Engineers Planners Surveyors Landscape Architects Environmental Scientists

MASER CONSULTING P. A.

Stormwater Management Report

Windsor Pointe

Block 3, Lots 3 and 3.02
Township of East Windsor, Mercer County, New Jersey

October 2019

Prepared For

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MC Project No. 18001982A

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INTRODUCTION

This stormwater management report is being submitted as part of the development application known as Windsor Pointe in the Township of East Windsor, Mercer County, New Jersey. The proposed project consists of the construction of eight residential multi-family buildings, one clubhouse, one maintenance building, free standing garages, surface parking, curbing, sidewalk, and associated drainage improvements including two bioretention basins. This report was prepared in accordance with currently accepted engineering standards, including those of the Township of East Windsor, the New Jersey Department of Environmental Protection-Land Use Regulation Program, Residential Site Improvement Standards, Mercer County, Delaware and Raritan Canal Commission (DRCC) and the Mercer County Soil Conservation District.

This report describes the site characteristics for existing and proposed conditions and a stormwater management proposal for the site. Supporting documentation is included in the appendices.

SITE CHARACTERISTICS

The project site is known as Lots 3 and 3.02, Block 3, as shown on the Tax Maps of the Township of East Windsor, Mercer County, New Jersey. The site contains approximately 14.27 acres.

The site is located on the west bound side of Old Trenton Road, west of the intersection with Princeton Hightstown Road. It is bound by farmland and office buildings.

The site is currently farmed with row crops.

SOILS

The soils at the site are based on data shown in the Web Soil Survey by the United States Department of Agriculture. The soil types present at the site as shown on the Drainage Area Maps consist of the following types:

Soil Symbol	Soil Name	Hydrologic Soil Group
MBYB	Mattapex and Bertie Loams 0 to 5% Slopes	C
SacC	Sassafras Sandy Loam 5 to 10% Slopes	B

For further information, refer to a report entitled "Report of Subsurface Exploration and Stormwater Infiltration Evaluation" dated 7/20/18, prepared by Maser Consulting P.A.

WETLANDS

A Letter of Interpretation – Presence/Absence Determination File No. 1100-04-0004.2 dated 11/27/18 was obtained stating that there are no freshwater wetlands or wetland buffers on the subject property.

COMPLIANCE STATEMENT

This project is designed in accordance with N.J.A.C. 7:8 and thereby also complies with N.J.A.C. 5:21-7. The proposed stormwater measures have been designed to meet the RSIS NJDEP and DRCC Standards. Compliance in each of these areas is explained in detail in the remainder of this report and verified with calculations found in the appropriate Appendices.

EXISTING CONDITIONS

The site, in its existing condition, generally slopes toward the north. The runoff from the site drains onto an adjacent property which is also farmed. Ground cover consists of row crops.

Pre-development peak flows were generated for the 2-, 10-, and 100-year storm events using the SCS Unit Hydrograph Method Delmarva Unit Hydrograph and U.S. Soil Conservation Service procedures TR-55 to compute the peak flow rates. The weighted runoff curve numbers (CN) were computed based on hydrologic soil type and land use as shown in the NRCS Mercer County Soil

Survey and the current use of the areas. The times of concentration (TC) are based on the Soil Conservation Service Methods (TR-55).

All backup calculations for the existing conditions are included in Appendix.

The existing site has been divided into four onsite and four off-site drainage areas:

Drainage Area E-1: This drainage area consists of 11.74 acres of farmland and gravel in the central and northern portion of the property that will be utilized for the proposed development. Drainage area E-1 drains to the unnamed Tributary to an unnamed tributary of "Bear Brook."

Drainage Area E-2: This drainage area consists of 0.165 acres of existing structures and gravel surfaces that will be utilized for the proposed development. Drainage area E-2 drains to the western portion of the site.

Drainage Area E-3: This drainage area consists of 1.86 acres of existing buildings and structures, open grass area, gravel surfaces, and farmland. This area will be utilized for the proposed development. Drainage area E-3 drains to the Southwest portion of the site onto Old Trenton Road.

Drainage Area E-4: This drainage area consists of 0.49 acres of farmland that will be utilized for the proposed development. Drainage area E-4 drains to the Southeast portion of the site onto Old Trenton Road.

Drainage Area E-1A-off: This is an offsite drainage area that consists of 0.65 acres of existing buildings and structures, open grass area and pavement. This area will not be disturbed. Drainage area E-1A-off drains onsite to the Northwest portion of the site.

Drainage Area E-1B-off: This is an offsite drainage area that consists of 0.53 acres of open grass area and farmland. This area will not be disturbed. Drainage area E-1B-off drains onsite to the Northwest portion of the site.

Drainage Area E-3-off: This is an offsite drainage area that contains 0.745 acres of buildings and structures, open grass area, gravel surfaces, farmland and pavement. This area will not be disturbed. Drainage area E-3-off drains offsite to Old Trenton Road.

Drainage Area E-4-off: This is an offsite drainage area that contains 0.138 acres of grass and pavement. This area will not be disturbed. Drainage area E-4-off drains offsite in the Southeast direction towards Old Trenton Road.

PROPOSED CONDITIONS

Post-development peak flows and the detention basin routings were generated for the 2-, 10-, and 100-year storm events using the SCS Unit Hydrograph Methods and U.S. Soil Conservation Service procedures, TR-55 to compute the peak flow rates. The runoff curve numbers (CN) were computed based on hydrologic soil type and land use as shown in the Hunterdon County Soil Survey and the current use of the areas. The times of concentration (TC) are based on the Soil Conservation Service Methods (TR-55).

The applicant proposes to construct a multi-family residential development. The proposed construction will include multi-family residential buildings, a clubhouse building, a maintenance building, free standing garage buildings, curbing and parking improvements, and associated drainage improvements.

The site, under the developed condition, will be broken up into four distinct drainage areas. A separate analysis has been done

Drainage Area P-1: consists of 8.00 acres and encompasses the central and rear portion of the property that will be utilized for the proposed property. It will include multi-family residential buildings, pavement, sidewalk, grassed areas and a detention basin with a bioretention bottom. Drainage area P-1 drains to an unnamed tributary of "Bear Brook."

Drainage Area P-1-Undet: consists of 0.45 acres of grassed area in the rear portion of the property. It will be converted from farmland to grass cover. Drainage Area P-1-Undet will drain to the Northwest portion of the site and eventually to an unnamed tributary of "Bear Brook."

Drainage Area P-2: consists of 0.03 acres of proposed grassed areas. It will be converted from existing structures and gravel surfaces to grass cover. Drainage area P-2 will drain offsite to an unnamed tributary of "Bear Brook."

Drainage Area P-3: consists of 1.16 acres of proposed pavement, sidewalk and grassed areas. Drainage Area P-3 will drain to the Southwest portion of the site and eventually onto Old Trenton Road offsite.

Drainage Area P-4: consists of 0.50 acres of proposed pavement areas and grassed areas. Drainage Area P-4 will drain to the Southeast portion of the site and eventually offsite onto Old Trenton Road.

Proposed condition calculations are shown in the Appendix.

EXISTING/ALLOWABLE AND PROPOSED FLOW TO POA

The following table displays the total allowable flows for each point of analysis. These flows are based on the stormwater standards for engineering standards including those of the Township of East Windsor, the New Jersey Department of Environmental Protection-Land Use Regulation Program and Residential Site Improvement Standards. To meet water quantity standards, the stormwater management system should be designed so that the post-development peak runoff rate

for the 2-year storm event is 50%, 10-year storm is 75% and 100-year storm is 80% of the pre-development peak runoff rate from the developed portion of the site. The standards may also be met by demonstrating that the post-construction hydrographs do not exceed the pre-construction hydrographs at any point, or by maintaining pre-development runoff rates while demonstrating that the change in runoff volume or timing will not have any downstream impacts.

For this analysis row crop and grass cover were used to produce the flows found below:

EXISTING/ALLOWABLE FLOWS

POA	DRAINAGE AREAS	STORM (YEAR)	EXISTING DISTURBED FLOW TO POA (CFS)	REDUCTION (PERCENT)	REDUCED FLOW (CFS)	EXISTING UNDISTURBED FLOW TO POA (CFS)	TOTAL ALLOWABLE FLOW TO POA (CFS)
POA 1	(DA E-1 X REDUCTION FACTOR) + DA E-1-OFF	2	6.79	*50*	3.40	0.58	**3.98**
		10	14.40	*75*	10.80	1.32	**12.12**
		100	30.64	*80*	24.51	3.04	**27.55**
POA 2	DA E-2 X REDUCTION FACTOR	2	0.35	*50*	0.18	-	**0.18**
		10	0.54	*75*	0.41	-	**0.41**
		100	0.90	*80*	0.72	-	**0.72**
POA 3	(DA E-3 X REDUCTION FACTOR) + DA E-3-OFF	2	1.51	*50*	0.76	1.10	**1.86**
		10	2.99	*75*	2.24	1.82	**4.06**
		100	6.14	*80*	4.91	3.32	**8.23**
POA 4	(DA E-4 X REDUCTION FACTOR) + DA E-4-OFF	2	0.33	*50*	0.17	0.14	**0.31**
		10	0.72	*75*	0.54	0.25	**0.79**
		100	1.60	*80*	1.28	0.50	**1.78**

PROPOSED FLOWS (NJDEP/RSIS)

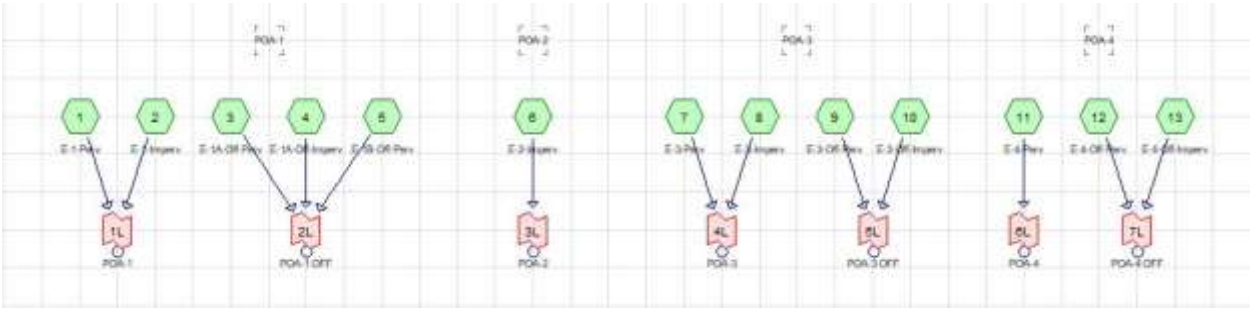
POA	STORM (YEAR)	TOTAL ALLOWABLE FLOW TO POA (CFS)	TOTAL PROPOSED FLOW TO POA (CFS)
POA 1	2	3.98	**1.39**
	10	12.12	**5.37**
	100	27.55	**17.85**
POA 2	2	0.18	**0.01**
	10	0.41	**0.03**
	100	0.72	**0.08**
POA 3	2	1.86	**1.30**
	10	4.06	**2.54**
	100	8.23	**5.52**
POA 4	2	0.31	**0.41***
	10	0.79	**0.71**
	100	1.78	**1.61**

*The project requires a *de minimis* exception for the peak discharge exceeding the pre-development peak runoff rate for the 2-year storm event at POA 4.

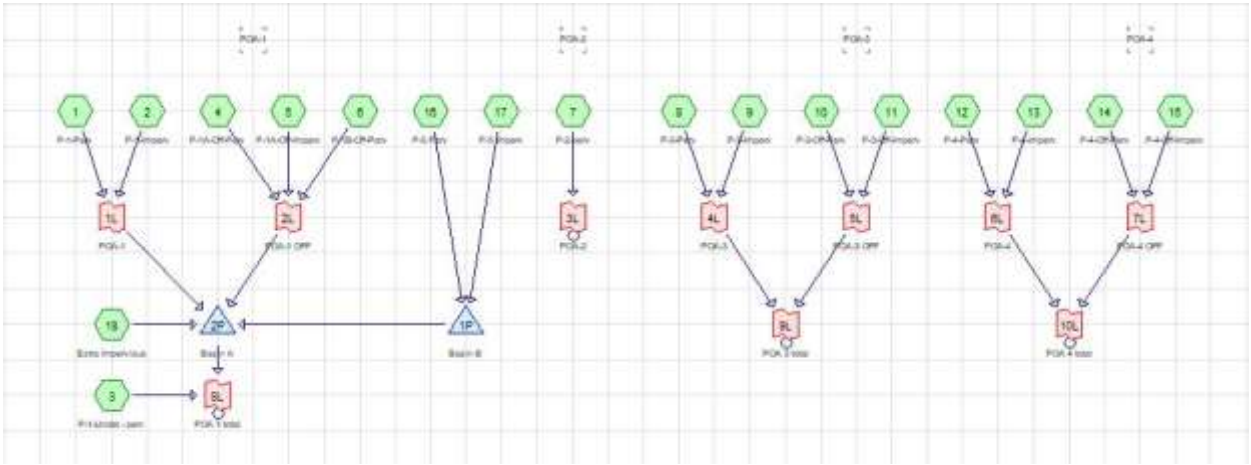
As demonstrated in the analysis, the stormwater reductions are met at POA 1, POA 2 and POA 3. The project requires a *de minimis* exception for the peak discharge exceeding the pre-development peak runoff rate for the 2-year storm event at POA 4.

STORMWATER MANAGEMENT NETWORK DIAGRAM

EXISTING CONDITIONS



PROPOSED CONDITIONS



BASIN WATER SURFACE ELEVATION SUMMARY

A summary of the basin water surface elevations is shown below, based on the existing and proposed conditions required by the stormwater standards for the Township of East Windsor, the New Jersey Department of Environmental Protection-Land Use Regulation Program and Residential Site Improvement Standards.

Basin A Outflow Water Surface Elevation Summary

Storm Event	Basin Outflow (cfs)	Basin WSEL (ft)
Water Quality	0.00	98.87
2	1.31	99.82
10	5.36	100.76
25	9.53	101.25
100	17.45	102.09

Basin B Outflow Water Surface Elevation Summary

Storm Event	Basin Outflow (cfs)	Basin WSEL (ft)
Water Quality	0.00	103.98
2	0.26	105.25
10	1.25	105.79
25	2.08	106.26
100	3.50	107.11

STORMWATER MANAGEMENT BASINS

Basin A

Proposed Basin A is a bioretention bottom basin with underdrains, designed with extended detention. Basin A is designed to provide 90% TSS removal using a 2 ft. deep soil planting bed planted with vegetation and an underdrain system. The total tributary area to Basin A is 8.00 acres of onsite area and 1.18 acres of offsite area. Based on test pit data performed by Maser Consulting, the seasonal high water table was encountered at elevations ranging from 90 – 94.1 ft. The bottom of the basin is set at elevation 98.1 ft. The infiltration rates in this area ranged from 0 - 0.86 in/hr obtained from test pits TP-1, TP-2, TP-3, TP-4 and TP-5. Therefore, due to poor infiltration rates, Basin A will be underdrained. Basin A was designed to fully detain the 100-year storm (without accounting for infiltration). Basin outflow will be controlled through the use of an outlet control structure which discharges overland to the adjacent site into a low lying area flowing toward an unnamed tributary of “Bear Brook” via two 18” pipes.

Basin A peak elevation:

Based on the existing and proposed conditions required by the stormwater standards for the Township of East Windsor, the New Jersey Department of Environmental Protection-Land Use Regulation Program and Residential Site Improvement Standards, Basin A will reach a peak elevation of 101.98 ft during the 100-year storm event and impound 1.796 ac-ft of water.

Dam classification: 103.7 – 96.62 (inv. out of outfall pipe) = 7.08 >5 ft.; therefore, this is a Class IV Dam.

Basin A emergency spillway:

An emergency spillway is provided at elevation 102.0 ft designed to handle storm events larger than 150% of the total inflow into the basin. The top of berm is proposed at 103.7 which is more than 1 foot of freeboard. These calculations are included in the Appendix.

Basin B

Proposed Basin B is a detention basin with a bioretention bottom designed to provide infiltration and 80% TSS removal. The total tributary area to Basin A is 4.17 acres of onsite area. Based on test pit data performed by Maser Consulting, the seasonal high water table was encountered at elevation 98.50 ft. The bottom of the basin is set at elevation 103 ft. The infiltration rate of 1.61 in/hr obtained from TP-11 was used. As a result, Basin B drains in 37.89 hours. Basin outflow will be controlled through the use of an outlet control structure which discharges to Basin A. Basin B is an excavated basin and not a dam.

Basin B peak elevation:

Based on the existing and proposed conditions required by the stormwater standards for the Township of East Windsor, the New Jersey Department of Environmental Protection-Land Use Regulation Program and Residential Site Improvement Standards, Basin B will reach a peak elevation of 107.11 ft during the 100-year storm event and impound 1.324 ac-ft of water.

STORMWATER COLLECTION SYSTEM

The storm sewer has been designed in accordance with the RSIS requirements. AutoCAD Civil 3D Pipe Networks and StormCad v8i Software by Bentley Systems were utilized in the design. The proposed storm sewer was designed using the Rational Method with a minimum time of concentration of 10 minutes and the Trenton Intensity-Duration-Frequency Table. Per RSIS, a 'C' value of 0.86 ('C' soil-lawn good condition) and 0.99 (Impervious) was utilized for storm sewer pipe design. These values are quite conservative, since portions of the site contain 'B' soil-lawn in good condition. These 'C' values were determined based upon the average impervious coverage per drainage area. The storm sewer was designed to convey the 25-year storm frequency using the 25-year tailwater elevations. The averaged 'C' values and 25-year tailwater elevations are listed below:

DRAINAGE AREA	'C' VALUE	(25-yr.) TAILWATER EL. (FT)
BASIN A	0.86	101.19
BASIN B	0.86	106.26

% impervious to Basin A: 63%

% impervious to Basin B: 42%

Average % impervious used: 65%

HSG used: C (highest HSG on site)

C value (per RSIS) for Basin A & B: 0.86

The storm sewer design calculations can be found in the Appendix.

WATER QUALITY N.J.A.C. 7:8-5.5

NJDEP and regulations require water quality treatment be provided for the proposed site runoff. The water quality standards require stormwater management measures 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% of the anticipated load from the developed site, expressed as an annual average.

The Appendix provides runoff volumes for the water quality storm (1.25 inches over 2 hours) to the proposed basins.

Basin A

90% TSS Removal (24" minimum depth of soil bed; Terrestrial Forested Community)

Basin B

80% TSS Removal (18" minimum depth of soil bed; Terrestrial Forested Community)

A small portion of the proposed boulevard entrance cannot be captured in the proposed stormwater management system due to the existing grades. Therefore, this area will be left untreated. Therefore, Basin A was designed for 90% TSS removal.

Proposed Treatment Provided by Basin A = 3.87 acres of impervious * 90% = 3.48 acre-%
Proposed Treatment Provided by Basin B = 2.65 acres of impervious * 80% = 2.12 acre-%
Proposed Untreated Impervious area= 0.14 acres of impervious * 0% = 0 acre-%
Total Treatment provided = 5.60 acre-%
Total impervious area = 6.66 acres
Total Provided treatment on site = (5.60 acre-%) / 6.66 acres = 84.08 %

As shown above, the project will provide a weighted average of 84.08 % TSS removal for the site where 80% is required, therefore exceeding the NJDEP requirements.

GROUNDWATER RECHARGE N.J.A.C. 7:8-5.4(a)2

According to N.J.A.C. 7:8, the site is subject to the recharge requirement.

The recharge calculations were performed using the New Jersey Geological Survey, Geological Survey Report GSR-32, a method for evaluating Ground-Water Recharge areas in New Jersey. The annual recharge parameters are as follows:

BMP effective depth dBMP = 0.98 ft.

Pre-developed conditions recharge = 516,025 cf;
Post-developed conditions recharge without any BMP measures = 373,663 cf;
Deficit = 142,363 cf

The recharge deficit on site will be met via bioretention bottom Basin B designed to fully infiltrate the water quality design storm.

Recharge from Basin B = 162,647 cf;
Total provided recharge = 162,647 cf

NON-STRUCTURAL STORMWATER MANAGEMENT STRATEGIES

Non-structural and structural stormwater management strategies have been implemented into the design of the site to reduce the impacts of development on the surrounding environment and ecological system. The following list demonstrates some of the non-structural strategies employed into the site:

- The project site is an existing disturbed farmland; therefore no native vegetation exists to preserve.
- Impervious surfaces have been minimized by utilizing minimum roadway and driveway widths per RSIS design standards.
- Upon final grading, measures may be implemented to either till or scarify the top layer of soil to minimize soil compaction.
- Low maintenance landscaped areas are proposed throughout the development to minimize the use of lawns, fertilizers, and pesticides.
- Preventative source controls at inlets and outlet structure help to contain floatable debris and promote public awareness. The inlets will have eco-type curb pieces. The basin outlet

structures will be equipped with trash racks. When vegetation is established, fertilizer will be applied in accordance with the Soil Erosion and Sediment Control Act requirements.

In accordance with N.J.A.C. 7:8 – Stormwater Management and DRCC requirements, Nonstructural Stormwater Management Strategies shall be incorporated into all proposed site designs. A Nonstructural Strategies Point System spreadsheet has been prepared and it demonstrates that the proposed development has been designed to comply. Refer to the Appendix for detailed calculations.

SOIL EROSION AND SEDIMENT CONTROL

The site was designed according to the Standards for Soil Erosion and Sediment Control from the USDA-Soil Conservation Service.

Downstream stability has been demonstrated by providing the required flow reductions for the project demonstrated in the report. In addition, the flow discharge from Basin A and un-detained drainage area P-1-undet have been matched or reduced to meet the pre-existing flow rates to the unnamed tributary of Bear Brook, proving downstream stability below the discharge point.

In accordance with the Soil Erosion and Sediment Control Act, soil erosion measures will be incorporated into the design and graphically depicted on the Soil Erosion and Sediment Control Plans. These measures may consist of, but are not limited to:

- Sediment Barriers and Silt Fences
- Conduit Outlet Protection
- Stormwater Management Basins
- Stabilized Construction Access
- Topsoil Stockpiles
- Storm Sewer Inlet Protection
- Temporary and Permanent Stabilization

Conduit outlet protection was provided at the outfall into the basin and was designed based upon the 25-year storm frequency event. The tailwater resulting from the 2-year water surface elevation was utilized within the basins. For detailed calculations, refer to the Appendix.

Off-site stability is met at the watershed level at each Point of Analysis by retaining pre-development runoff characteristics and reducing the rate of runoff from the development (21-2.a). These calculations have been demonstrated in the report.

BASIN A

Basin A discharges into an existing low lying area via two 15" pipes, which ultimately flows into the unnamed tributary of Bear Brook. This point was analyzed as an undefined waterway therefore the following criteria was met (21-1.b):

- The discharge rate for the 25-year storm is 8.99 cfs (maximum 10 cfs is permitted)
- Stable Slope at the point of discharge is approximately 0.6%
- Flow over outlet area is 0.4 cfs/ft (0.5 cfs/ft allowed)
- Topography shows broad uniform outlet area where flows will not concentrate
- Peak discharge velocity will be 4.9 ft/sec which is more than the 2 ft/sec. However, this area was selected because it is very broad and will not concentrate flows. The scour hole was also oversized and excavated 1 ft. deep in order to dissipate the velocity.

BASIN B

Basin B discharges into the proposed onsite storm sewer which is a stable condition.

CONCLUSION

The proposed development will incorporate stormwater management BMPs to satisfy the erosion control, stormwater runoff quantity and quality standards as set forth by N.J.A.C. 7:8 and DRCC.

The proposed stormwater management facilities will limit the post-development runoff discharge rates to less than peak pre-development rates and meet the required water quality criteria.

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APPENDIX A

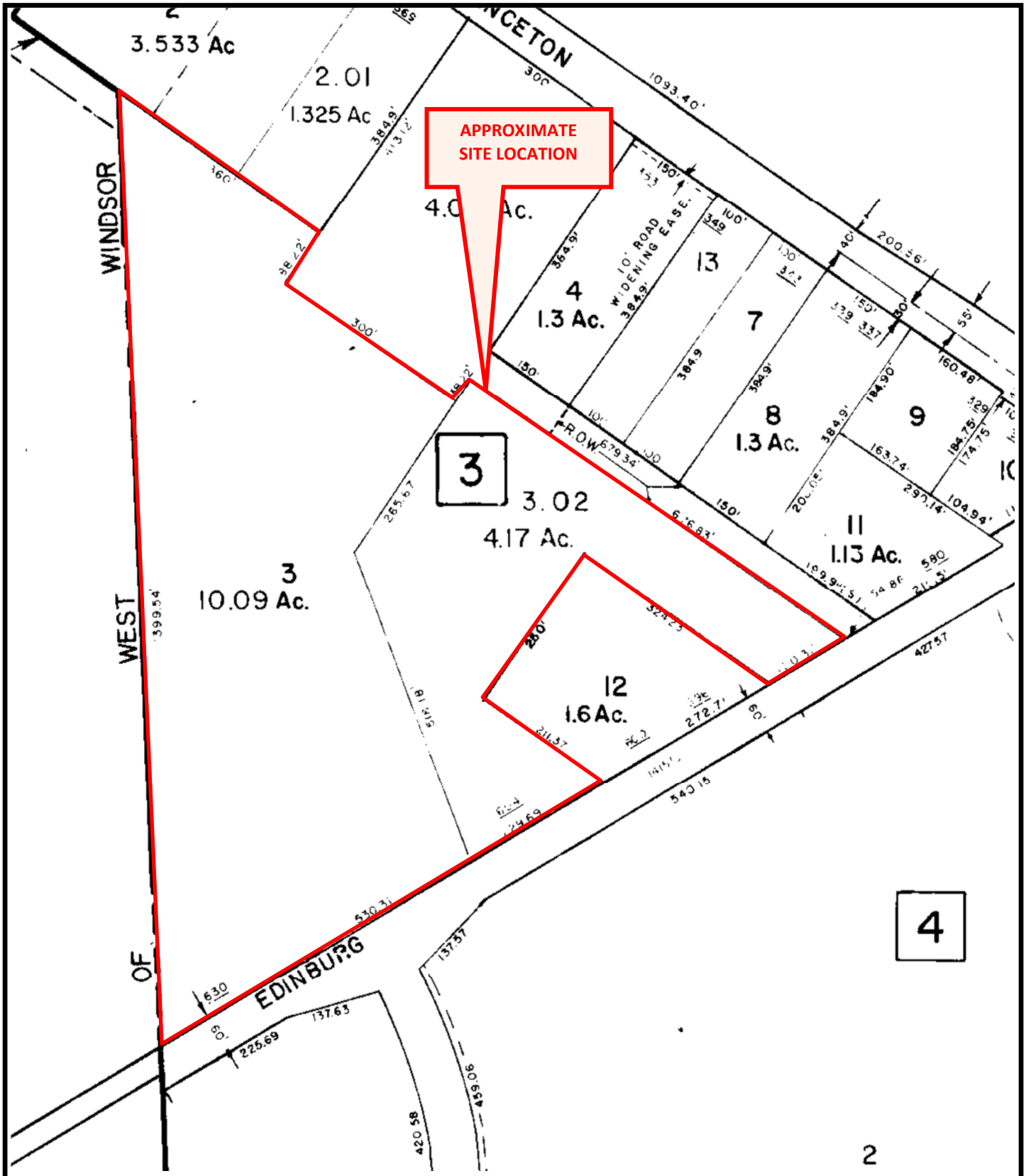
TAX MAP

USGS MAP

SOILS MAP

AERIAL MAP

FEMA MAP



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Tax Map

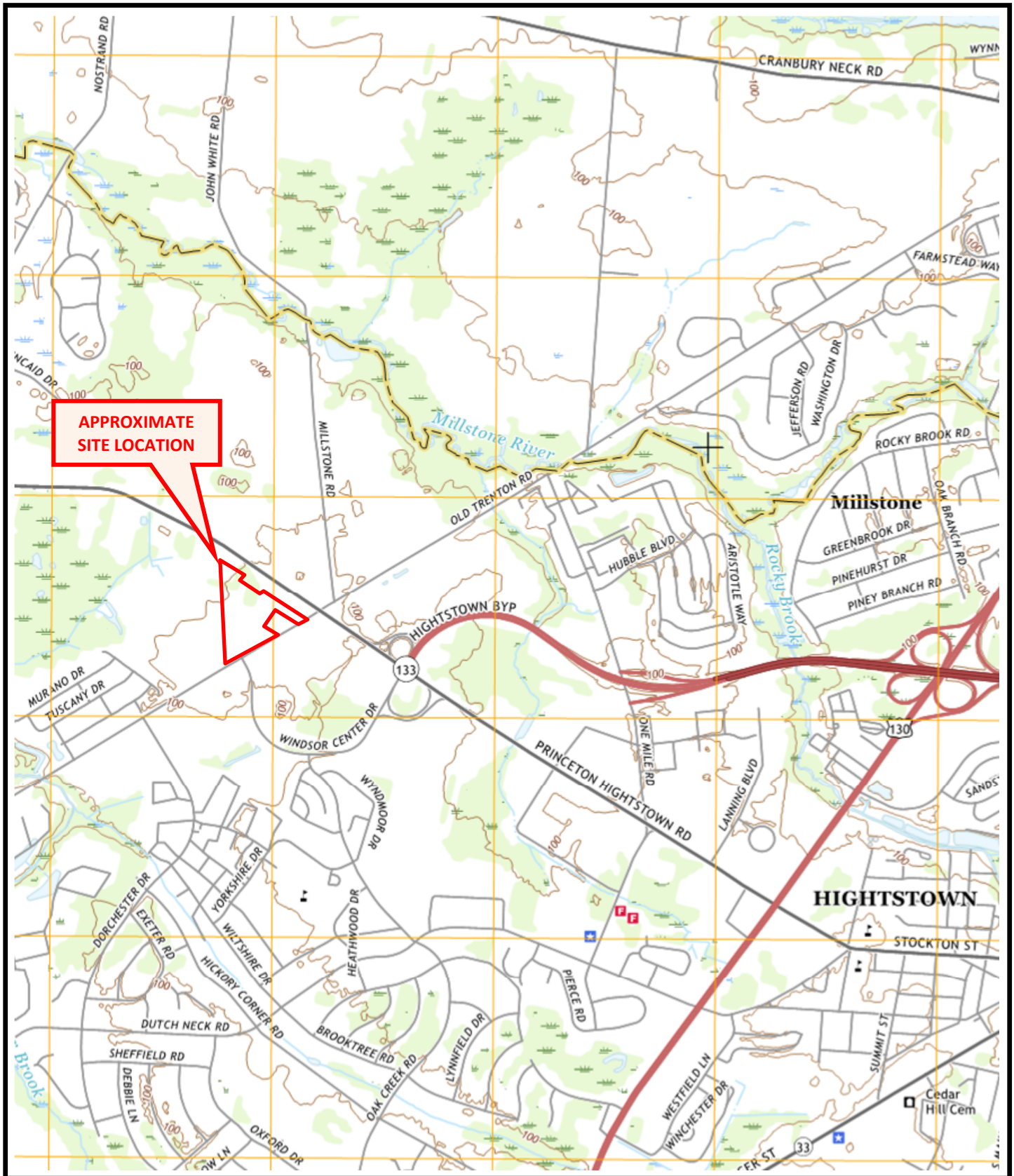
Block 3, Lots 3 & 3.02

Source: Township of East Windsor Tax Maps
Sheet 2

Scale: 1" = 200'

Date: March 1, 2019

MC Project No. 18001982A



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U.S.G.S. Map

Block 3, Lots 3 & 3.02

Source: USGS 7.5 Minute Series - Hightstown, NJ Quadrangle 2016

Scale: 1:24000

Date: March 1, 2019

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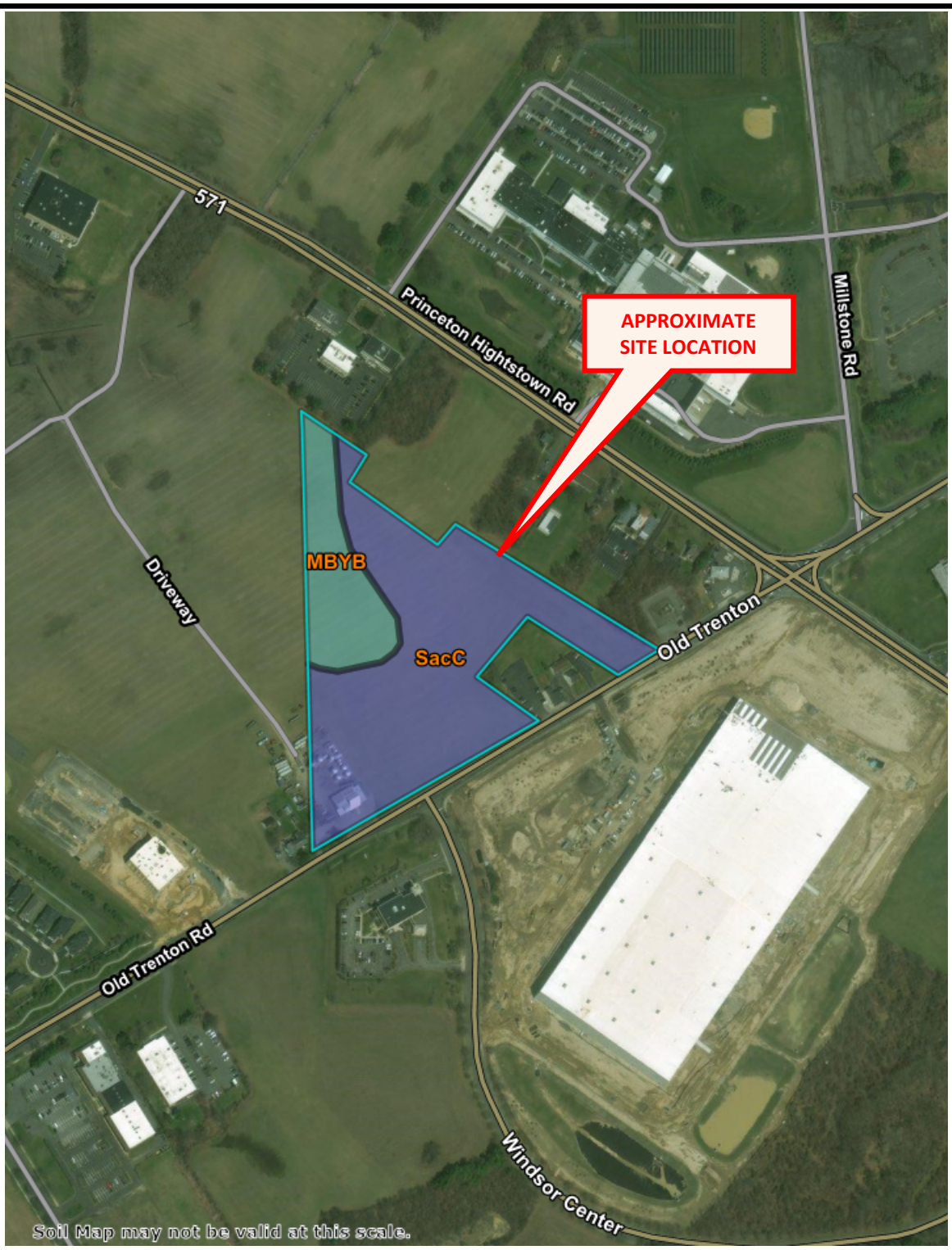

LEGEND

MBYB:	**Mattapex and Bertie loams, 0-5%, HSG C**
SacC:	**Sassafras sandy loam, 5-10% slopes, Northern Coastal Plain, HSG B**

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Soil Survey Map

Block 3, Lots 3 & 3.02

Source: NRCS Web Soil Survey

Scale: 1" = 500'

Date: March 1, 2019

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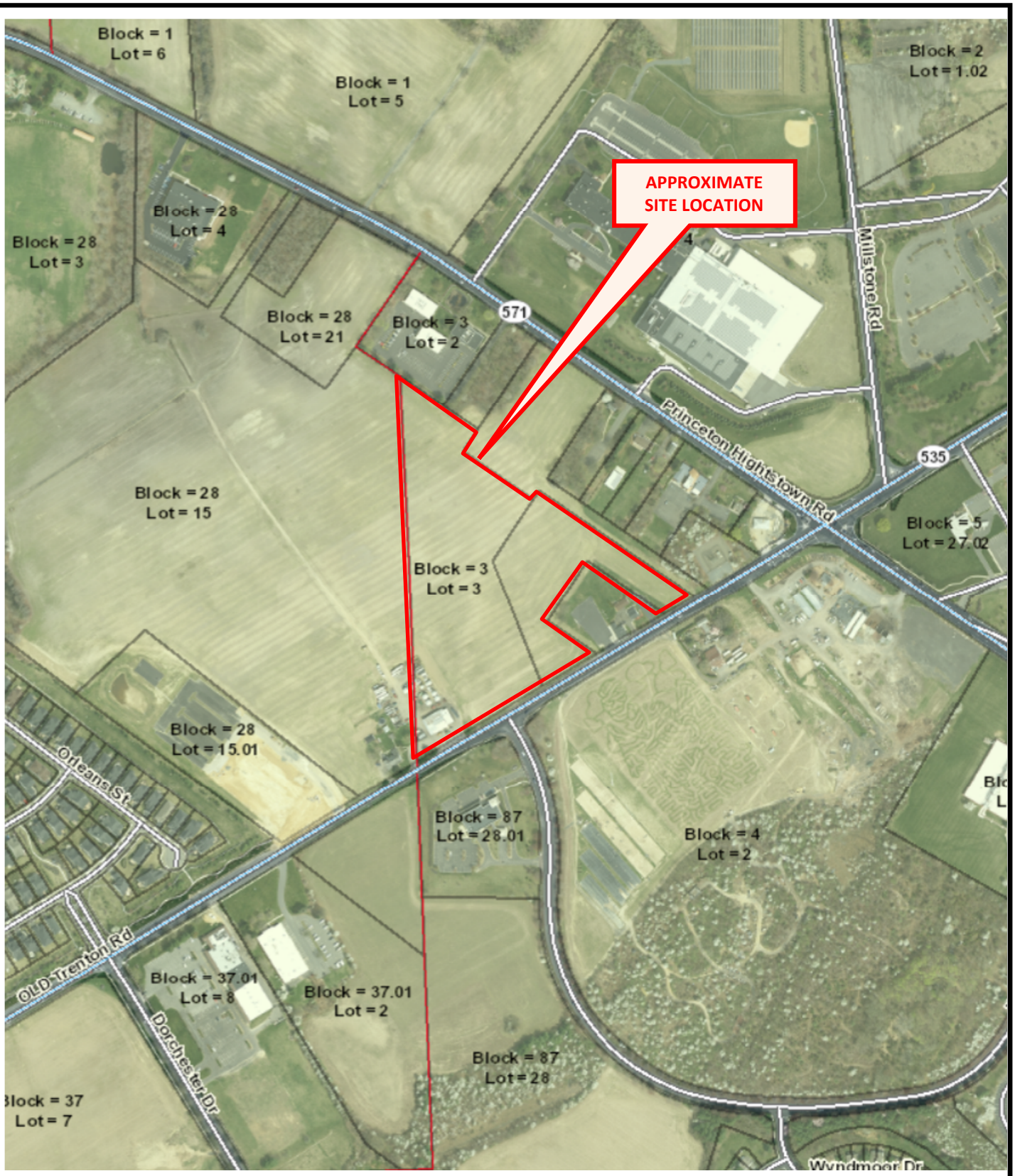

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Aerial Map

Block 3, Lots 3 & 3.02

Source: NJDEP NJ-GeoWeb

Scale: 1"=500'

Date: March 1, 2019

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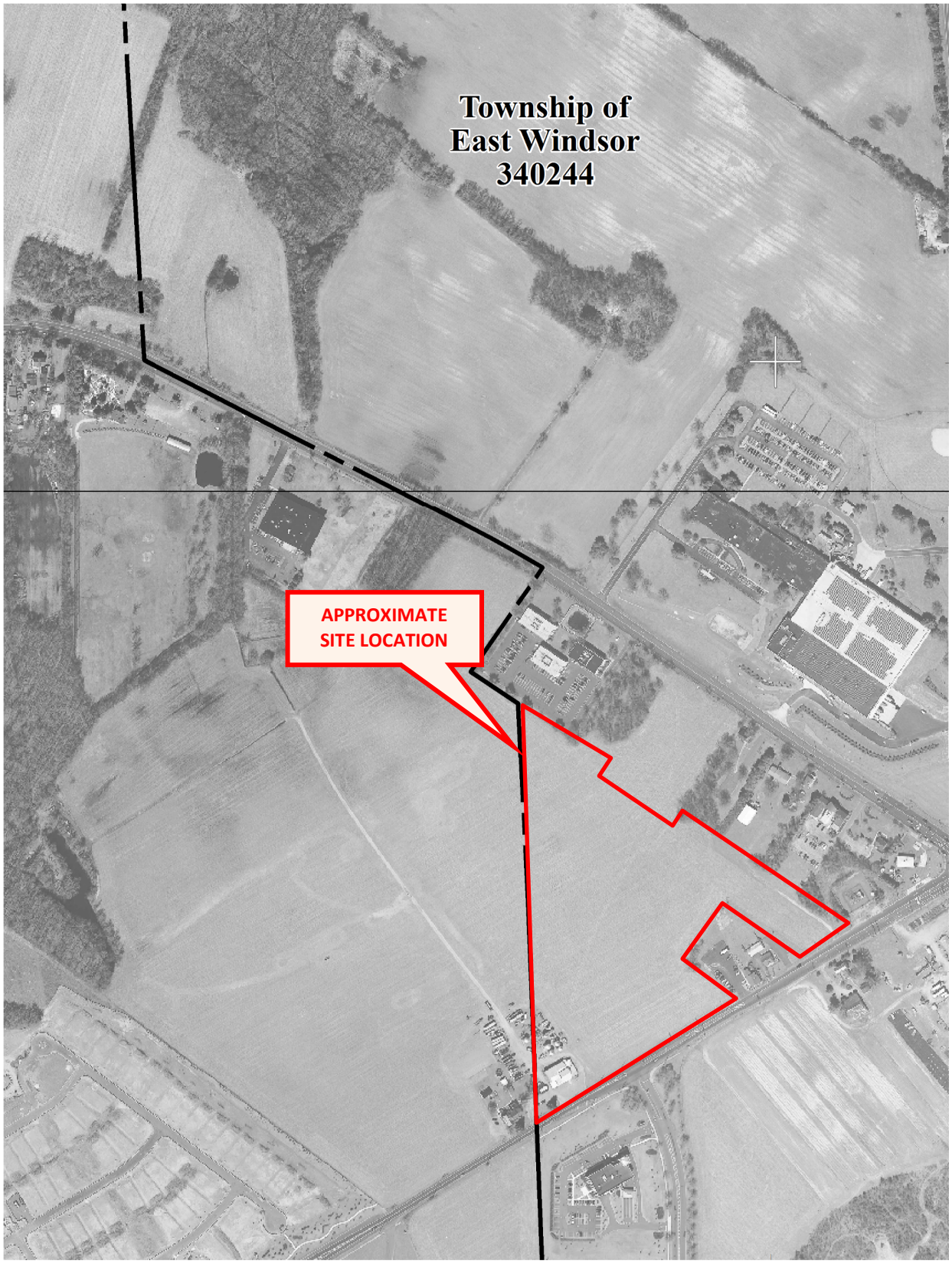

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FEMA Map
Block 3, Lots 3 & 3.02

Source: FEMA FIRM Monmouth County, NJ
Map Number: 34021C0162F
(7/20/2016)

Scale: 1" = 500'

Date: March 1, 2019

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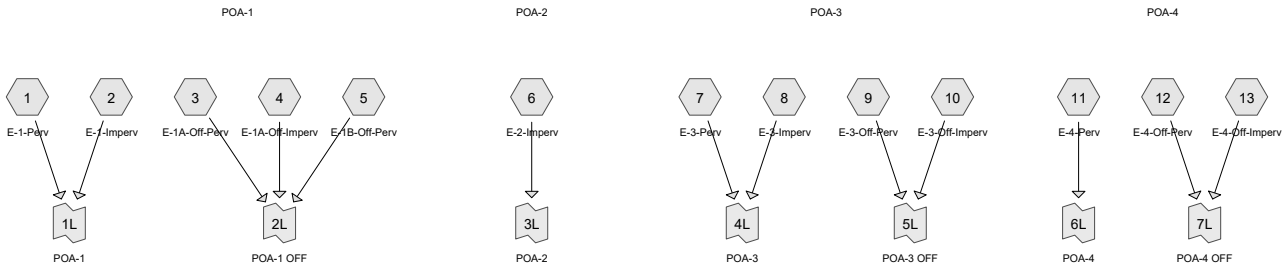
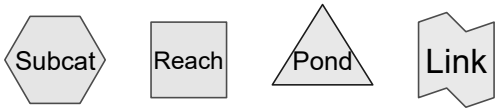
APPENDIX B

EXISTING AND PROPOSED CONDITIONS ANALYSIS

EXISTING CONDITIONS ANALYSIS





Routing Diagram for 191025-Existing Analysis - Row Crop
Prepared by Maser Consulting PA, Printed 10/30/2019
HydroCAD® 10.00-22 s/n 10901 © 2018 HydroCAD Software Solutions LLC

Area Listing (all nodes)

Area (acres)	CN	Description (subcatchment-numbers)
0.928	61	>75% Grass cover, Good, HSG B (3, 5, 7, 9, 12)
0.348	98	Gravel surface, HSG B (2, 6, 8)
0.078	98	Gravel, HSG B (10)
0.049	98	Misc., HSG B (10)
0.437	98	Paved parking, HSG B (4, 10, 13)
0.260	98	Roofs, HSG B (2, 4, 6, 8, 10)
11.529	75	Row crops, contoured, Good, HSG B (1, 5, 7, 11)
2.702	82	Row crops, contoured, Good, HSG C (1)
16.331	**77**	**TOTAL AREA**

Soil Listing (all nodes)

Area (acres)	Soil Group	Subcatchment Numbers
0.000	HSG A	
13.629	HSG B	1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13
2.702	HSG C	1
0.000	HSG D	
0.000	Other	
16.331		**TOTAL AREA**

Summary for Subcatchment 1: E-1-Perv

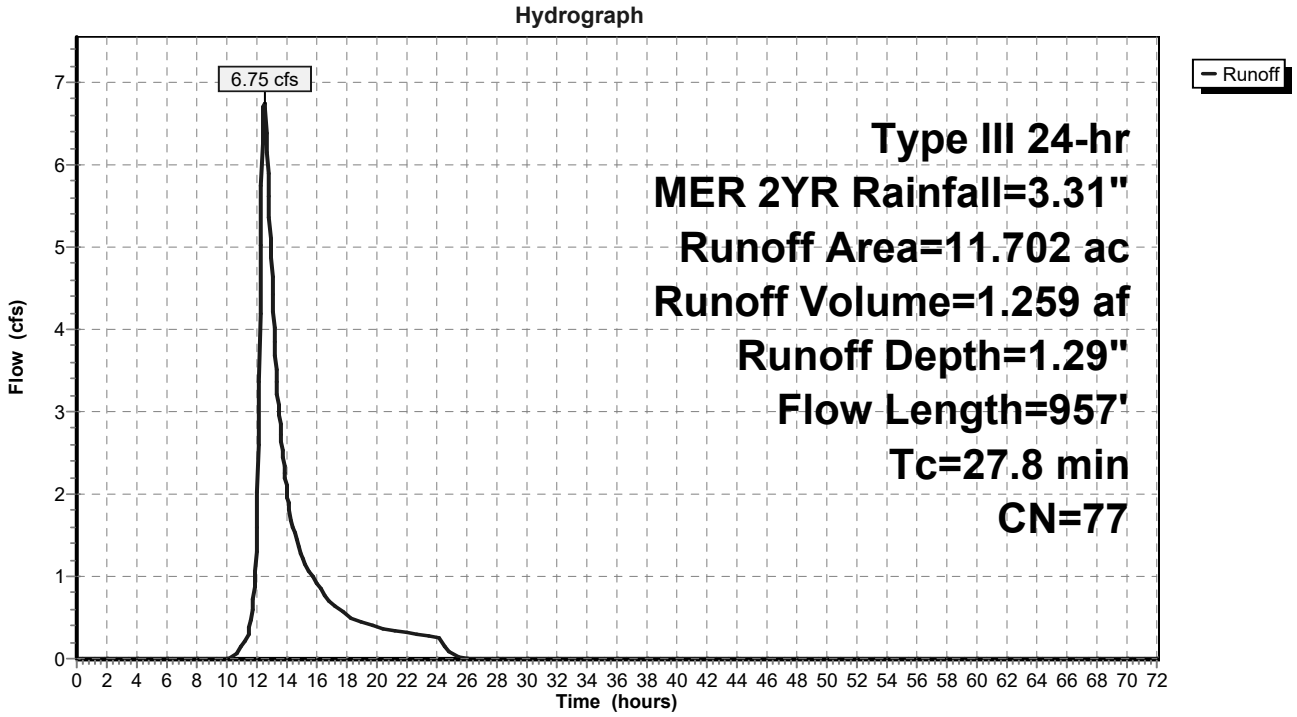
Runoff = 6.75 cfs @ 12.50 hrs, Volume= 1.259 af, Depth= 1.29"

Runoff by SCS TR-20 method, UH=Delmarva, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
Type III 24-hr MER 2YR Rainfall=3.31"

Area (ac)	CN	Description
2.702	82	Row crops, contoured, Good, HSG C
9.000	75	Row crops, contoured, Good, HSG B
11.702	77	Weighted Average
11.702		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
20.3	100	0.0040	0.08		**Sheet Flow, Sheet 1** Cultivated: Residue>20% n= 0.170 P2= 3.31"
7.5	857	0.0140	1.90		**Shallow Concentrated Flow, SCF 1** Unpaved Kv= 16.1 fps
27.8	957	Total			

Subcatchment 1: E-1-Perv



Summary for Subcatchment 2: E-1-Imperv

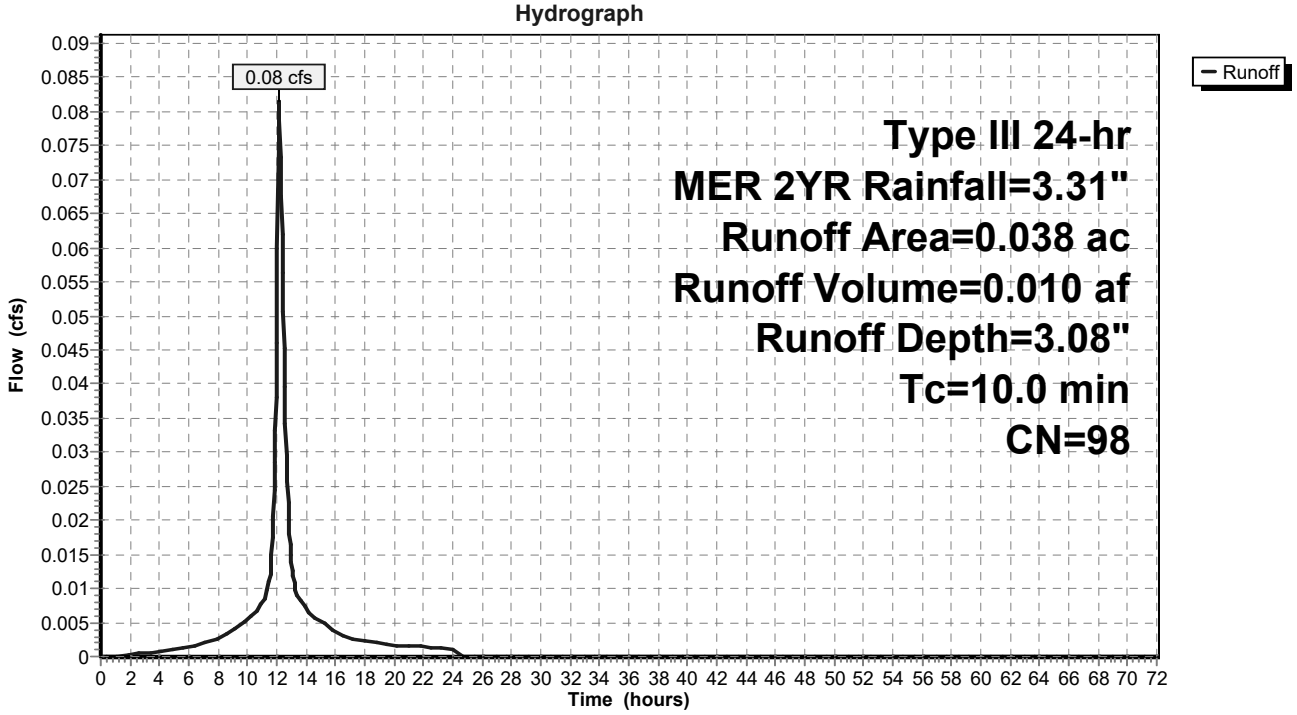
Runoff = 0.08 cfs @ 12.16 hrs, Volume= 0.010 af, Depth= 3.08"

Runoff by SCS TR-20 method, UH=Delmarva, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
Type III 24-hr MER 2YR Rainfall=3.31"

	Area (ac)	CN	Description
	0.013	98	Roofs, HSG B
*	0.025	98	Gravel surface, HSG B
	0.038	98	Weighted Average
	0.038		100.00% Impervious Area

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

Subcatchment 2: E-1-Imperv



Summary for Subcatchment 3: E-1A-Off-Perv

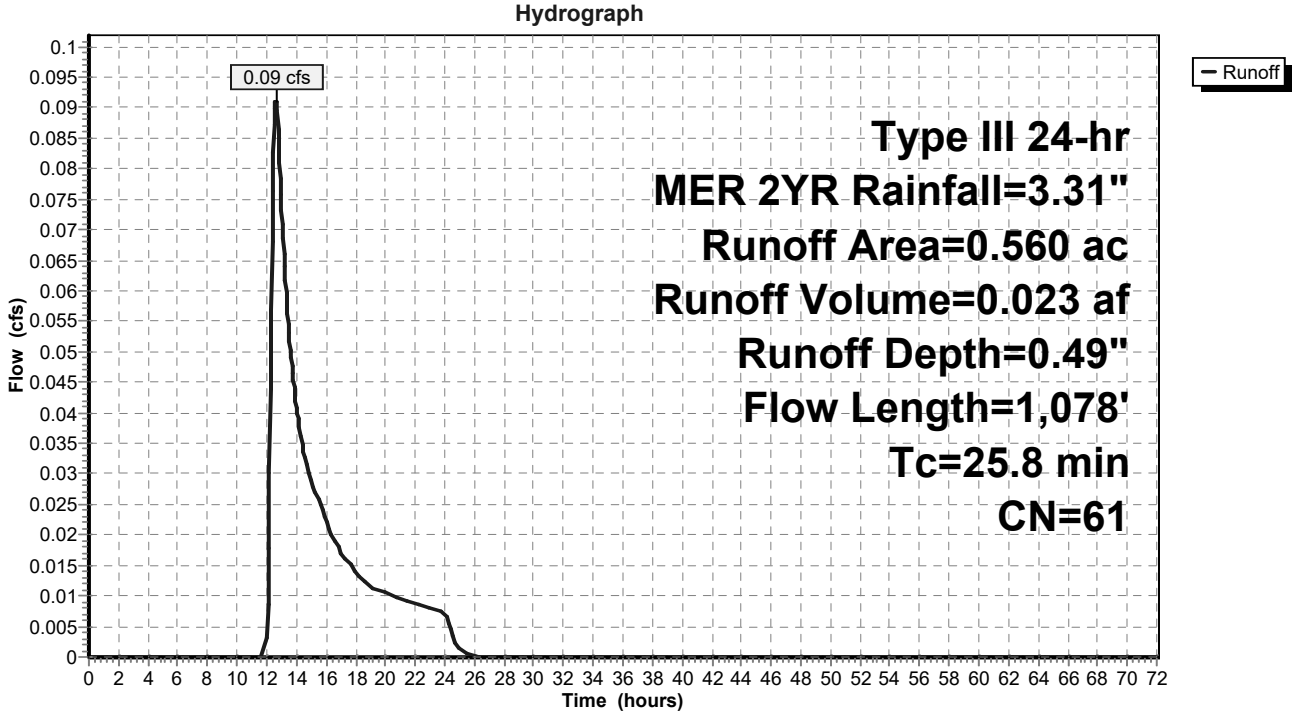
Runoff = 0.09 cfs @ 12.61 hrs, Volume= 0.023 af, Depth= 0.49"

Runoff by SCS TR-20 method, UH=Delmarva, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
Type III 24-hr MER 2YR Rainfall=3.31"

Area (ac)	CN	Description
0.560	61	>75% Grass cover, Good, HSG B
0.560		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
17.2	100	0.0120	0.10		**Sheet Flow, Sheet 1.3** Grass: Dense n= 0.240 P2= 3.31"
8.6	978	0.0140	1.90		**Shallow Concentrated Flow, SCF 1.3** Unpaved Kv= 16.1 fps
25.8	1,078	Total			

Subcatchment 3: E-1A-Off-Perv



Summary for Subcatchment 4: E-1A-Off-Imperv

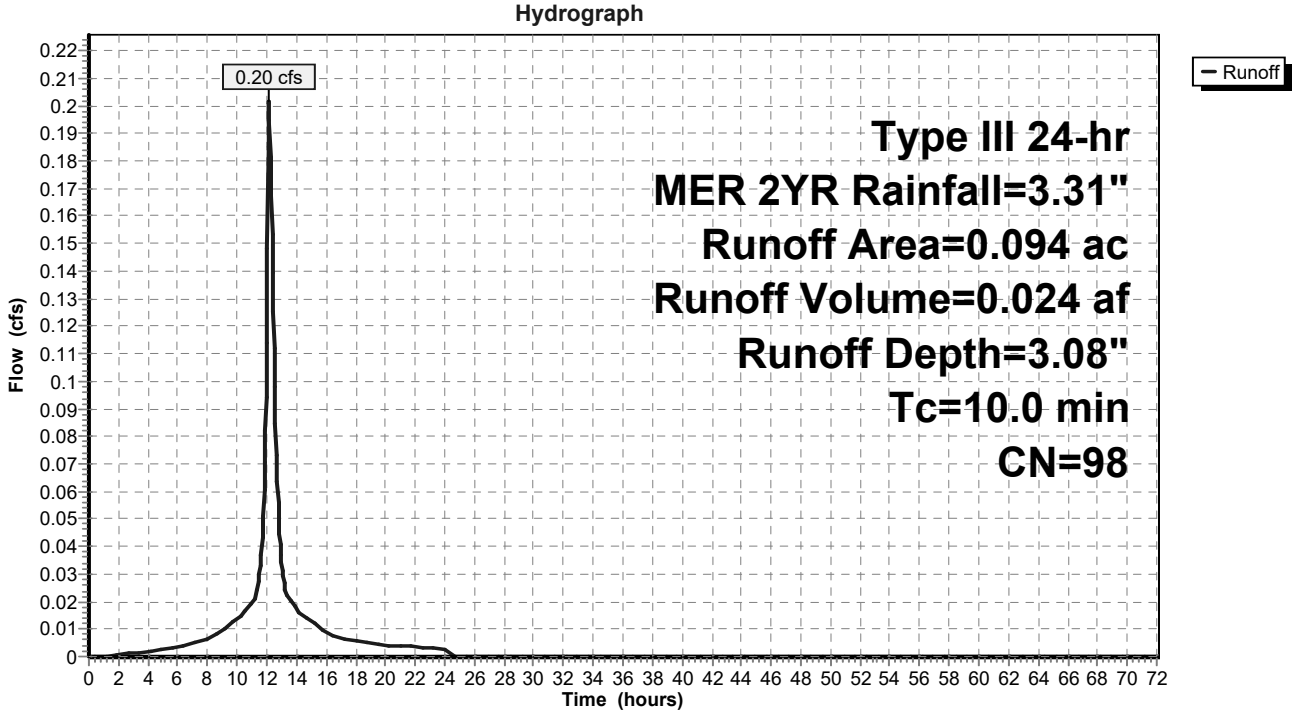
Runoff = 0.20 cfs @ 12.16 hrs, Volume= 0.024 af, Depth= 3.08"

Runoff by SCS TR-20 method, UH=Delmarva, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
Type III 24-hr MER 2YR Rainfall=3.31"

	Area (ac)	CN	Description
	0.011	98	Roofs, HSG B
*	0.083	98	Paved parking, HSG B
	0.094	98	Weighted Average
	0.094		100.00% Impervious Area

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

Subcatchment 4: E-1A-Off-Imperv



Summary for Subcatchment 5: E-1B-Off-Perv

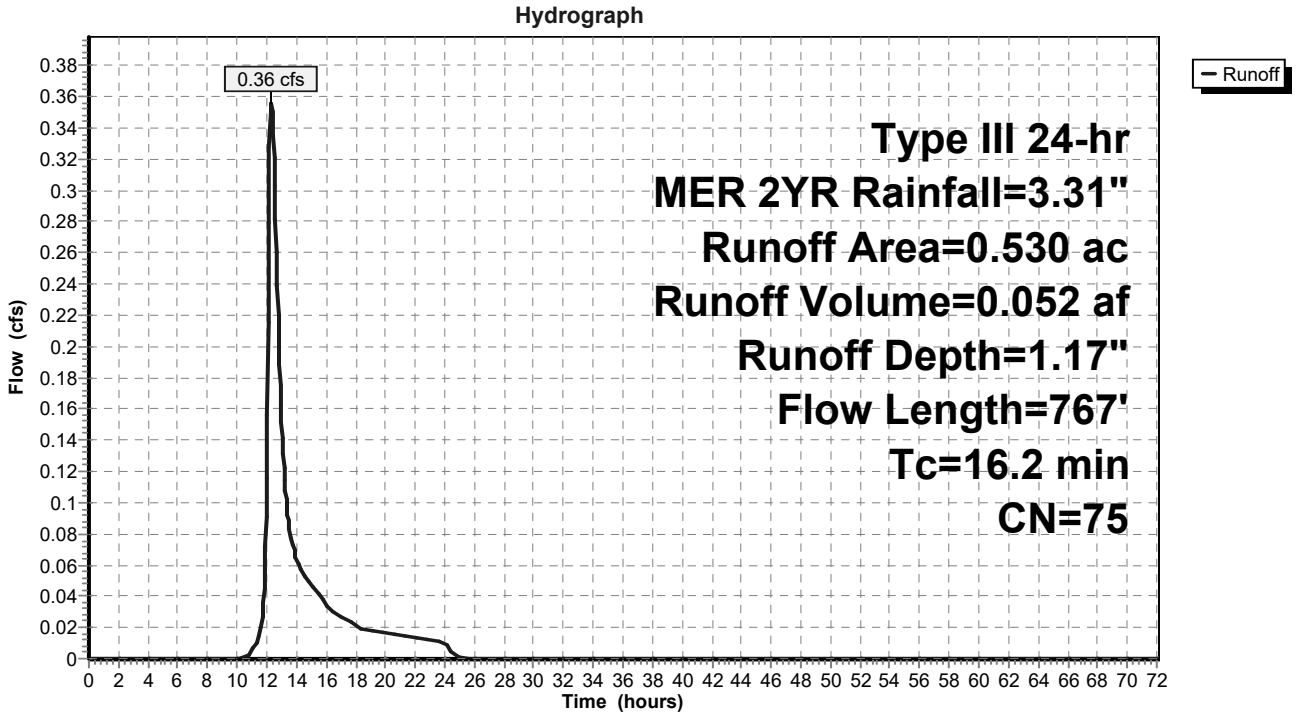
Runoff = 0.36 cfs @ 12.31 hrs, Volume= 0.052 af, Depth= 1.17"

Runoff by SCS TR-20 method, UH=Delmarva, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
Type III 24-hr MER 2YR Rainfall=3.31"

Area (ac)	CN	Description
0.520	75	Row crops, contoured, Good, HSG B
0.010	61	>75% Grass cover, Good, HSG B
0.530	75	Weighted Average
0.530		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
10.4	100	0.0210	0.16		**Sheet Flow, Sheet** Cultivated: Residue>20% n= 0.170 P2= 3.31"
5.8	667	0.0140	1.90		**Shallow Concentrated Flow, SCF** Unpaved Kv= 16.1 fps
16.2	767	Total			

Subcatchment 5: E-1B-Off-Perv



Summary for Subcatchment 6: E-2-Imperv

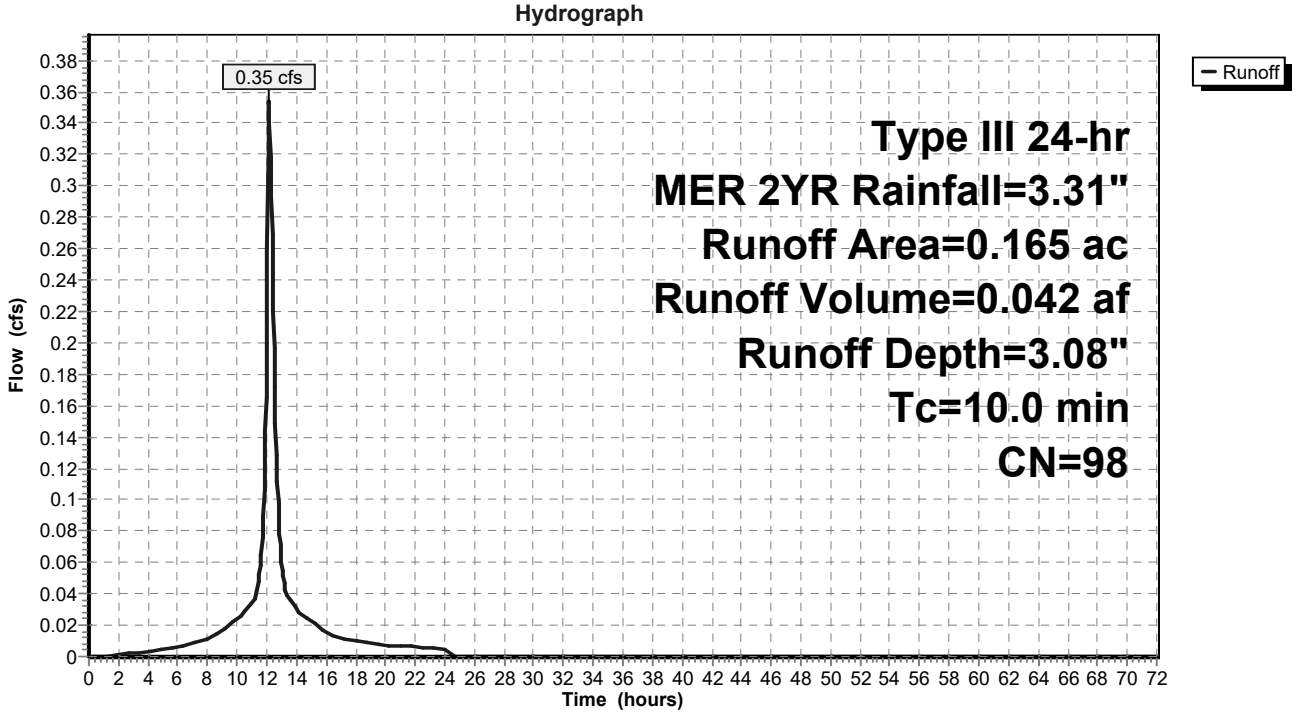
Runoff = 0.35 cfs @ 12.16 hrs, Volume= 0.042 af, Depth= 3.08"

Runoff by SCS TR-20 method, UH=Delmarva, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
Type III 24-hr MER 2YR Rainfall=3.31"

	Area (ac)	CN	Description
	0.065	98	Roofs, HSG B
*	0.100	98	Gravel surface, HSG B
	0.165	98	Weighted Average
	0.165		100.00% Impervious Area

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

Subcatchment 6: E-2-Imperv



Summary for Subcatchment 7: E-3-Perv

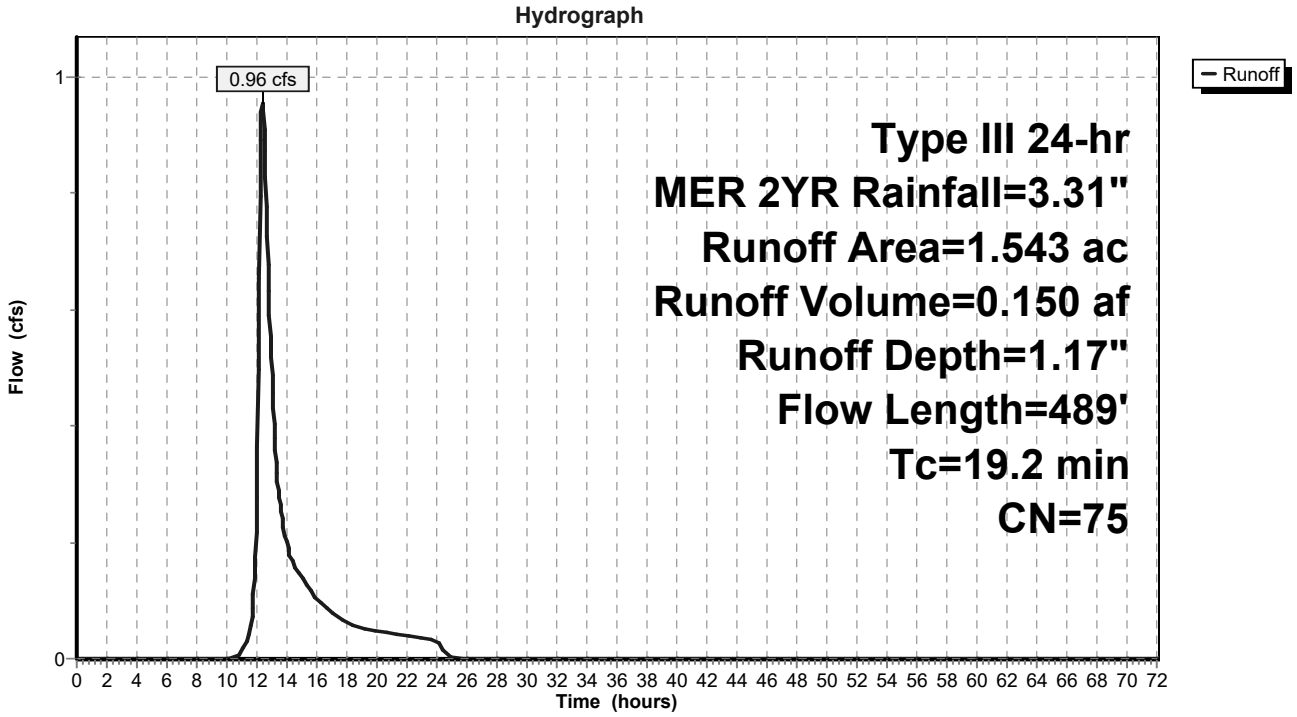
Runoff = 0.96 cfs @ 12.37 hrs, Volume= 0.150 af, Depth= 1.17"

Runoff by SCS TR-20 method, UH=Delmarva, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
Type III 24-hr MER 2YR Rainfall=3.31"

Area (ac)	CN	Description
1.515	75	Row crops, contoured, Good, HSG B
0.028	61	>75% Grass cover, Good, HSG B
1.543	75	Weighted Average
1.543		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
14.7	100	0.0090	0.11		**Sheet Flow, Sheet 4** Cultivated: Residue>20% n= 0.170 P2= 3.31"
4.5	389	0.0080	1.44		**Shallow Concentrated Flow, SCF 4** Unpaved Kv= 16.1 fps
19.2	489	Total			

Subcatchment 7: E-3-Perv



Summary for Subcatchment 8: E-3-Imperv

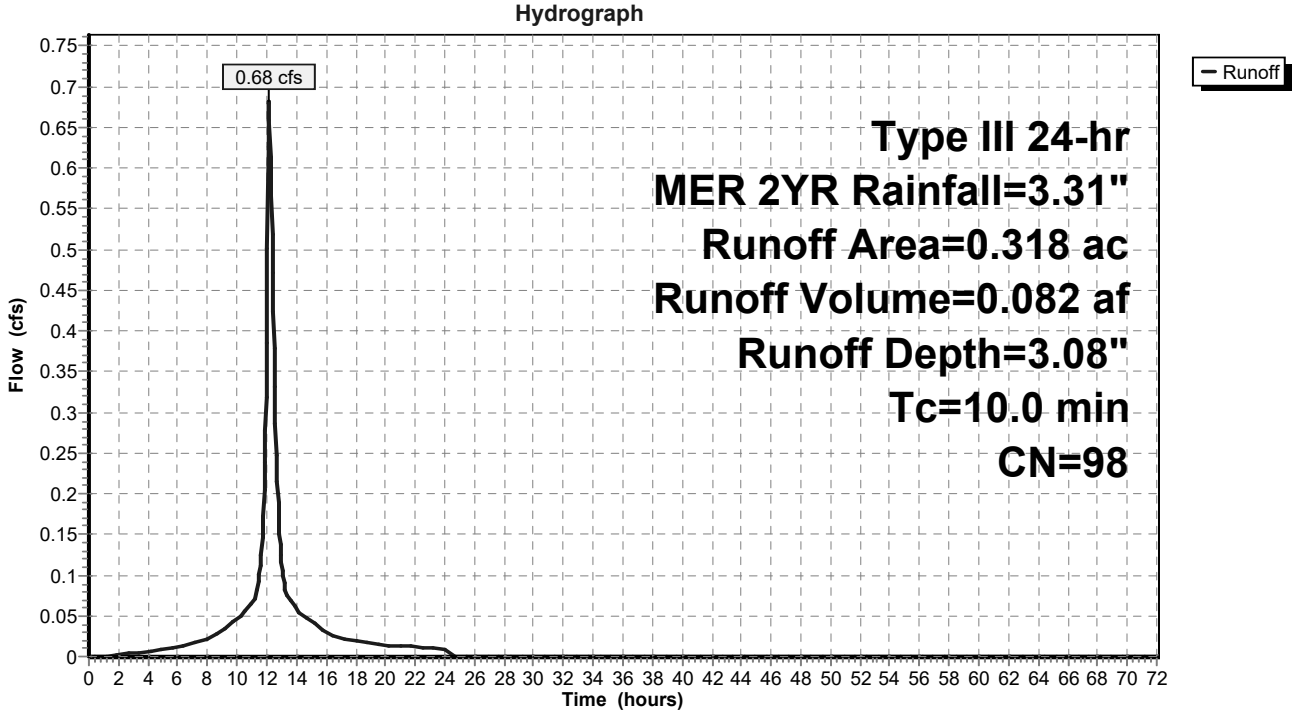
Runoff = 0.68 cfs @ 12.16 hrs, Volume= 0.082 af, Depth= 3.08"

Runoff by SCS TR-20 method, UH=Delmarva, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
Type III 24-hr MER 2YR Rainfall=3.31"

	Area (ac)	CN	Description
	0.095	98	Roofs, HSG B
*	0.223	98	Gravel surface, HSG B
	0.318	98	Weighted Average
	0.318		100.00% Impervious Area

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

Subcatchment 8: E-3-Imperv



Summary for Subcatchment 9: E-3-Off-Perv

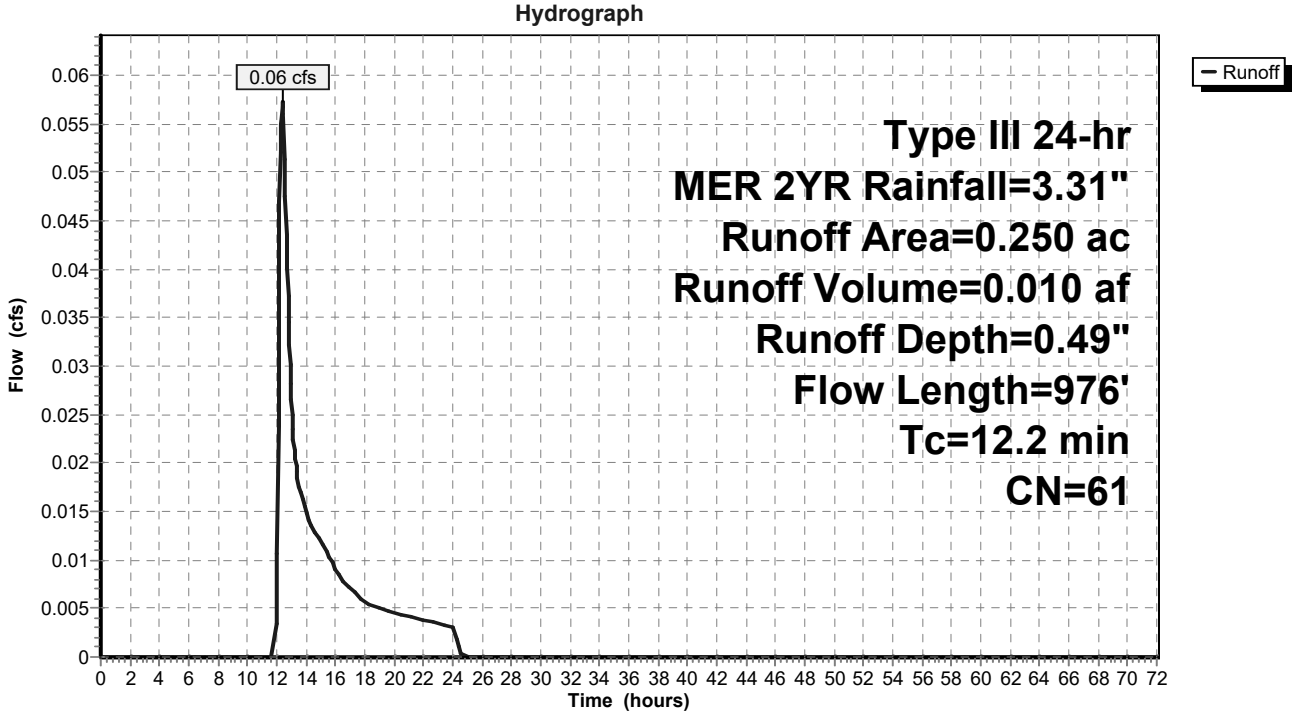
Runoff = 0.06 cfs @ 12.39 hrs, Volume= 0.010 af, Depth= 0.49"

Runoff by SCS TR-20 method, UH=Delmarva, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
Type III 24-hr MER 2YR Rainfall=3.31"

Area (ac)	CN	Description
0.250	61	>75% Grass cover, Good, HSG B
0.250		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
1.4	100	0.0140	1.21		**Sheet Flow, Sheet 4** Smooth surfaces n= 0.011 P2= 3.31"
10.8	876	0.0070	1.35		**Shallow Concentrated Flow, SCF 4** Unpaved Kv= 16.1 fps
12.2	976	Total			

Subcatchment 9: E-3-Off-Perv



Summary for Subcatchment 10: E-3-Off-Imperv

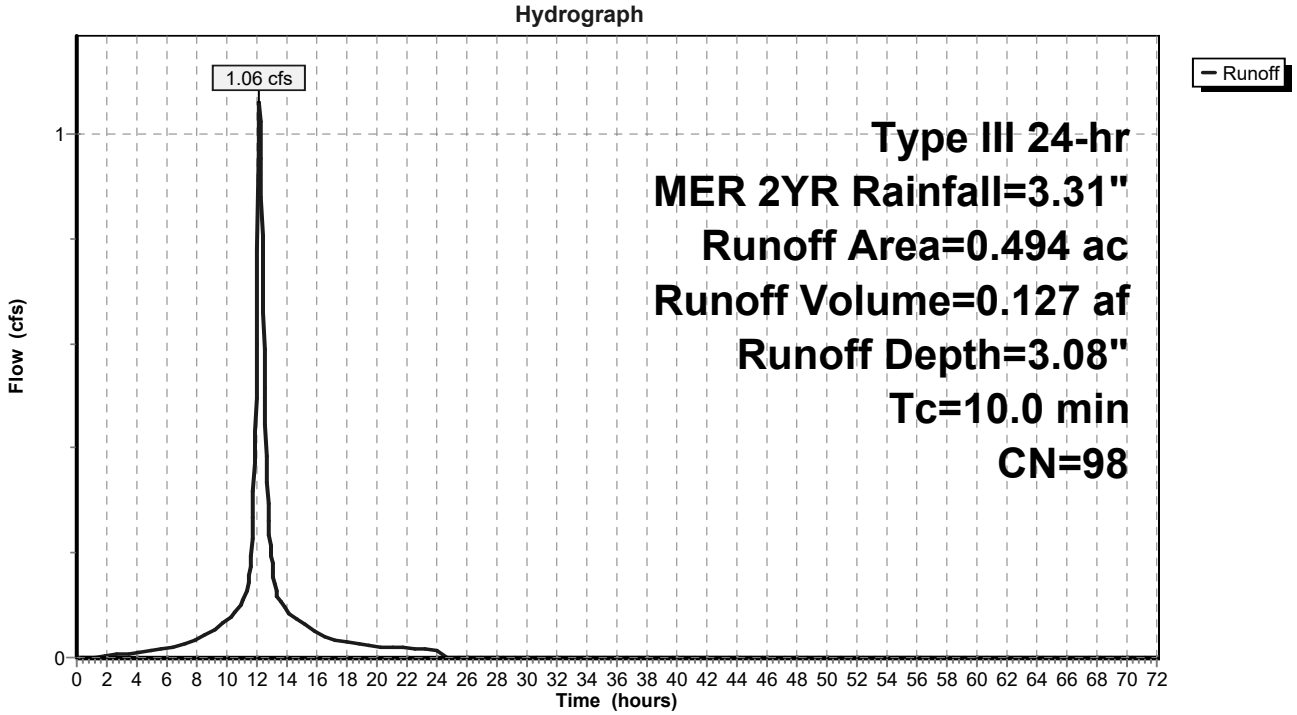
Runoff = 1.06 cfs @ 12.16 hrs, Volume= 0.127 af, Depth= 3.08"

Runoff by SCS TR-20 method, UH=Delmarva, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
Type III 24-hr MER 2YR Rainfall=3.31"

	Area (ac)	CN	Description
	0.076	98	Roofs, HSG B
*	0.078	98	Gravel, HSG B
	0.291	98	Paved parking, HSG B
*	0.049	98	Misc., HSG B
	0.494	98	Weighted Average
	0.494		100.00% Impervious Area

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

Subcatchment 10: E-3-Off-Imperv



Summary for Subcatchment 11: E-4-Perv

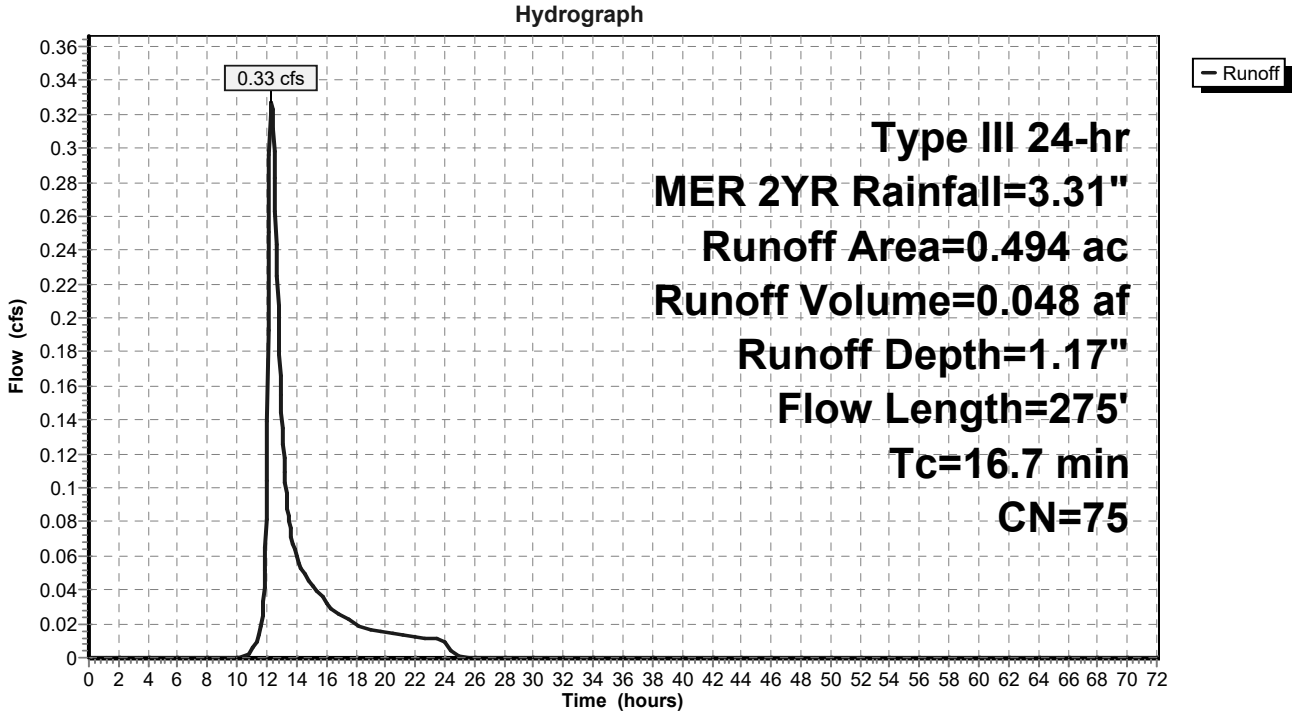
Runoff = 0.33 cfs @ 12.32 hrs, Volume= 0.048 af, Depth= 1.17"

Runoff by SCS TR-20 method, UH=Delmarva, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
Type III 24-hr MER 2YR Rainfall=3.31"

Area (ac)	CN	Description
0.494	75	Row crops, contoured, Good, HSG B
0.494		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.8	27	0.0090	0.07		**Sheet Flow, Sheet 1** Grass: Dense n= 0.240 P2= 3.31"
0.9	45	0.0090	0.87		**Sheet Flow, Sheet 2** Smooth surfaces n= 0.011 P2= 3.31"
7.0	28	0.0090	0.07		**Sheet Flow, Sheet 3** Grass: Dense n= 0.240 P2= 3.31"
2.0	175	0.0080	1.44		**Shallow Concentrated Flow, SCF** Unpaved Kv= 16.1 fps
16.7	275	Total			

Subcatchment 11: E-4-Perv



Summary for Subcatchment 12: E-4-Off-Perv

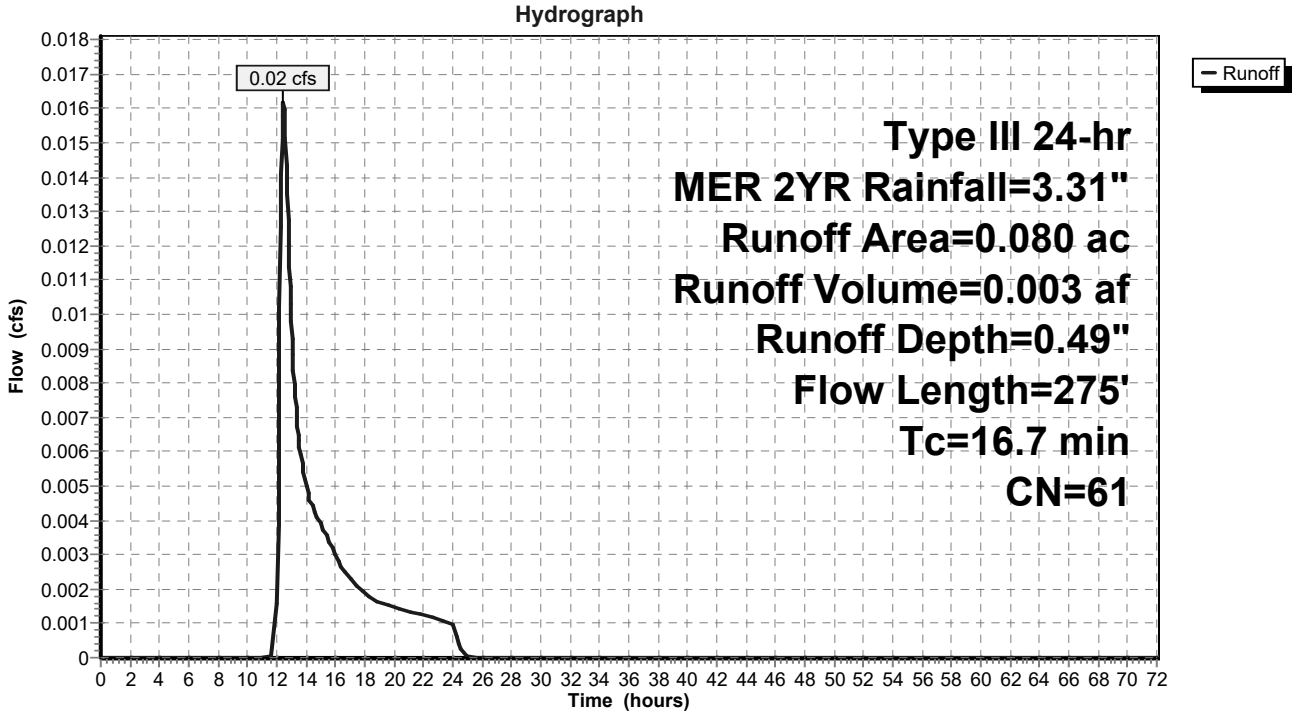
Runoff = 0.02 cfs @ 12.47 hrs, Volume= 0.003 af, Depth= 0.49"

Runoff by SCS TR-20 method, UH=Delmarva, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
Type III 24-hr MER 2YR Rainfall=3.31"

Area (ac)	CN	Description
0.080	61	>75% Grass cover, Good, HSG B
0.080		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.8	27	0.0090	0.07		**Sheet Flow, Sheet 1** Grass: Dense n= 0.240 P2= 3.31"
0.9	45	0.0090	0.87		**Sheet Flow, Sheet 2** Smooth surfaces n= 0.011 P2= 3.31"
7.0	28	0.0090	0.07		**Sheet Flow, Sheet 3** Grass: Dense n= 0.240 P2= 3.31"
2.0	175	0.0080	1.44		**Shallow Concentrated Flow, SCF** Unpaved Kv= 16.1 fps
16.7	275	Total			

Subcatchment 12: E-4-Off-Perv



Summary for Subcatchment 13: E-4-Off-Imperv

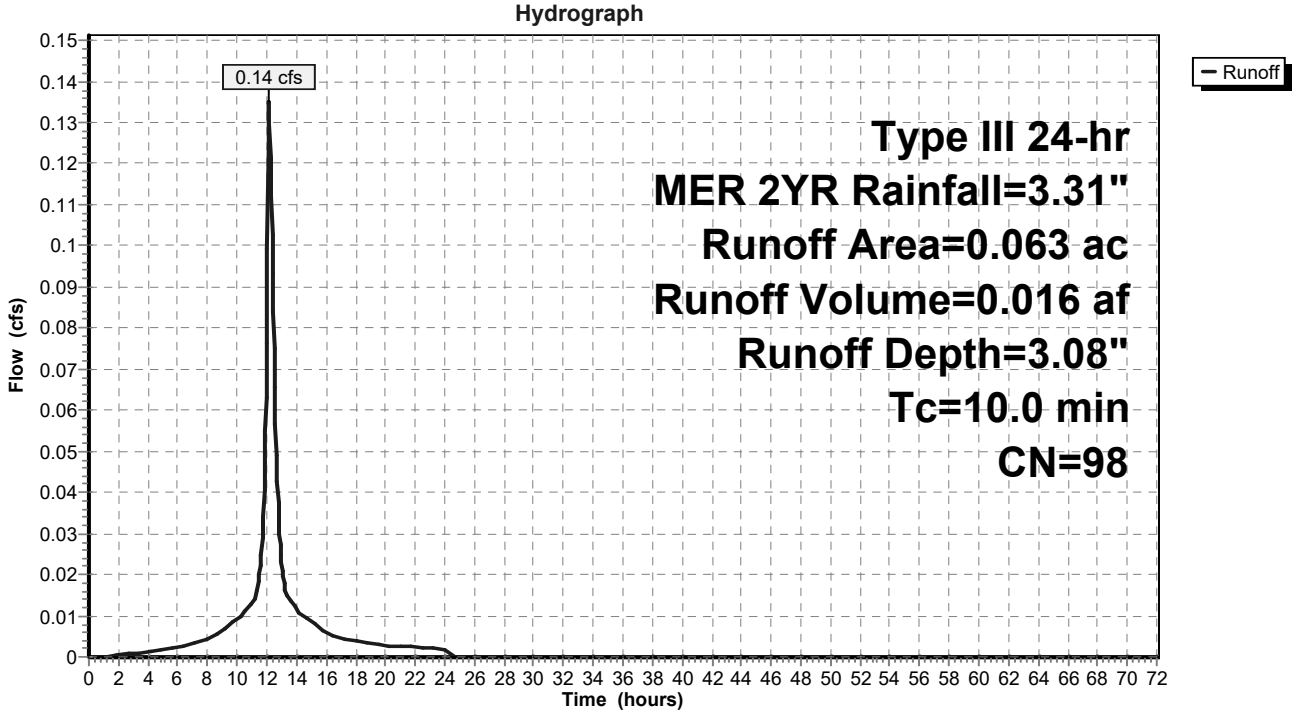
Runoff = 0.14 cfs @ 12.16 hrs, Volume= 0.016 af, Depth= 3.08"

Runoff by SCS TR-20 method, UH=Delmarva, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
Type III 24-hr MER 2YR Rainfall=3.31"

Area (ac)	CN	Description
0.063	98	Paved parking, HSG B
0.063		100.00% Impervious Area

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

Subcatchment 13: E-4-Off-Imperv

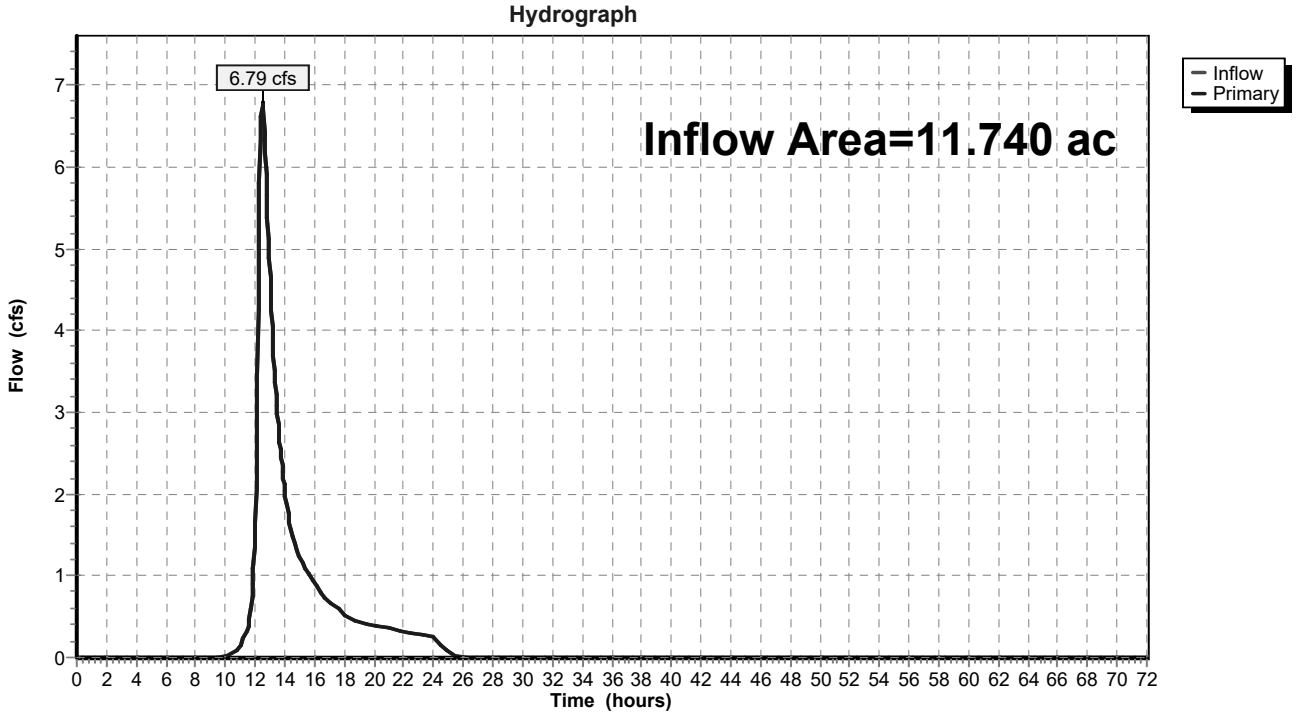


Summary for Link 1L: POA-1

Inflow Area = 11.740 ac, 0.32% Impervious, Inflow Depth = 1.30" for MER 2YR event
Inflow = 6.79 cfs @ 12.49 hrs, Volume= 1.269 af
Primary = 6.79 cfs @ 12.49 hrs, Volume= 1.269 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs

Link 1L: POA-1

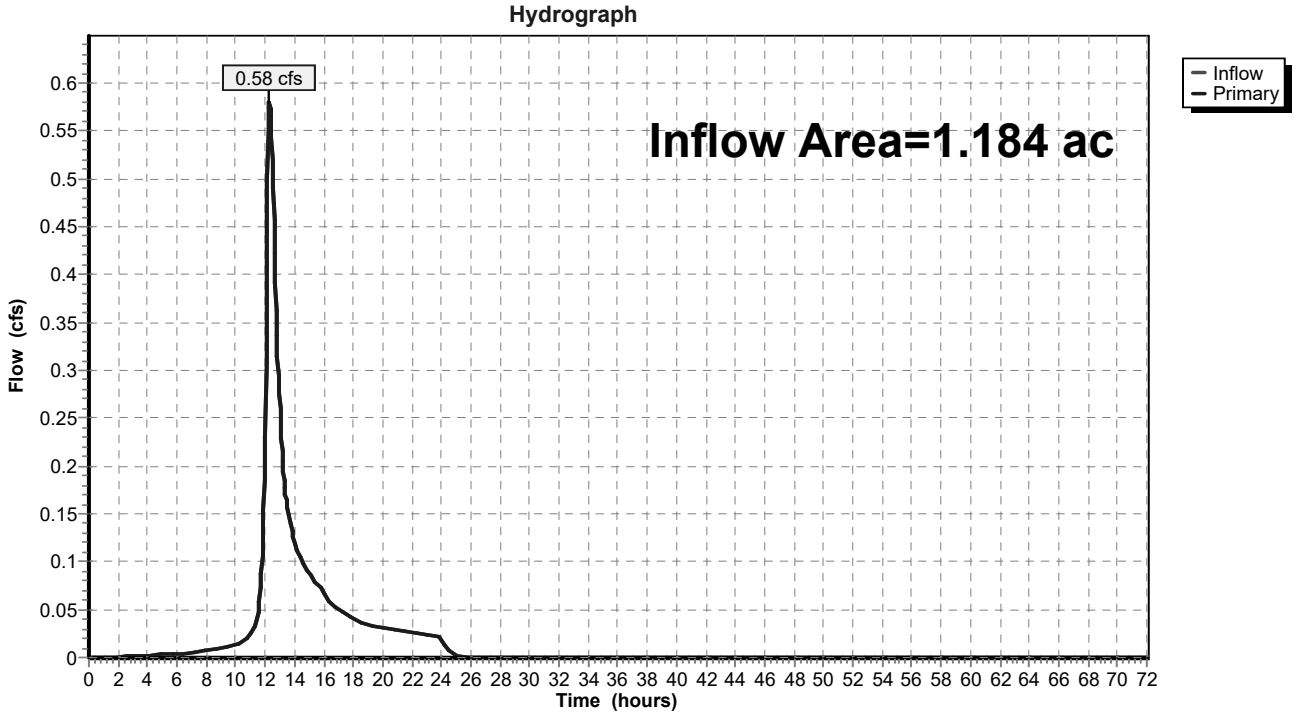


Summary for Link 2L: POA-1 OFF

Inflow Area = 1.184 ac, 7.94% Impervious, Inflow Depth = 1.00" for MER 2YR event
Inflow = 0.58 cfs @ 12.30 hrs, Volume= 0.099 af
Primary = 0.58 cfs @ 12.30 hrs, Volume= 0.099 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs

Link 2L: POA-1 OFF

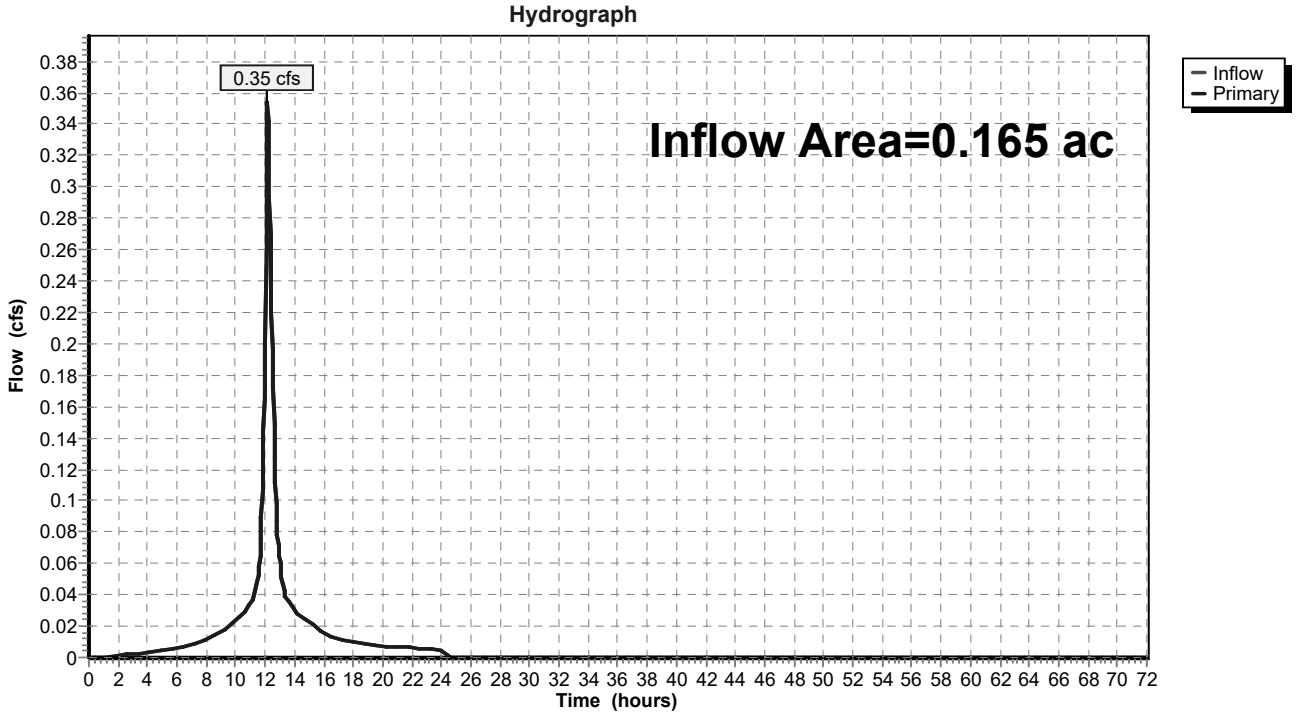


Summary for Link 3L: POA-2

Inflow Area = 0.165 ac,100.00% Impervious, Inflow Depth = 3.08" for MER 2YR event
Inflow = 0.35 cfs @ 12.16 hrs, Volume= 0.042 af
Primary = 0.35 cfs @ 12.16 hrs, Volume= 0.042 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs

Link 3L: POA-2

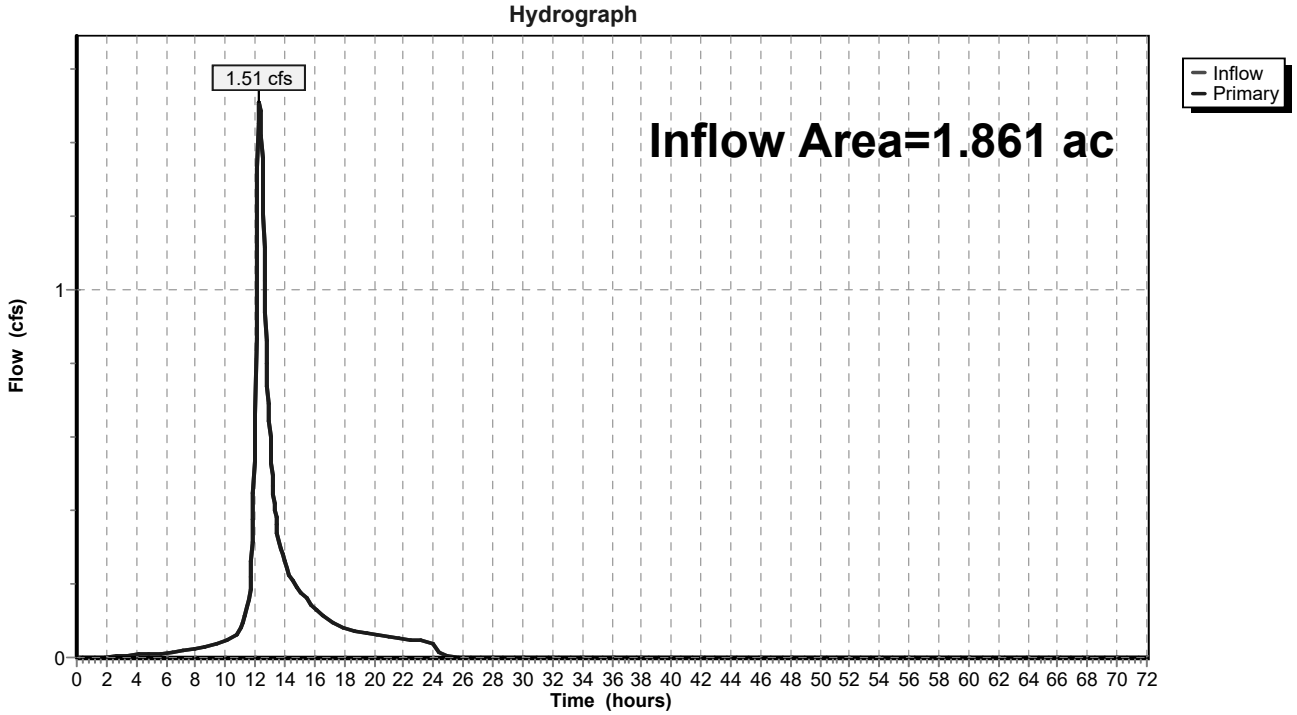


Summary for Link 4L: POA-3

Inflow Area = 1.861 ac, 17.09% Impervious, Inflow Depth = 1.50" for MER 2YR event
Inflow = 1.51 cfs @ 12.27 hrs, Volume= 0.232 af
Primary = 1.51 cfs @ 12.27 hrs, Volume= 0.232 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs

