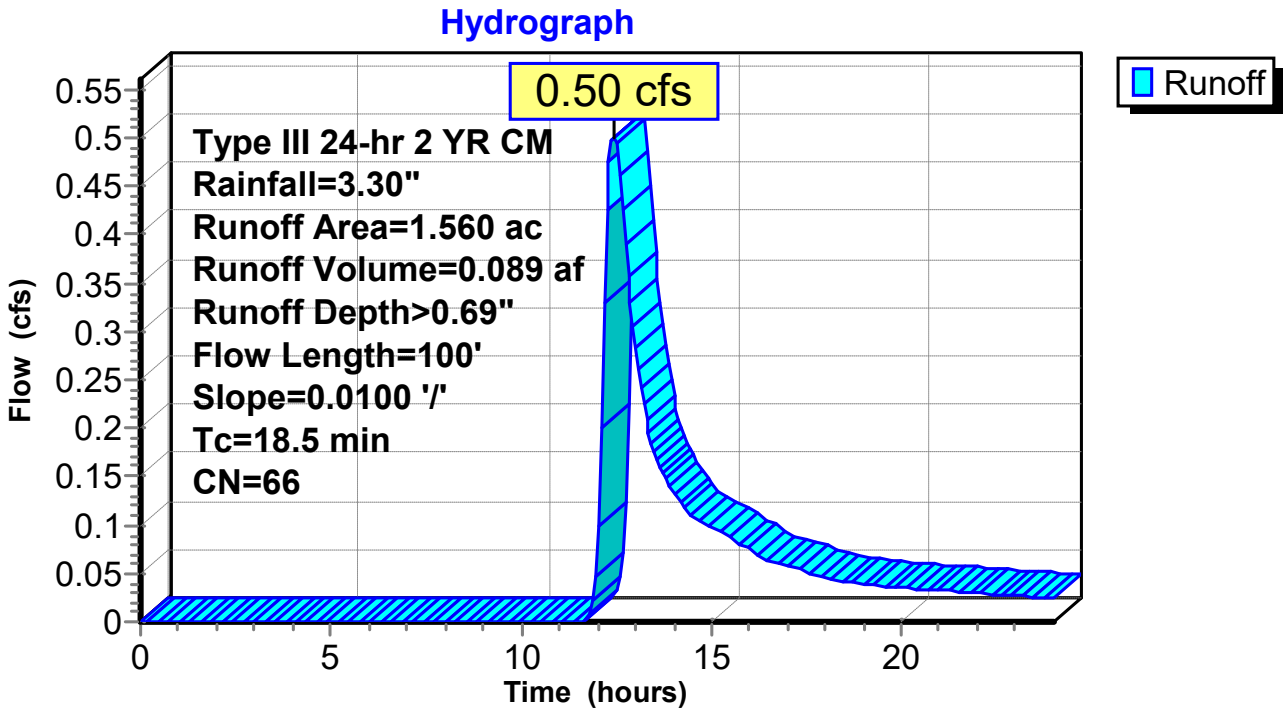
Runoff = 0.50 cfs @ 12.44 hrs, Volume= 0.089 af, Depth> 0.69"

Runoff by SCS TR-20 method, UH=Delmarva, Time Span= 0.00-24.01 hrs, dt= 0.07 hrs
Type III 24-hr 2 YR CM Rainfall=3.30"

Area (ac)	CN	Description
1.000	61	>75% Grass cover, Good, HSG B
0.560	74	>75% Grass cover, Good, HSG C
1.560	66	Weighted Average
1.560		Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
18.5	100	0.0100	0.09		**Sheet Flow, Unpaved** Grass: Dense n= 0.240 P2= 3.30"

Subcatchment Post DA3: Pervious



Summary for Subcatchment Post DA4: Pervious

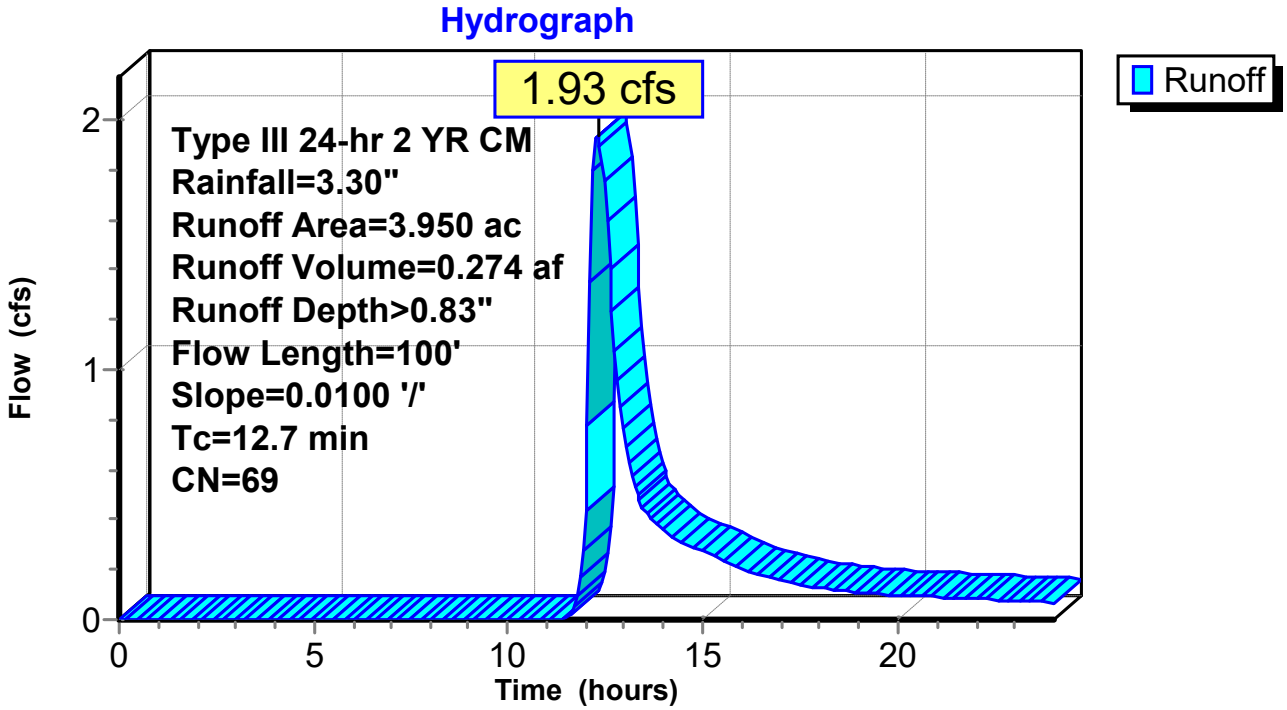
Runoff = 1.93 cfs @ 12.28 hrs, Volume= 0.274 af, Depth> 0.83"

Runoff by SCS TR-20 method, UH=Delmarva, Time Span= 0.00-24.01 hrs, dt= 0.07 hrs
Type III 24-hr 2 YR CM Rainfall=3.30"

Area (ac)	CN	Description
0.660	61	>75% Grass cover, Good, HSG B
2.520	74	>75% Grass cover, Good, HSG C
0.550	55	Woods, Good, HSG B
0.220	70	Woods, Good, HSG C
3.950	69	Weighted Average
3.950		Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
12.7	100	0.0100	0.13		**Sheet Flow, Unpaved** Grass: Short n= 0.150 P2= 3.30"

Subcatchment Post DA4: Pervious



Summary for Subcatchment Post DA5 Off: Off Site Pervious

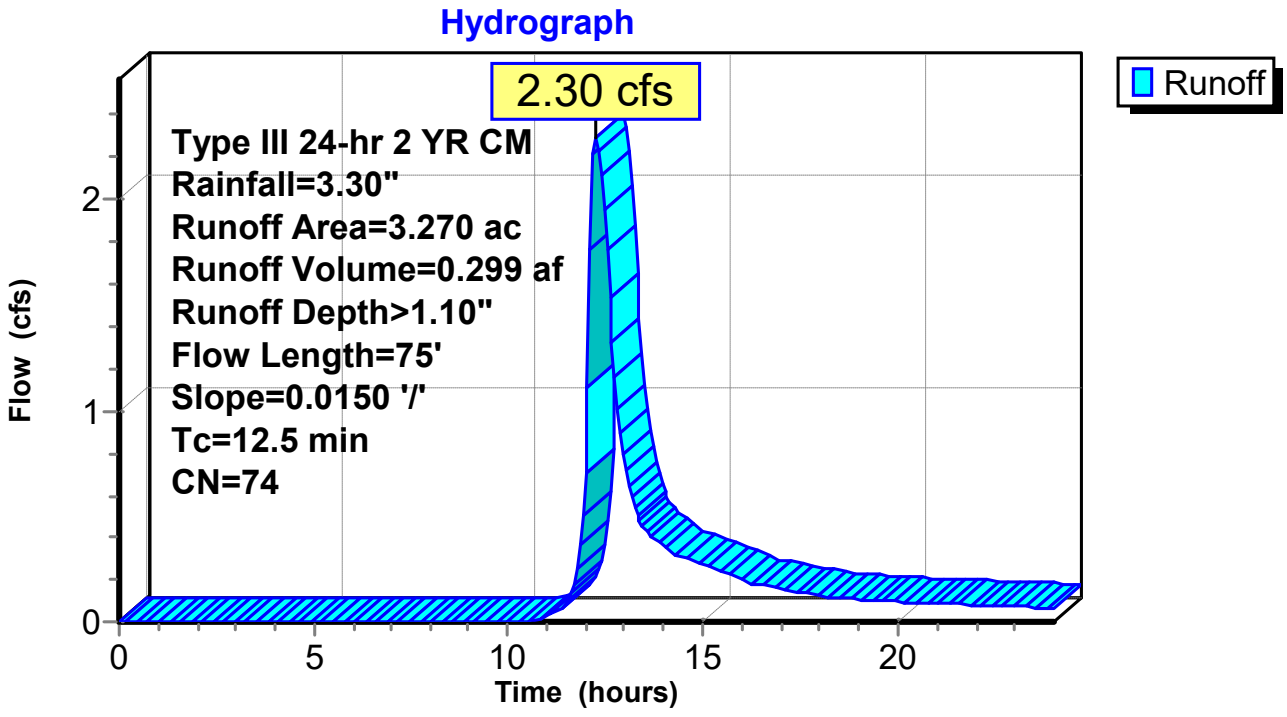
Runoff = 2.30 cfs @ 12.25 hrs, Volume= 0.299 af, Depth> 1.10"

Runoff by SCS TR-20 method, UH=Delmarva, Time Span= 0.00-24.01 hrs, dt= 0.07 hrs
Type III 24-hr 2 YR CM Rainfall=3.30"

Area (ac)	CN	Description
3.170	74	>75% Grass cover, Good, HSG C
0.100	72	Woods/grass comb., Good, HSG C
3.270	74	Weighted Average
3.270		Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
12.5	75	0.0150	0.10		**Sheet Flow, Unpaved** Grass: Dense n= 0.240 P2= 3.30"

Subcatchment Post DA5 Off: Off Site Pervious



Summary for Pond Lake1: Basin

Inflow Area = 7.860 ac, 31.55% Impervious, Inflow Depth > 1.32" for 2 YR CM event
Inflow = 6.09 cfs @ 12.20 hrs, Volume= 0.866 af
Outflow = 0.45 cfs @ 15.97 hrs, Volume= 0.407 af, Atten= 93%, Lag= 226.5 min
Primary = 0.45 cfs @ 15.97 hrs, Volume= 0.407 af

Routing by Stor-Ind method, Time Span= 0.00-24.01 hrs, dt= 0.07 hrs
Peak Elev= 11.19' @ 15.97 hrs Surf.Area= 0 sf Storage= 24,838 cf

Plug-Flow detention time= 404.2 min calculated for 0.407 af (47% of inflow)
Center-of-Mass det. time= 260.1 min (1,066.0 - 805.9)

Volume	Invert	Avail.Storage	Storage Description
#1	10.70'	137,878 cf	**Custom Stage Data** Listed below

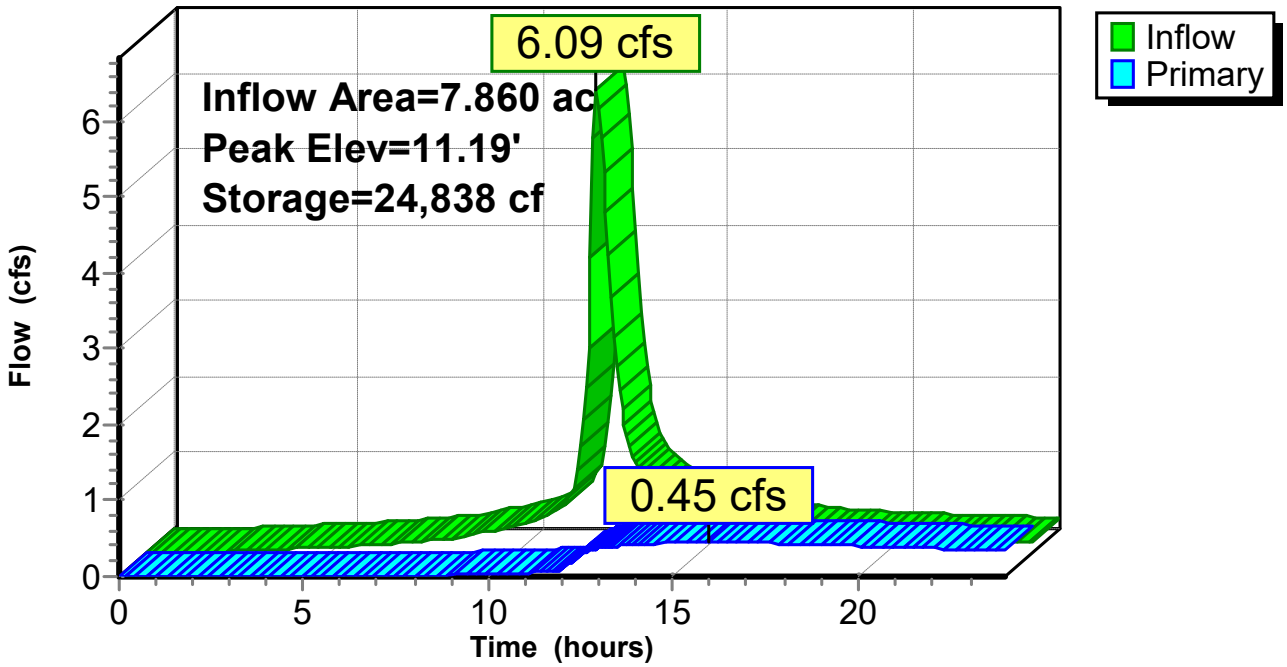
Elevation (feet)	Cum.Store (cubic-feet)
10.70	0
11.00	15,300
12.00	65,780
13.00	118,459
13.70	137,878

Device	Routing	Invert	Outlet Devices
#1	Primary	11.35'	**2.0' long Sharp-Crested Rectangular Weir** 2 End Contraction(s)
#2	Primary	10.70'	**0.5' long Sharp-Crested Rectangular Weir** 2 End Contraction(s)

Primary OutFlow Max=0.45 cfs @ 15.97 hrs HW=11.19' (Free Discharge)
↑—**1=Sharp-Crested Rectangular Weir** (Controls 0.00 cfs)
└—**2=Sharp-Crested Rectangular Weir** (Weir Controls 0.45 cfs @ 2.29 fps)

Pond Lake1: Basin

Hydrograph



Summary for Pond Lake2: Lake 2

Inflow Area = 12.640 ac, 32.83% Impervious, Inflow Depth > 0.86" for 2 YR CM event
Inflow = 3.77 cfs @ 12.18 hrs, Volume= 0.905 af
Outflow = 0.48 cfs @ 21.42 hrs, Volume= 0.369 af, Atten= 87%, Lag= 554.3 min
Primary = 0.48 cfs @ 21.42 hrs, Volume= 0.369 af

Routing by Stor-Ind method, Time Span= 0.00-24.01 hrs, dt= 0.07 hrs
Peak Elev= 10.05' @ 21.42 hrs Surf.Area= 0 sf Storage= 23,609 cf

Plug-Flow detention time= 453.5 min calculated for 0.368 af (41% of inflow)
Center-of-Mass det. time= 222.9 min (1,138.3 - 915.4)

Volume	Invert	Avail.Storage	Storage Description
#1	9.67'	87,360 cf	**Custom Stage Data** Listed below

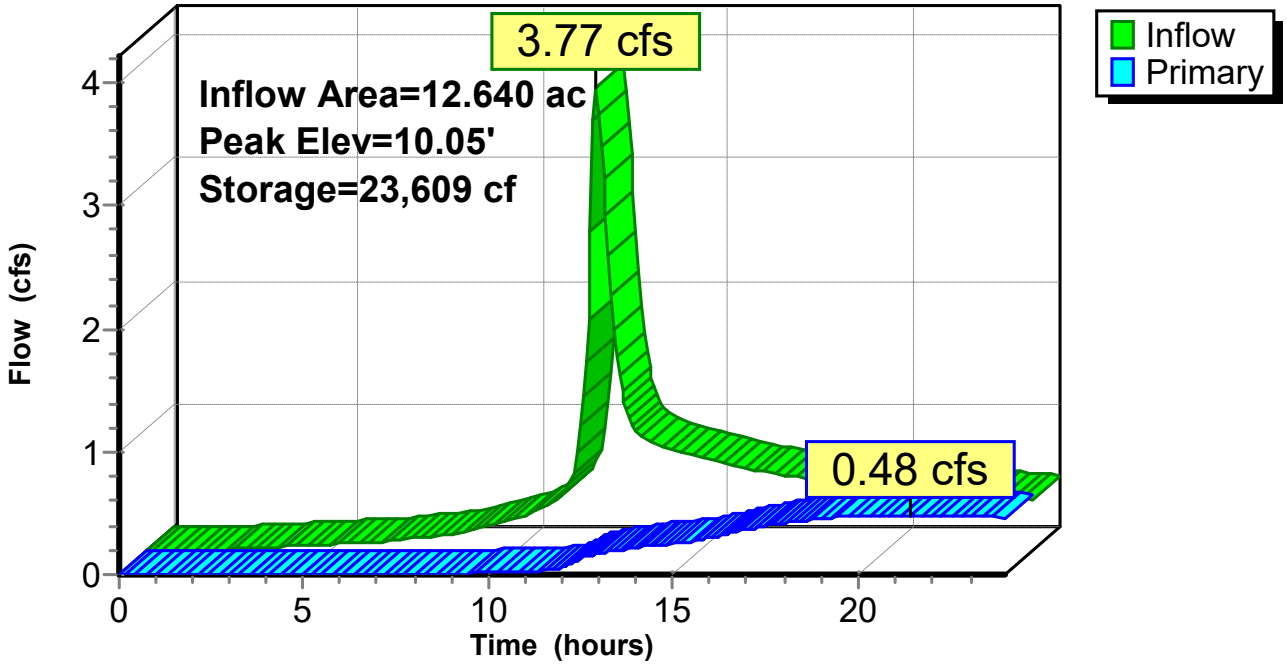
Elevation (feet)	Cum.Store (cubic-feet)
9.67	0
10.00	20,120
11.00	87,360

Device	Routing	Invert	Outlet Devices
#1	Primary	10.00'	**4.0' long Sharp-Crested Rectangular Weir** 2 End Contraction(s)
#2	Primary	9.67'	**0.5' long Sharp-Crested Rectangular Weir** 2 End Contraction(s)

Primary OutFlow Max=0.48 cfs @ 21.42 hrs HW=10.05' (Free Discharge)
└**1=Sharp-Crested Rectangular Weir** (Weir Controls 0.15 cfs @ 0.74 fps)
└**2=Sharp-Crested Rectangular Weir** (Weir Controls 0.33 cfs @ 2.02 fps)

Pond Lake2: Lake 2

Hydrograph



Summary for Pond Lake3: Lake 3

Inflow Area = 16.170 ac, 37.85% Impervious, Inflow Depth > 0.71" for 2 YR CM event
Inflow = 4.56 cfs @ 12.18 hrs, Volume= 0.961 af
Outflow = 0.86 cfs @ 13.37 hrs, Volume= 0.724 af, Atten= 81%, Lag= 71.2 min
Primary = 0.86 cfs @ 13.37 hrs, Volume= 0.724 af

Routing by Stor-Ind method, Time Span= 0.00-24.01 hrs, dt= 0.07 hrs
Peak Elev= 9.07' @ 13.37 hrs Surf.Area= 0 sf Storage= 13,892 cf

Plug-Flow detention time= 241.4 min calculated for 0.724 af (75% of inflow)
Center-of-Mass det. time= 120.3 min (1,041.3 - 921.0)

Volume	Invert	Avail.Storage	Storage Description
#1	8.60'	69,310 cf	**Custom Stage Data** Listed below

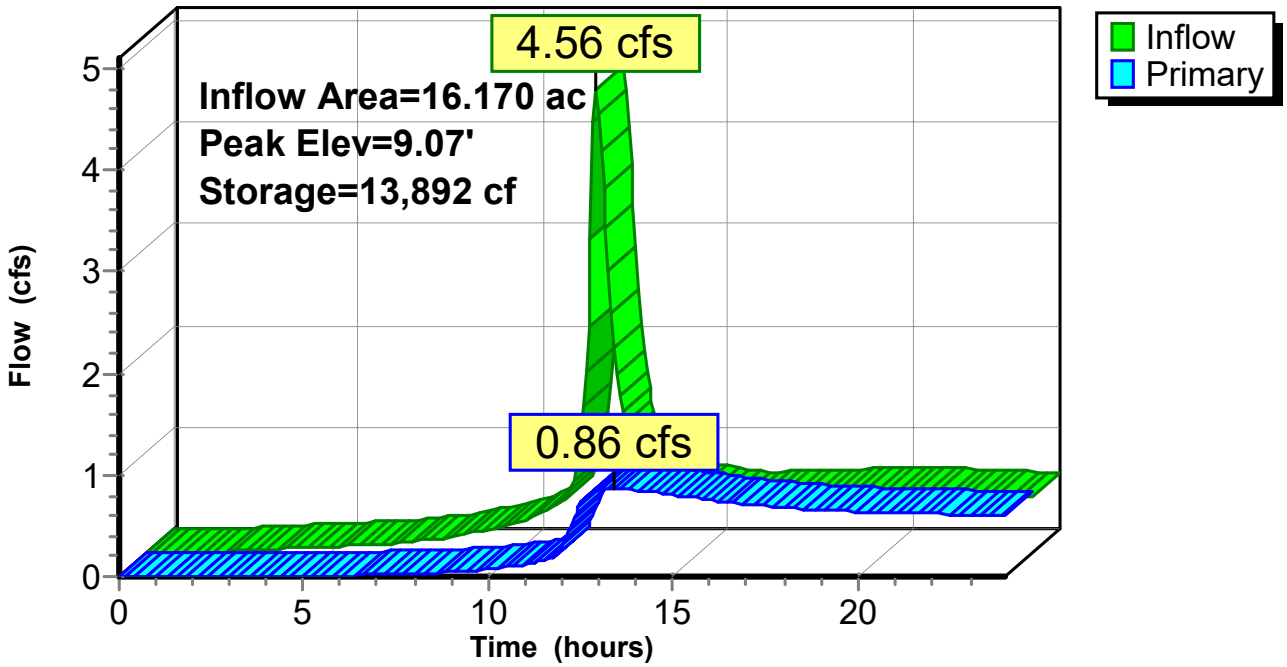
Elevation (feet)	Cum.Store (cubic-feet)
8.60	0
9.00	11,585
10.00	42,767
10.80	69,310

Device	Routing	Invert	Outlet Devices
#1	Primary	9.60'	**12.0' long Sharp-Crested Rectangular Weir** 2 End Contraction(s)
#2	Primary	9.60'	**4.0' long Sharp-Crested Rectangular Weir** 2 End Contraction(s)
#3	Primary	8.60'	**0.5' long Sharp-Crested Rectangular Weir** 2 End Contraction(s)
#4	Primary	8.60'	**0.5' long Sharp-Crested Rectangular Weir** 2 End Contraction(s)

Primary OutFlow Max=0.86 cfs @ 13.37 hrs HW=9.07' (Free Discharge)
- **1=Sharp-Crested Rectangular Weir** (Controls 0.00 cfs)
- **2=Sharp-Crested Rectangular Weir** (Controls 0.00 cfs)
- **3=Sharp-Crested Rectangular Weir** (Weir Controls 0.43 cfs @ 2.25 fps)
- **4=Sharp-Crested Rectangular Weir** (Weir Controls 0.43 cfs @ 2.25 fps)

Pond Lake3: Lake 3

Hydrograph



Summary for Pond Lake4&5: Lake 4 & 5

Inflow Area = 21.700 ac, 35.48% Impervious, Inflow Depth > 0.77" for 2 YR CM event
Inflow = 5.61 cfs @ 12.21 hrs, Volume= 1.401 af
Outflow = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af, Atten= 100%, Lag= 0.0 min
Primary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af

Routing by Stor-Ind method, Time Span= 0.00-24.01 hrs, dt= 0.07 hrs
Peak Elev= 8.32' @ 24.01 hrs Surf.Area= 52,490 sf Storage= 60,950 cf

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

Volume	Invert	Avail.Storage	Storage Description
#1	7.00'	126,192 cf	**Custom Stage Data (Prismatic)** Listed below

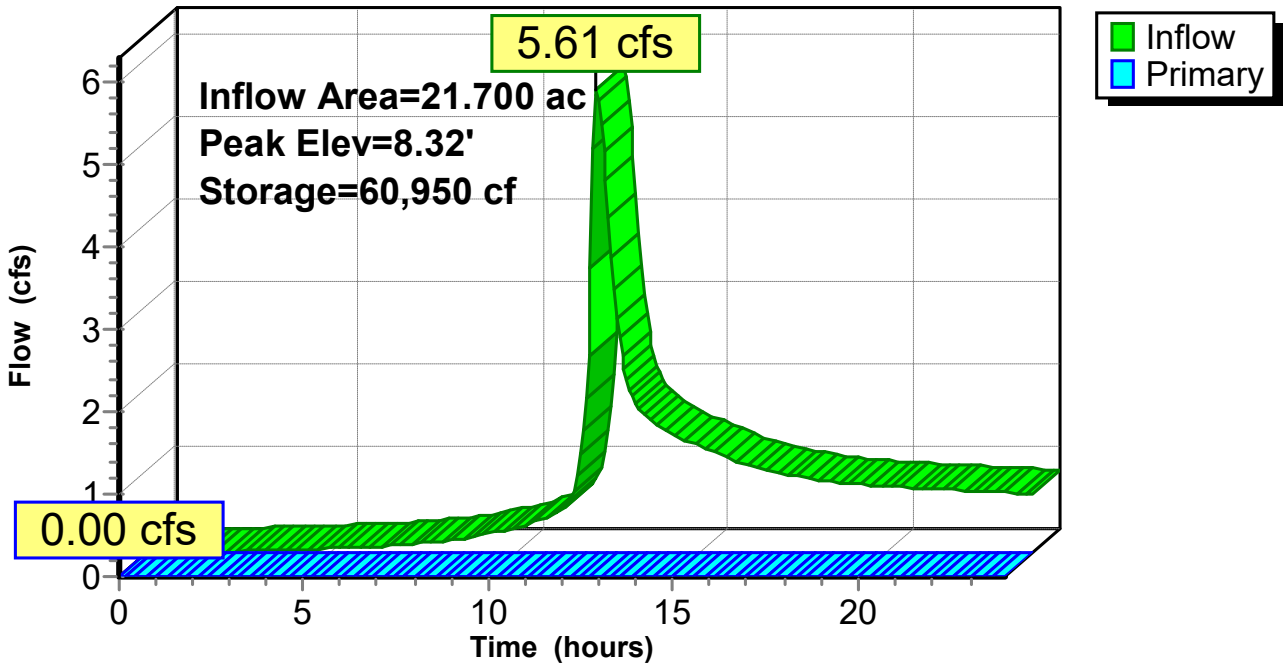
Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
7.00	27,767	0	0
7.40	46,551	14,864	14,864
8.00	50,946	29,249	44,113
9.00	55,842	53,394	97,507
9.50	58,900	28,686	126,192

Device	Routing	Invert	Outlet Devices
#1	Primary	9.20'	**100.0' long x 20.0' 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
#2	Primary	8.60'	**12.0" Vert. Orifice/Grate** C= 0.600

Primary OutFlow Max=0.00 cfs @ 0.00 hrs HW=7.00' (Free Discharge)
└**1=Broad-Crested Rectangular Weir** (Controls 0.00 cfs)
└**2=Orifice/Grate** (Controls 0.00 cfs)

Pond Lake4&5: Lake 4 & 5

Hydrograph

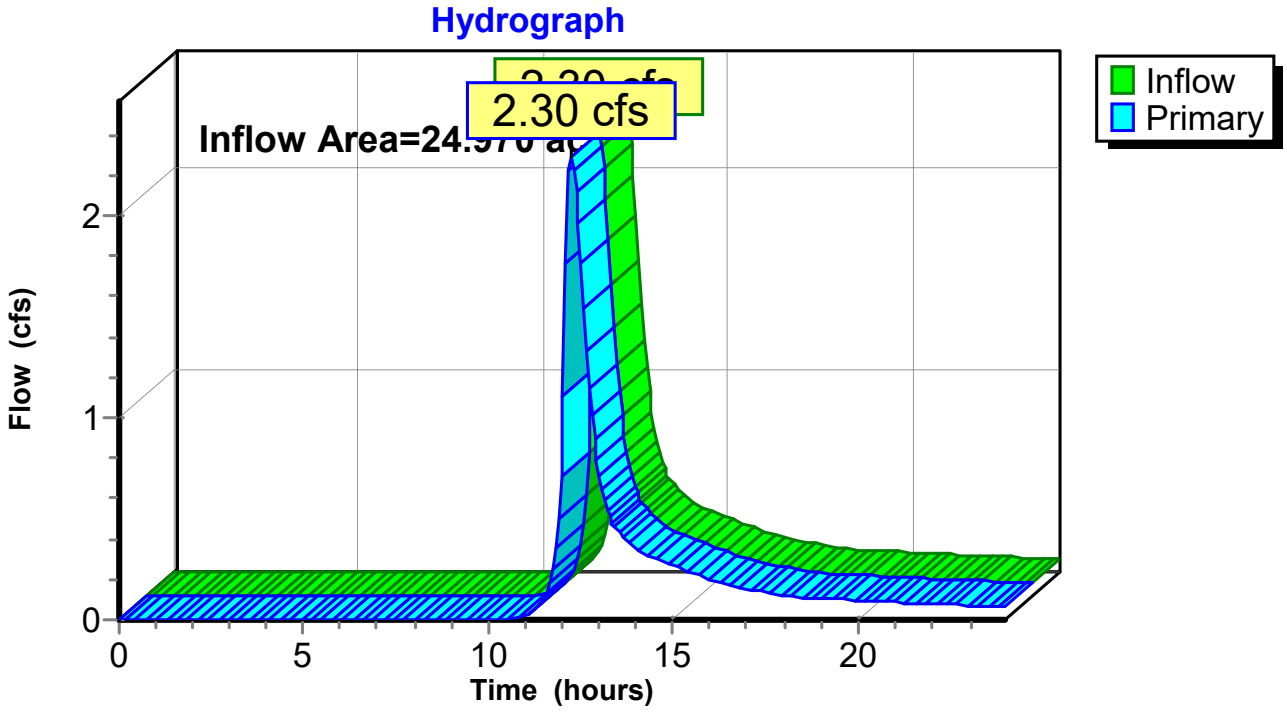


Summary for Link 1L: Combo Discharge

Inflow Area = 24.970 ac, 30.84% Impervious, Inflow Depth > 0.14" for 2 YR CM event
Inflow = 2.30 cfs @ 12.25 hrs, Volume= 0.299 af
Primary = 2.30 cfs @ 12.25 hrs, Volume= 0.299 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-24.01 hrs, dt= 0.07 hrs

Link 1L: Combo Discharge



Time span=0.00-24.00 hrs, dt=0.07 hrs, 344 points
Runoff by SCS TR-20 method, UH=Delmarva
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Subcatchment Post DA 2: Pervious Runoff Area=3.110 ac 0.00% Impervious Runoff Depth>0.61"
Flow Length=100' Slope=0.0100 '/' Tc=12.7 min CN=55 Runoff=0.87 cfs 0.157 af

Subcatchment Post DA 3: Impervious Runoff Area=1.970 ac 100.00% Impervious Runoff Depth>3.96"
Tc=10.0 min CN=98 Runoff=5.31 cfs 0.650 af

Subcatchment Post DA 4: Impervious Runoff Area=1.580 ac 100.00% Impervious Runoff Depth>3.96"
Tc=10.0 min CN=98 Runoff=4.26 cfs 0.521 af

Subcatchment Post DA- 1: Pervious Runoff Area=5.380 ac 0.00% Impervious Runoff Depth>0.96"
Tc=15.0 min CN=62 Runoff=2.75 cfs 0.433 af

Subcatchment Post DA-1: Impervious Runoff Area=2.480 ac 100.00% Impervious Runoff Depth>3.96"
Tc=10.0 min CN=98 Runoff=6.69 cfs 0.818 af

Subcatchment Post DA2: Impervious Runoff Area=1.670 ac 100.00% Impervious Runoff Depth>3.96"
Tc=10.0 min CN=98 Runoff=4.50 cfs 0.551 af

Subcatchment Post DA3: Pervious Runoff Area=1.560 ac 0.00% Impervious Runoff Depth>1.20"
Flow Length=100' Slope=0.0100 '/' Tc=18.5 min CN=66 Runoff=0.97 cfs 0.156 af

Subcatchment Post DA4: Pervious Runoff Area=3.950 ac 0.00% Impervious Runoff Depth>1.39"
Flow Length=100' Slope=0.0100 '/' Tc=12.7 min CN=69 Runoff=3.49 cfs 0.458 af

Subcatchment Post DA5 Off: Off Site Runoff Area=3.270 ac 0.00% Impervious Runoff Depth>1.74"
Flow Length=75' Slope=0.0150 '/' Tc=12.5 min CN=74 Runoff=3.78 cfs 0.473 af

Pond Lake1: Basin Peak Elev=11.39' Storage=35,077 cf Inflow=9.02 cfs 1.250 af
Outflow=0.74 cfs 0.628 af

Pond Lake2: Lake 2 Peak Elev=10.12' Storage=28,000 cf Inflow=5.39 cfs 1.336 af
Outflow=0.92 cfs 0.738 af

Pond Lake3: Lake 3 Peak Elev=9.23' Storage=18,793 cf Inflow=6.16 cfs 1.543 af
Outflow=1.23 cfs 1.186 af

Pond Lake4&5: Lake 4 & 5 Peak Elev=8.90' Storage=92,120 cf Inflow=8.32 cfs 2.166 af
Outflow=0.37 cfs 0.048 af

Link 1L: Combo Discharge Inflow=3.78 cfs 0.522 af
Primary=3.78 cfs 0.522 af

Total Runoff Area = 24.970 ac Runoff Volume = 4.216 af Average Runoff Depth = 2.03"
69.16% Pervious = 17.270 ac 30.84% Impervious = 7.700 ac

Summary for Subcatchment Post DA 2: Pervious

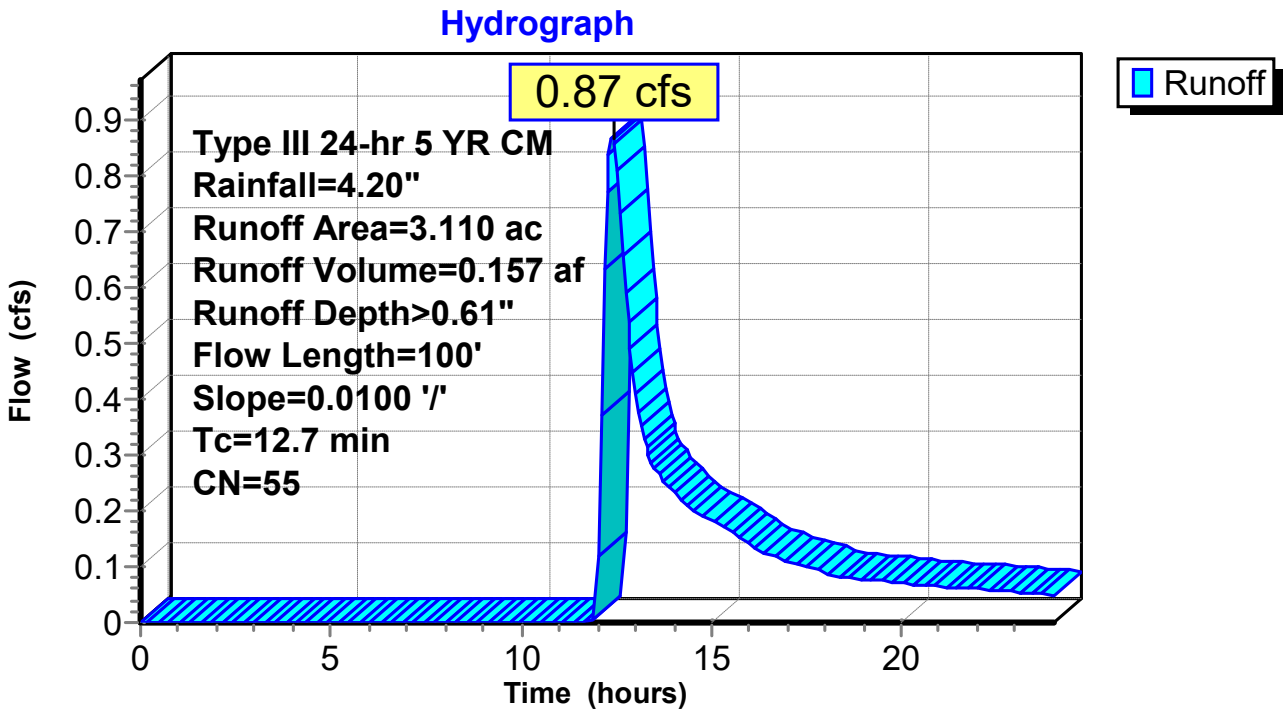
Runoff = 0.87 cfs @ 12.41 hrs, Volume= 0.157 af, Depth> 0.61"

Runoff by SCS TR-20 method, UH=Delmarva, Time Span= 0.00-24.01 hrs, dt= 0.07 hrs
Type III 24-hr 5 YR CM Rainfall=4.20"

Area (ac)	CN	Description
1.000	39	>75% Grass cover, Good, HSG A
1.340	61	>75% Grass cover, Good, HSG B
0.590	74	>75% Grass cover, Good, HSG C
0.080	30	Woods, Good, HSG A
0.100	55	Woods, Good, HSG B
3.110	55	Weighted Average
3.110		Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
12.7	100	0.0100	0.13		**Sheet Flow, Unpaved** Grass: Short n= 0.150 P2= 3.30"

Subcatchment Post DA 2: Pervious



Summary for Subcatchment Post DA 3: Impervious

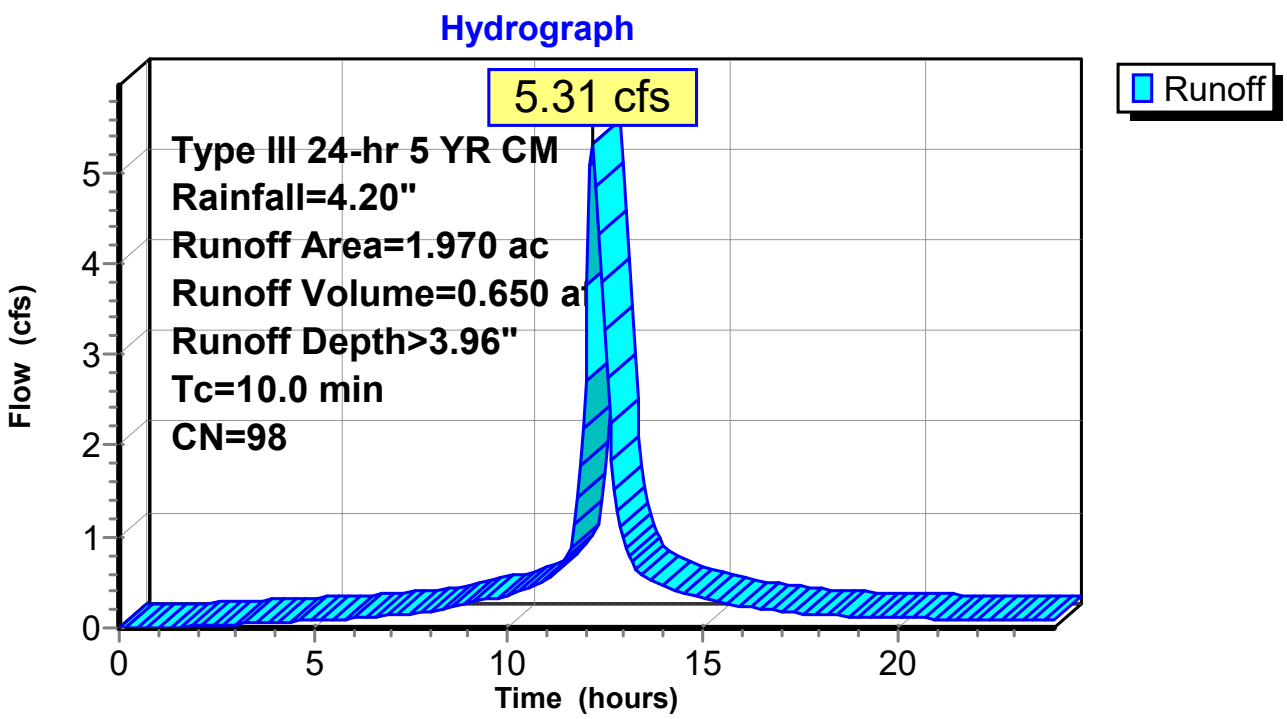
Runoff = 5.31 cfs @ 12.17 hrs, Volume= 0.650 af, Depth> 3.96"

Runoff by SCS TR-20 method, UH=Delmarva, Time Span= 0.00-24.01 hrs, dt= 0.07 hrs
Type III 24-hr 5 YR CM Rainfall=4.20"

Area (ac)	CN	Description
0.630	98	Water Surface
1.340	98	Paved parking & roofs
1.970	98	Weighted Average
1.970		Impervious Area

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

Subcatchment Post DA 3: Impervious



Summary for Subcatchment Post DA 4: Impervious

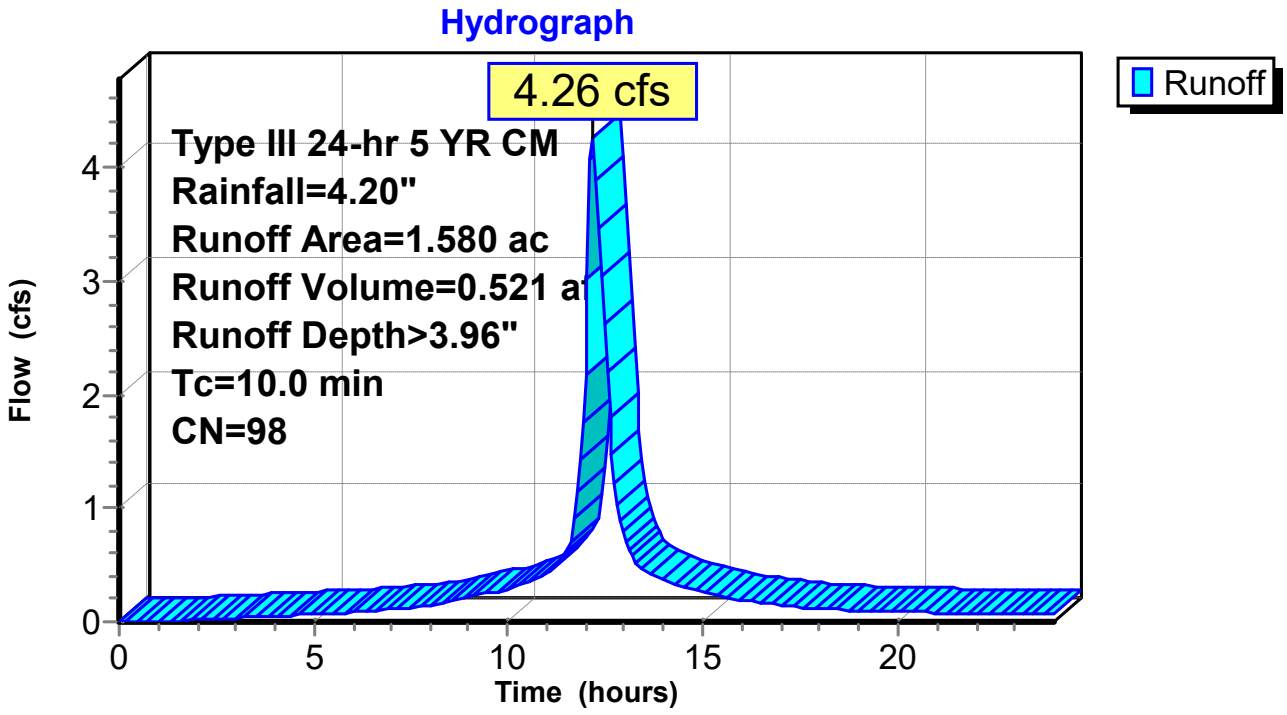
Runoff = 4.26 cfs @ 12.17 hrs, Volume= 0.521 af, Depth> 3.96"

Runoff by SCS TR-20 method, UH=Delmarva, Time Span= 0.00-24.01 hrs, dt= 0.07 hrs
Type III 24-hr 5 YR CM Rainfall=4.20"

	Area (ac)	CN	Description
*	0.100	98	Cart Paths
	0.180	98	Paved parking & roofs
	1.300	98	Water Surface
	1.580	98	Weighted Average
	1.580		Impervious Area

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

Subcatchment Post DA 4: Impervious



Summary for Subcatchment Post DA- 1: Pervious

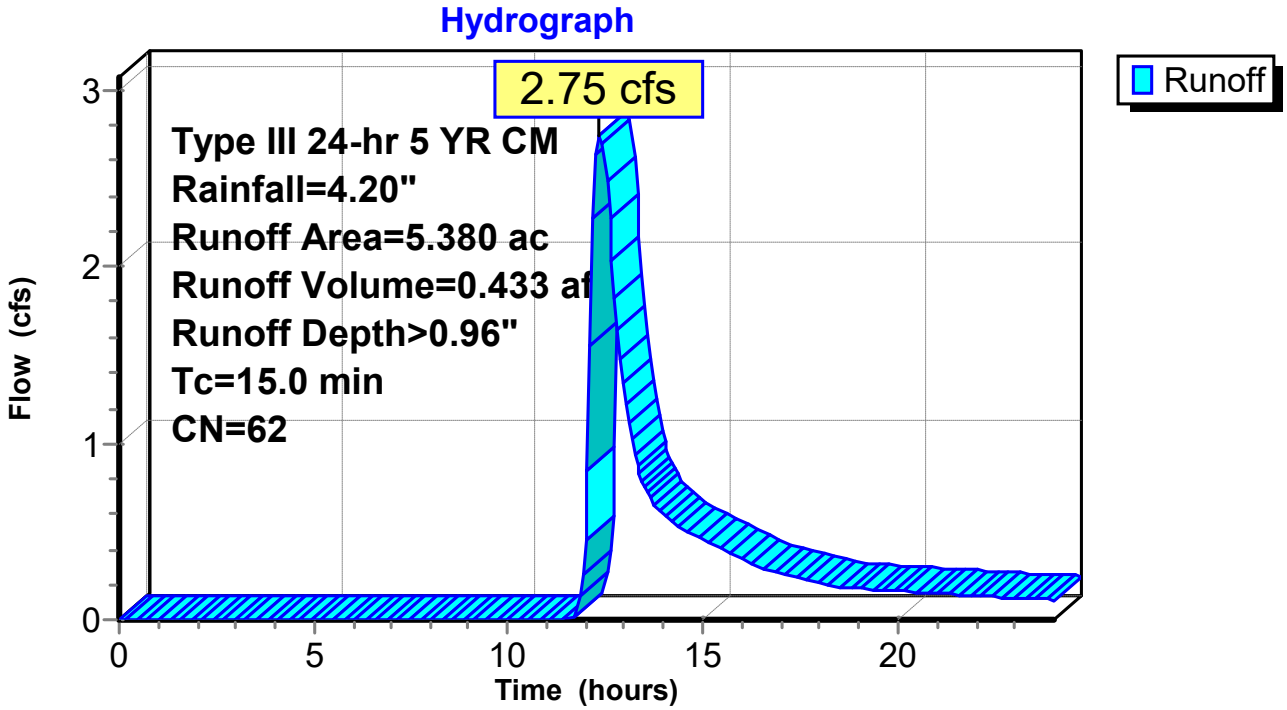
Runoff = 2.75 cfs @ 12.36 hrs, Volume= 0.433 af, Depth> 0.96"

Runoff by SCS TR-20 method, UH=Delmarva, Time Span= 0.00-24.01 hrs, dt= 0.07 hrs
Type III 24-hr 5 YR CM Rainfall=4.20"

Area (ac)	CN	Description
0.010	39	>75% Grass cover, Good, HSG A
4.320	61	>75% Grass cover, Good, HSG B
0.680	74	>75% Grass cover, Good, HSG C
0.370	58	Woods/grass comb., Good, HSG B
5.380	62	Weighted Average
5.380		Pervious Area

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

Subcatchment Post DA- 1: Pervious



Summary for Subcatchment Post DA-1: Impervious

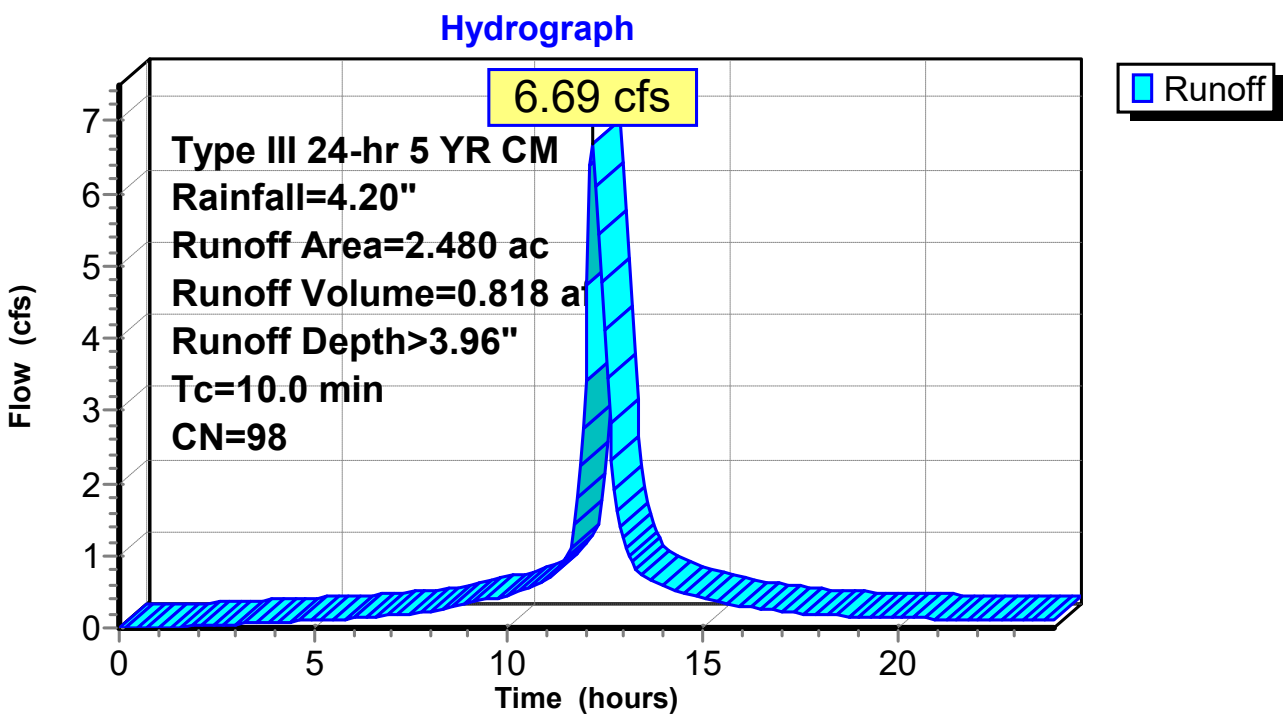
Runoff = 6.69 cfs @ 12.17 hrs, Volume= 0.818 af, Depth> 3.96"

Runoff by SCS TR-20 method, UH=Delmarva, Time Span= 0.00-24.01 hrs, dt= 0.07 hrs
Type III 24-hr 5 YR CM Rainfall=4.20"

Area (ac)	CN	Description
1.160	98	Water Surface
1.320	98	Paved parking & roofs
2.480	98	Weighted Average
2.480		Impervious Area

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

Subcatchment Post DA-1: Impervious



Summary for Subcatchment Post DA2: Impervious

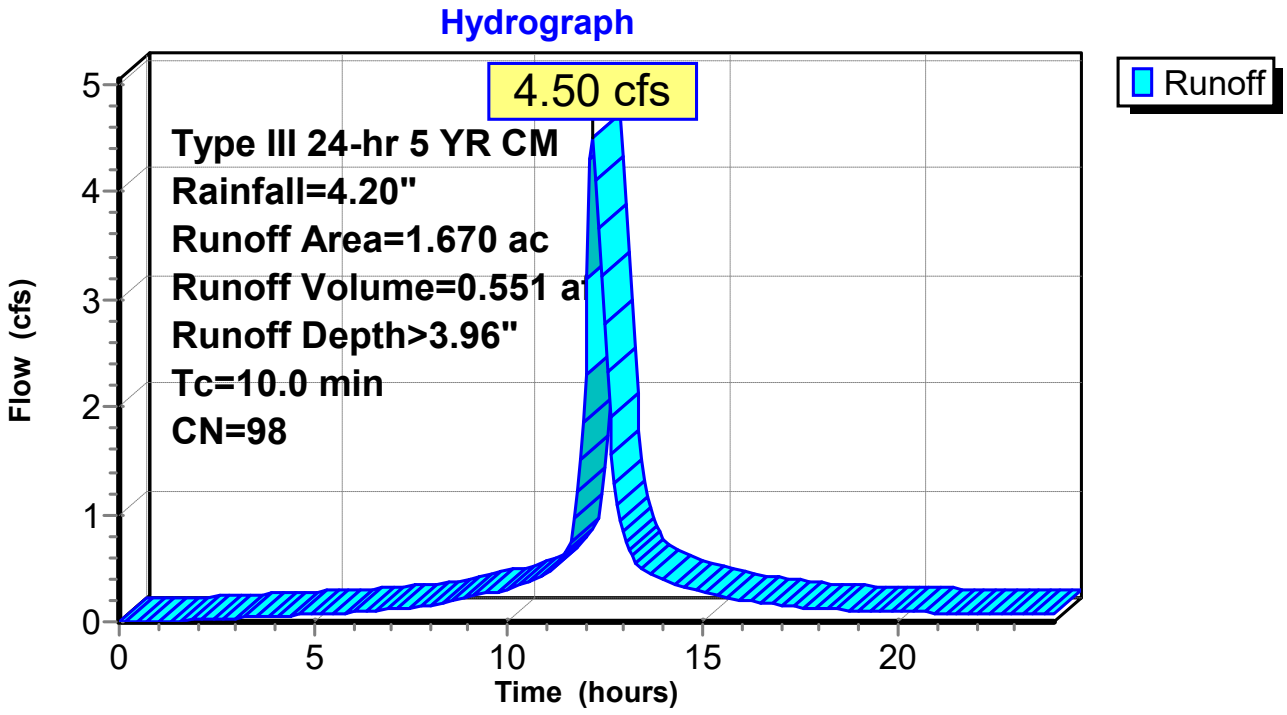
Runoff = 4.50 cfs @ 12.17 hrs, Volume= 0.551 af, Depth> 3.96"

Runoff by SCS TR-20 method, UH=Delmarva, Time Span= 0.00-24.01 hrs, dt= 0.07 hrs
Type III 24-hr 5 YR CM Rainfall=4.20"

	Area (ac)	CN	Description
*	0.250	98	Cart Paths
	1.330	98	Water Surface
*	0.090	98	Townhouse
	1.670	98	Weighted Average
	1.670		Impervious Area

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

Subcatchment Post DA2: Impervious



Summary for Subcatchment Post DA3: Pervious

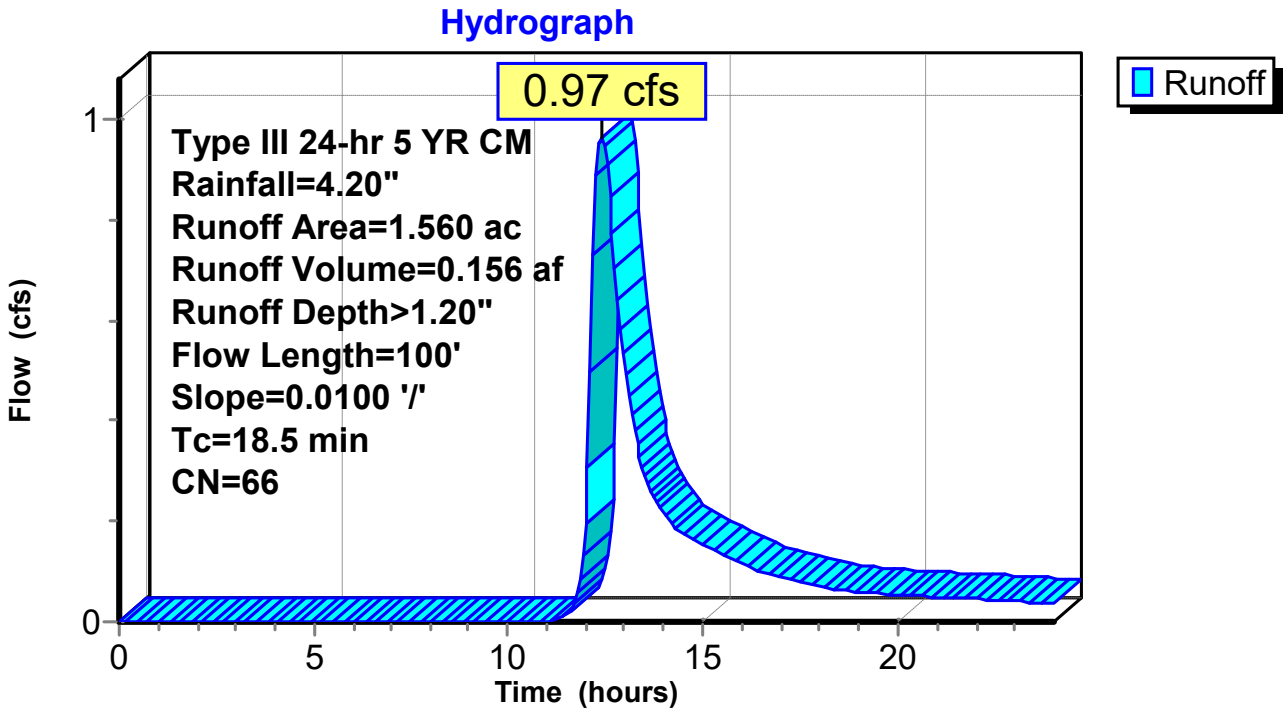
Runoff = 0.97 cfs @ 12.39 hrs, Volume= 0.156 af, Depth> 1.20"

Runoff by SCS TR-20 method, UH=Delmarva, Time Span= 0.00-24.01 hrs, dt= 0.07 hrs
Type III 24-hr 5 YR CM Rainfall=4.20"

Area (ac)	CN	Description
1.000	61	>75% Grass cover, Good, HSG B
0.560	74	>75% Grass cover, Good, HSG C
1.560	66	Weighted Average
1.560		Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
18.5	100	0.0100	0.09		**Sheet Flow, Unpaved** Grass: Dense n= 0.240 P2= 3.30"

Subcatchment Post DA3: Pervious



Summary for Subcatchment Post DA4: Pervious

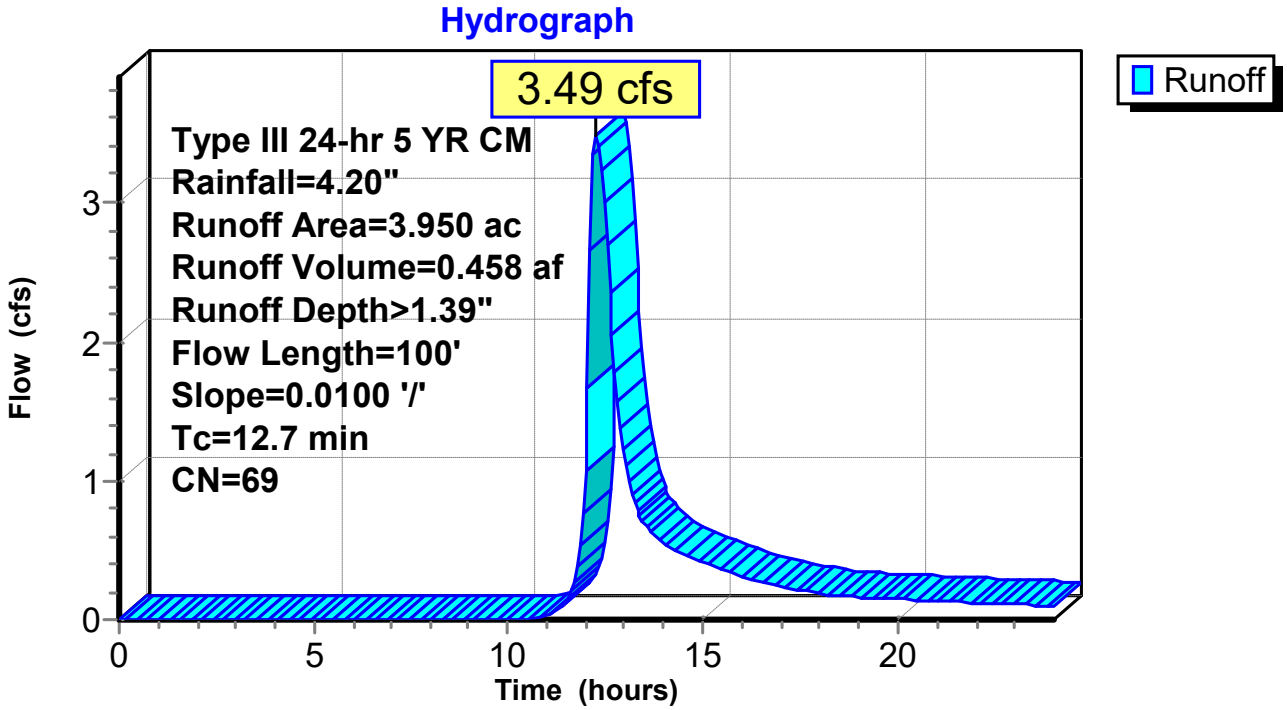
Runoff = 3.49 cfs @ 12.26 hrs, Volume= 0.458 af, Depth> 1.39"

Runoff by SCS TR-20 method, UH=Delmarva, Time Span= 0.00-24.01 hrs, dt= 0.07 hrs
Type III 24-hr 5 YR CM Rainfall=4.20"

Area (ac)	CN	Description
0.660	61	>75% Grass cover, Good, HSG B
2.520	74	>75% Grass cover, Good, HSG C
0.550	55	Woods, Good, HSG B
0.220	70	Woods, Good, HSG C
3.950	69	Weighted Average
3.950		Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
12.7	100	0.0100	0.13		**Sheet Flow, Unpaved** Grass: Short n= 0.150 P2= 3.30"

Subcatchment Post DA4: Pervious



Summary for Subcatchment Post DA5 Off: Off Site Pervious

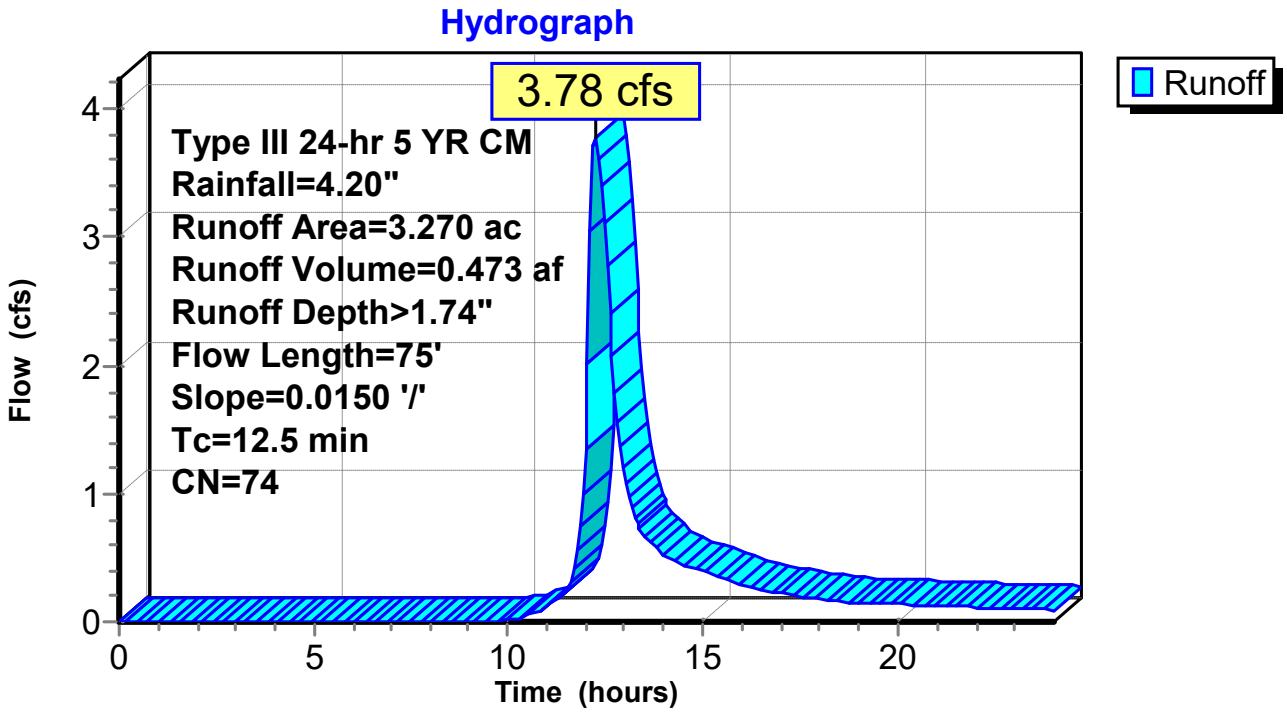
Runoff = 3.78 cfs @ 12.23 hrs, Volume= 0.473 af, Depth> 1.74"

Runoff by SCS TR-20 method, UH=Delmarva, Time Span= 0.00-24.01 hrs, dt= 0.07 hrs
Type III 24-hr 5 YR CM Rainfall=4.20"

Area (ac)	CN	Description
3.170	74	>75% Grass cover, Good, HSG C
0.100	72	Woods/grass comb., Good, HSG C
3.270	74	Weighted Average
3.270		Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
12.5	75	0.0150	0.10		**Sheet Flow, Unpaved** Grass: Dense n= 0.240 P2= 3.30"

Subcatchment Post DA5 Off: Off Site Pervious



Summary for Pond Lake1: Basin

Inflow Area = 7.860 ac, 31.55% Impervious, Inflow Depth > 1.91" for 5 YR CM event
Inflow = 9.02 cfs @ 12.20 hrs, Volume= 1.250 af
Outflow = 0.74 cfs @ 15.60 hrs, Volume= 0.628 af, Atten= 92%, Lag= 203.8 min
Primary = 0.74 cfs @ 15.60 hrs, Volume= 0.628 af

Routing by Stor-Ind method, Time Span= 0.00-24.01 hrs, dt= 0.07 hrs
Peak Elev= 11.39' @ 15.60 hrs Surf.Area= 0 sf Storage= 35,077 cf

Plug-Flow detention time= 389.8 min calculated for 0.628 af (50% of inflow)
Center-of-Mass det. time= 253.2 min (1,059.9 - 806.7)

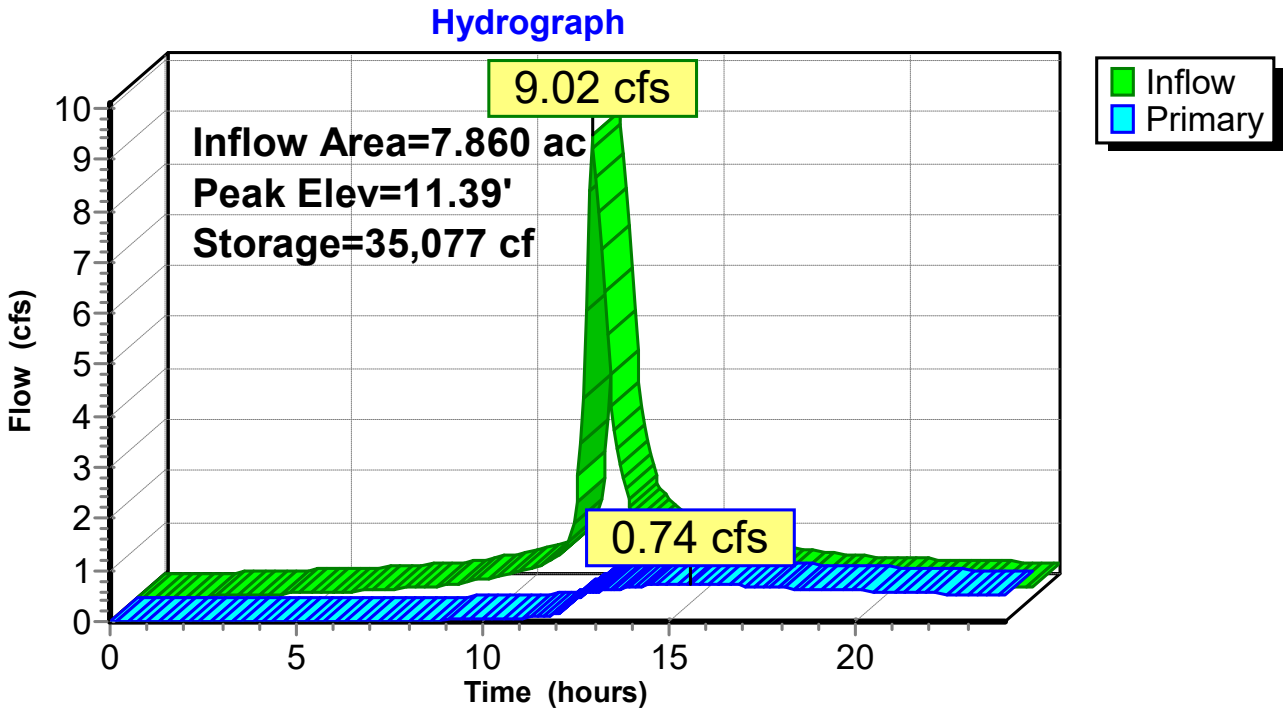
Volume	Invert	Avail.Storage	Storage Description
#1	10.70'	137,878 cf	**Custom Stage Data** Listed below

Elevation (feet)	Cum.Store (cubic-feet)
10.70	0
11.00	15,300
12.00	65,780
13.00	118,459
13.70	137,878

Device	Routing	Invert	Outlet Devices
#1	Primary	11.35'	**2.0' long Sharp-Crested Rectangular Weir** 2 End Contraction(s)
#2	Primary	10.70'	**0.5' long Sharp-Crested Rectangular Weir** 2 End Contraction(s)

Primary OutFlow Max=0.74 cfs @ 15.60 hrs HW=11.39' (Free Discharge)
↑ **1=Sharp-Crested Rectangular Weir** (Weir Controls 0.06 cfs @ 0.67 fps)
└ **2=Sharp-Crested Rectangular Weir** (Weir Controls 0.68 cfs @ 2.72 fps)

Pond Lake1: Basin



Summary for Pond Lake2: Lake 2

Inflow Area = 12.640 ac, 32.83% Impervious, Inflow Depth > 1.27" for 5 YR CM event
Inflow = 5.39 cfs @ 12.19 hrs, Volume= 1.336 af
Outflow = 0.92 cfs @ 17.47 hrs, Volume= 0.738 af, Atten= 83%, Lag= 316.6 min
Primary = 0.92 cfs @ 17.47 hrs, Volume= 0.738 af

Routing by Stor-Ind method, Time Span= 0.00-24.01 hrs, dt= 0.07 hrs
Peak Elev= 10.12' @ 17.47 hrs Surf.Area= 0 sf Storage= 28,000 cf

Plug-Flow detention time= 376.5 min calculated for 0.738 af (55% of inflow)
Center-of-Mass det. time= 190.1 min (1,109.9 - 919.8)

Volume	Invert	Avail.Storage	Storage Description
#1	9.67'	87,360 cf	**Custom Stage Data** Listed below

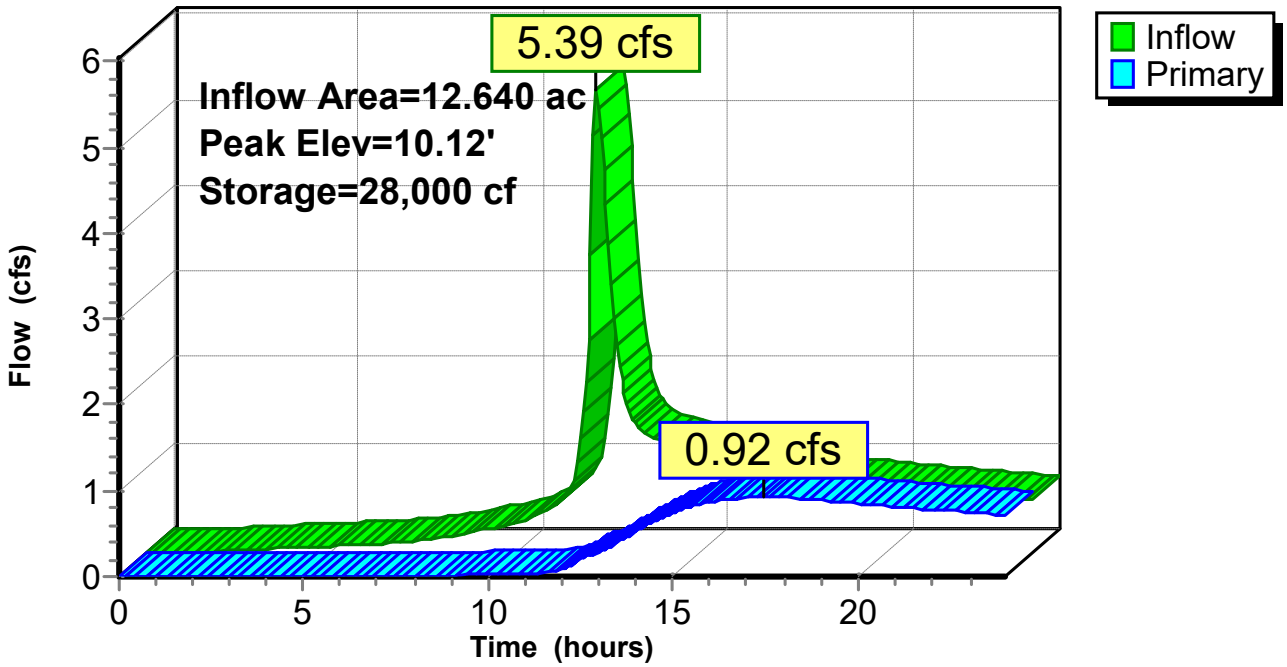
Elevation (feet)	Cum.Store (cubic-feet)
9.67	0
10.00	20,120
11.00	87,360

Device	Routing	Invert	Outlet Devices
#1	Primary	10.00'	**4.0' long Sharp-Crested Rectangular Weir** 2 End Contraction(s)
#2	Primary	9.67'	**0.5' long Sharp-Crested Rectangular Weir** 2 End Contraction(s)

Primary OutFlow Max=0.92 cfs @ 17.47 hrs HW=10.12' (Free Discharge)
1=Sharp-Crested Rectangular Weir (Weir Controls 0.52 cfs @ 1.12 fps)
2=Sharp-Crested Rectangular Weir (Weir Controls 0.40 cfs @ 2.19 fps)

Pond Lake2: Lake 2

Hydrograph



Summary for Pond Lake3: Lake 3

Inflow Area = 16.170 ac, 37.85% Impervious, Inflow Depth > 1.15" for 5 YR CM event
Inflow = 6.16 cfs @ 12.19 hrs, Volume= 1.543 af
Outflow = 1.23 cfs @ 13.73 hrs, Volume= 1.186 af, Atten= 80%, Lag= 92.3 min
Primary = 1.23 cfs @ 13.73 hrs, Volume= 1.186 af

Routing by Stor-Ind method, Time Span= 0.00-24.01 hrs, dt= 0.07 hrs
Peak Elev= 9.23' @ 13.73 hrs Surf.Area= 0 sf Storage= 18,793 cf

Plug-Flow detention time= 223.4 min calculated for 1.183 af (77% of inflow)
Center-of-Mass det. time= 116.1 min (1,056.1 - 940.0)

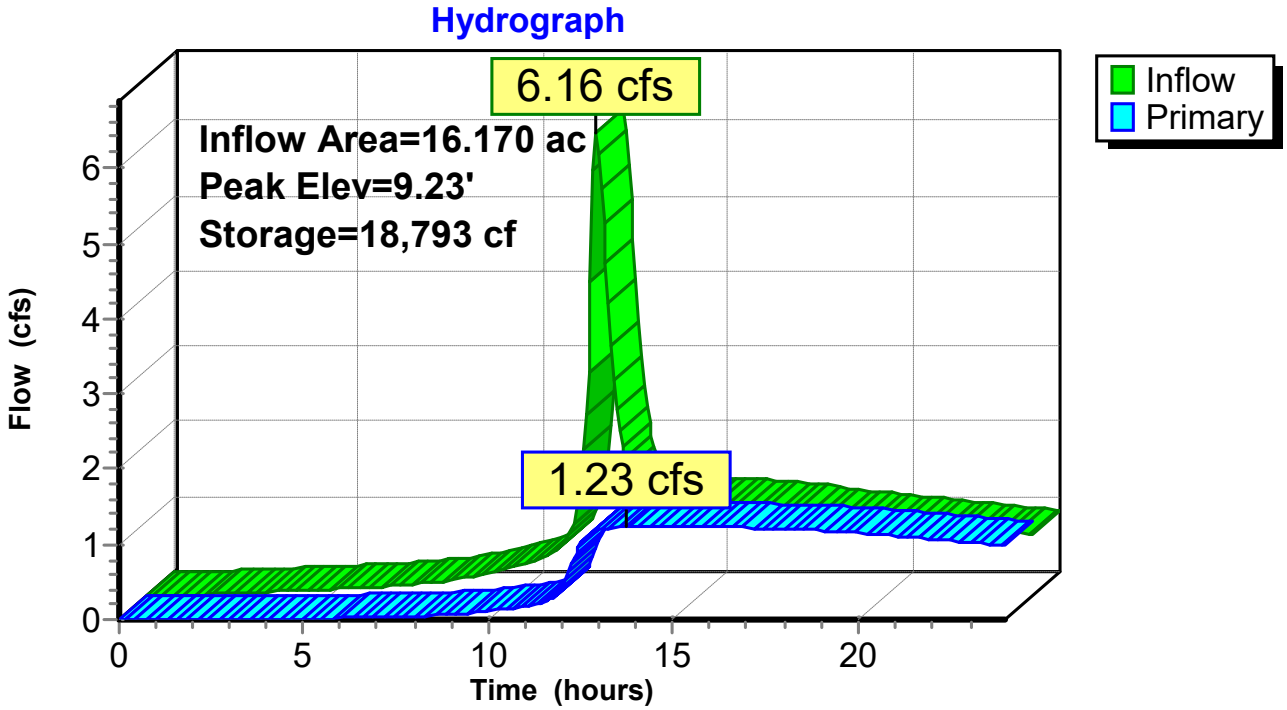
Volume	Invert	Avail.Storage	Storage Description
#1	8.60'	69,310 cf	**Custom Stage Data** Listed below

Elevation (feet)	Cum.Store (cubic-feet)
8.60	0
9.00	11,585
10.00	42,767
10.80	69,310

Device	Routing	Invert	Outlet Devices
#1	Primary	9.60'	**12.0' long Sharp-Crested Rectangular Weir** 2 End Contraction(s)
#2	Primary	9.60'	**4.0' long Sharp-Crested Rectangular Weir** 2 End Contraction(s)
#3	Primary	8.60'	**0.5' long Sharp-Crested Rectangular Weir** 2 End Contraction(s)
#4	Primary	8.60'	**0.5' long Sharp-Crested Rectangular Weir** 2 End Contraction(s)

Primary OutFlow Max=1.23 cfs @ 13.73 hrs HW=9.23' (Free Discharge)
- **1=Sharp-Crested Rectangular Weir** (Controls 0.00 cfs)
- **2=Sharp-Crested Rectangular Weir** (Controls 0.00 cfs)
- **3=Sharp-Crested Rectangular Weir** (Weir Controls 0.61 cfs @ 2.60 fps)
- **4=Sharp-Crested Rectangular Weir** (Weir Controls 0.61 cfs @ 2.60 fps)

Pond Lake3: Lake 3



Summary for Pond Lake4&5: Lake 4 & 5

[79] Warning: Submerged Pond Lake3 Primary device # 3 by 0.30'
[79] Warning: Submerged Pond Lake3 Primary device # 4 by 0.30'

Inflow Area = 21.700 ac, 35.48% Impervious, Inflow Depth > 1.20" for 5 YR CM event
Inflow = 8.32 cfs @ 12.21 hrs, Volume= 2.166 af
Outflow = 0.37 cfs @ 24.01 hrs, Volume= 0.048 af, Atten= 96%, Lag= 708.2 min
Primary = 0.37 cfs @ 24.01 hrs, Volume= 0.048 af

