Engineers Planners Surveyors Landscape Architects Environmental Scientists

MASER CONSULTING P. A.

Stormwater Management & Mitigation Report

All American Assisted Living of Tinton Falls

Block 124.63, Lot 30.01
Borough of Tinton Falls, Monmouth County, New Jersey

April 2020
Revised July 2020

Prepared For

Senior Housing Development, LLC.
100 Jericho Quadrangle, Suite 142
Jericho, NY 11753

Prepared By

Maser Consulting P.A.
Corporate Headquarters
331 Newman Springs Road, Suite 203
Red Bank, NJ 07701
732.383.1950
Certificate of Authorization: 24GA27986500

Mark Lescavage, P.E.
N.J. Professional Engineer License No. 40346

MC Project No. 18006673A

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INTRODUCTION

This stormwater management report is being submitted as part of the site plan application known as Senior Housing Project, LLC located on Lot 30.01, Block 124.63, as shown on Sheet 60 of the Official Tax Map of the Borough of Tinton Falls, Monmouth County, New Jersey. The applicant proposes to construct a 112 bed senior living facility with parking areas, utilities, underground stormwater management facilities, site lighting, landscaping and typical site appurtenant improvements.

This report is prepared in accordance with the Borough of Tinton Falls, New Jersey Department of Environmental Protection (NJDEP) and current industry standards and practices for stormwater management. The purpose of this report is to summarize the stormwater management design as it pertains to the stormwater rules and to provide calculations to support the design. The stormwater management measures proposed for this site are designed to meet erosion control, stormwater runoff quantity, and stormwater quality standards as set forth by N.J.A.C 7:8.

LOCATION & EXISTING CONDITIONS OF SITE

The subject property, consisting of approximately 12.39 acres is located in the Borough of Tinton Falls, Monmouth County, New Jersey and is referred to as Block 124.63 Lot 30.01. The subject property has frontage on West Park Avenue to the North. It is bound by commercial uses to the North and West and residential uses to the South and East. The site generally slopes towards the Southeast. The site is currently wooded and vacant and does not contain any existing stormwater management facilities. An aerial map, which shows the general property location in relation to surrounding roadways is included in the Appendix A.

SOIL CHARACTERISTICS

The existing soil classifications for the site are based on the USDA NRCS Web Soil Survey. The survey is useful at the planning level to draw general conclusions about the suitability of a site for certain land uses. Based on the website data, the site consists of the following soil types:

SOIL NAME	HYDROLOGIC GROUP
AtsAO– Atsion sand, 0 to 2% slopes	A/D
PHG – Pits, sand and gravel, 2 to 5% slopes	-

The dual hydrological soil groups have been modeled as HSG D soils consistent with the guidance of the NRCS NEH. A majority of the subject site including the area classified as pits, sands, and gravel displayed low surface penetration and has been classified as an existing HSG D soil within this report and modeling. Test pits were performed on site to determine the seasonal high-water table and tube permeameter tests were performed to determine the permeability of the underlying soils. The seasonal high-water table was encountered at depths between 14 to 37 feet below existing grades. Tube permeameter tests varied between 0.00 to 18.01 in/hr.

WETLANDS

Freshwater wetlands are present on the subject property. A wetlands complex is located to the East and South of the proposed development and is classified as intermediate resource value with a fifty-foot transition area. An additional isolated wetland is located along the western property boundary where there are proposed improvements. The proposed development will require NJDEP General Permits 6 & 11 and a transition area waiver for all disturbance located within the wetlands and wetland transition areas. An application for a wetland letter of interpretation (LOI) has been submitted and is currently pending.

FLOOD PLAINS AND RIPARIAN ZONES

Based on the Flood Insurance Rate Map for Monmouth County, New Jersey (All Jurisdictions), Panel Number 189 of 457, Map Number 34025C0189F, Effective Date September 20, 2009, the subject property is located within Zone X and does not lie within a flood hazard area. A partial flood hazard area verification (File no. 1336-02-0014.1 LUP200001) was obtained on June 11, 2020 confirming there is no flood hazard area, floodway or riparian zone within the limit of flood hazard area verification.

COMPLIANCE STATEMENT

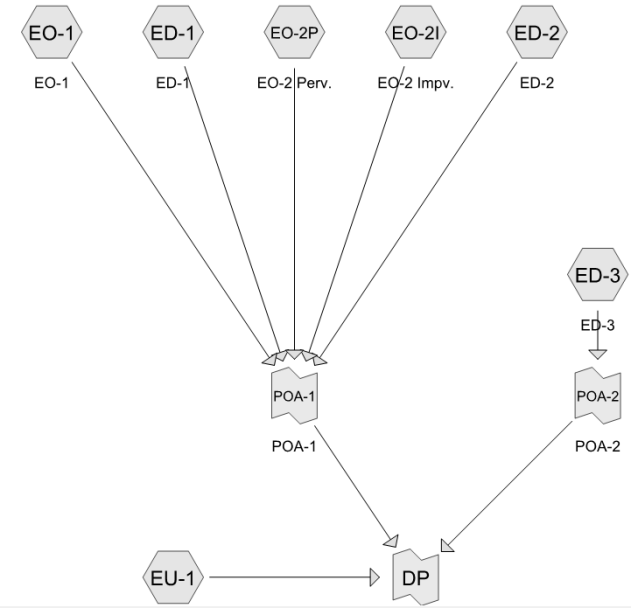
This project is designed in accordance with N.J.A.C. 7:8 and compliance according to these requirements is explained in detail in the remainder of this report and verified with calculations as appropriate in the Appendix.

STORMWATER MANAGEMENT METHODOLOGY

The stormwater runoff resulting from the proposed development must be managed both qualitatively and quantitatively in accordance with the NJDEP requirements.

To evaluate the proposed site for compliance with the above standards, the Delmarva Unit Hydrograph method and the HydroCAD v10.10-3a hydrologic/hydraulic model from HydroCAD Software Solutions were utilized. Times of concentrations were calculated for all drainage areas and are shown on the drainage area maps and included in the HydroCAD output. A minimum time of concentrations of 6 minutes was utilized for design purposes.

EXISTING CONDITIONS NETWORK DIAGRAM



EXISTING CONDITIONS

Under existing conditions runoff flows to two different points of analysis. The points of analysis and their tributary drainage areas are described below:

POA 1 – POA 1 is located to the Southeast of the proposed improvements. The majority of the proposed improvement area and upstream off-site runoff drains to this point. Beyond the improvement area, the site drains to a broad swale which is tributary to an inlet located in the Southeast portion of the property near the adjacent residential uses. This inlet is connected to an existing stormwater conveyance system that discharges into an existing retention pond.

POA 2 – POA 2 is located East of the proposed improvements. This area drains to a broad swale to the South which is tributary to an existing inlet located Southeast of the property near the adjacent residential uses. This inlet is connected to an existing stormwater conveyance system that discharges into an existing retention pond.

ED-1 – On-site wooded area that discharges towards POA-1 and travels via a broad swale to an existing off-site storm sewer to the Southeast of the property boundary.

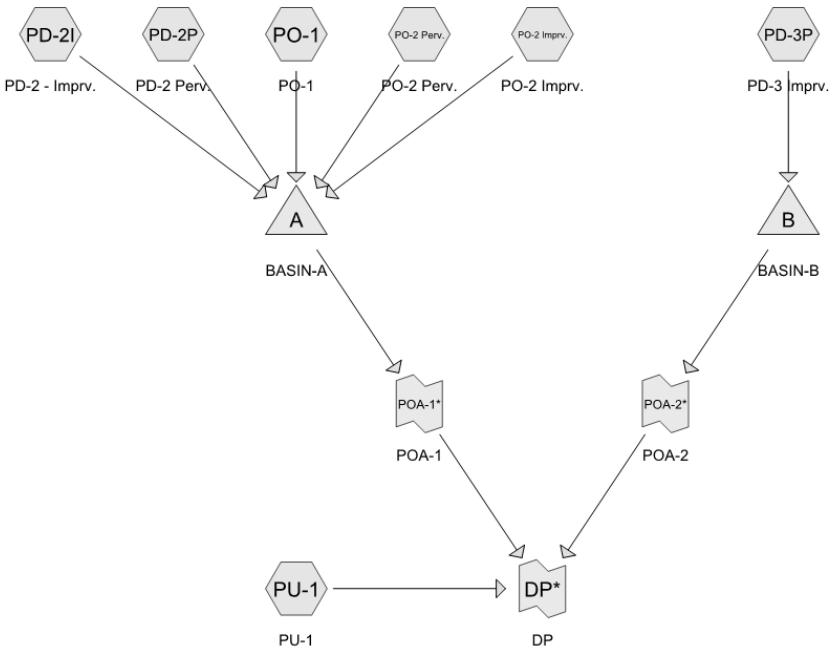
EO-1 – Off-site wooded area which flows towards the site from the West then joining at POA -1 and flows via a broad swale to an existing off-site storm sewer to the Southeast of the property boundary.

ED-2 – On-site wooded area that reaches POA-1 and flows via a broad swale to an existing off-site storm sewer to the Southeast of the property boundary.

EO-2. – Off-site area consisting of grasses, and parking areas draining to an existing Type-B inlet located within the adjacent property to the West, discharging via a 15" RCP pipe and flared end section to the West property boundary of the project site. This flow then joins at POA -1 flows via a broad swale to an existing off-site storm sewer to the Southeast of the property boundary.

ED-3 – On-site area consisting of wooded areas along the North of the disturbed project area that discharges towards POA-2 and travels via a broad swale to an existing off-site storm sewer to the Southeast of the property boundary.

PROPOSED CONDITIONS STORMWATER MANAGEMENT NETWORK DIAGRAM



PROPOSED CONDITIONS

Under proposed conditions a portion of roof runoff from the proposed building (approximately 8,000 SF) as well as the entirety of parking, driveways, and landscaped areas will be managed by proposed Basin A. The remaining roof area will be managed by proposed Basin B. Both basins have been designed as detention basins to comply with both water quality and quantity requirements.

PO-1 Off-site wooded area which flows towards the site from the West and is captured by the proposed on-site stormwater conveyance system and detained by Basin A. Basin A then discharges to POA-1 which then flows via a broad swale to an existing off-site storm sewer to the Southeast of the property boundary.

PD-2 – On-site area containing the proposed senior facility, parking/driveways and associated site improvements. This area will be collected by storm sewers and conveyed to Basin A. Basin A then

discharges to POA-1 which then flows via a broad swale to an existing off-site storm sewer to the Southeast of the property boundary.

PO-2. – Off-site area consisting of grasses, and parking areas draining to an existing Type-B inlet located within the adjacent property to the West. This area discharges via a 15" RCP pipe and flared end section to the West property boundary of the project site. This water is collected via the on-site stormwater conveyance system and propagates toward Basin A. Basin A then discharges to POA-1 which then flows via a broad swale to an existing off-site storm sewer to the Southeast of the property boundary.

PD-3 – On-site area consisting of approximately 21,000 SF of remaining roof area which is collected via a roof drain collection system and discharges into Basin B. Basin B then discharges to POA -2 which then flows via a broad swale to an existing off-site storm sewer to the Southeast of the property boundary.

Under proposed conditions the new impervious coverage of the site will total 1.70 acres.

WATER QUANTITY

Water quantity requirements have been analyzed independently for both POA 1 and POA 2.

To meet the NJDEP water quantity impact standards, it can be demonstrated that for stormwater leaving the site at POA-1 & POA-2, 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.

To calculate the allowable outflow from the proposed site, the existing peak flows to each POA are summarized in the following table. Required runoff reductions have been applied to proposed on-site disturbed areas. Reductions do not need to be applied to off-site areas flowing through the site.

POA-1

STORM (YEAR)	DISCHARGE TO POA 1 (CFS) (REQUIRING REDUCTIONS)	ALLOWABLE DISCHARGE (PERCENT)	ALLOWABLE DISCHARGE (CFS)	DISCHARGE TO POA 1 (CFS) (NOT REQUIRING REDUCTIONS)	ALLOWABLE DISCHARGE (CFS)
2	0.77	50%	0.38	2.01	2.39
10	1.69	75%	1.26	3.39	4.65
25	2.35	-	2.35	4.40	6.75
100	3.67	80%	2.94	6.28	9.22

POA-2

STORM (YEAR)	DISCHARGE TO POA 2 (CFS) (REQUIRING REDUCTIONS)	ALLOWABLE DISCHARGE (PERCENT)	ALLOWABLE DISCHARGE (CFS)	DISCHARGE TO POA 2 (CFS) (NOT REQUIRING REDUCTIONS)	ALLOWABLE DISCHARGE (CFS)
2	0.17	50%	0.09	N/A	0.09
10	0.38	75%	0.29	N/A	0.29
25	0.53	-	0.53	N/A	0.53
100	0.83	80%	0.66	N/A	0.66

The proposed basins have been designed with outlet control structures to provide attenuation to meet the runoff reduction requirements. The proposed peak flows to the points of analysis are summarized in the following tables:

POA-1

STORM (YEAR)	ALLOWABLE DISCHARGE TO POA 1 (CFS)	PROPOSED DISCHARGE TO POA 1 (CFS)
2	2.39	2.11
10	4.70	4.15
25	6.83	5.69
100	9.35	8.29

POA-2

STORM (YEAR)	ALLOWABLE DISCHARGE TO POA 2 (CFS)	PROPOSED DISCHARGE TO POA 2 (CFS)
2	0.09	0.07
10	0.29	0.26
25	0.53	0.37
100	0.66	0.54

As demonstrated in the table above the proposed peak flows meet the required reductions.

Basin A

Basin A is a proposed subsurface 60" HDPE detention basin. An outlet control structure is proposed to control the peak rate of runoff out of the pond. The proposed OCS will connect to the WW S-100 via P-100. This structure will have two (2) 5.5" orifice at elevation 122.50, a rectangular orifice (5.5" H X 10" W) at elevation 124.50, a rectangular orifice (4" H X 8" W) at elevation 125.45, and a 4-foot sharp crested weir at elevation 128.25. This storm sewer discharges to the exiting broad swale which ultimately discharges to an existing off-site inlet along the Southeast property boundary.

The 100-year basin information is summarized in the table below:

Basin	Peak Inflow (cfs)	Peak Outflow (cfs)	Peak Volume (ac-ft)	Max WSE (ft)
A	11.60	8.29	2.276	127.73

Basin B

Basin B is a proposed subsurface 30" HDPE detention basin. An outlet control structure is proposed to control the peak rate of runoff out of the pond. The OCS will have a 3" Reg-U-Flo vortex device (Model 'SH') at elevation 128.40, a 4" orifice at elevation 129.10, and a 4-foot sharp crested weir at elevation 130.40. This storm sewer discharges to the exiting broad swale which ultimately discharges to an existing off-site inlet along the Southeast property boundary.

The 100-year basin information is summarized in the table below:

Basin	Peak Inflow (cfs)	Peak Outflow (cfs)	Peak Volume (ac-ft)	Max WSE (ft)
B	3.52	0.54	0.321	130.37

WATER QUALITY

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-development 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. As a result post-development water quality measures will be provided via a Hydro International Up-Flo Filter MTD rated for 80% TSS removal.

Required Water Quality Treatment

Existing Un-Treated Imperious Area (on-site)- 0.0 ac. X 50% = 0.00 acre
Proposed Impervious Area Requiring Treatment (on-site) - 1.055 ac. X 80% = 0.844 acre
Total Required Treatment (on-site) = *0.844 acres*

In addition to the proposed 1.040 acres of on-site paved area there is an additional 0.730 acres of existing off-site paved area which discharges on-site untreated. Under proposed conditions this off-site impervious area will be captured and treated by the proposed manufactured treatment device to 80% TSS removal.

Proposed Water Quality Treatment

Proposed Untreated Impervious Area (on-site) = 0.014 ac. X 0 % = 0.00 acre
Proposed Treatment of Impervious Area (on-site) = 1.040 ac. X 80 % = 0.832 acre
Proposed Treatment of Impervious Area (off-site) = 0.730 ac. X 80 % = 0.584 acre
Total Provided treatment (on site + off-site) = *1.416 acres*

As shown above, the project will provide 1.416 acres of treatment where only 0.844 acres is required, therefore exceeding the NJDEP requirements.

GROUNDWATER RECHARGE

The proposed development is located entirely within Planning Area 2 (Suburban Planning Area). The site is currently undeveloped and therefore does not meet the "urban redevelopment" definition; therefore, groundwater recharge is required. 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 recharge parameters are as follows:

RECHARGE DEFICIT VOLUME	TOTAL ANNUAL BMP RECHARGE VOLUME
36,247 cf.	59,801 cf.

Therefore the proposed site meets the BMP groundwater recharge requirements. For detailed recharge calculations, refer to the Appendix.

NON-STRUCTURAL STORMWATER MANAGEMENT STRATEGIES

Several 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 non-structural strategies employed into the site:

- Soil erosion and sediment control measures will be implemented throughout the site during construction activity.
- 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. Further, this site will be professionally maintained helping to ensure that fertilizer and pesticides that are used will be correctly and appropriately applied.
- Preventative source controls at inlets and outlet structure help to contain floatable debris and promote public awareness.

STORM SEWER DESIGN

Proposed storm sewers have been designed using Hydraflow Software by Autodesk. The proposed storm sewer was designed using the Rational Method with a minimum time of concentration of 6 minutes and the NJ BMP Intensity-Duration-Frequency Table. The pipes were designed to convey the 100-year storm event to the basin and the hydraulic grade line was analyzed using the 25-year tailwater elevation in the basins.

Storm sewer calculations for can be found in the Appendix.

SOIL EROSION AND SEDIMENT CONTROL

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

- Sediment Barriers and Silt Fences
- Conduit Outlet Protection
- Stabilized Construction Access
- Storm Sewer Inlet Protection
- Temporary and Permanent Stabilization

Conduit outlet protection was provided at both outfalls and was designed based upon the 100-year storm frequency event. For detailed calculations, refer to Appendix D.

Off-site stability is met at each point of discharge by retaining pre-development runoff characteristics and reducing the rate of runoff from the development (21-2.a). A summary of the allowable and proposed runoff rates are presented in the following tables:

PRE-DEVELOPED AND POST-DEVELOPED FLOWS TO WW S-100 (POA-1)

STORM (YEAR)	ALLOWABLE FLOW TO POA-1 (CFS)	PROPOSED DISCHARGE FROM BASIN A (CFS)
2	2.39	2.11
10	4.70	4.15

PRE-DEVELOPED AND POST-DEVELOPED FLOWS TO WW S-200 (POA-2)

STORM (YEAR)	ALLOWABLE FLOW TO POA-2 (CFS)	PROPOSED DISCHARGE BASIN B (CFS)
2	0.09	0.07
10	0.29	0.26

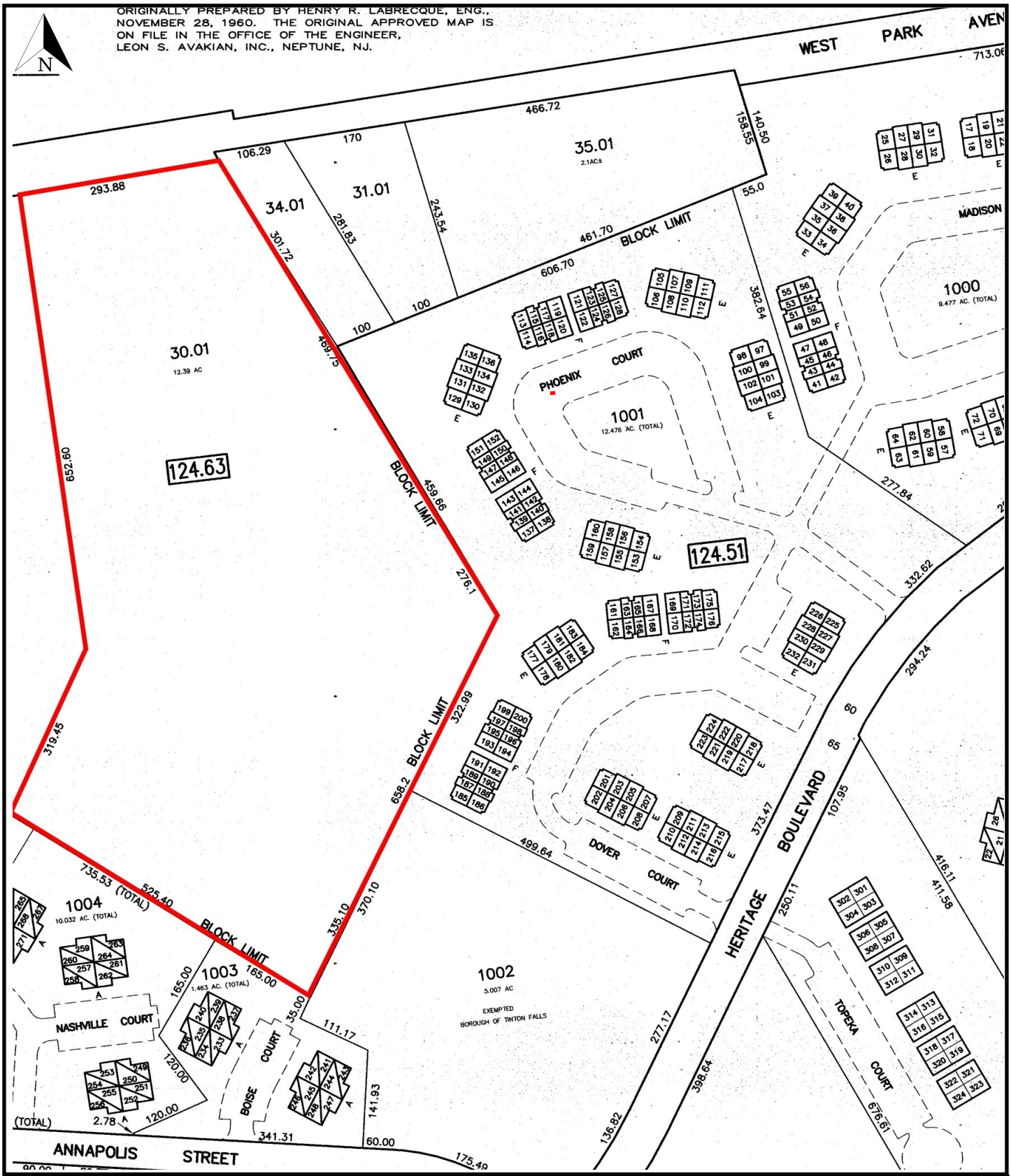
CONCLUSION

The proposed development will maintain the existing drainage patterns and will not increase the rate of runoff from the site. The stormwater design is in compliance with the Borough, NJDEP, DRCC and Soil Conservation District regulations with regard to stormwater quantity, quality and groundwater recharge requirements.

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APPENDIX A

MAPS



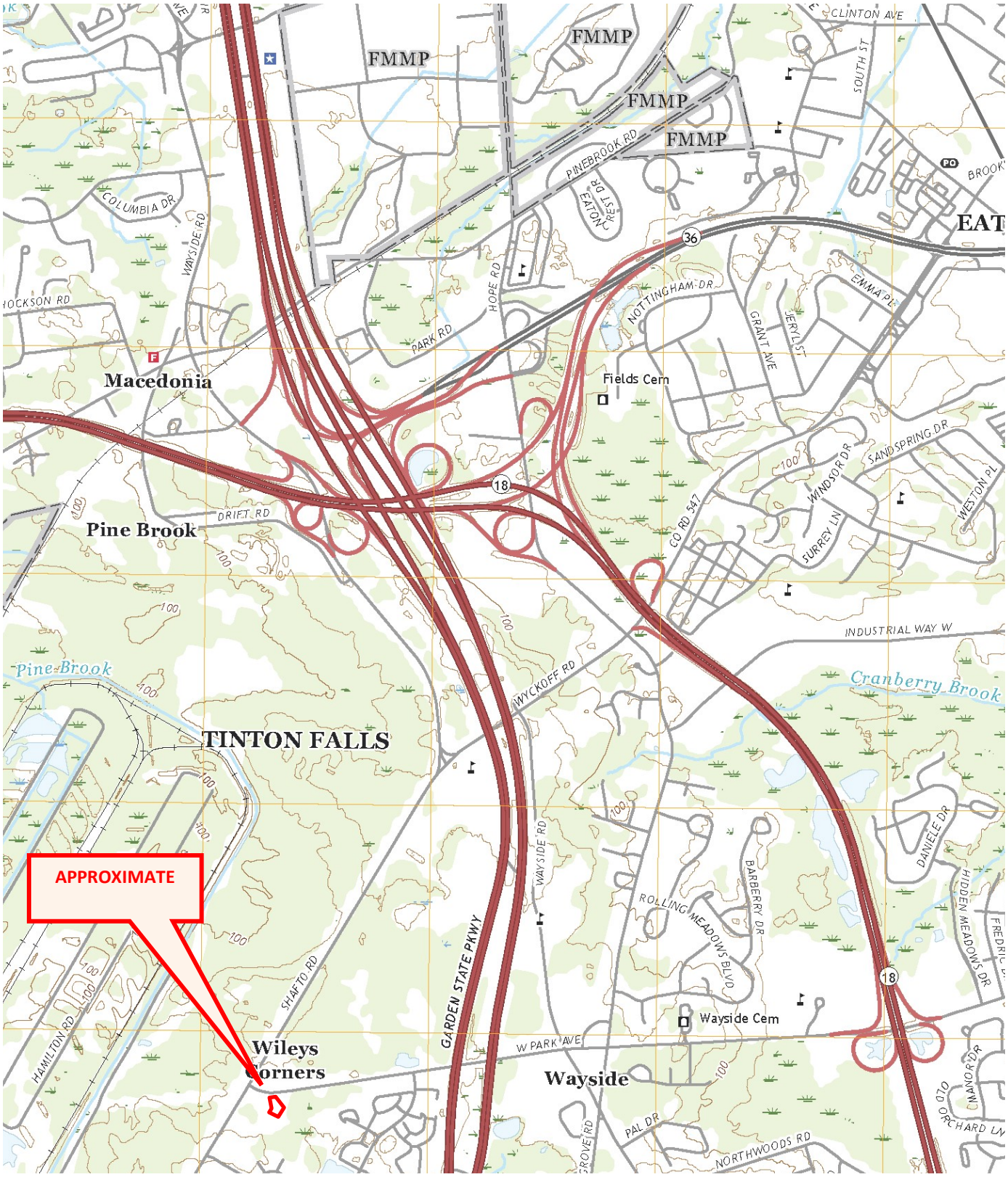
Corporate Headquarters
331 Newman Springs Road
Suite 203
Red Bank, NJ 07701
T: 732.383.1950
F: 732.383.1984
www.maserconsulting.com

Figure 1
Tax Map
All American Assisted Living of Tinton Falls
Image Source: Official Tax Map for the Borough of Tinton Falls, December, 2005 (Adopted October, 2007)

Scale: 1"=200'

Date: February 2020

MC Project No. 18006637A



Corporate Headquarters
331 Newman Springs Road
Suite 203
Red Bank, NJ 07701
T: 732.383.1950
F: 732.383.1984
www.maserconsulting.com

U.S.G.S. Map

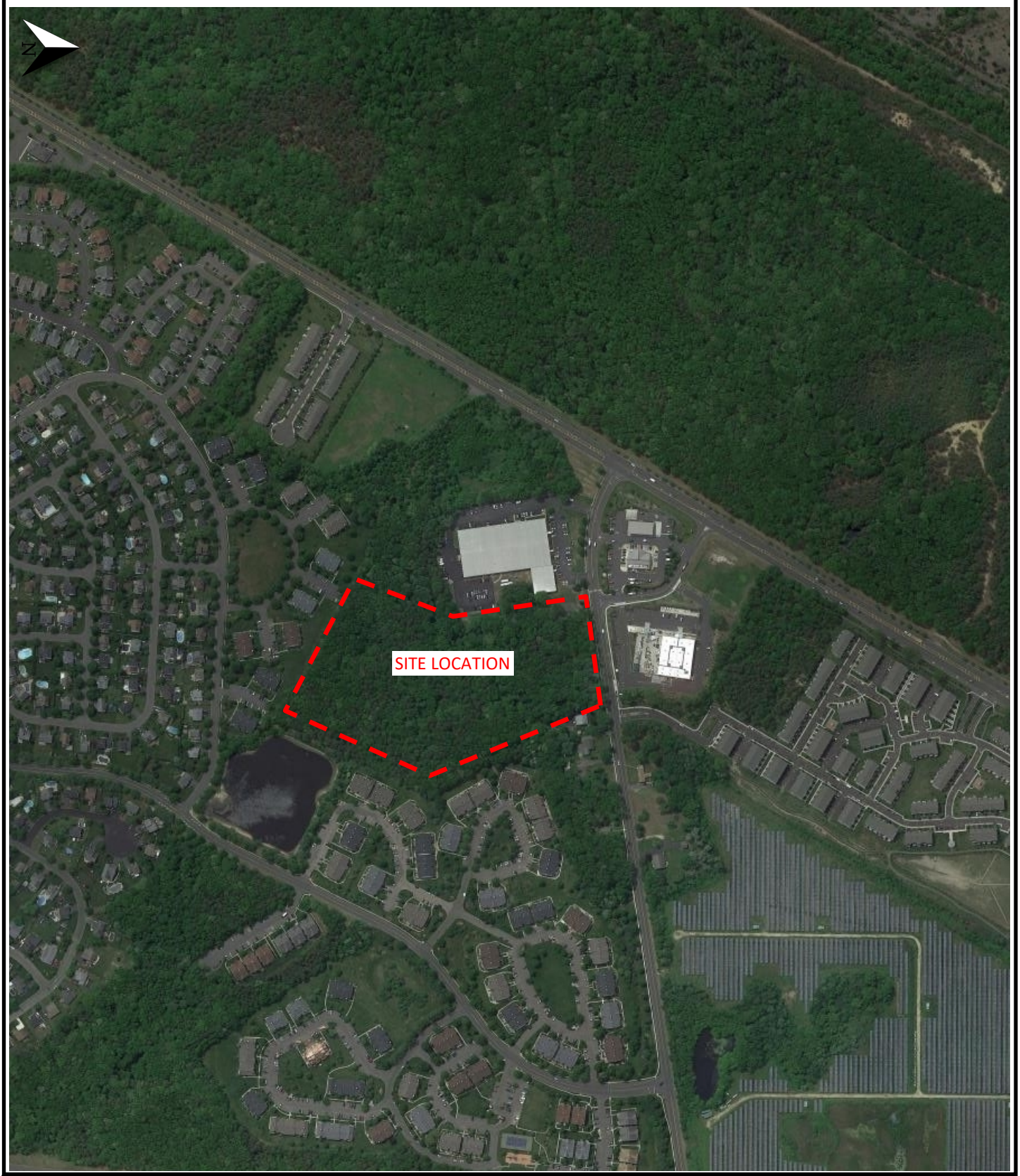
Block 124.63, Lot 30.01

Source: USGS 7.5 Minute Series -
Long Branch West, NJ Quadrangle 2019

Scale: 1" = 2,000'

Date: February 2020

MC Project No. 18006673A



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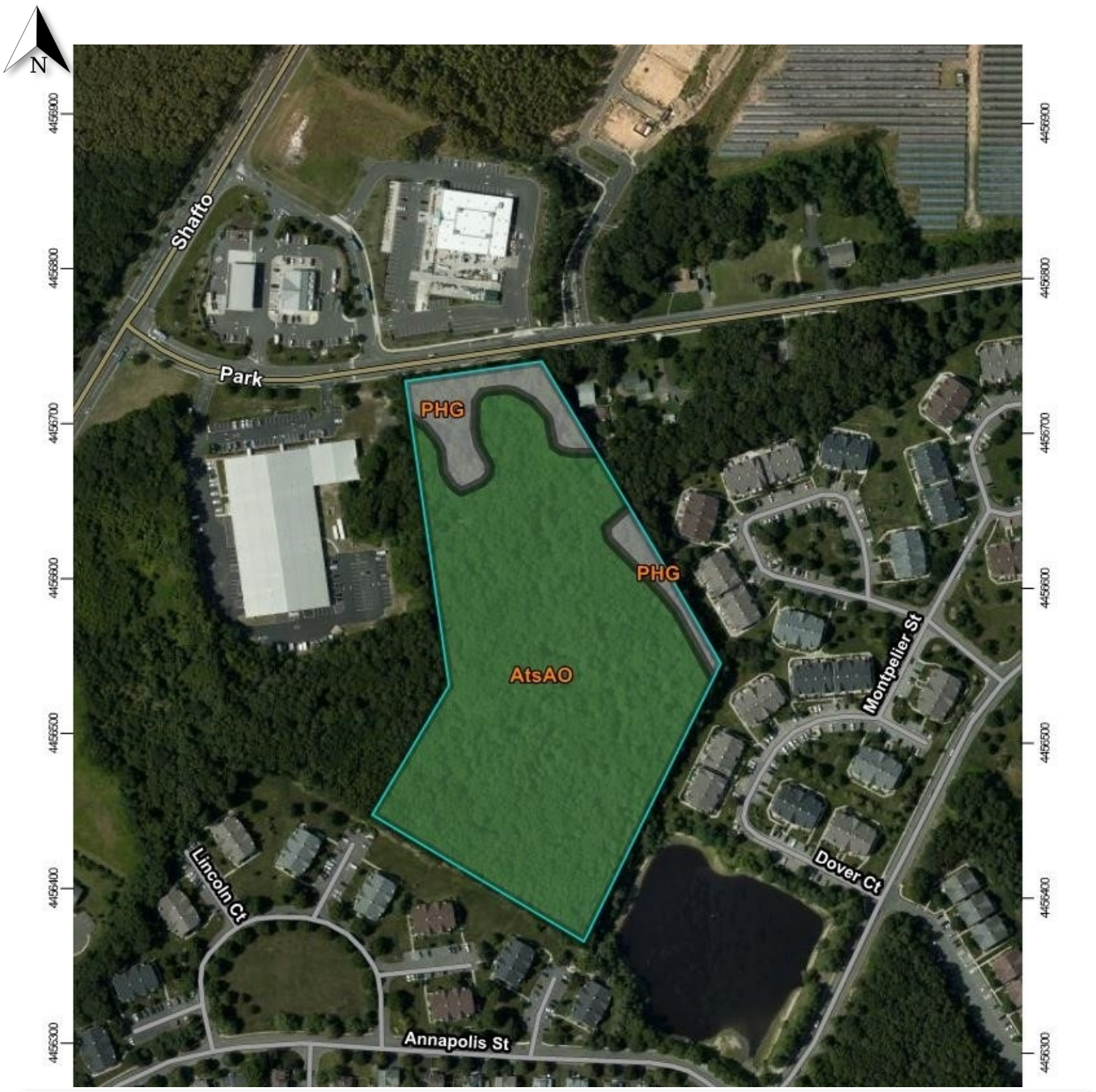
Corporate Headquarters
331 Newman Springs Road
Suite 203
Red Bank, NJ 07701
T: 732.383.1950
F: 732.383.1984
www.maserconsulting.com

Figure 2
Aerial Map
All American Assisted Living of Tinton Falls
Image Source: Google Earth (May, 2019)

Scale: 1"=1000'

Date: February 2020

MC Project No. 18006673A



Map unit symbol	Map unit name	Rating	Acres in AOI	Percent of AOI
AtsAO	Atsion sand, 0 to 2 percent slopes, Northern Tidewater Area	A/D	11.0	88.6%
PHG	Pits, sand and gravel		1.4	11.4%
Totals for Area of Interest			**12.4**	**100.0%**