Link 4L: POA-3

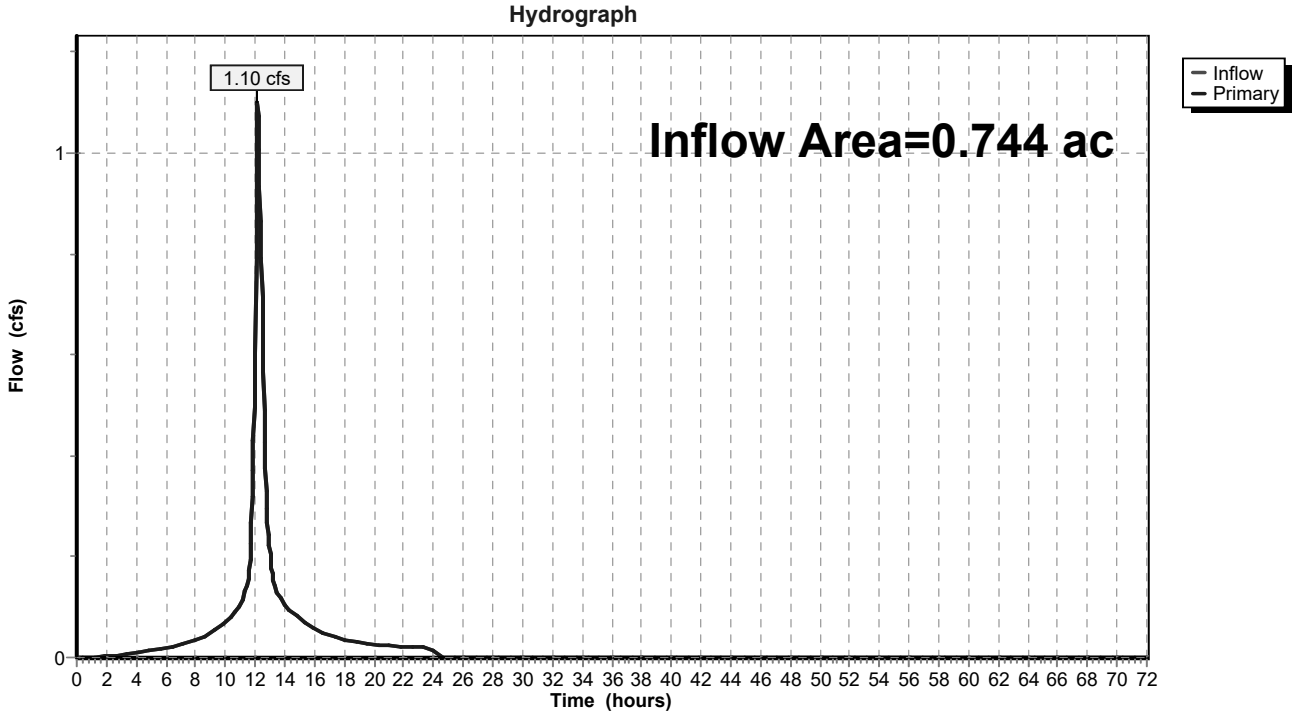


Summary for Link 5L: POA-3 OFF

Inflow Area = 0.744 ac, 66.40% Impervious, Inflow Depth = 2.21" for MER 2YR event
Inflow = 1.10 cfs @ 12.17 hrs, Volume= 0.137 af
Primary = 1.10 cfs @ 12.17 hrs, Volume= 0.137 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs

Link 5L: POA-3 OFF

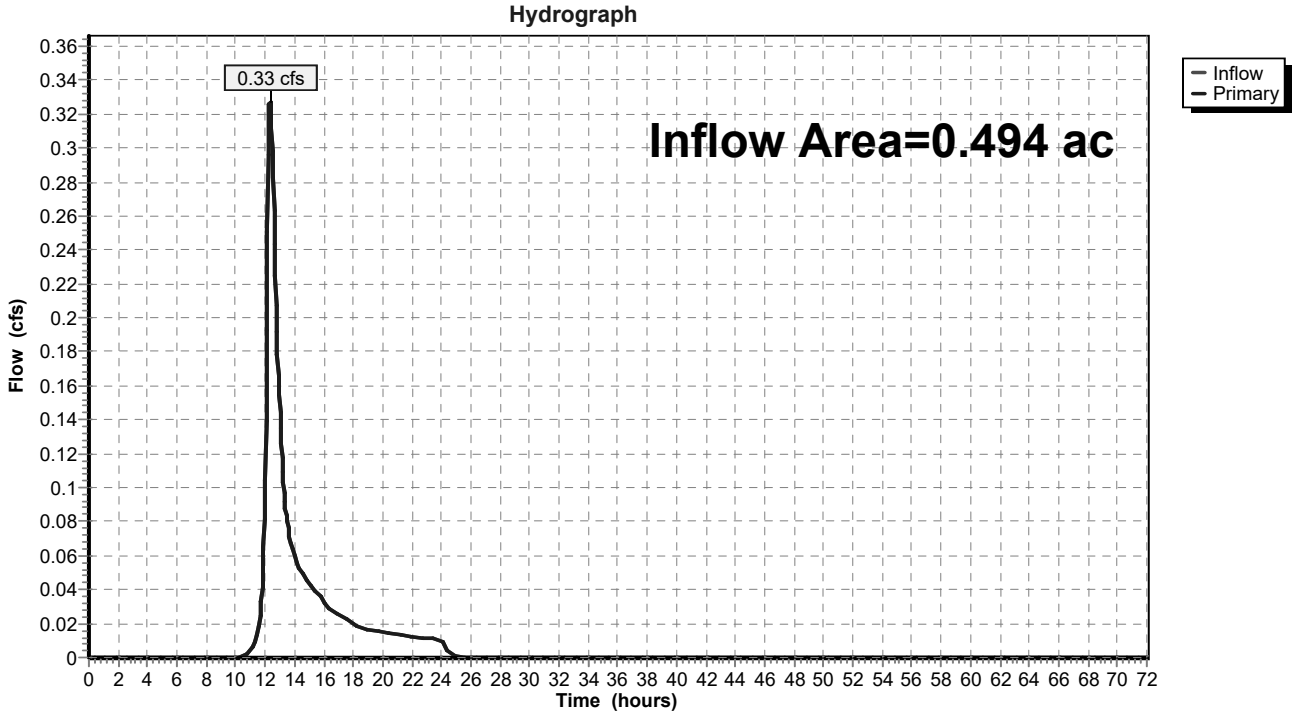


Summary for Link 6L: POA-4

Inflow Area = 0.494 ac, 0.00% Impervious, Inflow Depth = 1.17" for MER 2YR event
Inflow = 0.33 cfs @ 12.32 hrs, Volume= 0.048 af
Primary = 0.33 cfs @ 12.32 hrs, Volume= 0.048 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs

Link 6L: POA-4

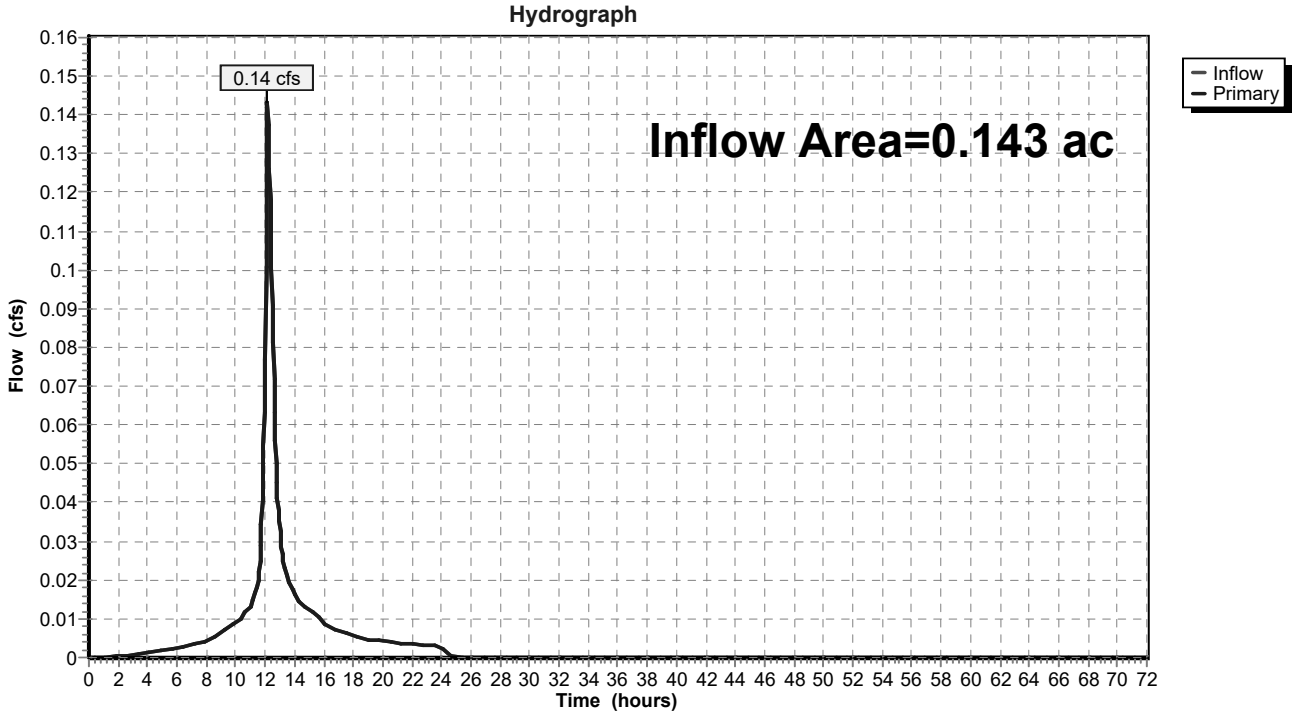


Summary for Link 7L: POA-4 OFF

Inflow Area = 0.143 ac, 44.06% Impervious, Inflow Depth = 1.63" for MER 2YR event
Inflow = 0.14 cfs @ 12.17 hrs, Volume= 0.019 af
Primary = 0.14 cfs @ 12.17 hrs, Volume= 0.019 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs

Link 7L: POA-4 OFF



Summary for Subcatchment 1: E-1-Perv

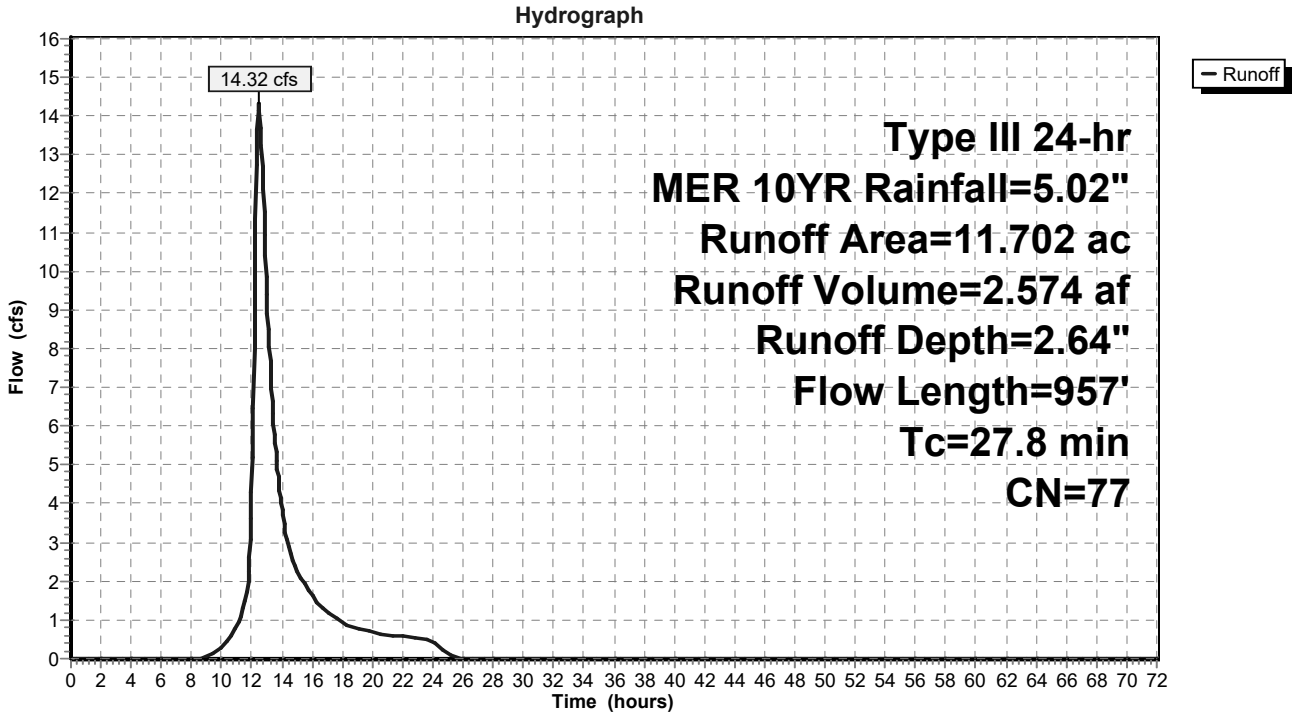
Runoff = 14.32 cfs @ 12.46 hrs, Volume= 2.574 af, Depth= 2.64"

Runoff by SCS TR-20 method, UH=Delmarva, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
Type III 24-hr MER 10YR Rainfall=5.02"

Area (ac)	CN	Description
2.702	82	Row crops, contoured, Good, HSG C
9.000	75	Row crops, contoured, Good, HSG B
11.702	77	Weighted Average
11.702		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
20.3	100	0.0040	0.08		**Sheet Flow, Sheet 1** Cultivated: Residue>20% n= 0.170 P2= 3.31"
7.5	857	0.0140	1.90		**Shallow Concentrated Flow, SCF 1** Unpaved Kv= 16.1 fps
27.8	957	Total			

Subcatchment 1: E-1-Perv



Summary for Subcatchment 2: E-1-Imperv

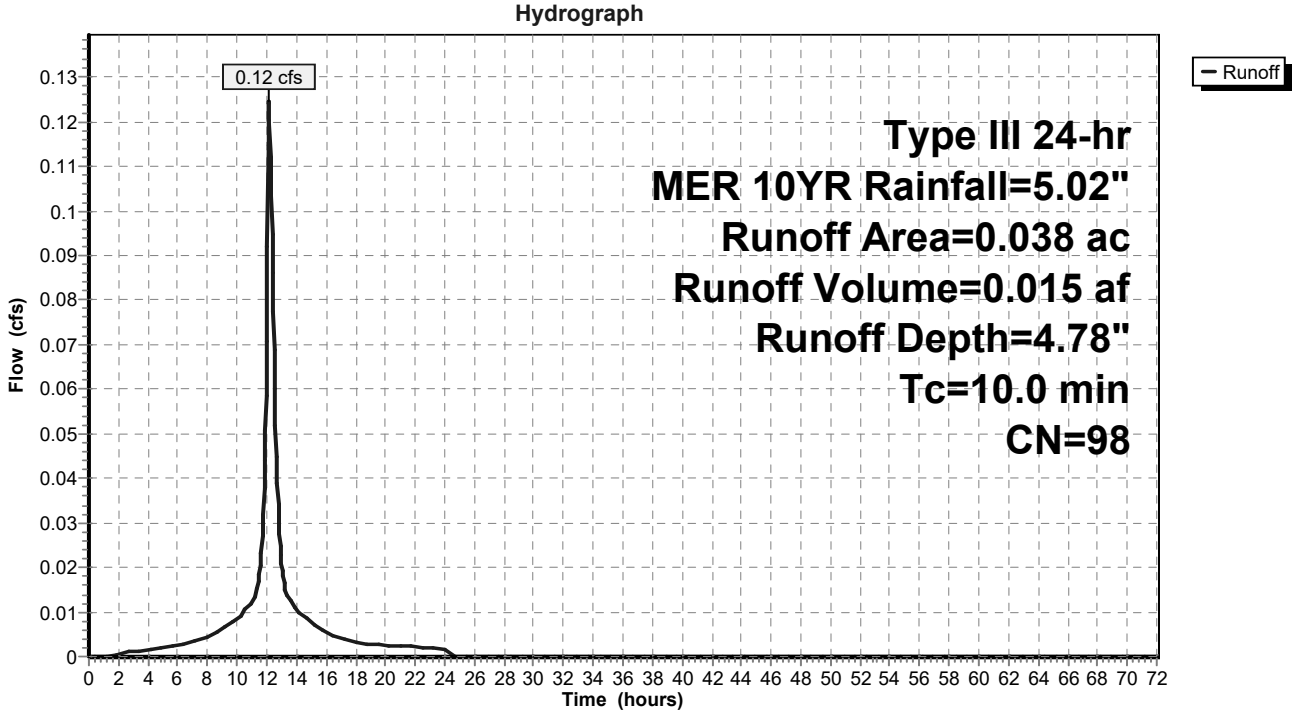
Runoff = 0.12 cfs @ 12.16 hrs, Volume= 0.015 af, Depth= 4.78"

Runoff by SCS TR-20 method, UH=Delmarva, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
Type III 24-hr MER 10YR Rainfall=5.02"

	Area (ac)	CN	Description
	0.013	98	Roofs, HSG B
*	0.025	98	Gravel surface, HSG B
	0.038	98	Weighted Average
	0.038		100.00% Impervious Area

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

Subcatchment 2: E-1-Imperv



Summary for Subcatchment 3: E-1A-Off-Perv

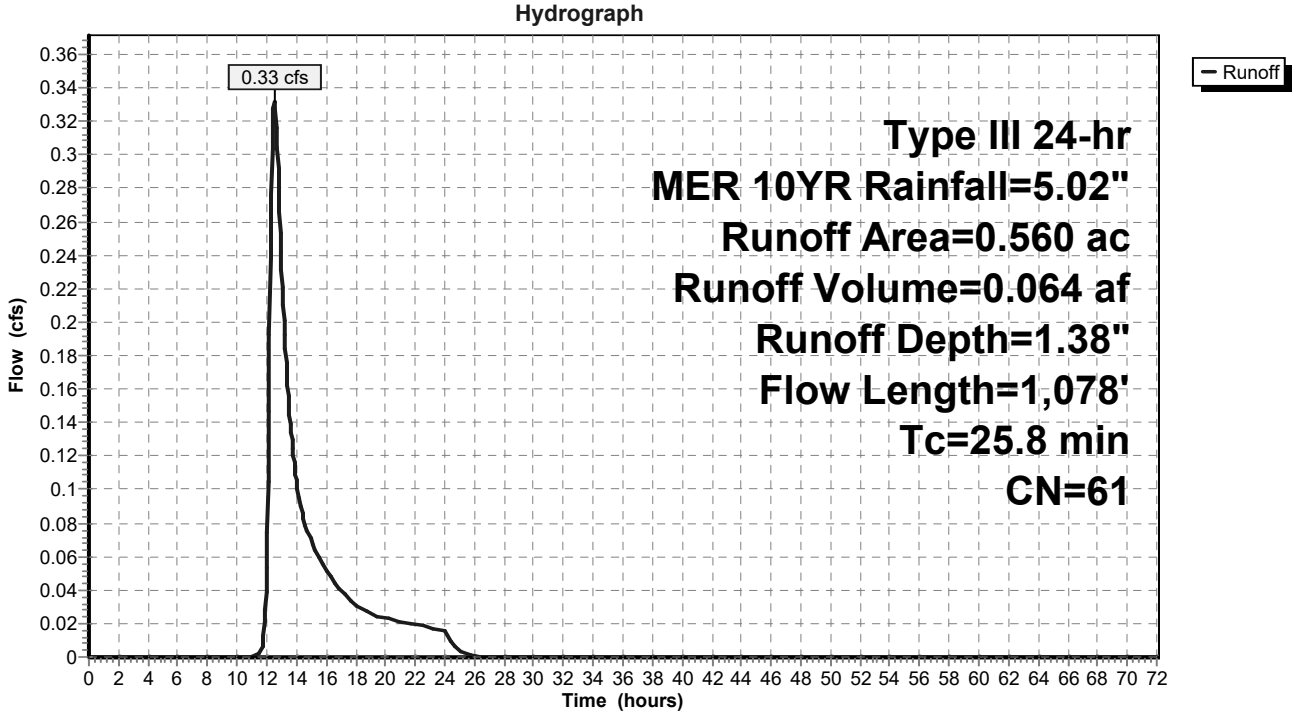
Runoff = 0.33 cfs @ 12.51 hrs, Volume= 0.064 af, Depth= 1.38"

Runoff by SCS TR-20 method, UH=Delmarva, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
Type III 24-hr MER 10YR Rainfall=5.02"

Area (ac)	CN	Description
0.560	61	>75% Grass cover, Good, HSG B
0.560		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
17.2	100	0.0120	0.10		**Sheet Flow, Sheet 1.3** Grass: Dense n= 0.240 P2= 3.31"
8.6	978	0.0140	1.90		**Shallow Concentrated Flow, SCF 1.3** Unpaved Kv= 16.1 fps
25.8	1,078	Total			

Subcatchment 3: E-1A-Off-Perv



Summary for Subcatchment 4: E-1A-Off-Imperv

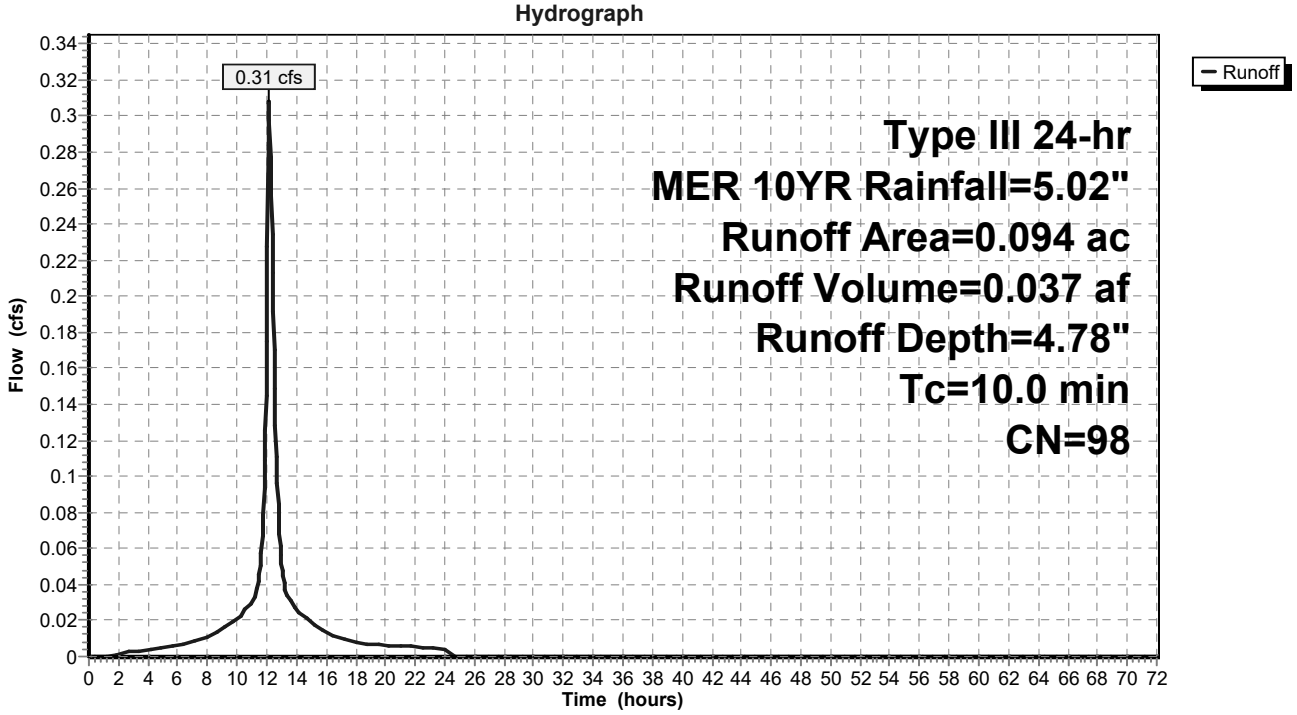
Runoff = 0.31 cfs @ 12.16 hrs, Volume= 0.037 af, Depth= 4.78"

Runoff by SCS TR-20 method, UH=Delmarva, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
Type III 24-hr MER 10YR Rainfall=5.02"

	Area (ac)	CN	Description
	0.011	98	Roofs, HSG B
*	0.083	98	Paved parking, HSG B
	0.094	98	Weighted Average
	0.094		100.00% Impervious Area

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

Subcatchment 4: E-1A-Off-Imperv



Summary for Subcatchment 5: E-1B-Off-Perv

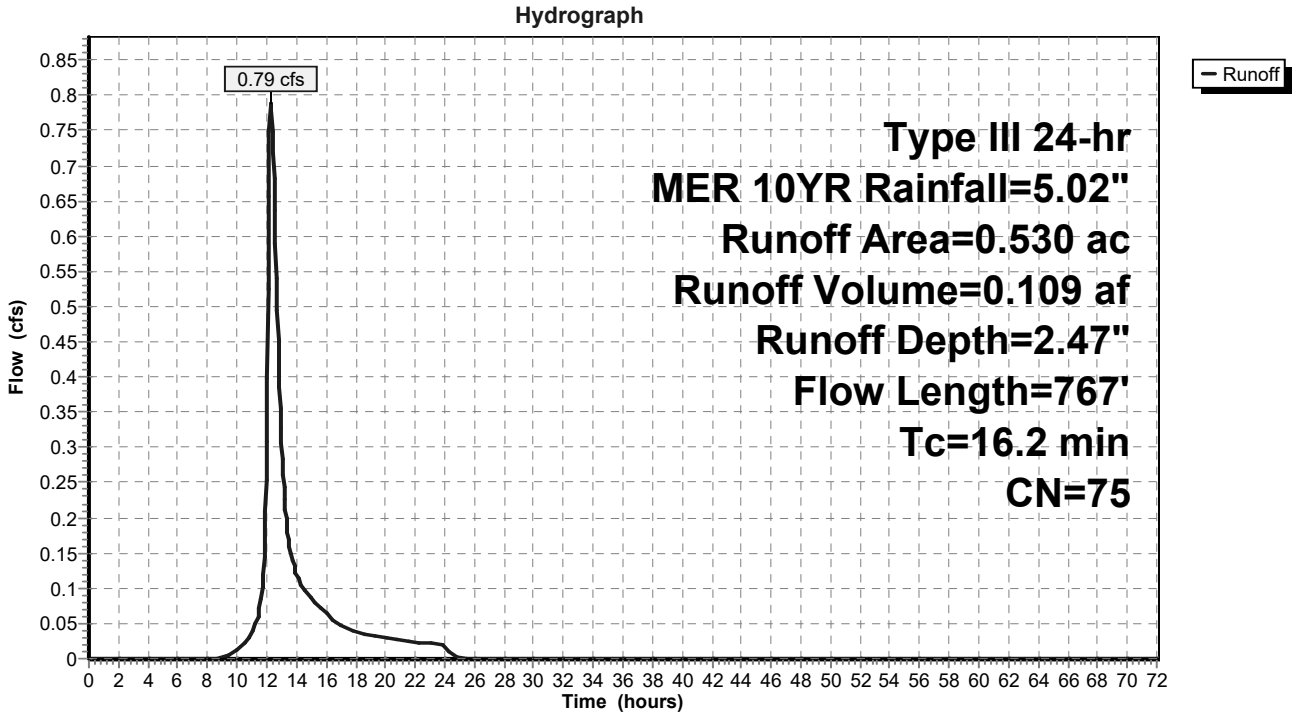
Runoff = 0.79 cfs @ 12.28 hrs, Volume= 0.109 af, Depth= 2.47"

Runoff by SCS TR-20 method, UH=Delmarva, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
Type III 24-hr MER 10YR Rainfall=5.02"

Area (ac)	CN	Description
0.520	75	Row crops, contoured, Good, HSG B
0.010	61	>75% Grass cover, Good, HSG B
0.530	75	Weighted Average
0.530		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
10.4	100	0.0210	0.16		**Sheet Flow, Sheet** Cultivated: Residue>20% n= 0.170 P2= 3.31"
5.8	667	0.0140	1.90		**Shallow Concentrated Flow, SCF** Unpaved Kv= 16.1 fps
16.2	767	Total			

Subcatchment 5: E-1B-Off-Perv



Summary for Subcatchment 6: E-2-Imperv

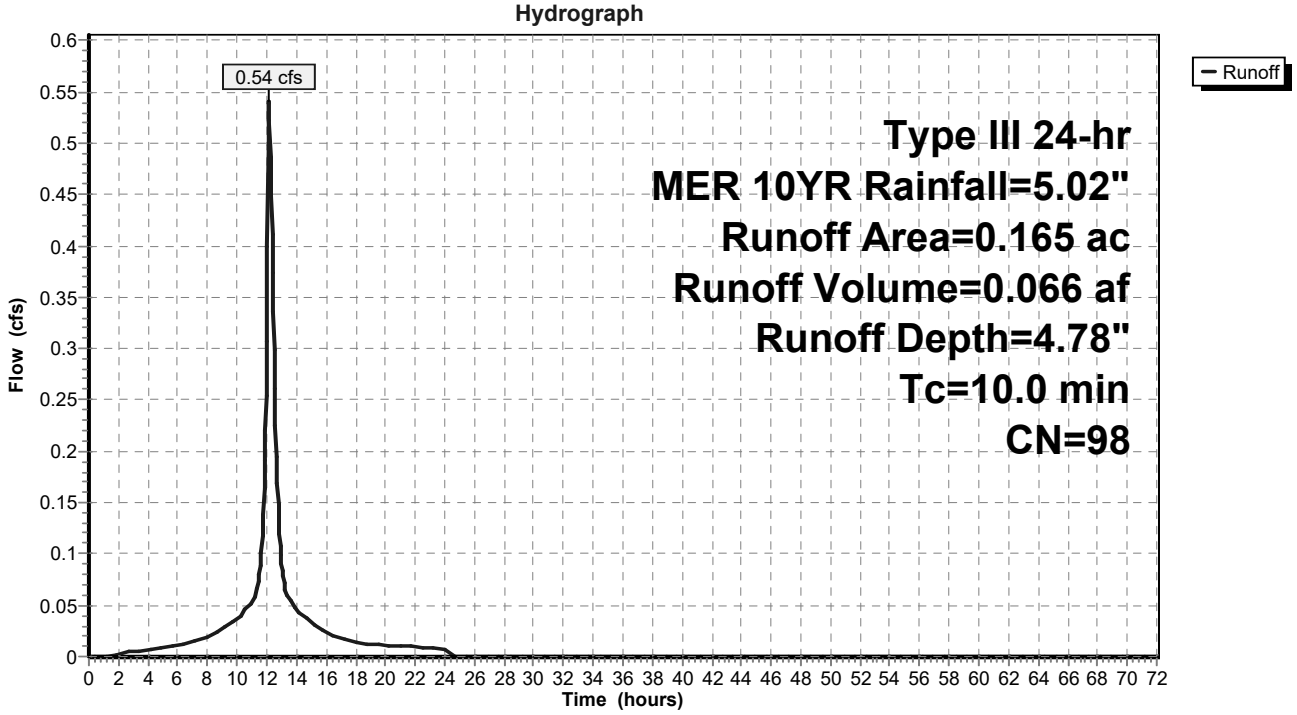
Runoff = 0.54 cfs @ 12.16 hrs, Volume= 0.066 af, Depth= 4.78"

Runoff by SCS TR-20 method, UH=Delmarva, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
Type III 24-hr MER 10YR Rainfall=5.02"

	Area (ac)	CN	Description
	0.065	98	Roofs, HSG B
*	0.100	98	Gravel surface, HSG B
	0.165	98	Weighted Average
	0.165		100.00% Impervious Area

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

Subcatchment 6: E-2-Imperv



Summary for Subcatchment 7: E-3-Perv

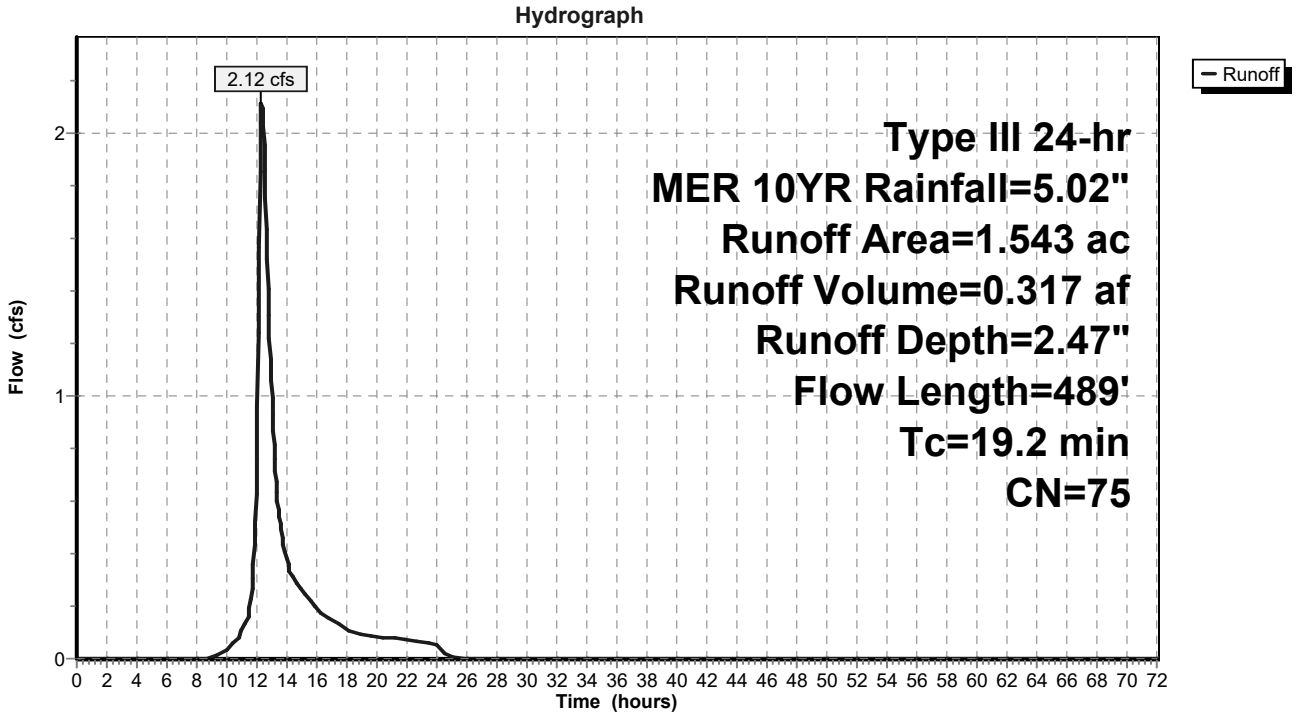
Runoff = 2.12 cfs @ 12.33 hrs, Volume= 0.317 af, Depth= 2.47"

Runoff by SCS TR-20 method, UH=Delmarva, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
Type III 24-hr MER 10YR Rainfall=5.02"

Area (ac)	CN	Description
1.515	75	Row crops, contoured, Good, HSG B
0.028	61	>75% Grass cover, Good, HSG B
1.543	75	Weighted Average
1.543		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
14.7	100	0.0090	0.11		**Sheet Flow, Sheet 4** Cultivated: Residue>20% n= 0.170 P2= 3.31"
4.5	389	0.0080	1.44		**Shallow Concentrated Flow, SCF 4** Unpaved Kv= 16.1 fps
19.2	489	Total			

Subcatchment 7: E-3-Perv



Summary for Subcatchment 8: E-3-Imperv

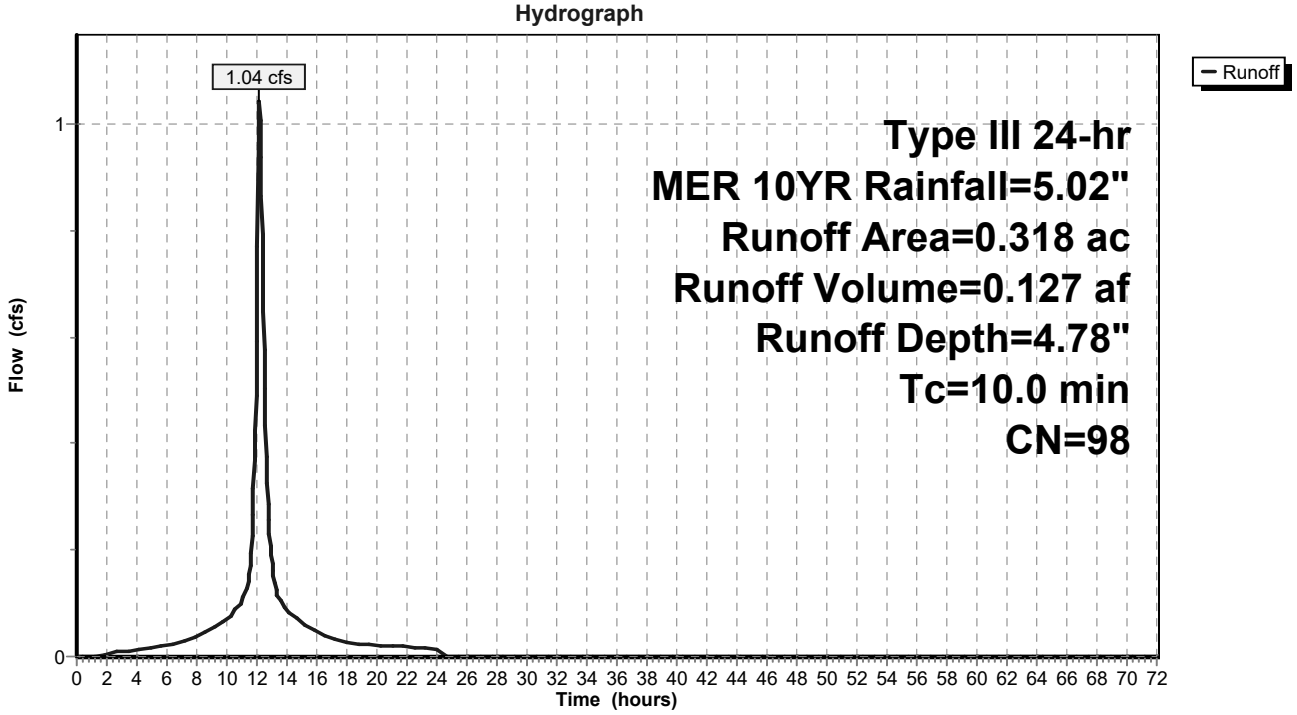
Runoff = 1.04 cfs @ 12.16 hrs, Volume= 0.127 af, Depth= 4.78"

Runoff by SCS TR-20 method, UH=Delmarva, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
Type III 24-hr MER 10YR Rainfall=5.02"

	Area (ac)	CN	Description
	0.095	98	Roofs, HSG B
*	0.223	98	Gravel surface, HSG B
	0.318	98	Weighted Average
	0.318		100.00% Impervious Area

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

Subcatchment 8: E-3-Imperv



Summary for Subcatchment 9: E-3-Off-Perv

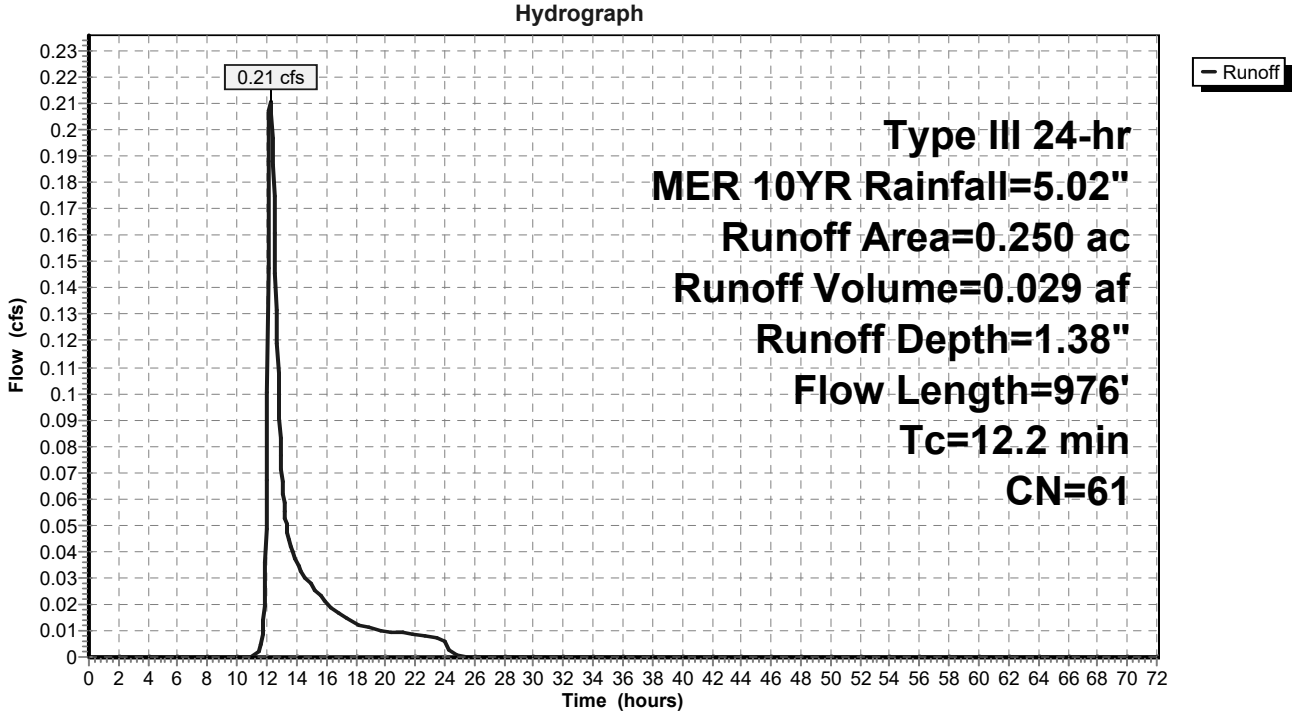
Runoff = 0.21 cfs @ 12.26 hrs, Volume= 0.029 af, Depth= 1.38"

Runoff by SCS TR-20 method, UH=Delmarva, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
Type III 24-hr MER 10YR Rainfall=5.02"

Area (ac)	CN	Description
0.250	61	>75% Grass cover, Good, HSG B
0.250		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
1.4	100	0.0140	1.21		**Sheet Flow, Sheet 4** Smooth surfaces n= 0.011 P2= 3.31"
10.8	876	0.0070	1.35		**Shallow Concentrated Flow, SCF 4** Unpaved Kv= 16.1 fps
12.2	976	Total			

Subcatchment 9: E-3-Off-Perv



Summary for Subcatchment 10: E-3-Off-Imperv

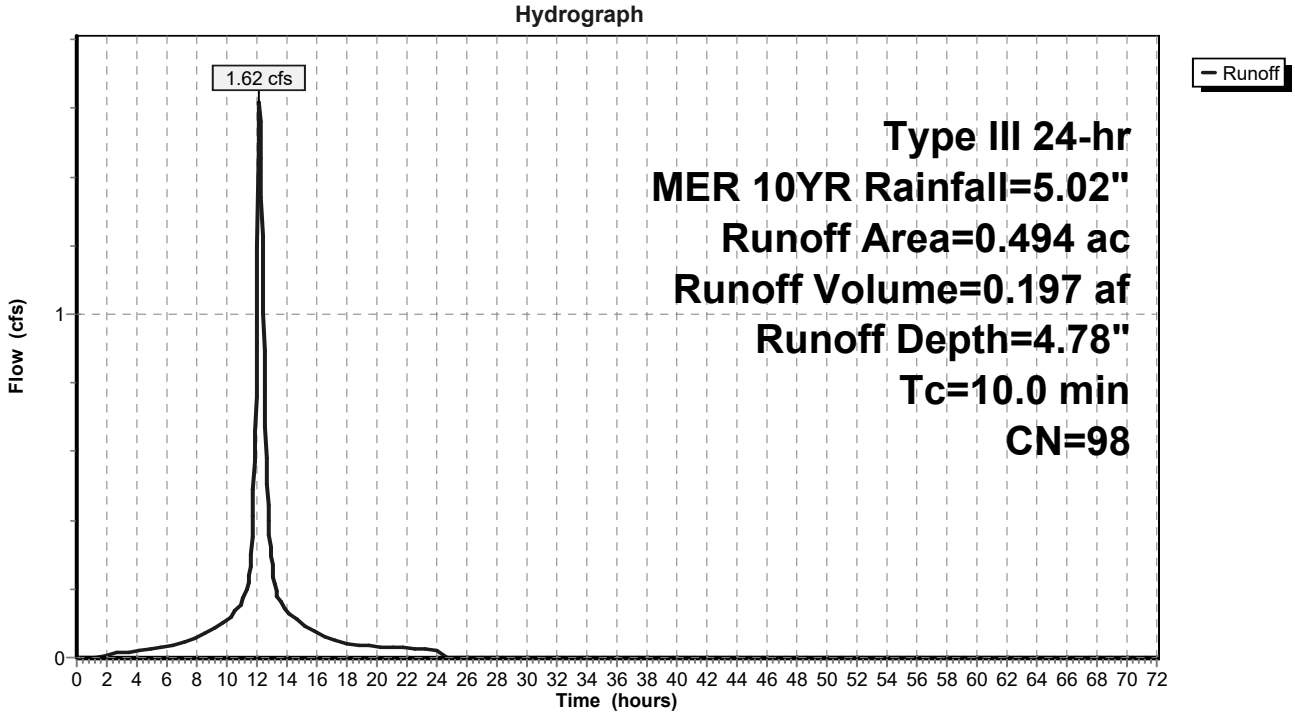
Runoff = 1.62 cfs @ 12.16 hrs, Volume= 0.197 af, Depth= 4.78"

Runoff by SCS TR-20 method, UH=Delmarva, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
Type III 24-hr MER 10YR Rainfall=5.02"

	Area (ac)	CN	Description
	0.076	98	Roofs, HSG B
*	0.078	98	Gravel, HSG B
	0.291	98	Paved parking, HSG B
*	0.049	98	Misc., HSG B
	0.494	98	Weighted Average
	0.494		100.00% Impervious Area

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

Subcatchment 10: E-3-Off-Imperv



Summary for Subcatchment 11: E-4-Perv

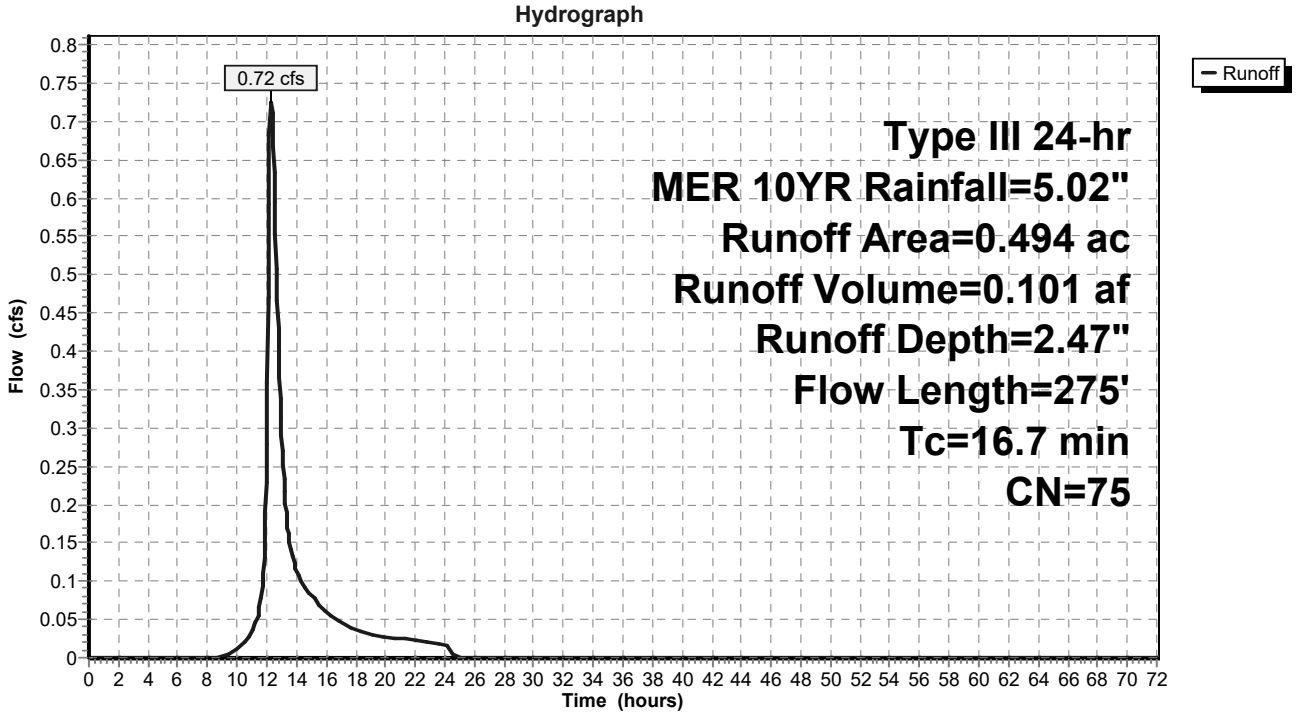
Runoff = 0.72 cfs @ 12.29 hrs, Volume= 0.101 af, Depth= 2.47"

Runoff by SCS TR-20 method, UH=Delmarva, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
Type III 24-hr MER 10YR Rainfall=5.02"

Area (ac)	CN	Description
0.494	75	Row crops, contoured, Good, HSG B
0.494		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.8	27	0.0090	0.07		**Sheet Flow, Sheet 1** Grass: Dense n= 0.240 P2= 3.31"
0.9	45	0.0090	0.87		**Sheet Flow, Sheet 2** Smooth surfaces n= 0.011 P2= 3.31"
7.0	28	0.0090	0.07		**Sheet Flow, Sheet 3** Grass: Dense n= 0.240 P2= 3.31"
2.0	175	0.0080	1.44		**Shallow Concentrated Flow, SCF** Unpaved Kv= 16.1 fps
16.7	275	Total			

Subcatchment 11: E-4-Perv



Summary for Subcatchment 12: E-4-Off-Perv

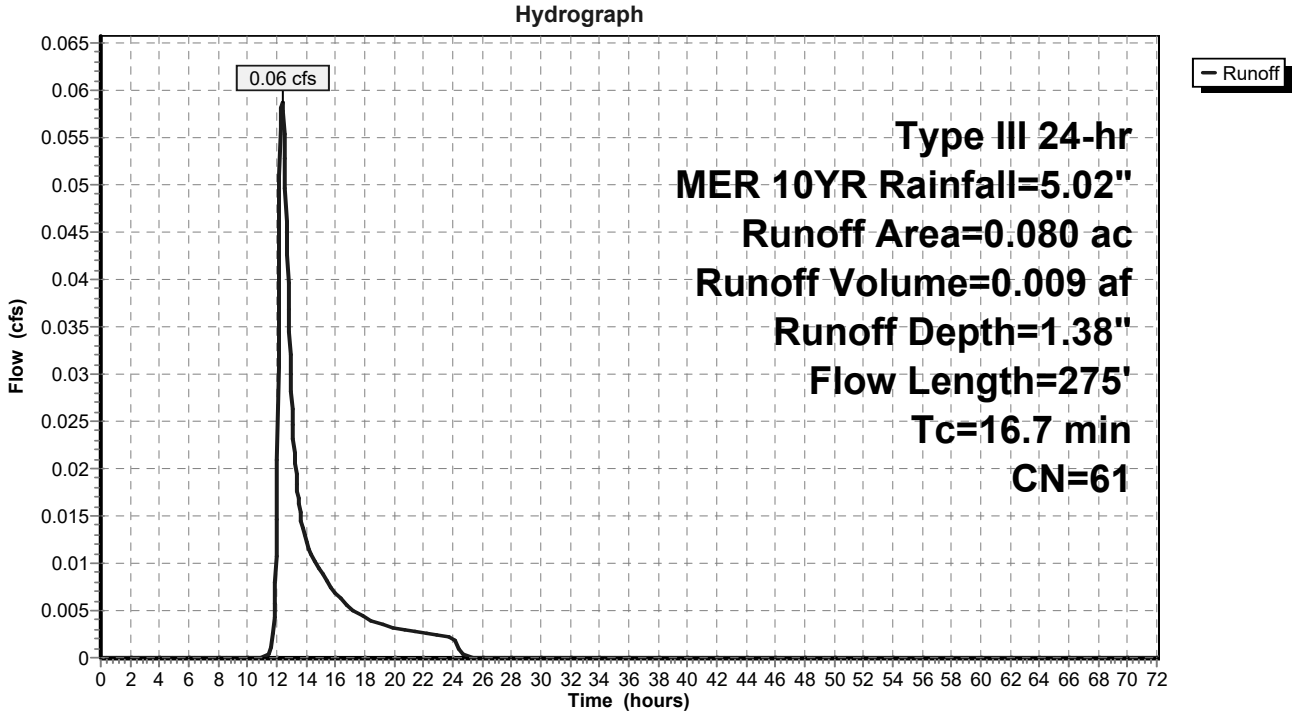
Runoff = 0.06 cfs @ 12.36 hrs, Volume= 0.009 af, Depth= 1.38"

Runoff by SCS TR-20 method, UH=Delmarva, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
Type III 24-hr MER 10YR Rainfall=5.02"

Area (ac)	CN	Description
0.080	61	>75% Grass cover, Good, HSG B
0.080		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.8	27	0.0090	0.07		**Sheet Flow, Sheet 1** Grass: Dense n= 0.240 P2= 3.31"
0.9	45	0.0090	0.87		**Sheet Flow, Sheet 2** Smooth surfaces n= 0.011 P2= 3.31"
7.0	28	0.0090	0.07		**Sheet Flow, Sheet 3** Grass: Dense n= 0.240 P2= 3.31"
2.0	175	0.0080	1.44		**Shallow Concentrated Flow, SCF** Unpaved Kv= 16.1 fps
16.7	275	Total			

Subcatchment 12: E-4-Off-Perv



Summary for Subcatchment 13: E-4-Off-Imperv

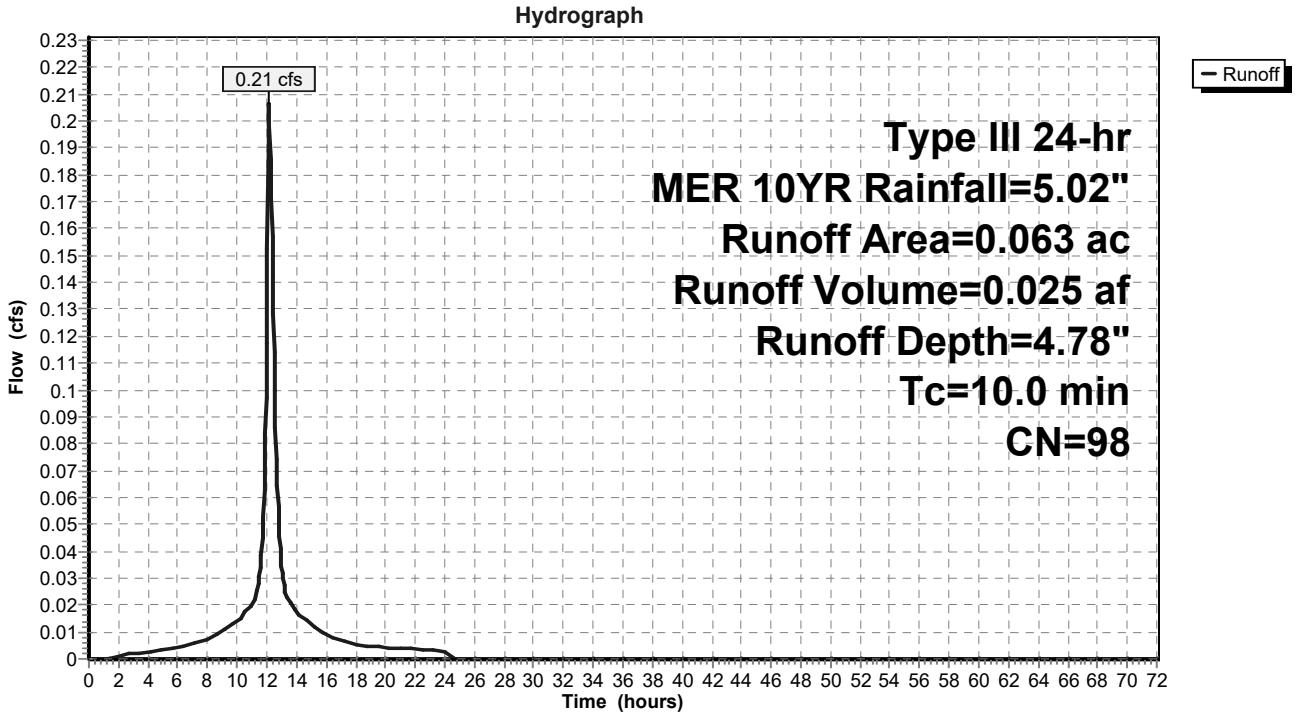
Runoff = 0.21 cfs @ 12.16 hrs, Volume= 0.025 af, Depth= 4.78"

Runoff by SCS TR-20 method, UH=Delmarva, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
Type III 24-hr MER 10YR Rainfall=5.02"

Area (ac)	CN	Description
0.063	98	Paved parking, HSG B
0.063		100.00% Impervious Area

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

Subcatchment 13: E-4-Off-Imperv

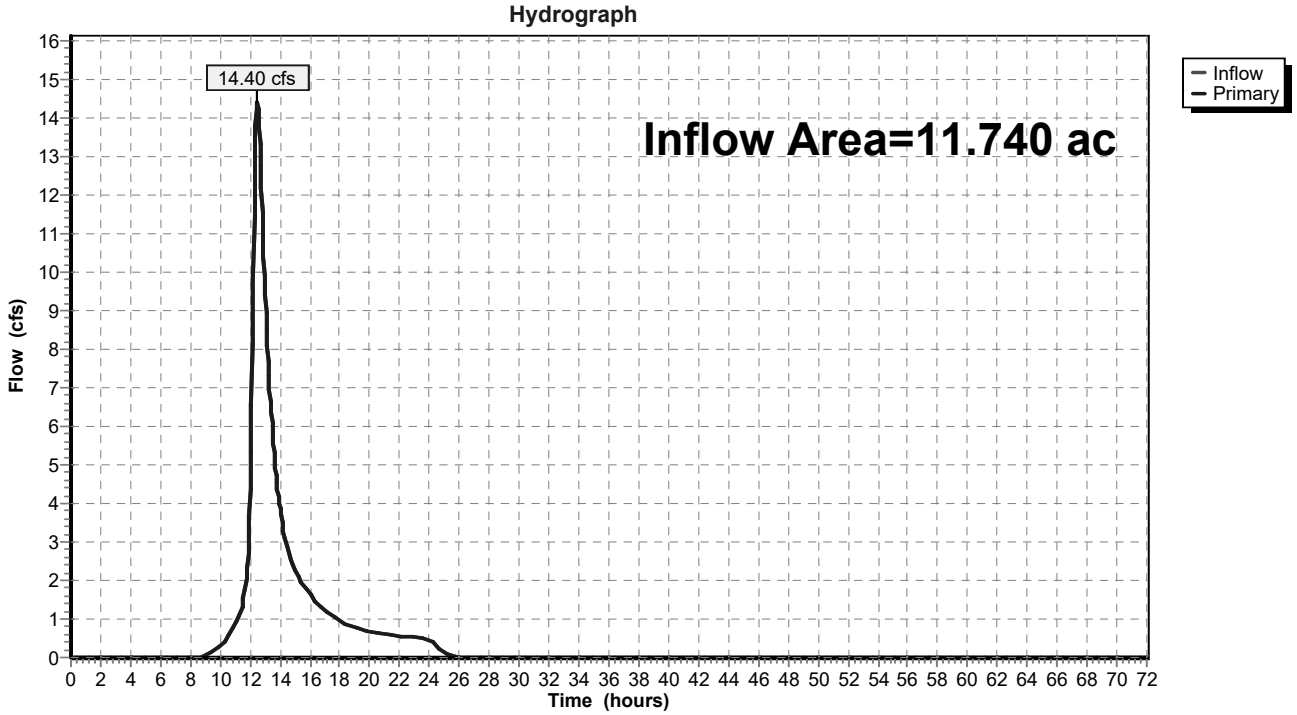


Summary for Link 1L: POA-1

Inflow Area = 11.740 ac, 0.32% Impervious, Inflow Depth = 2.65" for MER 10YR event
Inflow = 14.40 cfs @ 12.46 hrs, Volume= 2.589 af
Primary = 14.40 cfs @ 12.46 hrs, Volume= 2.589 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs

Link 1L: POA-1

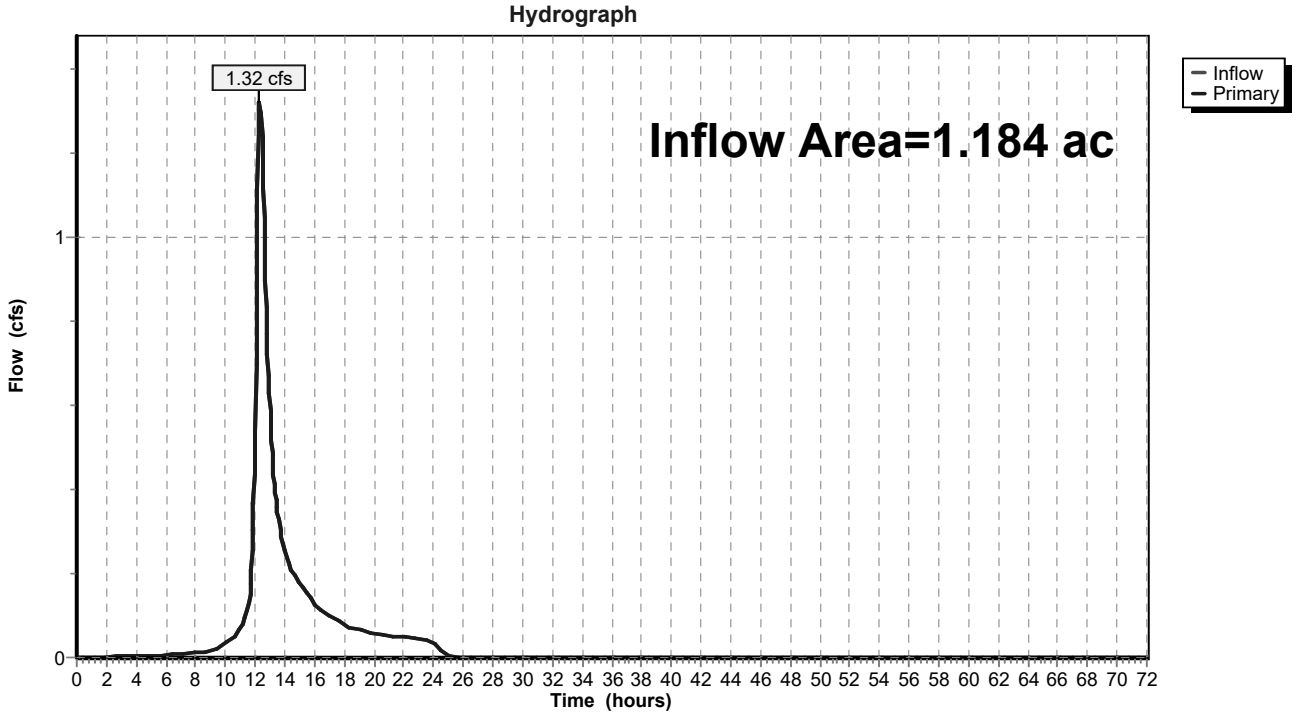


Summary for Link 2L: POA-1 OFF

Inflow Area = 1.184 ac, 7.94% Impervious, Inflow Depth = 2.14" for MER 10YR event
Inflow = 1.32 cfs @ 12.31 hrs, Volume= 0.211 af
Primary = 1.32 cfs @ 12.31 hrs, Volume= 0.211 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs

Link 2L: POA-1 OFF

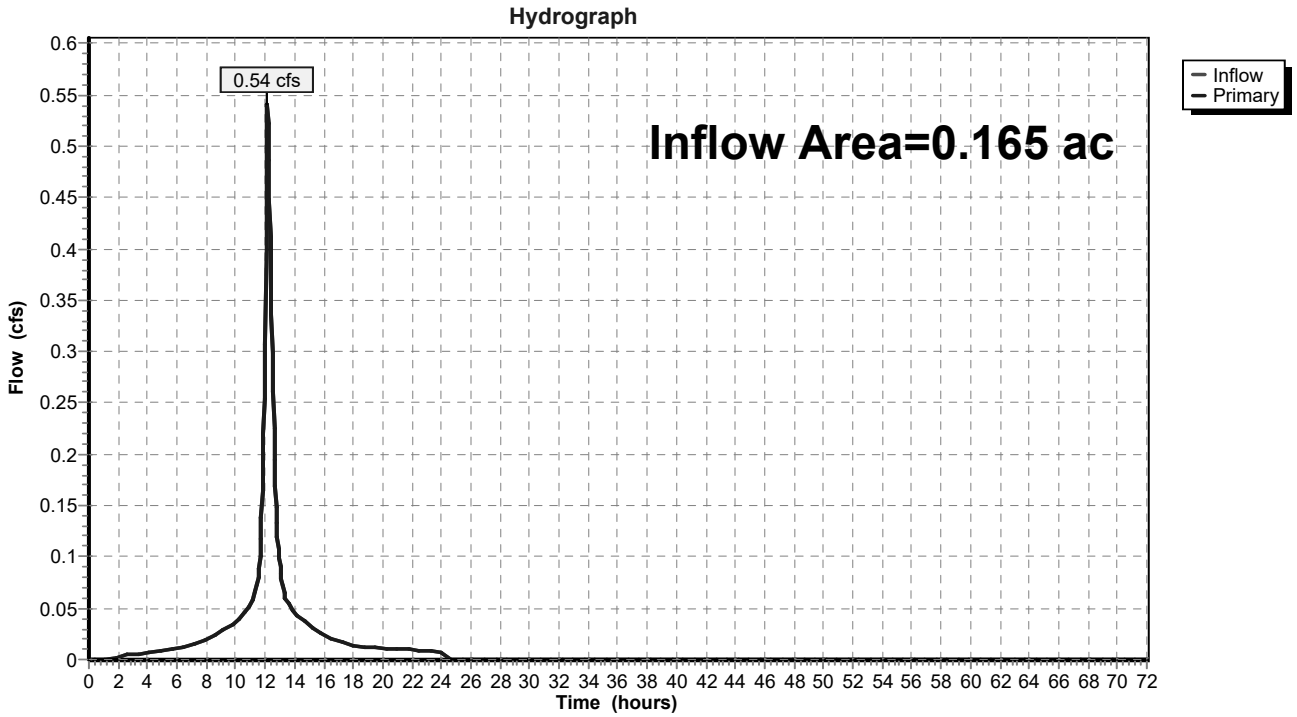


Summary for Link 3L: POA-2

Inflow Area = 0.165 ac,100.00% Impervious, Inflow Depth = 4.78" for MER 10YR event
Inflow = 0.54 cfs @ 12.16 hrs, Volume= 0.066 af
Primary = 0.54 cfs @ 12.16 hrs, Volume= 0.066 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs

Link 3L: POA-2

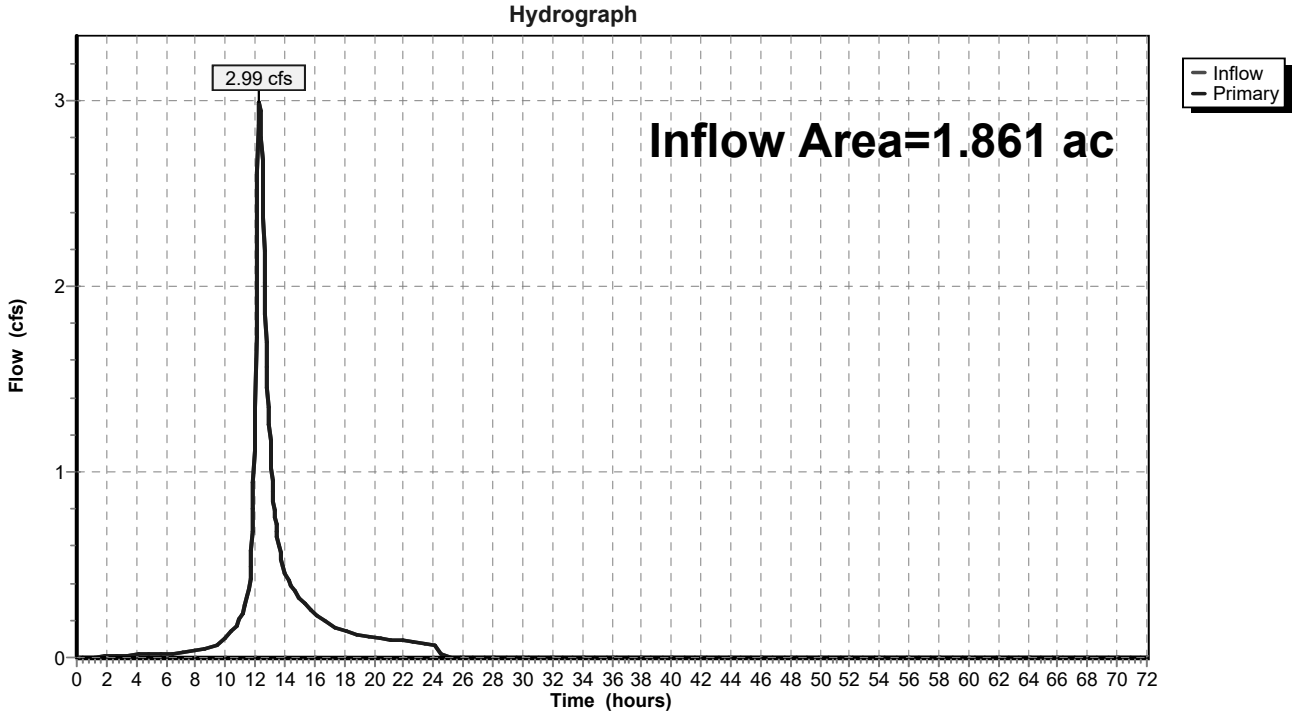


Summary for Link 4L: POA-3

Inflow Area = 1.861 ac, 17.09% Impervious, Inflow Depth = 2.86" for MER 10YR event
Inflow = 2.99 cfs @ 12.27 hrs, Volume= 0.444 af
Primary = 2.99 cfs @ 12.27 hrs, Volume= 0.444 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs

Link 4L: POA-3

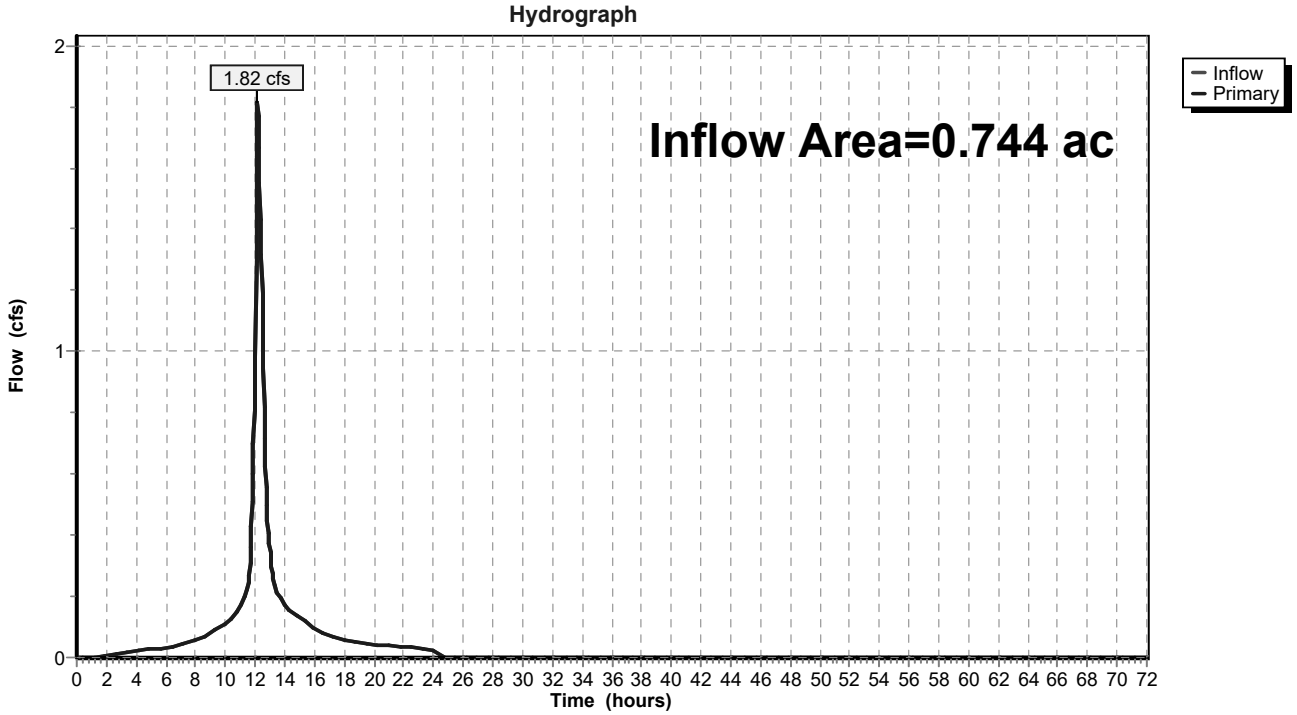


Summary for Link 5L: POA-3 OFF

Inflow Area = 0.744 ac, 66.40% Impervious, Inflow Depth = 3.64" for MER 10YR event
Inflow = 1.82 cfs @ 12.17 hrs, Volume= 0.226 af
Primary = 1.82 cfs @ 12.17 hrs, Volume= 0.226 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs

Link 5L: POA-3 OFF

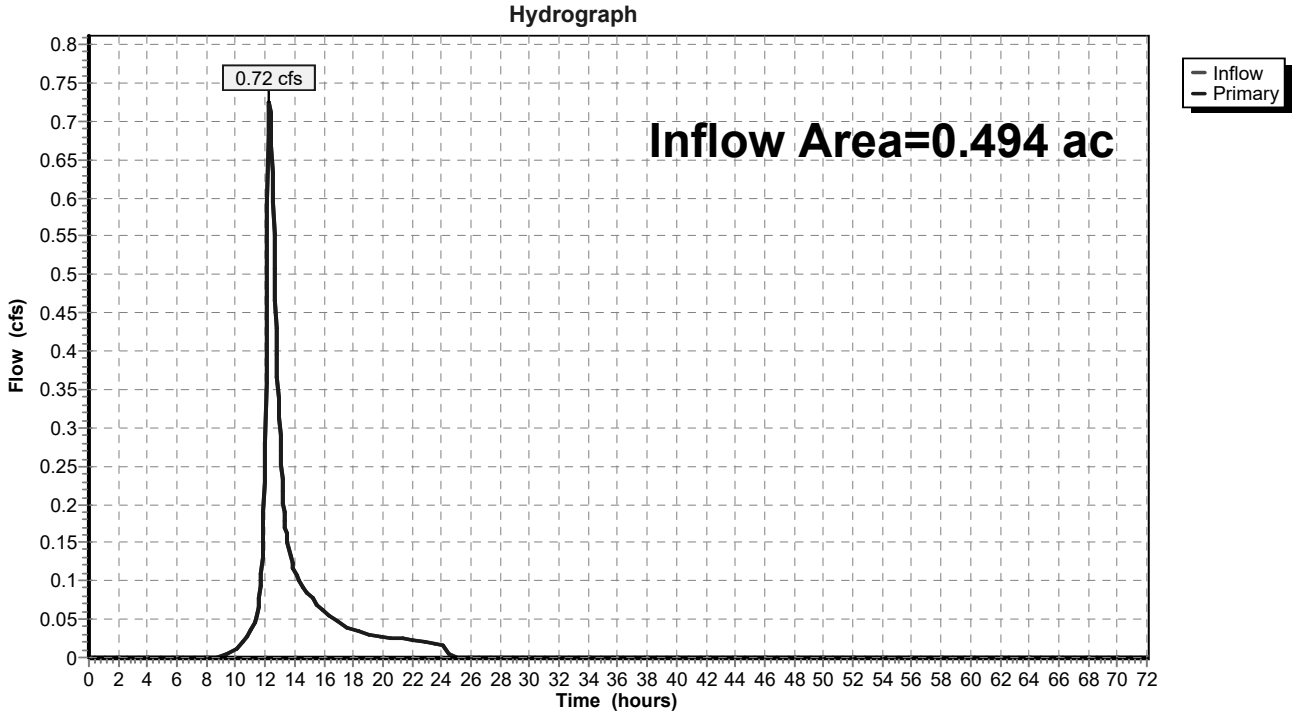


Summary for Link 6L: POA-4

Inflow Area = 0.494 ac, 0.00% Impervious, Inflow Depth = 2.47" for MER 10YR event
Inflow = 0.72 cfs @ 12.29 hrs, Volume= 0.101 af
Primary = 0.72 cfs @ 12.29 hrs, Volume= 0.101 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs

Link 6L: POA-4

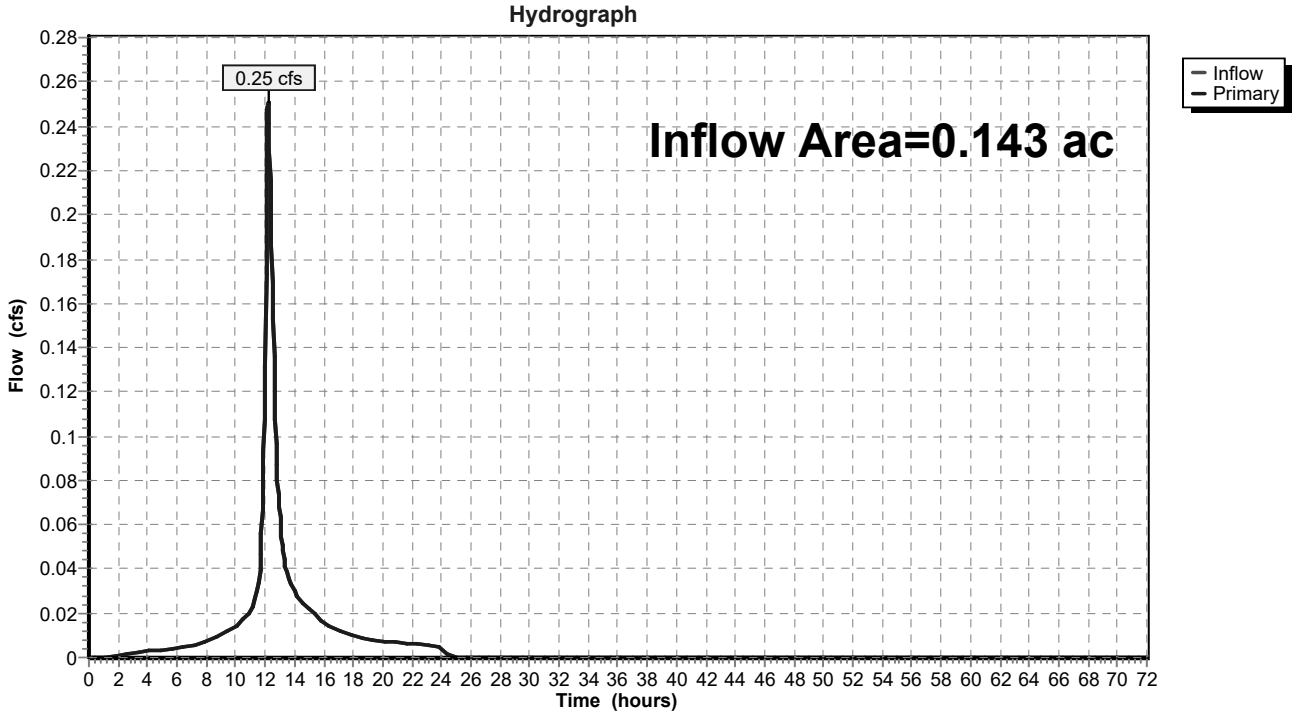


Summary for Link 7L: POA-4 OFF

Inflow Area = 0.143 ac, 44.06% Impervious, Inflow Depth = 2.88" for MER 10YR event
Inflow = 0.25 cfs @ 12.19 hrs, Volume= 0.034 af
Primary = 0.25 cfs @ 12.19 hrs, Volume= 0.034 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs

Link 7L: POA-4 OFF



Summary for Subcatchment 1: E-1-Perv

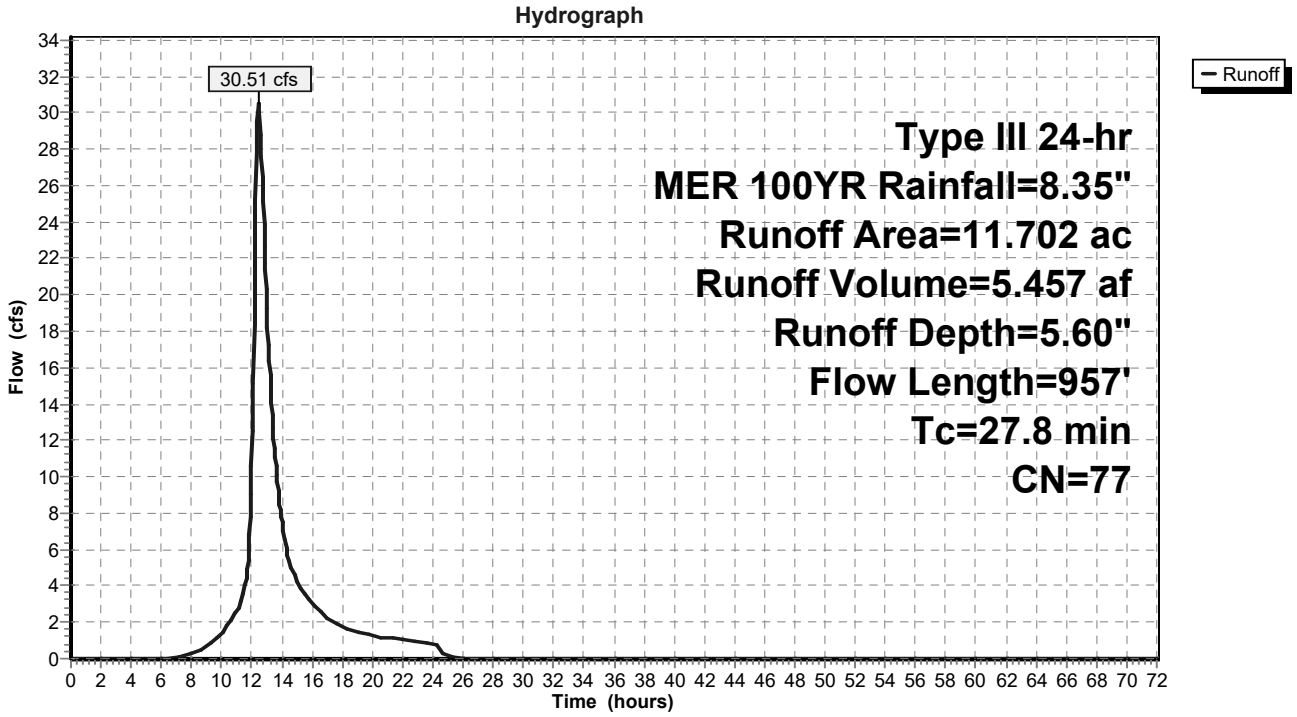
Runoff = 30.51 cfs @ 12.44 hrs, Volume= 5.457 af, Depth= 5.60"

Runoff by SCS TR-20 method, UH=Delmarva, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
Type III 24-hr MER 100YR Rainfall=8.35"

Area (ac)	CN	Description
2.702	82	Row crops, contoured, Good, HSG C
9.000	75	Row crops, contoured, Good, HSG B
11.702	77	Weighted Average
11.702		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
20.3	100	0.0040	0.08		**Sheet Flow, Sheet 1** Cultivated: Residue>20% n= 0.170 P2= 3.31"
7.5	857	0.0140	1.90		**Shallow Concentrated Flow, SCF 1** Unpaved Kv= 16.1 fps
27.8	957	Total			

Subcatchment 1: E-1-Perv



Summary for Subcatchment 2: E-1-Imperv

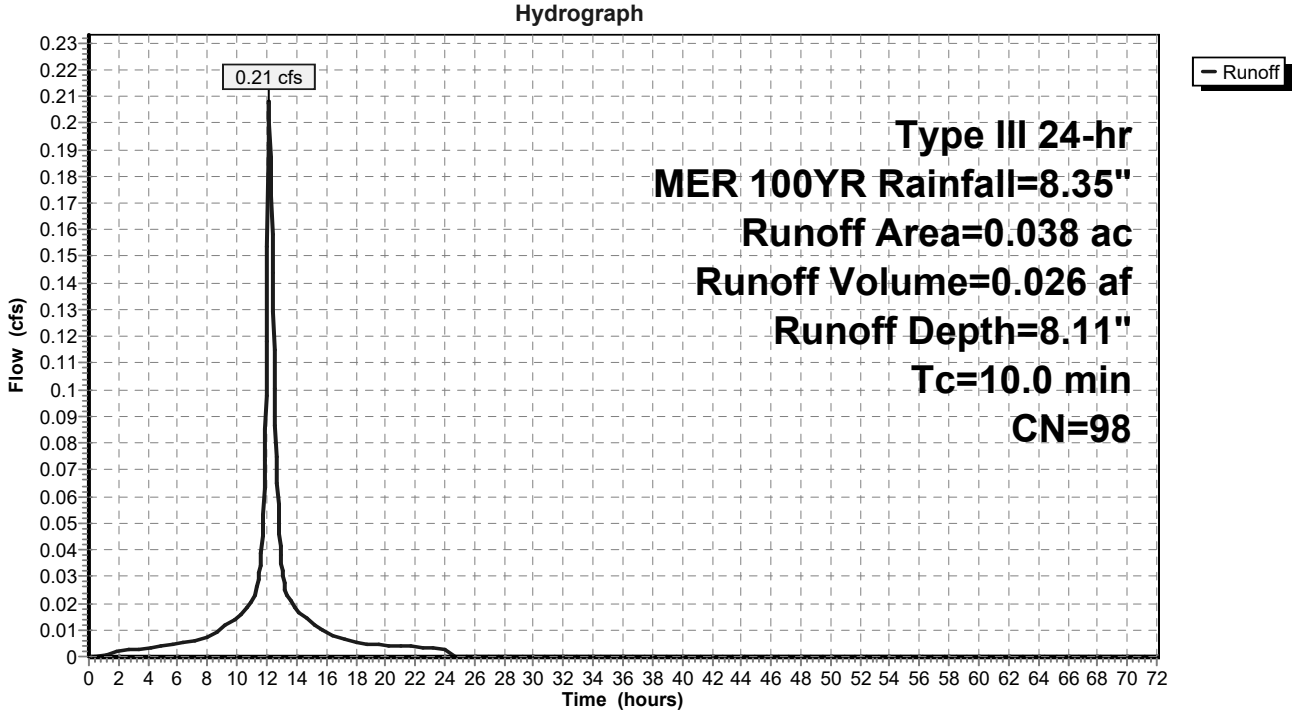
Runoff = 0.21 cfs @ 12.16 hrs, Volume= 0.026 af, Depth= 8.11"

Runoff by SCS TR-20 method, UH=Delmarva, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
Type III 24-hr MER 100YR Rainfall=8.35"

	Area (ac)	CN	Description
	0.013	98	Roofs, HSG B
*	0.025	98	Gravel surface, HSG B
	0.038	98	Weighted Average
	0.038		100.00% Impervious Area

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

Subcatchment 2: E-1-Imperv



Summary for Subcatchment 3: E-1A-Off-Perv

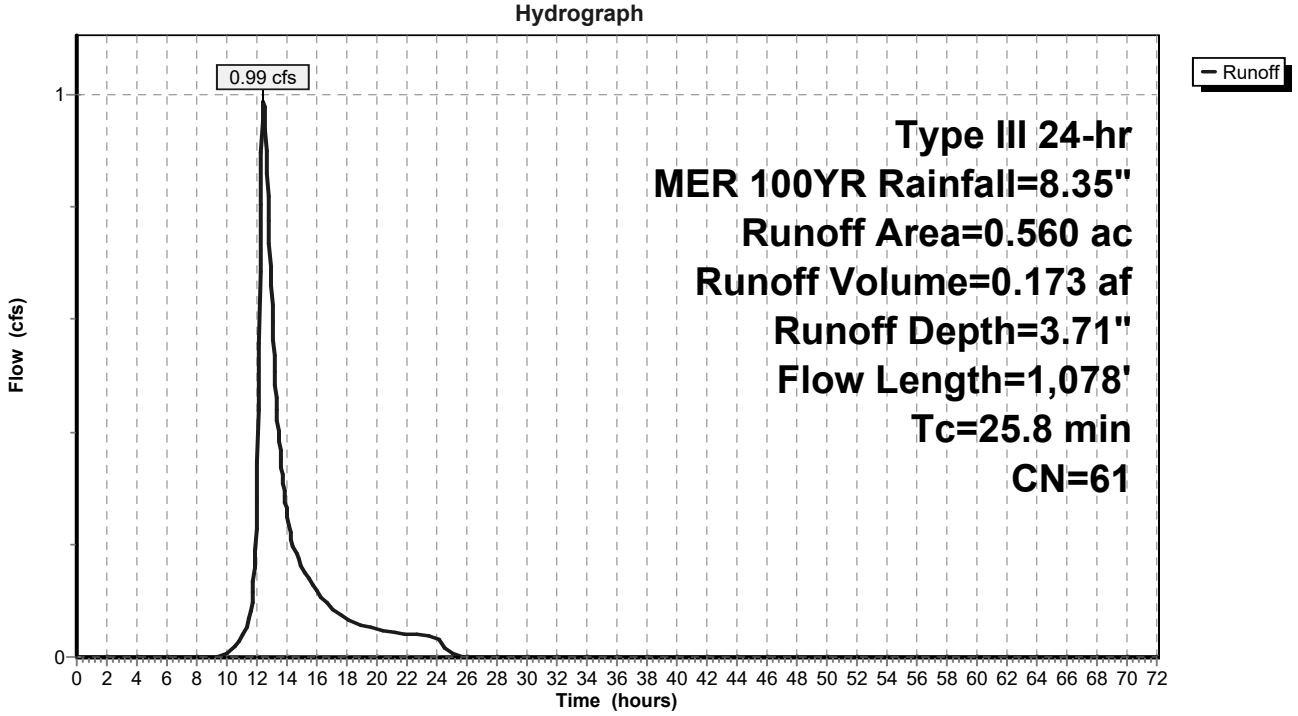
Runoff = 0.99 cfs @ 12.45 hrs, Volume= 0.173 af, Depth= 3.71"

Runoff by SCS TR-20 method, UH=Delmarva, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
Type III 24-hr MER 100YR Rainfall=8.35"

Area (ac)	CN	Description
0.560	61	>75% Grass cover, Good, HSG B
0.560		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
17.2	100	0.0120	0.10		**Sheet Flow, Sheet 1.3** Grass: Dense n= 0.240 P2= 3.31"
8.6	978	0.0140	1.90		**Shallow Concentrated Flow, SCF 1.3** Unpaved Kv= 16.1 fps
25.8	1,078	Total			

Subcatchment 3: E-1A-Off-Perv



Summary for Subcatchment 4: E-1A-Off-Imperv

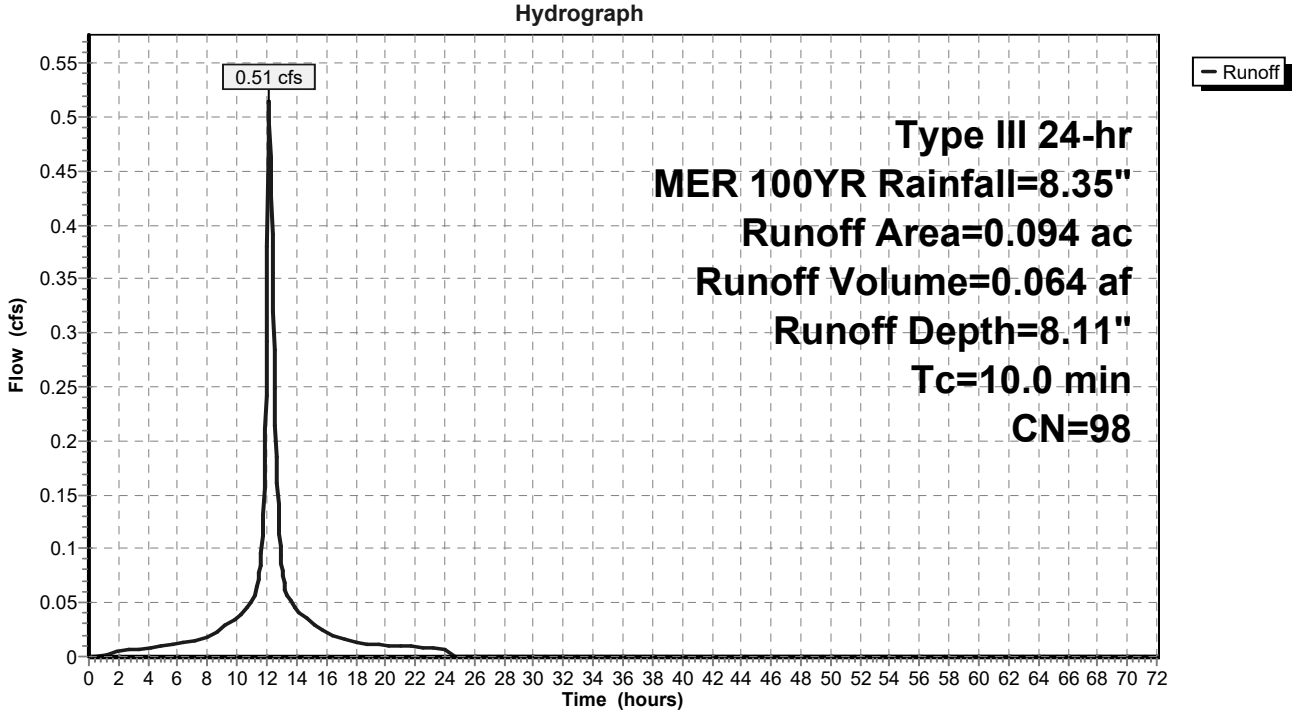
Runoff = 0.51 cfs @ 12.16 hrs, Volume= 0.064 af, Depth= 8.11"

Runoff by SCS TR-20 method, UH=Delmarva, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
Type III 24-hr MER 100YR Rainfall=8.35"

	Area (ac)	CN	Description
	0.011	98	Roofs, HSG B
*	0.083	98	Paved parking, HSG B
	0.094	98	Weighted Average
	0.094		100.00% Impervious Area

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

Subcatchment 4: E-1A-Off-Imperv



Summary for Subcatchment 5: E-1B-Off-Perv

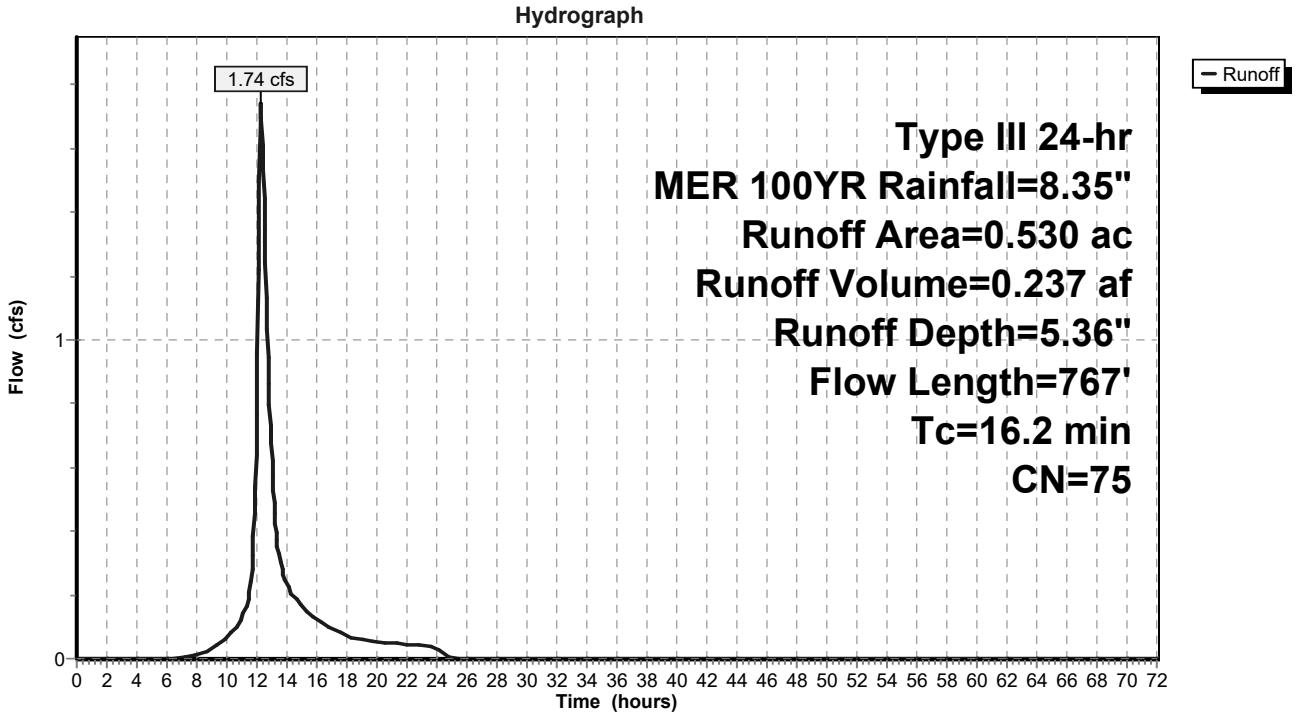
Runoff = 1.74 cfs @ 12.26 hrs, Volume= 0.237 af, Depth= 5.36"

Runoff by SCS TR-20 method, UH=Delmarva, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
Type III 24-hr MER 100YR Rainfall=8.35"

Area (ac)	CN	Description
0.520	75	Row crops, contoured, Good, HSG B
0.010	61	>75% Grass cover, Good, HSG B
0.530	75	Weighted Average
0.530		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
10.4	100	0.0210	0.16		**Sheet Flow, Sheet** Cultivated: Residue>20% n= 0.170 P2= 3.31"
5.8	667	0.0140	1.90		**Shallow Concentrated Flow, SCF** Unpaved Kv= 16.1 fps
16.2	767	Total			

Subcatchment 5: E-1B-Off-Perv



Summary for Subcatchment 6: E-2-Imperv

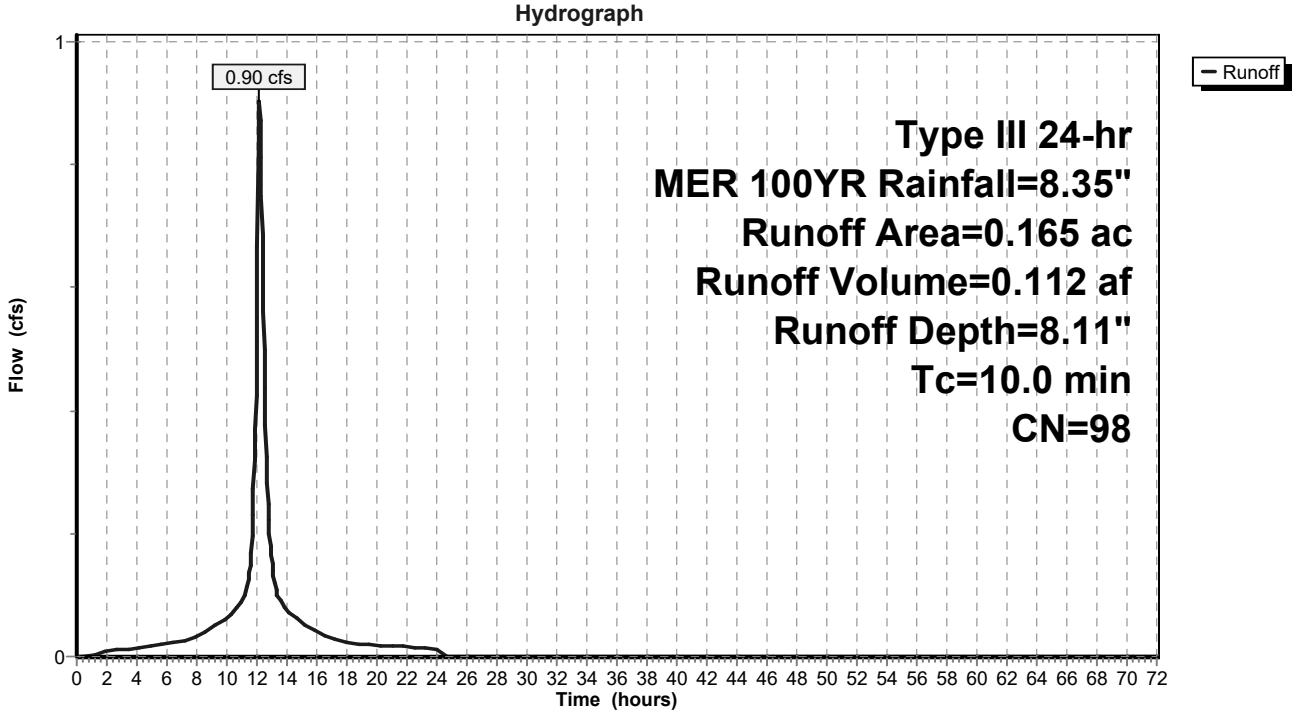
Runoff = 0.90 cfs @ 12.16 hrs, Volume= 0.112 af, Depth= 8.11"

Runoff by SCS TR-20 method, UH=Delmarva, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
Type III 24-hr MER 100YR Rainfall=8.35"

	Area (ac)	CN	Description
	0.065	98	Roofs, HSG B
*	0.100	98	Gravel surface, HSG B
	0.165	98	Weighted Average
	0.165		100.00% Impervious Area

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

Subcatchment 6: E-2-Imperv



Summary for Subcatchment 7: E-3-Perv

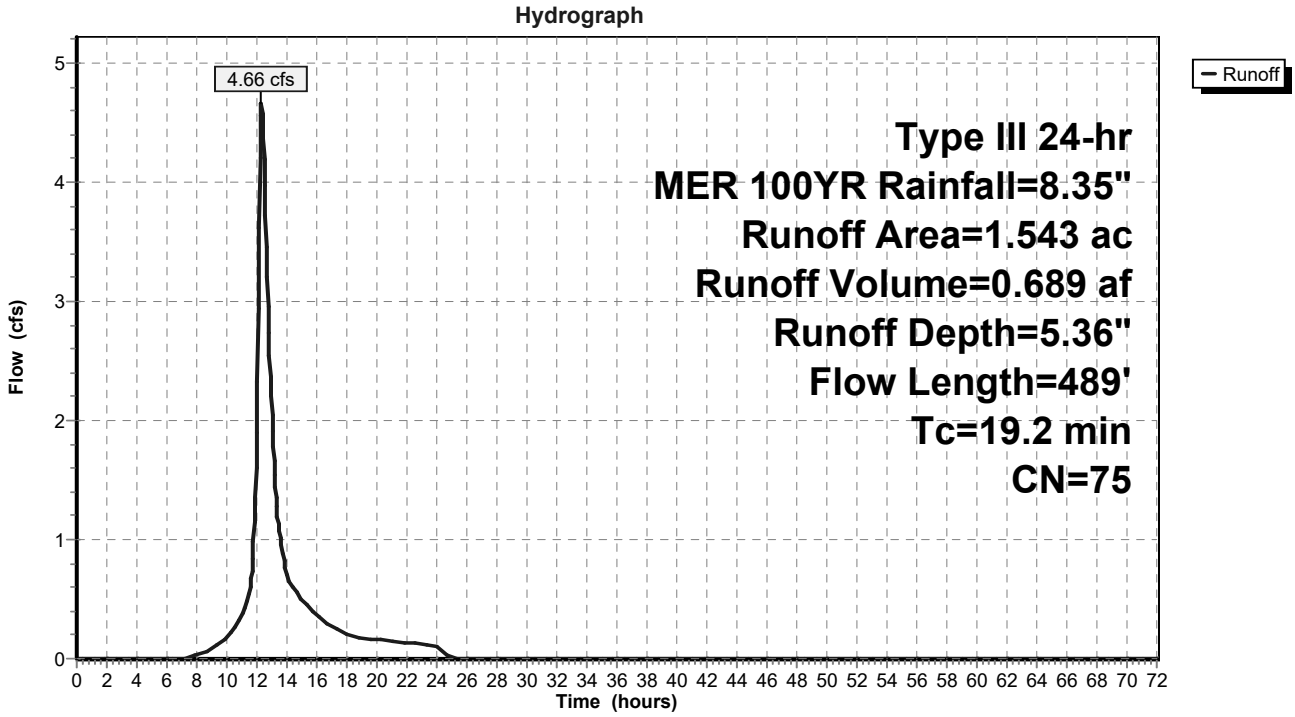
Runoff = 4.66 cfs @ 12.31 hrs, Volume= 0.689 af, Depth= 5.36"