Routing by Stor-Ind method, Time Span= 0.00-24.01 hrs, dt= 0.07 hrs
Peak Elev= 8.90' @ 24.01 hrs Surf.Area= 55,348 sf Storage= 92,120 cf

Plug-Flow detention time= 1,008.7 min calculated for 0.048 af (2% of inflow)
Center-of-Mass det. time= 431.4 min (1,377.1 - 945.7)

Volume	Invert	Avail.Storage	Storage Description
#1	7.00'	126,192 cf	**Custom Stage Data (Prismatic)** Listed below

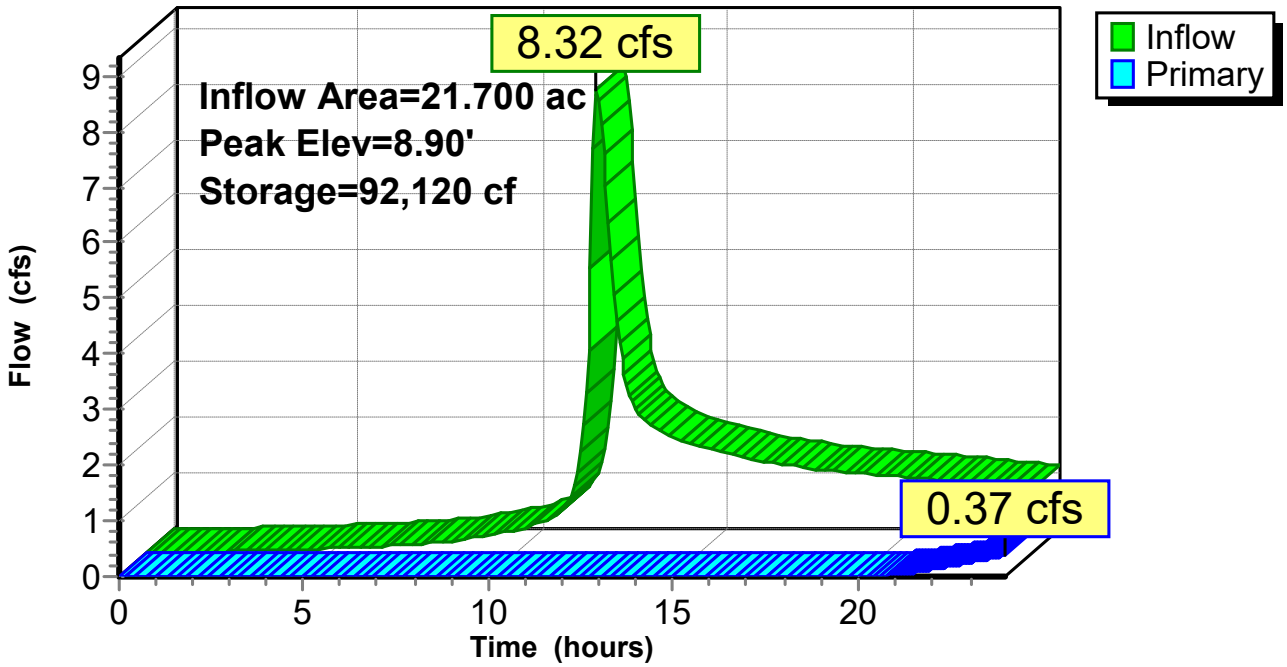
Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
7.00	27,767	0	0
7.40	46,551	14,864	14,864
8.00	50,946	29,249	44,113
9.00	55,842	53,394	97,507
9.50	58,900	28,686	126,192

Device	Routing	Invert	Outlet Devices
#1	Primary	9.20'	**100.0' long x 20.0' 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
#2	Primary	8.60'	**12.0" Vert. Orifice/Grate** C= 0.600

Primary OutFlow Max=0.37 cfs @ 24.01 hrs HW=8.90' (Free Discharge)
└**1=Broad-Crested Rectangular Weir** (Controls 0.00 cfs)
└**2=Orifice/Grate** (Orifice Controls 0.37 cfs @ 1.86 fps)

Pond Lake4&5: Lake 4 & 5

Hydrograph

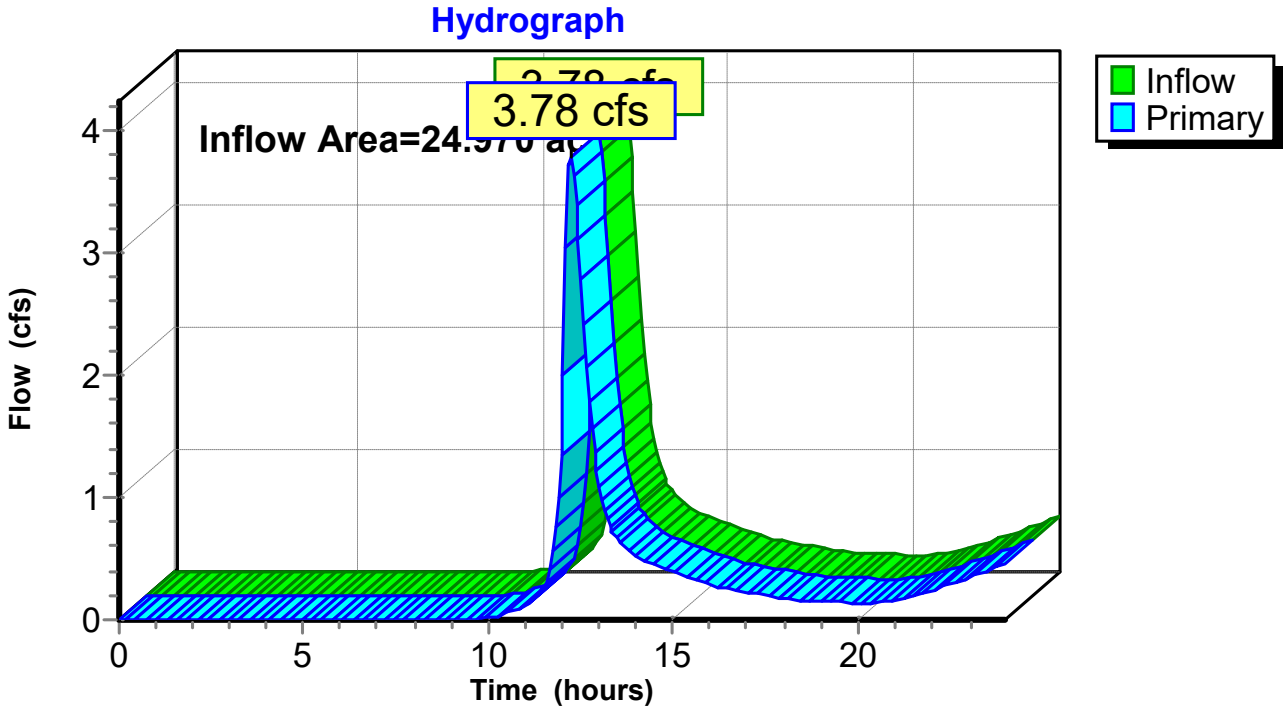


Summary for Link 1L: Combo Discharge

Inflow Area = 24.970 ac, 30.84% Impervious, Inflow Depth > 0.25" for 5 YR CM event
Inflow = 3.78 cfs @ 12.23 hrs, Volume= 0.522 af
Primary = 3.78 cfs @ 12.23 hrs, Volume= 0.522 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-24.01 hrs, dt= 0.07 hrs

Link 1L: Combo Discharge



Time span=0.00-24.00 hrs, dt=0.07 hrs, 344 points
Runoff by SCS TR-20 method, UH=Delmarva
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Subcatchment Post DA 2: Pervious Runoff Area=3.110 ac 0.00% Impervious Runoff Depth>1.02"
Flow Length=100' Slope=0.0100 '/' Tc=12.7 min CN=55 Runoff=1.71 cfs 0.265 af

Subcatchment Post DA 3: Impervious Runoff Area=1.970 ac 100.00% Impervious Runoff Depth>4.85"
Tc=10.0 min CN=98 Runoff=6.47 cfs 0.797 af

Subcatchment Post DA 4: Impervious Runoff Area=1.580 ac 100.00% Impervious Runoff Depth>4.85"
Tc=10.0 min CN=98 Runoff=5.19 cfs 0.639 af

Subcatchment Post DA- 1: Pervious Runoff Area=5.380 ac 0.00% Impervious Runoff Depth>1.49"
Tc=15.0 min CN=62 Runoff=4.58 cfs 0.668 af

Subcatchment Post DA-1: Impervious Runoff Area=2.480 ac 100.00% Impervious Runoff Depth>4.85"
Tc=10.0 min CN=98 Runoff=8.15 cfs 1.003 af

Subcatchment Post DA2: Impervious Runoff Area=1.670 ac 100.00% Impervious Runoff Depth>4.85"
Tc=10.0 min CN=98 Runoff=5.49 cfs 0.675 af

Subcatchment Post DA3: Pervious Runoff Area=1.560 ac 0.00% Impervious Runoff Depth>1.78"
Flow Length=100' Slope=0.0100 '/' Tc=18.5 min CN=66 Runoff=1.51 cfs 0.232 af

Subcatchment Post DA4: Pervious Runoff Area=3.950 ac 0.00% Impervious Runoff Depth>2.02"
Flow Length=100' Slope=0.0100 '/' Tc=12.7 min CN=69 Runoff=5.25 cfs 0.665 af

Subcatchment Post DA5 Off: Off Site Runoff Area=3.270 ac 0.00% Impervious Runoff Depth>2.43"
Flow Length=75' Slope=0.0150 '/' Tc=12.5 min CN=74 Runoff=5.39 cfs 0.663 af

Pond Lake1: Basin Peak Elev=11.55' Storage=43,244 cf Inflow=12.29 cfs 1.672 af
Outflow=1.44 cfs 0.966 af

Pond Lake2: Lake 2 Peak Elev=10.21' Storage=34,342 cf Inflow=7.36 cfs 1.907 af
Outflow=1.77 cfs 1.273 af

Pond Lake3: Lake 3 Peak Elev=9.60' Storage=30,230 cf Inflow=7.85 cfs 2.302 af
Outflow=1.96 cfs 1.801 af

Pond Lake4&5: Lake 4 & 5 Peak Elev=9.21' Storage=109,725 cf Inflow=11.23 cfs 3.105 af
Outflow=1.79 cfs 0.589 af

Link 1L: Combo Discharge Inflow=5.39 cfs 1.252 af
Primary=5.39 cfs 1.252 af

Total Runoff Area = 24.970 ac Runoff Volume = 5.609 af Average Runoff Depth = 2.70"
69.16% Pervious = 17.270 ac 30.84% Impervious = 7.700 ac

Summary for Subcatchment Post DA 2: Pervious

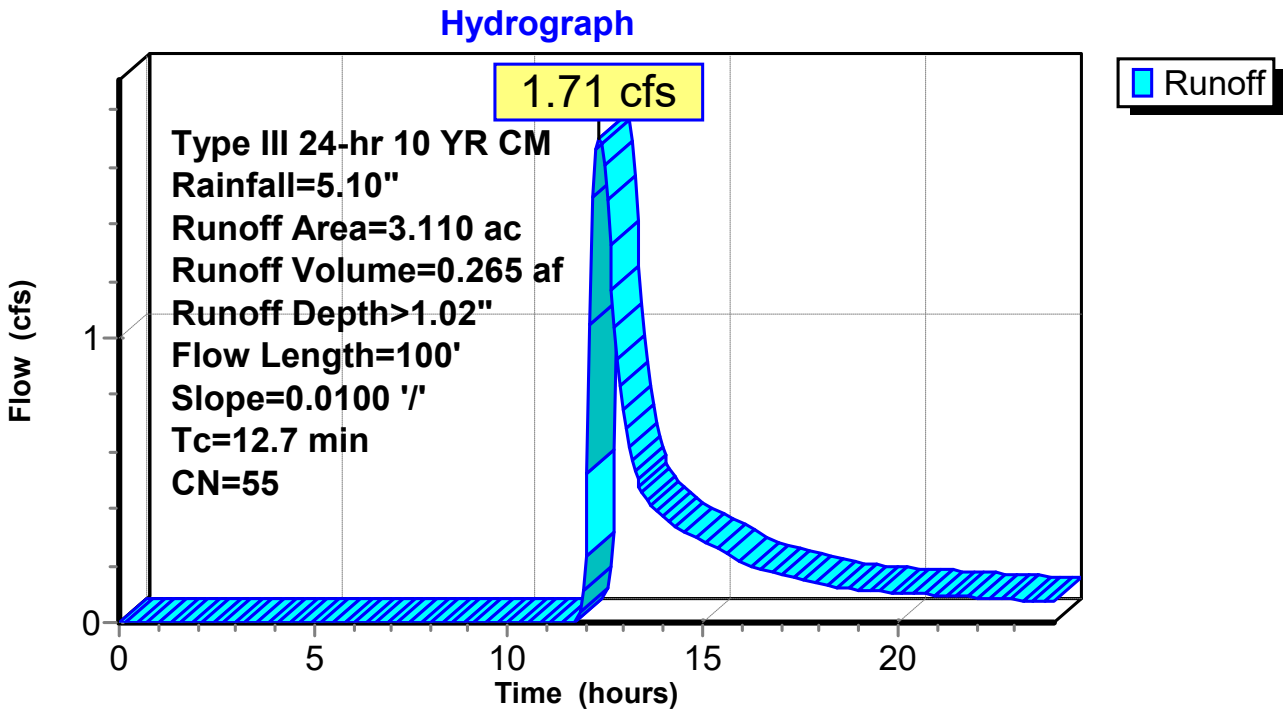
Runoff = 1.71 cfs @ 12.33 hrs, Volume= 0.265 af, Depth> 1.02"

Runoff by SCS TR-20 method, UH=Delmarva, Time Span= 0.00-24.01 hrs, dt= 0.07 hrs
Type III 24-hr 10 YR CM Rainfall=5.10"

Area (ac)	CN	Description
1.000	39	>75% Grass cover, Good, HSG A
1.340	61	>75% Grass cover, Good, HSG B
0.590	74	>75% Grass cover, Good, HSG C
0.080	30	Woods, Good, HSG A
0.100	55	Woods, Good, HSG B
3.110	55	Weighted Average
3.110		Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
12.7	100	0.0100	0.13		**Sheet Flow, Unpaved** Grass: Short n= 0.150 P2= 3.30"

Subcatchment Post DA 2: Pervious



Summary for Subcatchment Post DA 3: Impervious

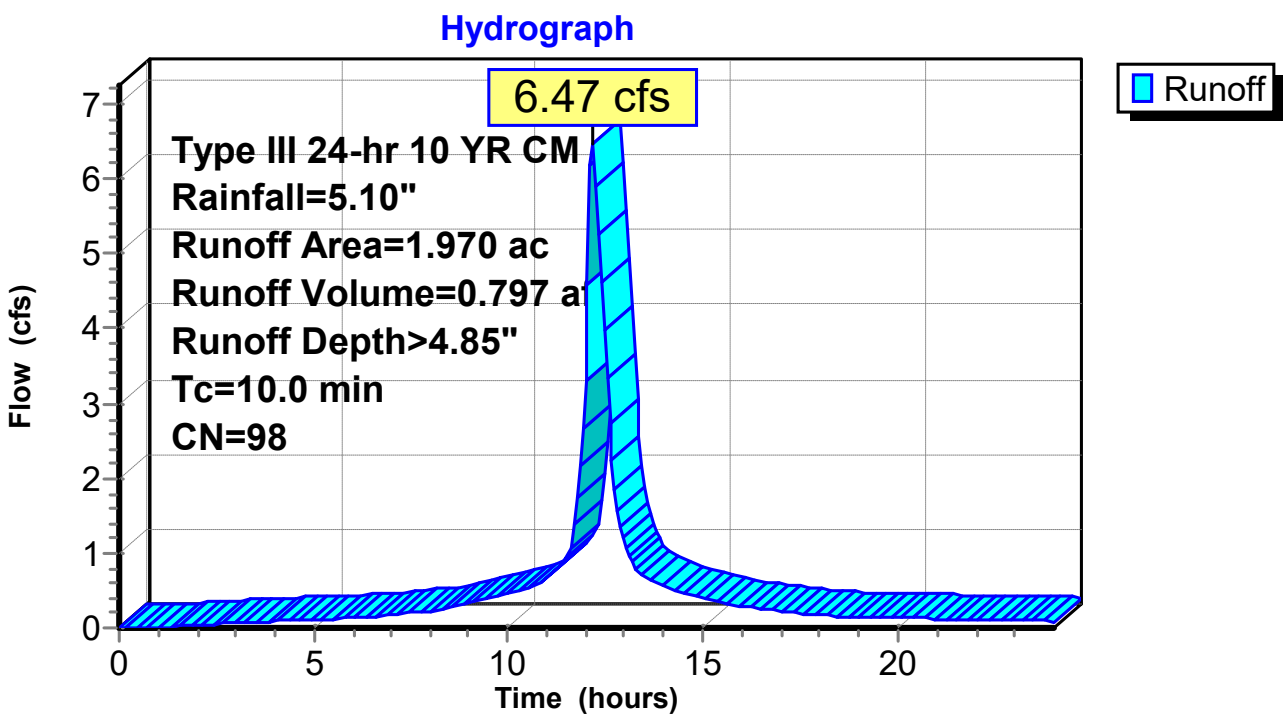
Runoff = 6.47 cfs @ 12.17 hrs, Volume= 0.797 af, Depth> 4.85"

Runoff by SCS TR-20 method, UH=Delmarva, Time Span= 0.00-24.01 hrs, dt= 0.07 hrs
Type III 24-hr 10 YR CM Rainfall=5.10"

Area (ac)	CN	Description
0.630	98	Water Surface
1.340	98	Paved parking & roofs
1.970	98	Weighted Average
1.970		Impervious Area

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

Subcatchment Post DA 3: Impervious



Summary for Subcatchment Post DA 4: Impervious

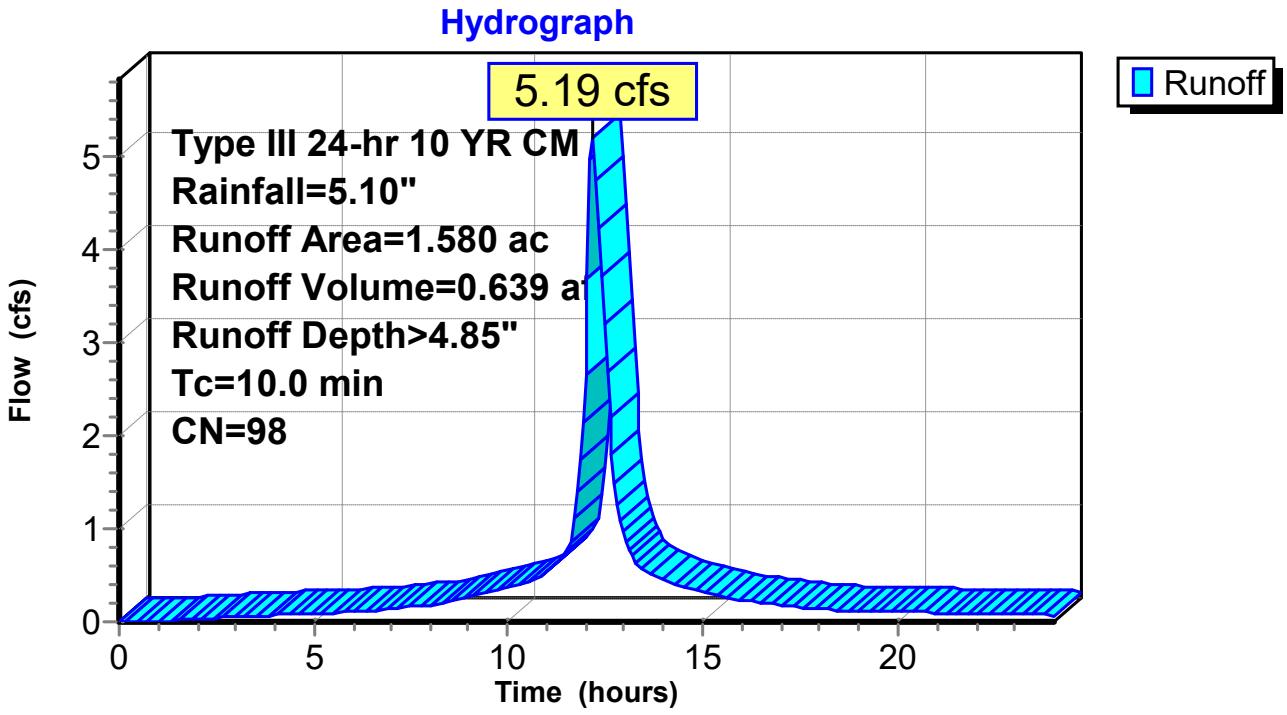
Runoff = 5.19 cfs @ 12.17 hrs, Volume= 0.639 af, Depth> 4.85"

Runoff by SCS TR-20 method, UH=Delmarva, Time Span= 0.00-24.01 hrs, dt= 0.07 hrs
Type III 24-hr 10 YR CM Rainfall=5.10"

	Area (ac)	CN	Description
*	0.100	98	Cart Paths
	0.180	98	Paved parking & roofs
	1.300	98	Water Surface
	1.580	98	Weighted Average
	1.580		Impervious Area

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

Subcatchment Post DA 4: Impervious



Summary for Subcatchment Post DA- 1: Pervious

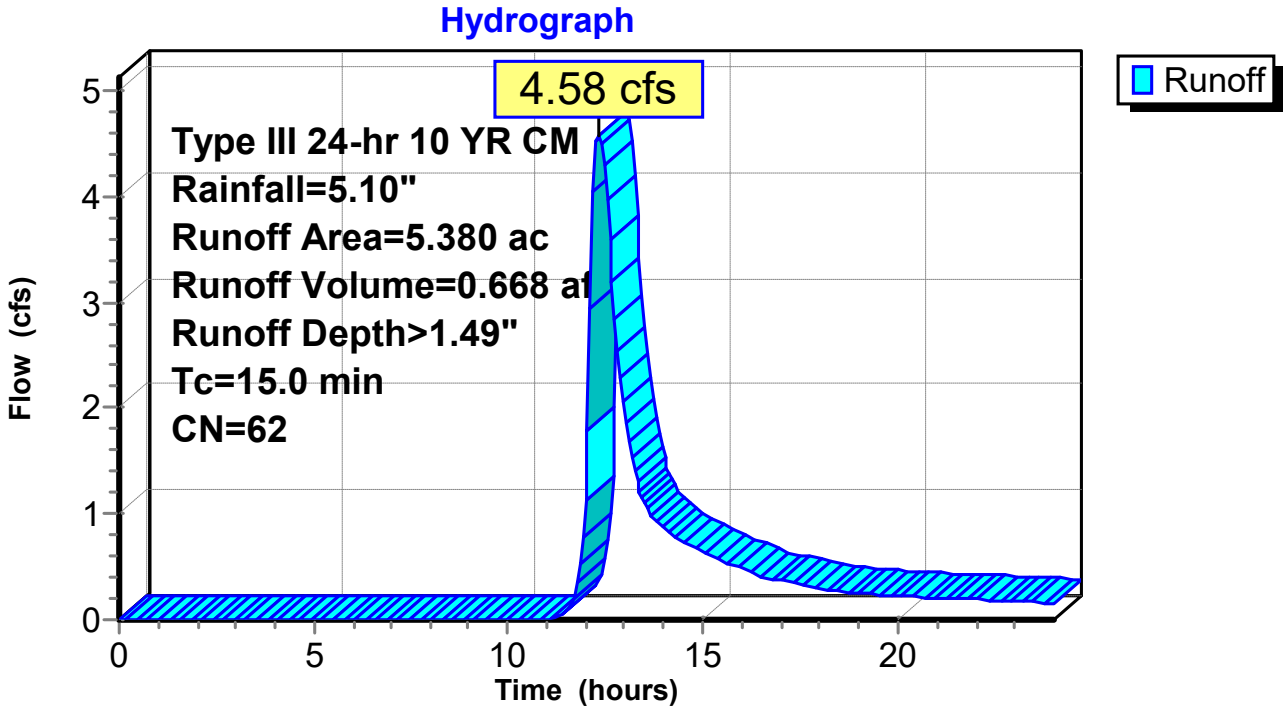
Runoff = 4.58 cfs @ 12.31 hrs, Volume= 0.668 af, Depth> 1.49"

Runoff by SCS TR-20 method, UH=Delmarva, Time Span= 0.00-24.01 hrs, dt= 0.07 hrs
Type III 24-hr 10 YR CM Rainfall=5.10"

Area (ac)	CN	Description
0.010	39	>75% Grass cover, Good, HSG A
4.320	61	>75% Grass cover, Good, HSG B
0.680	74	>75% Grass cover, Good, HSG C
0.370	58	Woods/grass comb., Good, HSG B
5.380	62	Weighted Average
5.380		Pervious Area

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

Subcatchment Post DA- 1: Pervious



Summary for Subcatchment Post DA-1: Impervious

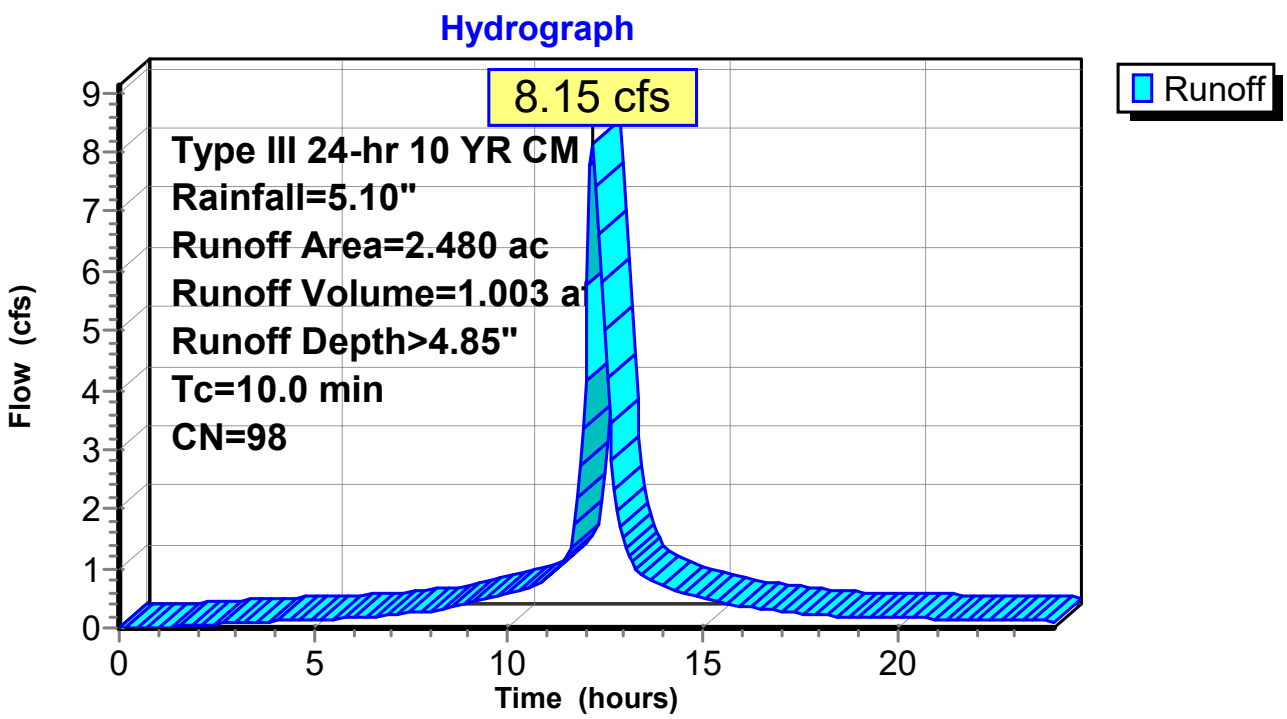
Runoff = 8.15 cfs @ 12.17 hrs, Volume= 1.003 af, Depth> 4.85"

Runoff by SCS TR-20 method, UH=Delmarva, Time Span= 0.00-24.01 hrs, dt= 0.07 hrs
Type III 24-hr 10 YR CM Rainfall=5.10"

Area (ac)	CN	Description
1.160	98	Water Surface
1.320	98	Paved parking & roofs
2.480	98	Weighted Average
2.480		Impervious Area

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

Subcatchment Post DA-1: Impervious



Summary for Subcatchment Post DA2: Impervious

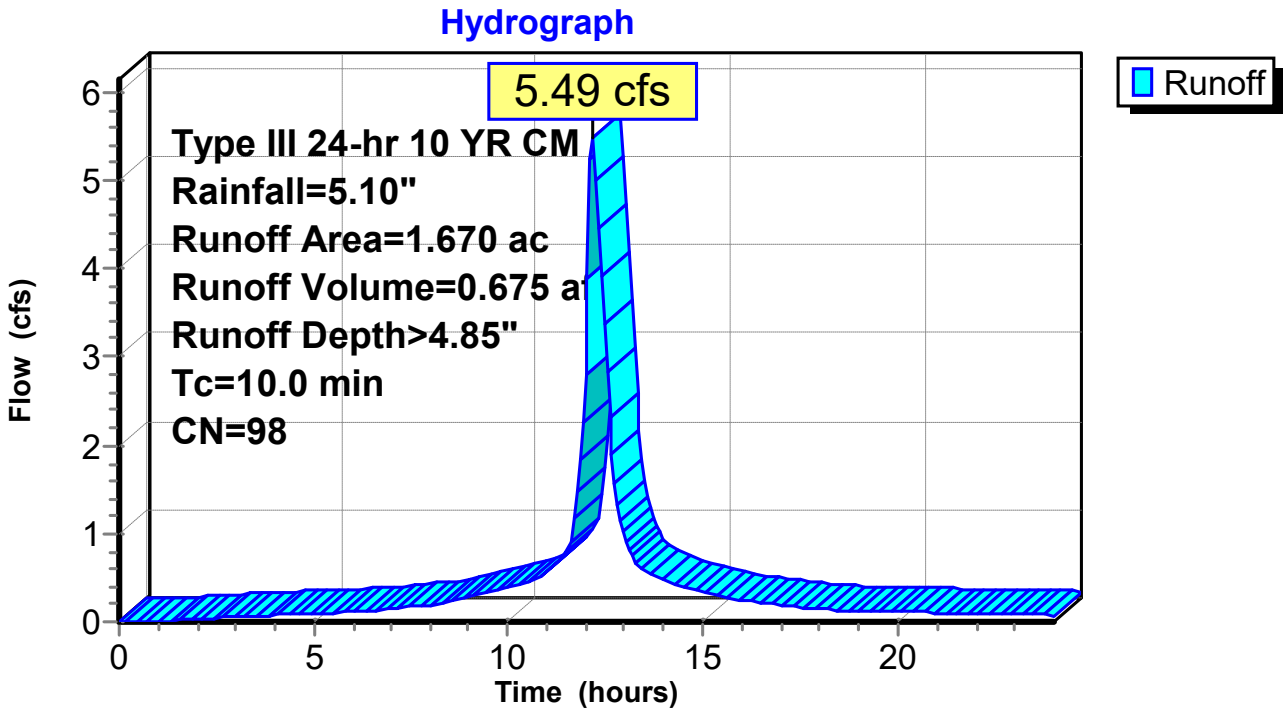
Runoff = 5.49 cfs @ 12.17 hrs, Volume= 0.675 af, Depth> 4.85"

Runoff by SCS TR-20 method, UH=Delmarva, Time Span= 0.00-24.01 hrs, dt= 0.07 hrs
Type III 24-hr 10 YR CM Rainfall=5.10"

	Area (ac)	CN	Description
*	0.250	98	Cart Paths
	1.330	98	Water Surface
*	0.090	98	Townhouse
	1.670	98	Weighted Average
	1.670		Impervious Area

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

Subcatchment Post DA2: Impervious



Summary for Subcatchment Post DA3: Pervious

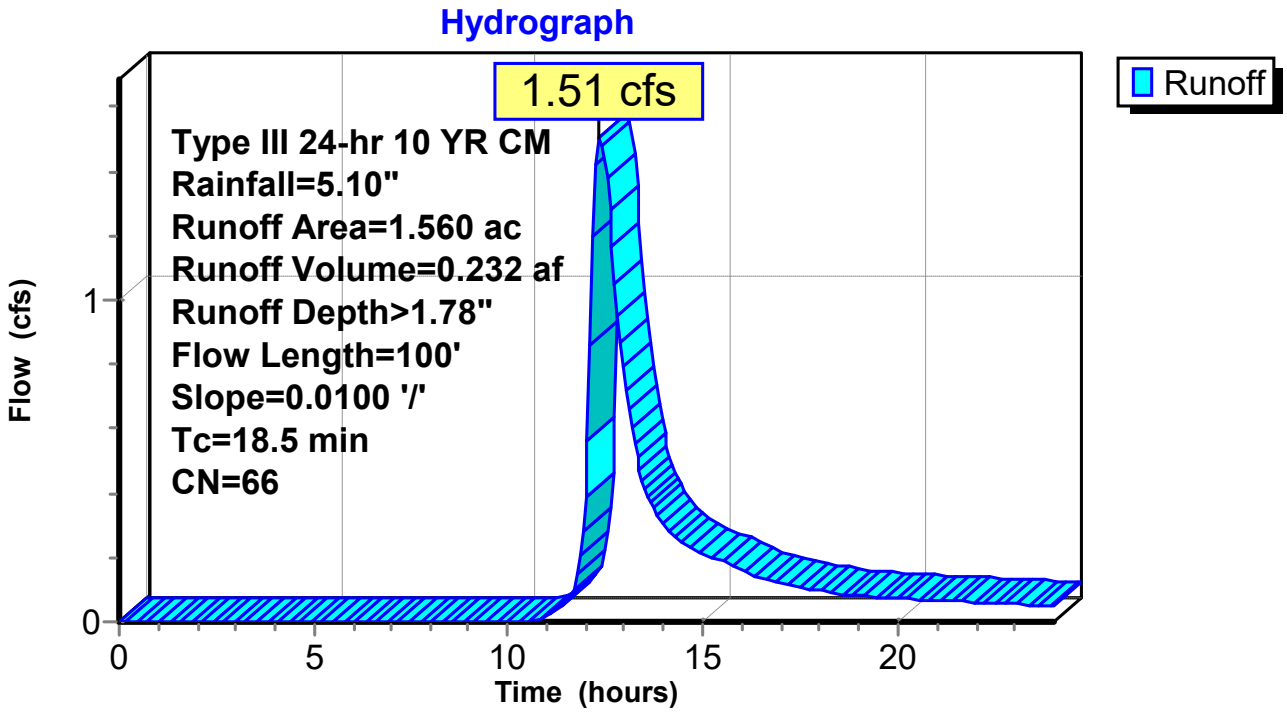
Runoff = 1.51 cfs @ 12.35 hrs, Volume= 0.232 af, Depth> 1.78"

Runoff by SCS TR-20 method, UH=Delmarva, Time Span= 0.00-24.01 hrs, dt= 0.07 hrs
Type III 24-hr 10 YR CM Rainfall=5.10"

Area (ac)	CN	Description
1.000	61	>75% Grass cover, Good, HSG B
0.560	74	>75% Grass cover, Good, HSG C
1.560	66	Weighted Average
1.560		Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
18.5	100	0.0100	0.09		**Sheet Flow, Unpaved** Grass: Dense n= 0.240 P2= 3.30"

Subcatchment Post DA3: Pervious



Summary for Subcatchment Post DA4: Pervious

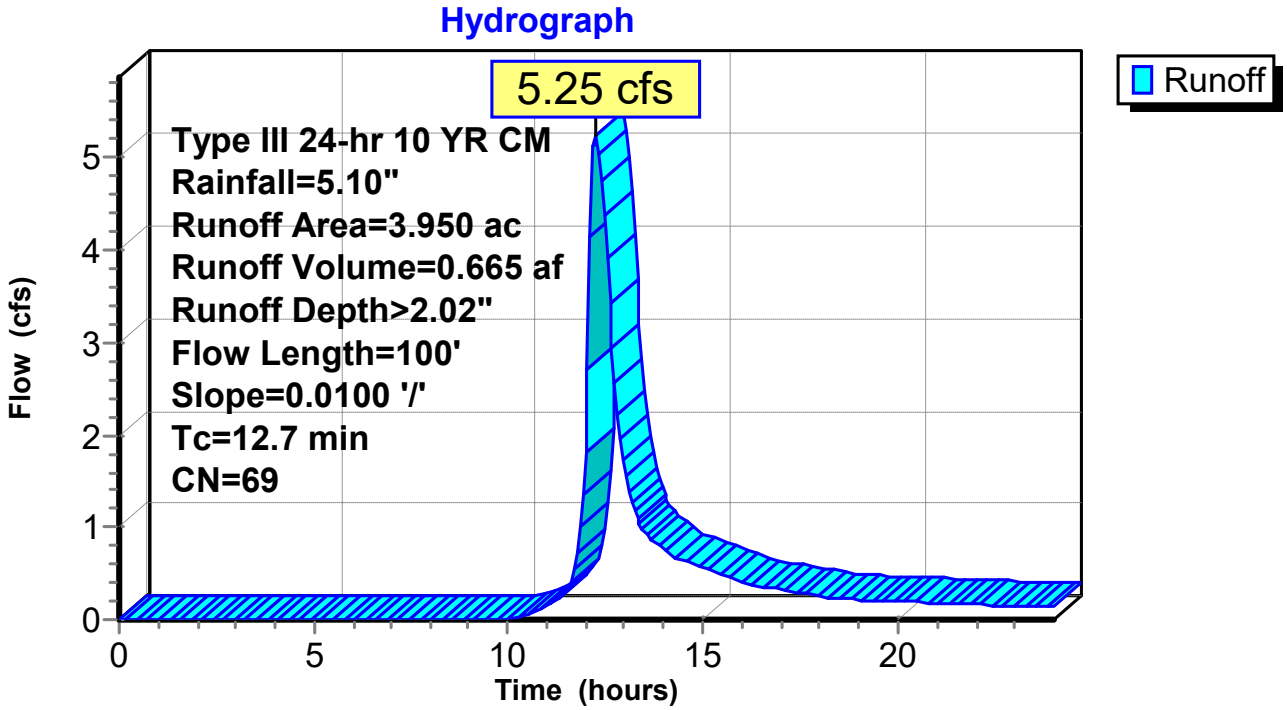
Runoff = 5.25 cfs @ 12.24 hrs, Volume= 0.665 af, Depth> 2.02"

Runoff by SCS TR-20 method, UH=Delmarva, Time Span= 0.00-24.01 hrs, dt= 0.07 hrs
Type III 24-hr 10 YR CM Rainfall=5.10"

Area (ac)	CN	Description
0.660	61	>75% Grass cover, Good, HSG B
2.520	74	>75% Grass cover, Good, HSG C
0.550	55	Woods, Good, HSG B
0.220	70	Woods, Good, HSG C
3.950	69	Weighted Average
3.950		Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
12.7	100	0.0100	0.13		**Sheet Flow, Unpaved** Grass: Short n= 0.150 P2= 3.30"

Subcatchment Post DA4: Pervious



Summary for Subcatchment Post DA5 Off: Off Site Pervious

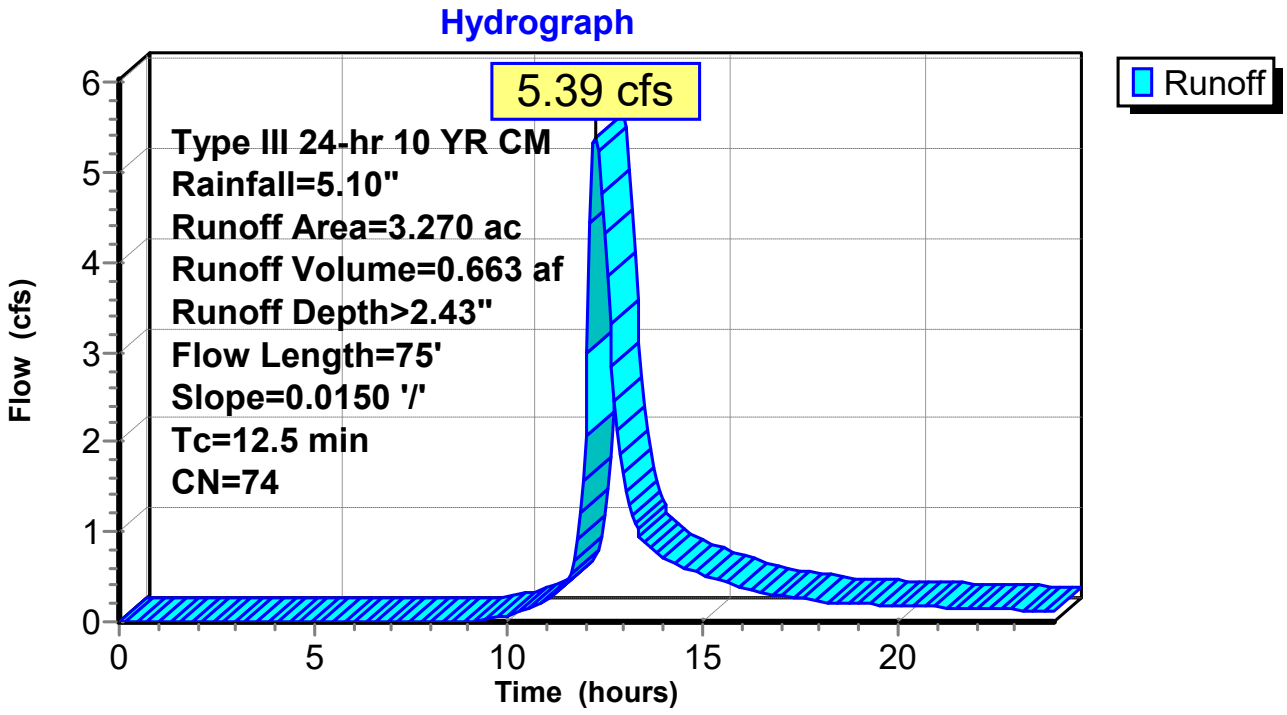
Runoff = 5.39 cfs @ 12.22 hrs, Volume= 0.663 af, Depth> 2.43"

Runoff by SCS TR-20 method, UH=Delmarva, Time Span= 0.00-24.01 hrs, dt= 0.07 hrs
Type III 24-hr 10 YR CM Rainfall=5.10"

Area (ac)	CN	Description
3.170	74	>75% Grass cover, Good, HSG C
0.100	72	Woods/grass comb., Good, HSG C
3.270	74	Weighted Average
3.270		Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
12.5	75	0.0150	0.10		**Sheet Flow, Unpaved** Grass: Dense n= 0.240 P2= 3.30"

Subcatchment Post DA5 Off: Off Site Pervious



Summary for Pond Lake1: Basin

Inflow Area = 7.860 ac, 31.55% Impervious, Inflow Depth > 2.55" for 10 YR CM event
Inflow = 12.29 cfs @ 12.21 hrs, Volume= 1.672 af
Outflow = 1.44 cfs @ 14.21 hrs, Volume= 0.966 af, Atten= 88%, Lag= 120.0 min
Primary = 1.44 cfs @ 14.21 hrs, Volume= 0.966 af

Routing by Stor-Ind method, Time Span= 0.00-24.01 hrs, dt= 0.07 hrs
Peak Elev= 11.55' @ 14.21 hrs Surf.Area= 0 sf Storage= 43,244 cf

Plug-Flow detention time= 338.5 min calculated for 0.963 af (58% of inflow)
Center-of-Mass det. time= 217.0 min (1,023.4 - 806.4)

Volume	Invert	Avail.Storage	Storage Description
#1	10.70'	137,878 cf	**Custom Stage Data** Listed below

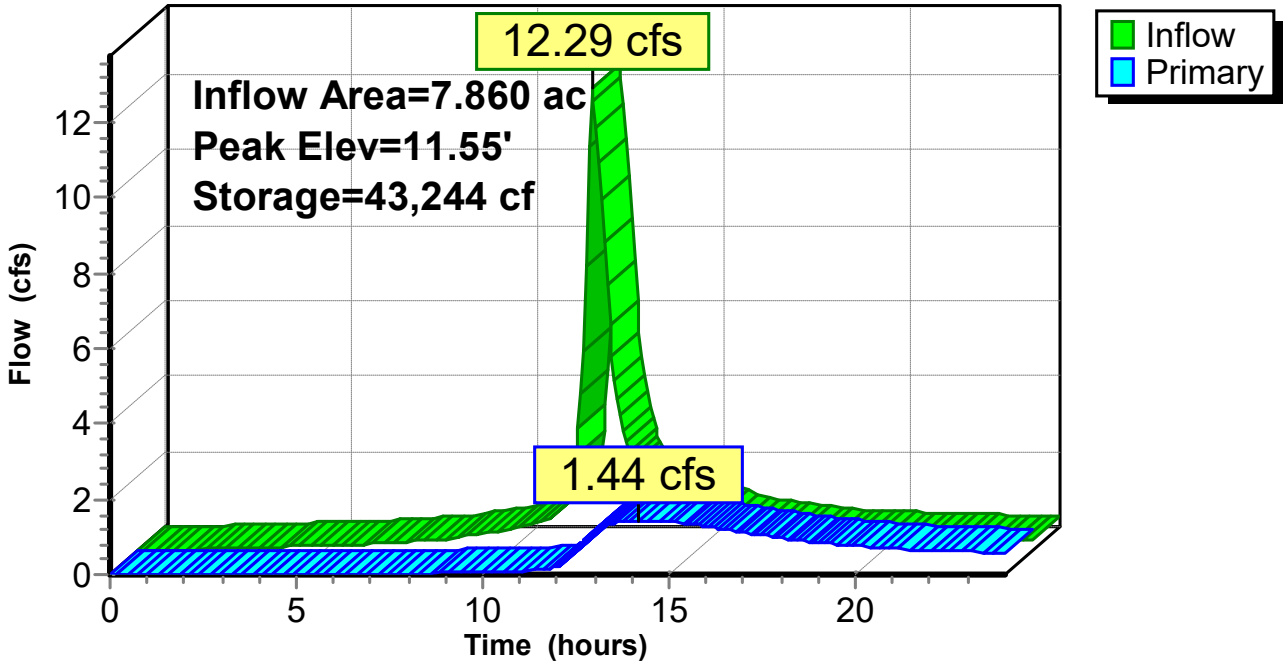
Elevation (feet)	Cum.Store (cubic-feet)
10.70	0
11.00	15,300
12.00	65,780
13.00	118,459
13.70	137,878

Device	Routing	Invert	Outlet Devices
#1	Primary	11.35'	**2.0' long Sharp-Crested Rectangular Weir** 2 End Contraction(s)
#2	Primary	10.70'	**0.5' long Sharp-Crested Rectangular Weir** 2 End Contraction(s)

Primary OutFlow Max=1.44 cfs @ 14.21 hrs HW=11.55' (Free Discharge)
↑ **1=Sharp-Crested Rectangular Weir** (Weir Controls 0.59 cfs @ 1.48 fps)
└ **2=Sharp-Crested Rectangular Weir** (Weir Controls 0.85 cfs @ 3.02 fps)

Pond Lake1: Basin

Hydrograph



Summary for Pond Lake2: Lake 2

Inflow Area = 12.640 ac, 32.83% Impervious, Inflow Depth > 1.81" for 10 YR CM event
Inflow = 7.36 cfs @ 12.20 hrs, Volume= 1.907 af
Outflow = 1.77 cfs @ 15.90 hrs, Volume= 1.273 af, Atten= 76%, Lag= 222.2 min
Primary = 1.77 cfs @ 15.90 hrs, Volume= 1.273 af

Routing by Stor-Ind method, Time Span= 0.00-24.01 hrs, dt= 0.07 hrs
Peak Elev= 10.21' @ 15.90 hrs Surf.Area= 0 sf Storage= 34,342 cf

Plug-Flow detention time= 294.2 min calculated for 1.269 af (67% of inflow)
Center-of-Mass det. time= 158.0 min (1,069.8 - 911.8)

Volume	Invert	Avail.Storage	Storage Description
#1	9.67'	87,360 cf	**Custom Stage Data** Listed below

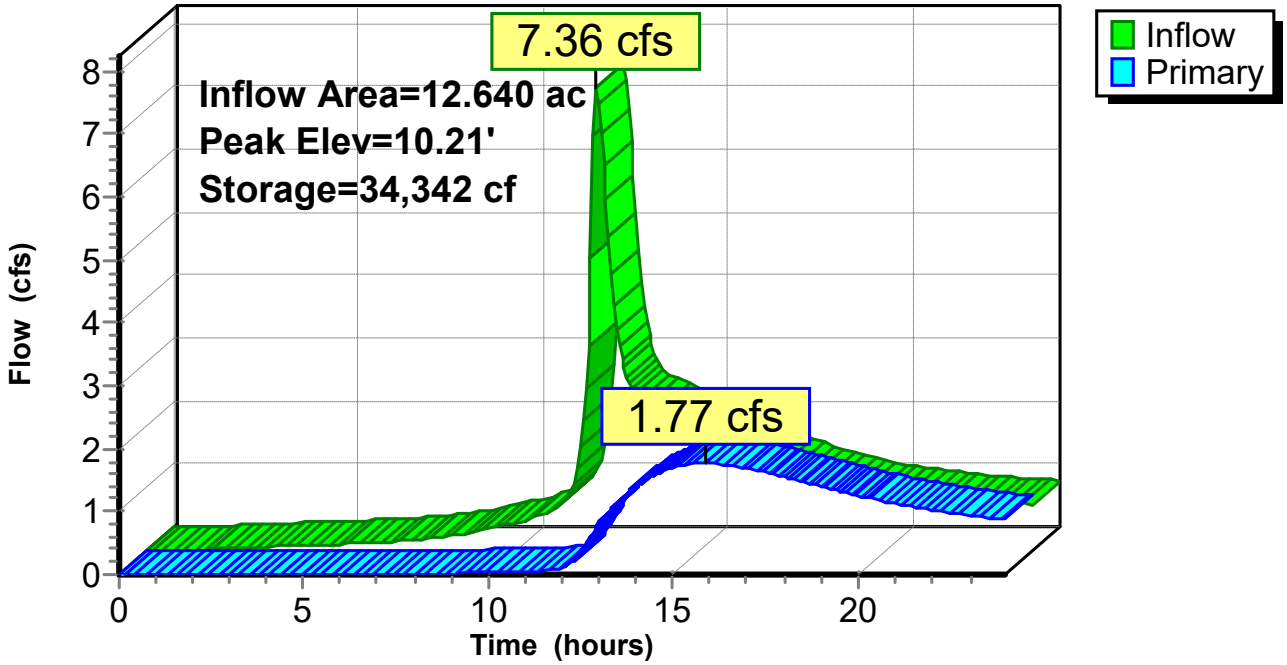
Elevation (feet)	Cum.Store (cubic-feet)
9.67	0
10.00	20,120
11.00	87,360

Device	Routing	Invert	Outlet Devices
#1	Primary	10.00'	**4.0' long Sharp-Crested Rectangular Weir** 2 End Contraction(s)
#2	Primary	9.67'	**0.5' long Sharp-Crested Rectangular Weir** 2 End Contraction(s)

Primary OutFlow Max=1.77 cfs @ 15.90 hrs HW=10.21' (Free Discharge)
└**1=Sharp-Crested Rectangular Weir** (Weir Controls 1.26 cfs @ 1.50 fps)
└**2=Sharp-Crested Rectangular Weir** (Weir Controls 0.51 cfs @ 2.41 fps)

Pond Lake2: Lake 2

Hydrograph



Summary for Pond Lake3: Lake 3

Inflow Area = 16.170 ac, 37.85% Impervious, Inflow Depth > 1.71" for 10 YR CM event
Inflow = 7.85 cfs @ 12.19 hrs, Volume= 2.302 af
Outflow = 1.96 cfs @ 17.41 hrs, Volume= 1.801 af, Atten= 75%, Lag= 313.2 min
Primary = 1.96 cfs @ 17.41 hrs, Volume= 1.801 af

Routing by Stor-Ind method, Time Span= 0.00-24.01 hrs, dt= 0.07 hrs
Peak Elev= 9.60' @ 17.41 hrs Surf.Area= 0 sf Storage= 30,230 cf

Plug-Flow detention time= 218.7 min calculated for 1.801 af (78% of inflow)
Center-of-Mass det. time= 122.5 min (1,064.2 - 941.6)

Volume	Invert	Avail.Storage	Storage Description
#1	8.60'	69,310 cf	**Custom Stage Data** Listed below

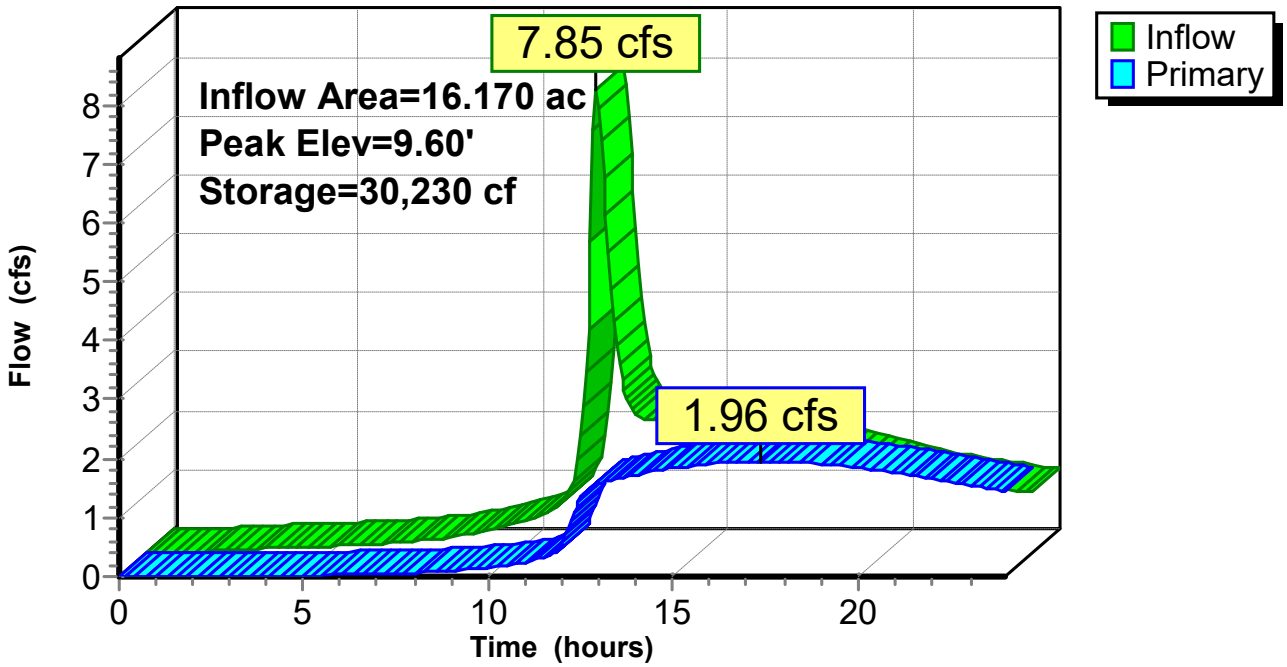
Elevation (feet)	Cum.Store (cubic-feet)
8.60	0
9.00	11,585
10.00	42,767
10.80	69,310

Device	Routing	Invert	Outlet Devices
#1	Primary	9.60'	**12.0' long Sharp-Crested Rectangular Weir** 2 End Contraction(s)
#2	Primary	9.60'	**4.0' long Sharp-Crested Rectangular Weir** 2 End Contraction(s)
#3	Primary	8.60'	**0.5' long Sharp-Crested Rectangular Weir** 2 End Contraction(s)
#4	Primary	8.60'	**0.5' long Sharp-Crested Rectangular Weir** 2 End Contraction(s)

Primary OutFlow Max=1.96 cfs @ 17.41 hrs HW=9.60' (Free Discharge)
- **1=Sharp-Crested Rectangular Weir** (Controls 0.00 cfs)
- **2=Sharp-Crested Rectangular Weir** (Controls 0.00 cfs)
- **3=Sharp-Crested Rectangular Weir** (Weir Controls 0.98 cfs @ 3.27 fps)
- **4=Sharp-Crested Rectangular Weir** (Weir Controls 0.98 cfs @ 3.27 fps)

Pond Lake3: Lake 3

Hydrograph



Summary for Pond Lake4&5: Lake 4 & 5

[79] Warning: Submerged Pond Lake3 Primary device # 3 by 0.61'
[79] Warning: Submerged Pond Lake3 Primary device # 4 by 0.61'

Inflow Area = 21.700 ac, 35.48% Impervious, Inflow Depth > 1.72" for 10 YR CM event
Inflow = 11.23 cfs @ 12.21 hrs, Volume= 3.105 af
Outflow = 1.79 cfs @ 22.91 hrs, Volume= 0.589 af, Atten= 84%, Lag= 642.3 min
Primary = 1.79 cfs @ 22.91 hrs, Volume= 0.589 af

Routing by Stor-Ind method, Time Span= 0.00-24.01 hrs, dt= 0.07 hrs
Peak Elev= 9.21' @ 22.91 hrs Surf.Area= 57,145 sf Storage= 109,725 cf

Plug-Flow detention time= 639.7 min calculated for 0.587 af (19% of inflow)
Center-of-Mass det. time= 339.2 min (1,296.3 - 957.1)

Volume	Invert	Avail.Storage	Storage Description
#1	7.00'	126,192 cf	**Custom Stage Data (Prismatic)** Listed below

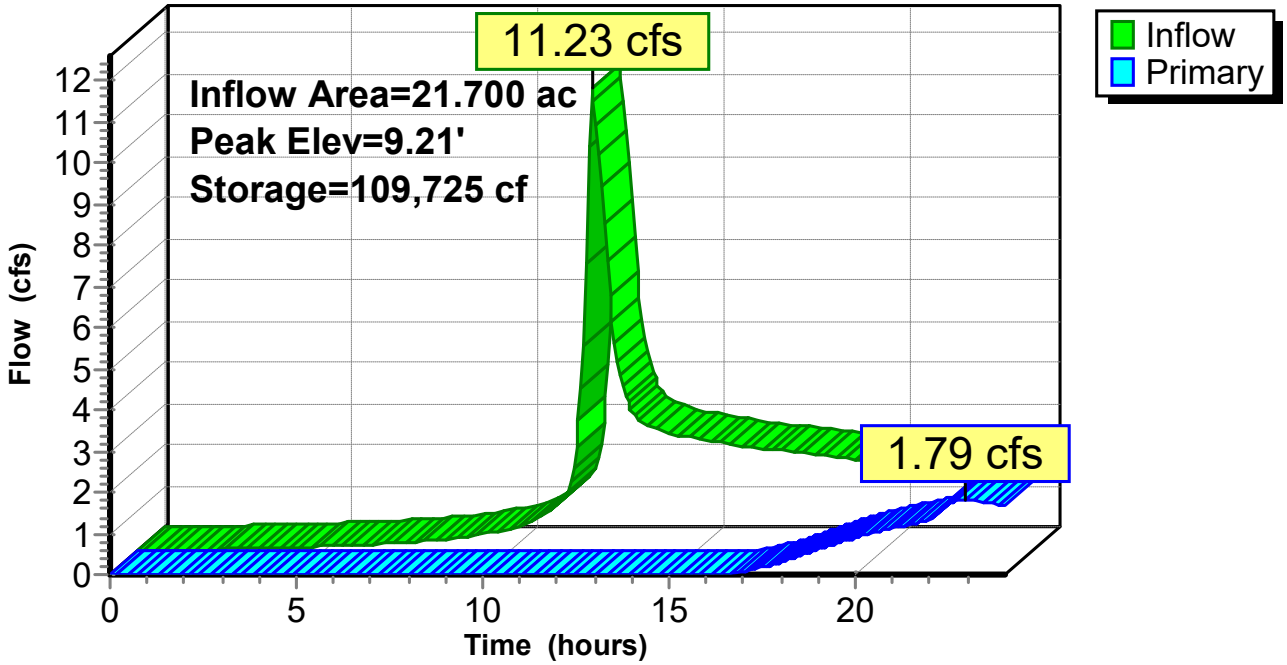
Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
7.00	27,767	0	0
7.40	46,551	14,864	14,864
8.00	50,946	29,249	44,113
9.00	55,842	53,394	97,507
9.50	58,900	28,686	126,192

Device	Routing	Invert	Outlet Devices
#1	Primary	9.20'	**100.0' long x 20.0' 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
#2	Primary	8.60'	**12.0" Vert. Orifice/Grate** C= 0.600

Primary OutFlow Max=1.74 cfs @ 22.91 hrs HW=9.21' (Free Discharge)
└**1=Broad-Crested Rectangular Weir** (Weir Controls 0.40 cfs @ 0.31 fps)
└**2=Orifice/Grate** (Orifice Controls 1.35 cfs @ 2.67 fps)

Pond Lake4&5: Lake 4 & 5

Hydrograph

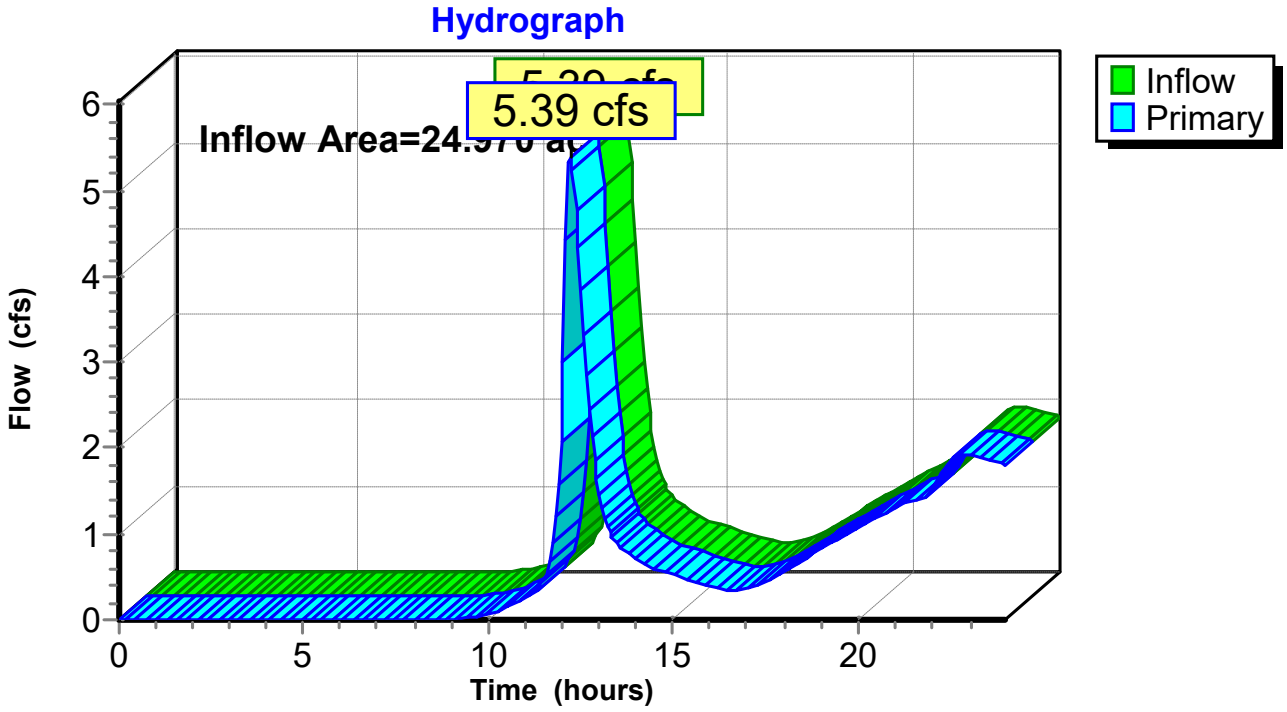


Summary for Link 1L: Combo Discharge

Inflow Area = 24.970 ac, 30.84% Impervious, Inflow Depth > 0.60" for 10 YR CM event
Inflow = 5.39 cfs @ 12.22 hrs, Volume= 1.252 af
Primary = 5.39 cfs @ 12.22 hrs, Volume= 1.252 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-24.01 hrs, dt= 0.07 hrs

Link 1L: Combo Discharge



Time span=0.00-24.00 hrs, dt=0.07 hrs, 344 points
Runoff by SCS TR-20 method, UH=Delmarva
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Subcatchment Post DA 2: Pervious Runoff Area=3.110 ac 0.00% Impervious Runoff Depth>2.44"
Flow Length=100' Slope=0.0100 '/' Tc=12.7 min CN=55 Runoff=4.79 cfs 0.631 af

Subcatchment Post DA 3: Impervious Runoff Area=1.970 ac 100.00% Impervious Runoff Depth>7.25"
Tc=10.0 min CN=98 Runoff=9.55 cfs 1.190 af

Subcatchment Post DA 4: Impervious Runoff Area=1.580 ac 100.00% Impervious Runoff Depth>7.25"
Tc=10.0 min CN=98 Runoff=7.66 cfs 0.954 af

Subcatchment Post DA- 1: Pervious Runoff Area=5.380 ac 0.00% Impervious Runoff Depth>3.16"
Tc=15.0 min CN=62 Runoff=10.52 cfs 1.415 af

Subcatchment Post DA-1: Impervious Runoff Area=2.480 ac 100.00% Impervious Runoff Depth>7.25"
Tc=10.0 min CN=98 Runoff=12.02 cfs 1.498 af

Subcatchment Post DA2: Impervious Runoff Area=1.670 ac 100.00% Impervious Runoff Depth>7.25"
Tc=10.0 min CN=98 Runoff=8.09 cfs 1.009 af

Subcatchment Post DA3: Pervious Runoff Area=1.560 ac 0.00% Impervious Runoff Depth>3.58"
Flow Length=100' Slope=0.0100 '/' Tc=18.5 min CN=66 Runoff=3.18 cfs 0.465 af

Subcatchment Post DA4: Pervious Runoff Area=3.950 ac 0.00% Impervious Runoff Depth>3.91"
Flow Length=100' Slope=0.0100 '/' Tc=12.7 min CN=69 Runoff=10.48 cfs 1.288 af

Subcatchment Post DA5 Off: Off Site Runoff Area=3.270 ac 0.00% Impervious Runoff Depth>4.47"
Flow Length=75' Slope=0.0150 '/' Tc=12.5 min CN=74 Runoff=10.16 cfs 1.217 af

Pond Lake1: Basin Peak Elev=12.02' Storage=66,669 cf Inflow=21.96 cfs 2.913 af
Outflow=4.56 cfs 2.104 af

Pond Lake2: Lake 2 Peak Elev=10.49' Storage=53,223 cf Inflow=13.61 cfs 3.744 af
Outflow=5.23 cfs 3.034 af

Pond Lake3: Lake 3 Peak Elev=9.81' Storage=36,755 cf Inflow=12.89 cfs 4.689 af
Outflow=7.15 cfs 4.028 af

Pond Lake4&5: Lake 4 & 5 Peak Elev=9.28' Storage=113,787 cf Inflow=19.57 cfs 6.270 af
Outflow=8.14 cfs 3.742 af

Link 1L: Combo Discharge Inflow=10.16 cfs 4.958 af
Primary=10.16 cfs 4.958 af

Total Runoff Area = 24.970 ac Runoff Volume = 9.667 af Average Runoff Depth = 4.65"
69.16% Pervious = 17.270 ac 30.84% Impervious = 7.700 ac

Summary for Subcatchment Post DA 2: Pervious

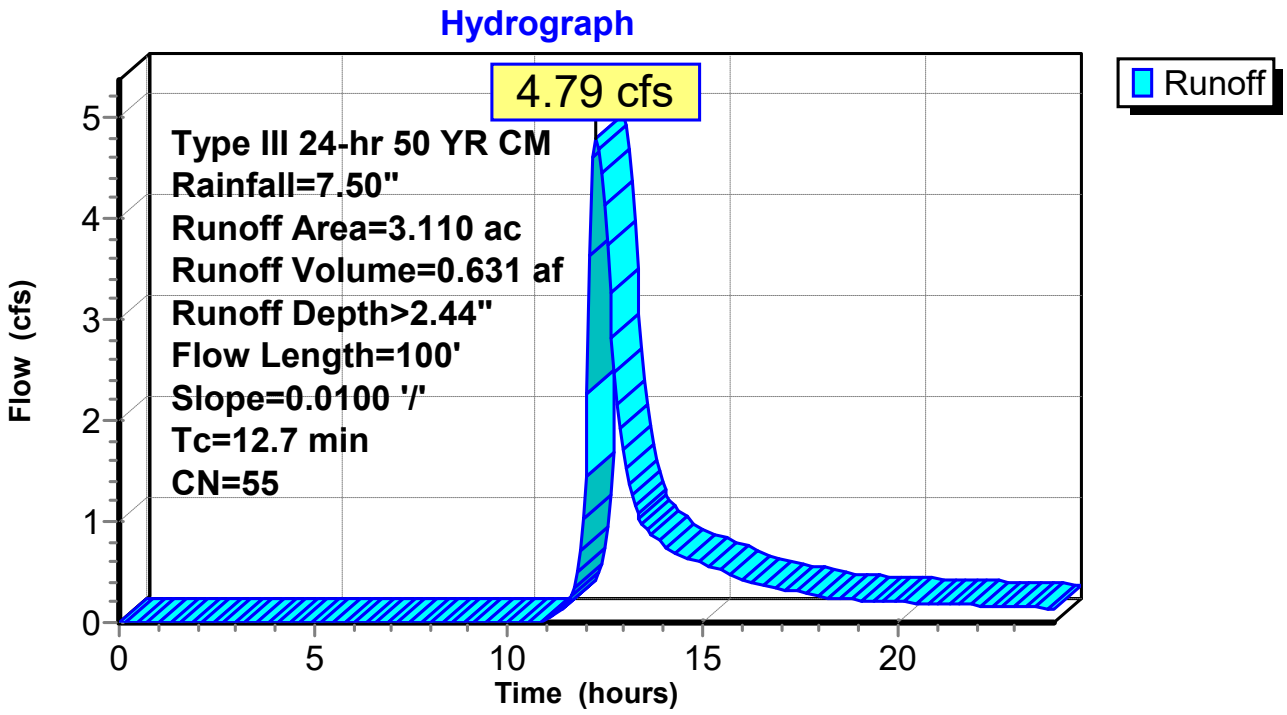
Runoff = 4.79 cfs @ 12.26 hrs, Volume= 0.631 af, Depth> 2.44"

Runoff by SCS TR-20 method, UH=Delmarva, Time Span= 0.00-24.01 hrs, dt= 0.07 hrs
Type III 24-hr 50 YR CM Rainfall=7.50"

Area (ac)	CN	Description
1.000	39	>75% Grass cover, Good, HSG A
1.340	61	>75% Grass cover, Good, HSG B
0.590	74	>75% Grass cover, Good, HSG C
0.080	30	Woods, Good, HSG A
0.100	55	Woods, Good, HSG B
3.110	55	Weighted Average
3.110		Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
12.7	100	0.0100	0.13		**Sheet Flow, Unpaved** Grass: Short n= 0.150 P2= 3.30"

Subcatchment Post DA 2: Pervious



Summary for Subcatchment Post DA 3: Impervious

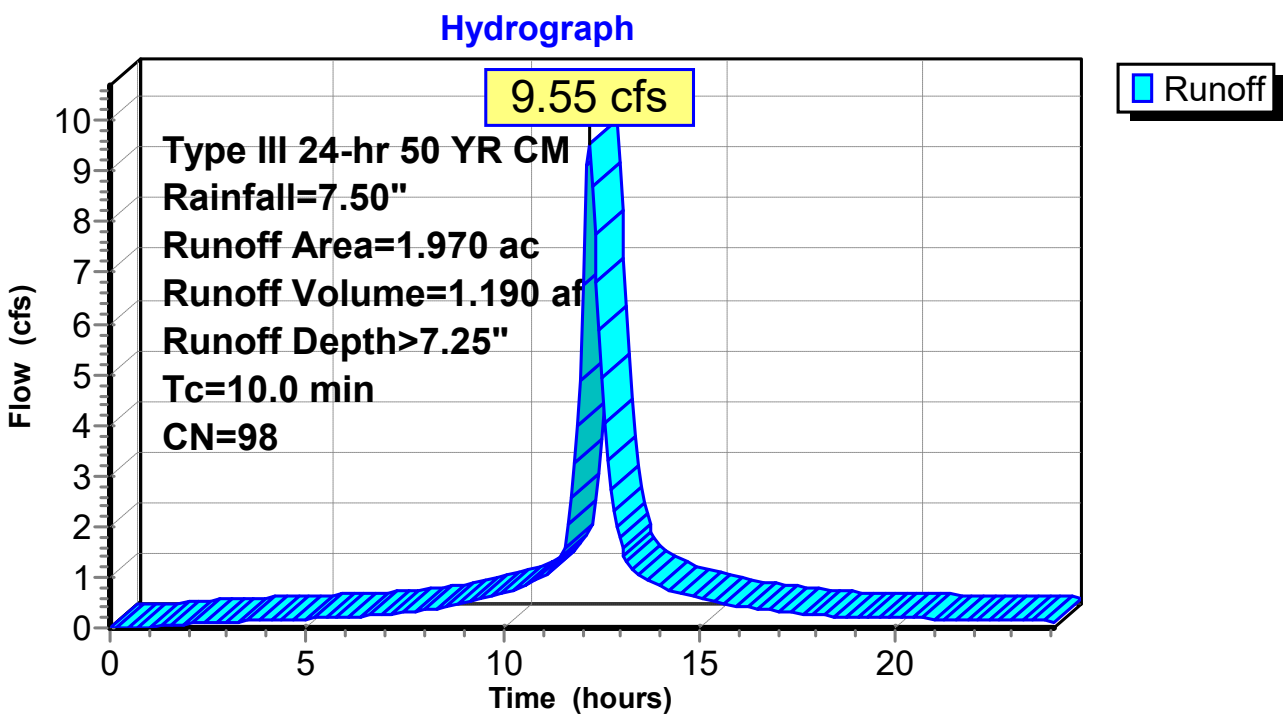
Runoff = 9.55 cfs @ 12.17 hrs, Volume= 1.190 af, Depth> 7.25"

Runoff by SCS TR-20 method, UH=Delmarva, Time Span= 0.00-24.01 hrs, dt= 0.07 hrs
Type III 24-hr 50 YR CM Rainfall=7.50"

Area (ac)	CN	Description
0.630	98	Water Surface
1.340	98	Paved parking & roofs
1.970	98	Weighted Average
1.970		Impervious Area

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

Subcatchment Post DA 3: Impervious



Summary for Subcatchment Post DA 4: Impervious

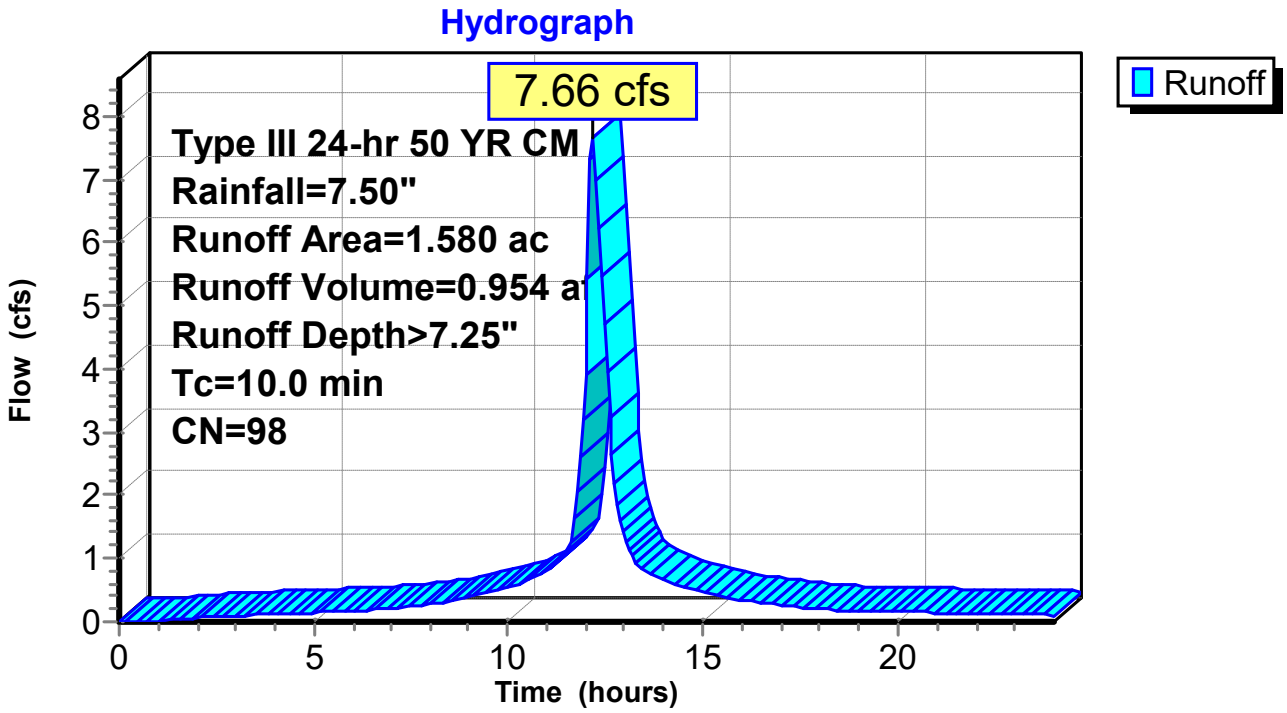
Runoff = 7.66 cfs @ 12.17 hrs, Volume= 0.954 af, Depth> 7.25"

Runoff by SCS TR-20 method, UH=Delmarva, Time Span= 0.00-24.01 hrs, dt= 0.07 hrs
Type III 24-hr 50 YR CM Rainfall=7.50"

	Area (ac)	CN	Description
*	0.100	98	Cart Paths
	0.180	98	Paved parking & roofs
	1.300	98	Water Surface
	1.580	98	Weighted Average
	1.580		Impervious Area

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

Subcatchment Post DA 4: Impervious



Summary for Subcatchment Post DA- 1: Pervious

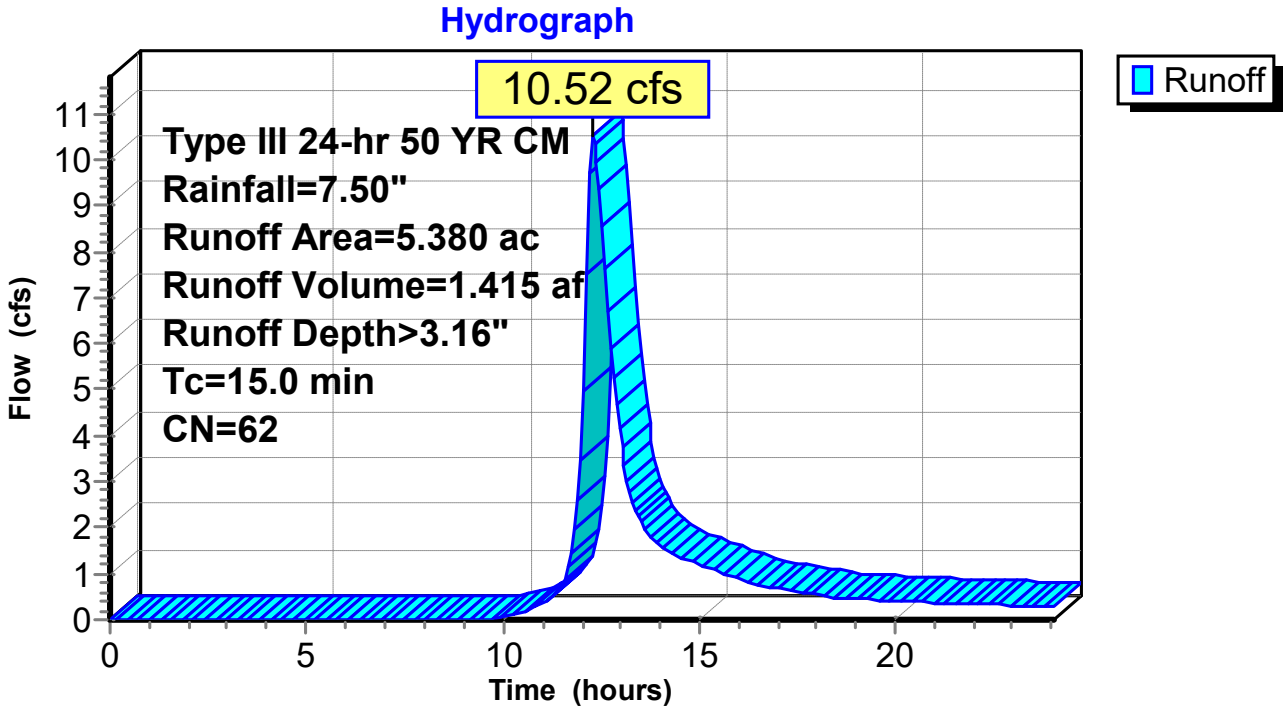
Runoff = 10.52 cfs @ 12.28 hrs, Volume= 1.415 af, Depth> 3.16"

Runoff by SCS TR-20 method, UH=Delmarva, Time Span= 0.00-24.01 hrs, dt= 0.07 hrs
Type III 24-hr 50 YR CM Rainfall=7.50"

Area (ac)	CN	Description
0.010	39	>75% Grass cover, Good, HSG A
4.320	61	>75% Grass cover, Good, HSG B
0.680	74	>75% Grass cover, Good, HSG C
0.370	58	Woods/grass comb., Good, HSG B
5.380	62	Weighted Average
5.380		Pervious Area