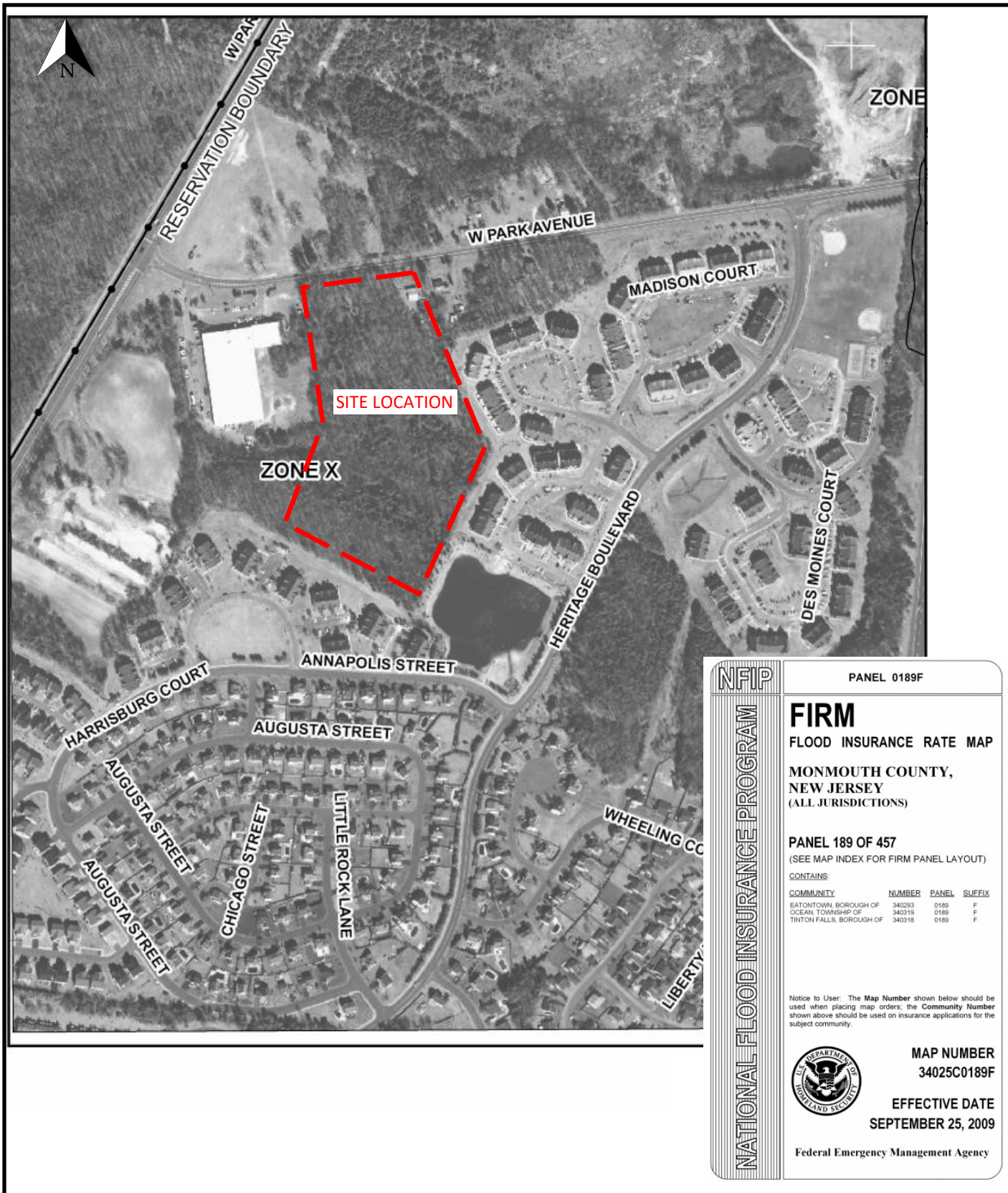
Corporate Headquarters
331 Newman Springs Road
Suite 203
Red Bank, NJ 07701
T: 732.383.1950
F: 732.383.1984
www.maserconsulting.com

Figure 3
Soils Map
All American Assisted Living of Tinton Falls
Image Source: USDA Natural Conservation Service, Web Soil Survey

Scale: 1:3,960

Date: February 2020

MC Project No. 18006673A



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331 Newman Springs Road
Suite 203
Red Bank, NJ 07701
T: 732.383.1950
F: 732.383.1984
www.maserconsulting.com

Figure 5
Flood Insurance Rate Map—Effective
All American Assisted Living of Tinton Falls
Image Source: FEMA Flood Map Service Center

Scale: 1”=500’

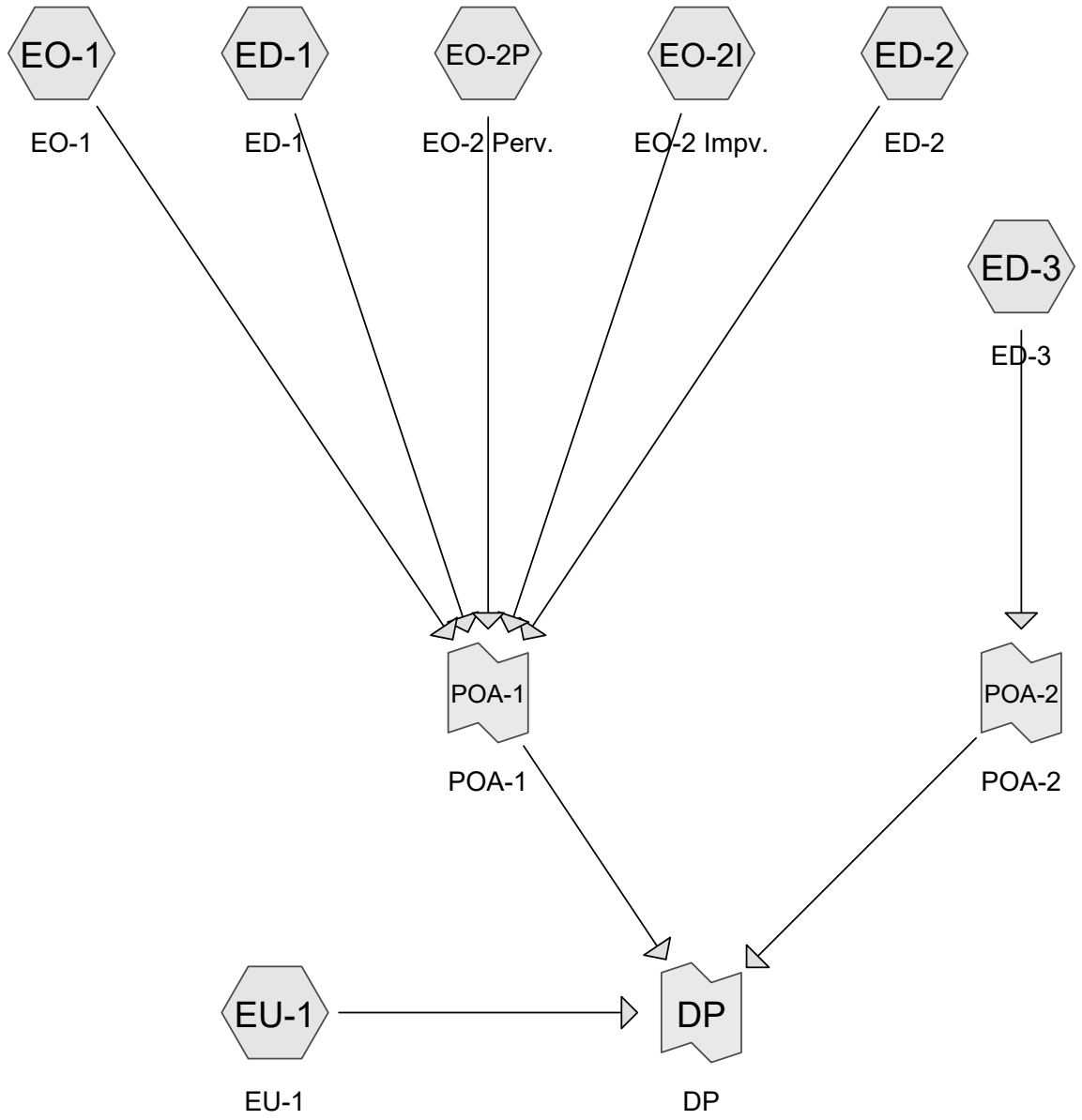
Date: February 2020

MC Project No. 18006673A

APPENDIX B

EXISTING CONDITIONS ANALYSIS

EXISTING



Subcat Reach Pond Link

Routing Diagram for 200715A_Analysis
Prepared by Maser Consulting, Printed 7/29/2020
HydroCAD® 10.10-3a s/n 10901 © 2020 HydroCAD Software Solutions LLC

Rainfall Events Listing

Event#	Event Name	Storm Type	Curve	Mode	Duration (hours)	B/B	Depth (inches)	AMC
1	A-2 YR	NOAA 24-hr	D	Default	24.00	1	3.38	2
2	B-10 YR	NOAA 24-hr	D	Default	24.00	1	5.23	2
3	C-25 YR	NOAA 24-hr	D	Default	24.00	1	6.53	2
4	D-100 YR	NOAA 24-hr	D	Default	24.00	1	8.94	2
5	WQ	NJ DEP 2-hr		Default	2.00	1	1.25	2

Area Listing (selected nodes)

Area (acres)	CN	Description (subcatchment-numbers)
0.250	80	>75% Grass cover, Good, HSG D (EO-2P)
0.730	98	Paved parking, HSG D (EO-2I)
12.540	77	Woods, Good, HSG D (ED-1, ED-2, ED-3, EO-1, EO-2P, EU-1)
13.520	**78**	**TOTAL AREA**

Soil Listing (selected nodes)

Area (acres)	Soil Group	Subcatchment Numbers
0.000	HSG A	
0.000	HSG B	
0.000	HSG C	
13.520	HSG D	ED-1, ED-2, ED-3, EO-1, EO-2I, EO-2P, EU-1
0.000	Other	
13.520		**TOTAL AREA**

Ground Covers (selected nodes)

HSG-A (acres)	HSG-B (acres)	HSG-C (acres)	HSG-D (acres)	Other (acres)	Total (acres)	Ground Cover	Subcatchment Numbers
0.000	0.000	0.000	0.250	0.000	0.250	>75% Grass cover, Good	EO-2P
0.000	0.000	0.000	0.730	0.000	0.730	Paved parking	EO-2I
0.000	0.000	0.000	12.540	0.000	12.540	Woods, Good	ED-1, ED-2, ED-3, EO-1, EO-2P, EU-1
0.000	**0.000**	**0.000**	**13.520**	**0.000**	**13.520**	**TOTAL AREA**	

Pipe Listing (selected nodes)

Line#	Node Number	In-Invert (feet)	Out-Invert (feet)	Length (feet)	Slope (ft/ft)	n	Diam/Width (inches)	Height (inches)	Inside-Fill (inches)
1	EO-2P	0.00	0.00	140.0	0.0010	0.013	15.0	0.0	4.0

Time span=0.00-100.00 hrs, dt=0.01 hrs, 10001 points
Runoff by SCS TR-20 method, UH=Delmarva, Split Pervious/Imperv. UI as Pervious
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Subcatchment ED-1: ED-1 Runoff Area=0.220 ac 0.00% Impervious Runoff Depth=1.34"
Flow Length=137' Tc=22.3 min CN=77/0 Runoff=0.14 cfs 0.025 af

Subcatchment ED-2: ED-2 Runoff Area=1.690 ac 0.00% Impervious Runoff Depth=1.34"
Flow Length=1,258' Tc=54.0 min CN=77/0 Runoff=0.63 cfs 0.189 af

Subcatchment ED-3: ED-3 Runoff Area=0.560 ac 0.00% Impervious Runoff Depth=1.34"
Flow Length=1,209' Tc=73.4 min CN=77/0 Runoff=0.17 cfs 0.063 af

Subcatchment EO-1: EO-1 Runoff Area=0.050 ac 0.00% Impervious Runoff Depth=1.34"
Flow Length=896' Tc=29.3 min CN=77/0 Runoff=0.03 cfs 0.006 af

Subcatchment EO-2I: EO-2 Impv. Runoff Area=0.730 ac 100.00% Impervious Runoff Depth=3.15"
Tc=10.0 min CN=0/98 Runoff=1.55 cfs 0.191 af

Subcatchment EO-2P: EO-2 Perv. Runoff Area=1.010 ac 0.00% Impervious Runoff Depth=1.41"
Flow Length=1,319' Tc=43.3 min CN=78/0 Runoff=0.46 cfs 0.118 af

Subcatchment EU-1: EU-1 Runoff Area=9.260 ac 0.00% Impervious Runoff Depth=1.34"
Flow Length=1,065' Tc=47.8 min CN=77/0 Runoff=3.73 cfs 1.036 af

Link DP: DP Inflow=5.54 cfs 1.627 af
Primary=5.54 cfs 1.627 af

Link POA-1: POA-1 Inflow=2.03 cfs 0.529 af
Primary=2.03 cfs 0.529 af

Link POA-2: POA-2 Inflow=0.17 cfs 0.063 af
Primary=0.17 cfs 0.063 af

Total Runoff Area = 13.520 ac Runoff Volume = 1.627 af Average Runoff Depth = 1.44"
94.60% Pervious = 12.790 ac 5.40% Impervious = 0.730 ac

Summary for Subcatchment ED-1: ED-1

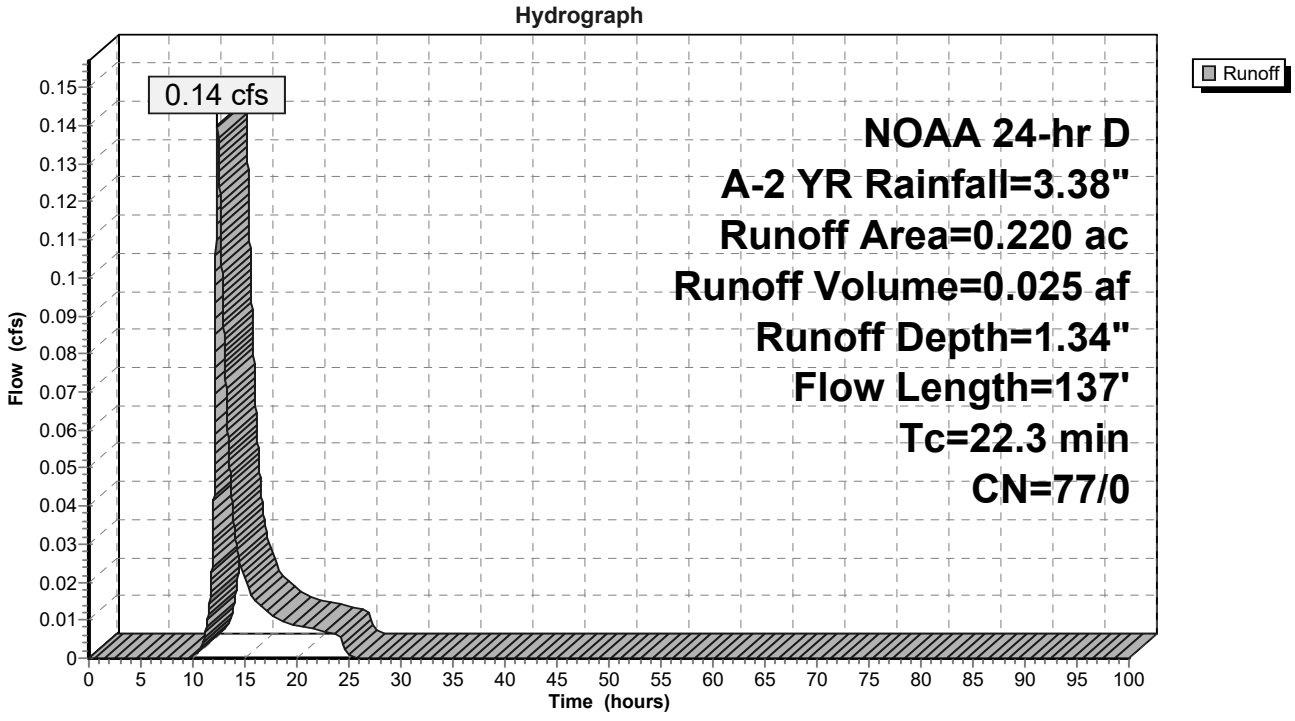
Runoff = 0.14 cfs @ 12.38 hrs, Volume= 0.025 af, Depth= 1.34"

Runoff by SCS TR-20 method, UH=Delmarva, Split Pervious/Imperv. UI as Pervious, Time Span= 0.00-100.00 hrs, dt=
NOAA 24-hr D A-2 YR Rainfall=3.38"

Area (ac)	CN	Description
0.220	77	Woods, Good, HSG D
0.220	77	100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
21.6	100	0.0185	0.08		**Sheet Flow, ED-1 SHEET** Woods: Light underbrush n= 0.400 P2= 3.38"
0.7	37	0.0313	0.88		**Shallow Concentrated Flow, ED-1** Woodland Kv= 5.0 fps
22.3	137	Total			

Subcatchment ED-1: ED-1



Summary for Subcatchment ED-2: ED-2

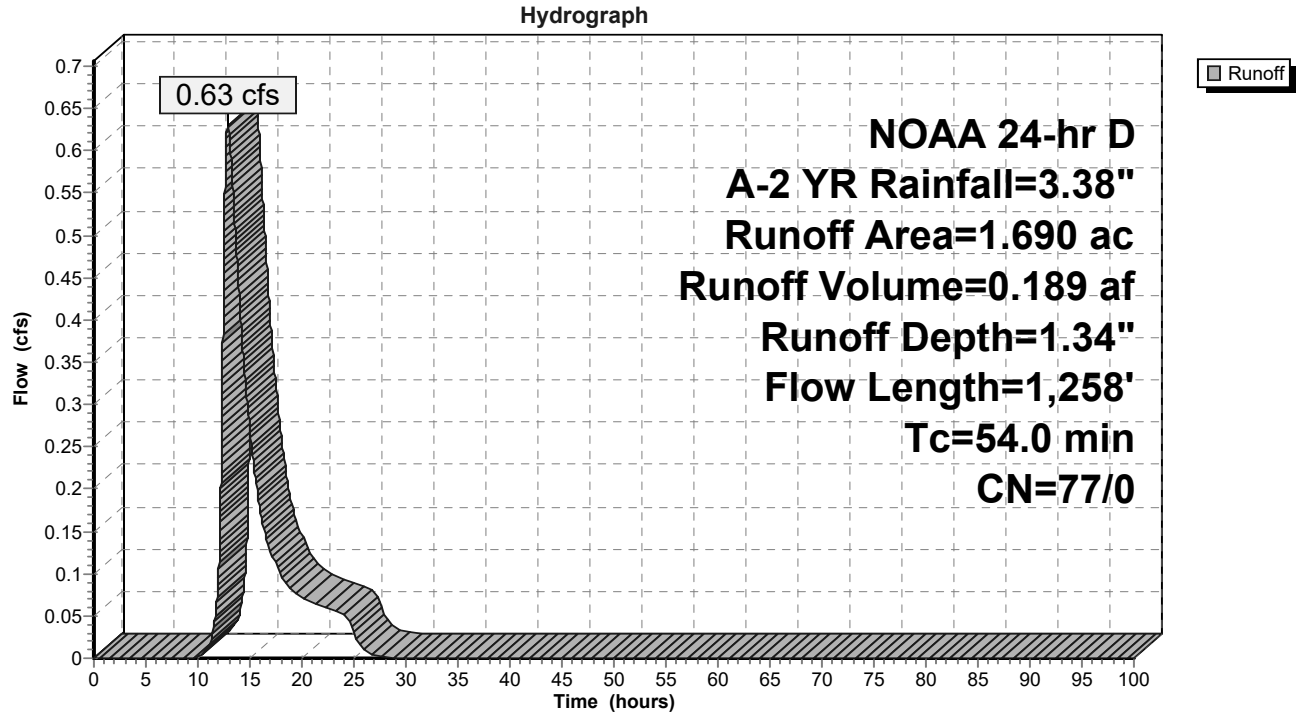
Runoff = 0.63 cfs @ 12.84 hrs, Volume= 0.189 af, Depth= 1.34"

Runoff by SCS TR-20 method, UH=Delmarva, Split Pervious/Imperv. UI as Pervious, Time Span= 0.00-100.00 hrs, dt=
NOAA 24-hr D A-2 YR Rainfall=3.38"

Area (ac)	CN	Description
1.690	77	Woods, Good, HSG D
1.690	77	100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
22.1	100	0.0173	0.08		**Sheet Flow, ED-2 SHEET** Woods: Light underbrush n= 0.400 P2= 3.38"
13.4	530	0.0173	0.66		**Shallow Concentrated Flow, ED-2 SHALLOW** Woodland Kv= 5.0 fps
18.5	628	0.0128	0.57		**Shallow Concentrated Flow, EU-2** Woodland Kv= 5.0 fps
54.0	1,258	Total			

Subcatchment ED-2: ED-2



Summary for Subcatchment ED-3: ED-3

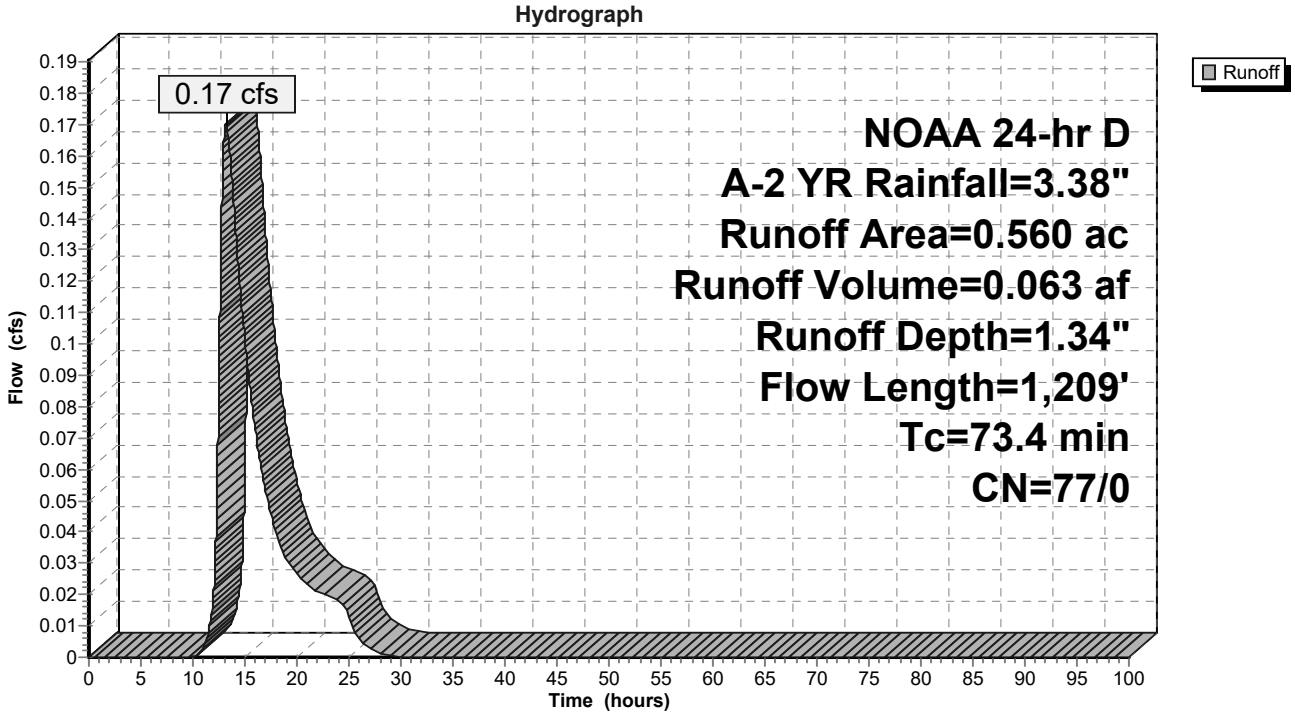
Runoff = 0.17 cfs @ 13.21 hrs, Volume= 0.063 af, Depth= 1.34"

Runoff by SCS TR-20 method, UH=Delmarva, Split Pervious/Imperv. UI as Pervious, Time Span= 0.00-100.00 hrs, dt=
NOAA 24-hr D A-2 YR Rainfall=3.38"

Area (ac)	CN	Description
0.560	77	Woods, Good, HSG D
0.560	77	100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
20.1	100	0.0220	0.08		**Sheet Flow, Sheet Flow** Woods: Light underbrush n= 0.400 P2= 3.38"
0.7	30	0.0223	0.75		**Shallow Concentrated Flow, Shallow** Woodland Kv= 5.0 fps
24.5	100	0.0135	0.07		**Sheet Flow, EU-1 SHEET** Woods: Light underbrush n= 0.400 P2= 3.38"
28.1	979	0.0135	0.58		**Shallow Concentrated Flow, EU-1** Woodland Kv= 5.0 fps
73.4	1,209	Total			

Subcatchment ED-3: ED-3



Summary for Subcatchment EO-1: EO-1

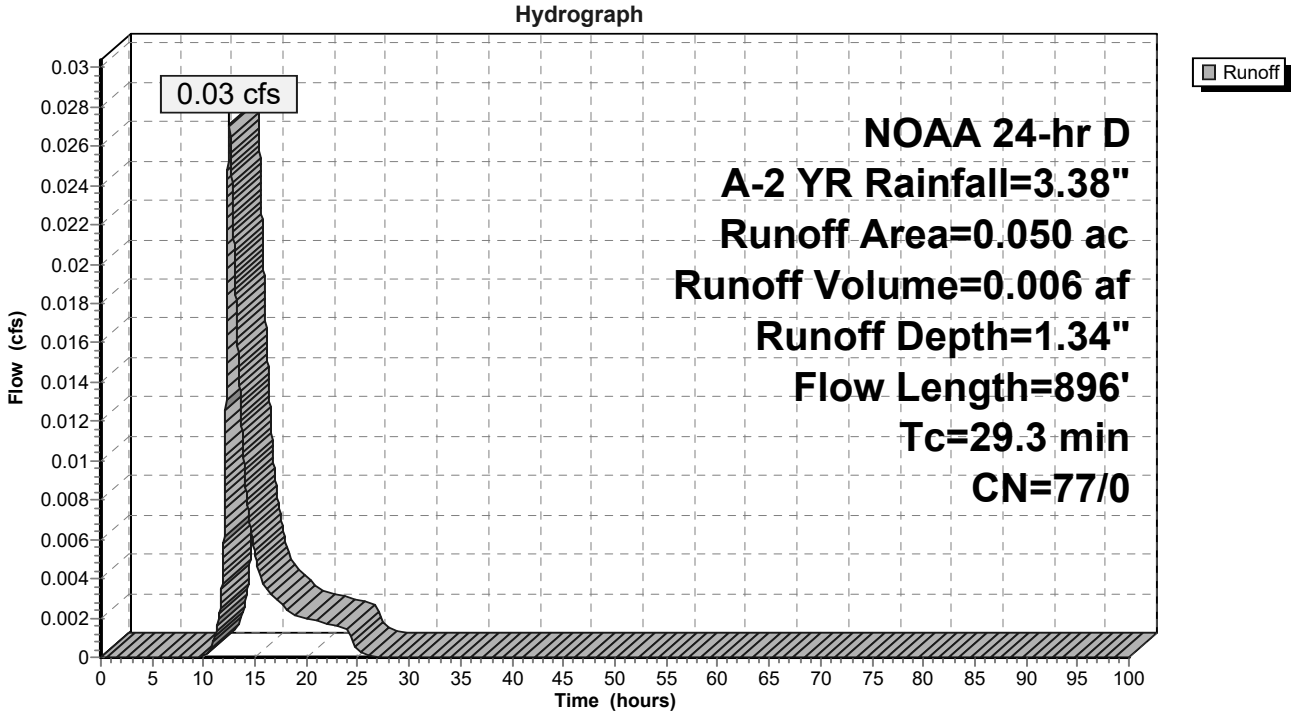
Runoff = 0.03 cfs @ 12.49 hrs, Volume= 0.006 af, Depth= 1.34"

Runoff by SCS TR-20 method, UH=Delmarva, Split Pervious/Imperv. UI as Pervious, Time Span= 0.00-100.00 hrs, dt=
NOAA 24-hr D A-2 YR Rainfall=3.38"

Area (ac)	CN	Description
0.050	77	Woods, Good, HSG D
0.050	77	100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
11.9	682	0.0365	0.96		**Shallow Concentrated Flow, EU-1** Woodland Kv= 5.0 fps
0.7	110	0.3130	2.80		**Shallow Concentrated Flow, ED-1B** Woodland Kv= 5.0 fps
7.6	27	0.0185	0.06		**Sheet Flow, ED-1A** Woods: Light underbrush n= 0.400 P2= 3.38"
9.1	77	0.0960	0.14		**Sheet Flow, EO-1** Woods: Light underbrush n= 0.400 P2= 3.38"
29.3	896	Total			

Subcatchment EO-1: EO-1



Summary for Subcatchment EO-2I: EO-2 Impv.

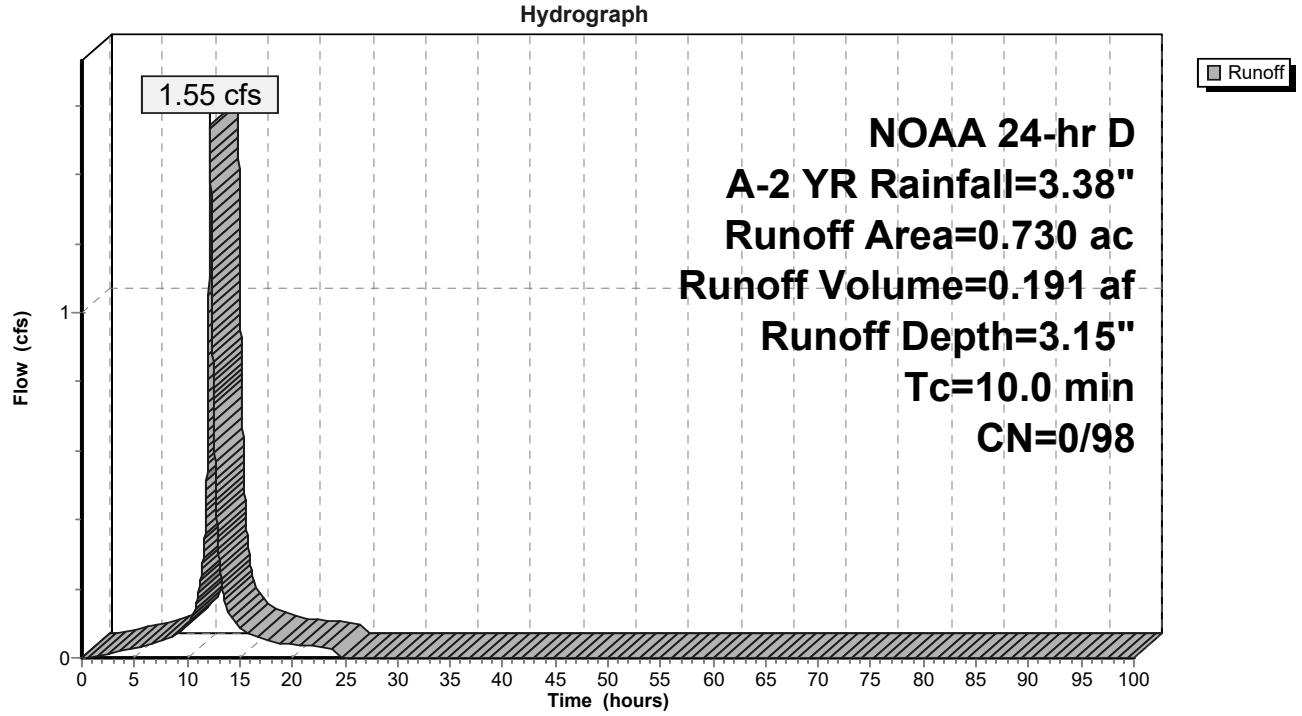
Runoff = 1.55 cfs @ 12.18 hrs, Volume= 0.191 af, Depth= 3.15"

Runoff by SCS TR-20 method, UH=Delmarva, Split Pervious/Imperv. UI as Pervious, Time Span= 0.00-100.00 hrs, dt=
NOAA 24-hr D A-2 YR Rainfall=3.38"

Area (ac)	CN	Description
0.730	98	Paved parking, HSG D
0.730	98	100.00% Impervious Area

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

Subcatchment EO-2I: EO-2 Impv.



Summary for Subcatchment EO-2P: EO-2 Perv.

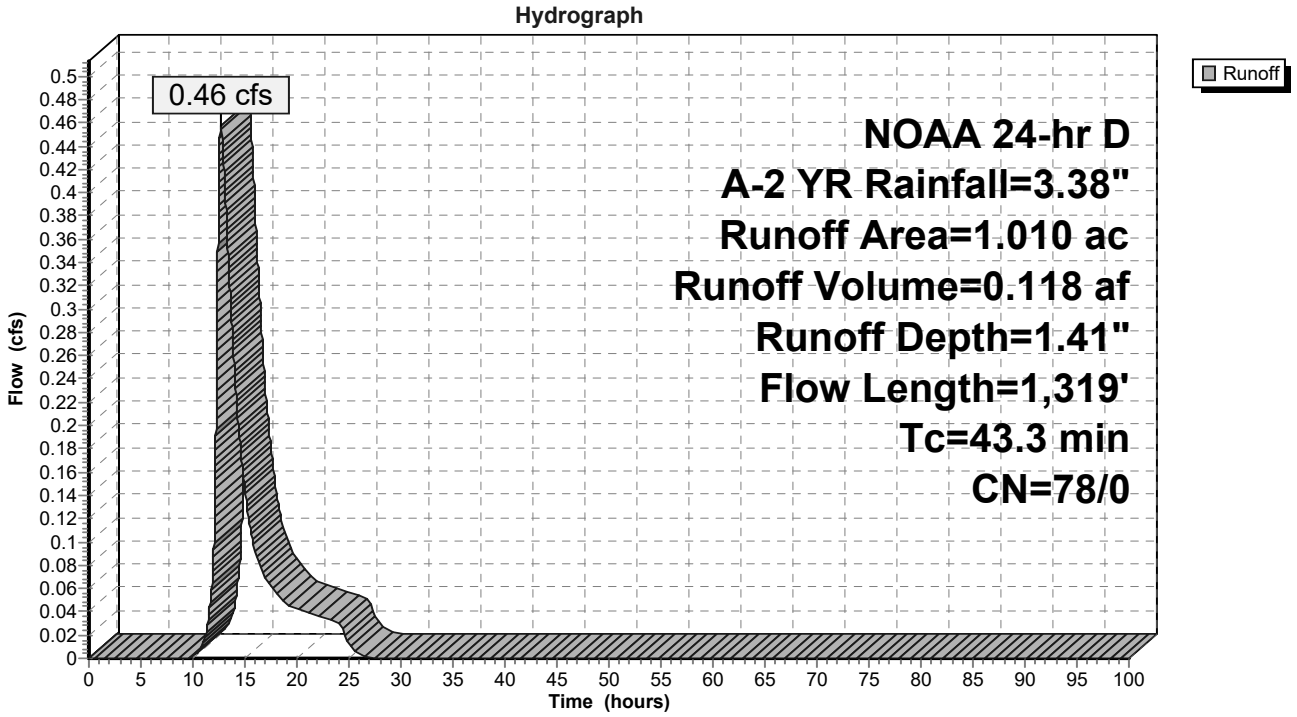
Runoff = 0.46 cfs @ 12.70 hrs, Volume= 0.118 af, Depth= 1.41"

Runoff by SCS TR-20 method, UH=Delmarva, Split Pervious/Imperv. UI as Pervious, Time Span= 0.00-100.00 hrs, dt=
NOAA 24-hr D A-2 YR Rainfall=3.38"

Area (ac)	CN	Description
0.250	80	>75% Grass cover, Good, HSG D
0.760	77	Woods, Good, HSG D
1.010	78	Weighted Average
1.010	78	100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
18.5	628	0.0128	0.57		**Shallow Concentrated Flow, EU-2** Woodland Kv= 5.0 fps
8.8	347	0.0173	0.66		**Shallow Concentrated Flow, ED-2** Woodland Kv= 5.0 fps
9.8	100	0.0189	0.17		**Sheet Flow, EO-2** Grass: Short n= 0.150 P2= 3.38"
0.1	61	0.1890	8.83		**Shallow Concentrated Flow, EO-2 PAVED** Paved Kv= 20.3 fps
1.6	140	0.0010	1.48	1.43	**Pipe Channel, EO-2 PIPE FLOW** 15.0" Round w/ 4.0" inside fill Area= 1.0 sf Perim= 3.7' r= 0.26' n= 0.013 Concrete pipe, bends & connections
4.5	43	0.0010	0.16		**Shallow Concentrated Flow, EO-2 FES** Woodland Kv= 5.0 fps
43.3	1,319	Total			

Subcatchment EO-2P: EO-2 Perv.