Runoff by SCS TR-20 method, UH=Delmarva, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
Type III 24-hr MER 100YR Rainfall=8.35"

Area (ac)	CN	Description
1.515	75	Row crops, contoured, Good, HSG B
0.028	61	>75% Grass cover, Good, HSG B
1.543	75	Weighted Average
1.543		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
14.7	100	0.0090	0.11		**Sheet Flow, Sheet 4** Cultivated: Residue>20% n= 0.170 P2= 3.31"
4.5	389	0.0080	1.44		**Shallow Concentrated Flow, SCF 4** Unpaved Kv= 16.1 fps
19.2	489	Total			

Subcatchment 7: E-3-Perv



Summary for Subcatchment 8: E-3-Imperv

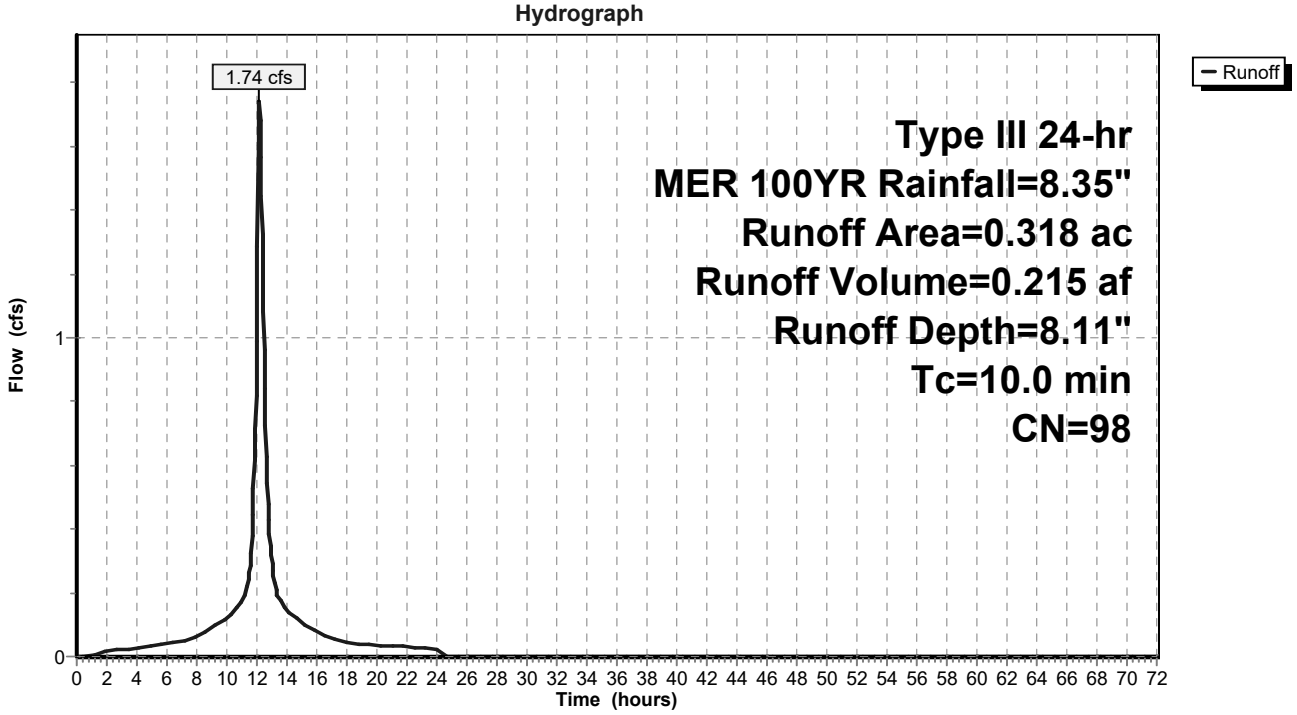
Runoff = 1.74 cfs @ 12.16 hrs, Volume= 0.215 af, Depth= 8.11"

Runoff by SCS TR-20 method, UH=Delmarva, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
Type III 24-hr MER 100YR Rainfall=8.35"

	Area (ac)	CN	Description
	0.095	98	Roofs, HSG B
*	0.223	98	Gravel surface, HSG B
	0.318	98	Weighted Average
	0.318		100.00% Impervious Area

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

Subcatchment 8: E-3-Imperv



Summary for Subcatchment 9: E-3-Off-Perv

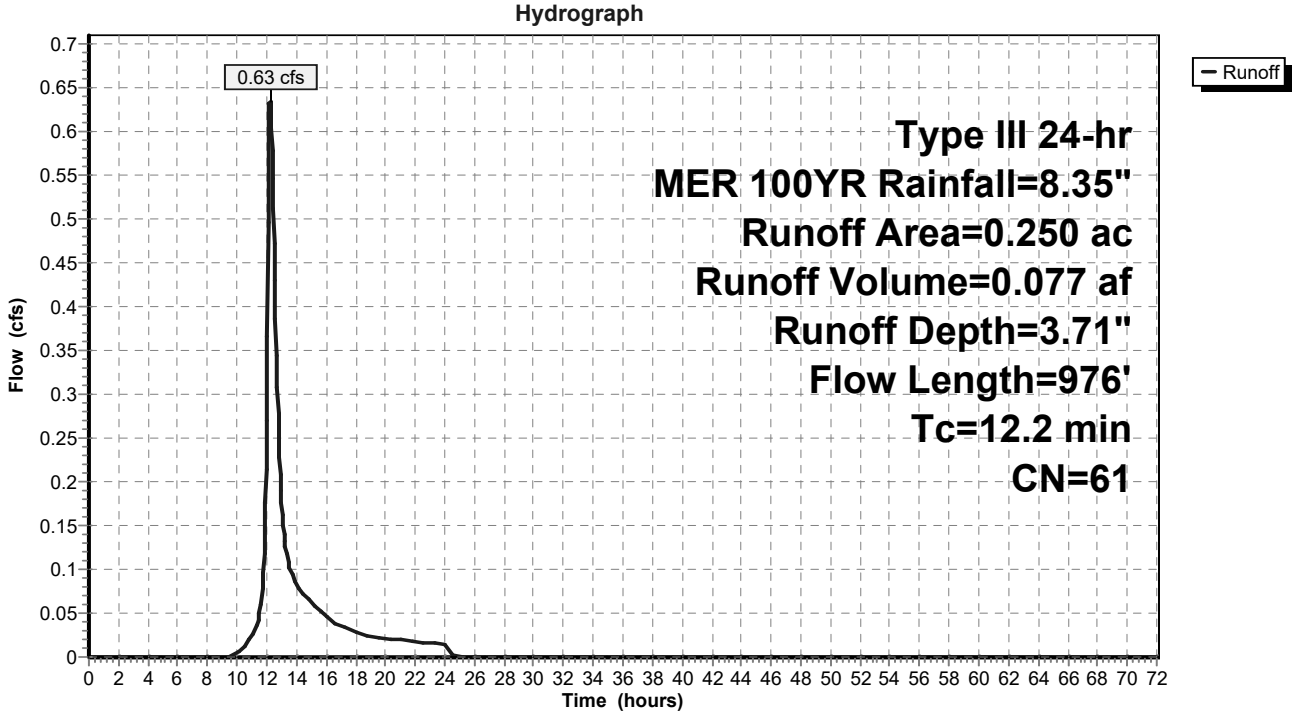
Runoff = 0.63 cfs @ 12.22 hrs, Volume= 0.077 af, Depth= 3.71"

Runoff by SCS TR-20 method, UH=Delmarva, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
Type III 24-hr MER 100YR Rainfall=8.35"

Area (ac)	CN	Description
0.250	61	>75% Grass cover, Good, HSG B
0.250		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
1.4	100	0.0140	1.21		**Sheet Flow, Sheet 4** Smooth surfaces n= 0.011 P2= 3.31"
10.8	876	0.0070	1.35		**Shallow Concentrated Flow, SCF 4** Unpaved Kv= 16.1 fps
12.2	976	Total			

Subcatchment 9: E-3-Off-Perv



Summary for Subcatchment 10: E-3-Off-Imperv

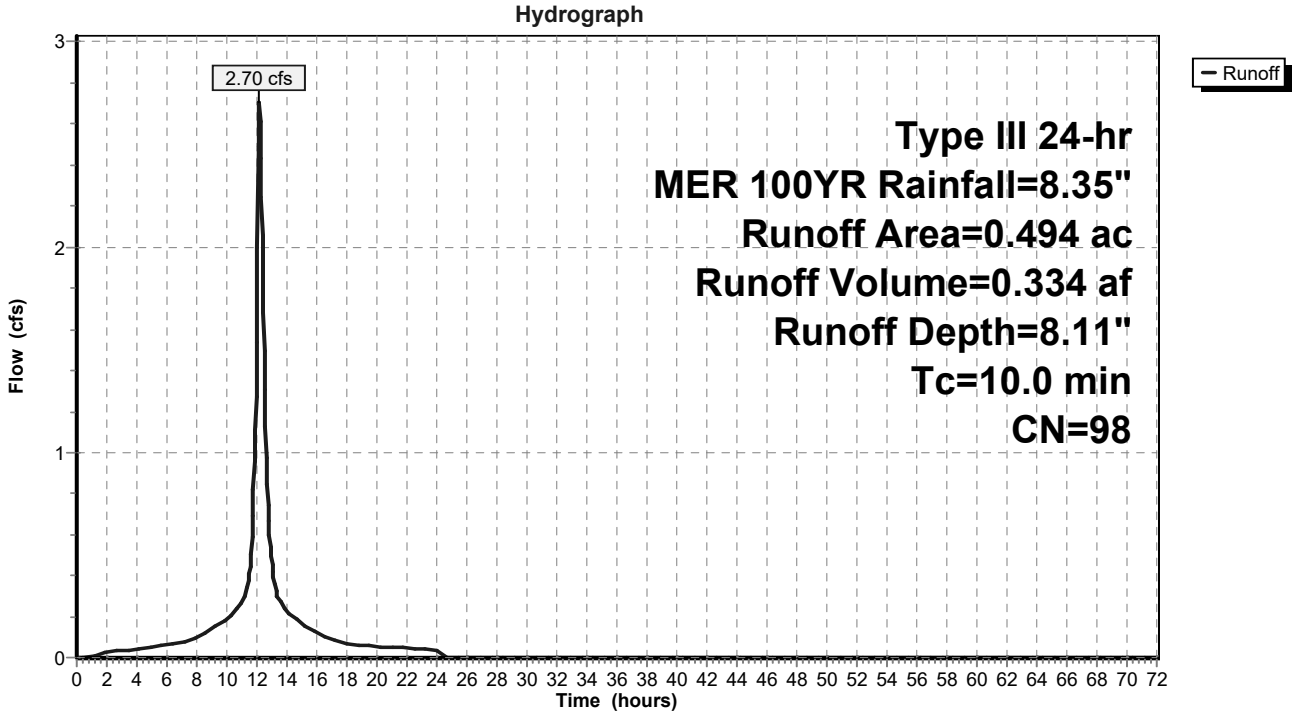
Runoff = 2.70 cfs @ 12.16 hrs, Volume= 0.334 af, Depth= 8.11"

Runoff by SCS TR-20 method, UH=Delmarva, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
Type III 24-hr MER 100YR Rainfall=8.35"

	Area (ac)	CN	Description
	0.076	98	Roofs, HSG B
*	0.078	98	Gravel, HSG B
	0.291	98	Paved parking, HSG B
*	0.049	98	Misc., HSG B
	0.494	98	Weighted Average
	0.494		100.00% Impervious Area

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

Subcatchment 10: E-3-Off-Imperv



Summary for Subcatchment 11: E-4-Perv

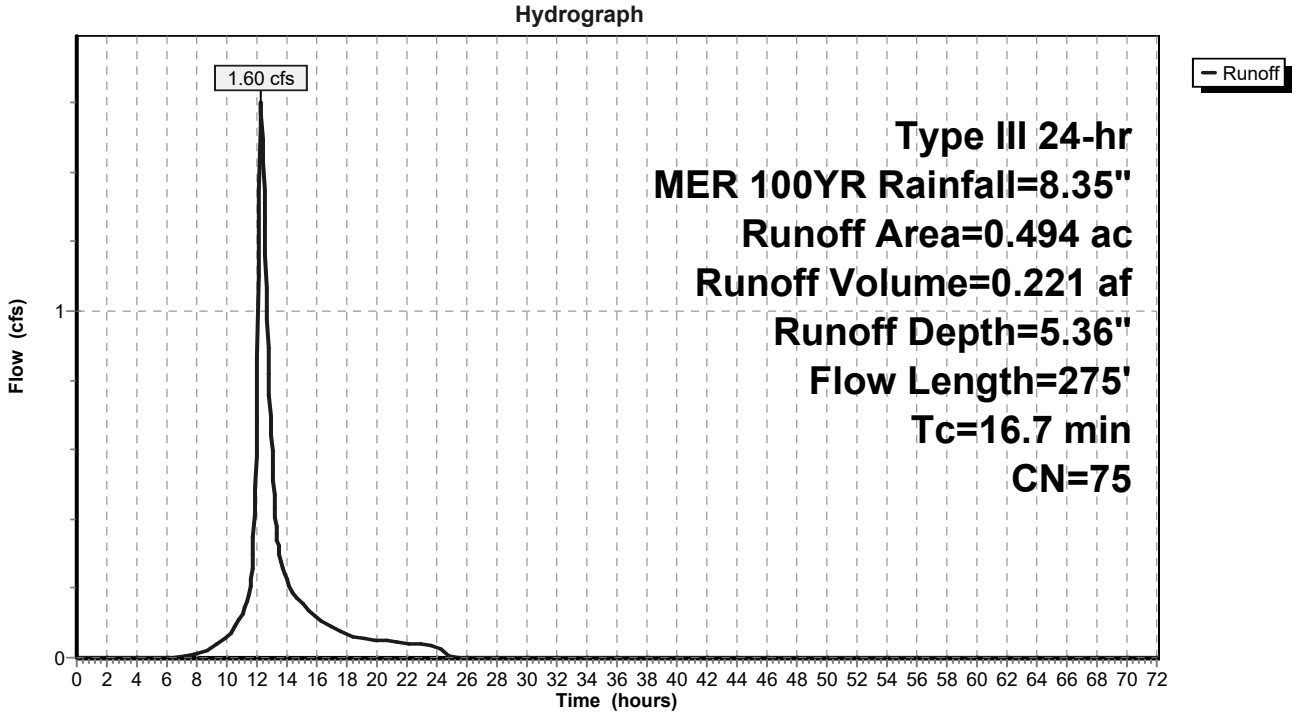
Runoff = 1.60 cfs @ 12.27 hrs, Volume= 0.221 af, Depth= 5.36"

Runoff by SCS TR-20 method, UH=Delmarva, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
Type III 24-hr MER 100YR Rainfall=8.35"

Area (ac)	CN	Description
0.494	75	Row crops, contoured, Good, HSG B
0.494		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.8	27	0.0090	0.07		**Sheet Flow, Sheet 1** Grass: Dense n= 0.240 P2= 3.31"
0.9	45	0.0090	0.87		**Sheet Flow, Sheet 2** Smooth surfaces n= 0.011 P2= 3.31"
7.0	28	0.0090	0.07		**Sheet Flow, Sheet 3** Grass: Dense n= 0.240 P2= 3.31"
2.0	175	0.0080	1.44		**Shallow Concentrated Flow, SCF** Unpaved Kv= 16.1 fps
16.7	275	Total			

Subcatchment 11: E-4-Perv



Summary for Subcatchment 12: E-4-Off-Perv

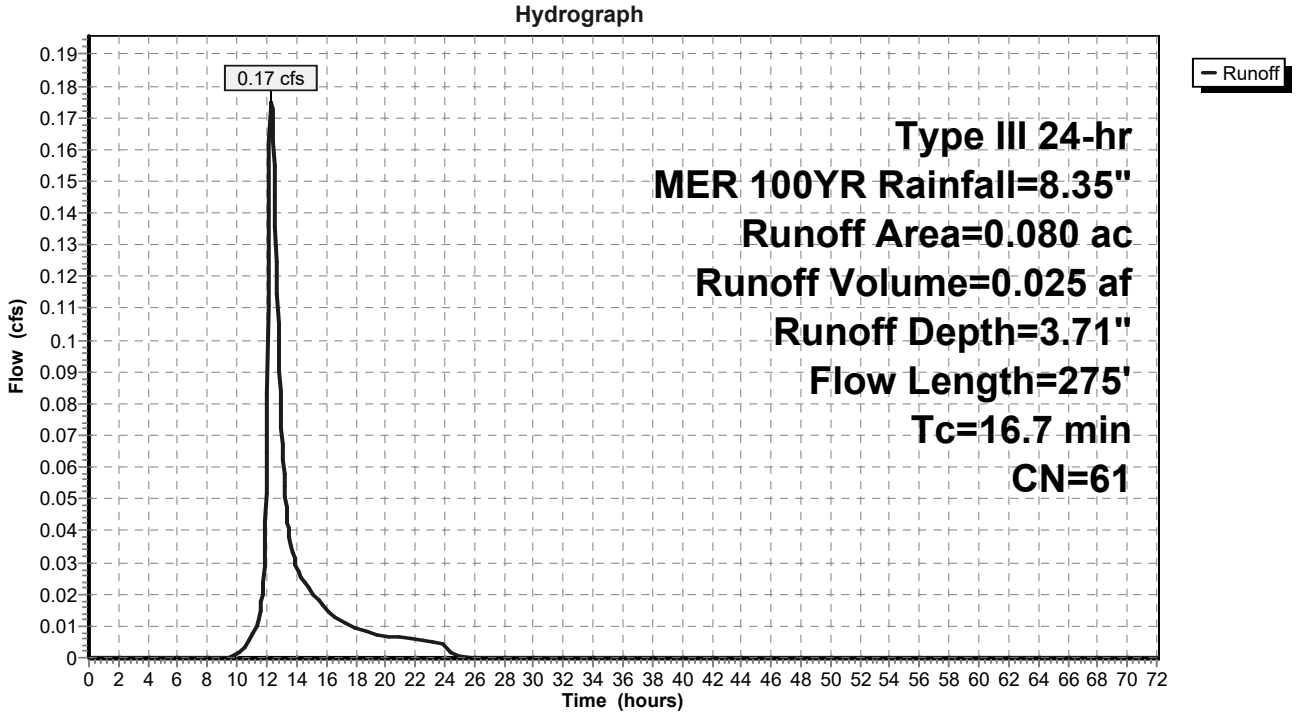
Runoff = 0.17 cfs @ 12.30 hrs, Volume= 0.025 af, Depth= 3.71"

Runoff by SCS TR-20 method, UH=Delmarva, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
Type III 24-hr MER 100YR Rainfall=8.35"

Area (ac)	CN	Description
0.080	61	>75% Grass cover, Good, HSG B
0.080		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.8	27	0.0090	0.07		**Sheet Flow, Sheet 1** Grass: Dense n= 0.240 P2= 3.31"
0.9	45	0.0090	0.87		**Sheet Flow, Sheet 2** Smooth surfaces n= 0.011 P2= 3.31"
7.0	28	0.0090	0.07		**Sheet Flow, Sheet 3** Grass: Dense n= 0.240 P2= 3.31"
2.0	175	0.0080	1.44		**Shallow Concentrated Flow, SCF** Unpaved Kv= 16.1 fps
16.7	275	Total			

Subcatchment 12: E-4-Off-Perv



Summary for Subcatchment 13: E-4-Off-Imperv

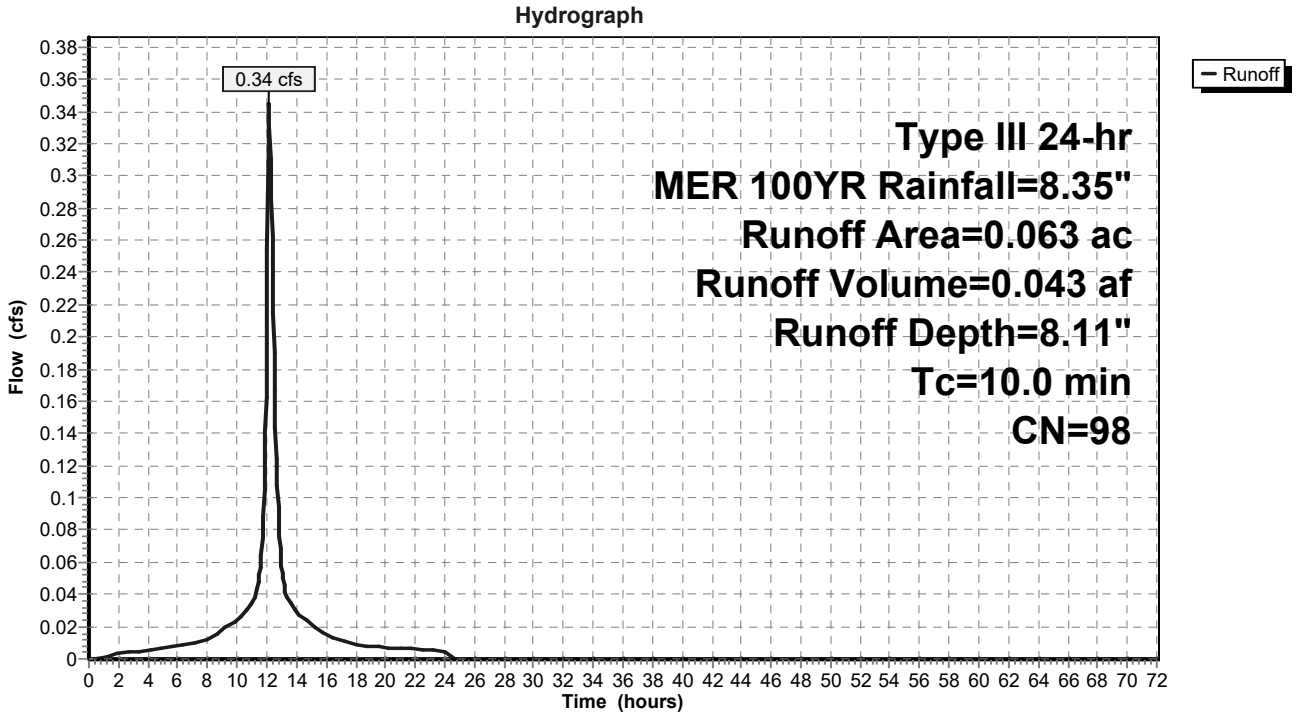
Runoff = 0.34 cfs @ 12.16 hrs, Volume= 0.043 af, Depth= 8.11"

Runoff by SCS TR-20 method, UH=Delmarva, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
Type III 24-hr MER 100YR Rainfall=8.35"

Area (ac)	CN	Description
0.063	98	Paved parking, HSG B
0.063		100.00% Impervious Area

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

Subcatchment 13: E-4-Off-Imperv

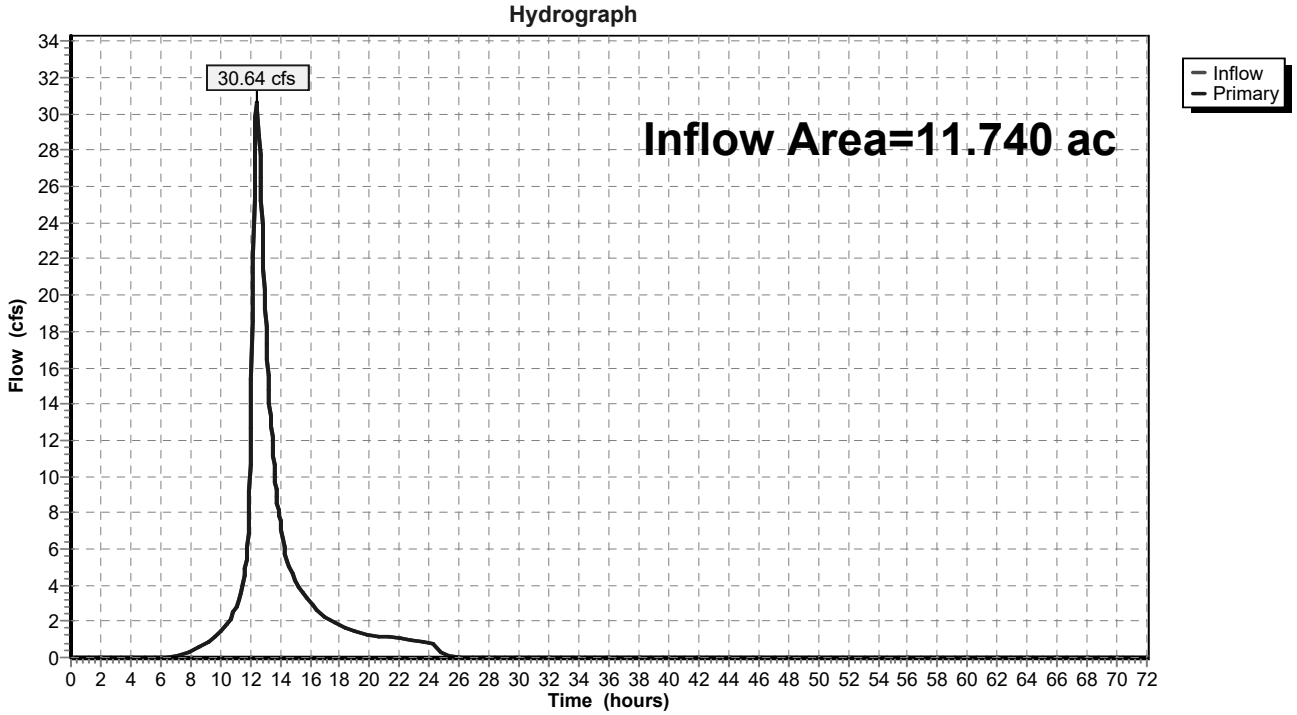


Summary for Link 1L: POA-1

Inflow Area = 11.740 ac, 0.32% Impervious, Inflow Depth = 5.60" for MER 100YR event
Inflow = 30.64 cfs @ 12.44 hrs, Volume= 5.483 af
Primary = 30.64 cfs @ 12.44 hrs, Volume= 5.483 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs

Link 1L: POA-1

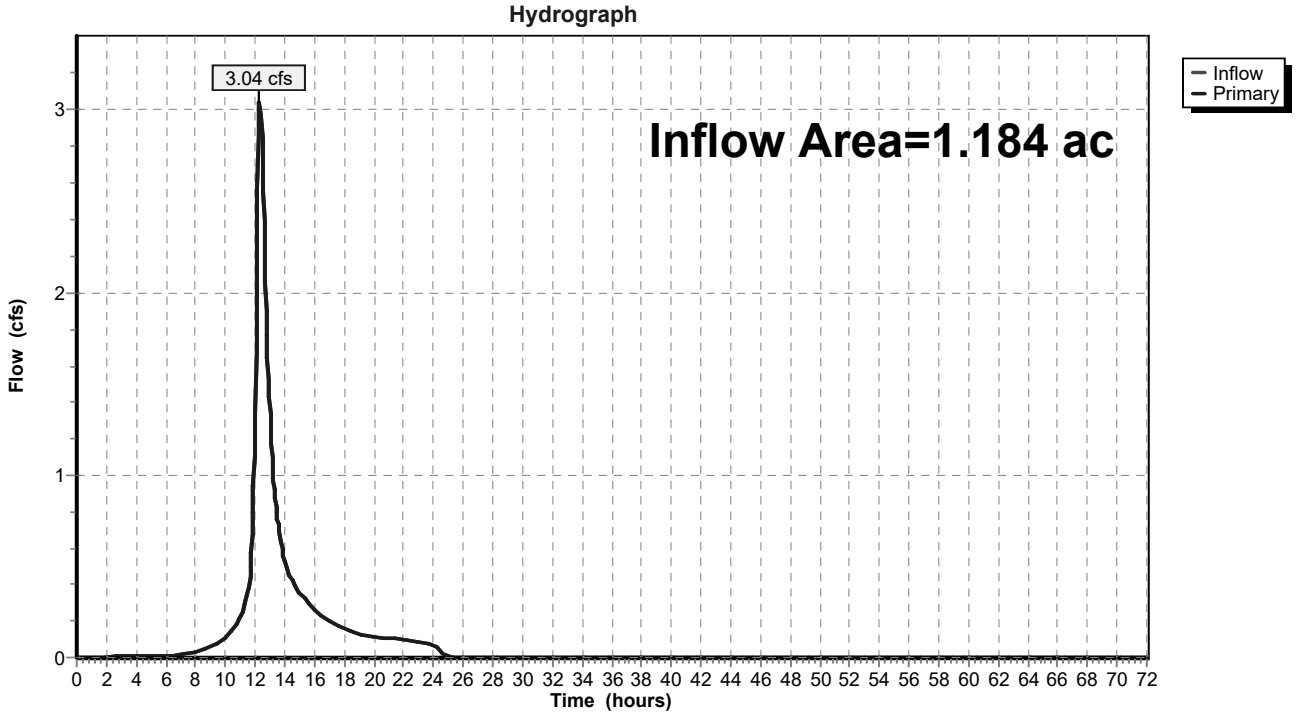


Summary for Link 2L: POA-1 OFF

Inflow Area = 1.184 ac, 7.94% Impervious, Inflow Depth = 4.80" for MER 100YR event
Inflow = 3.04 cfs @ 12.30 hrs, Volume= 0.474 af
Primary = 3.04 cfs @ 12.30 hrs, Volume= 0.474 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs

Link 2L: POA-1 OFF

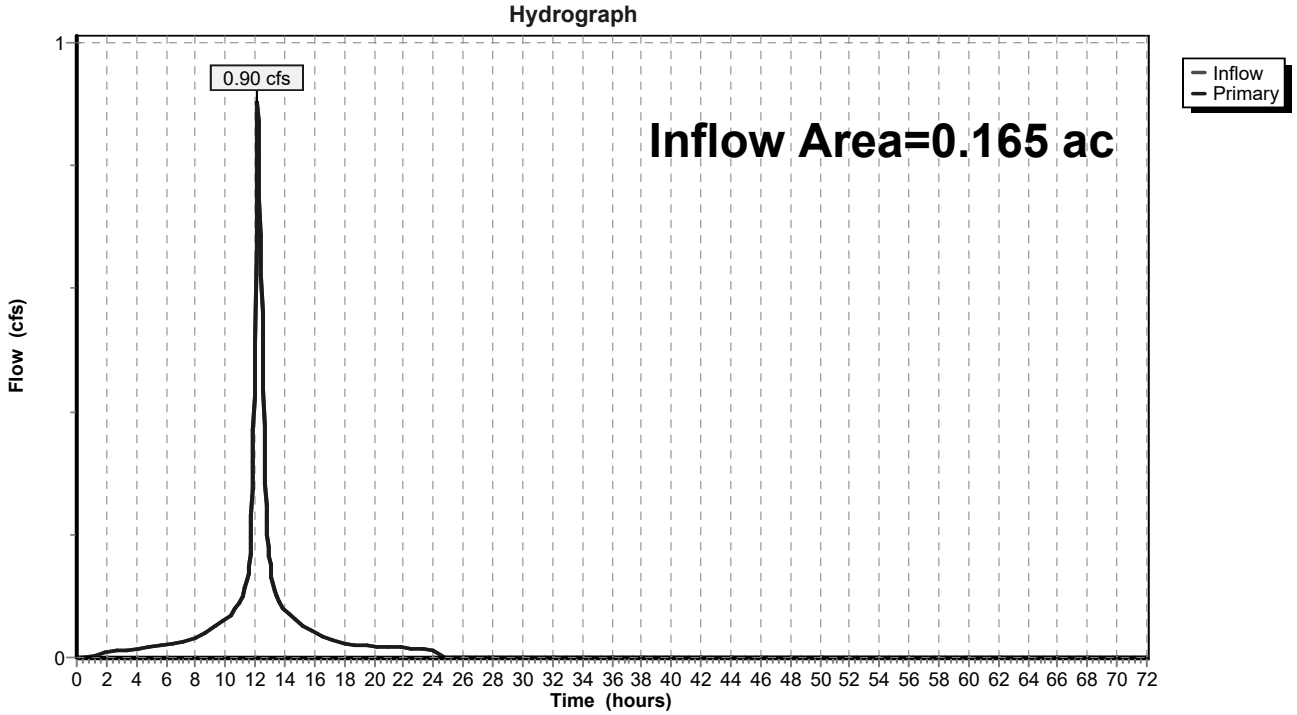


Summary for Link 3L: POA-2

Inflow Area = 0.165 ac,100.00% Impervious, Inflow Depth = 8.11" for MER 100YR event
Inflow = 0.90 cfs @ 12.16 hrs, Volume= 0.112 af
Primary = 0.90 cfs @ 12.16 hrs, Volume= 0.112 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs

Link 3L: POA-2

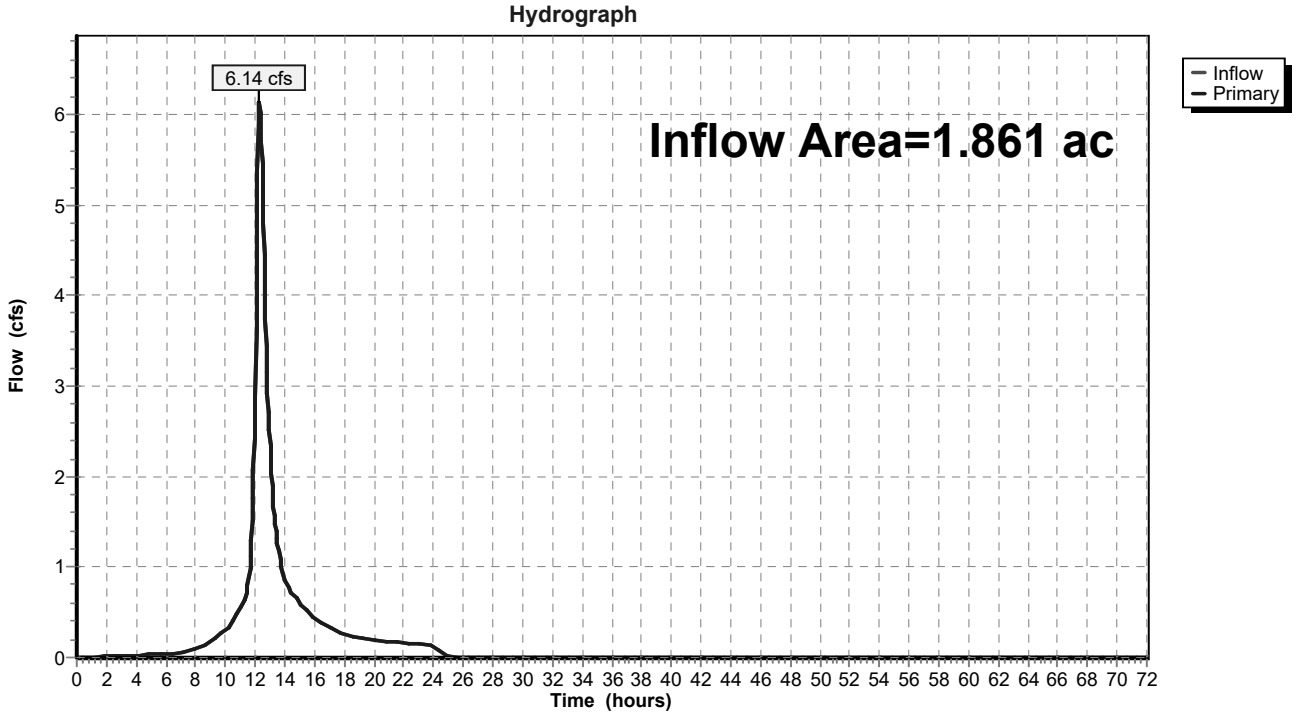


Summary for Link 4L: POA-3

Inflow Area = 1.861 ac, 17.09% Impervious, Inflow Depth = 5.83" for MER 100YR event
Inflow = 6.14 cfs @ 12.27 hrs, Volume= 0.904 af
Primary = 6.14 cfs @ 12.27 hrs, Volume= 0.904 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs

Link 4L: POA-3

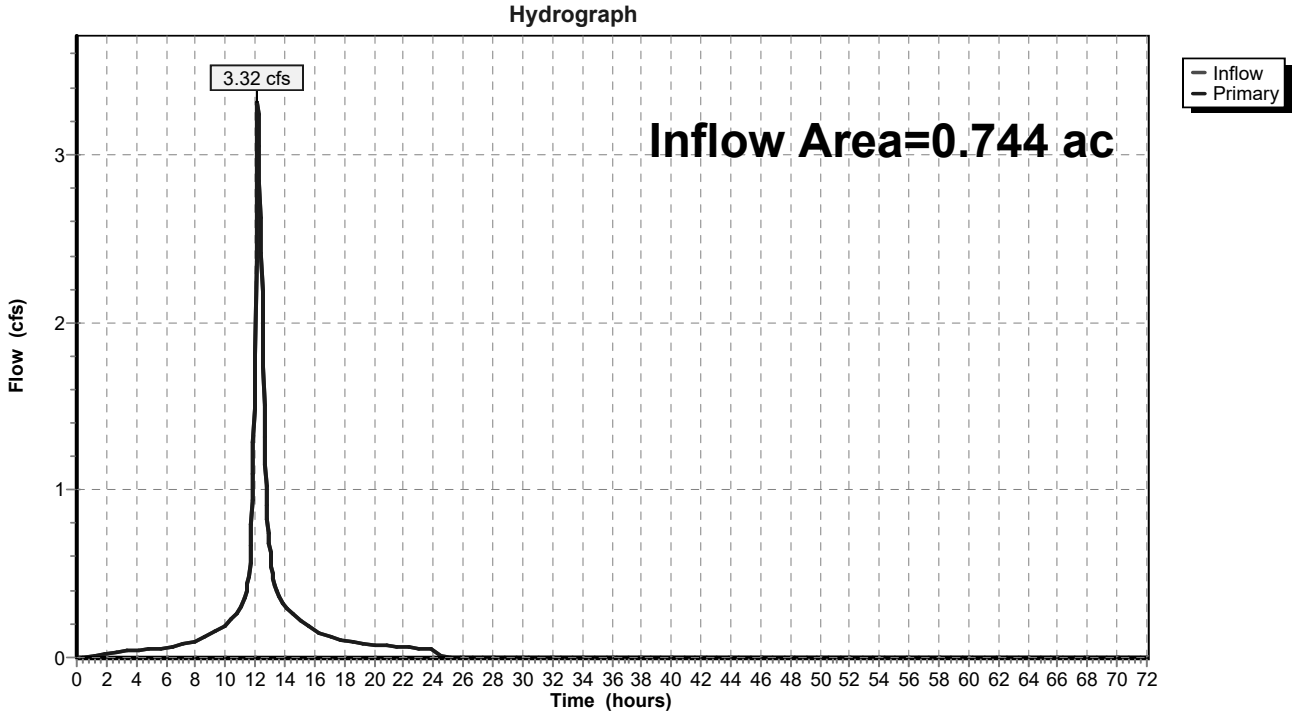


Summary for Link 5L: POA-3 OFF

Inflow Area = 0.744 ac, 66.40% Impervious, Inflow Depth = 6.63" for MER 100YR event
Inflow = 3.32 cfs @ 12.17 hrs, Volume= 0.411 af
Primary = 3.32 cfs @ 12.17 hrs, Volume= 0.411 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs

Link 5L: POA-3 OFF

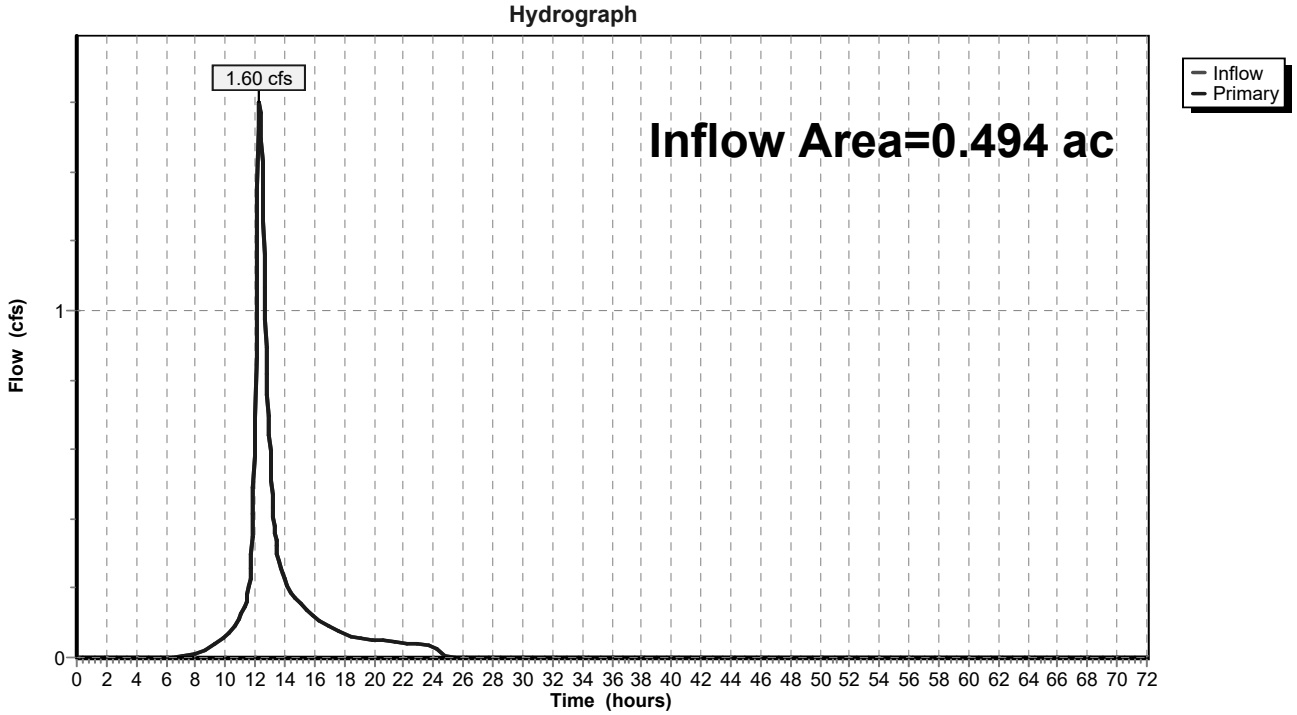


Summary for Link 6L: POA-4

Inflow Area = 0.494 ac, 0.00% Impervious, Inflow Depth = 5.36" for MER 100YR event
Inflow = 1.60 cfs @ 12.27 hrs, Volume= 0.221 af
Primary = 1.60 cfs @ 12.27 hrs, Volume= 0.221 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs

Link 6L: POA-4

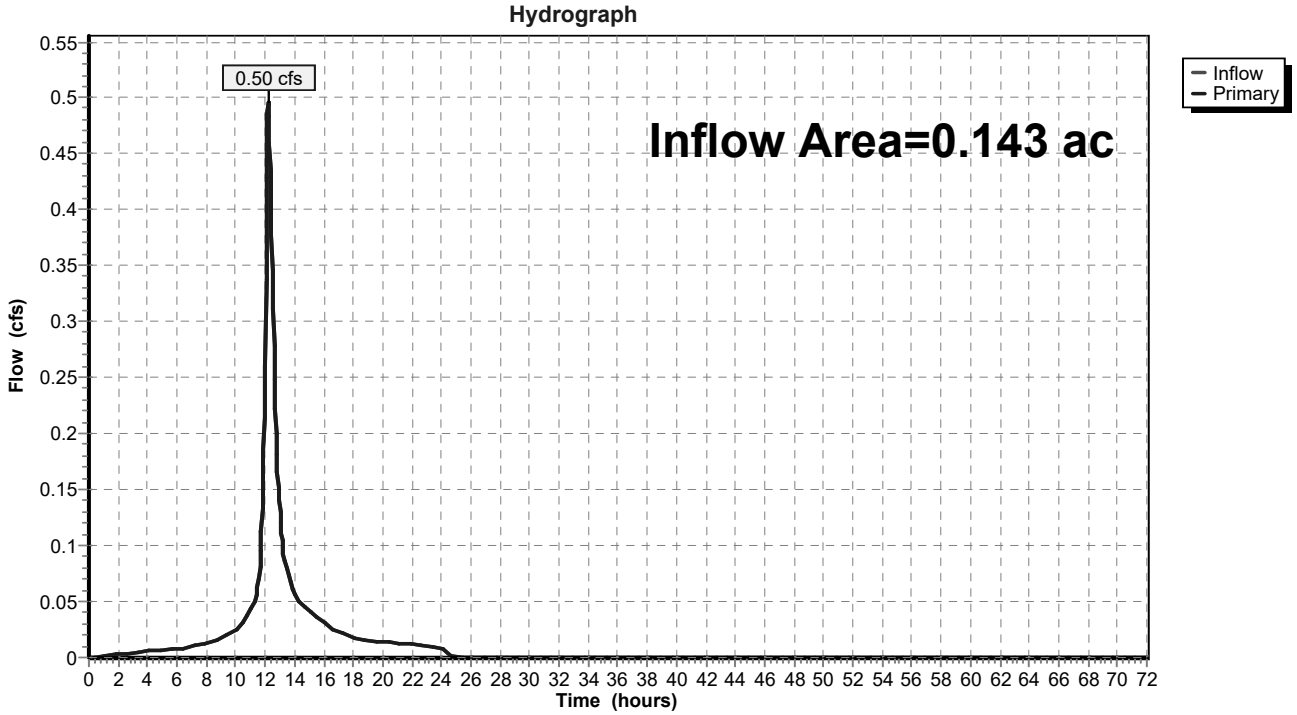


Summary for Link 7L: POA-4 OFF

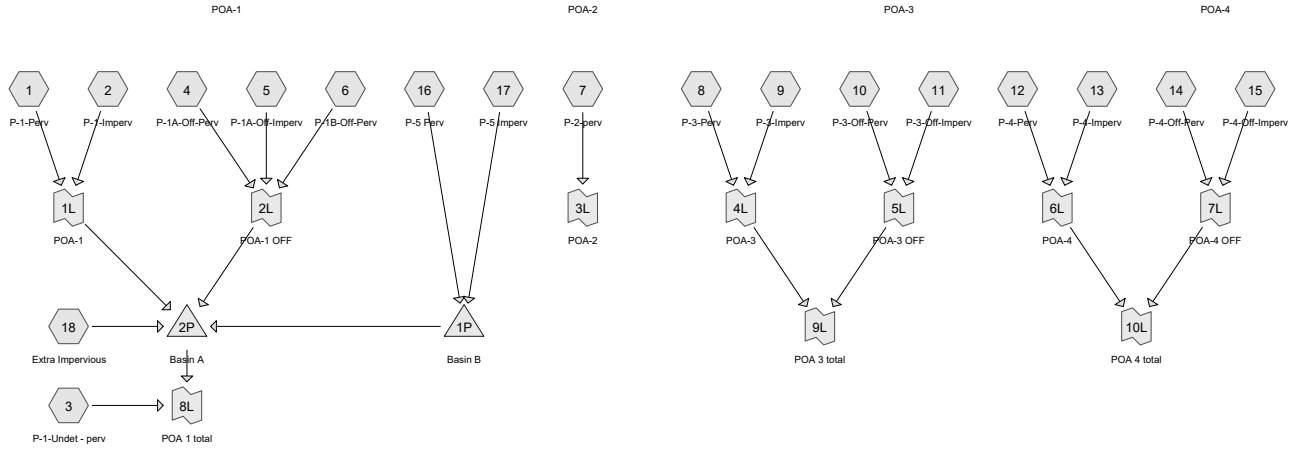
Inflow Area = 0.143 ac, 44.06% Impervious, Inflow Depth = 5.65" for MER 100YR event
Inflow = 0.50 cfs @ 12.20 hrs, Volume= 0.067 af
Primary = 0.50 cfs @ 12.20 hrs, Volume= 0.067 af, Atten= 0%, Lag= 0.0 min

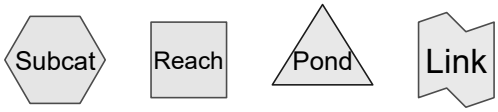
Primary outflow = Inflow, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs

Link 7L: POA-4 OFF



PROPOSED CONDITIONS ANALYSIS





Routing Diagram for 191025 - Proposed Analysis-Row Crop
Prepared by Maser Consulting PA, Printed 10/30/2019
HydroCAD® 10.00-22 s/n 10901 © 2018 HydroCAD Software Solutions LLC

Area Listing (all nodes)

Area (acres)	CN	Description (subcatchment-numbers)
7.430	61	>75% Grass cover, Good, HSG B (1, 3, 4, 6, 7, 8, 10, 12, 14, 16)
1.600	74	>75% Grass cover, Good, HSG C (1, 3)
1.040	98	Building (17)
1.600	98	Buildings (2)
0.110	98	Conc (2)
0.110	98	Concrete (17)
0.290	98	Driveway (2, 17)
0.100	98	Gravel, HSG B (11)
0.030	98	Misc., HSG B (11)
0.510	98	Paved parking, HSG B (5, 11, 13, 15)
2.450	98	Pavement (2, 9, 17)
0.090	98	Roofs, HSG B (5, 11)
0.520	75	Row crops, contoured, Good, HSG B (6)
0.490	98	Sidewalk (2, 9, 17)
0.500	98	impervious (18)
16.870	**79**	**TOTAL AREA**

Soil Listing (all nodes)

Area (acres)	Soil Group	Subcatchment Numbers
0.000	HSG A	
8.680	HSG B	1, 3, 4, 5, 6, 7, 8, 10, 11, 12, 13, 14, 15, 16
1.600	HSG C	1, 3
0.000	HSG D	
6.590	Other	2, 9, 17, 18
16.870		**TOTAL AREA**

Summary for Subcatchment 1: P-1-Perv

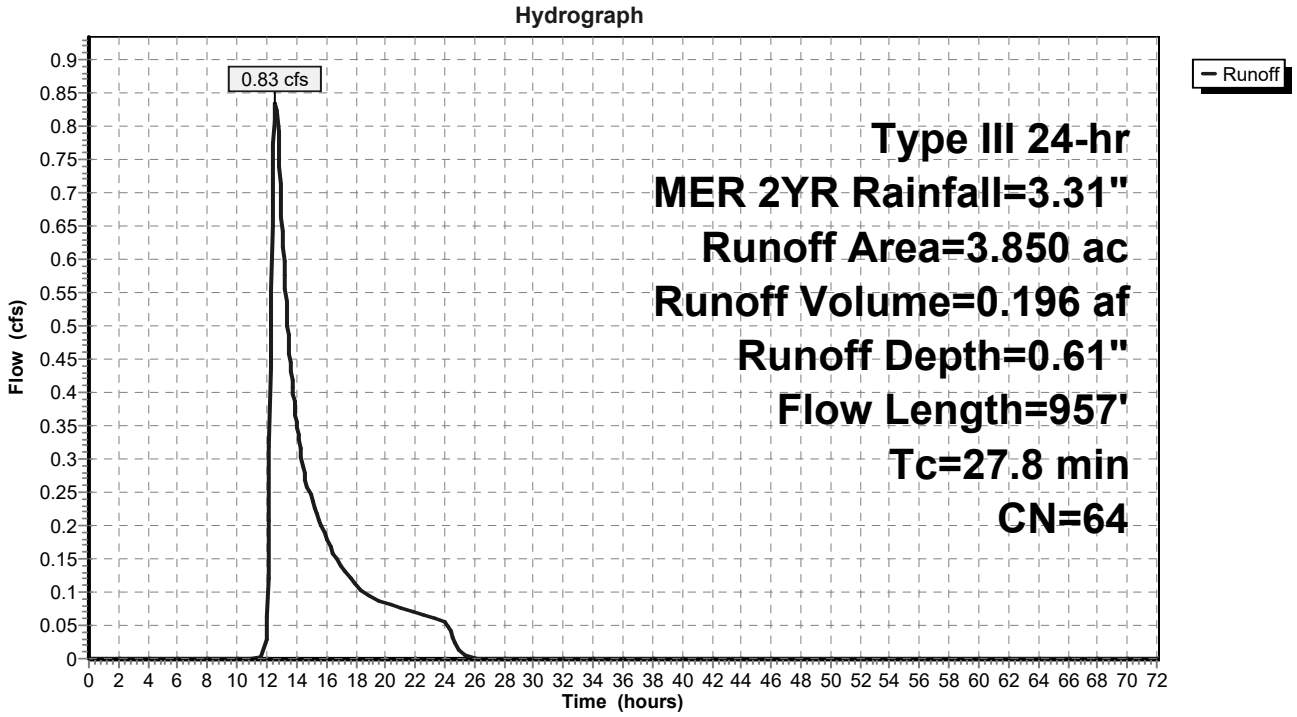
Runoff = 0.83 cfs @ 12.60 hrs, Volume= 0.196 af, Depth= 0.61"

Runoff by SCS TR-20 method, UH=Delmarva, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
Type III 24-hr MER 2YR Rainfall=3.31"

Area (ac)	CN	Description
3.070	61	>75% Grass cover, Good, HSG B
0.780	74	>75% Grass cover, Good, HSG C
3.850	64	Weighted Average
3.850		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
20.3	100	0.0040	0.08		**Sheet Flow, Sheet 1** Cultivated: Residue>20% n= 0.170 P2= 3.31"
7.5	857	0.0140	1.90		**Shallow Concentrated Flow, SCF 1** Unpaved Kv= 16.1 fps
27.8	957	Total			

Subcatchment 1: P-1-Perv



Summary for Subcatchment 2: P-1-Imperv

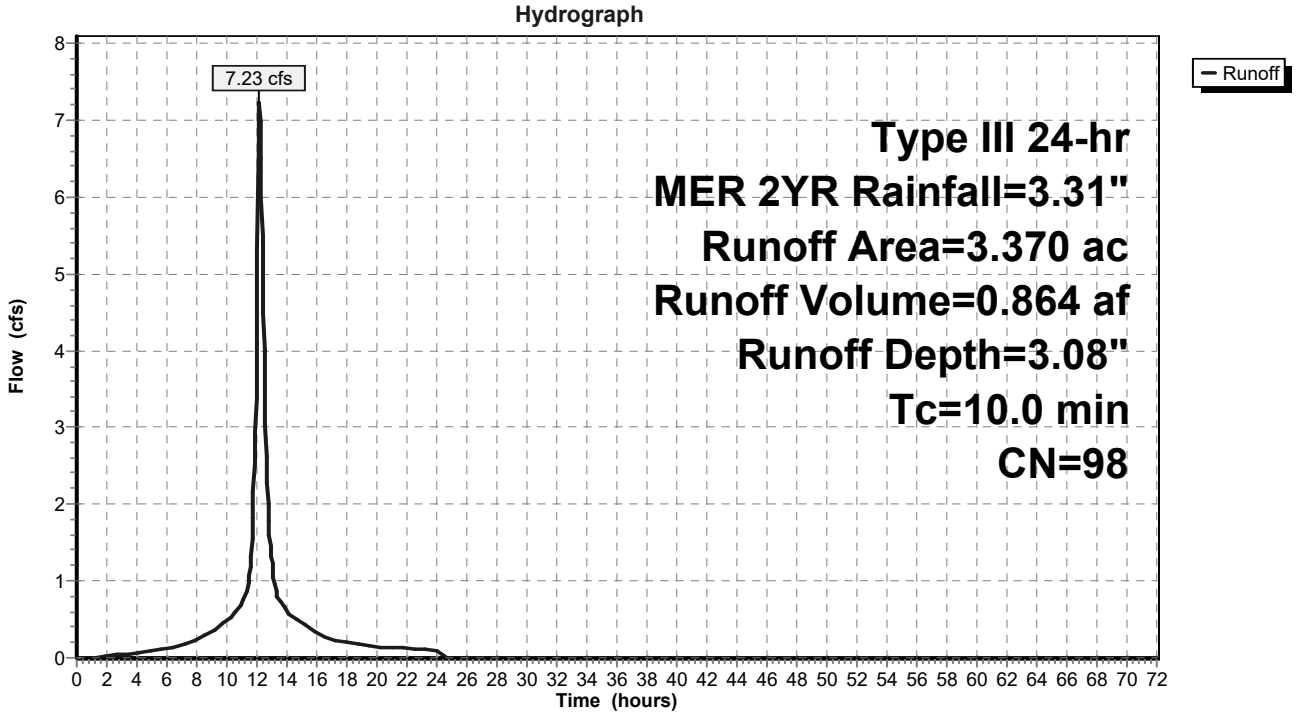
Runoff = 7.23 cfs @ 12.16 hrs, Volume= 0.864 af, Depth= 3.08"

Runoff by SCS TR-20 method, UH=Delmarva, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
Type III 24-hr MER 2YR Rainfall=3.31"

	Area (ac)	CN	Description
*	1.600	98	Buildings
*	1.310	98	Pavement
*	0.300	98	Sidewalk
*	0.110	98	Conc
*	0.050	98	Driveway
	3.370	98	Weighted Average
	3.370		100.00% Impervious Area

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

Subcatchment 2: P-1-Imperv



Summary for Subcatchment 3: P-1-Undet - perv

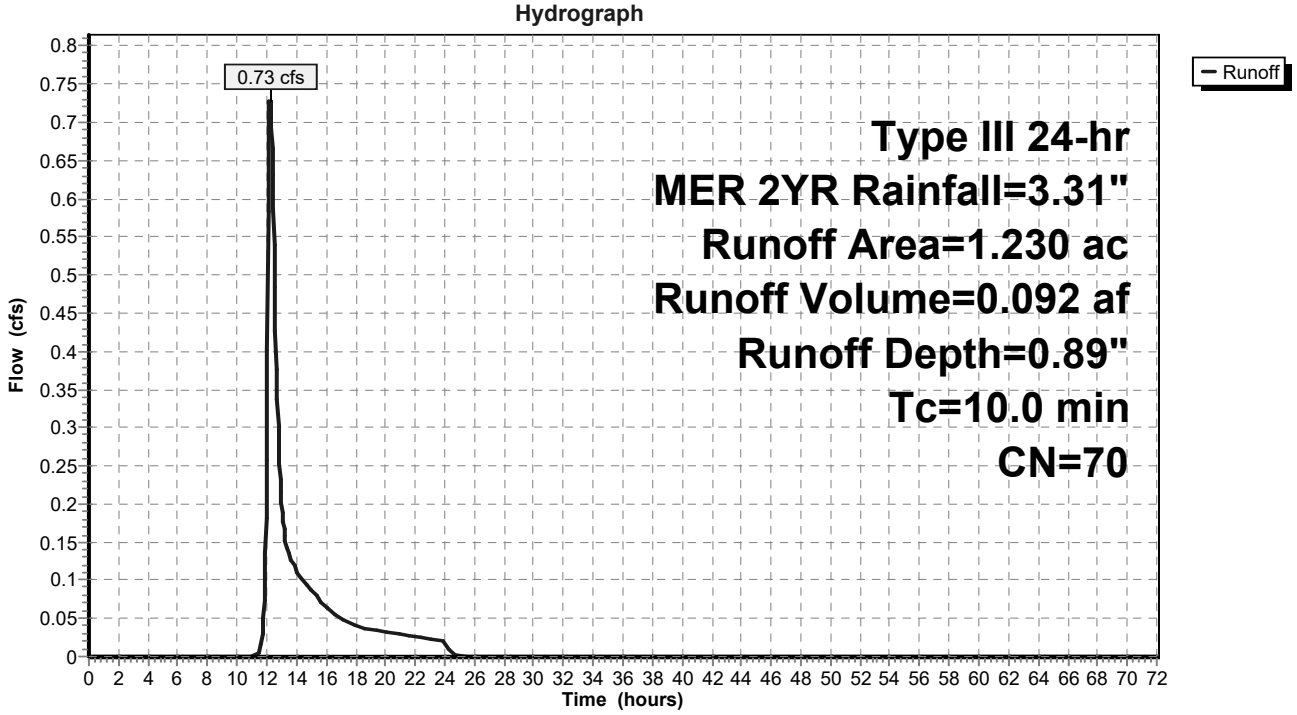
Runoff = 0.73 cfs @ 12.21 hrs, Volume= 0.092 af, Depth= 0.89"

Runoff by SCS TR-20 method, UH=Delmarva, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
Type III 24-hr MER 2YR Rainfall=3.31"

Area (ac)	CN	Description
0.820	74	>75% Grass cover, Good, HSG C
0.410	61	>75% Grass cover, Good, HSG B
1.230	70	Weighted Average
1.230		100.00% Pervious Area

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

Subcatchment 3: P-1-Undet - perv



Summary for Subcatchment 4: P-1A-Off-Perv

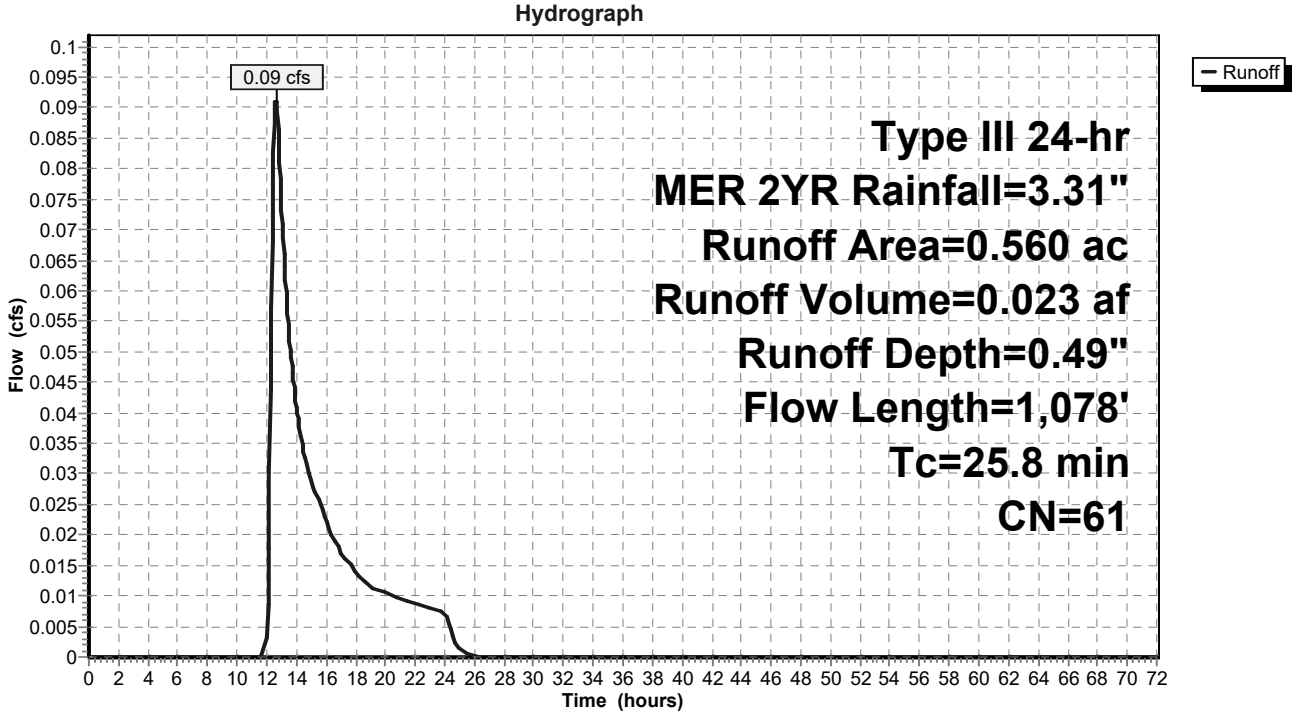
Runoff = 0.09 cfs @ 12.61 hrs, Volume= 0.023 af, Depth= 0.49"

Runoff by SCS TR-20 method, UH=Delmarva, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
Type III 24-hr MER 2YR Rainfall=3.31"

Area (ac)	CN	Description
0.560	61	>75% Grass cover, Good, HSG B
0.560		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
17.2	100	0.0120	0.10		**Sheet Flow, Sheet 1.3** Grass: Dense n= 0.240 P2= 3.31"
8.6	978	0.0140	1.90		**Shallow Concentrated Flow, SCF 1.3** Unpaved Kv= 16.1 fps
25.8	1,078	Total			

Subcatchment 4: P-1A-Off-Perv



Summary for Subcatchment 5: P-1A-Off-Imperv

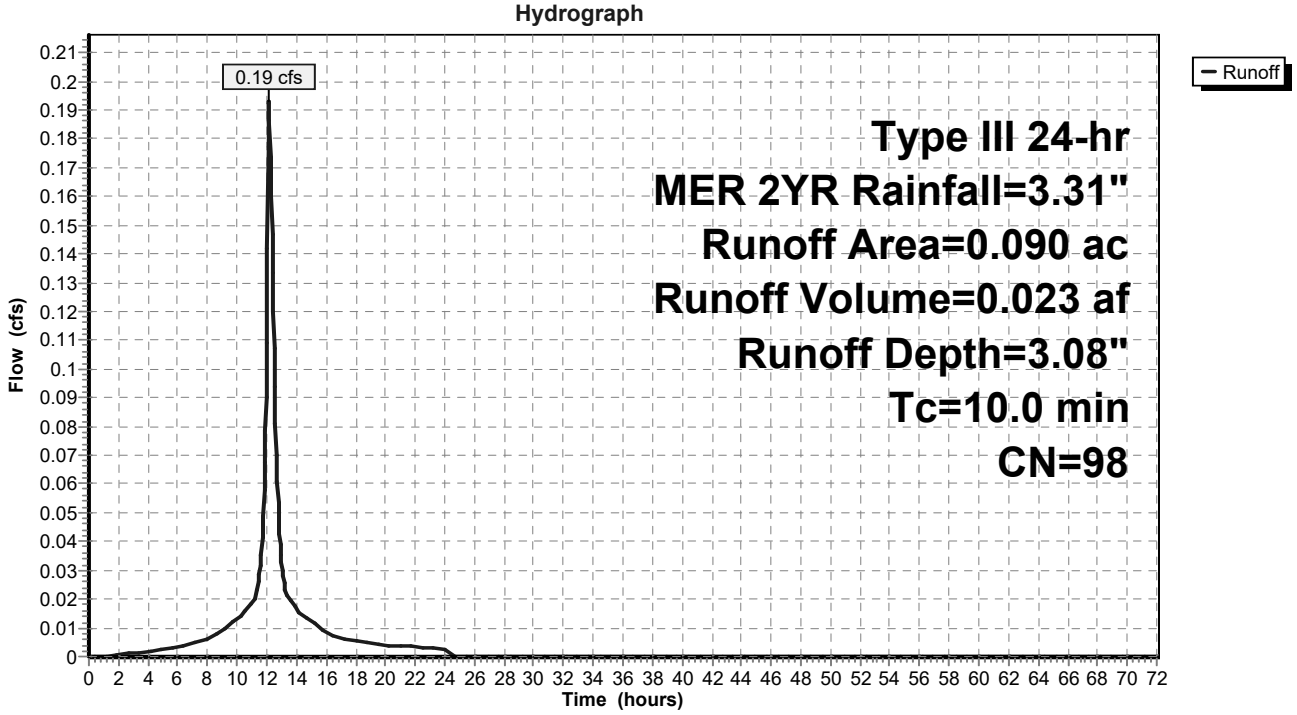
Runoff = 0.19 cfs @ 12.16 hrs, Volume= 0.023 af, Depth= 3.08"

Runoff by SCS TR-20 method, UH=Delmarva, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
Type III 24-hr MER 2YR Rainfall=3.31"

	Area (ac)	CN	Description
	0.010	98	Roofs, HSG B
*	0.080	98	Paved parking, HSG B
	0.090	98	Weighted Average
	0.090		100.00% Impervious Area

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

Subcatchment 5: P-1A-Off-Imperv



Summary for Subcatchment 6: P-1B-Off-Perv

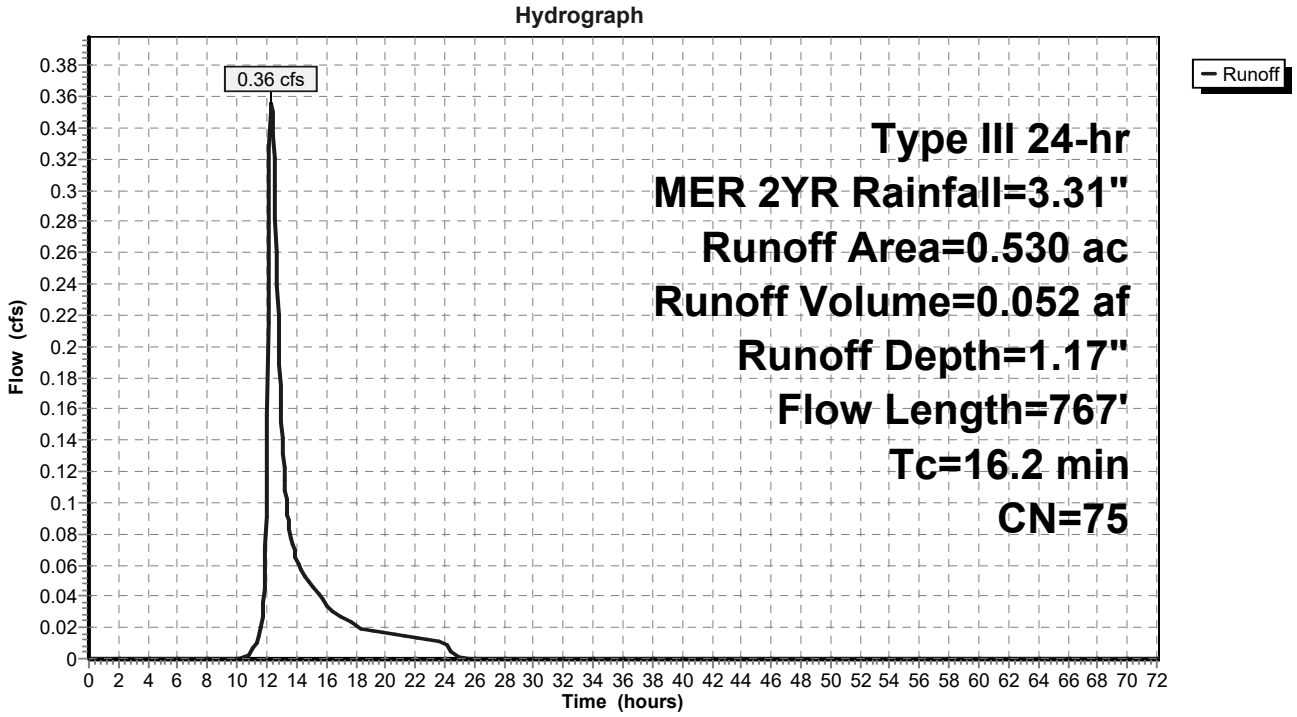
Runoff = 0.36 cfs @ 12.31 hrs, Volume= 0.052 af, Depth= 1.17"

Runoff by SCS TR-20 method, UH=Delmarva, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
Type III 24-hr MER 2YR Rainfall=3.31"

Area (ac)	CN	Description
0.520	75	Row crops, contoured, Good, HSG B
0.010	61	>75% Grass cover, Good, HSG B
0.530	75	Weighted Average
0.530		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
10.4	100	0.0210	0.16		**Sheet Flow, Sheet** Cultivated: Residue>20% n= 0.170 P2= 3.31"
5.8	667	0.0140	1.90		**Shallow Concentrated Flow, SCF** Unpaved Kv= 16.1 fps
16.2	767	Total			

Subcatchment 6: P-1B-Off-Perv



Summary for Subcatchment 7: P-2-perv

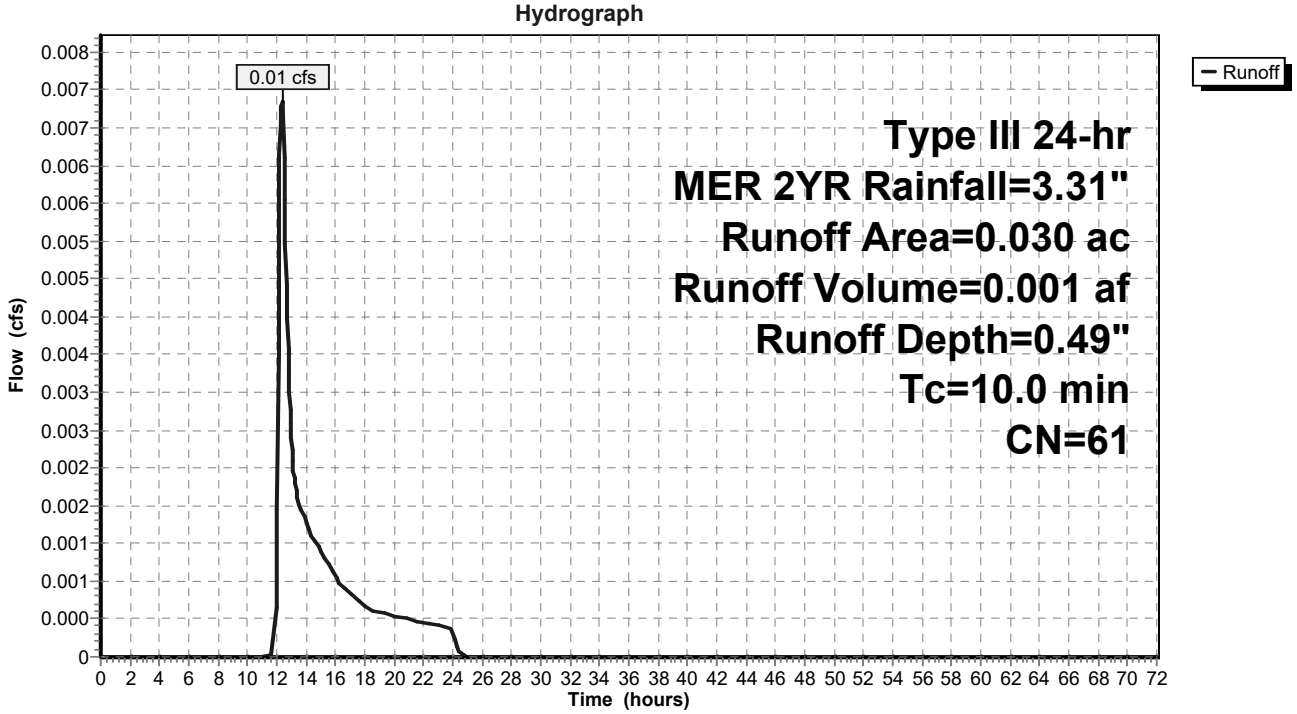
Runoff = 0.01 cfs @ 12.35 hrs, Volume= 0.001 af, Depth= 0.49"

Runoff by SCS TR-20 method, UH=Delmarva, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
Type III 24-hr MER 2YR Rainfall=3.31"

Area (ac)	CN	Description
0.030	61	>75% Grass cover, Good, HSG B
0.030		100.00% Pervious Area

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

Subcatchment 7: P-2-perv



Summary for Subcatchment 8: P-3-Perv

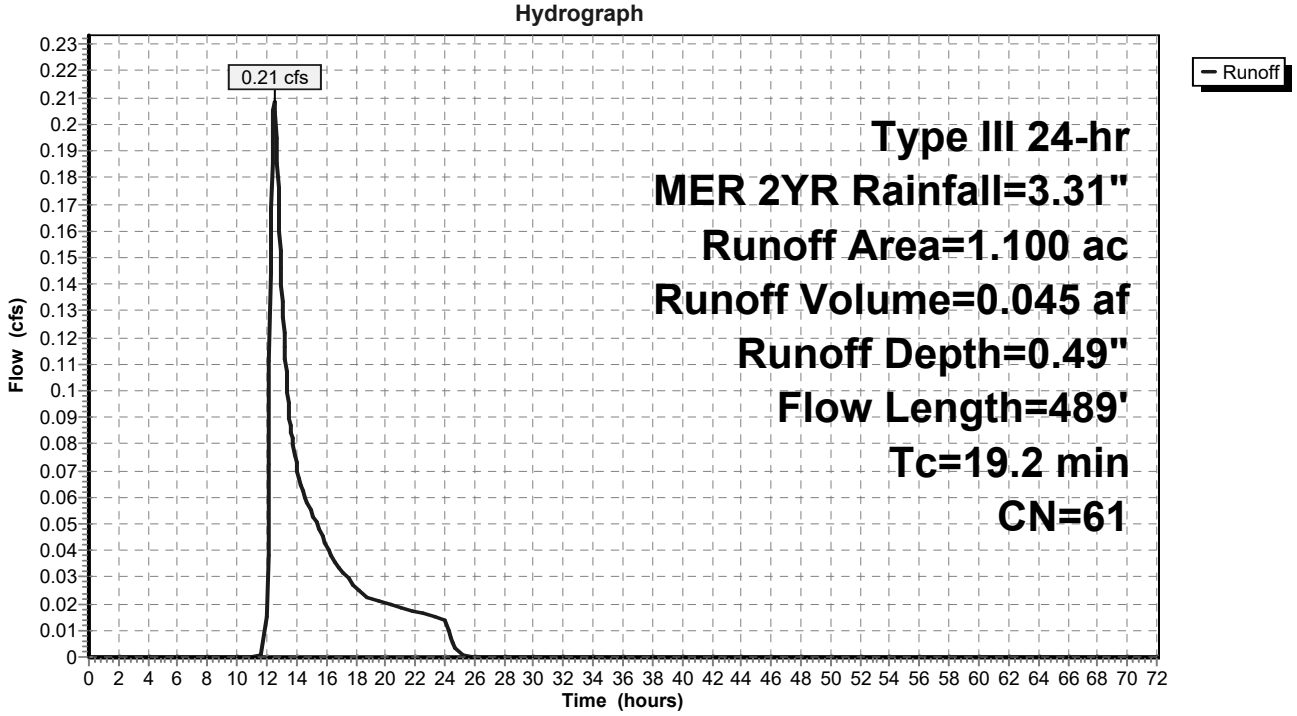
Runoff = 0.21 cfs @ 12.51 hrs, Volume= 0.045 af, Depth= 0.49"

Runoff by SCS TR-20 method, UH=Delmarva, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
Type III 24-hr MER 2YR Rainfall=3.31"

Area (ac)	CN	Description
1.100	61	>75% Grass cover, Good, HSG B
1.100		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
14.7	100	0.0090	0.11		**Sheet Flow, Sheet 4** Cultivated: Residue>20% n= 0.170 P2= 3.31"
4.5	389	0.0080	1.44		**Shallow Concentrated Flow, SCF 4** Unpaved Kv= 16.1 fps
19.2	489	Total			

Subcatchment 8: P-3-Perv



Summary for Subcatchment 9: P-3-Imperv

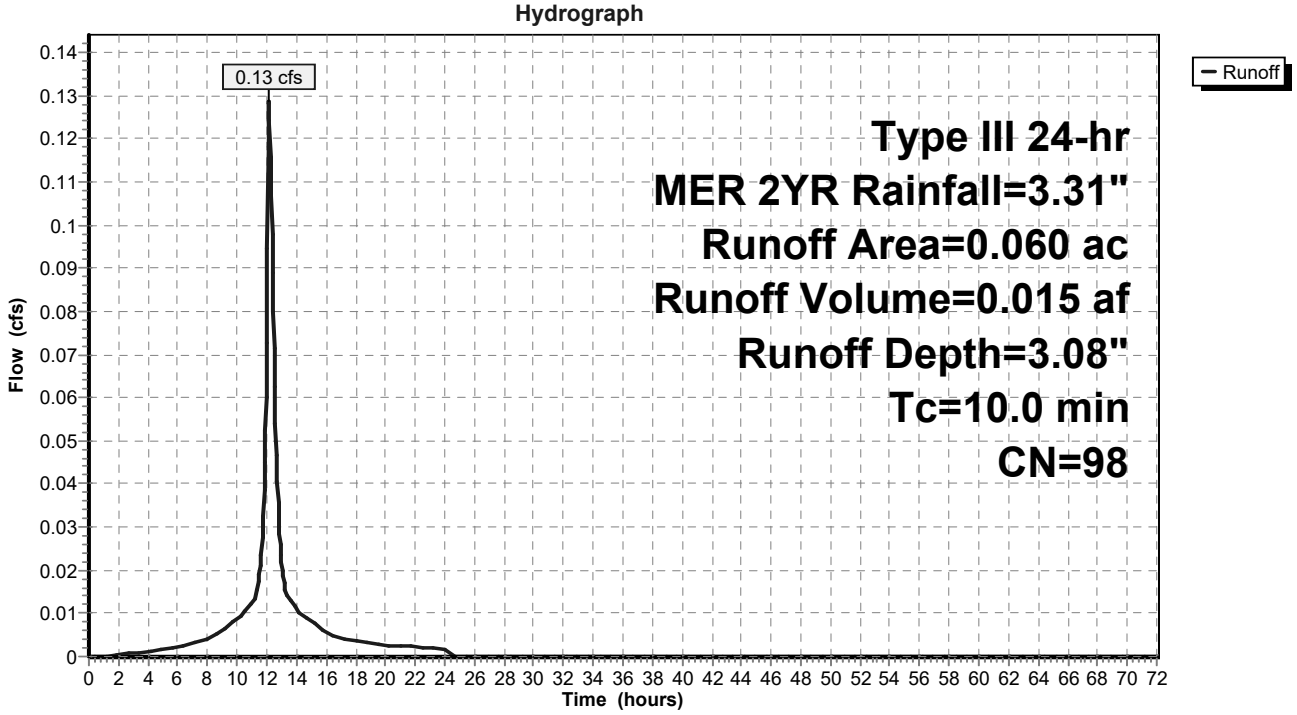
Runoff = 0.13 cfs @ 12.16 hrs, Volume= 0.015 af, Depth= 3.08"

Runoff by SCS TR-20 method, UH=Delmarva, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
Type III 24-hr MER 2YR Rainfall=3.31"

	Area (ac)	CN	Description
*	0.030	98	Pavement
*	0.030	98	Sidewalk
	0.060	98	Weighted Average
	0.060		100.00% Impervious Area

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

Subcatchment 9: P-3-Imperv



Summary for Subcatchment 10: P-3-Off-Perv

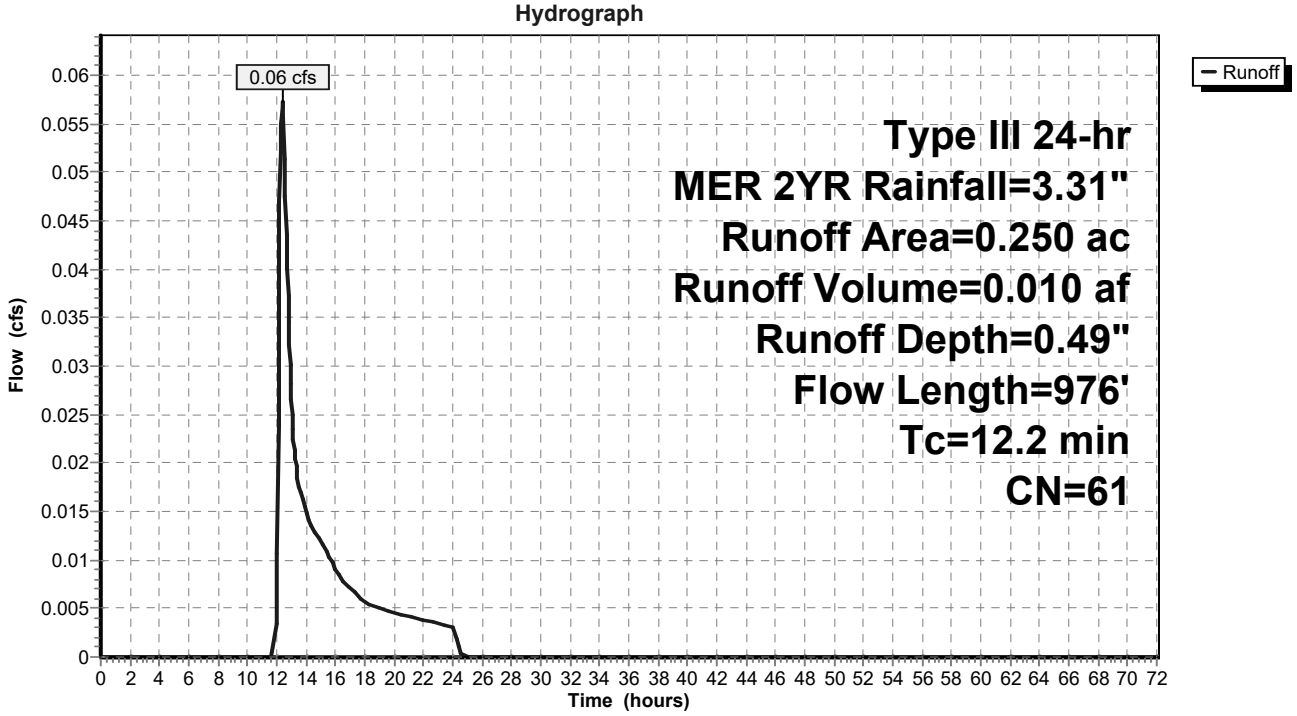
Runoff = 0.06 cfs @ 12.39 hrs, Volume= 0.010 af, Depth= 0.49"

Runoff by SCS TR-20 method, UH=Delmarva, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
Type III 24-hr MER 2YR Rainfall=3.31"

Area (ac)	CN	Description
0.250	61	>75% Grass cover, Good, HSG B
0.250		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
1.4	100	0.0140	1.21		**Sheet Flow, Sheet 4** Smooth surfaces n= 0.011 P2= 3.31"
10.8	876	0.0070	1.35		**Shallow Concentrated Flow, SCF 4** Unpaved Kv= 16.1 fps
12.2	976	Total			

Subcatchment 10: P-3-Off-Perv



Summary for Subcatchment 11: P-3-Off-Imperv

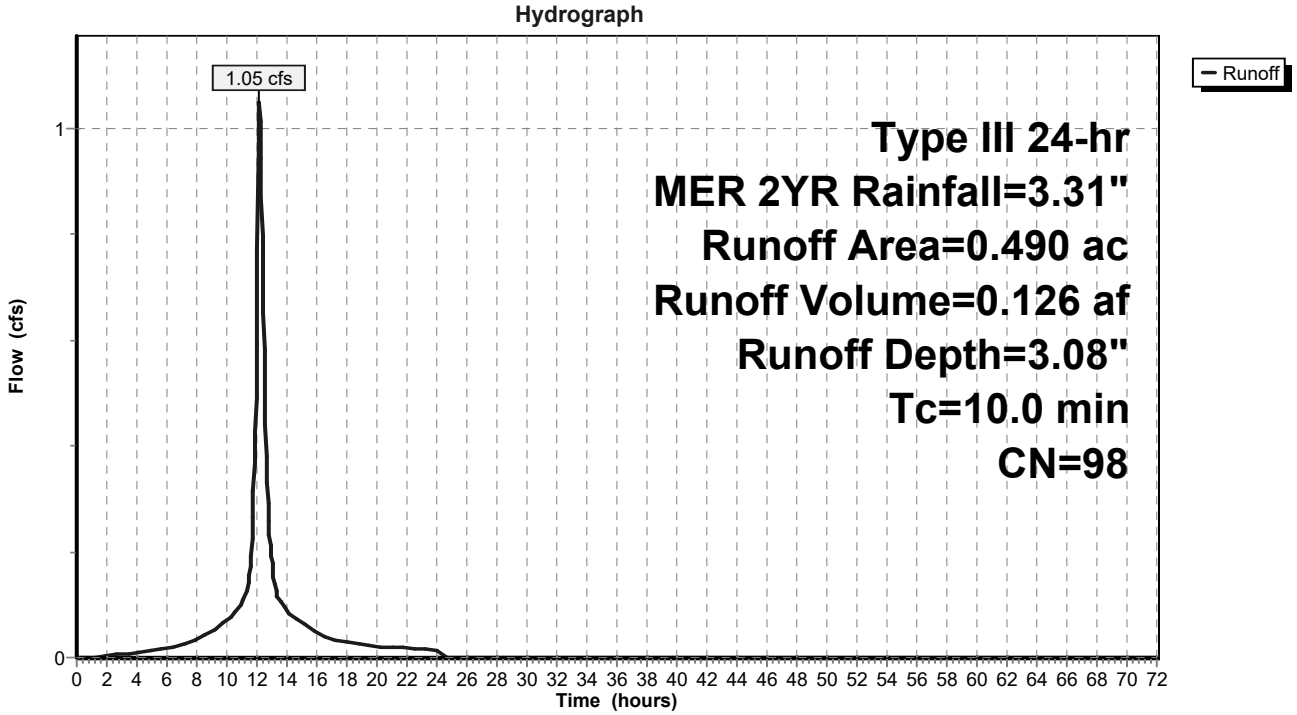
Runoff = 1.05 cfs @ 12.16 hrs, Volume= 0.126 af, Depth= 3.08"

Runoff by SCS TR-20 method, UH=Delmarva, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
Type III 24-hr MER 2YR Rainfall=3.31"

	Area (ac)	CN	Description
	0.080	98	Roofs, HSG B
*	0.100	98	Gravel, HSG B
	0.280	98	Paved parking, HSG B
*	0.030	98	Misc., HSG B
	0.490	98	Weighted Average
	0.490		100.00% Impervious Area

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

Subcatchment 11: P-3-Off-Imperv



Summary for Subcatchment 12: P-4-Perv

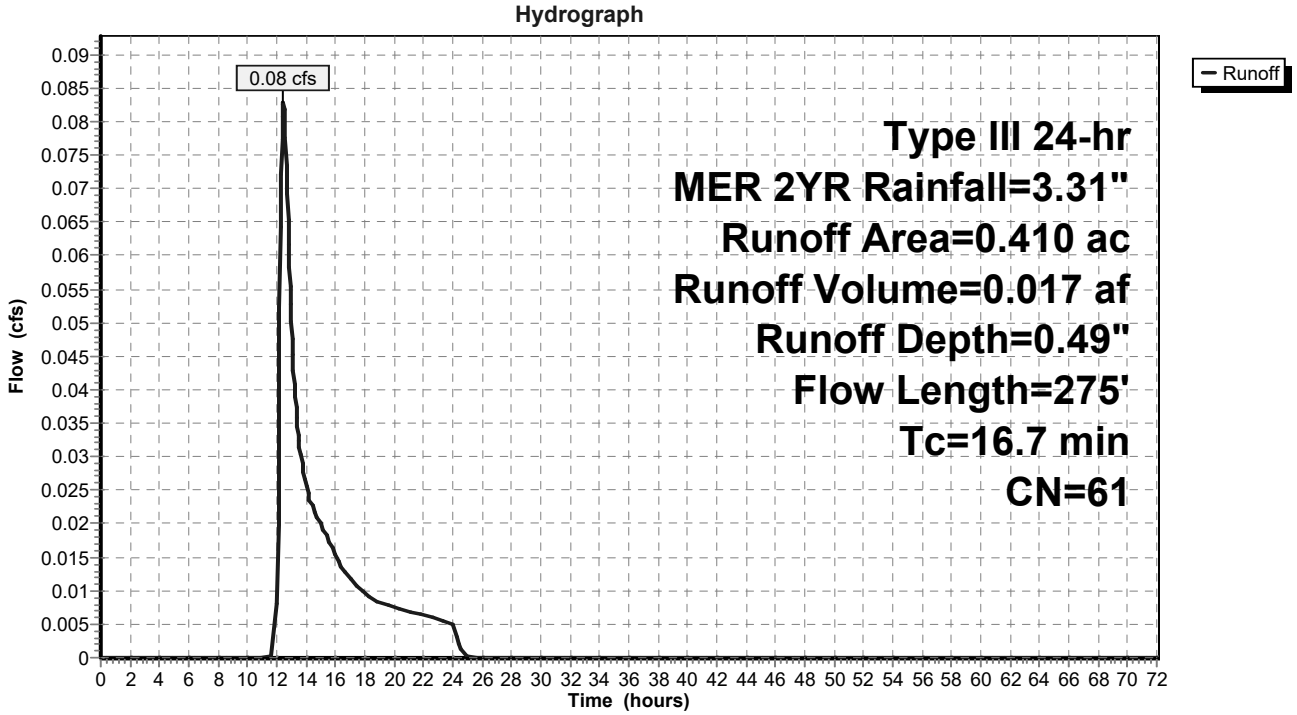
Runoff = 0.08 cfs @ 12.47 hrs, Volume= 0.017 af, Depth= 0.49"

Runoff by SCS TR-20 method, UH=Delmarva, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
Type III 24-hr MER 2YR Rainfall=3.31"

Area (ac)	CN	Description
0.410	61	>75% Grass cover, Good, HSG B
0.410		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.8	27	0.0090	0.07		**Sheet Flow, Sheet 1** Grass: Dense n= 0.240 P2= 3.31"
0.9	45	0.0090	0.87		**Sheet Flow, Sheet 2** Smooth surfaces n= 0.011 P2= 3.31"
7.0	28	0.0090	0.07		**Sheet Flow, Sheet 3** Grass: Dense n= 0.240 P2= 3.31"
2.0	175	0.0080	1.44		**Shallow Concentrated Flow, SCF** Unpaved Kv= 16.1 fps
16.7	275	Total			

Subcatchment 12: P-4-Perv



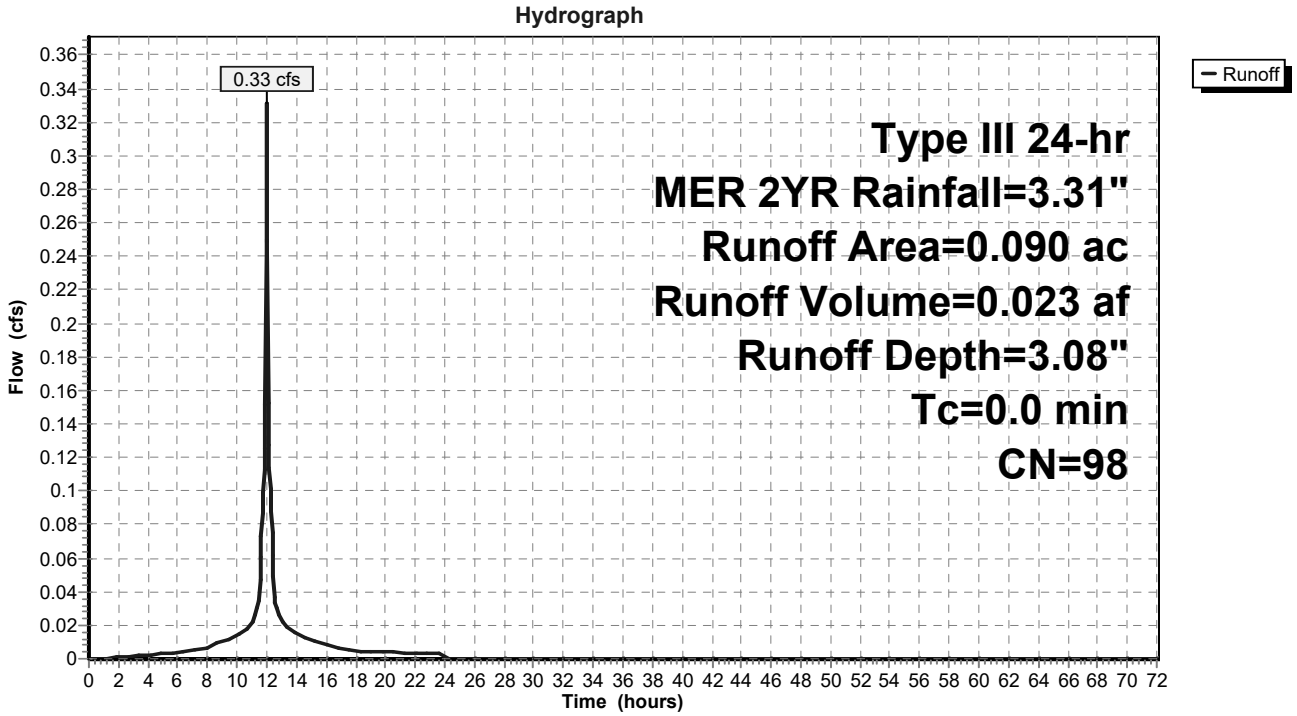
Summary for Subcatchment 13: P-4-Imperv

Runoff = 0.33 cfs @ 12.00 hrs, Volume= 0.023 af, Depth= 3.08"

Runoff by SCS TR-20 method, UH=Delmarva, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
Type III 24-hr MER 2YR Rainfall=3.31"

Area (ac)	CN	Description
0.090	98	Paved parking, HSG B
0.090		100.00% Impervious Area

Subcatchment 13: P-4-Imperv



Summary for Subcatchment 14: P-4-Off-Perv

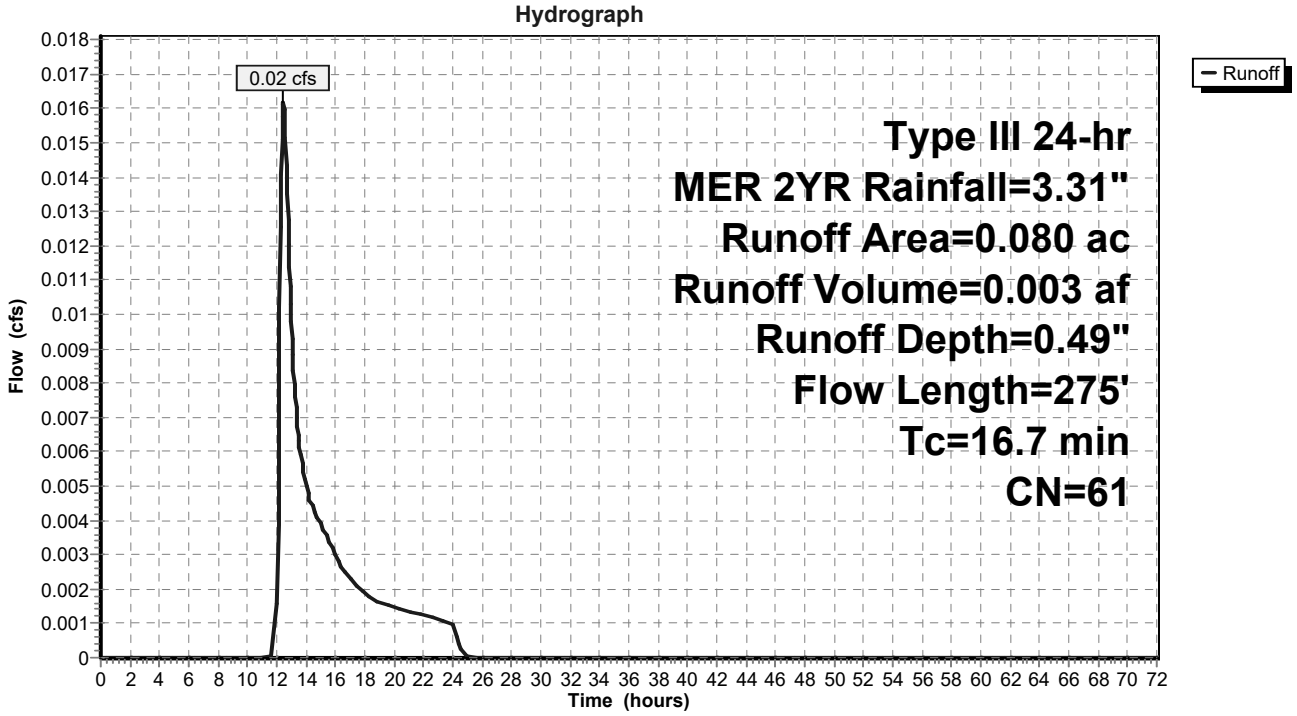
Runoff = 0.02 cfs @ 12.47 hrs, Volume= 0.003 af, Depth= 0.49"

Runoff by SCS TR-20 method, UH=Delmarva, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
Type III 24-hr MER 2YR Rainfall=3.31"

Area (ac)	CN	Description
0.080	61	>75% Grass cover, Good, HSG B
0.080		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.8	27	0.0090	0.07		**Sheet Flow, Sheet 1** Grass: Dense n= 0.240 P2= 3.31"
0.9	45	0.0090	0.87		**Sheet Flow, Sheet 2** Smooth surfaces n= 0.011 P2= 3.31"
7.0	28	0.0090	0.07		**Sheet Flow, Sheet 3** Grass: Dense n= 0.240 P2= 3.31"
2.0	175	0.0080	1.44		**Shallow Concentrated Flow, SCF** Unpaved Kv= 16.1 fps
16.7	275	Total			

Subcatchment 14: P-4-Off-Perv



Summary for Subcatchment 15: P-4-Off-Imperv

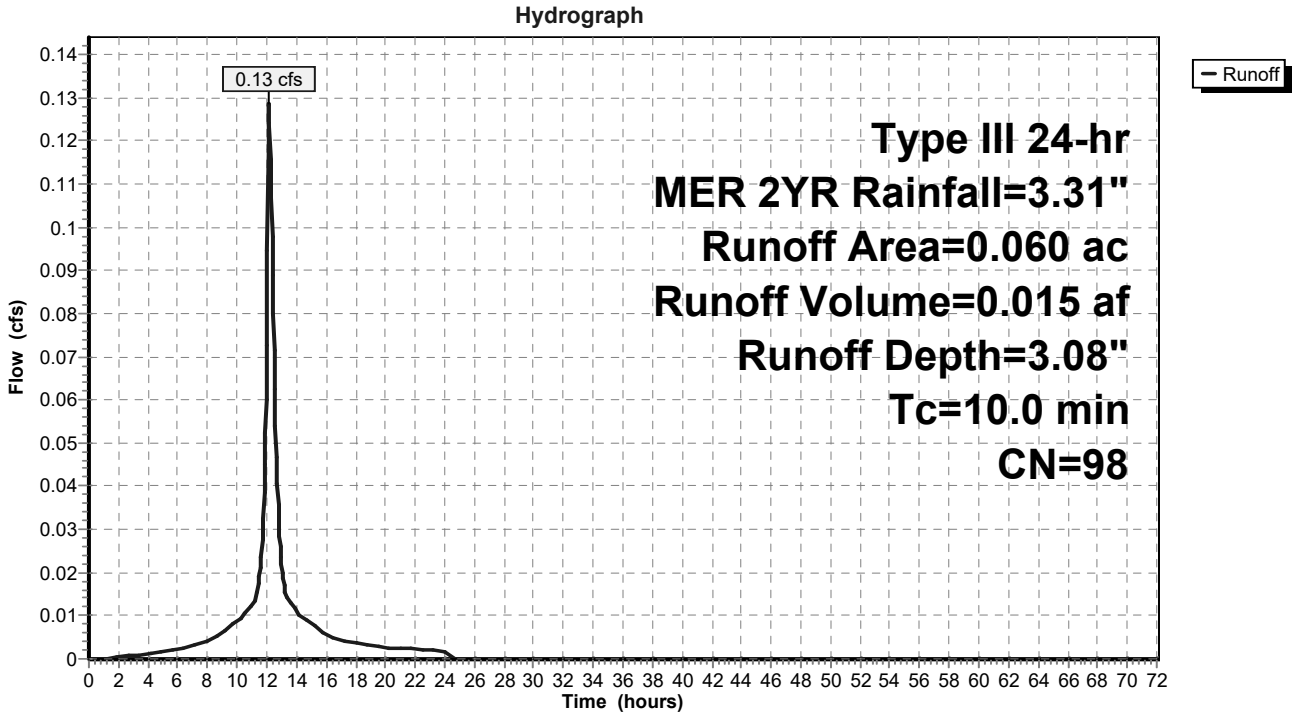
Runoff = 0.13 cfs @ 12.16 hrs, Volume= 0.015 af, Depth= 3.08"

Runoff by SCS TR-20 method, UH=Delmarva, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
Type III 24-hr MER 2YR Rainfall=3.31"

Area (ac)	CN	Description
0.060	98	Paved parking, HSG B
0.060		100.00% Impervious Area