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

Subcatchment Post DA- 1: Pervious



Summary for Subcatchment Post DA-1: Impervious

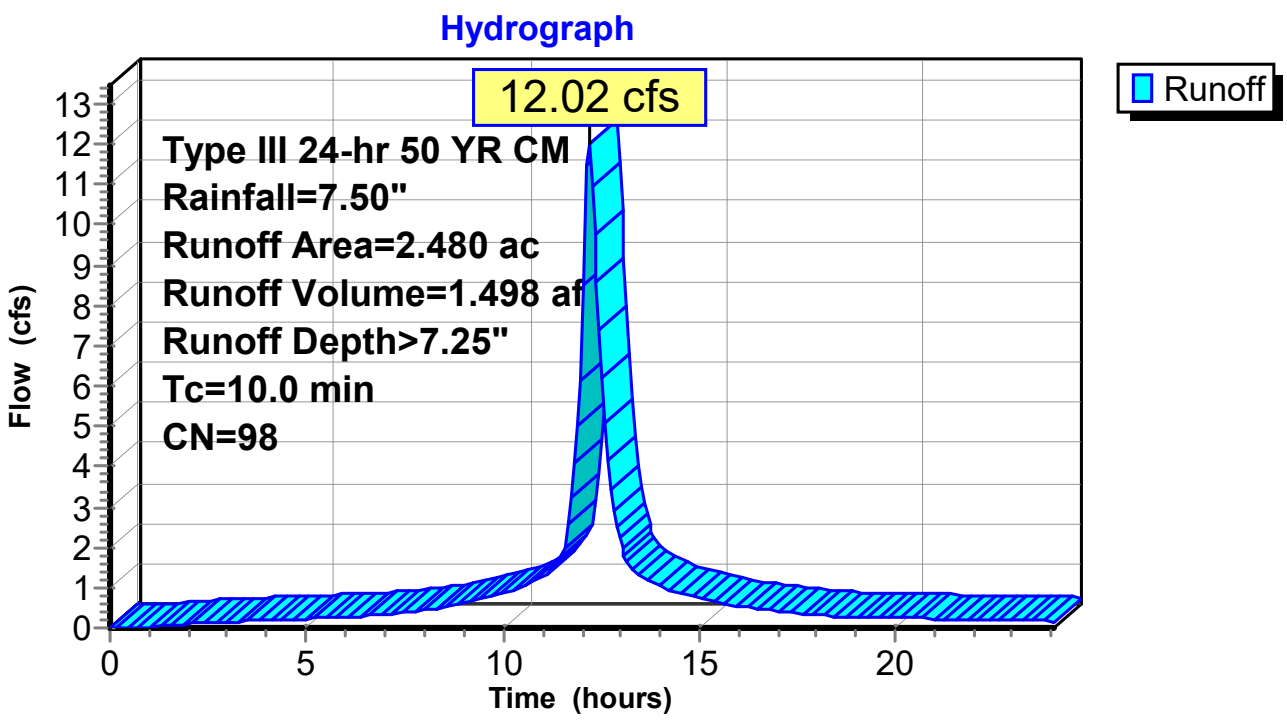
Runoff = 12.02 cfs @ 12.17 hrs, Volume= 1.498 af, Depth> 7.25"

Runoff by SCS TR-20 method, UH=Delmarva, Time Span= 0.00-24.01 hrs, dt= 0.07 hrs
Type III 24-hr 50 YR CM Rainfall=7.50"

Area (ac)	CN	Description
1.160	98	Water Surface
1.320	98	Paved parking & roofs
2.480	98	Weighted Average
2.480		Impervious Area

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

Subcatchment Post DA-1: Impervious



Summary for Subcatchment Post DA2: Impervious

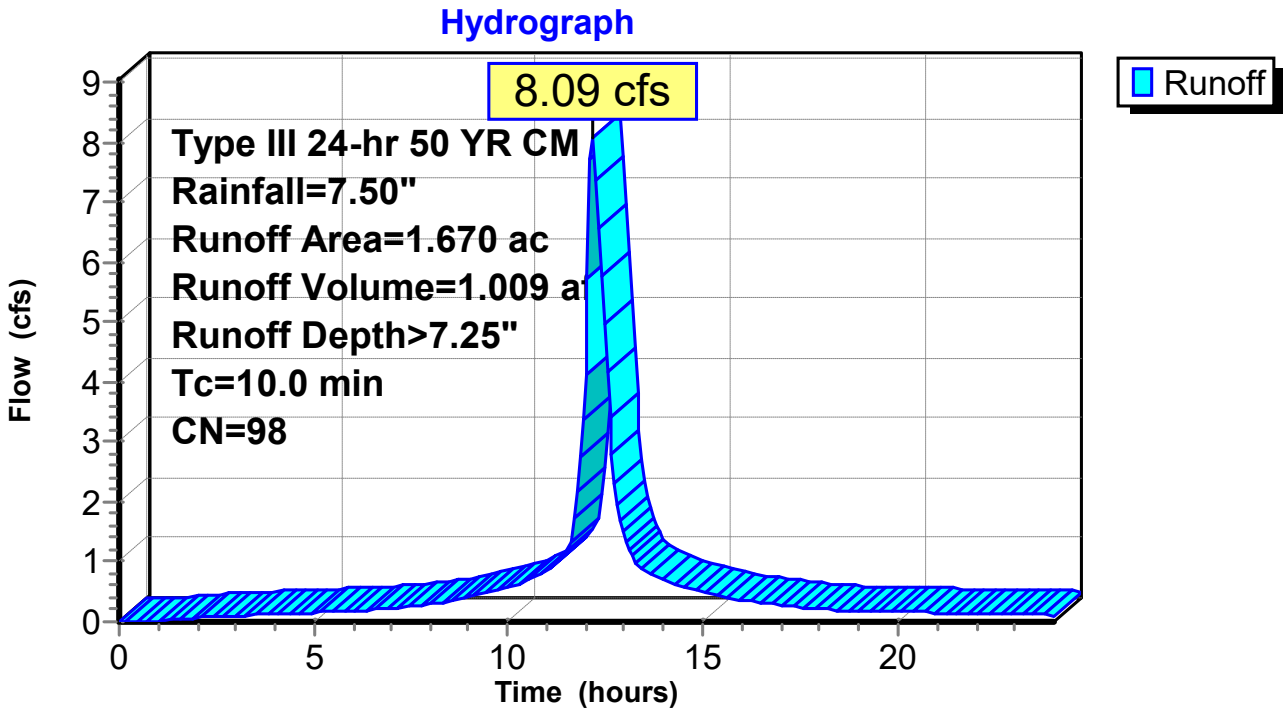
Runoff = 8.09 cfs @ 12.17 hrs, Volume= 1.009 af, Depth> 7.25"

Runoff by SCS TR-20 method, UH=Delmarva, Time Span= 0.00-24.01 hrs, dt= 0.07 hrs
Type III 24-hr 50 YR CM Rainfall=7.50"

	Area (ac)	CN	Description
*	0.250	98	Cart Paths
	1.330	98	Water Surface
*	0.090	98	Townhouse
	1.670	98	Weighted Average
	1.670		Impervious Area

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

Subcatchment Post DA2: Impervious



Summary for Subcatchment Post DA3: Pervious

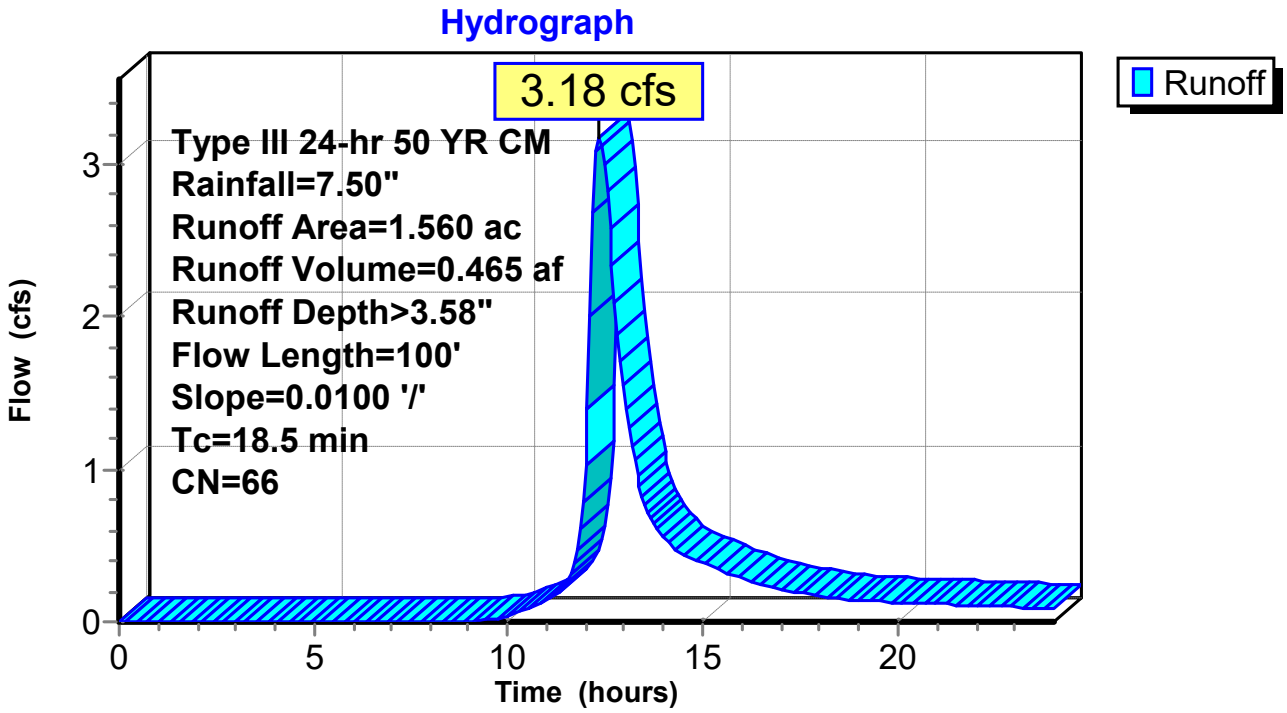
Runoff = 3.18 cfs @ 12.33 hrs, Volume= 0.465 af, Depth> 3.58"

Runoff by SCS TR-20 method, UH=Delmarva, Time Span= 0.00-24.01 hrs, dt= 0.07 hrs
Type III 24-hr 50 YR CM Rainfall=7.50"

Area (ac)	CN	Description
1.000	61	>75% Grass cover, Good, HSG B
0.560	74	>75% Grass cover, Good, HSG C
1.560	66	Weighted Average
1.560		Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
18.5	100	0.0100	0.09		**Sheet Flow, Unpaved** Grass: Dense n= 0.240 P2= 3.30"

Subcatchment Post DA3: Pervious



Summary for Subcatchment Post DA4: Pervious

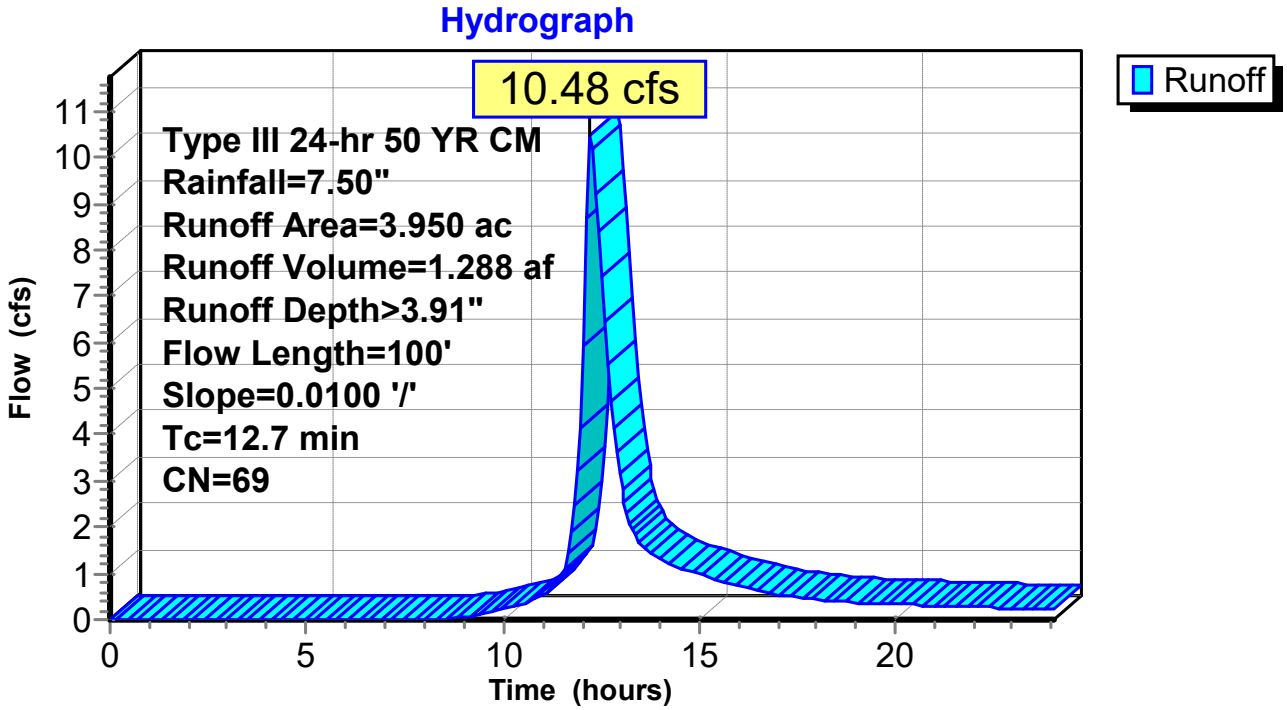
Runoff = 10.48 cfs @ 12.22 hrs, Volume= 1.288 af, Depth> 3.91"

Runoff by SCS TR-20 method, UH=Delmarva, Time Span= 0.00-24.01 hrs, dt= 0.07 hrs
Type III 24-hr 50 YR CM Rainfall=7.50"

Area (ac)	CN	Description
0.660	61	>75% Grass cover, Good, HSG B
2.520	74	>75% Grass cover, Good, HSG C
0.550	55	Woods, Good, HSG B
0.220	70	Woods, Good, HSG C
3.950	69	Weighted Average
3.950		Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
12.7	100	0.0100	0.13		**Sheet Flow, Unpaved** Grass: Short n= 0.150 P2= 3.30"

Subcatchment Post DA4: Pervious



Summary for Subcatchment Post DA5 Off: Off Site Pervious

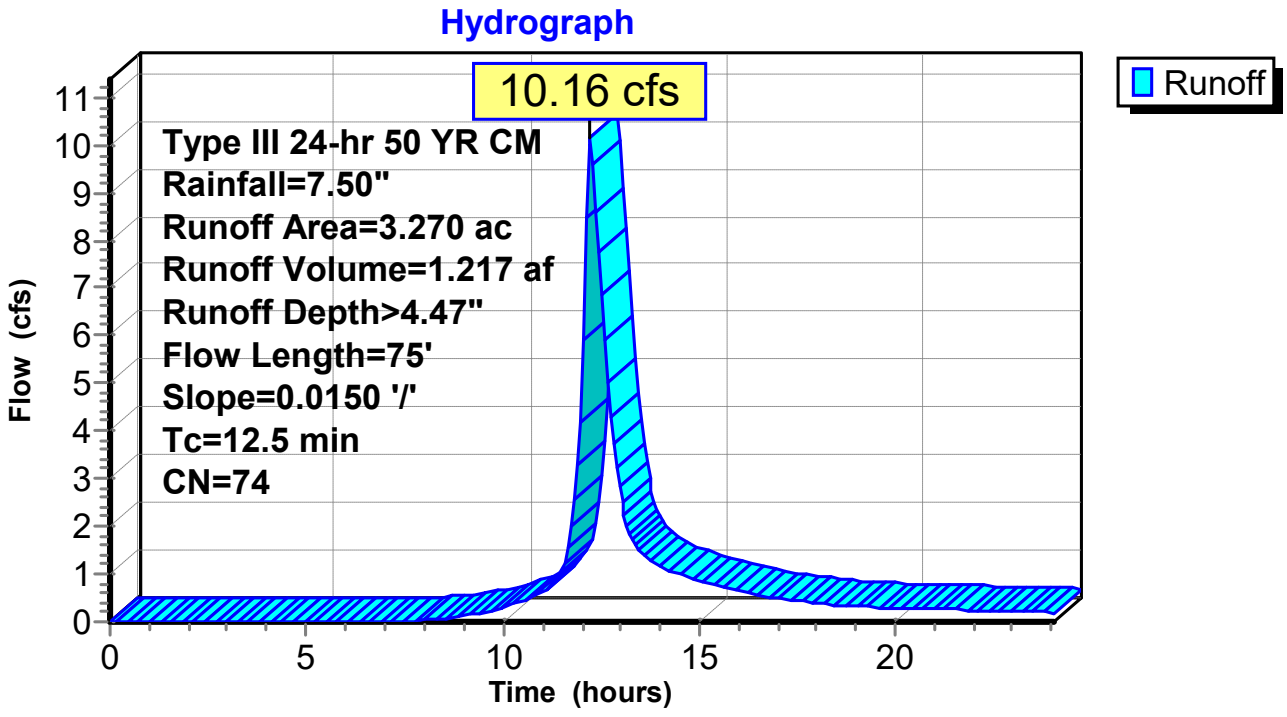
Runoff = 10.16 cfs @ 12.21 hrs, Volume= 1.217 af, Depth> 4.47"

Runoff by SCS TR-20 method, UH=Delmarva, Time Span= 0.00-24.01 hrs, dt= 0.07 hrs
Type III 24-hr 50 YR CM Rainfall=7.50"

Area (ac)	CN	Description
3.170	74	>75% Grass cover, Good, HSG C
0.100	72	Woods/grass comb., Good, HSG C
3.270	74	Weighted Average
3.270		Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
12.5	75	0.0150	0.10		**Sheet Flow, Unpaved** Grass: Dense n= 0.240 P2= 3.30"

Subcatchment Post DA5 Off: Off Site Pervious



Summary for Pond Lake1: Basin

Inflow Area = 7.860 ac, 31.55% Impervious, Inflow Depth > 4.45" for 50 YR CM event
Inflow = 21.96 cfs @ 12.21 hrs, Volume= 2.913 af
Outflow = 4.56 cfs @ 13.18 hrs, Volume= 2.104 af, Atten= 79%, Lag= 58.3 min
Primary = 4.56 cfs @ 13.18 hrs, Volume= 2.104 af

Routing by Stor-Ind method, Time Span= 0.00-24.01 hrs, dt= 0.07 hrs
Peak Elev= 12.02' @ 13.18 hrs Surf.Area= 0 sf Storage= 66,669 cf

Plug-Flow detention time= 260.0 min calculated for 2.098 af (72% of inflow)
Center-of-Mass det. time= 165.3 min (968.7 - 803.4)

Volume	Invert	Avail.Storage	Storage Description
#1	10.70'	137,878 cf	**Custom Stage Data** Listed below

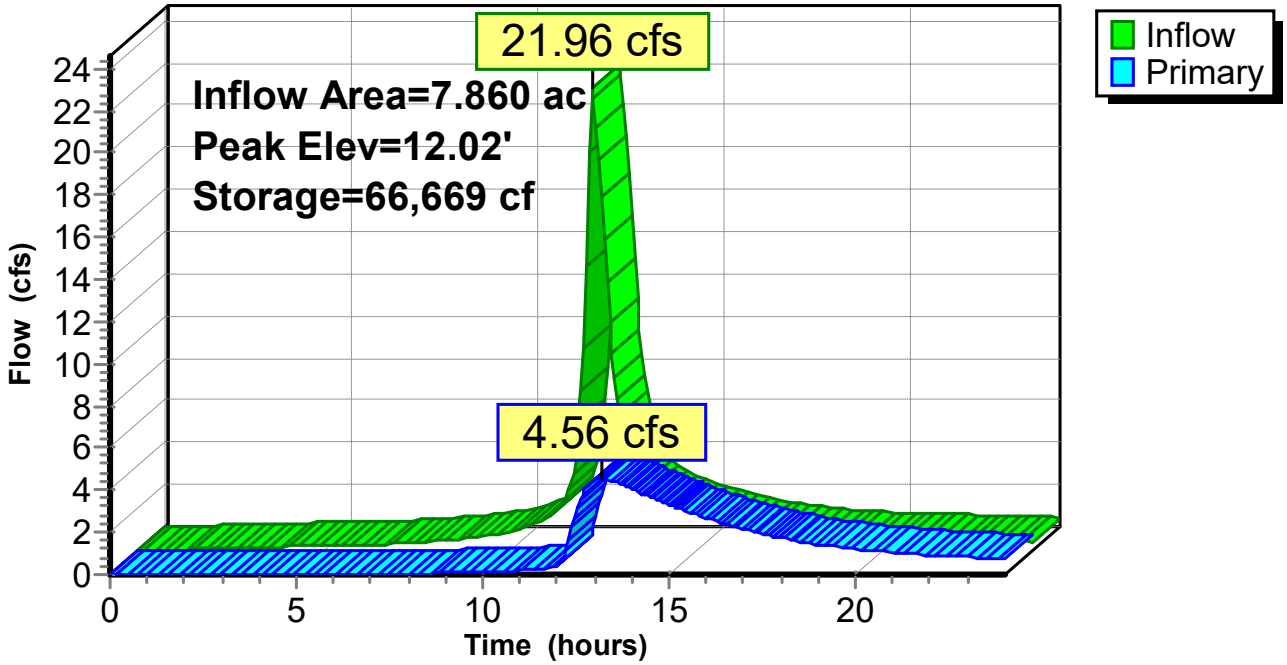
Elevation (feet)	Cum.Store (cubic-feet)
10.70	0
11.00	15,300
12.00	65,780
13.00	118,459
13.70	137,878

Device	Routing	Invert	Outlet Devices
#1	Primary	11.35'	**2.0' long Sharp-Crested Rectangular Weir** 2 End Contraction(s)
#2	Primary	10.70'	**0.5' long Sharp-Crested Rectangular Weir** 2 End Contraction(s)

Primary OutFlow Max=4.56 cfs @ 13.18 hrs HW=12.02' (Free Discharge)
↑ **1=Sharp-Crested Rectangular Weir** (Weir Controls 3.32 cfs @ 2.67 fps)
└ **2=Sharp-Crested Rectangular Weir** (Weir Controls 1.24 cfs @ 3.75 fps)

Pond Lake1: Basin

Hydrograph



Summary for Pond Lake2: Lake 2

Inflow Area = 12.640 ac, 32.83% Impervious, Inflow Depth > 3.55" for 50 YR CM event
Inflow = 13.61 cfs @ 12.21 hrs, Volume= 3.744 af
Outflow = 5.23 cfs @ 14.23 hrs, Volume= 3.034 af, Atten= 62%, Lag= 121.1 min
Primary = 5.23 cfs @ 14.23 hrs, Volume= 3.034 af

Routing by Stor-Ind method, Time Span= 0.00-24.01 hrs, dt= 0.07 hrs
Peak Elev= 10.49' @ 14.23 hrs Surf.Area= 0 sf Storage= 53,223 cf

Plug-Flow detention time= 197.0 min calculated for 3.034 af (81% of inflow)
Center-of-Mass det. time= 116.1 min (1,009.9 - 893.8)

Volume	Invert	Avail.Storage	Storage Description
#1	9.67'	87,360 cf	**Custom Stage Data** Listed below

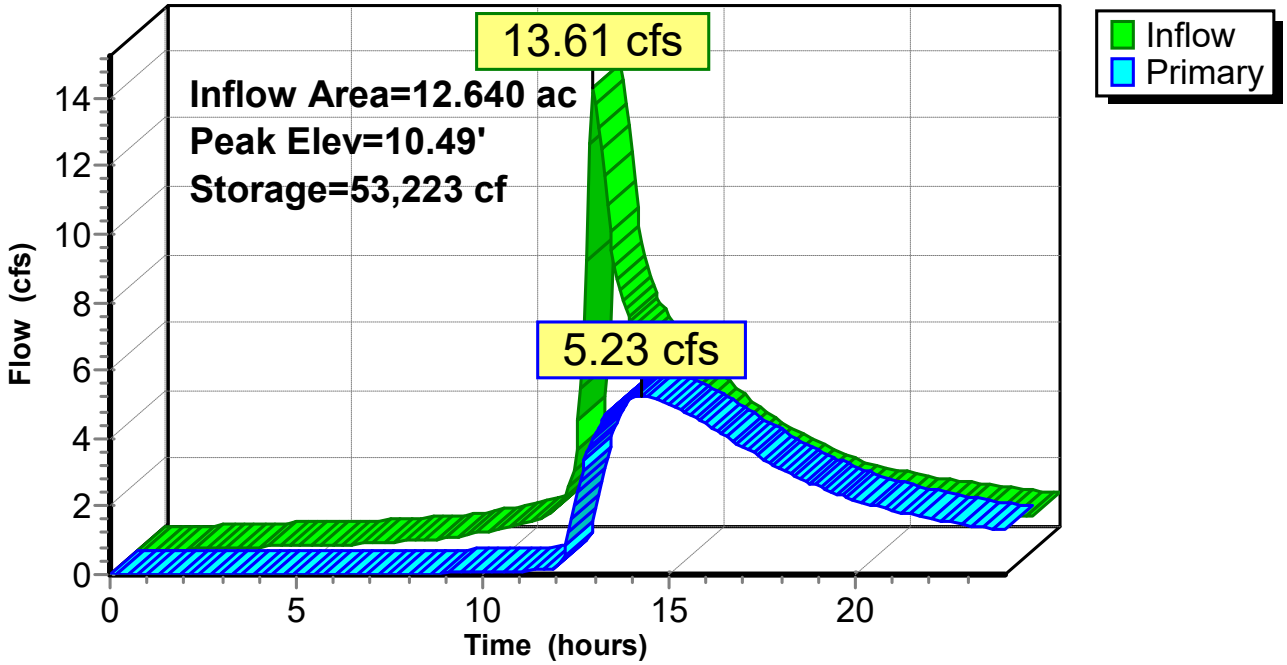
Elevation (feet)	Cum.Store (cubic-feet)
9.67	0
10.00	20,120
11.00	87,360

Device	Routing	Invert	Outlet Devices
#1	Primary	10.00'	**4.0' long Sharp-Crested Rectangular Weir** 2 End Contraction(s)
#2	Primary	9.67'	**0.5' long Sharp-Crested Rectangular Weir** 2 End Contraction(s)

Primary OutFlow Max=5.22 cfs @ 14.23 hrs HW=10.49' (Free Discharge)
1=Sharp-Crested Rectangular Weir (Weir Controls 4.41 cfs @ 2.29 fps)
2=Sharp-Crested Rectangular Weir (Weir Controls 0.82 cfs @ 2.97 fps)

Pond Lake2: Lake 2

Hydrograph



Summary for Pond Lake3: Lake 3

[79] Warning: Submerged Pond Lake2 Primary device # 2 by 0.14'

Inflow Area = 16.170 ac, 37.85% Impervious, Inflow Depth > 3.48" for 50 YR CM event
Inflow = 12.89 cfs @ 12.21 hrs, Volume= 4.689 af
Outflow = 7.15 cfs @ 13.01 hrs, Volume= 4.028 af, Atten= 45%, Lag= 48.3 min
Primary = 7.15 cfs @ 13.01 hrs, Volume= 4.028 af

Routing by Stor-Ind method, Time Span= 0.00-24.01 hrs, dt= 0.07 hrs
Peak Elev= 9.81' @ 13.01 hrs Surf.Area= 0 sf Storage= 36,755 cf

Plug-Flow detention time= 125.2 min calculated for 4.016 af (86% of inflow)
Center-of-Mass det. time= 63.3 min (992.1 - 928.8)

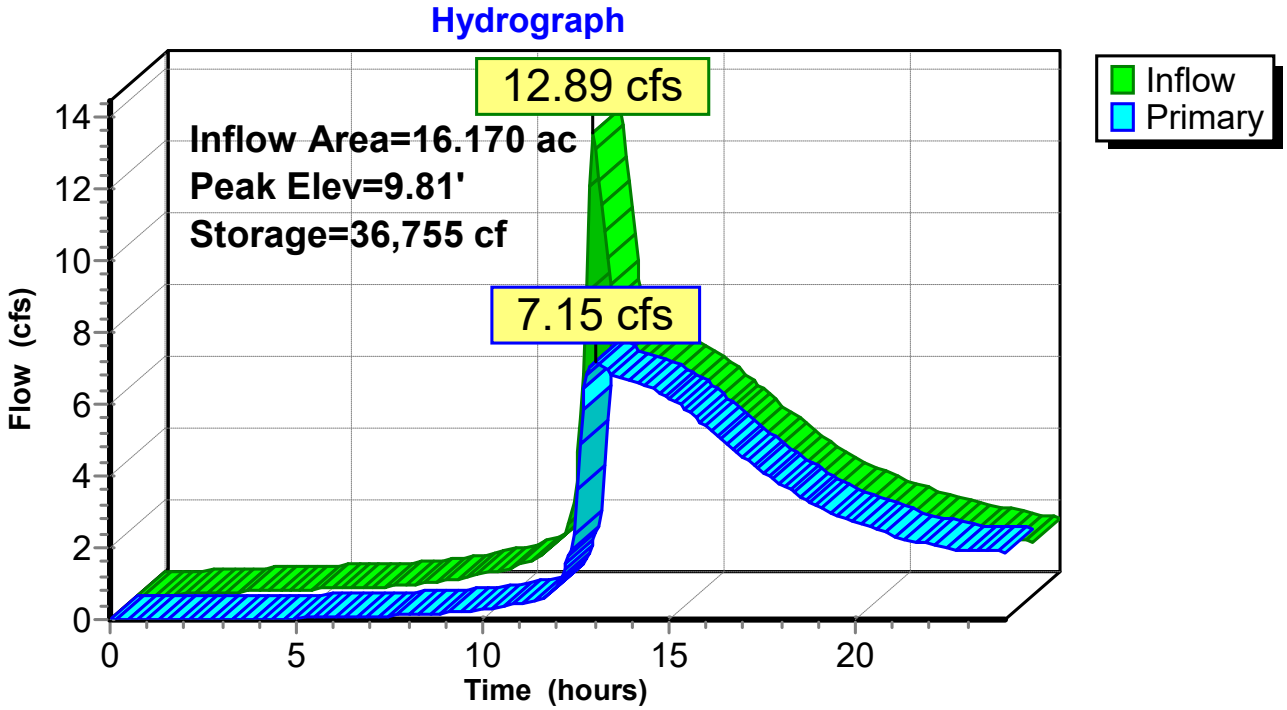
Volume	Invert	Avail.Storage	Storage Description
#1	8.60'	69,310 cf	**Custom Stage Data** Listed below

Elevation (feet)	Cum.Store (cubic-feet)
8.60	0
9.00	11,585
10.00	42,767
10.80	69,310

Device	Routing	Invert	Outlet Devices
#1	Primary	9.60'	**12.0' long Sharp-Crested Rectangular Weir** 2 End Contraction(s)
#2	Primary	9.60'	**4.0' long Sharp-Crested Rectangular Weir** 2 End Contraction(s)
#3	Primary	8.60'	**0.5' long Sharp-Crested Rectangular Weir** 2 End Contraction(s)
#4	Primary	8.60'	**0.5' long Sharp-Crested Rectangular Weir** 2 End Contraction(s)

Primary OutFlow Max=7.15 cfs @ 13.01 hrs HW=9.81' (Free Discharge)
- **1=Sharp-Crested Rectangular Weir** (Weir Controls 3.69 cfs @ 1.49 fps)
- **2=Sharp-Crested Rectangular Weir** (Weir Controls 1.22 cfs @ 1.49 fps)
- **3=Sharp-Crested Rectangular Weir** (Weir Controls 1.12 cfs @ 3.59 fps)
- **4=Sharp-Crested Rectangular Weir** (Weir Controls 1.12 cfs @ 3.59 fps)

Pond Lake3: Lake 3



Summary for Pond Lake4&5: Lake 4 & 5

[79] Warning: Submerged Pond Lake3 Primary device # 3 by 0.68'
[79] Warning: Submerged Pond Lake3 Primary device # 4 by 0.68'

Inflow Area = 21.700 ac, 35.48% Impervious, Inflow Depth > 3.47" for 50 YR CM event
Inflow = 19.57 cfs @ 12.20 hrs, Volume= 6.270 af
Outflow = 8.14 cfs @ 14.47 hrs, Volume= 3.742 af, Atten= 58%, Lag= 136.1 min
Primary = 8.14 cfs @ 14.47 hrs, Volume= 3.742 af

Routing by Stor-Ind method, Time Span= 0.00-24.01 hrs, dt= 0.07 hrs
Peak Elev= 9.28' @ 14.47 hrs Surf.Area= 57,578 sf Storage= 113,787 cf

Plug-Flow detention time= 284.8 min calculated for 3.731 af (60% of inflow)
Center-of-Mass det. time= 139.3 min (1,063.7 - 924.4)

Volume	Invert	Avail.Storage	Storage Description
#1	7.00'	126,192 cf	**Custom Stage Data (Prismatic)** Listed below

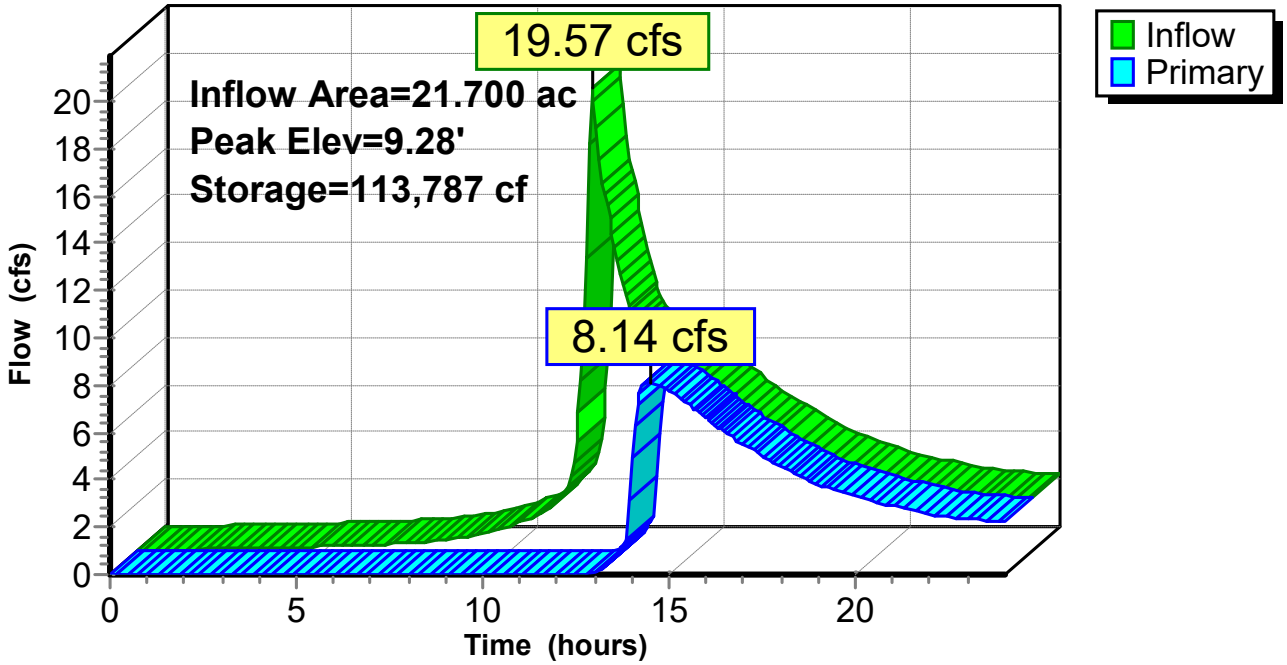
Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
7.00	27,767	0	0
7.40	46,551	14,864	14,864
8.00	50,946	29,249	44,113
9.00	55,842	53,394	97,507
9.50	58,900	28,686	126,192

Device	Routing	Invert	Outlet Devices
#1	Primary	9.20'	**100.0' long x 20.0' 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
#2	Primary	8.60'	**12.0" Vert. Orifice/Grate** C= 0.600

Primary OutFlow Max=8.11 cfs @ 14.47 hrs HW=9.28' (Free Discharge)
└**1=Broad-Crested Rectangular Weir** (Weir Controls 6.50 cfs @ 0.78 fps)
└**2=Orifice/Grate** (Orifice Controls 1.61 cfs @ 2.82 fps)

Pond Lake4&5: Lake 4 & 5

Hydrograph

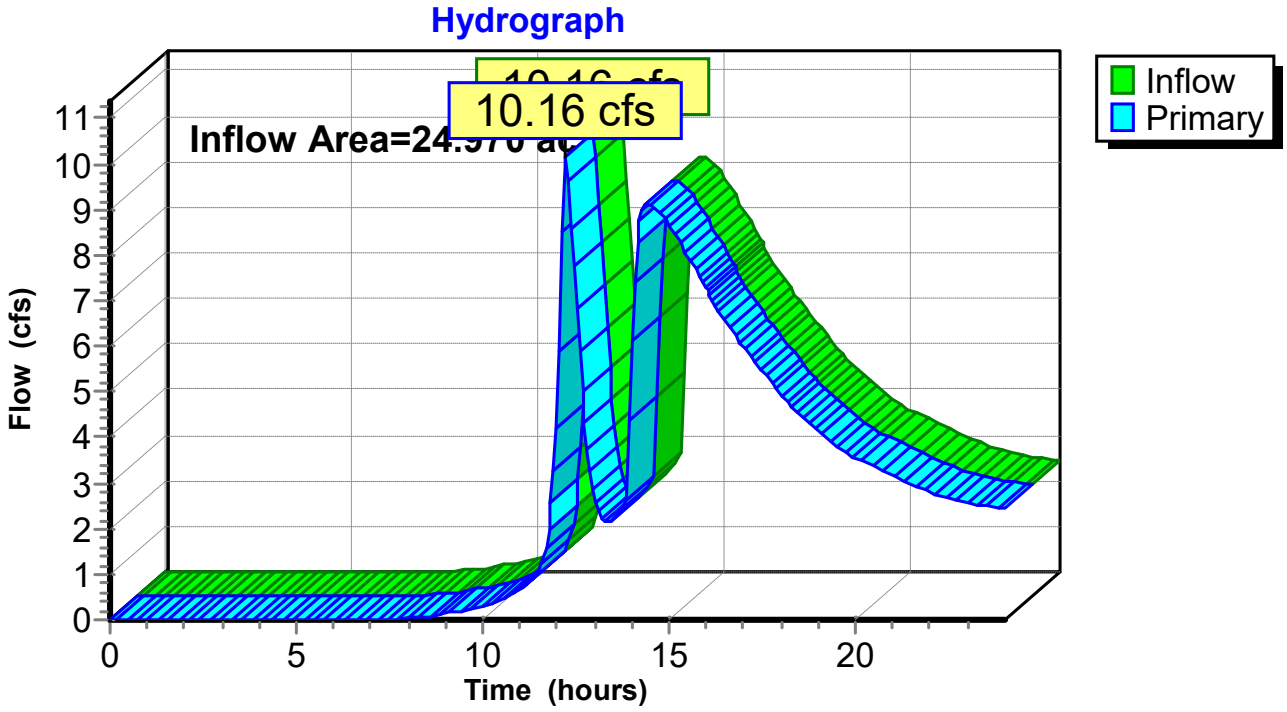


Summary for Link 1L: Combo Discharge

Inflow Area = 24.970 ac, 30.84% Impervious, Inflow Depth > 2.38" for 50 YR CM event
Inflow = 10.16 cfs @ 12.21 hrs, Volume= 4.958 af
Primary = 10.16 cfs @ 12.21 hrs, Volume= 4.958 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-24.01 hrs, dt= 0.07 hrs

Link 1L: Combo Discharge



Time span=0.00-24.00 hrs, dt=0.07 hrs, 344 points
Runoff by SCS TR-20 method, UH=Delmarva
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Subcatchment Post DA 2: Pervious Runoff Area=3.110 ac 0.00% Impervious Runoff Depth>3.33"
Flow Length=100' Slope=0.0100 '/' Tc=12.7 min CN=55 Runoff=6.75 cfs 0.863 af

Subcatchment Post DA 3: Impervious Runoff Area=1.970 ac 100.00% Impervious Runoff Depth>8.54"
Tc=10.0 min CN=98 Runoff=11.21 cfs 1.403 af

Subcatchment Post DA 4: Impervious Runoff Area=1.580 ac 100.00% Impervious Runoff Depth>8.54"
Tc=10.0 min CN=98 Runoff=8.99 cfs 1.125 af

Subcatchment Post DA- 1: Pervious Runoff Area=5.380 ac 0.00% Impervious Runoff Depth>4.17"
Tc=15.0 min CN=62 Runoff=14.08 cfs 1.868 af

Subcatchment Post DA-1: Impervious Runoff Area=2.480 ac 100.00% Impervious Runoff Depth>8.54"
Tc=10.0 min CN=98 Runoff=14.11 cfs 1.766 af

Subcatchment Post DA2: Impervious Runoff Area=1.670 ac 100.00% Impervious Runoff Depth>8.54"
Tc=10.0 min CN=98 Runoff=9.50 cfs 1.189 af

Subcatchment Post DA3: Pervious Runoff Area=1.560 ac 0.00% Impervious Runoff Depth>4.64"
Flow Length=100' Slope=0.0100 '/' Tc=18.5 min CN=66 Runoff=4.15 cfs 0.604 af

Subcatchment Post DA4: Pervious Runoff Area=3.950 ac 0.00% Impervious Runoff Depth>5.02"
Flow Length=100' Slope=0.0100 '/' Tc=12.7 min CN=69 Runoff=13.68 cfs 1.652 af

Subcatchment Post DA5 Off: Off Site Runoff Area=3.270 ac 0.00% Impervious Runoff Depth>5.63"
Flow Length=75' Slope=0.0150 '/' Tc=12.5 min CN=74 Runoff=12.79 cfs 1.534 af

Pond Lake1: Basin Peak Elev=12.27' Storage=79,822 cf Inflow=27.56 cfs 3.633 af
Outflow=6.82 cfs 2.787 af

Pond Lake2: Lake 2 Peak Elev=10.66' Storage=64,532 cf Inflow=17.76 cfs 4.838 af
Outflow=7.76 cfs 4.092 af

Pond Lake3: Lake 3 Peak Elev=9.91' Storage=39,981 cf Inflow=16.12 cfs 6.098 af
Outflow=11.45 cfs 5.403 af

Pond Lake4&5: Lake 4 & 5 Peak Elev=9.32' Storage=116,032 cf Inflow=24.26 cfs 8.180 af
Outflow=13.35 cfs 5.648 af

Link 1L: Combo Discharge Inflow=15.31 cfs 7.182 af
Primary=15.31 cfs 7.182 af

Total Runoff Area = 24.970 ac Runoff Volume = 12.002 af Average Runoff Depth = 5.77"
69.16% Pervious = 17.270 ac 30.84% Impervious = 7.700 ac

Summary for Subcatchment Post DA 2: Pervious

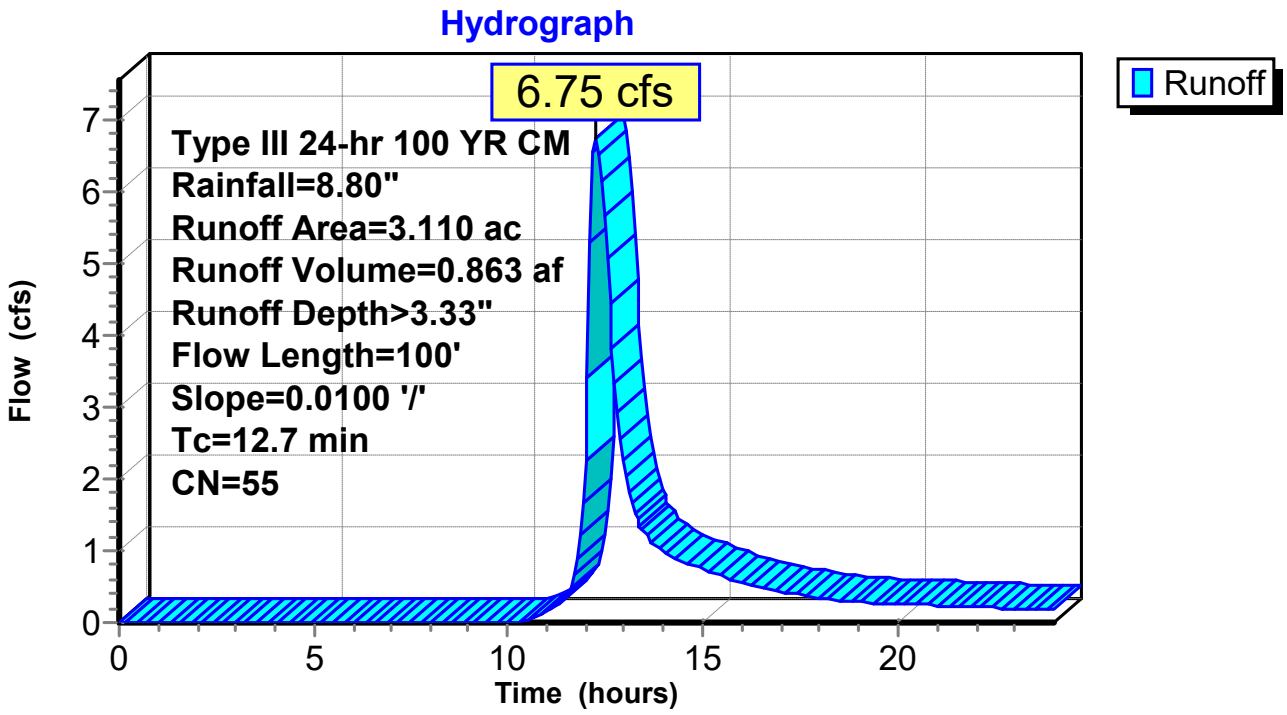
Runoff = 6.75 cfs @ 12.25 hrs, Volume= 0.863 af, Depth> 3.33"

Runoff by SCS TR-20 method, UH=Delmarva, Time Span= 0.00-24.01 hrs, dt= 0.07 hrs
Type III 24-hr 100 YR CM Rainfall=8.80"

Area (ac)	CN	Description
1.000	39	>75% Grass cover, Good, HSG A
1.340	61	>75% Grass cover, Good, HSG B
0.590	74	>75% Grass cover, Good, HSG C
0.080	30	Woods, Good, HSG A
0.100	55	Woods, Good, HSG B
3.110	55	Weighted Average
3.110		Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
12.7	100	0.0100	0.13		**Sheet Flow, Unpaved** Grass: Short n= 0.150 P2= 3.30"

Subcatchment Post DA 2: Pervious



Summary for Subcatchment Post DA 3: Impervious

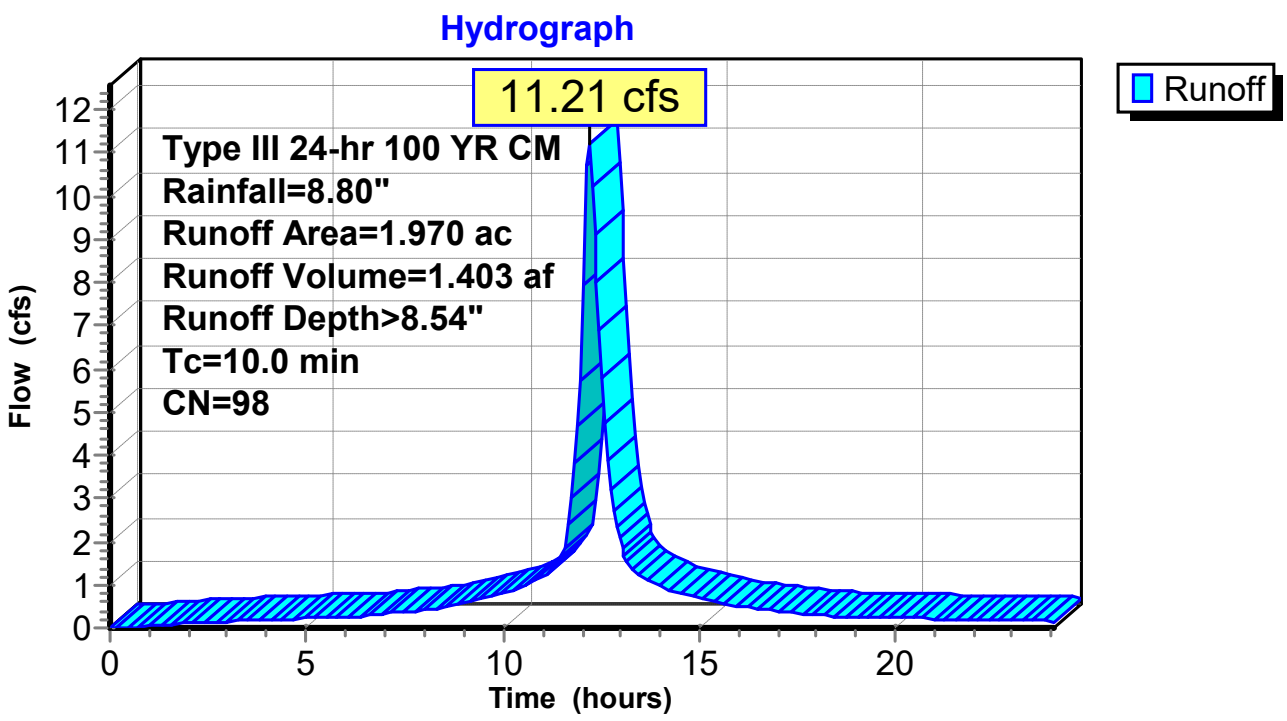
Runoff = 11.21 cfs @ 12.17 hrs, Volume= 1.403 af, Depth> 8.54"

Runoff by SCS TR-20 method, UH=Delmarva, Time Span= 0.00-24.01 hrs, dt= 0.07 hrs
Type III 24-hr 100 YR CM Rainfall=8.80"

Area (ac)	CN	Description
0.630	98	Water Surface
1.340	98	Paved parking & roofs
1.970	98	Weighted Average
1.970		Impervious Area

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

Subcatchment Post DA 3: Impervious



Summary for Subcatchment Post DA 4: Impervious

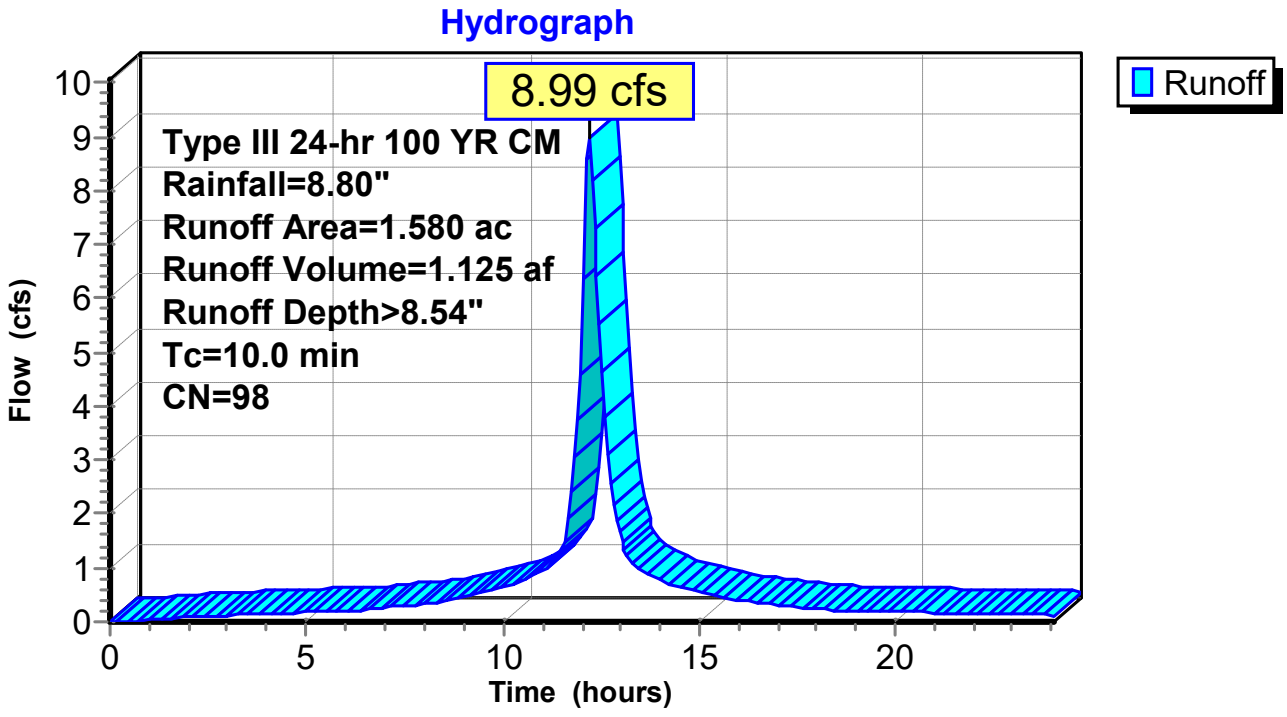
Runoff = 8.99 cfs @ 12.17 hrs, Volume= 1.125 af, Depth> 8.54"

Runoff by SCS TR-20 method, UH=Delmarva, Time Span= 0.00-24.01 hrs, dt= 0.07 hrs
Type III 24-hr 100 YR CM Rainfall=8.80"

	Area (ac)	CN	Description
*	0.100	98	Cart Paths
	0.180	98	Paved parking & roofs
	1.300	98	Water Surface
	1.580	98	Weighted Average
	1.580		Impervious Area

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

Subcatchment Post DA 4: Impervious



Summary for Subcatchment Post DA- 1: Pervious

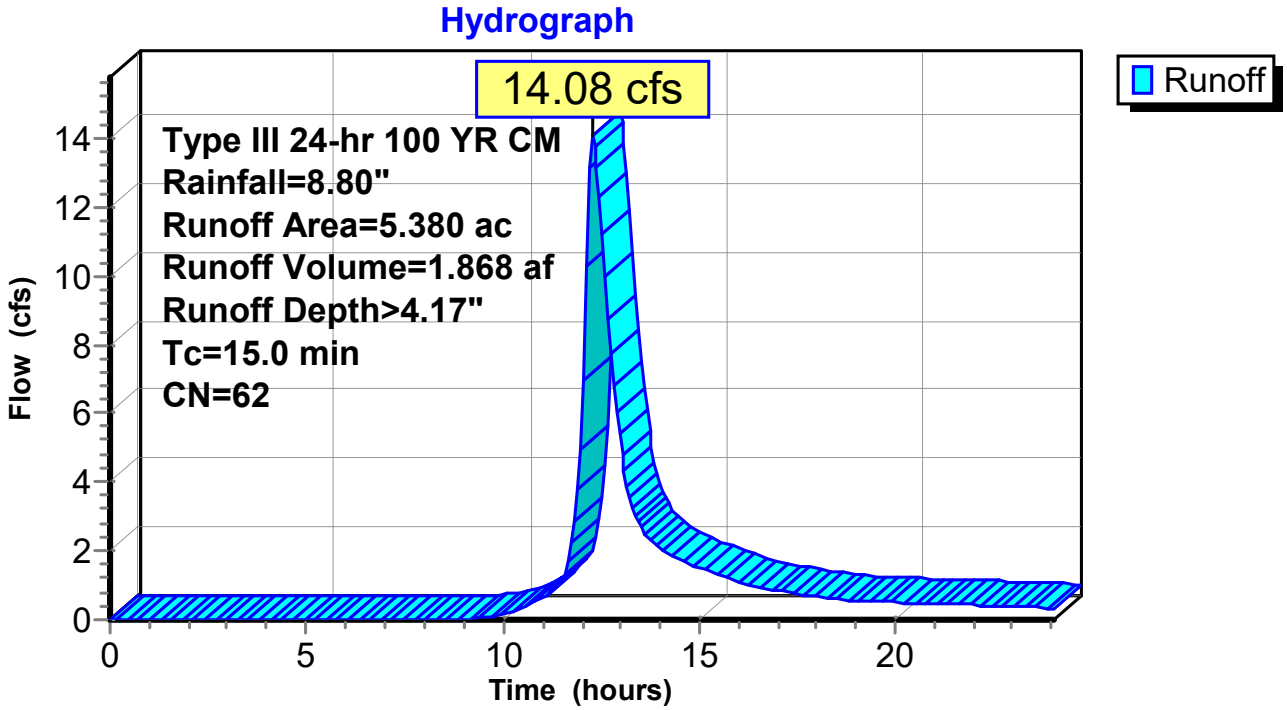
Runoff = 14.08 cfs @ 12.27 hrs, Volume= 1.868 af, Depth> 4.17"

Runoff by SCS TR-20 method, UH=Delmarva, Time Span= 0.00-24.01 hrs, dt= 0.07 hrs
Type III 24-hr 100 YR CM Rainfall=8.80"

Area (ac)	CN	Description
0.010	39	>75% Grass cover, Good, HSG A
4.320	61	>75% Grass cover, Good, HSG B
0.680	74	>75% Grass cover, Good, HSG C
0.370	58	Woods/grass comb., Good, HSG B
5.380	62	Weighted Average
5.380		Pervious Area

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

Subcatchment Post DA- 1: Pervious



Summary for Subcatchment Post DA-1: Impervious

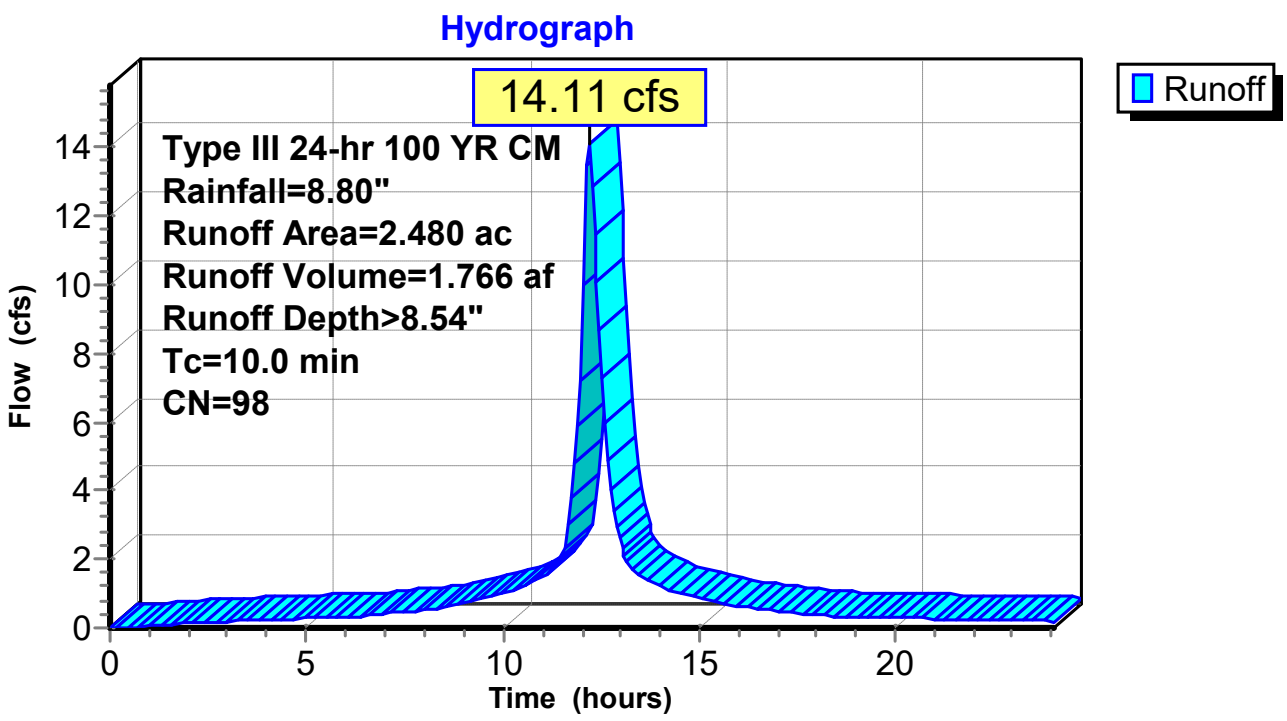
Runoff = 14.11 cfs @ 12.17 hrs, Volume= 1.766 af, Depth> 8.54"

Runoff by SCS TR-20 method, UH=Delmarva, Time Span= 0.00-24.01 hrs, dt= 0.07 hrs
Type III 24-hr 100 YR CM Rainfall=8.80"

Area (ac)	CN	Description
1.160	98	Water Surface
1.320	98	Paved parking & roofs
2.480	98	Weighted Average
2.480		Impervious Area

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

Subcatchment Post DA-1: Impervious



Summary for Subcatchment Post DA2: Impervious

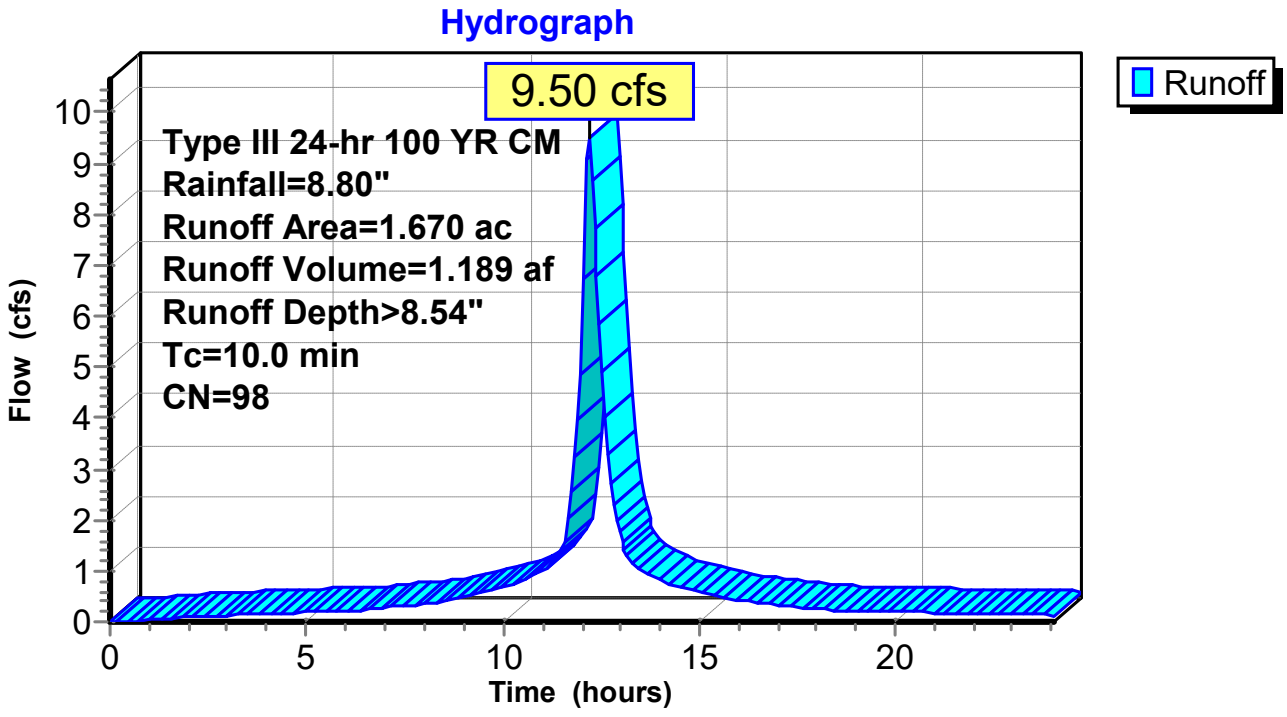
Runoff = 9.50 cfs @ 12.17 hrs, Volume= 1.189 af, Depth> 8.54"

Runoff by SCS TR-20 method, UH=Delmarva, Time Span= 0.00-24.01 hrs, dt= 0.07 hrs
Type III 24-hr 100 YR CM Rainfall=8.80"

	Area (ac)	CN	Description
*	0.250	98	Cart Paths
	1.330	98	Water Surface
*	0.090	98	Townhouse
	1.670	98	Weighted Average
	1.670		Impervious Area

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

Subcatchment Post DA2: Impervious



Summary for Subcatchment Post DA3: Pervious

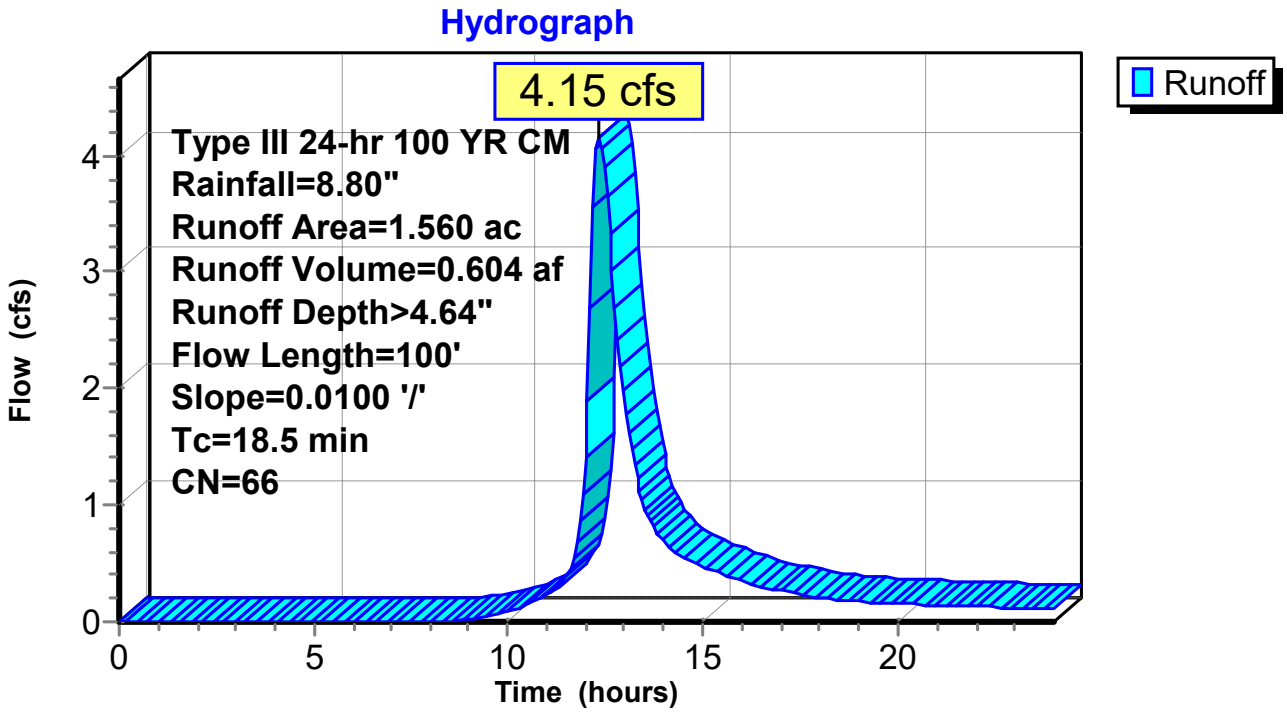
Runoff = 4.15 cfs @ 12.32 hrs, Volume= 0.604 af, Depth> 4.64"

Runoff by SCS TR-20 method, UH=Delmarva, Time Span= 0.00-24.01 hrs, dt= 0.07 hrs
Type III 24-hr 100 YR CM Rainfall=8.80"

Area (ac)	CN	Description
1.000	61	>75% Grass cover, Good, HSG B
0.560	74	>75% Grass cover, Good, HSG C
1.560	66	Weighted Average
1.560		Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
18.5	100	0.0100	0.09		**Sheet Flow, Unpaved** Grass: Dense n= 0.240 P2= 3.30"

Subcatchment Post DA3: Pervious



Summary for Subcatchment Post DA4: Pervious

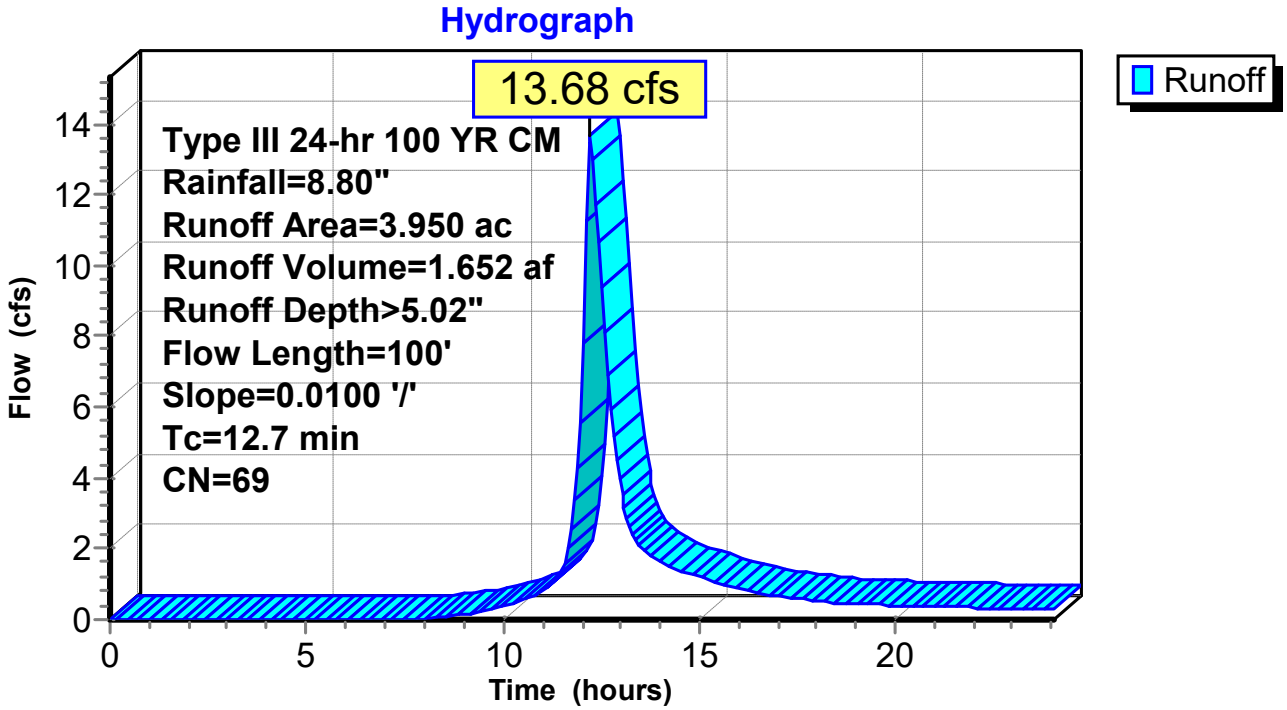
Runoff = 13.68 cfs @ 12.21 hrs, Volume= 1.652 af, Depth> 5.02"

Runoff by SCS TR-20 method, UH=Delmarva, Time Span= 0.00-24.01 hrs, dt= 0.07 hrs
Type III 24-hr 100 YR CM Rainfall=8.80"

Area (ac)	CN	Description
0.660	61	>75% Grass cover, Good, HSG B
2.520	74	>75% Grass cover, Good, HSG C
0.550	55	Woods, Good, HSG B
0.220	70	Woods, Good, HSG C
3.950	69	Weighted Average
3.950		Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
12.7	100	0.0100	0.13		**Sheet Flow, Unpaved** Grass: Short n= 0.150 P2= 3.30"

Subcatchment Post DA4: Pervious



Summary for Subcatchment Post DA5 Off: Off Site Pervious

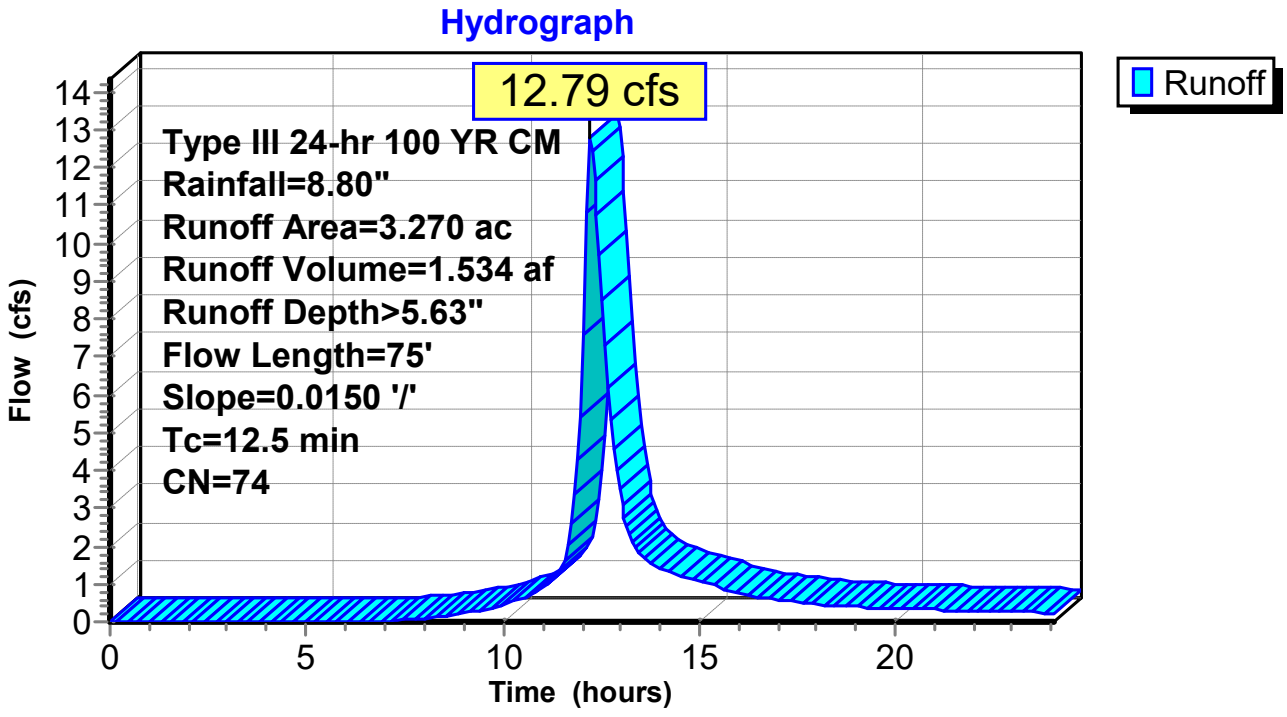
Runoff = 12.79 cfs @ 12.21 hrs, Volume= 1.534 af, Depth> 5.63"

Runoff by SCS TR-20 method, UH=Delmarva, Time Span= 0.00-24.01 hrs, dt= 0.07 hrs
Type III 24-hr 100 YR CM Rainfall=8.80"

Area (ac)	CN	Description
3.170	74	>75% Grass cover, Good, HSG C
0.100	72	Woods/grass comb., Good, HSG C
3.270	74	Weighted Average
3.270		Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
12.5	75	0.0150	0.10		**Sheet Flow, Unpaved** Grass: Dense n= 0.240 P2= 3.30"

Subcatchment Post DA5 Off: Off Site Pervious



Summary for Pond Lake1: Basin

Inflow Area = 7.860 ac, 31.55% Impervious, Inflow Depth > 5.55" for 100 YR CM event
Inflow = 27.56 cfs @ 12.21 hrs, Volume= 3.633 af
Outflow = 6.82 cfs @ 13.05 hrs, Volume= 2.787 af, Atten= 75%, Lag= 50.6 min
Primary = 6.82 cfs @ 13.05 hrs, Volume= 2.787 af

Routing by Stor-Ind method, Time Span= 0.00-24.01 hrs, dt= 0.07 hrs
Peak Elev= 12.27' @ 13.05 hrs Surf.Area= 0 sf Storage= 79,822 cf

Plug-Flow detention time= 235.9 min calculated for 2.778 af (76% of inflow)
Center-of-Mass det. time= 151.0 min (952.4 - 801.4)

Volume	Invert	Avail.Storage	Storage Description
#1	10.70'	137,878 cf	**Custom Stage Data** Listed below

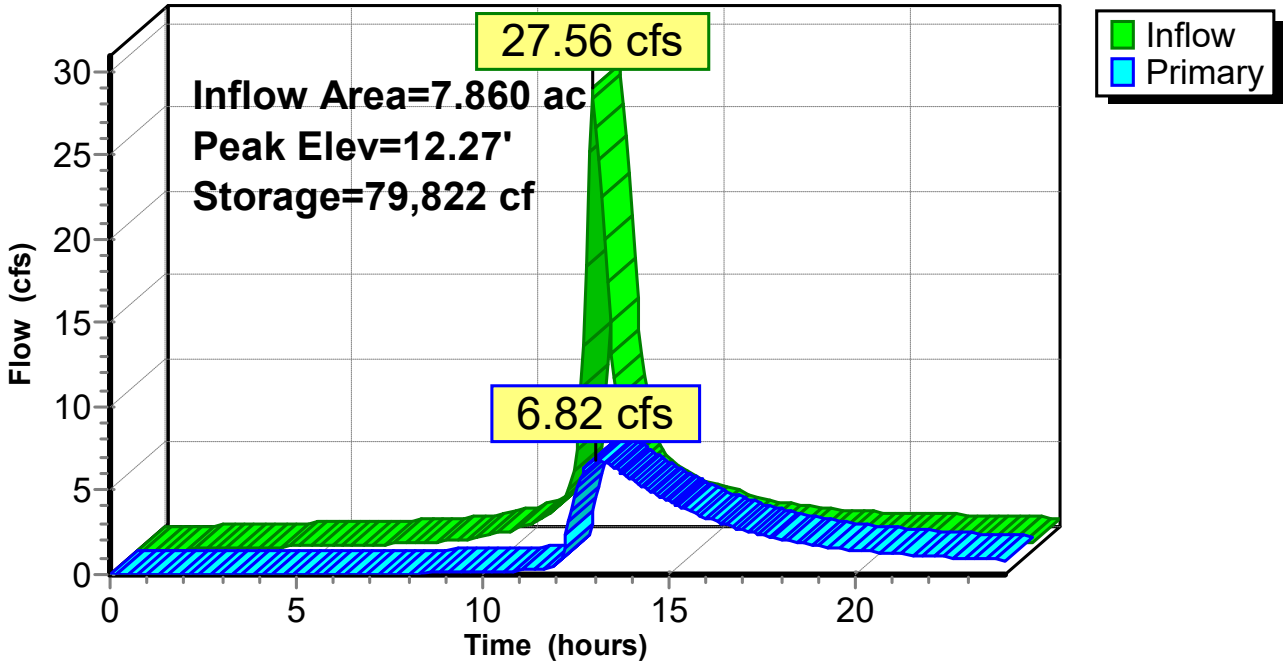
Elevation (feet)	Cum.Store (cubic-feet)
10.70	0
11.00	15,300
12.00	65,780
13.00	118,459
13.70	137,878

Device	Routing	Invert	Outlet Devices
#1	Primary	11.35'	**2.0' long Sharp-Crested Rectangular Weir** 2 End Contraction(s)
#2	Primary	10.70'	**0.5' long Sharp-Crested Rectangular Weir** 2 End Contraction(s)

Primary OutFlow Max=6.81 cfs @ 13.05 hrs HW=12.27' (Free Discharge)
└**1=Sharp-Crested Rectangular Weir** (Weir Controls 5.21 cfs @ 3.13 fps)
└**2=Sharp-Crested Rectangular Weir** (Weir Controls 1.60 cfs @ 4.09 fps)

Pond Lake1: Basin

Hydrograph



Summary for Pond Lake2: Lake 2

Inflow Area = 12.640 ac, 32.83% Impervious, Inflow Depth > 4.59" for 100 YR CM event
Inflow = 17.76 cfs @ 12.23 hrs, Volume= 4.838 af
Outflow = 7.76 cfs @ 13.87 hrs, Volume= 4.092 af, Atten= 56%, Lag= 98.6 min
Primary = 7.76 cfs @ 13.87 hrs, Volume= 4.092 af

Routing by Stor-Ind method, Time Span= 0.00-24.01 hrs, dt= 0.07 hrs
Peak Elev= 10.66' @ 13.87 hrs Surf.Area= 0 sf Storage= 64,532 cf

Plug-Flow detention time= 171.9 min calculated for 4.080 af (84% of inflow)
Center-of-Mass det. time= 104.8 min (991.3 - 886.4)

Volume	Invert	Avail.Storage	Storage Description
#1	9.67'	87,360 cf	**Custom Stage Data** Listed below

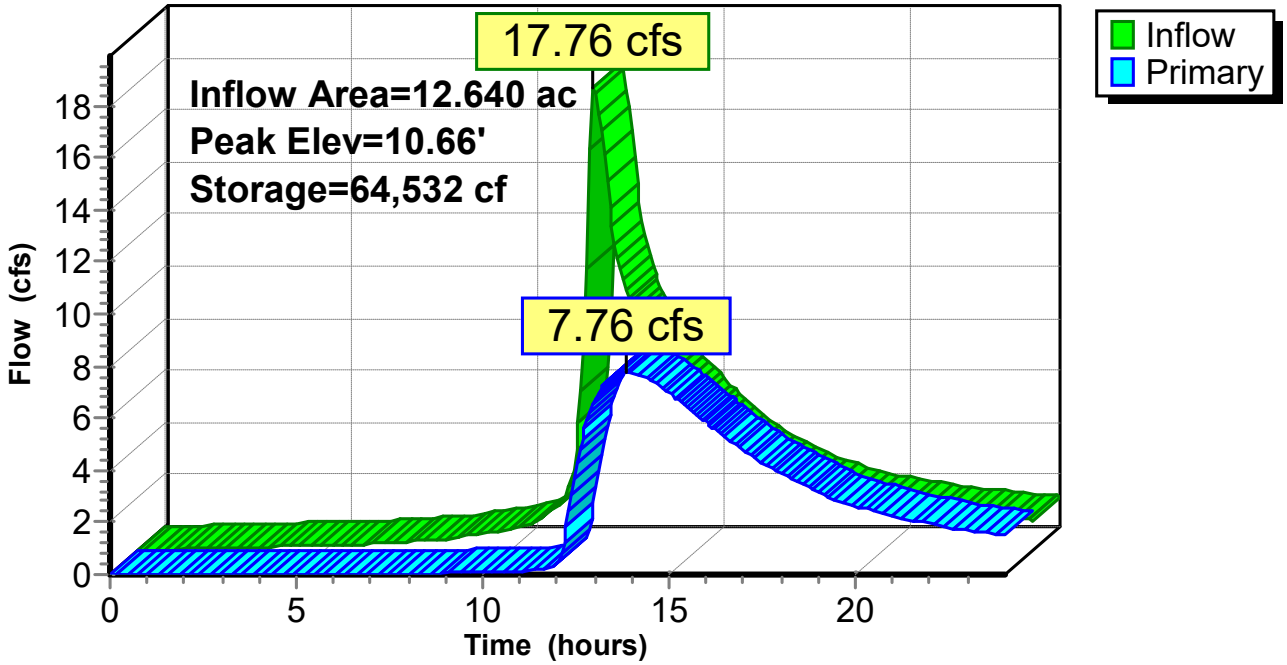
Elevation (feet)	Cum.Store (cubic-feet)
9.67	0
10.00	20,120
11.00	87,360