Summary for Subcatchment EU-1: EU-1

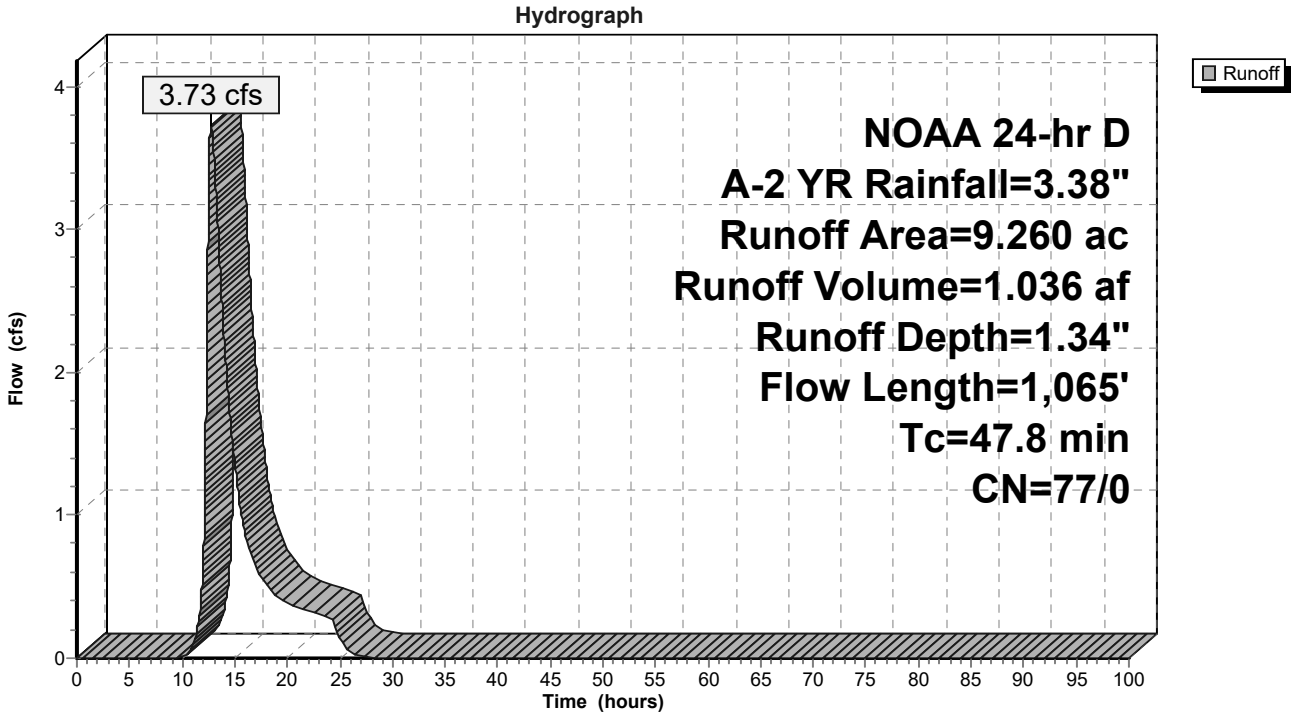
Runoff = 3.73 cfs @ 12.75 hrs, Volume= 1.036 af, Depth= 1.34"

Runoff by SCS TR-20 method, UH=Delmarva, Split Pervious/Imperv. UI as Pervious, Time Span= 0.00-100.00 hrs, dt=
NOAA 24-hr D A-2 YR Rainfall=3.38"

Area (ac)	CN	Description
9.260	77	Woods, Good, HSG D
9.260	77	100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
24.2	100	0.0139	0.07		**Sheet Flow, EU-2** Woods: Light underbrush n= 0.400 P2= 3.38"
23.6	965	0.0185	0.68		**Shallow Concentrated Flow, EU-2** Woodland Kv= 5.0 fps
47.8	1,065	Total			

Subcatchment EU-1: EU-1

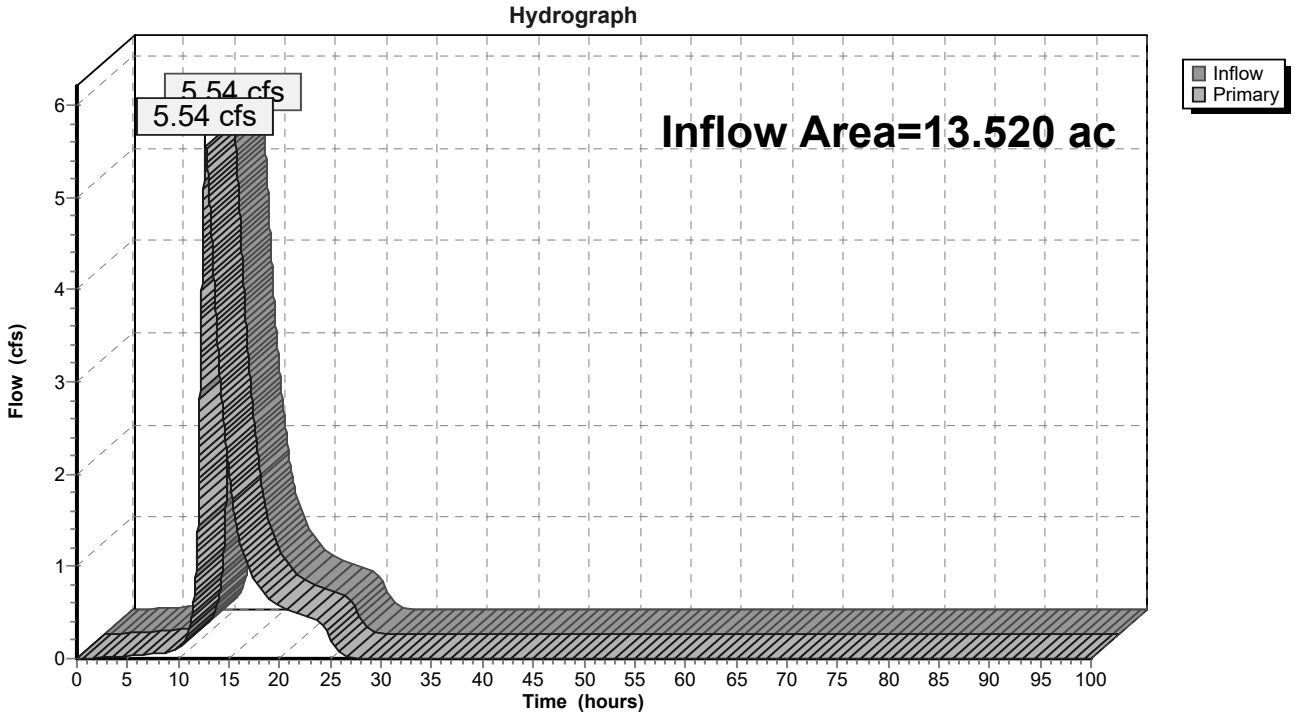


Summary for Link DP: DP

Inflow Area = 13.520 ac, 5.40% Impervious, Inflow Depth = 1.44" for A-2 YR event
Inflow = 5.54 cfs @ 12.72 hrs, Volume= 1.627 af
Primary = 5.54 cfs @ 12.72 hrs, Volume= 1.627 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-100.00 hrs, dt= 0.01 hrs

Link DP: DP

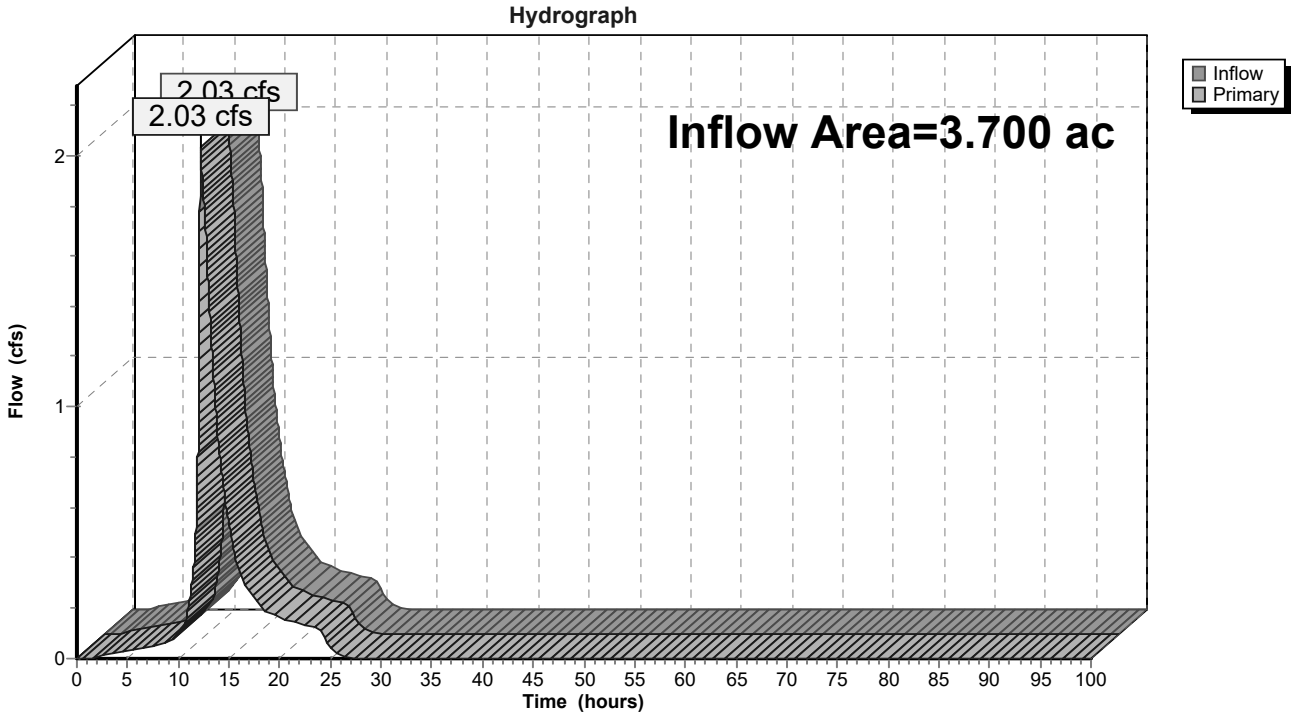


Summary for Link POA-1: POA-1

Inflow Area = 3.700 ac, 19.73% Impervious, Inflow Depth = 1.72" for A-2 YR event
Inflow = 2.03 cfs @ 12.20 hrs, Volume= 0.529 af
Primary = 2.03 cfs @ 12.20 hrs, Volume= 0.529 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-100.00 hrs, dt= 0.01 hrs

Link POA-1: POA-1

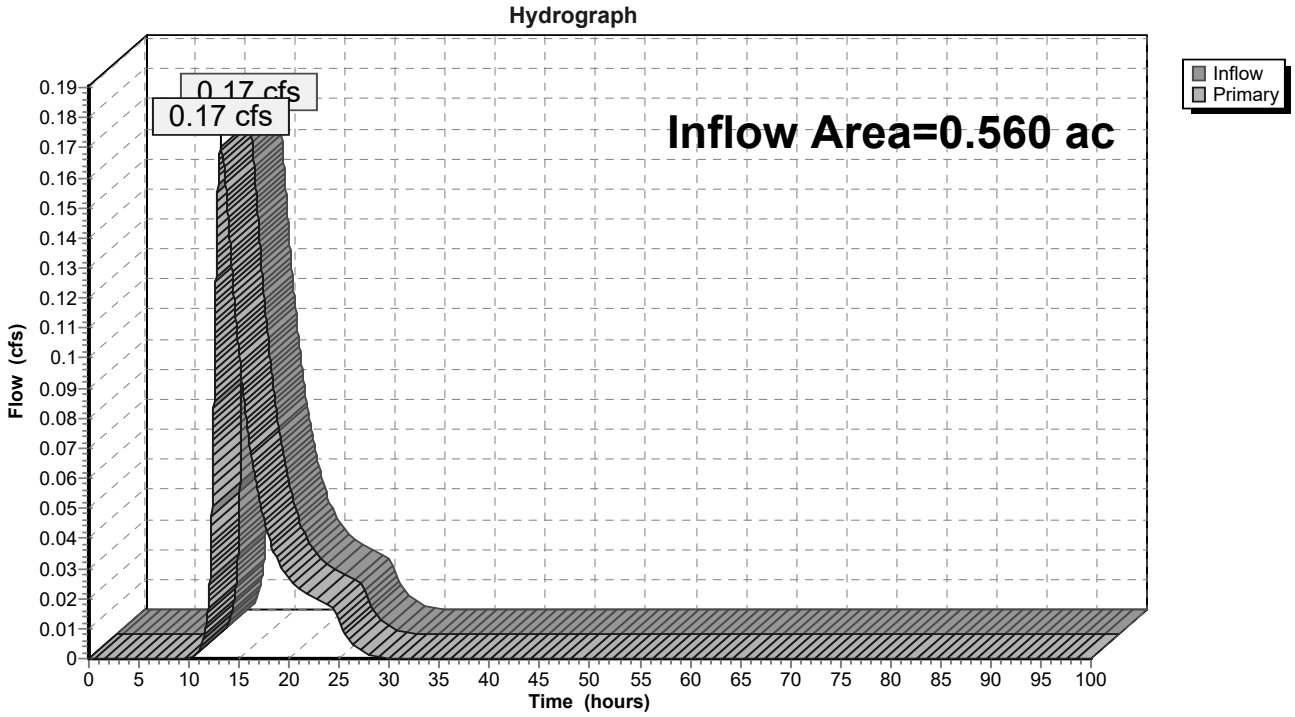


Summary for Link POA-2: POA-2

Inflow Area = 0.560 ac, 0.00% Impervious, Inflow Depth = 1.34" for A-2 YR event
Inflow = 0.17 cfs @ 13.21 hrs, Volume= 0.063 af
Primary = 0.17 cfs @ 13.21 hrs, Volume= 0.063 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-100.00 hrs, dt= 0.01 hrs

Link POA-2: POA-2



Time span=0.00-100.00 hrs, dt=0.01 hrs, 10001 points
Runoff by SCS TR-20 method, UH=Delmarva, Split Pervious/Imperv. UI as Pervious
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Subcatchment ED-1: ED-1 Runoff Area=0.220 ac 0.00% Impervious Runoff Depth=2.82"
Flow Length=137' Tc=22.3 min CN=77/0 Runoff=0.31 cfs 0.052 af

Subcatchment ED-2: ED-2 Runoff Area=1.690 ac 0.00% Impervious Runoff Depth=2.82"
Flow Length=1,258' Tc=54.0 min CN=77/0 Runoff=1.39 cfs 0.397 af

Subcatchment ED-3: ED-3 Runoff Area=0.560 ac 0.00% Impervious Runoff Depth=2.82"
Flow Length=1,209' Tc=73.4 min CN=77/0 Runoff=0.38 cfs 0.131 af

Subcatchment EO-1: EO-1 Runoff Area=0.050 ac 0.00% Impervious Runoff Depth=2.82"
Flow Length=896' Tc=29.3 min CN=77/0 Runoff=0.06 cfs 0.012 af

Subcatchment EO-2I: EO-2 Impv. Runoff Area=0.730 ac 100.00% Impervious Runoff Depth=4.99"
Tc=10.0 min CN=0/98 Runoff=2.41 cfs 0.304 af

Subcatchment EO-2P: EO-2 Perv. Runoff Area=1.010 ac 0.00% Impervious Runoff Depth=2.91"
Flow Length=1,319' Tc=43.3 min CN=78/0 Runoff=0.98 cfs 0.245 af

Subcatchment EU-1: EU-1 Runoff Area=9.260 ac 0.00% Impervious Runoff Depth=2.82"
Flow Length=1,065' Tc=47.8 min CN=77/0 Runoff=8.21 cfs 2.173 af

Link DP: DP Inflow=11.92 cfs 3.313 af
Primary=11.92 cfs 3.313 af

Link POA-1: POA-1 Inflow=3.65 cfs 1.009 af
Primary=3.65 cfs 1.009 af

Link POA-2: POA-2 Inflow=0.38 cfs 0.131 af
Primary=0.38 cfs 0.131 af

Total Runoff Area = 13.520 ac Runoff Volume = 3.313 af Average Runoff Depth = 2.94"
94.60% Pervious = 12.790 ac 5.40% Impervious = 0.730 ac

Summary for Subcatchment ED-1: ED-1

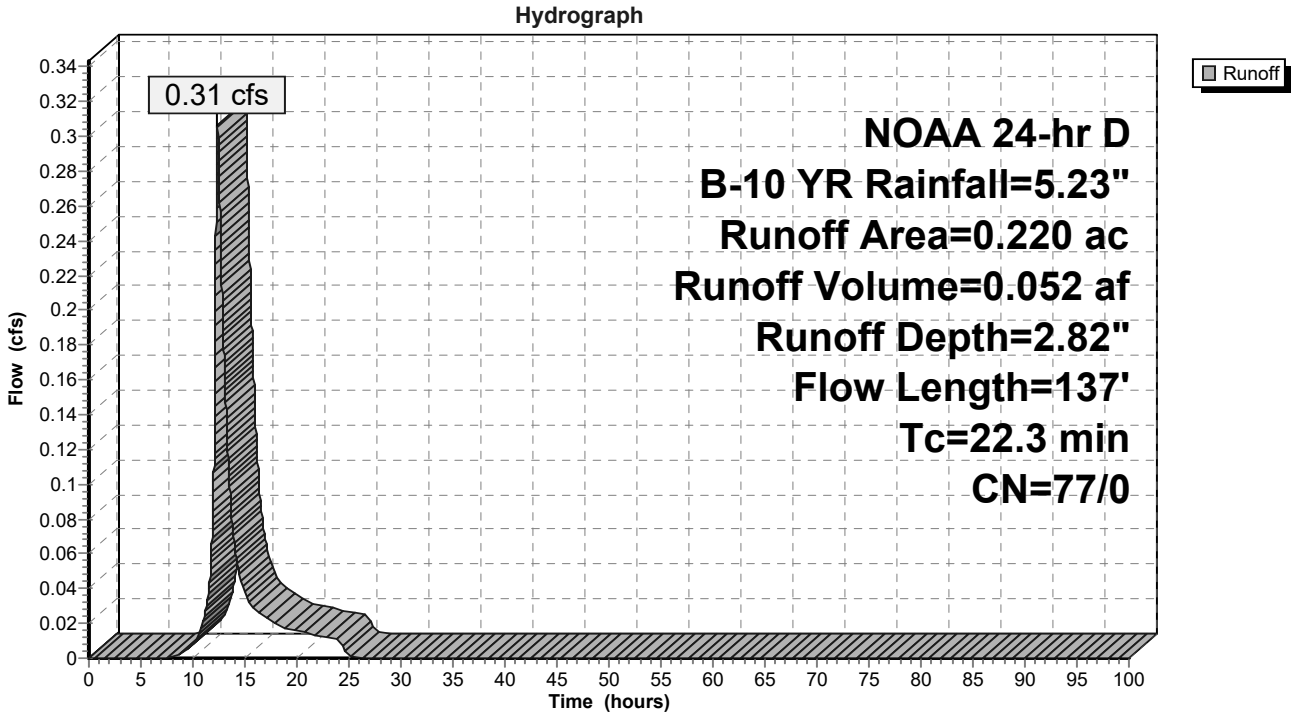
Runoff = 0.31 cfs @ 12.34 hrs, Volume= 0.052 af, Depth= 2.82"

Runoff by SCS TR-20 method, UH=Delmarva, Split Pervious/Imperv. UI as Pervious, Time Span= 0.00-100.00 hrs, dt=
NOAA 24-hr D B-10 YR Rainfall=5.23"

Area (ac)	CN	Description
0.220	77	Woods, Good, HSG D
0.220	77	100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
21.6	100	0.0185	0.08		**Sheet Flow, ED-1 SHEET** Woods: Light underbrush n= 0.400 P2= 3.38"
0.7	37	0.0313	0.88		**Shallow Concentrated Flow, ED-1** Woodland Kv= 5.0 fps
22.3	137	Total			

Subcatchment ED-1: ED-1



Summary for Subcatchment ED-2: ED-2

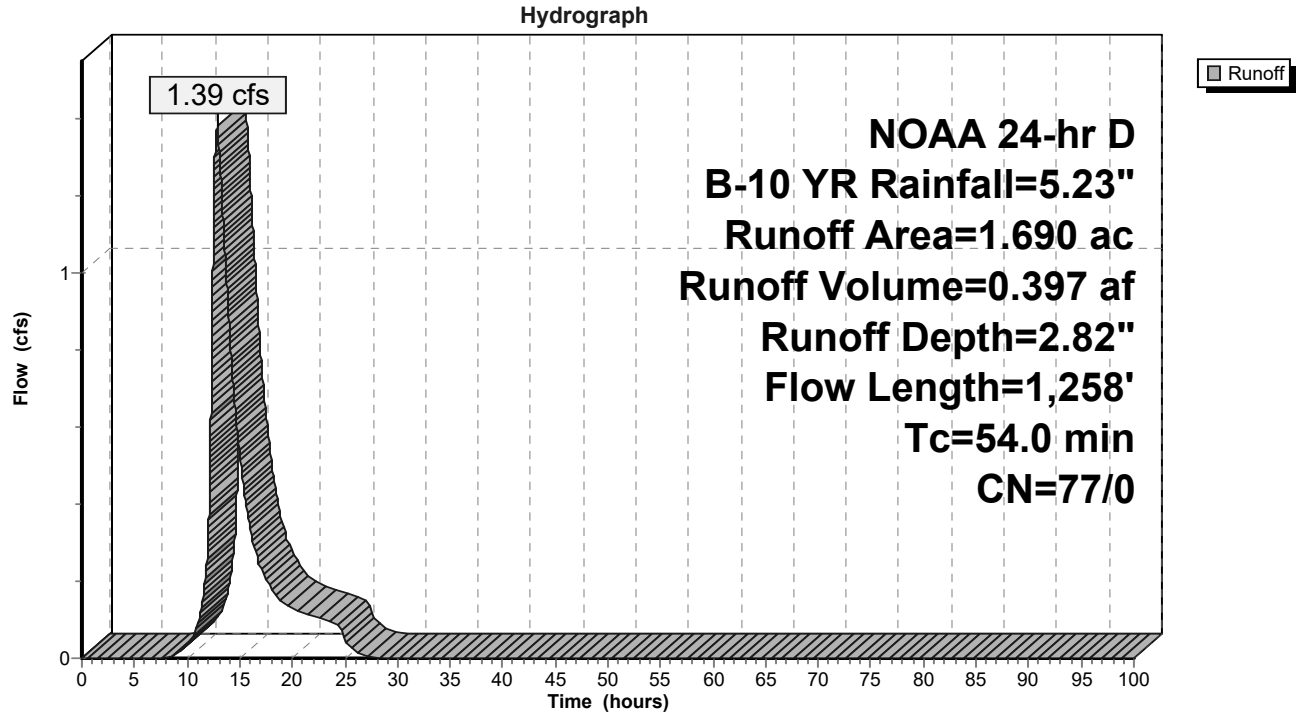
Runoff = 1.39 cfs @ 12.84 hrs, Volume= 0.397 af, Depth= 2.82"

Runoff by SCS TR-20 method, UH=Delmarva, Split Pervious/Imperv. UI as Pervious, Time Span= 0.00-100.00 hrs, dt=
NOAA 24-hr D B-10 YR Rainfall=5.23"

Area (ac)	CN	Description
1.690	77	Woods, Good, HSG D
1.690	77	100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
22.1	100	0.0173	0.08		**Sheet Flow, ED-2 SHEET** Woods: Light underbrush n= 0.400 P2= 3.38"
13.4	530	0.0173	0.66		**Shallow Concentrated Flow, ED-2 SHALLOW** Woodland Kv= 5.0 fps
18.5	628	0.0128	0.57		**Shallow Concentrated Flow, EU-2** Woodland Kv= 5.0 fps
54.0	1,258	Total			

Subcatchment ED-2: ED-2



Summary for Subcatchment ED-3: ED-3

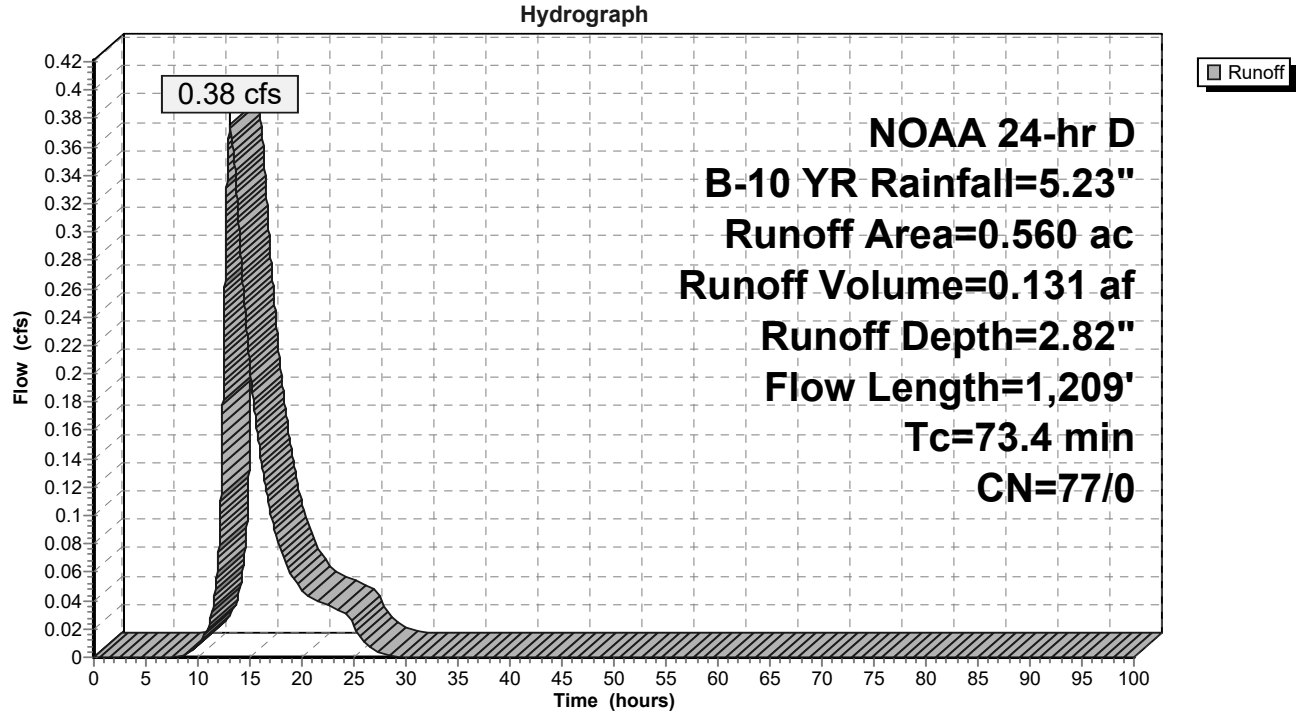
Runoff = 0.38 cfs @ 13.05 hrs, Volume= 0.131 af, Depth= 2.82"

Runoff by SCS TR-20 method, UH=Delmarva, Split Pervious/Imperv. UI as Pervious, Time Span= 0.00-100.00 hrs, dt=
NOAA 24-hr D B-10 YR Rainfall=5.23"

Area (ac)	CN	Description
0.560	77	Woods, Good, HSG D
0.560	77	100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
20.1	100	0.0220	0.08		**Sheet Flow, Sheet Flow** Woods: Light underbrush n= 0.400 P2= 3.38"
0.7	30	0.0223	0.75		**Shallow Concentrated Flow, Shallow** Woodland Kv= 5.0 fps
24.5	100	0.0135	0.07		**Sheet Flow, EU-1 SHEET** Woods: Light underbrush n= 0.400 P2= 3.38"
28.1	979	0.0135	0.58		**Shallow Concentrated Flow, EU-1** Woodland Kv= 5.0 fps
73.4	1,209	Total			

Subcatchment ED-3: ED-3



Summary for Subcatchment EO-1: EO-1

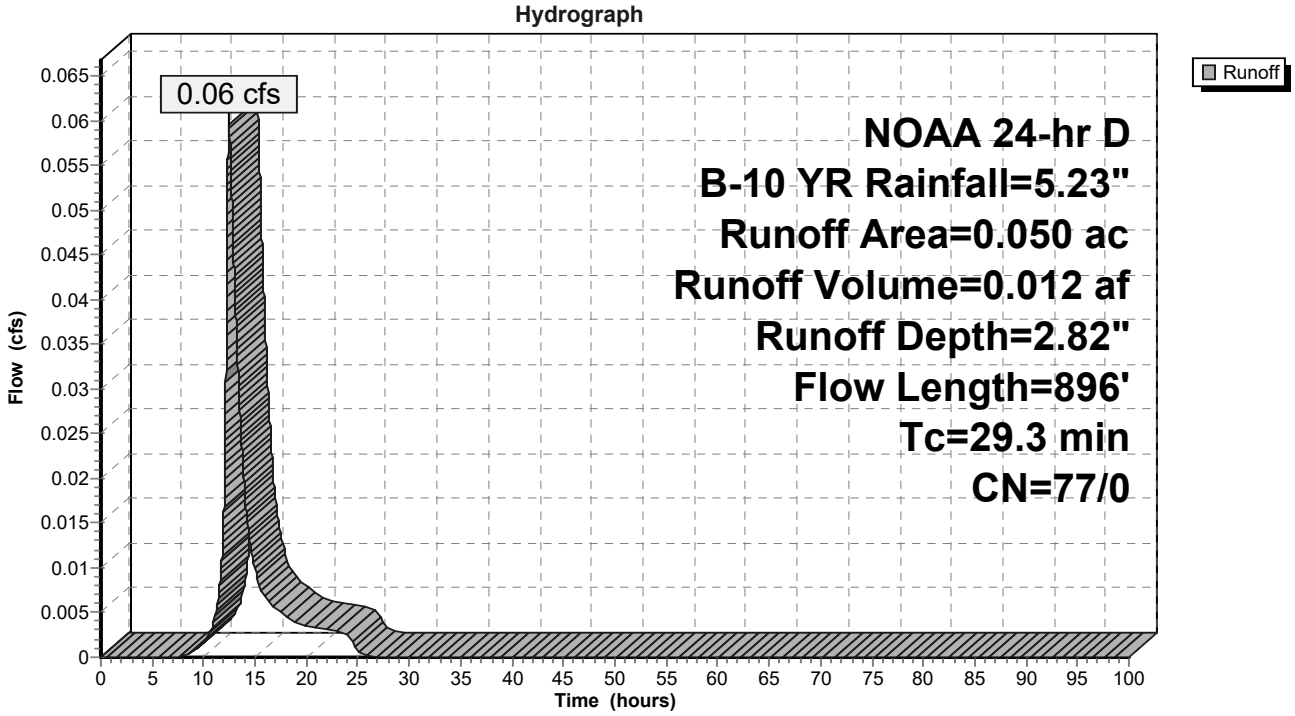
Runoff = 0.06 cfs @ 12.44 hrs, Volume= 0.012 af, Depth= 2.82"

Runoff by SCS TR-20 method, UH=Delmarva, Split Pervious/Imperv. UI as Pervious, Time Span= 0.00-100.00 hrs, dt=
NOAA 24-hr D B-10 YR Rainfall=5.23"

Area (ac)	CN	Description
0.050	77	Woods, Good, HSG D
0.050	77	100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
11.9	682	0.0365	0.96		**Shallow Concentrated Flow, EU-1** Woodland Kv= 5.0 fps
0.7	110	0.3130	2.80		**Shallow Concentrated Flow, ED-1B** Woodland Kv= 5.0 fps
7.6	27	0.0185	0.06		**Sheet Flow, ED-1A** Woods: Light underbrush n= 0.400 P2= 3.38"
9.1	77	0.0960	0.14		**Sheet Flow, EO-1** Woods: Light underbrush n= 0.400 P2= 3.38"
29.3	896	Total			

Subcatchment EO-1: EO-1



Summary for Subcatchment EO-2I: EO-2 Impv.

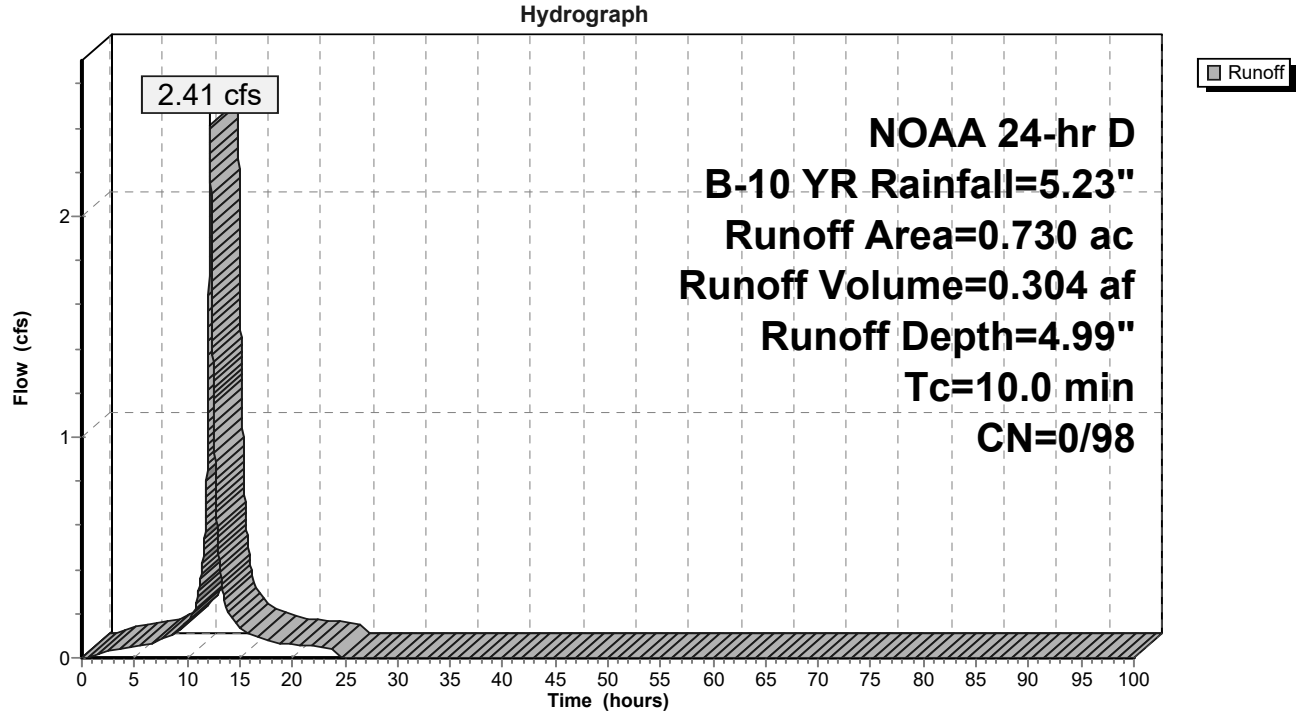
Runoff = 2.41 cfs @ 12.18 hrs, Volume= 0.304 af, Depth= 4.99"

Runoff by SCS TR-20 method, UH=Delmarva, Split Pervious/Imperv. UI as Pervious, Time Span= 0.00-100.00 hrs, dt=
NOAA 24-hr D B-10 YR Rainfall=5.23"

Area (ac)	CN	Description
0.730	98	Paved parking, HSG D
0.730	98	100.00% Impervious Area

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

Subcatchment EO-2I: EO-2 Impv.



Summary for Subcatchment EO-2P: EO-2 Perv.