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

Subcatchment 15: P-4-Off-Imperv



Summary for Subcatchment 16: P-5 Perv

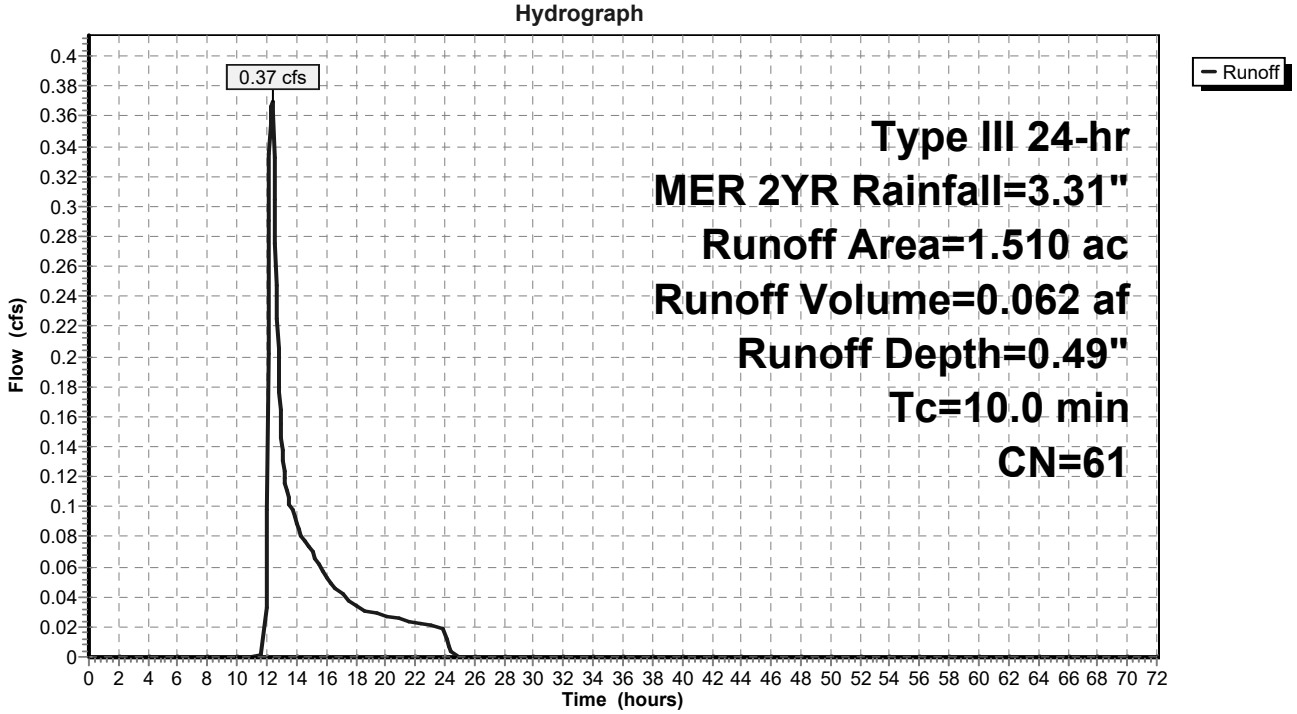
Runoff = 0.37 cfs @ 12.35 hrs, Volume= 0.062 af, Depth= 0.49"

Runoff by SCS TR-20 method, UH=Delmarva, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
Type III 24-hr MER 2YR Rainfall=3.31"

Area (ac)	CN	Description
1.510	61	>75% Grass cover, Good, HSG B
1.510		100.00% Pervious Area

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

Subcatchment 16: P-5 Perv



Summary for Subcatchment 17: P-5 Imperv

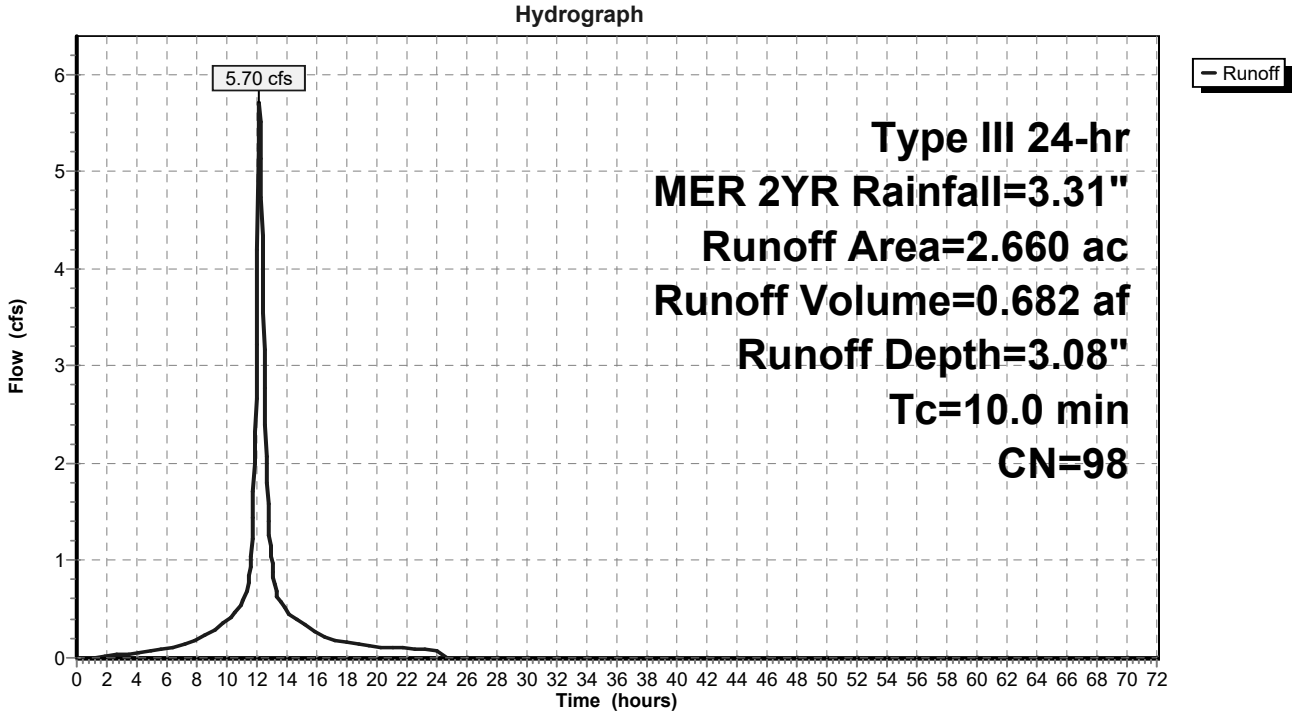
Runoff = 5.70 cfs @ 12.16 hrs, Volume= 0.682 af, Depth= 3.08"

Runoff by SCS TR-20 method, UH=Delmarva, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
Type III 24-hr MER 2YR Rainfall=3.31"

	Area (ac)	CN	Description
*	1.040	98	Building
*	1.110	98	Pavement
*	0.160	98	Sidewalk
*	0.110	98	Concrete
*	0.240	98	Driveway
	2.660	98	Weighted Average
	2.660		100.00% Impervious Area

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

Subcatchment 17: P-5 Imperv



Summary for Subcatchment 18: Extra Impervious

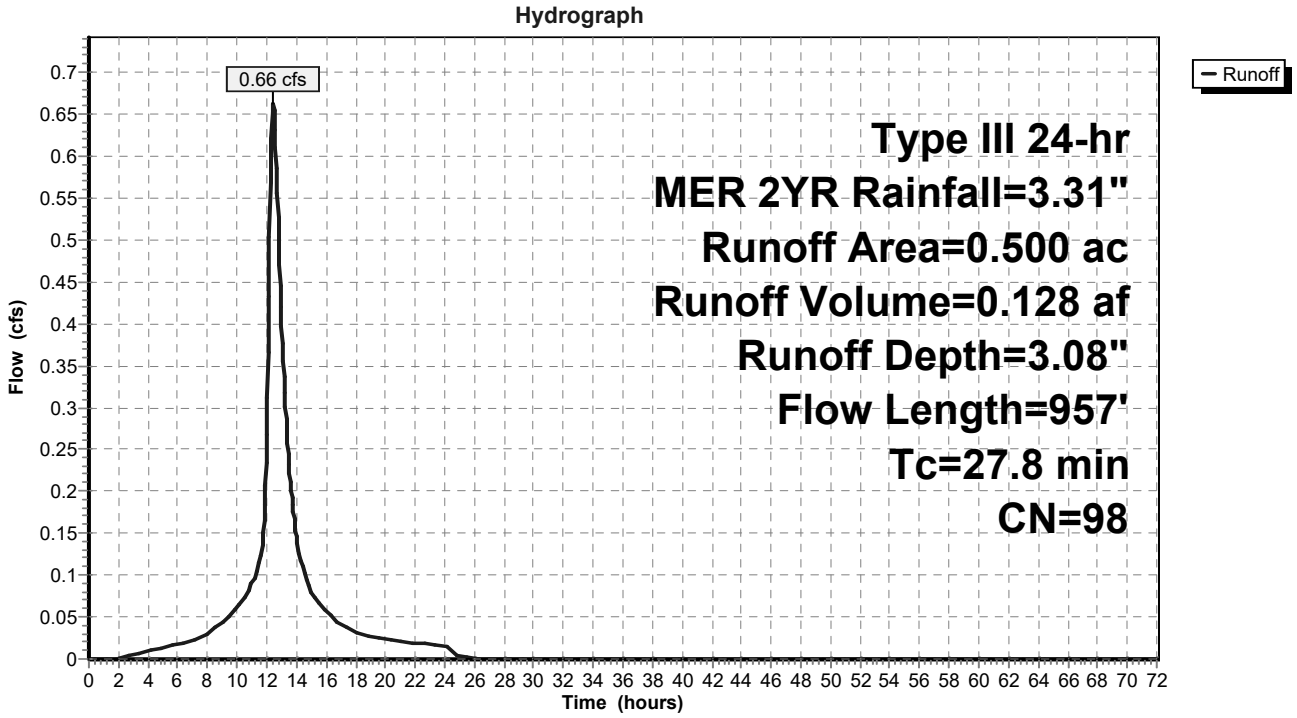
Runoff = 0.66 cfs @ 12.42 hrs, Volume= 0.128 af, Depth= 3.08"

Runoff by SCS TR-20 method, UH=Delmarva, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
Type III 24-hr MER 2YR Rainfall=3.31"

	Area (ac)	CN	Description
*	0.500	98	impervious
	0.500		100.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
20.3	100	0.0040	0.08		**Sheet Flow, Sheet 1** Cultivated: Residue>20% n= 0.170 P2= 3.31"
7.5	857	0.0140	1.90		**Shallow Concentrated Flow, SCF 1** Unpaved Kv= 16.1 fps
27.8	957	Total			

Subcatchment 18: Extra Impervious



Summary for Pond 1P: Basin B

Inflow Area = 4.170 ac, 63.79% Impervious, Inflow Depth = 2.14" for MER 2YR event
Inflow = 6.01 cfs @ 12.17 hrs, Volume= 0.744 af
Outflow = 0.26 cfs @ 16.62 hrs, Volume= 0.221 af, Atten= 96%, Lag= 267.5 min
Primary = 0.26 cfs @ 16.62 hrs, Volume= 0.221 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
Peak Elev= 105.25' @ 16.62 hrs Surf.Area= 0.332 ac Storage= 0.601 af

Plug-Flow detention time= 689.1 min calculated for 0.221 af (30% of inflow)
Center-of-Mass det. time= 502.9 min (1,281.2 - 778.3)

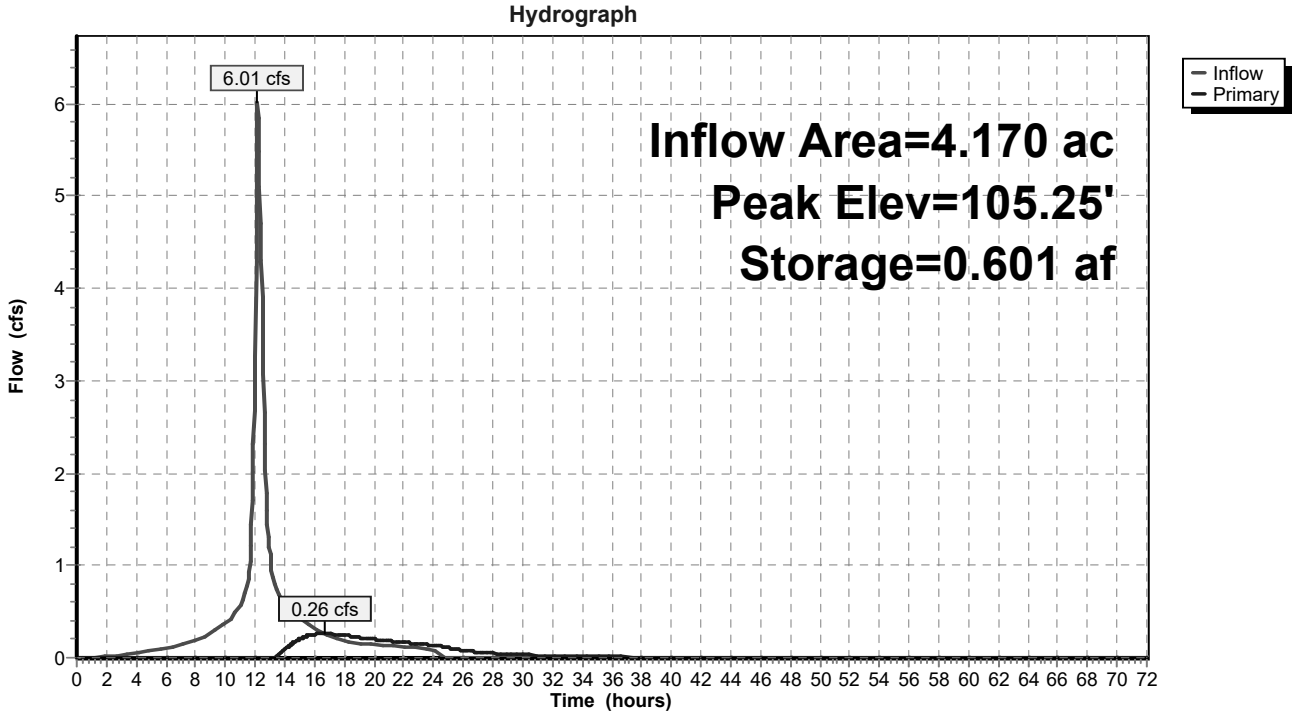
Volume	Invert	Avail.Storage	Storage Description
#1	103.00'	1.751 af	**Custom Stage Data (Prismatic)** Listed below (Recalc)

Elevation (feet)	Surf.Area (acres)	Inc.Store (acre-feet)	Cum.Store (acre-feet)
103.00	0.206	0.000	0.000
104.00	0.260	0.233	0.233
105.00	0.317	0.288	0.522
106.00	0.377	0.347	0.869
107.00	0.440	0.409	1.277
108.00	0.507	0.474	1.751

Device	Routing	Invert	Outlet Devices
#1	Primary	103.50'	**15.0" Round Culvert** L= 1,030.0' RCP, sq.cut end projecting, Ke= 0.500 Inlet / Outlet Invert= 103.50' / 98.35' S= 0.0050 '/' Cc= 0.900 n= 0.013, Flow Area= 1.23 sf
#2	Device 1	105.00'	**0.7' long Sharp-Crested Rectangular Weir** 2 End Contraction(s)

Primary OutFlow Max=0.26 cfs @ 16.62 hrs HW=105.25' TW=99.69' (Dynamic Tailwater)
└─**1=Culvert** (Passes 0.26 cfs of 4.60 cfs potential flow)
  └─**2=Sharp-Crested Rectangular Weir** (Weir Controls 0.26 cfs @ 1.62 fps)

Pond 1P: Basin B



Summary for Pond 2P: Basin A

Inflow Area = 13.070 ac, 50.65% Impervious, Inflow Depth = 1.38" for MER 2YR event
Inflow = 8.38 cfs @ 12.18 hrs, Volume= 1.507 af
Outflow = 1.28 cfs @ 14.13 hrs, Volume= 1.140 af, Atten= 85%, Lag= 117.0 min
Primary = 1.28 cfs @ 14.13 hrs, Volume= 1.140 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
Peak Elev= 99.79' @ 14.13 hrs Surf.Area= 0.461 ac Storage= 0.766 af

Plug-Flow detention time= 472.3 min calculated for 1.140 af (76% of inflow)
Center-of-Mass det. time= 343.1 min (1,214.9 - 871.8)

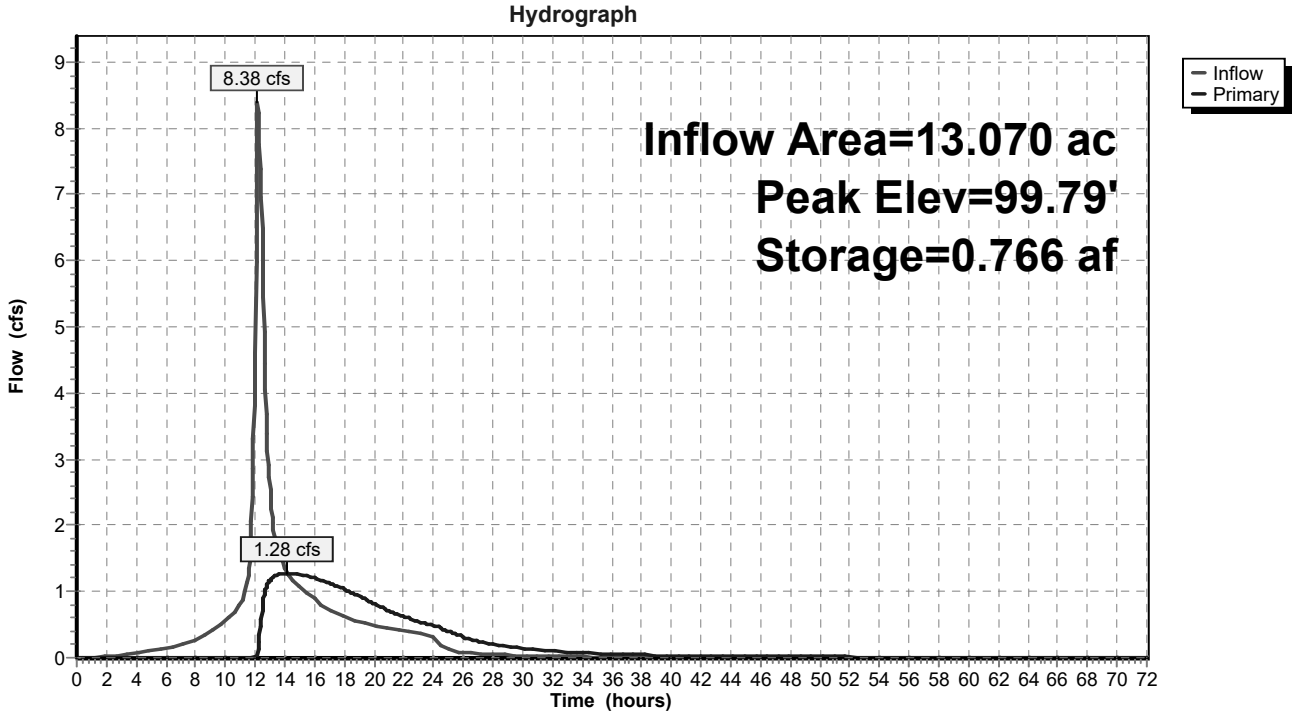
Volume	Invert	Avail.Storage	Storage Description
#1	98.10'	2.779 af	**Custom Stage Data (Prismatic)** Listed below (Recalc)

Elevation (feet)	Surf.Area (acres)	Inc.Store (acre-feet)	Cum.Store (acre-feet)
98.10	0.446	0.000	0.000
99.00	0.454	0.405	0.405
100.00	0.463	0.458	0.863
101.00	0.471	0.467	1.330
102.00	0.479	0.475	1.805
103.00	0.487	0.483	2.288
104.00	0.496	0.492	2.779

Device	Routing	Invert	Outlet Devices
#1	Primary	98.10'	**18.0" Round Culvert X 2.00** L= 100.0' RCP, sq.cut end projecting, Ke= 0.500 Inlet / Outlet Invert= 98.10' / 97.60' S= 0.0050 '/' Cc= 0.900 n= 0.013 Concrete pipe, straight & clean, Flow Area= 1.77 sf
#2	Device 1	98.88'	**8.0" Vert. Orifice/Grate** C= 0.600
#3	Device 1	100.10'	**2.0' long Sharp-Crested Rectangular Weir** 2 End Contraction(s)

Primary OutFlow Max=1.28 cfs @ 14.13 hrs HW=99.79' TW=0.00' (Dynamic Tailwater)
└─**1=Culvert** (Passes 1.28 cfs of 14.38 cfs potential flow)
  ├─**2=Orifice/Grate** (Orifice Controls 1.28 cfs @ 3.65 fps)
  └─**3=Sharp-Crested Rectangular Weir** (Controls 0.00 cfs)

Pond 2P: Basin A

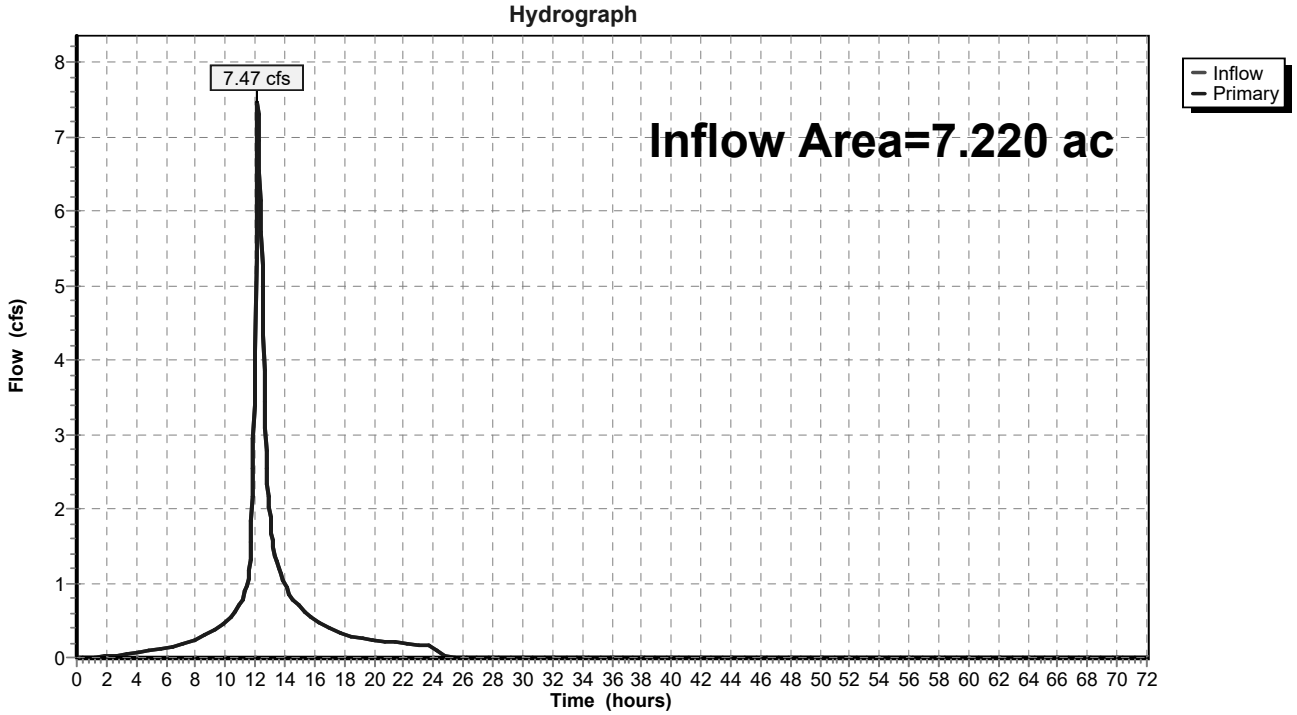


Summary for Link 1L: POA-1

Inflow Area = 7.220 ac, 46.68% Impervious, Inflow Depth = 1.76" for MER 2YR event
Inflow = 7.47 cfs @ 12.17 hrs, Volume= 1.060 af
Primary = 7.47 cfs @ 12.17 hrs, Volume= 1.060 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs

Link 1L: POA-1

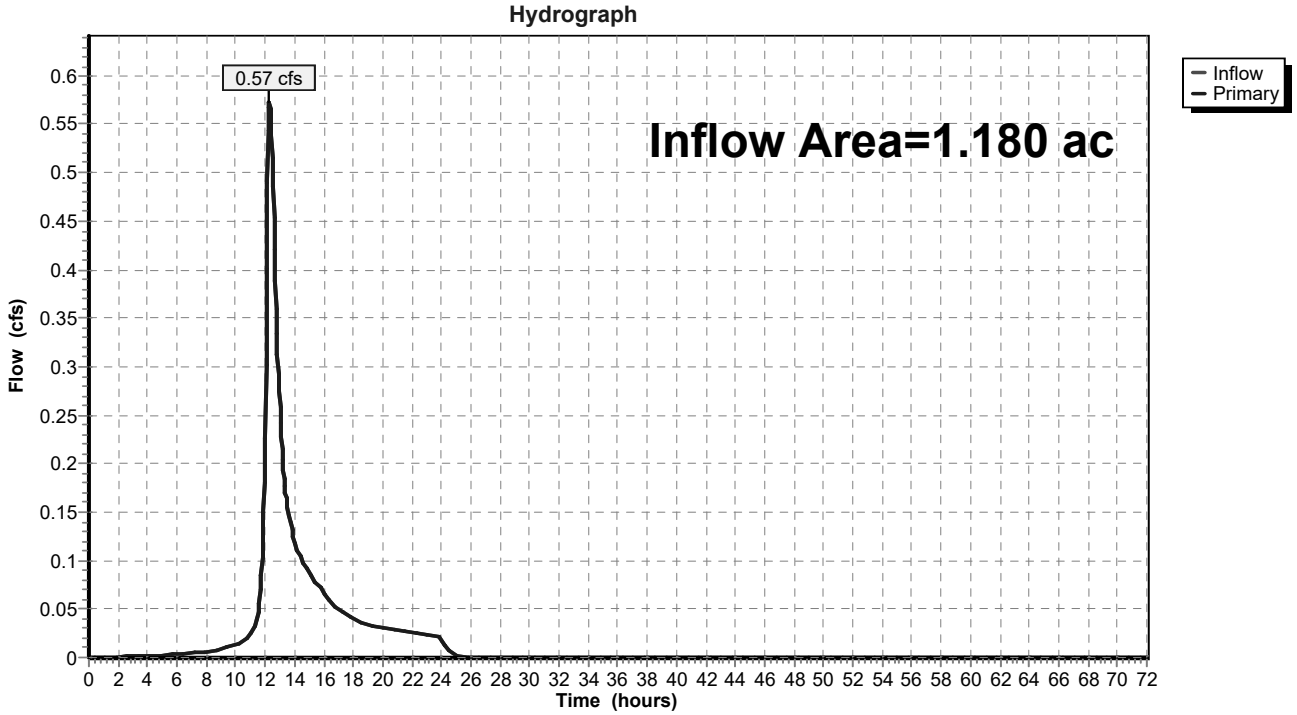


Summary for Link 2L: POA-1 OFF

Inflow Area = 1.180 ac, 7.63% Impervious, Inflow Depth = 0.99" for MER 2YR event
Inflow = 0.57 cfs @ 12.30 hrs, Volume= 0.098 af
Primary = 0.57 cfs @ 12.30 hrs, Volume= 0.098 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs

Link 2L: POA-1 OFF

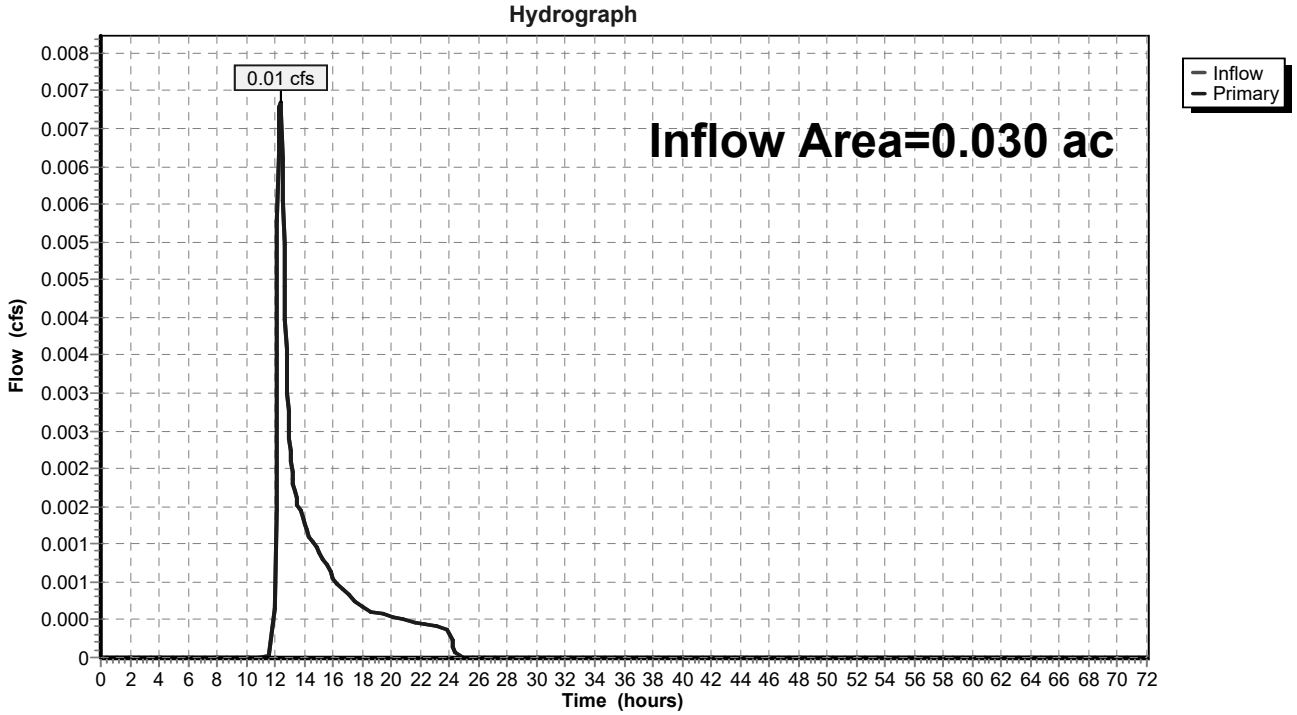


Summary for Link 3L: POA-2

Inflow Area = 0.030 ac, 0.00% Impervious, Inflow Depth = 0.49" for MER 2YR event
Inflow = 0.01 cfs @ 12.35 hrs, Volume= 0.001 af
Primary = 0.01 cfs @ 12.35 hrs, Volume= 0.001 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs

Link 3L: POA-2

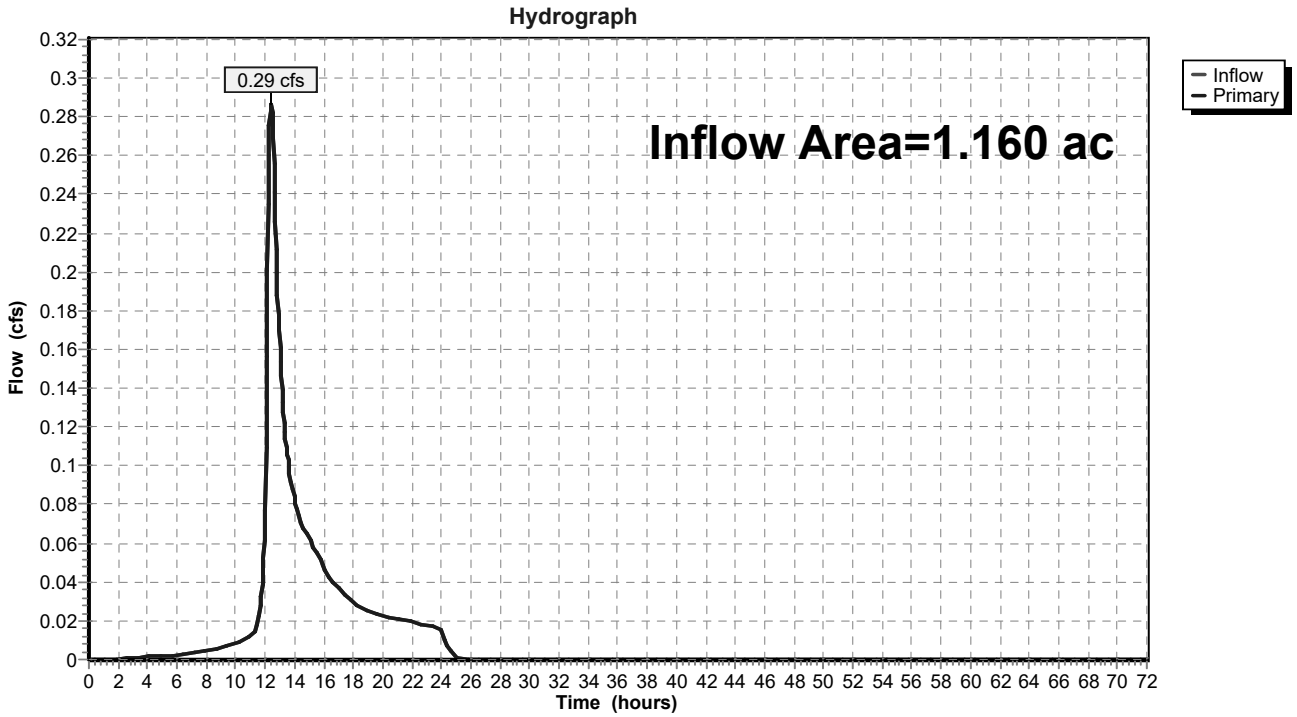


Summary for Link 4L: POA-3

Inflow Area = 1.160 ac, 5.17% Impervious, Inflow Depth = 0.62" for MER 2YR event
Inflow = 0.29 cfs @ 12.41 hrs, Volume= 0.060 af
Primary = 0.29 cfs @ 12.41 hrs, Volume= 0.060 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs

Link 4L: POA-3

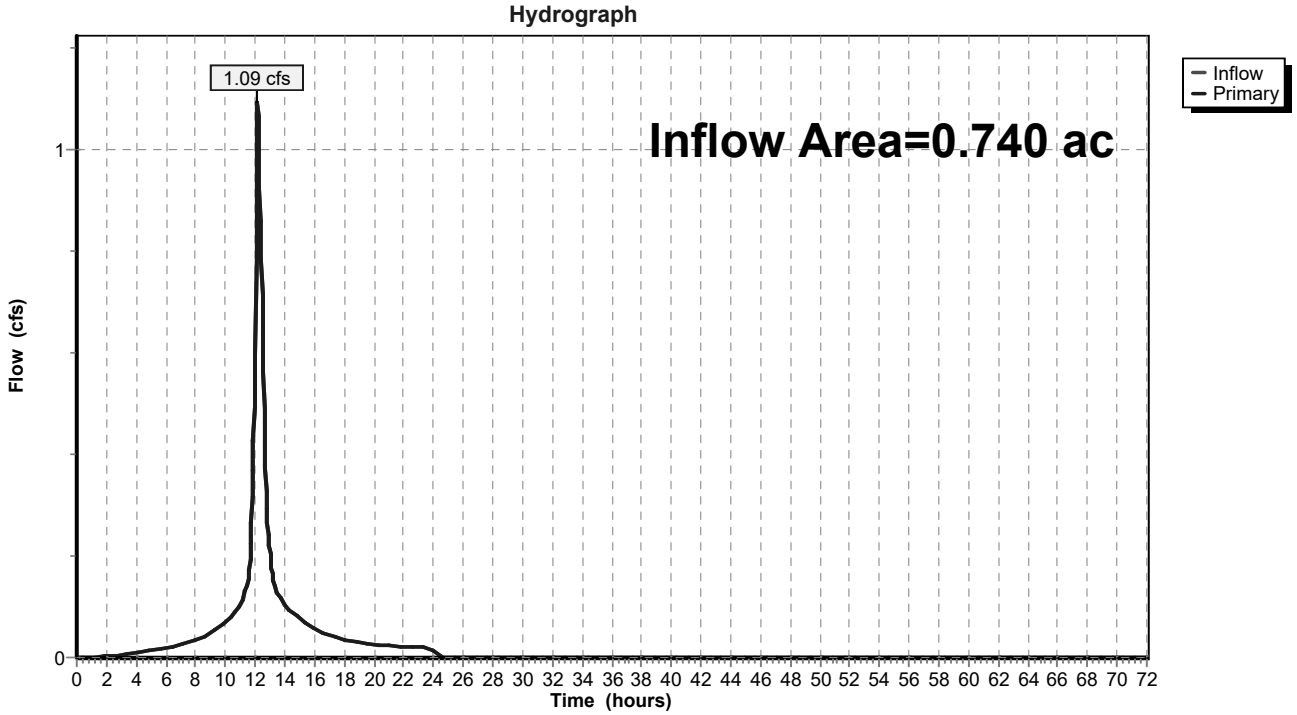


Summary for Link 5L: POA-3 OFF

Inflow Area = 0.740 ac, 66.22% Impervious, Inflow Depth = 2.20" for MER 2YR event
Inflow = 1.09 cfs @ 12.17 hrs, Volume= 0.136 af
Primary = 1.09 cfs @ 12.17 hrs, Volume= 0.136 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs

Link 5L: POA-3 OFF

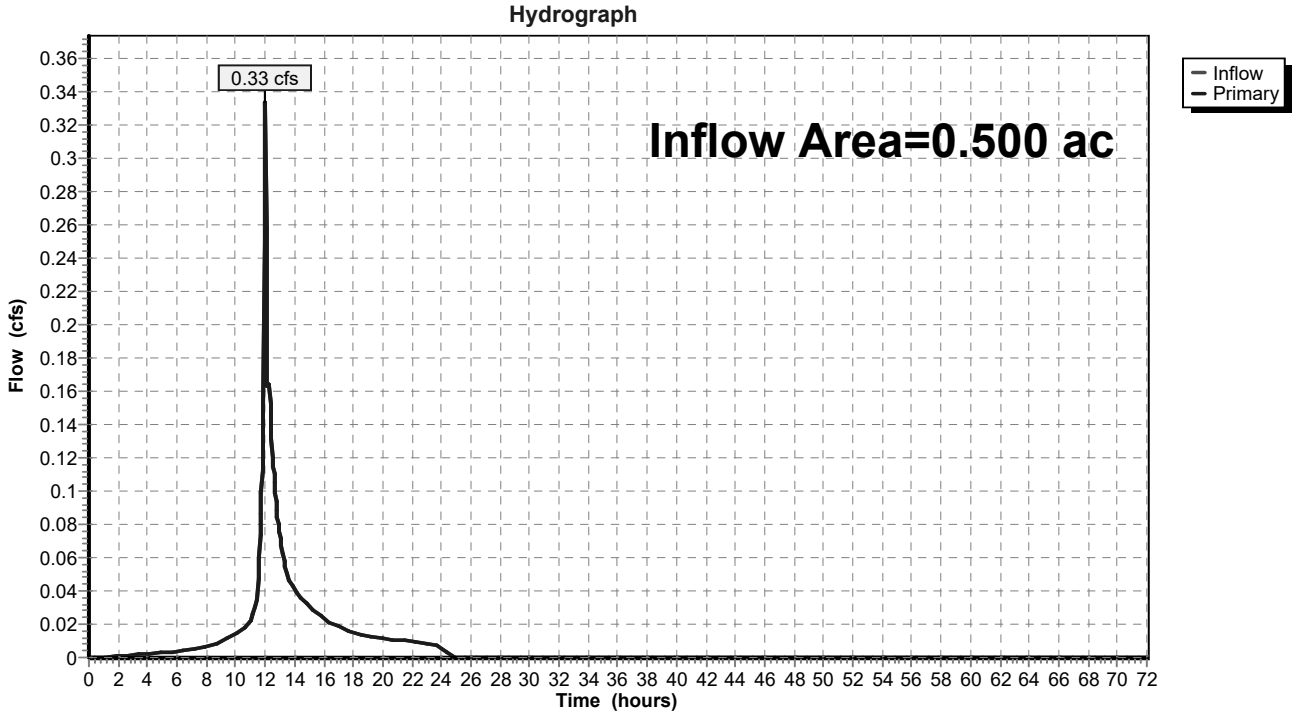


Summary for Link 6L: POA-4

Inflow Area = 0.500 ac, 18.00% Impervious, Inflow Depth = 0.96" for MER 2YR event
Inflow = 0.33 cfs @ 12.00 hrs, Volume= 0.040 af
Primary = 0.33 cfs @ 12.00 hrs, Volume= 0.040 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs

Link 6L: POA-4

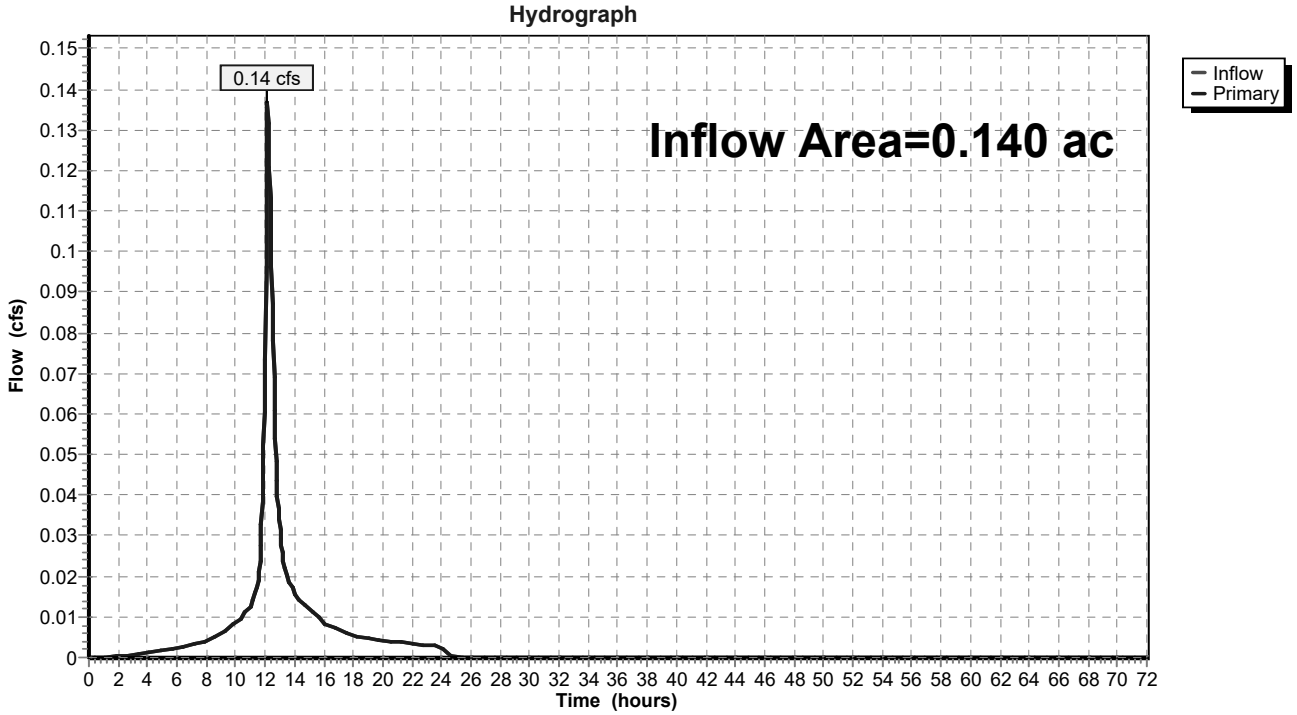


Summary for Link 7L: POA-4 OFF

Inflow Area = 0.140 ac, 42.86% Impervious, Inflow Depth = 1.60" for MER 2YR event
Inflow = 0.14 cfs @ 12.17 hrs, Volume= 0.019 af
Primary = 0.14 cfs @ 12.17 hrs, Volume= 0.019 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs

Link 7L: POA-4 OFF

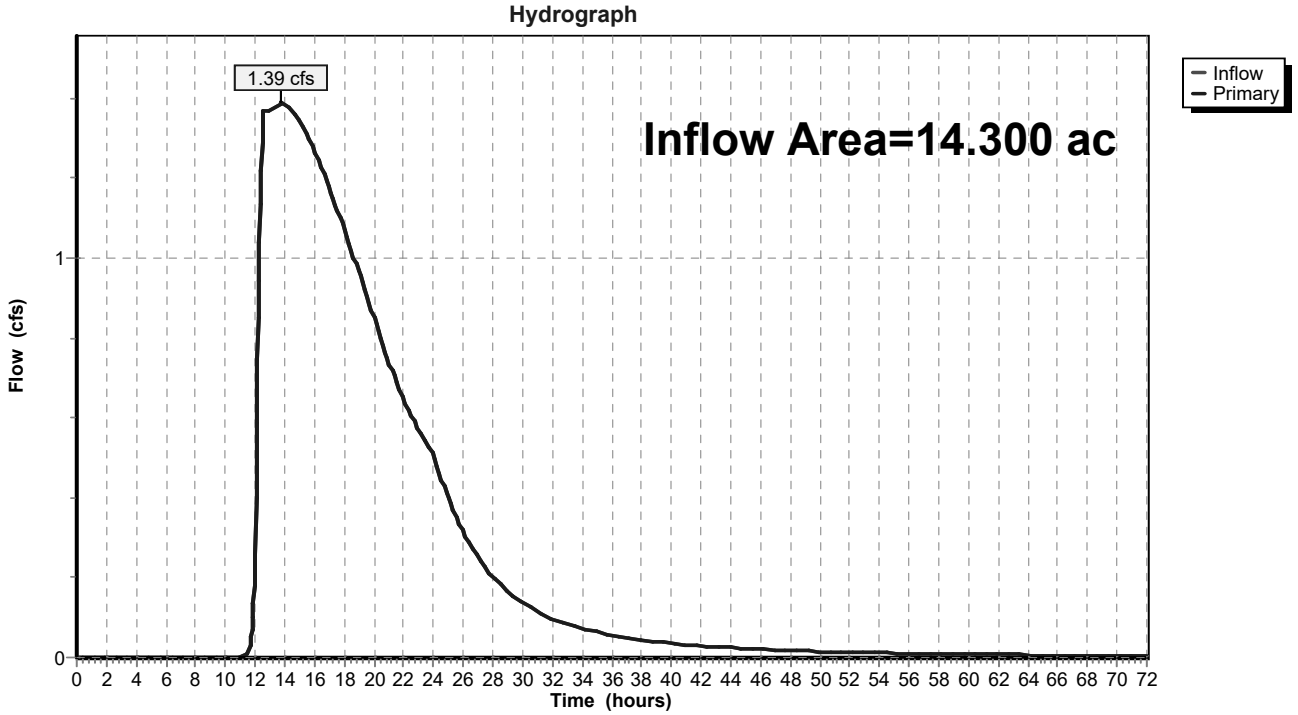


Summary for Link 8L: POA 1 total

Inflow Area = 14.300 ac, 46.29% Impervious, Inflow Depth > 1.03" for MER 2YR event
Inflow = 1.39 cfs @ 13.74 hrs, Volume= 1.232 af
Primary = 1.39 cfs @ 13.74 hrs, Volume= 1.232 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs

Link 8L: POA 1 total

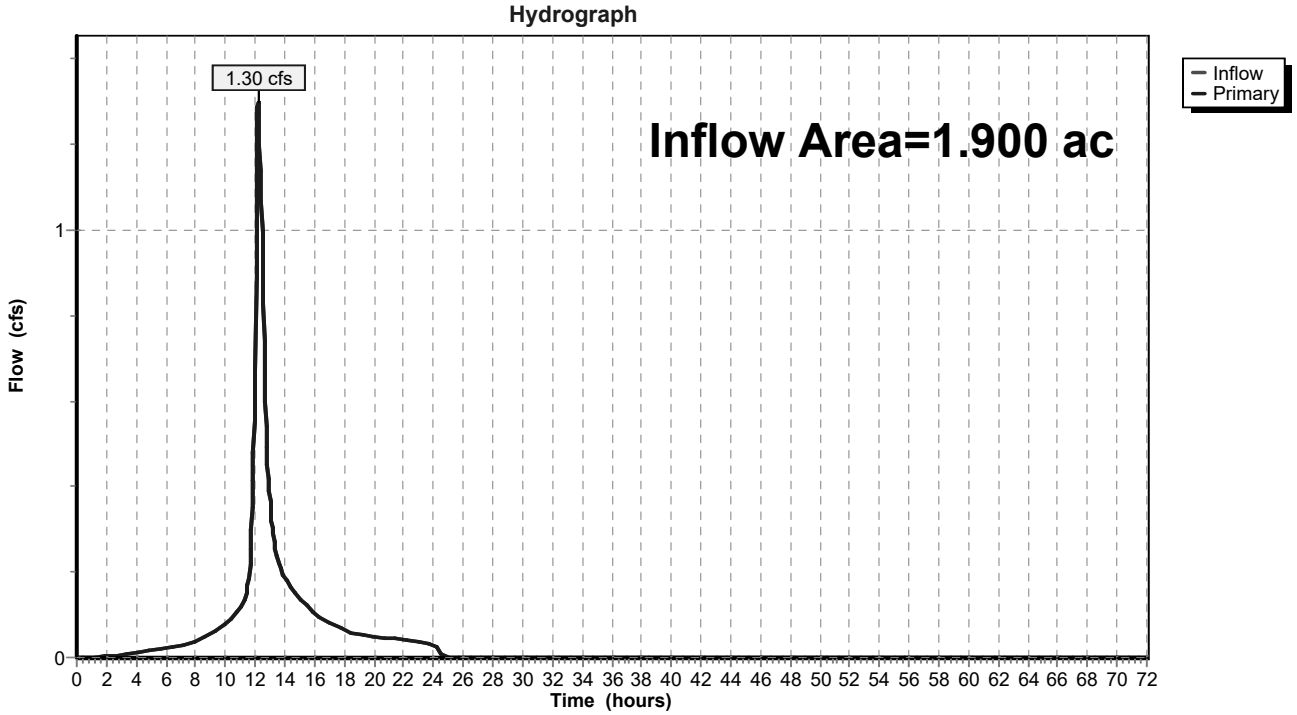


Summary for Link 9L: POA 3 total

Inflow Area = 1.900 ac, 28.95% Impervious, Inflow Depth = 1.24" for MER 2YR event
Inflow = 1.30 cfs @ 12.19 hrs, Volume= 0.196 af
Primary = 1.30 cfs @ 12.19 hrs, Volume= 0.196 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs

Link 9L: POA 3 total

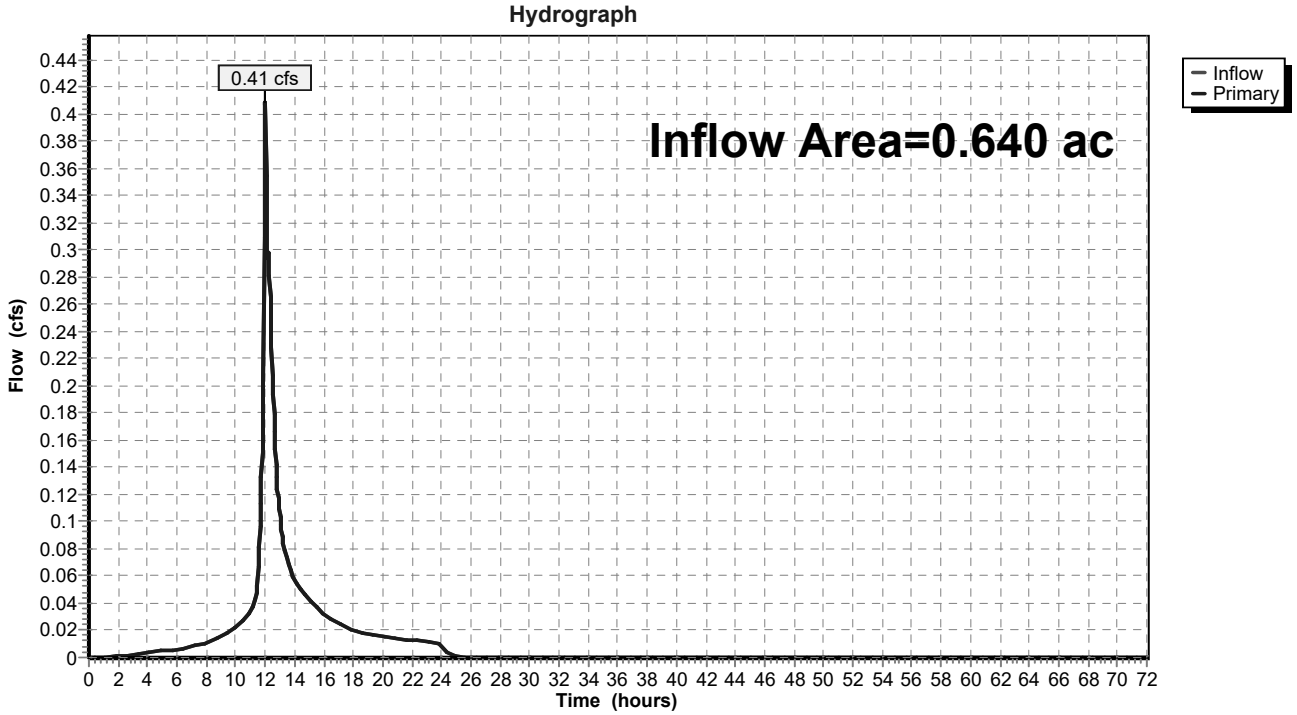


Summary for Link 10L: POA 4 total

Inflow Area = 0.640 ac, 23.44% Impervious, Inflow Depth = 1.10" for MER 2YR event
Inflow = 0.41 cfs @ 12.01 hrs, Volume= 0.058 af
Primary = 0.41 cfs @ 12.01 hrs, Volume= 0.058 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs

Link 10L: POA 4 total



Summary for Subcatchment 1: P-1-Perv

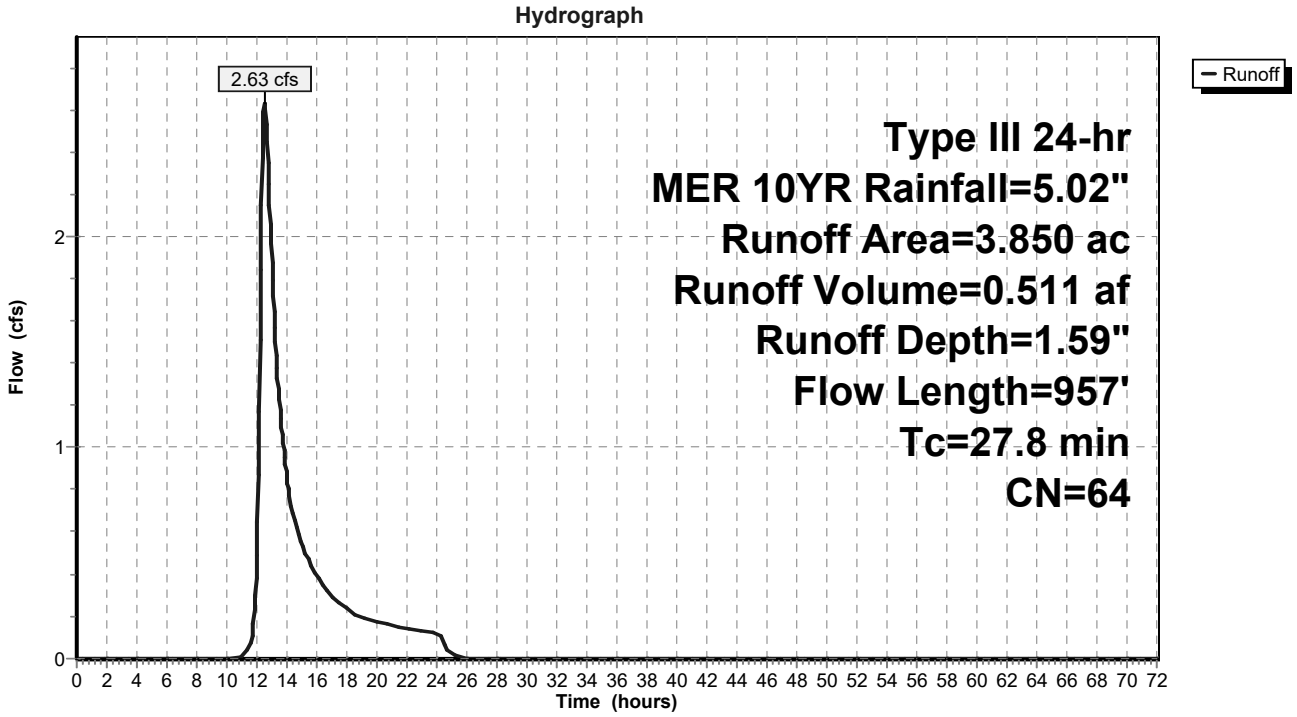
Runoff = 2.63 cfs @ 12.52 hrs, Volume= 0.511 af, Depth= 1.59"

Runoff by SCS TR-20 method, UH=Delmarva, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
Type III 24-hr MER 10YR Rainfall=5.02"

Area (ac)	CN	Description
3.070	61	>75% Grass cover, Good, HSG B
0.780	74	>75% Grass cover, Good, HSG C
3.850	64	Weighted Average
3.850		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
20.3	100	0.0040	0.08		**Sheet Flow, Sheet 1** Cultivated: Residue>20% n= 0.170 P2= 3.31"
7.5	857	0.0140	1.90		**Shallow Concentrated Flow, SCF 1** Unpaved Kv= 16.1 fps
27.8	957	Total			

Subcatchment 1: P-1-Perv



Summary for Subcatchment 2: P-1-Imperv

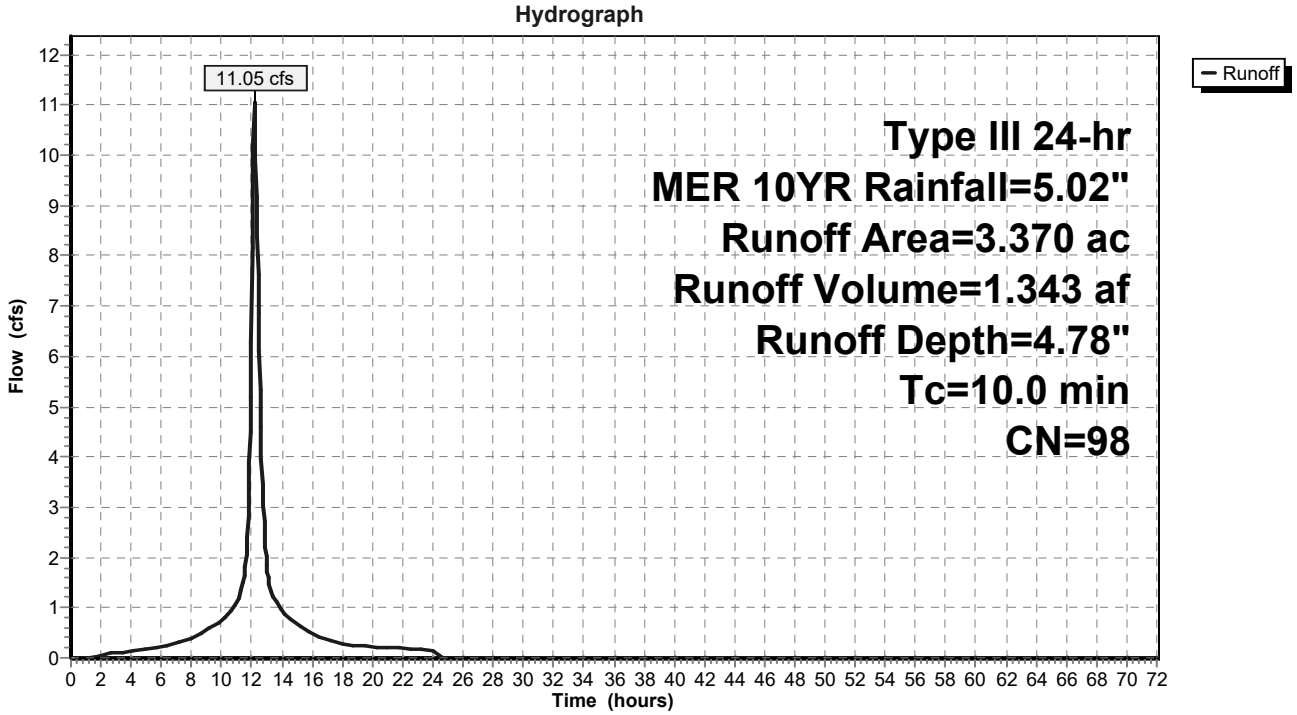
Runoff = 11.05 cfs @ 12.16 hrs, Volume= 1.343 af, Depth= 4.78"

Runoff by SCS TR-20 method, UH=Delmarva, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
Type III 24-hr MER 10YR Rainfall=5.02"

	Area (ac)	CN	Description
*	1.600	98	Buildings
*	1.310	98	Pavement
*	0.300	98	Sidewalk
*	0.110	98	Conc
*	0.050	98	Driveway
	3.370	98	Weighted Average
	3.370		100.00% Impervious Area

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

Subcatchment 2: P-1-Imperv



Summary for Subcatchment 3: P-1-Undet - perv

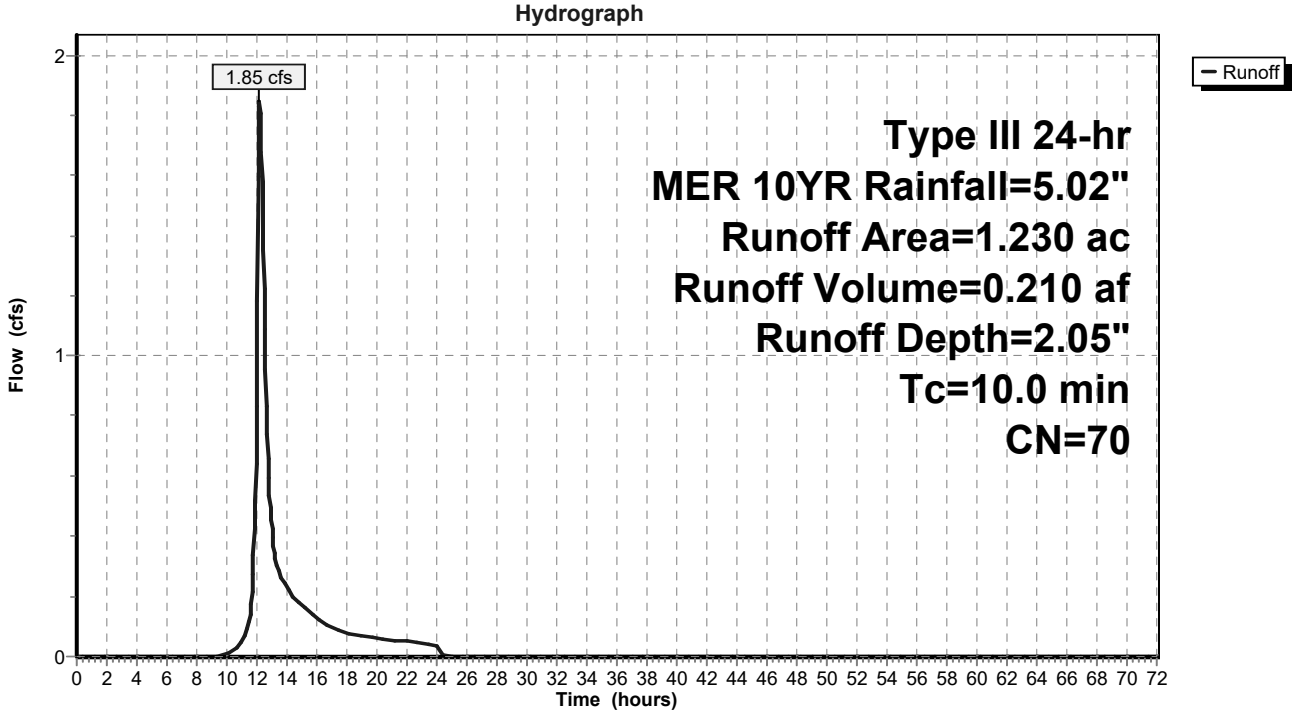
Runoff = 1.85 cfs @ 12.18 hrs, Volume= 0.210 af, Depth= 2.05"

Runoff by SCS TR-20 method, UH=Delmarva, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
Type III 24-hr MER 10YR Rainfall=5.02"

Area (ac)	CN	Description
0.820	74	>75% Grass cover, Good, HSG C
0.410	61	>75% Grass cover, Good, HSG B
1.230	70	Weighted Average
1.230		100.00% Pervious Area

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

Subcatchment 3: P-1-Undet - perv



Summary for Subcatchment 4: P-1A-Off-Perv

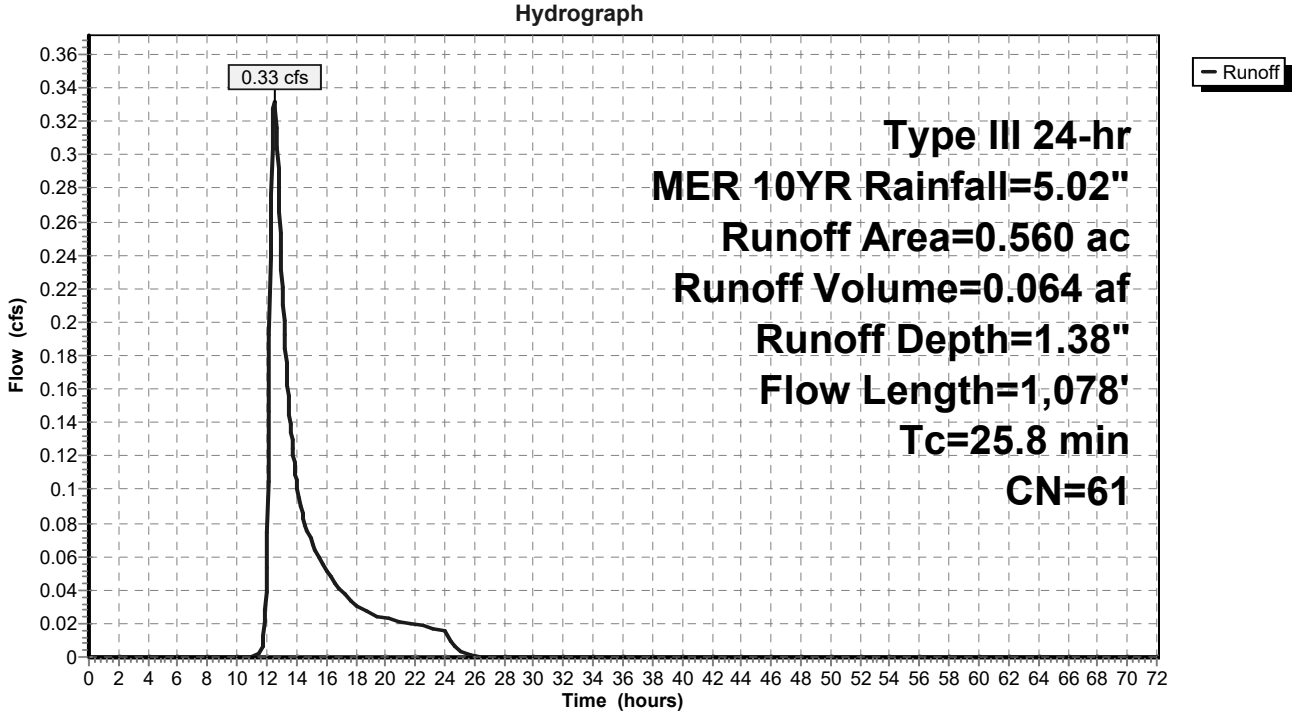
Runoff = 0.33 cfs @ 12.51 hrs, Volume= 0.064 af, Depth= 1.38"

Runoff by SCS TR-20 method, UH=Delmarva, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
Type III 24-hr MER 10YR Rainfall=5.02"

Area (ac)	CN	Description
0.560	61	>75% Grass cover, Good, HSG B
0.560		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
17.2	100	0.0120	0.10		**Sheet Flow, Sheet 1.3** Grass: Dense n= 0.240 P2= 3.31"
8.6	978	0.0140	1.90		**Shallow Concentrated Flow, SCF 1.3** Unpaved Kv= 16.1 fps
25.8	1,078	Total			

Subcatchment 4: P-1A-Off-Perv



Summary for Subcatchment 5: P-1A-Off-Imperv

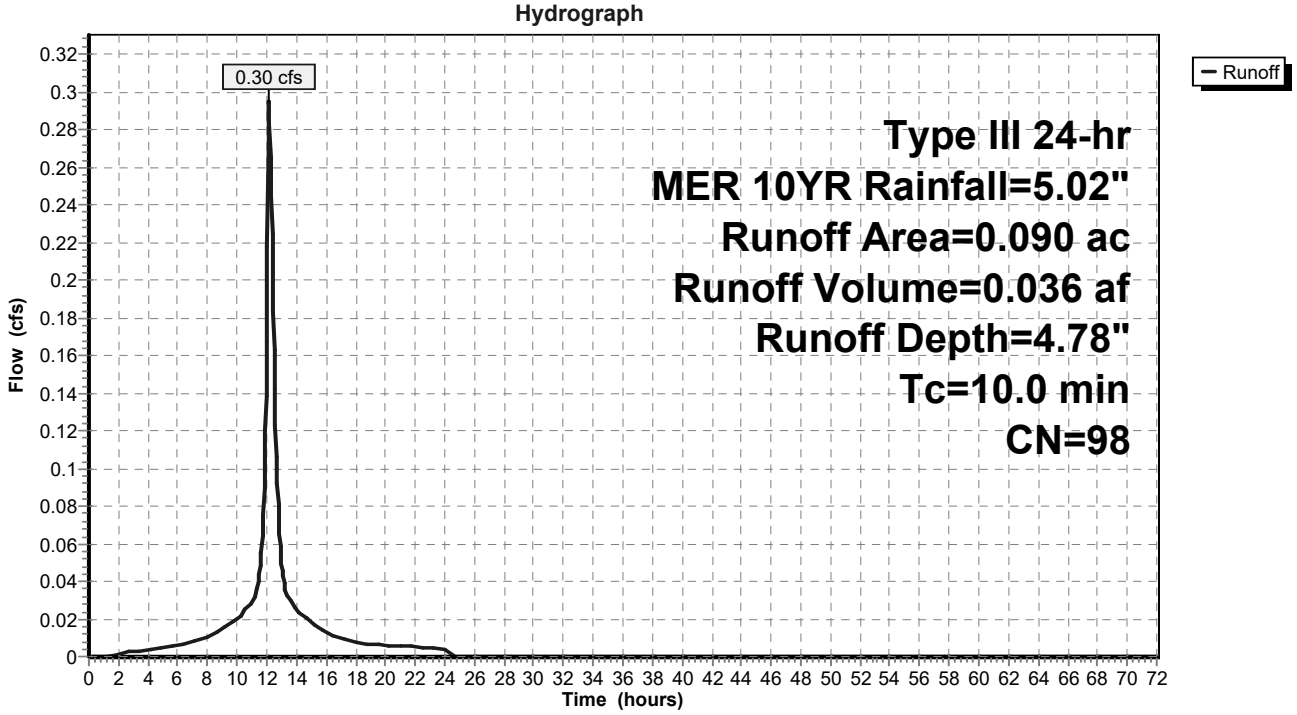
Runoff = 0.30 cfs @ 12.16 hrs, Volume= 0.036 af, Depth= 4.78"

Runoff by SCS TR-20 method, UH=Delmarva, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
Type III 24-hr MER 10YR Rainfall=5.02"

	Area (ac)	CN	Description
	0.010	98	Roofs, HSG B
*	0.080	98	Paved parking, HSG B
	0.090	98	Weighted Average
	0.090		100.00% Impervious Area

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

Subcatchment 5: P-1A-Off-Imperv



Summary for Subcatchment 6: P-1B-Off-Perv

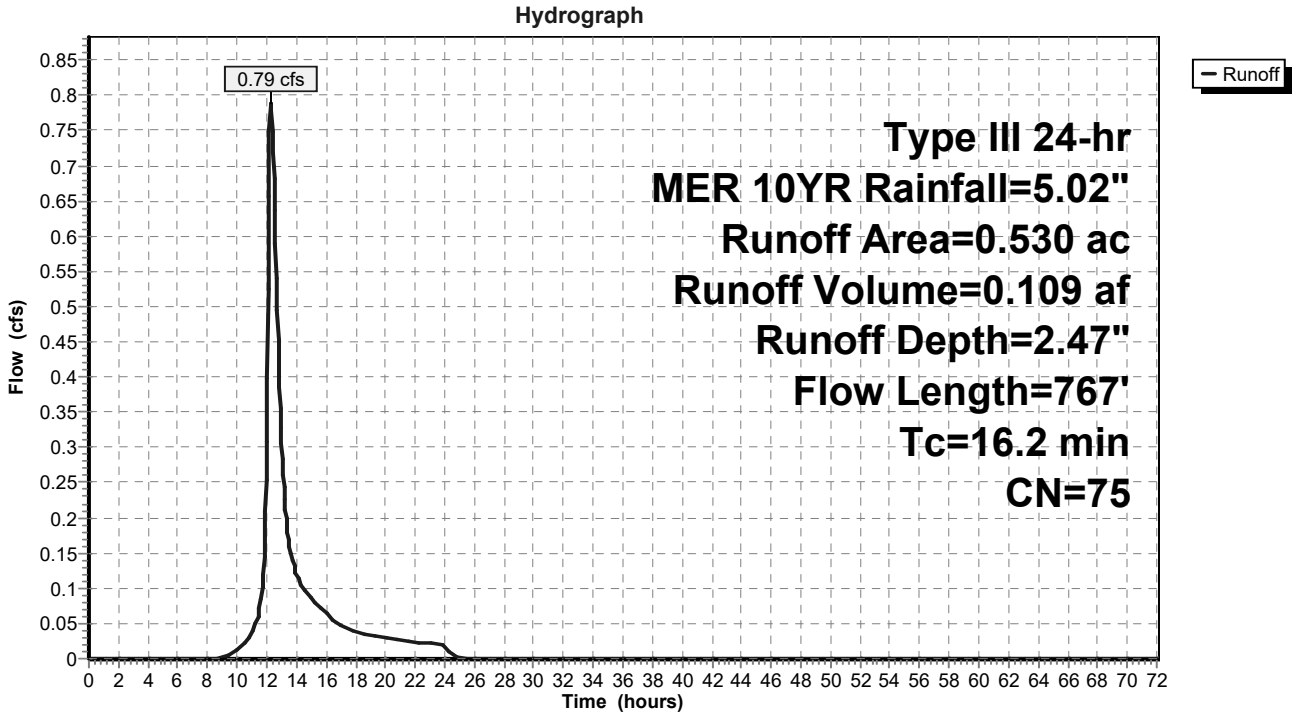
Runoff = 0.79 cfs @ 12.28 hrs, Volume= 0.109 af, Depth= 2.47"

Runoff by SCS TR-20 method, UH=Delmarva, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
Type III 24-hr MER 10YR Rainfall=5.02"

Area (ac)	CN	Description
0.520	75	Row crops, contoured, Good, HSG B
0.010	61	>75% Grass cover, Good, HSG B
0.530	75	Weighted Average
0.530		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
10.4	100	0.0210	0.16		**Sheet Flow, Sheet** Cultivated: Residue>20% n= 0.170 P2= 3.31"
5.8	667	0.0140	1.90		**Shallow Concentrated Flow, SCF** Unpaved Kv= 16.1 fps
16.2	767	Total			

Subcatchment 6: P-1B-Off-Perv



Summary for Subcatchment 7: P-2-perv

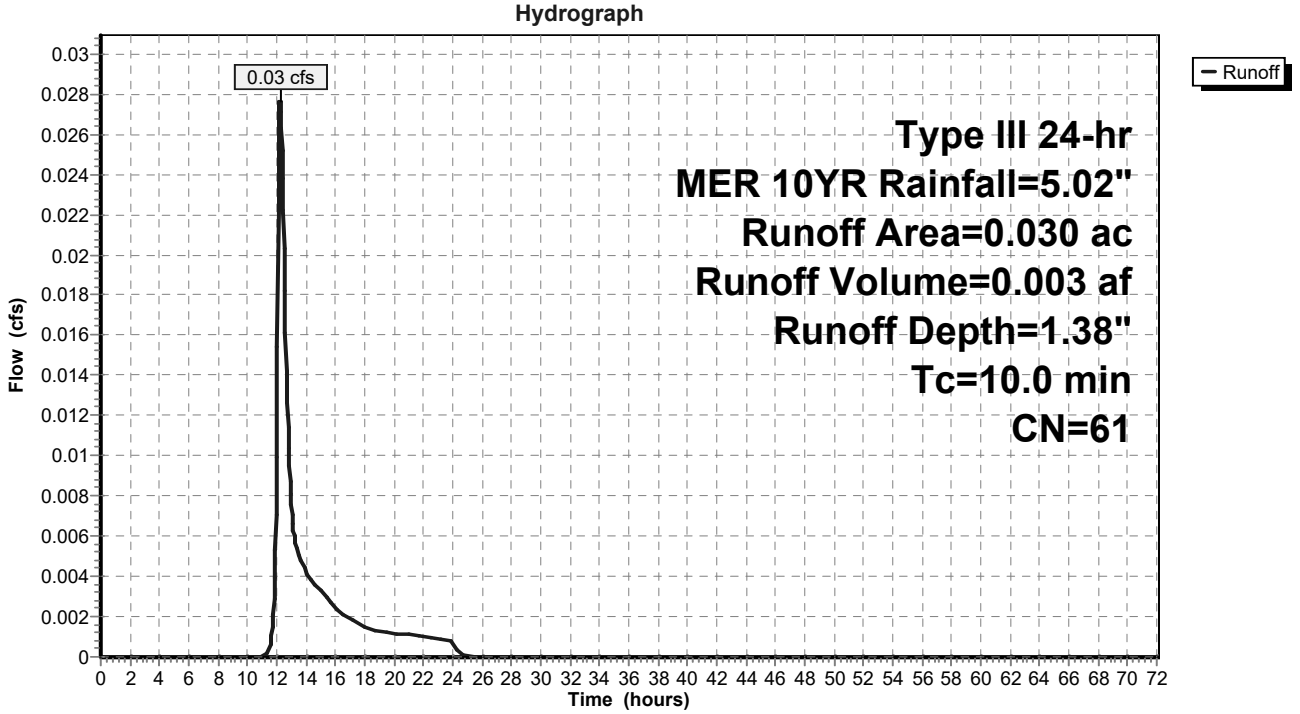
Runoff = 0.03 cfs @ 12.21 hrs, Volume= 0.003 af, Depth= 1.38"

Runoff by SCS TR-20 method, UH=Delmarva, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
Type III 24-hr MER 10YR Rainfall=5.02"

Area (ac)	CN	Description
0.030	61	>75% Grass cover, Good, HSG B
0.030		100.00% Pervious Area

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

Subcatchment 7: P-2-perv



Summary for Subcatchment 8: P-3-Perv

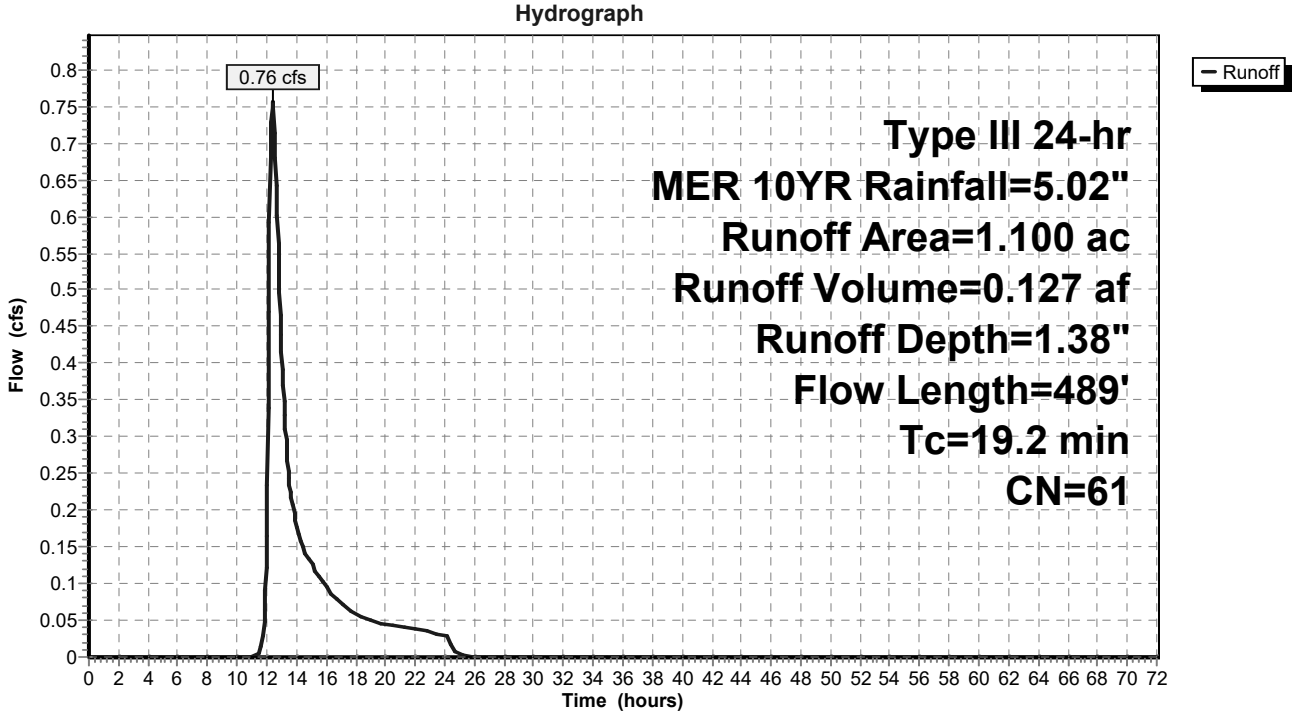
Runoff = 0.76 cfs @ 12.41 hrs, Volume= 0.127 af, Depth= 1.38"

Runoff by SCS TR-20 method, UH=Delmarva, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
Type III 24-hr MER 10YR Rainfall=5.02"

Area (ac)	CN	Description
1.100	61	>75% Grass cover, Good, HSG B
1.100		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
14.7	100	0.0090	0.11		**Sheet Flow, Sheet 4** Cultivated: Residue>20% n= 0.170 P2= 3.31"
4.5	389	0.0080	1.44		**Shallow Concentrated Flow, SCF 4** Unpaved Kv= 16.1 fps
19.2	489	Total			

Subcatchment 8: P-3-Perv



Summary for Subcatchment 9: P-3-Imperv

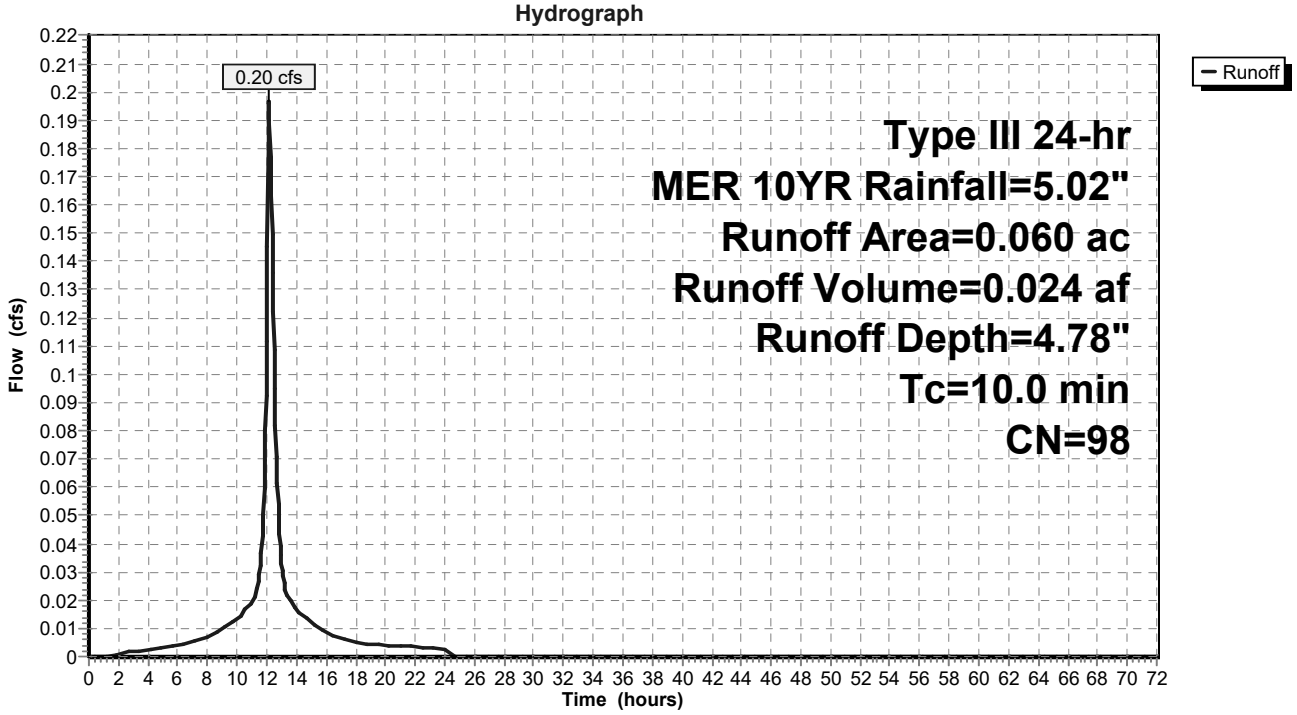
Runoff = 0.20 cfs @ 12.16 hrs, Volume= 0.024 af, Depth= 4.78"

Runoff by SCS TR-20 method, UH=Delmarva, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
Type III 24-hr MER 10YR Rainfall=5.02"

	Area (ac)	CN	Description
*	0.030	98	Pavement
*	0.030	98	Sidewalk
	0.060	98	Weighted Average
	0.060		100.00% Impervious Area

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

Subcatchment 9: P-3-Imperv



Summary for Subcatchment 10: P-3-Off-Perv

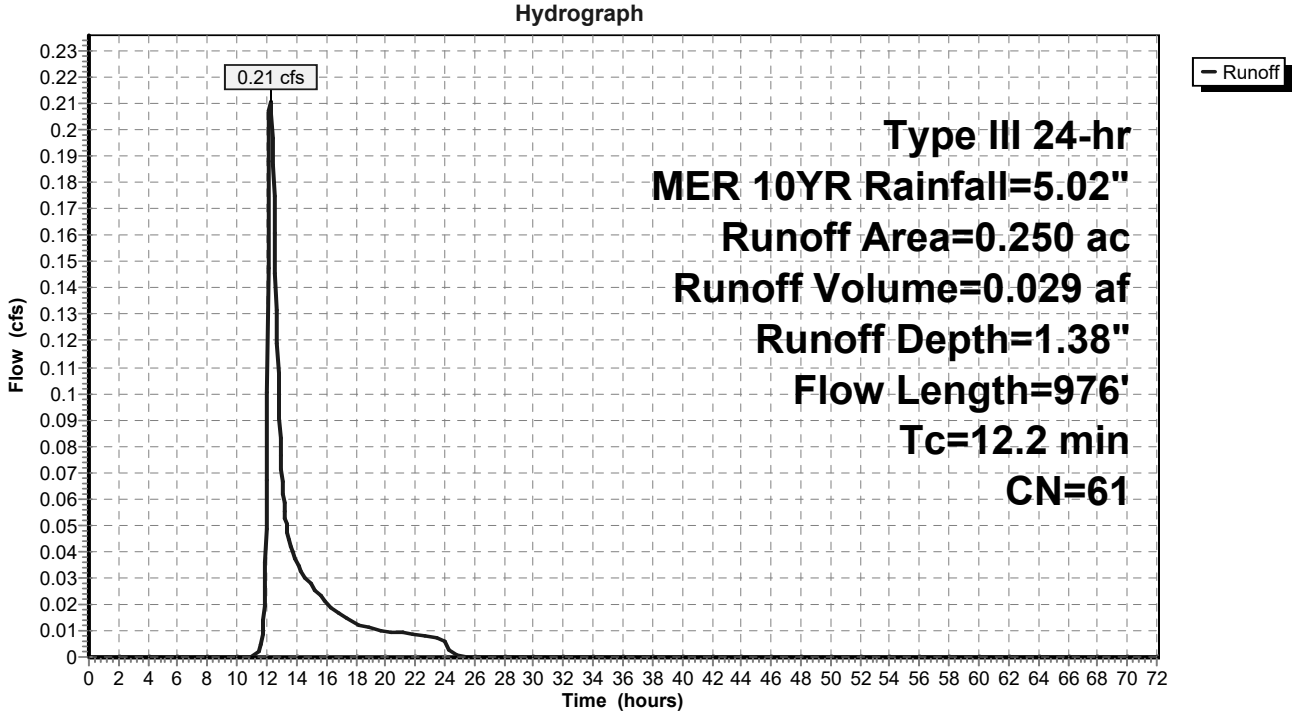
Runoff = 0.21 cfs @ 12.26 hrs, Volume= 0.029 af, Depth= 1.38"

Runoff by SCS TR-20 method, UH=Delmarva, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
Type III 24-hr MER 10YR Rainfall=5.02"

Area (ac)	CN	Description
0.250	61	>75% Grass cover, Good, HSG B
0.250		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
1.4	100	0.0140	1.21		**Sheet Flow, Sheet 4** Smooth surfaces n= 0.011 P2= 3.31"
10.8	876	0.0070	1.35		**Shallow Concentrated Flow, SCF 4** Unpaved Kv= 16.1 fps
12.2	976	Total			

Subcatchment 10: P-3-Off-Perv



Summary for Subcatchment 11: P-3-Off-Imperv

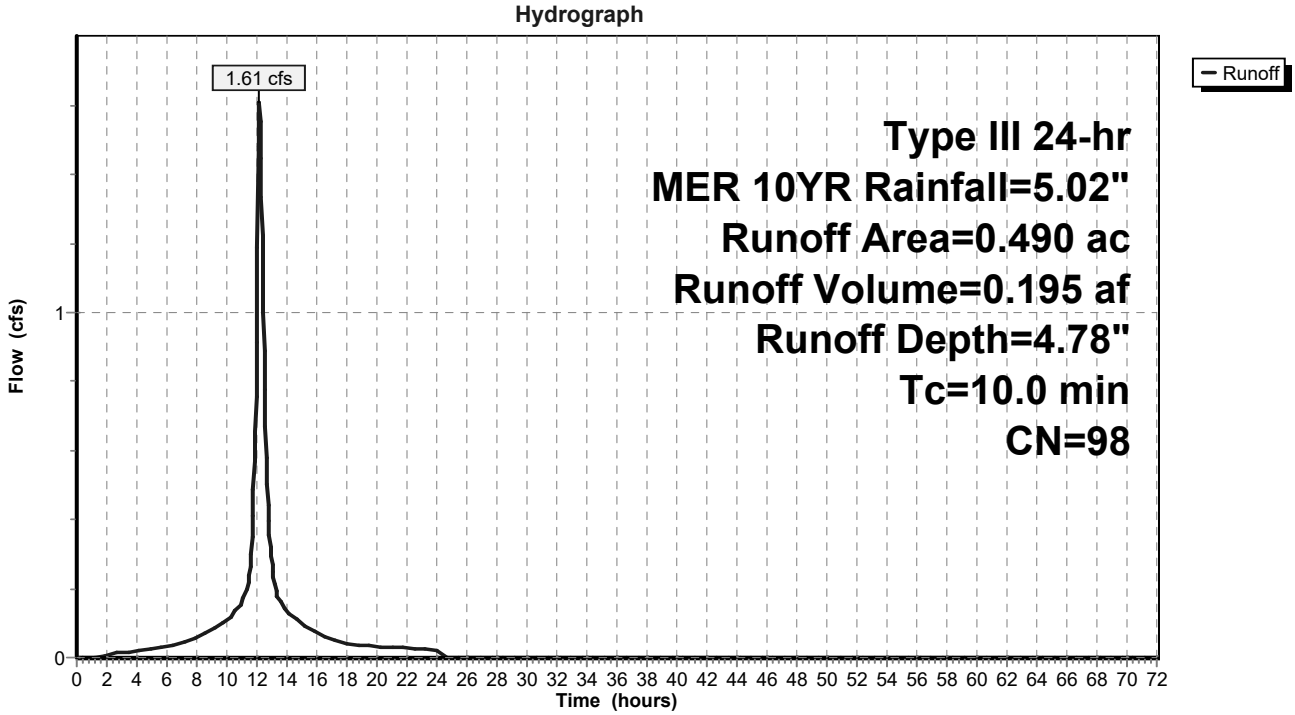
Runoff = 1.61 cfs @ 12.16 hrs, Volume= 0.195 af, Depth= 4.78"

Runoff by SCS TR-20 method, UH=Delmarva, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
Type III 24-hr MER 10YR Rainfall=5.02"

	Area (ac)	CN	Description
	0.080	98	Roofs, HSG B
*	0.100	98	Gravel, HSG B
	0.280	98	Paved parking, HSG B
*	0.030	98	Misc., HSG B
	0.490	98	Weighted Average
	0.490		100.00% Impervious Area

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

Subcatchment 11: P-3-Off-Imperv



Summary for Subcatchment 12: P-4-Perv

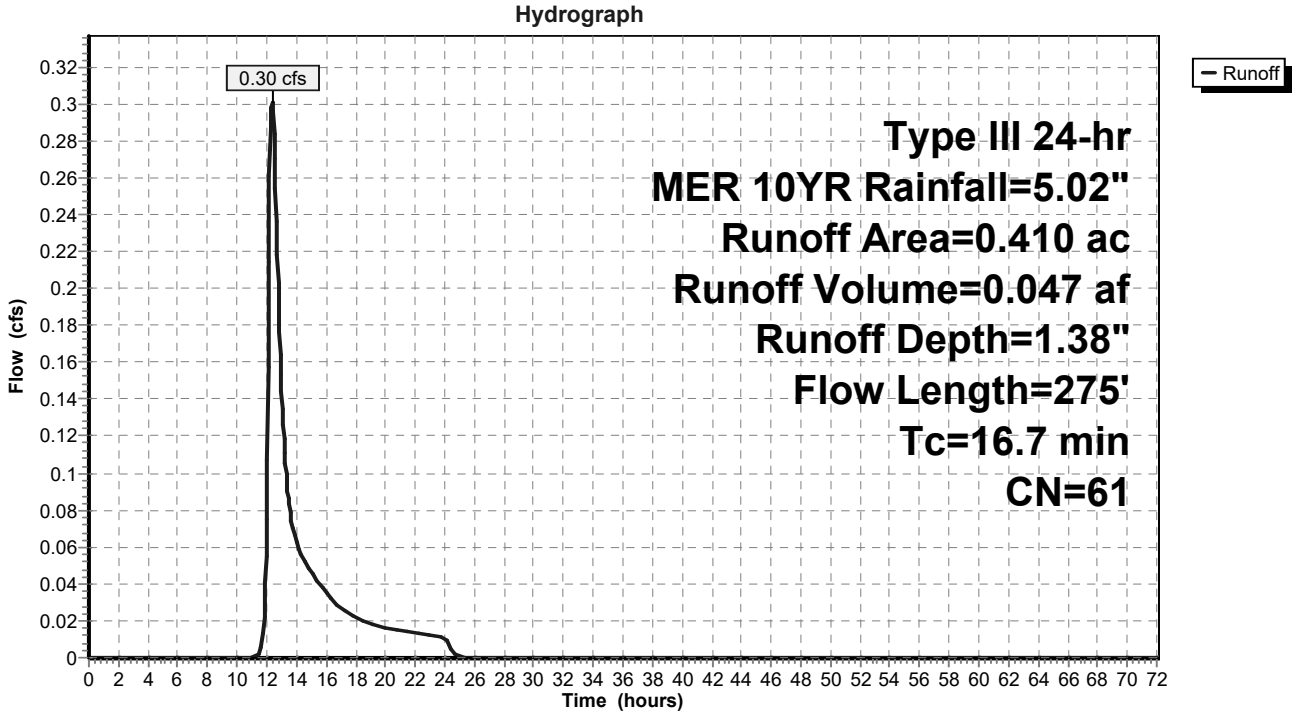
Runoff = 0.30 cfs @ 12.36 hrs, Volume= 0.047 af, Depth= 1.38"

Runoff by SCS TR-20 method, UH=Delmarva, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
Type III 24-hr MER 10YR Rainfall=5.02"

Area (ac)	CN	Description
0.410	61	>75% Grass cover, Good, HSG B
0.410		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.8	27	0.0090	0.07		**Sheet Flow, Sheet 1** Grass: Dense n= 0.240 P2= 3.31"
0.9	45	0.0090	0.87		**Sheet Flow, Sheet 2** Smooth surfaces n= 0.011 P2= 3.31"
7.0	28	0.0090	0.07		**Sheet Flow, Sheet 3** Grass: Dense n= 0.240 P2= 3.31"
2.0	175	0.0080	1.44		**Shallow Concentrated Flow, SCF** Unpaved Kv= 16.1 fps
16.7	275	Total			

Subcatchment 12: P-4-Perv



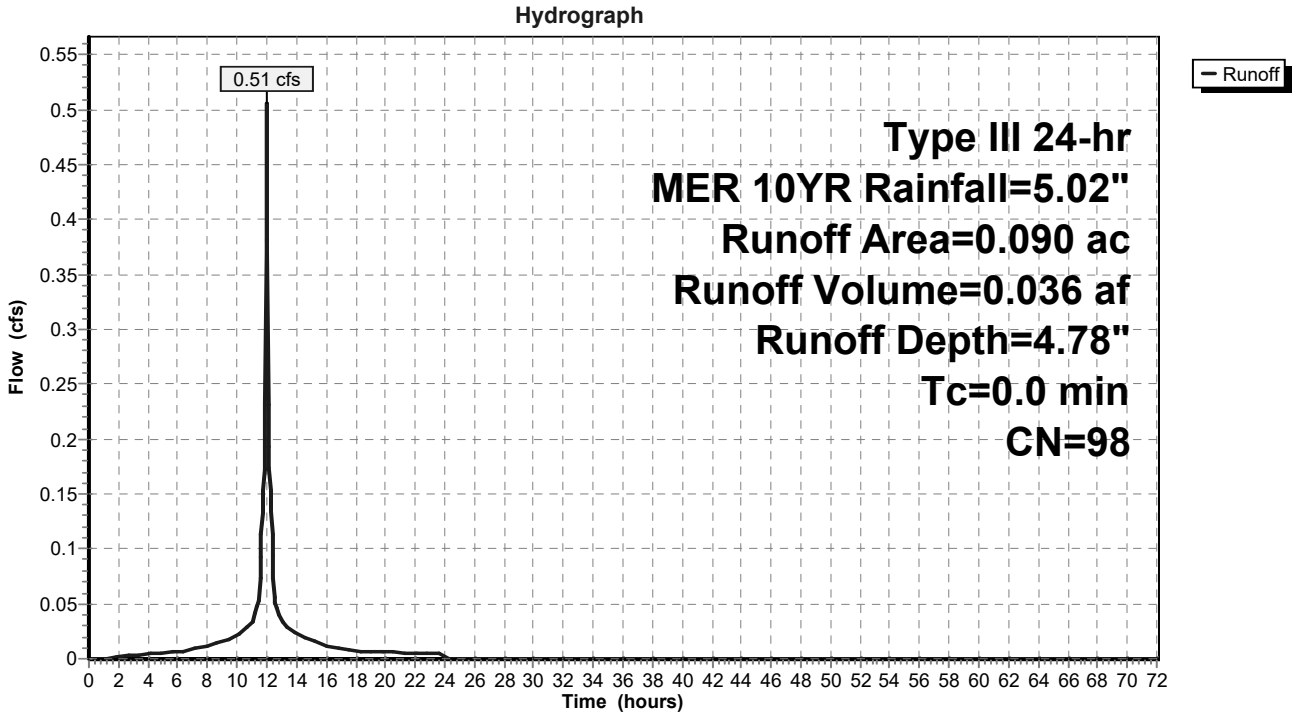
Summary for Subcatchment 13: P-4-Imperv

Runoff = 0.51 cfs @ 12.00 hrs, Volume= 0.036 af, Depth= 4.78"

Runoff by SCS TR-20 method, UH=Delmarva, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
Type III 24-hr MER 10YR Rainfall=5.02"

Area (ac)	CN	Description
0.090	98	Paved parking, HSG B
0.090		100.00% Impervious Area

Subcatchment 13: P-4-Imperv



Summary for Subcatchment 14: P-4-Off-Perv

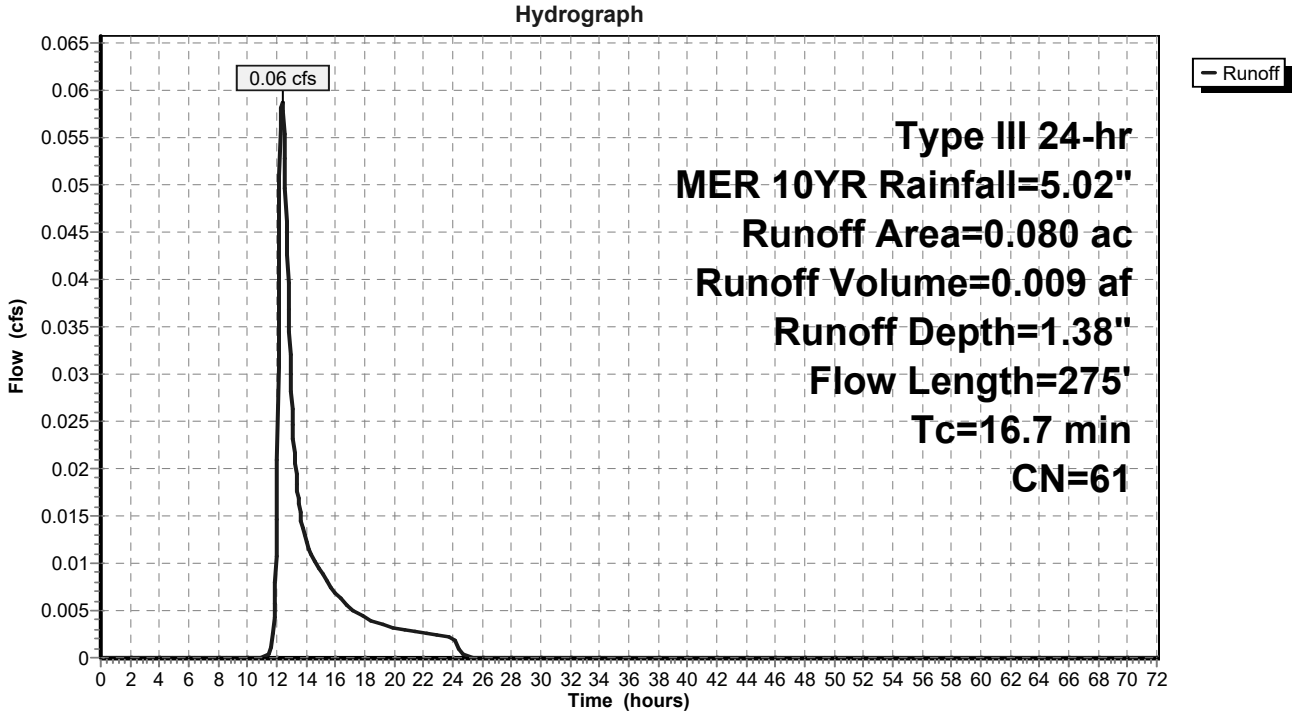
Runoff = 0.06 cfs @ 12.36 hrs, Volume= 0.009 af, Depth= 1.38"

Runoff by SCS TR-20 method, UH=Delmarva, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
Type III 24-hr MER 10YR Rainfall=5.02"

Area (ac)	CN	Description
0.080	61	>75% Grass cover, Good, HSG B
0.080		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.8	27	0.0090	0.07		**Sheet Flow, Sheet 1** Grass: Dense n= 0.240 P2= 3.31"
0.9	45	0.0090	0.87		**Sheet Flow, Sheet 2** Smooth surfaces n= 0.011 P2= 3.31"
7.0	28	0.0090	0.07		**Sheet Flow, Sheet 3** Grass: Dense n= 0.240 P2= 3.31"
2.0	175	0.0080	1.44		**Shallow Concentrated Flow, SCF** Unpaved Kv= 16.1 fps
16.7	275	Total			