Device	Routing	Invert	Outlet Devices
#1	Primary	10.00'	**4.0' long Sharp-Crested Rectangular Weir** 2 End Contraction(s)
#2	Primary	9.67'	**0.5' long Sharp-Crested Rectangular Weir** 2 End Contraction(s)

Primary OutFlow Max=7.76 cfs @ 13.87 hrs HW=10.66' (Free Discharge)
1=Sharp-Crested Rectangular Weir (Weir Controls 6.79 cfs @ 2.66 fps)
2=Sharp-Crested Rectangular Weir (Weir Controls 0.97 cfs @ 3.25 fps)

Pond Lake2: Lake 2

Hydrograph



Summary for Pond Lake3: Lake 3

[79] Warning: Submerged Pond Lake2 Primary device # 2 by 0.24'

Inflow Area = 16.170 ac, 37.85% Impervious, Inflow Depth > 4.53" for 100 YR CM event
Inflow = 16.12 cfs @ 12.23 hrs, Volume= 6.098 af
Outflow = 11.45 cfs @ 12.76 hrs, Volume= 5.403 af, Atten= 29%, Lag= 32.0 min
Primary = 11.45 cfs @ 12.76 hrs, Volume= 5.403 af

Routing by Stor-Ind method, Time Span= 0.00-24.01 hrs, dt= 0.07 hrs
Peak Elev= 9.91' @ 12.76 hrs Surf.Area= 0 sf Storage= 39,981 cf

Plug-Flow detention time= 100.6 min calculated for 5.387 af (88% of inflow)
Center-of-Mass det. time= 49.7 min (971.0 - 921.2)

Volume	Invert	Avail.Storage	Storage Description
#1	8.60'	69,310 cf	**Custom Stage Data** Listed below

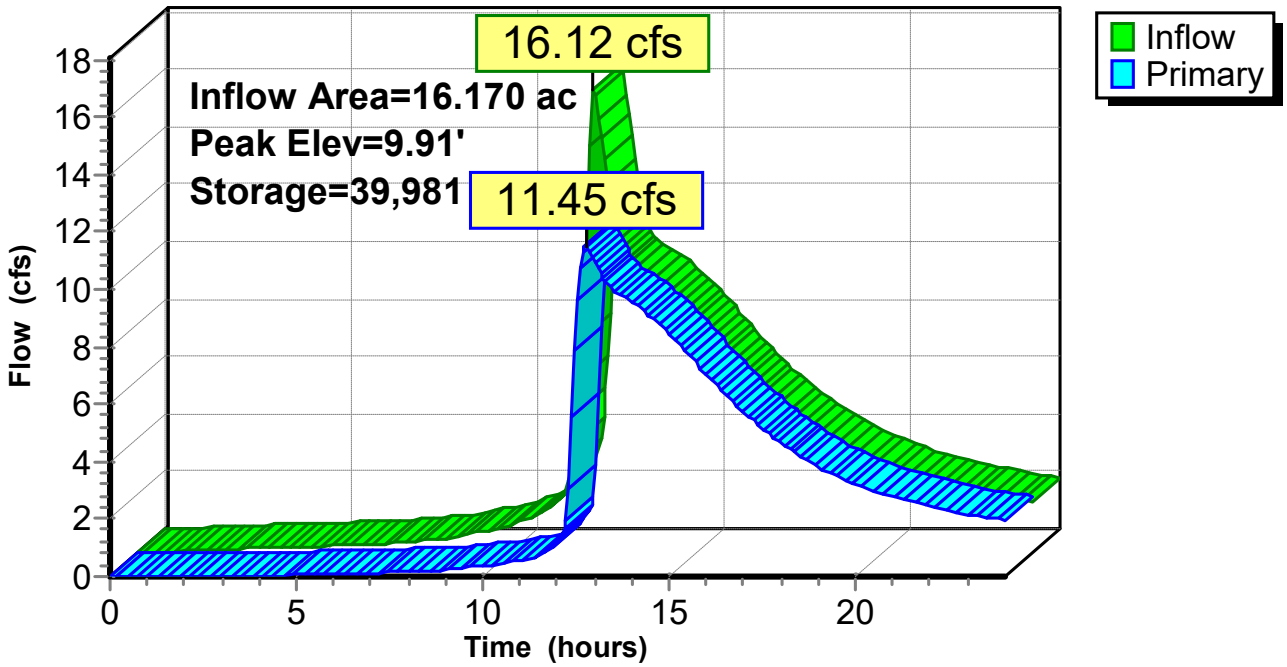
Elevation (feet)	Cum.Store (cubic-feet)
8.60	0
9.00	11,585
10.00	42,767
10.80	69,310

Device	Routing	Invert	Outlet Devices
#1	Primary	9.60'	**12.0' long Sharp-Crested Rectangular Weir** 2 End Contraction(s)
#2	Primary	9.60'	**4.0' long Sharp-Crested Rectangular Weir** 2 End Contraction(s)
#3	Primary	8.60'	**0.5' long Sharp-Crested Rectangular Weir** 2 End Contraction(s)
#4	Primary	8.60'	**0.5' long Sharp-Crested Rectangular Weir** 2 End Contraction(s)

Primary OutFlow Max=11.42 cfs @ 12.76 hrs HW=9.91' (Free Discharge)
- **1=Sharp-Crested Rectangular Weir** (Weir Controls 6.74 cfs @ 1.82 fps)
- **2=Sharp-Crested Rectangular Weir** (Weir Controls 2.22 cfs @ 1.82 fps)
- **3=Sharp-Crested Rectangular Weir** (Weir Controls 1.23 cfs @ 3.74 fps)
- **4=Sharp-Crested Rectangular Weir** (Weir Controls 1.23 cfs @ 3.74 fps)

Pond Lake3: Lake 3

Hydrograph



Summary for Pond Lake4&5: Lake 4 & 5

[79] Warning: Submerged Pond Lake3 Primary device # 3 by 0.72'
[79] Warning: Submerged Pond Lake3 Primary device # 4 by 0.72'

Inflow Area = 21.700 ac, 35.48% Impervious, Inflow Depth > 4.52" for 100 YR CM event
Inflow = 24.26 cfs @ 12.20 hrs, Volume= 8.180 af
Outflow = 13.35 cfs @ 13.40 hrs, Volume= 5.648 af, Atten= 45%, Lag= 72.1 min
Primary = 13.35 cfs @ 13.40 hrs, Volume= 5.648 af

Routing by Stor-Ind method, Time Span= 0.00-24.01 hrs, dt= 0.07 hrs
Peak Elev= 9.32' @ 13.40 hrs Surf.Area= 57,817 sf Storage= 116,032 cf

Plug-Flow detention time= 215.2 min calculated for 5.632 af (69% of inflow)
Center-of-Mass det. time= 100.6 min (1,013.4 - 912.8)

Volume	Invert	Avail.Storage	Storage Description
#1	7.00'	126,192 cf	**Custom Stage Data (Prismatic)** Listed below

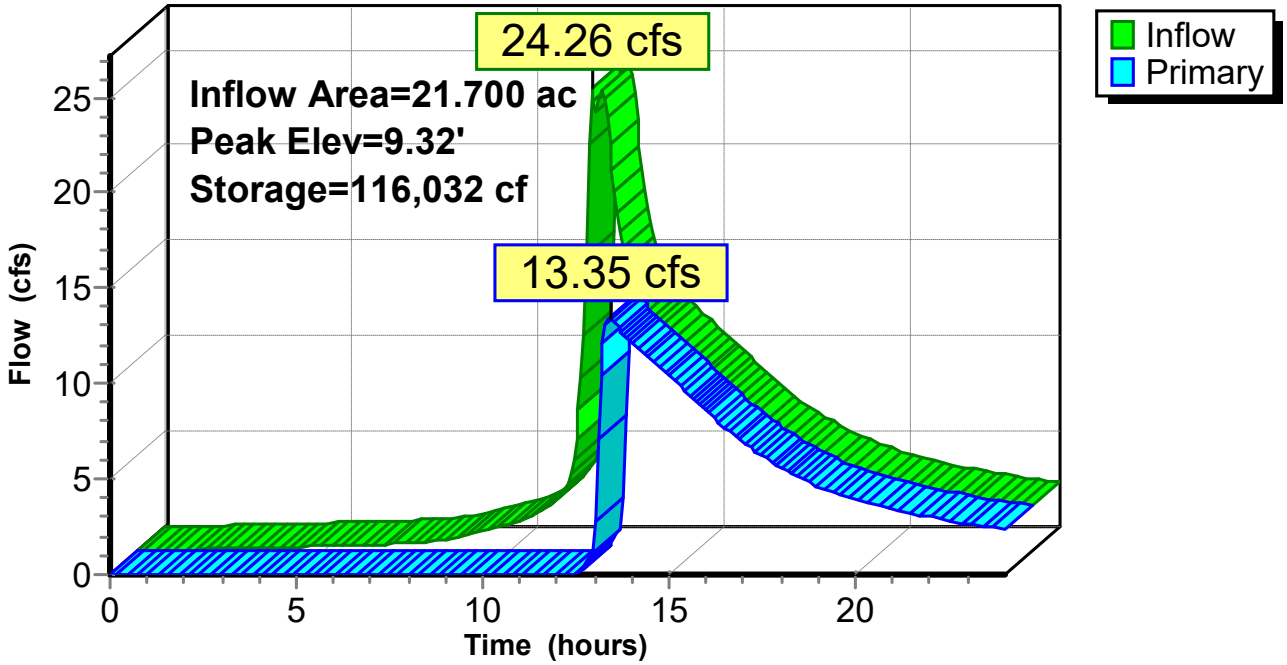
Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
7.00	27,767	0	0
7.40	46,551	14,864	14,864
8.00	50,946	29,249	44,113
9.00	55,842	53,394	97,507
9.50	58,900	28,686	126,192

Device	Routing	Invert	Outlet Devices
#1	Primary	9.20'	**100.0' long x 20.0' 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
#2	Primary	8.60'	**12.0" Vert. Orifice/Grate** C= 0.600

Primary OutFlow Max=13.27 cfs @ 13.40 hrs HW=9.32' (Free Discharge)
└**1=Broad-Crested Rectangular Weir** (Weir Controls 11.52 cfs @ 0.94 fps)
└**2=Orifice/Grate** (Orifice Controls 1.76 cfs @ 2.89 fps)

Pond Lake4&5: Lake 4 & 5

Hydrograph

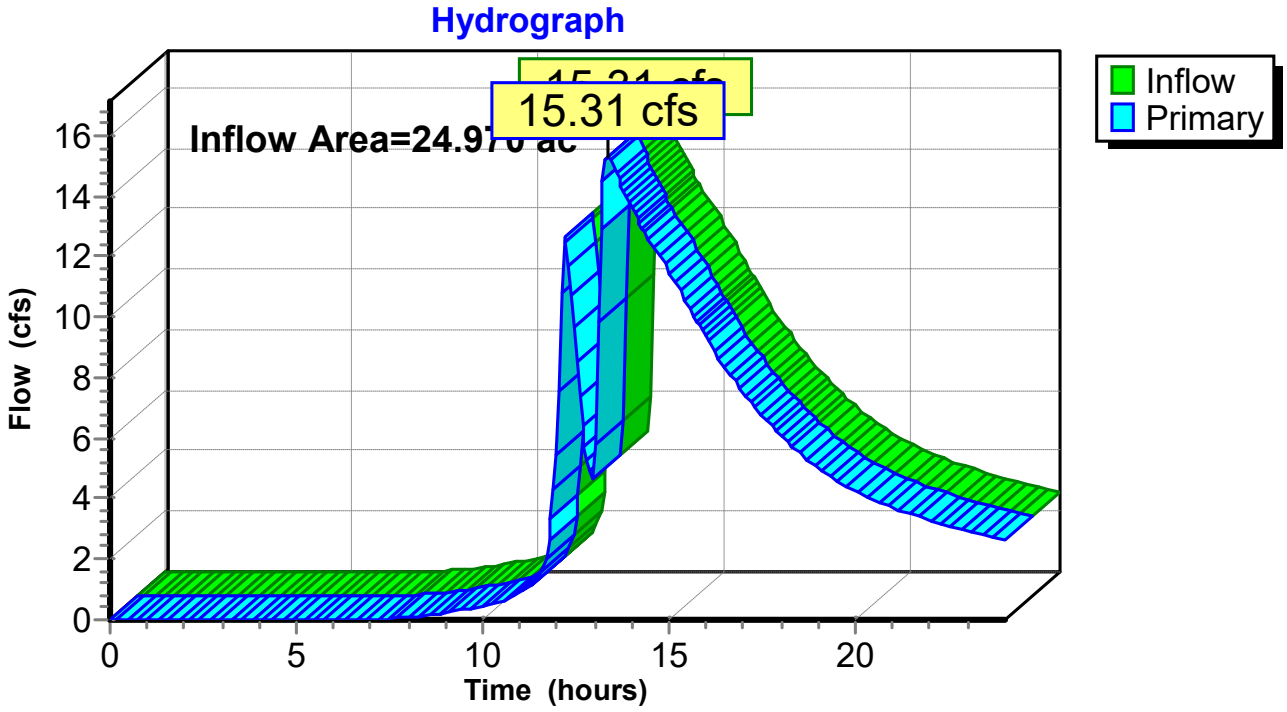


Summary for Link 1L: Combo Discharge

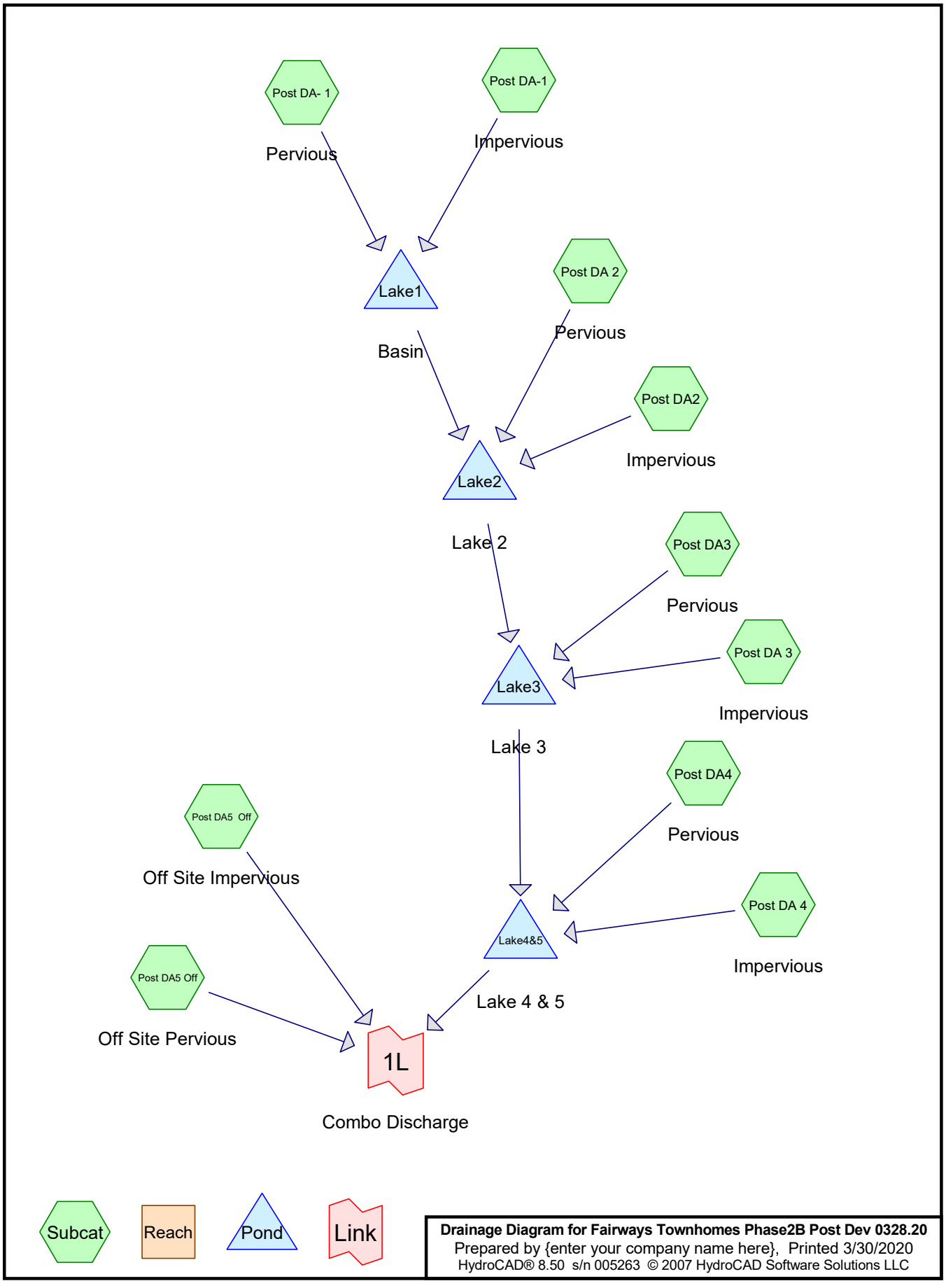
Inflow Area = 24.970 ac, 30.84% Impervious, Inflow Depth > 3.45" for 100 YR CM event
Inflow = 15.31 cfs @ 13.37 hrs, Volume= 7.182 af
Primary = 15.31 cfs @ 13.37 hrs, Volume= 7.182 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-24.01 hrs, dt= 0.07 hrs

Link 1L: Combo Discharge



Post-Development Calculations



Drainage Diagram for Fairways Townhomes Phase2B Post Dev 0328.20
Prepared by {enter your company name here}, Printed 3/30/2020

Area Listing (all nodes)

Area (acres)	CN	Description (subcatchment-numbers)
0.080	30	Woods, Good, HSG A (Post DA 2)
1.010	39	>75% Grass cover, Good, HSG A (Post DA 2,Post DA- 1)
0.650	55	Woods, Good, HSG B (Post DA 2,Post DA4)
0.370	58	Woods/grass comb., Good, HSG B (Post DA- 1)
7.320	61	>75% Grass cover, Good, HSG B (Post DA 2,Post DA- 1,Post DA3,Post DA4)
0.220	70	Woods, Good, HSG C (Post DA4)
0.100	72	Woods/grass comb., Good, HSG C (Post DA5 Off)
6.350	74	>75% Grass cover, Good, HSG C (Post DA 2,Post DA- 1,Post DA3,Post DA4,Post DA5 Off)
0.350	98	Cart Paths (Post DA 4,Post DA2)
0.090	98	Impervious (Post DA5 Off)
3.920	98	Paved parking & roofs (Post DA 3,Post DA 4,Post DA-1)
0.090	98	Townhouse (Post DA2)
4.420	98	Water Surface (Post DA 3,Post DA 4,Post DA-1,Post DA2)
24.970		**TOTAL AREA**

Soil Listing (all nodes)

Area (acres)	Soil Goup	Subcatchment Numbers
1.090	HSG A	Post DA 2, Post DA- 1
8.340	HSG B	Post DA 2, Post DA- 1, Post DA3, Post DA4
6.670	HSG C	Post DA 2, Post DA- 1, Post DA3, Post DA4, Post DA5 Off
0.000	HSG D	
8.870	Other	Post DA 3, Post DA 4, Post DA-1, Post DA2, Post DA5 Off
24.970		**TOTAL AREA**

Time span=0.00-24.00 hrs, dt=0.07 hrs, 344 points
Runoff by SCS TR-20 method, UH=Delmarva
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Subcatchment Post DA 2: Pervious Runoff Area=3.110 ac 0.00% Impervious Runoff Depth=0.00"
Flow Length=100' Slope=0.0100 '/' Tc=12.7 min CN=55 Runoff=0.00 cfs 0.000 af

Subcatchment Post DA 3: Impervious Runoff Area=1.970 ac 100.00% Impervious Runoff Depth=1.03"
Tc=10.0 min CN=98 Runoff=3.61 cfs 0.170 af

Subcatchment Post DA 4: Impervious Runoff Area=2.660 ac 100.00% Impervious Runoff Depth=1.03"
Tc=10.0 min CN=98 Runoff=4.88 cfs 0.229 af

Subcatchment Post DA- 1: Pervious Runoff Area=5.380 ac 0.00% Impervious Runoff Depth=0.00"
Tc=15.0 min CN=62 Runoff=0.00 cfs 0.000 af

Subcatchment Post DA-1: Impervious Runoff Area=2.480 ac 100.00% Impervious Runoff Depth=1.03"
Tc=10.0 min CN=98 Runoff=4.55 cfs 0.214 af

Subcatchment Post DA2: Impervious Runoff Area=1.670 ac 100.00% Impervious Runoff Depth=1.03"
Tc=10.0 min CN=98 Runoff=3.06 cfs 0.144 af

Subcatchment Post DA3: Pervious Runoff Area=1.560 ac 0.00% Impervious Runoff Depth=0.01"
Flow Length=100' Slope=0.0100 '/' Tc=18.5 min CN=66 Runoff=0.02 cfs 0.001 af

Subcatchment Post DA4: Pervious Runoff Area=3.240 ac 0.00% Impervious Runoff Depth=0.02"
Flow Length=100' Slope=0.0100 '/' Tc=12.7 min CN=68 Runoff=0.08 cfs 0.005 af

Subcatchment Post DA5 Off: Off Site Runoff Area=0.090 ac 100.00% Impervious Runoff Depth=1.03"
Flow Length=75' Slope=0.0150 '/' Tc=12.5 min CN=98 Runoff=0.15 cfs 0.008 af

Subcatchment Post DA5 Off: Off Site Runoff Area=2.810 ac 0.00% Impervious Runoff Depth=0.07"
Flow Length=75' Slope=0.0150 '/' Tc=12.5 min CN=74 Runoff=0.23 cfs 0.017 af

Pond Lake1: Basin Peak Elev=10.87' Storage=8,887 cf Inflow=4.55 cfs 0.214 af
Outflow=0.11 cfs 0.123 af

Pond Lake2: Lake 2 Peak Elev=9.79' Storage=7,281 cf Inflow=3.09 cfs 0.267 af
Outflow=0.06 cfs 0.114 af

Pond Lake3: Lake 3 Peak Elev=8.83' Storage=6,523 cf Inflow=3.62 cfs 0.285 af
Outflow=0.32 cfs 0.235 af

Pond Lake4&5: Lake 4 & 5 Peak Elev=7.51' Storage=20,455 cf Inflow=4.96 cfs 0.470 af
Outflow=0.00 cfs 0.000 af

Link 1L: Combo Discharge Inflow=0.34 cfs 0.025 af
Primary=0.34 cfs 0.025 af

Total Runoff Area = 24.970 ac Runoff Volume = 0.788 af Average Runoff Depth = 0.38"
64.48% Pervious = 16.100 ac 35.52% Impervious = 8.870 ac

Summary for Subcatchment Post DA 2: Pervious

[45] Hint: Runoff=Zero

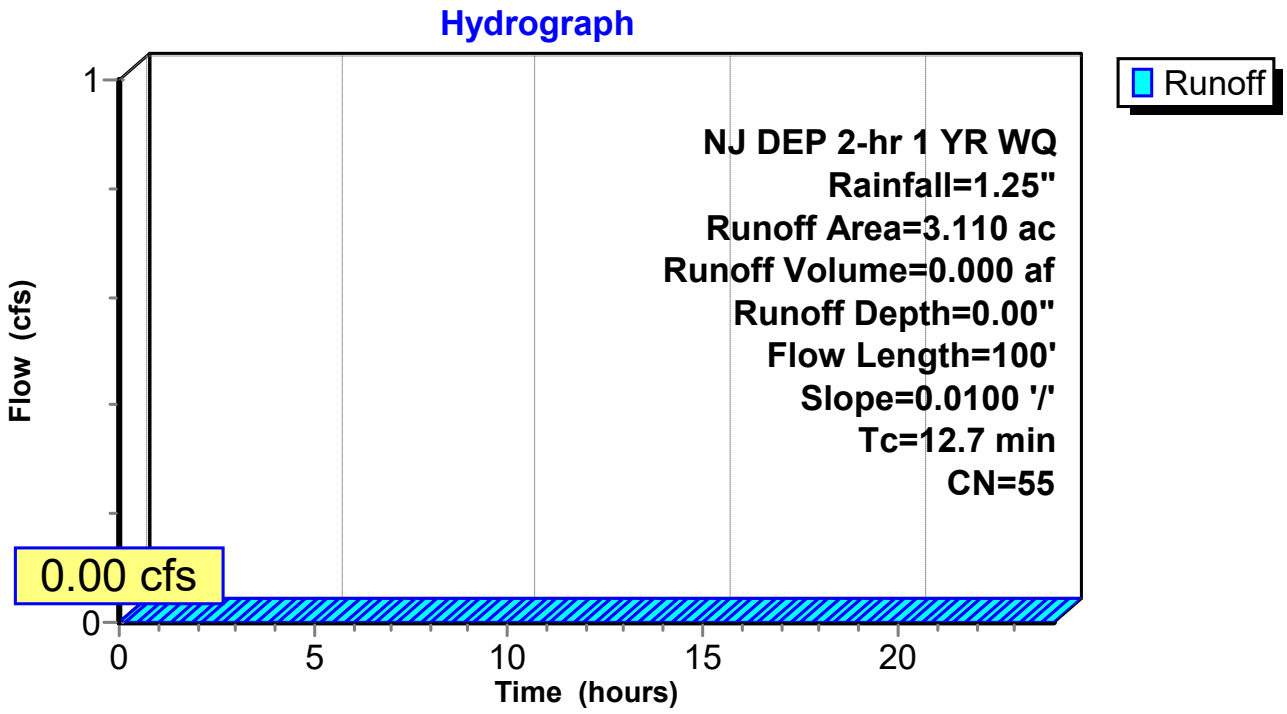
Runoff = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af, Depth= 0.00"

Runoff by SCS TR-20 method, UH=Delmarva, Time Span= 0.00-24.01 hrs, dt= 0.07 hrs
NJ DEP 2-hr 1 YR WQ Rainfall=1.25"

Area (ac)	CN	Description
1.000	39	>75% Grass cover, Good, HSG A
1.340	61	>75% Grass cover, Good, HSG B
0.590	74	>75% Grass cover, Good, HSG C
0.080	30	Woods, Good, HSG A
0.100	55	Woods, Good, HSG B
3.110	55	Weighted Average
3.110		Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
12.7	100	0.0100	0.13		**Sheet Flow, Unpaved** Grass: Short n= 0.150 P2= 3.30"

Subcatchment Post DA 2: Pervious



Summary for Subcatchment Post DA 3: Impervious

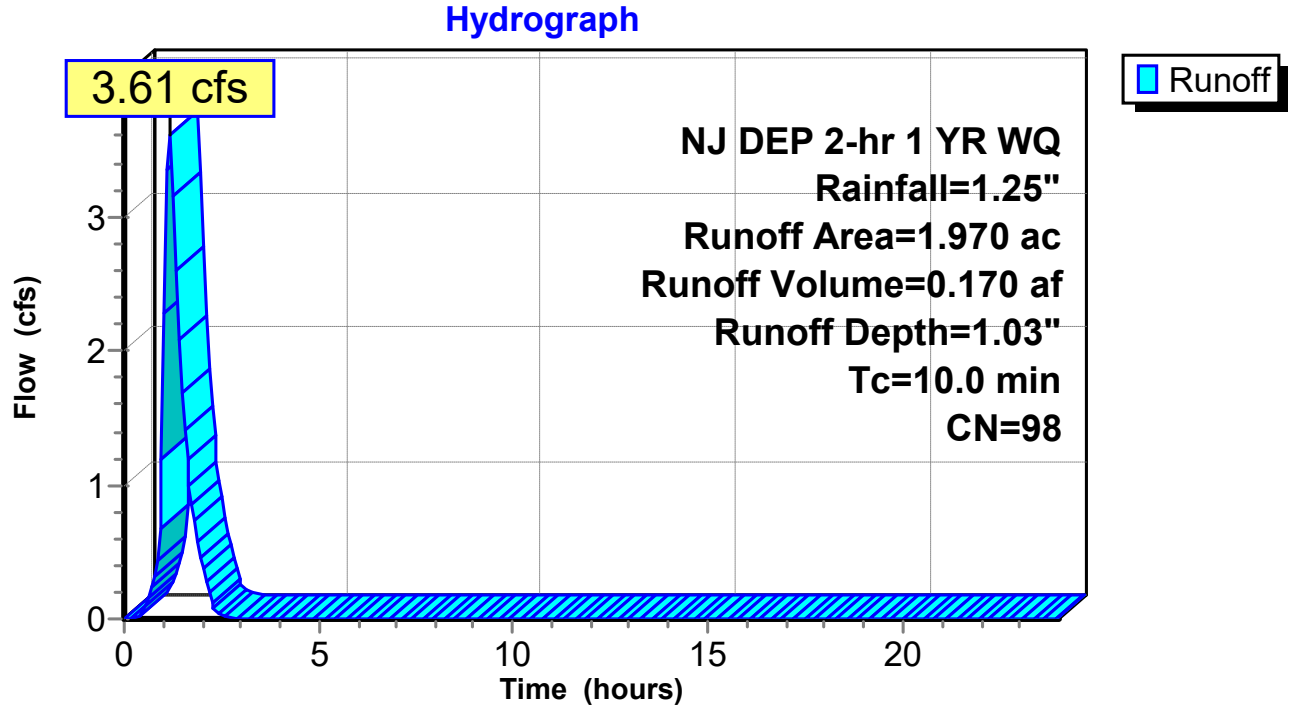
Runoff = 3.61 cfs @ 1.18 hrs, Volume= 0.170 af, Depth= 1.03"

Runoff by SCS TR-20 method, UH=Delmarva, Time Span= 0.00-24.01 hrs, dt= 0.07 hrs
NJ DEP 2-hr 1 YR WQ Rainfall=1.25"

Area (ac)	CN	Description
0.630	98	Water Surface
1.340	98	Paved parking & roofs
1.970	98	Weighted Average
1.970		Impervious Area

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

Subcatchment Post DA 3: Impervious



Summary for Subcatchment Post DA 4: Impervious

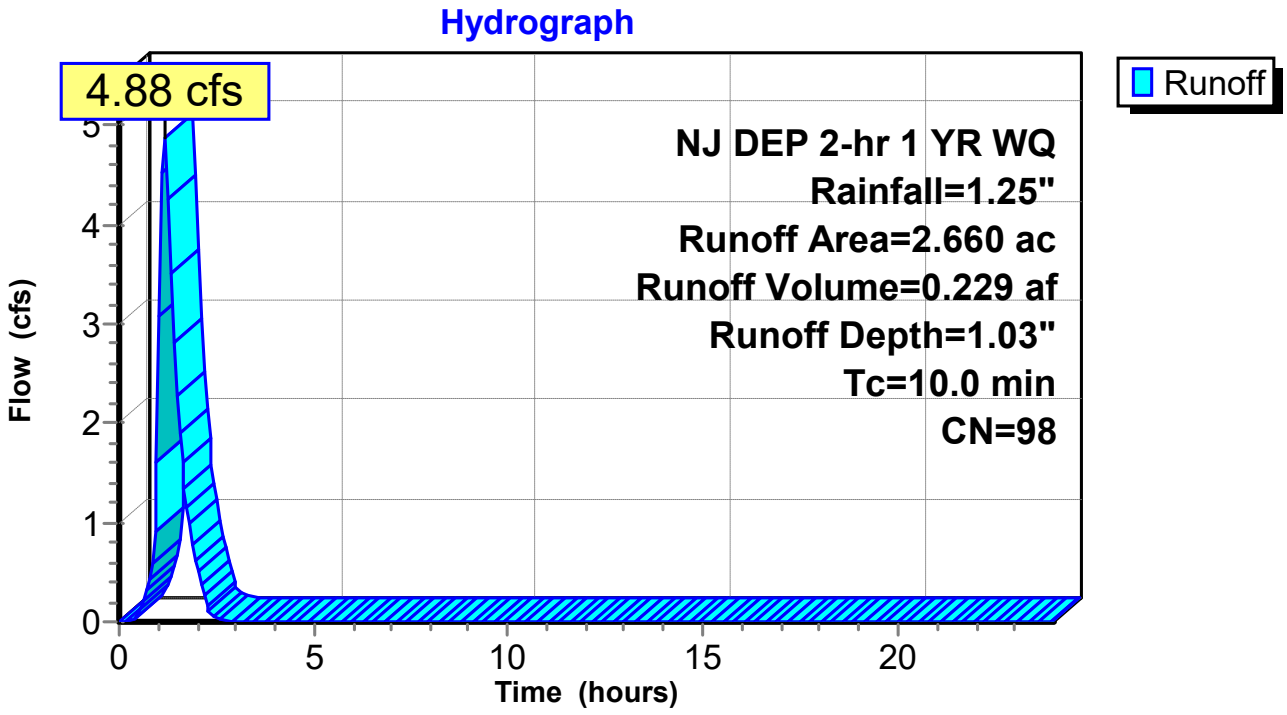
Runoff = 4.88 cfs @ 1.18 hrs, Volume= 0.229 af, Depth= 1.03"

Runoff by SCS TR-20 method, UH=Delmarva, Time Span= 0.00-24.01 hrs, dt= 0.07 hrs
NJ DEP 2-hr 1 YR WQ Rainfall=1.25"

	Area (ac)	CN	Description
*	0.100	98	Cart Paths
	1.260	98	Paved parking & roofs
	1.300	98	Water Surface
	2.660	98	Weighted Average
	2.660		Impervious Area

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

Subcatchment Post DA 4: Impervious



Summary for Subcatchment Post DA- 1: Pervious

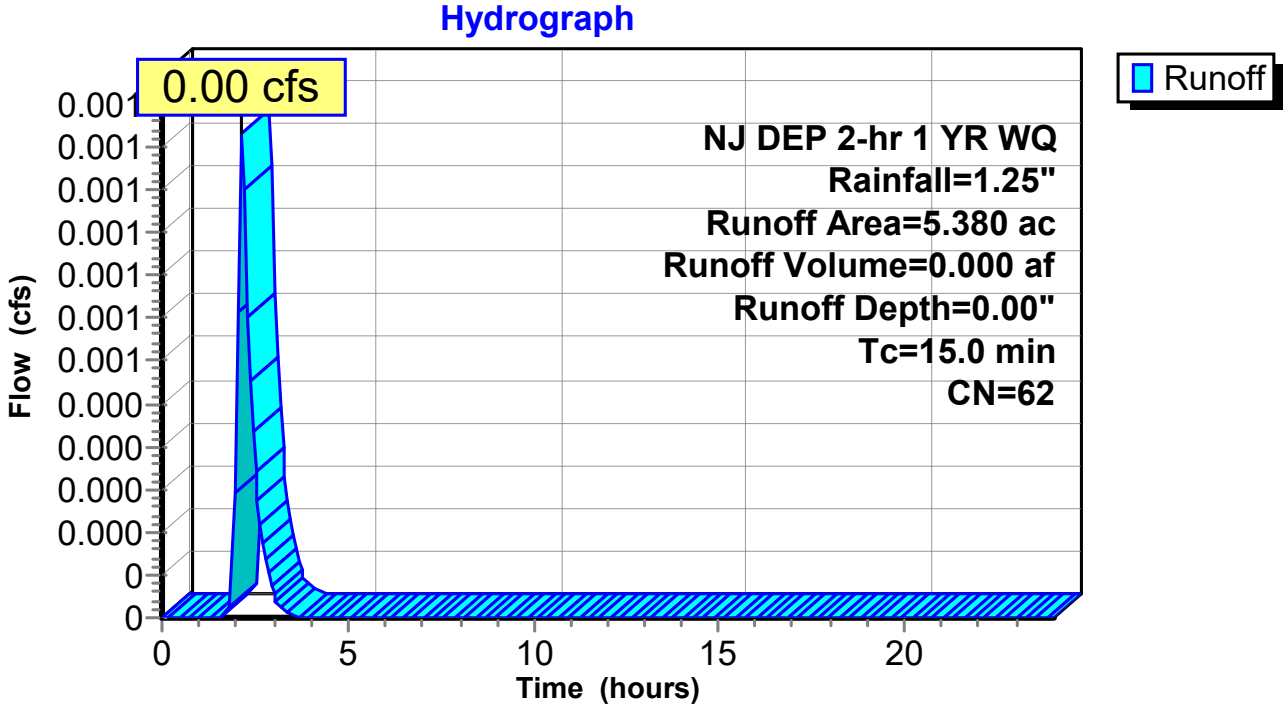
Runoff = 0.00 cfs @ 2.14 hrs, Volume= 0.000 af, Depth= 0.00"

Runoff by SCS TR-20 method, UH=Delmarva, Time Span= 0.00-24.01 hrs, dt= 0.07 hrs
NJ DEP 2-hr 1 YR WQ Rainfall=1.25"

Area (ac)	CN	Description
0.010	39	>75% Grass cover, Good, HSG A
4.320	61	>75% Grass cover, Good, HSG B
0.680	74	>75% Grass cover, Good, HSG C
0.370	58	Woods/grass comb., Good, HSG B
5.380	62	Weighted Average
5.380		Pervious Area

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

Subcatchment Post DA- 1: Pervious



Summary for Subcatchment Post DA-1: Impervious

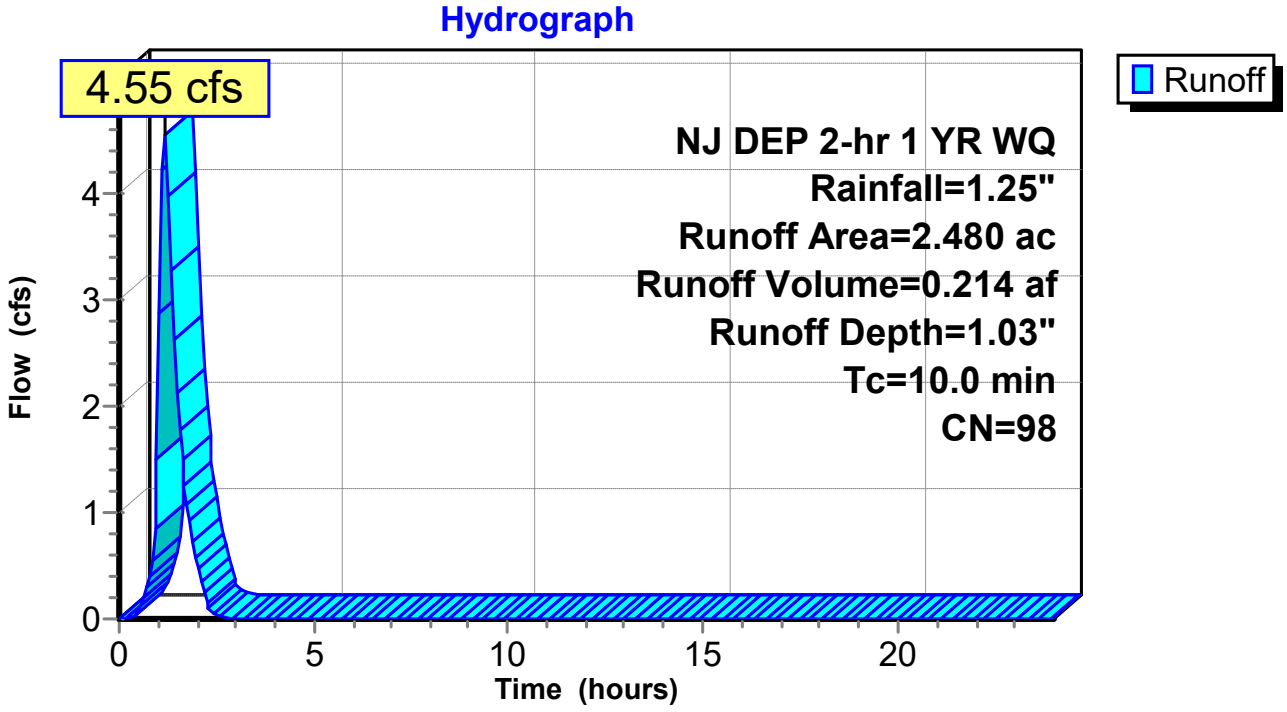
Runoff = 4.55 cfs @ 1.18 hrs, Volume= 0.214 af, Depth= 1.03"

Runoff by SCS TR-20 method, UH=Delmarva, Time Span= 0.00-24.01 hrs, dt= 0.07 hrs
NJ DEP 2-hr 1 YR WQ Rainfall=1.25"

Area (ac)	CN	Description
1.160	98	Water Surface
1.320	98	Paved parking & roofs
2.480	98	Weighted Average
2.480		Impervious Area

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

Subcatchment Post DA-1: Impervious



Summary for Subcatchment Post DA2: Impervious

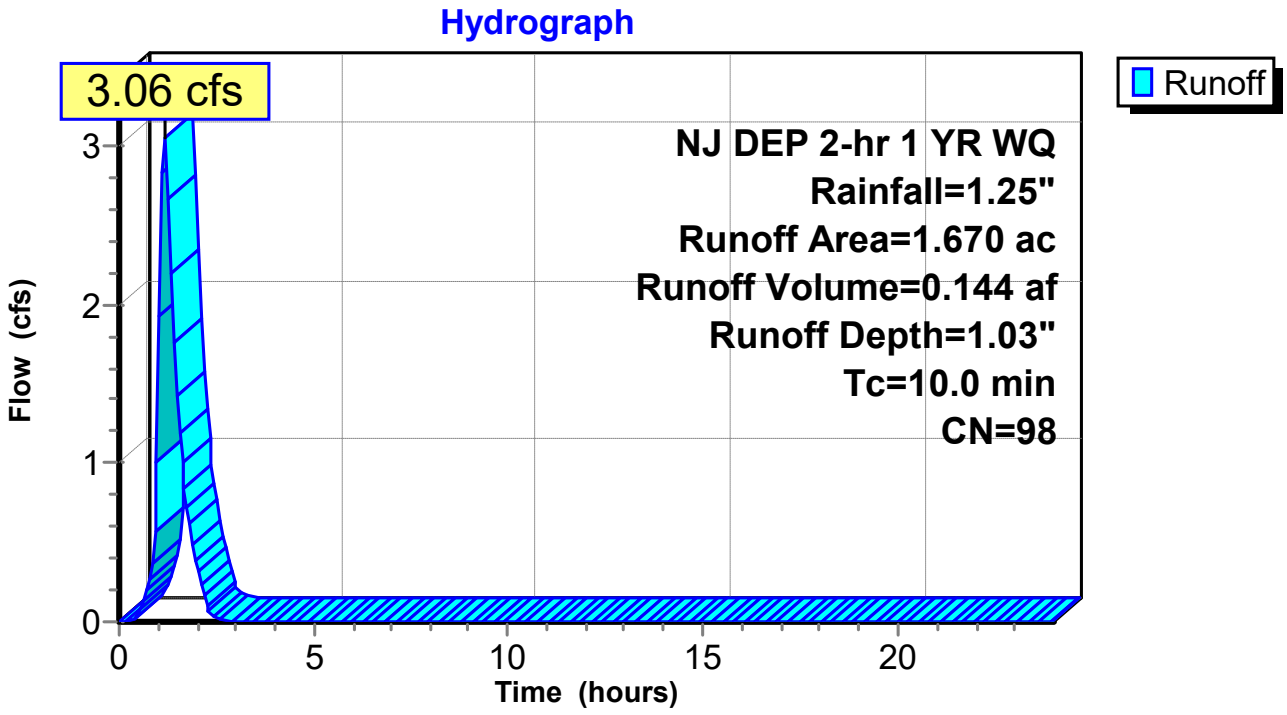
Runoff = 3.06 cfs @ 1.18 hrs, Volume= 0.144 af, Depth= 1.03"

Runoff by SCS TR-20 method, UH=Delmarva, Time Span= 0.00-24.01 hrs, dt= 0.07 hrs
NJ DEP 2-hr 1 YR WQ Rainfall=1.25"

	Area (ac)	CN	Description
*	0.250	98	Cart Paths
	1.330	98	Water Surface
*	0.090	98	Townhouse
	1.670	98	Weighted Average
	1.670		Impervious Area

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

Subcatchment Post DA2: Impervious



Summary for Subcatchment Post DA3: Pervious

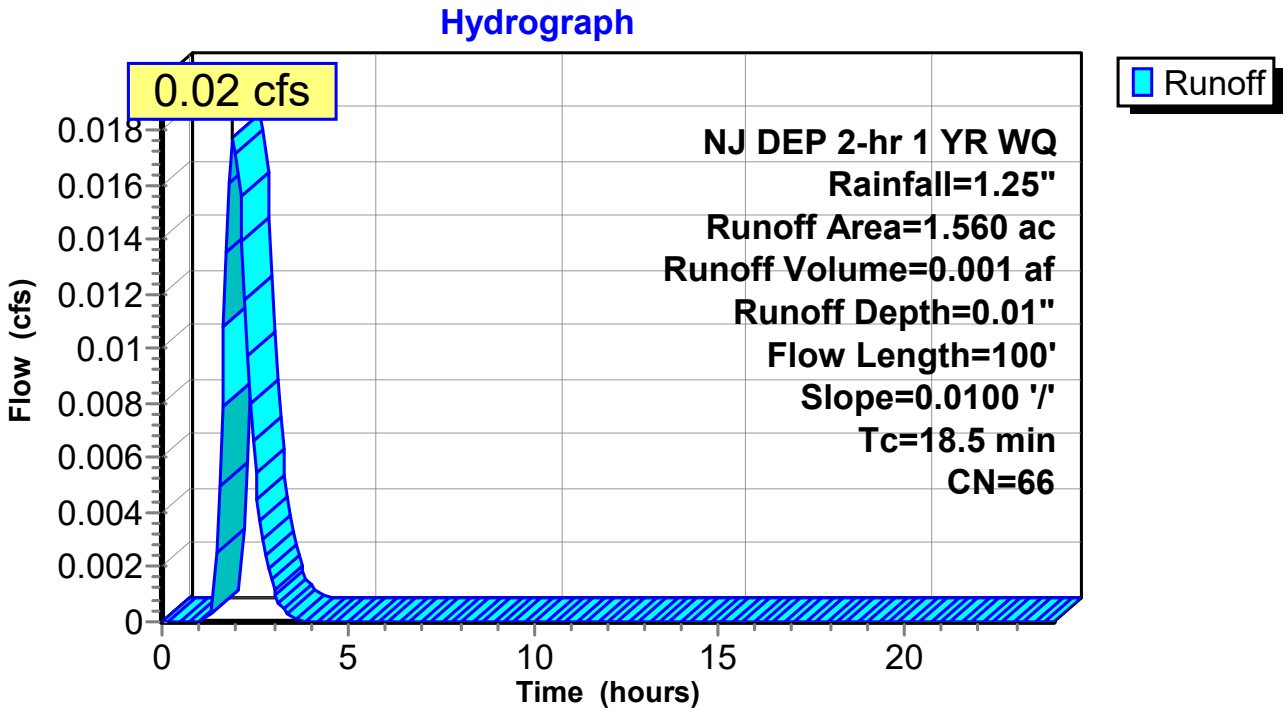
Runoff = 0.02 cfs @ 1.92 hrs, Volume= 0.001 af, Depth= 0.01"

Runoff by SCS TR-20 method, UH=Delmarva, Time Span= 0.00-24.01 hrs, dt= 0.07 hrs
NJ DEP 2-hr 1 YR WQ Rainfall=1.25"

Area (ac)	CN	Description
1.000	61	>75% Grass cover, Good, HSG B
0.560	74	>75% Grass cover, Good, HSG C
1.560	66	Weighted Average
1.560		Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
18.5	100	0.0100	0.09		**Sheet Flow, Unpaved** Grass: Dense n= 0.240 P2= 3.30"

Subcatchment Post DA3: Pervious



Summary for Subcatchment Post DA4: Pervious

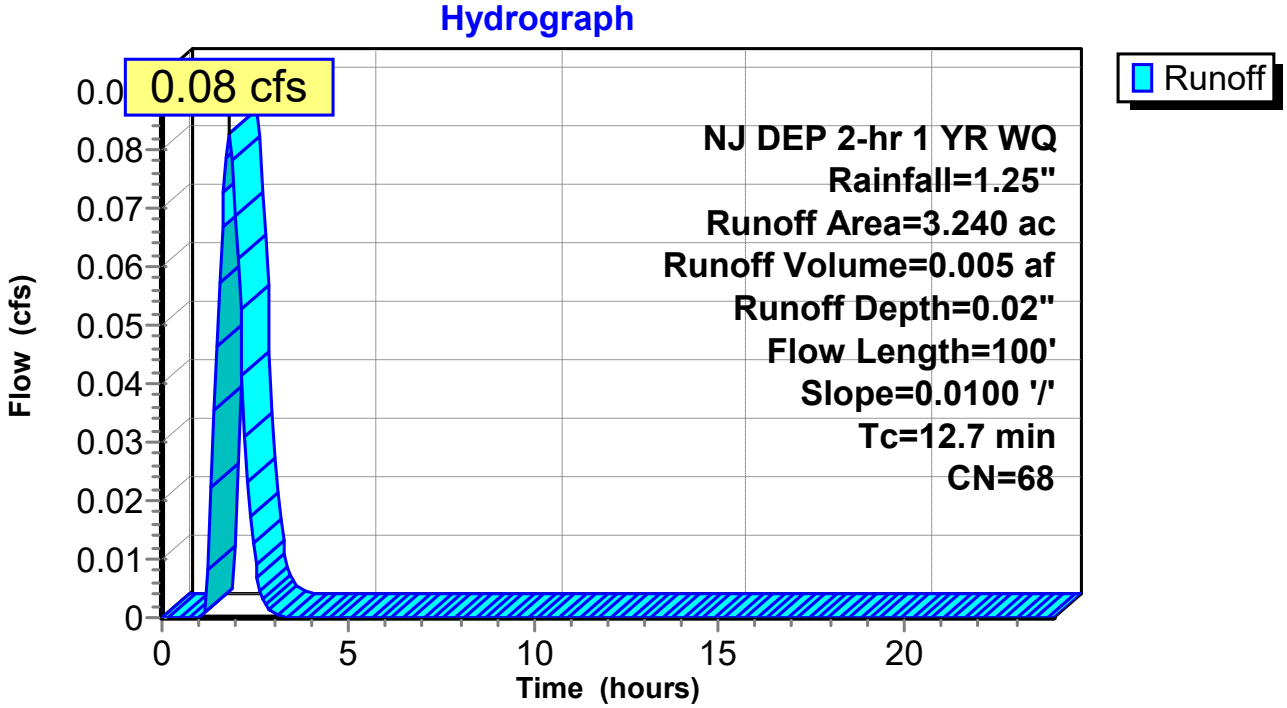
Runoff = 0.08 cfs @ 1.82 hrs, Volume= 0.005 af, Depth= 0.02"

Runoff by SCS TR-20 method, UH=Delmarva, Time Span= 0.00-24.01 hrs, dt= 0.07 hrs
NJ DEP 2-hr 1 YR WQ Rainfall=1.25"

Area (ac)	CN	Description
0.660	61	>75% Grass cover, Good, HSG B
1.810	74	>75% Grass cover, Good, HSG C
0.550	55	Woods, Good, HSG B
0.220	70	Woods, Good, HSG C
3.240	68	Weighted Average
3.240		Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
12.7	100	0.0100	0.13		**Sheet Flow, Unpaved** Grass: Short n= 0.150 P2= 3.30"

Subcatchment Post DA4: Pervious



Summary for Subcatchment Post DA5 Off: Off Site Impervious

Runoff = 0.15 cfs @ 1.21 hrs, Volume= 0.008 af, Depth= 1.03"

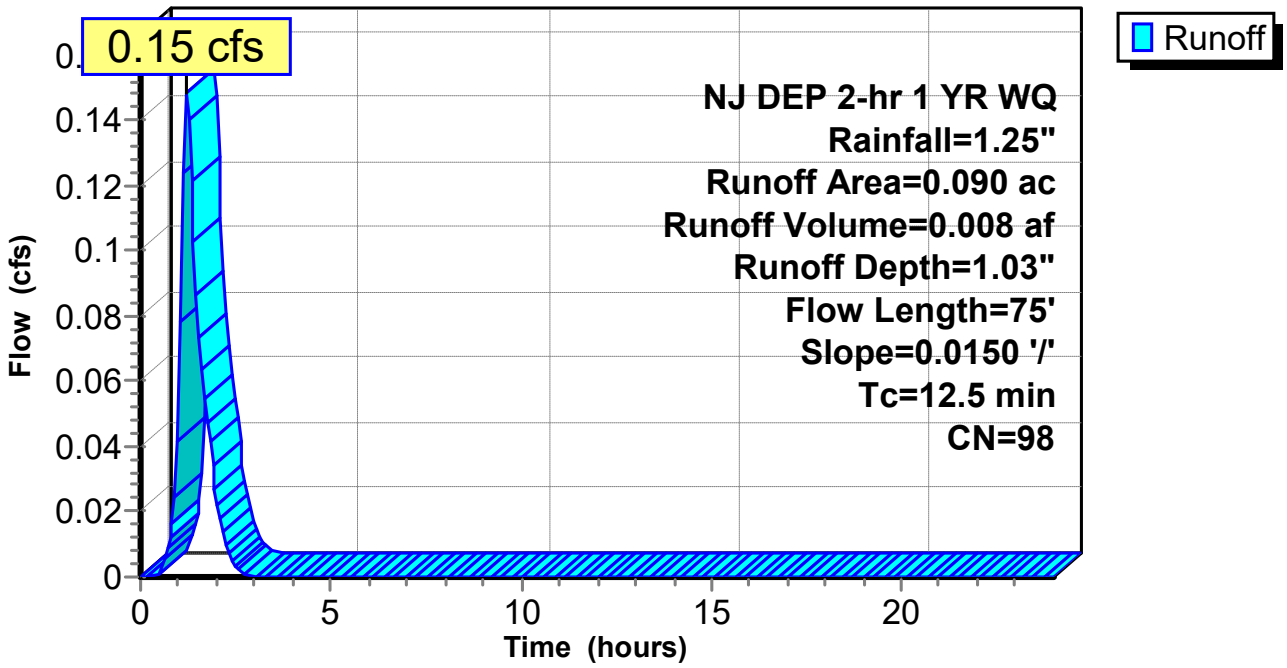
Runoff by SCS TR-20 method, UH=Delmarva, Time Span= 0.00-24.01 hrs, dt= 0.07 hrs
NJ DEP 2-hr 1 YR WQ Rainfall=1.25"

	Area (ac)	CN	Description
*	0.090	98	Impervious
	0.090		Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
12.5	75	0.0150	0.10		**Sheet Flow, Unpaved** Grass: Dense n= 0.240 P2= 3.30"

Subcatchment Post DA5 Off: Off Site Impervious

Hydrograph



Summary for Subcatchment Post DA5 Off: Off Site Pervious

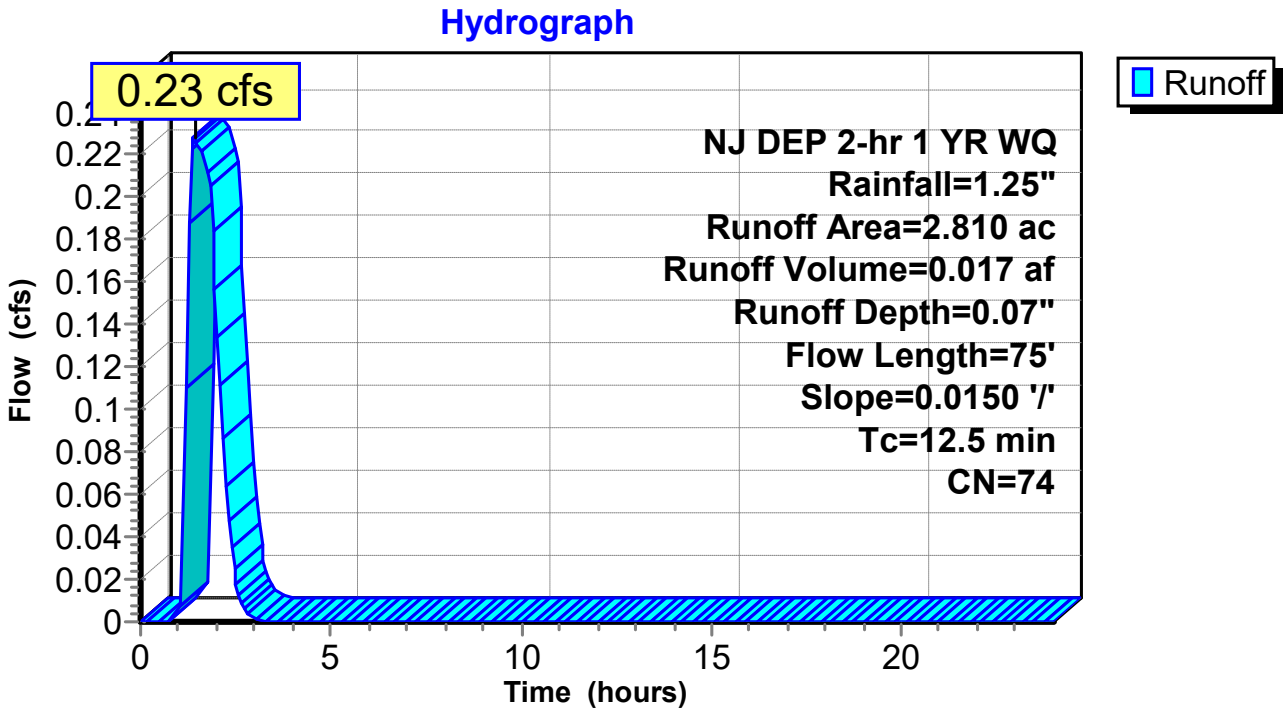
Runoff = 0.23 cfs @ 1.41 hrs, Volume= 0.017 af, Depth= 0.07"

Runoff by SCS TR-20 method, UH=Delmarva, Time Span= 0.00-24.01 hrs, dt= 0.07 hrs
NJ DEP 2-hr 1 YR WQ Rainfall=1.25"

Area (ac)	CN	Description
2.710	74	>75% Grass cover, Good, HSG C
0.100	72	Woods/grass comb., Good, HSG C
2.810	74	Weighted Average
2.810		Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
12.5	75	0.0150	0.10		**Sheet Flow, Unpaved** Grass: Dense n= 0.240 P2= 3.30"

Subcatchment Post DA5 Off: Off Site Pervious



Summary for Pond Lake1: Basin

Inflow Area = 7.860 ac, 31.55% Impervious, Inflow Depth = 0.33" for 1 YR WQ event
Inflow = 4.55 cfs @ 1.18 hrs, Volume= 0.214 af
Outflow = 0.11 cfs @ 2.31 hrs, Volume= 0.123 af, Atten= 98%, Lag= 68.0 min
Primary = 0.11 cfs @ 2.31 hrs, Volume= 0.123 af

Routing by Stor-Ind method, Time Span= 0.00-24.01 hrs, dt= 0.07 hrs
Peak Elev= 10.87' @ 2.31 hrs Surf.Area= 0 sf Storage= 8,887 cf

Plug-Flow detention time= 559.5 min calculated for 0.123 af (57% of inflow)
Center-of-Mass det. time= 546.5 min (626.6 - 80.1)

Volume	Invert	Avail.Storage	Storage Description
#1	10.70'	137,878 cf	**Custom Stage Data** Listed below

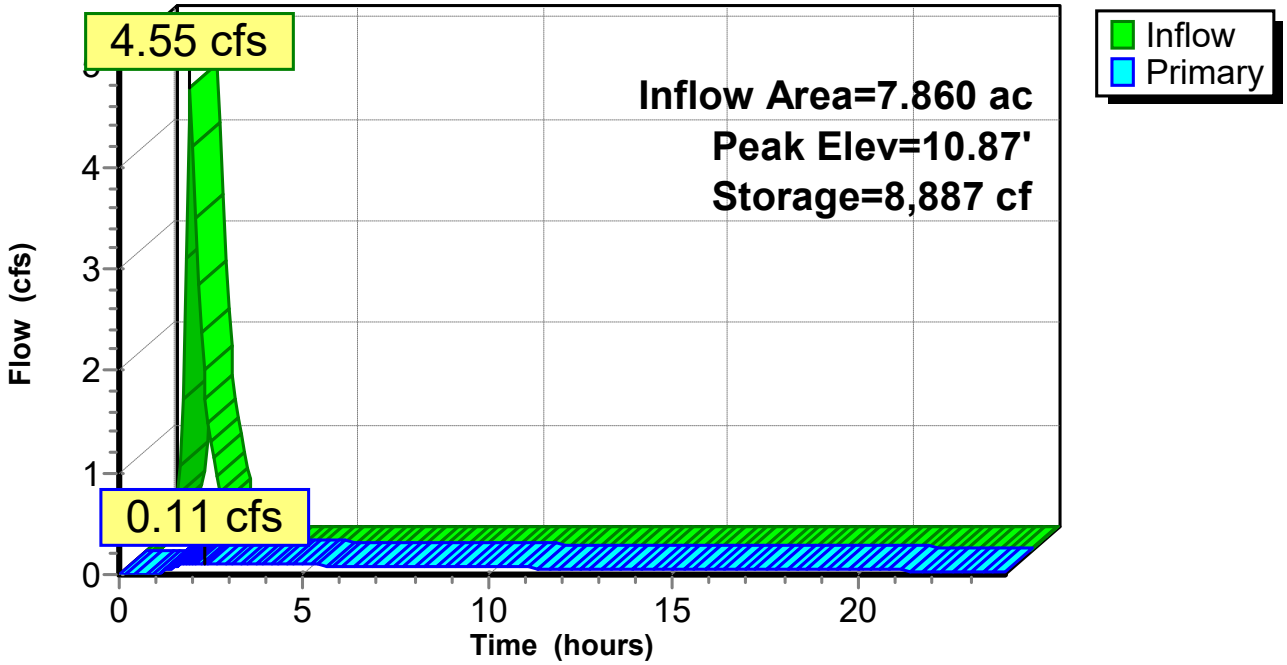
Elevation (feet)	Cum.Store (cubic-feet)
10.70	0
11.00	15,300
12.00	65,780
13.00	118,459
13.70	137,878

Device	Routing	Invert	Outlet Devices
#1	Primary	11.35'	**2.0' long Sharp-Crested Rectangular Weir** 2 End Contraction(s)
#2	Primary	10.70'	**0.5' long Sharp-Crested Rectangular Weir** 2 End Contraction(s)

Primary OutFlow Max=0.11 cfs @ 2.31 hrs HW=10.87' (Free Discharge)
↑ **1=Sharp-Crested Rectangular Weir** (Controls 0.00 cfs)
└ **2=Sharp-Crested Rectangular Weir** (Weir Controls 0.11 cfs @ 1.37 fps)

Pond Lake1: Basin

Hydrograph



Summary for Pond Lake2: Lake 2

Inflow Area = 12.640 ac, 32.83% Impervious, Inflow Depth > 0.25" for 1 YR WQ event
Inflow = 3.09 cfs @ 1.18 hrs, Volume= 0.267 af
Outflow = 0.06 cfs @ 11.62 hrs, Volume= 0.114 af, Atten= 98%, Lag= 626.1 min
Primary = 0.06 cfs @ 11.62 hrs, Volume= 0.114 af

Routing by Stor-Ind method, Time Span= 0.00-24.01 hrs, dt= 0.07 hrs
Peak Elev= 9.79' @ 11.62 hrs Surf.Area= 0 sf Storage= 7,281 cf

Plug-Flow detention time= 694.5 min calculated for 0.114 af (43% of inflow)
Center-of-Mass det. time= 434.9 min (766.6 - 331.7)

Volume	Invert	Avail.Storage	Storage Description
#1	9.67'	87,360 cf	**Custom Stage Data** Listed below

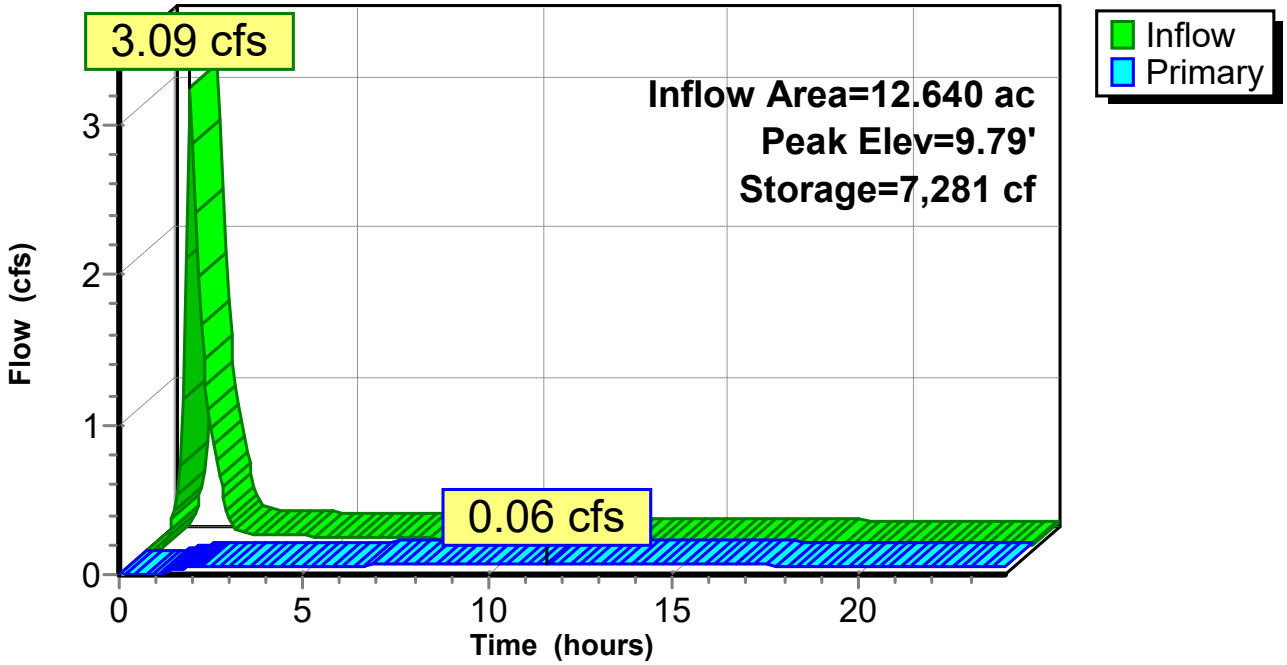
Elevation (feet)	Cum.Store (cubic-feet)
9.67	0
10.00	20,120
11.00	87,360

Device	Routing	Invert	Outlet Devices
#1	Primary	10.00'	**4.0' long Sharp-Crested Rectangular Weir** 2 End Contraction(s)
#2	Primary	9.67'	**0.5' long Sharp-Crested Rectangular Weir** 2 End Contraction(s)

Primary OutFlow Max=0.06 cfs @ 11.62 hrs HW=9.79' (Free Discharge)
└**1=Sharp-Crested Rectangular Weir** (Controls 0.00 cfs)
└**2=Sharp-Crested Rectangular Weir** (Weir Controls 0.06 cfs @ 1.13 fps)

Pond Lake2: Lake 2

Hydrograph



Summary for Pond Lake3: Lake 3

Inflow Area = 16.170 ac, 37.85% Impervious, Inflow Depth > 0.21" for 1 YR WQ event
Inflow = 3.62 cfs @ 1.18 hrs, Volume= 0.285 af
Outflow = 0.32 cfs @ 2.12 hrs, Volume= 0.235 af, Atten= 91%, Lag= 56.6 min
Primary = 0.32 cfs @ 2.12 hrs, Volume= 0.235 af

Routing by Stor-Ind method, Time Span= 0.00-24.01 hrs, dt= 0.07 hrs
Peak Elev= 8.83' @ 2.12 hrs Surf.Area= 0 sf Storage= 6,523 cf

Plug-Flow detention time= 378.5 min calculated for 0.235 af (83% of inflow)
Center-of-Mass det. time= 213.0 min (567.8 - 354.8)

Volume	Invert	Avail.Storage	Storage Description
#1	8.60'	69,310 cf	**Custom Stage Data** Listed below

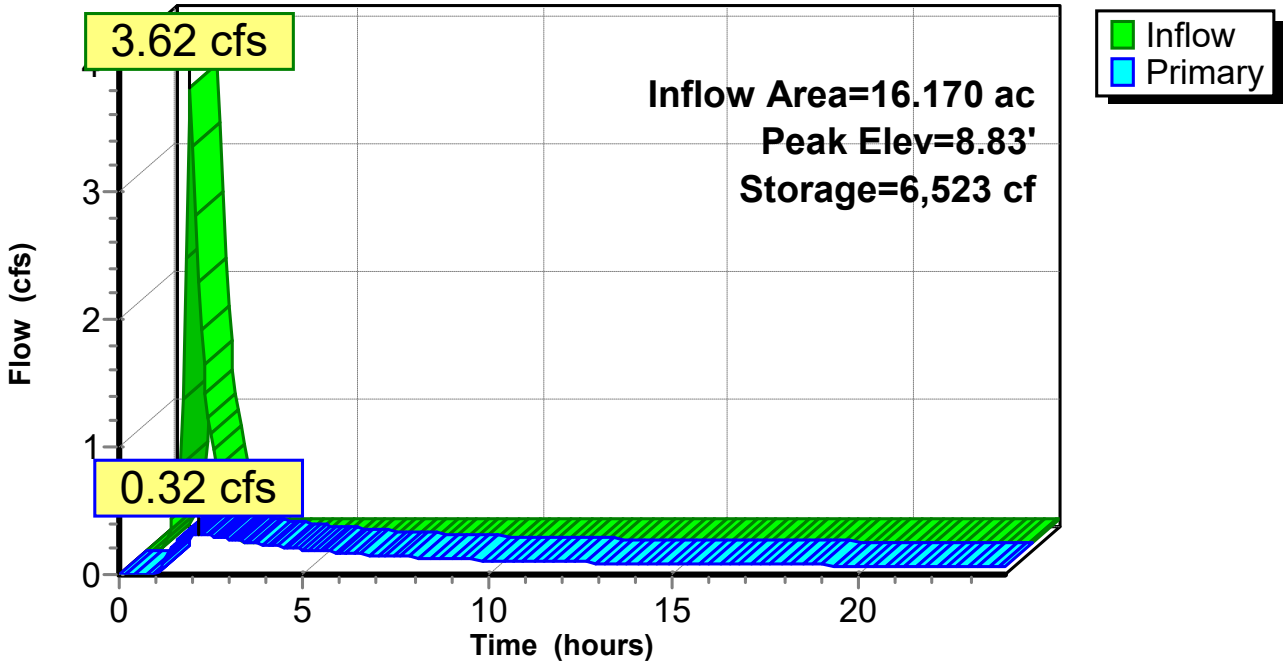
Elevation (feet)	Cum.Store (cubic-feet)
8.60	0
9.00	11,585
10.00	42,767
10.80	69,310

Device	Routing	Invert	Outlet Devices
#1	Primary	9.60'	**12.0' long Sharp-Crested Rectangular Weir** 2 End Contraction(s)
#2	Primary	9.60'	**4.0' long Sharp-Crested Rectangular Weir** 2 End Contraction(s)
#3	Primary	8.60'	**0.5' long Sharp-Crested Rectangular Weir** 2 End Contraction(s)
#4	Primary	8.60'	**0.5' long Sharp-Crested Rectangular Weir** 2 End Contraction(s)

Primary OutFlow Max=0.32 cfs @ 2.12 hrs HW=8.83' (Free Discharge)
- **1=Sharp-Crested Rectangular Weir** (Controls 0.00 cfs)
- **2=Sharp-Crested Rectangular Weir** (Controls 0.00 cfs)
- **3=Sharp-Crested Rectangular Weir** (Weir Controls 0.16 cfs @ 1.55 fps)
- **4=Sharp-Crested Rectangular Weir** (Weir Controls 0.16 cfs @ 1.55 fps)

Pond Lake3: Lake 3

Hydrograph



Summary for Pond Lake4&5: Lake 4 & 5

Inflow Area = 22.070 ac, 39.78% Impervious, Inflow Depth > 0.26" for 1 YR WQ event
Inflow = 4.96 cfs @ 1.18 hrs, Volume= 0.470 af
Outflow = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af, Atten= 100%, Lag= 0.0 min
Primary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af

Routing by Stor-Ind method, Time Span= 0.00-24.01 hrs, dt= 0.07 hrs
Peak Elev= 7.51' @ 24.01 hrs Surf.Area= 47,391 sf Storage= 20,455 cf

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

Volume	Invert	Avail.Storage	Storage Description
#1	7.00'	126,192 cf	**Custom Stage Data (Prismatic)** Listed below

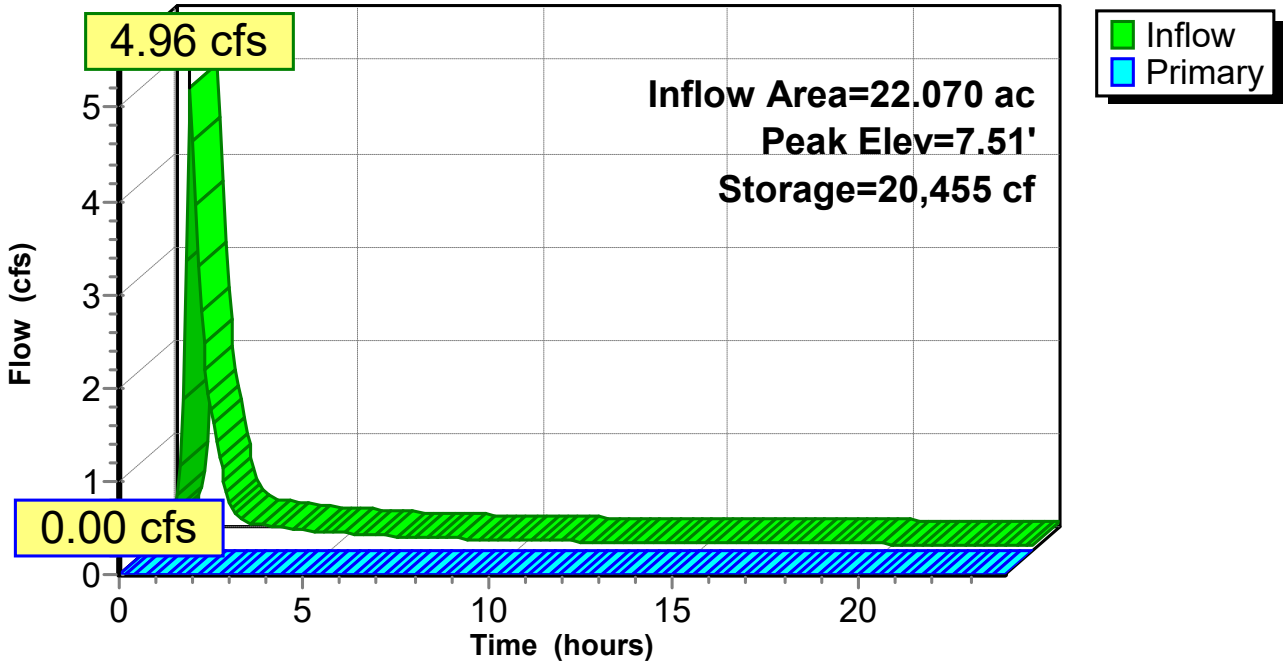
Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
7.00	27,767	0	0
7.40	46,551	14,864	14,864
8.00	50,946	29,249	44,113
9.00	55,842	53,394	97,507
9.50	58,900	28,686	126,192

Device	Routing	Invert	Outlet Devices
#1	Primary	9.20'	**100.0' long x 20.0' 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
#2	Primary	9.00'	**4.0' long Sharp-Crested Rectangular Weir** 2 End Contraction(s)

Primary OutFlow Max=0.00 cfs @ 0.00 hrs HW=7.00' (Free Discharge)
1=Broad-Crested Rectangular Weir (Controls 0.00 cfs)
2=Sharp-Crested Rectangular Weir (Controls 0.00 cfs)

Pond Lake4&5: Lake 4 & 5

Hydrograph

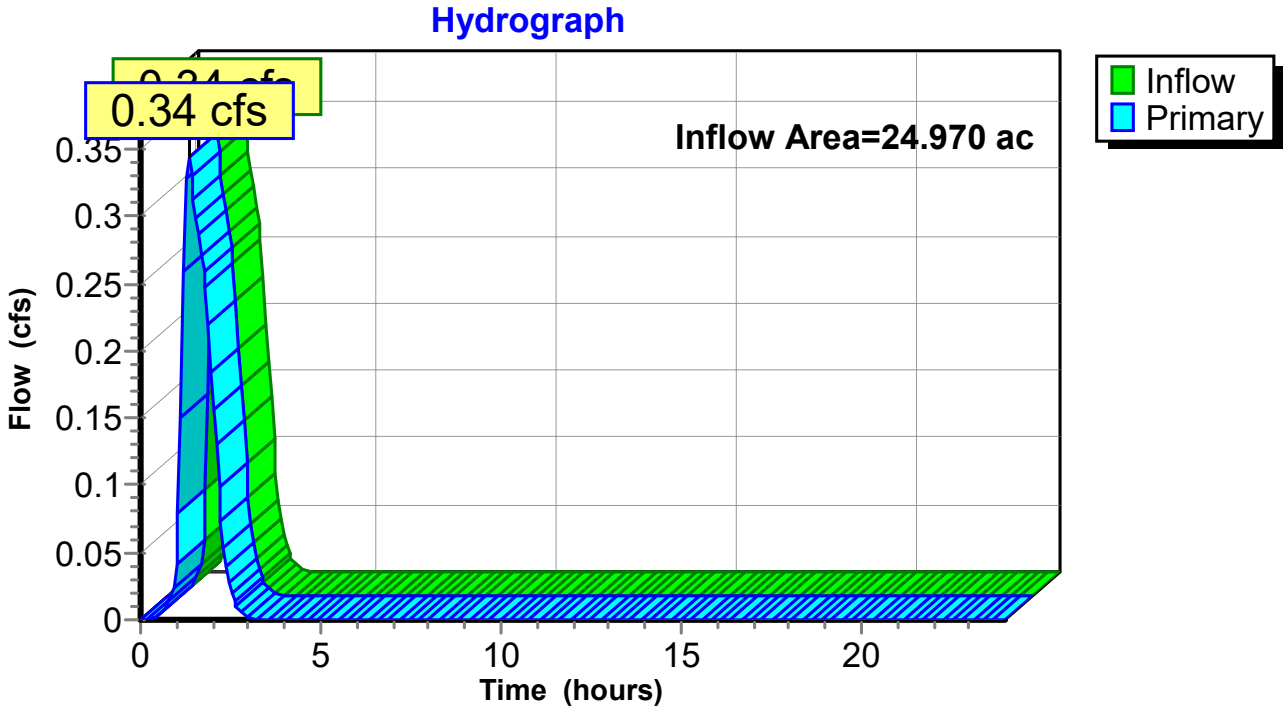


Summary for Link 1L: Combo Discharge

Inflow Area = 24.970 ac, 35.52% Impervious, Inflow Depth = 0.01" for 1 YR WQ event
Inflow = 0.34 cfs @ 1.33 hrs, Volume= 0.025 af
Primary = 0.34 cfs @ 1.33 hrs, Volume= 0.025 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-24.01 hrs, dt= 0.07 hrs

Link 1L: Combo Discharge



Time span=0.00-24.00 hrs, dt=0.07 hrs, 344 points
Runoff by SCS TR-20 method, UH=Delmarva
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Subcatchment Post DA 2: Pervious Runoff Area=3.110 ac 0.00% Impervious Runoff Depth>0.28"
Flow Length=100' Slope=0.0100 '/' Tc=12.7 min CN=55 Runoff=0.28 cfs 0.072 af

Subcatchment Post DA 3: Impervious Runoff Area=1.970 ac 100.00% Impervious Runoff Depth>3.06"
Tc=10.0 min CN=98 Runoff=4.15 cfs 0.503 af

Subcatchment Post DA 4: Impervious Runoff Area=2.660 ac 100.00% Impervious Runoff Depth>3.06"
Tc=10.0 min CN=98 Runoff=5.61 cfs 0.679 af

Subcatchment Post DA- 1: Pervious Runoff Area=5.380 ac 0.00% Impervious Runoff Depth>0.52"
Tc=15.0 min CN=62 Runoff=1.26 cfs 0.233 af

Subcatchment Post DA-1: Impervious Runoff Area=2.480 ac 100.00% Impervious Runoff Depth>3.06"
Tc=10.0 min CN=98 Runoff=5.23 cfs 0.633 af

Subcatchment Post DA2: Impervious Runoff Area=1.670 ac 100.00% Impervious Runoff Depth>3.06"
Tc=10.0 min CN=98 Runoff=3.52 cfs 0.426 af

Subcatchment Post DA3: Pervious Runoff Area=1.560 ac 0.00% Impervious Runoff Depth>0.69"
Flow Length=100' Slope=0.0100 '/' Tc=18.5 min CN=66 Runoff=0.50 cfs 0.089 af