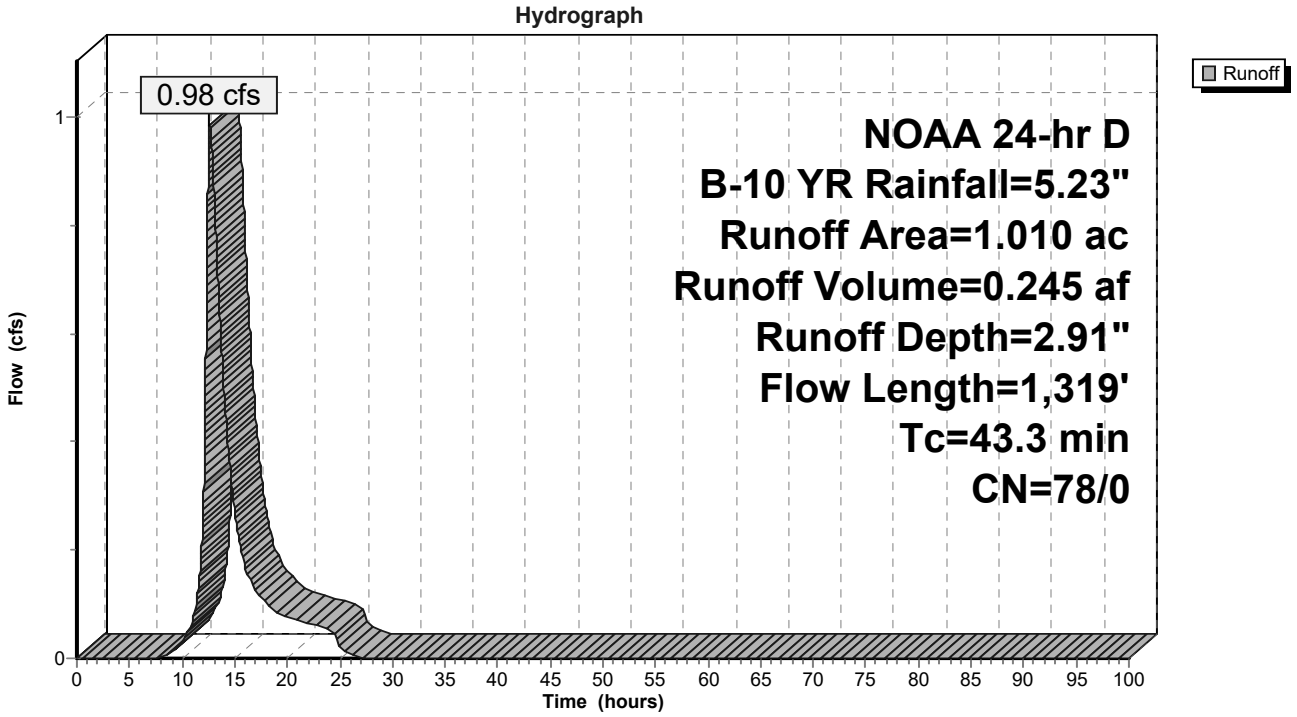
Runoff = 0.98 cfs @ 12.61 hrs, Volume= 0.245 af, Depth= 2.91"

Runoff by SCS TR-20 method, UH=Delmarva, Split Pervious/Imperv. UI as Pervious, Time Span= 0.00-100.00 hrs, dt=
NOAA 24-hr D B-10 YR Rainfall=5.23"

Area (ac)	CN	Description
0.250	80	>75% Grass cover, Good, HSG D
0.760	77	Woods, Good, HSG D
1.010	78	Weighted Average
1.010	78	100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
18.5	628	0.0128	0.57		**Shallow Concentrated Flow, EU-2** Woodland Kv= 5.0 fps
8.8	347	0.0173	0.66		**Shallow Concentrated Flow, ED-2** Woodland Kv= 5.0 fps
9.8	100	0.0189	0.17		**Sheet Flow, EO-2** Grass: Short n= 0.150 P2= 3.38"
0.1	61	0.1890	8.83		**Shallow Concentrated Flow, EO-2 PAVED** Paved Kv= 20.3 fps
1.6	140	0.0010	1.48	1.43	**Pipe Channel, EO-2 PIPE FLOW** 15.0" Round w/ 4.0" inside fill Area= 1.0 sf Perim= 3.7' r= 0.26' n= 0.013 Concrete pipe, bends & connections
4.5	43	0.0010	0.16		**Shallow Concentrated Flow, EO-2 FES** Woodland Kv= 5.0 fps
43.3	1,319	Total			

Subcatchment EO-2P: EO-2 Perv.



Summary for Subcatchment EU-1: EU-1

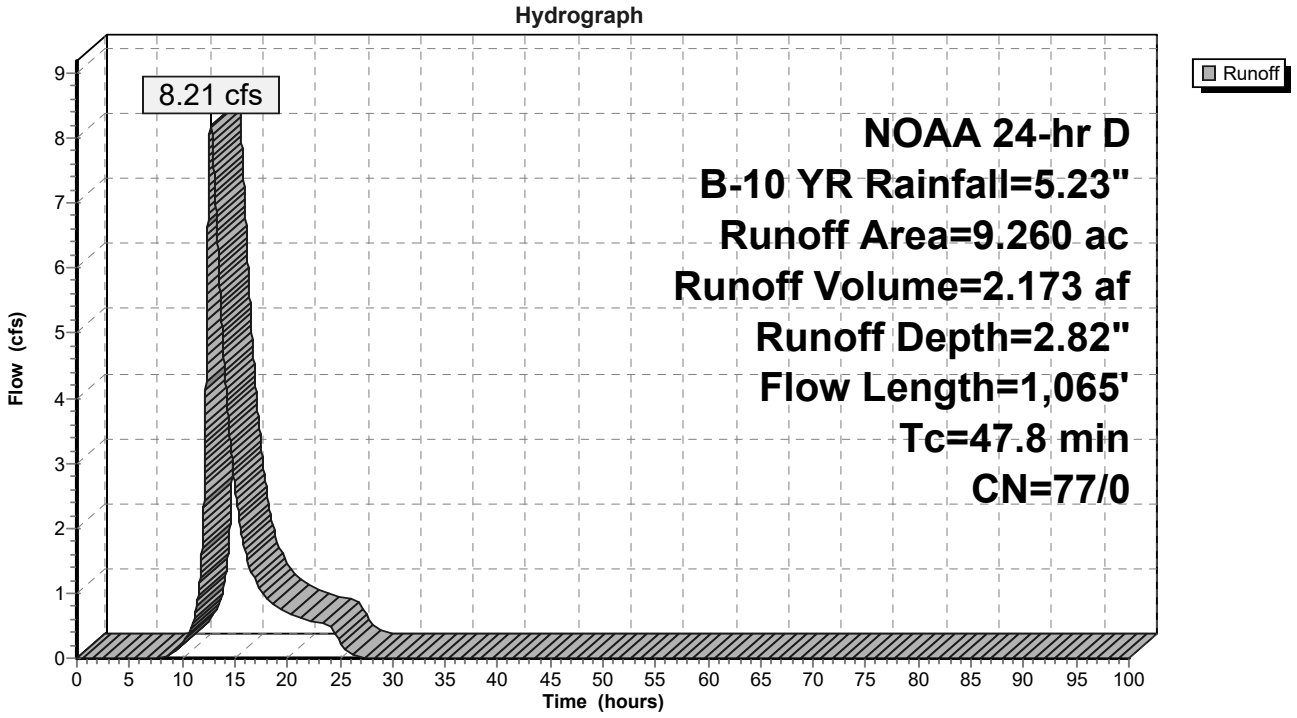
Runoff = 8.21 cfs @ 12.74 hrs, Volume= 2.173 af, Depth= 2.82"

Runoff by SCS TR-20 method, UH=Delmarva, Split Pervious/Imperv. UI as Pervious, Time Span= 0.00-100.00 hrs, dt=
NOAA 24-hr D B-10 YR Rainfall=5.23"

Area (ac)	CN	Description
9.260	77	Woods, Good, HSG D
9.260	77	100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
24.2	100	0.0139	0.07		**Sheet Flow, EU-2** Woods: Light underbrush n= 0.400 P2= 3.38"
23.6	965	0.0185	0.68		**Shallow Concentrated Flow, EU-2** Woodland Kv= 5.0 fps
47.8	1,065	Total			

Subcatchment EU-1: EU-1

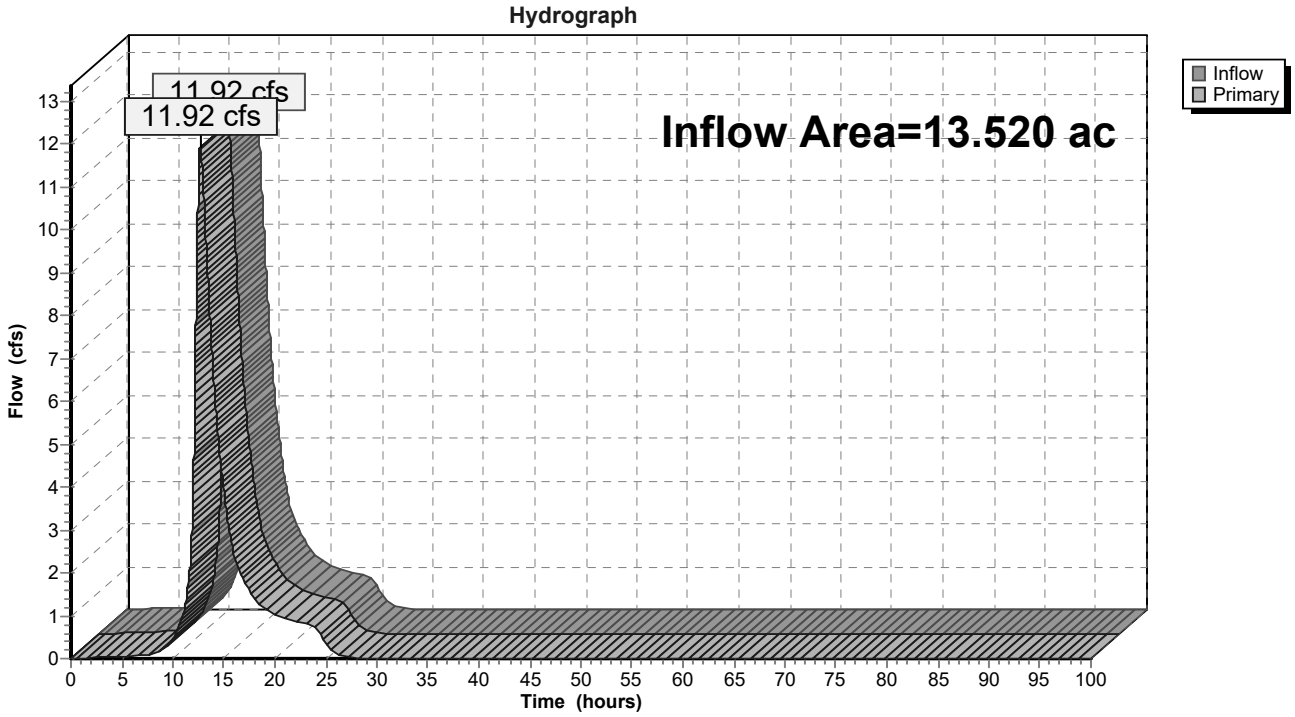


Summary for Link DP: DP

Inflow Area = 13.520 ac, 5.40% Impervious, Inflow Depth = 2.94" for B-10 YR event
Inflow = 11.92 cfs @ 12.65 hrs, Volume= 3.313 af
Primary = 11.92 cfs @ 12.65 hrs, Volume= 3.313 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-100.00 hrs, dt= 0.01 hrs

Link DP: DP

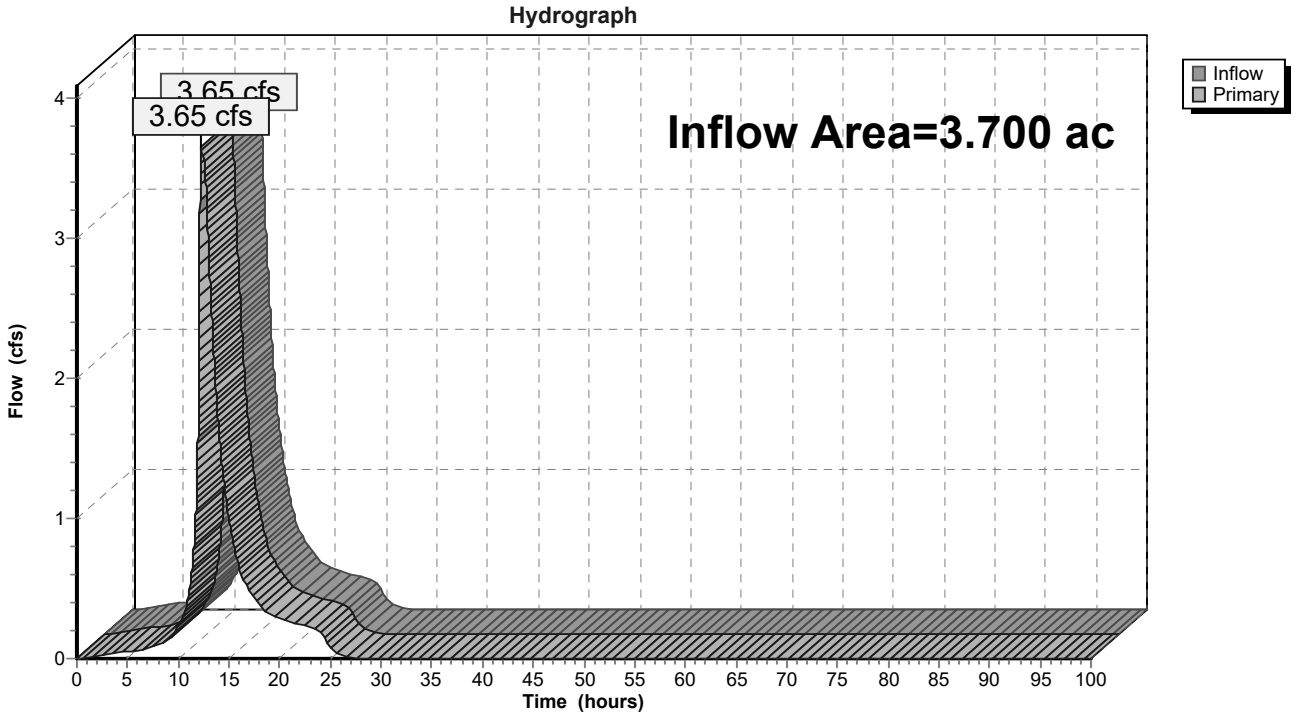


Summary for Link POA-1: POA-1

Inflow Area = 3.700 ac, 19.73% Impervious, Inflow Depth = 3.27" for B-10 YR event
Inflow = 3.65 cfs @ 12.22 hrs, Volume= 1.009 af
Primary = 3.65 cfs @ 12.22 hrs, Volume= 1.009 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-100.00 hrs, dt= 0.01 hrs

Link POA-1: POA-1

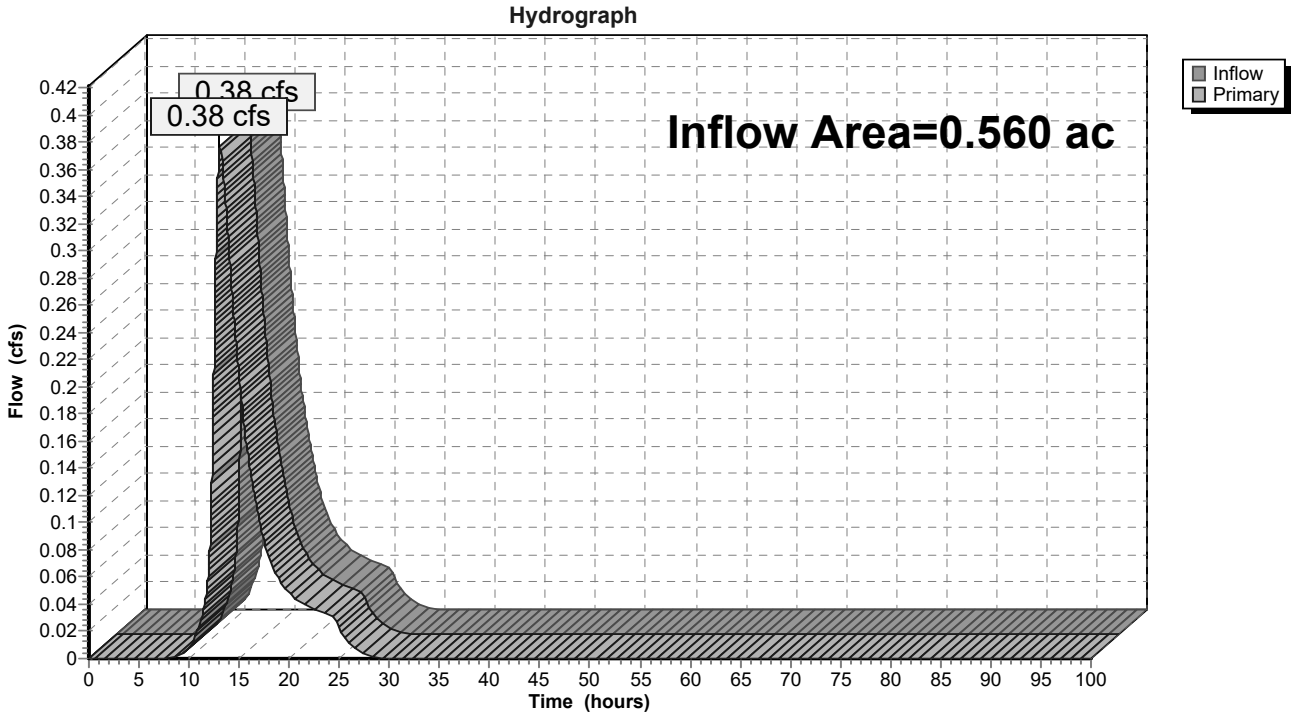


Summary for Link POA-2: POA-2

Inflow Area = 0.560 ac, 0.00% Impervious, Inflow Depth = 2.82" for B-10 YR event
Inflow = 0.38 cfs @ 13.05 hrs, Volume= 0.131 af
Primary = 0.38 cfs @ 13.05 hrs, Volume= 0.131 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-100.00 hrs, dt= 0.01 hrs

Link POA-2: POA-2



Time span=0.00-100.00 hrs, dt=0.01 hrs, 10001 points
Runoff by SCS TR-20 method, UH=Delmarva, Split Pervious/Imperv. UI as Pervious
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Subcatchment ED-1: ED-1 Runoff Area=0.220 ac 0.00% Impervious Runoff Depth=3.95"
Flow Length=137' Tc=22.3 min CN=77/0 Runoff=0.43 cfs 0.072 af

Subcatchment ED-2: ED-2 Runoff Area=1.690 ac 0.00% Impervious Runoff Depth=3.95"
Flow Length=1,258' Tc=54.0 min CN=77/0 Runoff=1.96 cfs 0.556 af

Subcatchment ED-3: ED-3 Runoff Area=0.560 ac 0.00% Impervious Runoff Depth=3.95"
Flow Length=1,209' Tc=73.4 min CN=77/0 Runoff=0.53 cfs 0.184 af

Subcatchment EO-1: EO-1 Runoff Area=0.050 ac 0.00% Impervious Runoff Depth=3.95"
Flow Length=896' Tc=29.3 min CN=77/0 Runoff=0.08 cfs 0.016 af

Subcatchment EO-2I: EO-2 Impv. Runoff Area=0.730 ac 100.00% Impervious Runoff Depth=6.29"
Tc=10.0 min CN=0/98 Runoff=3.02 cfs 0.383 af

Subcatchment EO-2P: EO-2 Perv. Runoff Area=1.010 ac 0.00% Impervious Runoff Depth=4.05"
Flow Length=1,319' Tc=43.3 min CN=78/0 Runoff=1.38 cfs 0.341 af

Subcatchment EU-1: EU-1 Runoff Area=9.260 ac 0.00% Impervious Runoff Depth=3.95"
Flow Length=1,065' Tc=47.8 min CN=77/0 Runoff=11.59 cfs 3.045 af

Link DP: DP Inflow=16.75 cfs 4.597 af
Primary=16.75 cfs 4.597 af

Link POA-1: POA-1 Inflow=4.89 cfs 1.368 af
Primary=4.89 cfs 1.368 af

Link POA-2: POA-2 Inflow=0.53 cfs 0.184 af
Primary=0.53 cfs 0.184 af

Total Runoff Area = 13.520 ac Runoff Volume = 4.597 af Average Runoff Depth = 4.08"
94.60% Pervious = 12.790 ac 5.40% Impervious = 0.730 ac

Summary for Subcatchment ED-1: ED-1

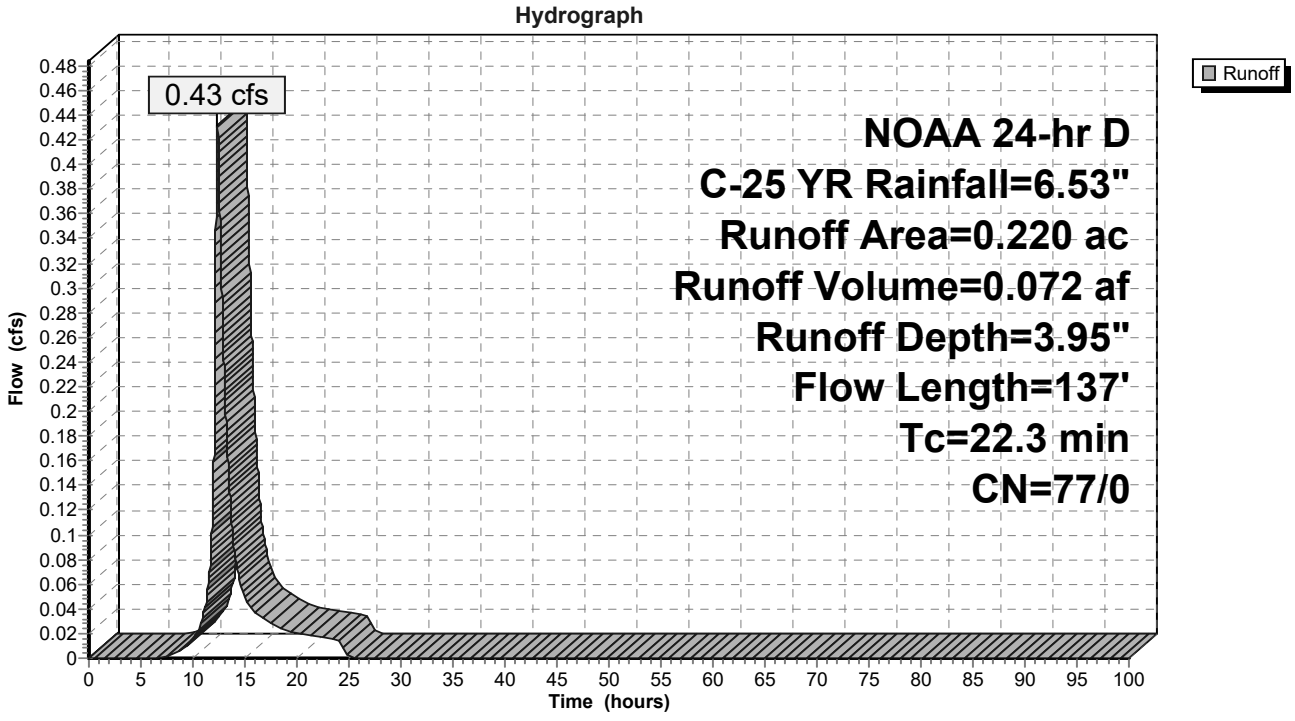
Runoff = 0.43 cfs @ 12.34 hrs, Volume= 0.072 af, Depth= 3.95"

Runoff by SCS TR-20 method, UH=Delmarva, Split Pervious/Imperv. UI as Pervious, Time Span= 0.00-100.00 hrs, dt=
NOAA 24-hr D C-25 YR Rainfall=6.53"

Area (ac)	CN	Description
0.220	77	Woods, Good, HSG D
0.220	77	100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
21.6	100	0.0185	0.08		**Sheet Flow, ED-1 SHEET** Woods: Light underbrush n= 0.400 P2= 3.38"
0.7	37	0.0313	0.88		**Shallow Concentrated Flow, ED-1** Woodland Kv= 5.0 fps
22.3	137	Total			

Subcatchment ED-1: ED-1



Summary for Subcatchment ED-2: ED-2

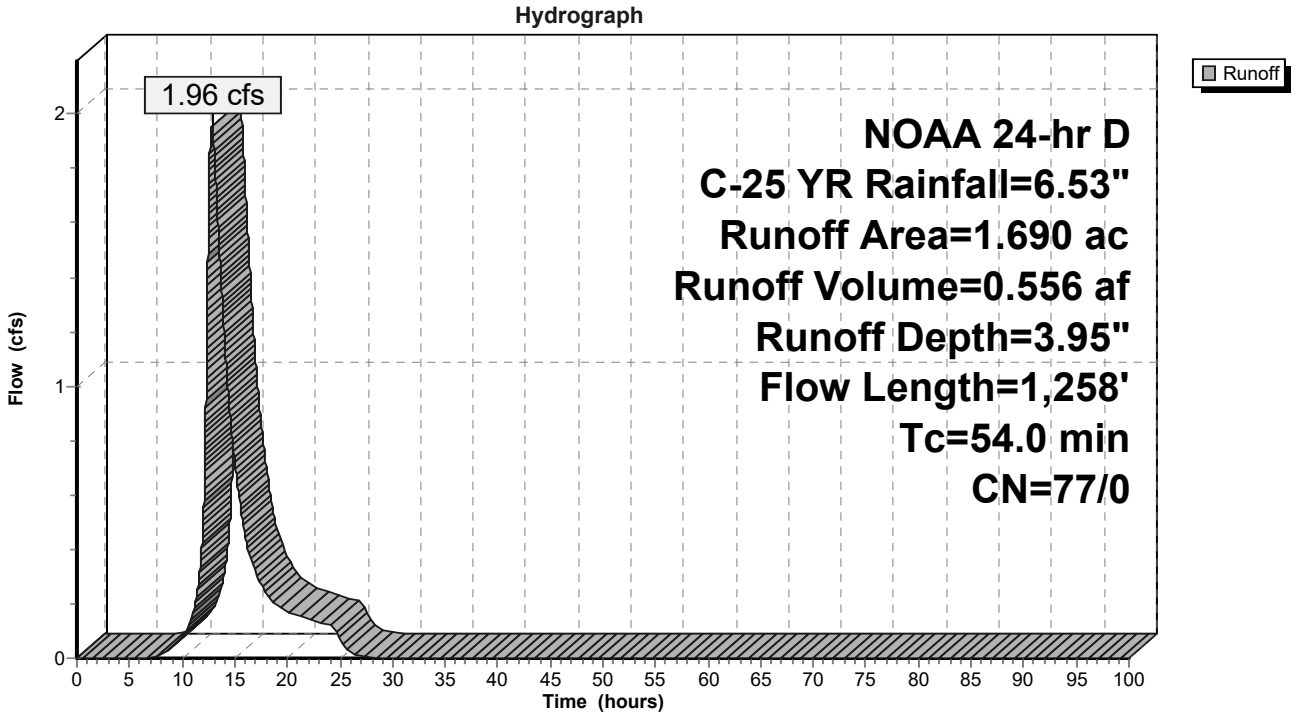
Runoff = 1.96 cfs @ 12.83 hrs, Volume= 0.556 af, Depth= 3.95"

Runoff by SCS TR-20 method, UH=Delmarva, Split Pervious/Imperv. UI as Pervious, Time Span= 0.00-100.00 hrs, dt=
NOAA 24-hr D C-25 YR Rainfall=6.53"

Area (ac)	CN	Description
1.690	77	Woods, Good, HSG D
1.690	77	100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
22.1	100	0.0173	0.08		**Sheet Flow, ED-2 SHEET** Woods: Light underbrush n= 0.400 P2= 3.38"
13.4	530	0.0173	0.66		**Shallow Concentrated Flow, ED-2 SHALLOW** Woodland Kv= 5.0 fps
18.5	628	0.0128	0.57		**Shallow Concentrated Flow, EU-2** Woodland Kv= 5.0 fps
54.0	1,258	Total			

Subcatchment ED-2: ED-2



Summary for Subcatchment ED-3: ED-3

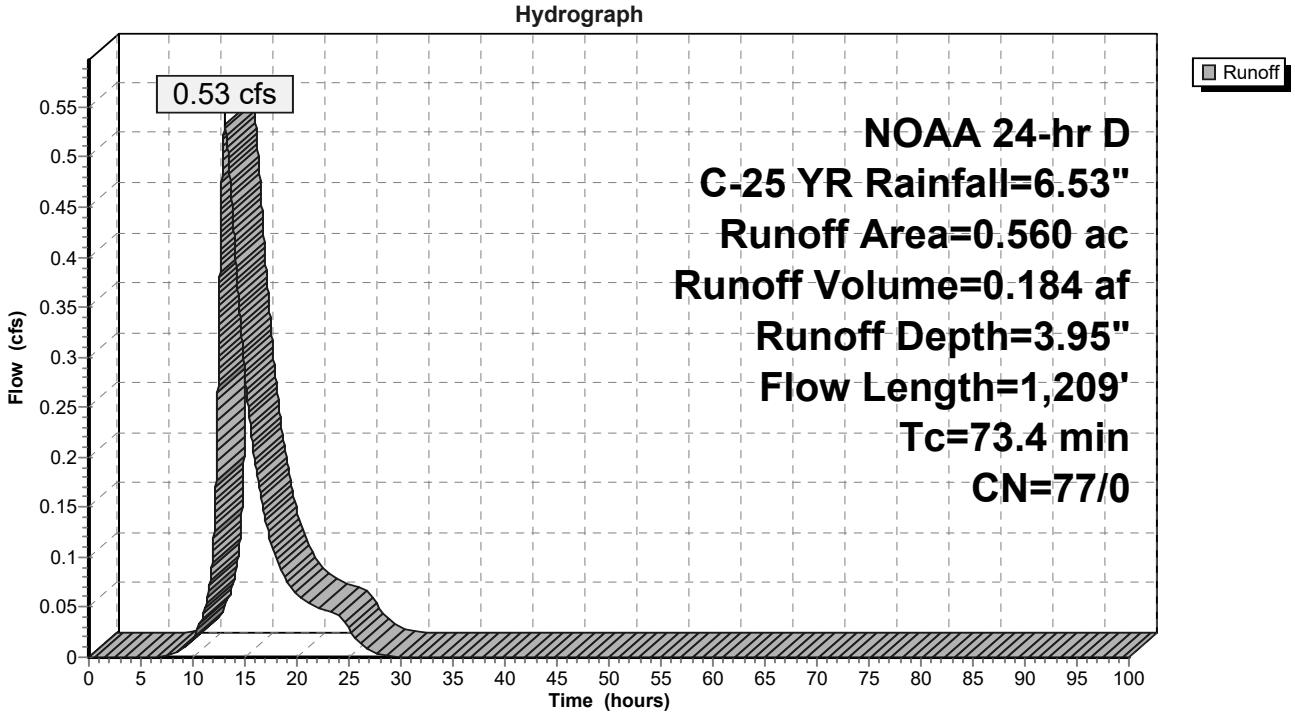
Runoff = 0.53 cfs @ 13.05 hrs, Volume= 0.184 af, Depth= 3.95"

Runoff by SCS TR-20 method, UH=Delmarva, Split Pervious/Imperv. UI as Pervious, Time Span= 0.00-100.00 hrs, dt=
NOAA 24-hr D C-25 YR Rainfall=6.53"

Area (ac)	CN	Description
0.560	77	Woods, Good, HSG D
0.560	77	100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
20.1	100	0.0220	0.08		**Sheet Flow, Sheet Flow** Woods: Light underbrush n= 0.400 P2= 3.38"
0.7	30	0.0223	0.75		**Shallow Concentrated Flow, Shallow** Woodland Kv= 5.0 fps
24.5	100	0.0135	0.07		**Sheet Flow, EU-1 SHEET** Woods: Light underbrush n= 0.400 P2= 3.38"
28.1	979	0.0135	0.58		**Shallow Concentrated Flow, EU-1** Woodland Kv= 5.0 fps
73.4	1,209	Total			

Subcatchment ED-3: ED-3



Summary for Subcatchment EO-1: EO-1

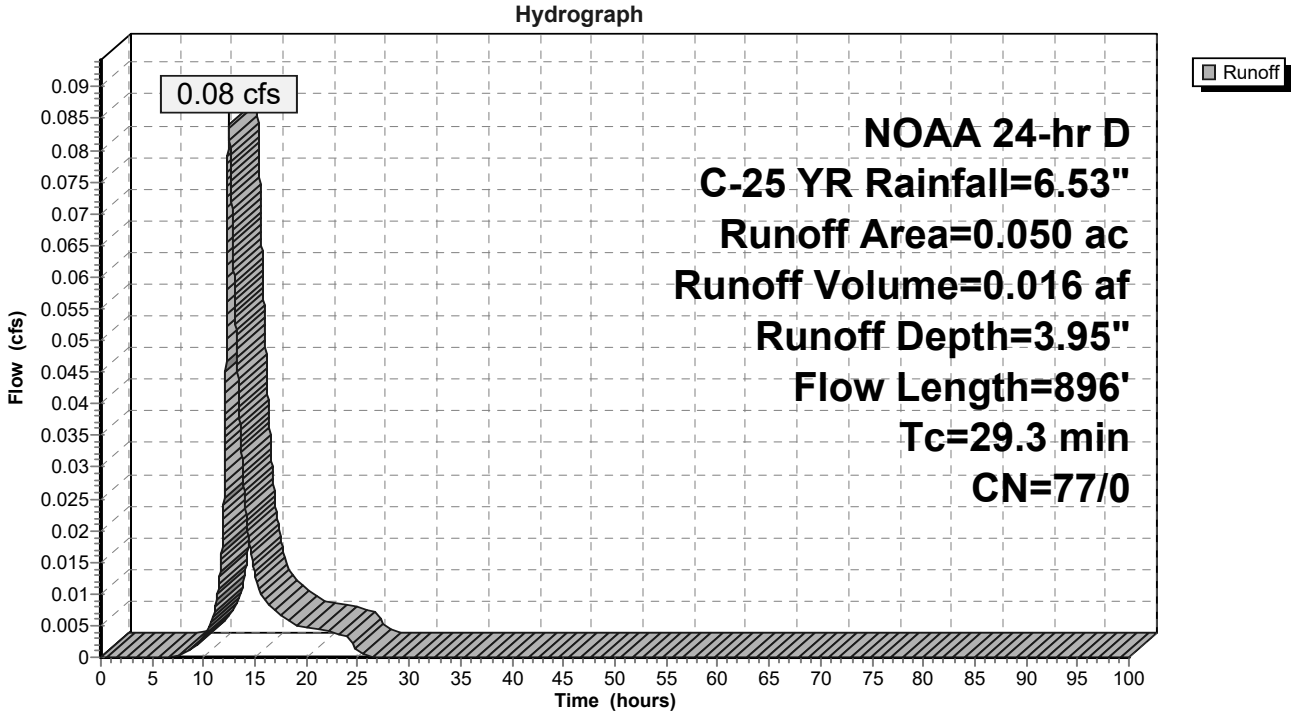
Runoff = 0.08 cfs @ 12.44 hrs, Volume= 0.016 af, Depth= 3.95"

Runoff by SCS TR-20 method, UH=Delmarva, Split Pervious/Imperv. UI as Pervious, Time Span= 0.00-100.00 hrs, dt=
NOAA 24-hr D C-25 YR Rainfall=6.53"

Area (ac)	CN	Description
0.050	77	Woods, Good, HSG D
0.050	77	100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
11.9	682	0.0365	0.96		**Shallow Concentrated Flow, EU-1** Woodland Kv= 5.0 fps
0.7	110	0.3130	2.80		**Shallow Concentrated Flow, ED-1B** Woodland Kv= 5.0 fps
7.6	27	0.0185	0.06		**Sheet Flow, ED-1A** Woods: Light underbrush n= 0.400 P2= 3.38"
9.1	77	0.0960	0.14		**Sheet Flow, EO-1** Woods: Light underbrush n= 0.400 P2= 3.38"
29.3	896	Total			

Subcatchment EO-1: EO-1



Summary for Subcatchment EO-2I: EO-2 Impv.