Subcatchment 14: P-4-Off-Perv



Summary for Subcatchment 15: P-4-Off-Imperv

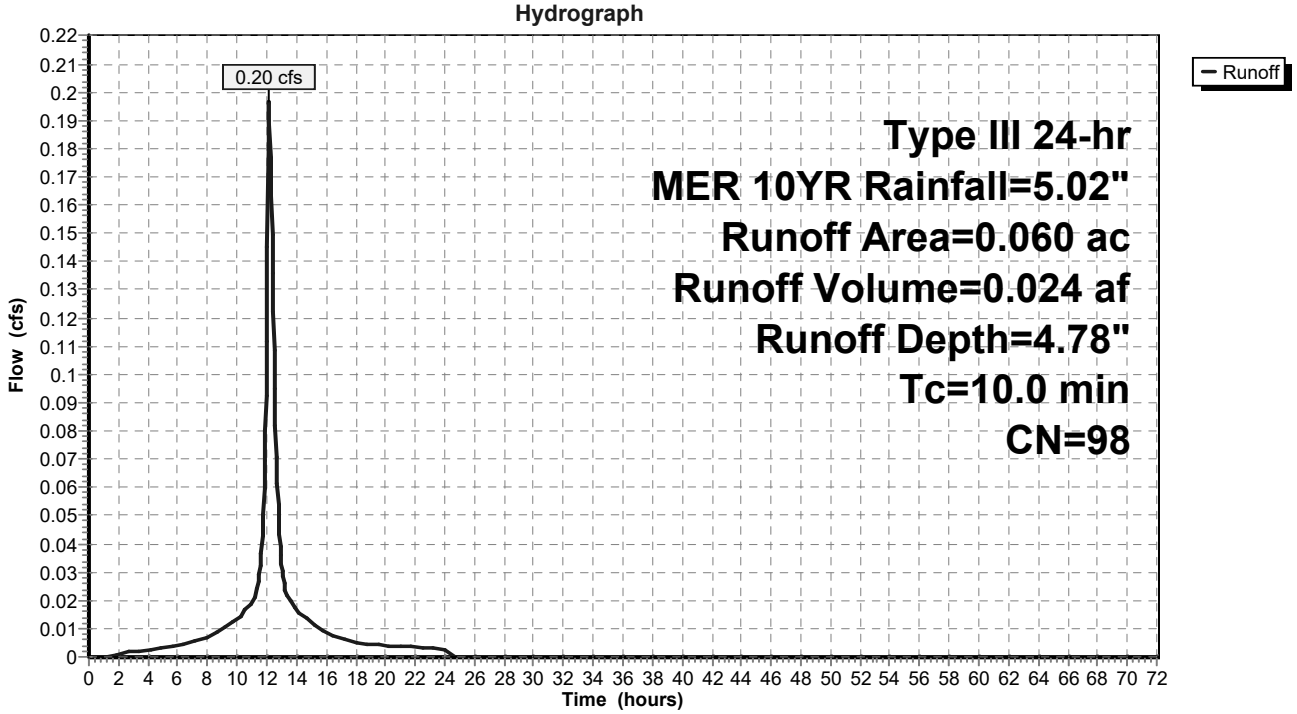
Runoff = 0.20 cfs @ 12.16 hrs, Volume= 0.024 af, Depth= 4.78"

Runoff by SCS TR-20 method, UH=Delmarva, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
Type III 24-hr MER 10YR Rainfall=5.02"

Area (ac)	CN	Description
0.060	98	Paved parking, HSG B
0.060		100.00% Impervious Area

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

Subcatchment 15: P-4-Off-Imperv



Summary for Subcatchment 16: P-5 Perv

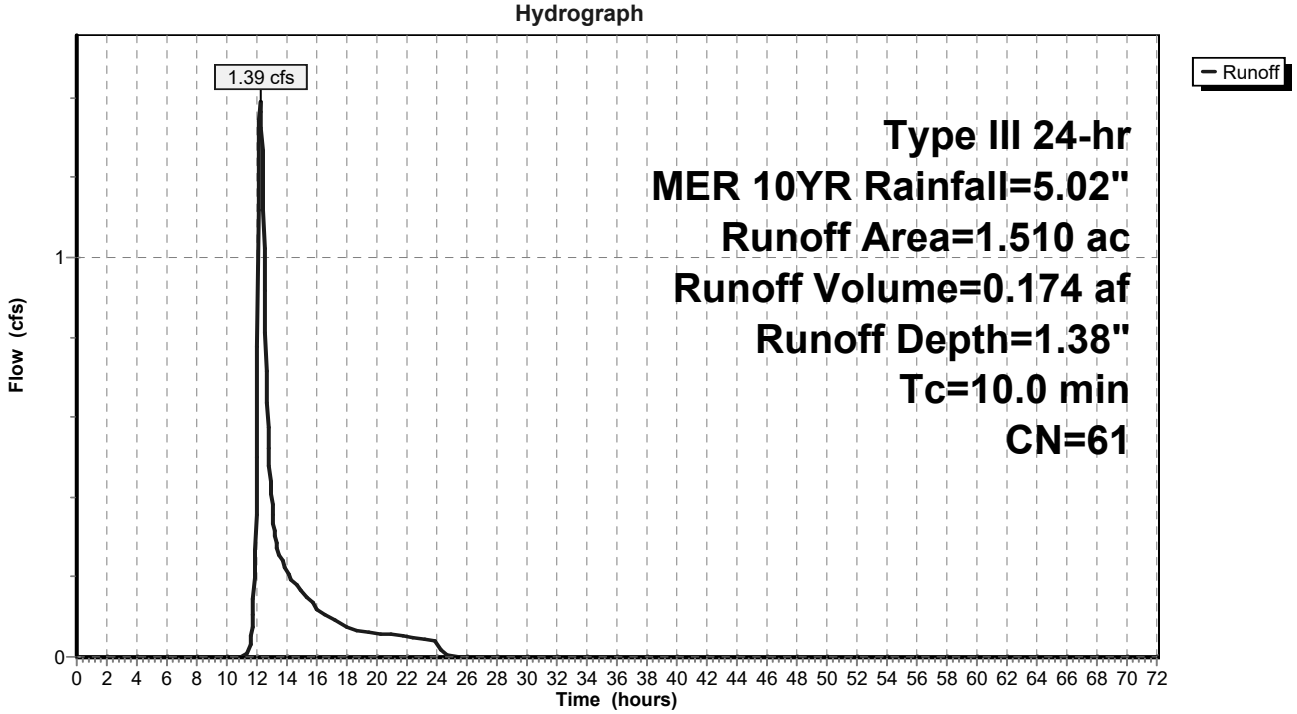
Runoff = 1.39 cfs @ 12.21 hrs, Volume= 0.174 af, Depth= 1.38"

Runoff by SCS TR-20 method, UH=Delmarva, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
Type III 24-hr MER 10YR Rainfall=5.02"

Area (ac)	CN	Description
1.510	61	>75% Grass cover, Good, HSG B
1.510		100.00% Pervious Area

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

Subcatchment 16: P-5 Perv



Summary for Subcatchment 17: P-5 Imperv

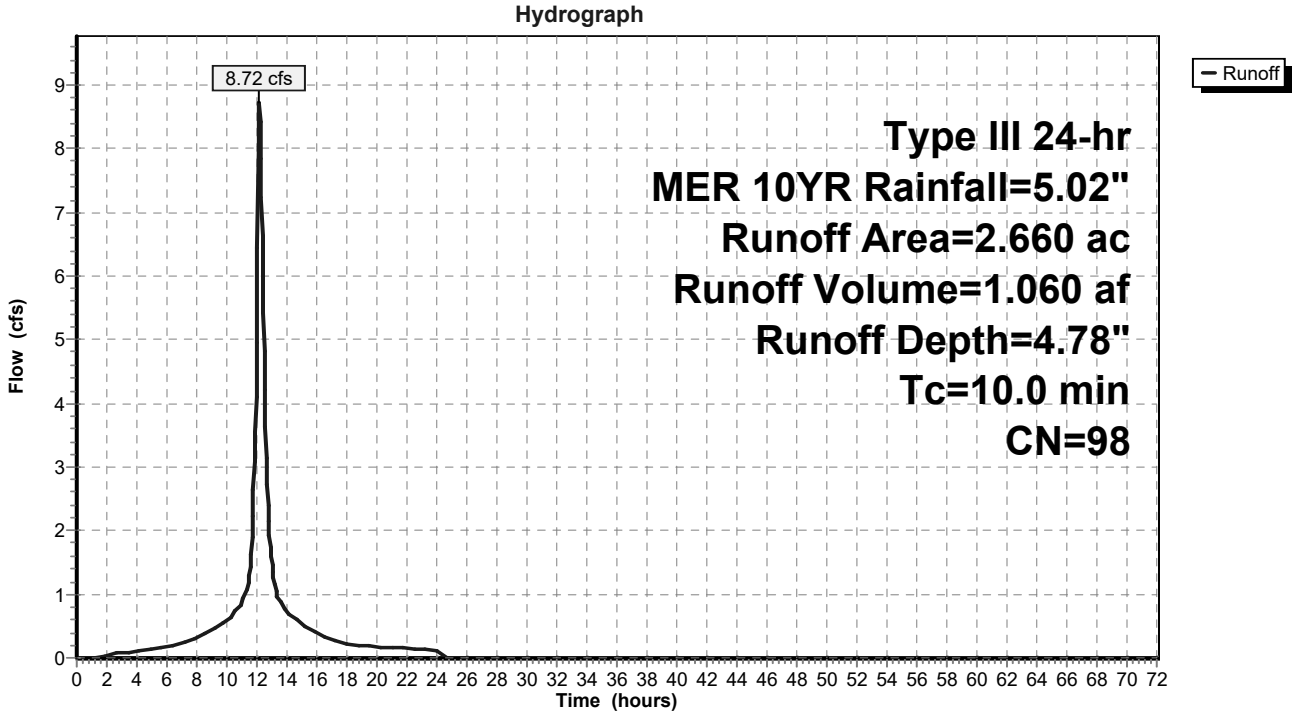
Runoff = 8.72 cfs @ 12.16 hrs, Volume= 1.060 af, Depth= 4.78"

Runoff by SCS TR-20 method, UH=Delmarva, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
Type III 24-hr MER 10YR Rainfall=5.02"

	Area (ac)	CN	Description
*	1.040	98	Building
*	1.110	98	Pavement
*	0.160	98	Sidewalk
*	0.110	98	Concrete
*	0.240	98	Driveway
	2.660	98	Weighted Average
	2.660		100.00% Impervious Area

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

Subcatchment 17: P-5 Imperv



Summary for Subcatchment 18: Extra Impervious

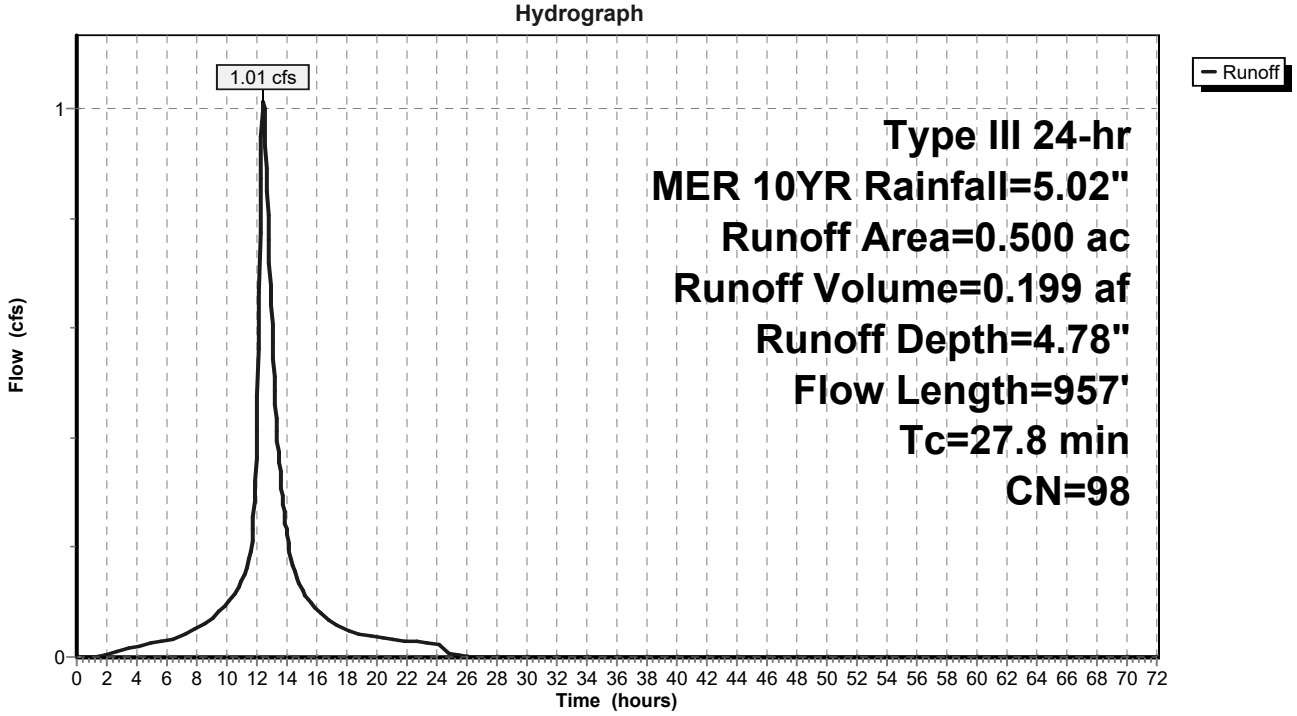
Runoff = 1.01 cfs @ 12.41 hrs, Volume= 0.199 af, Depth= 4.78"

Runoff by SCS TR-20 method, UH=Delmarva, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
Type III 24-hr MER 10YR Rainfall=5.02"

	Area (ac)	CN	Description
*	0.500	98	impervious
	0.500		100.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
20.3	100	0.0040	0.08		**Sheet Flow, Sheet 1** Cultivated: Residue>20% n= 0.170 P2= 3.31"
7.5	857	0.0140	1.90		**Shallow Concentrated Flow, SCF 1** Unpaved Kv= 16.1 fps
27.8	957	Total			

Subcatchment 18: Extra Impervious



Summary for Pond 1P: Basin B

Inflow Area = 4.170 ac, 63.79% Impervious, Inflow Depth = 3.55" for MER 10YR event
Inflow = 10.09 cfs @ 12.17 hrs, Volume= 1.234 af
Outflow = 1.25 cfs @ 13.37 hrs, Volume= 0.711 af, Atten= 88%, Lag= 72.5 min
Primary = 1.25 cfs @ 13.37 hrs, Volume= 0.711 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
Peak Elev= 105.79' @ 13.37 hrs Surf.Area= 0.365 ac Storage= 0.792 af

Plug-Flow detention time= 419.7 min calculated for 0.711 af (58% of inflow)
Center-of-Mass det. time= 300.4 min (1,075.6 - 775.2)

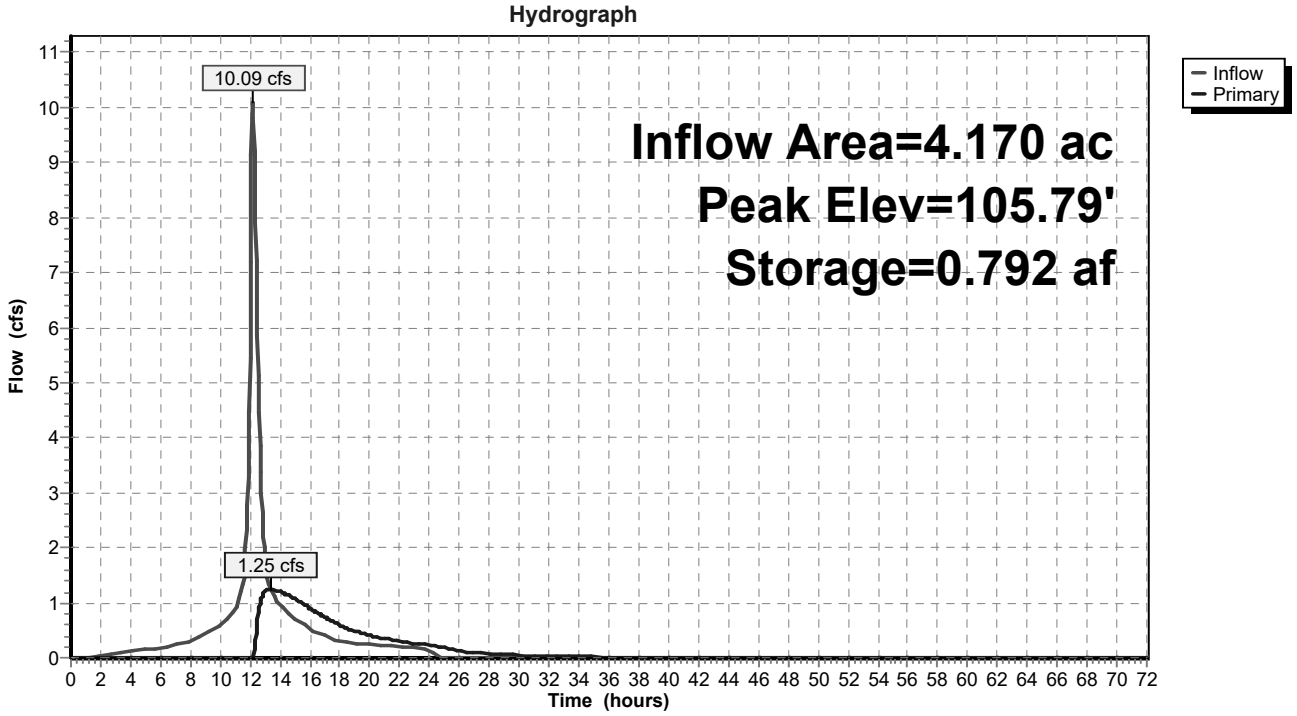
Volume	Invert	Avail.Storage	Storage Description
#1	103.00'	1.751 af	**Custom Stage Data (Prismatic)** Listed below (Recalc)

Elevation (feet)	Surf.Area (acres)	Inc.Store (acre-feet)	Cum.Store (acre-feet)
103.00	0.206	0.000	0.000
104.00	0.260	0.233	0.233
105.00	0.317	0.288	0.522
106.00	0.377	0.347	0.869
107.00	0.440	0.409	1.277
108.00	0.507	0.474	1.751

Device	Routing	Invert	Outlet Devices
#1	Primary	103.50'	**15.0" Round Culvert** L= 1,030.0' RCP, sq.cut end projecting, Ke= 0.500 Inlet / Outlet Invert= 103.50' / 98.35' S= 0.0050 '/' Cc= 0.900 n= 0.013, Flow Area= 1.23 sf
#2	Device 1	105.00'	**0.7' long Sharp-Crested Rectangular Weir** 2 End Contraction(s)

Primary OutFlow Max=1.25 cfs @ 13.37 hrs HW=105.79' TW=100.71' (Dynamic Tailwater)
└─**1=Culvert** (Passes 1.25 cfs of 4.39 cfs potential flow)
  └─**2=Sharp-Crested Rectangular Weir** (Weir Controls 1.25 cfs @ 2.91 fps)

Pond 1P: Basin B



Summary for Pond 2P: Basin A

Inflow Area = 13.070 ac, 50.65% Impervious, Inflow Depth = 2.73" for MER 10YR event
Inflow = 14.18 cfs @ 12.20 hrs, Volume= 2.974 af
Outflow = 5.04 cfs @ 13.24 hrs, Volume= 2.607 af, Atten= 64%, Lag= 62.1 min
Primary = 5.04 cfs @ 13.24 hrs, Volume= 2.607 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
Peak Elev= 100.72' @ 13.24 hrs Surf.Area= 0.469 ac Storage= 1.197 af

Plug-Flow detention time= 325.5 min calculated for 2.607 af (88% of inflow)
Center-of-Mass det. time= 250.9 min (1,117.7 - 866.9)

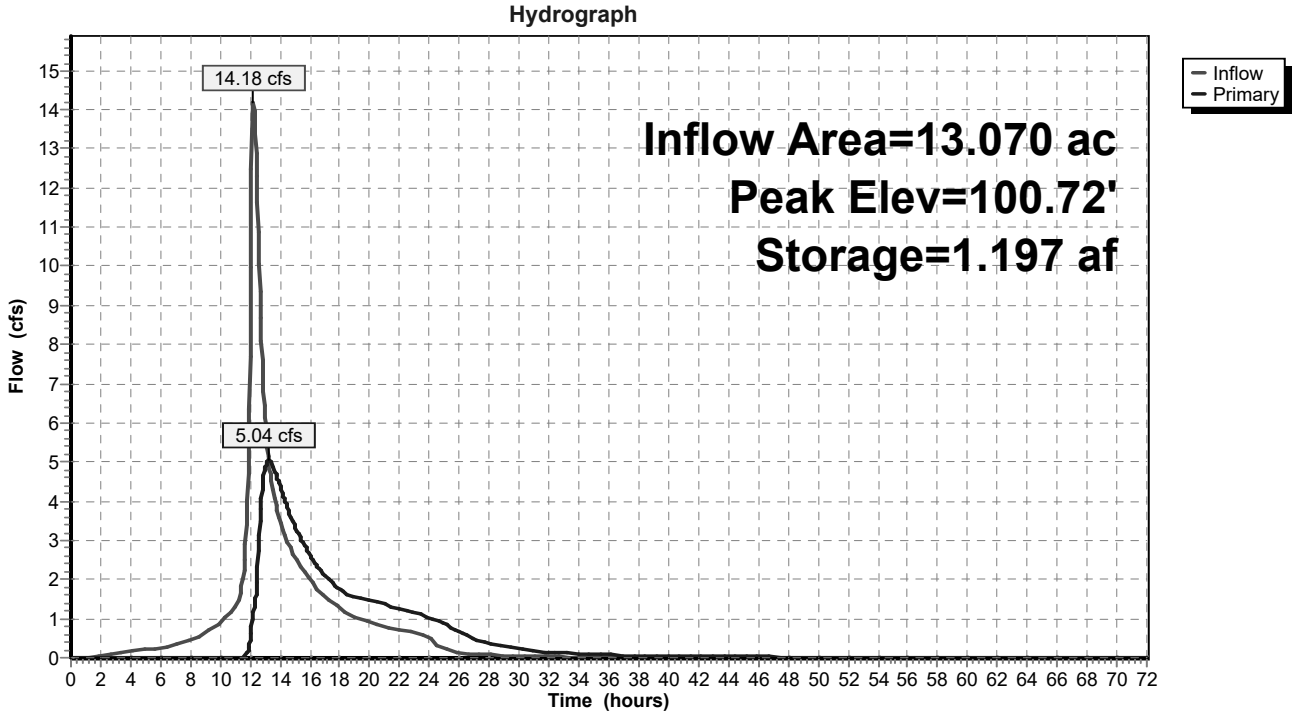
Volume	Invert	Avail.Storage	Storage Description
#1	98.10'	2.779 af	**Custom Stage Data (Prismatic)** Listed below (Recalc)

Elevation (feet)	Surf.Area (acres)	Inc.Store (acre-feet)	Cum.Store (acre-feet)
98.10	0.446	0.000	0.000
99.00	0.454	0.405	0.405
100.00	0.463	0.458	0.863
101.00	0.471	0.467	1.330
102.00	0.479	0.475	1.805
103.00	0.487	0.483	2.288
104.00	0.496	0.492	2.779

Device	Routing	Invert	Outlet Devices
#1	Primary	98.10'	**18.0" Round Culvert X 2.00** L= 100.0' RCP, sq.cut end projecting, Ke= 0.500 Inlet / Outlet Invert= 98.10' / 97.60' S= 0.0050 '/' Cc= 0.900 n= 0.013 Concrete pipe, straight & clean, Flow Area= 1.77 sf
#2	Device 1	98.88'	**8.0" Vert. Orifice/Grate** C= 0.600
#3	Device 1	100.10'	**2.0' long Sharp-Crested Rectangular Weir** 2 End Contraction(s)

Primary OutFlow Max=5.04 cfs @ 13.24 hrs HW=100.72' TW=0.00' (Dynamic Tailwater)
└─**1=Culvert** (Passes 5.04 cfs of 19.77 cfs potential flow)
  ├─**2=Orifice/Grate** (Orifice Controls 2.06 cfs @ 5.91 fps)
  └─**3=Sharp-Crested Rectangular Weir** (Weir Controls 2.98 cfs @ 2.57 fps)

Pond 2P: Basin A

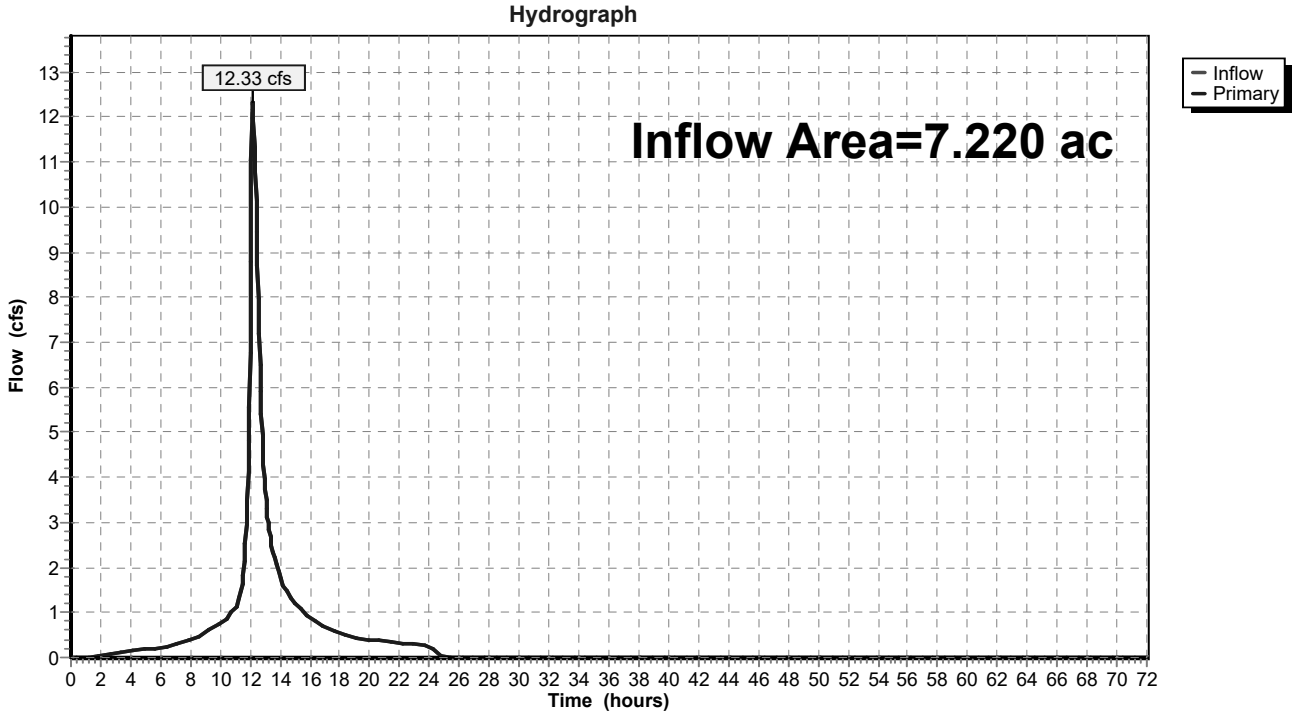


Summary for Link 1L: POA-1

Inflow Area = 7.220 ac, 46.68% Impervious, Inflow Depth = 3.08" for MER 10YR event
Inflow = 12.33 cfs @ 12.17 hrs, Volume= 1.855 af
Primary = 12.33 cfs @ 12.17 hrs, Volume= 1.855 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs

Link 1L: POA-1

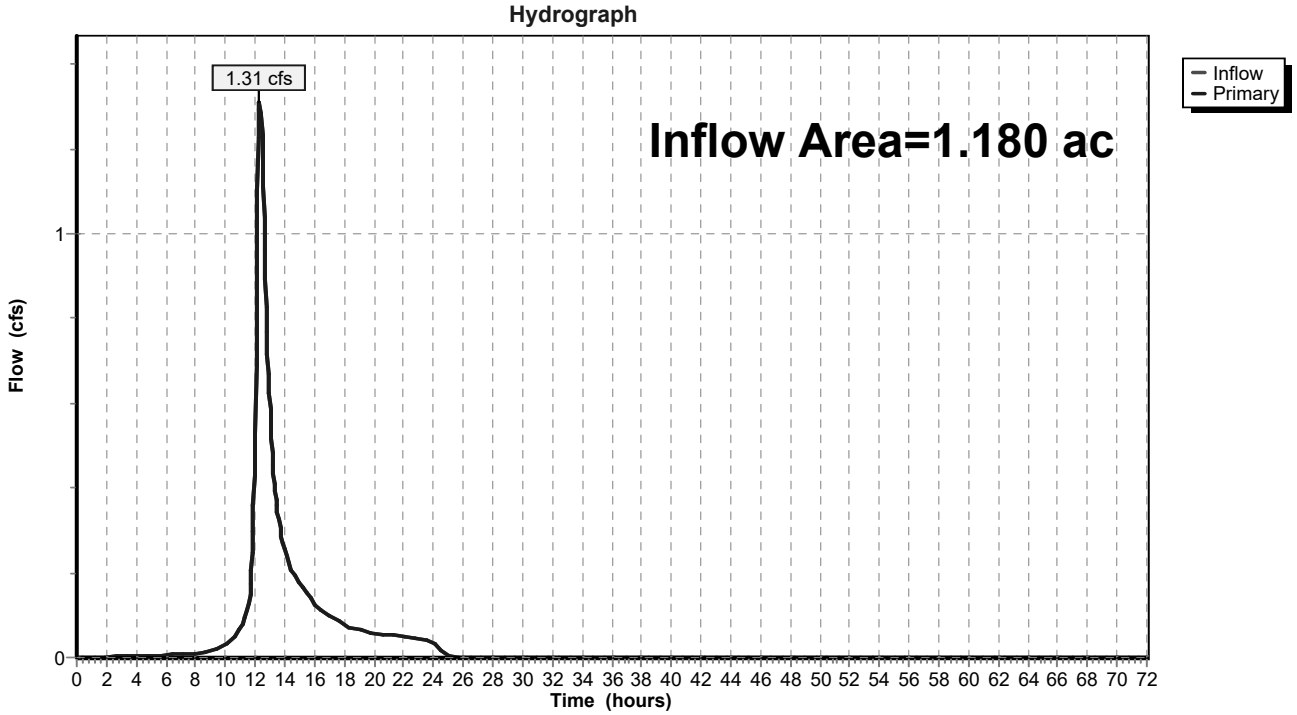


Summary for Link 2L: POA-1 OFF

Inflow Area = 1.180 ac, 7.63% Impervious, Inflow Depth = 2.13" for MER 10YR event
Inflow = 1.31 cfs @ 12.31 hrs, Volume= 0.209 af
Primary = 1.31 cfs @ 12.31 hrs, Volume= 0.209 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs

Link 2L: POA-1 OFF

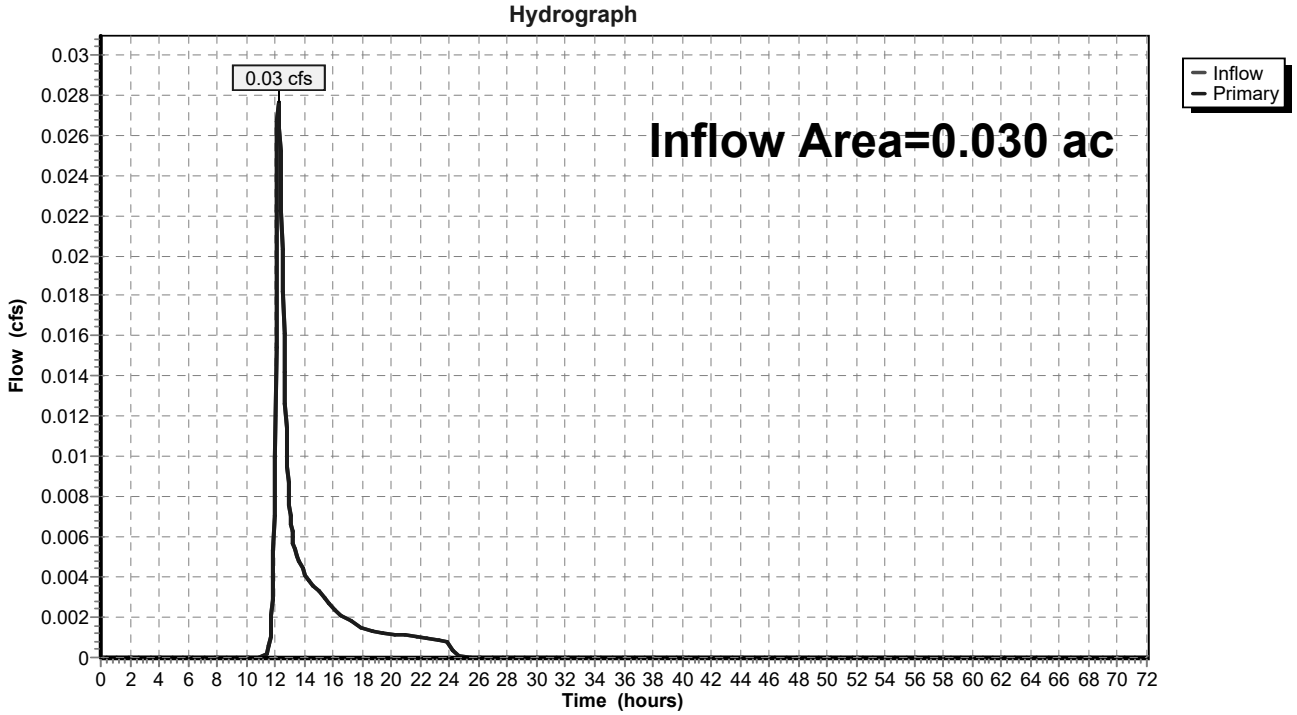


Summary for Link 3L: POA-2

Inflow Area = 0.030 ac, 0.00% Impervious, Inflow Depth = 1.38" for MER 10YR event
Inflow = 0.03 cfs @ 12.21 hrs, Volume= 0.003 af
Primary = 0.03 cfs @ 12.21 hrs, Volume= 0.003 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs

Link 3L: POA-2

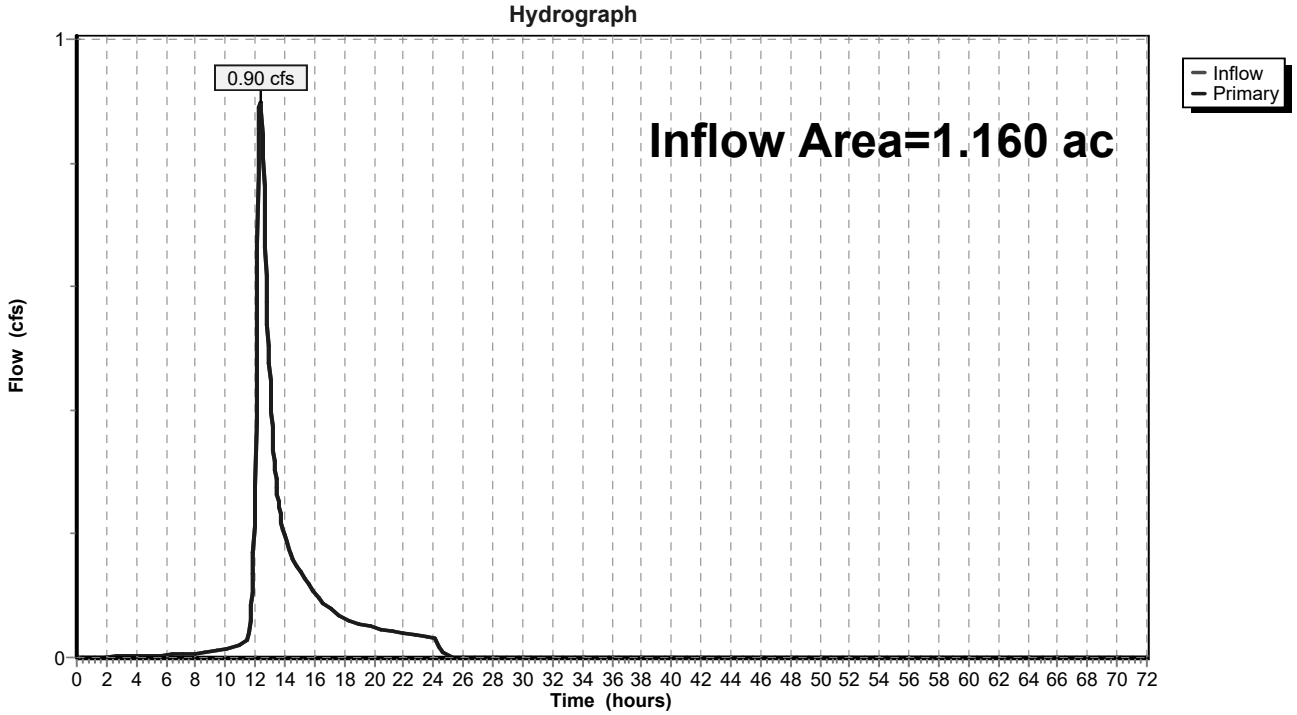


Summary for Link 4L: POA-3

Inflow Area = 1.160 ac, 5.17% Impervious, Inflow Depth = 1.56" for MER 10YR event
Inflow = 0.90 cfs @ 12.35 hrs, Volume= 0.151 af
Primary = 0.90 cfs @ 12.35 hrs, Volume= 0.151 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs

Link 4L: POA-3

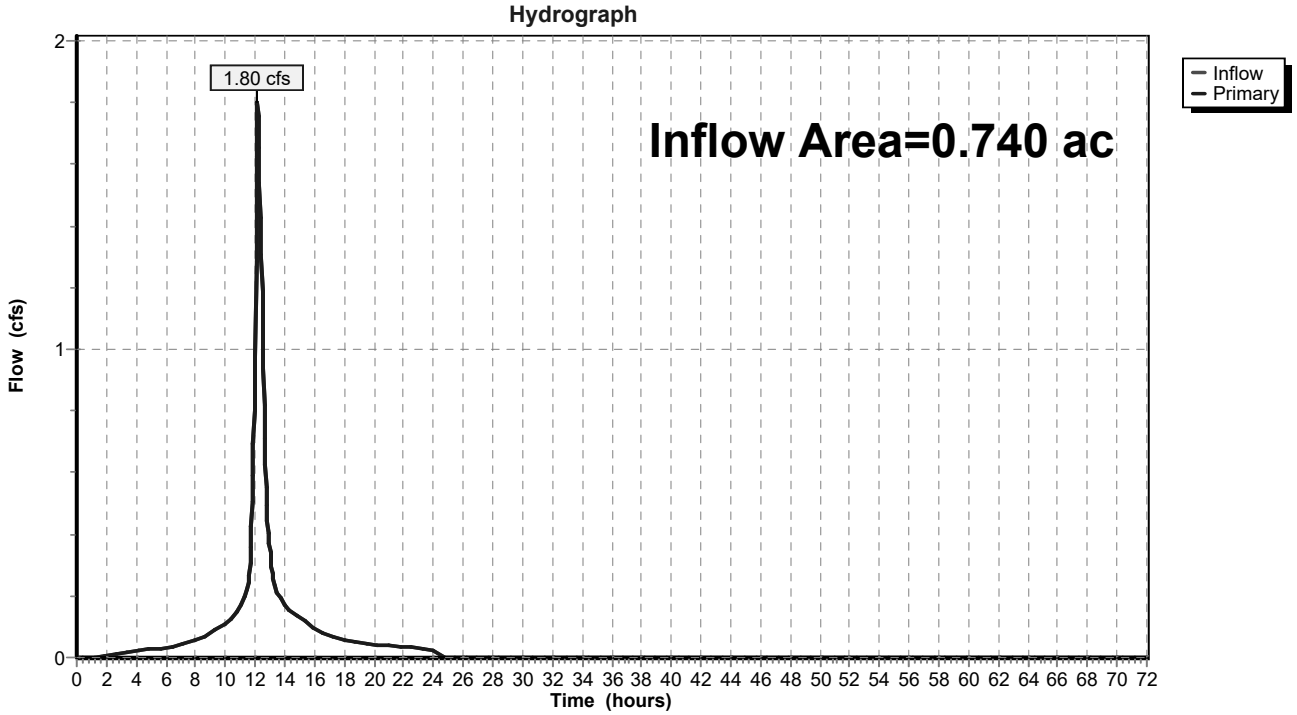


Summary for Link 5L: POA-3 OFF

Inflow Area = 0.740 ac, 66.22% Impervious, Inflow Depth = 3.63" for MER 10YR event
Inflow = 1.80 cfs @ 12.17 hrs, Volume= 0.224 af
Primary = 1.80 cfs @ 12.17 hrs, Volume= 0.224 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs

Link 5L: POA-3 OFF

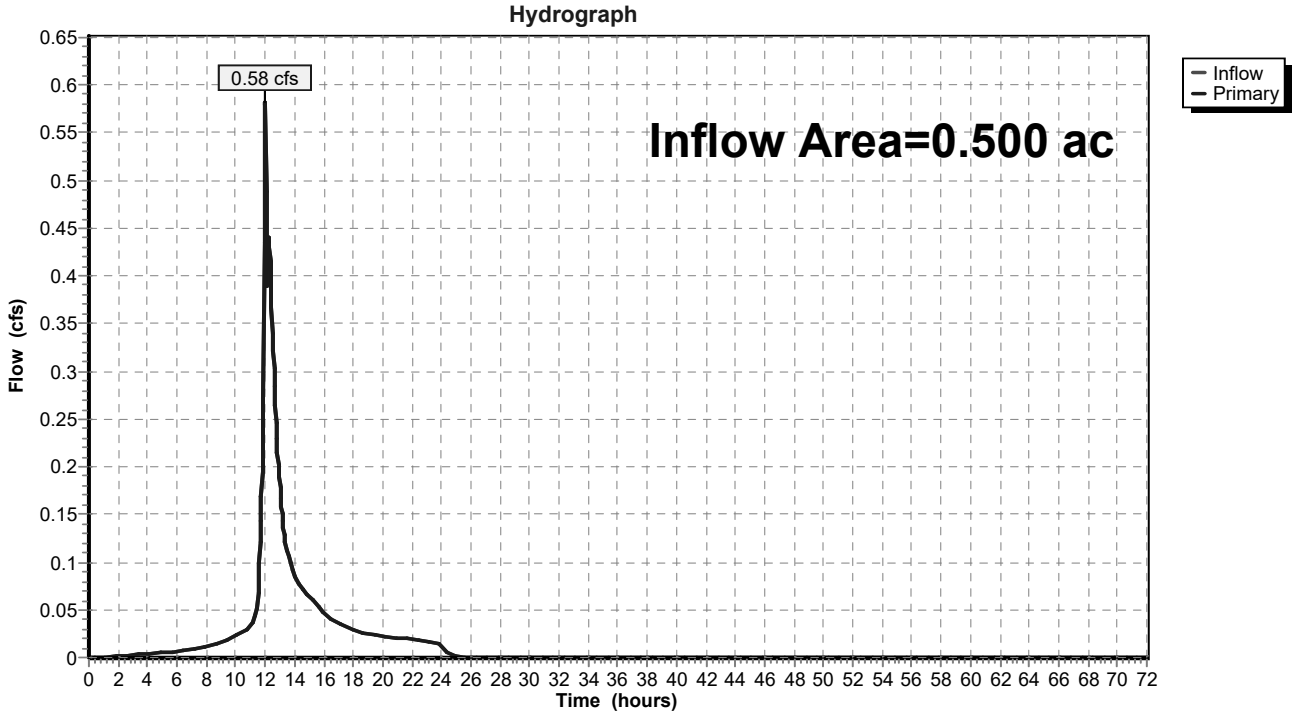


Summary for Link 6L: POA-4

Inflow Area = 0.500 ac, 18.00% Impervious, Inflow Depth = 1.99" for MER 10YR event
Inflow = 0.58 cfs @ 12.01 hrs, Volume= 0.083 af
Primary = 0.58 cfs @ 12.01 hrs, Volume= 0.083 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs

Link 6L: POA-4

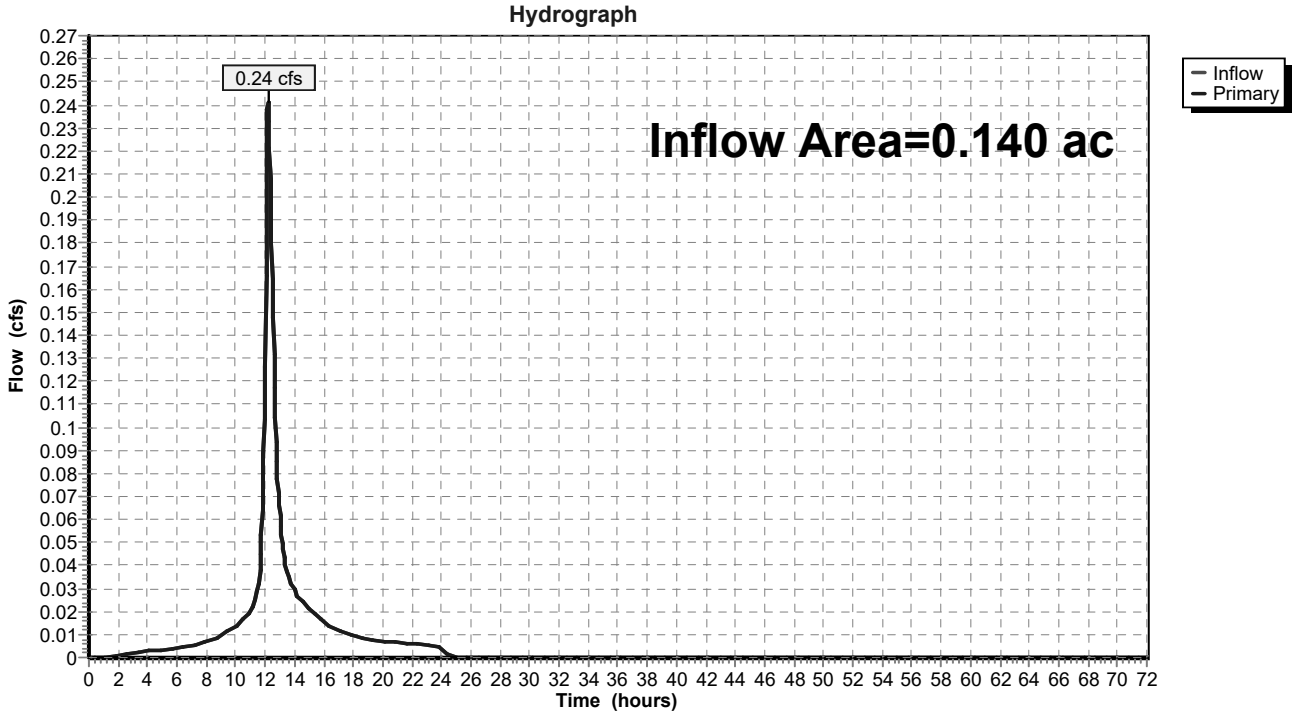


Summary for Link 7L: POA-4 OFF

Inflow Area = 0.140 ac, 42.86% Impervious, Inflow Depth = 2.84" for MER 10YR event
Inflow = 0.24 cfs @ 12.19 hrs, Volume= 0.033 af
Primary = 0.24 cfs @ 12.19 hrs, Volume= 0.033 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs

Link 7L: POA-4 OFF

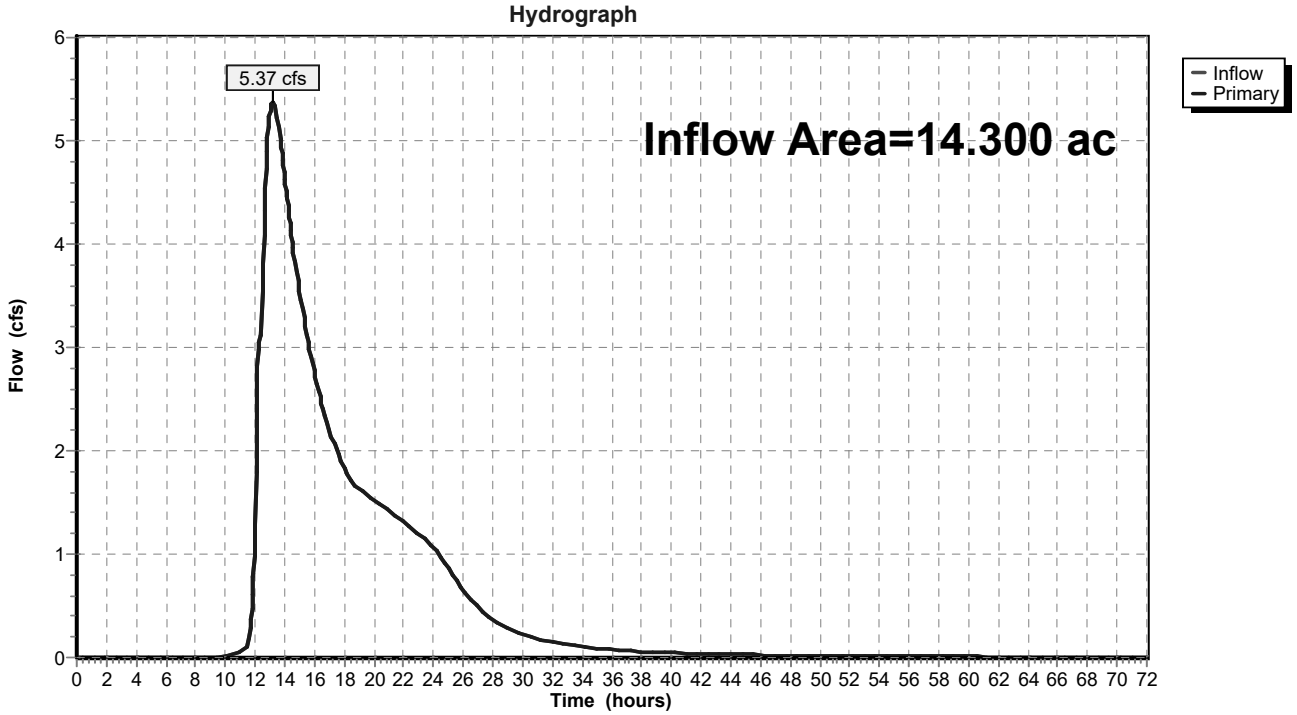


Summary for Link 8L: POA 1 total

Inflow Area = 14.300 ac, 46.29% Impervious, Inflow Depth > 2.36" for MER 10YR event
Inflow = 5.37 cfs @ 13.17 hrs, Volume= 2.817 af
Primary = 5.37 cfs @ 13.17 hrs, Volume= 2.817 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs

Link 8L: POA 1 total

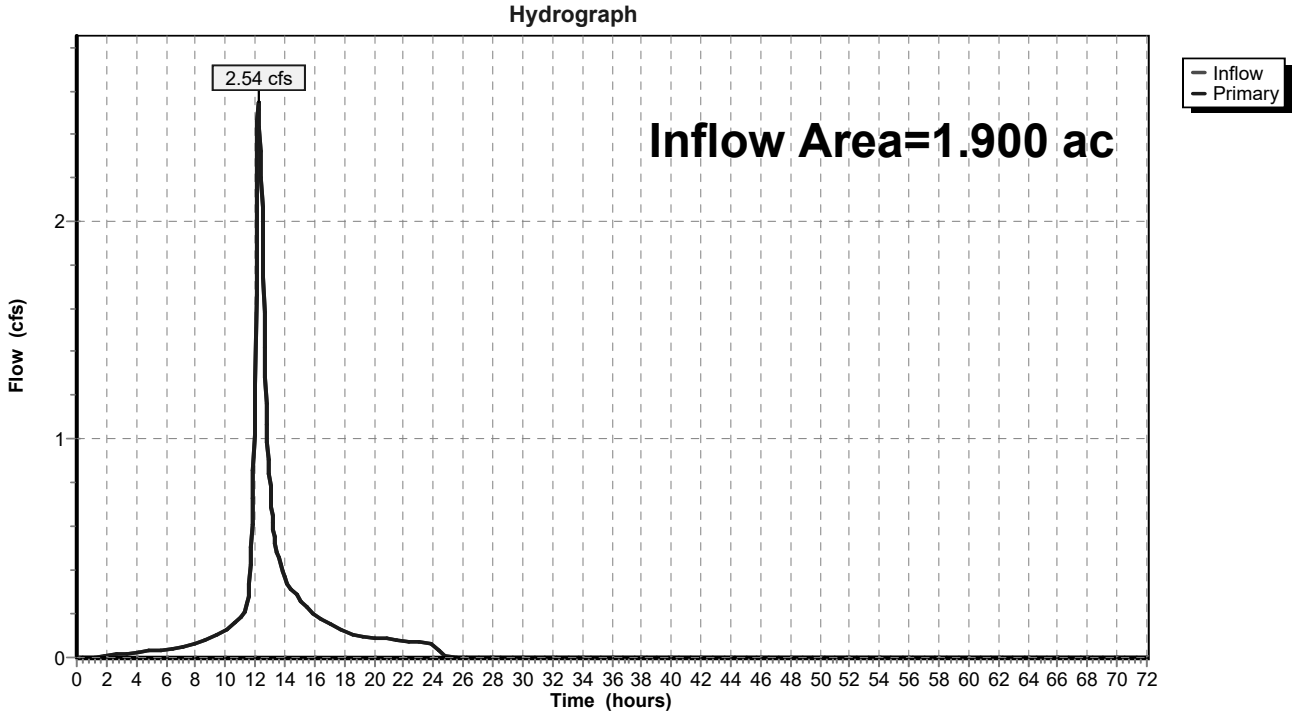


Summary for Link 9L: POA 3 total

Inflow Area = 1.900 ac, 28.95% Impervious, Inflow Depth = 2.37" for MER 10YR event
Inflow = 2.54 cfs @ 12.21 hrs, Volume= 0.375 af
Primary = 2.54 cfs @ 12.21 hrs, Volume= 0.375 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs

Link 9L: POA 3 total

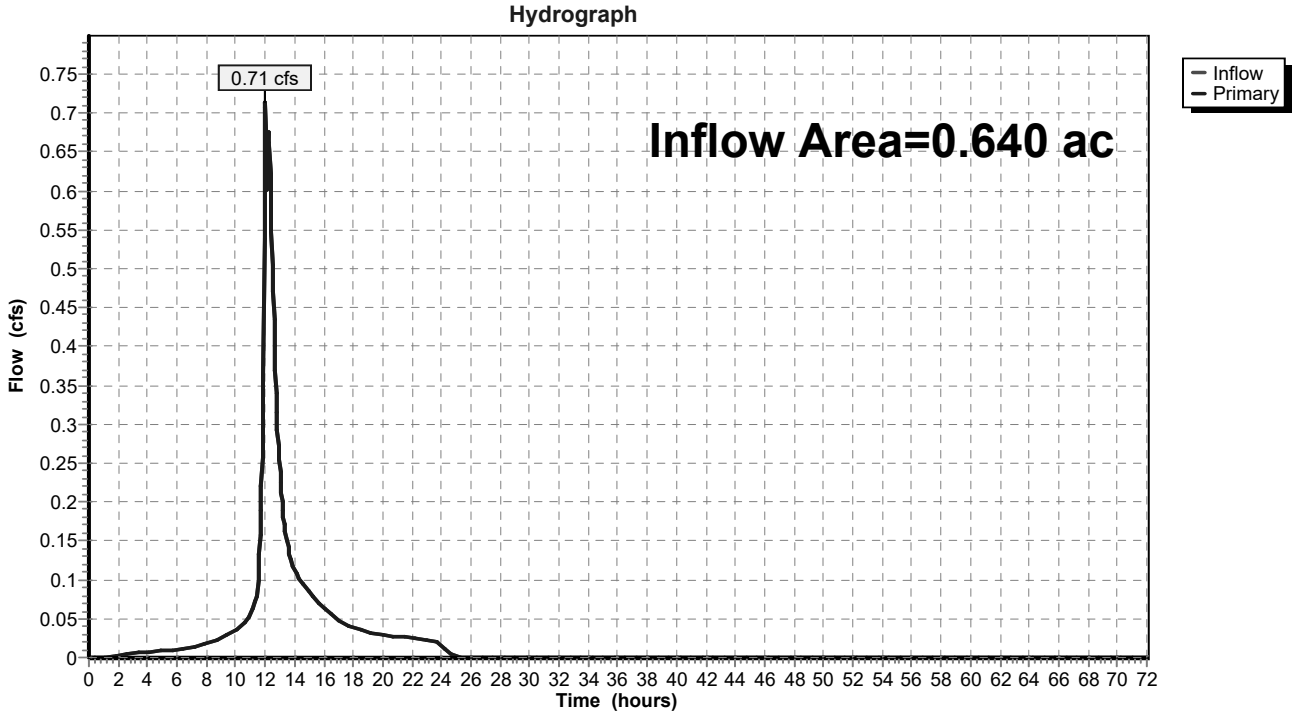


Summary for Link 10L: POA 4 total

Inflow Area = 0.640 ac, 23.44% Impervious, Inflow Depth = 2.18" for MER 10YR event
Inflow = 0.71 cfs @ 12.01 hrs, Volume= 0.116 af
Primary = 0.71 cfs @ 12.01 hrs, Volume= 0.116 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs

Link 10L: POA 4 total



Summary for Subcatchment 1: P-1-Perv

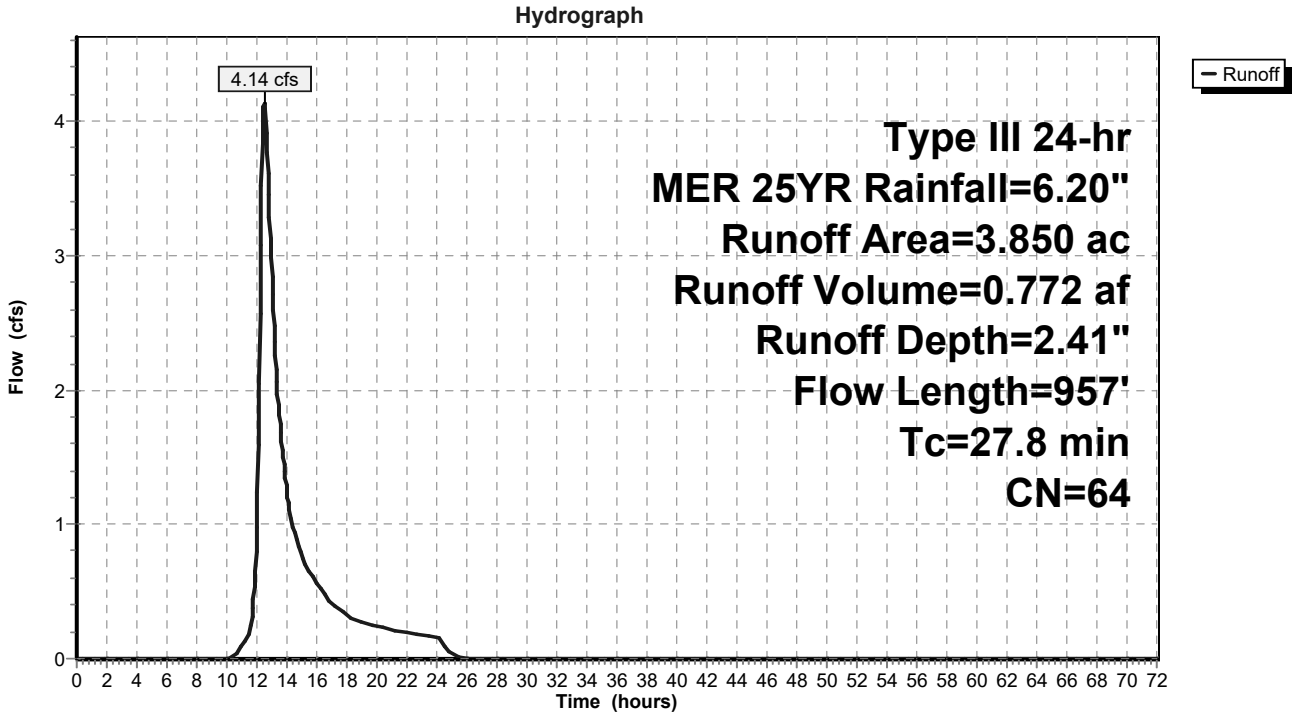
Runoff = 4.14 cfs @ 12.50 hrs, Volume= 0.772 af, Depth= 2.41"

Runoff by SCS TR-20 method, UH=Delmarva, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
Type III 24-hr MER 25YR Rainfall=6.20"

Area (ac)	CN	Description
3.070	61	>75% Grass cover, Good, HSG B
0.780	74	>75% Grass cover, Good, HSG C
3.850	64	Weighted Average
3.850		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
20.3	100	0.0040	0.08		**Sheet Flow, Sheet 1** Cultivated: Residue>20% n= 0.170 P2= 3.31"
7.5	857	0.0140	1.90		**Shallow Concentrated Flow, SCF 1** Unpaved Kv= 16.1 fps
27.8	957	Total			

Subcatchment 1: P-1-Perv



Summary for Subcatchment 2: P-1-Imperv

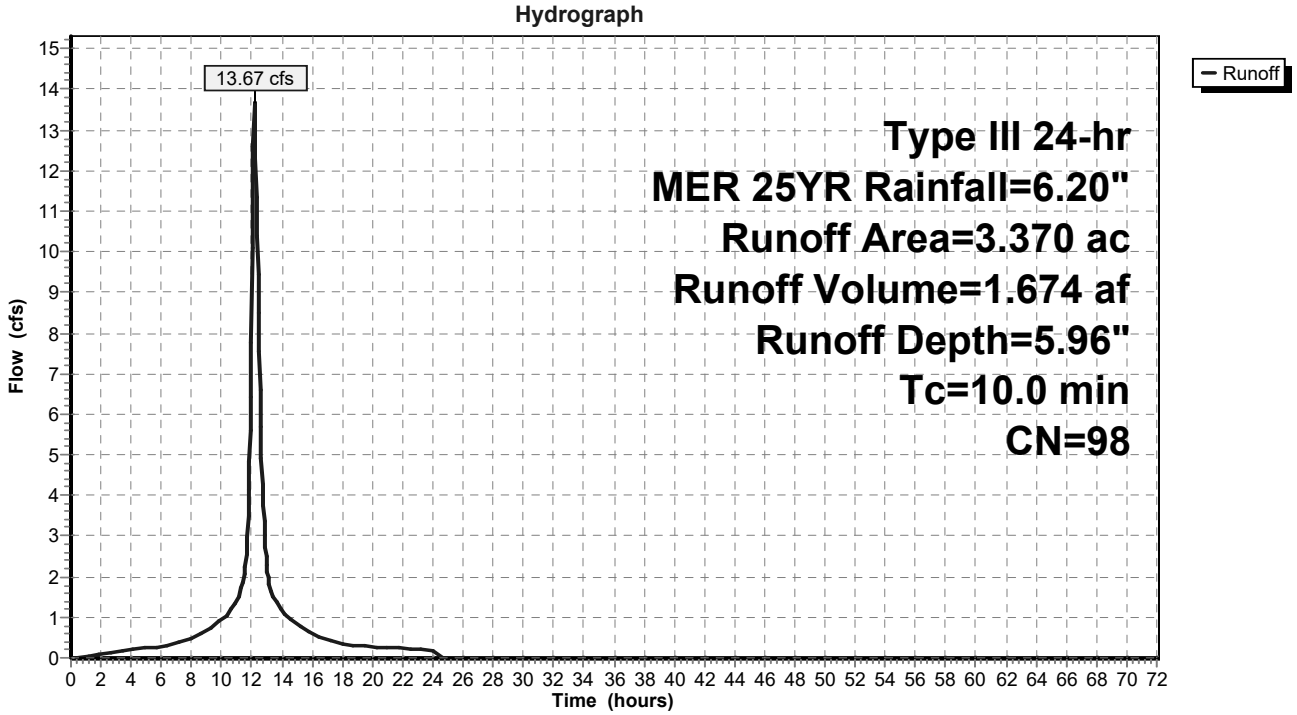
Runoff = 13.67 cfs @ 12.16 hrs, Volume= 1.674 af, Depth= 5.96"

Runoff by SCS TR-20 method, UH=Delmarva, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
Type III 24-hr MER 25YR Rainfall=6.20"

	Area (ac)	CN	Description
*	1.600	98	Buildings
*	1.310	98	Pavement
*	0.300	98	Sidewalk
*	0.110	98	Conc
*	0.050	98	Driveway
	3.370	98	Weighted Average
	3.370		100.00% Impervious Area

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

Subcatchment 2: P-1-Imperv



Summary for Subcatchment 3: P-1-Undet - perv

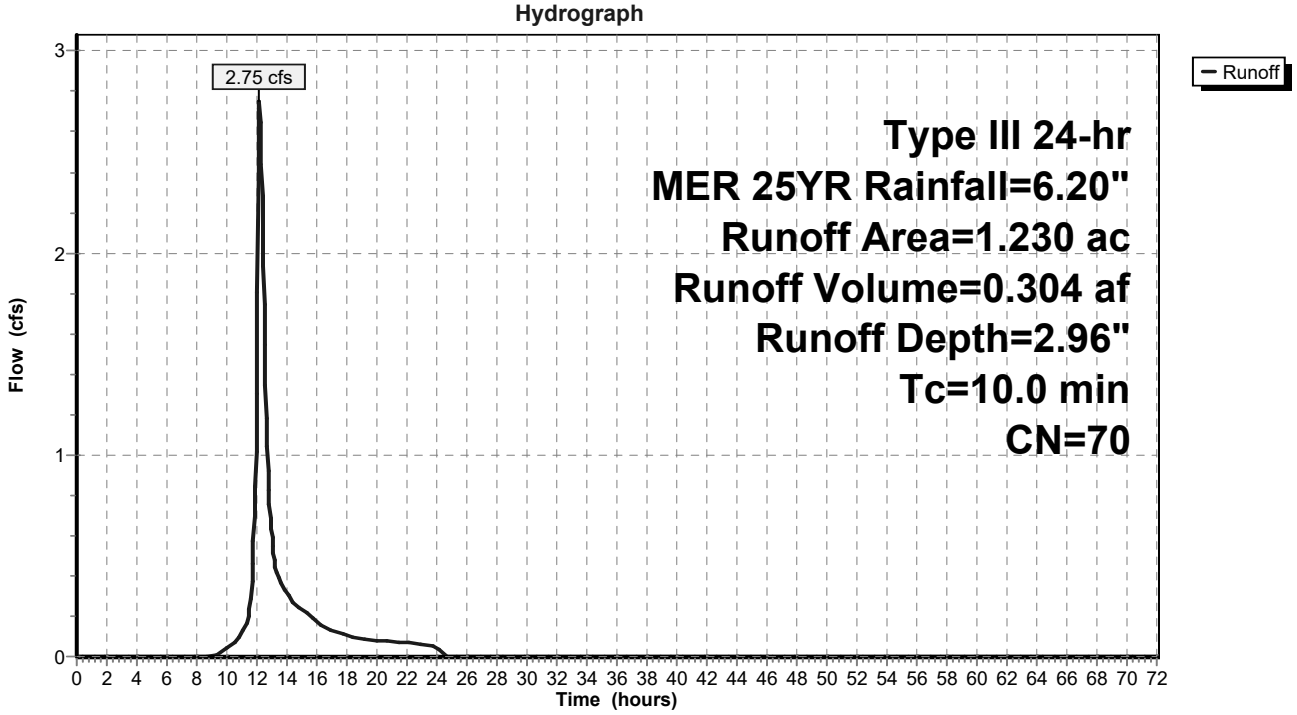
Runoff = 2.75 cfs @ 12.17 hrs, Volume= 0.304 af, Depth= 2.96"

Runoff by SCS TR-20 method, UH=Delmarva, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
Type III 24-hr MER 25YR Rainfall=6.20"

Area (ac)	CN	Description
0.820	74	>75% Grass cover, Good, HSG C
0.410	61	>75% Grass cover, Good, HSG B
1.230	70	Weighted Average
1.230		100.00% Pervious Area

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

Subcatchment 3: P-1-Undet - perv



Summary for Subcatchment 4: P-1A-Off-Perv

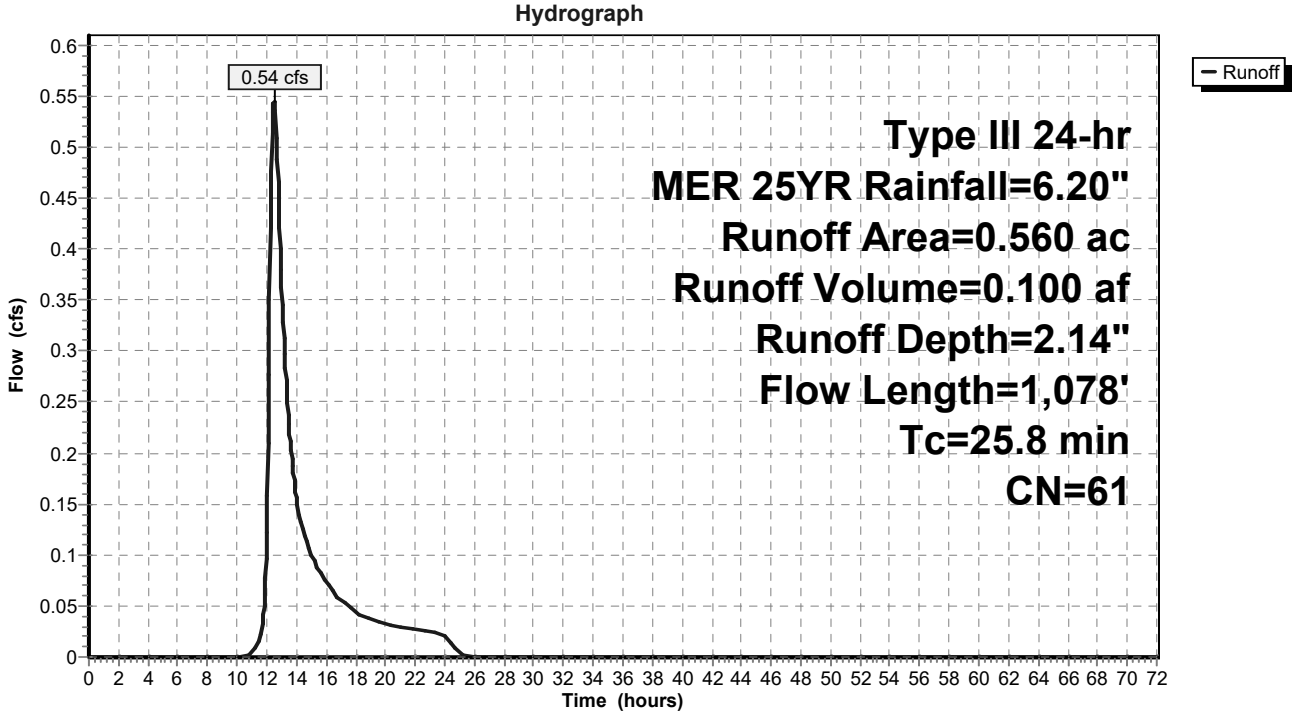
Runoff = 0.54 cfs @ 12.48 hrs, Volume= 0.100 af, Depth= 2.14"

Runoff by SCS TR-20 method, UH=Delmarva, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
Type III 24-hr MER 25YR Rainfall=6.20"

Area (ac)	CN	Description
0.560	61	>75% Grass cover, Good, HSG B
0.560		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
17.2	100	0.0120	0.10		**Sheet Flow, Sheet 1.3** Grass: Dense n= 0.240 P2= 3.31"
8.6	978	0.0140	1.90		**Shallow Concentrated Flow, SCF 1.3** Unpaved Kv= 16.1 fps
25.8	1,078	Total			

Subcatchment 4: P-1A-Off-Perv



Summary for Subcatchment 5: P-1A-Off-Imperv

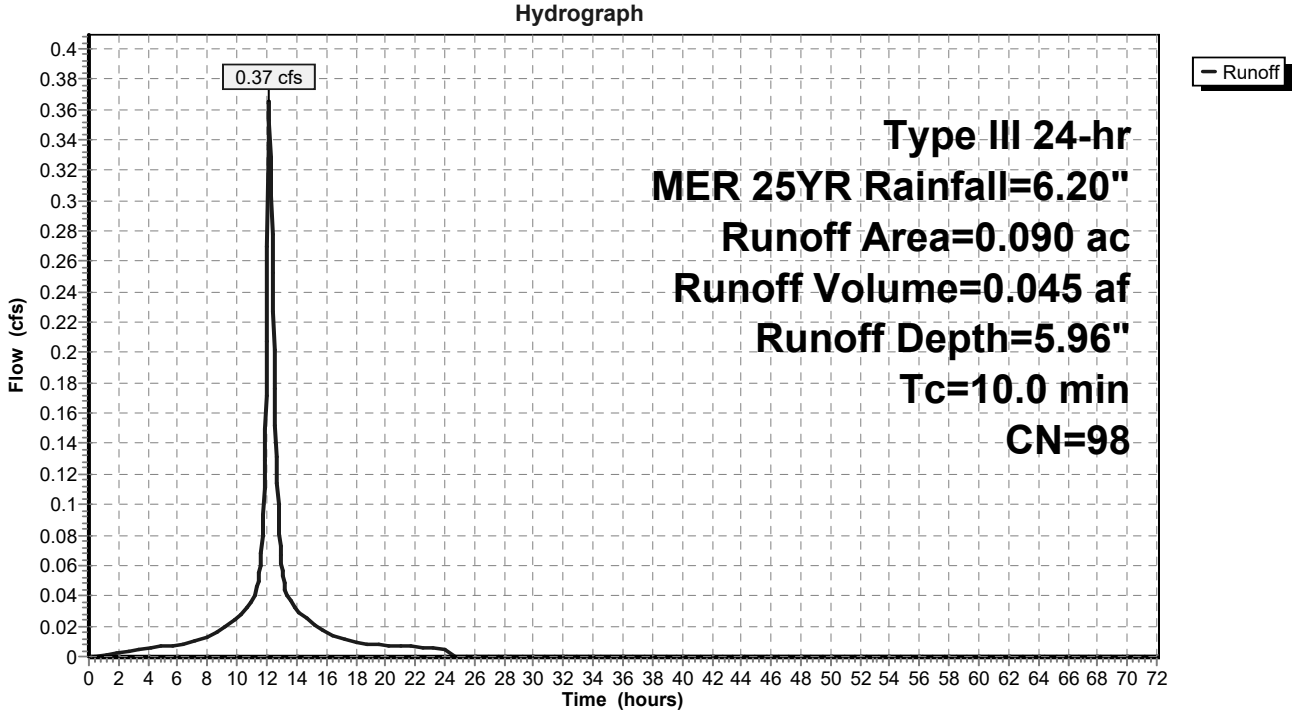
Runoff = 0.37 cfs @ 12.16 hrs, Volume= 0.045 af, Depth= 5.96"

Runoff by SCS TR-20 method, UH=Delmarva, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
Type III 24-hr MER 25YR Rainfall=6.20"

	Area (ac)	CN	Description
	0.010	98	Roofs, HSG B
*	0.080	98	Paved parking, HSG B
	0.090	98	Weighted Average
	0.090		100.00% Impervious Area

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

Subcatchment 5: P-1A-Off-Imperv



Summary for Subcatchment 6: P-1B-Off-Perv

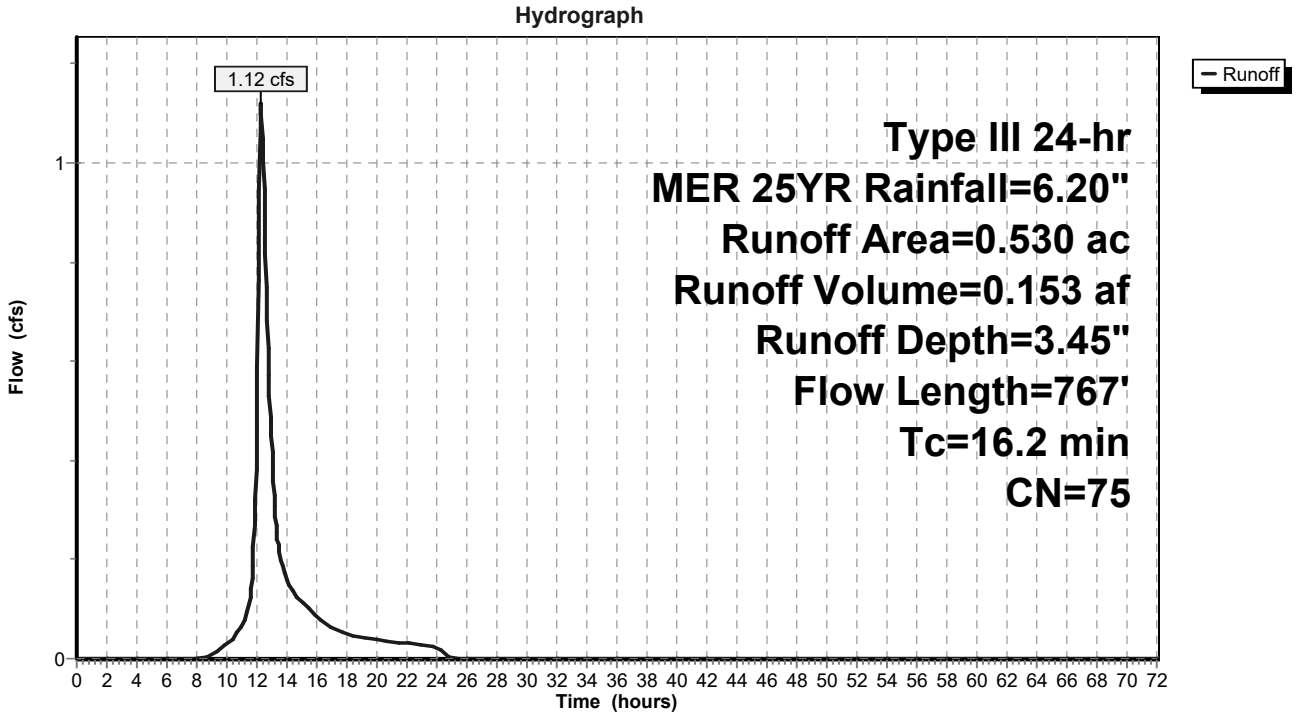
Runoff = 1.12 cfs @ 12.27 hrs, Volume= 0.153 af, Depth= 3.45"

Runoff by SCS TR-20 method, UH=Delmarva, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
Type III 24-hr MER 25YR Rainfall=6.20"

Area (ac)	CN	Description
0.520	75	Row crops, contoured, Good, HSG B
0.010	61	>75% Grass cover, Good, HSG B
0.530	75	Weighted Average
0.530		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
10.4	100	0.0210	0.16		**Sheet Flow, Sheet** Cultivated: Residue>20% n= 0.170 P2= 3.31"
5.8	667	0.0140	1.90		**Shallow Concentrated Flow, SCF** Unpaved Kv= 16.1 fps
16.2	767	Total			

Subcatchment 6: P-1B-Off-Perv



Summary for Subcatchment 7: P-2-perv

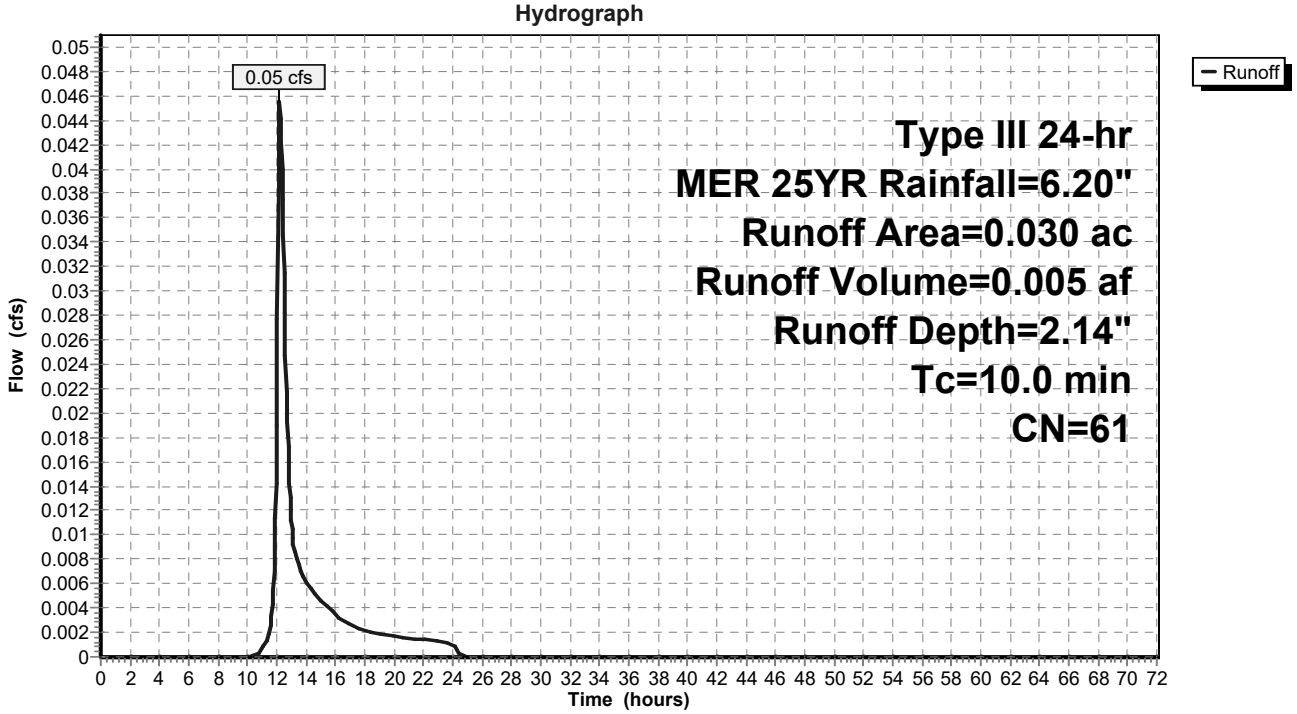
Runoff = 0.05 cfs @ 12.19 hrs, Volume= 0.005 af, Depth= 2.14"

Runoff by SCS TR-20 method, UH=Delmarva, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
Type III 24-hr MER 25YR Rainfall=6.20"

Area (ac)	CN	Description
0.030	61	>75% Grass cover, Good, HSG B
0.030		100.00% Pervious Area

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

Subcatchment 7: P-2-perv



Summary for Subcatchment 8: P-3-Perv

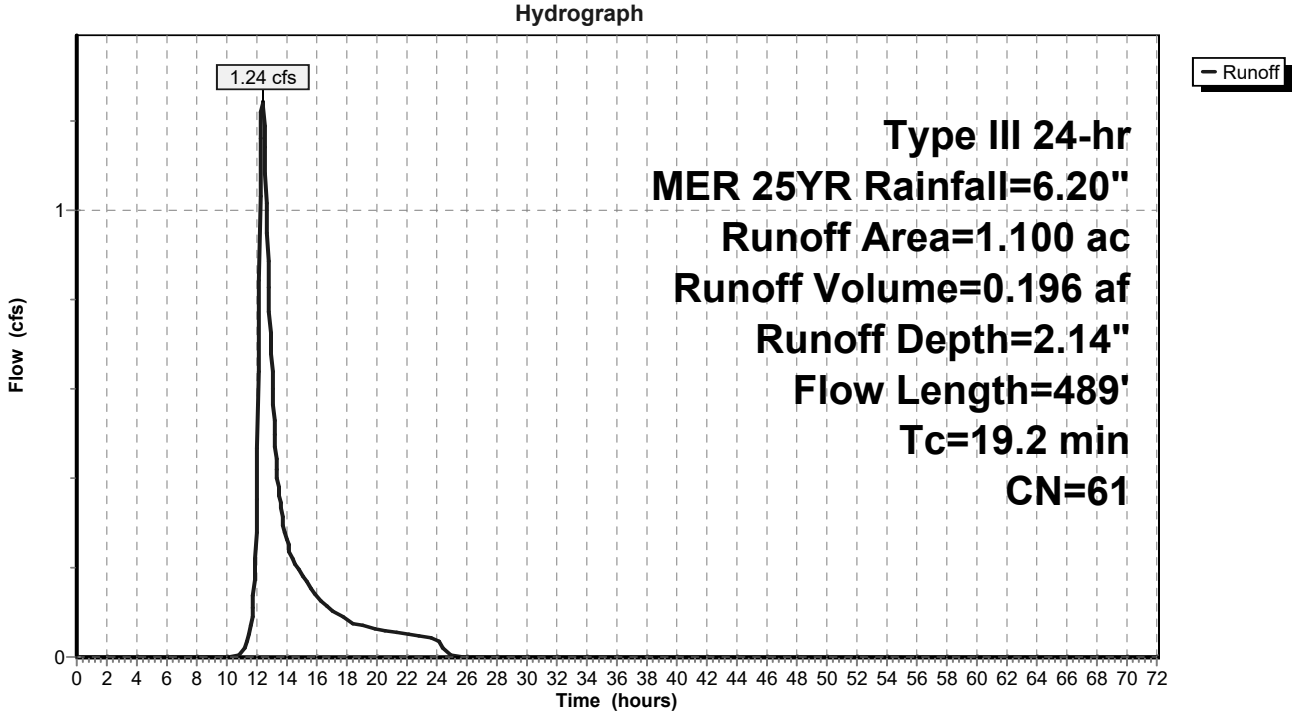
Runoff = 1.24 cfs @ 12.37 hrs, Volume= 0.196 af, Depth= 2.14"

Runoff by SCS TR-20 method, UH=Delmarva, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
Type III 24-hr MER 25YR Rainfall=6.20"

Area (ac)	CN	Description
1.100	61	>75% Grass cover, Good, HSG B
1.100		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
14.7	100	0.0090	0.11		**Sheet Flow, Sheet 4** Cultivated: Residue>20% n= 0.170 P2= 3.31"
4.5	389	0.0080	1.44		**Shallow Concentrated Flow, SCF 4** Unpaved Kv= 16.1 fps
19.2	489	Total			

Subcatchment 8: P-3-Perv



Summary for Subcatchment 9: P-3-Imperv

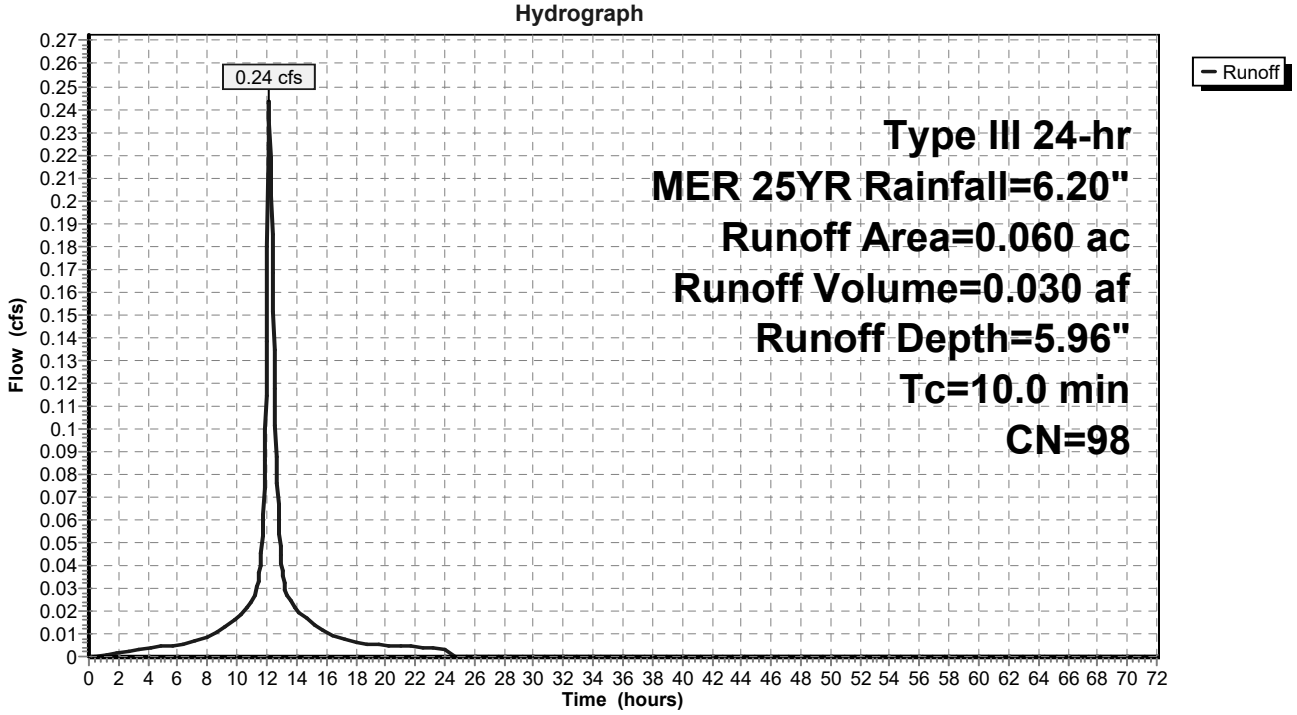
Runoff = 0.24 cfs @ 12.16 hrs, Volume= 0.030 af, Depth= 5.96"

Runoff by SCS TR-20 method, UH=Delmarva, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
Type III 24-hr MER 25YR Rainfall=6.20"

	Area (ac)	CN	Description
*	0.030	98	Pavement
*	0.030	98	Sidewalk
	0.060	98	Weighted Average
	0.060		100.00% Impervious Area

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

Subcatchment 9: P-3-Imperv



Summary for Subcatchment 10: P-3-Off-Perv

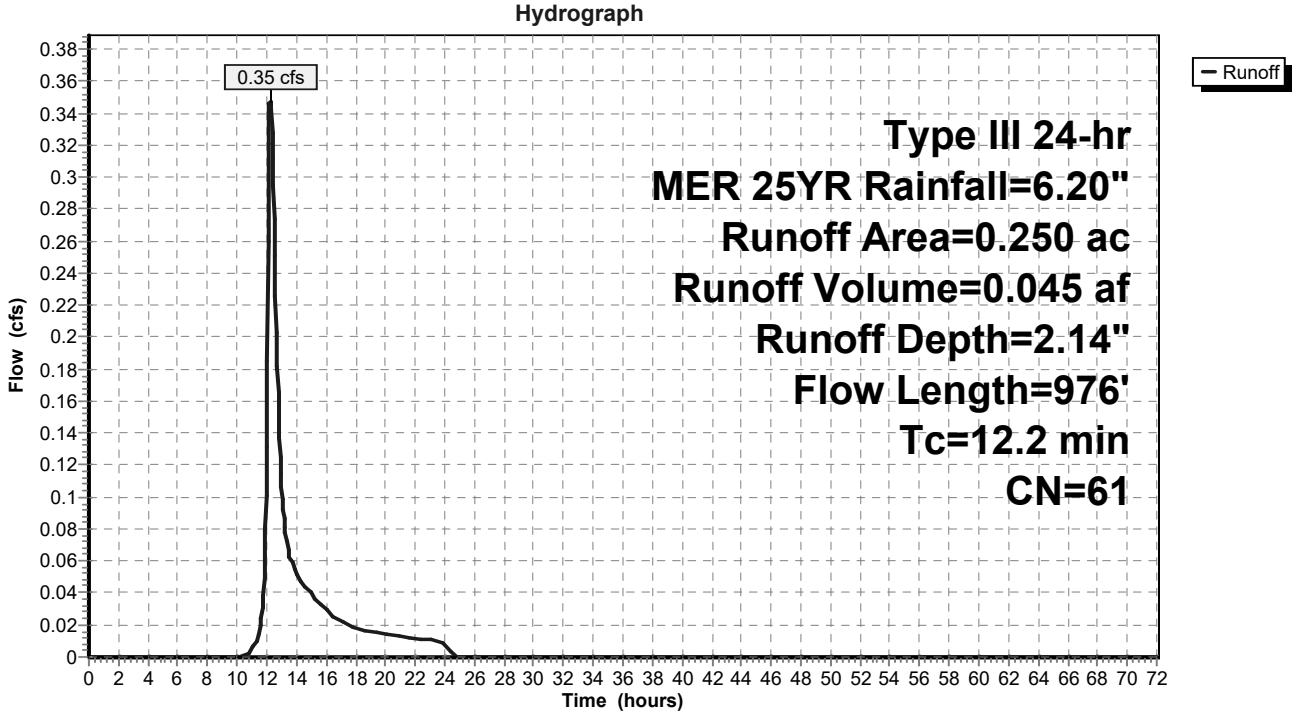
Runoff = 0.35 cfs @ 12.23 hrs, Volume= 0.045 af, Depth= 2.14"

Runoff by SCS TR-20 method, UH=Delmarva, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
Type III 24-hr MER 25YR Rainfall=6.20"

Area (ac)	CN	Description
0.250	61	>75% Grass cover, Good, HSG B
0.250		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
1.4	100	0.0140	1.21		**Sheet Flow, Sheet 4** Smooth surfaces n= 0.011 P2= 3.31"
10.8	876	0.0070	1.35		**Shallow Concentrated Flow, SCF 4** Unpaved Kv= 16.1 fps
12.2	976	Total			

Subcatchment 10: P-3-Off-Perv



Summary for Subcatchment 11: P-3-Off-Imperv

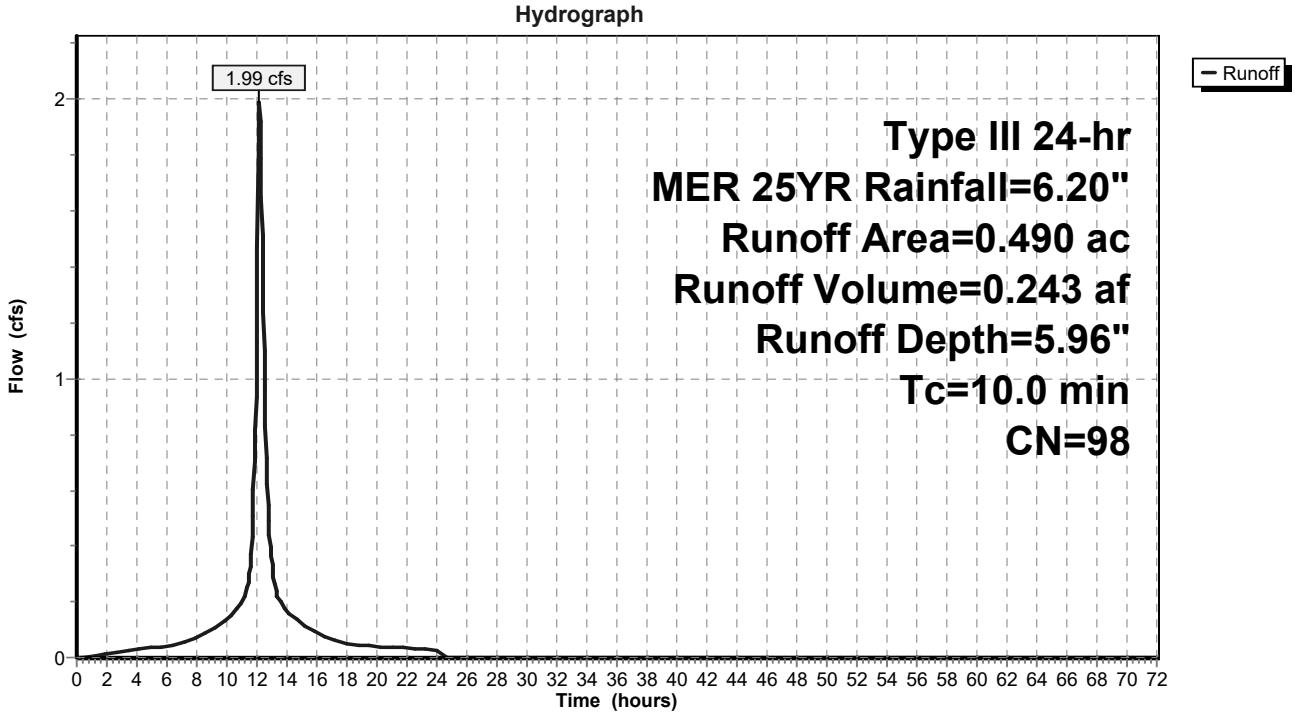
Runoff = 1.99 cfs @ 12.16 hrs, Volume= 0.243 af, Depth= 5.96"

Runoff by SCS TR-20 method, UH=Delmarva, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
Type III 24-hr MER 25YR Rainfall=6.20"

	Area (ac)	CN	Description
	0.080	98	Roofs, HSG B
*	0.100	98	Gravel, HSG B
	0.280	98	Paved parking, HSG B
*	0.030	98	Misc., HSG B
	0.490	98	Weighted Average
	0.490		100.00% Impervious Area

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

Subcatchment 11: P-3-Off-Imperv



Summary for Subcatchment 12: P-4-Perv

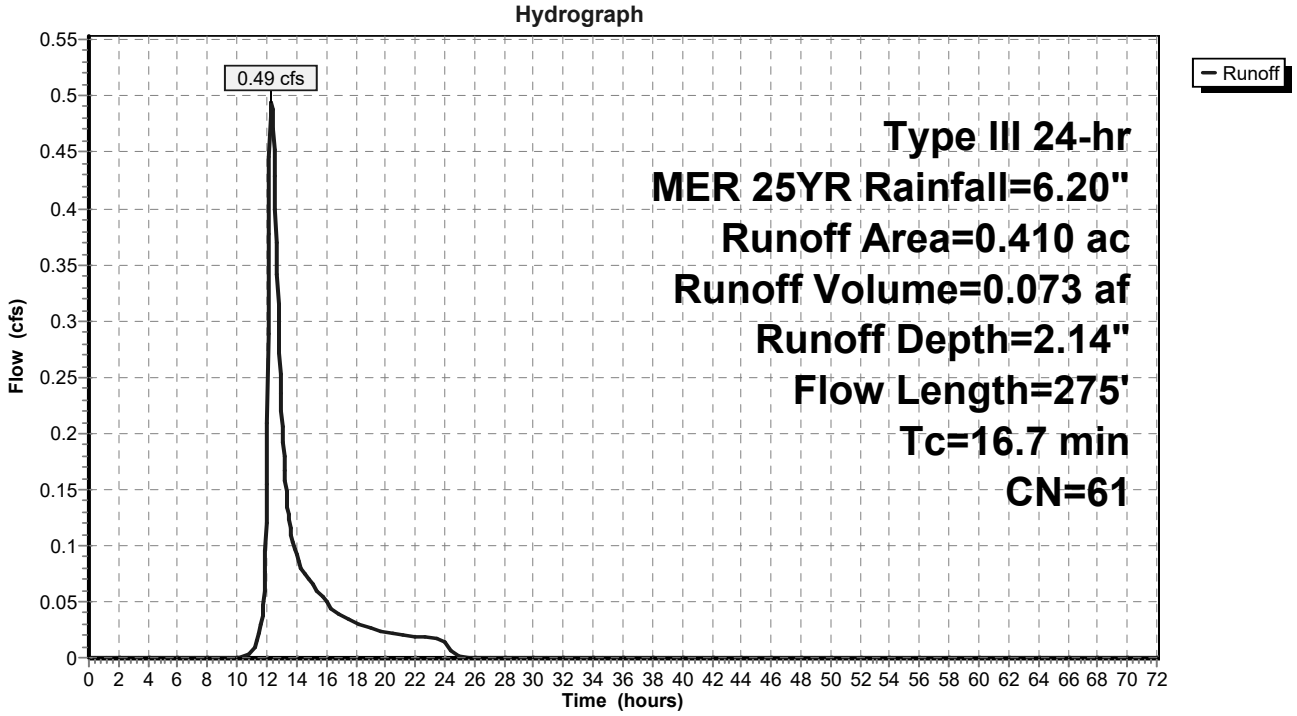
Runoff = 0.49 cfs @ 12.32 hrs, Volume= 0.073 af, Depth= 2.14"

Runoff by SCS TR-20 method, UH=Delmarva, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
Type III 24-hr MER 25YR Rainfall=6.20"

Area (ac)	CN	Description
0.410	61	>75% Grass cover, Good, HSG B
0.410		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.8	27	0.0090	0.07		**Sheet Flow, Sheet 1** Grass: Dense n= 0.240 P2= 3.31"
0.9	45	0.0090	0.87		**Sheet Flow, Sheet 2** Smooth surfaces n= 0.011 P2= 3.31"
7.0	28	0.0090	0.07		**Sheet Flow, Sheet 3** Grass: Dense n= 0.240 P2= 3.31"
2.0	175	0.0080	1.44		**Shallow Concentrated Flow, SCF** Unpaved Kv= 16.1 fps
16.7	275	Total			

Subcatchment 12: P-4-Perv



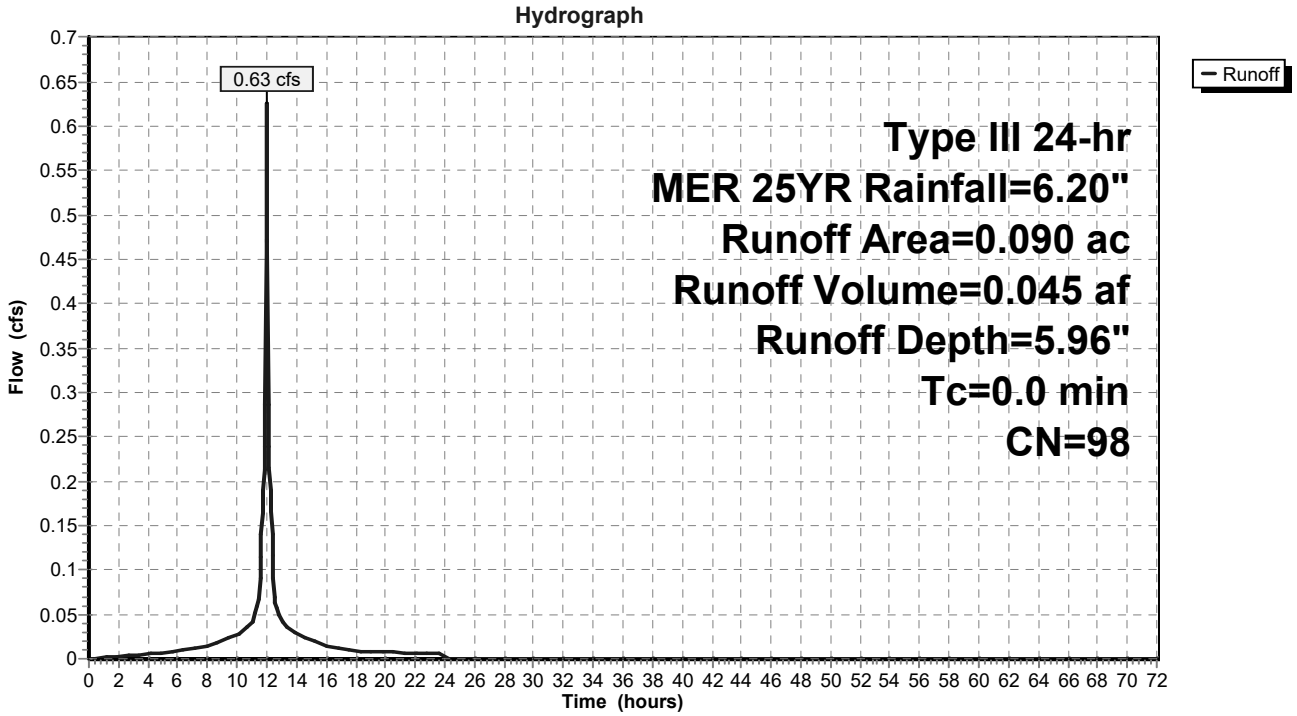
Summary for Subcatchment 13: P-4-Imperv

Runoff = 0.63 cfs @ 12.00 hrs, Volume= 0.045 af, Depth= 5.96"

Runoff by SCS TR-20 method, UH=Delmarva, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
Type III 24-hr MER 25YR Rainfall=6.20"

Area (ac)	CN	Description
0.090	98	Paved parking, HSG B
0.090		100.00% Impervious Area

Subcatchment 13: P-4-Imperv



Summary for Subcatchment 14: P-4-Off-Perv

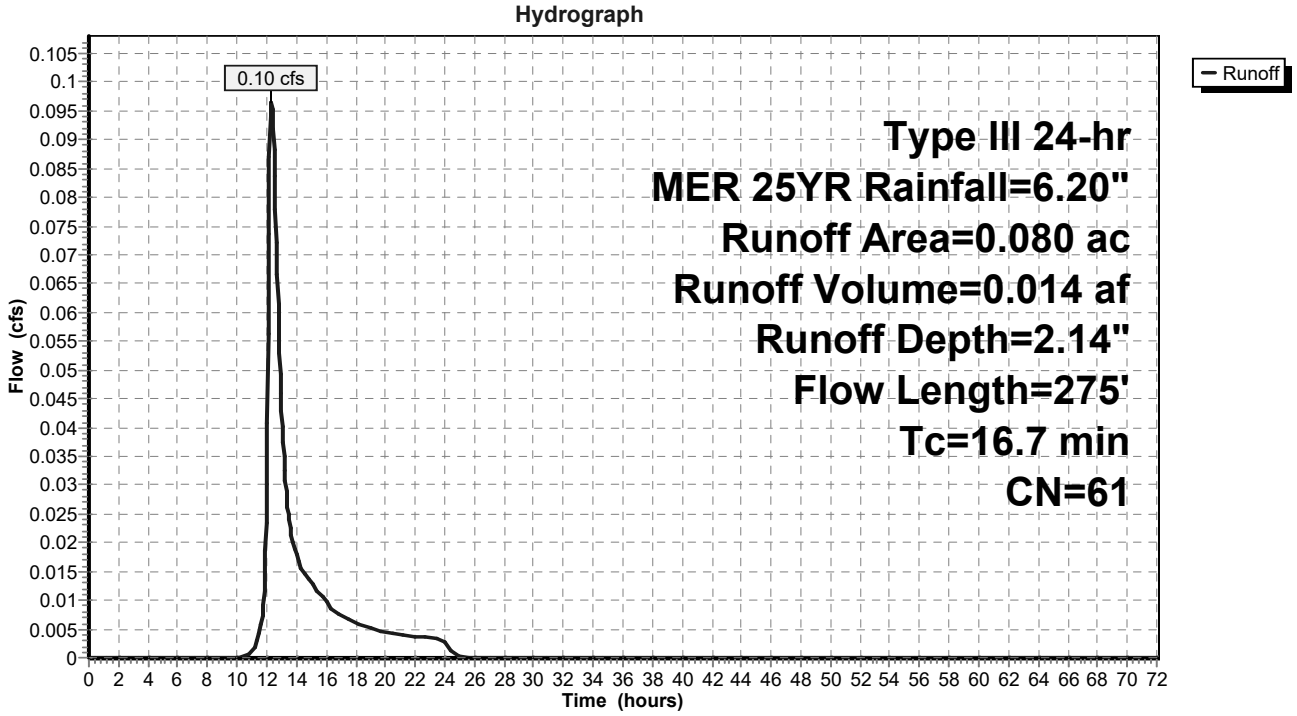
Runoff = 0.10 cfs @ 12.32 hrs, Volume= 0.014 af, Depth= 2.14"