Subcatchment Post DA4: Pervious Runoff Area=3.240 ac 0.00% Impervious Runoff Depth>0.78"
Flow Length=100' Slope=0.0100 '/' Tc=12.7 min CN=68 Runoff=1.45 cfs 0.211 af

Subcatchment Post DA5 Off: Off Site Runoff Area=0.090 ac 100.00% Impervious Runoff Depth>3.06"
Flow Length=75' Slope=0.0150 '/' Tc=12.5 min CN=98 Runoff=0.17 cfs 0.023 af

Subcatchment Post DA5 Off: Off Site Runoff Area=2.810 ac 0.00% Impervious Runoff Depth>1.10"
Flow Length=75' Slope=0.0150 '/' Tc=12.5 min CN=74 Runoff=1.97 cfs 0.257 af

Pond Lake1: Basin Peak Elev=11.19' Storage=24,838 cf Inflow=6.09 cfs 0.866 af
Outflow=0.45 cfs 0.407 af

Pond Lake2: Lake 2 Peak Elev=10.05' Storage=23,609 cf Inflow=3.77 cfs 0.905 af
Outflow=0.48 cfs 0.369 af

Pond Lake3: Lake 3 Peak Elev=9.07' Storage=13,892 cf Inflow=4.56 cfs 0.961 af
Outflow=0.86 cfs 0.724 af

Pond Lake4&5: Lake 4 & 5 Peak Elev=8.49' Storage=70,231 cf Inflow=7.39 cfs 1.614 af
Outflow=0.00 cfs 0.000 af

Link 1L: Combo Discharge Inflow=2.14 cfs 0.280 af
Primary=2.14 cfs 0.280 af

Total Runoff Area = 24.970 ac Runoff Volume = 3.126 af Average Runoff Depth = 1.50"
64.48% Pervious = 16.100 ac 35.52% Impervious = 8.870 ac

Summary for Subcatchment Post DA 2: Pervious

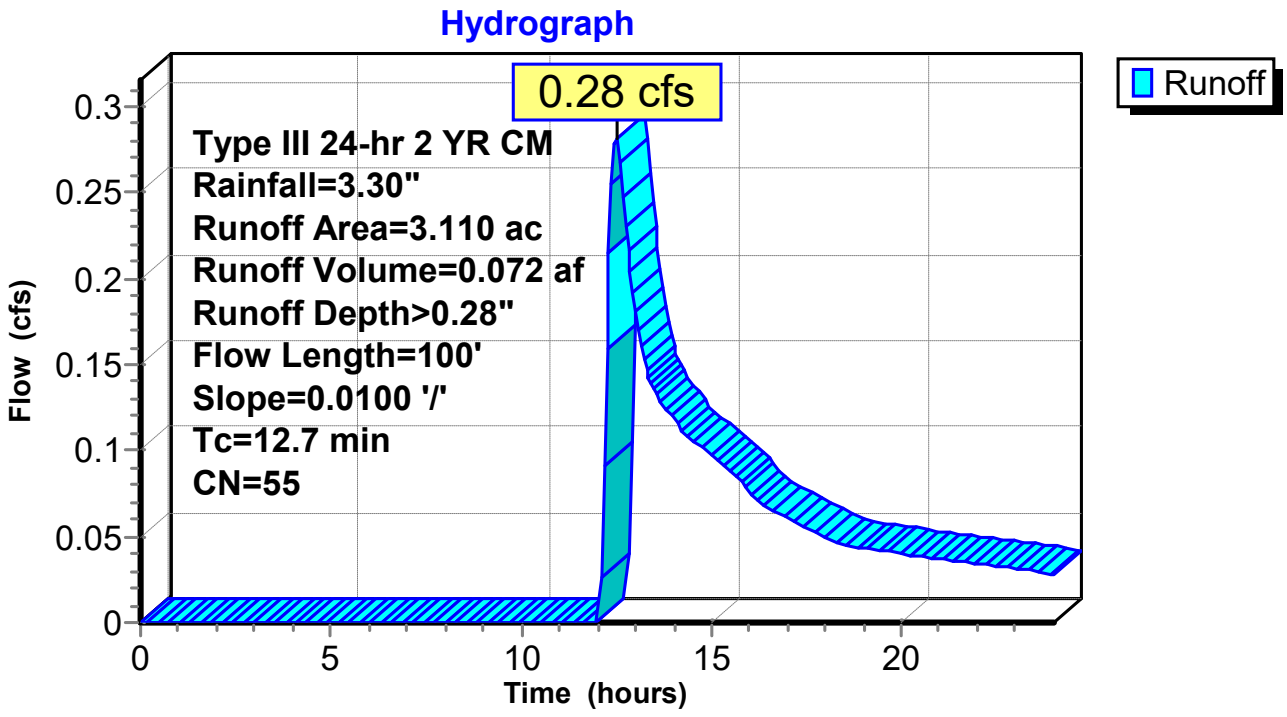
Runoff = 0.28 cfs @ 12.51 hrs, Volume= 0.072 af, Depth> 0.28"

Runoff by SCS TR-20 method, UH=Delmarva, Time Span= 0.00-24.01 hrs, dt= 0.07 hrs
Type III 24-hr 2 YR CM Rainfall=3.30"

Area (ac)	CN	Description
1.000	39	>75% Grass cover, Good, HSG A
1.340	61	>75% Grass cover, Good, HSG B
0.590	74	>75% Grass cover, Good, HSG C
0.080	30	Woods, Good, HSG A
0.100	55	Woods, Good, HSG B
3.110	55	Weighted Average
3.110		Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
12.7	100	0.0100	0.13		**Sheet Flow, Unpaved** Grass: Short n= 0.150 P2= 3.30"

Subcatchment Post DA 2: Pervious



Summary for Subcatchment Post DA 3: Impervious

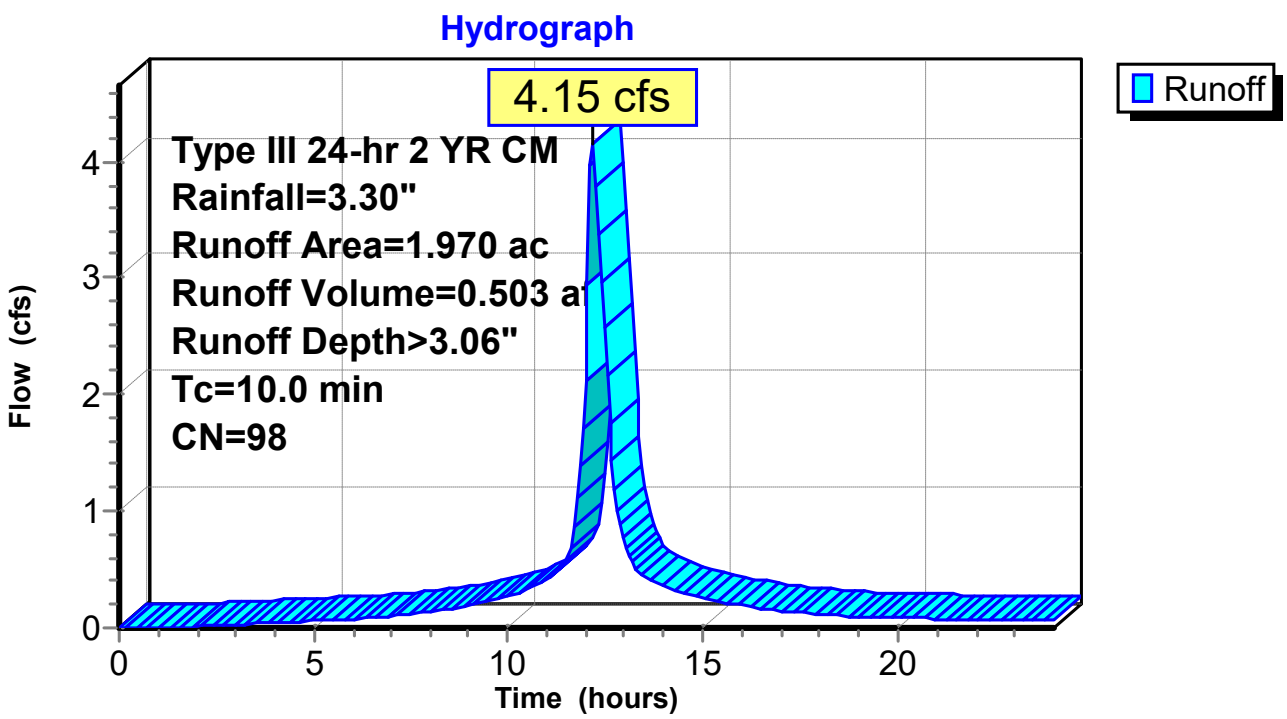
Runoff = 4.15 cfs @ 12.17 hrs, Volume= 0.503 af, Depth> 3.06"

Runoff by SCS TR-20 method, UH=Delmarva, Time Span= 0.00-24.01 hrs, dt= 0.07 hrs
Type III 24-hr 2 YR CM Rainfall=3.30"

Area (ac)	CN	Description
0.630	98	Water Surface
1.340	98	Paved parking & roofs
1.970	98	Weighted Average
1.970		Impervious Area

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

Subcatchment Post DA 3: Impervious



Summary for Subcatchment Post DA 4: Impervious

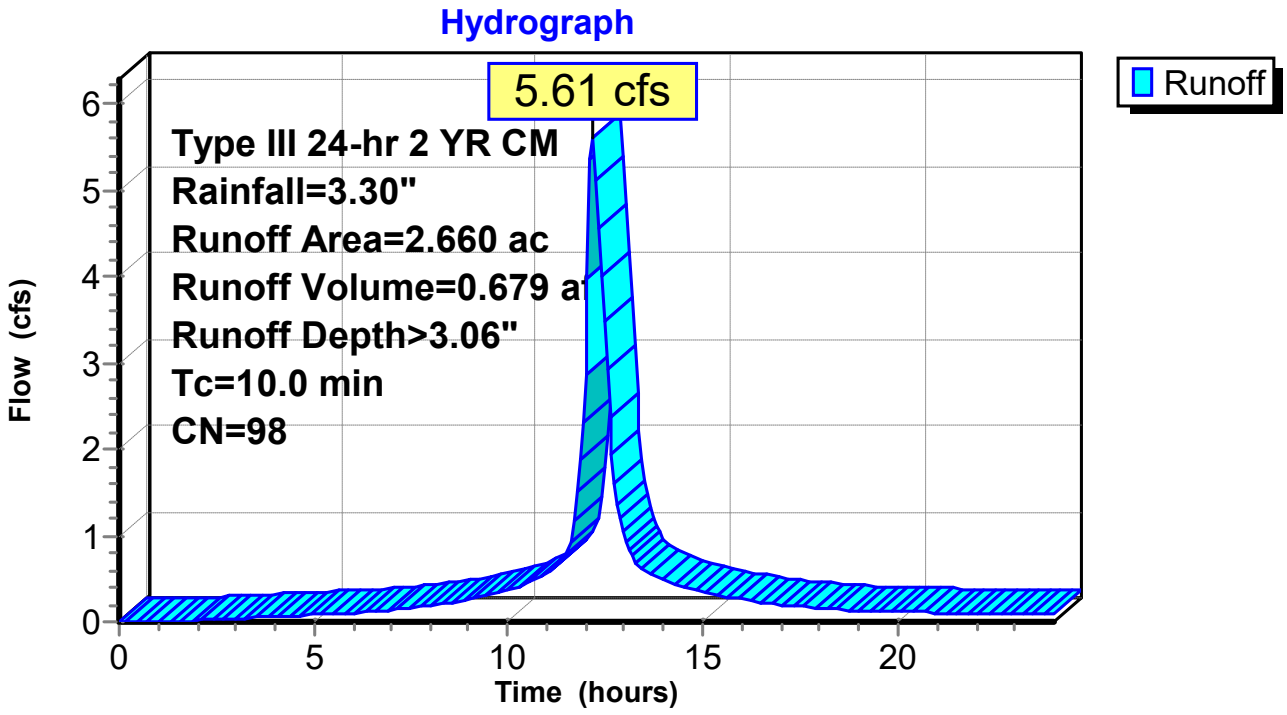
Runoff = 5.61 cfs @ 12.17 hrs, Volume= 0.679 af, Depth> 3.06"

Runoff by SCS TR-20 method, UH=Delmarva, Time Span= 0.00-24.01 hrs, dt= 0.07 hrs
Type III 24-hr 2 YR CM Rainfall=3.30"

	Area (ac)	CN	Description
*	0.100	98	Cart Paths
	1.260	98	Paved parking & roofs
	1.300	98	Water Surface
	2.660	98	Weighted Average
	2.660		Impervious Area

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

Subcatchment Post DA 4: Impervious



Summary for Subcatchment Post DA- 1: Pervious

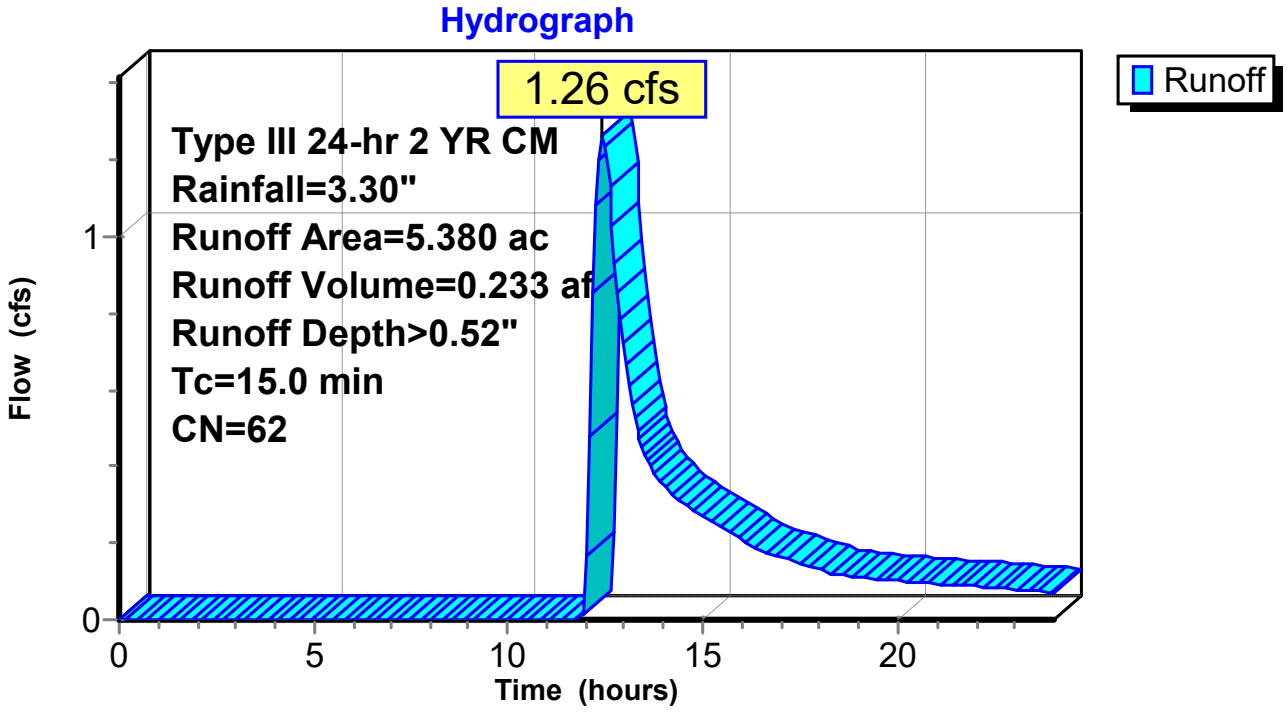
Runoff = 1.26 cfs @ 12.43 hrs, Volume= 0.233 af, Depth> 0.52"

Runoff by SCS TR-20 method, UH=Delmarva, Time Span= 0.00-24.01 hrs, dt= 0.07 hrs
Type III 24-hr 2 YR CM Rainfall=3.30"

Area (ac)	CN	Description
0.010	39	>75% Grass cover, Good, HSG A
4.320	61	>75% Grass cover, Good, HSG B
0.680	74	>75% Grass cover, Good, HSG C
0.370	58	Woods/grass comb., Good, HSG B
5.380	62	Weighted Average
5.380		Pervious Area

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

Subcatchment Post DA- 1: Pervious



Summary for Subcatchment Post DA-1: Impervious

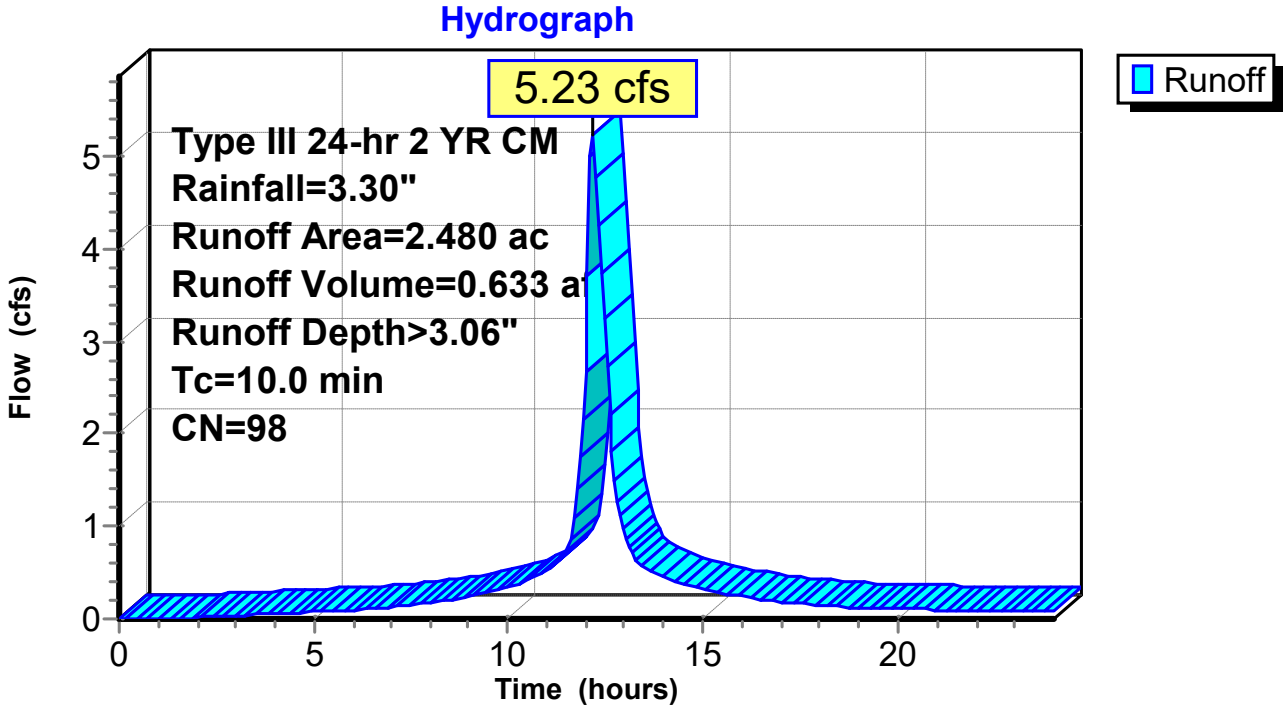
Runoff = 5.23 cfs @ 12.17 hrs, Volume= 0.633 af, Depth> 3.06"

Runoff by SCS TR-20 method, UH=Delmarva, Time Span= 0.00-24.01 hrs, dt= 0.07 hrs
Type III 24-hr 2 YR CM Rainfall=3.30"

Area (ac)	CN	Description
1.160	98	Water Surface
1.320	98	Paved parking & roofs
2.480	98	Weighted Average
2.480		Impervious Area

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

Subcatchment Post DA-1: Impervious



Summary for Subcatchment Post DA2: Impervious

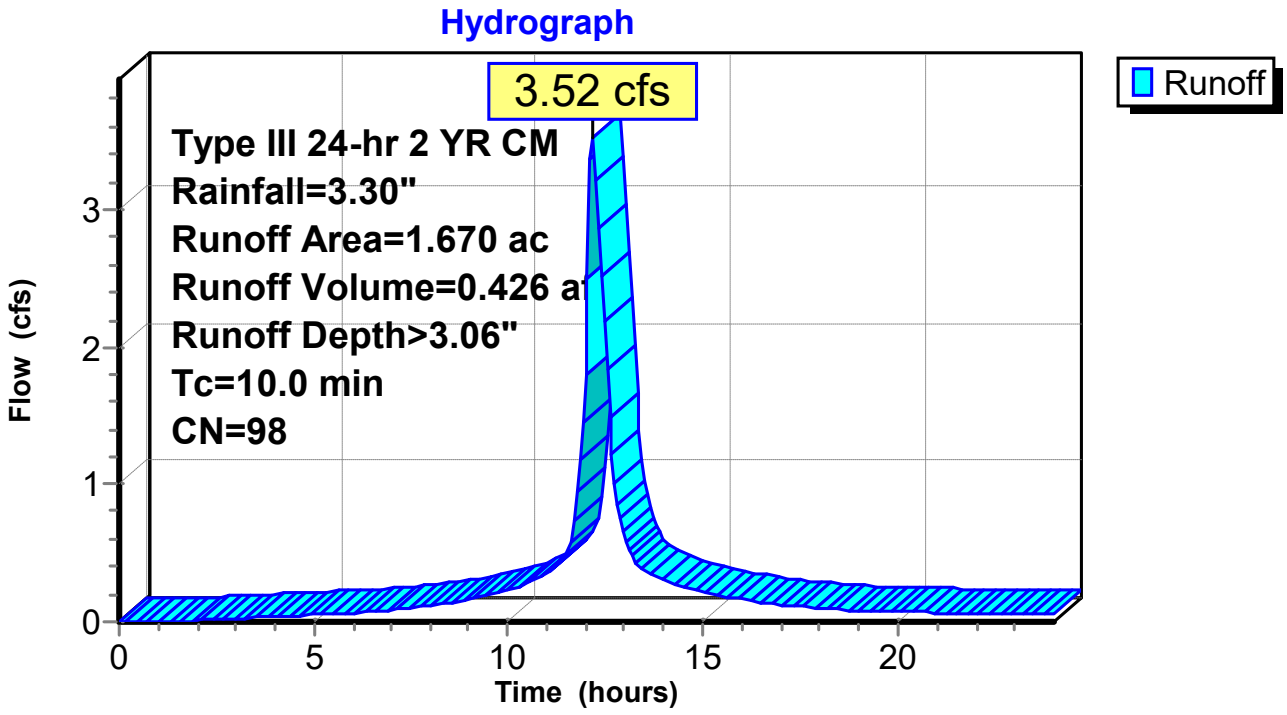
Runoff = 3.52 cfs @ 12.17 hrs, Volume= 0.426 af, Depth> 3.06"

Runoff by SCS TR-20 method, UH=Delmarva, Time Span= 0.00-24.01 hrs, dt= 0.07 hrs
Type III 24-hr 2 YR CM Rainfall=3.30"

	Area (ac)	CN	Description
*	0.250	98	Cart Paths
	1.330	98	Water Surface
*	0.090	98	Townhouse
	1.670	98	Weighted Average
	1.670		Impervious Area

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

Subcatchment Post DA2: Impervious



Summary for Subcatchment Post DA3: Pervious

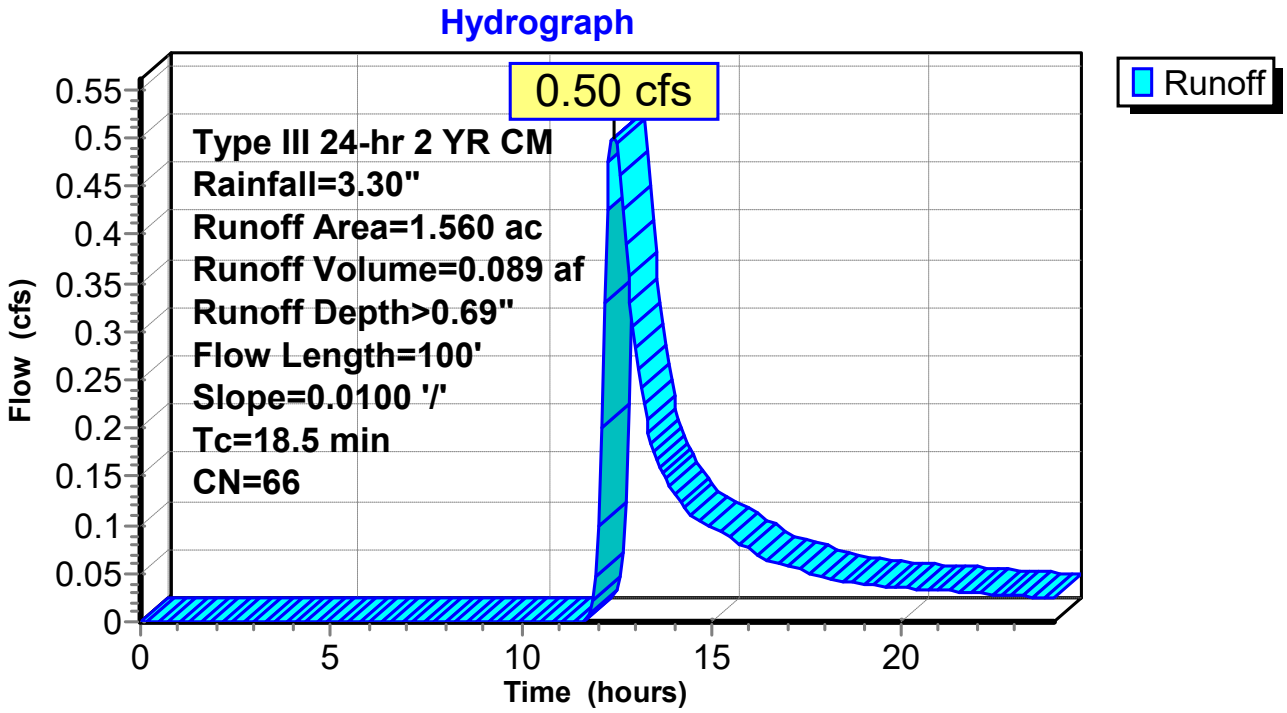
Runoff = 0.50 cfs @ 12.44 hrs, Volume= 0.089 af, Depth> 0.69"

Runoff by SCS TR-20 method, UH=Delmarva, Time Span= 0.00-24.01 hrs, dt= 0.07 hrs
Type III 24-hr 2 YR CM Rainfall=3.30"

Area (ac)	CN	Description
1.000	61	>75% Grass cover, Good, HSG B
0.560	74	>75% Grass cover, Good, HSG C
1.560	66	Weighted Average
1.560		Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
18.5	100	0.0100	0.09		**Sheet Flow, Unpaved** Grass: Dense n= 0.240 P2= 3.30"

Subcatchment Post DA3: Pervious



Summary for Subcatchment Post DA4: Pervious

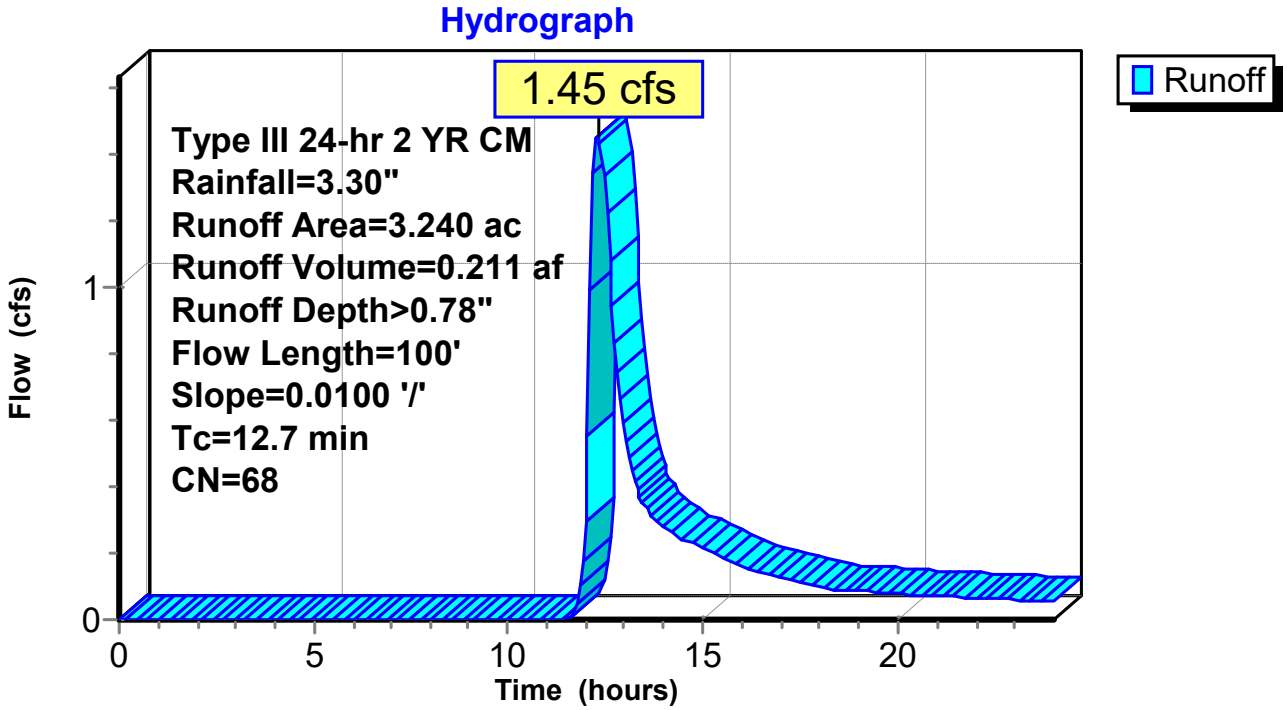
Runoff = 1.45 cfs @ 12.29 hrs, Volume= 0.211 af, Depth> 0.78"

Runoff by SCS TR-20 method, UH=Delmarva, Time Span= 0.00-24.01 hrs, dt= 0.07 hrs
Type III 24-hr 2 YR CM Rainfall=3.30"

Area (ac)	CN	Description
0.660	61	>75% Grass cover, Good, HSG B
1.810	74	>75% Grass cover, Good, HSG C
0.550	55	Woods, Good, HSG B
0.220	70	Woods, Good, HSG C
3.240	68	Weighted Average
3.240		Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
12.7	100	0.0100	0.13		**Sheet Flow, Unpaved** Grass: Short n= 0.150 P2= 3.30"

Subcatchment Post DA4: Pervious



Summary for Subcatchment Post DA5 Off: Off Site Impervious

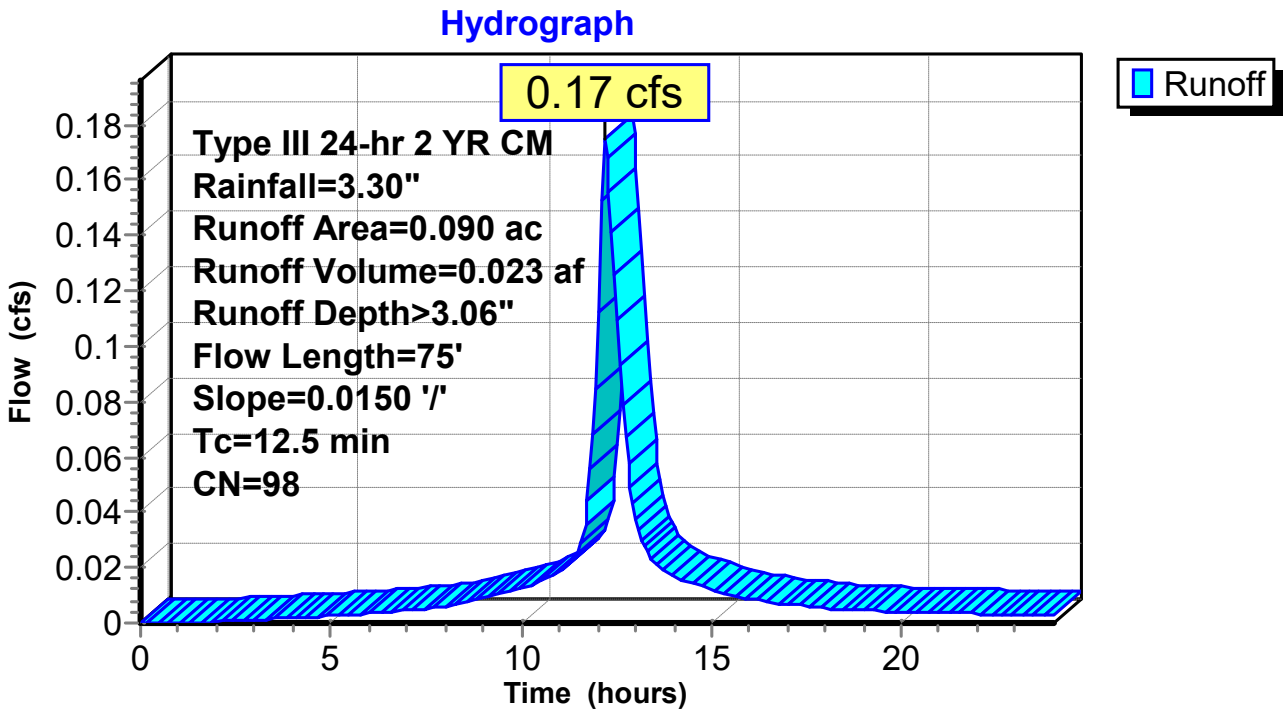
Runoff = 0.17 cfs @ 12.20 hrs, Volume= 0.023 af, Depth> 3.06"

Runoff by SCS TR-20 method, UH=Delmarva, Time Span= 0.00-24.01 hrs, dt= 0.07 hrs
Type III 24-hr 2 YR CM Rainfall=3.30"

	Area (ac)	CN	Description
*	0.090	98	Impervious
	0.090		Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
12.5	75	0.0150	0.10		**Sheet Flow, Unpaved** Grass: Dense n= 0.240 P2= 3.30"

Subcatchment Post DA5 Off: Off Site Impervious



Summary for Subcatchment Post DA5 Off: Off Site Pervious

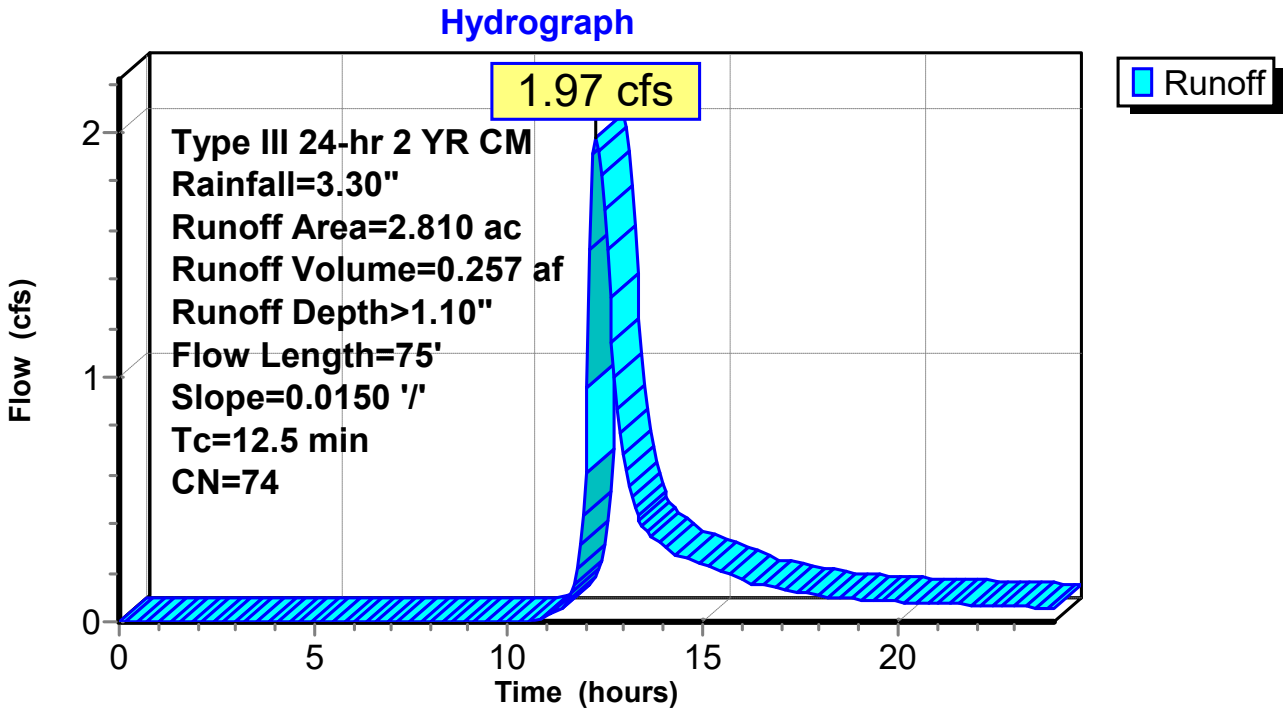
Runoff = 1.97 cfs @ 12.25 hrs, Volume= 0.257 af, Depth> 1.10"

Runoff by SCS TR-20 method, UH=Delmarva, Time Span= 0.00-24.01 hrs, dt= 0.07 hrs
Type III 24-hr 2 YR CM Rainfall=3.30"

Area (ac)	CN	Description
2.710	74	>75% Grass cover, Good, HSG C
0.100	72	Woods/grass comb., Good, HSG C
2.810	74	Weighted Average
2.810		Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
12.5	75	0.0150	0.10		**Sheet Flow, Unpaved** Grass: Dense n= 0.240 P2= 3.30"

Subcatchment Post DA5 Off: Off Site Pervious



Summary for Pond Lake1: Basin

Inflow Area = 7.860 ac, 31.55% Impervious, Inflow Depth > 1.32" for 2 YR CM event
Inflow = 6.09 cfs @ 12.20 hrs, Volume= 0.866 af
Outflow = 0.45 cfs @ 15.97 hrs, Volume= 0.407 af, Atten= 93%, Lag= 226.5 min
Primary = 0.45 cfs @ 15.97 hrs, Volume= 0.407 af

Routing by Stor-Ind method, Time Span= 0.00-24.01 hrs, dt= 0.07 hrs
Peak Elev= 11.19' @ 15.97 hrs Surf.Area= 0 sf Storage= 24,838 cf

Plug-Flow detention time= 404.2 min calculated for 0.407 af (47% of inflow)
Center-of-Mass det. time= 260.1 min (1,066.0 - 805.9)

Volume	Invert	Avail.Storage	Storage Description
#1	10.70'	137,878 cf	**Custom Stage Data** Listed below

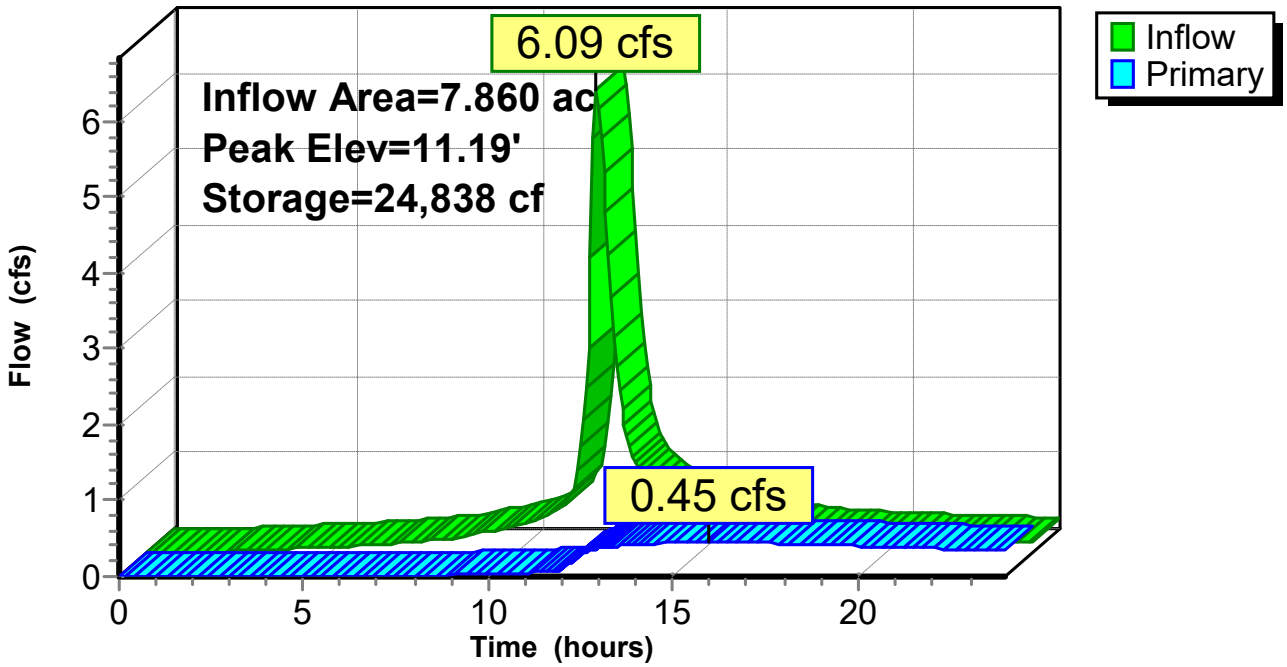
Elevation (feet)	Cum.Store (cubic-feet)
10.70	0
11.00	15,300
12.00	65,780
13.00	118,459
13.70	137,878

Device	Routing	Invert	Outlet Devices
#1	Primary	11.35'	**2.0' long Sharp-Crested Rectangular Weir** 2 End Contraction(s)
#2	Primary	10.70'	**0.5' long Sharp-Crested Rectangular Weir** 2 End Contraction(s)

Primary OutFlow Max=0.45 cfs @ 15.97 hrs HW=11.19' (Free Discharge)
↑ **1=Sharp-Crested Rectangular Weir** (Controls 0.00 cfs)
└ **2=Sharp-Crested Rectangular Weir** (Weir Controls 0.45 cfs @ 2.29 fps)

Pond Lake1: Basin

Hydrograph



Summary for Pond Lake2: Lake 2

Inflow Area = 12.640 ac, 32.83% Impervious, Inflow Depth > 0.86" for 2 YR CM event
Inflow = 3.77 cfs @ 12.18 hrs, Volume= 0.905 af
Outflow = 0.48 cfs @ 21.42 hrs, Volume= 0.369 af, Atten= 87%, Lag= 554.3 min
Primary = 0.48 cfs @ 21.42 hrs, Volume= 0.369 af

Routing by Stor-Ind method, Time Span= 0.00-24.01 hrs, dt= 0.07 hrs
Peak Elev= 10.05' @ 21.42 hrs Surf.Area= 0 sf Storage= 23,609 cf

Plug-Flow detention time= 453.5 min calculated for 0.368 af (41% of inflow)
Center-of-Mass det. time= 222.9 min (1,138.3 - 915.4)

Volume	Invert	Avail.Storage	Storage Description
#1	9.67'	87,360 cf	**Custom Stage Data** Listed below

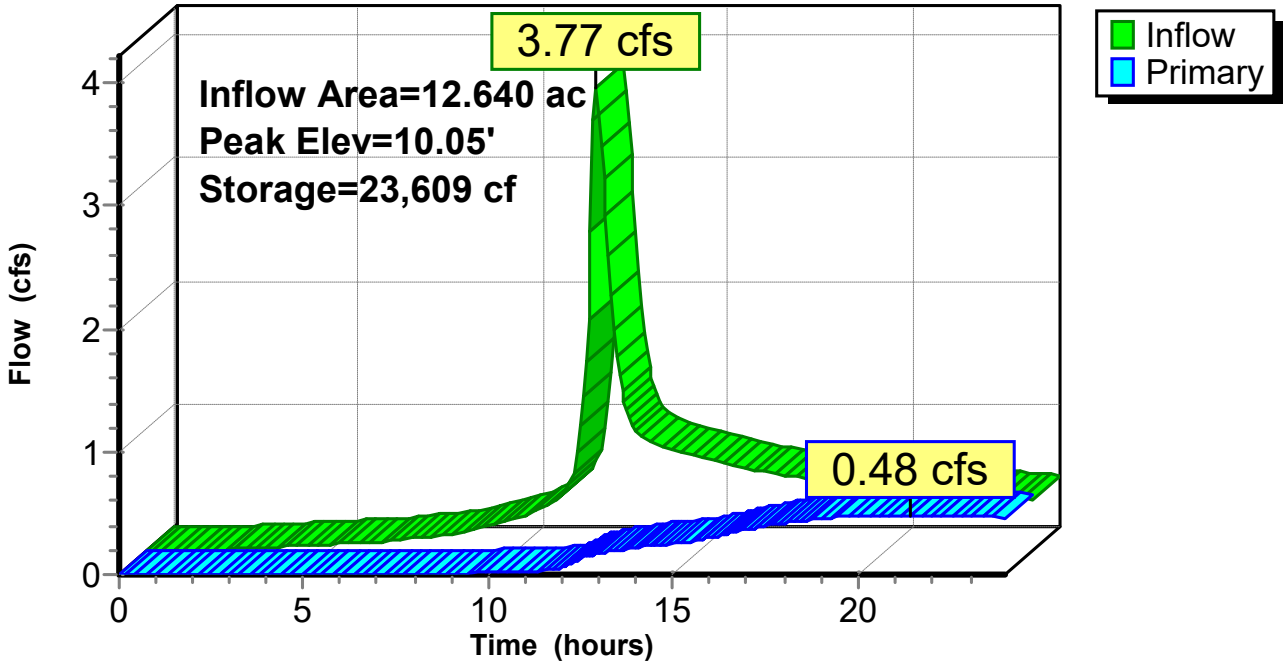
Elevation (feet)	Cum.Store (cubic-feet)
9.67	0
10.00	20,120
11.00	87,360

Device	Routing	Invert	Outlet Devices
#1	Primary	10.00'	**4.0' long Sharp-Crested Rectangular Weir** 2 End Contraction(s)
#2	Primary	9.67'	**0.5' long Sharp-Crested Rectangular Weir** 2 End Contraction(s)

Primary OutFlow Max=0.48 cfs @ 21.42 hrs HW=10.05' (Free Discharge)
└**1=Sharp-Crested Rectangular Weir** (Weir Controls 0.15 cfs @ 0.74 fps)
└**2=Sharp-Crested Rectangular Weir** (Weir Controls 0.33 cfs @ 2.02 fps)

Pond Lake2: Lake 2

Hydrograph



Summary for Pond Lake3: Lake 3

Inflow Area = 16.170 ac, 37.85% Impervious, Inflow Depth > 0.71" for 2 YR CM event
Inflow = 4.56 cfs @ 12.18 hrs, Volume= 0.961 af
Outflow = 0.86 cfs @ 13.37 hrs, Volume= 0.724 af, Atten= 81%, Lag= 71.2 min
Primary = 0.86 cfs @ 13.37 hrs, Volume= 0.724 af

Routing by Stor-Ind method, Time Span= 0.00-24.01 hrs, dt= 0.07 hrs
Peak Elev= 9.07' @ 13.37 hrs Surf.Area= 0 sf Storage= 13,892 cf

Plug-Flow detention time= 241.4 min calculated for 0.724 af (75% of inflow)
Center-of-Mass det. time= 120.3 min (1,041.3 - 921.0)

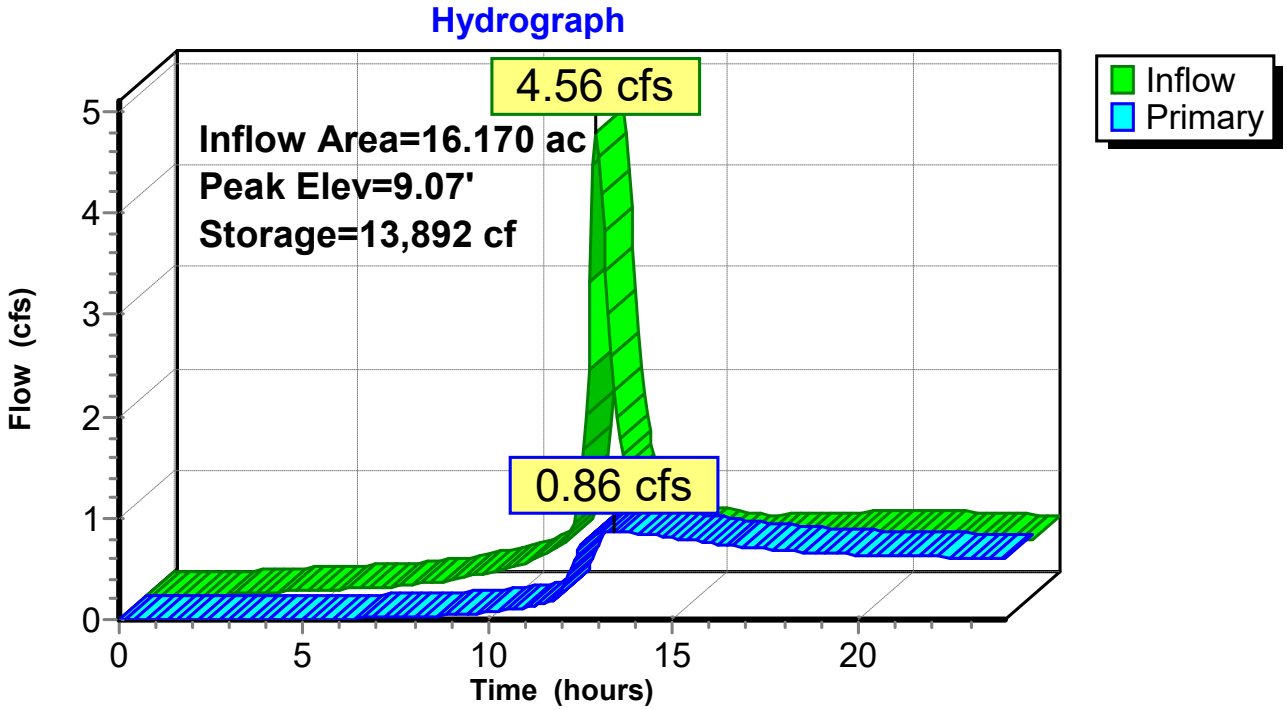
Volume	Invert	Avail.Storage	Storage Description
#1	8.60'	69,310 cf	**Custom Stage Data** Listed below

Elevation (feet)	Cum.Store (cubic-feet)
8.60	0
9.00	11,585
10.00	42,767
10.80	69,310

Device	Routing	Invert	Outlet Devices
#1	Primary	9.60'	**12.0' long Sharp-Crested Rectangular Weir** 2 End Contraction(s)
#2	Primary	9.60'	**4.0' long Sharp-Crested Rectangular Weir** 2 End Contraction(s)
#3	Primary	8.60'	**0.5' long Sharp-Crested Rectangular Weir** 2 End Contraction(s)
#4	Primary	8.60'	**0.5' long Sharp-Crested Rectangular Weir** 2 End Contraction(s)

Primary OutFlow Max=0.86 cfs @ 13.37 hrs HW=9.07' (Free Discharge)
- **1=Sharp-Crested Rectangular Weir** (Controls 0.00 cfs)
- **2=Sharp-Crested Rectangular Weir** (Controls 0.00 cfs)
- **3=Sharp-Crested Rectangular Weir** (Weir Controls 0.43 cfs @ 2.25 fps)
- **4=Sharp-Crested Rectangular Weir** (Weir Controls 0.43 cfs @ 2.25 fps)

Pond Lake3: Lake 3



Summary for Pond Lake4&5: Lake 4 & 5

Inflow Area = 22.070 ac, 39.78% Impervious, Inflow Depth > 0.88" for 2 YR CM event
Inflow = 7.39 cfs @ 12.19 hrs, Volume= 1.614 af
Outflow = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af, Atten= 100%, Lag= 0.0 min
Primary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af

Routing by Stor-Ind method, Time Span= 0.00-24.01 hrs, dt= 0.07 hrs
Peak Elev= 8.49' @ 24.01 hrs Surf.Area= 53,341 sf Storage= 70,231 cf

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

Volume	Invert	Avail.Storage	Storage Description
#1	7.00'	126,192 cf	**Custom Stage Data (Prismatic)** Listed below

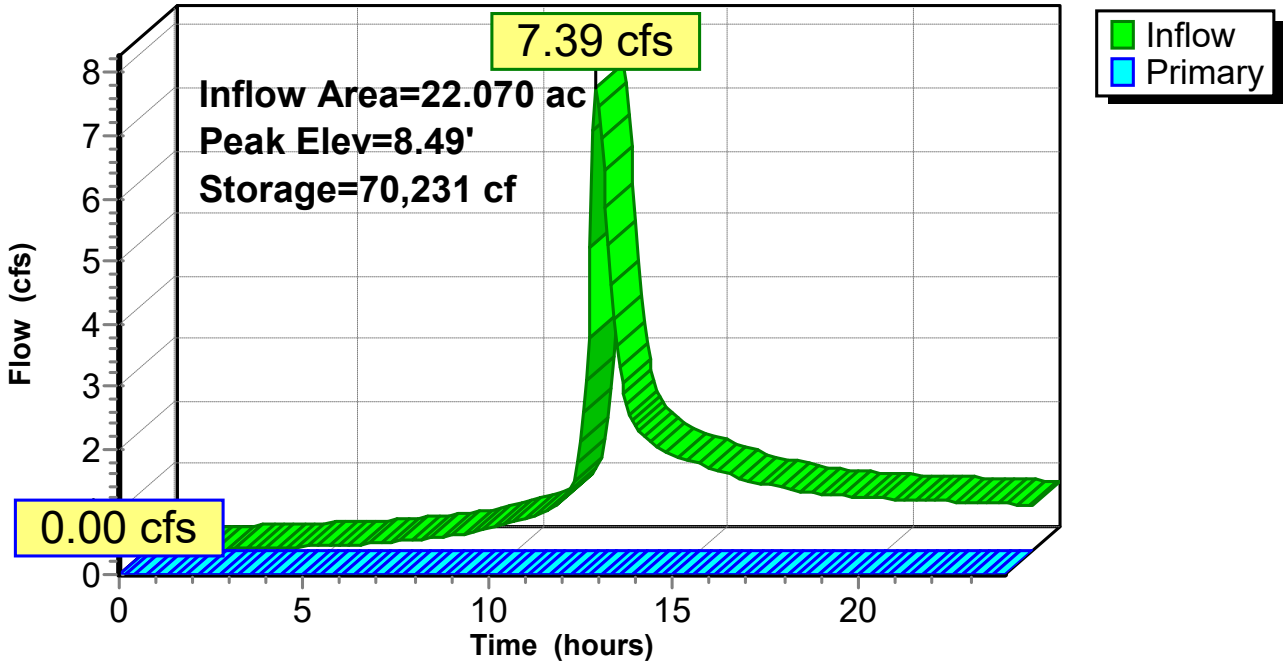
Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
7.00	27,767	0	0
7.40	46,551	14,864	14,864
8.00	50,946	29,249	44,113
9.00	55,842	53,394	97,507
9.50	58,900	28,686	126,192

Device	Routing	Invert	Outlet Devices
#1	Primary	9.20'	**100.0' long x 20.0' 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
#2	Primary	9.00'	**4.0' long Sharp-Crested Rectangular Weir** 2 End Contraction(s)

Primary OutFlow Max=0.00 cfs @ 0.00 hrs HW=7.00' (Free Discharge)
1=Broad-Crested Rectangular Weir (Controls 0.00 cfs)
2=Sharp-Crested Rectangular Weir (Controls 0.00 cfs)

Pond Lake4&5: Lake 4 & 5

Hydrograph

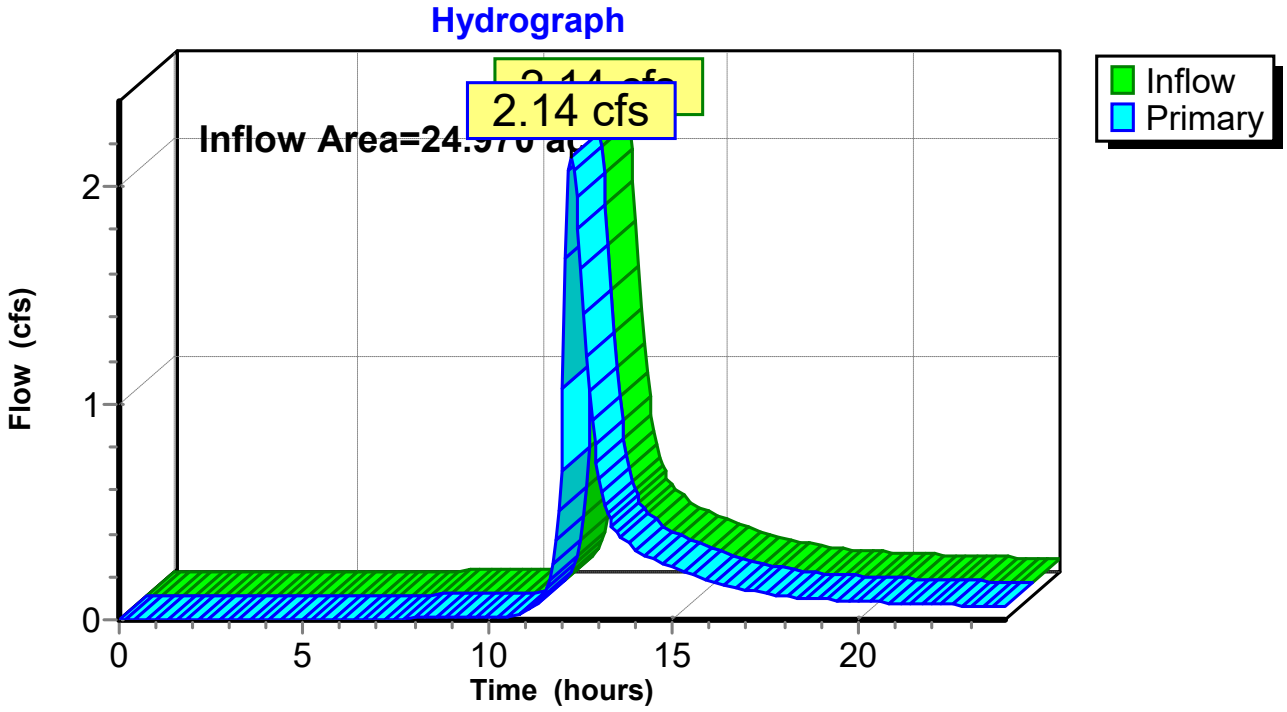


Summary for Link 1L: Combo Discharge

Inflow Area = 24.970 ac, 35.52% Impervious, Inflow Depth > 0.13" for 2 YR CM event
Inflow = 2.14 cfs @ 12.25 hrs, Volume= 0.280 af
Primary = 2.14 cfs @ 12.25 hrs, Volume= 0.280 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-24.01 hrs, dt= 0.07 hrs

Link 1L: Combo Discharge



Time span=0.00-24.00 hrs, dt=0.07 hrs, 344 points
Runoff by SCS TR-20 method, UH=Delmarva
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Subcatchment Post DA 2: Pervious Runoff Area=3.110 ac 0.00% Impervious Runoff Depth>0.61"
Flow Length=100' Slope=0.0100 '/' Tc=12.7 min CN=55 Runoff=0.87 cfs 0.157 af

Subcatchment Post DA 3: Impervious Runoff Area=1.970 ac 100.00% Impervious Runoff Depth>3.96"
Tc=10.0 min CN=98 Runoff=5.31 cfs 0.650 af

Subcatchment Post DA 4: Impervious Runoff Area=2.660 ac 100.00% Impervious Runoff Depth>3.96"
Tc=10.0 min CN=98 Runoff=7.18 cfs 0.877 af

Subcatchment Post DA- 1: Pervious Runoff Area=5.380 ac 0.00% Impervious Runoff Depth>0.96"
Tc=15.0 min CN=62 Runoff=2.75 cfs 0.433 af

Subcatchment Post DA-1: Impervious Runoff Area=2.480 ac 100.00% Impervious Runoff Depth>3.96"
Tc=10.0 min CN=98 Runoff=6.69 cfs 0.818 af

Subcatchment Post DA2: Impervious Runoff Area=1.670 ac 100.00% Impervious Runoff Depth>3.96"
Tc=10.0 min CN=98 Runoff=4.50 cfs 0.551 af

Subcatchment Post DA3: Pervious Runoff Area=1.560 ac 0.00% Impervious Runoff Depth>1.20"
Flow Length=100' Slope=0.0100 '/' Tc=18.5 min CN=66 Runoff=0.97 cfs 0.156 af

Subcatchment Post DA4: Pervious Runoff Area=3.240 ac 0.00% Impervious Runoff Depth>1.33"
Flow Length=100' Slope=0.0100 '/' Tc=12.7 min CN=68 Runoff=2.70 cfs 0.358 af

Subcatchment Post DA5 Off: Off Site Runoff Area=0.090 ac 100.00% Impervious Runoff Depth>3.95"
Flow Length=75' Slope=0.0150 '/' Tc=12.5 min CN=98 Runoff=0.22 cfs 0.030 af

Subcatchment Post DA5 Off: Off Site Runoff Area=2.810 ac 0.00% Impervious Runoff Depth>1.74"
Flow Length=75' Slope=0.0150 '/' Tc=12.5 min CN=74 Runoff=3.25 cfs 0.407 af

Pond Lake1: Basin Peak Elev=11.39' Storage=35,077 cf Inflow=9.02 cfs 1.250 af
Outflow=0.74 cfs 0.628 af

Pond Lake2: Lake 2 Peak Elev=10.12' Storage=28,000 cf Inflow=5.39 cfs 1.336 af
Outflow=0.92 cfs 0.738 af

Pond Lake3: Lake 3 Peak Elev=9.23' Storage=18,793 cf Inflow=6.16 cfs 1.543 af
Outflow=1.23 cfs 1.186 af

Pond Lake4&5: Lake 4 & 5 Peak Elev=9.11' Storage=103,910 cf Inflow=10.40 cfs 2.422 af
Outflow=0.49 cfs 0.034 af

Link 1L: Combo Discharge Inflow=3.47 cfs 0.471 af
Primary=3.47 cfs 0.471 af

Total Runoff Area = 24.970 ac Runoff Volume = 4.435 af Average Runoff Depth = 2.13"
64.48% Pervious = 16.100 ac 35.52% Impervious = 8.870 ac

Summary for Subcatchment Post DA 2: Pervious

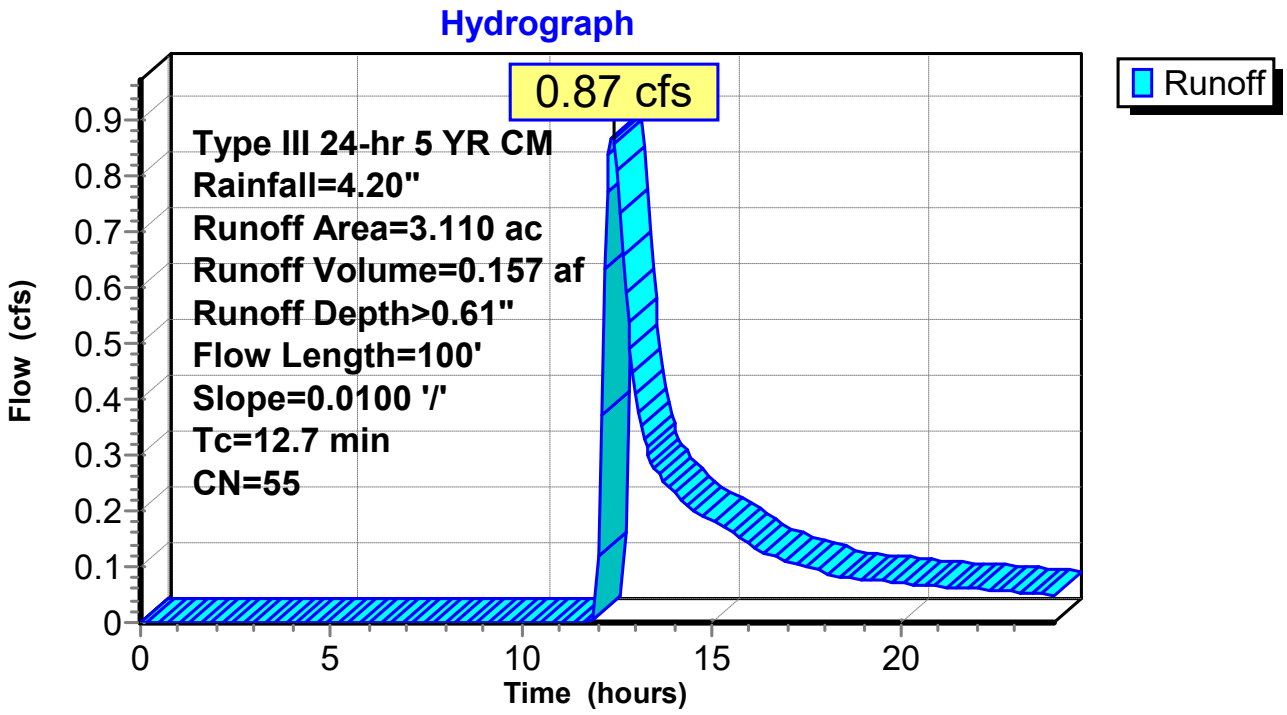
Runoff = 0.87 cfs @ 12.41 hrs, Volume= 0.157 af, Depth> 0.61"

Runoff by SCS TR-20 method, UH=Delmarva, Time Span= 0.00-24.01 hrs, dt= 0.07 hrs
Type III 24-hr 5 YR CM Rainfall=4.20"

Area (ac)	CN	Description
1.000	39	>75% Grass cover, Good, HSG A
1.340	61	>75% Grass cover, Good, HSG B
0.590	74	>75% Grass cover, Good, HSG C
0.080	30	Woods, Good, HSG A
0.100	55	Woods, Good, HSG B
3.110	55	Weighted Average
3.110		Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
12.7	100	0.0100	0.13		**Sheet Flow, Unpaved** Grass: Short n= 0.150 P2= 3.30"

Subcatchment Post DA 2: Pervious



Summary for Subcatchment Post DA 3: Impervious

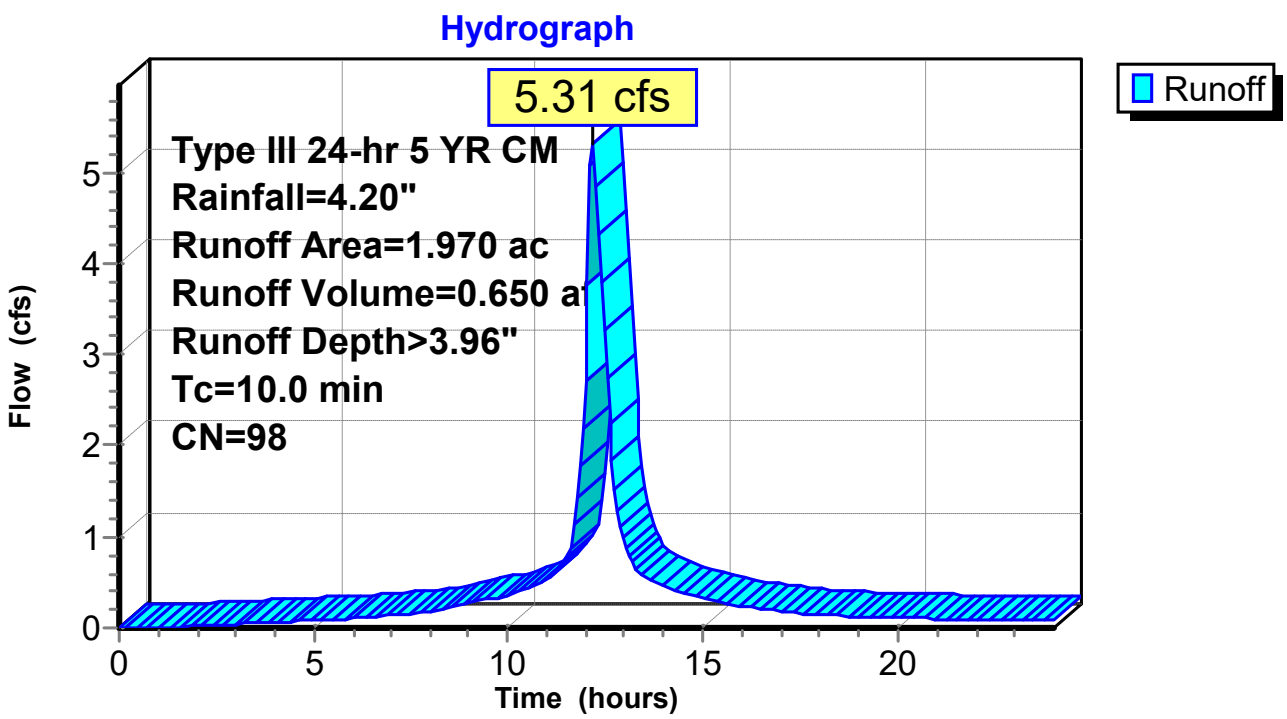
Runoff = 5.31 cfs @ 12.17 hrs, Volume= 0.650 af, Depth> 3.96"

Runoff by SCS TR-20 method, UH=Delmarva, Time Span= 0.00-24.01 hrs, dt= 0.07 hrs
Type III 24-hr 5 YR CM Rainfall=4.20"

Area (ac)	CN	Description
0.630	98	Water Surface
1.340	98	Paved parking & roofs
1.970	98	Weighted Average
1.970		Impervious Area

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

Subcatchment Post DA 3: Impervious



Summary for Subcatchment Post DA 4: Impervious

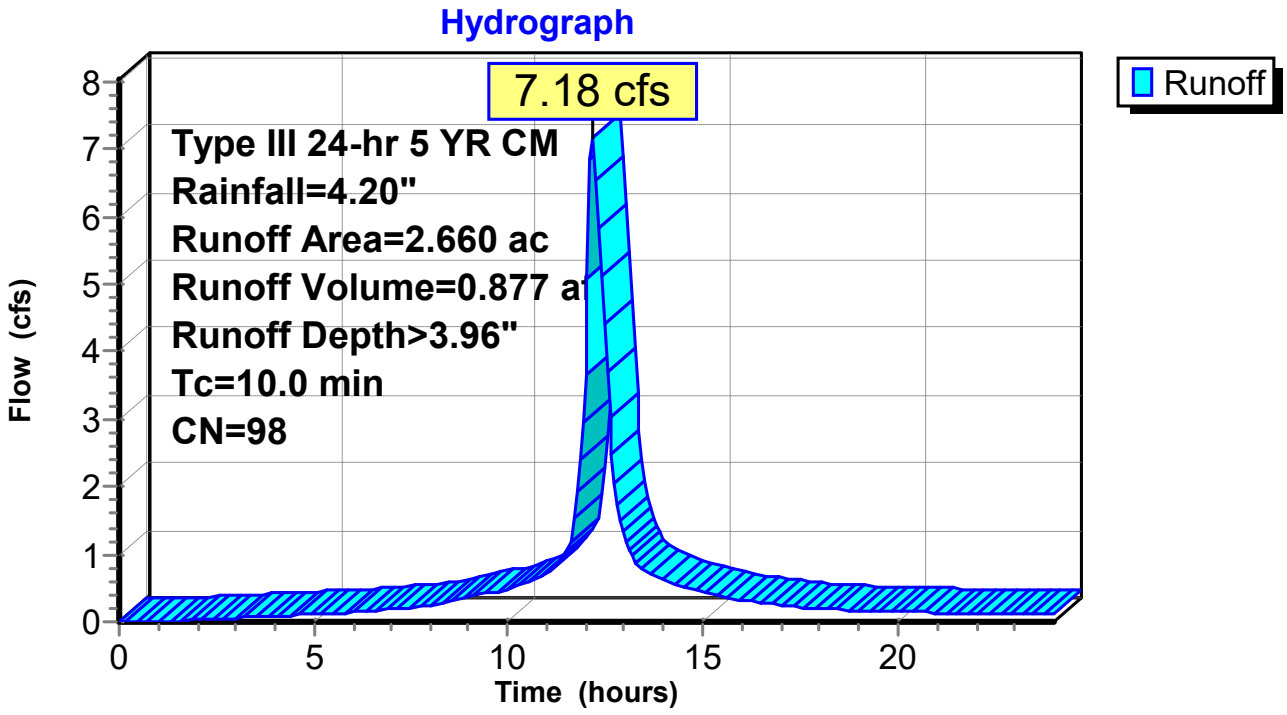
Runoff = 7.18 cfs @ 12.17 hrs, Volume= 0.877 af, Depth> 3.96"

Runoff by SCS TR-20 method, UH=Delmarva, Time Span= 0.00-24.01 hrs, dt= 0.07 hrs
Type III 24-hr 5 YR CM Rainfall=4.20"

	Area (ac)	CN	Description
*	0.100	98	Cart Paths
	1.260	98	Paved parking & roofs
	1.300	98	Water Surface
	2.660	98	Weighted Average
	2.660		Impervious Area

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

Subcatchment Post DA 4: Impervious



Summary for Subcatchment Post DA- 1: Pervious

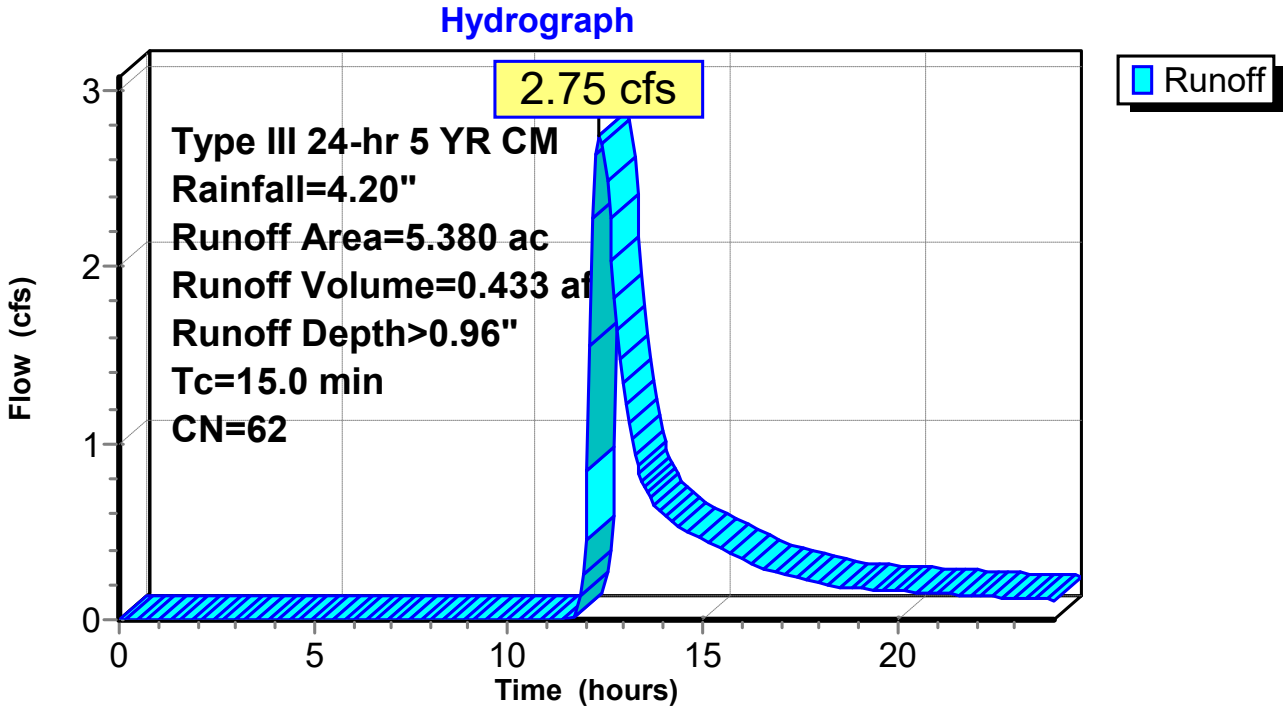
Runoff = 2.75 cfs @ 12.36 hrs, Volume= 0.433 af, Depth> 0.96"

Runoff by SCS TR-20 method, UH=Delmarva, Time Span= 0.00-24.01 hrs, dt= 0.07 hrs
Type III 24-hr 5 YR CM Rainfall=4.20"

Area (ac)	CN	Description
0.010	39	>75% Grass cover, Good, HSG A
4.320	61	>75% Grass cover, Good, HSG B
0.680	74	>75% Grass cover, Good, HSG C
0.370	58	Woods/grass comb., Good, HSG B
5.380	62	Weighted Average
5.380		Pervious Area

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

Subcatchment Post DA- 1: Pervious



Summary for Subcatchment Post DA-1: Impervious

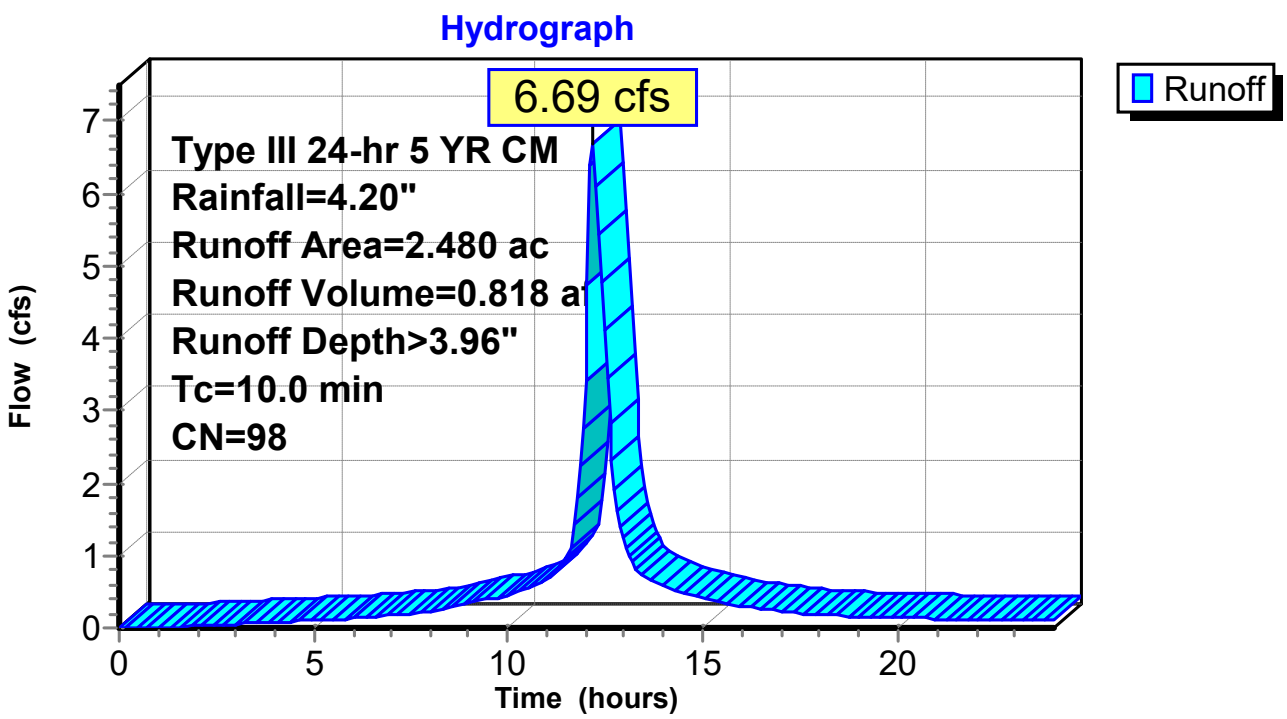
Runoff = 6.69 cfs @ 12.17 hrs, Volume= 0.818 af, Depth> 3.96"

Runoff by SCS TR-20 method, UH=Delmarva, Time Span= 0.00-24.01 hrs, dt= 0.07 hrs
Type III 24-hr 5 YR CM Rainfall=4.20"

Area (ac)	CN	Description
1.160	98	Water Surface
1.320	98	Paved parking & roofs
2.480	98	Weighted Average
2.480		Impervious Area

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

Subcatchment Post DA-1: Impervious



Summary for Subcatchment Post DA2: Impervious

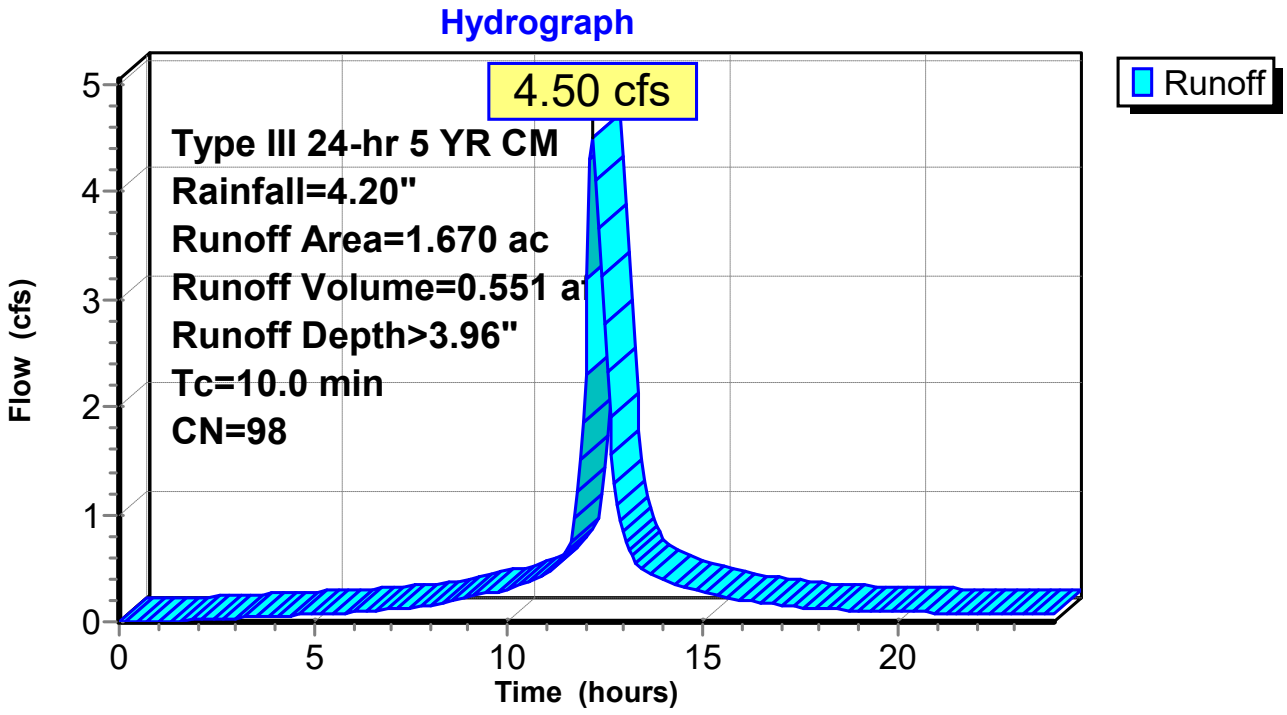
Runoff = 4.50 cfs @ 12.17 hrs, Volume= 0.551 af, Depth> 3.96"