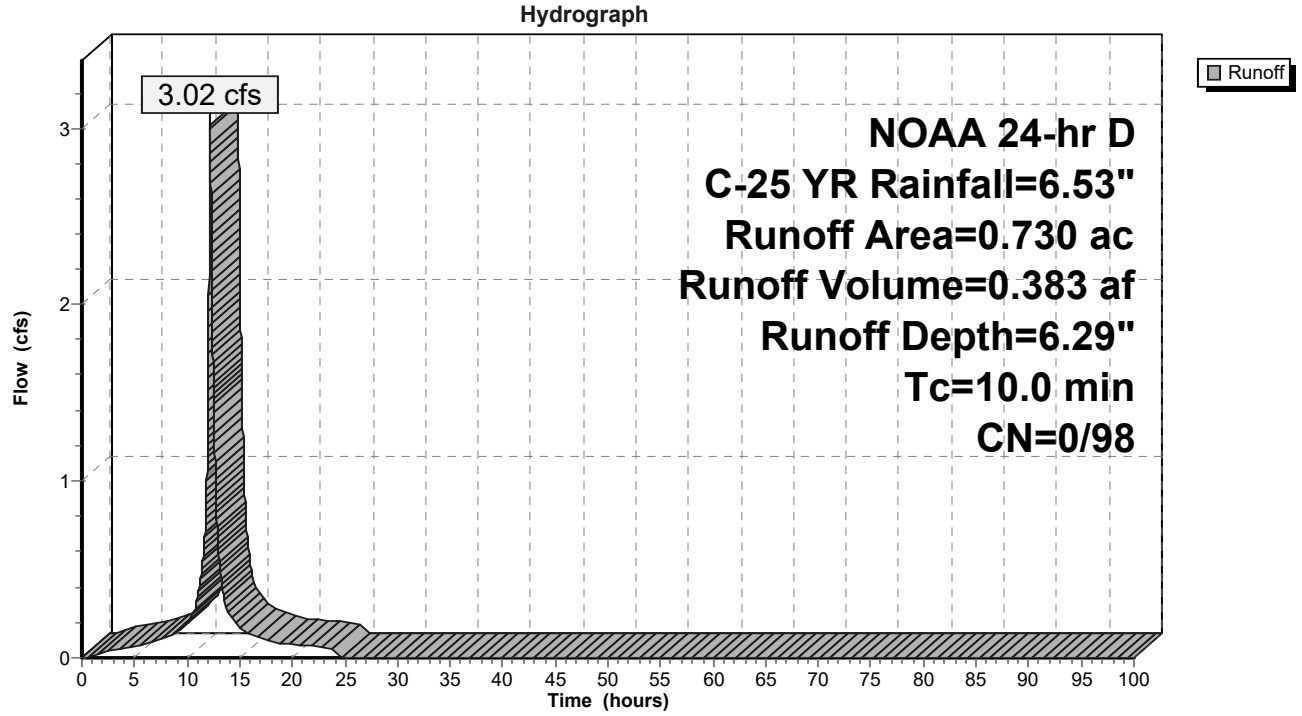
Runoff = 3.02 cfs @ 12.18 hrs, Volume= 0.383 af, Depth= 6.29"

Runoff by SCS TR-20 method, UH=Delmarva, Split Pervious/Imperv. UI as Pervious, Time Span= 0.00-100.00 hrs, dt=
NOAA 24-hr D C-25 YR Rainfall=6.53"

Area (ac)	CN	Description
0.730	98	Paved parking, HSG D
0.730	98	100.00% Impervious Area

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

Subcatchment EO-2I: EO-2 Impv.



Summary for Subcatchment EO-2P: EO-2 Perv.

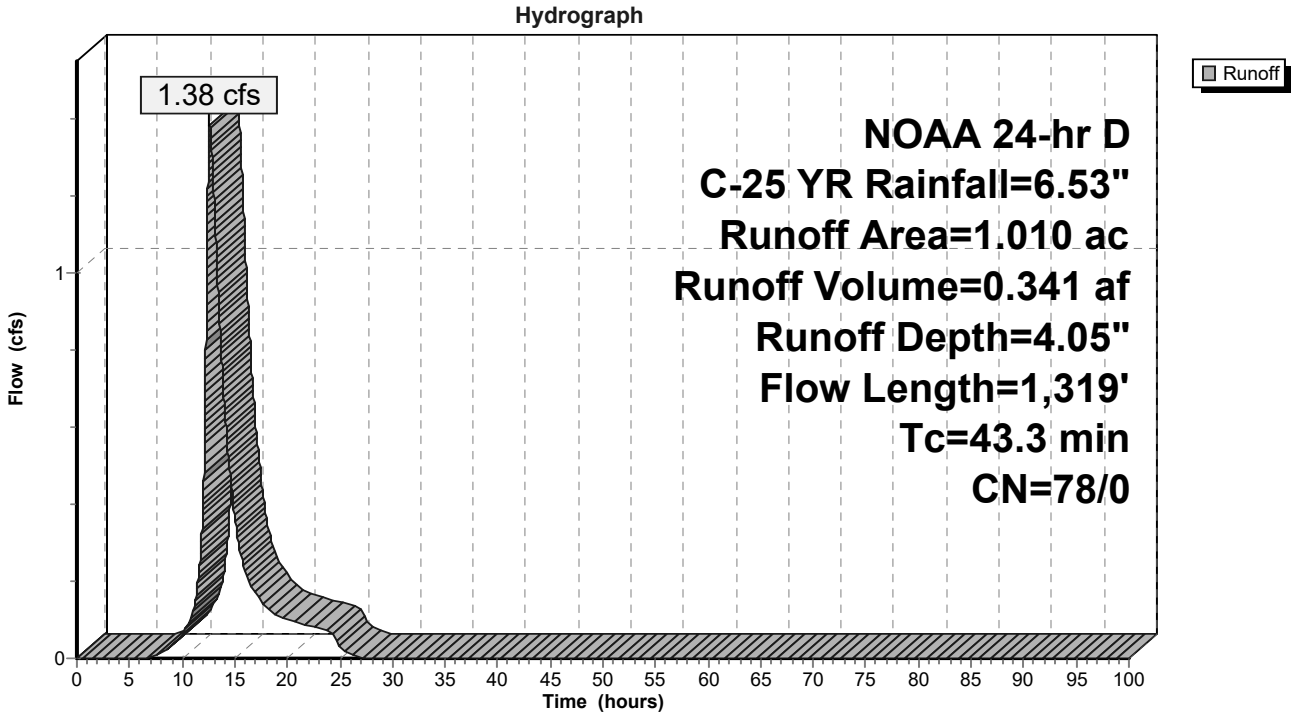
Runoff = 1.38 cfs @ 12.61 hrs, Volume= 0.341 af, Depth= 4.05"

Runoff by SCS TR-20 method, UH=Delmarva, Split Pervious/Imperv. UI as Pervious, Time Span= 0.00-100.00 hrs, dt=
NOAA 24-hr D C-25 YR Rainfall=6.53"

Area (ac)	CN	Description
0.250	80	>75% Grass cover, Good, HSG D
0.760	77	Woods, Good, HSG D
1.010	78	Weighted Average
1.010	78	100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
18.5	628	0.0128	0.57		**Shallow Concentrated Flow, EU-2** Woodland Kv= 5.0 fps
8.8	347	0.0173	0.66		**Shallow Concentrated Flow, ED-2** Woodland Kv= 5.0 fps
9.8	100	0.0189	0.17		**Sheet Flow, EO-2** Grass: Short n= 0.150 P2= 3.38"
0.1	61	0.1890	8.83		**Shallow Concentrated Flow, EO-2 PAVED** Paved Kv= 20.3 fps
1.6	140	0.0010	1.48	1.43	**Pipe Channel, EO-2 PIPE FLOW** 15.0" Round w/ 4.0" inside fill Area= 1.0 sf Perim= 3.7' r= 0.26' n= 0.013 Concrete pipe, bends & connections
4.5	43	0.0010	0.16		**Shallow Concentrated Flow, EO-2 FES** Woodland Kv= 5.0 fps
43.3	1,319	Total			

Subcatchment EO-2P: EO-2 Perv.



Summary for Subcatchment EU-1: EU-1

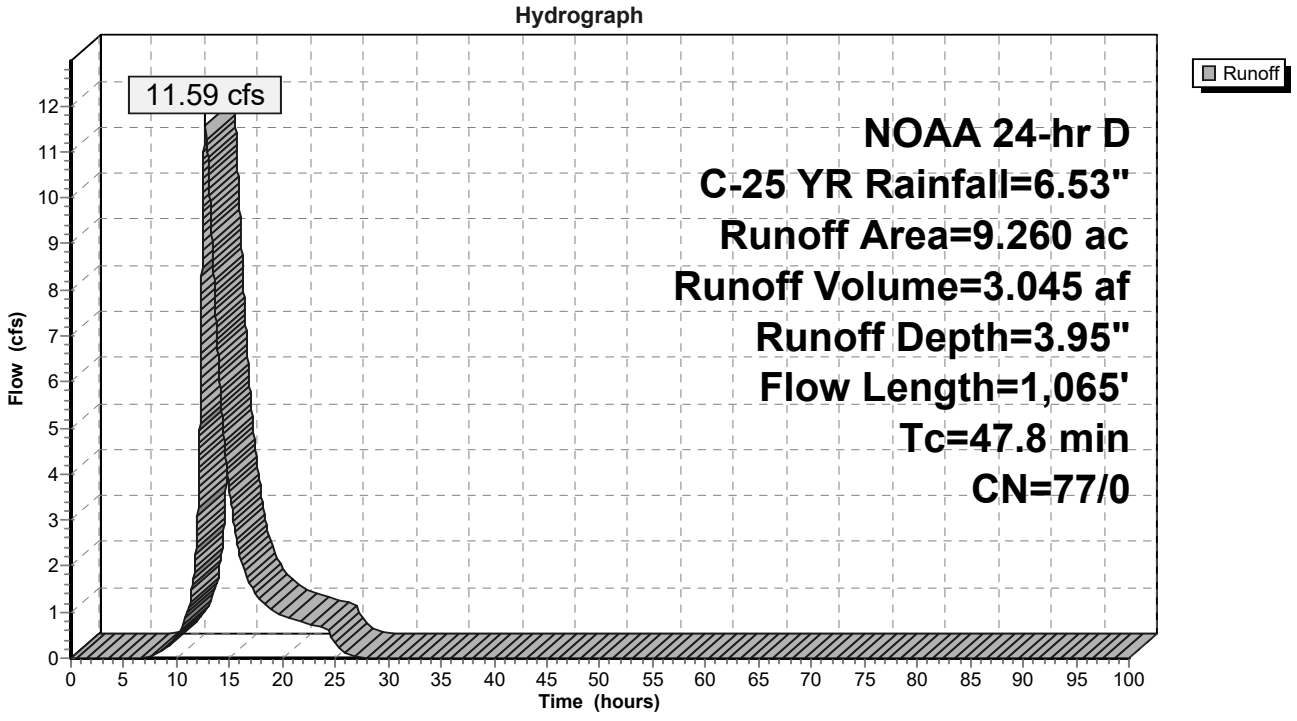
Runoff = 11.59 cfs @ 12.74 hrs, Volume= 3.045 af, Depth= 3.95"

Runoff by SCS TR-20 method, UH=Delmarva, Split Pervious/Imperv. UI as Pervious, Time Span= 0.00-100.00 hrs, dt=
NOAA 24-hr D C-25 YR Rainfall=6.53"

Area (ac)	CN	Description
9.260	77	Woods, Good, HSG D
9.260	77	100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
24.2	100	0.0139	0.07		**Sheet Flow, EU-2** Woods: Light underbrush n= 0.400 P2= 3.38"
23.6	965	0.0185	0.68		**Shallow Concentrated Flow, EU-2** Woodland Kv= 5.0 fps
47.8	1,065	Total			

Subcatchment EU-1: EU-1

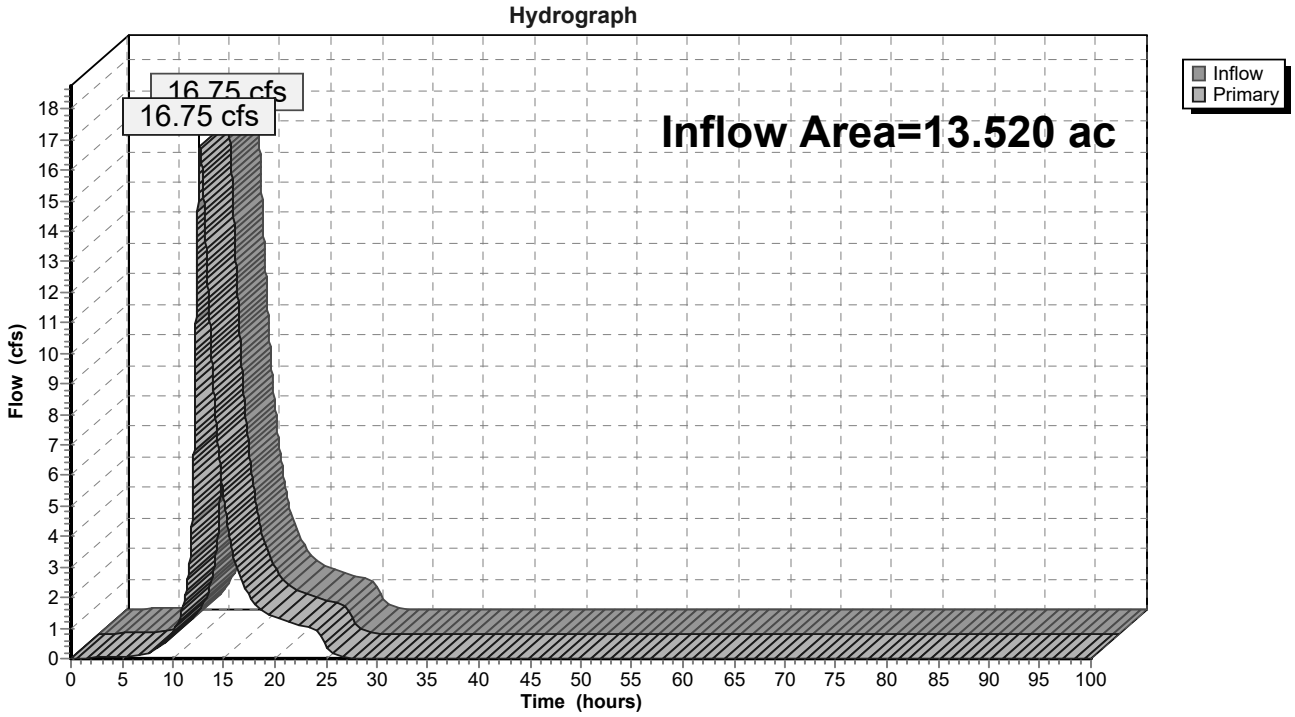


Summary for Link DP: DP

Inflow Area = 13.520 ac, 5.40% Impervious, Inflow Depth = 4.08" for C-25 YR event
Inflow = 16.75 cfs @ 12.64 hrs, Volume= 4.597 af
Primary = 16.75 cfs @ 12.64 hrs, Volume= 4.597 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-100.00 hrs, dt= 0.01 hrs

Link DP: DP

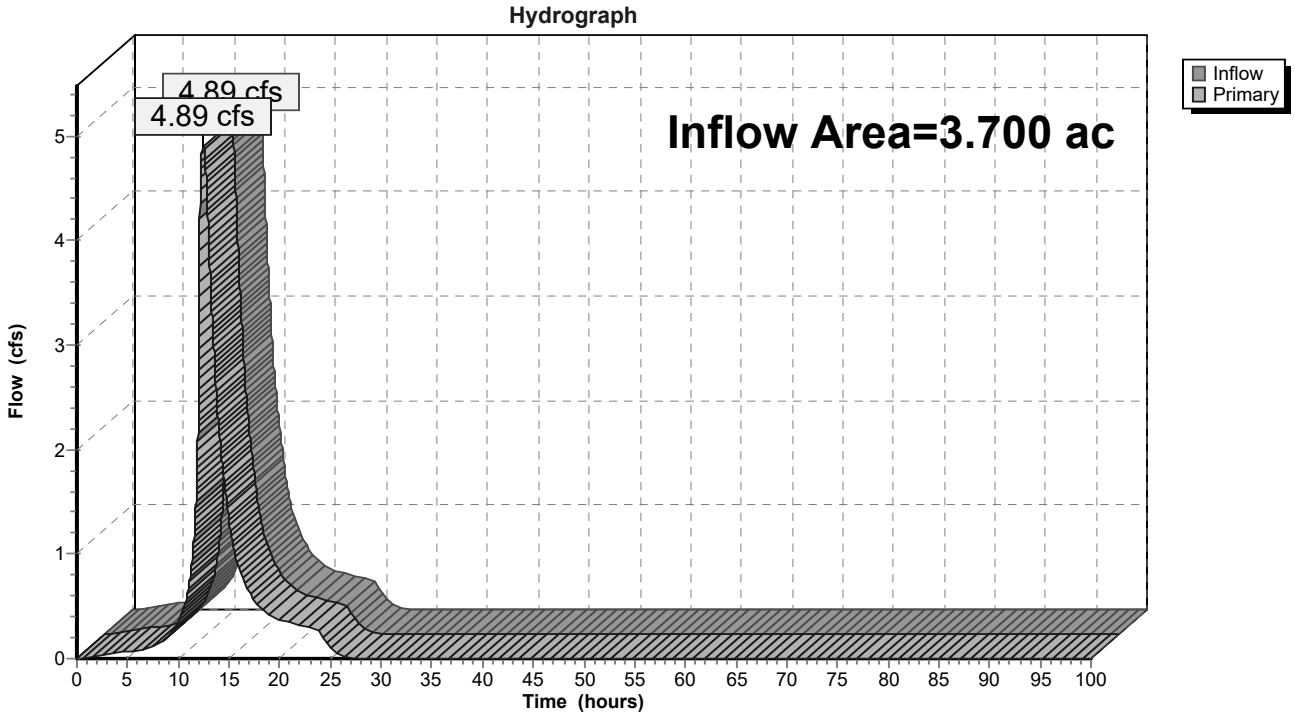


Summary for Link POA-1: POA-1

Inflow Area = 3.700 ac, 19.73% Impervious, Inflow Depth = 4.44" for C-25 YR event
Inflow = 4.89 cfs @ 12.51 hrs, Volume= 1.368 af
Primary = 4.89 cfs @ 12.51 hrs, Volume= 1.368 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-100.00 hrs, dt= 0.01 hrs

Link POA-1: POA-1

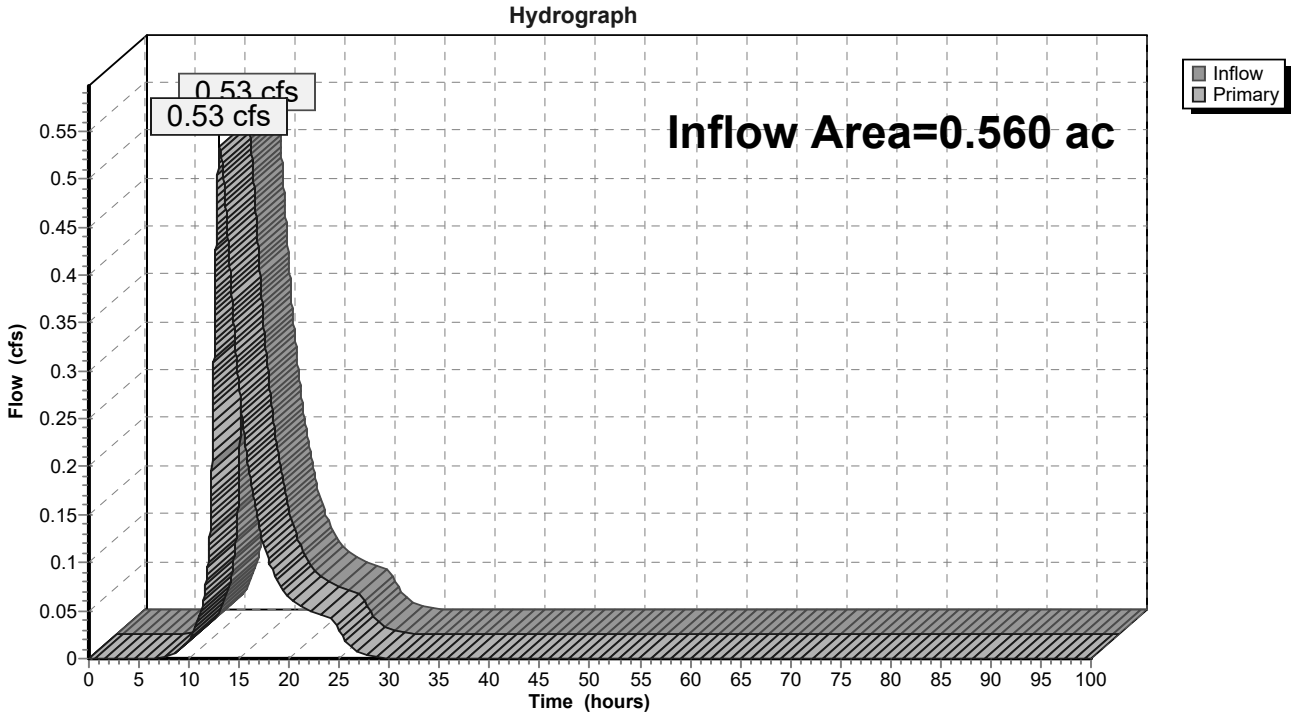


Summary for Link POA-2: POA-2

Inflow Area = 0.560 ac, 0.00% Impervious, Inflow Depth = 3.95" for C-25 YR event
Inflow = 0.53 cfs @ 13.05 hrs, Volume= 0.184 af
Primary = 0.53 cfs @ 13.05 hrs, Volume= 0.184 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-100.00 hrs, dt= 0.01 hrs

Link POA-2: POA-2



Time span=0.00-100.00 hrs, dt=0.01 hrs, 10001 points
Runoff by SCS TR-20 method, UH=Delmarva, Split Pervious/Imperv. UI as Pervious
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Subcatchment ED-1: ED-1 Runoff Area=0.220 ac 0.00% Impervious Runoff Depth=6.14"
Flow Length=137' Tc=22.3 min CN=77/0 Runoff=0.67 cfs 0.113 af

Subcatchment ED-2: ED-2 Runoff Area=1.690 ac 0.00% Impervious Runoff Depth=6.14"
Flow Length=1,258' Tc=54.0 min CN=77/0 Runoff=3.06 cfs 0.865 af

Subcatchment ED-3: ED-3 Runoff Area=0.560 ac 0.00% Impervious Runoff Depth=6.14"
Flow Length=1,209' Tc=73.4 min CN=77/0 Runoff=0.83 cfs 0.287 af

Subcatchment EO-1: EO-1 Runoff Area=0.050 ac 0.00% Impervious Runoff Depth=6.14"
Flow Length=896' Tc=29.3 min CN=77/0 Runoff=0.13 cfs 0.026 af

Subcatchment EO-2I: EO-2 Impv. Runoff Area=0.730 ac 100.00% Impervious Runoff Depth=8.70"
Tc=10.0 min CN=0/98 Runoff=4.14 cfs 0.529 af

Subcatchment EO-2P: EO-2 Perv. Runoff Area=1.010 ac 0.00% Impervious Runoff Depth=6.27"
Flow Length=1,319' Tc=43.3 min CN=78/0 Runoff=2.14 cfs 0.527 af

Subcatchment EU-1: EU-1 Runoff Area=9.260 ac 0.00% Impervious Runoff Depth=6.14"
Flow Length=1,065' Tc=47.8 min CN=77/0 Runoff=18.09 cfs 4.740 af

Link DP: DP Inflow=25.98 cfs 7.087 af
Primary=25.98 cfs 7.087 af

Link POA-1: POA-1 Inflow=7.39 cfs 2.060 af
Primary=7.39 cfs 2.060 af

Link POA-2: POA-2 Inflow=0.83 cfs 0.287 af
Primary=0.83 cfs 0.287 af

Total Runoff Area = 13.520 ac Runoff Volume = 7.087 af Average Runoff Depth = 6.29"
94.60% Pervious = 12.790 ac 5.40% Impervious = 0.730 ac

Summary for Subcatchment ED-1: ED-1

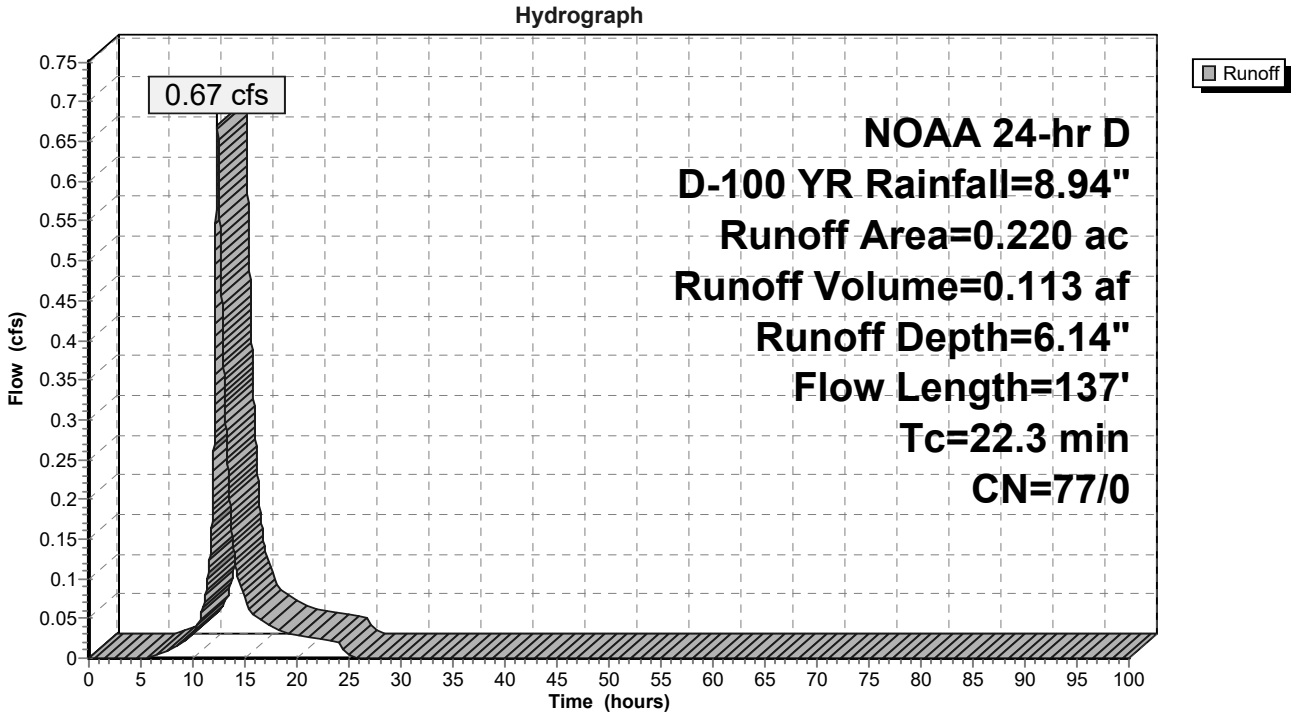
Runoff = 0.67 cfs @ 12.34 hrs, Volume= 0.113 af, Depth= 6.14"

Runoff by SCS TR-20 method, UH=Delmarva, Split Pervious/Imperv. UI as Pervious, Time Span= 0.00-100.00 hrs, dt=
NOAA 24-hr D D-100 YR Rainfall=8.94"

Area (ac)	CN	Description
0.220	77	Woods, Good, HSG D
0.220	77	100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
21.6	100	0.0185	0.08		**Sheet Flow, ED-1 SHEET** Woods: Light underbrush n= 0.400 P2= 3.38"
0.7	37	0.0313	0.88		**Shallow Concentrated Flow, ED-1** Woodland Kv= 5.0 fps
22.3	137	Total			

Subcatchment ED-1: ED-1



Summary for Subcatchment ED-2: ED-2

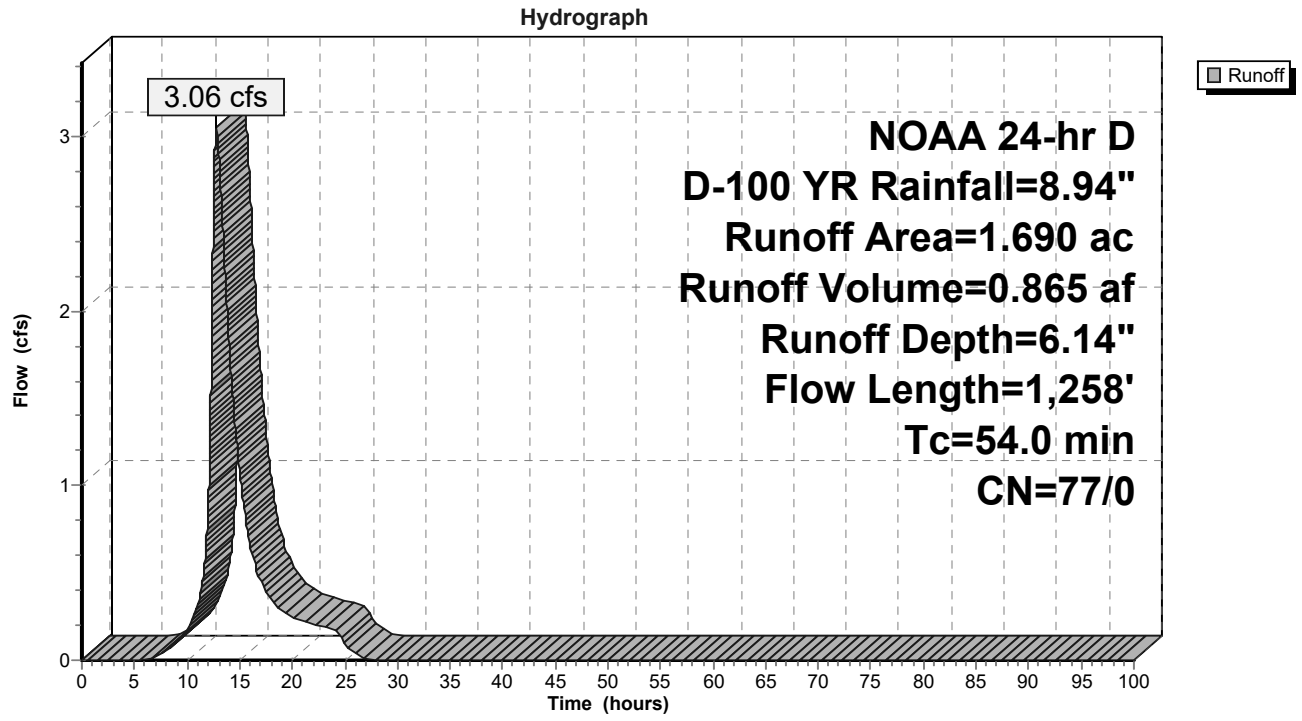
Runoff = 3.06 cfs @ 12.73 hrs, Volume= 0.865 af, Depth= 6.14"

Runoff by SCS TR-20 method, UH=Delmarva, Split Pervious/Imperv. UI as Pervious, Time Span= 0.00-100.00 hrs, dt=
NOAA 24-hr D D-100 YR Rainfall=8.94"

Area (ac)	CN	Description
1.690	77	Woods, Good, HSG D
1.690	77	100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
22.1	100	0.0173	0.08		**Sheet Flow, ED-2 SHEET** Woods: Light underbrush n= 0.400 P2= 3.38"
13.4	530	0.0173	0.66		**Shallow Concentrated Flow, ED-2 SHALLOW** Woodland Kv= 5.0 fps
18.5	628	0.0128	0.57		**Shallow Concentrated Flow, EU-2** Woodland Kv= 5.0 fps
54.0	1,258	Total			

Subcatchment ED-2: ED-2



Summary for Subcatchment ED-3: ED-3

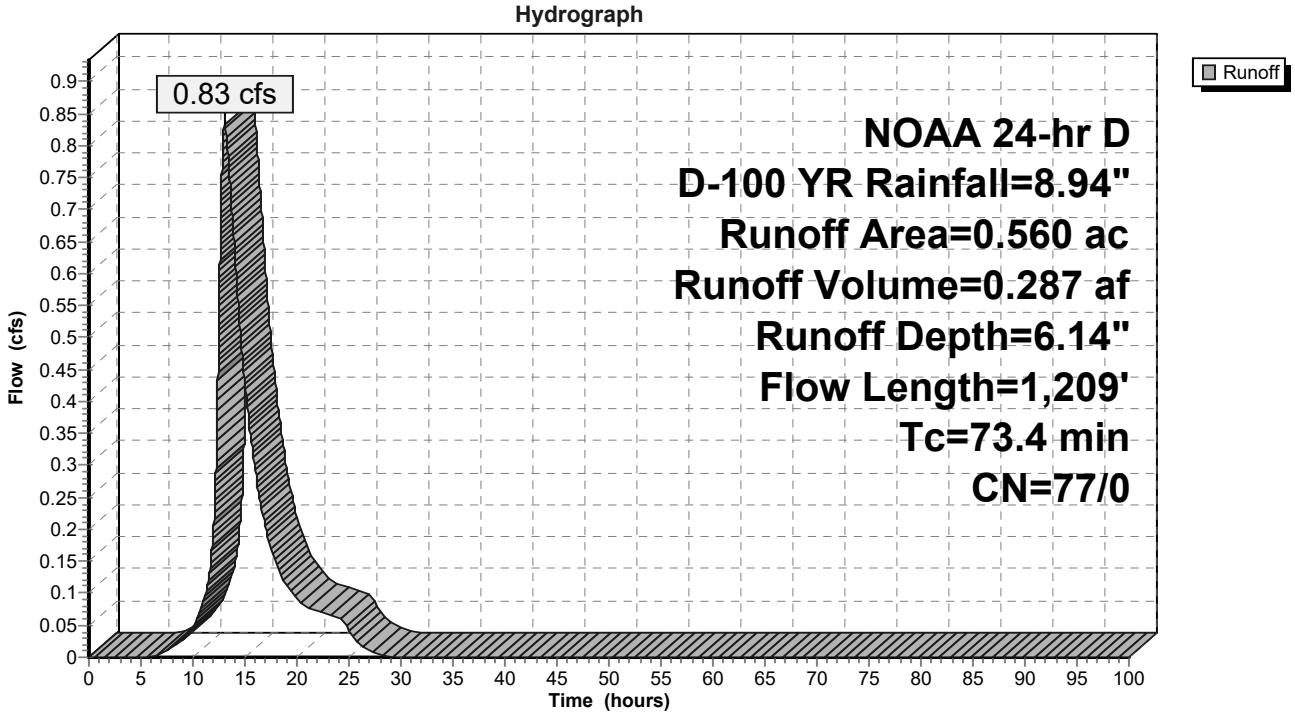
Runoff = 0.83 cfs @ 13.05 hrs, Volume= 0.287 af, Depth= 6.14"

Runoff by SCS TR-20 method, UH=Delmarva, Split Pervious/Imperv. UI as Pervious, Time Span= 0.00-100.00 hrs, dt=
NOAA 24-hr D D-100 YR Rainfall=8.94"

Area (ac)	CN	Description
0.560	77	Woods, Good, HSG D
0.560	77	100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
20.1	100	0.0220	0.08		**Sheet Flow, Sheet Flow** Woods: Light underbrush n= 0.400 P2= 3.38"
0.7	30	0.0223	0.75		**Shallow Concentrated Flow, Shallow** Woodland Kv= 5.0 fps
24.5	100	0.0135	0.07		**Sheet Flow, EU-1 SHEET** Woods: Light underbrush n= 0.400 P2= 3.38"
28.1	979	0.0135	0.58		**Shallow Concentrated Flow, EU-1** Woodland Kv= 5.0 fps
73.4	1,209	Total			

Subcatchment ED-3: ED-3



Summary for Subcatchment EO-1: EO-1

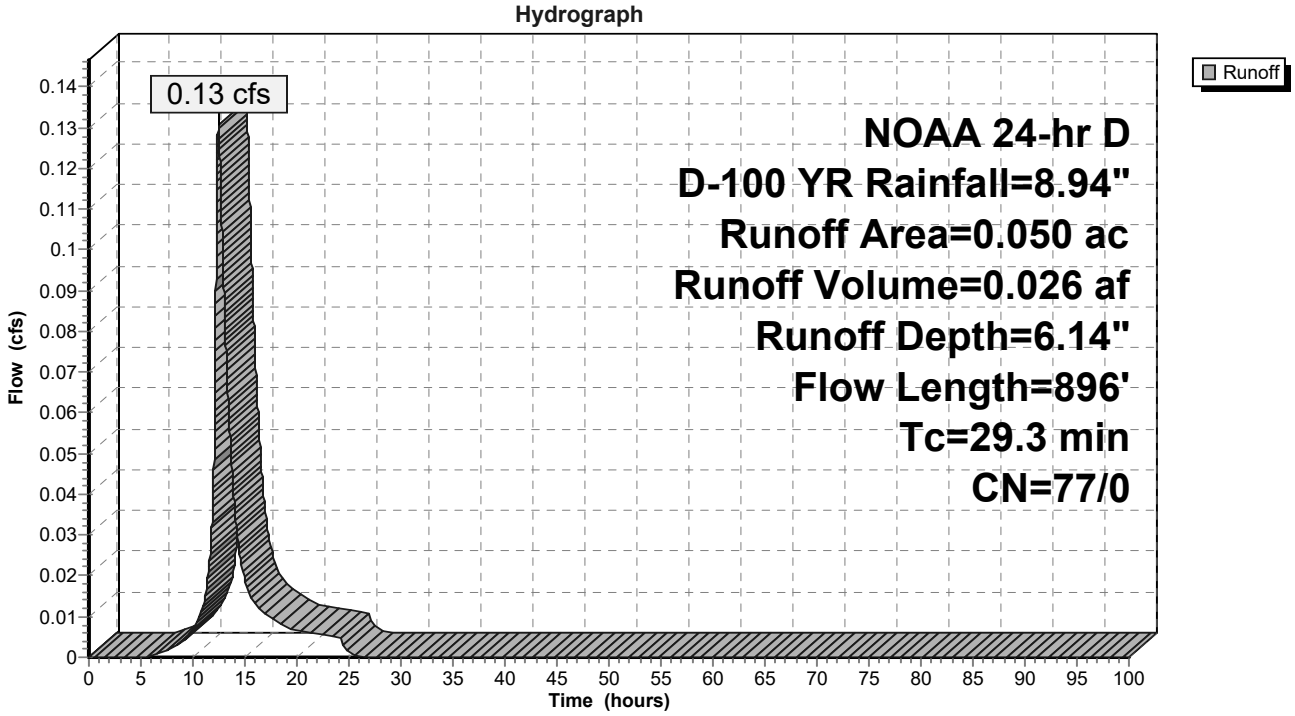
Runoff = 0.13 cfs @ 12.44 hrs, Volume= 0.026 af, Depth= 6.14"

Runoff by SCS TR-20 method, UH=Delmarva, Split Pervious/Imperv. UI as Pervious, Time Span= 0.00-100.00 hrs, dt=
NOAA 24-hr D D-100 YR Rainfall=8.94"

Area (ac)	CN	Description
0.050	77	Woods, Good, HSG D
0.050	77	100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
11.9	682	0.0365	0.96		**Shallow Concentrated Flow, EU-1** Woodland Kv= 5.0 fps
0.7	110	0.3130	2.80		**Shallow Concentrated Flow, ED-1B** Woodland Kv= 5.0 fps
7.6	27	0.0185	0.06		**Sheet Flow, ED-1A** Woods: Light underbrush n= 0.400 P2= 3.38"
9.1	77	0.0960	0.14		**Sheet Flow, EO-1** Woods: Light underbrush n= 0.400 P2= 3.38"
29.3	896	Total			

Subcatchment EO-1: EO-1



Summary for Subcatchment EO-2I: EO-2 Impv.