Runoff by SCS TR-20 method, UH=Delmarva, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
Type III 24-hr MER 25YR Rainfall=6.20"

Area (ac)	CN	Description
0.080	61	>75% Grass cover, Good, HSG B
0.080		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.8	27	0.0090	0.07		**Sheet Flow, Sheet 1** Grass: Dense n= 0.240 P2= 3.31"
0.9	45	0.0090	0.87		**Sheet Flow, Sheet 2** Smooth surfaces n= 0.011 P2= 3.31"
7.0	28	0.0090	0.07		**Sheet Flow, Sheet 3** Grass: Dense n= 0.240 P2= 3.31"
2.0	175	0.0080	1.44		**Shallow Concentrated Flow, SCF** Unpaved Kv= 16.1 fps
16.7	275	Total			

Subcatchment 14: P-4-Off-Perv



Summary for Subcatchment 15: P-4-Off-Imperv

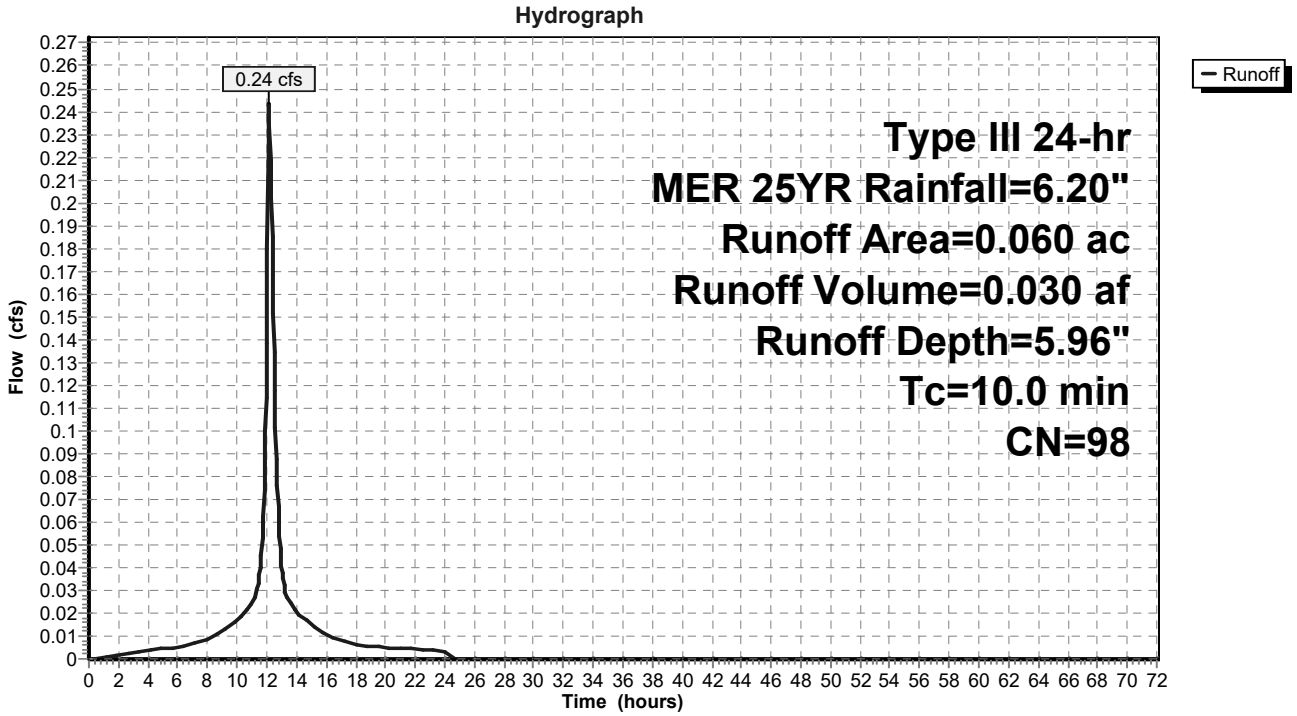
Runoff = 0.24 cfs @ 12.16 hrs, Volume= 0.030 af, Depth= 5.96"

Runoff by SCS TR-20 method, UH=Delmarva, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
Type III 24-hr MER 25YR Rainfall=6.20"

Area (ac)	CN	Description
0.060	98	Paved parking, HSG B
0.060		100.00% Impervious Area

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

Subcatchment 15: P-4-Off-Imperv



Summary for Subcatchment 16: P-5 Perv

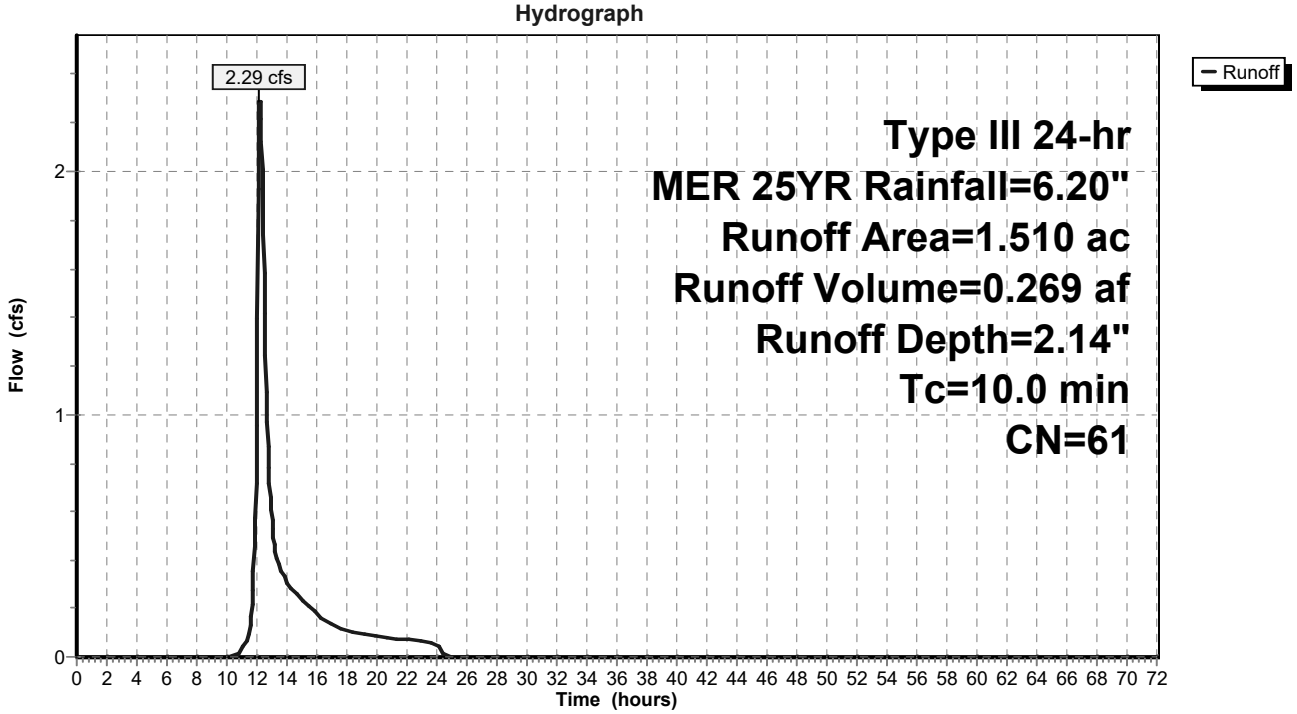
Runoff = 2.29 cfs @ 12.19 hrs, Volume= 0.269 af, Depth= 2.14"

Runoff by SCS TR-20 method, UH=Delmarva, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
Type III 24-hr MER 25YR Rainfall=6.20"

Area (ac)	CN	Description
1.510	61	>75% Grass cover, Good, HSG B
1.510		100.00% Pervious Area

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

Subcatchment 16: P-5 Perv



Summary for Subcatchment 17: P-5 Imperv

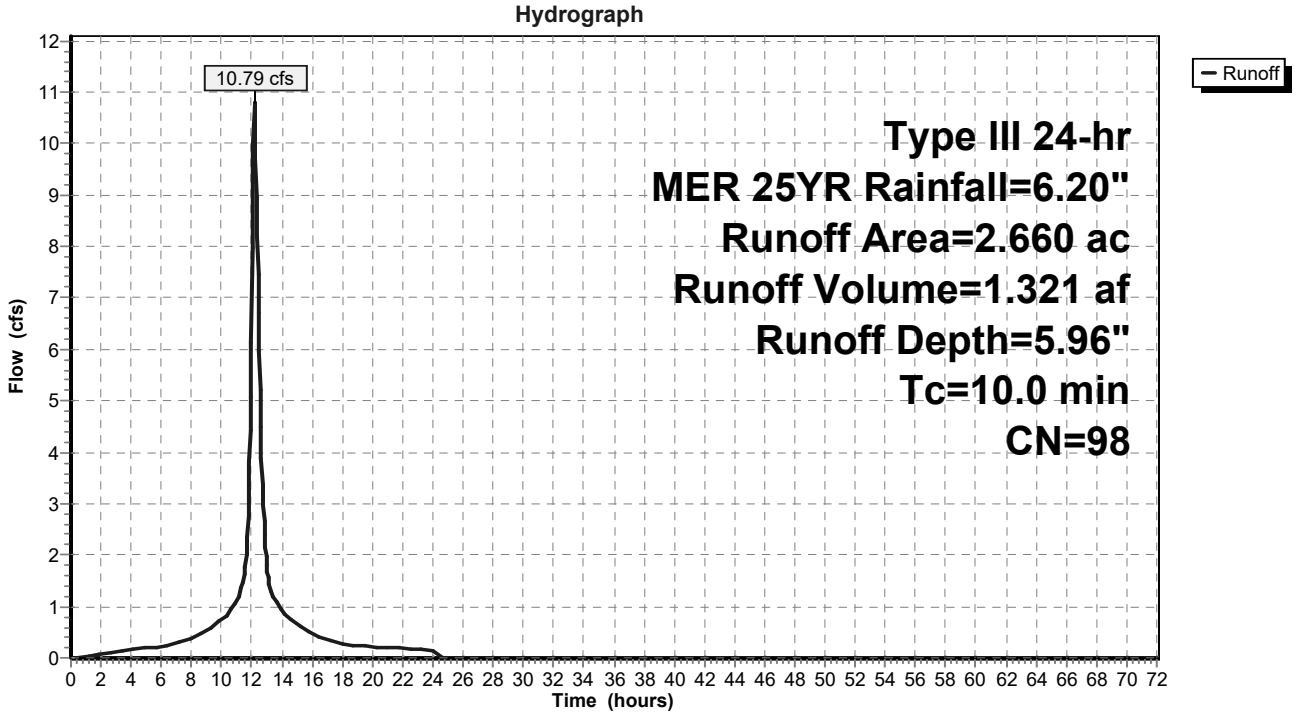
Runoff = 10.79 cfs @ 12.16 hrs, Volume= 1.321 af, Depth= 5.96"

Runoff by SCS TR-20 method, UH=Delmarva, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
Type III 24-hr MER 25YR Rainfall=6.20"

	Area (ac)	CN	Description
*	1.040	98	Building
*	1.110	98	Pavement
*	0.160	98	Sidewalk
*	0.110	98	Concrete
*	0.240	98	Driveway
	2.660	98	Weighted Average
	2.660		100.00% Impervious Area

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

Subcatchment 17: P-5 Imperv



Summary for Subcatchment 18: Extra Impervious

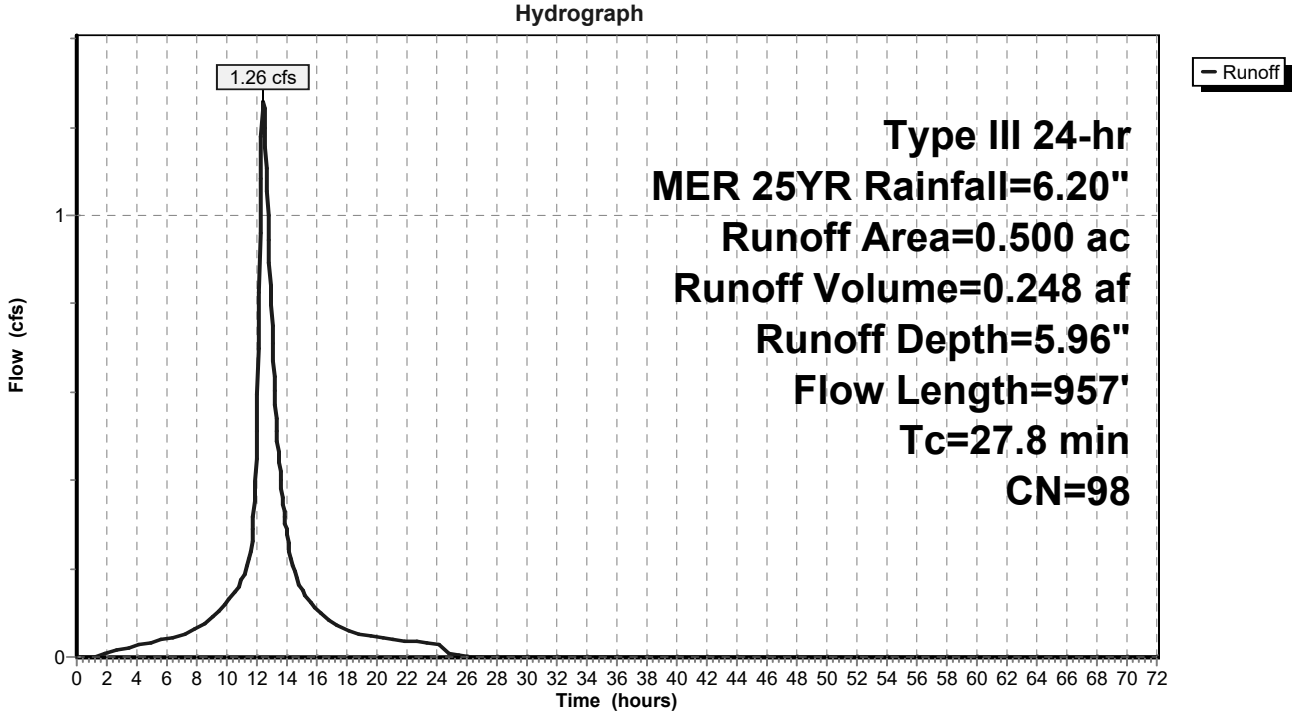
Runoff = 1.26 cfs @ 12.41 hrs, Volume= 0.248 af, Depth= 5.96"

Runoff by SCS TR-20 method, UH=Delmarva, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
Type III 24-hr MER 25YR Rainfall=6.20"

	Area (ac)	CN	Description
*	0.500	98	impervious
	0.500		100.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
20.3	100	0.0040	0.08		**Sheet Flow, Sheet 1** Cultivated: Residue>20% n= 0.170 P2= 3.31"
7.5	857	0.0140	1.90		**Shallow Concentrated Flow, SCF 1** Unpaved Kv= 16.1 fps
27.8	957	Total			

Subcatchment 18: Extra Impervious



Summary for Pond 1P: Basin B

Inflow Area = 4.170 ac, 63.79% Impervious, Inflow Depth = 4.58" for MER 25YR event
Inflow = 13.08 cfs @ 12.16 hrs, Volume= 1.591 af
Outflow = 2.08 cfs @ 13.09 hrs, Volume= 1.068 af, Atten= 84%, Lag= 55.6 min
Primary = 2.08 cfs @ 13.09 hrs, Volume= 1.068 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
Peak Elev= 106.26' @ 13.09 hrs Surf.Area= 0.394 ac Storage= 0.970 af

Plug-Flow detention time= 367.2 min calculated for 1.067 af (67% of inflow)
Center-of-Mass det. time= 265.0 min (1,038.6 - 773.7)

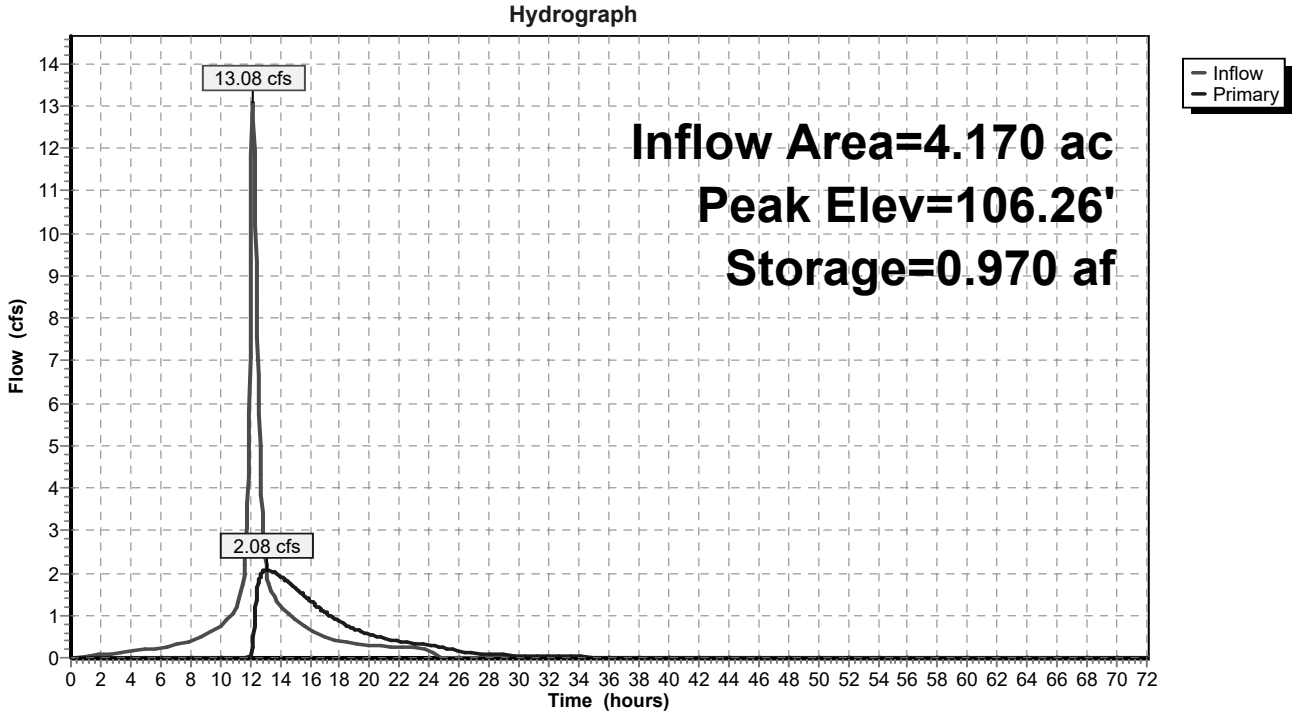
Volume	Invert	Avail.Storage	Storage Description
#1	103.00'	1.751 af	**Custom Stage Data (Prismatic)** Listed below (Recalc)

Elevation (feet)	Surf.Area (acres)	Inc.Store (acre-feet)	Cum.Store (acre-feet)
103.00	0.206	0.000	0.000
104.00	0.260	0.233	0.233
105.00	0.317	0.288	0.522
106.00	0.377	0.347	0.869
107.00	0.440	0.409	1.277
108.00	0.507	0.474	1.751

Device	Routing	Invert	Outlet Devices
#1	Primary	103.50'	**15.0" Round Culvert** L= 1,030.0' RCP, sq.cut end projecting, Ke= 0.500 Inlet / Outlet Invert= 103.50' / 98.35' S= 0.0050 '/' Cc= 0.900 n= 0.013, Flow Area= 1.23 sf
#2	Device 1	105.00'	**0.7' long Sharp-Crested Rectangular Weir** 2 End Contraction(s)

Primary OutFlow Max=2.08 cfs @ 13.09 hrs HW=106.26' TW=101.18' (Dynamic Tailwater)
└─**1=Culvert** (Passes 2.08 cfs of 4.39 cfs potential flow)
  └─**2=Sharp-Crested Rectangular Weir** (Weir Controls 2.08 cfs @ 3.67 fps)

Pond 1P: Basin B



Summary for Pond 2P: Basin A

Inflow Area = 13.070 ac, 50.65% Impervious, Inflow Depth = 3.73" for MER 25YR event
Inflow = 19.07 cfs @ 12.24 hrs, Volume= 4.060 af
Outflow = 8.99 cfs @ 12.98 hrs, Volume= 3.692 af, Atten= 53%, Lag= 44.5 min
Primary = 8.99 cfs @ 12.98 hrs, Volume= 3.692 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
Peak Elev= 101.19' @ 12.98 hrs Surf.Area= 0.473 ac Storage= 1.419 af

Plug-Flow detention time= 264.7 min calculated for 3.692 af (91% of inflow)
Center-of-Mass det. time= 207.4 min (1,070.5 - 863.0)

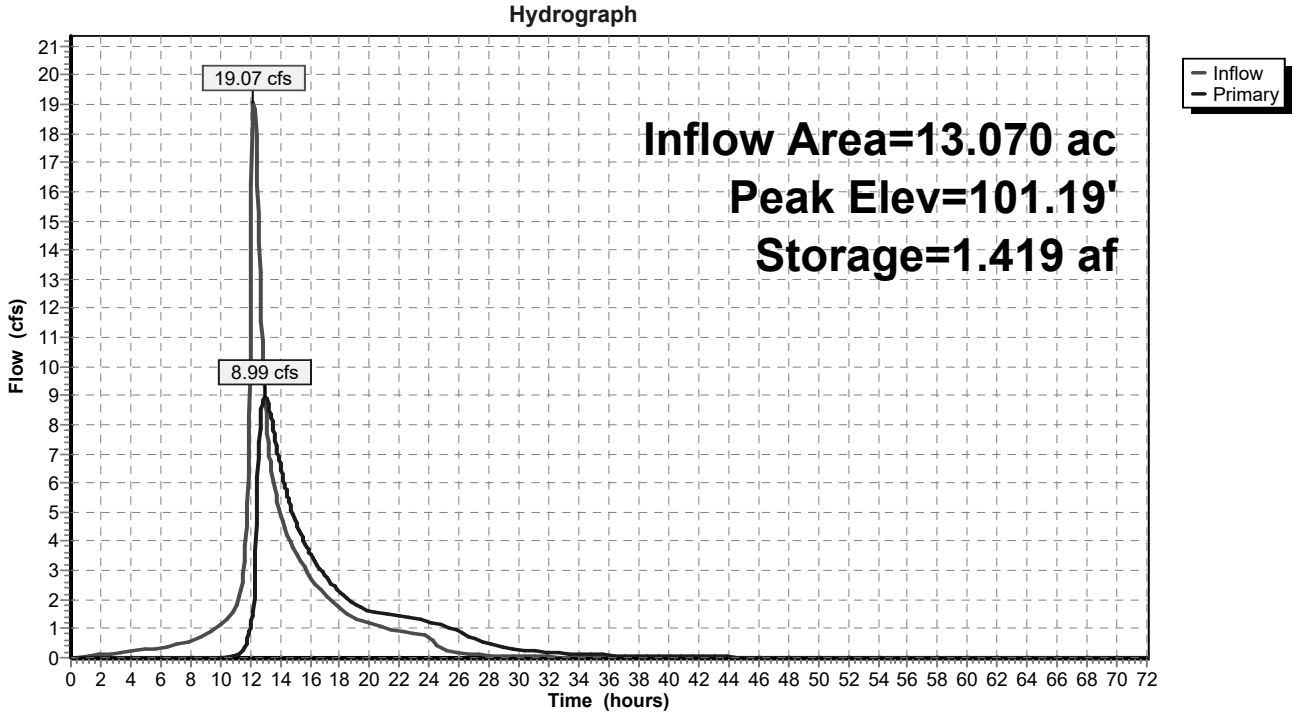
Volume	Invert	Avail.Storage	Storage Description
#1	98.10'	2.779 af	**Custom Stage Data (Prismatic)** Listed below (Recalc)

Elevation (feet)	Surf.Area (acres)	Inc.Store (acre-feet)	Cum.Store (acre-feet)
98.10	0.446	0.000	0.000
99.00	0.454	0.405	0.405
100.00	0.463	0.458	0.863
101.00	0.471	0.467	1.330
102.00	0.479	0.475	1.805
103.00	0.487	0.483	2.288
104.00	0.496	0.492	2.779

Device	Routing	Invert	Outlet Devices
#1	Primary	98.10'	**18.0" Round Culvert X 2.00** L= 100.0' RCP, sq.cut end projecting, Ke= 0.500 Inlet / Outlet Invert= 98.10' / 97.60' S= 0.0050 '/' Cc= 0.900 n= 0.013 Concrete pipe, straight & clean, Flow Area= 1.77 sf
#2	Device 1	98.88'	**8.0" Vert. Orifice/Grate** C= 0.600
#3	Device 1	100.10'	**2.0' long Sharp-Crested Rectangular Weir** 2 End Contraction(s)

Primary OutFlow Max=8.99 cfs @ 12.98 hrs HW=101.19' TW=0.00' (Dynamic Tailwater)
└─**1=Culvert** (Passes 8.99 cfs of 22.47 cfs potential flow)
  ├─**2=Orifice/Grate** (Orifice Controls 2.36 cfs @ 6.77 fps)
  └─**3=Sharp-Crested Rectangular Weir** (Weir Controls 6.62 cfs @ 3.41 fps)

Pond 2P: Basin A

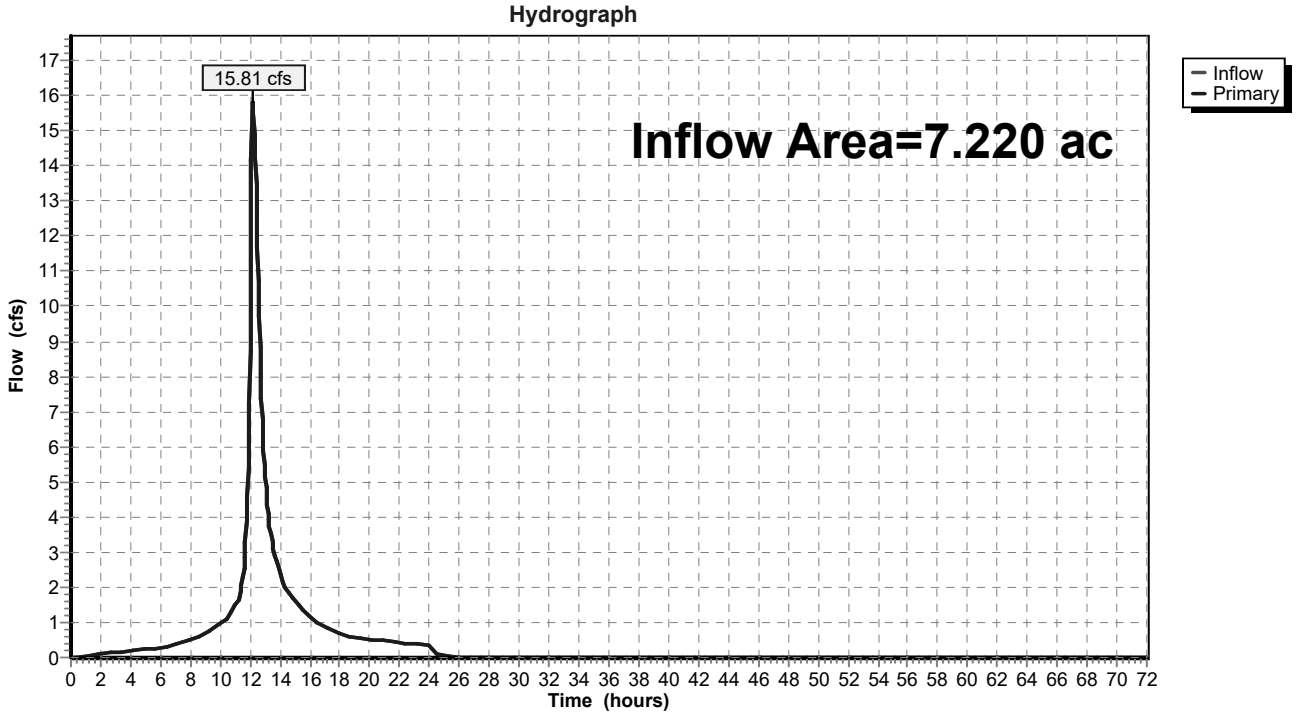


Summary for Link 1L: POA-1

Inflow Area = 7.220 ac, 46.68% Impervious, Inflow Depth = 4.07" for MER 25YR event
Inflow = 15.81 cfs @ 12.18 hrs, Volume= 2.446 af
Primary = 15.81 cfs @ 12.18 hrs, Volume= 2.446 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs

Link 1L: POA-1

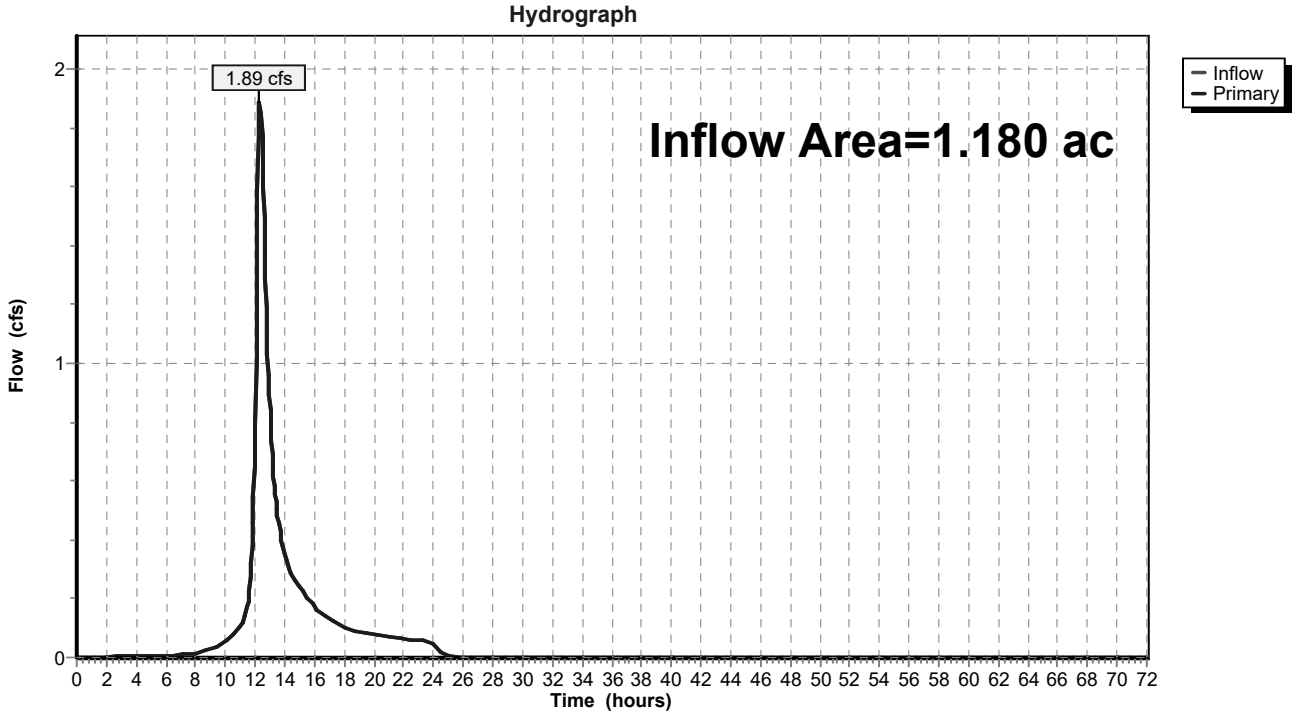


Summary for Link 2L: POA-1 OFF

Inflow Area = 1.180 ac, 7.63% Impervious, Inflow Depth = 3.02" for MER 25YR event
Inflow = 1.89 cfs @ 12.31 hrs, Volume= 0.297 af
Primary = 1.89 cfs @ 12.31 hrs, Volume= 0.297 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs

Link 2L: POA-1 OFF

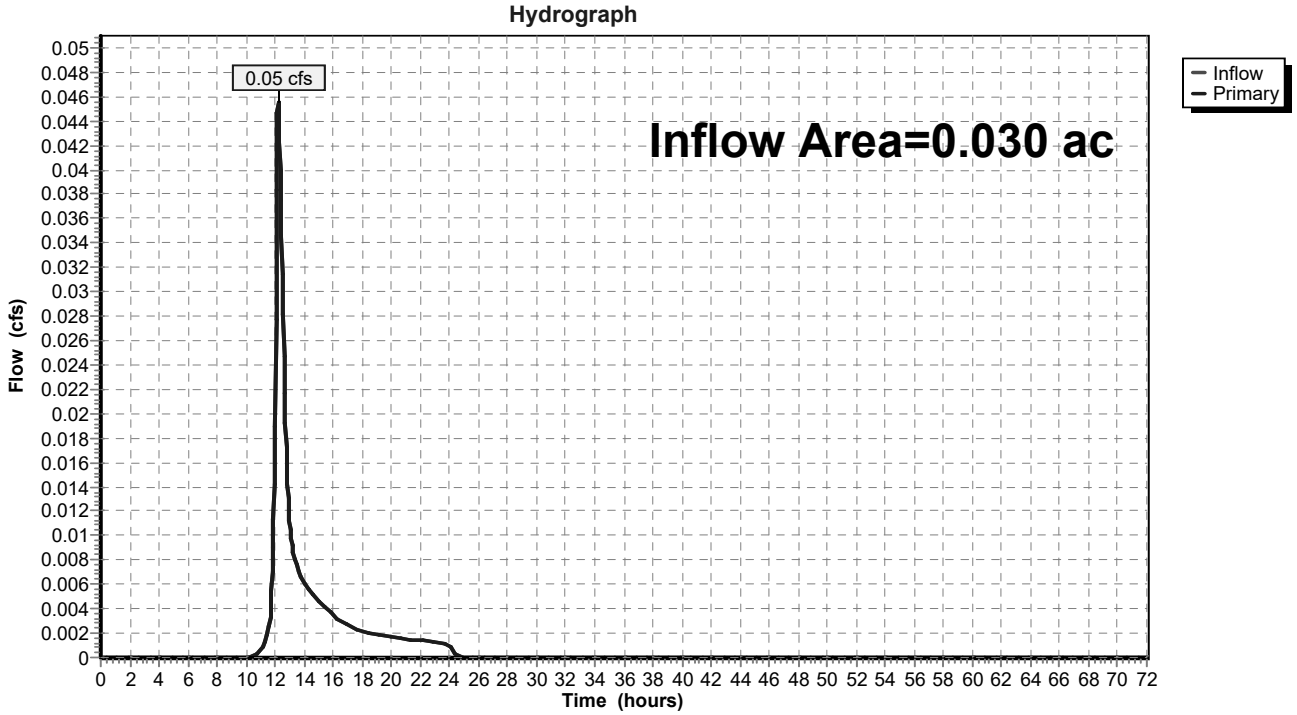


Summary for Link 3L: POA-2

Inflow Area = 0.030 ac, 0.00% Impervious, Inflow Depth = 2.14" for MER 25YR event
Inflow = 0.05 cfs @ 12.19 hrs, Volume= 0.005 af
Primary = 0.05 cfs @ 12.19 hrs, Volume= 0.005 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs

Link 3L: POA-2

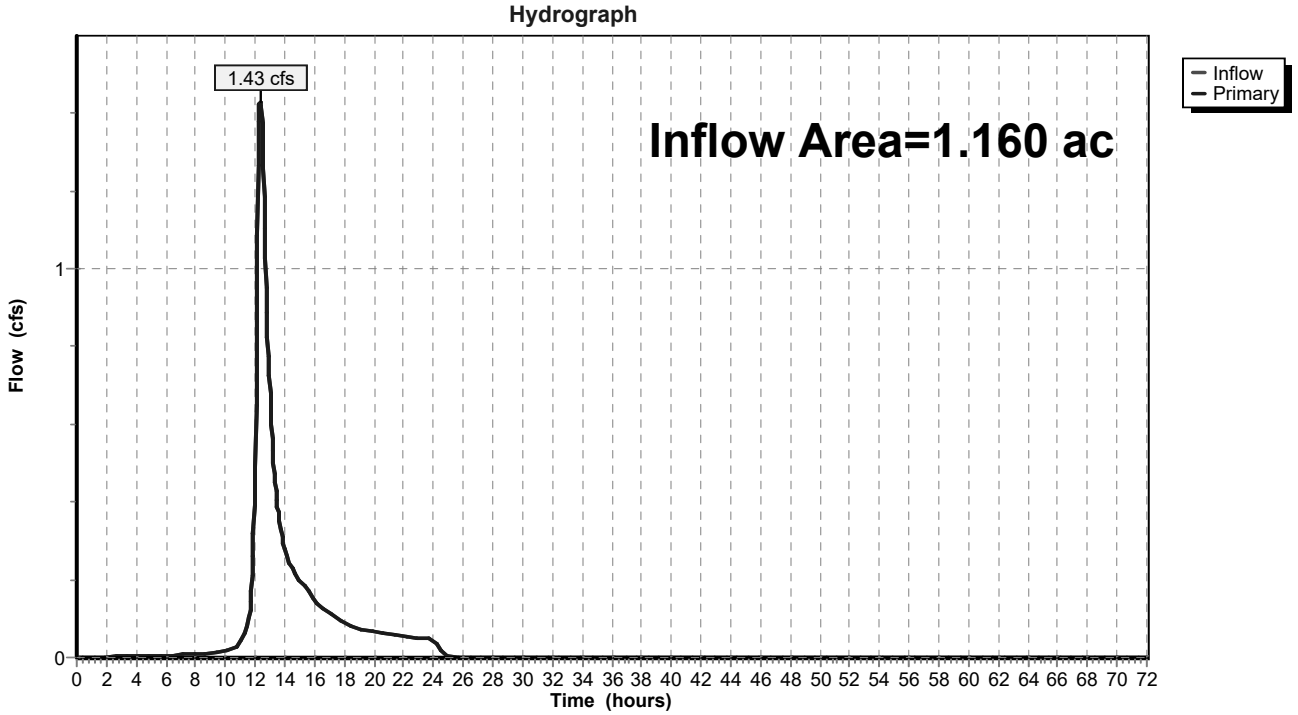


Summary for Link 4L: POA-3

Inflow Area = 1.160 ac, 5.17% Impervious, Inflow Depth = 2.34" for MER 25YR event
Inflow = 1.43 cfs @ 12.33 hrs, Volume= 0.226 af
Primary = 1.43 cfs @ 12.33 hrs, Volume= 0.226 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs

Link 4L: POA-3

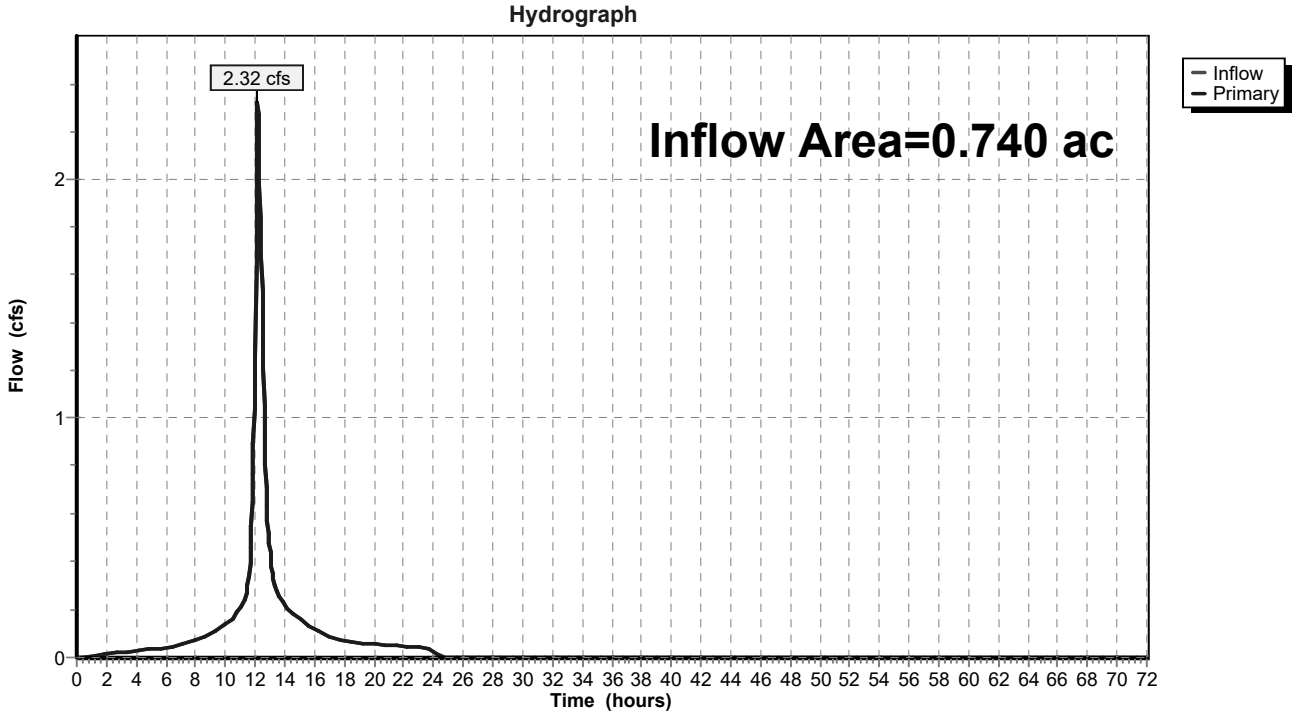


Summary for Link 5L: POA-3 OFF

Inflow Area = 0.740 ac, 66.22% Impervious, Inflow Depth = 4.67" for MER 25YR event
Inflow = 2.32 cfs @ 12.17 hrs, Volume= 0.288 af
Primary = 2.32 cfs @ 12.17 hrs, Volume= 0.288 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs

Link 5L: POA-3 OFF

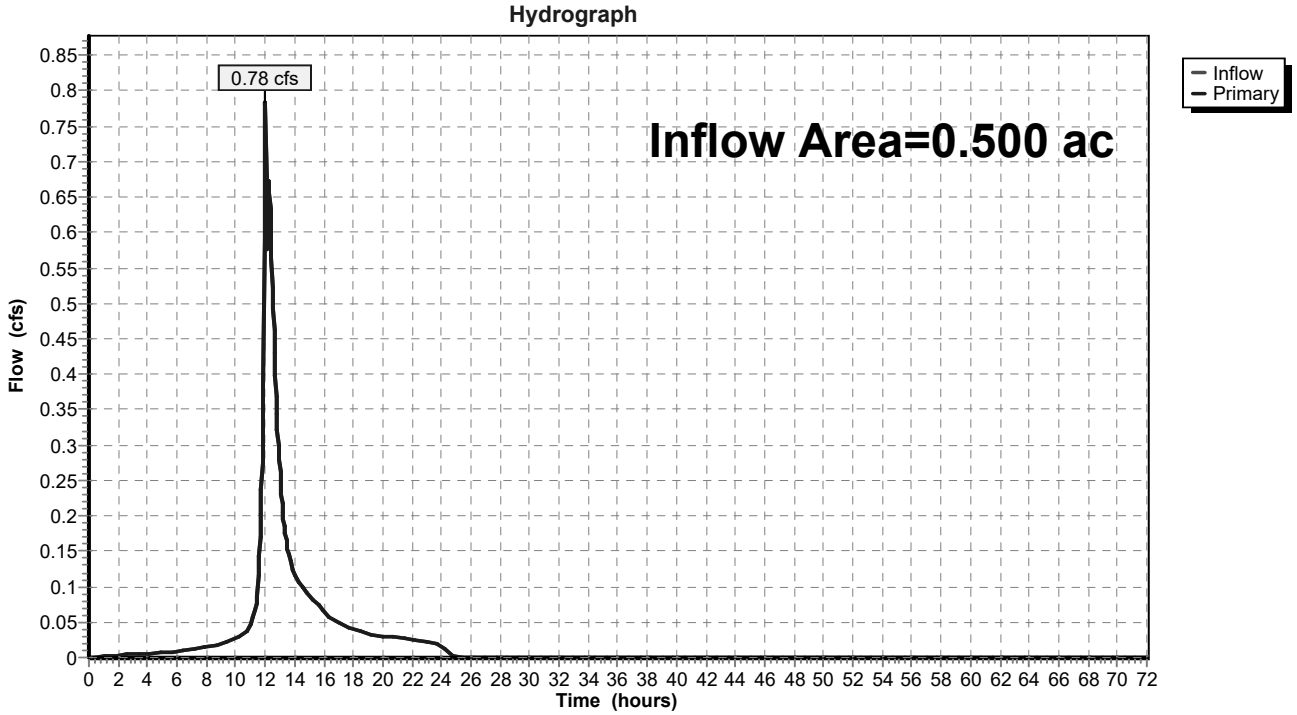


Summary for Link 6L: POA-4

Inflow Area = 0.500 ac, 18.00% Impervious, Inflow Depth = 2.83" for MER 25YR event
Inflow = 0.78 cfs @ 12.01 hrs, Volume= 0.118 af
Primary = 0.78 cfs @ 12.01 hrs, Volume= 0.118 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs

Link 6L: POA-4

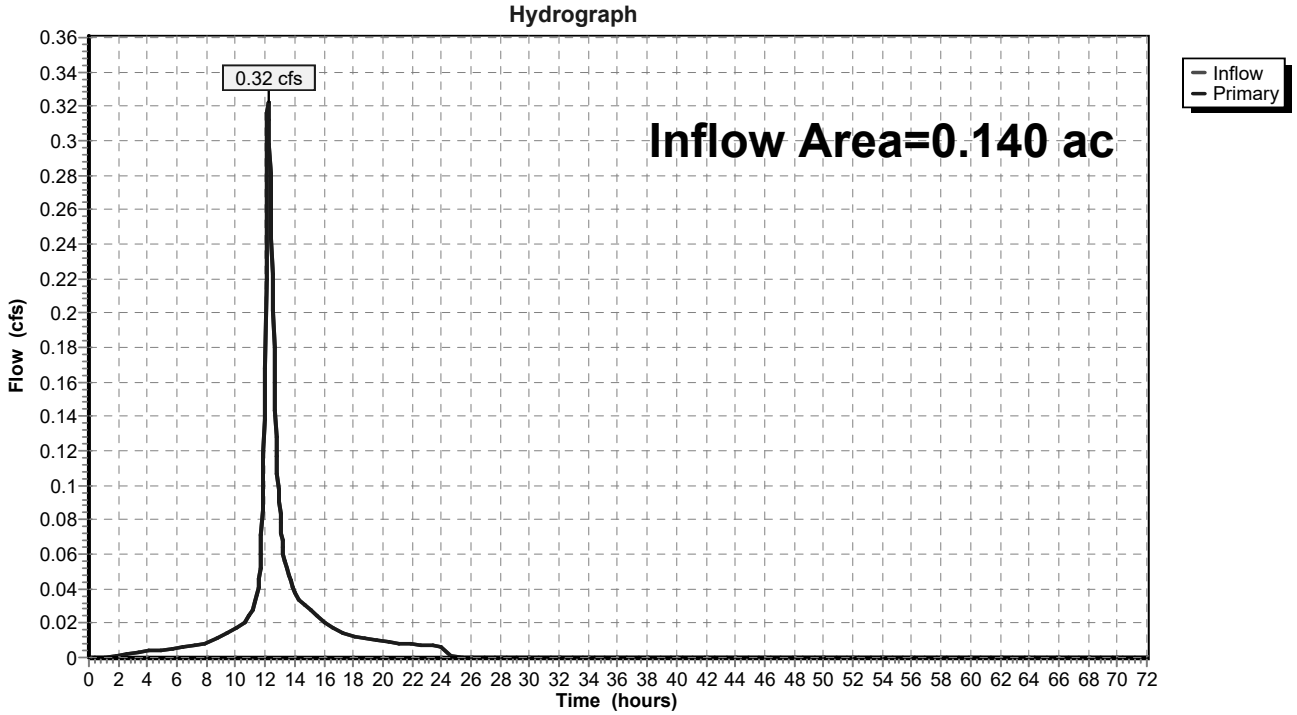


Summary for Link 7L: POA-4 OFF

Inflow Area = 0.140 ac, 42.86% Impervious, Inflow Depth = 3.78" for MER 25YR event
Inflow = 0.32 cfs @ 12.19 hrs, Volume= 0.044 af
Primary = 0.32 cfs @ 12.19 hrs, Volume= 0.044 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs

Link 7L: POA-4 OFF

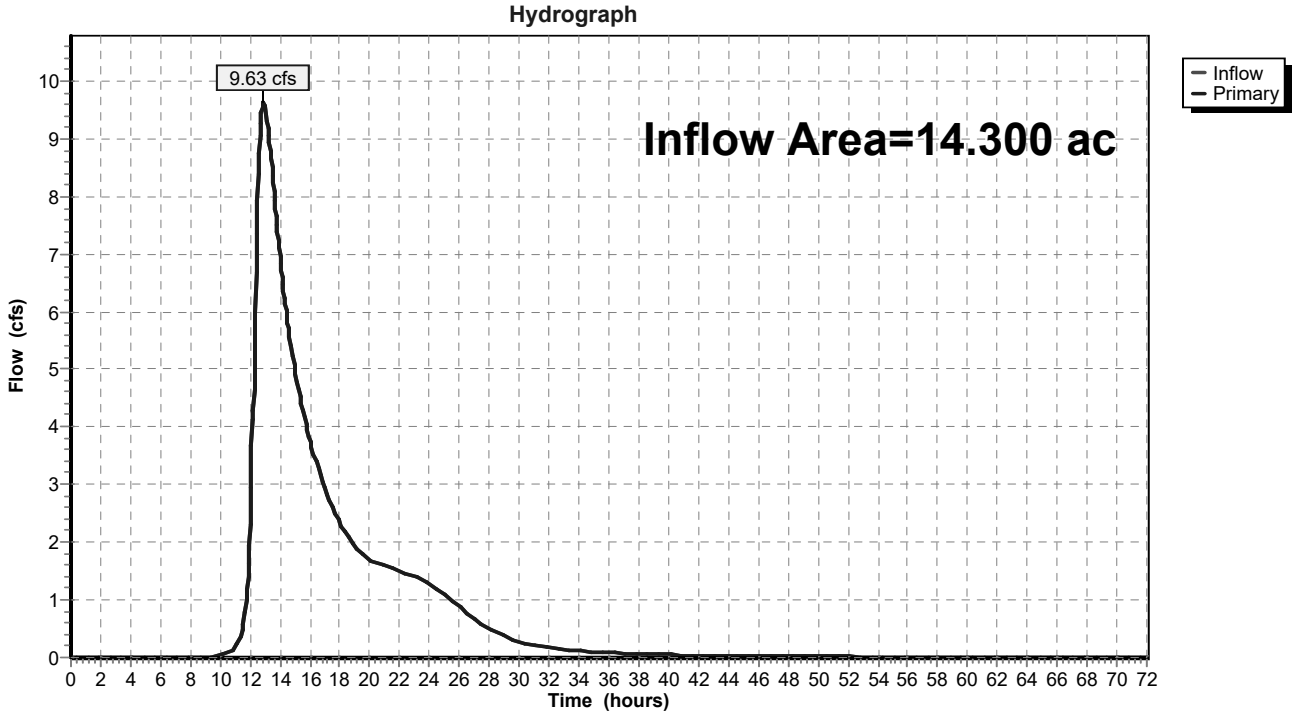


Summary for Link 8L: POA 1 total

Inflow Area = 14.300 ac, 46.29% Impervious, Inflow Depth > 3.35" for MER 25YR event
Inflow = 9.63 cfs @ 12.91 hrs, Volume= 3.996 af
Primary = 9.63 cfs @ 12.91 hrs, Volume= 3.996 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs

Link 8L: POA 1 total

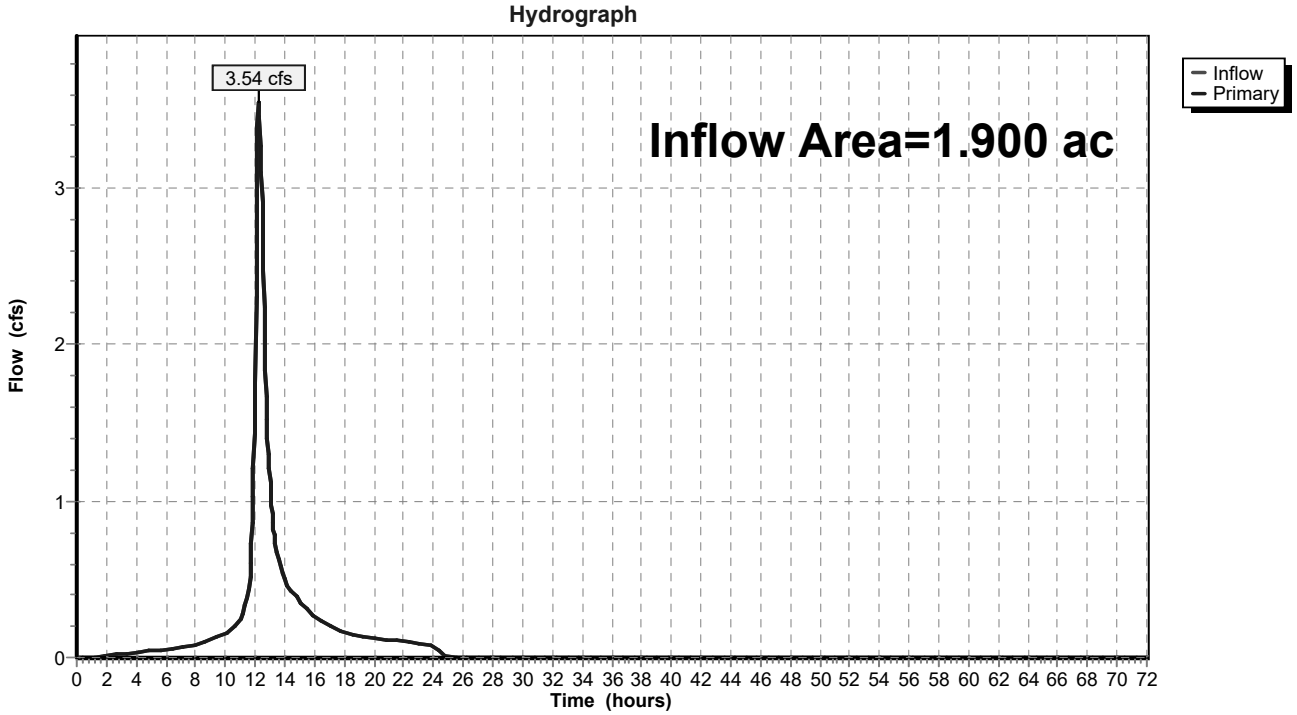


Summary for Link 9L: POA 3 total

Inflow Area = 1.900 ac, 28.95% Impervious, Inflow Depth = 3.25" for MER 25YR event
Inflow = 3.54 cfs @ 12.22 hrs, Volume= 0.514 af
Primary = 3.54 cfs @ 12.22 hrs, Volume= 0.514 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs

Link 9L: POA 3 total

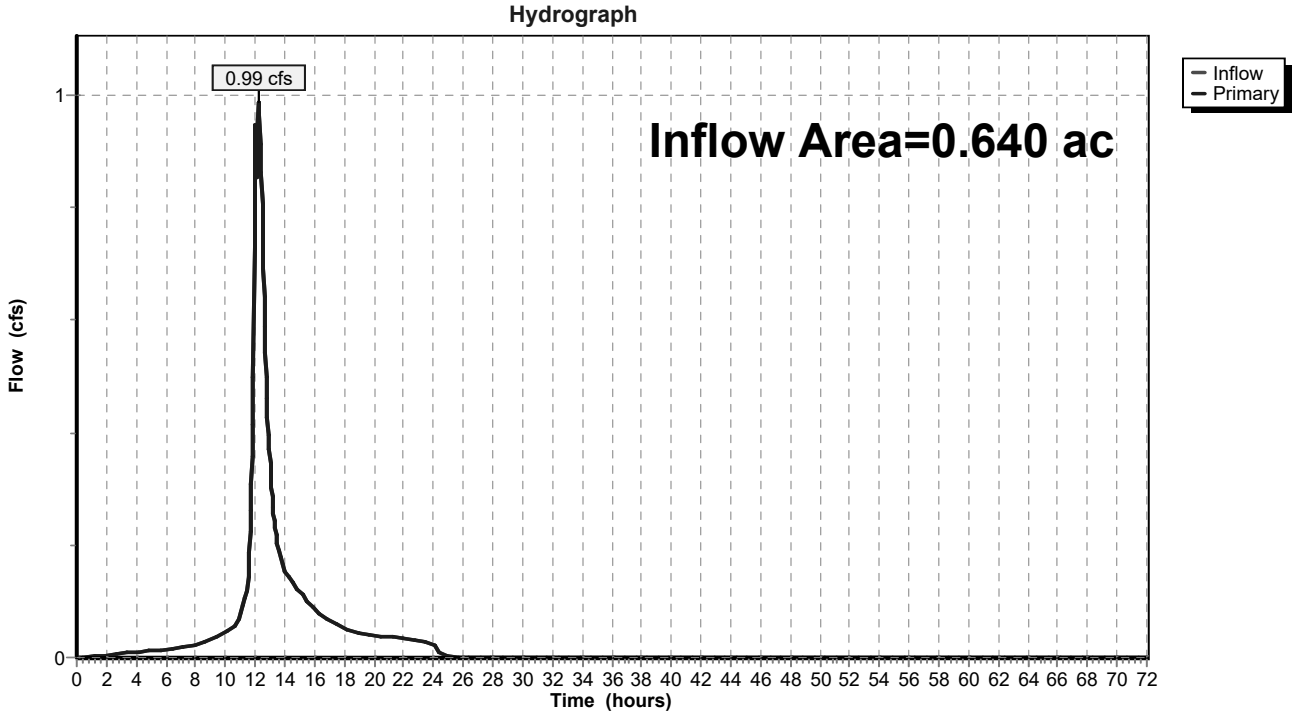


Summary for Link 10L: POA 4 total

Inflow Area = 0.640 ac, 23.44% Impervious, Inflow Depth = 3.04" for MER 25YR event
Inflow = 0.99 cfs @ 12.23 hrs, Volume= 0.162 af
Primary = 0.99 cfs @ 12.23 hrs, Volume= 0.162 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs

Link 10L: POA 4 total



Summary for Subcatchment 1: P-1-Perv

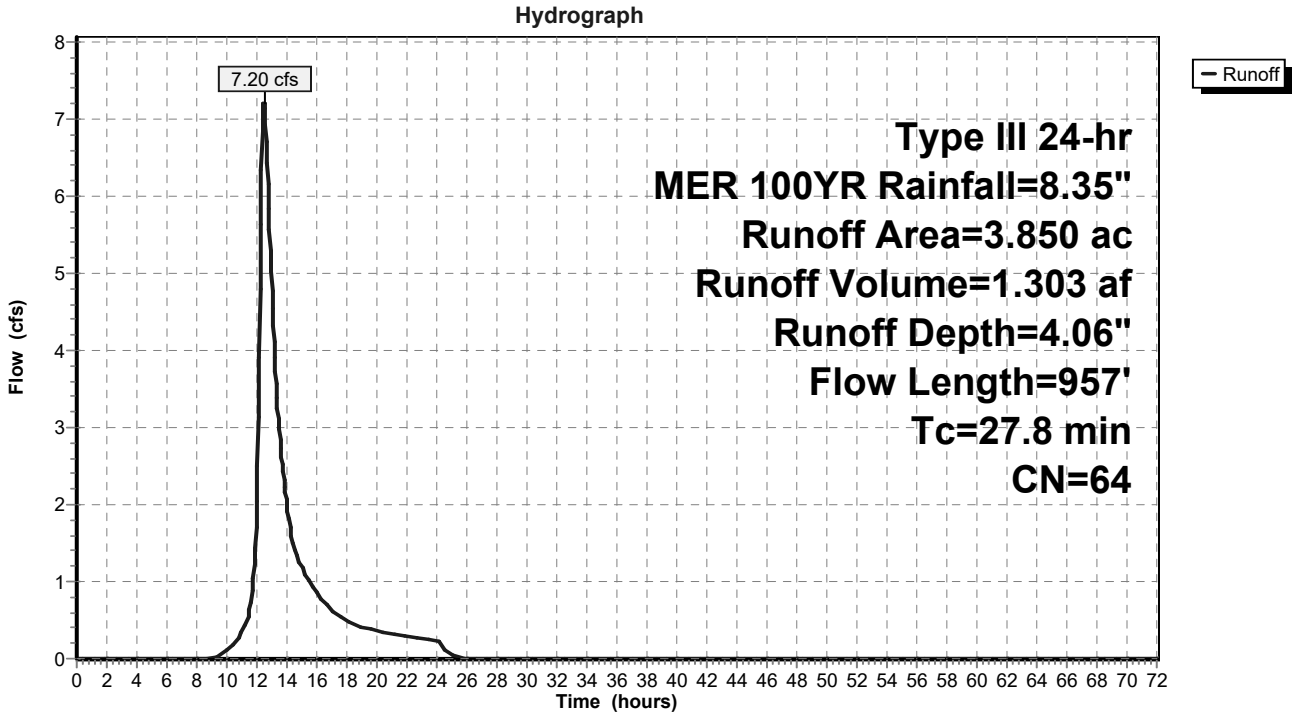
Runoff = 7.20 cfs @ 12.47 hrs, Volume= 1.303 af, Depth= 4.06"

Runoff by SCS TR-20 method, UH=Delmarva, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
Type III 24-hr MER 100YR Rainfall=8.35"

Area (ac)	CN	Description
3.070	61	>75% Grass cover, Good, HSG B
0.780	74	>75% Grass cover, Good, HSG C
3.850	64	Weighted Average
3.850		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
20.3	100	0.0040	0.08		**Sheet Flow, Sheet 1** Cultivated: Residue>20% n= 0.170 P2= 3.31"
7.5	857	0.0140	1.90		**Shallow Concentrated Flow, SCF 1** Unpaved Kv= 16.1 fps
27.8	957	Total			

Subcatchment 1: P-1-Perv



Summary for Subcatchment 2: P-1-Imperv

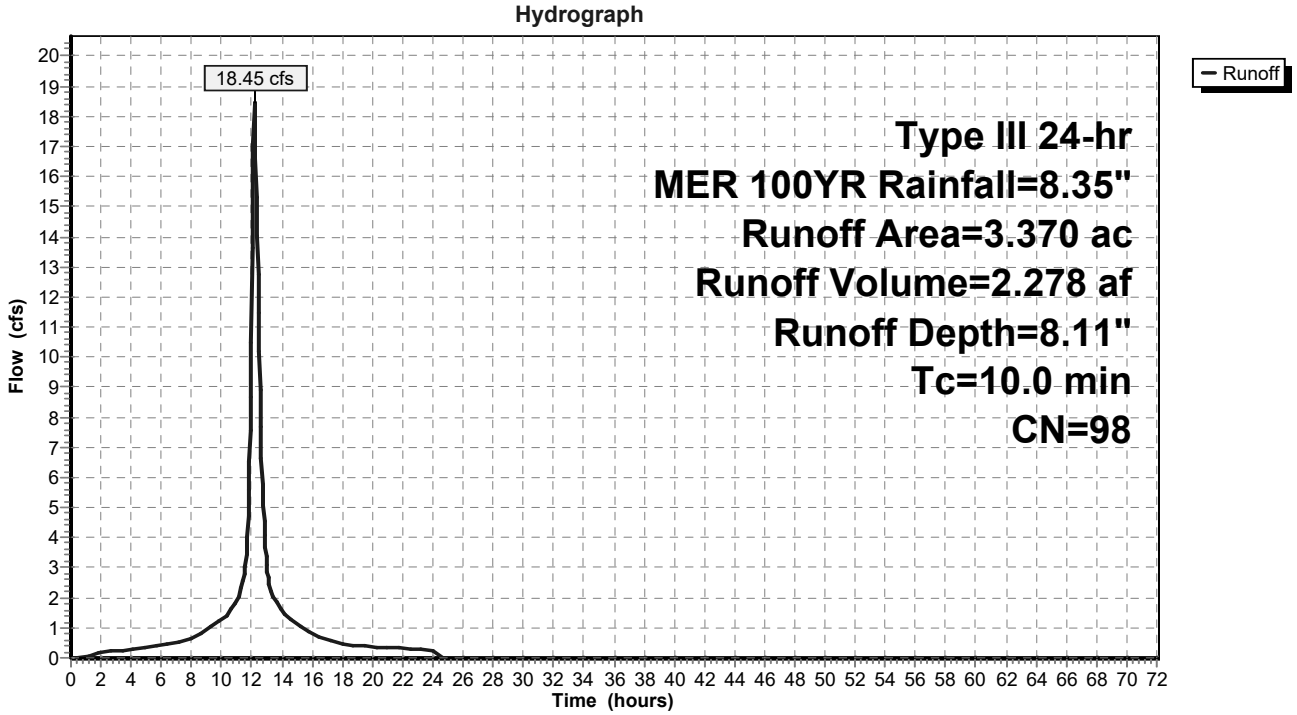
Runoff = 18.45 cfs @ 12.16 hrs, Volume= 2.278 af, Depth= 8.11"

Runoff by SCS TR-20 method, UH=Delmarva, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
Type III 24-hr MER 100YR Rainfall=8.35"

	Area (ac)	CN	Description
*	1.600	98	Buildings
*	1.310	98	Pavement
*	0.300	98	Sidewalk
*	0.110	98	Conc
*	0.050	98	Driveway
	3.370	98	Weighted Average
	3.370		100.00% Impervious Area

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

Subcatchment 2: P-1-Imperv



Summary for Subcatchment 3: P-1-Undet - perv

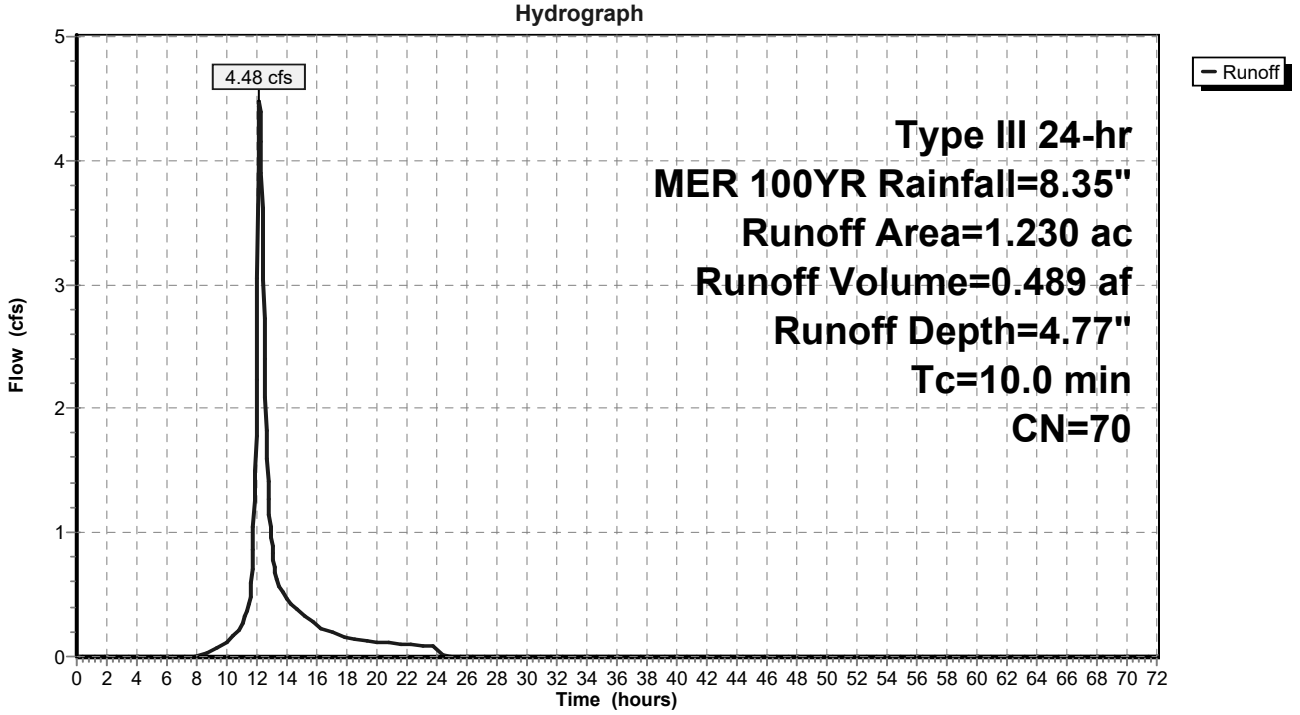
Runoff = 4.48 cfs @ 12.17 hrs, Volume= 0.489 af, Depth= 4.77"

Runoff by SCS TR-20 method, UH=Delmarva, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
Type III 24-hr MER 100YR Rainfall=8.35"

Area (ac)	CN	Description
0.820	74	>75% Grass cover, Good, HSG C
0.410	61	>75% Grass cover, Good, HSG B
1.230	70	Weighted Average
1.230		100.00% Pervious Area

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

Subcatchment 3: P-1-Undet - perv



Summary for Subcatchment 4: P-1A-Off-Perv

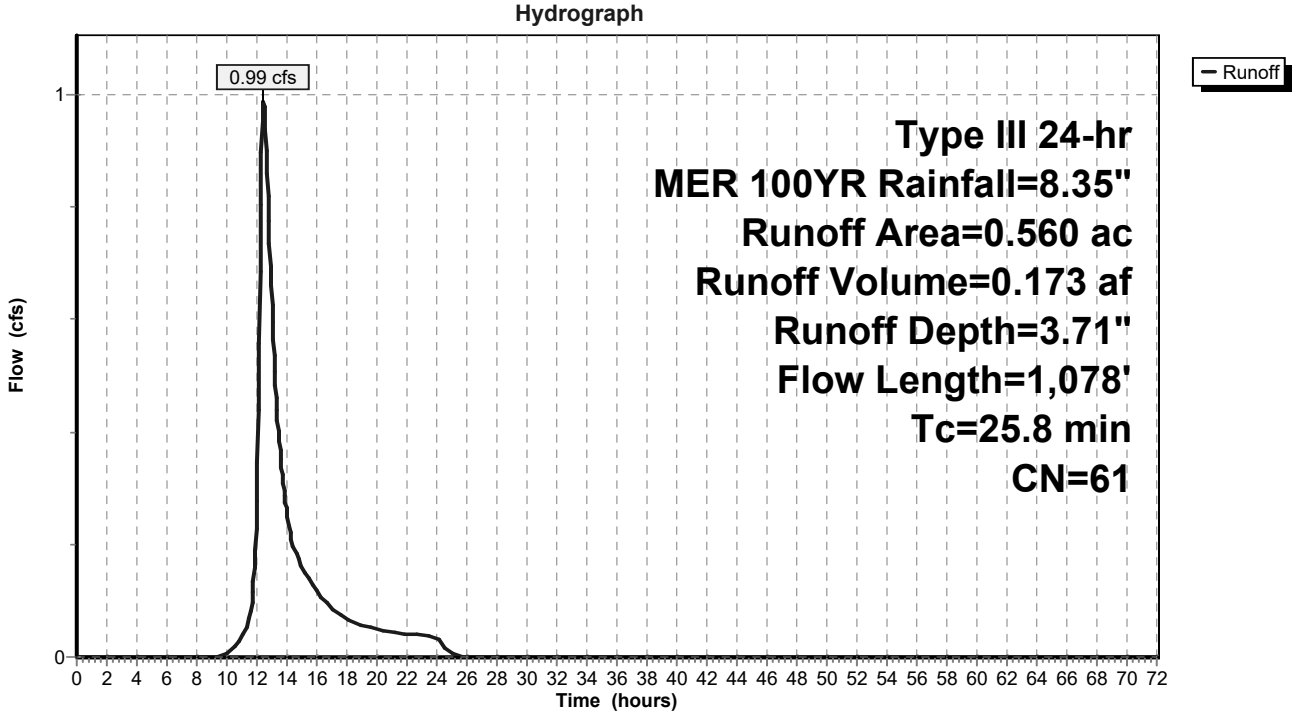
Runoff = 0.99 cfs @ 12.45 hrs, Volume= 0.173 af, Depth= 3.71"

Runoff by SCS TR-20 method, UH=Delmarva, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
Type III 24-hr MER 100YR Rainfall=8.35"

Area (ac)	CN	Description
0.560	61	>75% Grass cover, Good, HSG B
0.560		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
17.2	100	0.0120	0.10		**Sheet Flow, Sheet 1.3** Grass: Dense n= 0.240 P2= 3.31"
8.6	978	0.0140	1.90		**Shallow Concentrated Flow, SCF 1.3** Unpaved Kv= 16.1 fps
25.8	1,078	Total			

Subcatchment 4: P-1A-Off-Perv



Summary for Subcatchment 5: P-1A-Off-Imperv

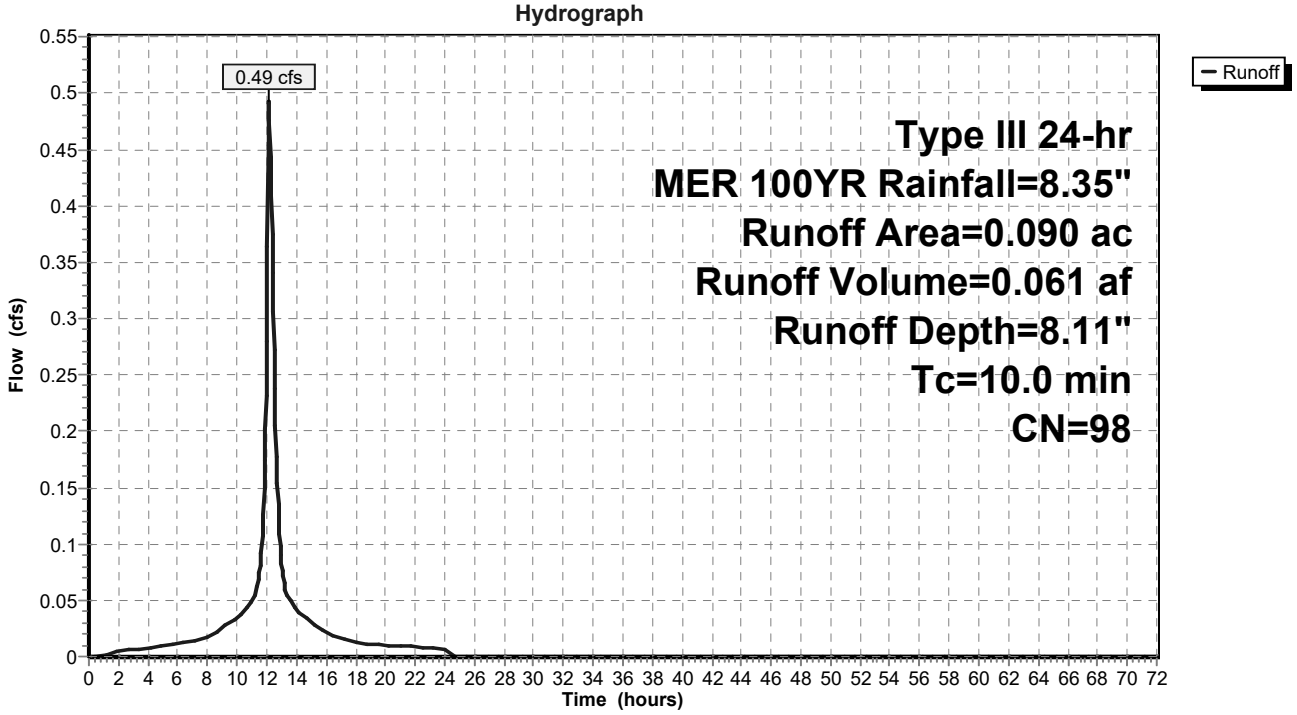
Runoff = 0.49 cfs @ 12.16 hrs, Volume= 0.061 af, Depth= 8.11"

Runoff by SCS TR-20 method, UH=Delmarva, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
Type III 24-hr MER 100YR Rainfall=8.35"

	Area (ac)	CN	Description
	0.010	98	Roofs, HSG B
*	0.080	98	Paved parking, HSG B
	0.090	98	Weighted Average
	0.090		100.00% Impervious Area

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

Subcatchment 5: P-1A-Off-Imperv



Summary for Subcatchment 6: P-1B-Off-Perv

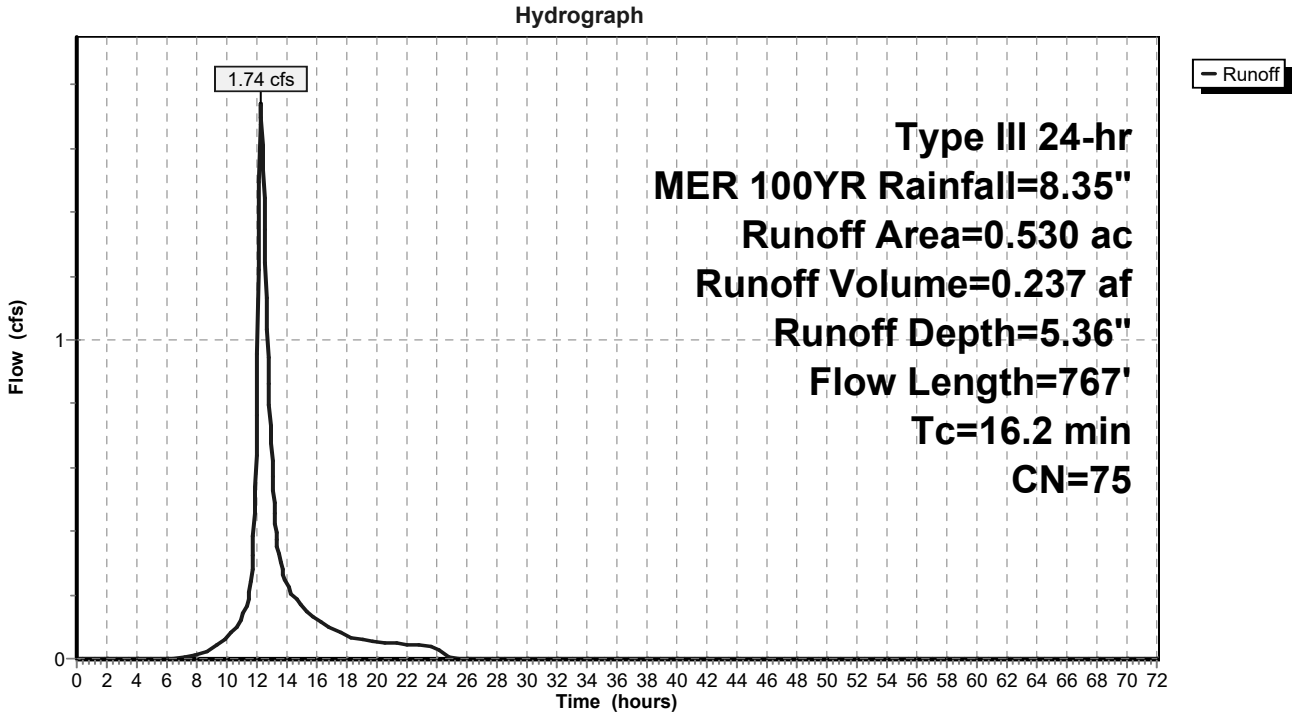
Runoff = 1.74 cfs @ 12.26 hrs, Volume= 0.237 af, Depth= 5.36"

Runoff by SCS TR-20 method, UH=Delmarva, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
Type III 24-hr MER 100YR Rainfall=8.35"

Area (ac)	CN	Description
0.520	75	Row crops, contoured, Good, HSG B
0.010	61	>75% Grass cover, Good, HSG B
0.530	75	Weighted Average
0.530		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
10.4	100	0.0210	0.16		**Sheet Flow, Sheet** Cultivated: Residue>20% n= 0.170 P2= 3.31"
5.8	667	0.0140	1.90		**Shallow Concentrated Flow, SCF** Unpaved Kv= 16.1 fps
16.2	767	Total			

Subcatchment 6: P-1B-Off-Perv



Summary for Subcatchment 7: P-2-perv

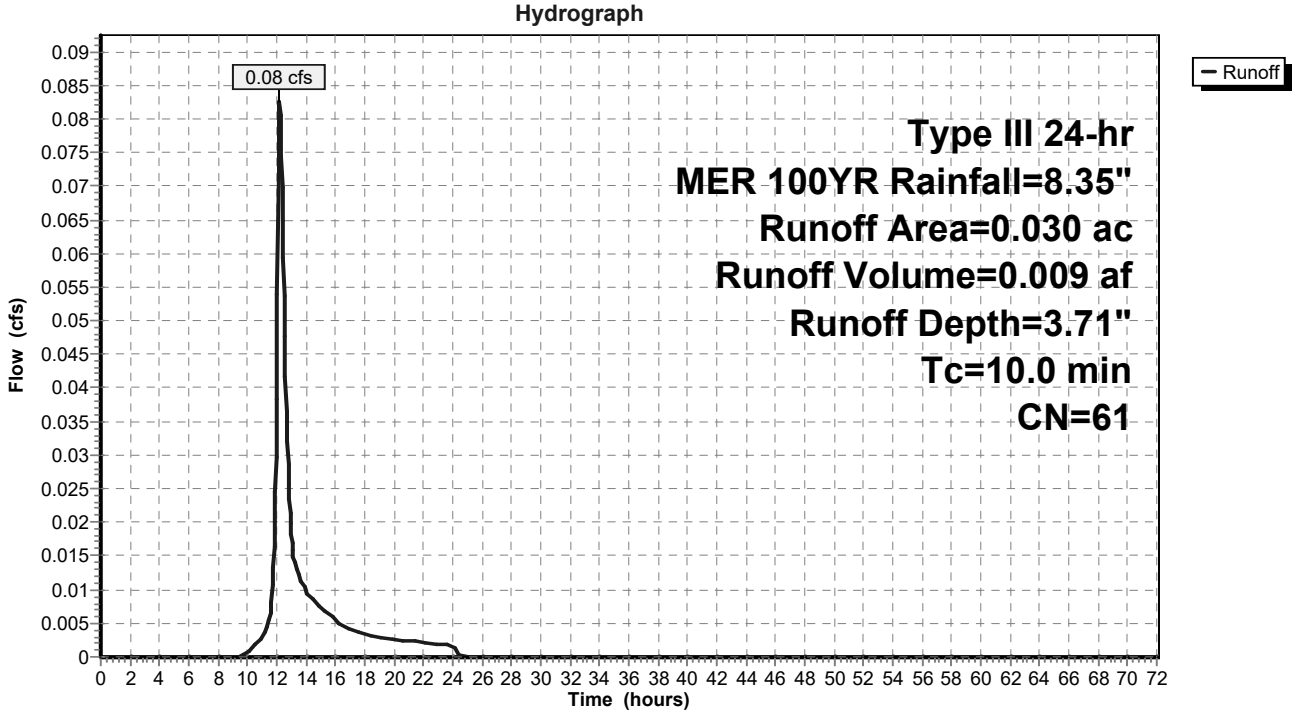
Runoff = 0.08 cfs @ 12.18 hrs, Volume= 0.009 af, Depth= 3.71"

Runoff by SCS TR-20 method, UH=Delmarva, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
Type III 24-hr MER 100YR Rainfall=8.35"

Area (ac)	CN	Description
0.030	61	>75% Grass cover, Good, HSG B
0.030		100.00% Pervious Area

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

Subcatchment 7: P-2-perv



Summary for Subcatchment 8: P-3-Perv

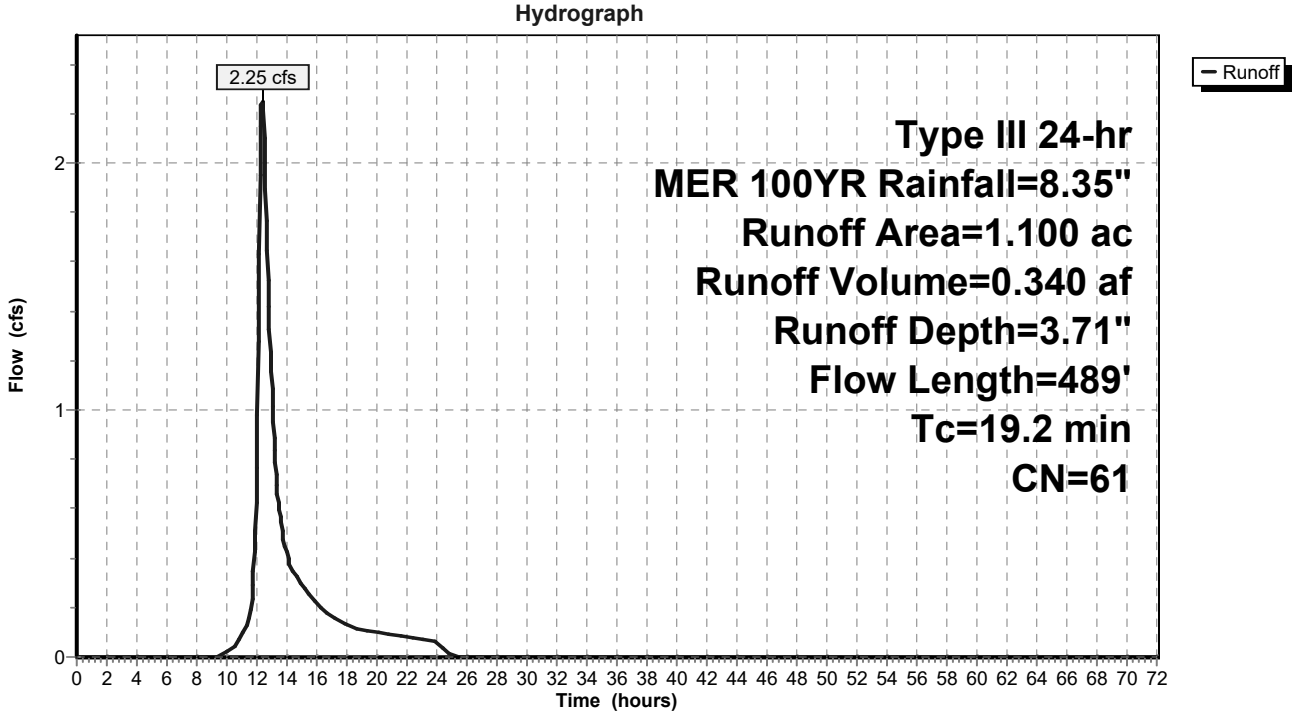
Runoff = 2.25 cfs @ 12.34 hrs, Volume= 0.340 af, Depth= 3.71"

Runoff by SCS TR-20 method, UH=Delmarva, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
Type III 24-hr MER 100YR Rainfall=8.35"

Area (ac)	CN	Description
1.100	61	>75% Grass cover, Good, HSG B
1.100		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
14.7	100	0.0090	0.11		**Sheet Flow, Sheet 4** Cultivated: Residue>20% n= 0.170 P2= 3.31"
4.5	389	0.0080	1.44		**Shallow Concentrated Flow, SCF 4** Unpaved Kv= 16.1 fps
19.2	489	Total			

Subcatchment 8: P-3-Perv



Summary for Subcatchment 9: P-3-Imperv

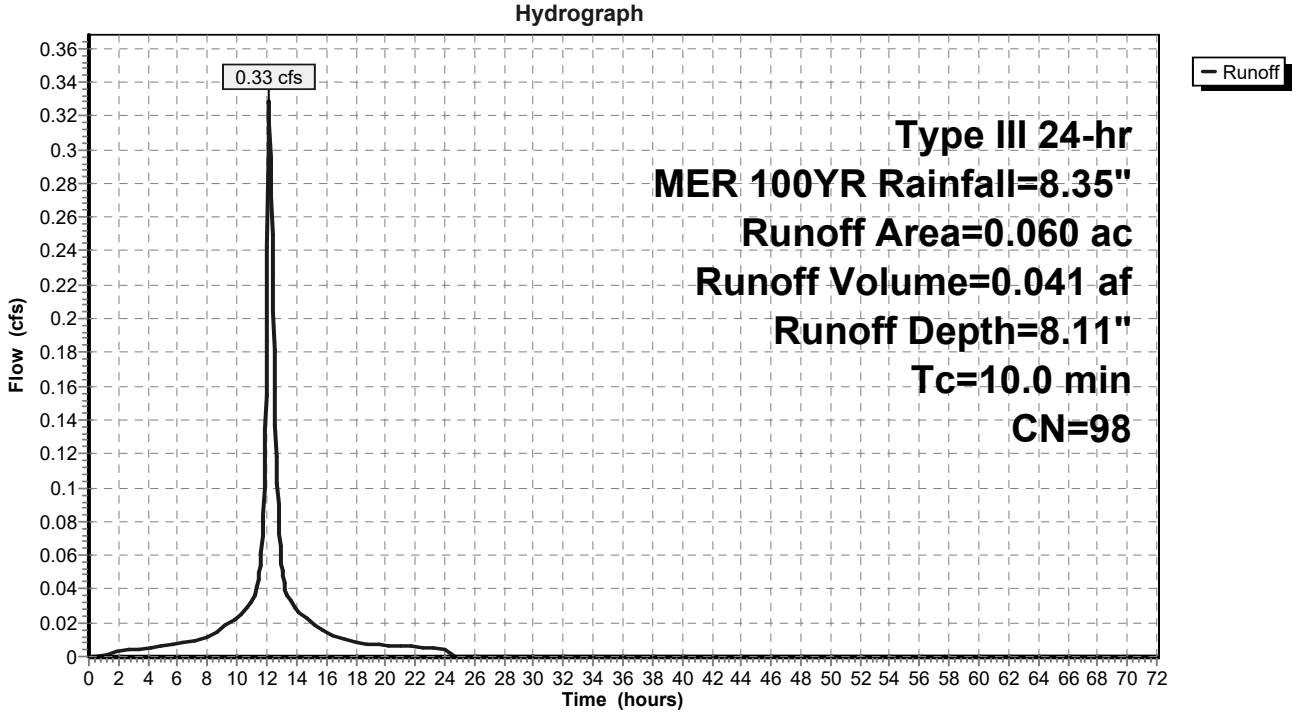
Runoff = 0.33 cfs @ 12.16 hrs, Volume= 0.041 af, Depth= 8.11"

Runoff by SCS TR-20 method, UH=Delmarva, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
Type III 24-hr MER 100YR Rainfall=8.35"

	Area (ac)	CN	Description
*	0.030	98	Pavement
*	0.030	98	Sidewalk
	0.060	98	Weighted Average
	0.060		100.00% Impervious Area

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

Subcatchment 9: P-3-Imperv



Summary for Subcatchment 10: P-3-Off-Perv

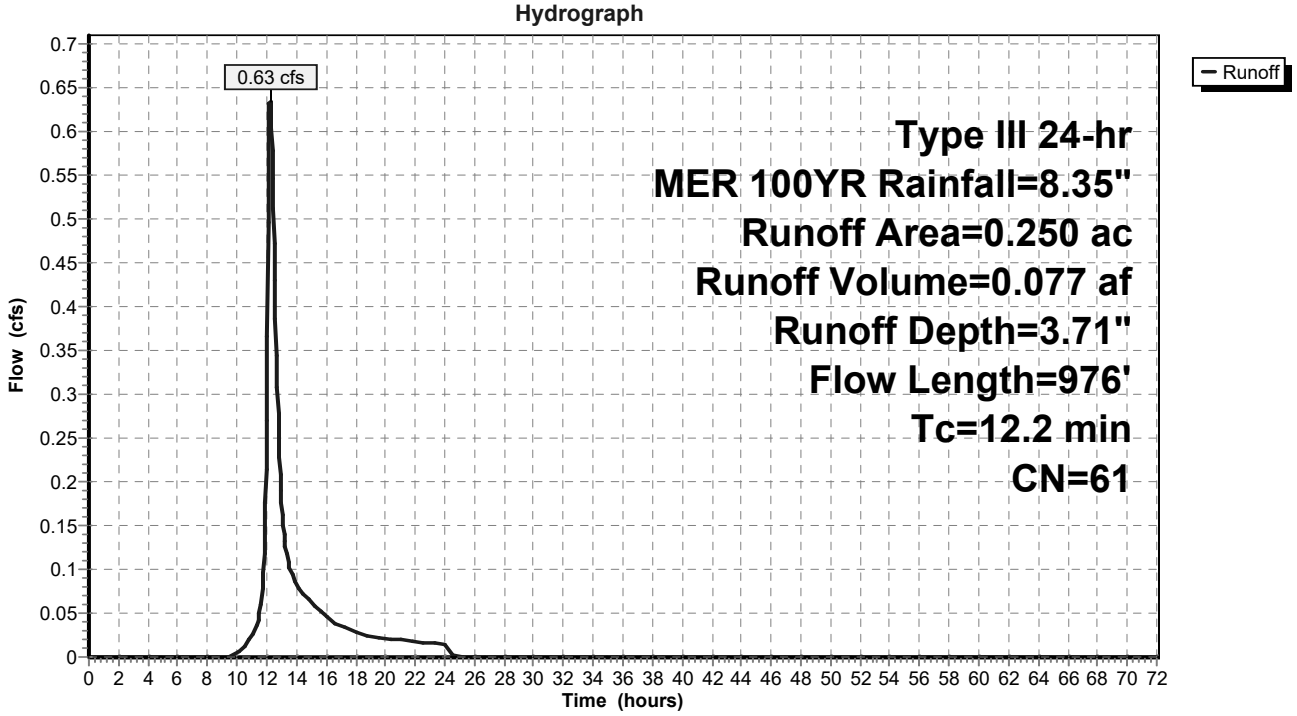
Runoff = 0.63 cfs @ 12.22 hrs, Volume= 0.077 af, Depth= 3.71"

Runoff by SCS TR-20 method, UH=Delmarva, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
Type III 24-hr MER 100YR Rainfall=8.35"

Area (ac)	CN	Description
0.250	61	>75% Grass cover, Good, HSG B
0.250		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
1.4	100	0.0140	1.21		**Sheet Flow, Sheet 4** Smooth surfaces n= 0.011 P2= 3.31"
10.8	876	0.0070	1.35		**Shallow Concentrated Flow, SCF 4** Unpaved Kv= 16.1 fps
12.2	976	Total			

Subcatchment 10: P-3-Off-Perv



Summary for Subcatchment 11: P-3-Off-Imperv

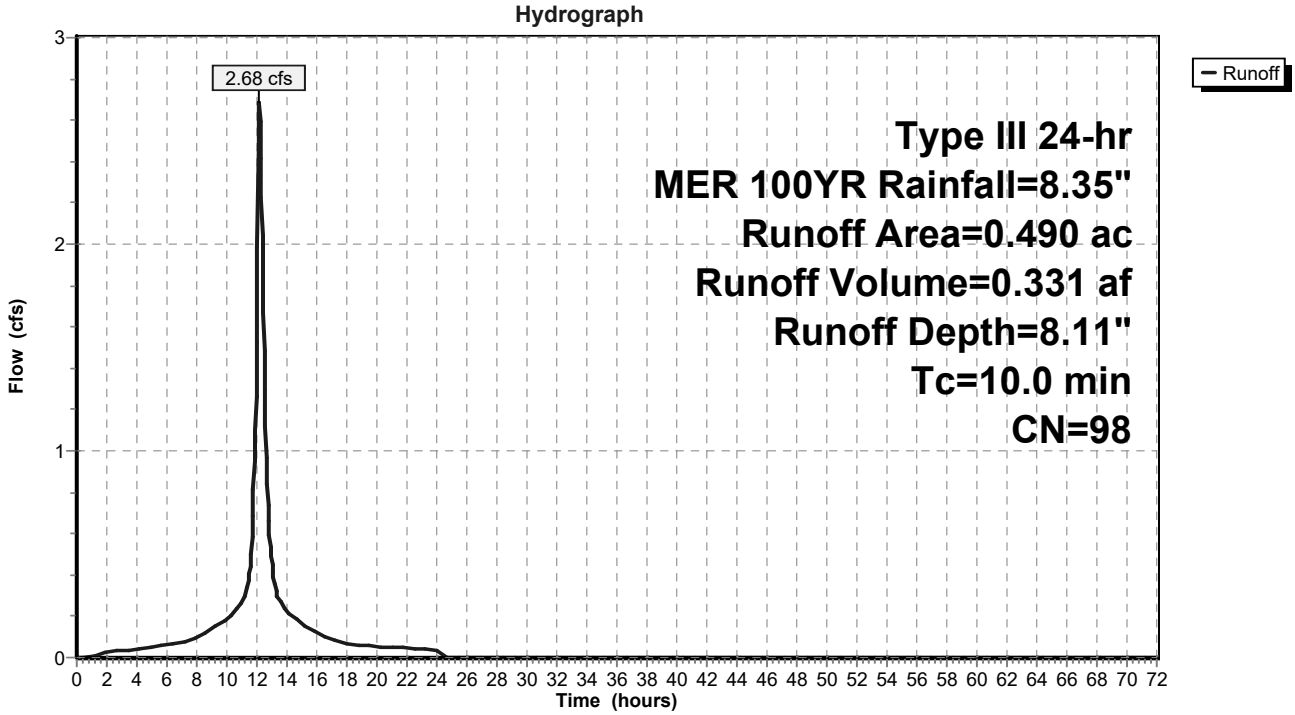
Runoff = 2.68 cfs @ 12.16 hrs, Volume= 0.331 af, Depth= 8.11"

Runoff by SCS TR-20 method, UH=Delmarva, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
Type III 24-hr MER 100YR Rainfall=8.35"

	Area (ac)	CN	Description
	0.080	98	Roofs, HSG B
*	0.100	98	Gravel, HSG B
	0.280	98	Paved parking, HSG B
*	0.030	98	Misc., HSG B
	0.490	98	Weighted Average
	0.490		100.00% Impervious Area

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

Subcatchment 11: P-3-Off-Imperv



Summary for Subcatchment 12: P-4-Perv

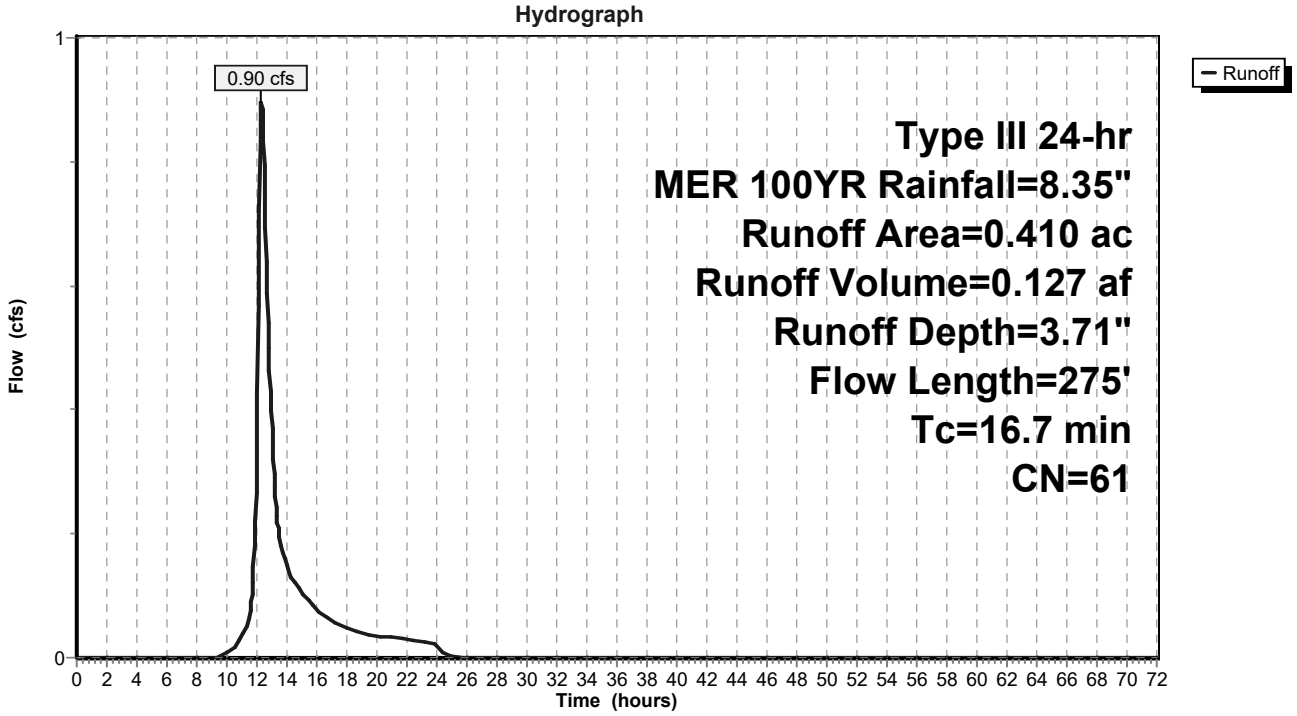
Runoff = 0.90 cfs @ 12.30 hrs, Volume= 0.127 af, Depth= 3.71"

Runoff by SCS TR-20 method, UH=Delmarva, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
Type III 24-hr MER 100YR Rainfall=8.35"

Area (ac)	CN	Description
0.410	61	>75% Grass cover, Good, HSG B
0.410		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.8	27	0.0090	0.07		**Sheet Flow, Sheet 1** Grass: Dense n= 0.240 P2= 3.31"
0.9	45	0.0090	0.87		**Sheet Flow, Sheet 2** Smooth surfaces n= 0.011 P2= 3.31"
7.0	28	0.0090	0.07		**Sheet Flow, Sheet 3** Grass: Dense n= 0.240 P2= 3.31"
2.0	175	0.0080	1.44		**Shallow Concentrated Flow, SCF** Unpaved Kv= 16.1 fps
16.7	275	Total			

Subcatchment 12: P-4-Perv



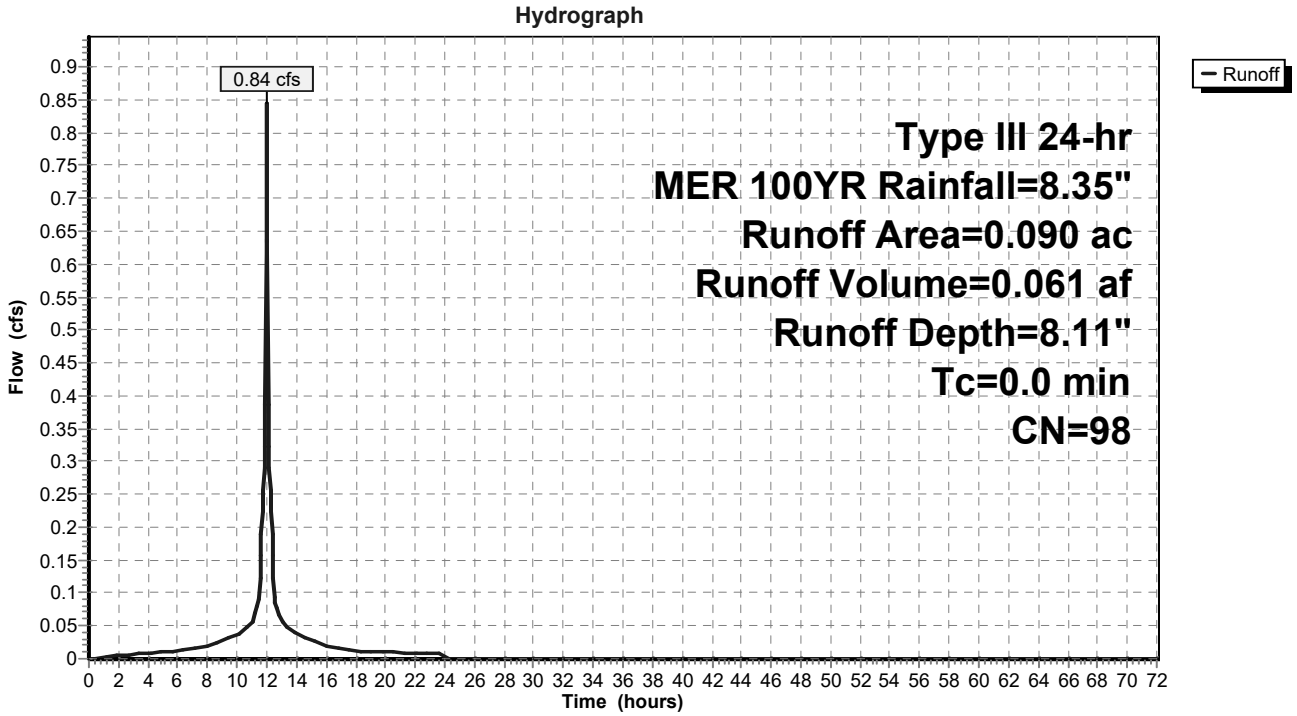
Summary for Subcatchment 13: P-4-Imperv

Runoff = 0.84 cfs @ 12.00 hrs, Volume= 0.061 af, Depth= 8.11"