Runoff by SCS TR-20 method, UH=Delmarva, Time Span= 0.00-24.01 hrs, dt= 0.07 hrs
Type III 24-hr 5 YR CM Rainfall=4.20"

	Area (ac)	CN	Description
*	0.250	98	Cart Paths
	1.330	98	Water Surface
*	0.090	98	Townhouse
	1.670	98	Weighted Average
	1.670		Impervious Area

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

Subcatchment Post DA2: Impervious



Summary for Subcatchment Post DA3: Pervious

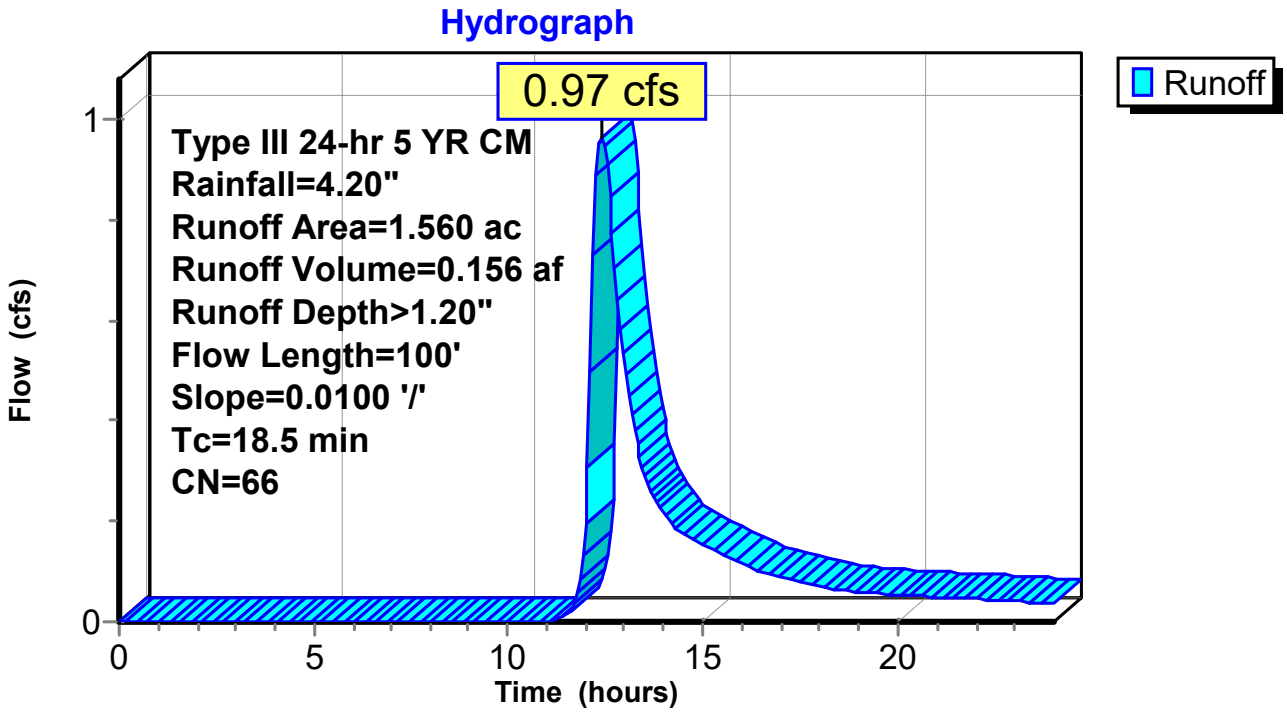
Runoff = 0.97 cfs @ 12.39 hrs, Volume= 0.156 af, Depth> 1.20"

Runoff by SCS TR-20 method, UH=Delmarva, Time Span= 0.00-24.01 hrs, dt= 0.07 hrs
Type III 24-hr 5 YR CM Rainfall=4.20"

Area (ac)	CN	Description
1.000	61	>75% Grass cover, Good, HSG B
0.560	74	>75% Grass cover, Good, HSG C
1.560	66	Weighted Average
1.560		Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
18.5	100	0.0100	0.09		**Sheet Flow, Unpaved** Grass: Dense n= 0.240 P2= 3.30"

Subcatchment Post DA3: Pervious



Summary for Subcatchment Post DA4: Pervious

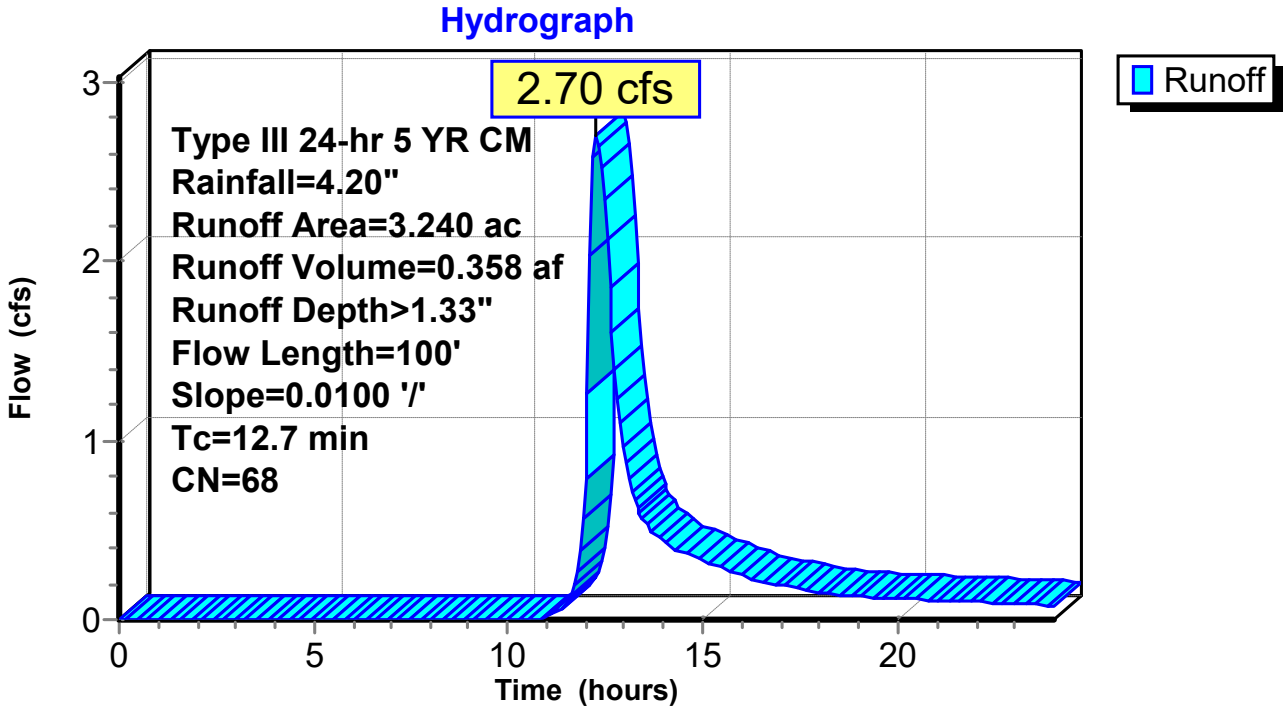
Runoff = 2.70 cfs @ 12.26 hrs, Volume= 0.358 af, Depth> 1.33"

Runoff by SCS TR-20 method, UH=Delmarva, Time Span= 0.00-24.01 hrs, dt= 0.07 hrs
Type III 24-hr 5 YR CM Rainfall=4.20"

Area (ac)	CN	Description
0.660	61	>75% Grass cover, Good, HSG B
1.810	74	>75% Grass cover, Good, HSG C
0.550	55	Woods, Good, HSG B
0.220	70	Woods, Good, HSG C
3.240	68	Weighted Average
3.240		Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
12.7	100	0.0100	0.13		**Sheet Flow, Unpaved** Grass: Short n= 0.150 P2= 3.30"

Subcatchment Post DA4: Pervious



Summary for Subcatchment Post DA5 Off: Off Site Impervious

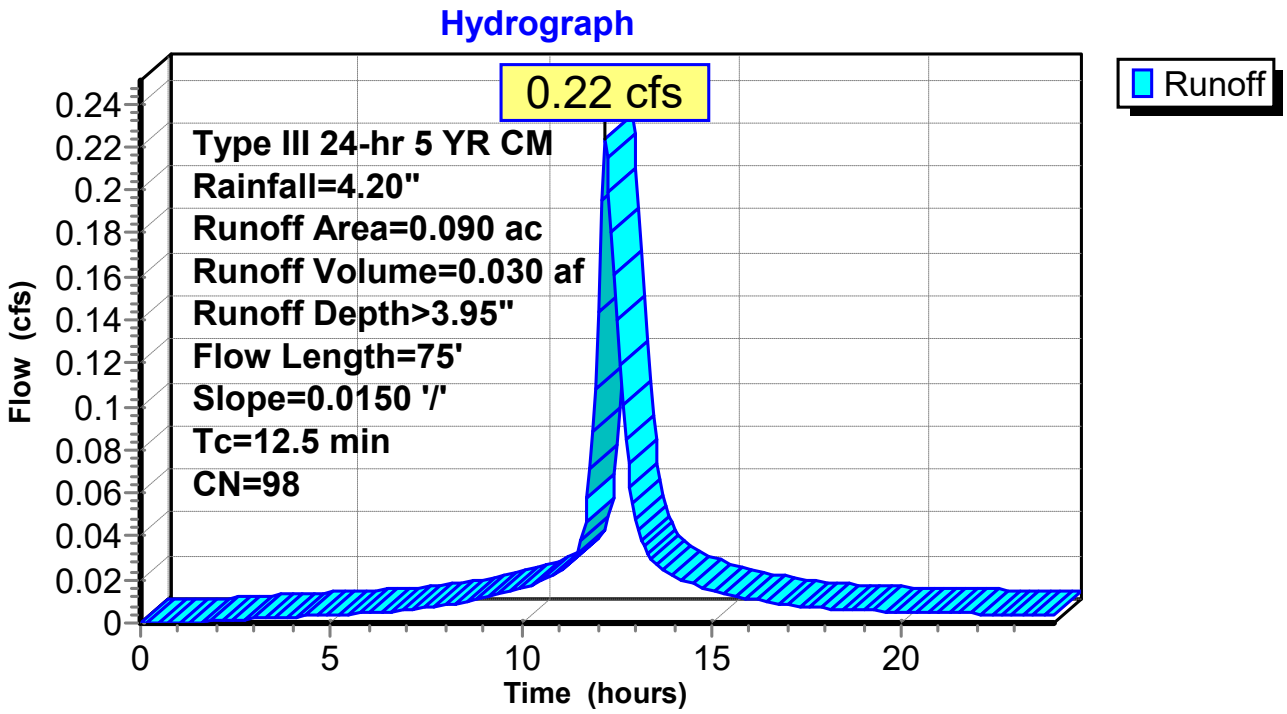
Runoff = 0.22 cfs @ 12.20 hrs, Volume= 0.030 af, Depth> 3.95"

Runoff by SCS TR-20 method, UH=Delmarva, Time Span= 0.00-24.01 hrs, dt= 0.07 hrs
Type III 24-hr 5 YR CM Rainfall=4.20"

	Area (ac)	CN	Description
*	0.090	98	Impervious
	0.090		Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
12.5	75	0.0150	0.10		**Sheet Flow, Unpaved** Grass: Dense n= 0.240 P2= 3.30"

Subcatchment Post DA5 Off: Off Site Impervious



Summary for Subcatchment Post DA5 Off: Off Site Pervious

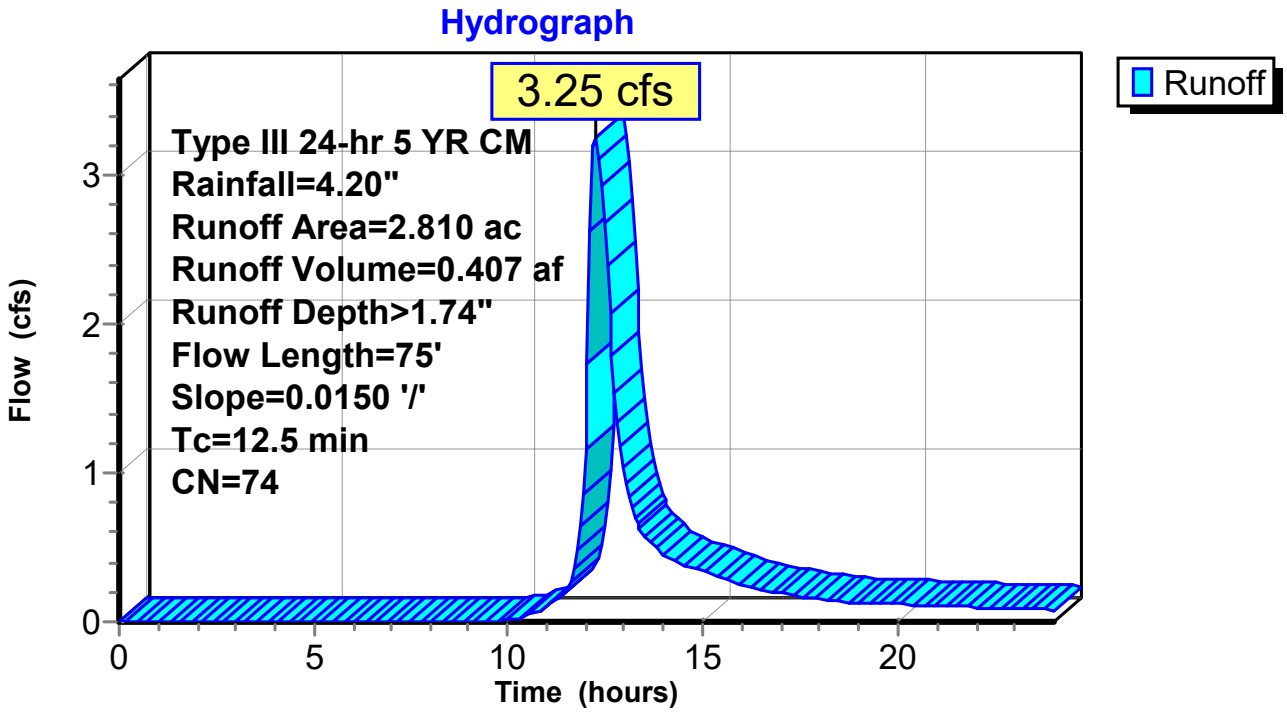
Runoff = 3.25 cfs @ 12.23 hrs, Volume= 0.407 af, Depth> 1.74"

Runoff by SCS TR-20 method, UH=Delmarva, Time Span= 0.00-24.01 hrs, dt= 0.07 hrs
Type III 24-hr 5 YR CM Rainfall=4.20"

Area (ac)	CN	Description
2.710	74	>75% Grass cover, Good, HSG C
0.100	72	Woods/grass comb., Good, HSG C
2.810	74	Weighted Average
2.810		Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
12.5	75	0.0150	0.10		**Sheet Flow, Unpaved** Grass: Dense n= 0.240 P2= 3.30"

Subcatchment Post DA5 Off: Off Site Pervious



Summary for Pond Lake1: Basin

Inflow Area = 7.860 ac, 31.55% Impervious, Inflow Depth > 1.91" for 5 YR CM event
Inflow = 9.02 cfs @ 12.20 hrs, Volume= 1.250 af
Outflow = 0.74 cfs @ 15.60 hrs, Volume= 0.628 af, Atten= 92%, Lag= 203.8 min
Primary = 0.74 cfs @ 15.60 hrs, Volume= 0.628 af

Routing by Stor-Ind method, Time Span= 0.00-24.01 hrs, dt= 0.07 hrs
Peak Elev= 11.39' @ 15.60 hrs Surf.Area= 0 sf Storage= 35,077 cf

Plug-Flow detention time= 389.8 min calculated for 0.628 af (50% of inflow)
Center-of-Mass det. time= 253.2 min (1,059.9 - 806.7)

Volume	Invert	Avail.Storage	Storage Description
#1	10.70'	137,878 cf	**Custom Stage Data** Listed below

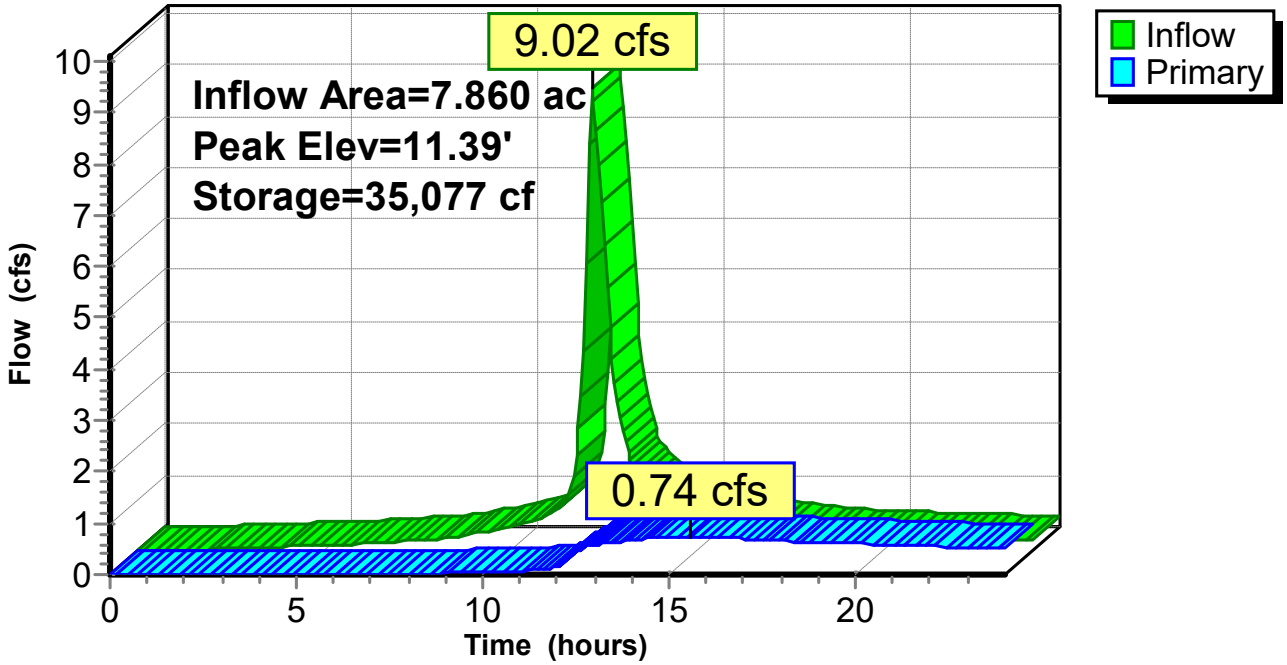
Elevation (feet)	Cum.Store (cubic-feet)
10.70	0
11.00	15,300
12.00	65,780
13.00	118,459
13.70	137,878

Device	Routing	Invert	Outlet Devices
#1	Primary	11.35'	**2.0' long Sharp-Crested Rectangular Weir** 2 End Contraction(s)
#2	Primary	10.70'	**0.5' long Sharp-Crested Rectangular Weir** 2 End Contraction(s)

Primary OutFlow Max=0.74 cfs @ 15.60 hrs HW=11.39' (Free Discharge)
↑ **1=Sharp-Crested Rectangular Weir** (Weir Controls 0.06 cfs @ 0.67 fps)
└ **2=Sharp-Crested Rectangular Weir** (Weir Controls 0.68 cfs @ 2.72 fps)

Pond Lake1: Basin

Hydrograph



Summary for Pond Lake2: Lake 2

Inflow Area = 12.640 ac, 32.83% Impervious, Inflow Depth > 1.27" for 5 YR CM event
Inflow = 5.39 cfs @ 12.19 hrs, Volume= 1.336 af
Outflow = 0.92 cfs @ 17.47 hrs, Volume= 0.738 af, Atten= 83%, Lag= 316.6 min
Primary = 0.92 cfs @ 17.47 hrs, Volume= 0.738 af

Routing by Stor-Ind method, Time Span= 0.00-24.01 hrs, dt= 0.07 hrs
Peak Elev= 10.12' @ 17.47 hrs Surf.Area= 0 sf Storage= 28,000 cf

Plug-Flow detention time= 376.5 min calculated for 0.738 af (55% of inflow)
Center-of-Mass det. time= 190.1 min (1,109.9 - 919.8)

Volume	Invert	Avail.Storage	Storage Description
#1	9.67'	87,360 cf	**Custom Stage Data** Listed below

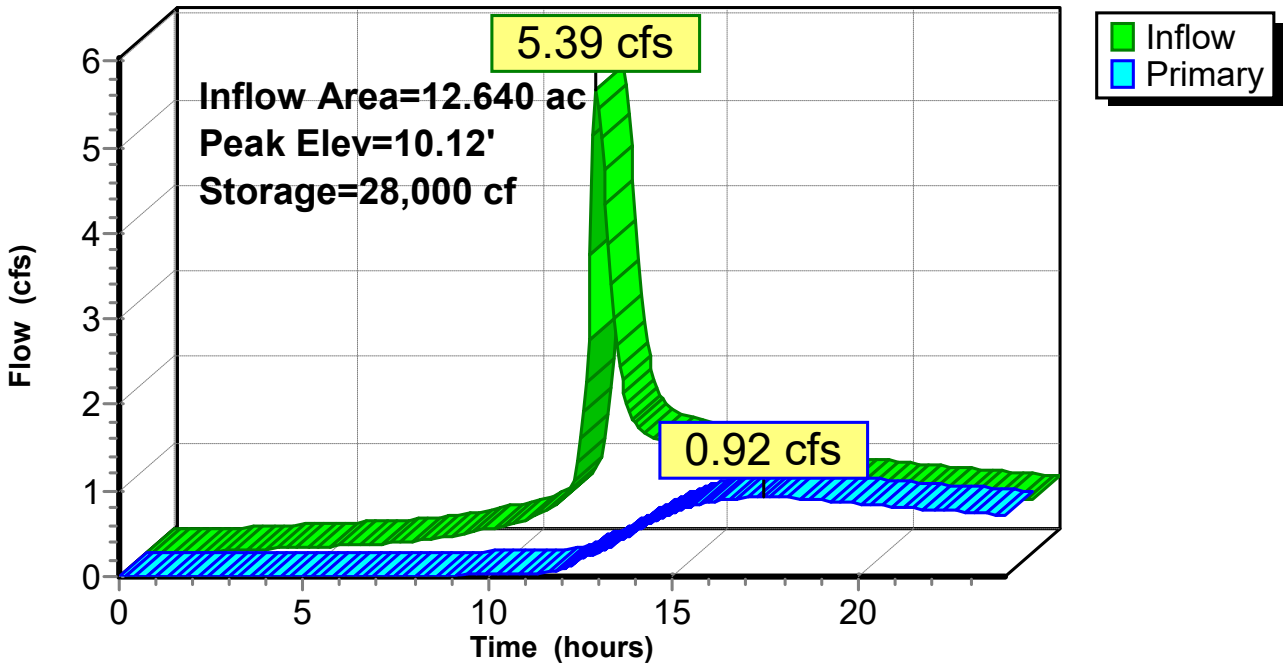
Elevation (feet)	Cum.Store (cubic-feet)
9.67	0
10.00	20,120
11.00	87,360

Device	Routing	Invert	Outlet Devices
#1	Primary	10.00'	**4.0' long Sharp-Crested Rectangular Weir** 2 End Contraction(s)
#2	Primary	9.67'	**0.5' long Sharp-Crested Rectangular Weir** 2 End Contraction(s)

Primary OutFlow Max=0.92 cfs @ 17.47 hrs HW=10.12' (Free Discharge)
1=Sharp-Crested Rectangular Weir (Weir Controls 0.52 cfs @ 1.12 fps)
2=Sharp-Crested Rectangular Weir (Weir Controls 0.40 cfs @ 2.19 fps)

Pond Lake2: Lake 2

Hydrograph



Summary for Pond Lake3: Lake 3

Inflow Area = 16.170 ac, 37.85% Impervious, Inflow Depth > 1.15" for 5 YR CM event
Inflow = 6.16 cfs @ 12.19 hrs, Volume= 1.543 af
Outflow = 1.23 cfs @ 13.73 hrs, Volume= 1.186 af, Atten= 80%, Lag= 92.3 min
Primary = 1.23 cfs @ 13.73 hrs, Volume= 1.186 af

Routing by Stor-Ind method, Time Span= 0.00-24.01 hrs, dt= 0.07 hrs
Peak Elev= 9.23' @ 13.73 hrs Surf.Area= 0 sf Storage= 18,793 cf

Plug-Flow detention time= 223.4 min calculated for 1.183 af (77% of inflow)
Center-of-Mass det. time= 116.1 min (1,056.1 - 940.0)

Volume	Invert	Avail.Storage	Storage Description
#1	8.60'	69,310 cf	**Custom Stage Data** Listed below

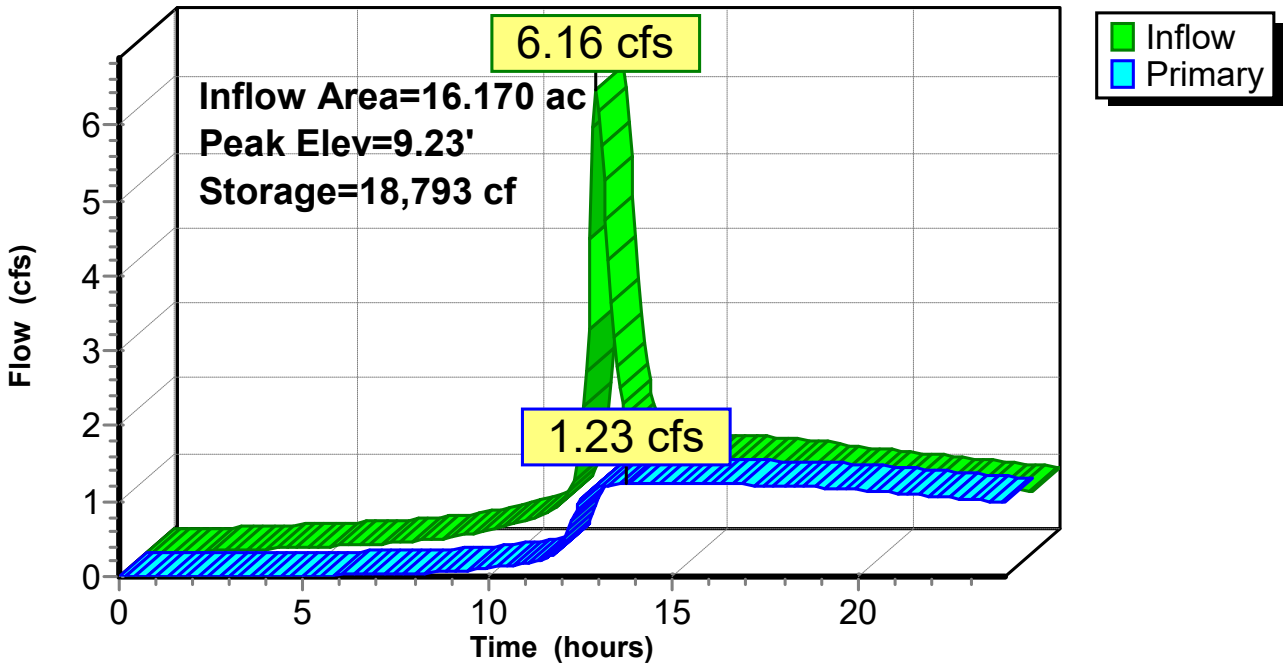
Elevation (feet)	Cum.Store (cubic-feet)
8.60	0
9.00	11,585
10.00	42,767
10.80	69,310

Device	Routing	Invert	Outlet Devices
#1	Primary	9.60'	**12.0' long Sharp-Crested Rectangular Weir** 2 End Contraction(s)
#2	Primary	9.60'	**4.0' long Sharp-Crested Rectangular Weir** 2 End Contraction(s)
#3	Primary	8.60'	**0.5' long Sharp-Crested Rectangular Weir** 2 End Contraction(s)
#4	Primary	8.60'	**0.5' long Sharp-Crested Rectangular Weir** 2 End Contraction(s)

Primary OutFlow Max=1.23 cfs @ 13.73 hrs HW=9.23' (Free Discharge)
- **1=Sharp-Crested Rectangular Weir** (Controls 0.00 cfs)
- **2=Sharp-Crested Rectangular Weir** (Controls 0.00 cfs)
- **3=Sharp-Crested Rectangular Weir** (Weir Controls 0.61 cfs @ 2.60 fps)
- **4=Sharp-Crested Rectangular Weir** (Weir Controls 0.61 cfs @ 2.60 fps)

Pond Lake3: Lake 3

Hydrograph



Summary for Pond Lake4&5: Lake 4 & 5

[79] Warning: Submerged Pond Lake3 Primary device # 3 by 0.51'
[79] Warning: Submerged Pond Lake3 Primary device # 4 by 0.51'

Inflow Area = 22.070 ac, 39.78% Impervious, Inflow Depth > 1.32" for 5 YR CM event
Inflow = 10.40 cfs @ 12.19 hrs, Volume= 2.422 af
Outflow = 0.49 cfs @ 24.01 hrs, Volume= 0.034 af, Atten= 95%, Lag= 708.9 min
Primary = 0.49 cfs @ 24.01 hrs, Volume= 0.034 af

Routing by Stor-Ind method, Time Span= 0.00-24.01 hrs, dt= 0.07 hrs
Peak Elev= 9.11' @ 24.01 hrs Surf.Area= 56,525 sf Storage= 103,910 cf

Plug-Flow detention time= 1,137.4 min calculated for 0.034 af (1% of inflow)
Center-of-Mass det. time= 487.2 min (1,409.0 - 921.8)

Volume	Invert	Avail.Storage	Storage Description
#1	7.00'	126,192 cf	**Custom Stage Data (Prismatic)** Listed below

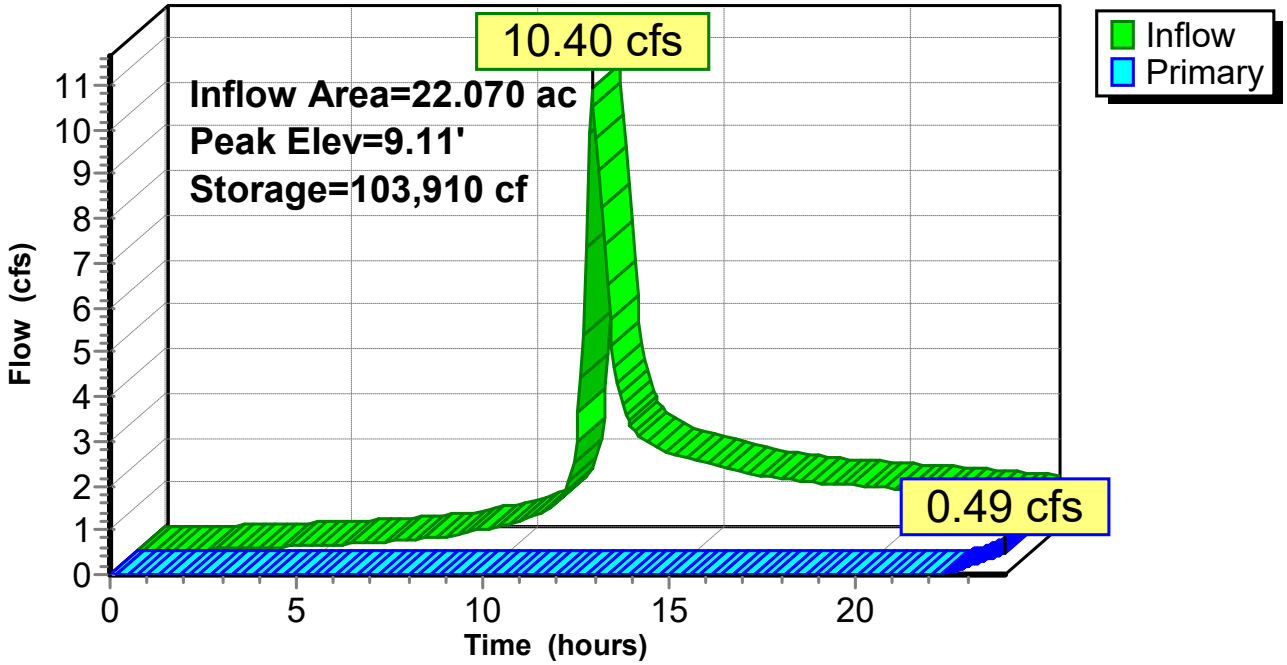
Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
7.00	27,767	0	0
7.40	46,551	14,864	14,864
8.00	50,946	29,249	44,113
9.00	55,842	53,394	97,507
9.50	58,900	28,686	126,192

Device	Routing	Invert	Outlet Devices
#1	Primary	9.20'	**100.0' long x 20.0' 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
#2	Primary	9.00'	**4.0' long Sharp-Crested Rectangular Weir** 2 End Contraction(s)

Primary OutFlow Max=0.49 cfs @ 24.01 hrs HW=9.11' (Free Discharge)
1=Broad-Crested Rectangular Weir (Controls 0.00 cfs)
2=Sharp-Crested Rectangular Weir (Weir Controls 0.49 cfs @ 1.09 fps)

Pond Lake4&5: Lake 4 & 5

Hydrograph

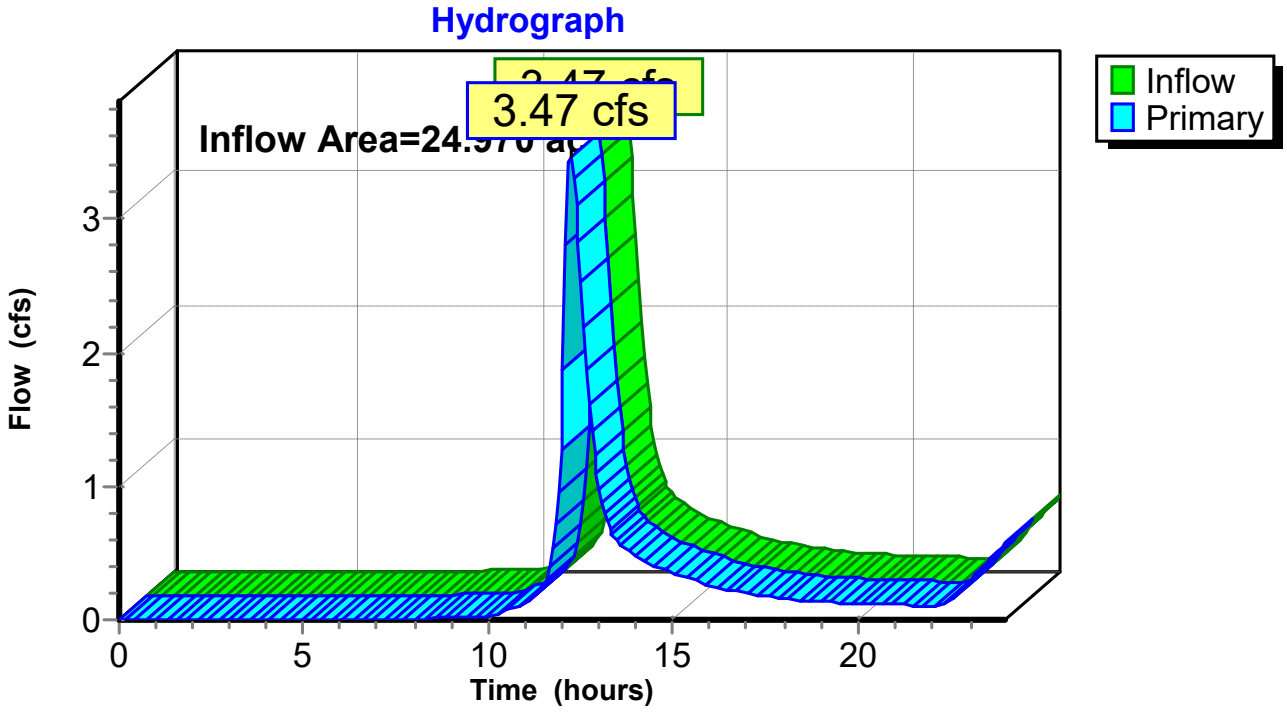


Summary for Link 1L: Combo Discharge

Inflow Area = 24.970 ac, 35.52% Impervious, Inflow Depth > 0.23" for 5 YR CM event
Inflow = 3.47 cfs @ 12.23 hrs, Volume= 0.471 af
Primary = 3.47 cfs @ 12.23 hrs, Volume= 0.471 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-24.01 hrs, dt= 0.07 hrs

Link 1L: Combo Discharge



Time span=0.00-24.00 hrs, dt=0.07 hrs, 344 points
Runoff by SCS TR-20 method, UH=Delmarva
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Subcatchment Post DA 2: Pervious Runoff Area=3.110 ac 0.00% Impervious Runoff Depth>1.02"
Flow Length=100' Slope=0.0100 '/' Tc=12.7 min CN=55 Runoff=1.71 cfs 0.265 af

Subcatchment Post DA 3: Impervious Runoff Area=1.970 ac 100.00% Impervious Runoff Depth>4.85"
Tc=10.0 min CN=98 Runoff=6.47 cfs 0.797 af

Subcatchment Post DA 4: Impervious Runoff Area=2.660 ac 100.00% Impervious Runoff Depth>4.85"
Tc=10.0 min CN=98 Runoff=8.74 cfs 1.076 af

Subcatchment Post DA- 1: Pervious Runoff Area=5.380 ac 0.00% Impervious Runoff Depth>1.49"
Tc=15.0 min CN=62 Runoff=4.58 cfs 0.668 af

Subcatchment Post DA-1: Impervious Runoff Area=2.480 ac 100.00% Impervious Runoff Depth>4.85"
Tc=10.0 min CN=98 Runoff=8.15 cfs 1.003 af

Subcatchment Post DA2: Impervious Runoff Area=1.670 ac 100.00% Impervious Runoff Depth>4.85"
Tc=10.0 min CN=98 Runoff=5.49 cfs 0.675 af

Subcatchment Post DA3: Pervious Runoff Area=1.560 ac 0.00% Impervious Runoff Depth>1.78"
Flow Length=100' Slope=0.0100 '/' Tc=18.5 min CN=66 Runoff=1.51 cfs 0.232 af

Subcatchment Post DA4: Pervious Runoff Area=3.240 ac 0.00% Impervious Runoff Depth>1.94"
Flow Length=100' Slope=0.0100 '/' Tc=12.7 min CN=68 Runoff=4.11 cfs 0.524 af

Subcatchment Post DA5 Off: Off Site Runoff Area=0.090 ac 100.00% Impervious Runoff Depth>4.85"
Flow Length=75' Slope=0.0150 '/' Tc=12.5 min CN=98 Runoff=0.27 cfs 0.036 af

Subcatchment Post DA5 Off: Off Site Runoff Area=2.810 ac 0.00% Impervious Runoff Depth>2.43"
Flow Length=75' Slope=0.0150 '/' Tc=12.5 min CN=74 Runoff=4.63 cfs 0.570 af

Pond Lake1: Basin Peak Elev=11.55' Storage=43,244 cf Inflow=12.29 cfs 1.672 af
Outflow=1.44 cfs 0.966 af

Pond Lake2: Lake 2 Peak Elev=10.21' Storage=34,342 cf Inflow=7.36 cfs 1.907 af
Outflow=1.77 cfs 1.273 af

Pond Lake3: Lake 3 Peak Elev=9.60' Storage=30,230 cf Inflow=7.85 cfs 2.302 af
Outflow=1.96 cfs 1.801 af

Pond Lake4&5: Lake 4 & 5 Peak Elev=9.22' Storage=110,111 cf Inflow=13.59 cfs 3.401 af
Outflow=2.17 cfs 0.885 af

Link 1L: Combo Discharge Inflow=4.90 cfs 1.492 af
Primary=4.90 cfs 1.492 af

Total Runoff Area = 24.970 ac Runoff Volume = 5.848 af Average Runoff Depth = 2.81"
64.48% Pervious = 16.100 ac 35.52% Impervious = 8.870 ac

Summary for Subcatchment Post DA 2: Pervious

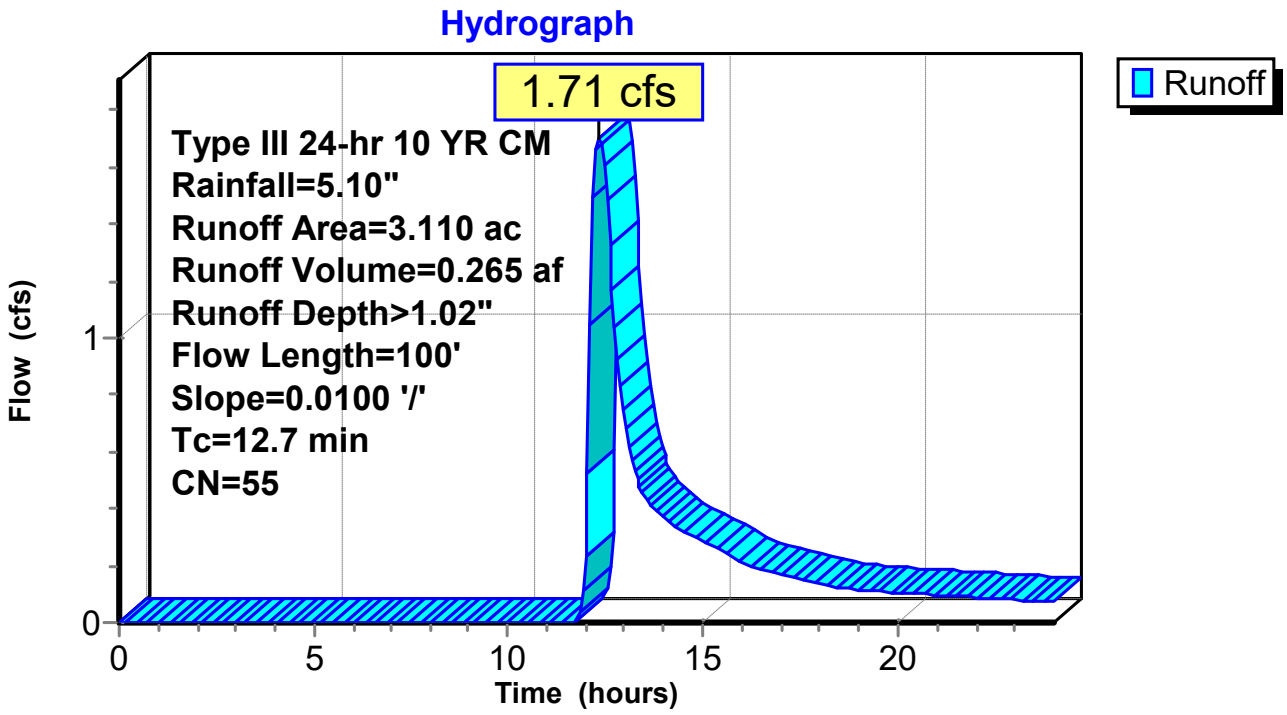
Runoff = 1.71 cfs @ 12.33 hrs, Volume= 0.265 af, Depth> 1.02"

Runoff by SCS TR-20 method, UH=Delmarva, Time Span= 0.00-24.01 hrs, dt= 0.07 hrs
Type III 24-hr 10 YR CM Rainfall=5.10"

Area (ac)	CN	Description
1.000	39	>75% Grass cover, Good, HSG A
1.340	61	>75% Grass cover, Good, HSG B
0.590	74	>75% Grass cover, Good, HSG C
0.080	30	Woods, Good, HSG A
0.100	55	Woods, Good, HSG B
3.110	55	Weighted Average
3.110		Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
12.7	100	0.0100	0.13		**Sheet Flow, Unpaved** Grass: Short n= 0.150 P2= 3.30"

Subcatchment Post DA 2: Pervious



Summary for Subcatchment Post DA 3: Impervious

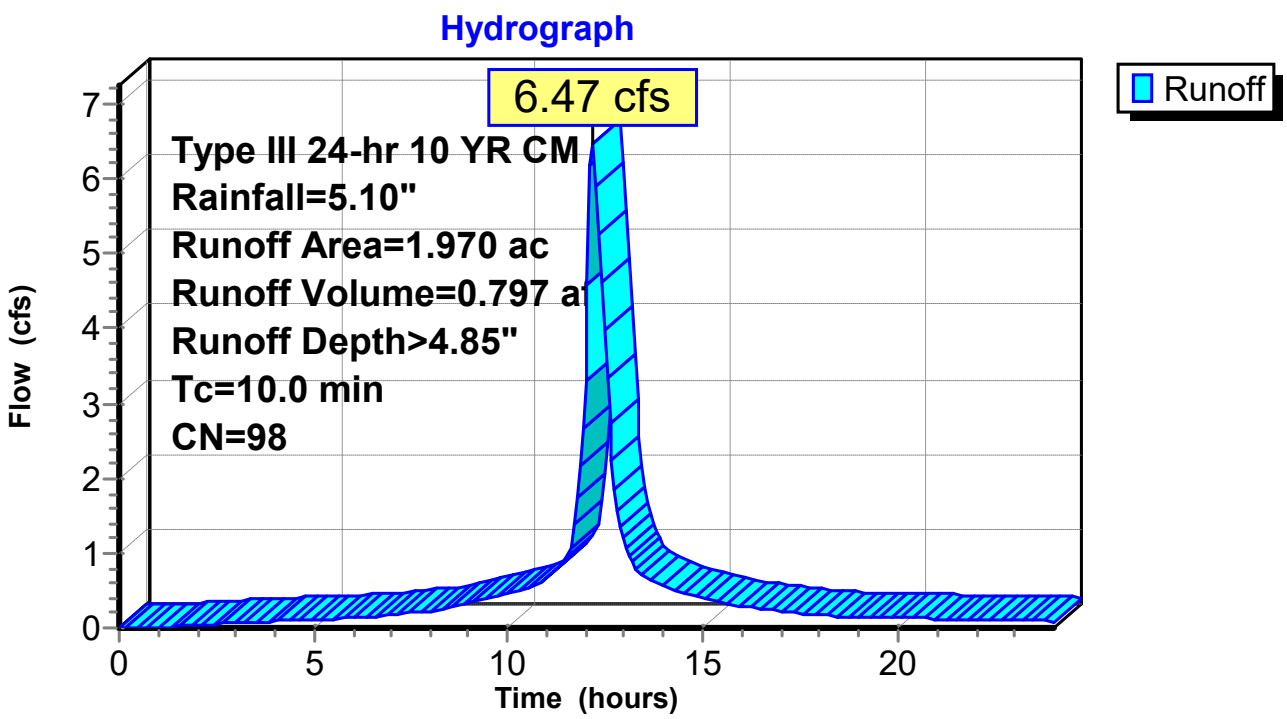
Runoff = 6.47 cfs @ 12.17 hrs, Volume= 0.797 af, Depth> 4.85"

Runoff by SCS TR-20 method, UH=Delmarva, Time Span= 0.00-24.01 hrs, dt= 0.07 hrs
Type III 24-hr 10 YR CM Rainfall=5.10"

Area (ac)	CN	Description
0.630	98	Water Surface
1.340	98	Paved parking & roofs
1.970	98	Weighted Average
1.970		Impervious Area

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

Subcatchment Post DA 3: Impervious



Summary for Subcatchment Post DA 4: Impervious

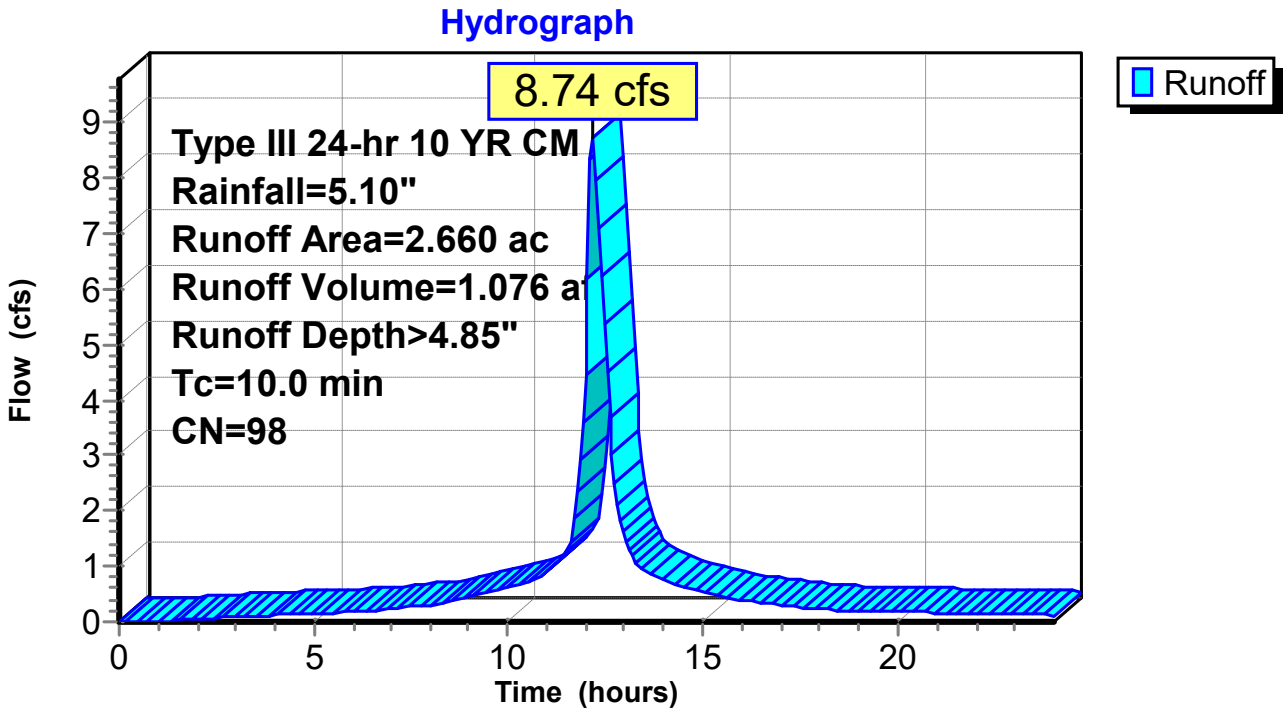
Runoff = 8.74 cfs @ 12.17 hrs, Volume= 1.076 af, Depth> 4.85"

Runoff by SCS TR-20 method, UH=Delmarva, Time Span= 0.00-24.01 hrs, dt= 0.07 hrs
Type III 24-hr 10 YR CM Rainfall=5.10"

	Area (ac)	CN	Description
*	0.100	98	Cart Paths
	1.260	98	Paved parking & roofs
	1.300	98	Water Surface
	2.660	98	Weighted Average
	2.660		Impervious Area

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

Subcatchment Post DA 4: Impervious



Summary for Subcatchment Post DA- 1: Pervious

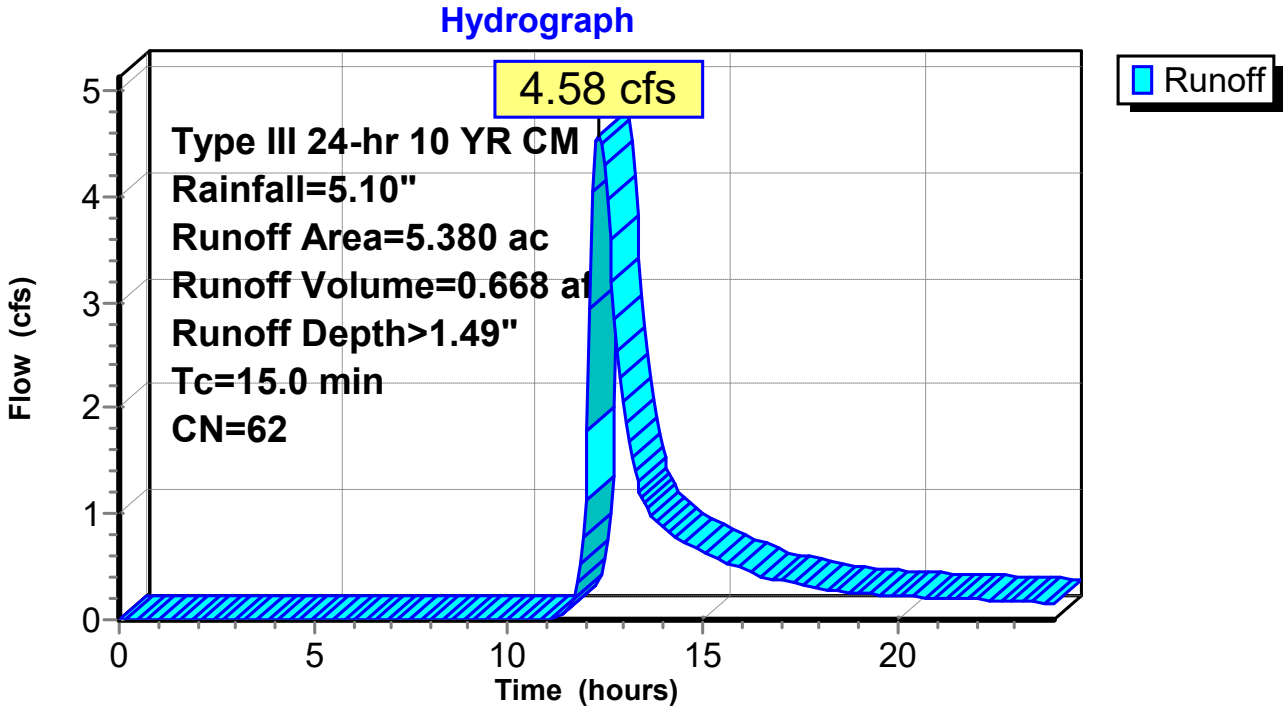
Runoff = 4.58 cfs @ 12.31 hrs, Volume= 0.668 af, Depth> 1.49"

Runoff by SCS TR-20 method, UH=Delmarva, Time Span= 0.00-24.01 hrs, dt= 0.07 hrs
Type III 24-hr 10 YR CM Rainfall=5.10"

Area (ac)	CN	Description
0.010	39	>75% Grass cover, Good, HSG A
4.320	61	>75% Grass cover, Good, HSG B
0.680	74	>75% Grass cover, Good, HSG C
0.370	58	Woods/grass comb., Good, HSG B
5.380	62	Weighted Average
5.380		Pervious Area

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

Subcatchment Post DA- 1: Pervious



Summary for Subcatchment Post DA-1: Impervious

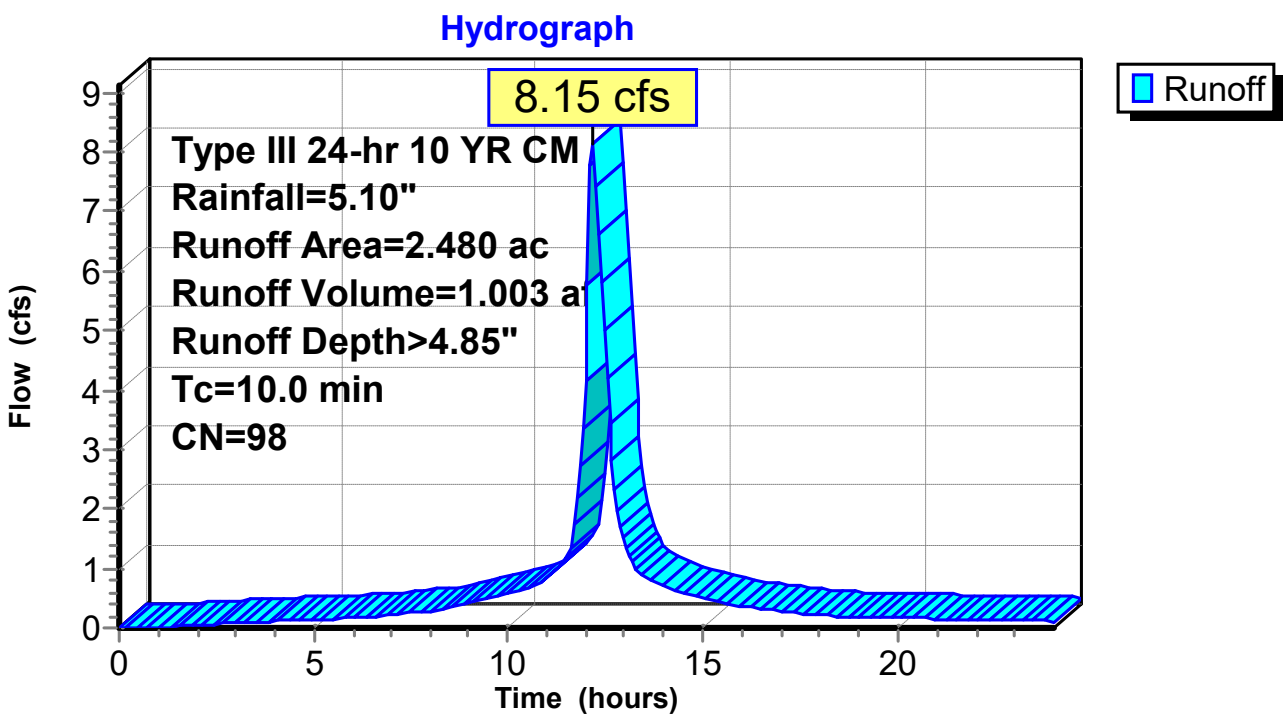
Runoff = 8.15 cfs @ 12.17 hrs, Volume= 1.003 af, Depth> 4.85"

Runoff by SCS TR-20 method, UH=Delmarva, Time Span= 0.00-24.01 hrs, dt= 0.07 hrs
Type III 24-hr 10 YR CM Rainfall=5.10"

Area (ac)	CN	Description
1.160	98	Water Surface
1.320	98	Paved parking & roofs
2.480	98	Weighted Average
2.480		Impervious Area

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

Subcatchment Post DA-1: Impervious



Summary for Subcatchment Post DA2: Impervious

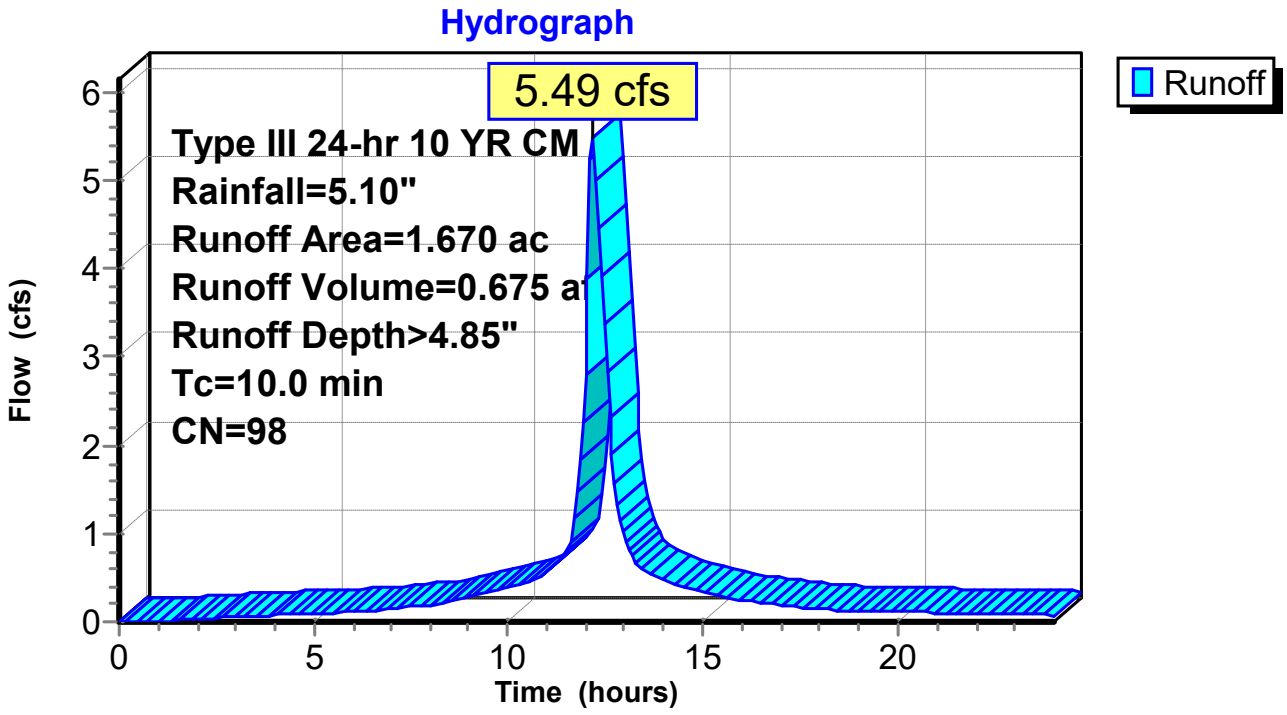
Runoff = 5.49 cfs @ 12.17 hrs, Volume= 0.675 af, Depth> 4.85"

Runoff by SCS TR-20 method, UH=Delmarva, Time Span= 0.00-24.01 hrs, dt= 0.07 hrs
Type III 24-hr 10 YR CM Rainfall=5.10"

	Area (ac)	CN	Description
*	0.250	98	Cart Paths
	1.330	98	Water Surface
*	0.090	98	Townhouse
	1.670	98	Weighted Average
	1.670		Impervious Area

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

Subcatchment Post DA2: Impervious



Summary for Subcatchment Post DA3: Pervious

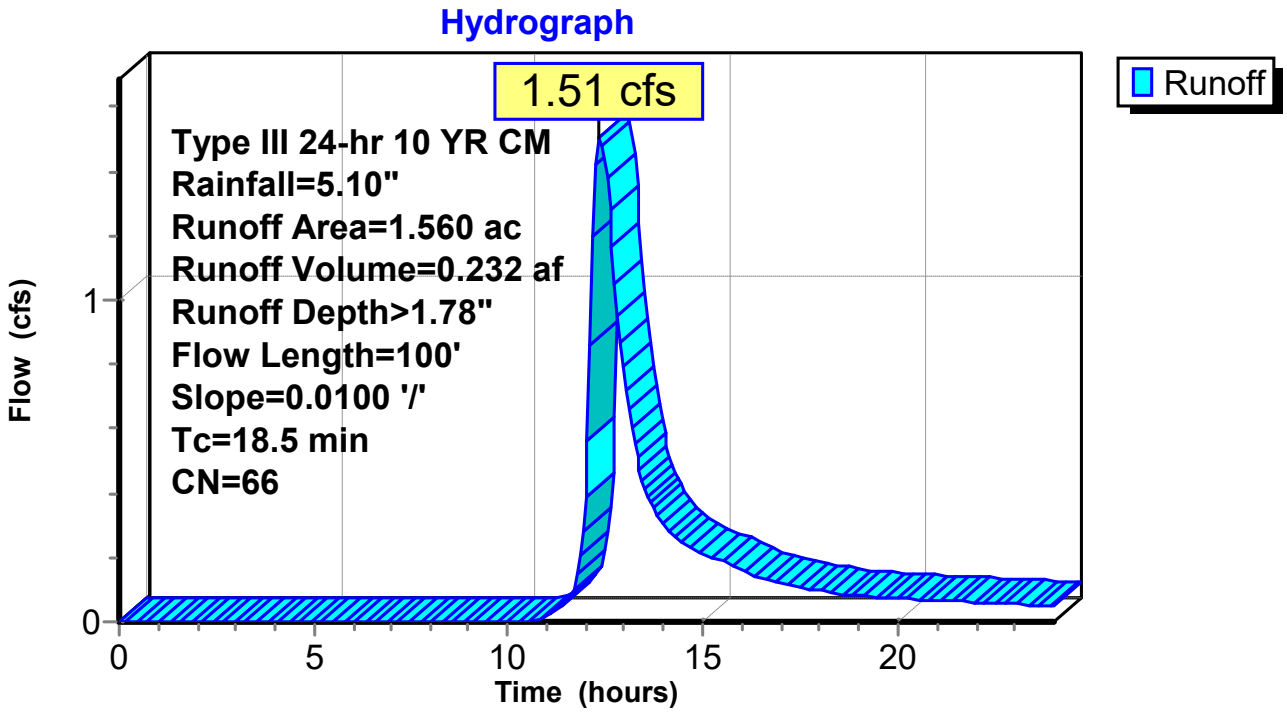
Runoff = 1.51 cfs @ 12.35 hrs, Volume= 0.232 af, Depth> 1.78"

Runoff by SCS TR-20 method, UH=Delmarva, Time Span= 0.00-24.01 hrs, dt= 0.07 hrs
Type III 24-hr 10 YR CM Rainfall=5.10"

Area (ac)	CN	Description
1.000	61	>75% Grass cover, Good, HSG B
0.560	74	>75% Grass cover, Good, HSG C
1.560	66	Weighted Average
1.560		Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
18.5	100	0.0100	0.09		**Sheet Flow, Unpaved** Grass: Dense n= 0.240 P2= 3.30"

Subcatchment Post DA3: Pervious



Summary for Subcatchment Post DA4: Pervious

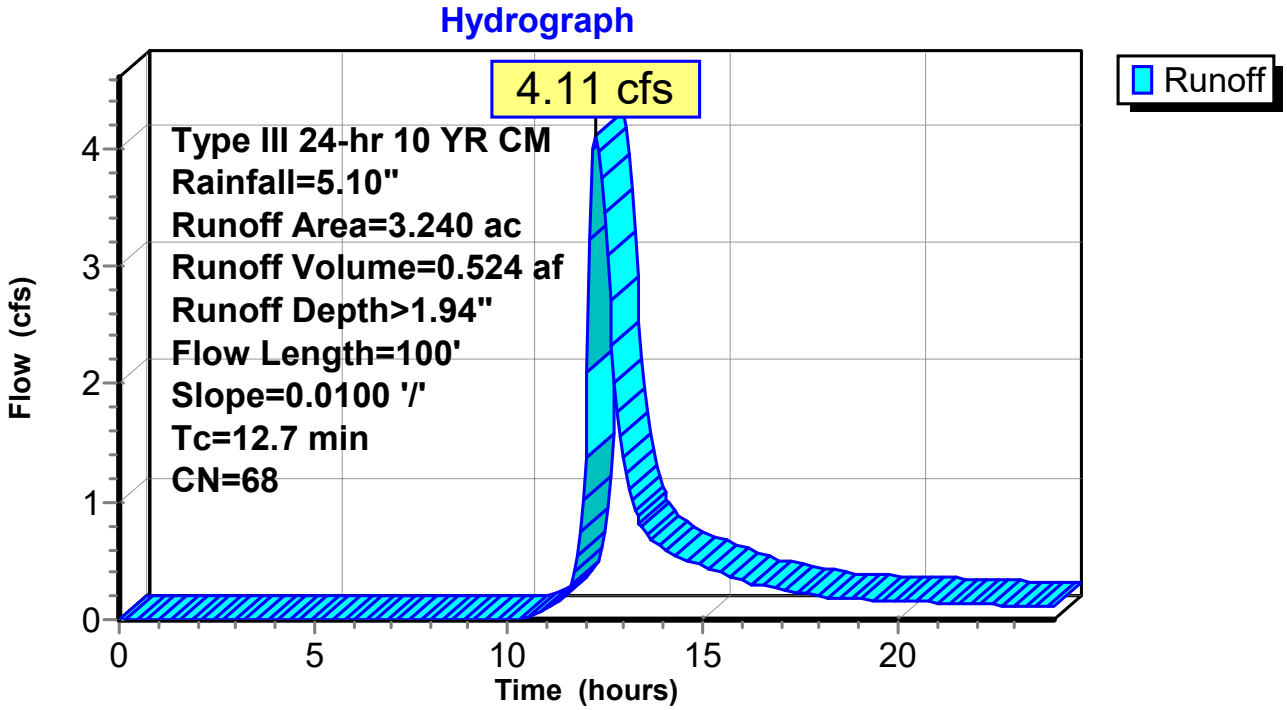
Runoff = 4.11 cfs @ 12.25 hrs, Volume= 0.524 af, Depth> 1.94"

Runoff by SCS TR-20 method, UH=Delmarva, Time Span= 0.00-24.01 hrs, dt= 0.07 hrs
Type III 24-hr 10 YR CM Rainfall=5.10"

Area (ac)	CN	Description
0.660	61	>75% Grass cover, Good, HSG B
1.810	74	>75% Grass cover, Good, HSG C
0.550	55	Woods, Good, HSG B
0.220	70	Woods, Good, HSG C
3.240	68	Weighted Average
3.240		Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
12.7	100	0.0100	0.13		**Sheet Flow, Unpaved** Grass: Short n= 0.150 P2= 3.30"

Subcatchment Post DA4: Pervious



Summary for Subcatchment Post DA5 Off: Off Site Impervious

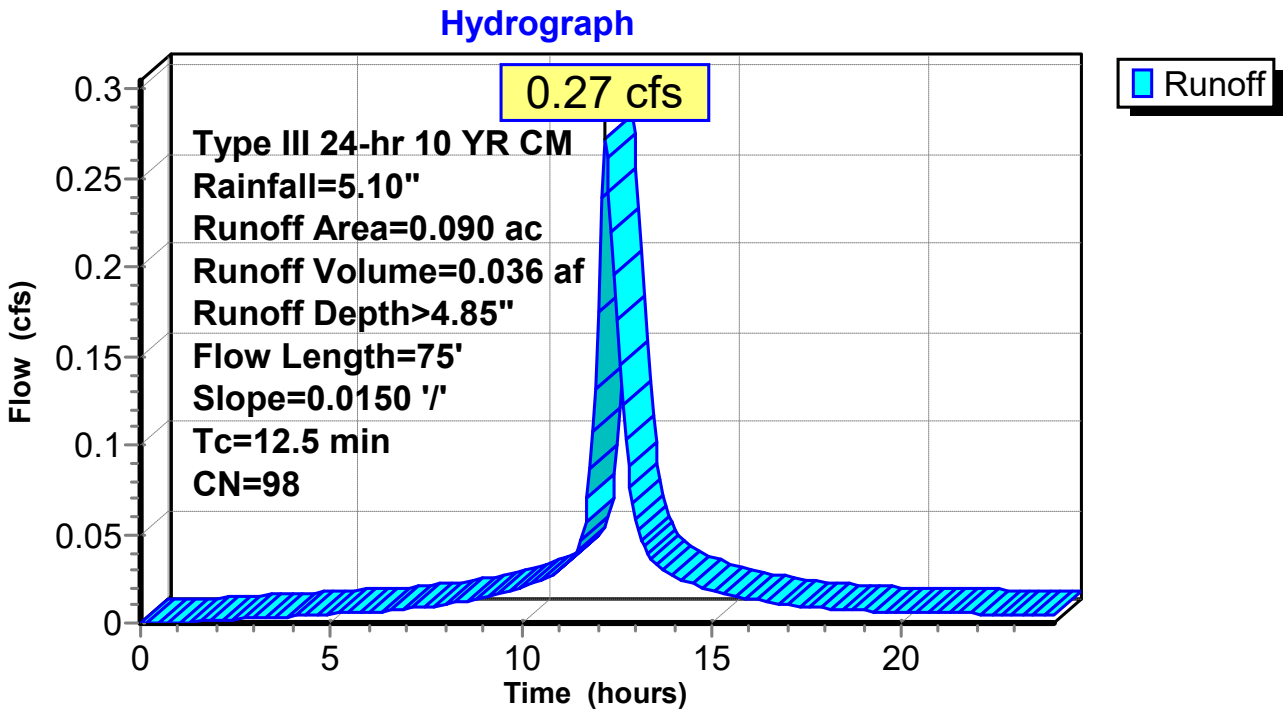
Runoff = 0.27 cfs @ 12.20 hrs, Volume= 0.036 af, Depth> 4.85"

Runoff by SCS TR-20 method, UH=Delmarva, Time Span= 0.00-24.01 hrs, dt= 0.07 hrs
Type III 24-hr 10 YR CM Rainfall=5.10"

	Area (ac)	CN	Description
*	0.090	98	Impervious
	0.090		Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
12.5	75	0.0150	0.10		**Sheet Flow, Unpaved** Grass: Dense n= 0.240 P2= 3.30"

Subcatchment Post DA5 Off: Off Site Impervious



Summary for Subcatchment Post DA5 Off: Off Site Pervious

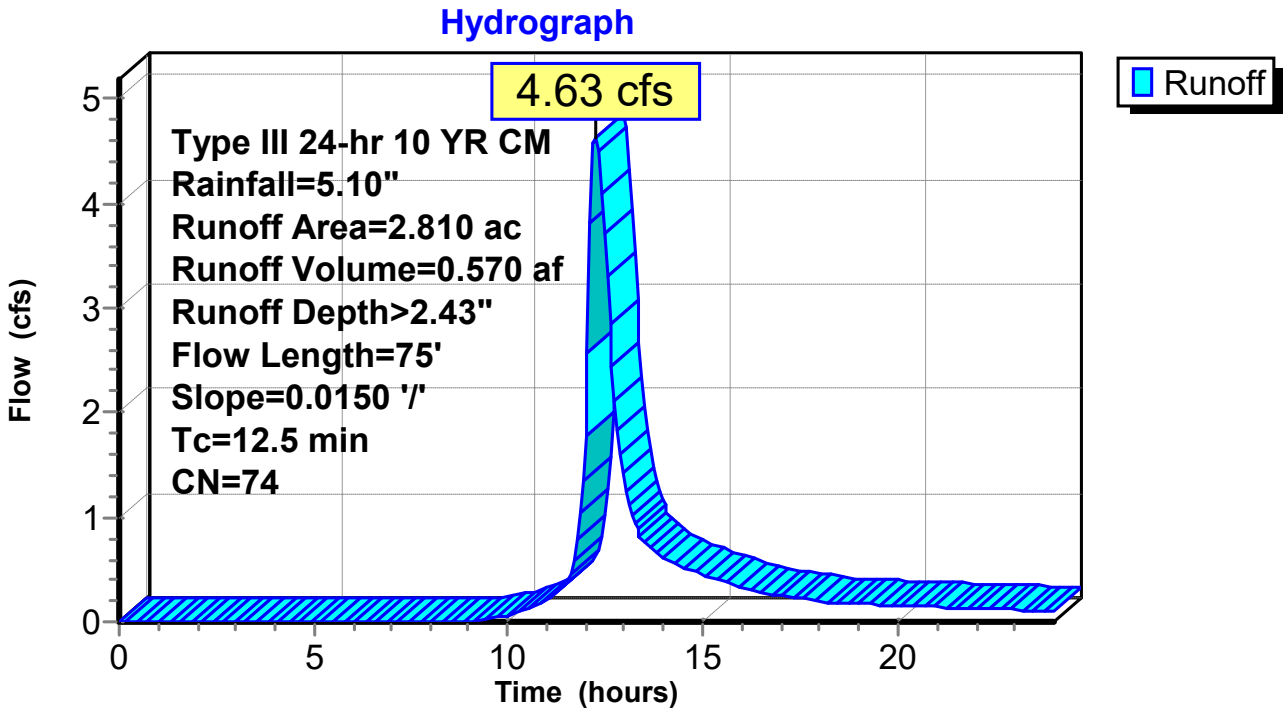
Runoff = 4.63 cfs @ 12.22 hrs, Volume= 0.570 af, Depth> 2.43"

Runoff by SCS TR-20 method, UH=Delmarva, Time Span= 0.00-24.01 hrs, dt= 0.07 hrs
Type III 24-hr 10 YR CM Rainfall=5.10"

Area (ac)	CN	Description
2.710	74	>75% Grass cover, Good, HSG C
0.100	72	Woods/grass comb., Good, HSG C
2.810	74	Weighted Average
2.810		Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
12.5	75	0.0150	0.10		**Sheet Flow, Unpaved** Grass: Dense n= 0.240 P2= 3.30"

Subcatchment Post DA5 Off: Off Site Pervious



Summary for Pond Lake1: Basin

Inflow Area = 7.860 ac, 31.55% Impervious, Inflow Depth > 2.55" for 10 YR CM event
Inflow = 12.29 cfs @ 12.21 hrs, Volume= 1.672 af
Outflow = 1.44 cfs @ 14.21 hrs, Volume= 0.966 af, Atten= 88%, Lag= 120.0 min
Primary = 1.44 cfs @ 14.21 hrs, Volume= 0.966 af

Routing by Stor-Ind method, Time Span= 0.00-24.01 hrs, dt= 0.07 hrs
Peak Elev= 11.55' @ 14.21 hrs Surf.Area= 0 sf Storage= 43,244 cf

Plug-Flow detention time= 338.5 min calculated for 0.963 af (58% of inflow)
Center-of-Mass det. time= 217.0 min (1,023.4 - 806.4)

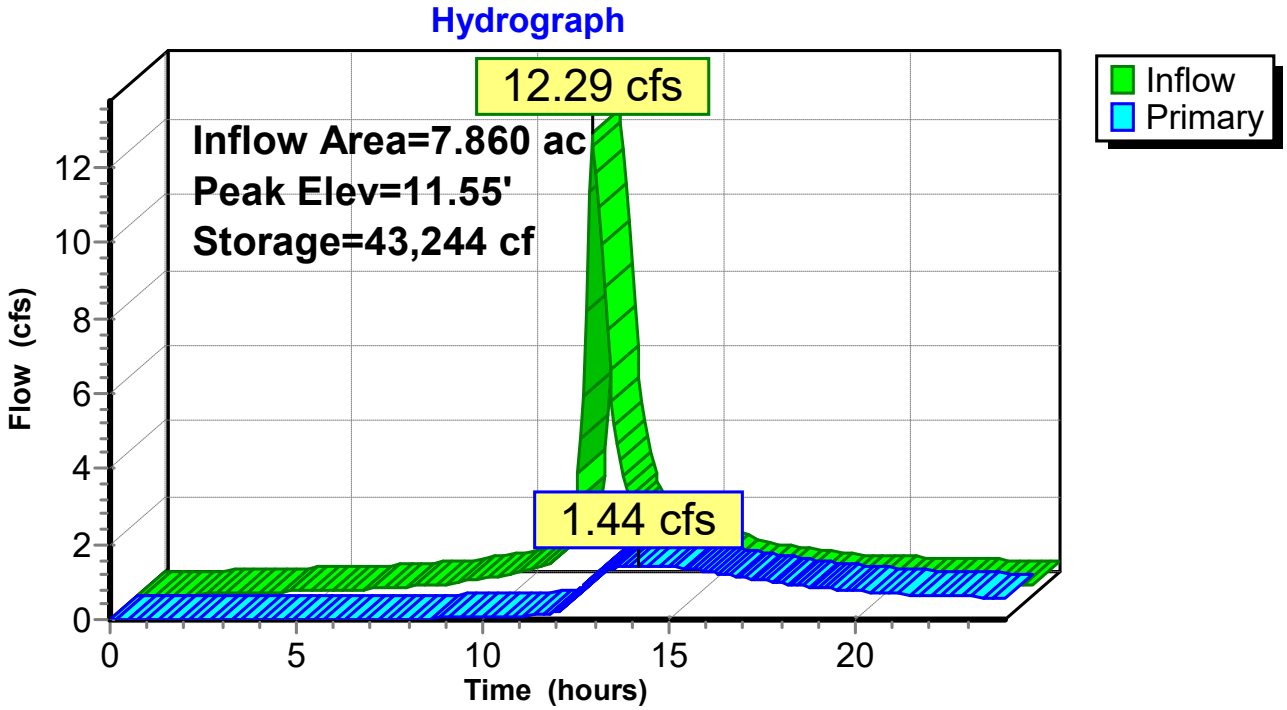
Volume	Invert	Avail.Storage	Storage Description
#1	10.70'	137,878 cf	**Custom Stage Data** Listed below

Elevation (feet)	Cum.Store (cubic-feet)
10.70	0
11.00	15,300
12.00	65,780
13.00	118,459
13.70	137,878

Device	Routing	Invert	Outlet Devices
#1	Primary	11.35'	**2.0' long Sharp-Crested Rectangular Weir** 2 End Contraction(s)
#2	Primary	10.70'	**0.5' long Sharp-Crested Rectangular Weir** 2 End Contraction(s)

Primary OutFlow Max=1.44 cfs @ 14.21 hrs HW=11.55' (Free Discharge)
↑ **1=Sharp-Crested Rectangular Weir** (Weir Controls 0.59 cfs @ 1.48 fps)
└ **2=Sharp-Crested Rectangular Weir** (Weir Controls 0.85 cfs @ 3.02 fps)

Pond Lake1: Basin



Summary for Pond Lake2: Lake 2

Inflow Area = 12.640 ac, 32.83% Impervious, Inflow Depth > 1.81" for 10 YR CM event
Inflow = 7.36 cfs @ 12.20 hrs, Volume= 1.907 af
Outflow = 1.77 cfs @ 15.90 hrs, Volume= 1.273 af, Atten= 76%, Lag= 222.2 min
Primary = 1.77 cfs @ 15.90 hrs, Volume= 1.273 af