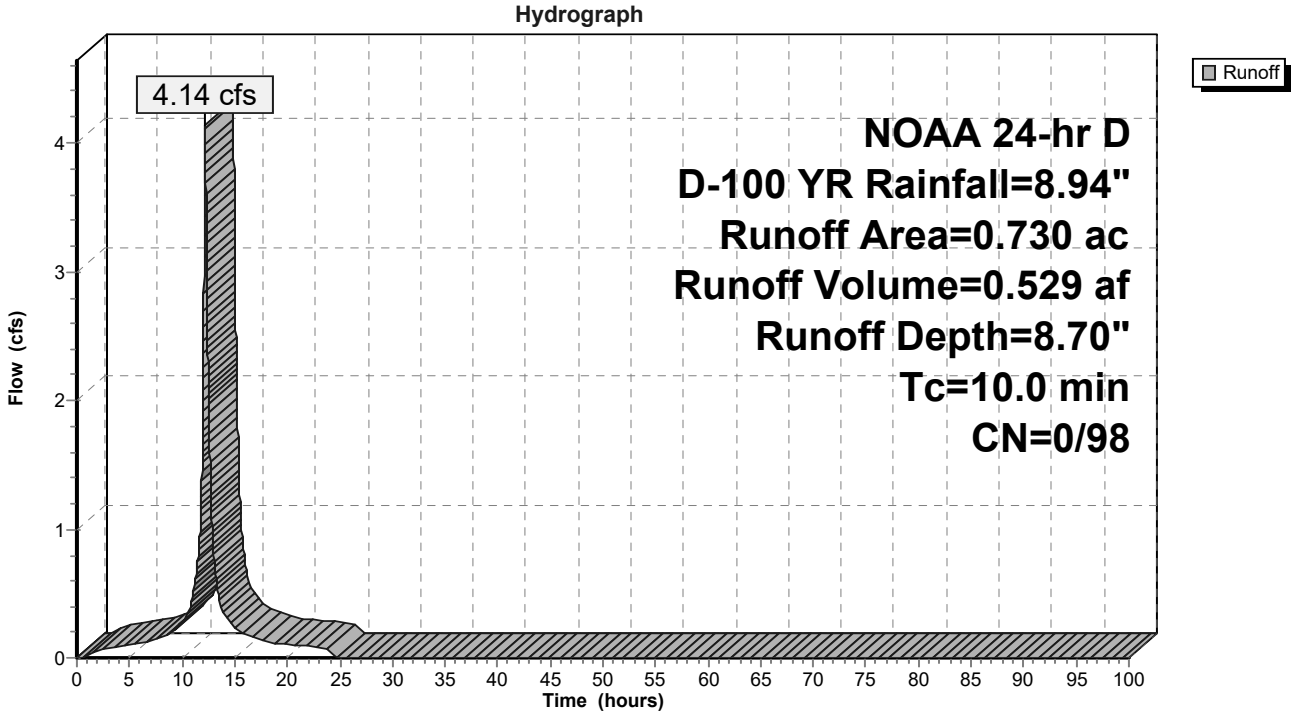
Runoff = 4.14 cfs @ 12.18 hrs, Volume= 0.529 af, Depth= 8.70"

Runoff by SCS TR-20 method, UH=Delmarva, Split Pervious/Imperv. UI as Pervious, Time Span= 0.00-100.00 hrs, dt=
NOAA 24-hr D D-100 YR Rainfall=8.94"

Area (ac)	CN	Description
0.730	98	Paved parking, HSG D
0.730	98	100.00% Impervious Area

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

Subcatchment EO-2I: EO-2 Impv.



Summary for Subcatchment EO-2P: EO-2 Perv.

[47] Hint: Peak is 150% of capacity of segment #5

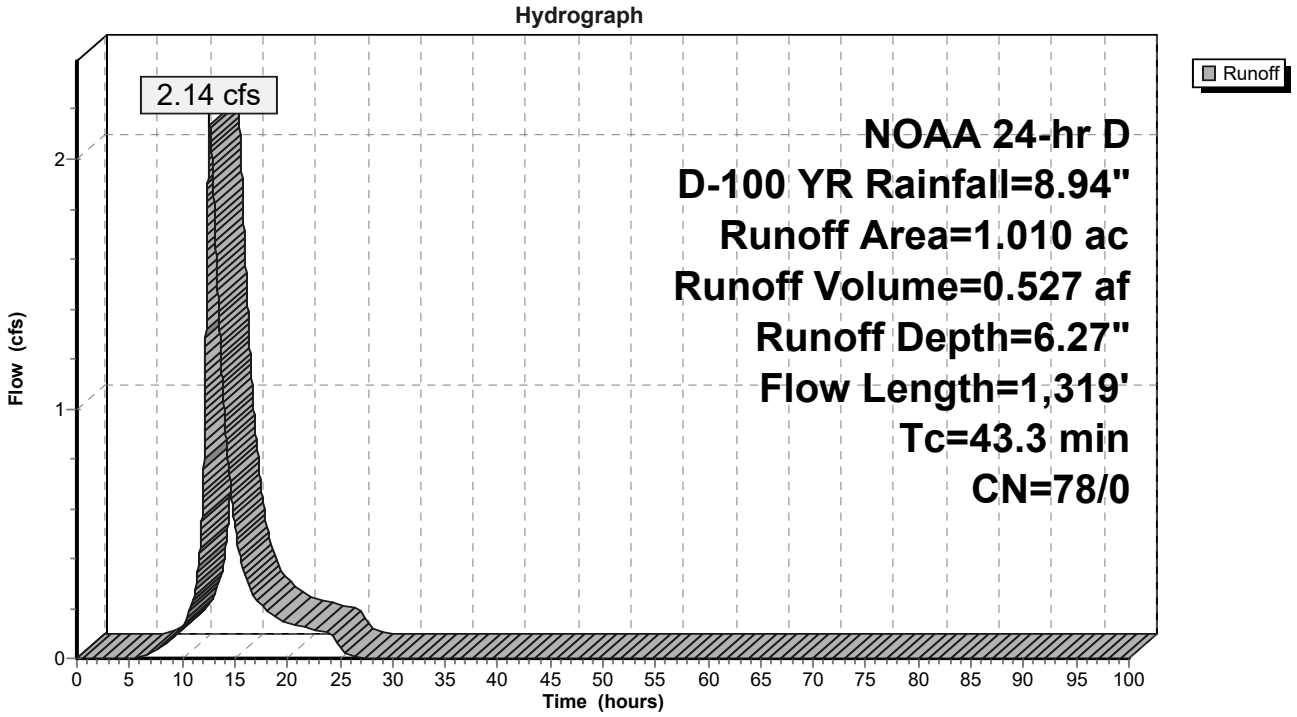
Runoff = 2.14 cfs @ 12.61 hrs, Volume= 0.527 af, Depth= 6.27"

Runoff by SCS TR-20 method, UH=Delmarva, Split Pervious/Imperv. UI as Pervious, Time Span= 0.00-100.00 hrs, dt=
NOAA 24-hr D D-100 YR Rainfall=8.94"

Area (ac)	CN	Description
0.250	80	>75% Grass cover, Good, HSG D
0.760	77	Woods, Good, HSG D
1.010	78	Weighted Average
1.010	78	100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
18.5	628	0.0128	0.57		**Shallow Concentrated Flow, EU-2** Woodland Kv= 5.0 fps
8.8	347	0.0173	0.66		**Shallow Concentrated Flow, ED-2** Woodland Kv= 5.0 fps
9.8	100	0.0189	0.17		**Sheet Flow, EO-2** Grass: Short n= 0.150 P2= 3.38"
0.1	61	0.1890	8.83		**Shallow Concentrated Flow, EO-2 PAVED** Paved Kv= 20.3 fps
1.6	140	0.0010	1.48	1.43	**Pipe Channel, EO-2 PIPE FLOW** 15.0" Round w/ 4.0" inside fill Area= 1.0 sf Perim= 3.7' r= 0.26' n= 0.013 Concrete pipe, bends & connections
4.5	43	0.0010	0.16		**Shallow Concentrated Flow, EO-2 FES** Woodland Kv= 5.0 fps
43.3	1,319	Total			

Subcatchment EO-2P: EO-2 Perv.



Summary for Subcatchment EU-1: EU-1

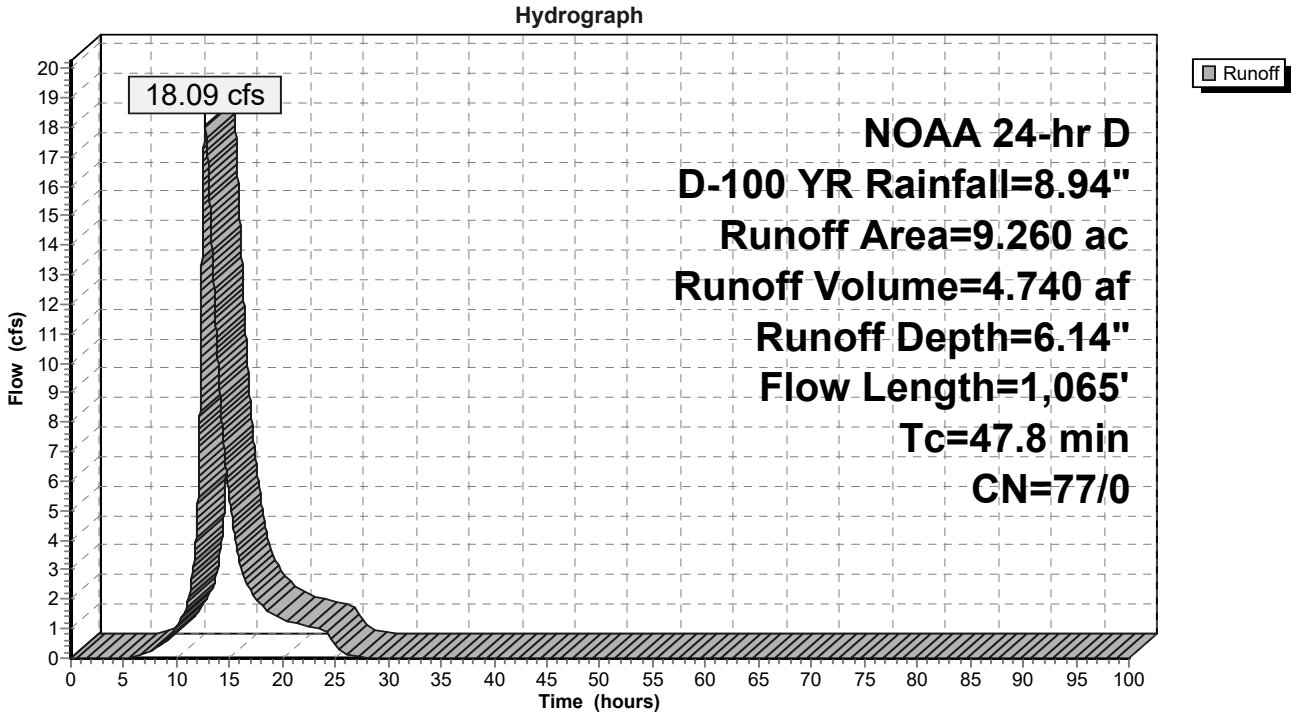
Runoff = 18.09 cfs @ 12.65 hrs, Volume= 4.740 af, Depth= 6.14"

Runoff by SCS TR-20 method, UH=Delmarva, Split Pervious/Imperv. UI as Pervious, Time Span= 0.00-100.00 hrs, dt=
NOAA 24-hr D D-100 YR Rainfall=8.94"

Area (ac)	CN	Description
9.260	77	Woods, Good, HSG D
9.260	77	100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
24.2	100	0.0139	0.07		**Sheet Flow, EU-2** Woods: Light underbrush n= 0.400 P2= 3.38"
23.6	965	0.0185	0.68		**Shallow Concentrated Flow, EU-2** Woodland Kv= 5.0 fps
47.8	1,065	Total			

Subcatchment EU-1: EU-1

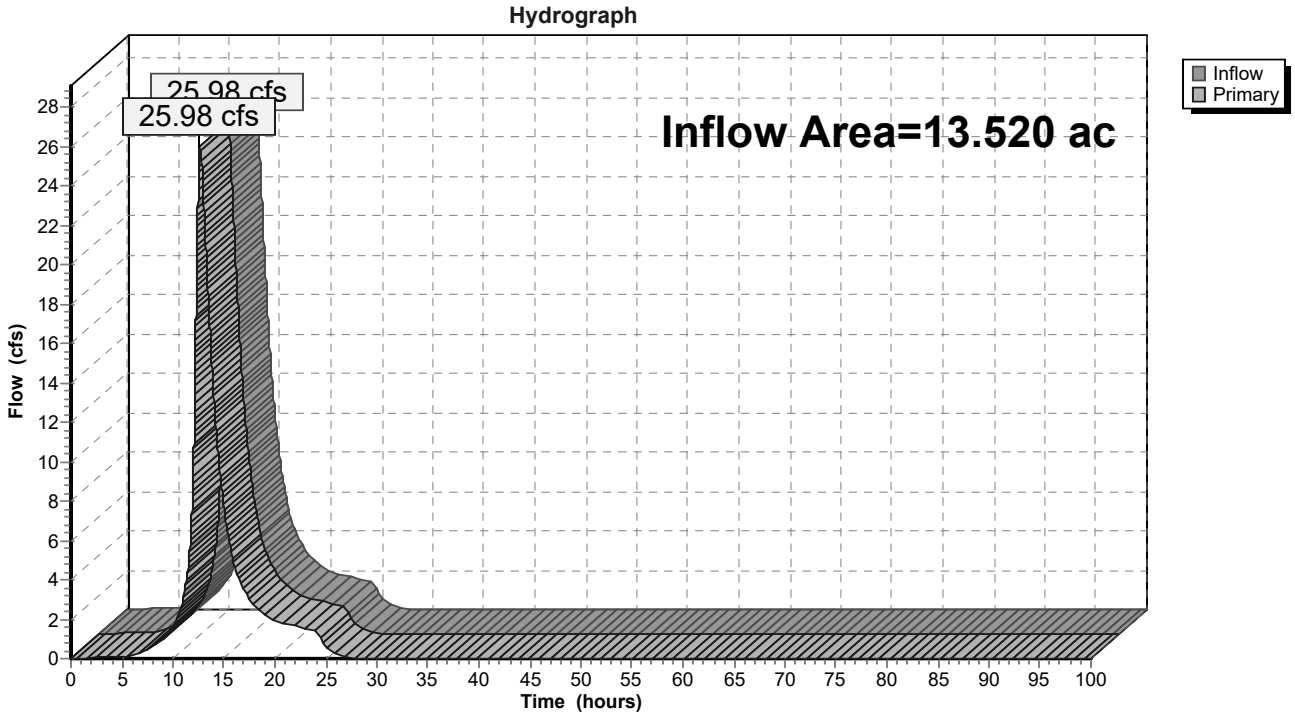


Summary for Link DP: DP

Inflow Area = 13.520 ac, 5.40% Impervious, Inflow Depth = 6.29" for D-100 YR event
Inflow = 25.98 cfs @ 12.64 hrs, Volume= 7.087 af
Primary = 25.98 cfs @ 12.64 hrs, Volume= 7.087 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-100.00 hrs, dt= 0.01 hrs

Link DP: DP

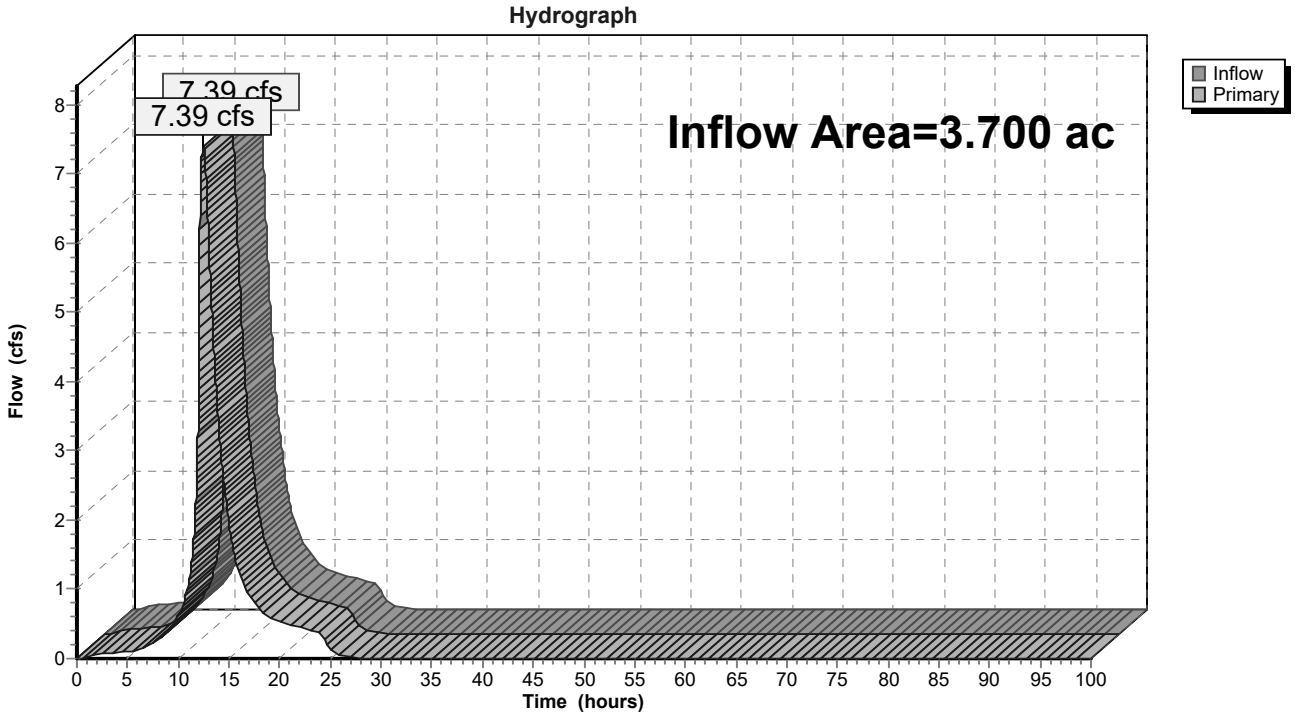


Summary for Link POA-1: POA-1

Inflow Area = 3.700 ac, 19.73% Impervious, Inflow Depth = 6.68" for D-100 YR event
Inflow = 7.39 cfs @ 12.51 hrs, Volume= 2.060 af
Primary = 7.39 cfs @ 12.51 hrs, Volume= 2.060 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-100.00 hrs, dt= 0.01 hrs

Link POA-1: POA-1

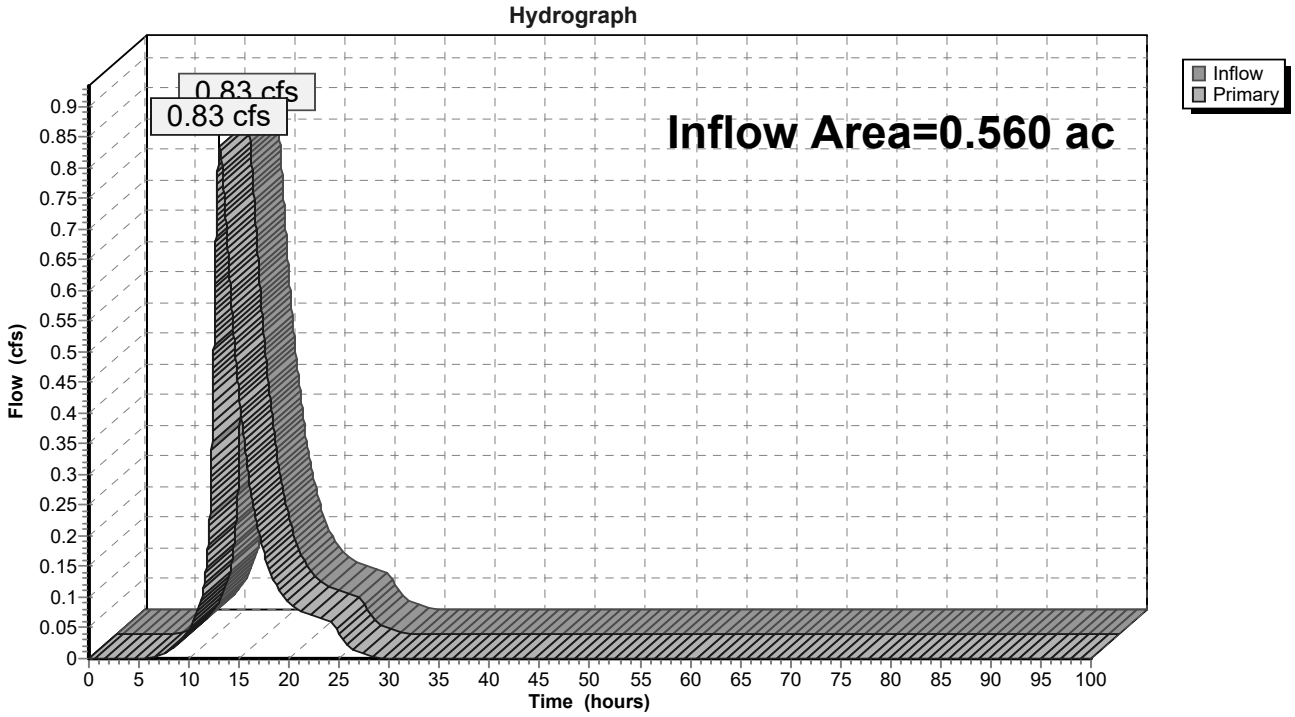


Summary for Link POA-2: POA-2

Inflow Area = 0.560 ac, 0.00% Impervious, Inflow Depth = 6.14" for D-100 YR event
Inflow = 0.83 cfs @ 13.05 hrs, Volume= 0.287 af
Primary = 0.83 cfs @ 13.05 hrs, Volume= 0.287 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-100.00 hrs, dt= 0.01 hrs

Link POA-2: POA-2



Time span=0.00-100.00 hrs, dt=0.01 hrs, 10001 points
Runoff by SCS TR-20 method, UH=Delmarva, Split Pervious/Imperv. UI as Pervious
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Subcatchment ED-1: ED-1 Runoff Area=0.220 ac 0.00% Impervious Runoff Depth=0.12"
Flow Length=137' Tc=22.3 min CN=77/0 Runoff=0.02 cfs 0.002 af

Subcatchment ED-2: ED-2 Runoff Area=1.690 ac 0.00% Impervious Runoff Depth=0.12"
Flow Length=1,258' Tc=54.0 min CN=77/0 Runoff=0.11 cfs 0.016 af

Subcatchment ED-3: ED-3 Runoff Area=0.560 ac 0.00% Impervious Runoff Depth=0.12"
Flow Length=1,209' Tc=73.4 min CN=77/0 Runoff=0.03 cfs 0.005 af

Subcatchment EO-1: EO-1 Runoff Area=0.050 ac 0.00% Impervious Runoff Depth=0.12"
Flow Length=896' Tc=29.3 min CN=77/0 Runoff=0.00 cfs 0.000 af

Subcatchment EO-2I: EO-2 Impv. Runoff Area=0.730 ac 100.00% Impervious Runoff Depth=1.03"
Tc=10.0 min CN=0/98 Runoff=1.36 cfs 0.063 af

Subcatchment EO-2P: EO-2 Perv. Runoff Area=1.010 ac 0.00% Impervious Runoff Depth=0.13"
Flow Length=1,319' Tc=43.3 min CN=78/0 Runoff=0.09 cfs 0.011 af

Subcatchment EU-1: EU-1 Runoff Area=9.260 ac 0.00% Impervious Runoff Depth=0.12"
Flow Length=1,065' Tc=47.8 min CN=77/0 Runoff=0.66 cfs 0.090 af

Link DP: DP Inflow=1.39 cfs 0.189 af
Primary=1.39 cfs 0.189 af

Link POA-1: POA-1 Inflow=1.37 cfs 0.093 af
Primary=1.37 cfs 0.093 af

Link POA-2: POA-2 Inflow=0.03 cfs 0.005 af
Primary=0.03 cfs 0.005 af

Total Runoff Area = 13.520 ac Runoff Volume = 0.189 af Average Runoff Depth = 0.17"
94.60% Pervious = 12.790 ac 5.40% Impervious = 0.730 ac

Summary for Subcatchment ED-1: ED-1

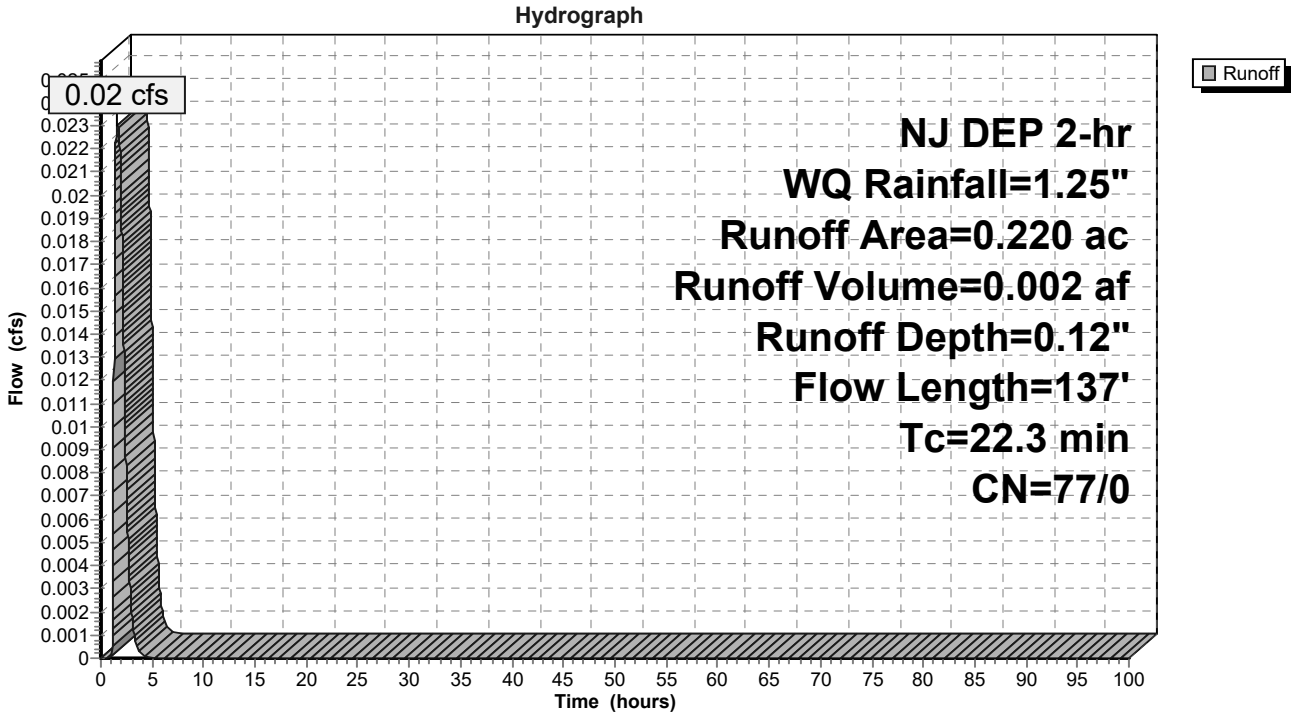
Runoff = 0.02 cfs @ 1.63 hrs, Volume= 0.002 af, Depth= 0.12"

Runoff by SCS TR-20 method, UH=Delmarva, Split Pervious/Imperv. UI as Pervious, Time Span= 0.00-100.00 hrs, dt=
NJ DEP 2-hr WQ Rainfall=1.25"

Area (ac)	CN	Description
0.220	77	Woods, Good, HSG D
0.220	77	100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
21.6	100	0.0185	0.08		**Sheet Flow, ED-1 SHEET** Woods: Light underbrush n= 0.400 P2= 3.38"
0.7	37	0.0313	0.88		**Shallow Concentrated Flow, ED-1** Woodland Kv= 5.0 fps
22.3	137	Total			

Subcatchment ED-1: ED-1



Summary for Subcatchment ED-2: ED-2

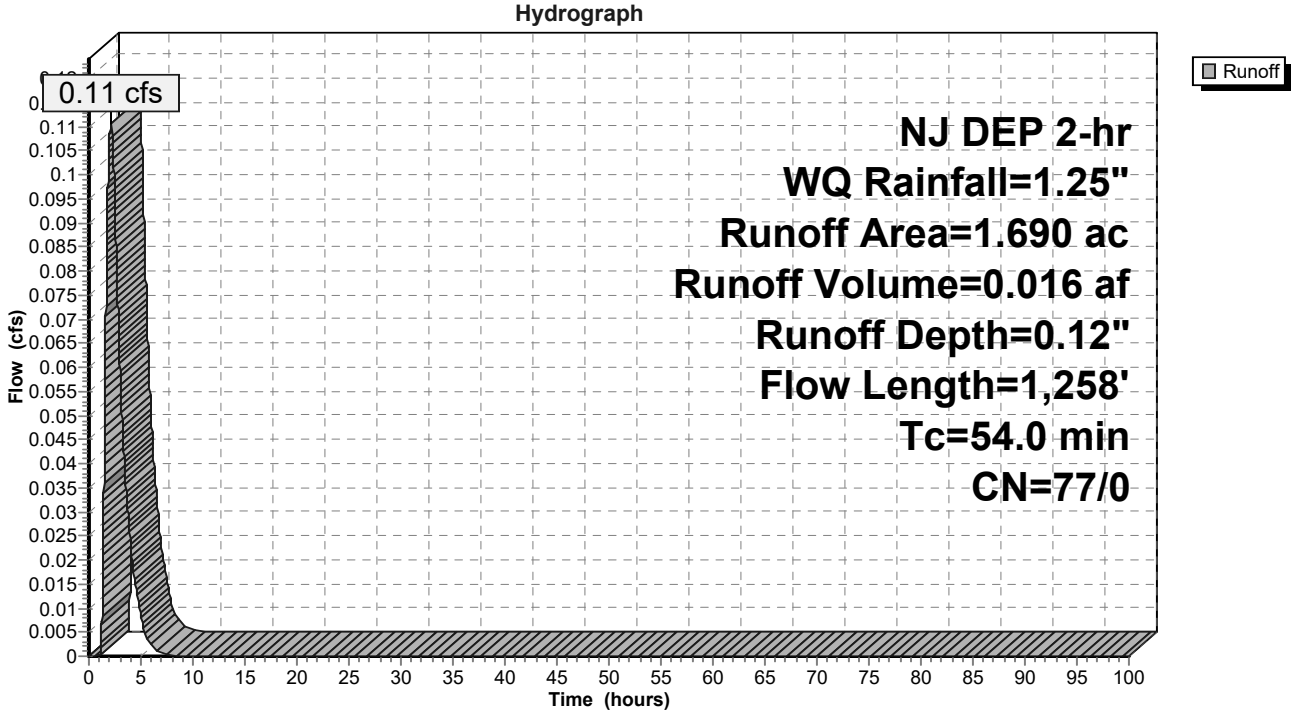
Runoff = 0.11 cfs @ 2.16 hrs, Volume= 0.016 af, Depth= 0.12"

Runoff by SCS TR-20 method, UH=Delmarva, Split Pervious/Imperv. UI as Pervious, Time Span= 0.00-100.00 hrs, dt=
NJ DEP 2-hr WQ Rainfall=1.25"

Area (ac)	CN	Description
1.690	77	Woods, Good, HSG D
1.690	77	100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
22.1	100	0.0173	0.08		**Sheet Flow, ED-2 SHEET** Woods: Light underbrush n= 0.400 P2= 3.38"
13.4	530	0.0173	0.66		**Shallow Concentrated Flow, ED-2 SHALLOW** Woodland Kv= 5.0 fps
18.5	628	0.0128	0.57		**Shallow Concentrated Flow, EU-2** Woodland Kv= 5.0 fps
54.0	1,258	Total			