Runoff by SCS TR-20 method, UH=Delmarva, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
Type III 24-hr MER 100YR Rainfall=8.35"

Area (ac)	CN	Description
0.090	98	Paved parking, HSG B
0.090		100.00% Impervious Area

Subcatchment 13: P-4-Imperv



Summary for Subcatchment 14: P-4-Off-Perv

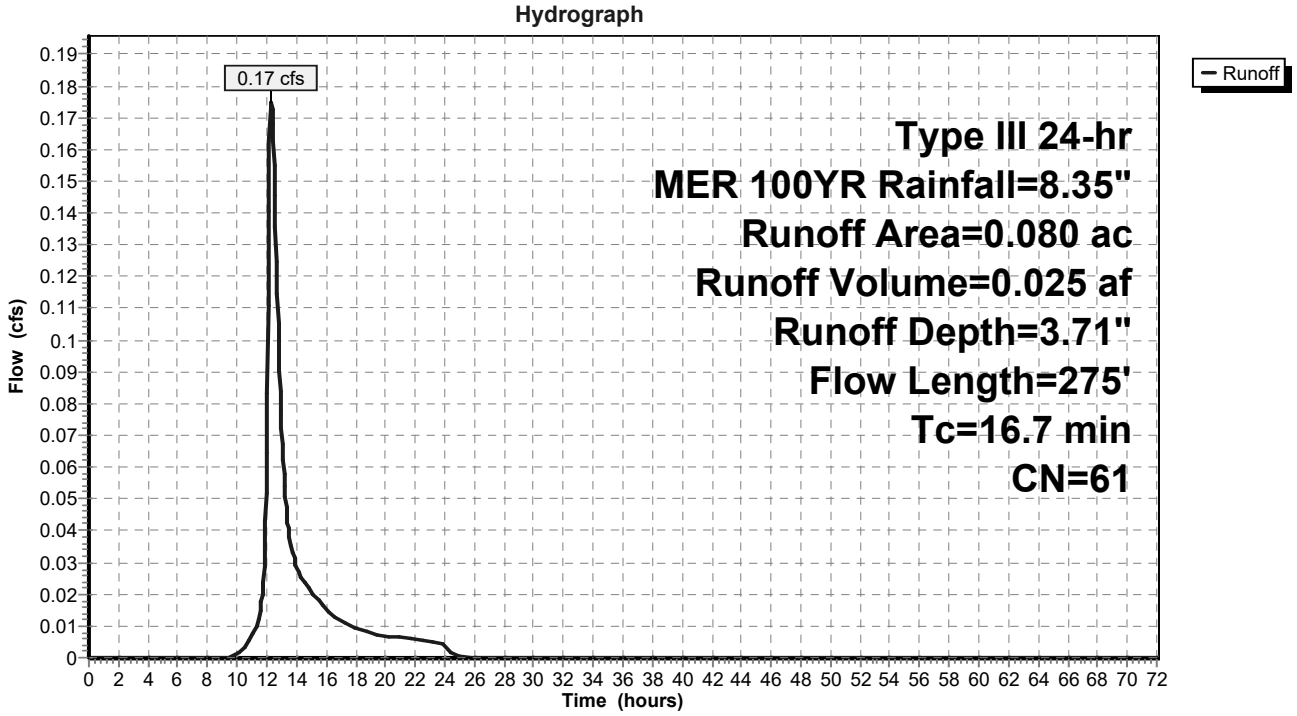
Runoff = 0.17 cfs @ 12.30 hrs, Volume= 0.025 af, Depth= 3.71"

Runoff by SCS TR-20 method, UH=Delmarva, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
Type III 24-hr MER 100YR Rainfall=8.35"

Area (ac)	CN	Description
0.080	61	>75% Grass cover, Good, HSG B
0.080		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.8	27	0.0090	0.07		**Sheet Flow, Sheet 1** Grass: Dense n= 0.240 P2= 3.31"
0.9	45	0.0090	0.87		**Sheet Flow, Sheet 2** Smooth surfaces n= 0.011 P2= 3.31"
7.0	28	0.0090	0.07		**Sheet Flow, Sheet 3** Grass: Dense n= 0.240 P2= 3.31"
2.0	175	0.0080	1.44		**Shallow Concentrated Flow, SCF** Unpaved Kv= 16.1 fps
16.7	275	Total			

Subcatchment 14: P-4-Off-Perv



Summary for Subcatchment 15: P-4-Off-Imperv

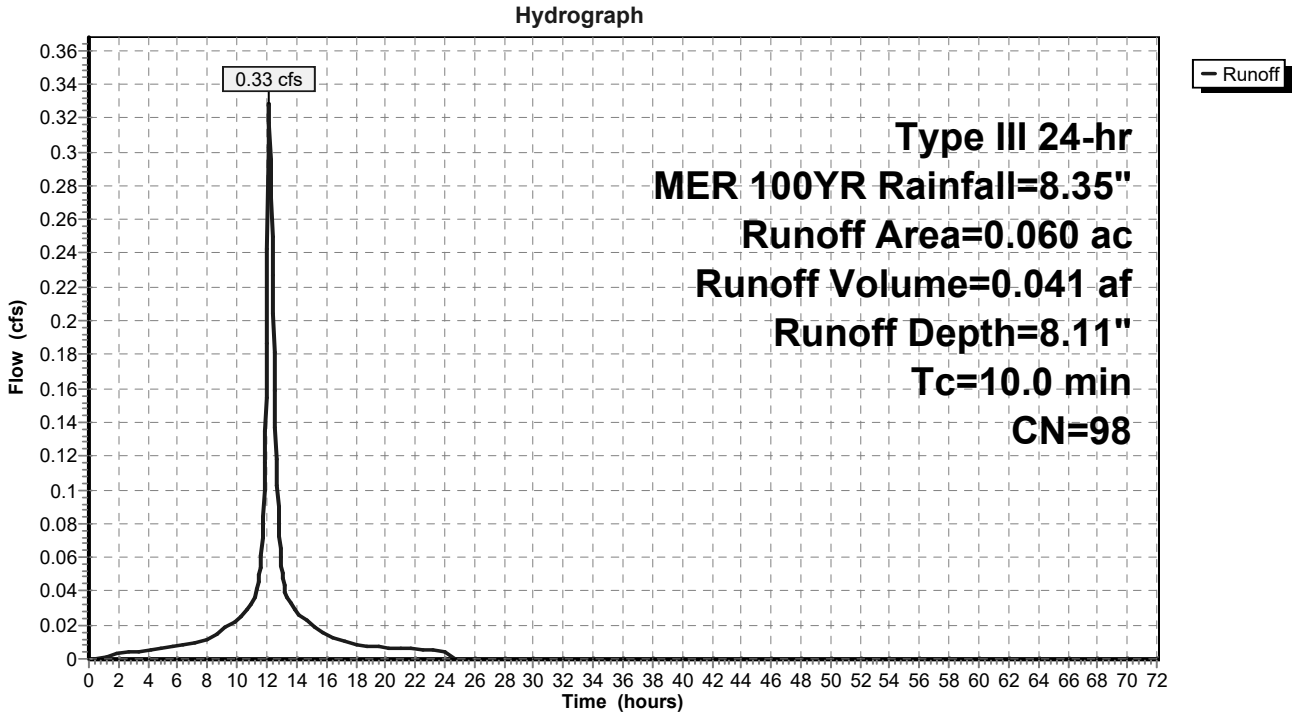
Runoff = 0.33 cfs @ 12.16 hrs, Volume= 0.041 af, Depth= 8.11"

Runoff by SCS TR-20 method, UH=Delmarva, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
Type III 24-hr MER 100YR Rainfall=8.35"

Area (ac)	CN	Description
0.060	98	Paved parking, HSG B
0.060		100.00% Impervious Area

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

Subcatchment 15: P-4-Off-Imperv



Summary for Subcatchment 16: P-5 Perv

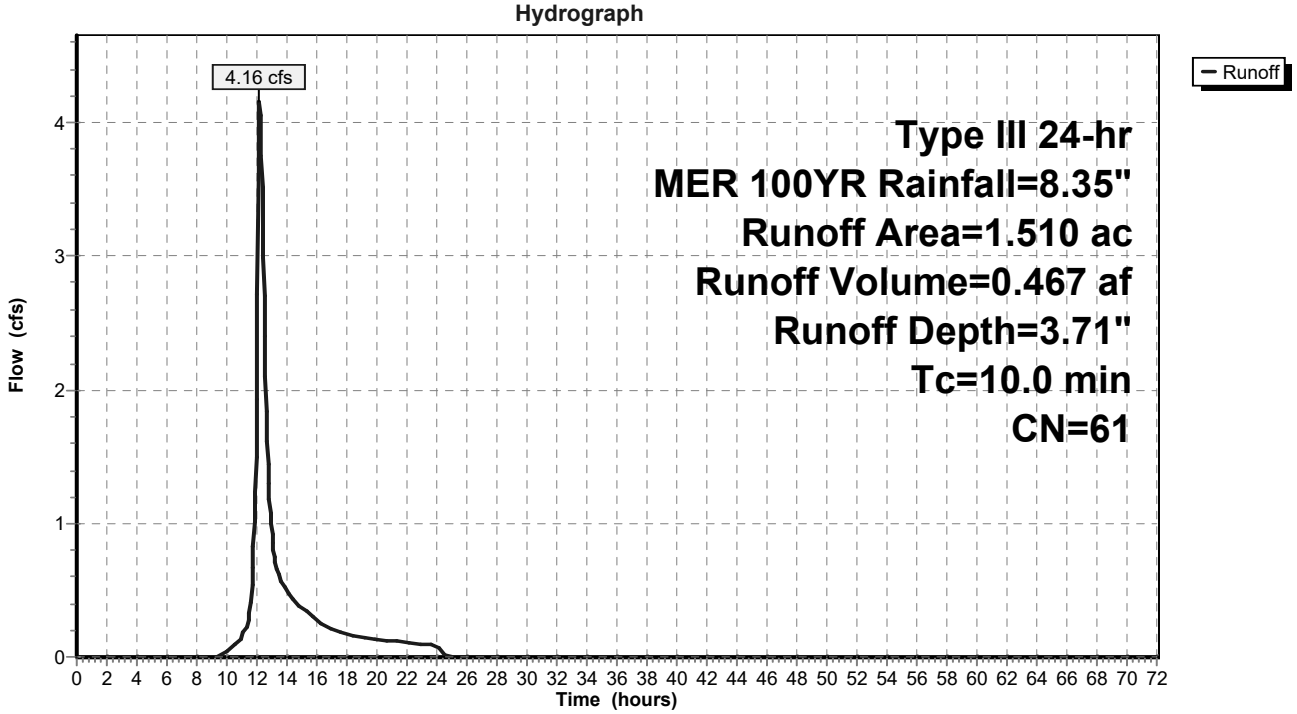
Runoff = 4.16 cfs @ 12.18 hrs, Volume= 0.467 af, Depth= 3.71"

Runoff by SCS TR-20 method, UH=Delmarva, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
Type III 24-hr MER 100YR Rainfall=8.35"

Area (ac)	CN	Description
1.510	61	>75% Grass cover, Good, HSG B
1.510		100.00% Pervious Area

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

Subcatchment 16: P-5 Perv



Summary for Subcatchment 17: P-5 Imperv

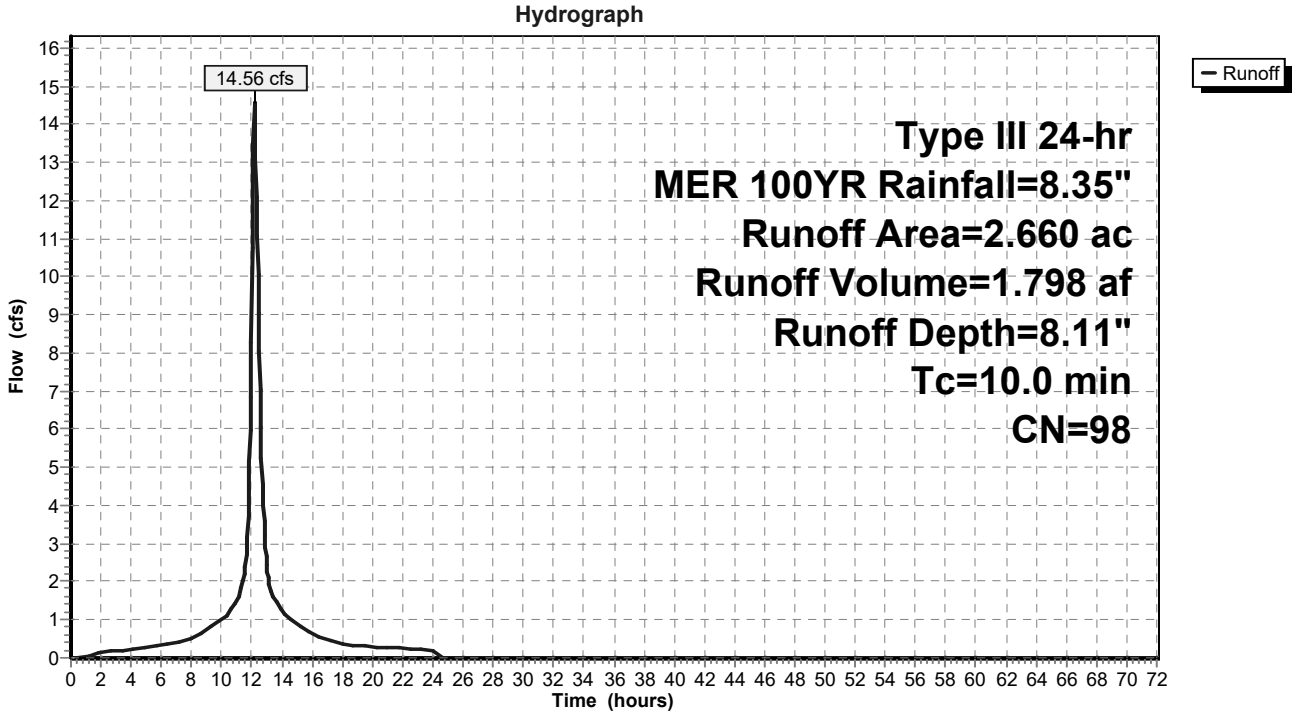
Runoff = 14.56 cfs @ 12.16 hrs, Volume= 1.798 af, Depth= 8.11"

Runoff by SCS TR-20 method, UH=Delmarva, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
Type III 24-hr MER 100YR Rainfall=8.35"

	Area (ac)	CN	Description
*	1.040	98	Building
*	1.110	98	Pavement
*	0.160	98	Sidewalk
*	0.110	98	Concrete
*	0.240	98	Driveway
	2.660	98	Weighted Average
	2.660		100.00% Impervious Area

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

Subcatchment 17: P-5 Imperv



Summary for Subcatchment 18: Extra Impervious

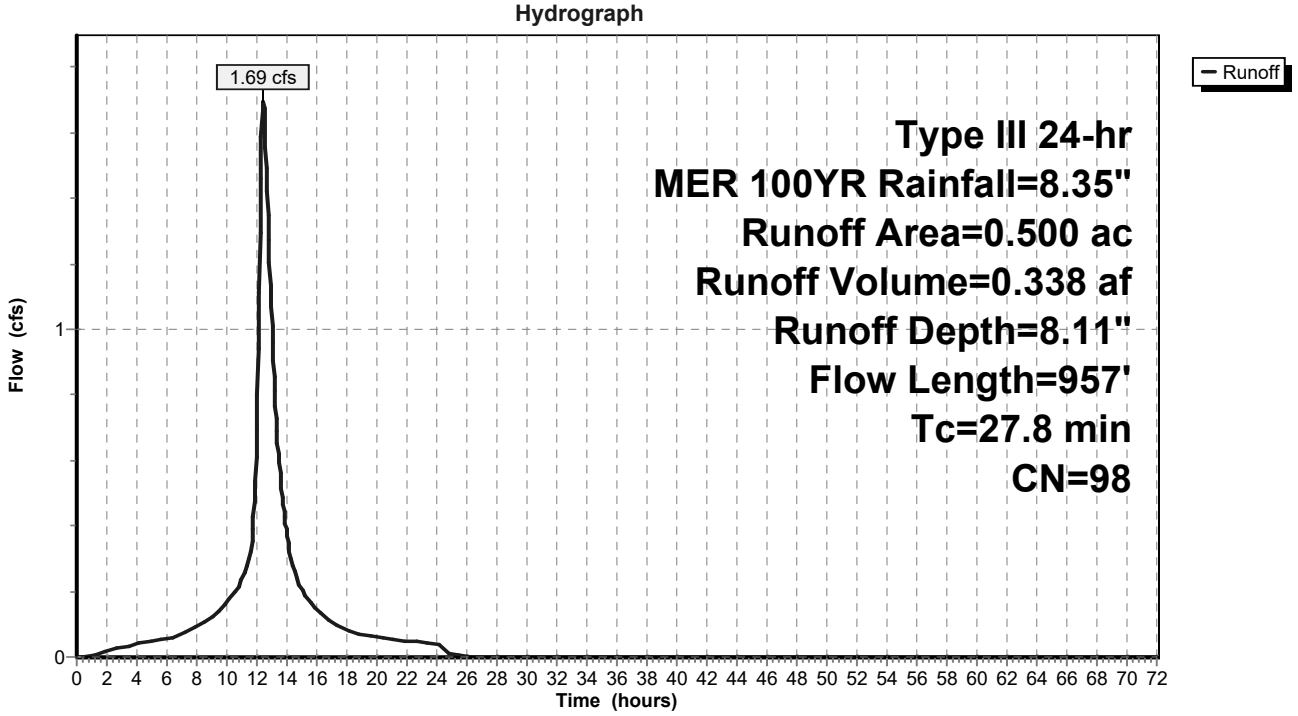
Runoff = 1.69 cfs @ 12.41 hrs, Volume= 0.338 af, Depth= 8.11"

Runoff by SCS TR-20 method, UH=Delmarva, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
Type III 24-hr MER 100YR Rainfall=8.35"

	Area (ac)	CN	Description
*	0.500	98	impervious
	0.500		100.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
20.3	100	0.0040	0.08		**Sheet Flow, Sheet 1** Cultivated: Residue>20% n= 0.170 P2= 3.31"
7.5	857	0.0140	1.90		**Shallow Concentrated Flow, SCF 1** Unpaved Kv= 16.1 fps
27.8	957	Total			

Subcatchment 18: Extra Impervious



Summary for Pond 1P: Basin B

Inflow Area = 4.170 ac, 63.79% Impervious, Inflow Depth = 6.52" for MER 100YR event
Inflow = 18.74 cfs @ 12.16 hrs, Volume= 2.265 af
Outflow = 3.50 cfs @ 12.98 hrs, Volume= 1.742 af, Atten= 81%, Lag= 48.8 min
Primary = 3.50 cfs @ 12.98 hrs, Volume= 1.742 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
Peak Elev= 107.11' @ 12.98 hrs Surf.Area= 0.448 ac Storage= 1.324 af

Plug-Flow detention time= 329.7 min calculated for 1.741 af (77% of inflow)
Center-of-Mass det. time= 245.2 min (1,016.6 - 771.3)

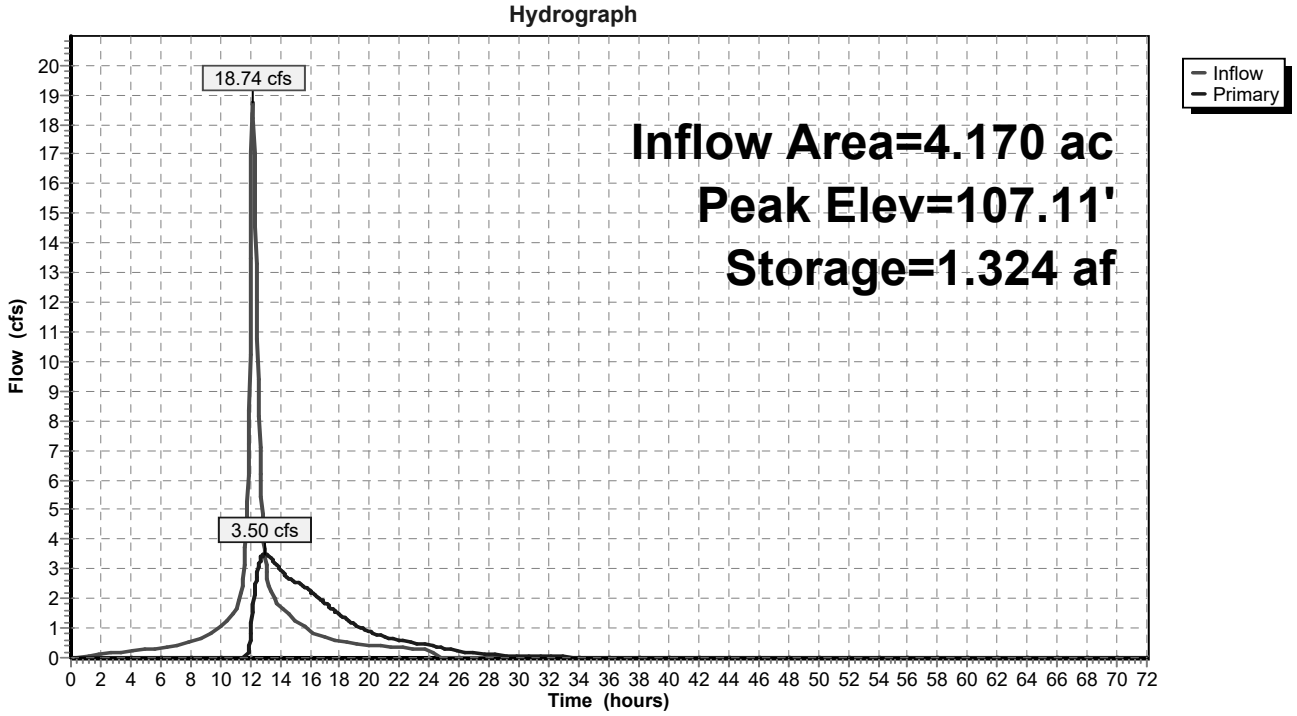
Volume	Invert	Avail.Storage	Storage Description
#1	103.00'	1.751 af	**Custom Stage Data (Prismatic)** Listed below (Recalc)

Elevation (feet)	Surf.Area (acres)	Inc.Store (acre-feet)	Cum.Store (acre-feet)
103.00	0.206	0.000	0.000
104.00	0.260	0.233	0.233
105.00	0.317	0.288	0.522
106.00	0.377	0.347	0.869
107.00	0.440	0.409	1.277
108.00	0.507	0.474	1.751

Device	Routing	Invert	Outlet Devices
#1	Primary	103.50'	**15.0" Round Culvert** L= 1,030.0' RCP, sq.cut end projecting, Ke= 0.500 Inlet / Outlet Invert= 103.50' / 98.35' S= 0.0050 '/' Cc= 0.900 n= 0.013, Flow Area= 1.23 sf
#2	Device 1	105.00'	**0.7' long Sharp-Crested Rectangular Weir** 2 End Contraction(s)

Primary OutFlow Max=3.50 cfs @ 12.98 hrs HW=107.11' TW=101.95' (Dynamic Tailwater)
└─**1=Culvert** (Passes 3.50 cfs of 4.43 cfs potential flow)
  └─**2=Sharp-Crested Rectangular Weir** (Weir Controls 3.50 cfs @ 4.75 fps)

Pond 1P: Basin B



Summary for Pond 2P: Basin A

Inflow Area = 13.070 ac, 50.65% Impervious, Inflow Depth = 5.63" for MER 100YR event
Inflow = 28.75 cfs @ 12.25 hrs, Volume= 6.132 af
Outflow = 16.50 cfs @ 12.82 hrs, Volume= 5.764 af, Atten= 43%, Lag= 34.3 min
Primary = 16.50 cfs @ 12.82 hrs, Volume= 5.764 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
Peak Elev= 101.98' @ 12.82 hrs Surf.Area= 0.479 ac Storage= 1.796 af

Plug-Flow detention time= 203.7 min calculated for 5.764 af (94% of inflow)
Center-of-Mass det. time= 163.6 min (1,023.8 - 860.2)

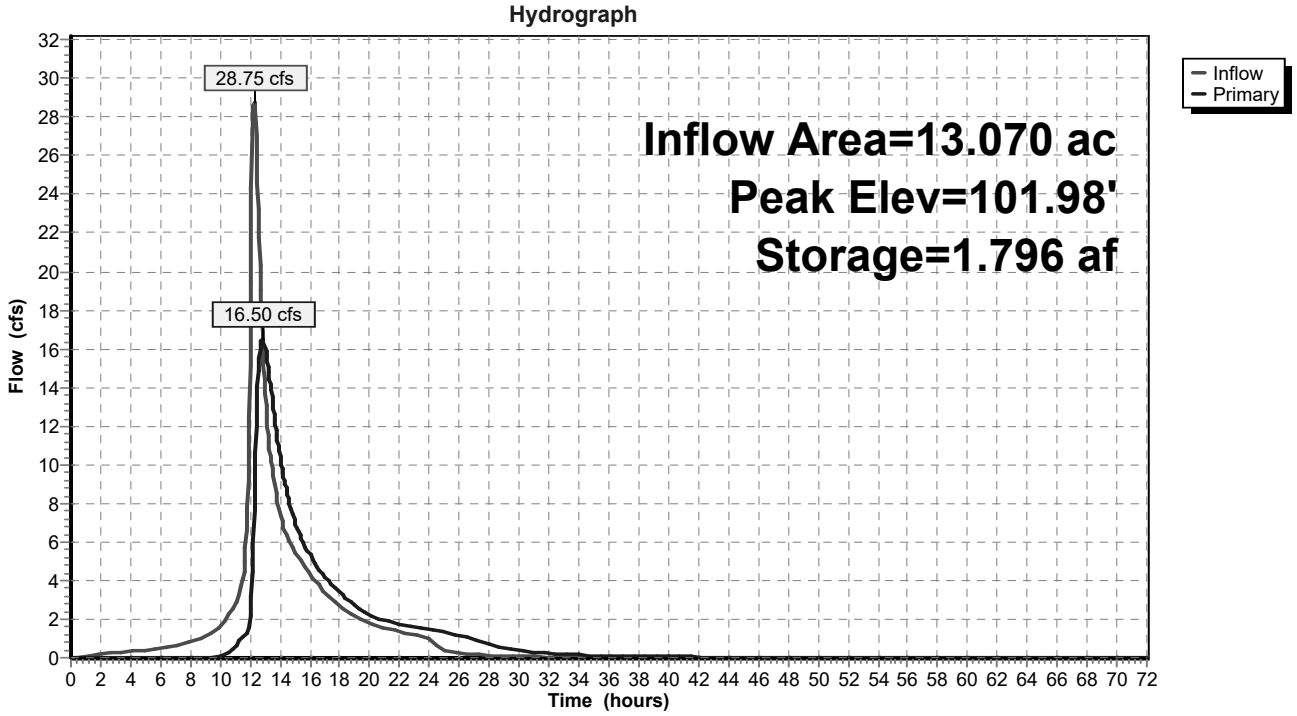
Volume	Invert	Avail.Storage	Storage Description
#1	98.10'	2.779 af	**Custom Stage Data (Prismatic)** Listed below (Recalc)

Elevation (feet)	Surf.Area (acres)	Inc.Store (acre-feet)	Cum.Store (acre-feet)
98.10	0.446	0.000	0.000
99.00	0.454	0.405	0.405
100.00	0.463	0.458	0.863
101.00	0.471	0.467	1.330
102.00	0.479	0.475	1.805
103.00	0.487	0.483	2.288
104.00	0.496	0.492	2.779

Device	Routing	Invert	Outlet Devices
#1	Primary	98.10'	**18.0" Round Culvert X 2.00** L= 100.0' RCP, sq.cut end projecting, Ke= 0.500 Inlet / Outlet Invert= 98.10' / 97.60' S= 0.0050 '/' Cc= 0.900 n= 0.013 Concrete pipe, straight & clean, Flow Area= 1.77 sf
#2	Device 1	98.88'	**8.0" Vert. Orifice/Grate** C= 0.600
#3	Device 1	100.10'	**2.0' long Sharp-Crested Rectangular Weir** 2 End Contraction(s)

Primary OutFlow Max=16.49 cfs @ 12.82 hrs HW=101.98' TW=0.00' (Dynamic Tailwater)
└─**1=Culvert** (Passes 16.49 cfs of 26.38 cfs potential flow)
  ├─**2=Orifice/Grate** (Orifice Controls 2.80 cfs @ 8.01 fps)
  └─**3=Sharp-Crested Rectangular Weir** (Weir Controls 13.69 cfs @ 4.48 fps)

Pond 2P: Basin A

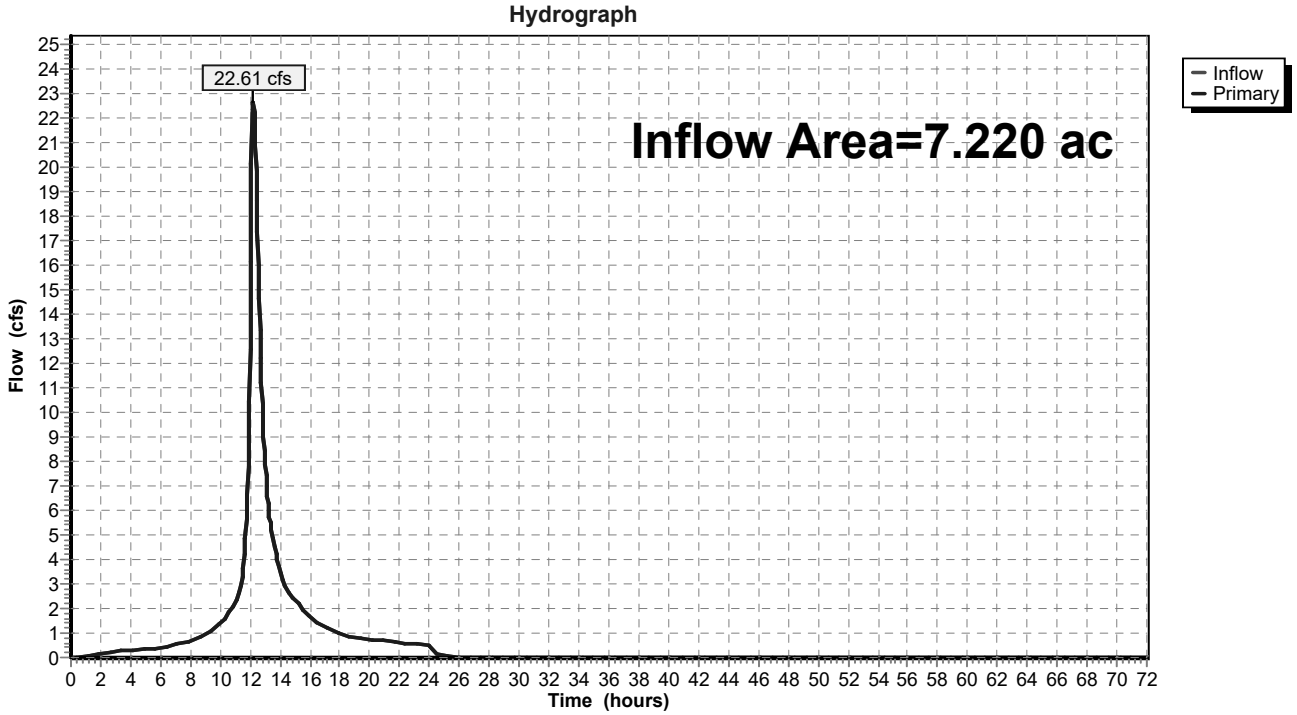


Summary for Link 1L: POA-1

Inflow Area = 7.220 ac, 46.68% Impervious, Inflow Depth = 5.95" for MER 100YR event
Inflow = 22.61 cfs @ 12.20 hrs, Volume= 3.581 af
Primary = 22.61 cfs @ 12.20 hrs, Volume= 3.581 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs

Link 1L: POA-1

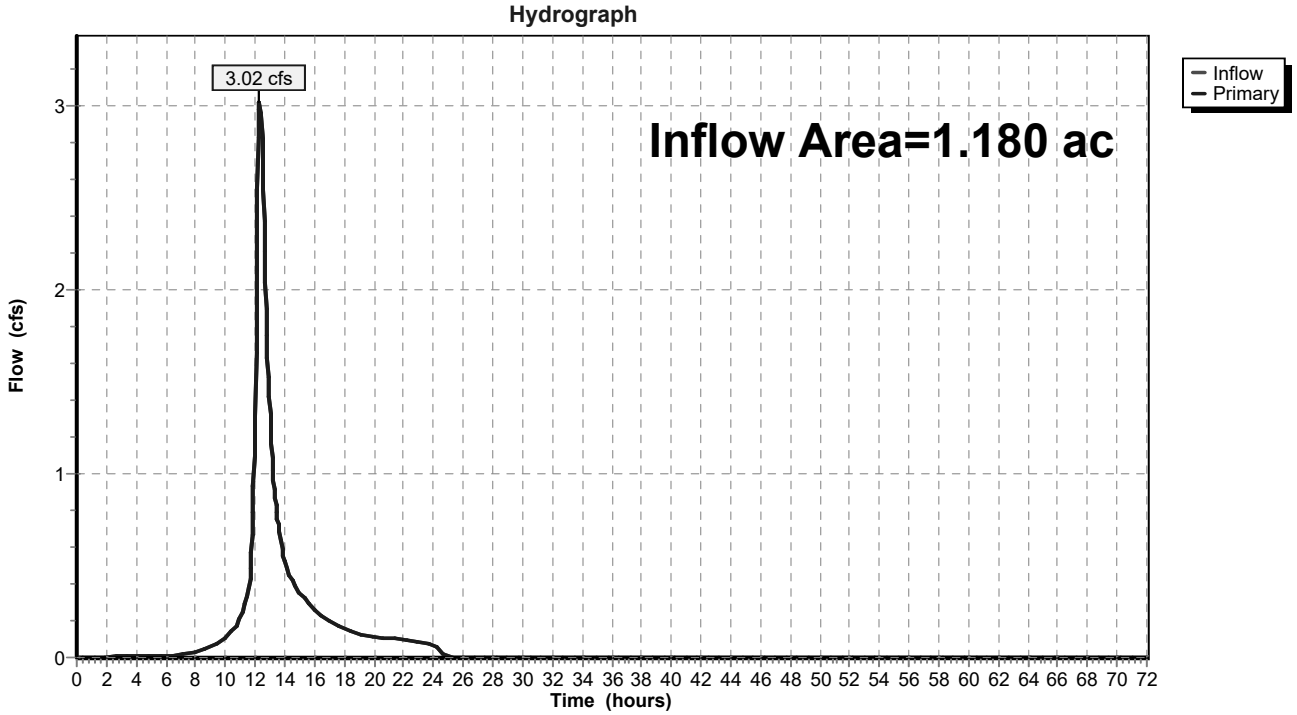


Summary for Link 2L: POA-1 OFF

Inflow Area = 1.180 ac, 7.63% Impervious, Inflow Depth = 4.79" for MER 100YR event
Inflow = 3.02 cfs @ 12.31 hrs, Volume= 0.471 af
Primary = 3.02 cfs @ 12.31 hrs, Volume= 0.471 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs

Link 2L: POA-1 OFF

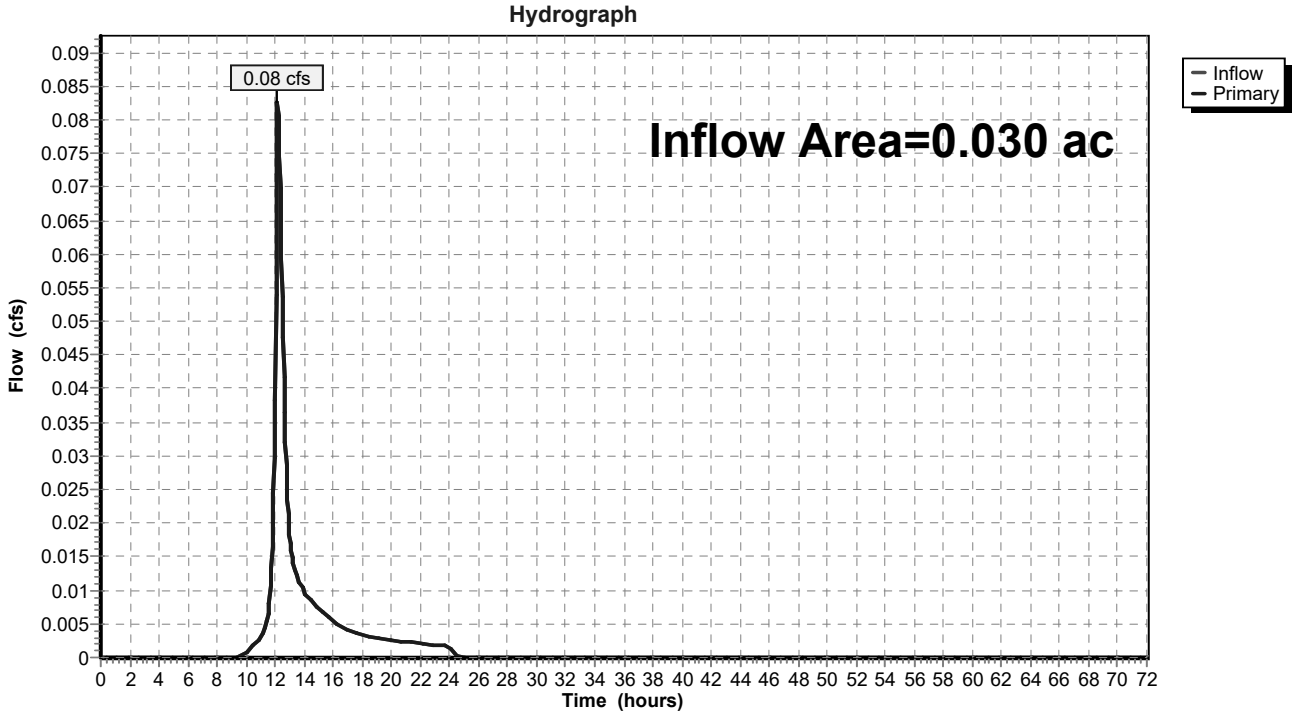


Summary for Link 3L: POA-2

Inflow Area = 0.030 ac, 0.00% Impervious, Inflow Depth = 3.71" for MER 100YR event
Inflow = 0.08 cfs @ 12.18 hrs, Volume= 0.009 af
Primary = 0.08 cfs @ 12.18 hrs, Volume= 0.009 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs

Link 3L: POA-2

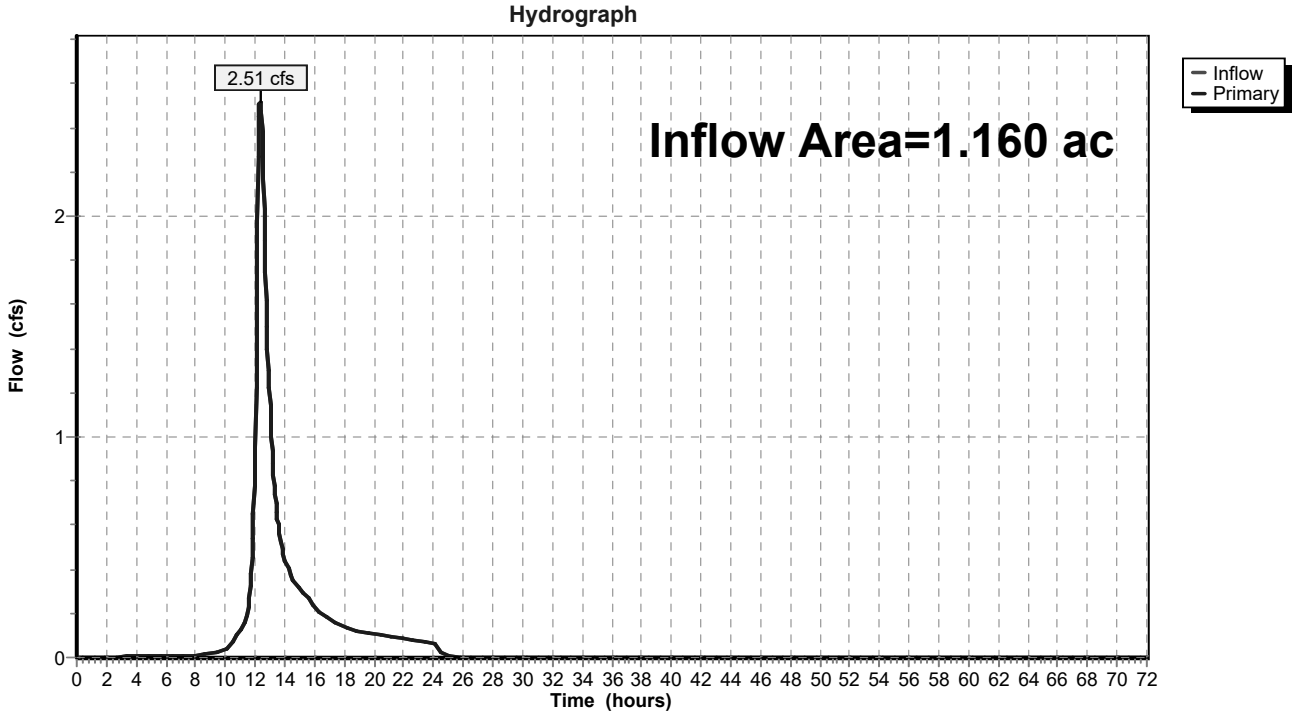


Summary for Link 4L: POA-3

Inflow Area = 1.160 ac, 5.17% Impervious, Inflow Depth = 3.94" for MER 100YR event
Inflow = 2.51 cfs @ 12.32 hrs, Volume= 0.381 af
Primary = 2.51 cfs @ 12.32 hrs, Volume= 0.381 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs

Link 4L: POA-3

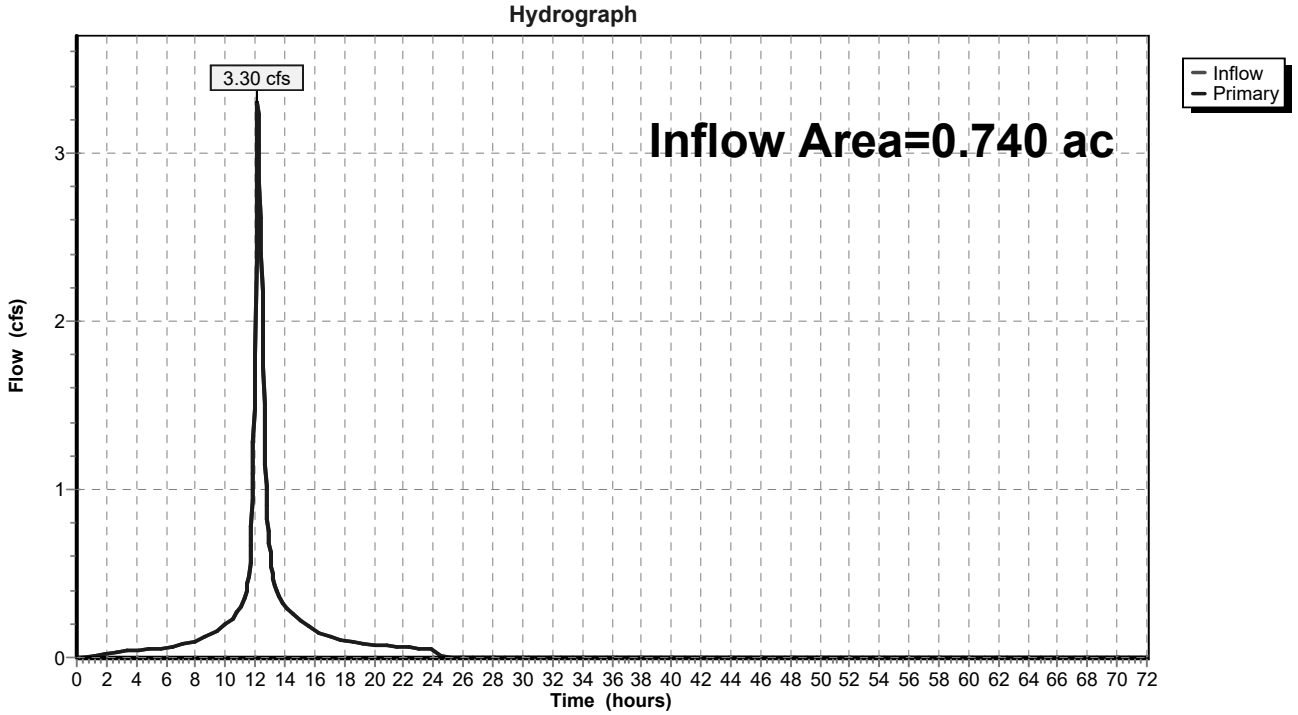


Summary for Link 5L: POA-3 OFF

Inflow Area = 0.740 ac, 66.22% Impervious, Inflow Depth = 6.62" for MER 100YR event
Inflow = 3.30 cfs @ 12.17 hrs, Volume= 0.409 af
Primary = 3.30 cfs @ 12.17 hrs, Volume= 0.409 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs

Link 5L: POA-3 OFF

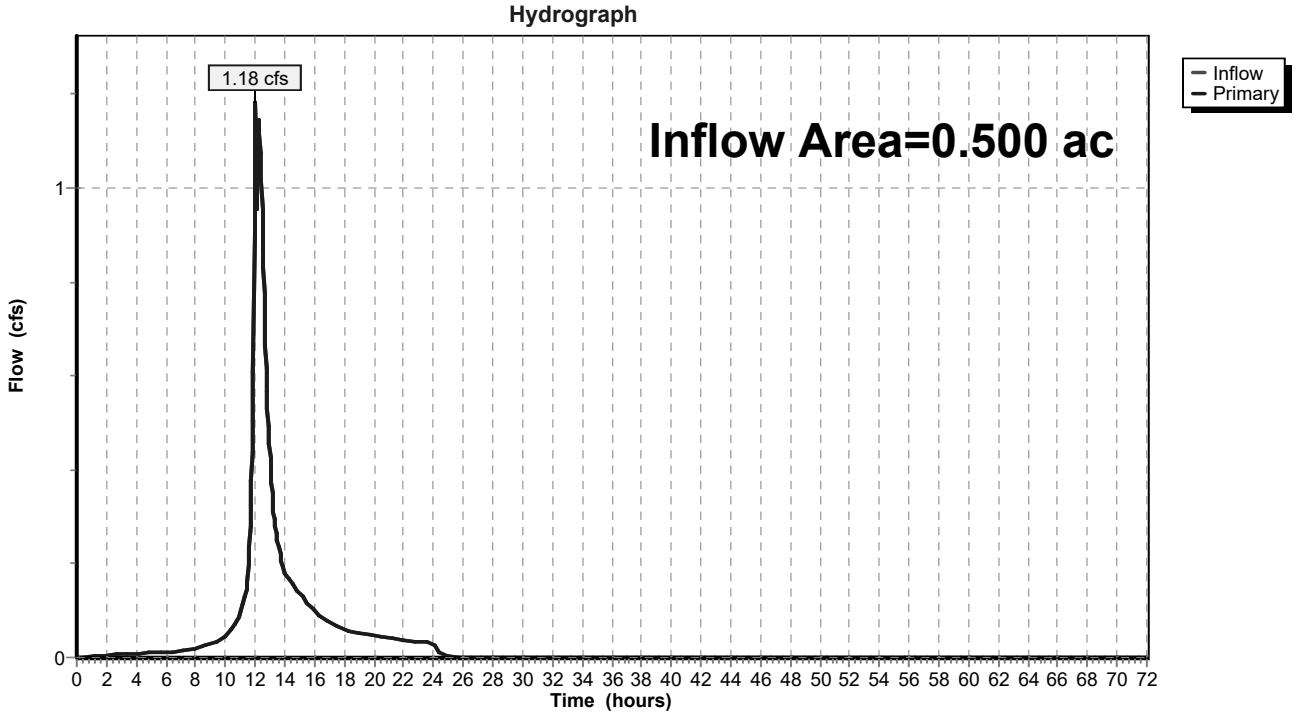


Summary for Link 6L: POA-4

Inflow Area = 0.500 ac, 18.00% Impervious, Inflow Depth = 4.50" for MER 100YR event
Inflow = 1.18 cfs @ 12.01 hrs, Volume= 0.188 af
Primary = 1.18 cfs @ 12.01 hrs, Volume= 0.188 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs

Link 6L: POA-4

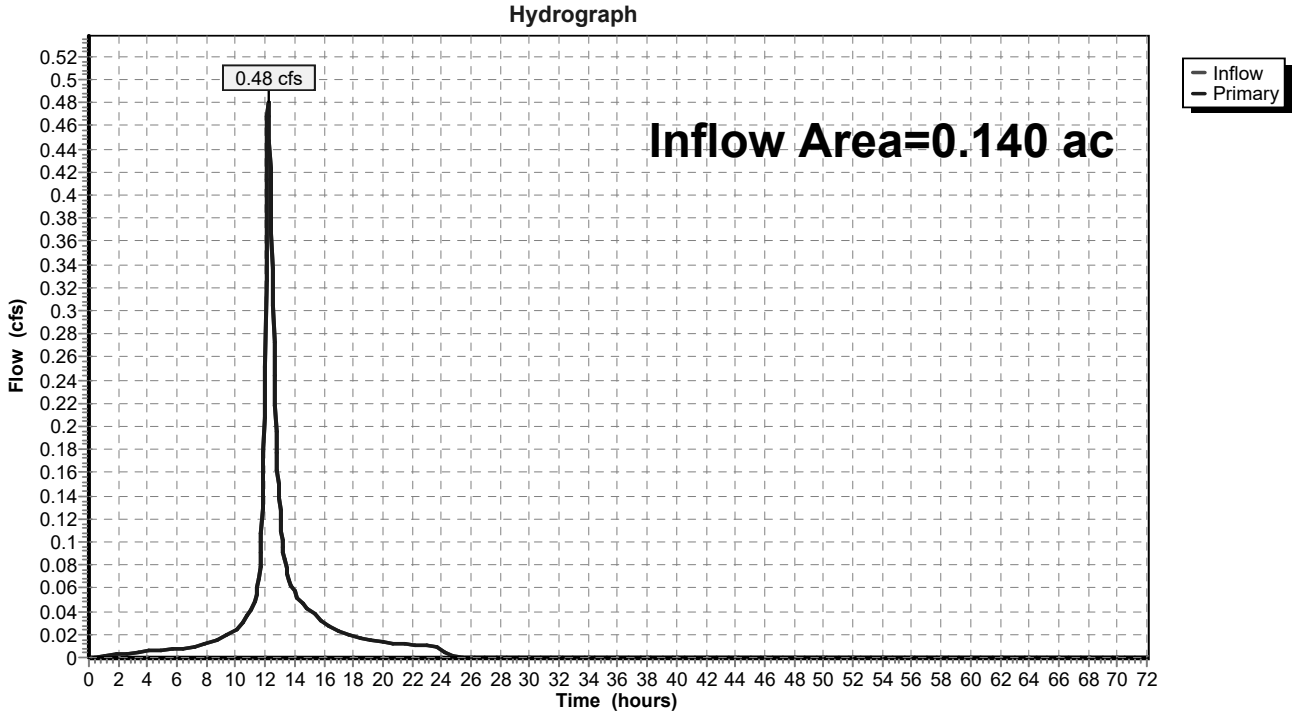


Summary for Link 7L: POA-4 OFF

Inflow Area = 0.140 ac, 42.86% Impervious, Inflow Depth = 5.60" for MER 100YR event
Inflow = 0.48 cfs @ 12.20 hrs, Volume= 0.065 af
Primary = 0.48 cfs @ 12.20 hrs, Volume= 0.065 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs

Link 7L: POA-4 OFF

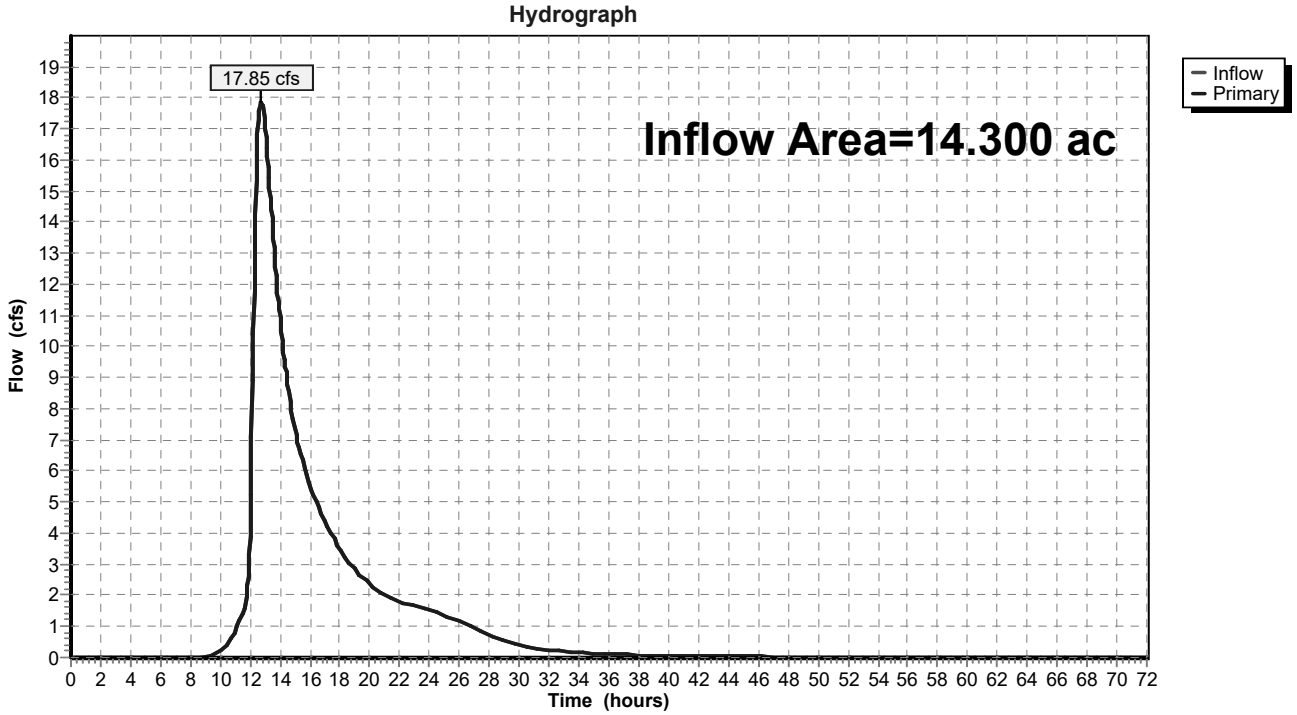


Summary for Link 8L: POA 1 total

Inflow Area = 14.300 ac, 46.29% Impervious, Inflow Depth > 5.25" for MER 100YR event
Inflow = 17.85 cfs @ 12.72 hrs, Volume= 6.252 af
Primary = 17.85 cfs @ 12.72 hrs, Volume= 6.252 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs

Link 8L: POA 1 total

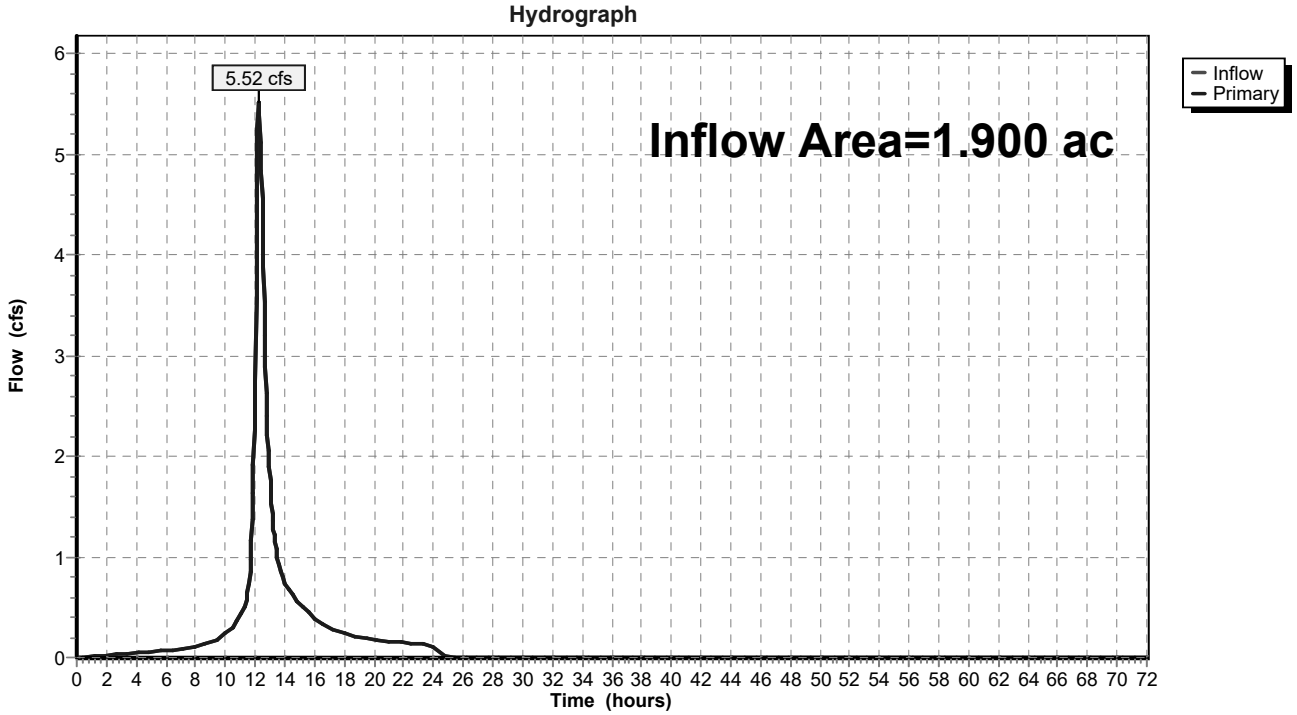


Summary for Link 9L: POA 3 total

Inflow Area = 1.900 ac, 28.95% Impervious, Inflow Depth = 4.99" for MER 100YR event
Inflow = 5.52 cfs @ 12.22 hrs, Volume= 0.789 af
Primary = 5.52 cfs @ 12.22 hrs, Volume= 0.789 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs

Link 9L: POA 3 total

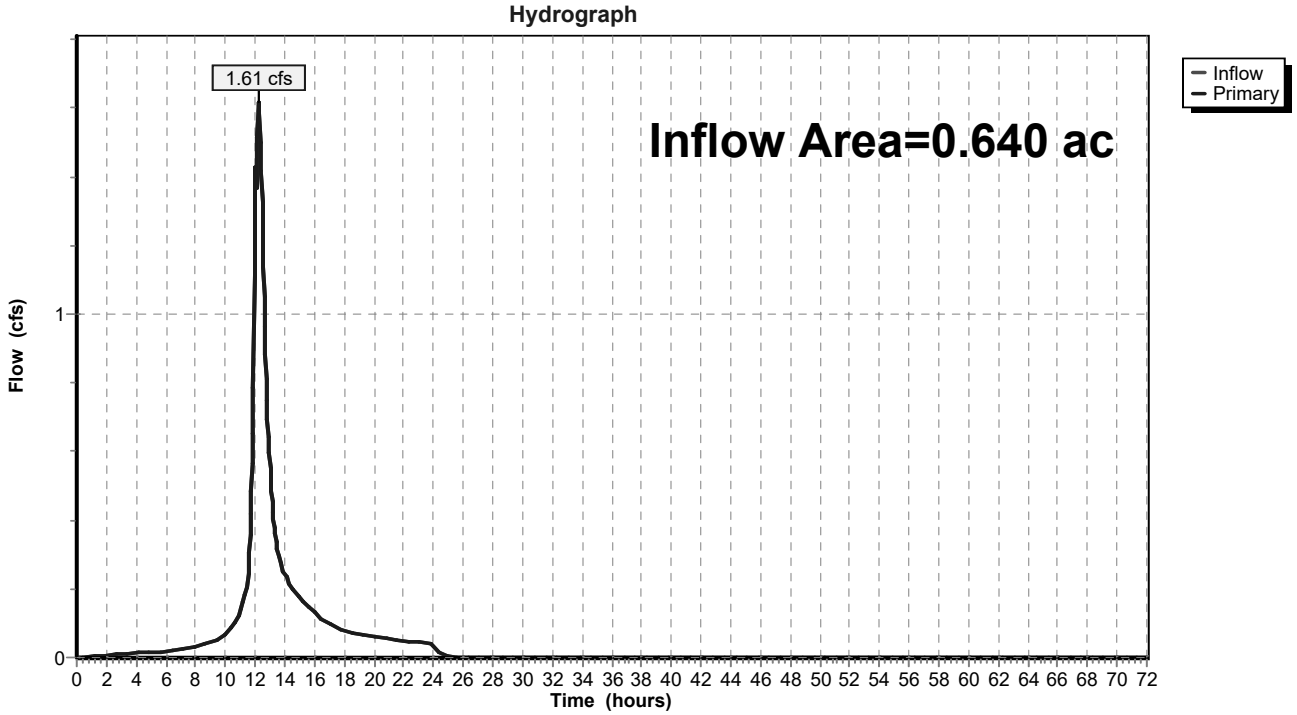


Summary for Link 10L: POA 4 total

Inflow Area = 0.640 ac, 23.44% Impervious, Inflow Depth = 4.74" for MER 100YR event
Inflow = 1.61 cfs @ 12.23 hrs, Volume= 0.253 af
Primary = 1.61 cfs @ 12.23 hrs, Volume= 0.253 af, Atten= 0%, Lag= 0.0 min

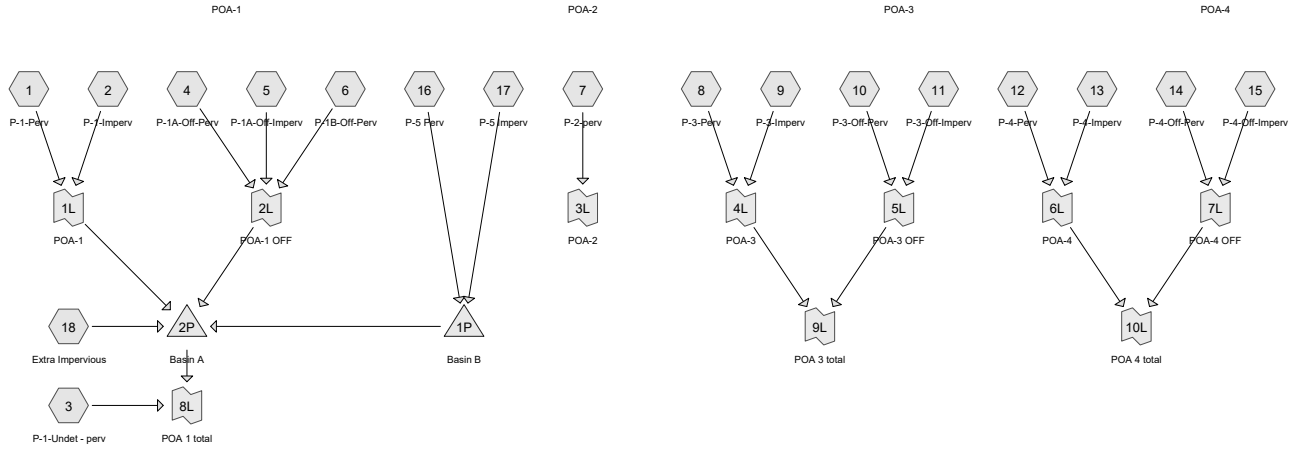
Primary outflow = Inflow, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs

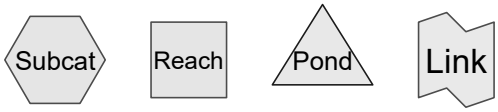
Link 10L: POA 4 total



APPENDIX C

WATER QUALITY CALCULATIONS





Routing Diagram for 191025 - Proposed Analysis-Row Crop
Prepared by Maser Consulting PA, Printed 10/30/2019
HydroCAD® 10.00-22 s/n 10901 © 2018 HydroCAD Software Solutions LLC

Area Listing (all nodes)

Area (acres)	CN	Description (subcatchment-numbers)
7.430	61	>75% Grass cover, Good, HSG B (1, 3, 4, 6, 7, 8, 10, 12, 14, 16)
1.600	74	>75% Grass cover, Good, HSG C (1, 3)
1.040	98	Building (17)
1.600	98	Buildings (2)
0.110	98	Conc (2)
0.110	98	Concrete (17)
0.290	98	Driveway (2, 17)
0.100	98	Gravel, HSG B (11)
0.030	98	Misc., HSG B (11)
0.510	98	Paved parking, HSG B (5, 11, 13, 15)
2.450	98	Pavement (2, 9, 17)
0.090	98	Roofs, HSG B (5, 11)
0.520	75	Row crops, contoured, Good, HSG B (6)
0.490	98	Sidewalk (2, 9, 17)
0.500	98	impervious (18)
16.870	**79**	**TOTAL AREA**

Soil Listing (all nodes)

Area (acres)	Soil Group	Subcatchment Numbers
0.000	HSG A	
8.680	HSG B	1, 3, 4, 5, 6, 7, 8, 10, 11, 12, 13, 14, 15, 16
1.600	HSG C	1, 3
0.000	HSG D	
6.590	Other	2, 9, 17, 18
16.870		**TOTAL AREA**

Summary for Subcatchment 1: P-1-Perv

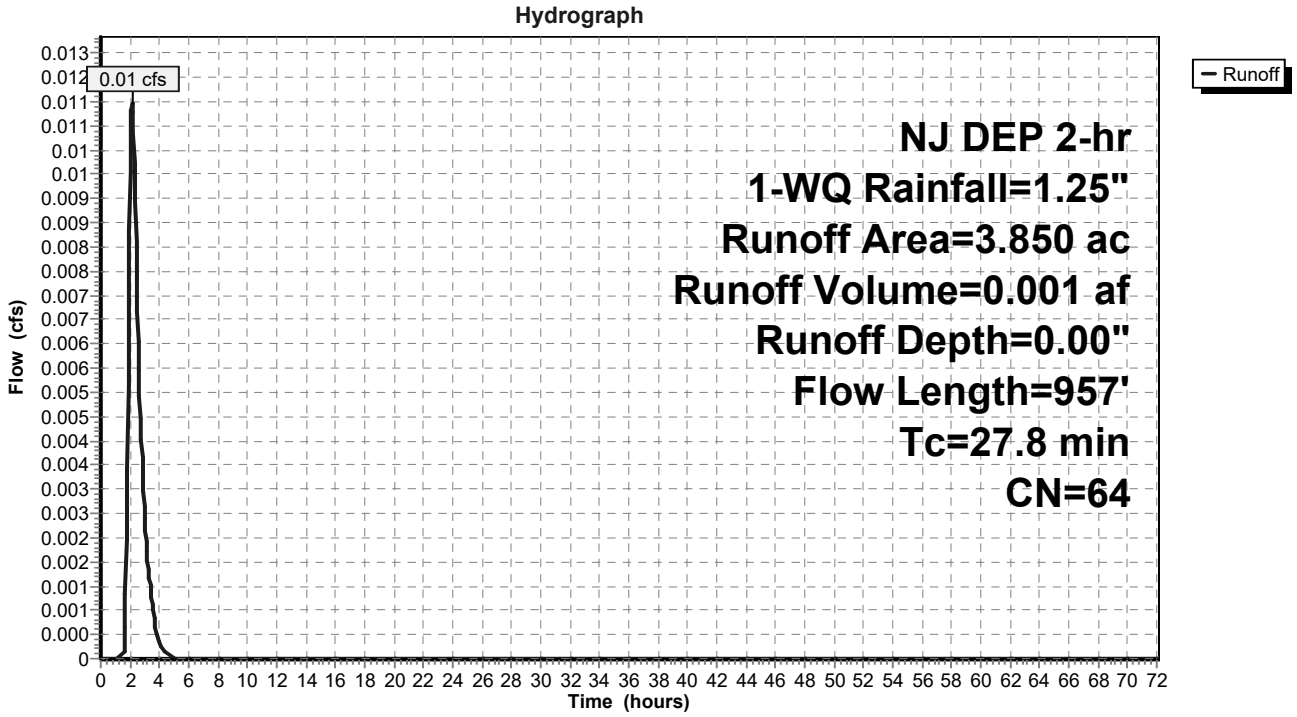
Runoff = 0.01 cfs @ 2.15 hrs, Volume= 0.001 af, Depth= 0.00"

Runoff by SCS TR-20 method, UH=Delmarva, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
NJ DEP 2-hr 1-WQ Rainfall=1.25"

Area (ac)	CN	Description
3.070	61	>75% Grass cover, Good, HSG B
0.780	74	>75% Grass cover, Good, HSG C
3.850	64	Weighted Average
3.850		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
20.3	100	0.0040	0.08		**Sheet Flow, Sheet 1** Cultivated: Residue>20% n= 0.170 P2= 3.31"
7.5	857	0.0140	1.90		**Shallow Concentrated Flow, SCF 1** Unpaved Kv= 16.1 fps
27.8	957	Total			

Subcatchment 1: P-1-Perv



Summary for Subcatchment 2: P-1-Imperv

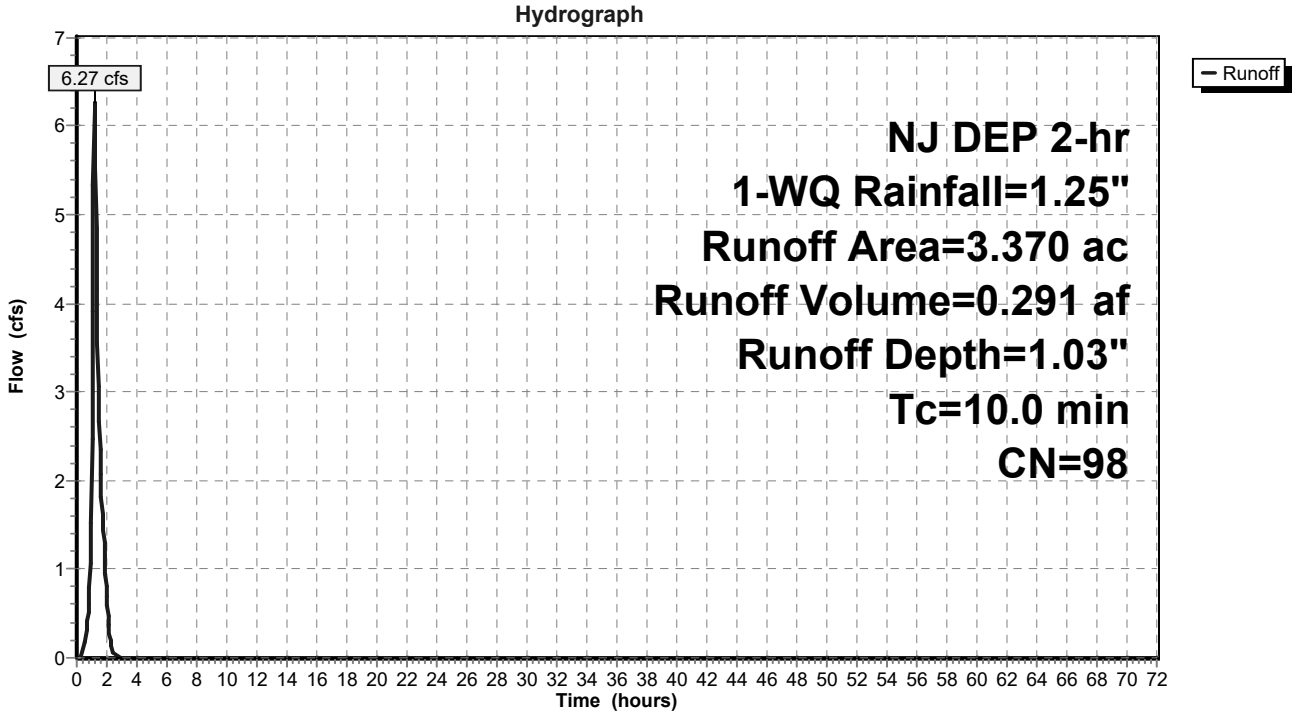
Runoff = 6.27 cfs @ 1.17 hrs, Volume= 0.291 af, Depth= 1.03"

Runoff by SCS TR-20 method, UH=Delmarva, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
NJ DEP 2-hr 1-WQ Rainfall=1.25"

	Area (ac)	CN	Description
*	1.600	98	Buildings
*	1.310	98	Pavement
*	0.300	98	Sidewalk
*	0.110	98	Conc
*	0.050	98	Driveway
	3.370	98	Weighted Average
	3.370		100.00% Impervious Area

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

Subcatchment 2: P-1-Imperv



Summary for Subcatchment 3: P-1-Undet - perv

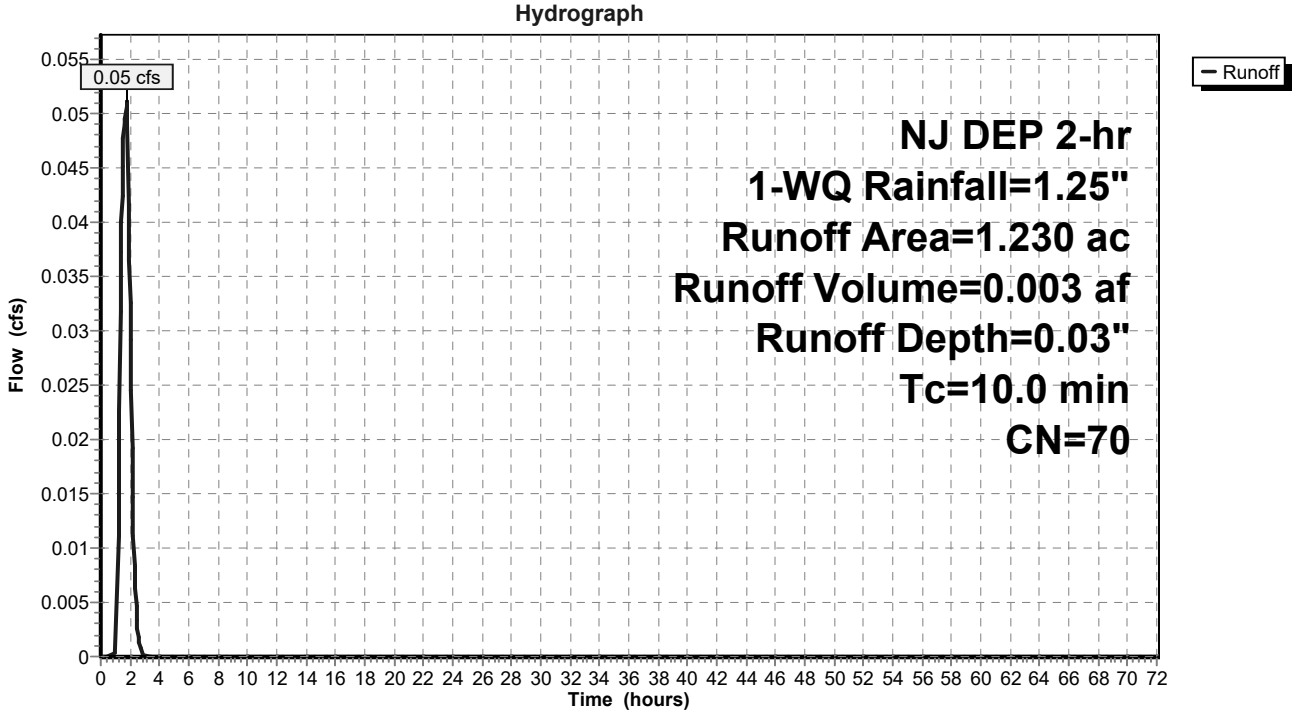
Runoff = 0.05 cfs @ 1.78 hrs, Volume= 0.003 af, Depth= 0.03"

Runoff by SCS TR-20 method, UH=Delmarva, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
NJ DEP 2-hr 1-WQ Rainfall=1.25"

Area (ac)	CN	Description
0.820	74	>75% Grass cover, Good, HSG C
0.410	61	>75% Grass cover, Good, HSG B
1.230	70	Weighted Average
1.230		100.00% Pervious Area

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

Subcatchment 3: P-1-Undet - perv



Summary for Subcatchment 4: P-1A-Off-Perv

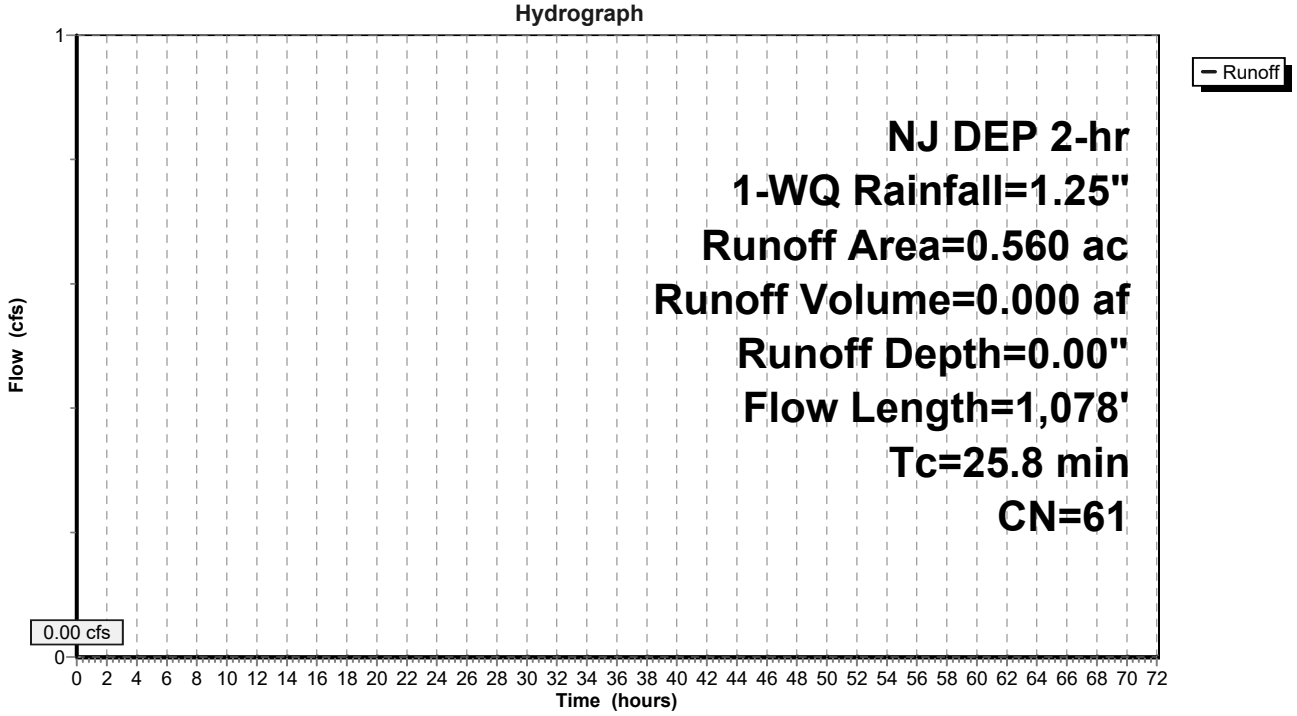
Runoff = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af, Depth= 0.00"

Runoff by SCS TR-20 method, UH=Delmarva, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
NJ DEP 2-hr 1-WQ Rainfall=1.25"

Area (ac)	CN	Description
0.560	61	>75% Grass cover, Good, HSG B
0.560		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
17.2	100	0.0120	0.10		**Sheet Flow, Sheet 1.3** Grass: Dense n= 0.240 P2= 3.31"
8.6	978	0.0140	1.90		**Shallow Concentrated Flow, SCF 1.3** Unpaved Kv= 16.1 fps
25.8	1,078	Total			

Subcatchment 4: P-1A-Off-Perv



Summary for Subcatchment 5: P-1A-Off-Imperv

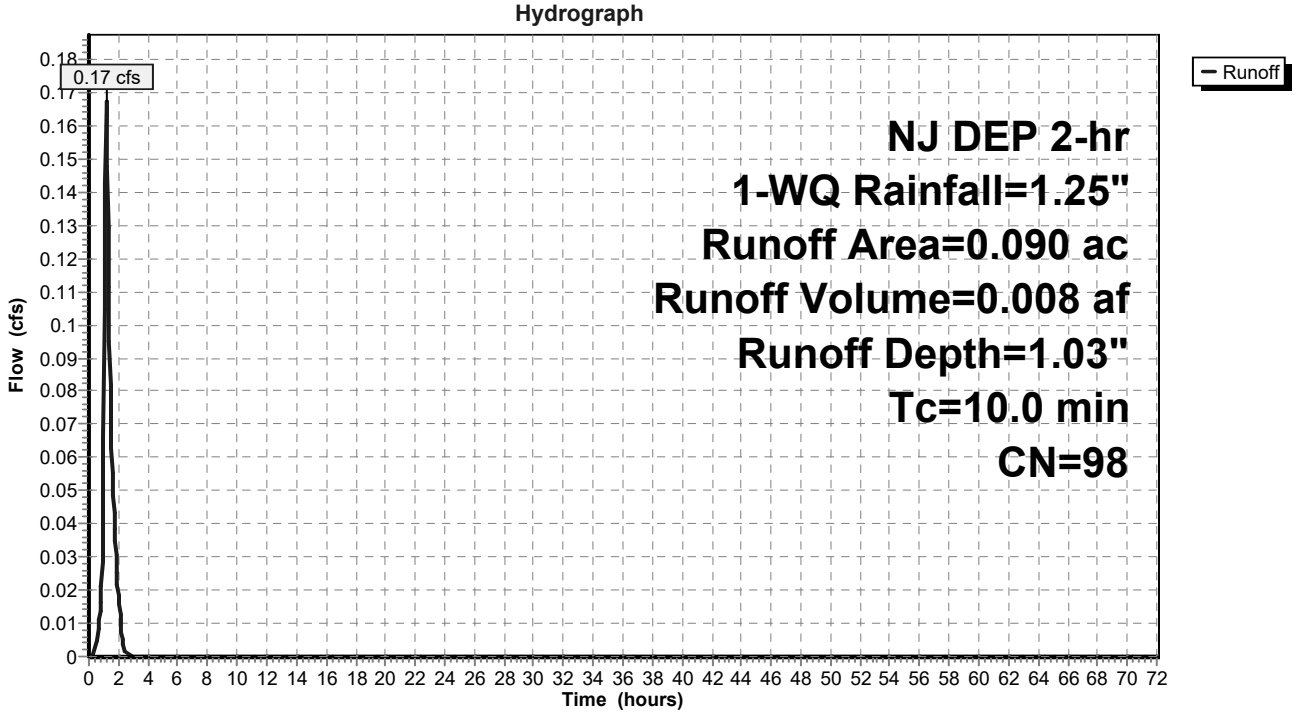
Runoff = 0.17 cfs @ 1.17 hrs, Volume= 0.008 af, Depth= 1.03"

Runoff by SCS TR-20 method, UH=Delmarva, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
NJ DEP 2-hr 1-WQ Rainfall=1.25"

	Area (ac)	CN	Description
	0.010	98	Roofs, HSG B
*	0.080	98	Paved parking, HSG B
	0.090	98	Weighted Average
	0.090		100.00% Impervious Area

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

Subcatchment 5: P-1A-Off-Imperv



Summary for Subcatchment 6: P-1B-Off-Perv

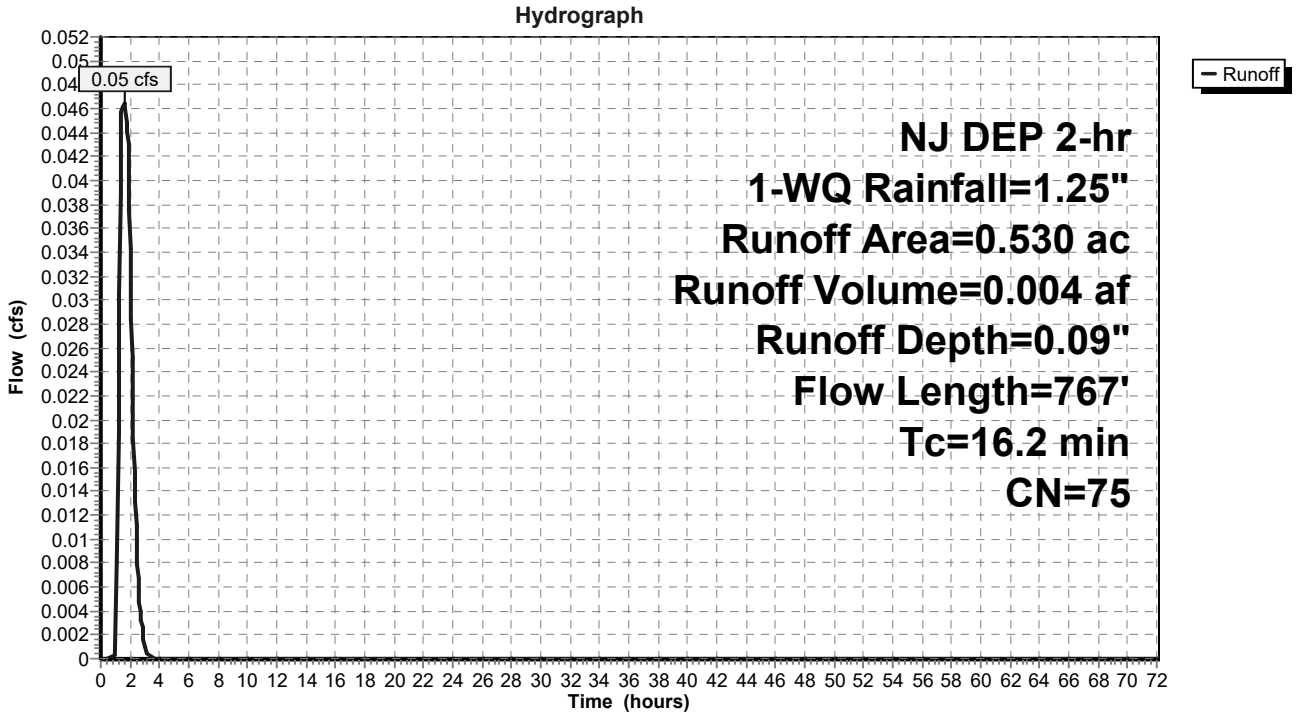
Runoff = 0.05 cfs @ 1.58 hrs, Volume= 0.004 af, Depth= 0.09"

Runoff by SCS TR-20 method, UH=Delmarva, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
NJ DEP 2-hr 1-WQ Rainfall=1.25"

Area (ac)	CN	Description
0.520	75	Row crops, contoured, Good, HSG B
0.010	61	>75% Grass cover, Good, HSG B
0.530	75	Weighted Average
0.530		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
10.4	100	0.0210	0.16		**Sheet Flow, Sheet** Cultivated: Residue>20% n= 0.170 P2= 3.31"
5.8	667	0.0140	1.90		**Shallow Concentrated Flow, SCF** Unpaved Kv= 16.1 fps
16.2	767	Total			

Subcatchment 6: P-1B-Off-Perv



Summary for Subcatchment 7: P-2-perv

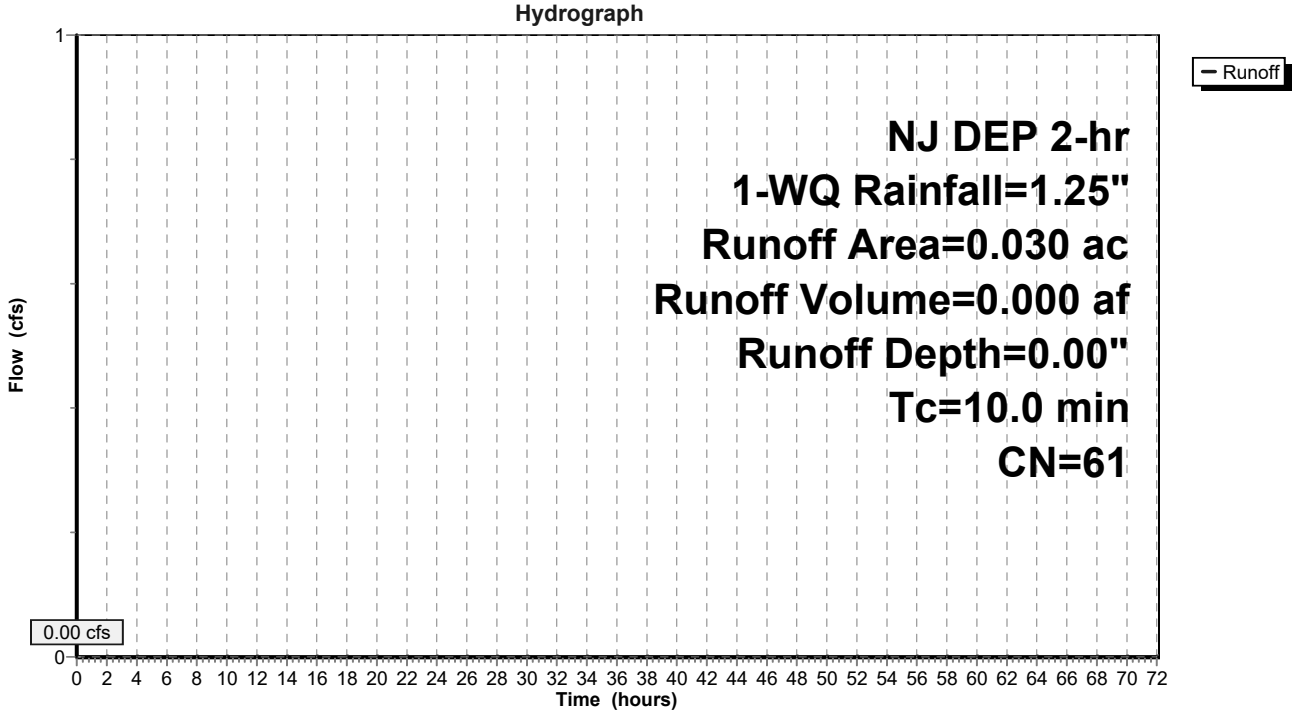
Runoff = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af, Depth= 0.00"

Runoff by SCS TR-20 method, UH=Delmarva, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
NJ DEP 2-hr 1-WQ Rainfall=1.25"

Area (ac)	CN	Description
0.030	61	>75% Grass cover, Good, HSG B
0.030		100.00% Pervious Area

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

Subcatchment 7: P-2-perv



Summary for Subcatchment 8: P-3-Perv

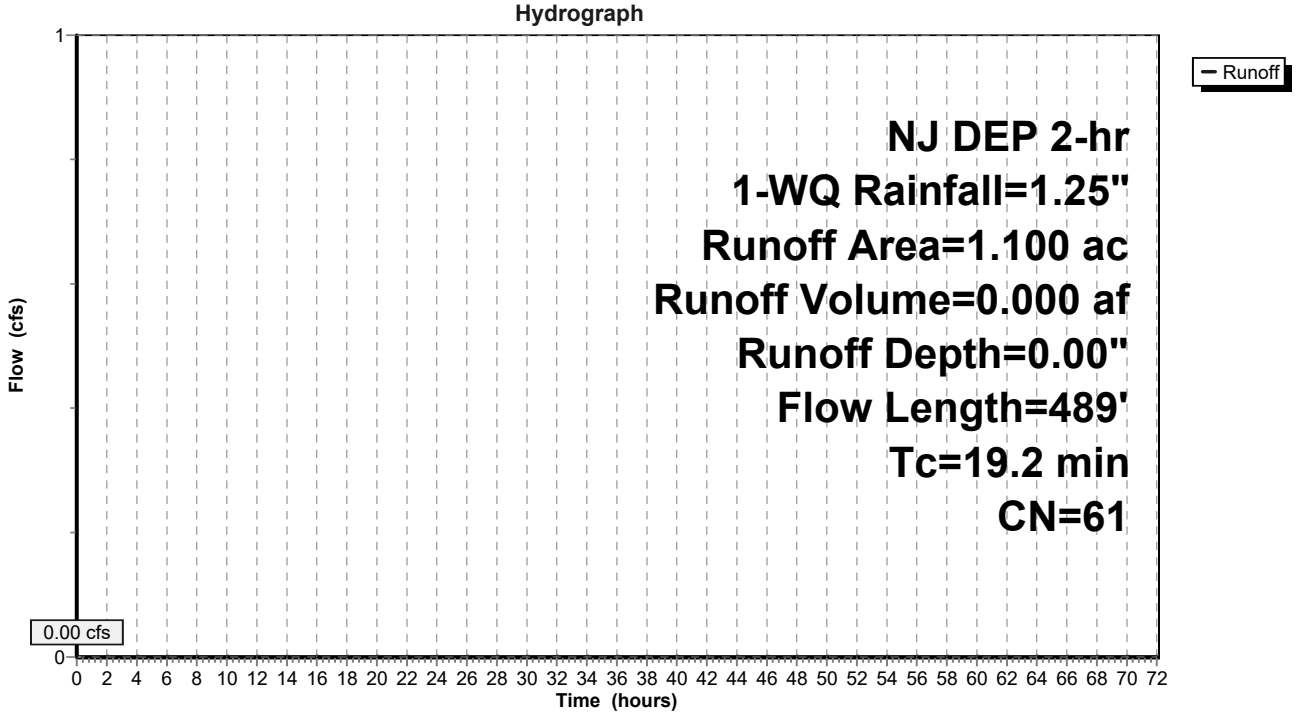
Runoff = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af, Depth= 0.00"

Runoff by SCS TR-20 method, UH=Delmarva, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
NJ DEP 2-hr 1-WQ Rainfall=1.25"

Area (ac)	CN	Description
1.100	61	>75% Grass cover, Good, HSG B
1.100		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
14.7	100	0.0090	0.11		**Sheet Flow, Sheet 4** Cultivated: Residue>20% n= 0.170 P2= 3.31"
4.5	389	0.0080	1.44		**Shallow Concentrated Flow, SCF 4** Unpaved Kv= 16.1 fps
19.2	489	Total			

Subcatchment 8: P-3-Perv



Summary for Subcatchment 9: P-3-Imperv

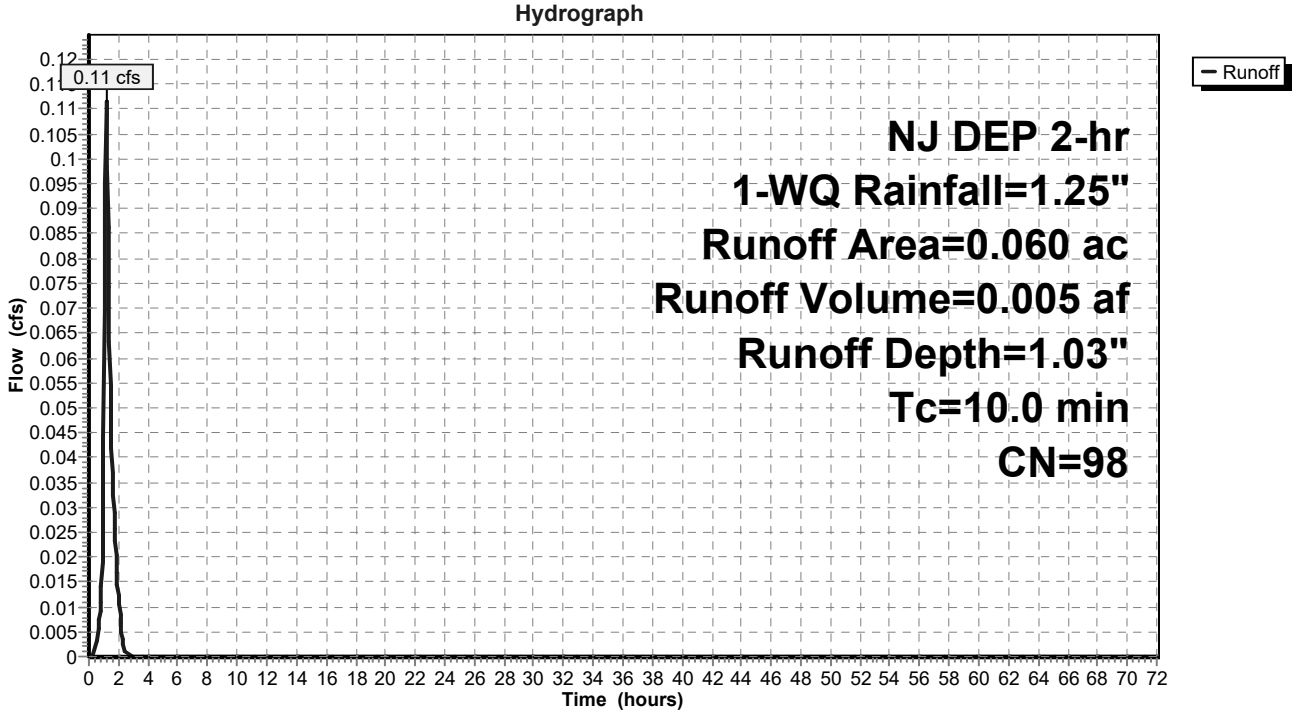
Runoff = 0.11 cfs @ 1.17 hrs, Volume= 0.005 af, Depth= 1.03"

Runoff by SCS TR-20 method, UH=Delmarva, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
NJ DEP 2-hr 1-WQ Rainfall=1.25"

	Area (ac)	CN	Description
*	0.030	98	Pavement
*	0.030	98	Sidewalk
	0.060	98	Weighted Average
	0.060		100.00% Impervious Area

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

Subcatchment 9: P-3-Imperv



Summary for Subcatchment 10: P-3-Off-Perv

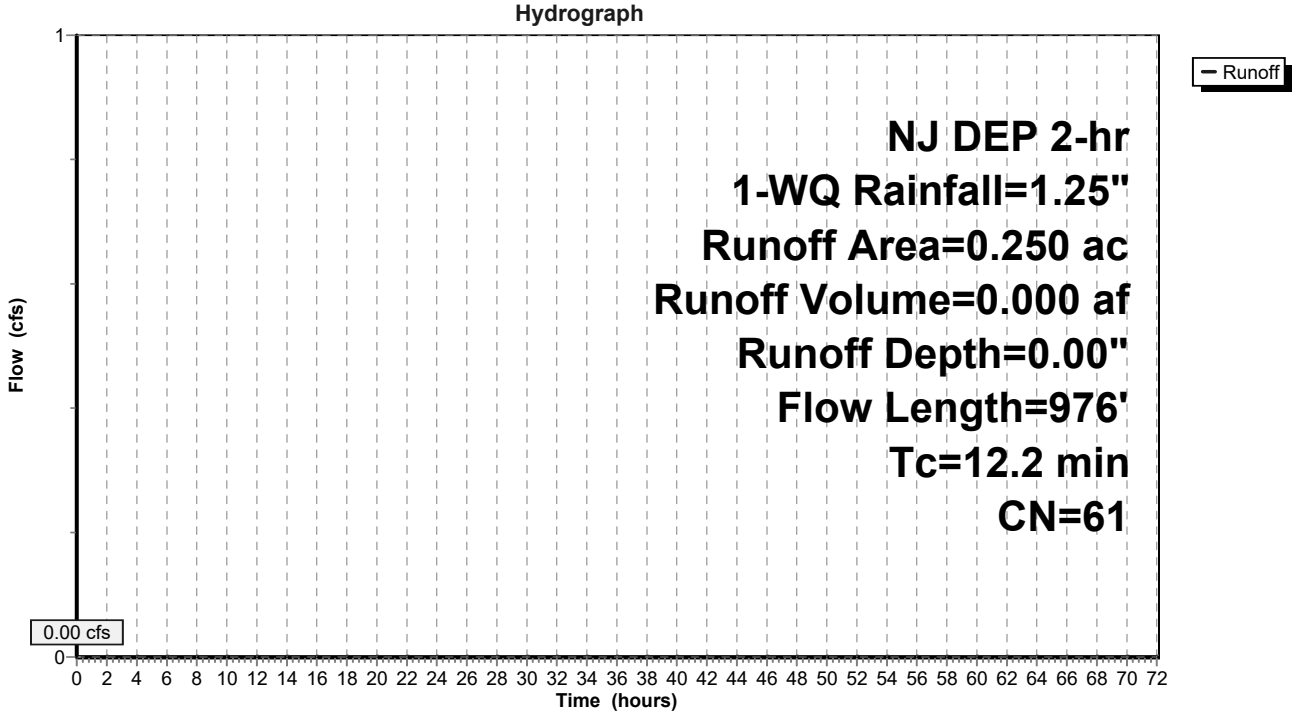
Runoff = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af, Depth= 0.00"

Runoff by SCS TR-20 method, UH=Delmarva, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
NJ DEP 2-hr 1-WQ Rainfall=1.25"

Area (ac)	CN	Description
0.250	61	>75% Grass cover, Good, HSG B
0.250		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
1.4	100	0.0140	1.21		**Sheet Flow, Sheet 4** Smooth surfaces n= 0.011 P2= 3.31"
10.8	876	0.0070	1.35		**Shallow Concentrated Flow, SCF 4** Unpaved Kv= 16.1 fps
12.2	976	Total			

Subcatchment 10: P-3-Off-Perv



Summary for Subcatchment 11: P-3-Off-Imperv

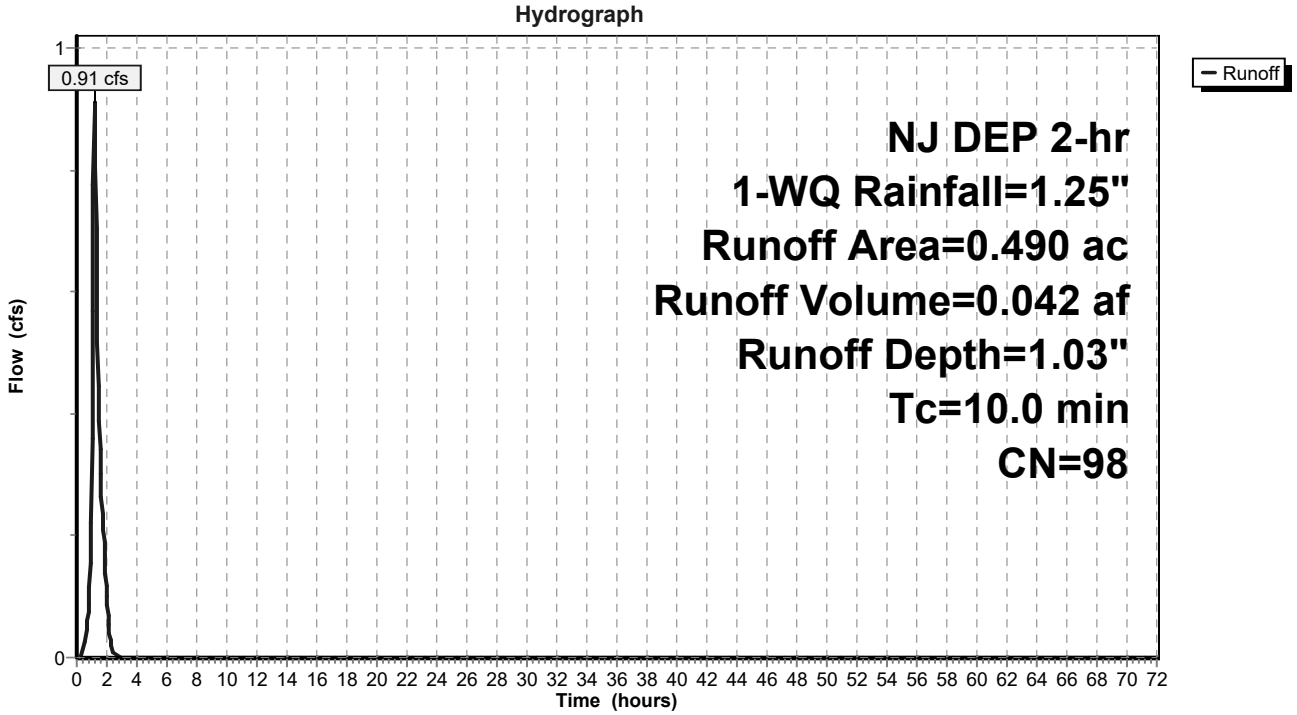
Runoff = 0.91 cfs @ 1.17 hrs, Volume= 0.042 af, Depth= 1.03"

Runoff by SCS TR-20 method, UH=Delmarva, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
NJ DEP 2-hr 1-WQ Rainfall=1.25"

	Area (ac)	CN	Description
	0.080	98	Roofs, HSG B
*	0.100	98	Gravel, HSG B
	0.280	98	Paved parking, HSG B
*	0.030	98	Misc., HSG B
	0.490	98	Weighted Average
	0.490		100.00% Impervious Area