Routing by Stor-Ind method, Time Span= 0.00-24.01 hrs, dt= 0.07 hrs
Peak Elev= 10.21' @ 15.90 hrs Surf.Area= 0 sf Storage= 34,342 cf

Plug-Flow detention time= 294.2 min calculated for 1.269 af (67% of inflow)
Center-of-Mass det. time= 158.0 min (1,069.8 - 911.8)

Volume	Invert	Avail.Storage	Storage Description
#1	9.67'	87,360 cf	**Custom Stage Data** Listed below

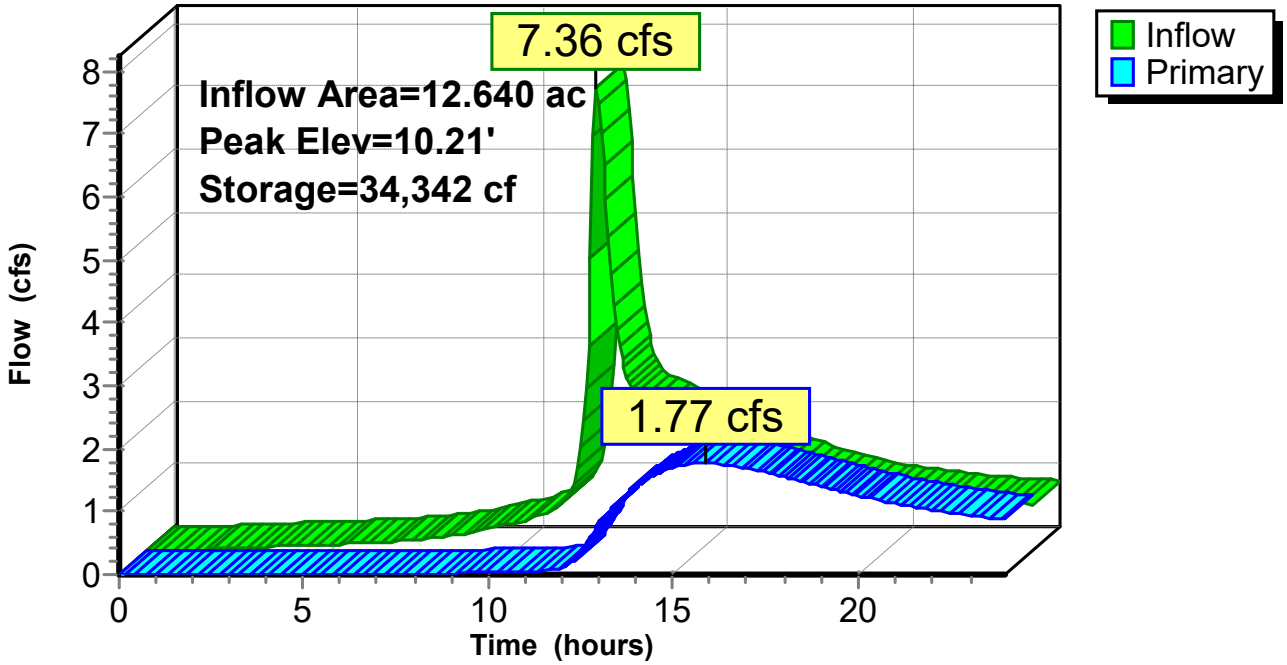
Elevation (feet)	Cum.Store (cubic-feet)
9.67	0
10.00	20,120
11.00	87,360

Device	Routing	Invert	Outlet Devices
#1	Primary	10.00'	**4.0' long Sharp-Crested Rectangular Weir** 2 End Contraction(s)
#2	Primary	9.67'	**0.5' long Sharp-Crested Rectangular Weir** 2 End Contraction(s)

Primary OutFlow Max=1.77 cfs @ 15.90 hrs HW=10.21' (Free Discharge)
└**1=Sharp-Crested Rectangular Weir** (Weir Controls 1.26 cfs @ 1.50 fps)
└**2=Sharp-Crested Rectangular Weir** (Weir Controls 0.51 cfs @ 2.41 fps)

Pond Lake2: Lake 2

Hydrograph



Summary for Pond Lake3: Lake 3

Inflow Area = 16.170 ac, 37.85% Impervious, Inflow Depth > 1.71" for 10 YR CM event
Inflow = 7.85 cfs @ 12.19 hrs, Volume= 2.302 af
Outflow = 1.96 cfs @ 17.41 hrs, Volume= 1.801 af, Atten= 75%, Lag= 313.2 min
Primary = 1.96 cfs @ 17.41 hrs, Volume= 1.801 af

Routing by Stor-Ind method, Time Span= 0.00-24.01 hrs, dt= 0.07 hrs
Peak Elev= 9.60' @ 17.41 hrs Surf.Area= 0 sf Storage= 30,230 cf

Plug-Flow detention time= 218.7 min calculated for 1.801 af (78% of inflow)
Center-of-Mass det. time= 122.5 min (1,064.2 - 941.6)

Volume	Invert	Avail.Storage	Storage Description
#1	8.60'	69,310 cf	**Custom Stage Data** Listed below

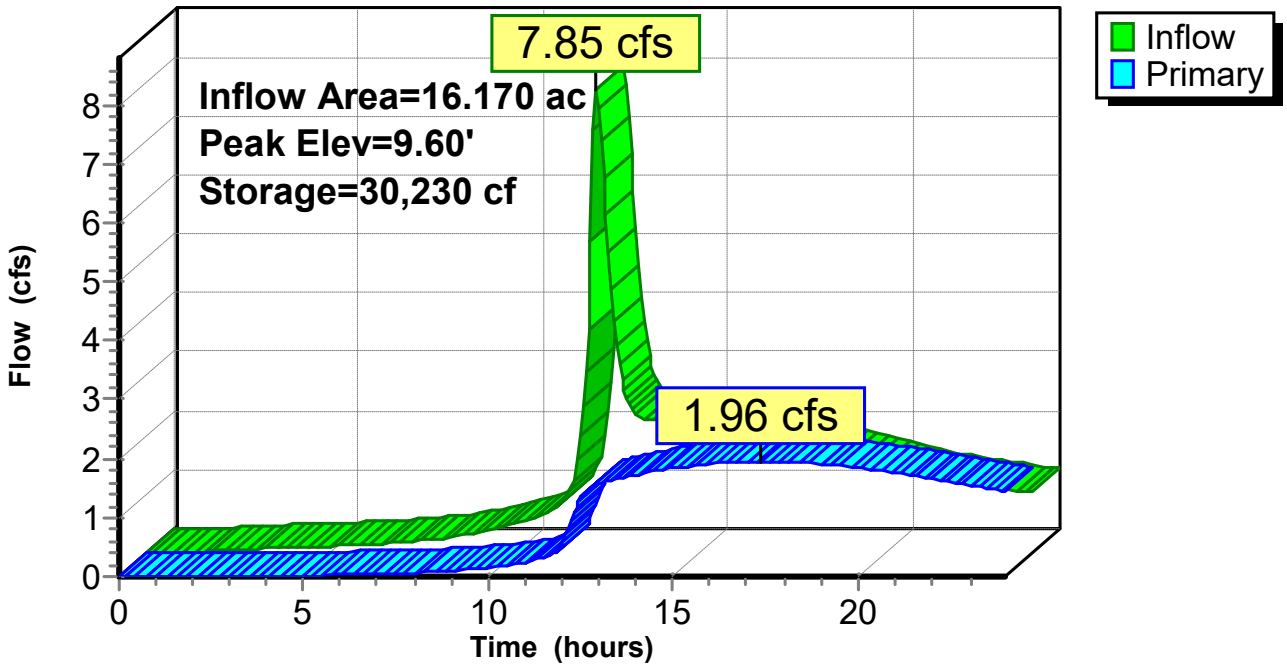
Elevation (feet)	Cum.Store (cubic-feet)
8.60	0
9.00	11,585
10.00	42,767
10.80	69,310

Device	Routing	Invert	Outlet Devices
#1	Primary	9.60'	**12.0' long Sharp-Crested Rectangular Weir** 2 End Contraction(s)
#2	Primary	9.60'	**4.0' long Sharp-Crested Rectangular Weir** 2 End Contraction(s)
#3	Primary	8.60'	**0.5' long Sharp-Crested Rectangular Weir** 2 End Contraction(s)
#4	Primary	8.60'	**0.5' long Sharp-Crested Rectangular Weir** 2 End Contraction(s)

Primary OutFlow Max=1.96 cfs @ 17.41 hrs HW=9.60' (Free Discharge)
- **1=Sharp-Crested Rectangular Weir** (Controls 0.00 cfs)
- **2=Sharp-Crested Rectangular Weir** (Controls 0.00 cfs)
- **3=Sharp-Crested Rectangular Weir** (Weir Controls 0.98 cfs @ 3.27 fps)
- **4=Sharp-Crested Rectangular Weir** (Weir Controls 0.98 cfs @ 3.27 fps)

Pond Lake3: Lake 3

Hydrograph



Summary for Pond Lake4&5: Lake 4 & 5

[79] Warning: Submerged Pond Lake3 Primary device # 3 by 0.62'
[79] Warning: Submerged Pond Lake3 Primary device # 4 by 0.62'

Inflow Area = 22.070 ac, 39.78% Impervious, Inflow Depth > 1.85" for 10 YR CM event
Inflow = 13.59 cfs @ 12.19 hrs, Volume= 3.401 af
Outflow = 2.17 cfs @ 20.15 hrs, Volume= 0.885 af, Atten= 84%, Lag= 477.2 min
Primary = 2.17 cfs @ 20.15 hrs, Volume= 0.885 af

Routing by Stor-Ind method, Time Span= 0.00-24.01 hrs, dt= 0.07 hrs
Peak Elev= 9.22' @ 20.15 hrs Surf.Area= 57,186 sf Storage= 110,111 cf

Plug-Flow detention time= 615.9 min calculated for 0.885 af (26% of inflow)
Center-of-Mass det. time= 338.3 min (1,274.0 - 935.7)

Volume	Invert	Avail.Storage	Storage Description
#1	7.00'	126,192 cf	**Custom Stage Data (Prismatic)** Listed below

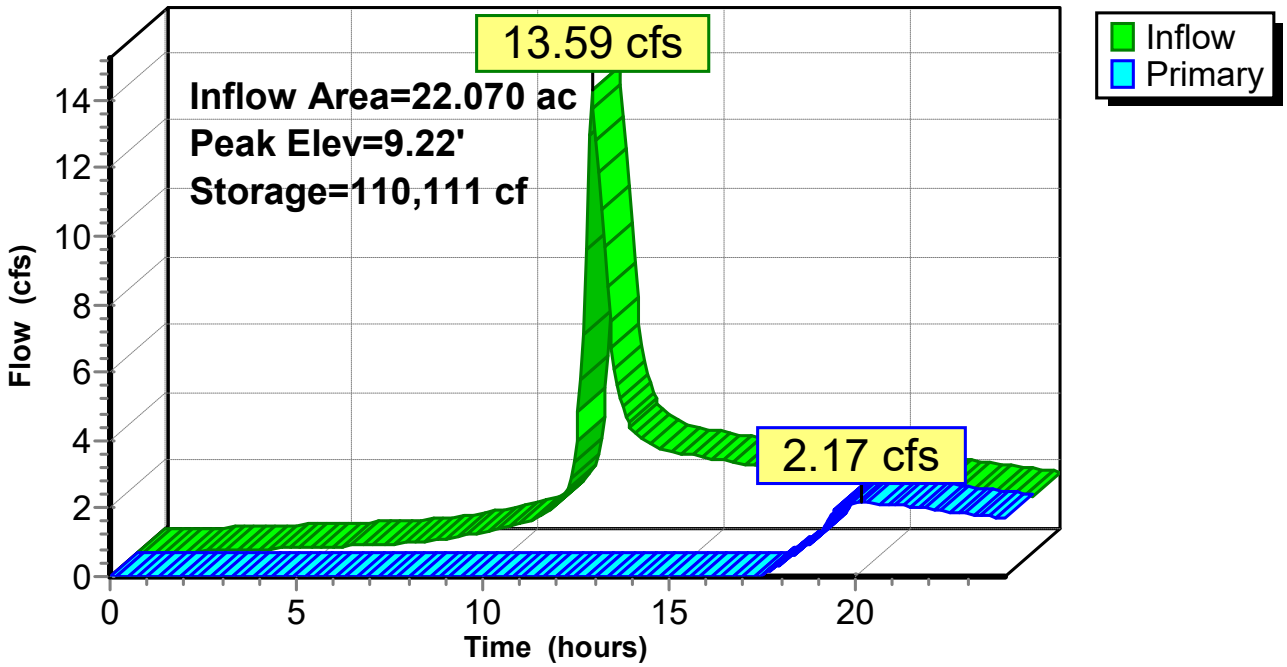
Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
7.00	27,767	0	0
7.40	46,551	14,864	14,864
8.00	50,946	29,249	44,113
9.00	55,842	53,394	97,507
9.50	58,900	28,686	126,192

Device	Routing	Invert	Outlet Devices
#1	Primary	9.20'	**100.0' long x 20.0' 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
#2	Primary	9.00'	**4.0' long Sharp-Crested Rectangular Weir** 2 End Contraction(s)

Primary OutFlow Max=2.07 cfs @ 20.15 hrs HW=9.22' (Free Discharge)
└**1=Broad-Crested Rectangular Weir** (Weir Controls 0.74 cfs @ 0.38 fps)
└**2=Sharp-Crested Rectangular Weir** (Weir Controls 1.33 cfs @ 1.53 fps)

Pond Lake4&5: Lake 4 & 5

Hydrograph

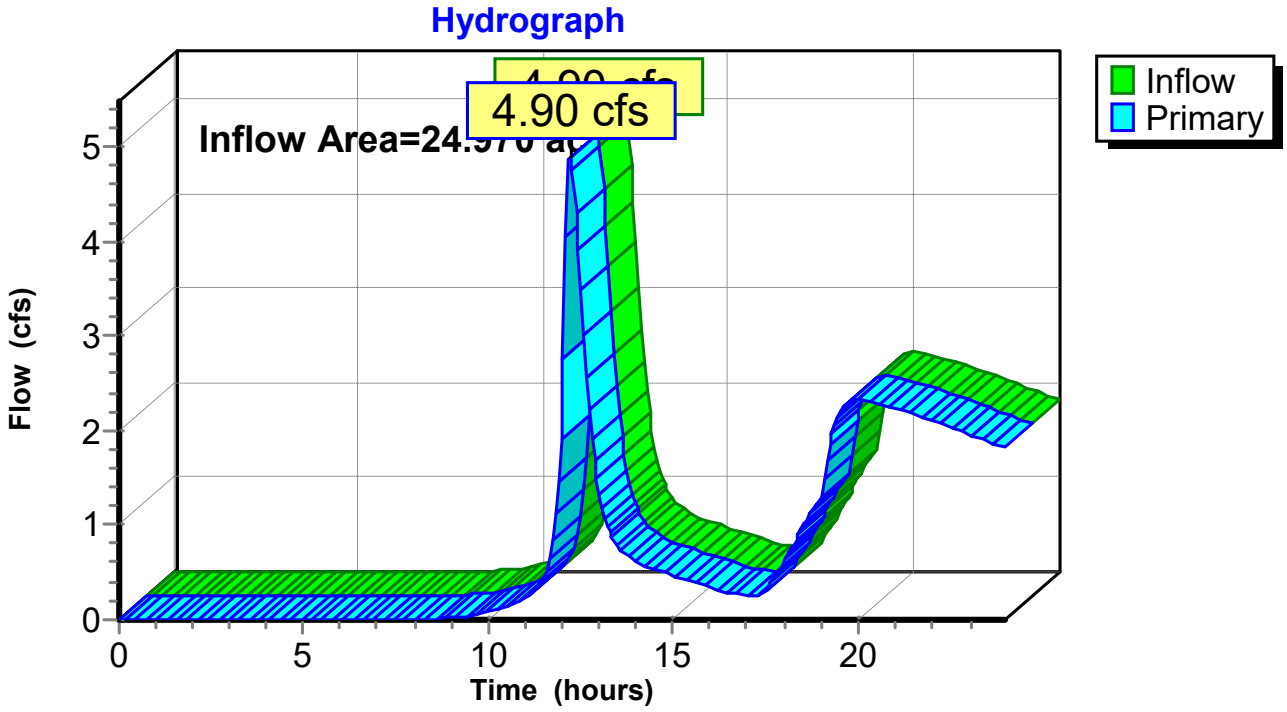


Summary for Link 1L: Combo Discharge

Inflow Area = 24.970 ac, 35.52% Impervious, Inflow Depth > 0.72" for 10 YR CM event
Inflow = 4.90 cfs @ 12.22 hrs, Volume= 1.492 af
Primary = 4.90 cfs @ 12.22 hrs, Volume= 1.492 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-24.01 hrs, dt= 0.07 hrs

Link 1L: Combo Discharge



Time span=0.00-24.00 hrs, dt=0.07 hrs, 344 points
Runoff by SCS TR-20 method, UH=Delmarva
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Subcatchment Post DA 2: Pervious Runoff Area=3.110 ac 0.00% Impervious Runoff Depth>2.44"
Flow Length=100' Slope=0.0100 '/' Tc=12.7 min CN=55 Runoff=4.79 cfs 0.631 af

Subcatchment Post DA 3: Impervious Runoff Area=1.970 ac 100.00% Impervious Runoff Depth>7.25"
Tc=10.0 min CN=98 Runoff=9.55 cfs 1.190 af

Subcatchment Post DA 4: Impervious Runoff Area=2.660 ac 100.00% Impervious Runoff Depth>7.25"
Tc=10.0 min CN=98 Runoff=12.89 cfs 1.606 af

Subcatchment Post DA- 1: Pervious Runoff Area=5.380 ac 0.00% Impervious Runoff Depth>3.16"
Tc=15.0 min CN=62 Runoff=10.52 cfs 1.415 af

Subcatchment Post DA-1: Impervious Runoff Area=2.480 ac 100.00% Impervious Runoff Depth>7.25"
Tc=10.0 min CN=98 Runoff=12.02 cfs 1.498 af

Subcatchment Post DA2: Impervious Runoff Area=1.670 ac 100.00% Impervious Runoff Depth>7.25"
Tc=10.0 min CN=98 Runoff=8.09 cfs 1.009 af

Subcatchment Post DA3: Pervious Runoff Area=1.560 ac 0.00% Impervious Runoff Depth>3.58"
Flow Length=100' Slope=0.0100 '/' Tc=18.5 min CN=66 Runoff=3.18 cfs 0.465 af

Subcatchment Post DA4: Pervious Runoff Area=3.240 ac 0.00% Impervious Runoff Depth>3.80"
Flow Length=100' Slope=0.0100 '/' Tc=12.7 min CN=68 Runoff=8.34 cfs 1.027 af

Subcatchment Post DA5 Off: Off Site Runoff Area=0.090 ac 100.00% Impervious Runoff Depth>7.24"
Flow Length=75' Slope=0.0150 '/' Tc=12.5 min CN=98 Runoff=0.40 cfs 0.054 af

Subcatchment Post DA5 Off: Off Site Runoff Area=2.810 ac 0.00% Impervious Runoff Depth>4.47"
Flow Length=75' Slope=0.0150 '/' Tc=12.5 min CN=74 Runoff=8.73 cfs 1.046 af

Pond Lake1: Basin Peak Elev=12.02' Storage=66,669 cf Inflow=21.96 cfs 2.913 af
Outflow=4.56 cfs 2.104 af

Pond Lake2: Lake 2 Peak Elev=10.49' Storage=53,223 cf Inflow=13.61 cfs 3.744 af
Outflow=5.23 cfs 3.034 af

Pond Lake3: Lake 3 Peak Elev=9.81' Storage=36,755 cf Inflow=12.89 cfs 4.689 af
Outflow=7.15 cfs 4.028 af

Pond Lake4&5: Lake 4 & 5 Peak Elev=9.29' Storage=113,968 cf Inflow=22.57 cfs 6.661 af
Outflow=8.90 cfs 4.130 af

Link 1L: Combo Discharge Inflow=9.99 cfs 5.230 af
Primary=9.99 cfs 5.230 af

Total Runoff Area = 24.970 ac Runoff Volume = 9.941 af Average Runoff Depth = 4.78"
64.48% Pervious = 16.100 ac 35.52% Impervious = 8.870 ac

Summary for Subcatchment Post DA 2: Pervious

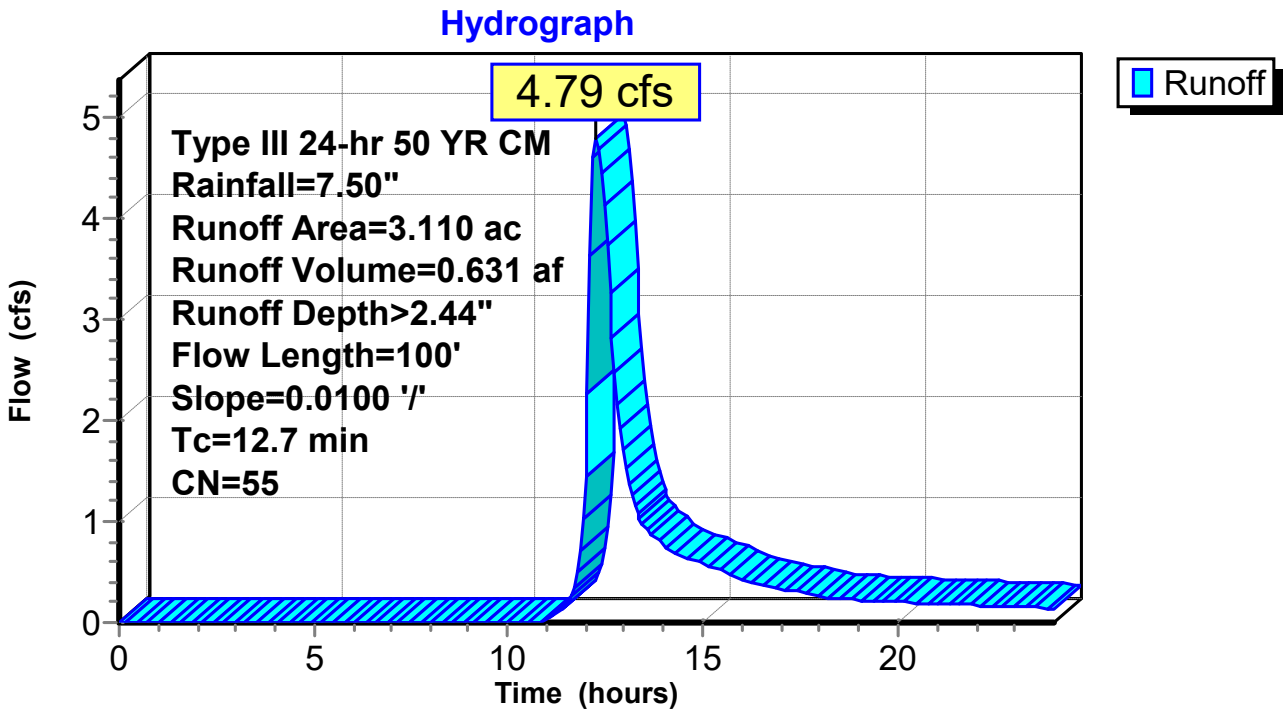
Runoff = 4.79 cfs @ 12.26 hrs, Volume= 0.631 af, Depth> 2.44"

Runoff by SCS TR-20 method, UH=Delmarva, Time Span= 0.00-24.01 hrs, dt= 0.07 hrs
Type III 24-hr 50 YR CM Rainfall=7.50"

Area (ac)	CN	Description
1.000	39	>75% Grass cover, Good, HSG A
1.340	61	>75% Grass cover, Good, HSG B
0.590	74	>75% Grass cover, Good, HSG C
0.080	30	Woods, Good, HSG A
0.100	55	Woods, Good, HSG B
3.110	55	Weighted Average
3.110		Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
12.7	100	0.0100	0.13		**Sheet Flow, Unpaved** Grass: Short n= 0.150 P2= 3.30"

Subcatchment Post DA 2: Pervious



Summary for Subcatchment Post DA 3: Impervious

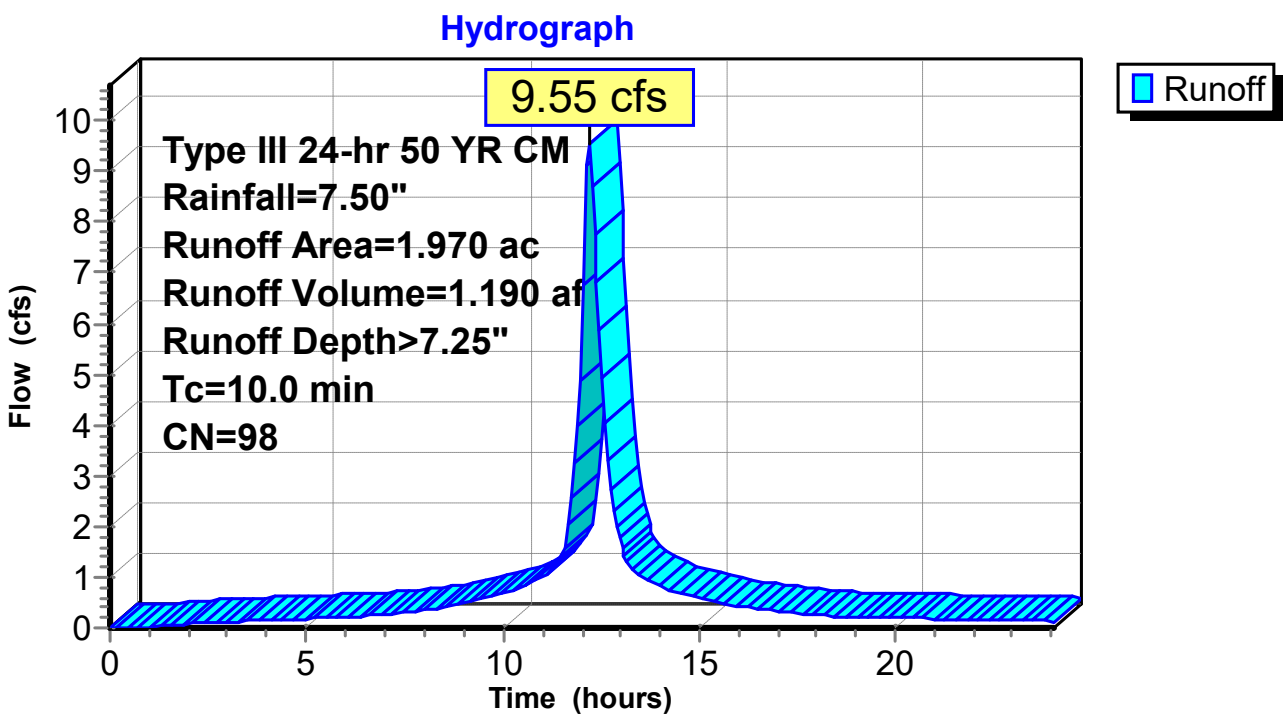
Runoff = 9.55 cfs @ 12.17 hrs, Volume= 1.190 af, Depth> 7.25"

Runoff by SCS TR-20 method, UH=Delmarva, Time Span= 0.00-24.01 hrs, dt= 0.07 hrs
Type III 24-hr 50 YR CM Rainfall=7.50"

Area (ac)	CN	Description
0.630	98	Water Surface
1.340	98	Paved parking & roofs
1.970	98	Weighted Average
1.970		Impervious Area

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

Subcatchment Post DA 3: Impervious



Summary for Subcatchment Post DA 4: Impervious

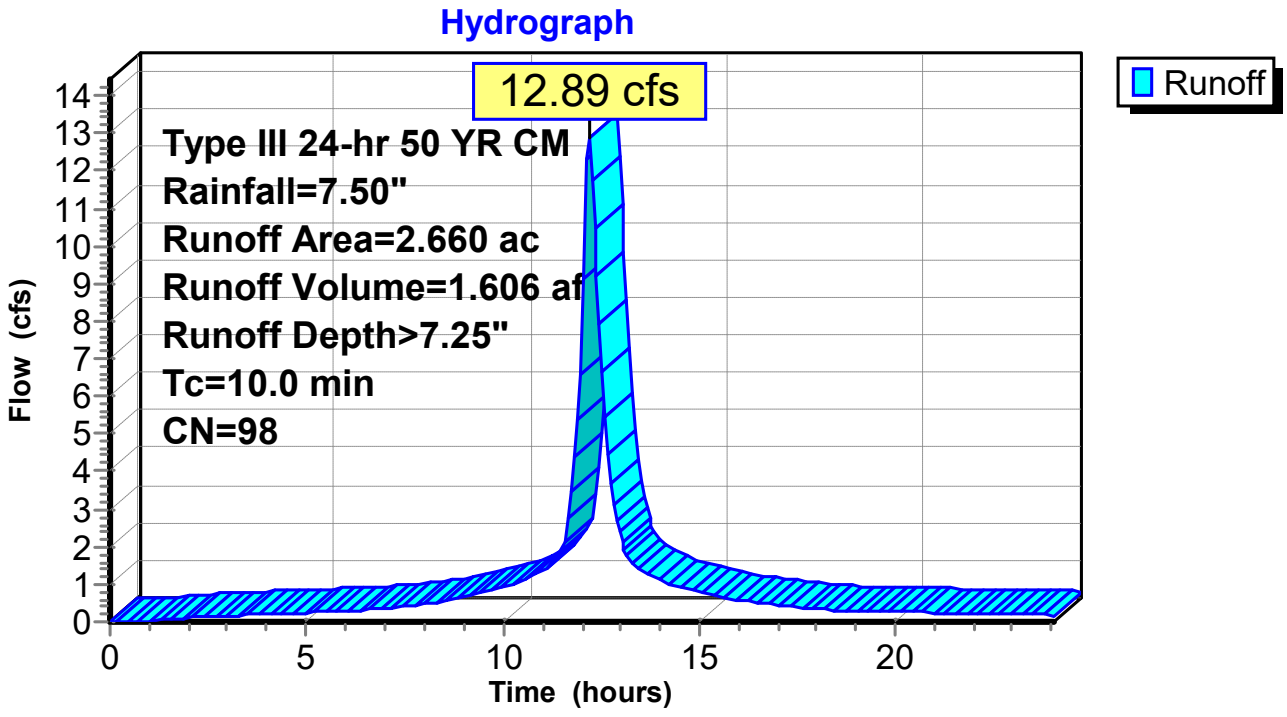
Runoff = 12.89 cfs @ 12.17 hrs, Volume= 1.606 af, Depth> 7.25"

Runoff by SCS TR-20 method, UH=Delmarva, Time Span= 0.00-24.01 hrs, dt= 0.07 hrs
Type III 24-hr 50 YR CM Rainfall=7.50"

	Area (ac)	CN	Description
*	0.100	98	Cart Paths
	1.260	98	Paved parking & roofs
	1.300	98	Water Surface
	2.660	98	Weighted Average
	2.660		Impervious Area

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

Subcatchment Post DA 4: Impervious



Summary for Subcatchment Post DA- 1: Pervious

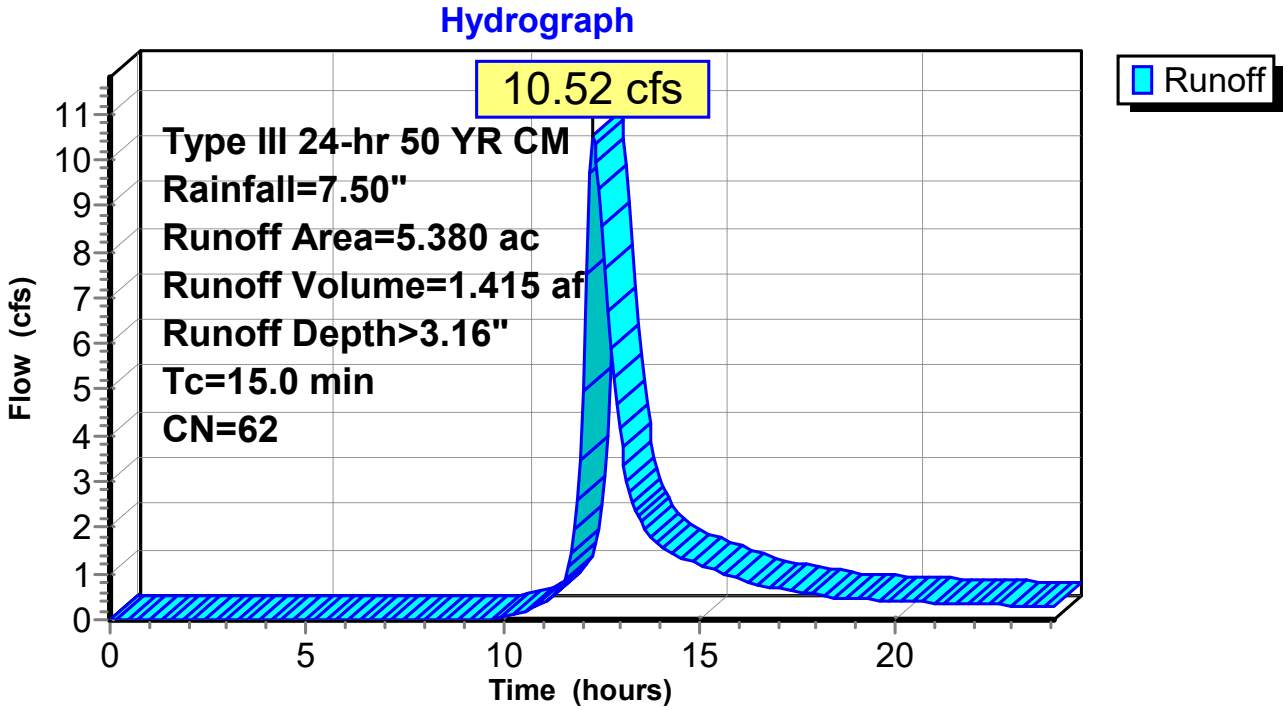
Runoff = 10.52 cfs @ 12.28 hrs, Volume= 1.415 af, Depth> 3.16"

Runoff by SCS TR-20 method, UH=Delmarva, Time Span= 0.00-24.01 hrs, dt= 0.07 hrs
Type III 24-hr 50 YR CM Rainfall=7.50"

Area (ac)	CN	Description
0.010	39	>75% Grass cover, Good, HSG A
4.320	61	>75% Grass cover, Good, HSG B
0.680	74	>75% Grass cover, Good, HSG C
0.370	58	Woods/grass comb., Good, HSG B
5.380	62	Weighted Average
5.380		Pervious Area

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

Subcatchment Post DA- 1: Pervious



Summary for Subcatchment Post DA-1: Impervious

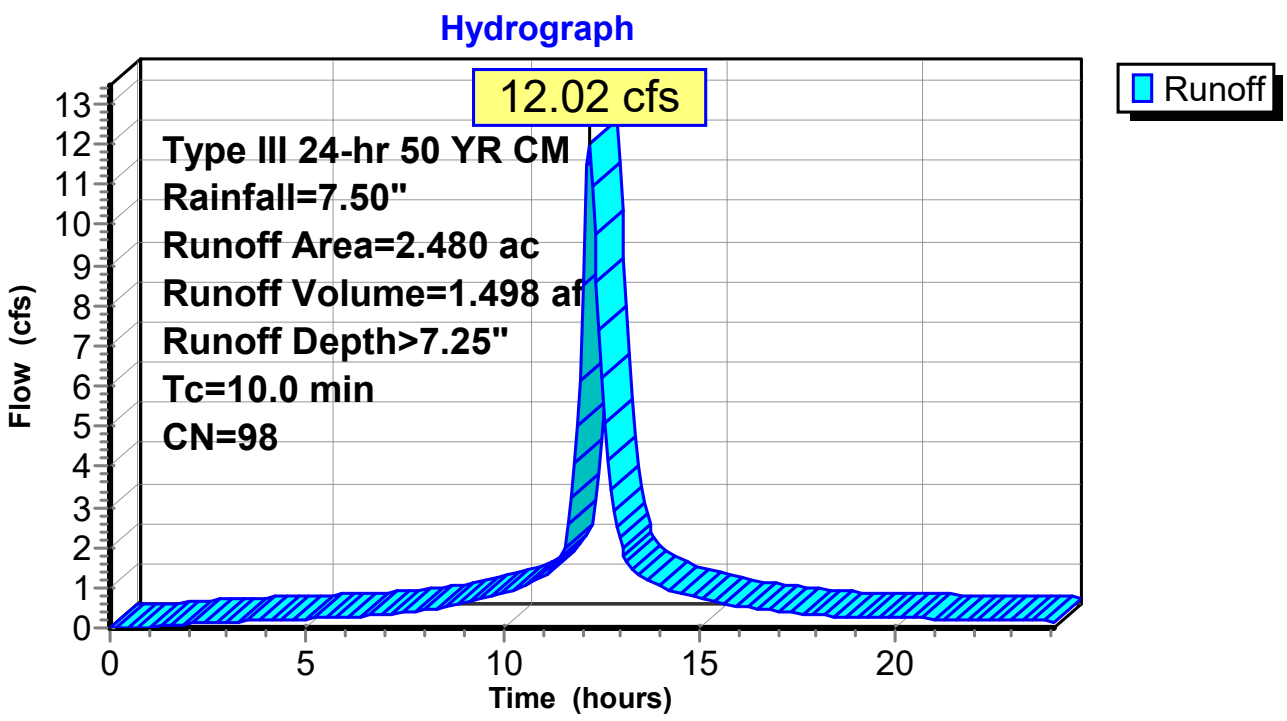
Runoff = 12.02 cfs @ 12.17 hrs, Volume= 1.498 af, Depth> 7.25"

Runoff by SCS TR-20 method, UH=Delmarva, Time Span= 0.00-24.01 hrs, dt= 0.07 hrs
Type III 24-hr 50 YR CM Rainfall=7.50"

Area (ac)	CN	Description
1.160	98	Water Surface
1.320	98	Paved parking & roofs
2.480	98	Weighted Average
2.480		Impervious Area

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

Subcatchment Post DA-1: Impervious



Summary for Subcatchment Post DA2: Impervious

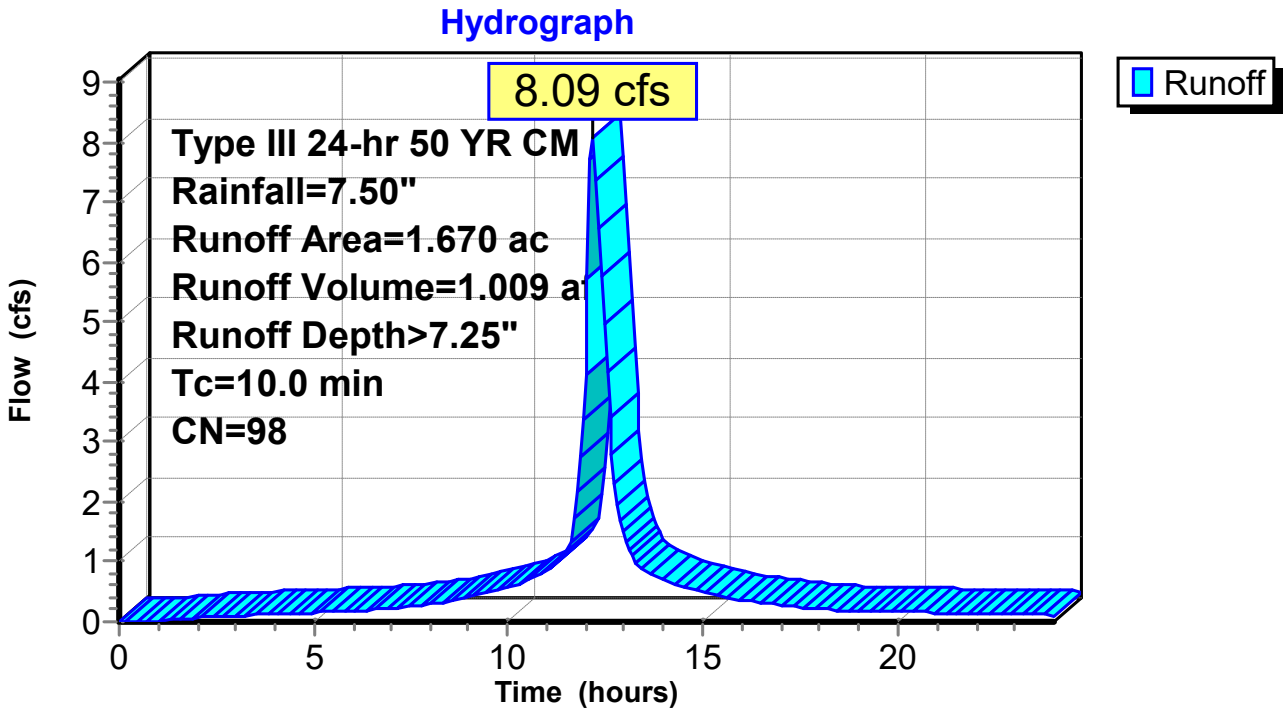
Runoff = 8.09 cfs @ 12.17 hrs, Volume= 1.009 af, Depth> 7.25"

Runoff by SCS TR-20 method, UH=Delmarva, Time Span= 0.00-24.01 hrs, dt= 0.07 hrs
Type III 24-hr 50 YR CM Rainfall=7.50"

	Area (ac)	CN	Description
*	0.250	98	Cart Paths
	1.330	98	Water Surface
*	0.090	98	Townhouse
	1.670	98	Weighted Average
	1.670		Impervious Area

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

Subcatchment Post DA2: Impervious



Summary for Subcatchment Post DA3: Pervious

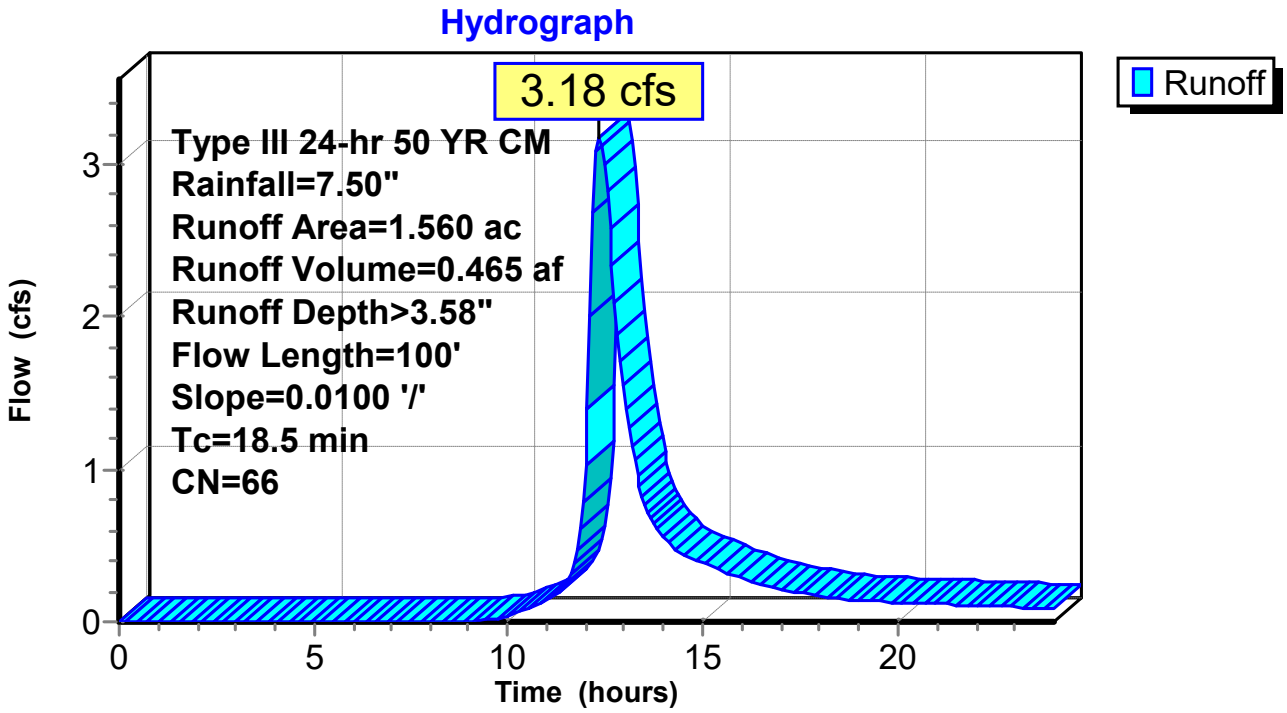
Runoff = 3.18 cfs @ 12.33 hrs, Volume= 0.465 af, Depth> 3.58"

Runoff by SCS TR-20 method, UH=Delmarva, Time Span= 0.00-24.01 hrs, dt= 0.07 hrs
Type III 24-hr 50 YR CM Rainfall=7.50"

Area (ac)	CN	Description
1.000	61	>75% Grass cover, Good, HSG B
0.560	74	>75% Grass cover, Good, HSG C
1.560	66	Weighted Average
1.560		Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
18.5	100	0.0100	0.09		**Sheet Flow, Unpaved** Grass: Dense n= 0.240 P2= 3.30"

Subcatchment Post DA3: Pervious



Summary for Subcatchment Post DA4: Pervious

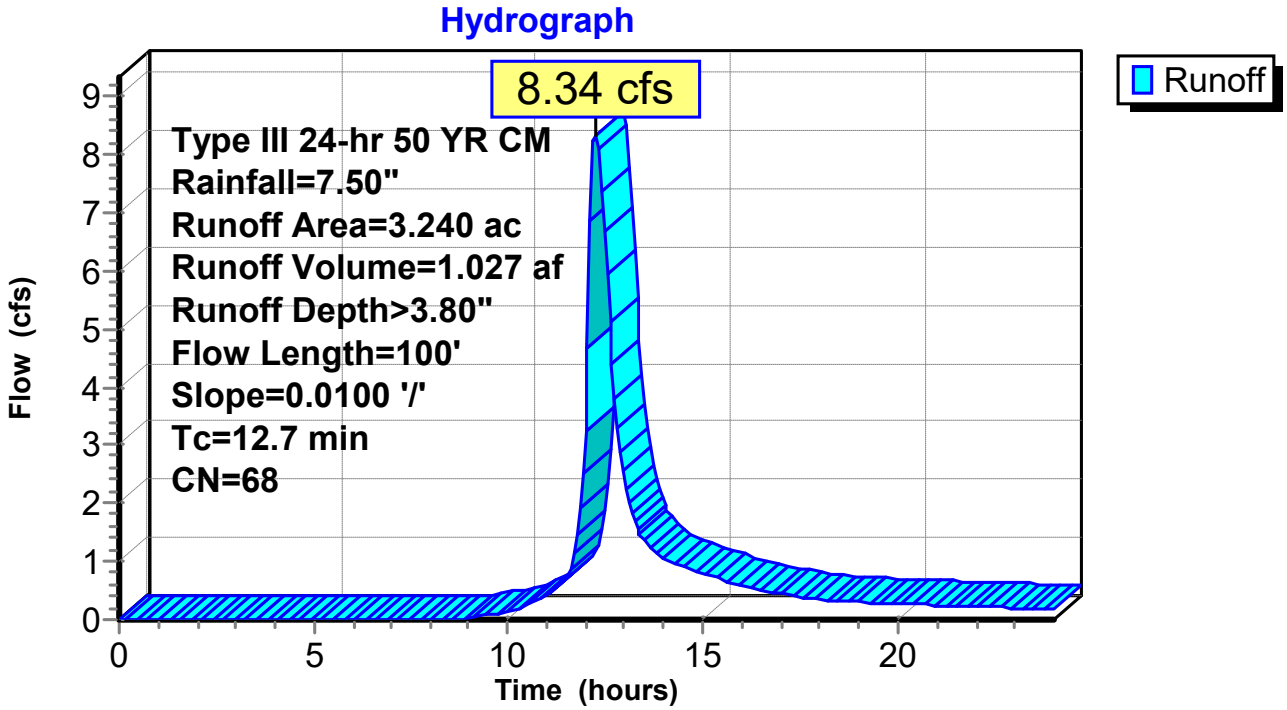
Runoff = 8.34 cfs @ 12.22 hrs, Volume= 1.027 af, Depth> 3.80"

Runoff by SCS TR-20 method, UH=Delmarva, Time Span= 0.00-24.01 hrs, dt= 0.07 hrs
Type III 24-hr 50 YR CM Rainfall=7.50"

Area (ac)	CN	Description
0.660	61	>75% Grass cover, Good, HSG B
1.810	74	>75% Grass cover, Good, HSG C
0.550	55	Woods, Good, HSG B
0.220	70	Woods, Good, HSG C
3.240	68	Weighted Average
3.240		Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
12.7	100	0.0100	0.13		**Sheet Flow, Unpaved** Grass: Short n= 0.150 P2= 3.30"

Subcatchment Post DA4: Pervious



Summary for Subcatchment Post DA5 Off: Off Site Impervious

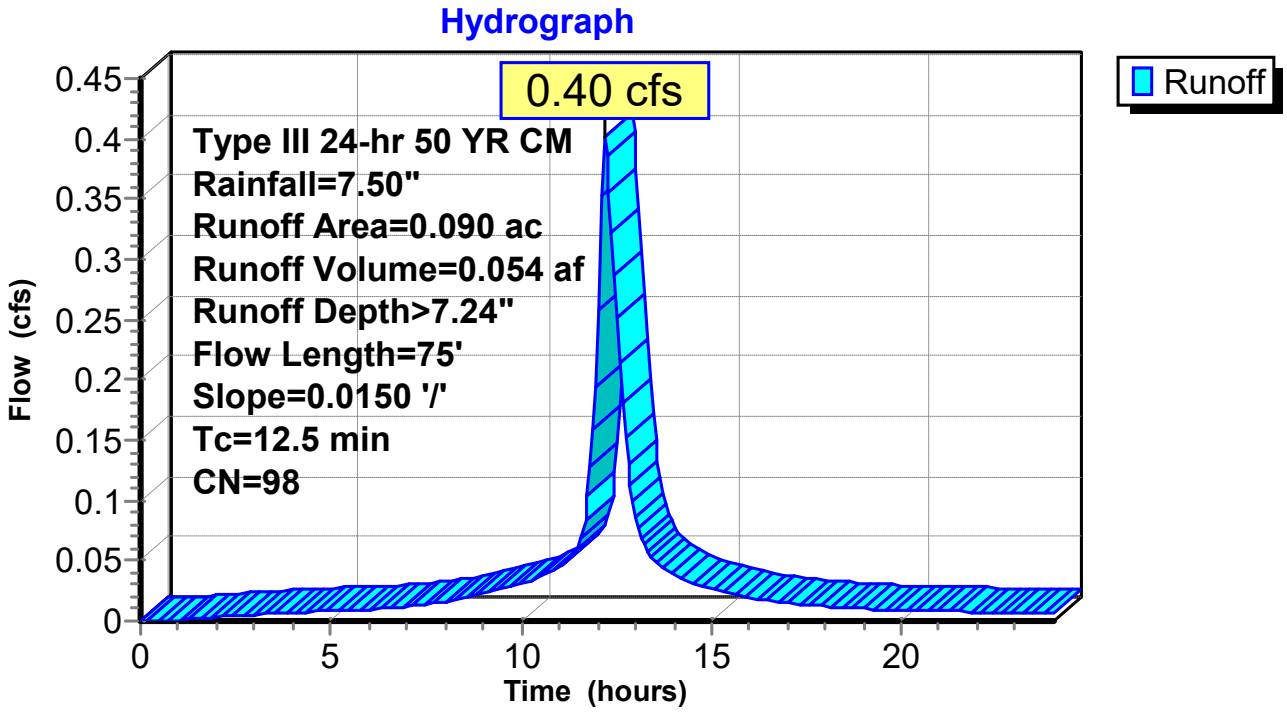
Runoff = 0.40 cfs @ 12.20 hrs, Volume= 0.054 af, Depth> 7.24"

Runoff by SCS TR-20 method, UH=Delmarva, Time Span= 0.00-24.01 hrs, dt= 0.07 hrs
Type III 24-hr 50 YR CM Rainfall=7.50"

	Area (ac)	CN	Description
*	0.090	98	Impervious
	0.090		Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
12.5	75	0.0150	0.10		**Sheet Flow, Unpaved** Grass: Dense n= 0.240 P2= 3.30"

Subcatchment Post DA5 Off: Off Site Impervious



Summary for Subcatchment Post DA5 Off: Off Site Pervious

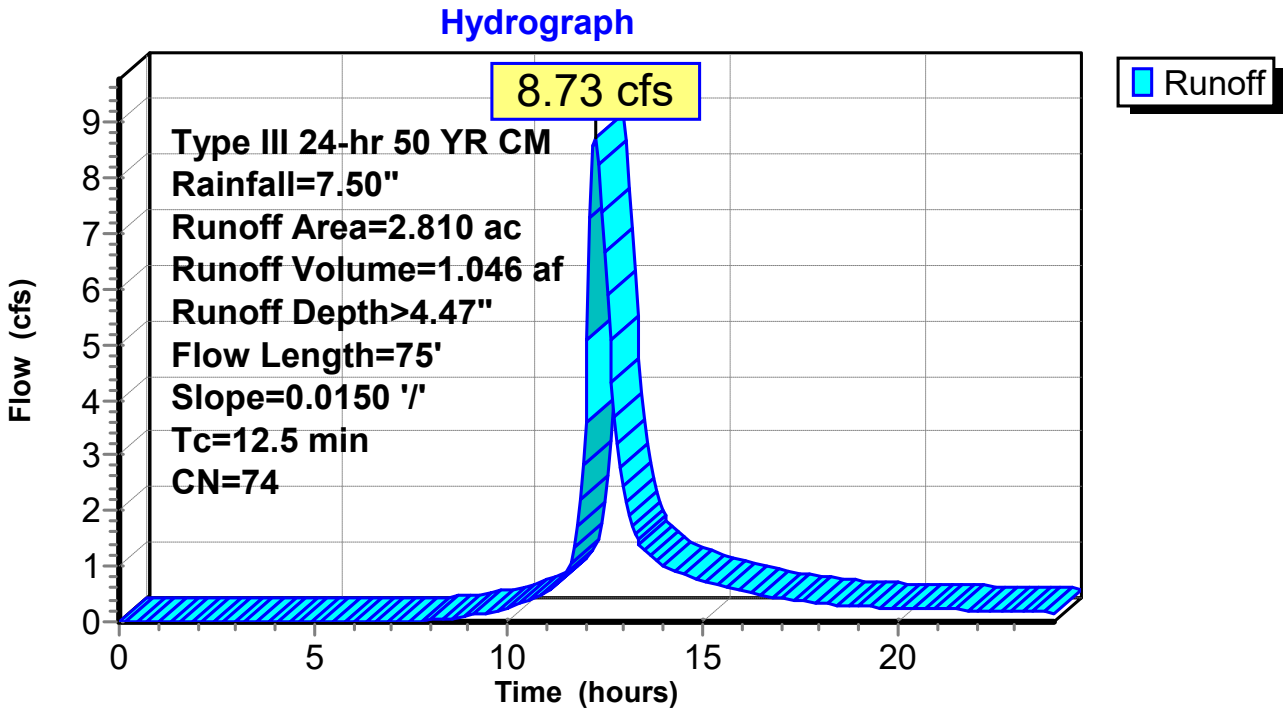
Runoff = 8.73 cfs @ 12.21 hrs, Volume= 1.046 af, Depth> 4.47"

Runoff by SCS TR-20 method, UH=Delmarva, Time Span= 0.00-24.01 hrs, dt= 0.07 hrs
Type III 24-hr 50 YR CM Rainfall=7.50"

Area (ac)	CN	Description
2.710	74	>75% Grass cover, Good, HSG C
0.100	72	Woods/grass comb., Good, HSG C
2.810	74	Weighted Average
2.810		Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
12.5	75	0.0150	0.10		**Sheet Flow, Unpaved** Grass: Dense n= 0.240 P2= 3.30"

Subcatchment Post DA5 Off: Off Site Pervious



Summary for Pond Lake1: Basin

Inflow Area = 7.860 ac, 31.55% Impervious, Inflow Depth > 4.45" for 50 YR CM event
Inflow = 21.96 cfs @ 12.21 hrs, Volume= 2.913 af
Outflow = 4.56 cfs @ 13.18 hrs, Volume= 2.104 af, Atten= 79%, Lag= 58.3 min
Primary = 4.56 cfs @ 13.18 hrs, Volume= 2.104 af

Routing by Stor-Ind method, Time Span= 0.00-24.01 hrs, dt= 0.07 hrs
Peak Elev= 12.02' @ 13.18 hrs Surf.Area= 0 sf Storage= 66,669 cf

Plug-Flow detention time= 260.0 min calculated for 2.098 af (72% of inflow)
Center-of-Mass det. time= 165.3 min (968.7 - 803.4)

Volume	Invert	Avail.Storage	Storage Description
#1	10.70'	137,878 cf	**Custom Stage Data** Listed below

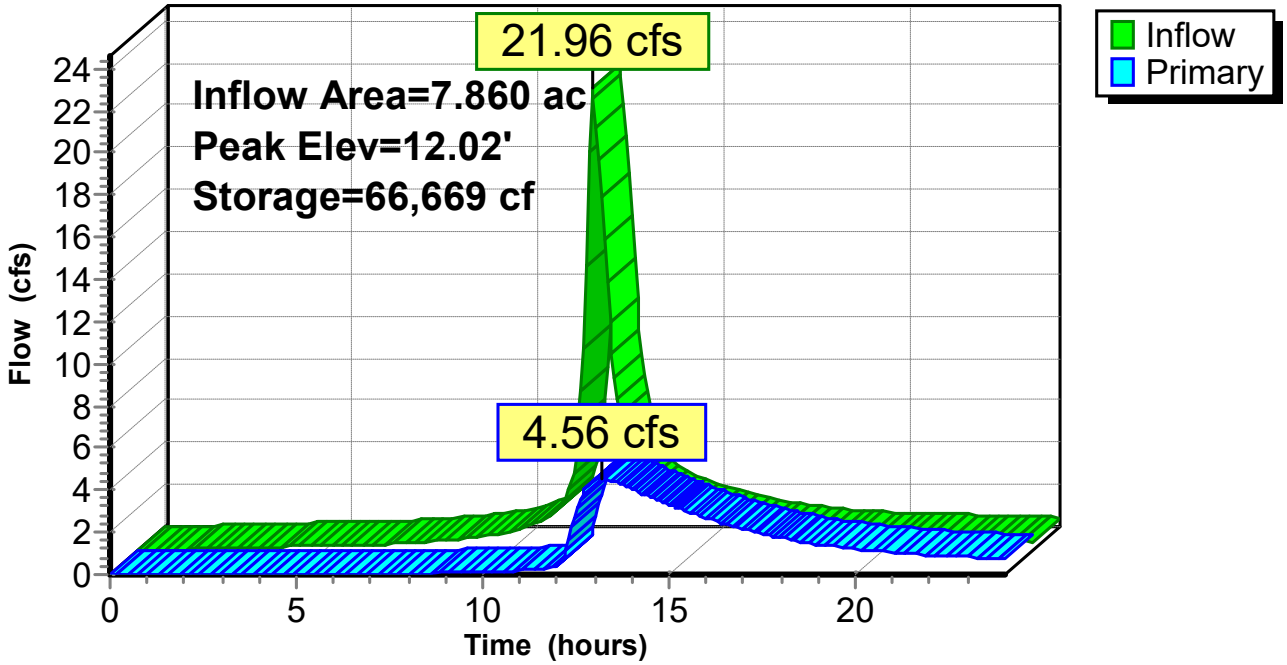
Elevation (feet)	Cum.Store (cubic-feet)
10.70	0
11.00	15,300
12.00	65,780
13.00	118,459
13.70	137,878

Device	Routing	Invert	Outlet Devices
#1	Primary	11.35'	**2.0' long Sharp-Crested Rectangular Weir** 2 End Contraction(s)
#2	Primary	10.70'	**0.5' long Sharp-Crested Rectangular Weir** 2 End Contraction(s)

Primary OutFlow Max=4.56 cfs @ 13.18 hrs HW=12.02' (Free Discharge)
↑—**1=Sharp-Crested Rectangular Weir** (Weir Controls 3.32 cfs @ 2.67 fps)
└—**2=Sharp-Crested Rectangular Weir** (Weir Controls 1.24 cfs @ 3.75 fps)

Pond Lake1: Basin

Hydrograph



Summary for Pond Lake2: Lake 2

Inflow Area = 12.640 ac, 32.83% Impervious, Inflow Depth > 3.55" for 50 YR CM event
Inflow = 13.61 cfs @ 12.21 hrs, Volume= 3.744 af
Outflow = 5.23 cfs @ 14.23 hrs, Volume= 3.034 af, Atten= 62%, Lag= 121.1 min
Primary = 5.23 cfs @ 14.23 hrs, Volume= 3.034 af

Routing by Stor-Ind method, Time Span= 0.00-24.01 hrs, dt= 0.07 hrs
Peak Elev= 10.49' @ 14.23 hrs Surf.Area= 0 sf Storage= 53,223 cf

Plug-Flow detention time= 197.0 min calculated for 3.034 af (81% of inflow)
Center-of-Mass det. time= 116.1 min (1,009.9 - 893.8)

Volume	Invert	Avail.Storage	Storage Description
#1	9.67'	87,360 cf	**Custom Stage Data** Listed below

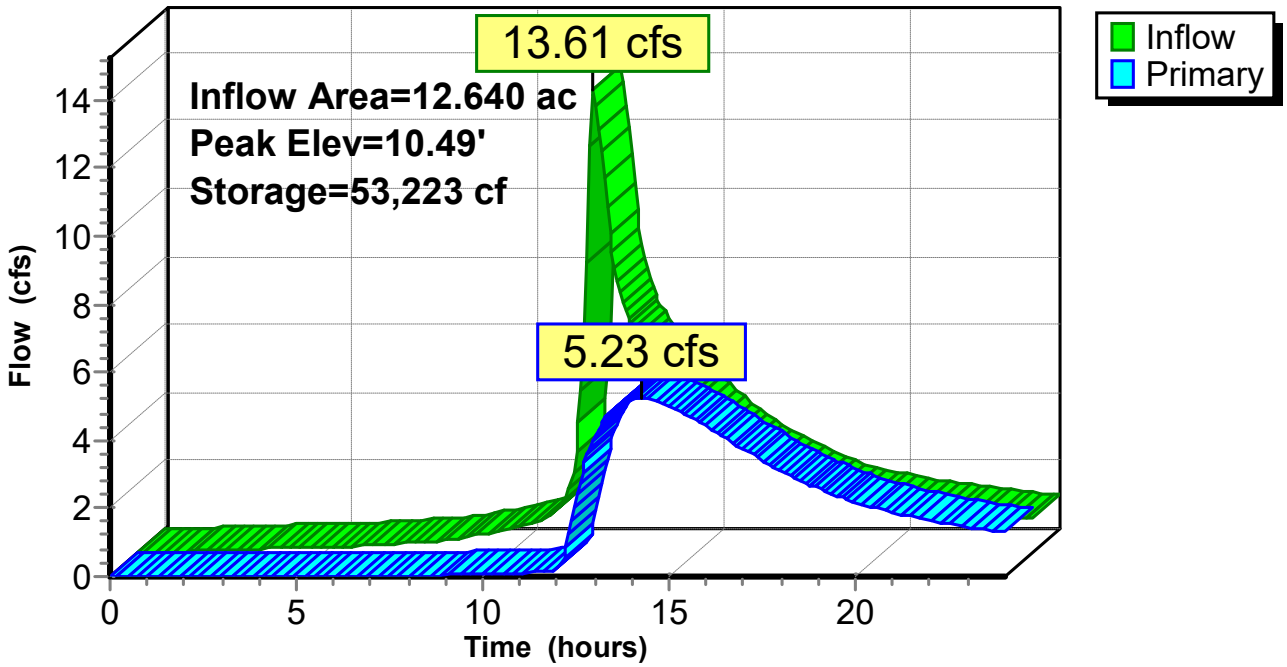
Elevation (feet)	Cum.Store (cubic-feet)
9.67	0
10.00	20,120
11.00	87,360

Device	Routing	Invert	Outlet Devices
#1	Primary	10.00'	**4.0' long Sharp-Crested Rectangular Weir** 2 End Contraction(s)
#2	Primary	9.67'	**0.5' long Sharp-Crested Rectangular Weir** 2 End Contraction(s)

Primary OutFlow Max=5.22 cfs @ 14.23 hrs HW=10.49' (Free Discharge)
1=Sharp-Crested Rectangular Weir (Weir Controls 4.41 cfs @ 2.29 fps)
2=Sharp-Crested Rectangular Weir (Weir Controls 0.82 cfs @ 2.97 fps)

Pond Lake2: Lake 2

Hydrograph



Summary for Pond Lake3: Lake 3

[79] Warning: Submerged Pond Lake2 Primary device # 2 by 0.14'

Inflow Area = 16.170 ac, 37.85% Impervious, Inflow Depth > 3.48" for 50 YR CM event
Inflow = 12.89 cfs @ 12.21 hrs, Volume= 4.689 af
Outflow = 7.15 cfs @ 13.01 hrs, Volume= 4.028 af, Atten= 45%, Lag= 48.3 min
Primary = 7.15 cfs @ 13.01 hrs, Volume= 4.028 af

Routing by Stor-Ind method, Time Span= 0.00-24.01 hrs, dt= 0.07 hrs
Peak Elev= 9.81' @ 13.01 hrs Surf.Area= 0 sf Storage= 36,755 cf

Plug-Flow detention time= 125.2 min calculated for 4.016 af (86% of inflow)
Center-of-Mass det. time= 63.3 min (992.1 - 928.8)

Volume	Invert	Avail.Storage	Storage Description
#1	8.60'	69,310 cf	**Custom Stage Data** Listed below

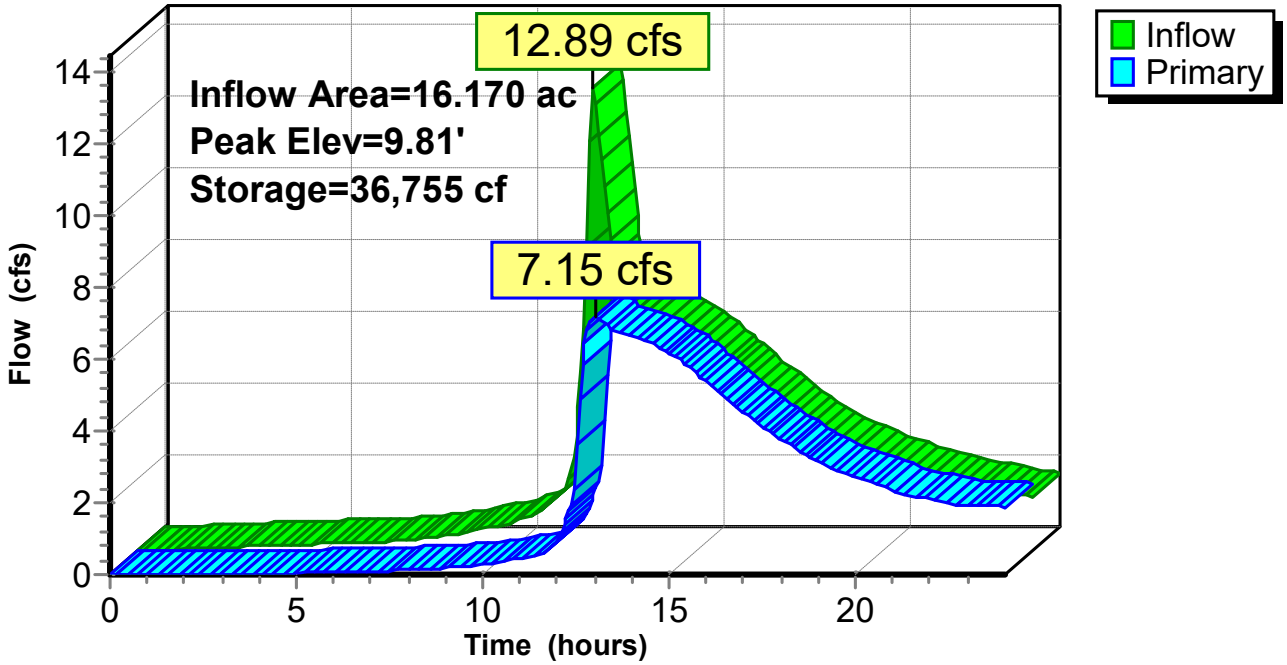
Elevation (feet)	Cum.Store (cubic-feet)
8.60	0
9.00	11,585
10.00	42,767
10.80	69,310

Device	Routing	Invert	Outlet Devices
#1	Primary	9.60'	**12.0' long Sharp-Crested Rectangular Weir** 2 End Contraction(s)
#2	Primary	9.60'	**4.0' long Sharp-Crested Rectangular Weir** 2 End Contraction(s)
#3	Primary	8.60'	**0.5' long Sharp-Crested Rectangular Weir** 2 End Contraction(s)
#4	Primary	8.60'	**0.5' long Sharp-Crested Rectangular Weir** 2 End Contraction(s)

Primary OutFlow Max=7.15 cfs @ 13.01 hrs HW=9.81' (Free Discharge)
- **1=Sharp-Crested Rectangular Weir** (Weir Controls 3.69 cfs @ 1.49 fps)
- **2=Sharp-Crested Rectangular Weir** (Weir Controls 1.22 cfs @ 1.49 fps)
- **3=Sharp-Crested Rectangular Weir** (Weir Controls 1.12 cfs @ 3.59 fps)
- **4=Sharp-Crested Rectangular Weir** (Weir Controls 1.12 cfs @ 3.59 fps)

Pond Lake3: Lake 3

Hydrograph



Summary for Pond Lake4&5: Lake 4 & 5

[79] Warning: Submerged Pond Lake3 Primary device # 3 by 0.69'
[79] Warning: Submerged Pond Lake3 Primary device # 4 by 0.69'

Inflow Area = 22.070 ac, 39.78% Impervious, Inflow Depth > 3.62" for 50 YR CM event
Inflow = 22.57 cfs @ 12.19 hrs, Volume= 6.661 af
Outflow = 8.90 cfs @ 13.94 hrs, Volume= 4.130 af, Atten= 61%, Lag= 104.8 min
Primary = 8.90 cfs @ 13.94 hrs, Volume= 4.130 af

Routing by Stor-Ind method, Time Span= 0.00-24.01 hrs, dt= 0.07 hrs
Peak Elev= 9.29' @ 13.94 hrs Surf.Area= 57,597 sf Storage= 113,968 cf

Plug-Flow detention time= 275.4 min calculated for 4.130 af (62% of inflow)
Center-of-Mass det. time= 133.1 min (1,044.0 - 910.9)

Volume	Invert	Avail.Storage	Storage Description
#1	7.00'	126,192 cf	**Custom Stage Data (Prismatic)** Listed below

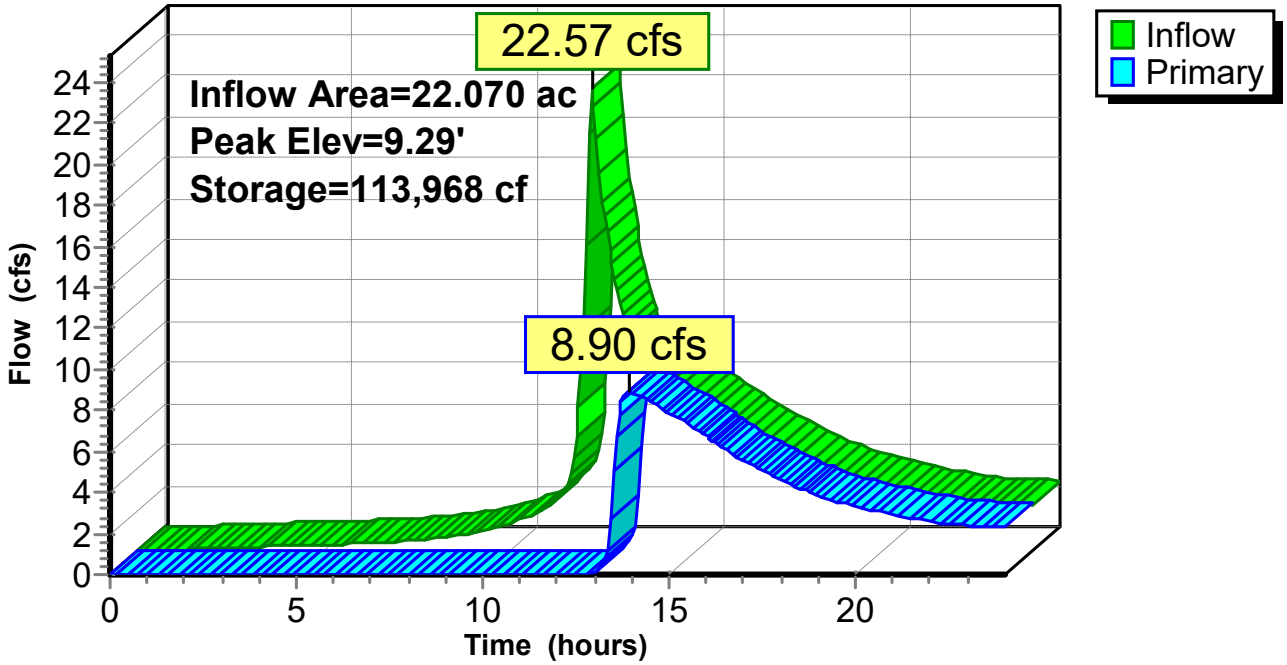
Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
7.00	27,767	0	0
7.40	46,551	14,864	14,864
8.00	50,946	29,249	44,113
9.00	55,842	53,394	97,507
9.50	58,900	28,686	126,192

Device	Routing	Invert	Outlet Devices
#1	Primary	9.20'	**100.0' long x 20.0' 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
#2	Primary	9.00'	**4.0' long Sharp-Crested Rectangular Weir** 2 End Contraction(s)

Primary OutFlow Max=8.85 cfs @ 13.94 hrs HW=9.29' (Free Discharge)
└**1=Broad-Crested Rectangular Weir** (Weir Controls 6.87 cfs @ 0.79 fps)
└**2=Sharp-Crested Rectangular Weir** (Weir Controls 1.98 cfs @ 1.75 fps)

Pond Lake4&5: Lake 4 & 5

Hydrograph

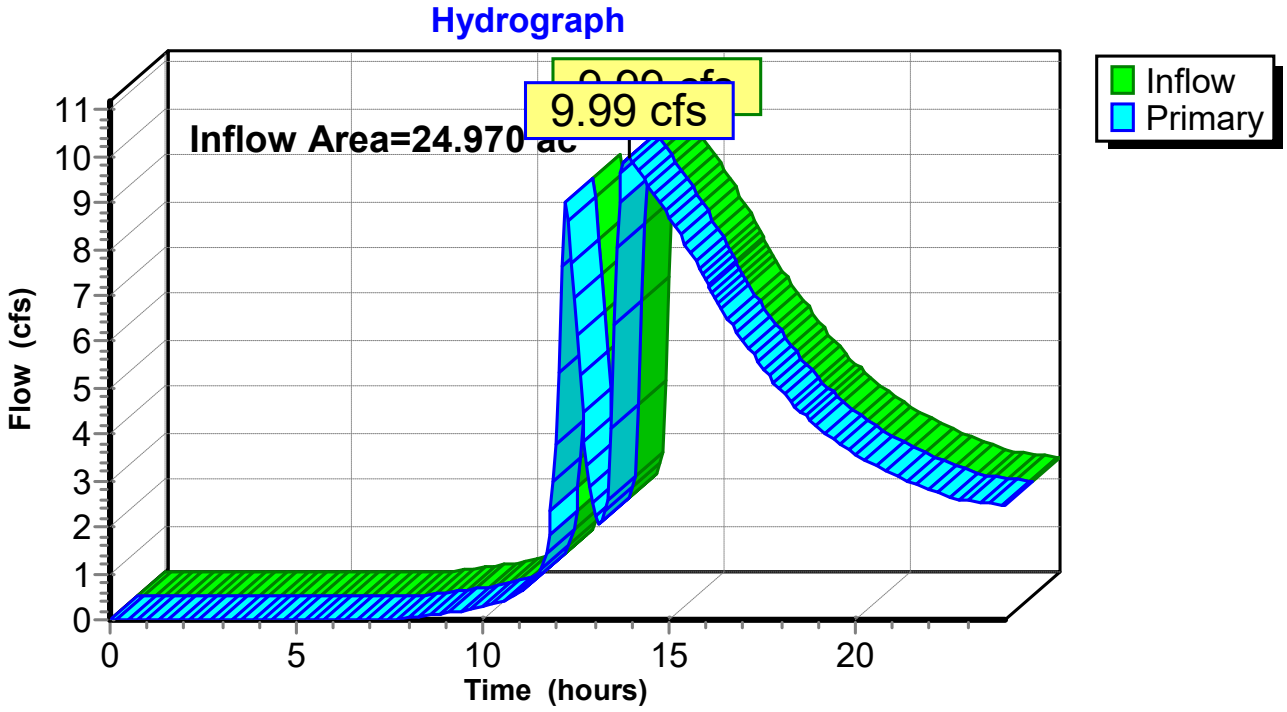


Summary for Link 1L: Combo Discharge

Inflow Area = 24.970 ac, 35.52% Impervious, Inflow Depth > 2.51" for 50 YR CM event
Inflow = 9.99 cfs @ 13.90 hrs, Volume= 5.230 af
Primary = 9.99 cfs @ 13.90 hrs, Volume= 5.230 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-24.01 hrs, dt= 0.07 hrs

Link 1L: Combo Discharge



Time span=0.00-24.00 hrs, dt=0.07 hrs, 344 points
Runoff by SCS TR-20 method, UH=Delmarva
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Subcatchment Post DA 2: Pervious Runoff Area=3.110 ac 0.00% Impervious Runoff Depth>3.33"
Flow Length=100' Slope=0.0100 '/' Tc=12.7 min CN=55 Runoff=6.75 cfs 0.863 af

Subcatchment Post DA 3: Impervious Runoff Area=1.970 ac 100.00% Impervious Runoff Depth>8.54"
Tc=10.0 min CN=98 Runoff=11.21 cfs 1.403 af

Subcatchment Post DA 4: Impervious Runoff Area=2.660 ac 100.00% Impervious Runoff Depth>8.54"
Tc=10.0 min CN=98 Runoff=15.14 cfs 1.894 af

Subcatchment Post DA- 1: Pervious Runoff Area=5.380 ac 0.00% Impervious Runoff Depth>4.17"
Tc=15.0 min CN=62 Runoff=14.08 cfs 1.868 af

Subcatchment Post DA-1: Impervious Runoff Area=2.480 ac 100.00% Impervious Runoff Depth>8.54"
Tc=10.0 min CN=98 Runoff=14.11 cfs 1.766 af

Subcatchment Post DA2: Impervious Runoff Area=1.670 ac 100.00% Impervious Runoff Depth>8.54"
Tc=10.0 min CN=98 Runoff=9.50 cfs 1.189 af

Subcatchment Post DA3: Pervious Runoff Area=1.560 ac 0.00% Impervious Runoff Depth>4.64"
Flow Length=100' Slope=0.0100 '/' Tc=18.5 min CN=66 Runoff=4.15 cfs 0.604 af

Subcatchment Post DA4: Pervious Runoff Area=3.240 ac 0.00% Impervious Runoff Depth>4.90"
Flow Length=100' Slope=0.0100 '/' Tc=12.7 min CN=68 Runoff=10.94 cfs 1.322 af

Subcatchment Post DA5 Off: Off Site Runoff Area=0.090 ac 100.00% Impervious Runoff Depth>8.54"
Flow Length=75' Slope=0.0150 '/' Tc=12.5 min CN=98 Runoff=0.47 cfs 0.064 af

Subcatchment Post DA5 Off: Off Site Runoff Area=2.810 ac 0.00% Impervious Runoff Depth>5.63"
Flow Length=75' Slope=0.0150 '/' Tc=12.5 min CN=74 Runoff=10.99 cfs 1.318 af

Pond Lake1: Basin Peak Elev=12.27' Storage=79,822 cf Inflow=27.56 cfs 3.633 af
Outflow=6.82 cfs 2.787 af

Pond Lake2: Lake 2 Peak Elev=10.66' Storage=64,532 cf Inflow=17.76 cfs 4.838 af
Outflow=7.76 cfs 4.092 af

Pond Lake3: Lake 3 Peak Elev=9.91' Storage=39,981 cf Inflow=16.12 cfs 6.098 af
Outflow=11.45 cfs 5.403 af

Pond Lake4&5: Lake 4 & 5 Peak Elev=9.33' Storage=116,706 cf Inflow=27.60 cfs 8.619 af
Outflow=15.77 cfs 6.085 af

Link 1L: Combo Discharge Inflow=18.45 cfs 7.467 af
Primary=18.45 cfs 7.467 af

Total Runoff Area = 24.970 ac Runoff Volume = 12.289 af Average Runoff Depth = 5.91"
64.48% Pervious = 16.100 ac 35.52% Impervious = 8.870 ac