Subcatchment ED-2: ED-2



Summary for Subcatchment ED-3: ED-3

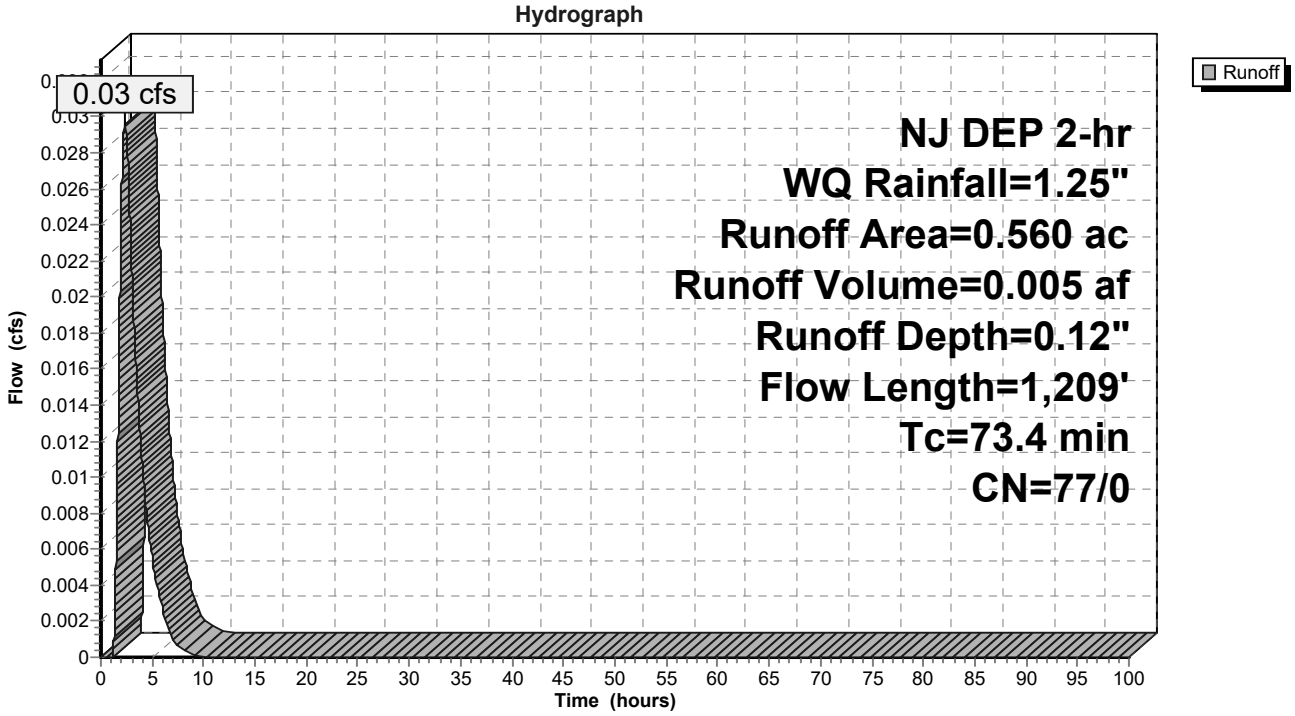
Runoff = 0.03 cfs @ 2.29 hrs, Volume= 0.005 af, Depth= 0.12"

Runoff by SCS TR-20 method, UH=Delmarva, Split Pervious/Imperv. UI as Pervious, Time Span= 0.00-100.00 hrs, dt=
NJ DEP 2-hr WQ Rainfall=1.25"

Area (ac)	CN	Description
0.560	77	Woods, Good, HSG D
0.560	77	100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
20.1	100	0.0220	0.08		**Sheet Flow, Sheet Flow** Woods: Light underbrush n= 0.400 P2= 3.38"
0.7	30	0.0223	0.75		**Shallow Concentrated Flow, Shallow** Woodland Kv= 5.0 fps
24.5	100	0.0135	0.07		**Sheet Flow, EU-1 SHEET** Woods: Light underbrush n= 0.400 P2= 3.38"
28.1	979	0.0135	0.58		**Shallow Concentrated Flow, EU-1** Woodland Kv= 5.0 fps
73.4	1,209	Total			

Subcatchment ED-3: ED-3



Summary for Subcatchment EO-1: EO-1

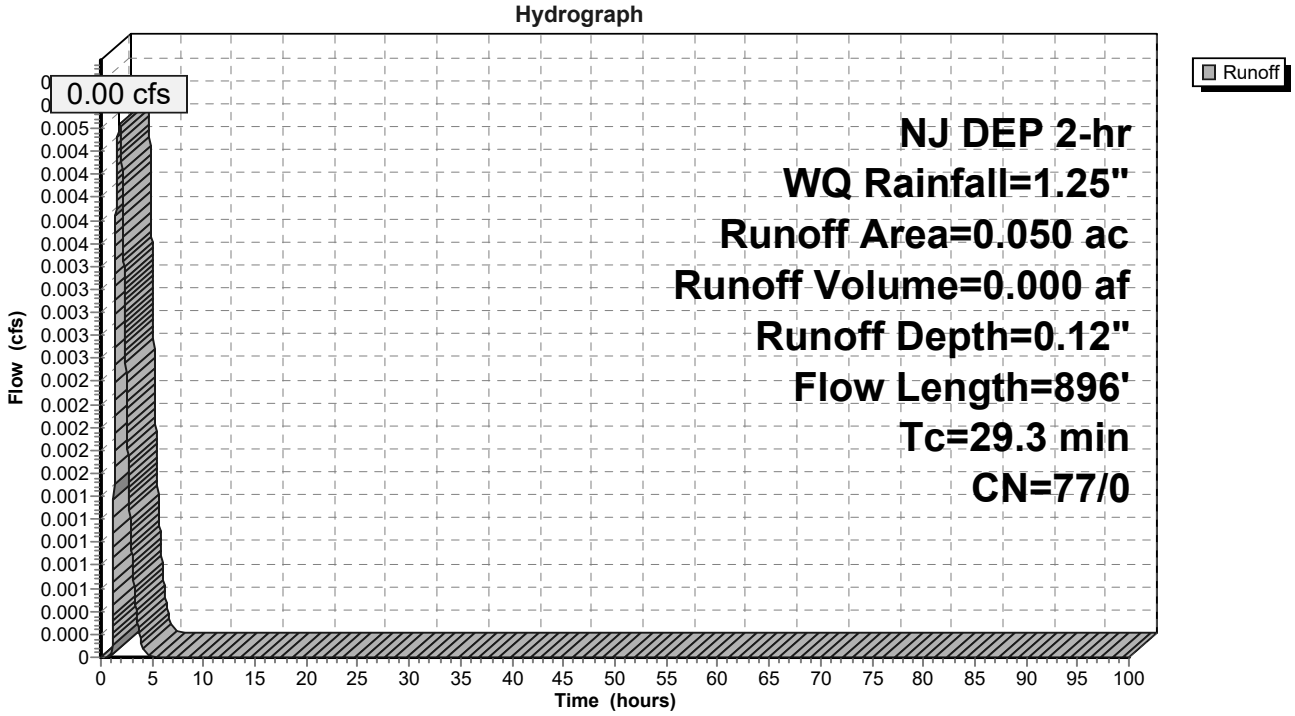
Runoff = 0.00 cfs @ 1.82 hrs, Volume= 0.000 af, Depth= 0.12"

Runoff by SCS TR-20 method, UH=Delmarva, Split Pervious/Imperv. UI as Pervious, Time Span= 0.00-100.00 hrs, dt=
NJ DEP 2-hr WQ Rainfall=1.25"

Area (ac)	CN	Description
0.050	77	Woods, Good, HSG D
0.050	77	100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
11.9	682	0.0365	0.96		**Shallow Concentrated Flow, EU-1** Woodland Kv= 5.0 fps
0.7	110	0.3130	2.80		**Shallow Concentrated Flow, ED-1B** Woodland Kv= 5.0 fps
7.6	27	0.0185	0.06		**Sheet Flow, ED-1A** Woods: Light underbrush n= 0.400 P2= 3.38"
9.1	77	0.0960	0.14		**Sheet Flow, EO-1** Woods: Light underbrush n= 0.400 P2= 3.38"
29.3	896	Total			

Subcatchment EO-1: EO-1



Summary for Subcatchment EO-2I: EO-2 Impv.

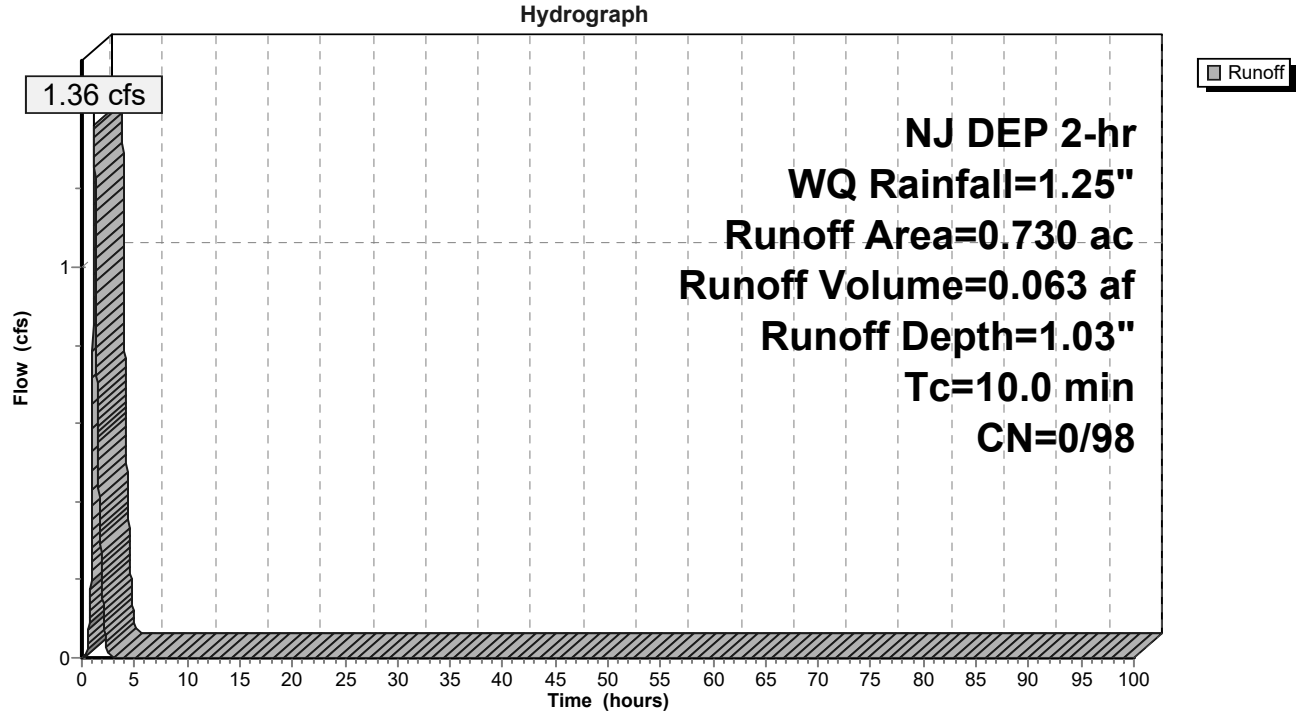
Runoff = 1.36 cfs @ 1.17 hrs, Volume= 0.063 af, Depth= 1.03"

Runoff by SCS TR-20 method, UH=Delmarva, Split Pervious/Imperv. UI as Pervious, Time Span= 0.00-100.00 hrs, dt=
NJ DEP 2-hr WQ Rainfall=1.25"

Area (ac)	CN	Description
0.730	98	Paved parking, HSG D
0.730	98	100.00% Impervious Area

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

Subcatchment EO-2I: EO-2 Impv.



Summary for Subcatchment EO-2P: EO-2 Perv.

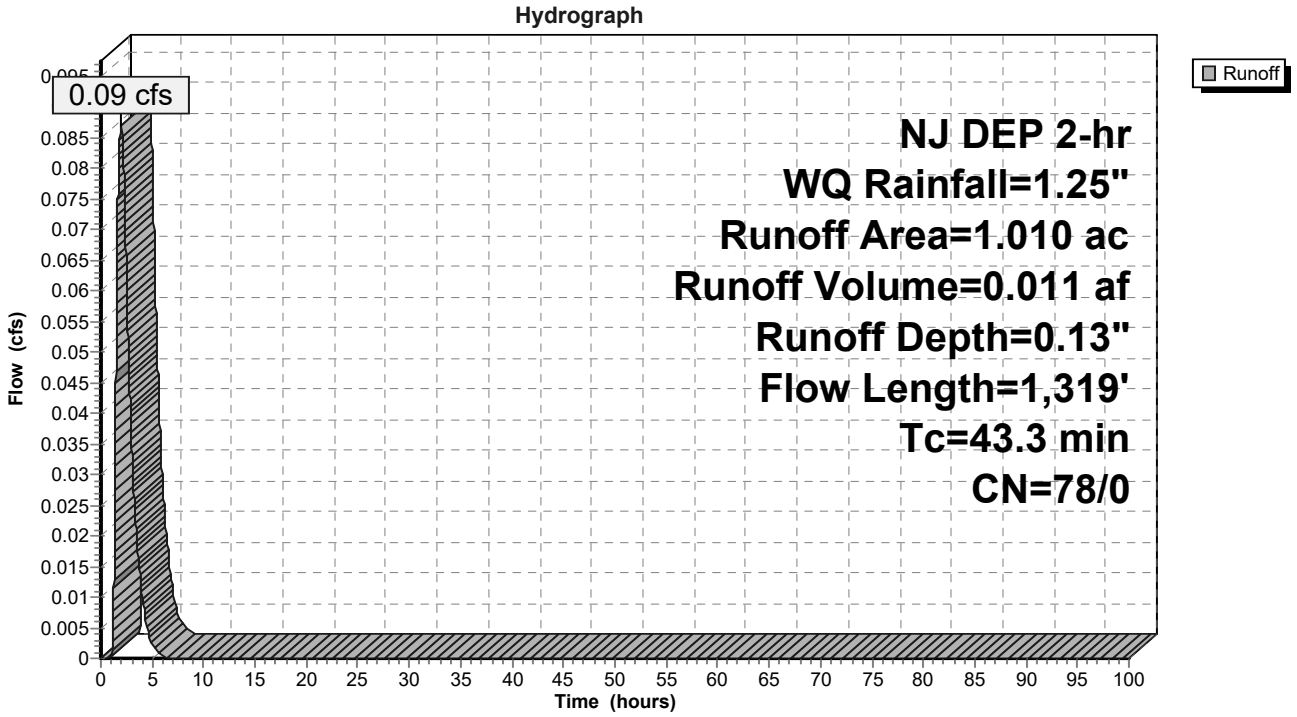
Runoff = 0.09 cfs @ 2.01 hrs, Volume= 0.011 af, Depth= 0.13"

Runoff by SCS TR-20 method, UH=Delmarva, Split Pervious/Imperv. UI as Pervious, Time Span= 0.00-100.00 hrs, dt=
NJ DEP 2-hr WQ Rainfall=1.25"

Area (ac)	CN	Description
0.250	80	>75% Grass cover, Good, HSG D
0.760	77	Woods, Good, HSG D
1.010	78	Weighted Average
1.010	78	100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
18.5	628	0.0128	0.57		**Shallow Concentrated Flow, EU-2** Woodland Kv= 5.0 fps
8.8	347	0.0173	0.66		**Shallow Concentrated Flow, ED-2** Woodland Kv= 5.0 fps
9.8	100	0.0189	0.17		**Sheet Flow, EO-2** Grass: Short n= 0.150 P2= 3.38"
0.1	61	0.1890	8.83		**Shallow Concentrated Flow, EO-2 PAVED** Paved Kv= 20.3 fps
1.6	140	0.0010	1.48	1.43	**Pipe Channel, EO-2 PIPE FLOW** 15.0" Round w/ 4.0" inside fill Area= 1.0 sf Perim= 3.7' r= 0.26' n= 0.013 Concrete pipe, bends & connections
4.5	43	0.0010	0.16		**Shallow Concentrated Flow, EO-2 FES** Woodland Kv= 5.0 fps
43.3	1,319	Total			

Subcatchment EO-2P: EO-2 Perv.



Summary for Subcatchment EU-1: EU-1

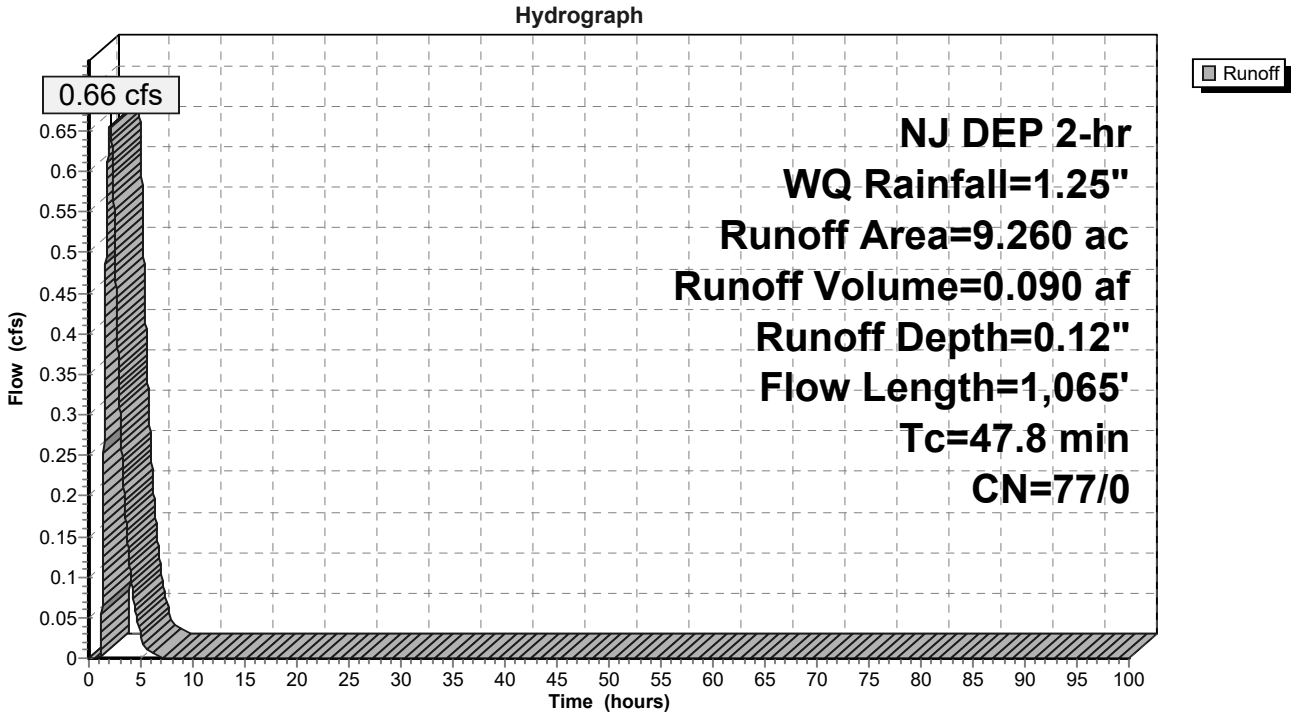
Runoff = 0.66 cfs @ 2.02 hrs, Volume= 0.090 af, Depth= 0.12"

Runoff by SCS TR-20 method, UH=Delmarva, Split Pervious/Imperv. UI as Pervious, Time Span= 0.00-100.00 hrs, dt=
NJ DEP 2-hr WQ Rainfall=1.25"

Area (ac)	CN	Description
9.260	77	Woods, Good, HSG D
9.260	77	100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
24.2	100	0.0139	0.07		**Sheet Flow, EU-2** Woods: Light underbrush n= 0.400 P2= 3.38"
23.6	965	0.0185	0.68		**Shallow Concentrated Flow, EU-2** Woodland Kv= 5.0 fps
47.8	1,065	Total			

Subcatchment EU-1: EU-1

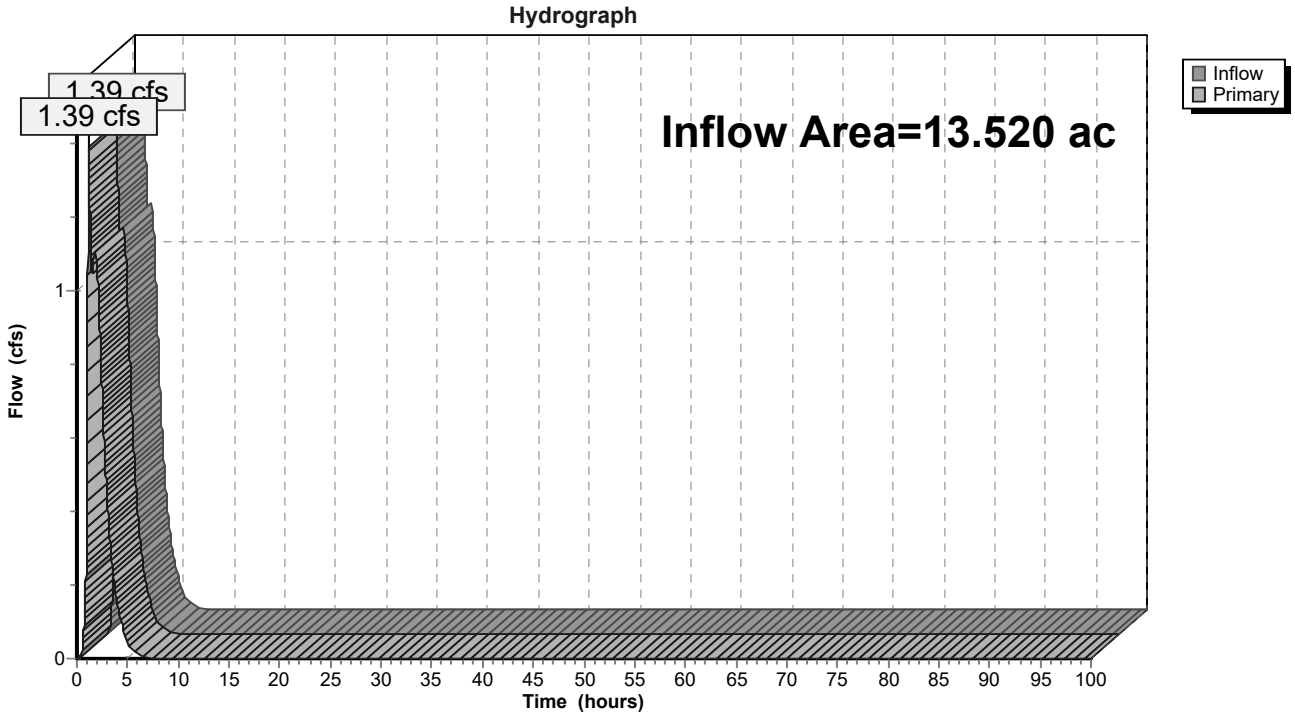


Summary for Link DP: DP

Inflow Area = 13.520 ac, 5.40% Impervious, Inflow Depth = 0.17" for WQ event
Inflow = 1.39 cfs @ 1.18 hrs, Volume= 0.189 af
Primary = 1.39 cfs @ 1.18 hrs, Volume= 0.189 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-100.00 hrs, dt= 0.01 hrs

Link DP: DP

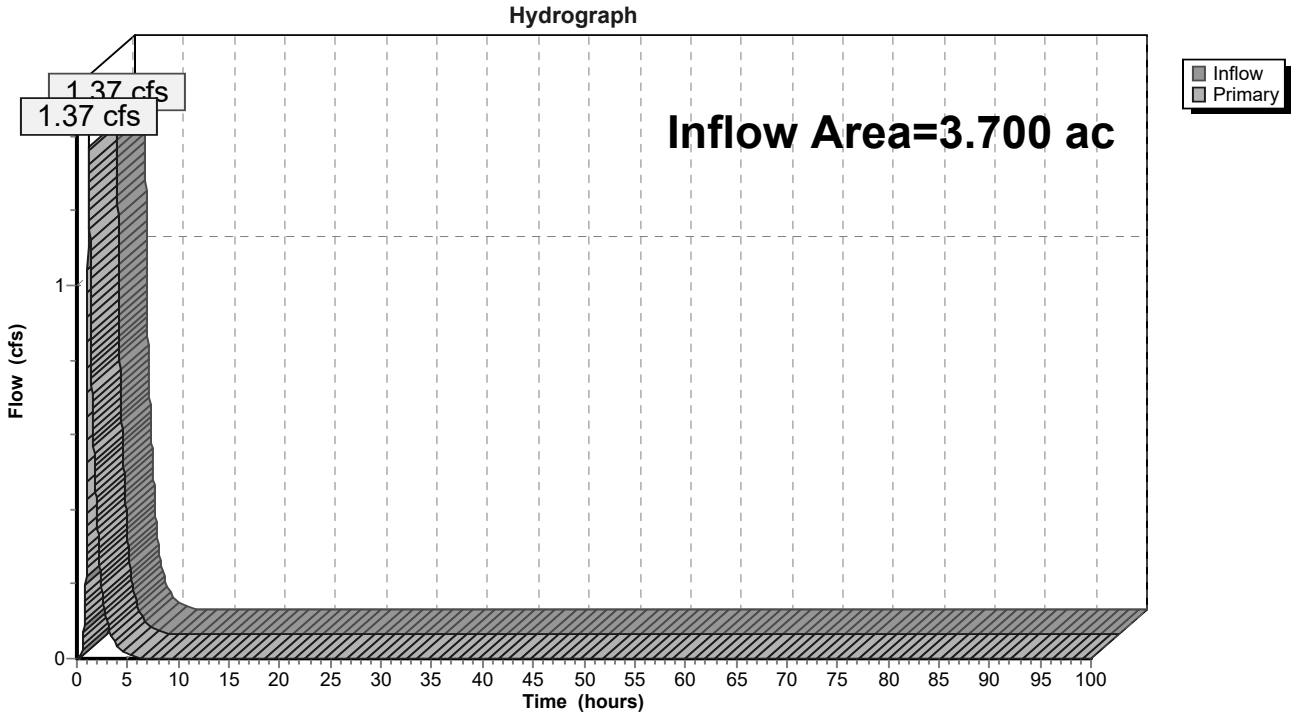


Summary for Link POA-1: POA-1

Inflow Area = 3.700 ac, 19.73% Impervious, Inflow Depth = 0.30" for WQ event
Inflow = 1.37 cfs @ 1.17 hrs, Volume= 0.093 af
Primary = 1.37 cfs @ 1.17 hrs, Volume= 0.093 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-100.00 hrs, dt= 0.01 hrs

Link POA-1: POA-1

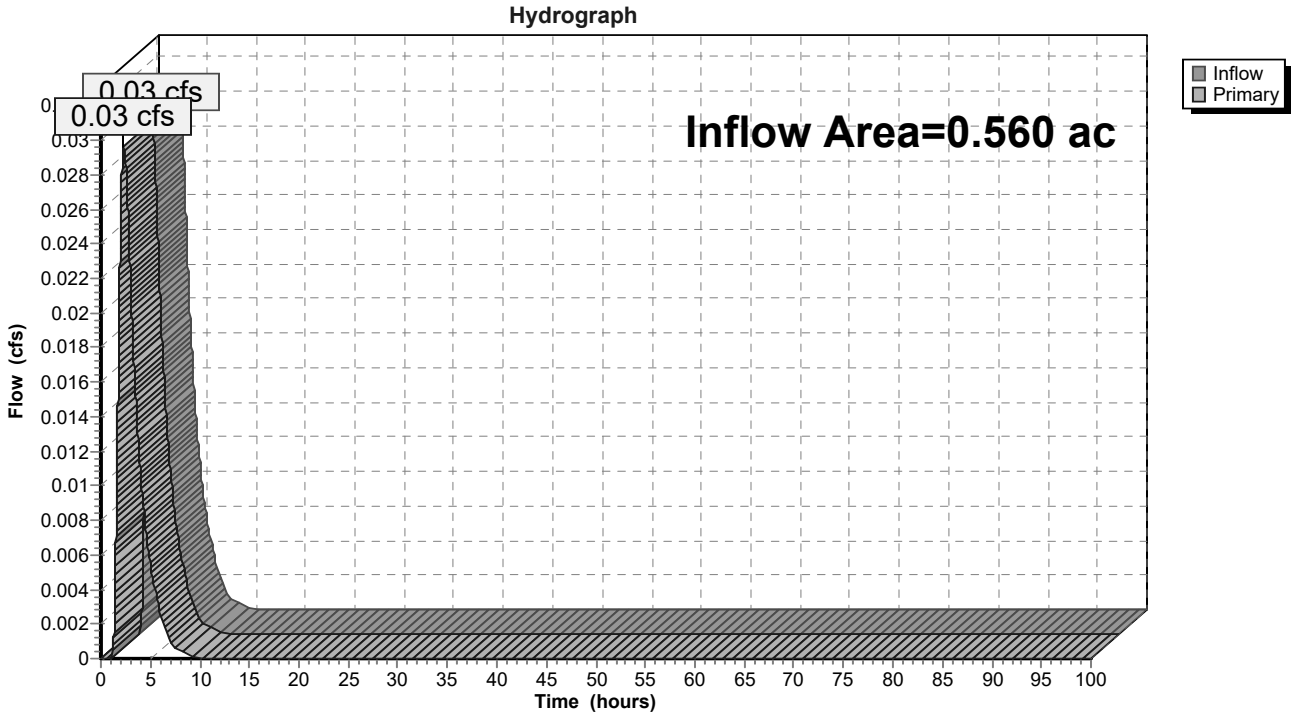


Summary for Link POA-2: POA-2

Inflow Area = 0.560 ac, 0.00% Impervious, Inflow Depth = 0.12" for WQ event
Inflow = 0.03 cfs @ 2.29 hrs, Volume= 0.005 af
Primary = 0.03 cfs @ 2.29 hrs, Volume= 0.005 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-100.00 hrs, dt= 0.01 hrs

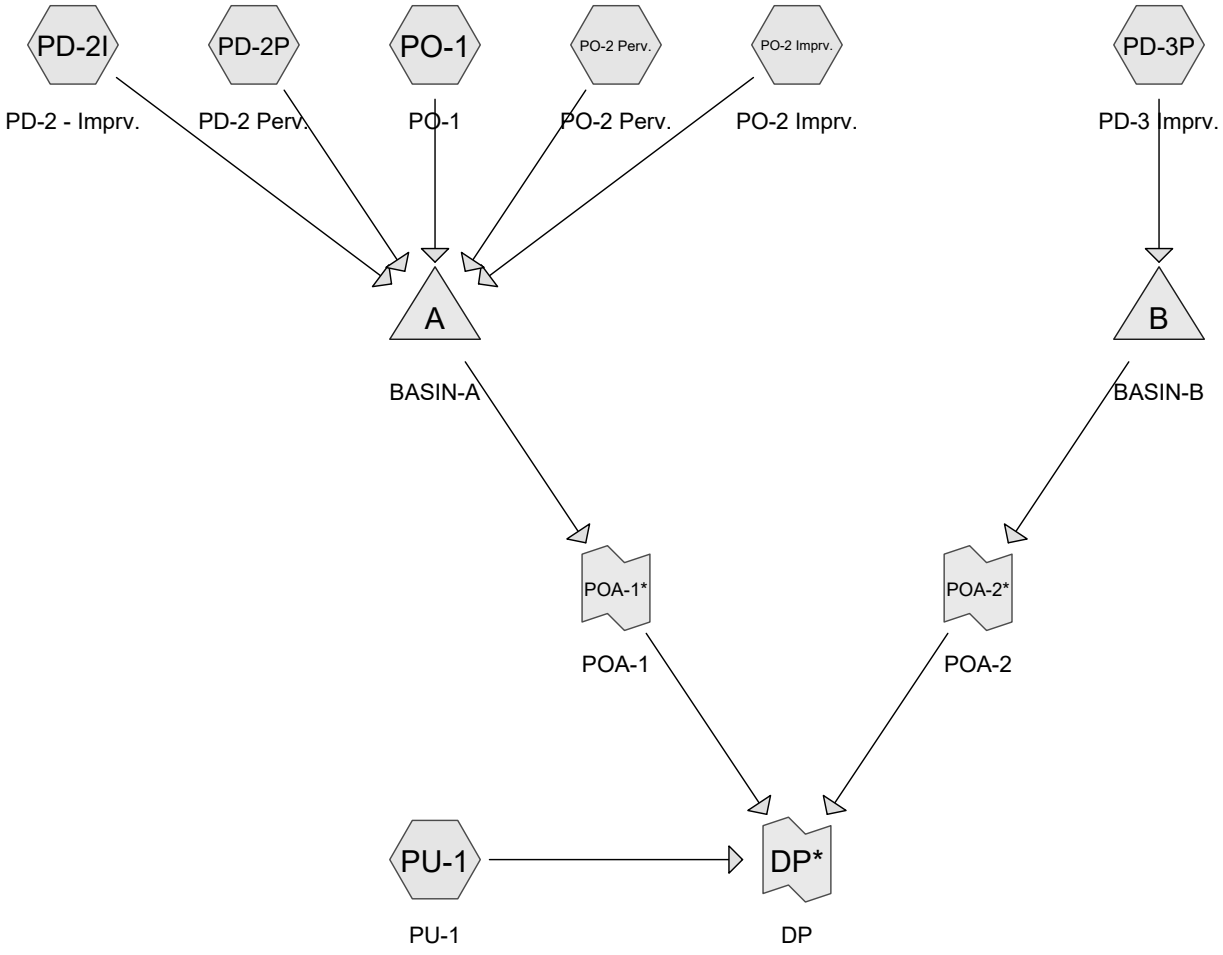
Link POA-2: POA-2



APPENDIX C

PROPOSED CONDITIONS ANALYSIS

PROPOSED



Subcat Reach Pond Link

Routing Diagram for 200715A_Analysis
Prepared by Maser Consulting, Printed 7/30/2020
HydroCAD® 10.10-3a s/n 10901 © 2020 HydroCAD Software Solutions LLC

Rainfall Events Listing

Event#	Event Name	Storm Type	Curve	Mode	Duration (hours)	B/B	Depth (inches)	AMC
1	A-2 YR	NOAA 24-hr	D	Default	24.00	1	3.38	2
2	B-10 YR	NOAA 24-hr	D	Default	24.00	1	5.23	2
3	C-25 YR	NOAA 24-hr	D	Default	24.00	1	6.53	2
4	D-100 YR	NOAA 24-hr	D	Default	24.00	1	8.94	2
5	WQ	NJ DEP 2-hr		Default	2.00	1	1.25	2

Area Listing (selected nodes)

Area (acres)	CN	Description (subcatchment-numbers)
0.915	80	>75% Grass cover, Good, HSG D (PD-2P, PD-3P, PO-2 Perv., PU-1)
1.780	98	Paved parking, HSG D (PD-2I, PO-2 Imprv., PU-1)
0.660	98	Roofs, HSG D (PD-2I, PD-3P)
10.165	77	Woods, Good, HSG D (PO-1, PO-2 Perv., PU-1)
13.520	**81**	**TOTAL AREA**

Soil Listing (selected nodes)

Area (acres)	Soil Group	Subcatchment Numbers
0.000	HSG A	
0.000	HSG B	
0.000	HSG C	
13.520	HSG D	PD-2I, PD-2P, PD-3P, PO-1, PO-2 Imprv., PO-2 Perv., PU-1
0.000	Other	
13.520		**TOTAL AREA**

Ground Covers (selected nodes)

HSG-A (acres)	HSG-B (acres)	HSG-C (acres)	HSG-D (acres)	Other (acres)	Total (acres)	Ground Cover	Subcatchment Numbers
0.000	0.000	0.000	0.915	0.000	0.915	>75% Grass cover, Good	PD-2P, PD-3P, PO-2 Perv., PU-1
0.000	0.000	0.000	1.780	0.000	1.780	Paved parking	PD-2I, PO-2 Imprv., PU-1
0.000	0.000	0.000	0.660	0.000	0.660	Roofs	PD-2I, PD-3P
0.000	0.000	0.000	10.165	0.000	10.165	Woods, Good	PO-1, PO-2 Perv., PU-1
0.000	**0.000**	**0.000**	**13.520**	**0.000**	**13.520**	**TOTAL AREA**	

Pipe Listing (selected nodes)

Line#	Node Number	In-Invert (feet)	Out-Invert (feet)	Length (feet)	Slope (ft/ft)	n	Diam/Width (inches)	Height (inches)	Inside-Fill (inches)
1	PO-2 Perv.	0.00	0.00	140.0	0.0010	0.013	15.0	0.0	4.0
2	PU-1	0.00	0.00	23.0	0.0138	0.013	18.0	0.0	0.0
3	A	122.50	122.00	26.0	0.0192	0.012	18.0	0.0	0.0
4	B	128.40	127.96	81.0	0.0054	0.012	15.0	0.0	0.0

Time span=0.00-100.00 hrs, dt=0.01 hrs, 10001 points
Runoff by SCS TR-20 method, UH=Delmarva, Split Pervious/Imperv. UI as Pervious
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Subcatchment PD-2I: PD-2 - Imprv. Runoff Area=1.220 ac 100.00% Impervious Runoff Depth=3.15"
Tc=24.5 min CN=0/98 Runoff=1.67 cfs 0.320 af

Subcatchment PD-2P: PD-2 Perv. Runoff Area=0.570 ac 0.00% Impervious Runoff Depth=1.54"
Tc=10.0 min CN=80/0 Runoff=0.65 cfs 0.073 af

Subcatchment PD-3P: PD-3 Imprv. Runoff Area=0.510 ac 94.12% Impervious Runoff Depth=3.05"
Tc=6.0 min CN=80/98 Runoff=1.29 cfs 0.130 af

Subcatchment PO-1: PO-1 Runoff Area=0.050 ac 0.00% Impervious Runoff Depth=1.34"
Flow Length=896' Tc=29.3 min CN=77/0 Runoff=0.03 cfs 0.006 af

Subcatchment PO-2 Imprv.: PO-2 Imprv. Runoff Area=0.730 ac 100.00% Impervious Runoff Depth=3.15"
Tc=10.0 min CN=0/98 Runoff=1.55 cfs 0.191 af

Subcatchment PO-2 Perv.: PO-2 Perv. Runoff Area=1.010 ac 0.00% Impervious Runoff Depth=1.41"
Flow Length=1,319' Tc=43.3 min CN=78/0 Runoff=0.46 cfs 0.118 af

Subcatchment PU-1: PU-1 Runoff Area=9.430 ac 0.11% Impervious Runoff Depth=1.34"
Flow Length=1,382' Tc=53.8 min CN=77/98 Runoff=3.51 cfs 1.056 af

Pond A: BASIN-A Peak Elev=124.49' Storage=0.095 af Inflow=3.74 cfs 0.709 af
Outflow=2.11 cfs 0.709 af

Pond B: BASIN-B Peak Elev=129.01' Storage=0.090 af Inflow=1.29 cfs 0.130 af
Outflow=0.07 cfs 0.087 af

Link DP*: DP Inflow=5.69 cfs 1.851 af
Primary=5.69 cfs 1.851 af

Link POA-1*: POA-1 Inflow=2.11 cfs 0.709 af
Primary=2.11 cfs 0.709 af

Link POA-2*: POA-2 Inflow=0.07 cfs 0.087 af
Primary=0.07 cfs 0.087 af

Total Runoff Area = 13.520 ac Runoff Volume = 1.894 af Average Runoff Depth = 1.68"
81.95% Pervious = 11.080 ac 18.05% Impervious = 2.440 ac

Summary for Subcatchment PD-2I: PD-2 - Imprv.