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

Subcatchment 11: P-3-Off-Imperv



Summary for Subcatchment 12: P-4-Perv

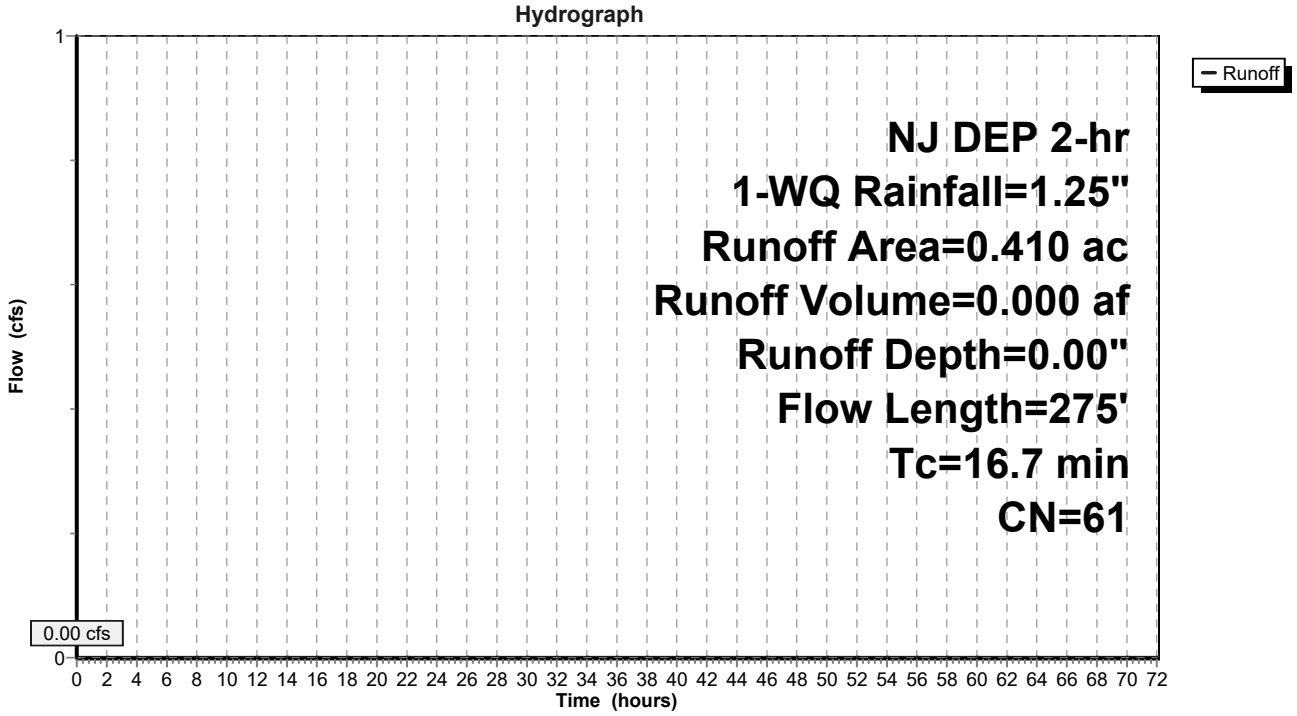
Runoff = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af, Depth= 0.00"

Runoff by SCS TR-20 method, UH=Delmarva, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
NJ DEP 2-hr 1-WQ Rainfall=1.25"

Area (ac)	CN	Description
0.410	61	>75% Grass cover, Good, HSG B
0.410		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.8	27	0.0090	0.07		**Sheet Flow, Sheet 1** Grass: Dense n= 0.240 P2= 3.31"
0.9	45	0.0090	0.87		**Sheet Flow, Sheet 2** Smooth surfaces n= 0.011 P2= 3.31"
7.0	28	0.0090	0.07		**Sheet Flow, Sheet 3** Grass: Dense n= 0.240 P2= 3.31"
2.0	175	0.0080	1.44		**Shallow Concentrated Flow, SCF** Unpaved Kv= 16.1 fps
16.7	275	Total			

Subcatchment 12: P-4-Perv



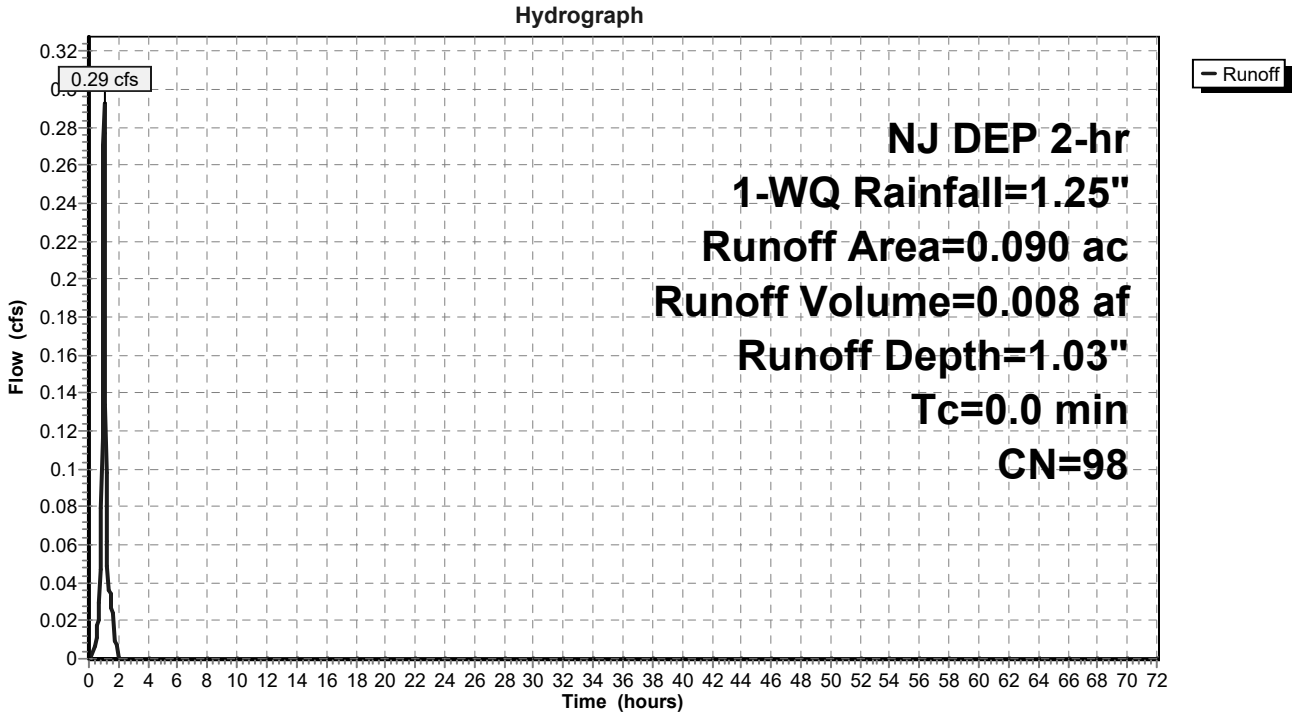
Summary for Subcatchment 13: P-4-Imperv

Runoff = 0.29 cfs @ 1.03 hrs, Volume= 0.008 af, Depth= 1.03"

Runoff by SCS TR-20 method, UH=Delmarva, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
NJ DEP 2-hr 1-WQ Rainfall=1.25"

Area (ac)	CN	Description
0.090	98	Paved parking, HSG B
0.090		100.00% Impervious Area

Subcatchment 13: P-4-Imperv



Summary for Subcatchment 14: P-4-Off-Perv

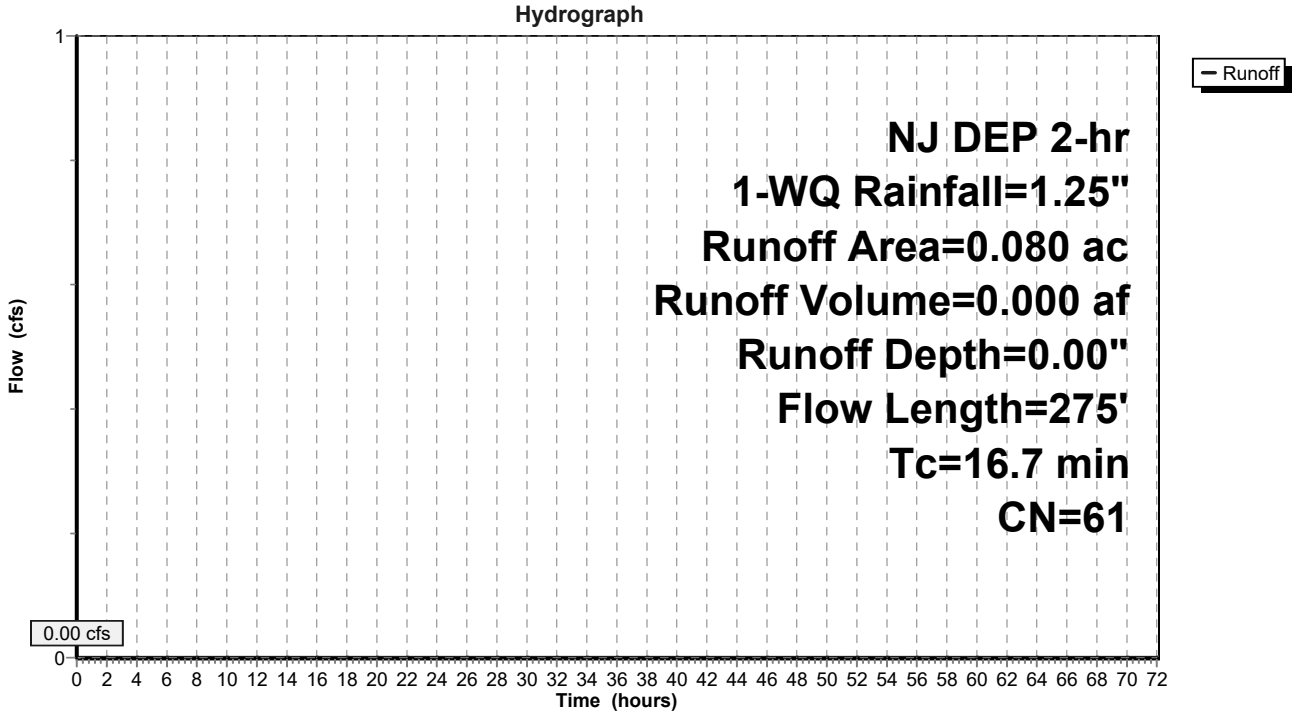
Runoff = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af, Depth= 0.00"

Runoff by SCS TR-20 method, UH=Delmarva, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
NJ DEP 2-hr 1-WQ Rainfall=1.25"

Area (ac)	CN	Description
0.080	61	>75% Grass cover, Good, HSG B
0.080		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.8	27	0.0090	0.07		**Sheet Flow, Sheet 1** Grass: Dense n= 0.240 P2= 3.31"
0.9	45	0.0090	0.87		**Sheet Flow, Sheet 2** Smooth surfaces n= 0.011 P2= 3.31"
7.0	28	0.0090	0.07		**Sheet Flow, Sheet 3** Grass: Dense n= 0.240 P2= 3.31"
2.0	175	0.0080	1.44		**Shallow Concentrated Flow, SCF** Unpaved Kv= 16.1 fps
16.7	275	Total			

Subcatchment 14: P-4-Off-Perv



Summary for Subcatchment 15: P-4-Off-Imperv

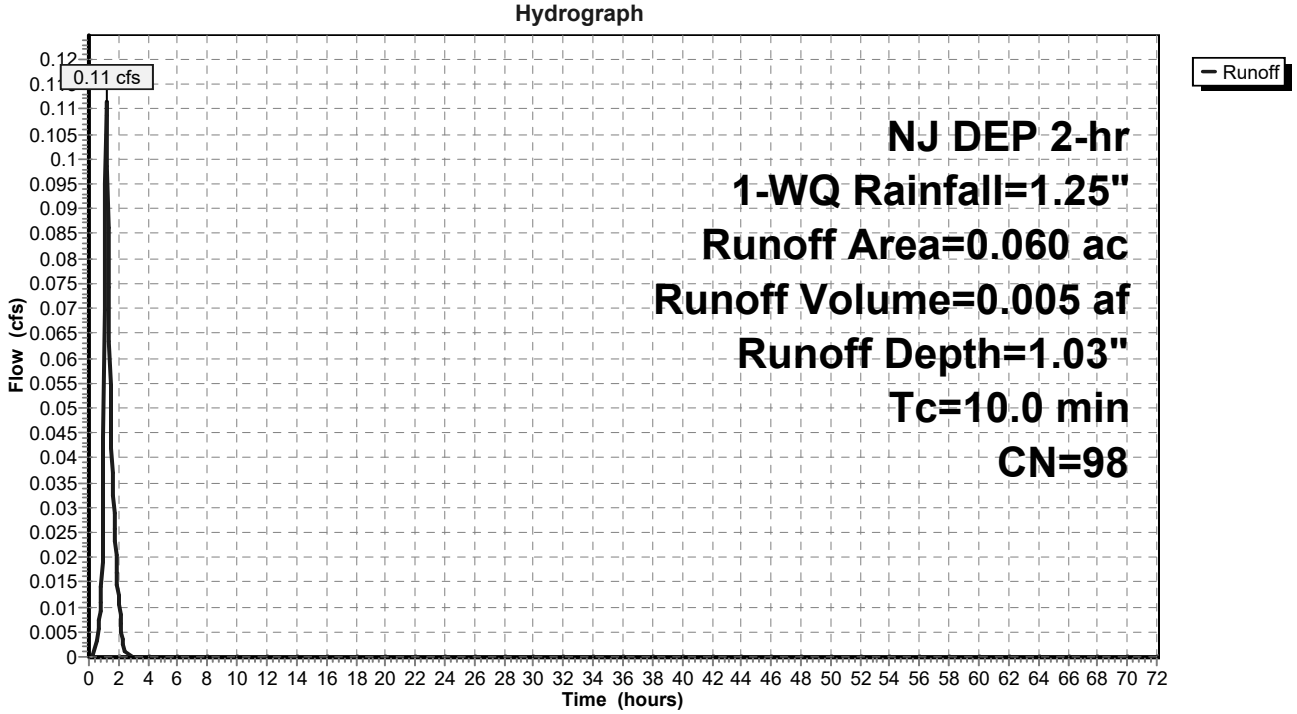
Runoff = 0.11 cfs @ 1.17 hrs, Volume= 0.005 af, Depth= 1.03"

Runoff by SCS TR-20 method, UH=Delmarva, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
NJ DEP 2-hr 1-WQ Rainfall=1.25"

Area (ac)	CN	Description
0.060	98	Paved parking, HSG B
0.060		100.00% Impervious Area

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

Subcatchment 15: P-4-Off-Imperv



Summary for Subcatchment 16: P-5 Perv

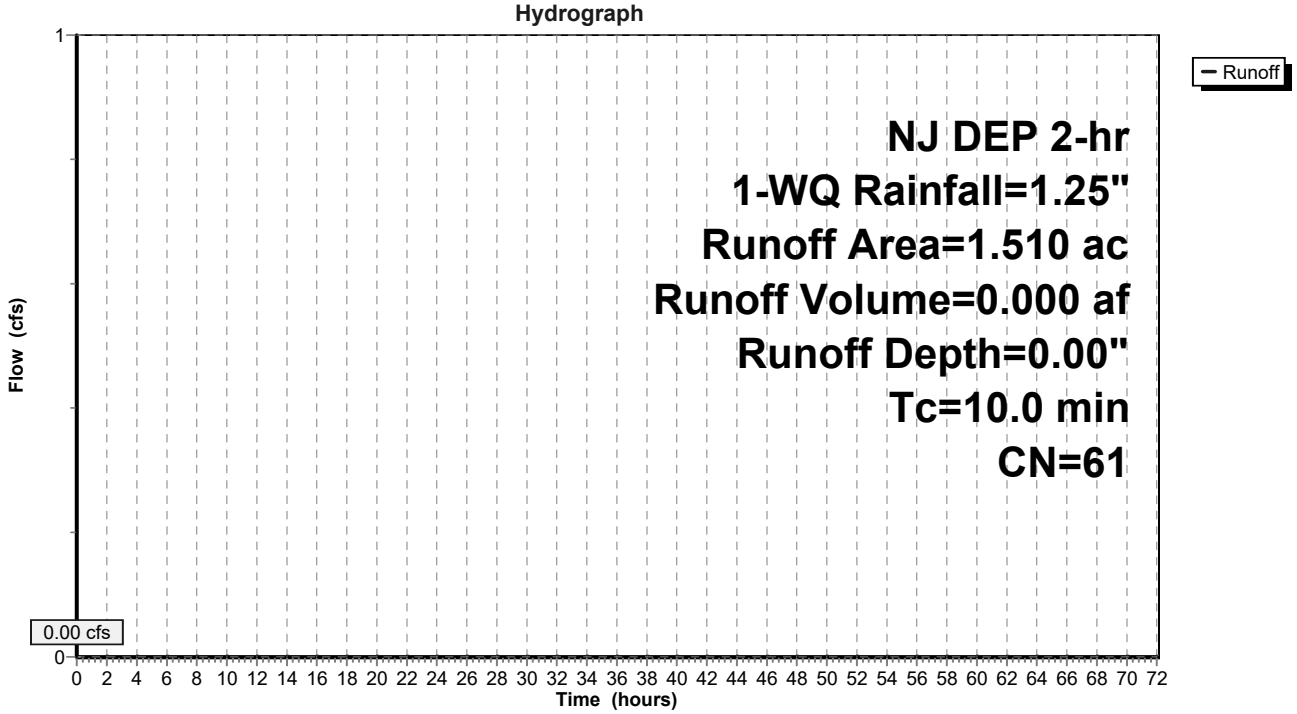
Runoff = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af, Depth= 0.00"

Runoff by SCS TR-20 method, UH=Delmarva, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
NJ DEP 2-hr 1-WQ Rainfall=1.25"

Area (ac)	CN	Description
1.510	61	>75% Grass cover, Good, HSG B
1.510		100.00% Pervious Area

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

Subcatchment 16: P-5 Perv



Summary for Subcatchment 17: P-5 Imperv

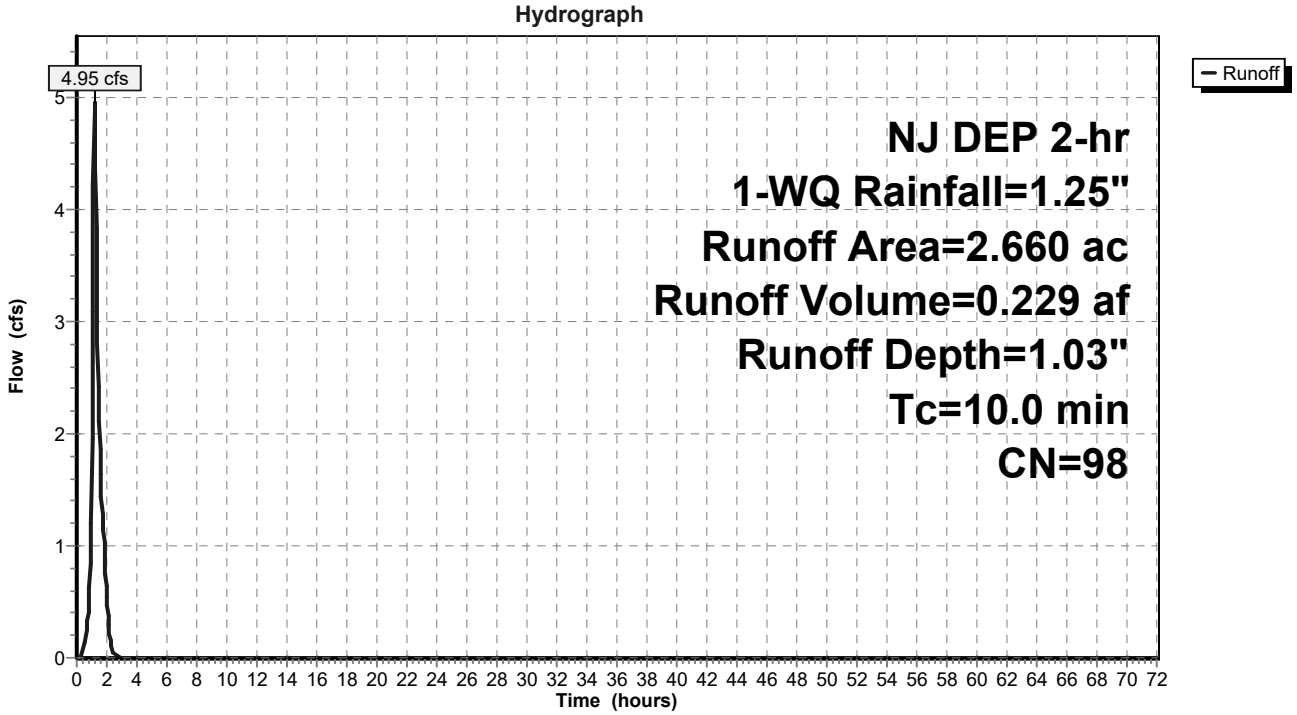
Runoff = 4.95 cfs @ 1.17 hrs, Volume= 0.229 af, Depth= 1.03"

Runoff by SCS TR-20 method, UH=Delmarva, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
NJ DEP 2-hr 1-WQ Rainfall=1.25"

	Area (ac)	CN	Description
*	1.040	98	Building
*	1.110	98	Pavement
*	0.160	98	Sidewalk
*	0.110	98	Concrete
*	0.240	98	Driveway
	2.660	98	Weighted Average
	2.660		100.00% Impervious Area

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

Subcatchment 17: P-5 Imperv



Summary for Subcatchment 18: Extra Impervious

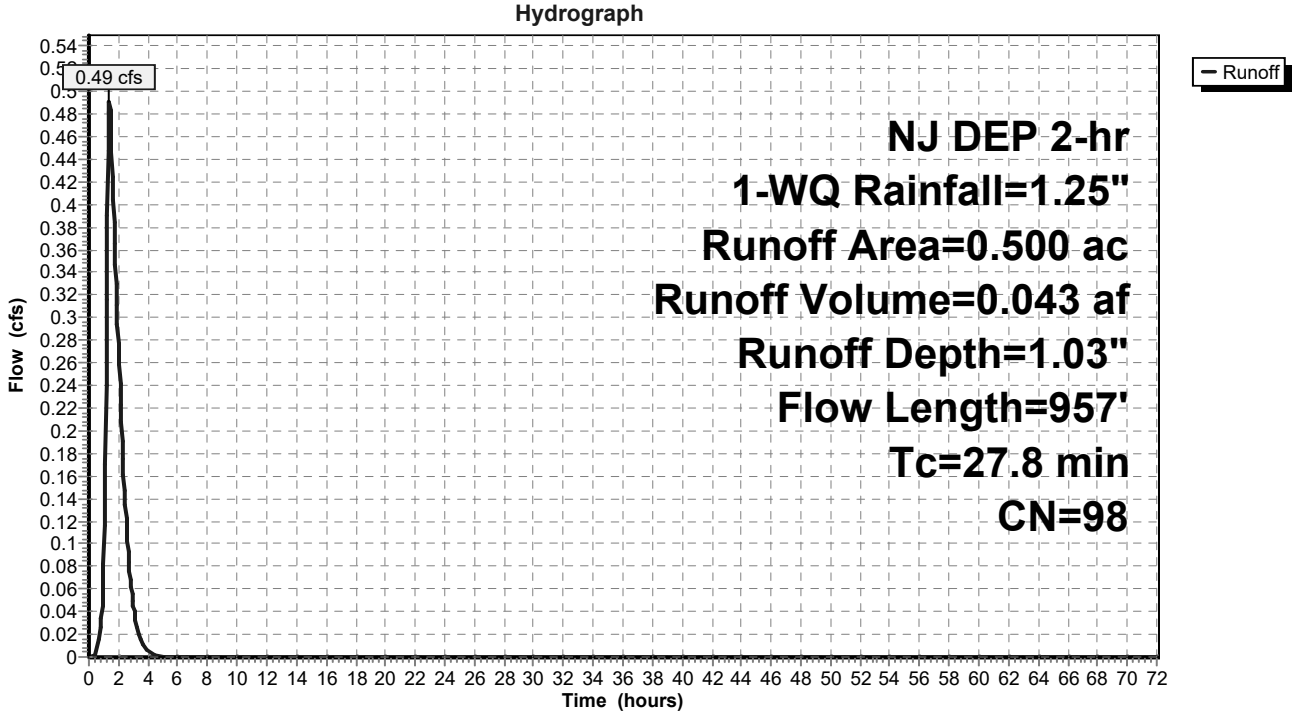
Runoff = 0.49 cfs @ 1.40 hrs, Volume= 0.043 af, Depth= 1.03"

Runoff by SCS TR-20 method, UH=Delmarva, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
NJ DEP 2-hr 1-WQ Rainfall=1.25"

	Area (ac)	CN	Description
*	0.500	98	impervious
	0.500		100.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
20.3	100	0.0040	0.08		**Sheet Flow, Sheet 1** Cultivated: Residue>20% n= 0.170 P2= 3.31"
7.5	857	0.0140	1.90		**Shallow Concentrated Flow, SCF 1** Unpaved Kv= 16.1 fps
27.8	957	Total			

Subcatchment 18: Extra Impervious



Summary for Pond 1P: Basin B

Inflow Area = 4.170 ac, 63.79% Impervious, Inflow Depth = 0.66" for 1-WQ event
Inflow = 4.95 cfs @ 1.17 hrs, Volume= 0.229 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 Dyn-Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
Peak Elev= 103.98' @ 3.15 hrs Surf.Area= 0.259 ac Storage= 0.229 af

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

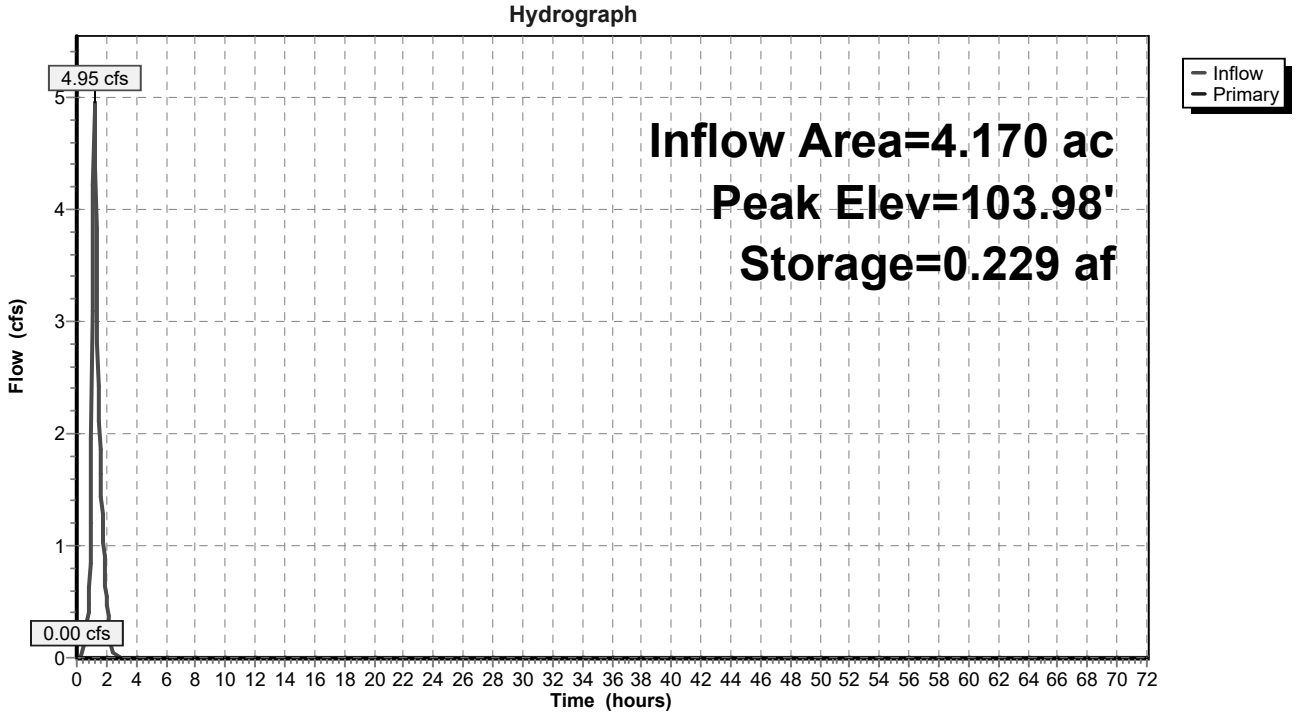
Volume	Invert	Avail.Storage	Storage Description
#1	103.00'	1.751 af	**Custom Stage Data (Prismatic)** Listed below (Recalc)

Elevation (feet)	Surf.Area (acres)	Inc.Store (acre-feet)	Cum.Store (acre-feet)
103.00	0.206	0.000	0.000
104.00	0.260	0.233	0.233
105.00	0.317	0.288	0.522
106.00	0.377	0.347	0.869
107.00	0.440	0.409	1.277
108.00	0.507	0.474	1.751

Device	Routing	Invert	Outlet Devices
#1	Primary	103.50'	**15.0" Round Culvert** L= 1,030.0' RCP, sq.cut end projecting, Ke= 0.500 Inlet / Outlet Invert= 103.50' / 98.35' S= 0.0050 '/' Cc= 0.900 n= 0.013, Flow Area= 1.23 sf
#2	Device 1	105.00'	**0.7' long Sharp-Crested Rectangular Weir** 2 End Contraction(s)

Primary OutFlow Max=0.00 cfs @ 0.00 hrs HW=103.00' TW=98.10' (Dynamic Tailwater)
└─**1=Culvert** (Controls 0.00 cfs)
  └─**2=Sharp-Crested Rectangular Weir** (Controls 0.00 cfs)

Pond 1P: Basin B



Summary for Pond 2P: Basin A

Inflow Area = 13.070 ac, 50.65% Impervious, Inflow Depth = 0.32" for 1-WQ event
Inflow = 6.67 cfs @ 1.18 hrs, Volume= 0.346 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 Dyn-Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
Peak Elev= 98.87' @ 5.10 hrs Surf.Area= 0.453 ac Storage= 0.346 af

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

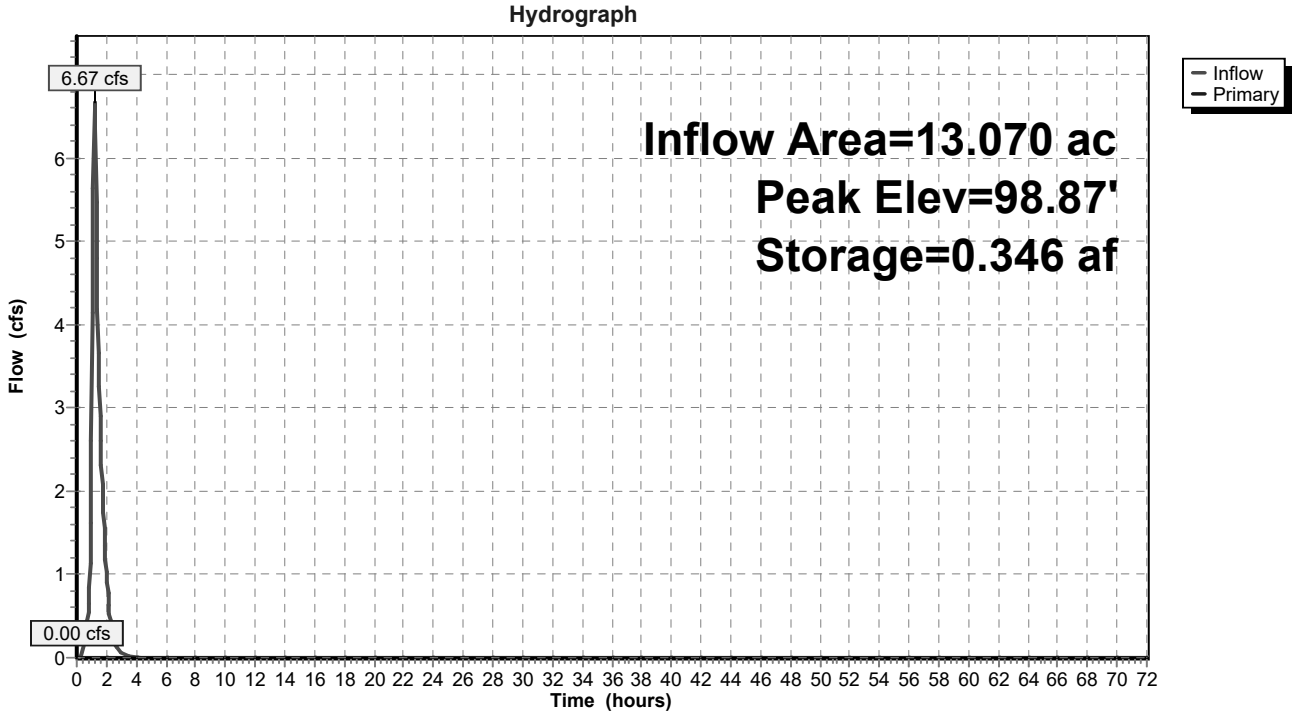
Volume	Invert	Avail.Storage	Storage Description
#1	98.10'	2.779 af	**Custom Stage Data (Prismatic)** Listed below (Recalc)

Elevation (feet)	Surf.Area (acres)	Inc.Store (acre-feet)	Cum.Store (acre-feet)
98.10	0.446	0.000	0.000
99.00	0.454	0.405	0.405
100.00	0.463	0.458	0.863
101.00	0.471	0.467	1.330
102.00	0.479	0.475	1.805
103.00	0.487	0.483	2.288
104.00	0.496	0.492	2.779

Device	Routing	Invert	Outlet Devices
#1	Primary	98.10'	**18.0" Round Culvert X 2.00** L= 100.0' RCP, sq.cut end projecting, Ke= 0.500 Inlet / Outlet Invert= 98.10' / 97.60' S= 0.0050 '/' Cc= 0.900 n= 0.013 Concrete pipe, straight & clean, Flow Area= 1.77 sf
#2	Device 1	98.88'	**8.0" Vert. Orifice/Grate** C= 0.600
#3	Device 1	100.10'	**2.0' long Sharp-Crested Rectangular Weir** 2 End Contraction(s)

Primary OutFlow Max=0.00 cfs @ 0.00 hrs HW=98.10' TW=0.00' (Dynamic Tailwater)
└─**1=Culvert** (Controls 0.00 cfs)
  ├─**2=Orifice/Grate** (Controls 0.00 cfs)
  └─**3=Sharp-Crested Rectangular Weir** (Controls 0.00 cfs)

Pond 2P: Basin A

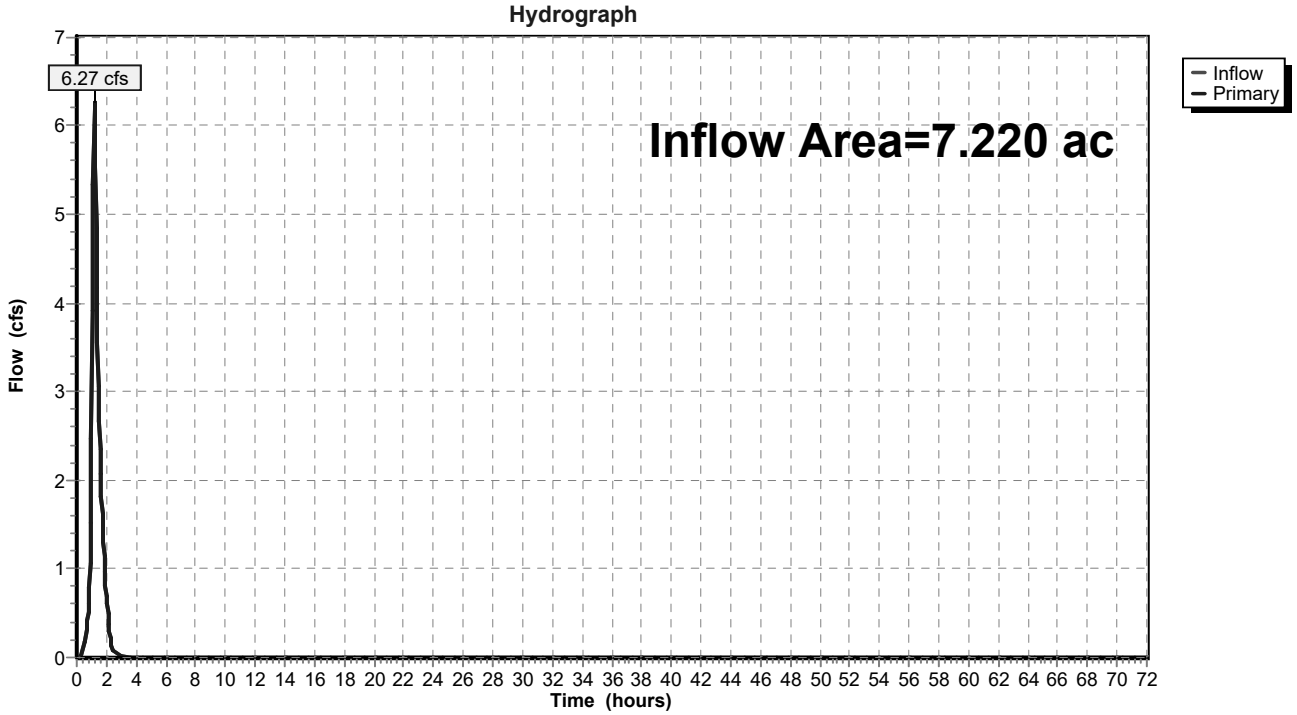


Summary for Link 1L: POA-1

Inflow Area = 7.220 ac, 46.68% Impervious, Inflow Depth = 0.48" for 1-WQ event
Inflow = 6.27 cfs @ 1.17 hrs, Volume= 0.291 af
Primary = 6.27 cfs @ 1.17 hrs, Volume= 0.291 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs

Link 1L: POA-1

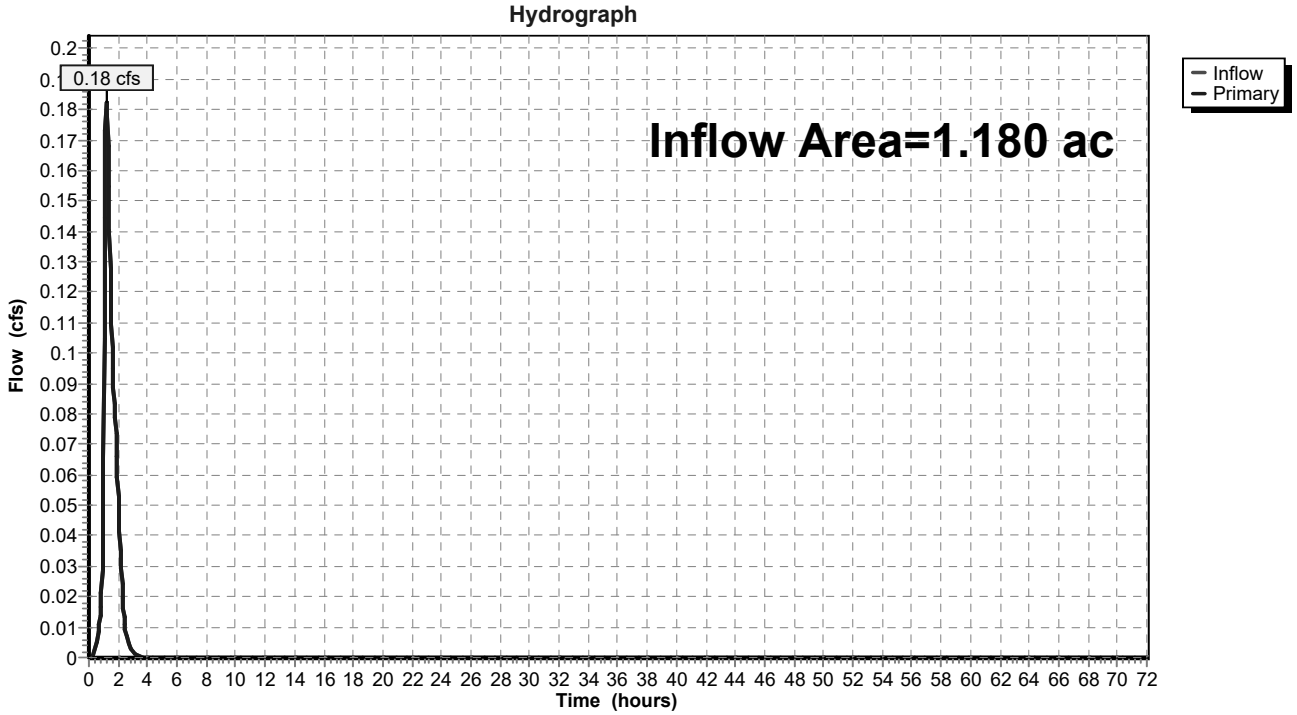


Summary for Link 2L: POA-1 OFF

Inflow Area = 1.180 ac, 7.63% Impervious, Inflow Depth = 0.12" for 1-WQ event
Inflow = 0.18 cfs @ 1.21 hrs, Volume= 0.012 af
Primary = 0.18 cfs @ 1.21 hrs, Volume= 0.012 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs

Link 2L: POA-1 OFF

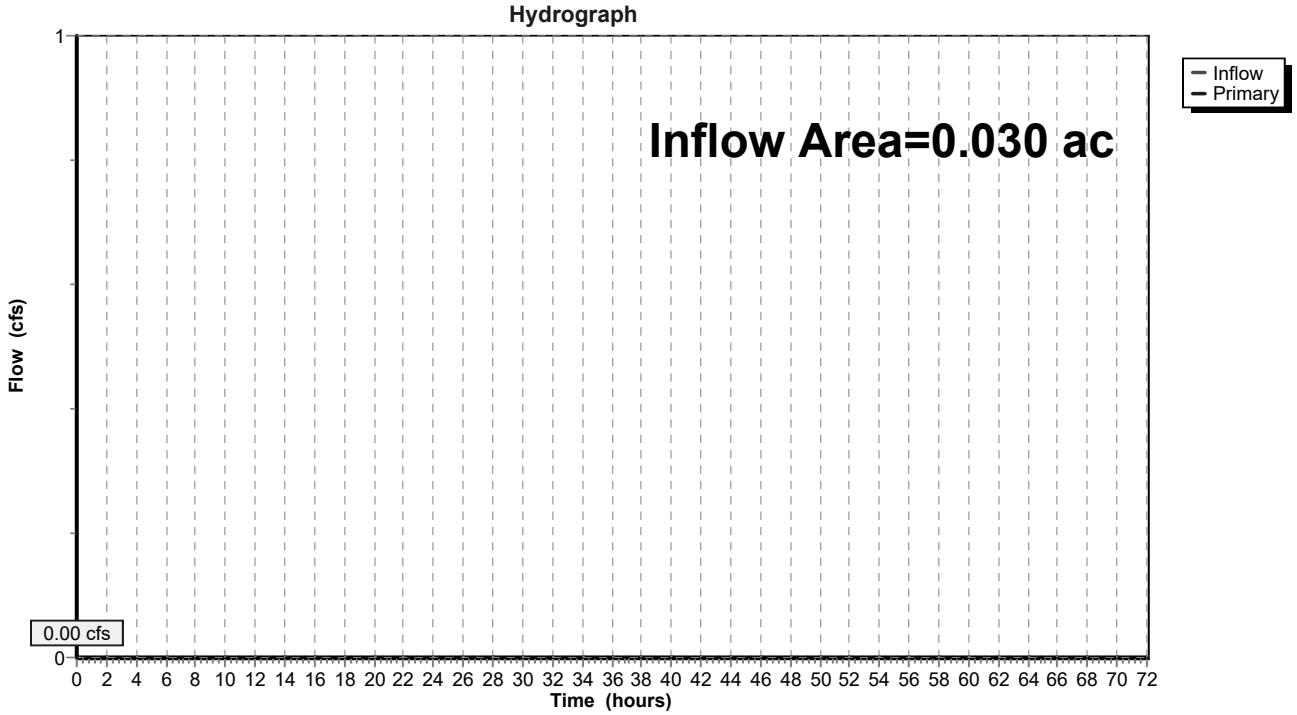


Summary for Link 3L: POA-2

Inflow Area = 0.030 ac, 0.00% Impervious, Inflow Depth = 0.00" for 1-WQ event
Inflow = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af
Primary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs

Link 3L: POA-2

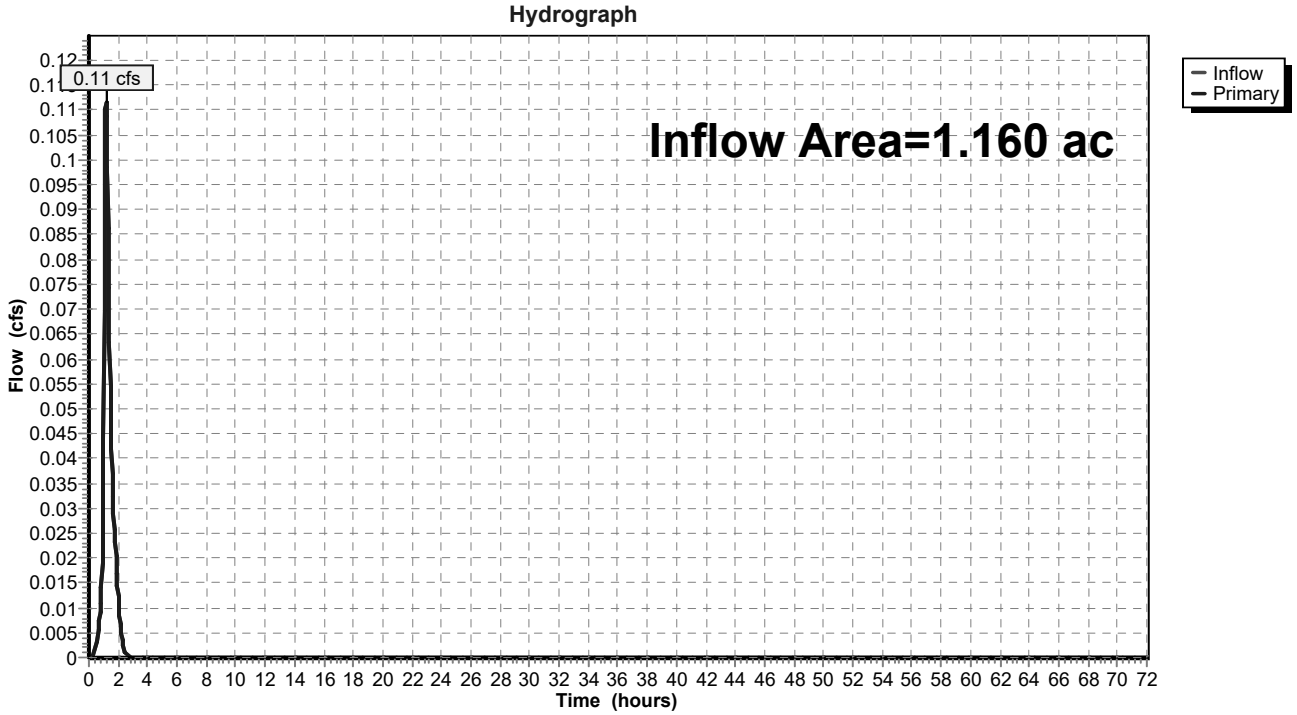


Summary for Link 4L: POA-3

Inflow Area = 1.160 ac, 5.17% Impervious, Inflow Depth = 0.05" for 1-WQ event
Inflow = 0.11 cfs @ 1.17 hrs, Volume= 0.005 af
Primary = 0.11 cfs @ 1.17 hrs, Volume= 0.005 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs

Link 4L: POA-3

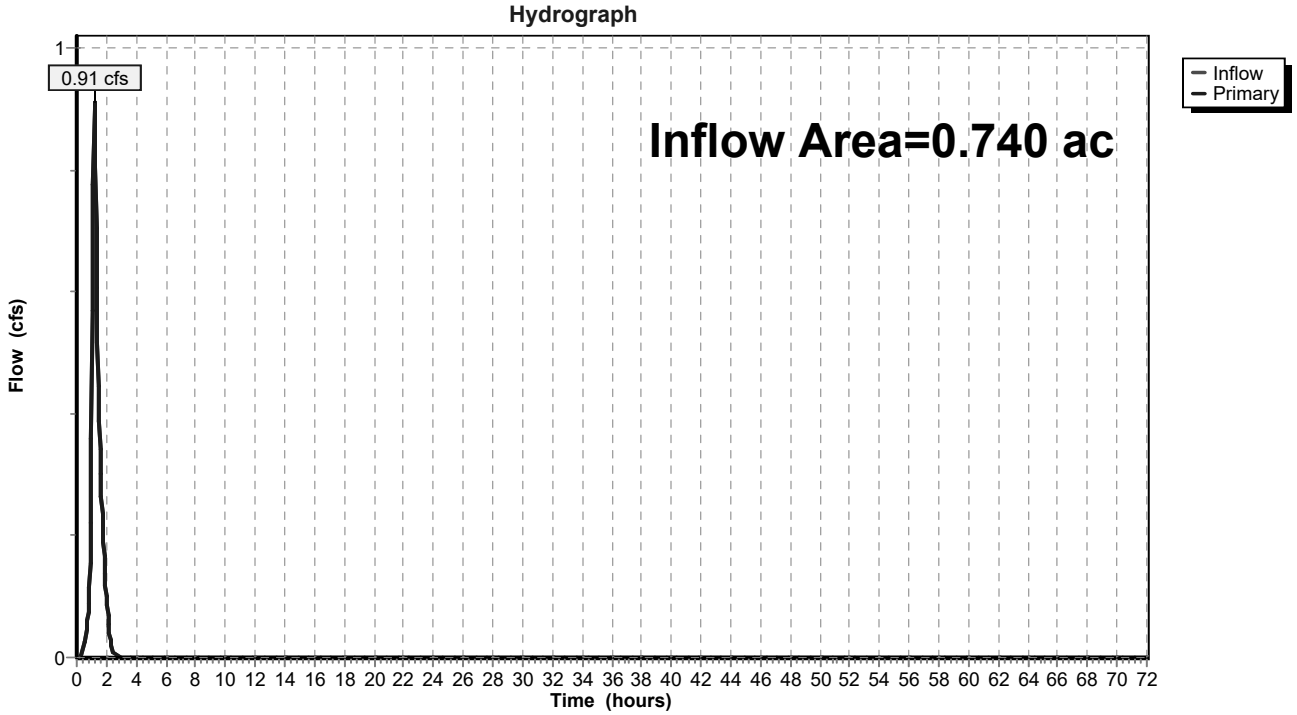


Summary for Link 5L: POA-3 OFF

Inflow Area = 0.740 ac, 66.22% Impervious, Inflow Depth = 0.69" for 1-WQ event
Inflow = 0.91 cfs @ 1.17 hrs, Volume= 0.042 af
Primary = 0.91 cfs @ 1.17 hrs, Volume= 0.042 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs

Link 5L: POA-3 OFF

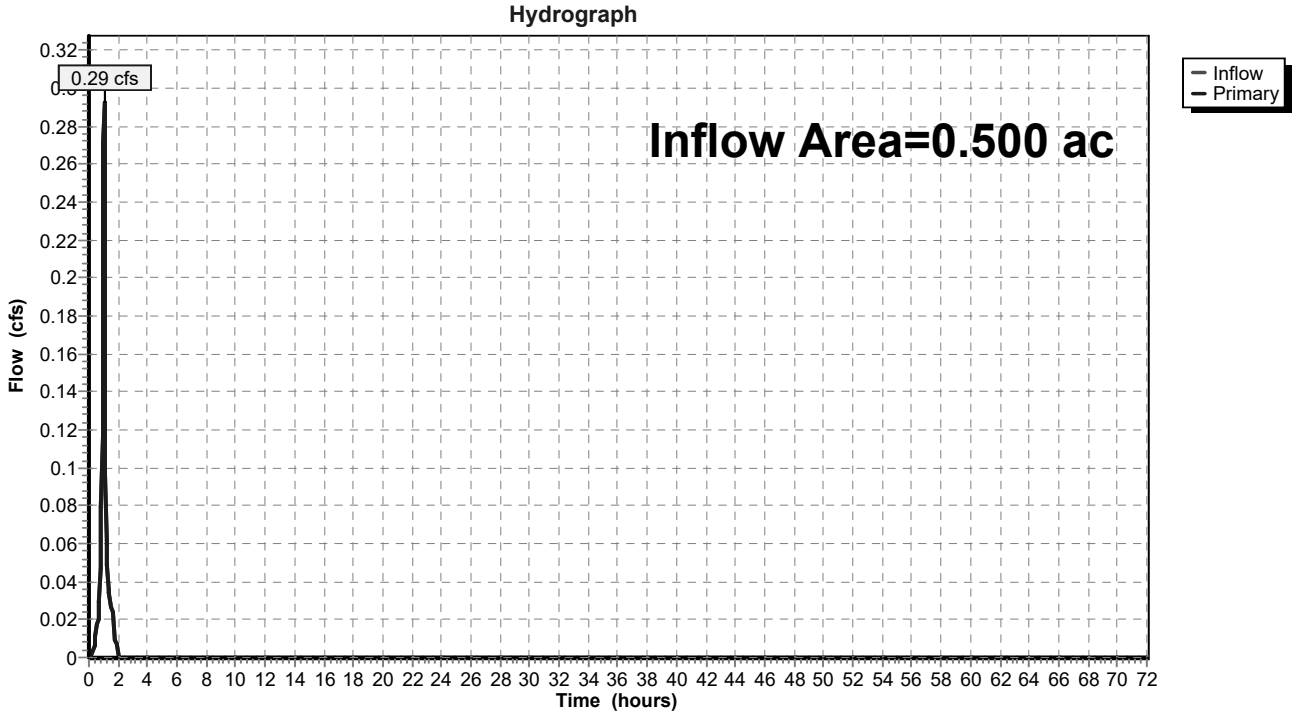


Summary for Link 6L: POA-4

Inflow Area = 0.500 ac, 18.00% Impervious, Inflow Depth = 0.19" for 1-WQ event
Inflow = 0.29 cfs @ 1.03 hrs, Volume= 0.008 af
Primary = 0.29 cfs @ 1.03 hrs, Volume= 0.008 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs

Link 6L: POA-4

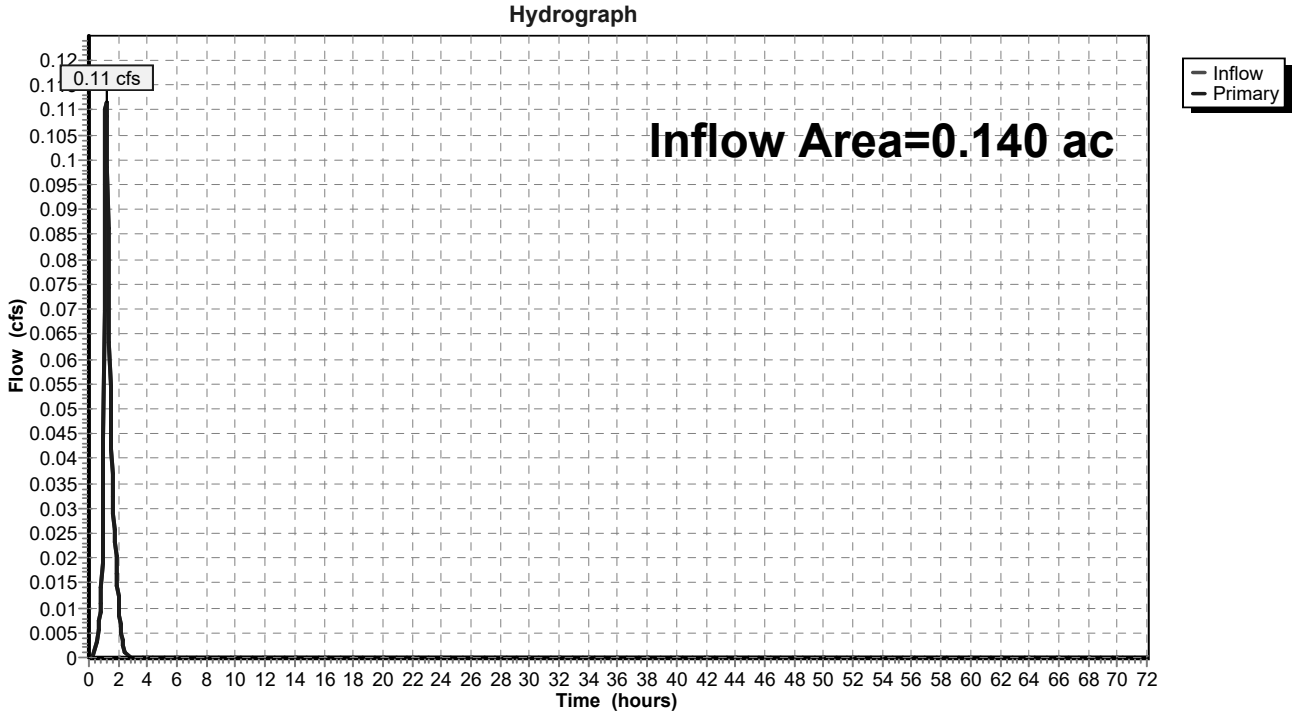


Summary for Link 7L: POA-4 OFF

Inflow Area = 0.140 ac, 42.86% Impervious, Inflow Depth = 0.44" for 1-WQ event
Inflow = 0.11 cfs @ 1.17 hrs, Volume= 0.005 af
Primary = 0.11 cfs @ 1.17 hrs, Volume= 0.005 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs

Link 7L: POA-4 OFF

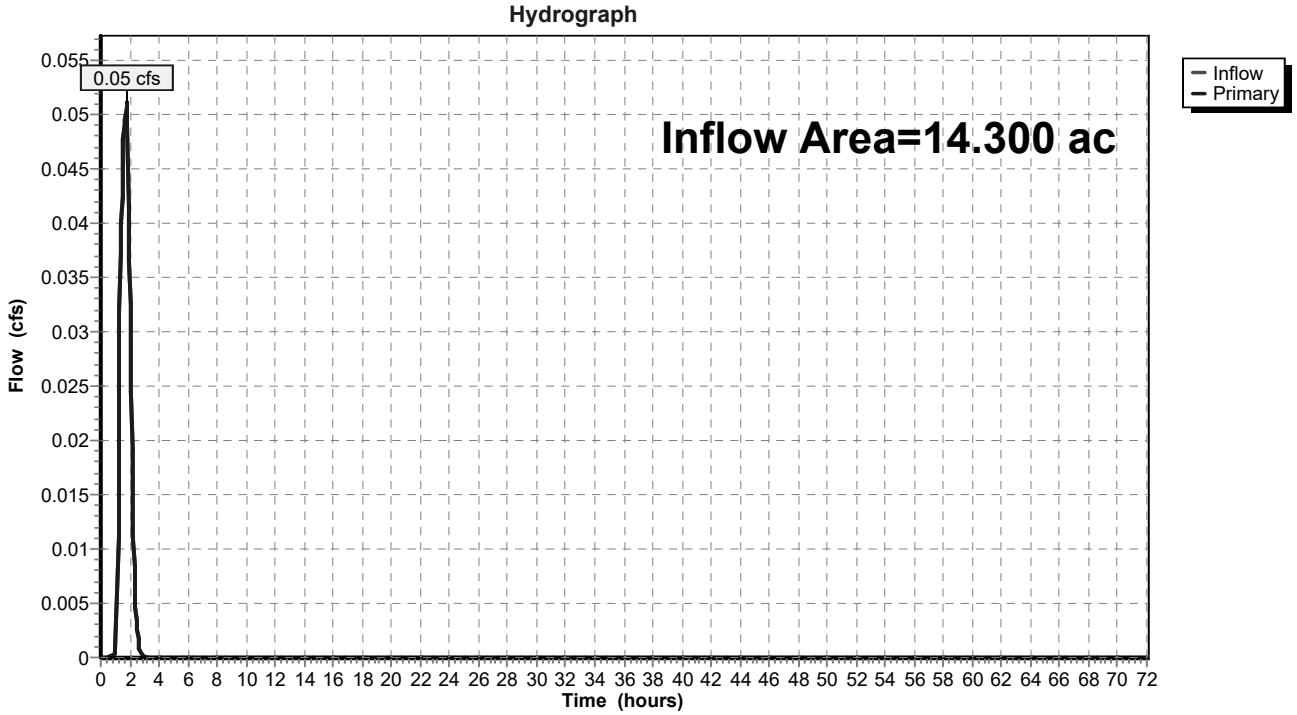


Summary for Link 8L: POA 1 total

Inflow Area = 14.300 ac, 46.29% Impervious, Inflow Depth = 0.00" for 1-WQ event
Inflow = 0.05 cfs @ 1.78 hrs, Volume= 0.003 af
Primary = 0.05 cfs @ 1.78 hrs, Volume= 0.003 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs

Link 8L: POA 1 total

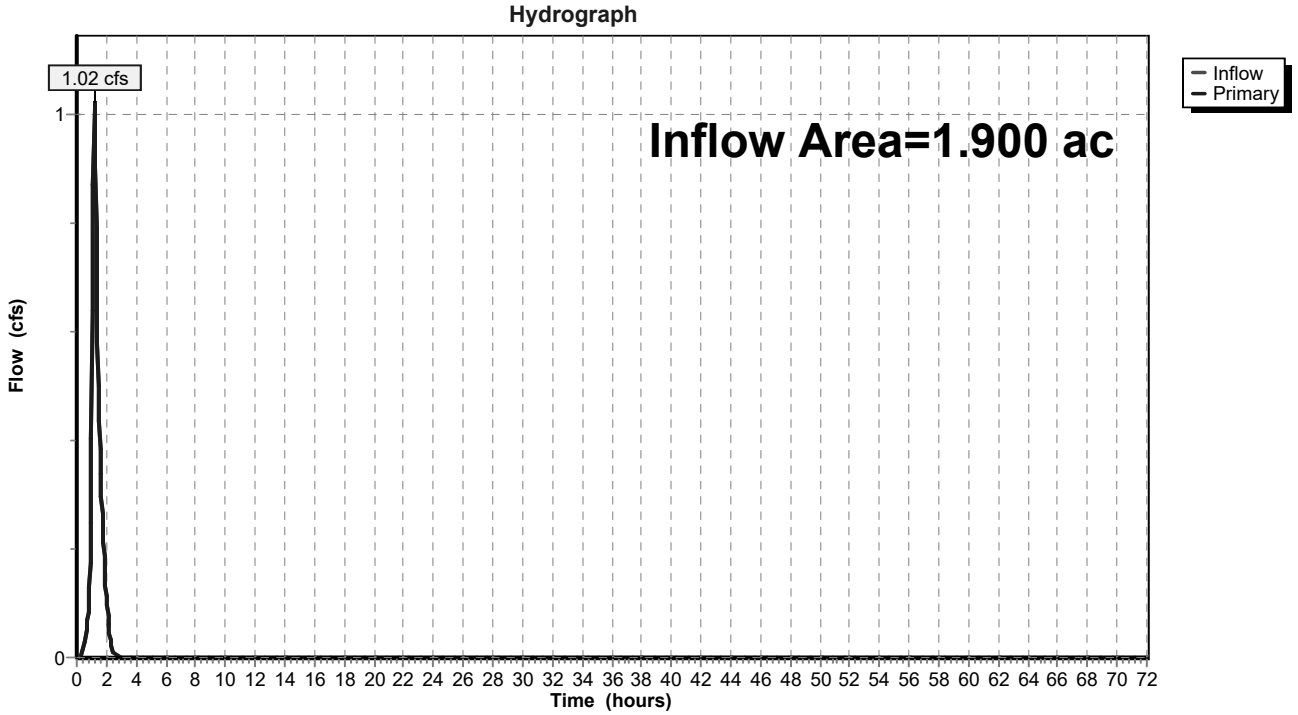


Summary for Link 9L: POA 3 total

Inflow Area = 1.900 ac, 28.95% Impervious, Inflow Depth = 0.30" for 1-WQ event
Inflow = 1.02 cfs @ 1.17 hrs, Volume= 0.047 af
Primary = 1.02 cfs @ 1.17 hrs, Volume= 0.047 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs

Link 9L: POA 3 total

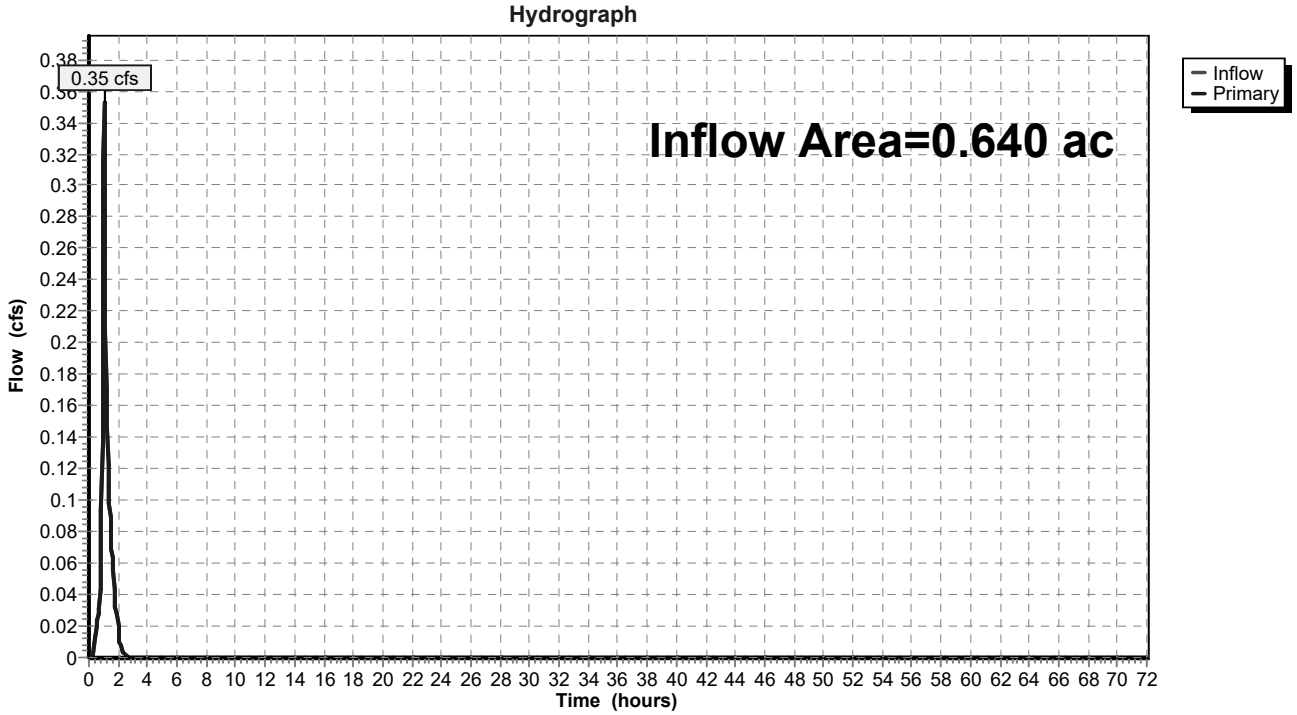


Summary for Link 10L: POA 4 total

Inflow Area = 0.640 ac, 23.44% Impervious, Inflow Depth = 0.24" for 1-WQ event
Inflow = 0.35 cfs @ 1.04 hrs, Volume= 0.013 af
Primary = 0.35 cfs @ 1.04 hrs, Volume= 0.013 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs

Link 10L: POA 4 total



APPENDIX D

CONDUIT OUTLET PROTECTION DESIGN
EMERGENCY SPILLWAY DESIGN
ON-SITE CONVEYANCE SYSTEM DESIGN
RECHARGE CALCULATIONS
DRAIN DOWN TIME

CONDUIT OUTLET PROTECTION DESIGN

MASER CONSULTING P.A.

Consulting, Municipal & Environmental Engineers
Planners ▪ Surveyors ▪ Landscape Architects

PROJECT- Old Trenton Road
NUMBER- 18001982A
BY- DSS
DATE- 10/29/2019

CONDUIT OUTLET PROTECTION CALCULATIONS

TAILWATER > 0.5 x Do

culvert width (in)

36 FES A-1

D_O =	3.00	
Q $_{(25)}$ =	34.16	CFS
TW =	1.69	
W_o=	3.00	(Width of culvert @ widest point)
q=	11.39	CFS/ft (Q/Wo)

LENGTH OF APRON

$$L_a = \frac{3 \times q}{D_o^{1/2}} = 19.72 \text{ FEET}$$

USE 20.0 FEET

WIDTH OF APRON

$$W = (3 \times Wo) + 0.4 \times La = 16.89 \text{ FEET}$$

USE 17.0 FEET

RIPRAP SIZE

$$D_{(50)} = \frac{0.02}{Tw} q \wedge 4/3 = 3.64 \text{ INCHES}$$

USE 4.0 INCHES

APRON THICKNESS

T = 2 x D (50) w/ FILTER FABRIC
= 0.67 FEET

T = 3 x D (50)
= 1.00 FEET

USE [X]

USE [ ]

RIP RAP QUANTITY

$$\text{VOLUME} = \frac{(1/2)(3Wo+W)(La)(T)}{27} =$$

6 CUBIC YARDS

0 CUBIC YARDS

MASER CONSULTING P.A.

Consulting, Municipal & Environmental Engineers
Planners ▪ Surveyors ▪ Landscape Architects

PROJECT- Old Trenton Road
NUMBER- 18001982A
BY- DSS
DATE- 10/29/2019

CONDUIT OUTLET PROTECTION CALCULATIONS

TAILWATER > 0.5 x Do

culvert width (in)

30 FES B-1

D_O =	2.50	
$Q_{(25)}$ =	12.32	CFS
TW =	2.25	
W_o=	2.50	(Width of culvert @ widest point)
q=	4.93	CFS/ft (Q/Wo)

LENGTH OF APRON

$$L_a = \frac{3 \times q}{D_o^{1/2}} = 9.35 \text{ FEET}$$

USE 10.0 FEET

WIDTH OF APRON

$$W = (3 \times Wo) + 0.4 \times La = 11.24 \text{ FEET}$$

USE 12.0 FEET

RIPRAP SIZE

$$D_{(50)} = \frac{0.02}{Tw} q \wedge 4/3 = 0.89 \text{ INCHES}$$

USE 4.0 INCHES

APRON THICKNESS

T = 2 x D (50) w/ FILTER FABRIC
= 0.67 FEET

USE [X]

T = 3 x D (50)
= 1.00 FEET

USE [ ]

RIP RAP QUANTITY

$$\text{VOLUME} = \frac{(1/2)(3Wo+W)(La)(T)}{27} =$$

2 CUBIC YARDS

0 CUBIC YARDS

MASER CONSULTING P.A.

Consulting, Municipal & Environmental Engineers
Planners ▪ Surveyors ▪ Landscape Architects

PROJECT- Old Trenton Road
NUMBER- 18001982A
BY- DSS
DATE- 10/29/2019

CONDUIT OUTLET PROTECTION CALCULATIONS

TAILWATER > 0.5 x Do

culvert width (in)

30 FES B-6

D_O =	2.50	
$Q_{(25)}$ =	3.81	CFS
TW =	2.25	
W_o=	2.50	(Width of culvert @ widest point)
q=	1.52	CFS/ft (Q/Wo)

LENGTH OF APRON

$$L_a = \frac{3 \times q}{D_o^{1/2}} = 2.89 \text{ FEET}$$

USE 3.0 FEET

WIDTH OF APRON

$$W = (3 \times Wo) + 0.4 \times La = 8.66 \text{ FEET}$$

USE 9.0 FEET

RIPRAP SIZE

$$D_{(50)} = \frac{0.02}{Tw} q \wedge 4/3 = 0.19 \text{ INCHES}$$

USE 4.0 INCHES

APRON THICKNESS

T = 2 x D (50) w/ FILTER FABRIC
= 0.67 FEET

USE [X]

T = 3 x D (50)
= 1.00 FEET

USE [ ]

RIP RAP QUANTITY

$$\text{VOLUME} = \frac{(1/2)(3Wo+W)(La)(T)}{27} =$$

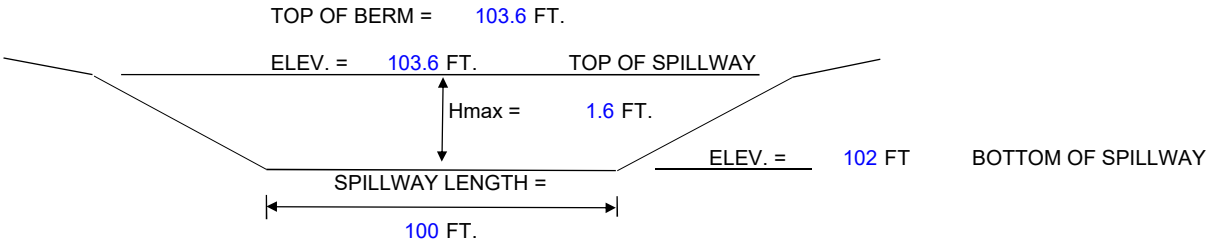
1 CUBIC YARDS

0 CUBIC YARDS

EMERGENCY SPILLWAY DESIGN

EMERGENCY SPILLWAY CALCULATIONS
BASIN A

POND 3



- **Spillway Capacity:**

Spillway calculation based on weir equation: Q = CLH**3/2

'C' = weir coefficient: Use 2.61

Qmax through spillway = 528.2

Spillway designed to pass 100 year flow

(inflow)	100 year flow =	28.8 CFS	HEADWATER DEPTH =	0.23 FT.
	100 year flow + 50 % =	43.1 CFS	HEADWATER DEPTH =	0.30 FT.

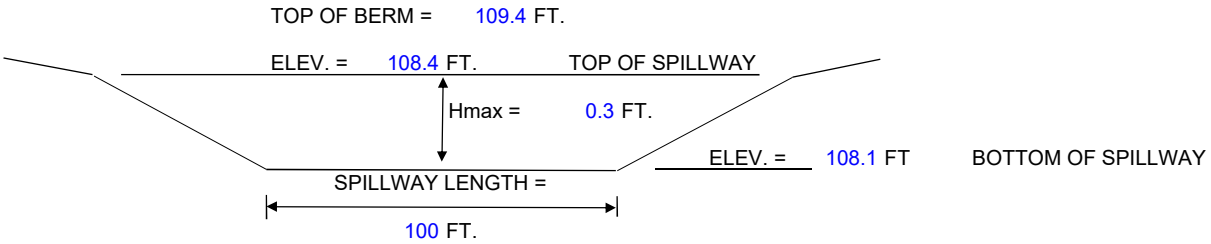
ALLOWABLE HEADWATER DEPTH = 1.6 FT. WHICH IS GREATER THAN REQUIRED THEREFORE WEIR HAS CAPACITY

FREEBOARD 100-YR = 1.37 FT.
FREEBOARD 100-YR+50% = 1.30 FT.

SINCE GREATER THAN OR EQUALS 1.0-FOOT FREEBOARD, IS OK

EMERGENCY SPILLWAY CALCULATIONS
BASIN B

POND 3



o **Spillway Capacity:**

Spillway calculation based on weir equation: Q = CLH**3/2

'C' = weir coefficient: Use 2.61

Qmax through spillway = 42.9

Spillway designed to pass 100 year flow

(inflow)	100 year flow =	18.7 CFS	HEADWATER DEPTH =	0.17 FT.
	100 year flow + 50 % =	28.1 CFS	HEADWATER DEPTH =	0.23 FT.

ALLOWABLE HEADWATER DEPTH = 0.3 FT. WHICH IS GREATER THAN REQUIRED THEREFORE WEIR HAS CAPACITY

FREEBOARD 100-YR = 1.13 FT.
FREEBOARD 100-YR+50% = 1.07 FT.

SINCE GREATER THAN OR EQUALS 1.0-FOOT FREEBOARD, IS OK

ON-SITE CONVEYANCE SYSTEM DESIGN

25 YEAR STORM
WINDSOR POINTE

Start Node	Stop Node	Label	Upstream Inlet Area (acres)	Upstream Inlet C	System CA (acres)	System Flow Time (min)	System Intensity (in/h)	Flow (cfs)	Invert (Start) (ft)	Invert (Stop) (ft)	Length (User Defined) (ft)	Slope (Calculated) (ft/ft)	Section Type	Diameter (in)	Darcy-Weisbach e (ft)	Velocity (ft/s)	Depth (Out) (ft)	Capacity (Full Flow) (cfs)	Flow / Capacity (Design) (%)	Depth (Normal) / Rise (%)	Capacity (Excess Design) (cfs)	Hydraulic Grade Line (In) (ft)	Hydraulic Grade Line (Out) (ft)	Elevation Ground (Start) (ft)	Elevation Ground (Stop) (ft)	Cover (Start) (ft)	Cover (Stop) (ft)
B-5	B-4	P-B-5	0.300	0.860	0.258	10.200	6.560	1.71	105.12	104.21	182.2	0.005	Circle	24.0	0.0001	4.33	2.82	22.46	7.6	18.3	20.75	107.04	107.04	109.80	108.25	2.68	2.04
A-8	A-7	P-A-8	(N/A)	(N/A)	0.000	0.421	8.358	3.50	102.08	101.49	116.4	0.005	Circle	18.0	0.0001	5.47	1.74	10.66	32.8	39.1	7.16	103.28	103.23	108.25	107.50	4.67	4.51
A-7	A-6	P-A-7	0.120	0.860	1.350	10.963	6.407	12.22	101.49	100.62	175.8	0.005	Circle	24.0	0.0001	7.33	1.82	22.38	54.6	52.4	10.16	102.75	102.44	107.50	106.00	4.01	3.38
A-23	A-7	P-A-23	0.810	0.860	1.247	10.669	6.466	8.13	101.96	101.49	93.2	0.005	Circle	24.0	0.0035	5.28	1.74	16.27	50.0	49.2	8.14	103.28	103.23	105.00	107.50	1.04	4.01
A-28	A-27	P-A-28	0.040	0.860	0.034	10.200	6.560	0.23	105.10	104.88	43.1	0.005	Circle	15.0	0.0001	2.57	0.52	6.62	3.4	12.5	6.39	105.40	105.40	108.10	108.83	1.75	2.70
A-27	A-26	P-A-27	0.170	0.860	0.181	10.479	6.504	1.18	104.88	104.10	157.3	0.005	Circle	15.0	0.0001	4.10	0.36	6.52	18.2	28.6	5.34	105.31	104.46	108.83	107.27	2.70	1.92
B-4	B-3	P-B-4	1.980	0.860	1.961	10.901	6.420	12.69	104.21	103.67	108.4	0.005	Circle	24.0	0.0001	4.04	3.06	22.59	56.2	53.3	9.90	106.91	106.73	108.25	108.77	2.04	3.10
B-3	B-2	P-B-3	(N/A)	(N/A)	1.961	11.348	6.330	12.51	103.67	103.09	115.2	0.005	Circle	24.0	0.0001	3.98	3.25	22.50	55.6	53.0	9.99	106.53	106.34	108.77	108.00	3.10	2.91
B-15	B-14	P-B-15	0.200	0.860	0.172	10.200	6.560	1.14	105.87	105.09	155.7	0.005	Circle	18.0	0.0001	4.00	1.44	10.59	10.7	21.8	9.45	106.52	106.53	109.00	108.40	1.63	1.81
B-13	B-9	P-B-13	0.520	0.860	0.834	10.975	6.405	5.39	104.90	104.65	49.0	0.005	Circle	18.0	0.0001	6.11	1.67	10.69	50.4	49.9	5.31	106.38	106.32	108.40	107.85	2.00	1.70
B-14	B-13	P-B-14	0.250	0.860	0.387	10.849	6.430	2.51	105.09	104.90	37.8	0.005	Circle	18.0	0.0001	4.99	1.60	10.61	23.6	32.7	8.11	106.51	106.50	108.40	108.40	1.81	2.00
B-2	B-1	P-B-2	(N/A)	(N/A)	1.961	11.830	6.234	12.32	103.09	103.00	11.9	0.008	Circle	30.0	0.0001	2.51	3.26	50.14	24.6	33.3	37.82	106.27	106.26	108.00	105.71	2.41	0.21
A-9	A-8	P-A-9	(N/A)	(N/A)	0.000	0.156	8.384	3.50	102.51	102.08	86.4	0.005	Circle	18.0	0.0001	5.43	1.27	10.56	33.2	39.3	7.06	103.28	103.35	109.20	108.25	5.19	4.67
B-12	B-9	P-B-12	0.170	0.860	0.146	10.200	6.560	0.97	104.85	104.65	38.0	0.005	Circle	18.0	0.0001	3.89	1.67	10.87	8.9	19.8	9.91	106.32	106.32	107.85	107.85	1.50	1.70
A-4	A-3	P-A-4	0.180	0.860	2.150	11.682	6.264	17.07	99.87	98.82	210.1	0.005	Circle	36.0	0.0001	7.88	2.78	64.98	26.3	34.5	47.91	101.54	101.60	107.40	104.00	4.53	2.18
A-5	A-4	P-A-5	0.430	0.860	1.995	11.558	6.288	16.15	100.17	99.87	58.5	0.005	Circle	24.0	0.0001	7.90	1.81	22.80	70.8	62.0	6.65	101.62	101.68	106.50	107.40	4.33	5.53
OCS B	A-9	P-A-10	(N/A)	(N/A)	0.000	0.000	7.900	3.50	102.75	102.51	50.0	0.005	Circle	18.0	0.0001	5.35	0.95	10.35	33.8	39.7	6.85	103.46	103.46	107.15	109.20	2.90	5.19
A-26	A-25	P-A-26	0.440	0.860	0.559	11.120	6.376	3.59	101.51	101.13	74.7	0.005	Circle	18.0	0.0001	5.51	1.54	10.68	33.7	39.6	7.08	102.70	102.67	107.27	107.15	4.26	4.52
A-25	A-17	P-A-25	0.340	0.860	0.851	11.346	6.331	5.43	101.13	100.20	186.3	0.005	Circle	18.0	0.0001	6.07	2.14	10.57	51.4	50.5	5.14	102.60	102.34	107.15	106.05	4.52	4.35
B-11	B-10	P-B-11	0.020	0.860	0.017	10.200	6.560	0.11	104.40	104.21	38.0	0.005	Circle	18.0	0.0001	0.06	2.07	10.58	1.1	7.2	10.47	106.28	106.28	107.40	107.40	1.50	1.69
A-6	A-5	P-A-6	0.320	0.860	1.625	11.363	6.327	13.87	100.62	100.17	89.1	0.005	Circle	24.0	0.0001	7.60	1.79	22.62	61.3	56.4	8.75	101.96	101.96	106.00	106.50	3.38	4.33
B-7	B-6	P-B-7	(N/A)	(N/A)	1.075	35.650	3.517	3.81	103.08	103.00	15.4	0.005	Circle	30.0	0.0001	0.78	3.26	41.11	9.3	20.2	37.30	106.26	106.26	110.05	105.71	4.47	0.21
A-24	A-23	P-A-24	0.640	0.860	0.550	10.200	6.560	3.64	102.58	101.96	122.6	0.005	Circle	18.0	0.0035	4.35	1.44	7.62	47.8	47.9	3.98	103.47	103.40	105.80	105.00	1.72	1.54
A-16	A-15	P-A-16	0.060	0.860	0.052	10.200	6.560	0.34	101.58	101.11	94.0	0.005	Circle	15.0	0.0001	2.88	0.97	6.55	5.2	15.3	6.21	102.08	102.08	105.50	104.70	2.67	2.34
A-20	A-19	P-A-20	0.140	0.860	0.645	11.156	6.369	4.14	100.84	100.55	57.5	0.005	Circle	15.0	0.0001	3.37	1.99	6.58	62.9	57.3	2.44	102.66	102.54	104.20	105.30	2.11	3.50
A-19	A-18	P-A-19	(N/A)	(N/A)	0.645	11.440	6.312	4.10	100.55	100.40	29.6	0.005	Circle	18.0	0.0001	2.32	2.06	10.66	38.5	42.7	6.55	102.49	102.46	105.30	104.30	3.25	2.40
A-17	A-15	P-A-17	0.320	0.860	1.918	11.888	6.222	12.03	100.20	99.86	67.9	0.005	Circle	24.0	0.0001	7.33	2.22	22.52	53.4	51.7	10.49	102.18	102.08	106.05	104.70	3.85	2.84
A-15	A-14	P-A-15	0.100	0.860	2.055	12.042	6.192	12.83	99.86	99.67	37.7	0.005	Circle	30.0	0.0001	7.42	2.31	40.52	31.7	38.3	27.69	101.99	101.99	104.70	104.00	2.34	1.83
A-13	A-12	P-A-13	0.080	0.860	0.069	10.200	6.560	0.45	101.17	100.77	79.6	0.005	Circle	15.0	0.0001	3.14	1.12	6.57	6.9	17.6	6.11	101.89	101.89	104.70	104.90	2.28	2.88
A-3	A-2	P-A-3	0.570	0.860	2.640	12.126	6.175	19.93	98.82	98.19	126.9	0.005	Circle	36.0	0.0001	8.19	3.28	64.76	30.8	37.7	44.83	101.52	101.47	104.00	104.24	2.18	3.05
A-11	A-2	P-A-11	0.110	0.860	2.485	12.392	6.122	15.34	99.06	98.19	175.6	0.005	Circle	30.0	0.0001	3.12	3.28	40.17	38.2	42.5	24.83	101.61	101.47	102.86	104.24	1.30	3.55
A-2	A-1	P-A-2	(N/A)	(N/A)	5.126	13.329	5.934	34.16	98.19	98.10	17.8	0.005	Circle	36.0	0.0001	4.83	3.09	65.33	52.3	51.0	31.17	101.22	101.19	104.24	103.00	3.05	1.90
A-22	A-21	P-A-22	0.440	0.860	0.378	10.200	6.560	2.50	101.50	101.01	92.5	0.005	Circle	15.0	0.0001	2.04	1.88	6.76	37.0	41.8	4.25	102.96	102.89	104.20	104.20	1.45	1.94
A-21	A-20	P-A-21	0.170	0.860	0.525	10.956	6.409	3.39	101.01	100.84	33.2	0.005	Circle	15.0	0.0001	2.76	1.91	6.64	51.1	50.3	3.25	102.79	102.75	104.20	104.20	1.94	2.11
A-14	A-12	P-A-14	0.250	0.860	2.270	12.127	6.175	14.13	99.67	99.52	30.2	0.005	Circle	30.0	0.0001	7.57	2.37	40.19	35.2	40.6	26.06	101.90	101.89	104.00	104.90	1.83	2.88
A-18	A-17	P-A-18	0.170	0.860	0.791	11.652	6.270	5.00	100.40	100.20	39.9	0.005	Circle	18.0	0.0001	2.83	2.14	10.59	47.2	48.0	5.59	102.39	102.34	104.30	106.05	2.40	4.35
A-12	A-11	P-A-12	0.060	0.860	2.391	12.193	6.161	14.85	99.52	99.06	91.8	0.005	Circle	30.0	0.0001	7.69	2.67	40.41	36.7	41.6	25.56	101.78	101.73	104.90	102.86	2.88	1.30
B-10	B-8	P-B-10	0.020	0.860	0.034	20.041	4.696	0.16	104.21	103.84	75.0	0.005	Circle	18.0	0.0001	0.09	2.44	10.50	1.6	8.5	10.34	106.28	106.28	107.40	108.24	1.69	2.90
B-9	B-8	P-B-9	0.040	0.860	1.015	11.109	6.378	6.52	103.73	103.57	32.0	0.005	Circle	30.0	0.0001	1.33	2.71	40.36	16.2	26.8	33.83	106.29	106.28	107.85	108.24	1.62	2.17
B-8	B-7	P-B-8	0.030	0.860	1.075	33.606	3.620	3.92	103.57	103.08	98.0	0.005	Circle	30.0	0.0000	0.80	3.19	43.10	9.1	20.1	39.18	106.27	106.27	108.24	110.05	2.17	4.47

R:\General\Projects\2018\18001982A\Reports\Drainage\190325 - design\2019_10_24_Storm CAD Analysis.stsw

FES C-1

SunCam, Inc.
Fleming Island, Florida 32003
www.suncam.com
800-735-4449 or 904-215-9345

Manning-Pipe

v 1.0.1

Input what you know into the "Inputs" column. No more than one entry in each of 10 color blocks.

Gravity Flow in Pipes

Variable		Inputs	Solution #1	Solution #2	Units
Q	Quantity of Flow	2.5	2.5		Cubic Foot/Sec
			1122.077938		Gallons/Minute [US]
			1.615792224		MGD (Million gal/day) [US]
			0.070792118		Cubic Meters/Sec
			254851.623		Liters/Hour
			4247.52705		Liters/Minute
			70.7921175		Liters/Second
			6.116438952		MLD (Million Liters/day)
			934.3253323		Gallons/Minute [UK]
			1.345428479		MGD (Million Gal/day) [UK]
V	Velocity of flow		4.873770896		Foot/Sec
			1.485525369		Meters/Sec
n	Roughness coefficient	0.013	0.013		No Units
S	Hydraulic Gradient		0.01		Feet/Foot or Meter/Meter
		1.00%	1.00%		% Slope*
R	Hydraulic Radius (a/p)		0.278409775		Feet
			0.084860331		Meters
d	Pipe Diameter	18	18		Inches
			457.2009144		Millimeters
%	% Full		33.21%		% Full*
h	Depth of Flow		5.97708		Inches
			151.8181356		Millimeters
a	Area of Flow		0.51294984		Square Feet
			0.047654203		Square Meters
p	Wetted Perimeter		1.842427549		Feet
			0.561578746		Meters

Complete Results!

A second solution will display when % full is at or above 81.96%

Project Name	Windor Pointe
Proj. #	18001982a
By	LBB
Notes	

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11:18:55 AM
10/30/2019

NOTE: All data is for round pipe. Entrance and exit losses are ignored.

RECHARGE CALCULATIONS

New Jersey Groundwater Recharge Spreadsheet
Version 2.0
November 2003

Annual Groundwater Recharge Analysis (based on GSR-32)

Select Township ↓	Average Annual P (in)	Climatic Factor
MERCER CO., EAST WINDSOR TWP	44.9	1.43

Project Name:	Windsor Pointe
Description:	
Analysis Date:	10/30/19

Pre-Developed Conditions

Land Segment	Area (acres)	TR-55 Land Cover	Soil	Annual Recharge (in)	Annual Recharge (cu.ft)
1	4.71	Row Crop	Mattapex	7.9	135,207
2	9	Row Crop	Sassafras	11.6	379,475
3	0.496	Impervious areas	Sassafras	0.0	-
4	0.028	Open space	Sassafras	13.2	1,343
5	0				
6	0				
7	0				
8	0				
9	0				
10	0				
11	0				
12	0				
13	0				
14	0				
15	0				
Total =	14.2			Total Annual Recharge (in)	Total Annual Recharge (cu-ft)
				10.0	516,025

Post-Developed Conditions

Land Segment	Area (acres)	TR-55 Land Cover	Soil	Annual Recharge (in)	Annual Recharge (cu.ft)
1	6.058	Impervious areas	Keyport	0.0	-
2	1.612	Open space	Mattapex	10.4	61,104
3	6.516	Open space	Sassafras	13.2	312,559
4	0				
5	0				
6	0				
7	0				
8	0				
9	0				
10	0				
11	0				
12	0				
13	0				
14	0				
15	0				
Total =	14.2	Warning: make total area equal to Pre-Developed Condition		Total Annual Recharge (in)	Total Annual Recharge (cu.ft)
				7.2	373,663

Annual Recharge Requirements Calculation ↓

% of Pre-Developed Annual Recharge to Preserve =	100%	Total Impervious Area (sq.ft)	263,886
Post-Development Annual Recharge Deficit=	***142,363***	(cubic feet)	

Recharge Efficiency Parameters Calculations (area averages)

RWC=	4.53	(in)	DRWC=	3.61	(in)
ERWC =	1.29	(in)	EDRWC=	1.03	(in)

Procedure to fill the Pre-Development and Post-Development Conditions Tables

For each land segment, first enter the area, then select TR-55 Land Cover, then select Soil. Start from the top of the table and proceed downward. Don't leave blank rows (with A=0) in between your segment entries. Rows with A=0 will not be displayed or used in calculations. For impervious areas outside of standard lots select "Impervious Areas" as the Land Cover. Soil type for impervious areas are only required if an infiltration facility will be built within these areas.

Project Name	Description	Analysis Date	BMP or LID Type
Windsor Pointe	0	10/30/19	

Recharge BMP Input Parameters

Parameter	Symbol	Value	Unit
BMP Area	ABMP	8995.0	sq.ft
BMP Effective Depth, this is the design variable	dBMP	11.8	in
Upper level of the BMP surface (negative if above ground)	dBMPu	11.8	in
Depth of lower surface of BMP, must be>=dBMPu	dEXC	0.0	in
Post-development Land Segment Location of BMP , Input Zero if Location is distributed or undetermined	SegBMP	3	unitless

Root Zone Water capacity Calculated Parameters

Parameter	Symbol	Value	Unit
Empty Portion of RWC under Post-D Natural Recharge	ERWC	1.60	in
ERWC Modified to consider dEXC	EDRWC	1.36	in
Empty Portion of RWC under Infilt. BMP	RERWC	1.10	in

Recharge Design Parameters

Parameter	Symbol	Value	Unit
Inches of Runoff to capture	Qdesign	1.31	in
Inches of Rainfall to capture	Pdesign	1.53	in
Recharge Provided Avg. over Imp. Area		23.5	in
Runoff Captured Avg. over imp. Area		32.1	in

BMP Calculated Size Parameters

ABMP/Aimp	Aratio	0.11	unitless
BMP Volume	VBMP	8,815	cu.ft

CALCULATION CHECK MESSAGES

Volume Balance-> **Solve Problem to satisfy Annual Recharge**
dBMP Check---> **dBMP must be<=dEXC-dBMPu, adjust parameters**
dEXC Check---> **make dEXC larger than dBMPu**

BMP Location---> **OK**

Parameters from Annual Recharge Worksheet

Post-D Deficit Recharge (or desired recharge volume)	Vdef	142,363	cu.ft
Post-D Impervious Area (or target Impervious Area)	Aimp	83,150	sq.ft
Root Zone Water Capacity	RWC	5.60	in
RWC Modified to consider dEXC	DRWC	4.78	in
Climatic Factor	C-factor	1.43	no units
Average Annual P	Pavg	44.9	in
Recharge Requirement over Imp. Area	dr	6.5	in

System Performance Calculated Parameters

Annual BMP Recharge Volume		162,647	cu.ft
Avg BMP Recharge Efficiency		73.2%	Represents % Infiltration Recharged
%Rainfall became Runoff		77.7%	%
%Runoff Infiltrated		91.9%	%
%Runoff Recharged		21.2%	%
%Rainfall Recharged		16.5%	%

OTHER NOTES

Pdesign is accurate only after BMP dimensions are updated to make rech volume= deficit volume. The portion of BMP infiltration prior to filling and the area occupied by BMP are ignored in these calculations. Results are sensetive to dBMP, make sure dBMP selected is small enough for BMP to empty in less than 3 days. For land Segment Location of BMP if you select "impervious areas" RWC will be minimal but not zero as determined by the soil type and a shallow root zone for this Land Cover allowing consideration of lateral flow and other losses.

How to solve for different recharge volumes: By default the spreadsheet assigns the values of total deficit recharge volume "Vdef" and total proposed impervious area "Aimp" from the "Annual Recharge" sheet to "Vdef" and "Aimp" on this page. This allows solution for a single BMP to handle the entire recharge requirement assuming the runoff from entire impervious area is available to the BMP.
To solve for a smaller BMP or a LID-IMP to recharge only part of the recharge requirement, set Vdef to your target value and Aimp to impervious area directly connected to your infiltration facility and then solve for ABMP or dBMP. To go back to the default configuration clik the "Default Vdef & Aimp" button.

DRAIN DOWN TIME

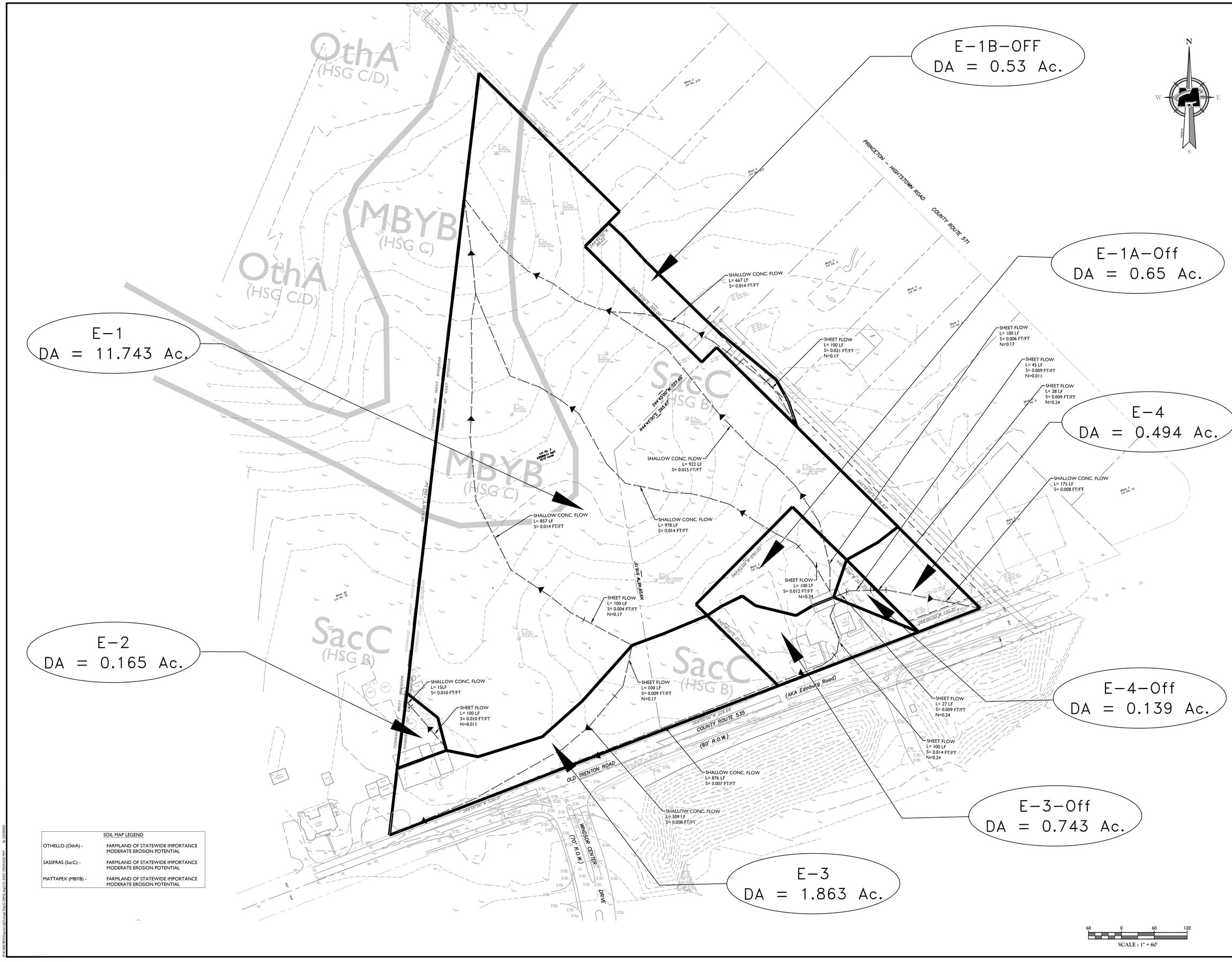
Draining Time Calculations for
Avalon Old Bridge
MC Project No. 000160H
March 2017

Basin Drain Down Time Calculations

Recharge Structure	Bottom Surface Area, A (sf)	K (in/hr)	K (ft/sec)	Factor of Safety	K used (ft/sec)	I	Q = KIA (cfs)	Storage Volume (cf)	Draining Time (hrs)
Basin B	8,995	1.6	0.000037	2	0.000019	1.00	0.166574074	22723.00	37.89

APPENDIX F

DRAINAGE AREA MAPS



SOIL MAP LEGEND	
OTHELLO (OthA) -	FARMLAND OF STATEWIDE IMPORTANCE MODERATE EROSION POTENTIAL
SASSFRAS (SacC) -	FARMLAND OF STATEWIDE IMPORTANCE MODERATE EROSION POTENTIAL
MATTAPEX (MBYB) -	FARMLAND OF STATEWIDE IMPORTANCE MODERATE EROSION POTENTIAL

2018-10-30 18:14 J:\Engineering\Drainage Maps\C-DRNG\ Map\C-01 EXIST. DRAINAGE MAP By: DSS

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REV	DATE	DRAWN BY	DESCRIPTION

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MAJOR
SITE PLAN
FOR
WINDSOR POINTE

BLOCK 3
LOTS 3 AND 3.02
TOWNSHIP OF EAST WINDSOR
MERCER COUNTY
NEW JERSEY

RED BANK OFFICE
Corporate Headquarters
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Phone: 732.383.1950
Fax: 732.383.1984

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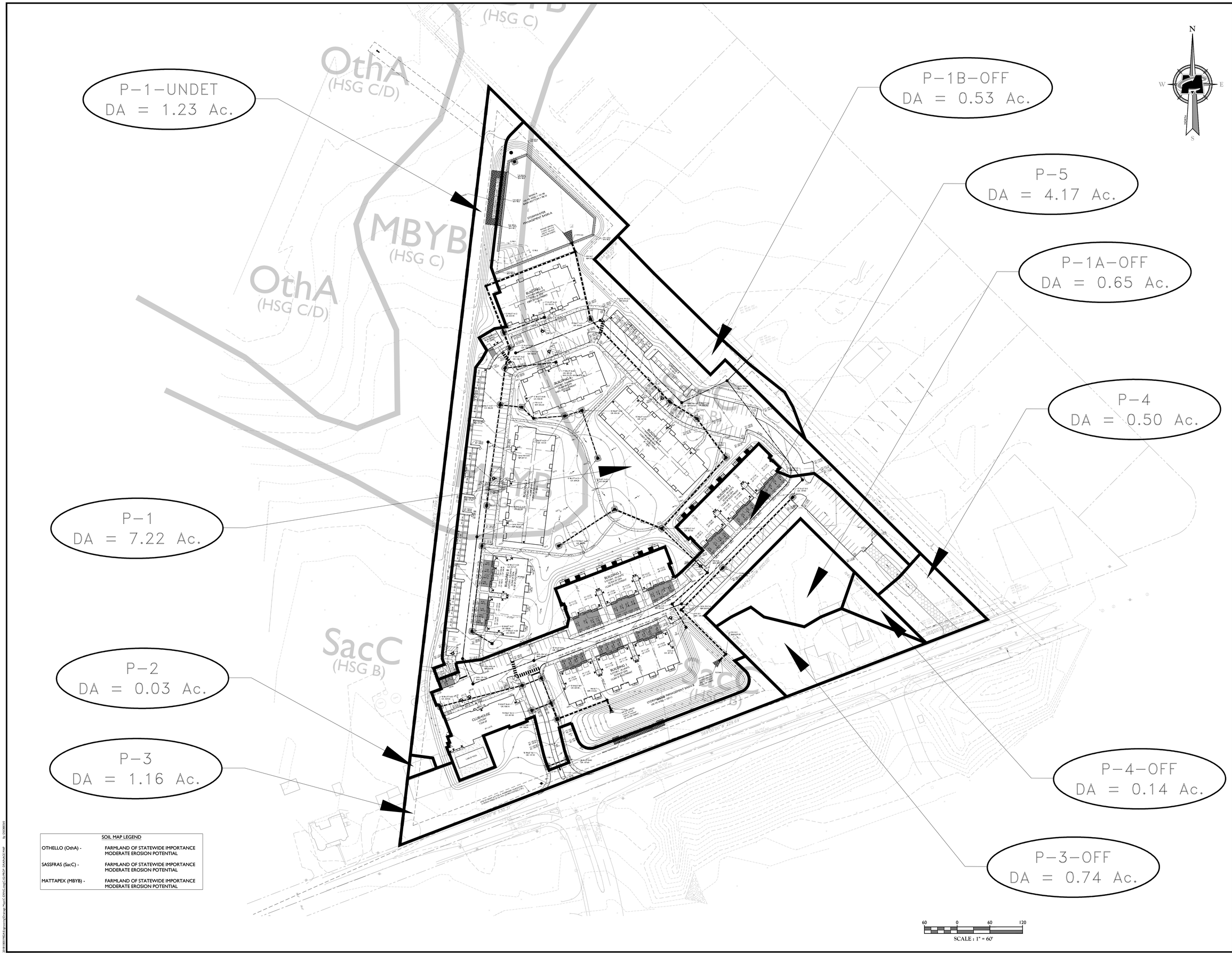
PROJECT NUMBER:	DRAWING NAME:
18001980A	C-DRNG

SHEET TITLE:
EXISTING
DRAINAGE AREA MAP

SHEET NUMBER:
1 of 3



SOIL MAP LEGEND	
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PROJECT NUMBER: 18001982A		DRAWING NAME: C-DRNG	

SHEET TITLE:
PROPOSED
DRAINAGE AREA MAP

SHEET NUMBER:
2 of 3

SOIL MAP LEGEND	
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180019182A	C-DRNG		

SHEET TITLE:
INLET
DRAINAGE AREA MAP

SHEET NUMBER:
3 of 3

2018-00019182A-Engineering\Drawings\Plans\C-DRNG\SacC-SOILMAP, DRAINAGE AREA By: DSS08/2019