Summary for Subcatchment Post DA 2: Pervious

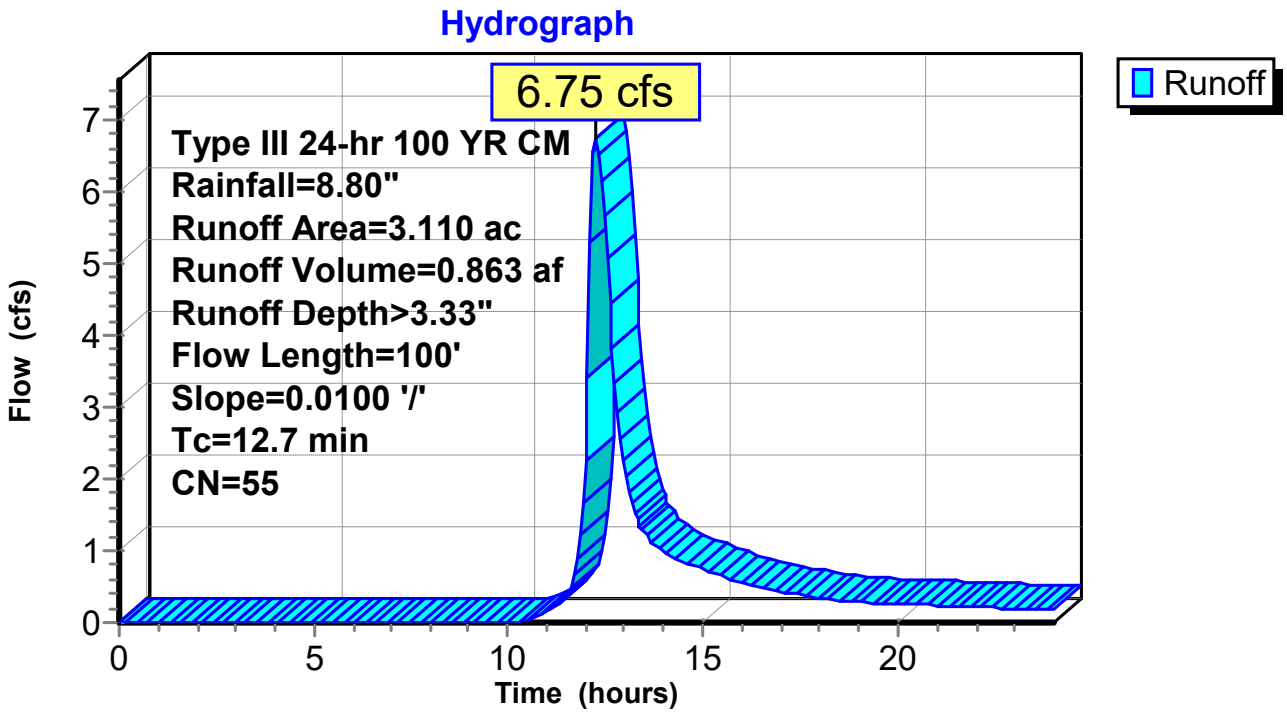
Runoff = 6.75 cfs @ 12.25 hrs, Volume= 0.863 af, Depth> 3.33"

Runoff by SCS TR-20 method, UH=Delmarva, Time Span= 0.00-24.01 hrs, dt= 0.07 hrs
Type III 24-hr 100 YR CM Rainfall=8.80"

Area (ac)	CN	Description
1.000	39	>75% Grass cover, Good, HSG A
1.340	61	>75% Grass cover, Good, HSG B
0.590	74	>75% Grass cover, Good, HSG C
0.080	30	Woods, Good, HSG A
0.100	55	Woods, Good, HSG B
3.110	55	Weighted Average
3.110		Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
12.7	100	0.0100	0.13		**Sheet Flow, Unpaved** Grass: Short n= 0.150 P2= 3.30"

Subcatchment Post DA 2: Pervious



Summary for Subcatchment Post DA 3: Impervious

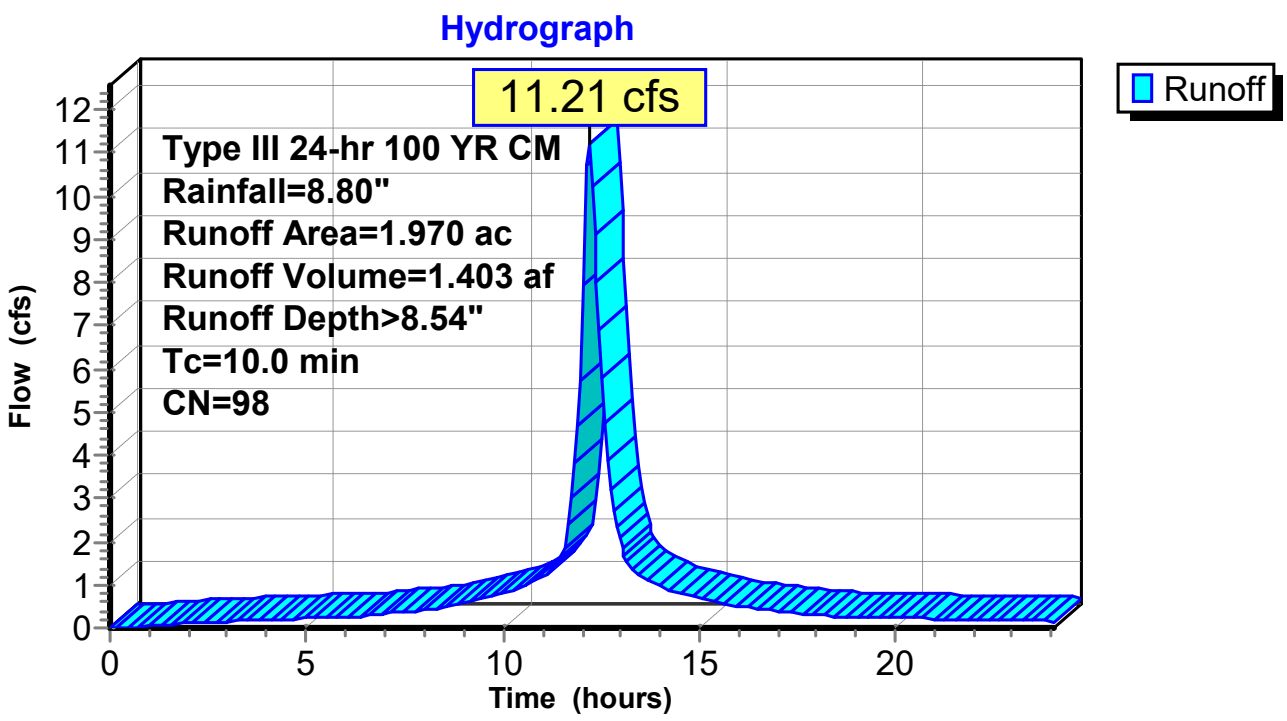
Runoff = 11.21 cfs @ 12.17 hrs, Volume= 1.403 af, Depth> 8.54"

Runoff by SCS TR-20 method, UH=Delmarva, Time Span= 0.00-24.01 hrs, dt= 0.07 hrs
Type III 24-hr 100 YR CM Rainfall=8.80"

Area (ac)	CN	Description
0.630	98	Water Surface
1.340	98	Paved parking & roofs
1.970	98	Weighted Average
1.970		Impervious Area

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

Subcatchment Post DA 3: Impervious



Summary for Subcatchment Post DA 4: Impervious

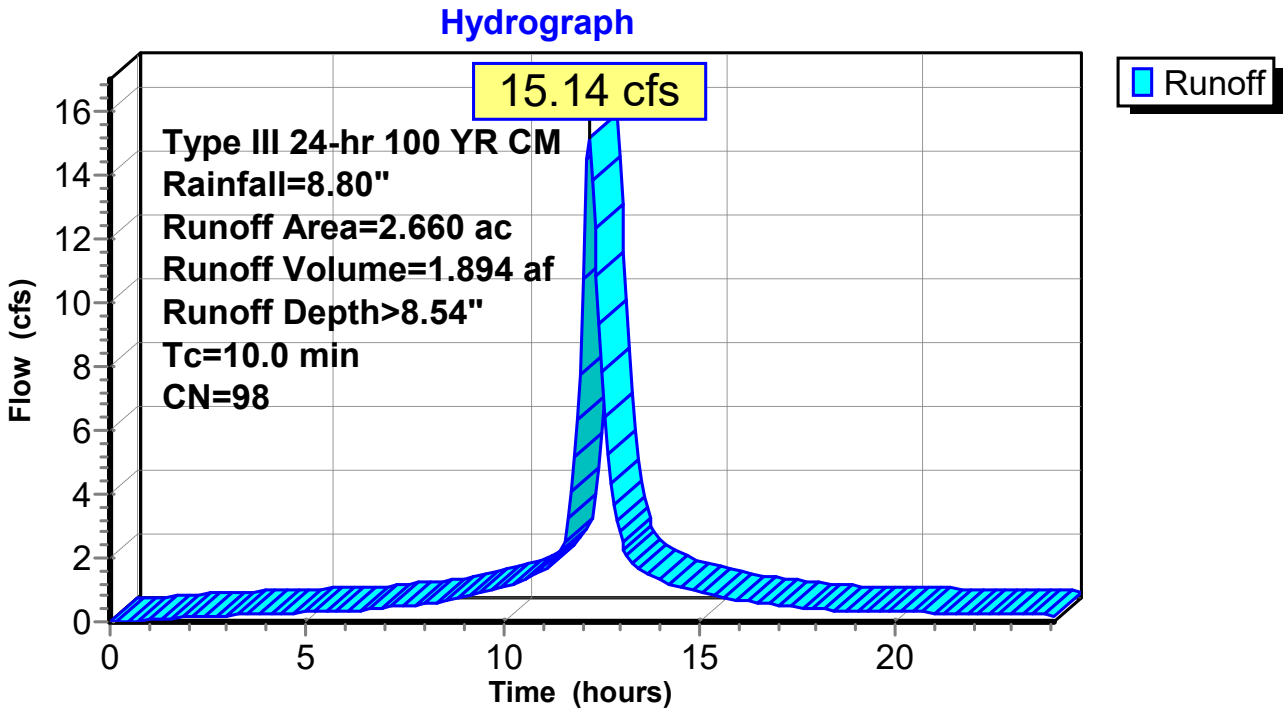
Runoff = 15.14 cfs @ 12.17 hrs, Volume= 1.894 af, Depth> 8.54"

Runoff by SCS TR-20 method, UH=Delmarva, Time Span= 0.00-24.01 hrs, dt= 0.07 hrs
Type III 24-hr 100 YR CM Rainfall=8.80"

	Area (ac)	CN	Description
*	0.100	98	Cart Paths
	1.260	98	Paved parking & roofs
	1.300	98	Water Surface
	2.660	98	Weighted Average
	2.660		Impervious Area

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

Subcatchment Post DA 4: Impervious



Summary for Subcatchment Post DA- 1: Pervious

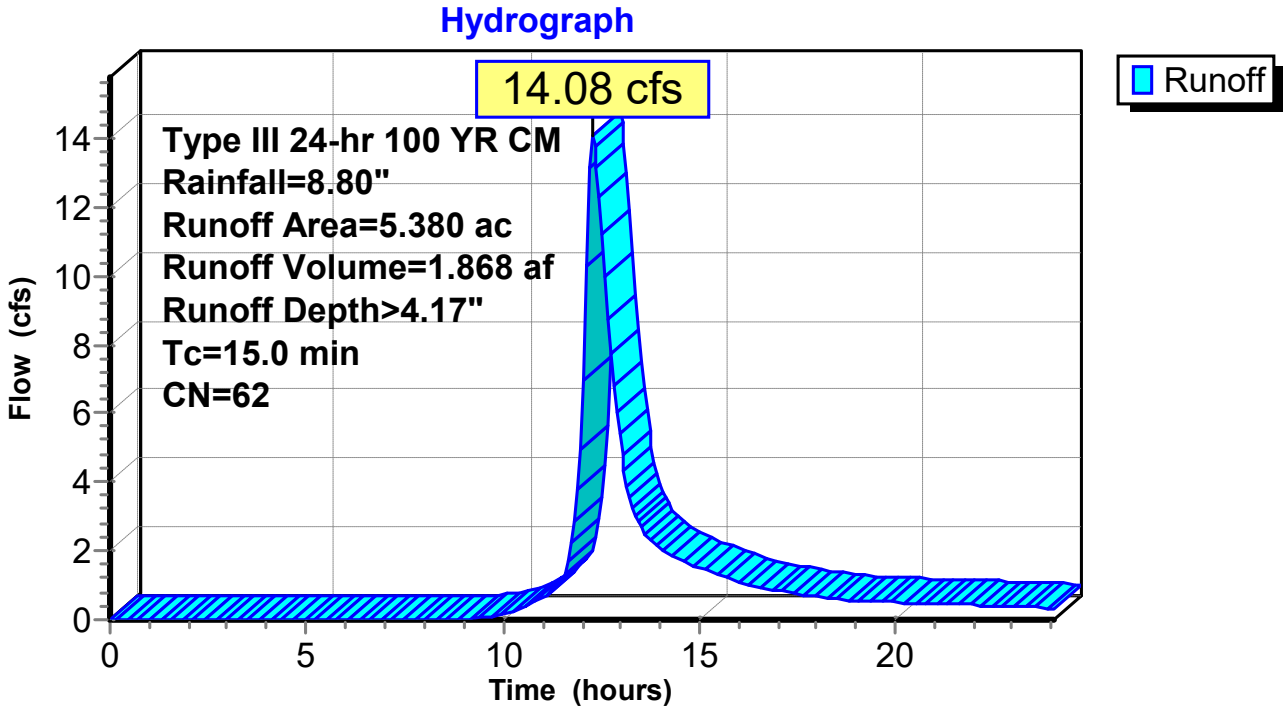
Runoff = 14.08 cfs @ 12.27 hrs, Volume= 1.868 af, Depth> 4.17"

Runoff by SCS TR-20 method, UH=Delmarva, Time Span= 0.00-24.01 hrs, dt= 0.07 hrs
Type III 24-hr 100 YR CM Rainfall=8.80"

Area (ac)	CN	Description
0.010	39	>75% Grass cover, Good, HSG A
4.320	61	>75% Grass cover, Good, HSG B
0.680	74	>75% Grass cover, Good, HSG C
0.370	58	Woods/grass comb., Good, HSG B
5.380	62	Weighted Average
5.380		Pervious Area

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

Subcatchment Post DA- 1: Pervious



Summary for Subcatchment Post DA-1: Impervious

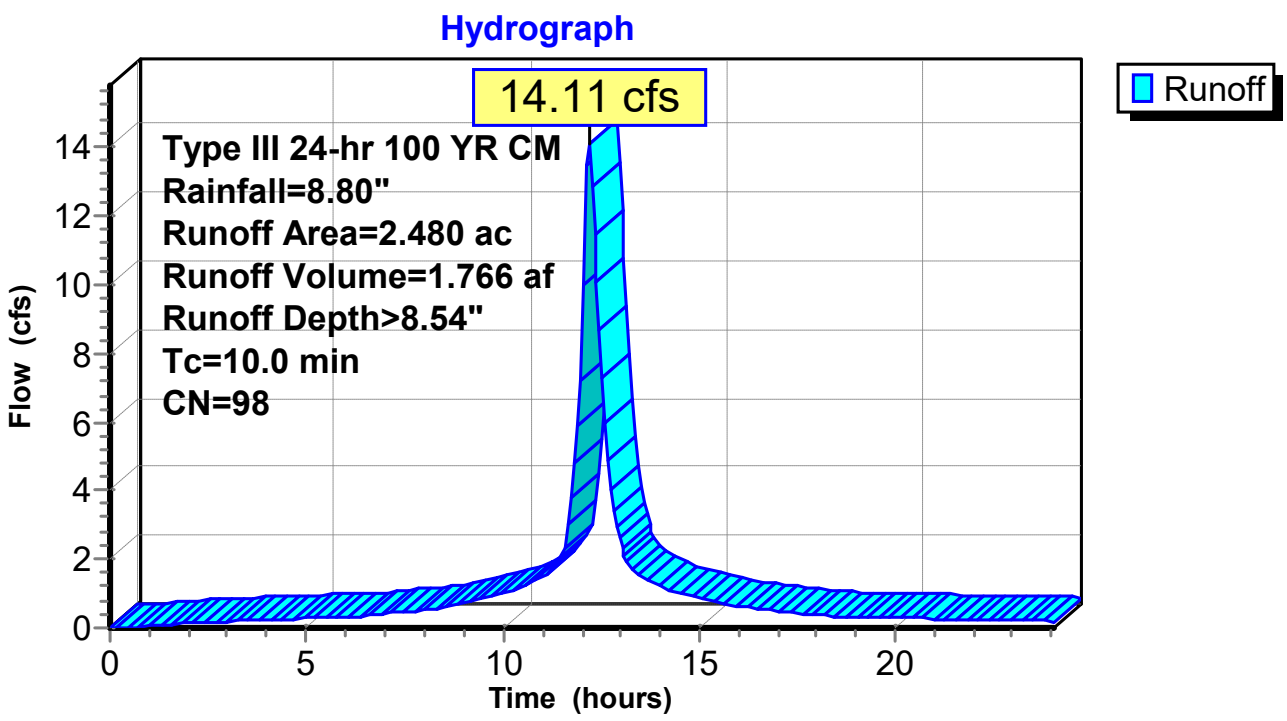
Runoff = 14.11 cfs @ 12.17 hrs, Volume= 1.766 af, Depth> 8.54"

Runoff by SCS TR-20 method, UH=Delmarva, Time Span= 0.00-24.01 hrs, dt= 0.07 hrs
Type III 24-hr 100 YR CM Rainfall=8.80"

Area (ac)	CN	Description
1.160	98	Water Surface
1.320	98	Paved parking & roofs
2.480	98	Weighted Average
2.480		Impervious Area

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

Subcatchment Post DA-1: Impervious



Summary for Subcatchment Post DA2: Impervious

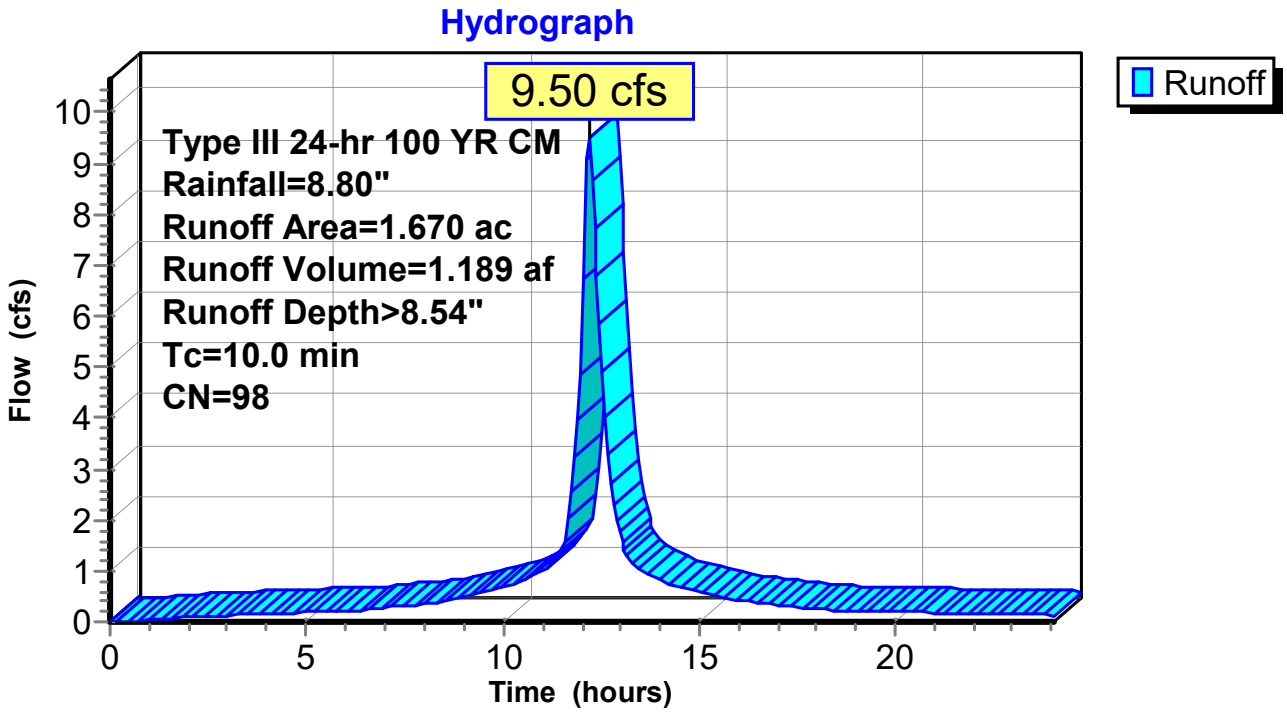
Runoff = 9.50 cfs @ 12.17 hrs, Volume= 1.189 af, Depth> 8.54"

Runoff by SCS TR-20 method, UH=Delmarva, Time Span= 0.00-24.01 hrs, dt= 0.07 hrs
Type III 24-hr 100 YR CM Rainfall=8.80"

	Area (ac)	CN	Description
*	0.250	98	Cart Paths
	1.330	98	Water Surface
*	0.090	98	Townhouse
	1.670	98	Weighted Average
	1.670		Impervious Area

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

Subcatchment Post DA2: Impervious



Summary for Subcatchment Post DA3: Pervious

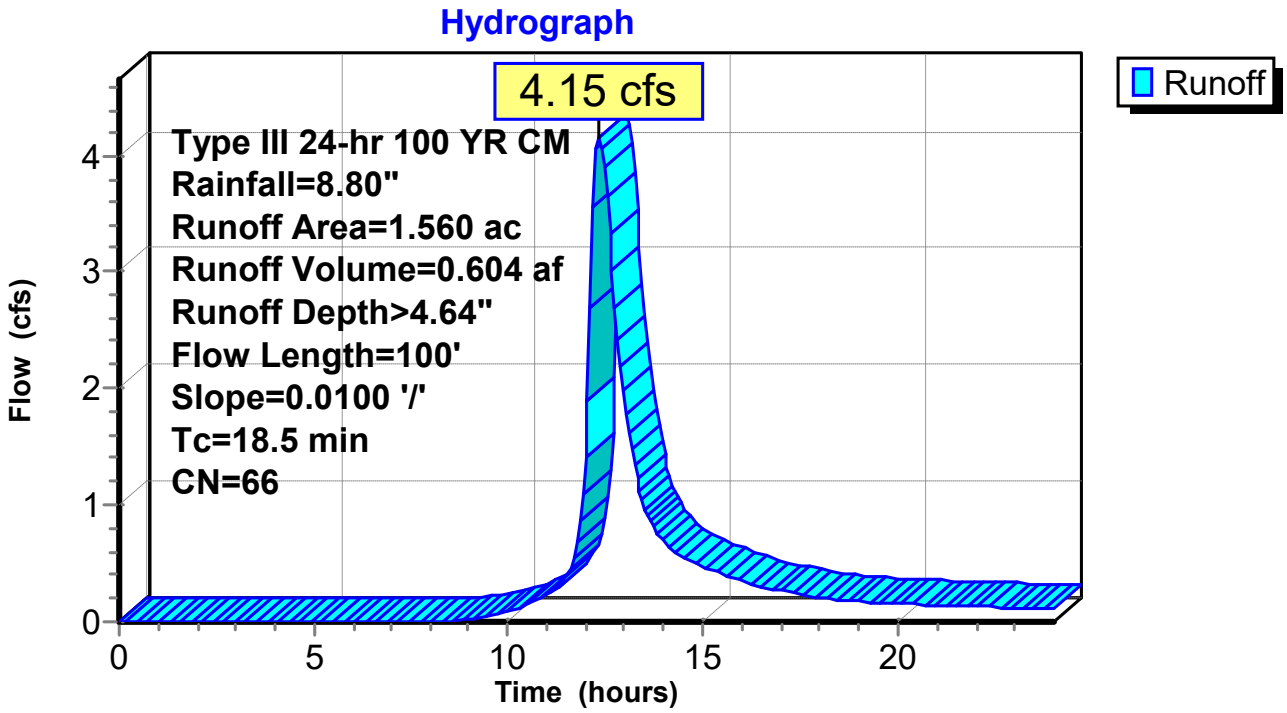
Runoff = 4.15 cfs @ 12.32 hrs, Volume= 0.604 af, Depth> 4.64"

Runoff by SCS TR-20 method, UH=Delmarva, Time Span= 0.00-24.01 hrs, dt= 0.07 hrs
Type III 24-hr 100 YR CM Rainfall=8.80"

Area (ac)	CN	Description
1.000	61	>75% Grass cover, Good, HSG B
0.560	74	>75% Grass cover, Good, HSG C
1.560	66	Weighted Average
1.560		Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
18.5	100	0.0100	0.09		**Sheet Flow, Unpaved** Grass: Dense n= 0.240 P2= 3.30"

Subcatchment Post DA3: Pervious



Summary for Subcatchment Post DA4: Pervious

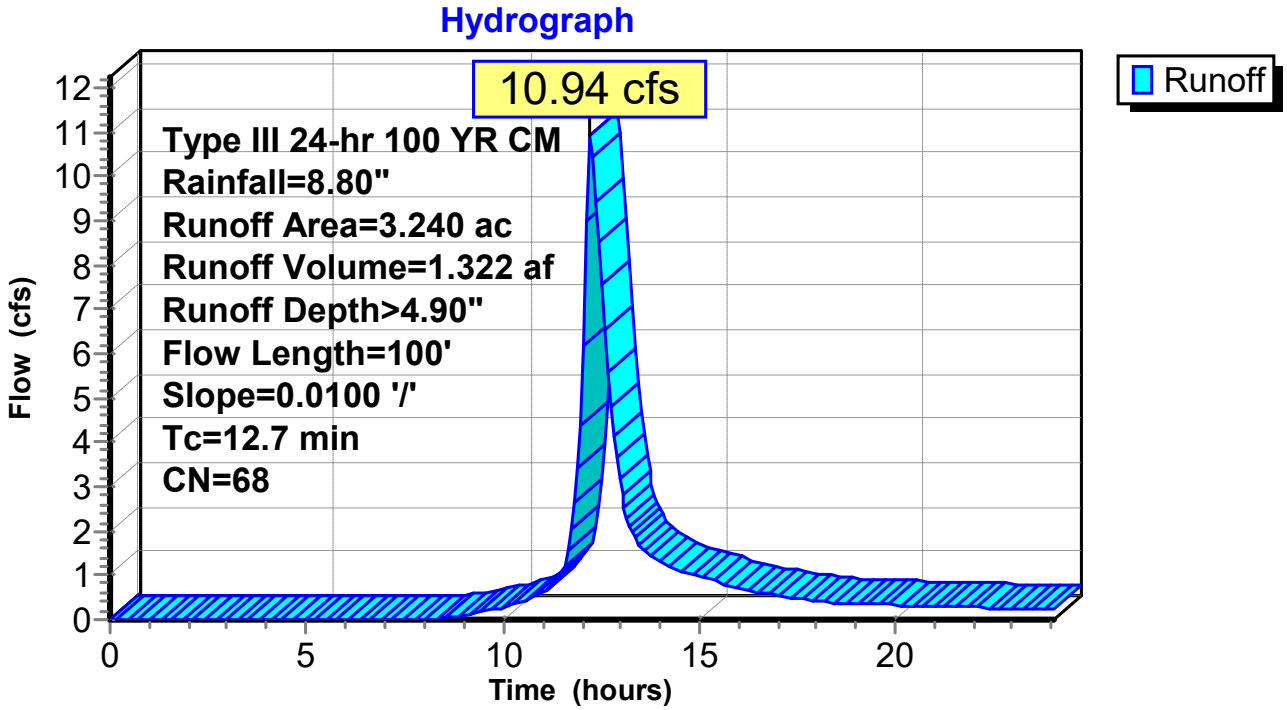
Runoff = 10.94 cfs @ 12.21 hrs, Volume= 1.322 af, Depth> 4.90"

Runoff by SCS TR-20 method, UH=Delmarva, Time Span= 0.00-24.01 hrs, dt= 0.07 hrs
Type III 24-hr 100 YR CM Rainfall=8.80"

Area (ac)	CN	Description
0.660	61	>75% Grass cover, Good, HSG B
1.810	74	>75% Grass cover, Good, HSG C
0.550	55	Woods, Good, HSG B
0.220	70	Woods, Good, HSG C
3.240	68	Weighted Average
3.240		Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
12.7	100	0.0100	0.13		**Sheet Flow, Unpaved** Grass: Short n= 0.150 P2= 3.30"

Subcatchment Post DA4: Pervious



Summary for Subcatchment Post DA5 Off: Off Site Impervious

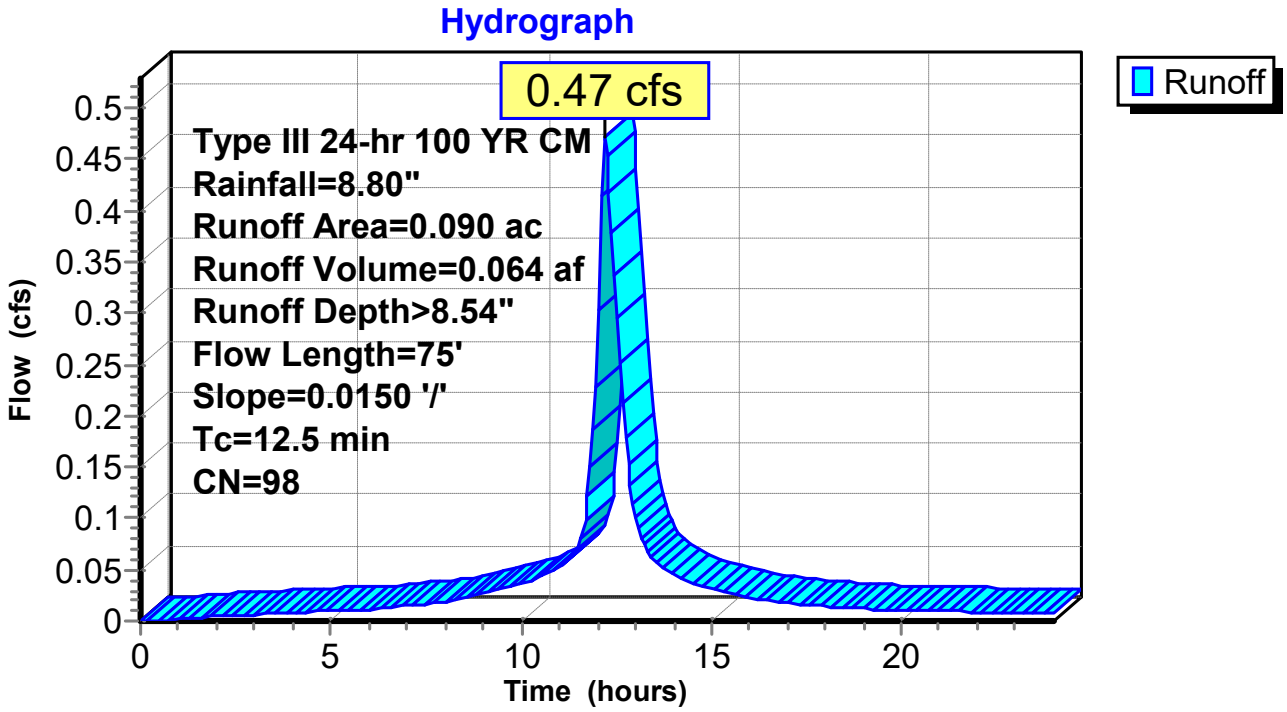
Runoff = 0.47 cfs @ 12.20 hrs, Volume= 0.064 af, Depth> 8.54"

Runoff by SCS TR-20 method, UH=Delmarva, Time Span= 0.00-24.01 hrs, dt= 0.07 hrs
Type III 24-hr 100 YR CM Rainfall=8.80"

	Area (ac)	CN	Description
*	0.090	98	Impervious
	0.090		Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
12.5	75	0.0150	0.10		**Sheet Flow, Unpaved** Grass: Dense n= 0.240 P2= 3.30"

Subcatchment Post DA5 Off: Off Site Impervious



Summary for Subcatchment Post DA5 Off: Off Site Pervious

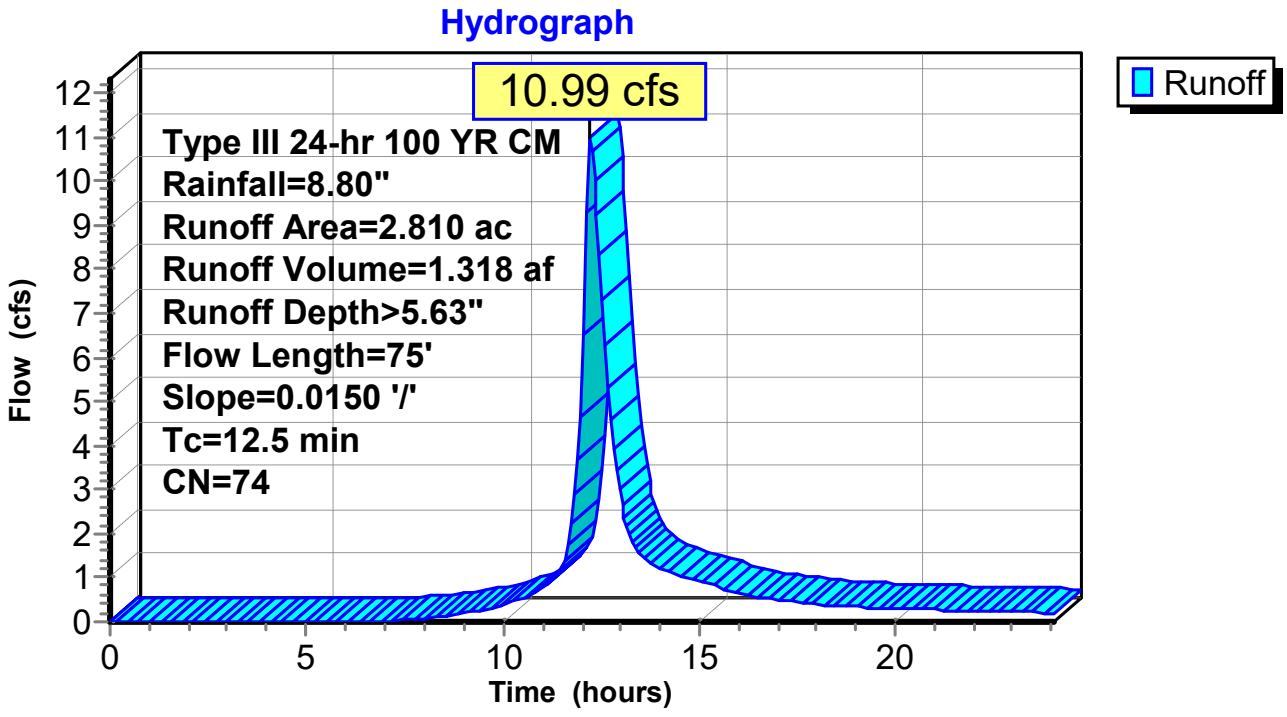
Runoff = 10.99 cfs @ 12.21 hrs, Volume= 1.318 af, Depth> 5.63"

Runoff by SCS TR-20 method, UH=Delmarva, Time Span= 0.00-24.01 hrs, dt= 0.07 hrs
Type III 24-hr 100 YR CM Rainfall=8.80"

Area (ac)	CN	Description
2.710	74	>75% Grass cover, Good, HSG C
0.100	72	Woods/grass comb., Good, HSG C
2.810	74	Weighted Average
2.810		Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
12.5	75	0.0150	0.10		**Sheet Flow, Unpaved** Grass: Dense n= 0.240 P2= 3.30"

Subcatchment Post DA5 Off: Off Site Pervious



Summary for Pond Lake1: Basin

Inflow Area = 7.860 ac, 31.55% Impervious, Inflow Depth > 5.55" for 100 YR CM event
Inflow = 27.56 cfs @ 12.21 hrs, Volume= 3.633 af
Outflow = 6.82 cfs @ 13.05 hrs, Volume= 2.787 af, Atten= 75%, Lag= 50.6 min
Primary = 6.82 cfs @ 13.05 hrs, Volume= 2.787 af

Routing by Stor-Ind method, Time Span= 0.00-24.01 hrs, dt= 0.07 hrs
Peak Elev= 12.27' @ 13.05 hrs Surf.Area= 0 sf Storage= 79,822 cf

Plug-Flow detention time= 235.9 min calculated for 2.778 af (76% of inflow)
Center-of-Mass det. time= 151.0 min (952.4 - 801.4)

Volume	Invert	Avail.Storage	Storage Description
#1	10.70'	137,878 cf	**Custom Stage Data** Listed below

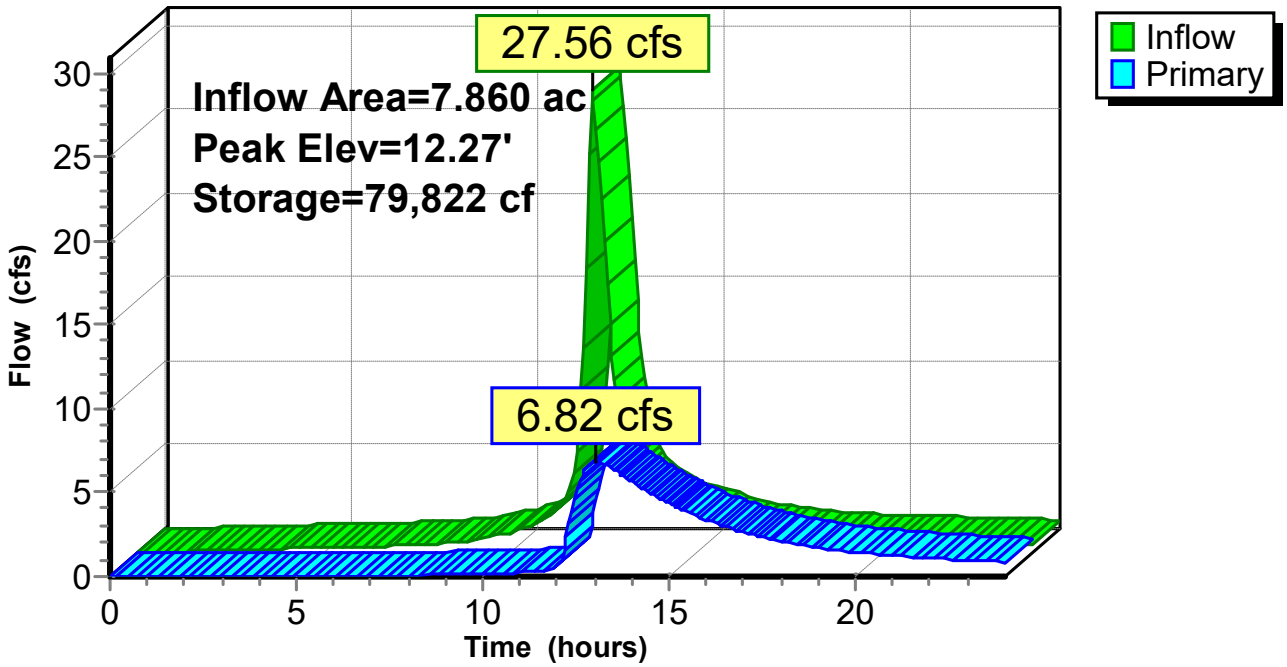
Elevation (feet)	Cum.Store (cubic-feet)
10.70	0
11.00	15,300
12.00	65,780
13.00	118,459
13.70	137,878

Device	Routing	Invert	Outlet Devices
#1	Primary	11.35'	**2.0' long Sharp-Crested Rectangular Weir** 2 End Contraction(s)
#2	Primary	10.70'	**0.5' long Sharp-Crested Rectangular Weir** 2 End Contraction(s)

Primary OutFlow Max=6.81 cfs @ 13.05 hrs HW=12.27' (Free Discharge)
↑—**1=Sharp-Crested Rectangular Weir** (Weir Controls 5.21 cfs @ 3.13 fps)
└—**2=Sharp-Crested Rectangular Weir** (Weir Controls 1.60 cfs @ 4.09 fps)

Pond Lake1: Basin

Hydrograph



Summary for Pond Lake2: Lake 2

Inflow Area = 12.640 ac, 32.83% Impervious, Inflow Depth > 4.59" for 100 YR CM event
Inflow = 17.76 cfs @ 12.23 hrs, Volume= 4.838 af
Outflow = 7.76 cfs @ 13.87 hrs, Volume= 4.092 af, Atten= 56%, Lag= 98.6 min
Primary = 7.76 cfs @ 13.87 hrs, Volume= 4.092 af

Routing by Stor-Ind method, Time Span= 0.00-24.01 hrs, dt= 0.07 hrs
Peak Elev= 10.66' @ 13.87 hrs Surf.Area= 0 sf Storage= 64,532 cf

Plug-Flow detention time= 171.9 min calculated for 4.080 af (84% of inflow)
Center-of-Mass det. time= 104.8 min (991.3 - 886.4)

Volume	Invert	Avail.Storage	Storage Description
#1	9.67'	87,360 cf	**Custom Stage Data** Listed below

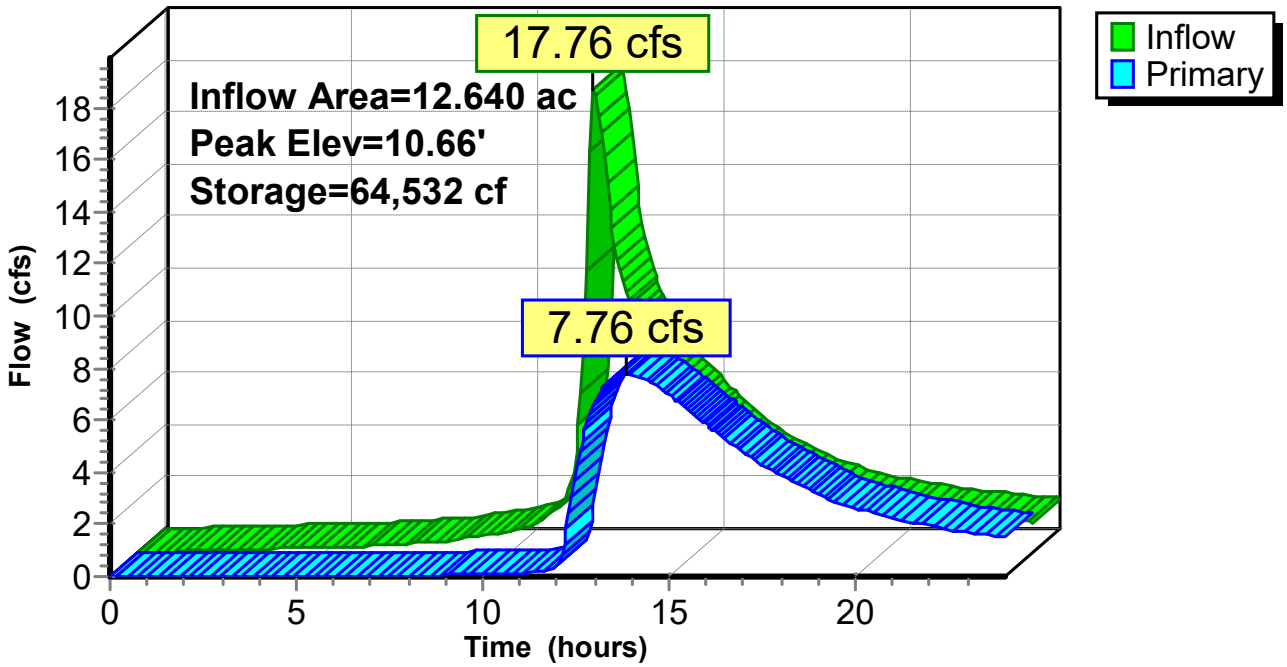
Elevation (feet)	Cum.Store (cubic-feet)
9.67	0
10.00	20,120
11.00	87,360

Device	Routing	Invert	Outlet Devices
#1	Primary	10.00'	**4.0' long Sharp-Crested Rectangular Weir** 2 End Contraction(s)
#2	Primary	9.67'	**0.5' long Sharp-Crested Rectangular Weir** 2 End Contraction(s)

Primary OutFlow Max=7.76 cfs @ 13.87 hrs HW=10.66' (Free Discharge)
1=Sharp-Crested Rectangular Weir (Weir Controls 6.79 cfs @ 2.66 fps)
2=Sharp-Crested Rectangular Weir (Weir Controls 0.97 cfs @ 3.25 fps)

Pond Lake2: Lake 2

Hydrograph



Summary for Pond Lake3: Lake 3

[79] Warning: Submerged Pond Lake2 Primary device # 2 by 0.24'

Inflow Area = 16.170 ac, 37.85% Impervious, Inflow Depth > 4.53" for 100 YR CM event
Inflow = 16.12 cfs @ 12.23 hrs, Volume= 6.098 af
Outflow = 11.45 cfs @ 12.76 hrs, Volume= 5.403 af, Atten= 29%, Lag= 32.0 min
Primary = 11.45 cfs @ 12.76 hrs, Volume= 5.403 af

Routing by Stor-Ind method, Time Span= 0.00-24.01 hrs, dt= 0.07 hrs
Peak Elev= 9.91' @ 12.76 hrs Surf.Area= 0 sf Storage= 39,981 cf

Plug-Flow detention time= 100.6 min calculated for 5.387 af (88% of inflow)
Center-of-Mass det. time= 49.7 min (971.0 - 921.2)

Volume	Invert	Avail.Storage	Storage Description
#1	8.60'	69,310 cf	**Custom Stage Data** Listed below

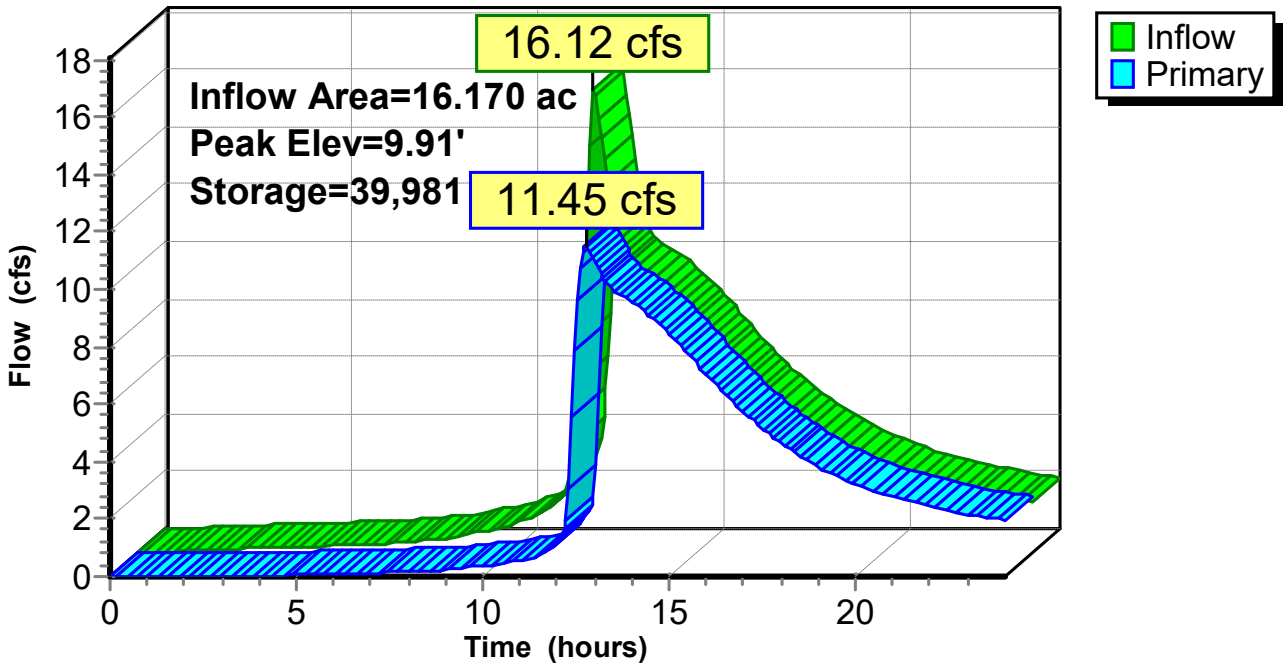
Elevation (feet)	Cum.Store (cubic-feet)
8.60	0
9.00	11,585
10.00	42,767
10.80	69,310

Device	Routing	Invert	Outlet Devices
#1	Primary	9.60'	**12.0' long Sharp-Crested Rectangular Weir** 2 End Contraction(s)
#2	Primary	9.60'	**4.0' long Sharp-Crested Rectangular Weir** 2 End Contraction(s)
#3	Primary	8.60'	**0.5' long Sharp-Crested Rectangular Weir** 2 End Contraction(s)
#4	Primary	8.60'	**0.5' long Sharp-Crested Rectangular Weir** 2 End Contraction(s)

Primary OutFlow Max=11.42 cfs @ 12.76 hrs HW=9.91' (Free Discharge)
- **1=Sharp-Crested Rectangular Weir** (Weir Controls 6.74 cfs @ 1.82 fps)
- **2=Sharp-Crested Rectangular Weir** (Weir Controls 2.22 cfs @ 1.82 fps)
- **3=Sharp-Crested Rectangular Weir** (Weir Controls 1.23 cfs @ 3.74 fps)
- **4=Sharp-Crested Rectangular Weir** (Weir Controls 1.23 cfs @ 3.74 fps)

Pond Lake3: Lake 3

Hydrograph



Summary for Pond Lake4&5: Lake 4 & 5

[79] Warning: Submerged Pond Lake3 Primary device # 3 by 0.73'
[79] Warning: Submerged Pond Lake3 Primary device # 4 by 0.73'

Inflow Area = 22.070 ac, 39.78% Impervious, Inflow Depth > 4.69" for 100 YR CM event
Inflow = 27.60 cfs @ 12.19 hrs, Volume= 8.619 af
Outflow = 15.77 cfs @ 13.07 hrs, Volume= 6.085 af, Atten= 43%, Lag= 52.7 min
Primary = 15.77 cfs @ 13.07 hrs, Volume= 6.085 af

Routing by Stor-Ind method, Time Span= 0.00-24.01 hrs, dt= 0.07 hrs
Peak Elev= 9.33' @ 13.07 hrs Surf.Area= 57,889 sf Storage= 116,706 cf

Plug-Flow detention time= 210.4 min calculated for 6.085 af (71% of inflow)
Center-of-Mass det. time= 97.7 min (999.1 - 901.4)

Volume	Invert	Avail.Storage	Storage Description
#1	7.00'	126,192 cf	**Custom Stage Data (Prismatic)** Listed below

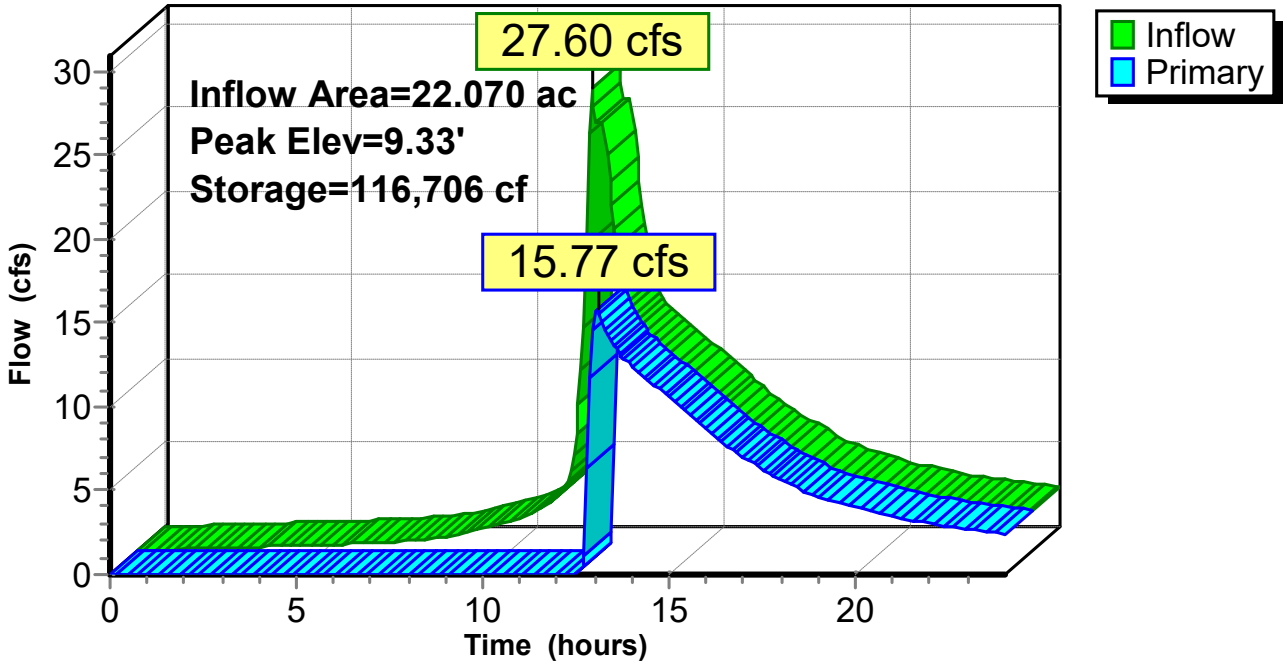
Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
7.00	27,767	0	0
7.40	46,551	14,864	14,864
8.00	50,946	29,249	44,113
9.00	55,842	53,394	97,507
9.50	58,900	28,686	126,192

Device	Routing	Invert	Outlet Devices
#1	Primary	9.20'	**100.0' long x 20.0' 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
#2	Primary	9.00'	**4.0' long Sharp-Crested Rectangular Weir** 2 End Contraction(s)

Primary OutFlow Max=15.70 cfs @ 13.07 hrs HW=9.33' (Free Discharge)
1=Broad-Crested Rectangular Weir (Weir Controls 13.21 cfs @ 0.98 fps)
2=Sharp-Crested Rectangular Weir (Weir Controls 2.49 cfs @ 1.89 fps)

Pond Lake4&5: Lake 4 & 5

Hydrograph

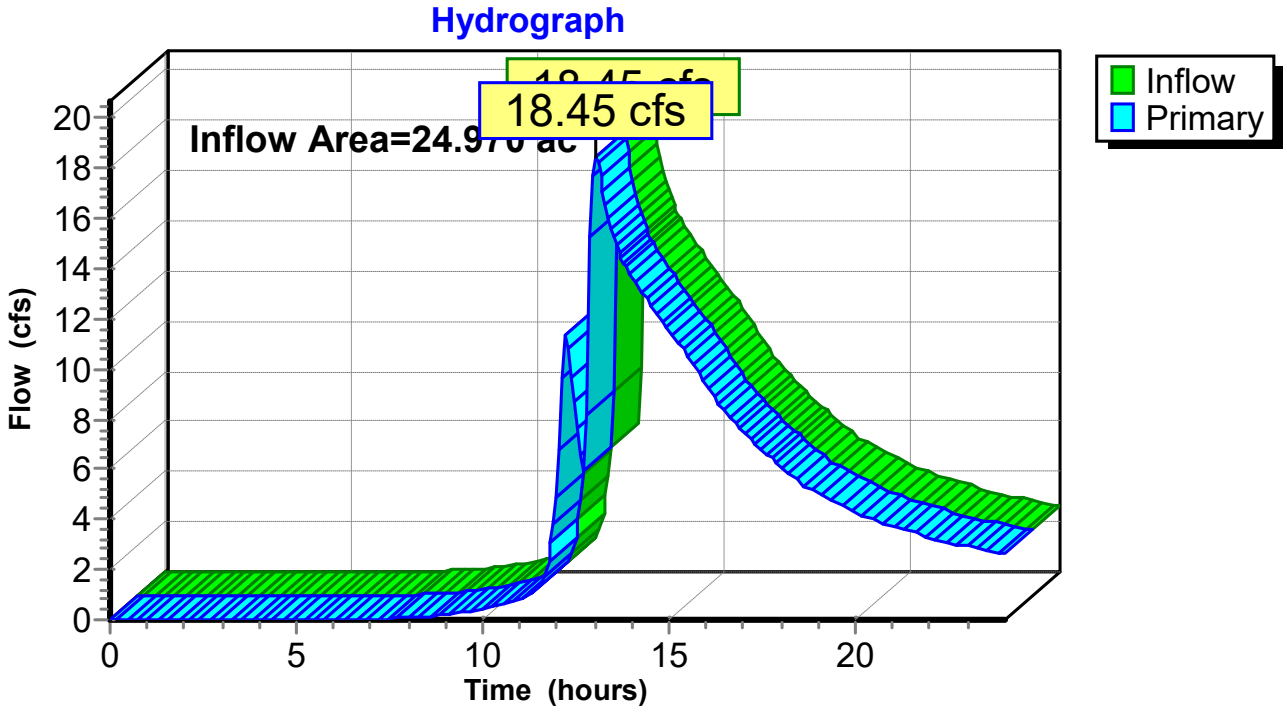


Summary for Link 1L: Combo Discharge

Inflow Area = 24.970 ac, 35.52% Impervious, Inflow Depth > 3.59" for 100 YR CM event
Inflow = 18.45 cfs @ 13.04 hrs, Volume= 7.467 af
Primary = 18.45 cfs @ 13.04 hrs, Volume= 7.467 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-24.01 hrs, dt= 0.07 hrs

Link 1L: Combo Discharge



Stormwater Pipe Calculations

Project Name:The Fairways Major Site Plan - Phase 2 Townhomes
Location: Middle Township, Cape May County, NJ
Design Storm: 25 yr

Date: 3/30/20
Calculated by: RAW

Locations		Drainage Area				Time																			
Inlet Up	Inlet Down	Area (Ac)	C	A*C	Totl. A*C	Tc (min)	Pipe Flow (min.)	Tc Total (min.)	I (in/hr.)	Q des. (c.f.s.)	n coeff.	Length (ft)	Diam. Pipe (FT)	Slope Want. FT/FT	Slope Des. FT/FT	Drop want. (ft.)	Drop des.(ft.)	Q full (c.f.s.)	Vel. Full (f.p.s.)	Upper End Invert	Lower End Invert	Upper Grate	Lower Grate	Uppe Grate Cover	Lower Grate Cover	Class Pipe
I-1	I-2	0.23	0.85	0.20	0.20	10	0.1	10.0	6.6	1.32	0.01	24	1.25	0.0002	0.0042	0.006	0.100	5.4	4.4	8.10	8.00	10.58	10.58	1.23	1.33	HDPE
I-2	FES-3	0.37	0.8	0.30	0.50	10	0.6	10.2	6.6	3.28	0.01	138	1.25	0.0015	0.0030	0.210	0.420	4.6	3.8	8.00	7.58	10.58	9.00	1.33	0.17	HDPE
I-4	I-5	0.33	0.8	0.27	0.27	10	0.4	15.4	5.6	1.52	0.01	86	1.25	0.0003	0.0029	0.028	0.250	4.5	3.7	8.00	7.75	10.50	11.00	1.25	2.00	HDPE
I-5	FES-6	0.31	0.8	0.25	0.52	10	0.6	10.2	6.6	3.41	0.01	138	1.25	0.0016	0.0034	0.228	0.470	4.9	4.0	7.75	7.28	10.58	9.00	1.58	0.47	HDPE

Low Impact Development Checklist

New Jersey Stormwater Best Management Practices Manual

February 2004

A P P E N D I X A

Low Impact Development Checklist

A checklist for identifying nonstructural stormwater management strategies incorporated into proposed land development

According to the NJDEP Stormwater Management Rules at N.J.A.C. 7:8, the groundwater recharge, stormwater quality, and stormwater quantity standards established by the Rules for major land development projects must be met by incorporating nine specific nonstructural stormwater management strategies into the project's design to the maximum extent practicable.

To accomplish this, the Rules require an applicant seeking land development approval from a regulatory board or agency to identify those nonstructural strategies that have been incorporated into the project's design. In addition, if an applicant contends that it is not feasible to incorporate any of the specific strategies into the project's design, particularly for engineering, environmental, or safety reasons, the Rules further require that the applicant provide a basis for that contention.

This checklist has been prepared to assist applicants, site designers, and regulatory boards and agencies in ensuring that the nonstructural stormwater management requirements of the Rules are met. It provides an applicant with a means to identify both the nonstructural strategies incorporated into the development's design and the specific low impact development BMPs (LID-BMPs) that have been used to do so. It can also help an applicant explain the engineering, environmental, and/or safety reasons that a specific nonstructural strategy could not be incorporated into the development's design.

The checklist can also assist municipalities and other land development review agencies in the development of specific requirements for both nonstructural strategies and LID-BMPs in zoning and/or land use ordinances and regulations. As such, where requirements consistent with the Rules have been adopted, they may supersede this checklist.

Finally, the checklist can be used during a pre-design meeting between an applicant and pertinent review personnel to discuss local nonstructural strategies and LID-BMPs requirements in order to optimize the development's nonstructural stormwater management design.

Since this checklist is intended to promote the use of nonstructural stormwater management strategies and provide guidance in their incorporation in land development projects, municipalities are permitted to revise it as necessary to meet the goals and objectives of their specific stormwater management program and plan within the limits of N.J.A.C. 7:8.

Low Impact Development Checklist

A checklist for identifying nonstructural stormwater management strategies incorporated into proposed land development

Municipality: Middle Township

County: Cape May County Date: 3/30/20

Review board or agency: CAFRA

Proposed land development name: Fairways Phase 2B Major Site Plan - Townhomes

Lot(s): 5.04 Block(s): 335.01

Project or application number: _____

Applicant's name: Fred Langford

Applicant's address: 212 Crest Road

Cape May Court House, NJ 08210

Telephone: (609) 465-8000 Fax: (609) 465-4937

Email address: _____

Designer's name: Mott Watkins Associates, LLC

Designer's address: 3120 Fire Road

Egg Harbor Township, NJ 08234

Telephone: (609) 569-1551 Fax: (609) 569-1521

Email address: bob@mottwatkins.com

Part 1: Description of Nonstructural Approach to Site Design

In narrative form, provide an overall description of the nonstructural stormwater management approach and strategies incorporated into the proposed site's design. Attach additional pages as necessary. Details of each nonstructural strategy are provided in Part 3 below.

The proposed stormwater basin/lake will promote infiltration above the water surface elevation and then evaporation will occur as well. We have also incorporated perforated pipe and stone trenches to collect the roof runoff as well as proposing porous asphalt paving in the 18 parking stalls along the new roadways.

Part 2: Review of Local Stormwater Management Regulations

Title and date of stormwater management regulations used in development design:

State stormwater regulations adopted in February, 2004

Do regulations include nonstructural requirements? Yes: X No: _____

If yes, briefly describe: Nonstructural elements of design incorporated are those as described in the Low Impact Development Checklist as found in the February 2004 BMP

List LID-BMPs prohibited by local regulations: None are specifically prohibited. Development Checklist as found in the February 2004 BMP

Pre-design meeting held? Yes: X Date: _____ No: _____

Meeting held with: Reviewing Engineer

Pre-design site walk held? Yes: X Date: _____ No: _____

Site walk held with: Mott Watkins Assiciates, LLC - design engineer

Other agencies with stormwater review jurisdiction:

Name: _____

Required approval: _____

Name: _____

Required approval: _____

Name: _____

Required approval: _____

Part 3: Nonstructural Strategies and LID-BMPs in Design

3.1 Vegetation and Landscaping

Effective management of both existing and proposed site vegetation can reduce a development's adverse impacts on groundwater recharges and runoff quality and quantity. This section of the checklist helps identify the vegetation and landscaping strategies and nonstructural LID-BMPs that have been incorporated into the proposed development's design to help maintain existing recharge rates and/or minimize or prevent increases in runoff quantity and pollutant loading.

A. Has an inventory of existing site vegetation been performed? Yes: X No: _____

If yes, was this inventory a factor in the site's layout and design? Yes: X No: _____

B. Does the site design utilize any of the following nonstructural LID-BMPs?

Preservation of natural areas? Yes: _____ No: X If yes, specify % of site: _____

Native ground cover? Yes: _____ No: X If yes, specify % of site: _____

Vegetated buffers? Yes: _____ No: X If yes, specify % of site: _____

C. Do the land development regulations require these nonstructural LID-BMPs?

Preservation of natural areas? Yes: _____ No: X If yes, specify % of site: _____

Native ground cover? Yes: _____ No: X If yes, specify % of site: _____

Vegetated buffers? Yes: _____ No: X If yes, specify % of site: _____

D. If vegetated filter strips or buffers are utilized, specify their functions:

Reduce runoff volume increases through lower runoff coefficient: Yes: _____ No: X

Reduce runoff pollutant loads through runoff treatment: Yes: X No: _____

Maintain groundwater recharge by preserving natural areas: Yes: X No: _____

3.2 Minimize Land Disturbance

Minimizing land disturbance is a nonstructural LID-BMP that can be applied during both the development's construction and post-construction phases. This section of the checklist helps identify those land disturbance strategies and nonstructural LID-BMPs that have been incorporated into the proposed development's design to minimize land disturbance and the resultant change in the site's hydrologic character.

A. Have inventories of existing site soils and slopes been performed? Yes: X No: _____

If yes, were these inventories factors in the site's layout and design? Yes: X No: _____

B. Does the development's design utilize any of the following nonstructural LID-BMPs?

Restrict permanent site disturbance by land owners? Yes: X No: _____

If yes, how: Deed restricting tree removal

Restrict temporary site disturbance during construction? Yes: X No: _____

If yes, how: Construction Entrance at one entrance

Consider soils and slopes in selecting disturbance limits? Yes: X No: _____

If yes, how: Reduced cut and fill in areas for limited disturbance.

C. Specify percentage of site to be cleared: 20%, Majority of site is cleared or developed Regraded: 85%

D. Specify percentage of cleared areas done so for buildings: 10%

For driveways and parking: 5% For roadways: 5%

E. What design criteria and/or site changes would be required to reduce the percentages in C and D above?

No curbing and sidewalk, but RSIS and Township standards require them.

F. Specify site's hydrologic soil group (HSG) percentages:

HSG A: _____ HSG B: 78.4% HSG C: 21.6% HSG D: _____

G. Specify percentage of each HSG that will be permanently disturbed:

HSG A: _____ HSG B: 100% HSG C: 100% HSG D: _____

H. Locating site disturbance within areas with less permeable soils (HSG C and D) and minimizing disturbance within areas with greater permeable soils (HSG A and B) can help maintain groundwater recharge rates and reduce runoff volume increases. In light of the HSG percentages in F and G above, what other practical measures if any can be taken to achieve this?

Oversize the storm water basin to cause the basin to retain enough water that coupled with other measures, and the storm water discharge volume is reduced compared to pre-developed conditions.

I. Does the site include Karst topography? Yes: _____ No: X

If yes, discuss measures taken to limit Karst impacts:

N/A

3.3 Impervious Area Management

New impervious surfaces at a development site can have the greatest adverse effect on groundwater recharge and stormwater quality and quantity. This section of the checklist helps identify those nonstructural strategies and LID-BMPs that have been incorporated into a proposed development's design to comprehensively manage the extent and impacts of new impervious surfaces.

A. Specify impervious cover at site: Existing: 0 Proposed: 2.39 Acres

B. Specify maximum site impervious coverage allowed by regulations: _____

C. Compare proposed street cartway widths with those required by regulations:

Type of Street	Proposed Cartway Width (feet)	Required Cartway Width (feet)
Residential access – low intensity		28'
Residential access – medium intensity		28'
Residential access – high intensity with parking	30' WIDE (15' both directions)	28'
Residential access – high intensity without parking		20'
Neighborhood		30'
Minor collector – low intensity without parking		20'
Minor collector – with one parking lane		28'
Minor collector – with two parking lanes		36'
Minor collector – without parking		22'
Major collector		24'

D. Compare proposed parking space dimensions with those required by regulations:

Proposed: 9' x 18' Regulations: 9' x 18'

E. Compare proposed number of parking spaces with those required by regulations:

Proposed: 2.5 Regulations: 2.5

F. Specify percentage of total site impervious cover created by buildings: Clubhouse: 2% Houses: 19.2%

By driveways and parking: Driveways: 5% By roadways: 9%

Parking Lot: 2%

G. What design criteria and/or site changes would be required to reduce the percentages in F above?

Reduce allowable coverage in ordinance

H. Specify percentage of total impervious area that will be unconnected:

Total site: 100 Buildings: _____ Driveways and parking: _____ Roads: _____

I. Specify percentage of total impervious area that will be porous:

Total site: 0 Buildings: _____ Driveways and parking: _____ Roads: _____

J. Specify percentage of total building roof area that will be vegetated: 0

K. Specify percentage of total parking area located beneath buildings: 0

L. Specify percentage of total parking located within multi-level parking deck: 0

3.4 Time of Concentration Modifications

Decreasing a site's time of concentration (Tc) can lead directly to increased site runoff rates which, in turn, can create new and/or aggravate existing erosion and flooding problems downstream. This section of the checklist helps identify those nonstructural strategies and LID-BMPs that have been incorporated into the proposed development's design to effectively minimize such Tc decreases.

When reviewing Tc modification strategies, it is important to remember that a drainage area's Tc should reflect the general conditions throughout the area. As a result, Tc modifications must generally be applied throughout a drainage area, not just along a specific Tc route.

A. Specify percentage of site's total stormwater conveyance system length that will be:

Storm sewer: 75% Vegetated swale: 25% Natural channel: 0%

Stormwater management facility: 0% Other: 0%

Note: the total length of the stormwater conveyance system should be measured from the site's downstream property line to the downstream limit of sheet flow at the system's headwaters.

B. What design criteria and/or site changes would be required to reduce the storm sewer percentages and increase the vegetated swale and natural channel percentages in A above?

Modify the ordinance to permit parking lots without curbing.

C. In conveyance system subareas that have overland or sheet flow over impervious surfaces or turf grass, what practical and effective site changes can be made to:

Decrease overland flow slope: Decrease slope by regrading. However, this comes at the expense and impact of regrading away from natural or existing topography.

Increase overland flow roughness: Include the use of biofilters, low height dams and rerouting of a flow path to not be straight.

3.5 Preventative Source Controls

The most effective way to address water quality concerns is by pollution prevention. This section of the checklist helps identify those nonstructural strategies and LID-BMPs that have been incorporated into the proposed development's design to reduce the exposure of pollutants to prevent their release into the stormwater runoff.

A. Trash Receptacles

Specify the number of trash receptacles provided: N/A

Specify the spacing between the trash receptacles: N/A

Compare trash receptacles proposed with those required by regulations:

Proposed: 0 Regulations: 0

B. Pet Waste Stations

Specify the number of pet waste stations provided: 0

Specify the spacing between the pet waste stations: N/A

Compare pet waste stations proposed with those required by regulations:

Proposed: 2 Regulations: 0

C. Inlets, Trash Racks, and Other Devices that Prevent Discharge of Large Trash and Debris

Specify percentage of total inlets that comply with the NJPDES storm drain inlet criteria: 100%

D. Maintenance

Specify the frequency of the following maintenance activities:

Street sweeping: Proposed: 0 Regulations: 0

Litter collection: Proposed: 0 Regulations: 0

Identify other stormwater management measures on the site that prevent discharge of large trash and debris:

there will be a trash rack on the flared end sections going into the wet pond.

E. Prevention and Containment of Spills

Identify locations where pollutants are located on the site, and the features that prevent these pollutants from being exposed to stormwater runoff:

Pollutant: Oil in parking lot Location: Runoff directed to grass

Feature utilized to prevent pollutant exposure, harmful accumulation, or contain spills:

Pollutant: _____ Location: _____

Feature utilized to prevent pollutant exposure, harmful accumulation, or contain spills:

Pollutant: _____ Location: _____

Feature utilized to prevent pollutant exposure, harmful accumulation, or contain spills:

Pollutant: _____ Location: _____

Feature utilized to prevent pollutant exposure, harmful accumulation, or contain spills:

Pollutant: _____ Location: _____

Part 4: Compliance with Nonstructural Requirements of NJDEP Stormwater Management Rules

1. Based upon the checklist responses above, indicate which nonstructural strategies have been incorporated into the proposed development's design in accordance with N.J.A.C. 7:8-5.3(b):

No.	Nonstructural Strategy	Yes	No
1.	Protect areas that provide water quality benefits or areas particularly susceptible to erosion and sediment loss.	X	
2.	Minimize impervious surfaces and break up or disconnect the flow of runoff over impervious surfaces.	X	
3.	Maximize the protection of natural drainage features and vegetation.	X	
4.	Minimize the decrease in the pre-construction time of concentration.	X	
5.	Minimize land disturbance including clearing and grading.	X	
6.	Minimize soil compaction.	X	
7.	Provide low maintenance landscaping that encourages retention and planting of native vegetation and minimizes the use of lawns, fertilizers, and pesticides.	X	
8.	Provide vegetated open-channel conveyance systems discharge into and through stable vegetated areas.	X	
9.	Provide preventative source controls.	X	

2. For those strategies that have not been incorporated into the proposed development's design, provide engineering, environmental, and/or safety reasons. Attached additional pages as necessary.

_____

_____

_____

_____

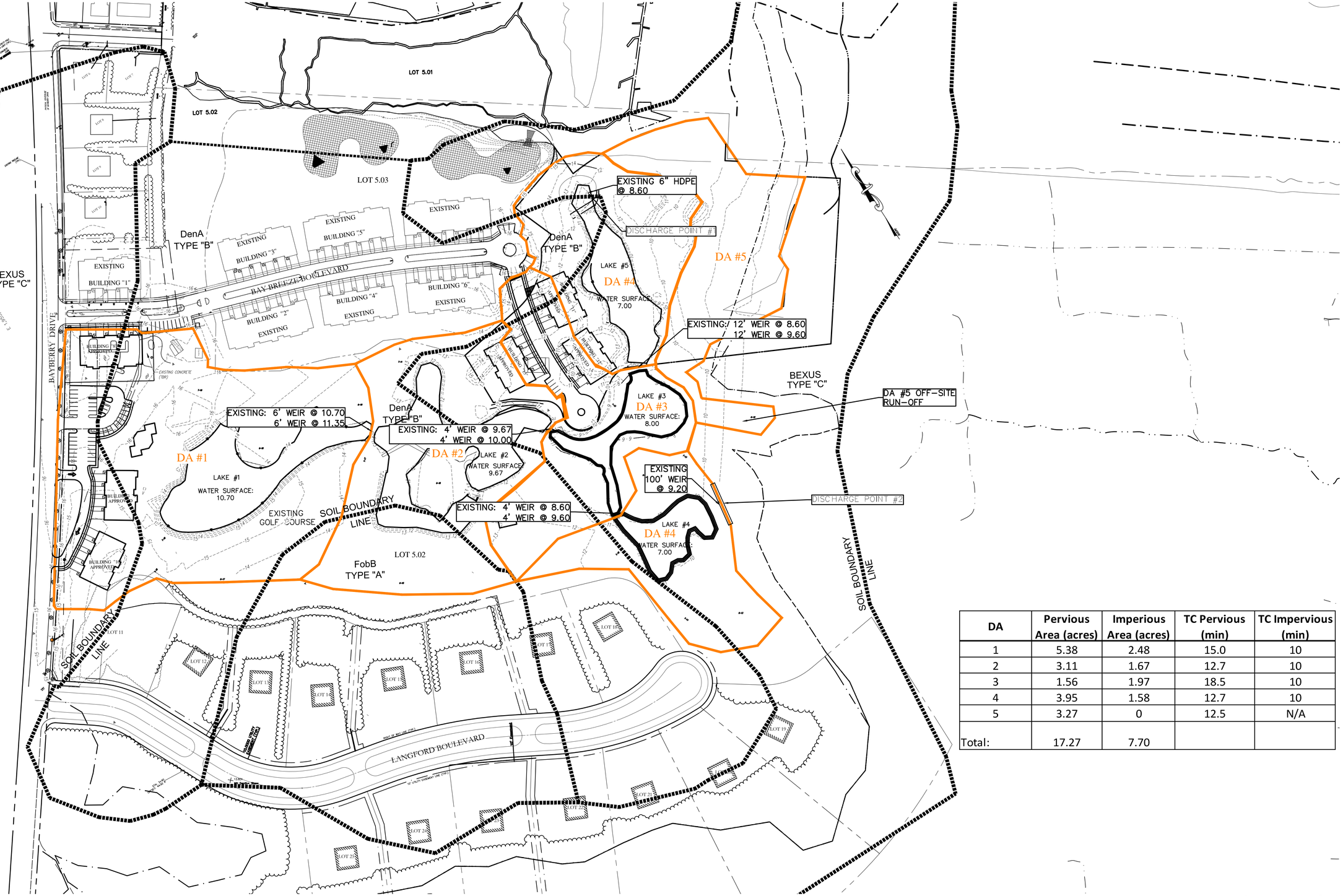
_____

_____

_____

_____

Drainage Area Map



DA	Pervious Area (acres)	Imperious Area (acres)	TC Pervious (min)	TC Impervious (min)
1	5.38	2.48	15.0	10
2	3.11	1.67	12.7	10
3	1.56	1.97	18.5	10
4	3.95	1.58	12.7	10
5	3.27	0	12.5	N/A
Total:	17.27	7.70		

Graphic Scale – 1"=100'

60 30 0 60 120

No.	Revisions	Date	By

Robert A. Watkins
Professional Engineer
New Jersey License No. 45865

Designed RAW | Drawn RAW | Checked RAW | Approved RAW | Date 3/30/20

Date 3/30/20

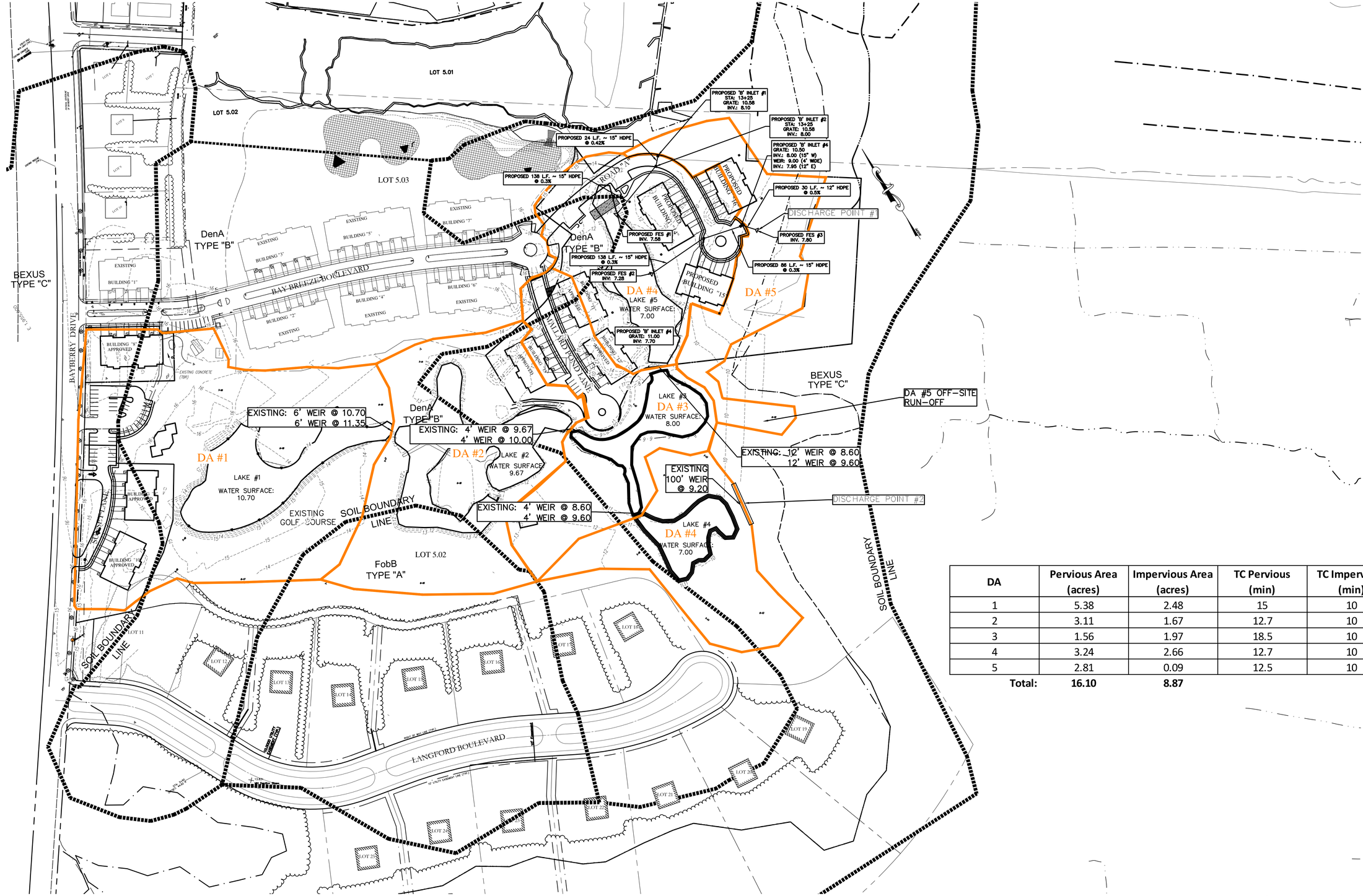
MOTT ASSOCIATES, LLC
CONSULTING ENGINEERS & PLANNERS
4 Zaccheus Road
Egg Harbor Township, New Jersey 08234
Phone: (609) 569-1551
Fax: (609) 569-1521
State Board of Professional Engineers & Land Surveyors
Certificate of Authorization No. GA 279920

Pre-Dev. Drainage Area Map

Middle Township
Cape May County

Fairways Phase 2B - Major Site Plan
Block 335.01; Lot 5.04

Job No. 4510 | Sheet DA | B/O 1 | Total 2



DA	Pervious Area (acres)	Impervious Area (acres)	TC Pervious (min)	TC Impervious (min)
1	5.38	2.48	15	10
2	3.11	1.67	12.7	10
3	1.56	1.97	18.5	10
4	3.24	2.66	12.7	10
5	2.81	0.09	12.5	10
Total:	**16.10**	**8.87**		

By	Revisions	Date

Robert A. Watkins
Professional Engineer
New Jersey License No. 45865500
Date 3/30/20

Designed	Drawn	Checked	Approved	Date
RAW	RAW	RAW	RAW	3/27/20

Mott Associates, LLC
CONSULTING ENGINEERS & PLANNERS
4121 Fifth Road
Egg Harbor Township, New Jersey 08234
Phone: (609) 569-1551
Fax: (609) 569-1521
State Board of Professional Engineers & Land Surveyors
Certificate of Authorization No. GA 279920

Post-Dev. Drainage Area Map

Middle Township
Cape May County

Fairways Phase 2B - Major Site Plan
Block 335.01; Lot 5.04

Job No.	Sheet	
4510	DA	
	B/O	Total
	2	2