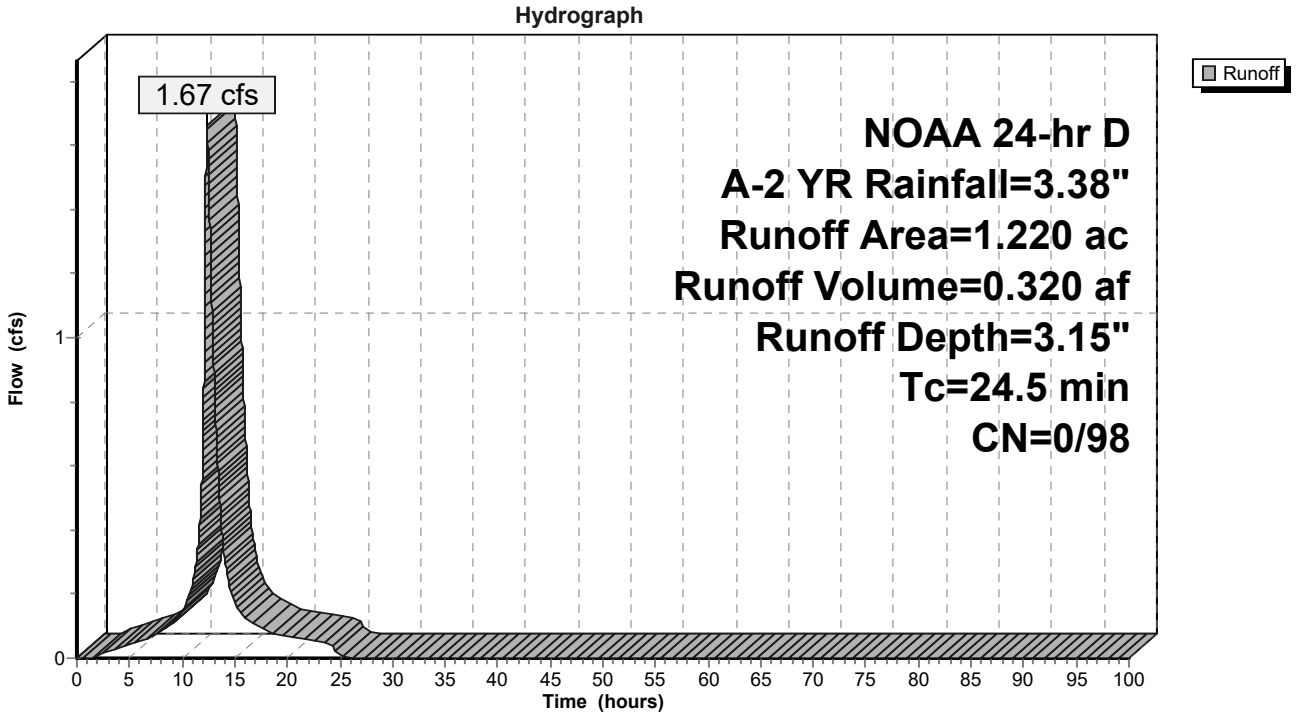
Runoff = 1.67 cfs @ 12.36 hrs, Volume= 0.320 af, Depth= 3.15"

Runoff by SCS TR-20 method, UH=Delmarva, Split Pervious/Imperv. UI as Pervious, Time Span= 0.00-100.00 hrs, dt=
NOAA 24-hr D A-2 YR Rainfall=3.38"

Area (ac)	CN	Description
0.180	98	Roofs, HSG D
1.040	98	Paved parking, HSG D
1.220	98	Weighted Average
1.220	98	100.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					**Direct Entry, Tc**
18.5					**Direct Entry, EU-2**
24.5	0	Total			

Subcatchment PD-2I: PD-2 - Imprv.



Summary for Subcatchment PD-2P: PD-2 Perv.

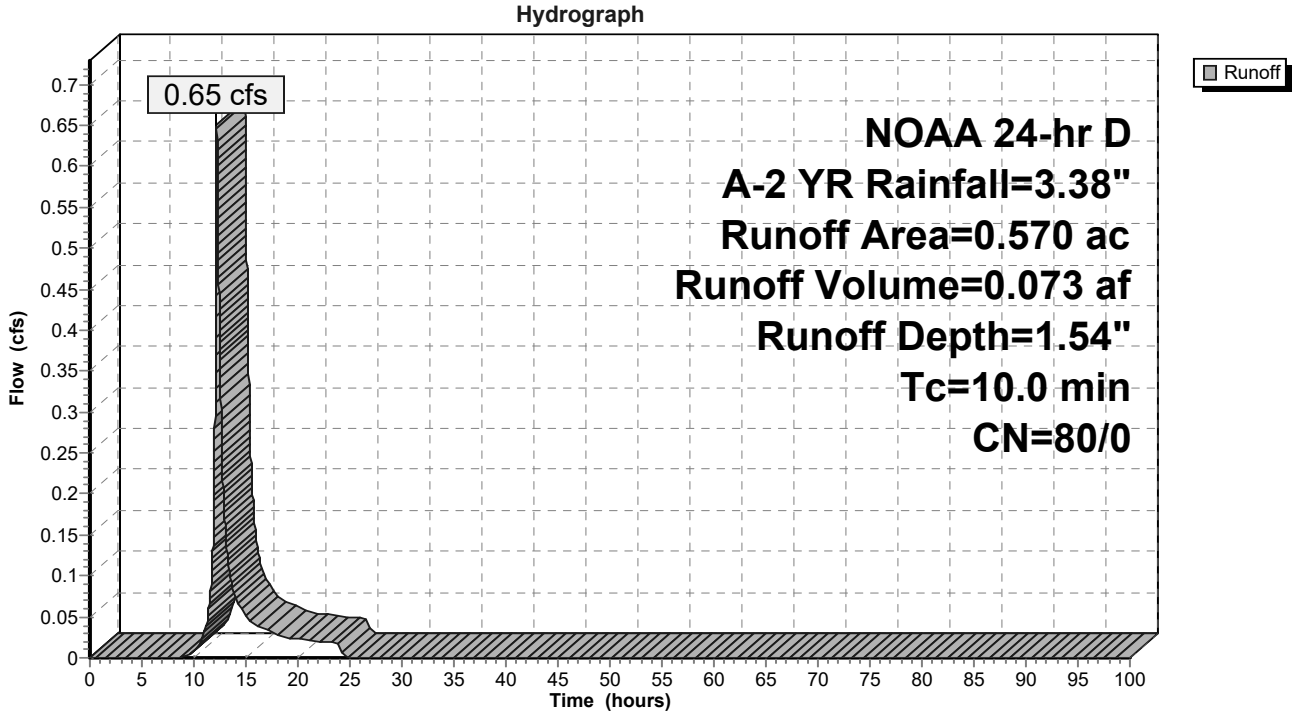
Runoff = 0.65 cfs @ 12.20 hrs, Volume= 0.073 af, Depth= 1.54"

Runoff by SCS TR-20 method, UH=Delmarva, Split Pervious/Imperv. UI as Pervious, Time Span= 0.00-100.00 hrs, dt=
NOAA 24-hr D A-2 YR Rainfall=3.38"

Area (ac)	CN	Description
0.570	80	>75% Grass cover, Good, HSG D
0.570	80	100.00% Pervious Area

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

Subcatchment PD-2P: PD-2 Perv.



Summary for Subcatchment PD-3P: PD-3 Imprv.

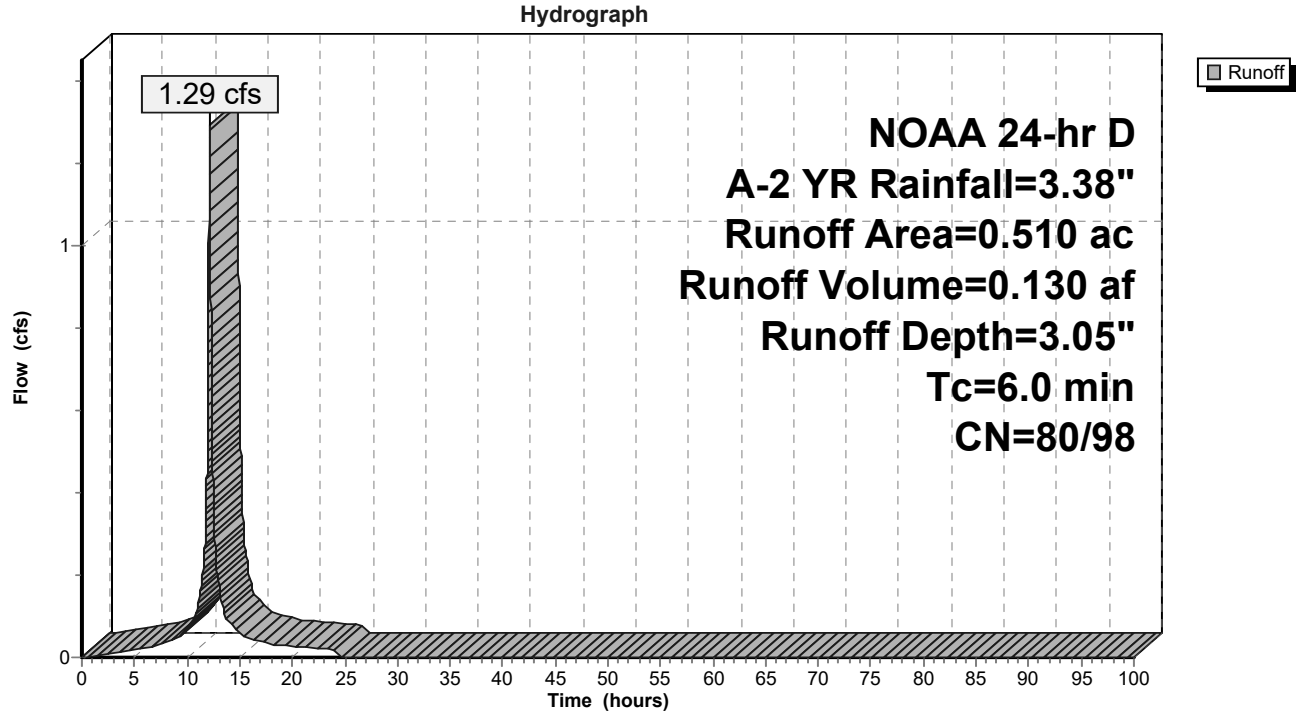
Runoff = 1.29 cfs @ 12.14 hrs, Volume= 0.130 af, Depth= 3.05"

Runoff by SCS TR-20 method, UH=Delmarva, Split Pervious/Imperv. UI as Pervious, Time Span= 0.00-100.00 hrs, dt=
NOAA 24-hr D A-2 YR Rainfall=3.38"

Area (ac)	CN	Description
0.480	98	Roofs, HSG D
0.030	80	>75% Grass cover, Good, HSG D
0.510	97	Weighted Average
0.030	80	5.88% Pervious Area
0.480	98	94.12% Impervious Area

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

Subcatchment PD-3P: PD-3 Imprv.



Summary for Subcatchment PO-1: PO-1

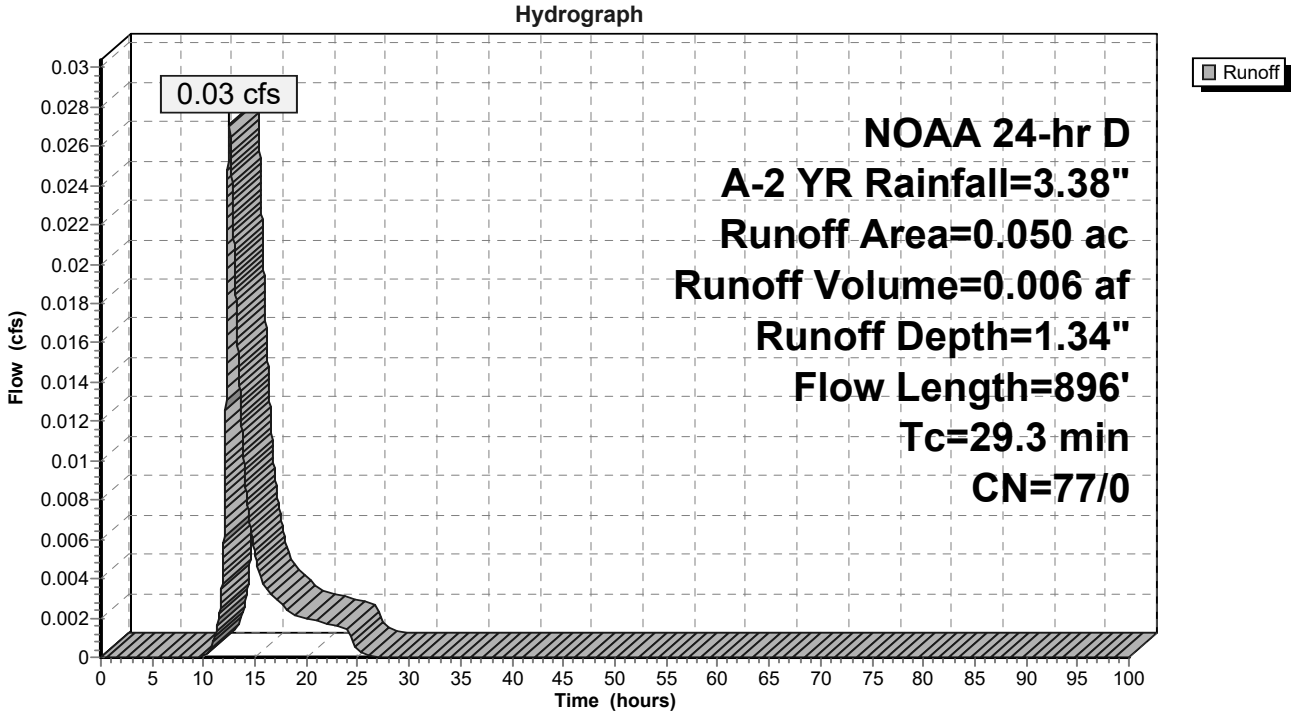
Runoff = 0.03 cfs @ 12.49 hrs, Volume= 0.006 af, Depth= 1.34"

Runoff by SCS TR-20 method, UH=Delmarva, Split Pervious/Imperv. UI as Pervious, Time Span= 0.00-100.00 hrs, dt=
NOAA 24-hr D A-2 YR Rainfall=3.38"

Area (ac)	CN	Description
0.050	77	Woods, Good, HSG D
0.050	77	100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
11.9	682	0.0365	0.96		**Shallow Concentrated Flow, EU-1** Woodland Kv= 5.0 fps
0.7	110	0.3130	2.80		**Shallow Concentrated Flow, ED-1B** Woodland Kv= 5.0 fps
7.6	27	0.0185	0.06		**Sheet Flow, ED-1A** Woods: Light underbrush n= 0.400 P2= 3.38"
9.1	77	0.0960	0.14		**Sheet Flow, EO-1** Woods: Light underbrush n= 0.400 P2= 3.38"
29.3	896	Total			

Subcatchment PO-1: PO-1



Summary for Subcatchment PO-2 Imprv.: PO-2 Imprv.

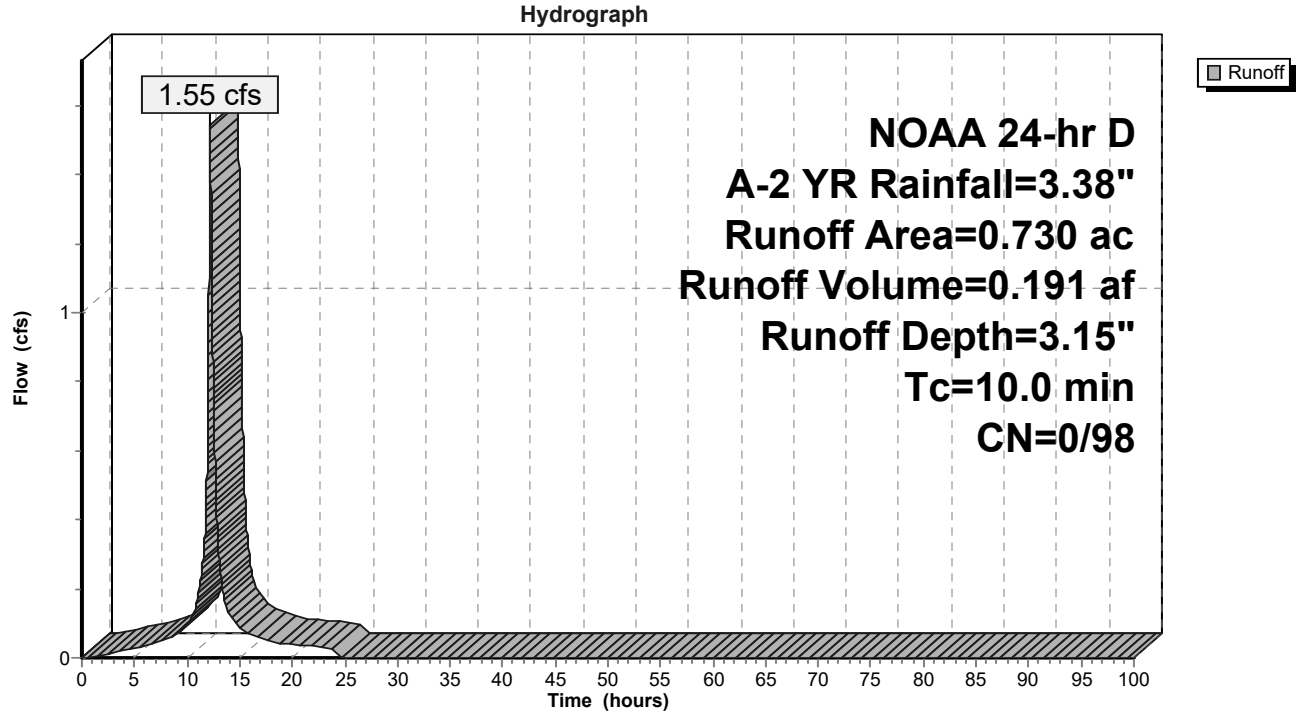
Runoff = 1.55 cfs @ 12.18 hrs, Volume= 0.191 af, Depth= 3.15"

Runoff by SCS TR-20 method, UH=Delmarva, Split Pervious/Imperv. UI as Pervious, Time Span= 0.00-100.00 hrs, dt=
NOAA 24-hr D A-2 YR Rainfall=3.38"

Area (ac)	CN	Description
0.730	98	Paved parking, HSG D
0.730	98	100.00% Impervious Area

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

Subcatchment PO-2 Imprv.: PO-2 Imprv.



Summary for Subcatchment PO-2 Perv.: PO-2 Perv.

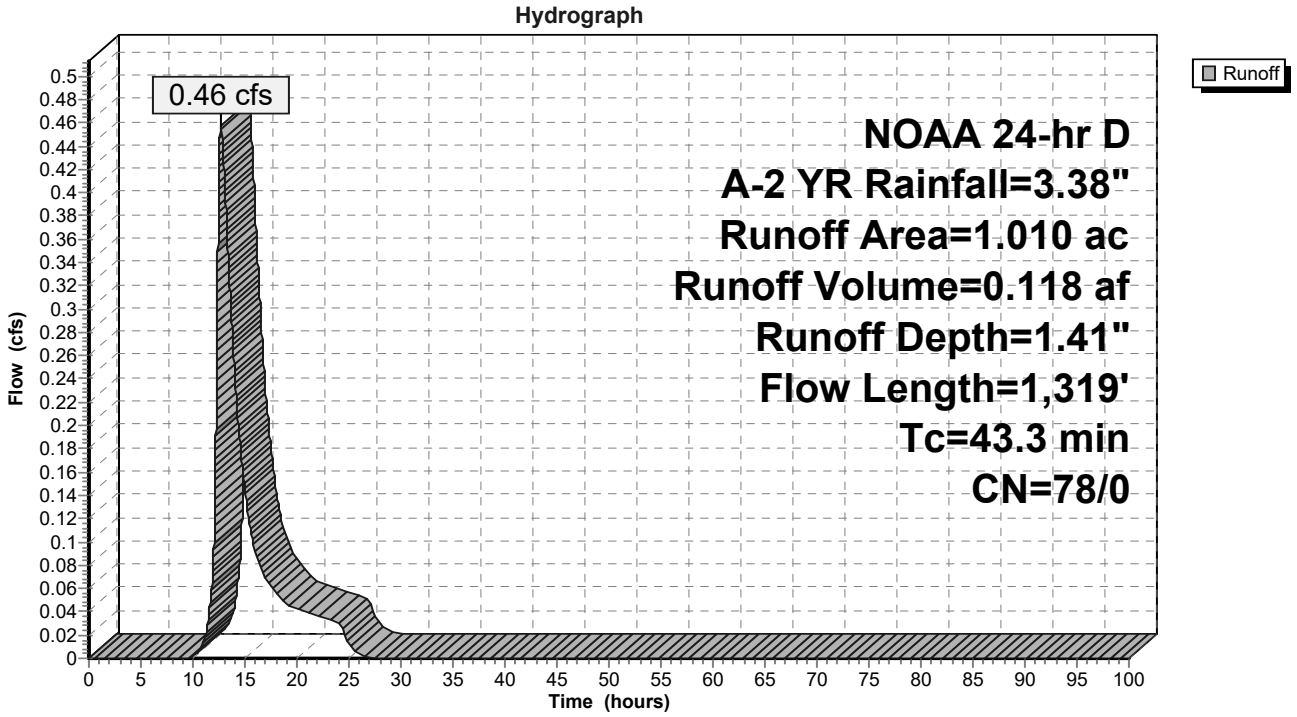
Runoff = 0.46 cfs @ 12.70 hrs, Volume= 0.118 af, Depth= 1.41"

Runoff by SCS TR-20 method, UH=Delmarva, Split Pervious/Imperv. UI as Pervious, Time Span= 0.00-100.00 hrs, dt=
NOAA 24-hr D A-2 YR Rainfall=3.38"

Area (ac)	CN	Description
0.250	80	>75% Grass cover, Good, HSG D
0.760	77	Woods, Good, HSG D
1.010	78	Weighted Average
1.010	78	100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
18.5	628	0.0128	0.57		**Shallow Concentrated Flow, EU-2** Woodland Kv= 5.0 fps
8.8	347	0.0173	0.66		**Shallow Concentrated Flow, ED-2** Woodland Kv= 5.0 fps
9.8	100	0.0189	0.17		**Sheet Flow, EO-2** Grass: Short n= 0.150 P2= 3.38"
0.1	61	0.1890	8.83		**Shallow Concentrated Flow, EO-2 PAVED** Paved Kv= 20.3 fps
1.6	140	0.0010	1.48	1.43	**Pipe Channel, EO-2 PIPE FLOW** 15.0" Round w/ 4.0" inside fill Area= 1.0 sf Perim= 3.7' r= 0.26' n= 0.013 Concrete pipe, bends & connections
4.5	43	0.0010	0.16		**Shallow Concentrated Flow, EO-2 FES** Woodland Kv= 5.0 fps
43.3	1,319	Total			

Subcatchment PO-2 Perv.: PO-2 Perv.



Summary for Subcatchment PU-1: PU-1

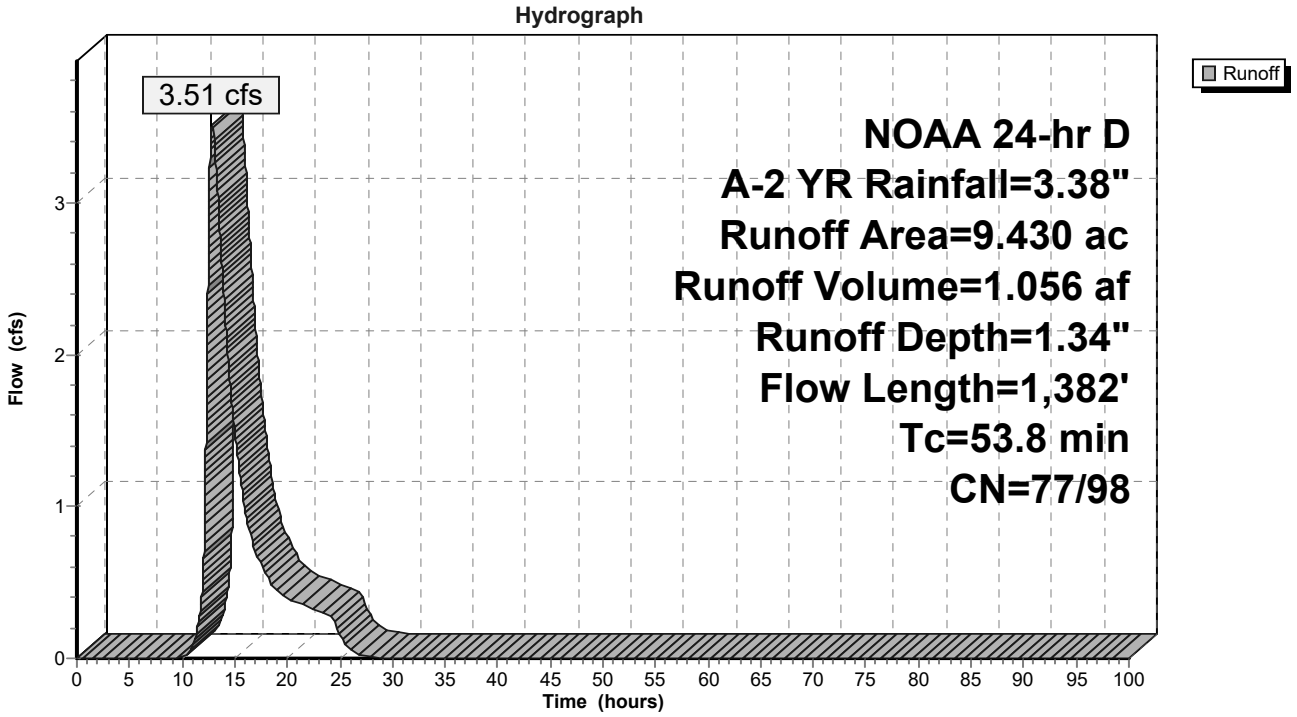
Runoff = 3.51 cfs @ 12.80 hrs, Volume= 1.056 af, Depth= 1.34"

Runoff by SCS TR-20 method, UH=Delmarva, Split Pervious/Imperv. UI as Pervious, Time Span= 0.00-100.00 hrs, dt=
NOAA 24-hr D A-2 YR Rainfall=3.38"

Area (ac)	CN	Description
9.355	77	Woods, Good, HSG D
0.010	98	Paved parking, HSG D
0.065	80	>75% Grass cover, Good, HSG D
9.430	77	Weighted Average
9.420	77	99.89% Pervious Area
0.010	98	0.11% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
16.6	100	0.0050	0.10		**Sheet Flow, PU-1** Grass: Short n= 0.150 P2= 3.38"
2.1	110	0.0153	0.87		**Shallow Concentrated Flow, PU-1O** Short Grass Pasture Kv= 7.0 fps
0.1	23	0.0138	6.98	12.34	**Pipe Channel, PU-1O** 18.0" Round Area= 1.8 sf Perim= 4.7' r= 0.38' n= 0.013
35.0	1,149	0.0120	0.55		**Shallow Concentrated Flow, EU-2** Woodland Kv= 5.0 fps
53.8	1,382	Total			

Subcatchment PU-1: PU-1



Summary for Pond A: BASIN-A

Inflow Area = 3.580 ac, 54.47% Impervious, Inflow Depth = 2.38" for A-2 YR event
Inflow = 3.74 cfs @ 12.25 hrs, Volume= 0.709 af
Outflow = 2.11 cfs @ 12.85 hrs, Volume= 0.709 af, Atten= 44%, Lag= 36.2 min
Primary = 2.11 cfs @ 12.85 hrs, Volume= 0.709 af

Routing by Stor-Ind method, Time Span= 0.00-100.00 hrs, dt= 0.01 hrs
Peak Elev= 124.49' @ 12.85 hrs Surf.Area= 0.129 ac Storage= 0.095 af

Plug-Flow detention time= (not calculated: outflow precedes inflow)
Center-of-Mass det. time= 12.9 min (826.0 - 813.1)

Volume	Invert	Avail.Storage	Storage Description
#1A	122.00'	0.000 af	**38.59'W x 114.17'L x 6.58'H Field A** 0.666 af Overall - 0.301 af Embedded = 0.365 af x 0.0% Voids
#2A	122.50'	0.253 af	**ADS N-12 60"** x 25 Inside #1 Inside= 59.5"W x 59.5"H => 19.30 sf x 20.00'L = 386.0 cf Outside= 67.0"W x 67.0"H => 22.91 sf x 20.00'L = 458.2 cf 25 Chambers in 5 Rows 35.59' Header x 19.30 sf x 2 = 1,373.6 cf Inside
#3B	122.00'	0.000 af	**16.08'W x 74.17'L x 6.58'H Field B** 0.180 af Overall - 0.077 af Embedded = 0.103 af x 0.0% Voids
#4B	122.50'	0.065 af	**ADS N-12 60"** x 6 Inside #3 Inside= 59.5"W x 59.5"H => 19.30 sf x 20.00'L = 386.0 cf Outside= 67.0"W x 67.0"H => 22.91 sf x 20.00'L = 458.2 cf 6 Chambers in 2 Rows 13.08' Header x 19.30 sf x 2 = 505.1 cf Inside
		0.318 af	Total Available Storage

Storage Group A created with Chamber Wizard
Storage Group B created with Chamber Wizard

Device	Routing	Invert	Outlet Devices
#1	Primary	122.50'	**18.0" Round Culvert** L= 26.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 122.50' / 122.00' S= 0.0192 '/' Cc= 0.900 n= 0.012, Flow Area= 1.77 sf
#2	Device 1	122.50'	**5.5" Vert. Orifice/Grate X 2.00** C= 0.600 Limited to weir flow at low heads
#3	Device 1	124.50'	**10.0" W x 5.5" H Vert. Orifice/Grate** C= 0.600 Limited to weir flow at low heads
#4	Device 1	125.45'	**8.0" W x 4.0" H Vert. Orifice/Grate** C= 0.600 Limited to weir flow at low heads
#5	Device 1	128.25'	**4.0' long Sharp-Crested Rectangular Weir** 2 End Contraction(s)

Primary OutFlow Max=2.11 cfs @ 12.85 hrs HW=124.49' (Free Discharge)
- **1=Culvert** (Passes 2.11 cfs of 9.48 cfs potential flow)
  - **2=Orifice/Grate** (Orifice Controls 2.11 cfs @ 6.39 fps)
  - **3=Orifice/Grate** (Controls 0.00 cfs)
  - **4=Orifice/Grate** (Controls 0.00 cfs)
  - **5=Sharp-Crested Rectangular Weir** (Controls 0.00 cfs)

Pond A: BASIN-A - Chamber Wizard Field A

Chamber Model = ADS N-12 60" (ADS N-12® Pipe)
Inside= 59.5"W x 59.5"H => 19.30 sf x 20.00'L = 386.0 cf
Outside= 67.0"W x 67.0"H => 22.91 sf x 20.00'L = 458.2 cf

67.0" Wide + 23.0" Spacing = 90.0" C-C Row Spacing

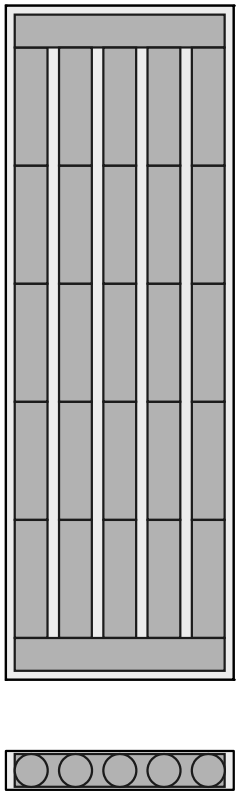
5 Chambers/Row x 20.00' Long +5.58' Header x 2 = 111.17' Row Length +18.0" End Stone x 2 = 114.17' Base Length
5 Rows x 67.0" Wide + 23.0" Spacing x 4 + 18.0" Side Stone x 2 = 38.59' Base Width
6.0" Stone Base + 67.0" Chamber Height + 6.0" Stone Cover = 6.58' Field Height

25 Chambers x 386.0 cf + 35.59' Header x 19.30 sf x 2 = 11,023.6 cf Chamber Storage
25 Chambers x 458.2 cf + 35.59' Header x 22.91 sf x 2 = 13,086.2 cf Displacement

29,003.5 cf Field - 13,086.2 cf Chambers = 15,917.3 cf Stone x 0.0% Voids = 0.0 cf Stone Storage

Chamber Storage = 11,023.6 cf = 0.253 af
Overall Storage Efficiency = 38.0%
Overall System Size = 114.17' x 38.59' x 6.58'

25 Chambers
1,074.2 cy Field
589.5 cy Stone



Pond A: BASIN-A - Chamber Wizard Field B

Chamber Model = ADS N-12 60" (ADS N-12® Pipe)
Inside= 59.5"W x 59.5"H => 19.30 sf x 20.00'L = 386.0 cf
Outside= 67.0"W x 67.0"H => 22.91 sf x 20.00'L = 458.2 cf

67.0" Wide + 23.0" Spacing = 90.0" C-C Row Spacing

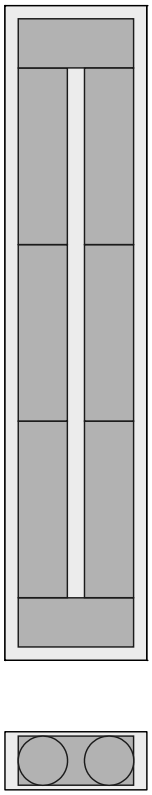
3 Chambers/Row x 20.00' Long +5.58' Header x 2 = 71.17' Row Length +18.0" End Stone x 2 = 74.17' Base Length
2 Rows x 67.0" Wide + 23.0" Spacing x 1 + 18.0" Side Stone x 2 = 16.08' Base Width
6.0" Stone Base + 67.0" Chamber Height + 6.0" Stone Cover = 6.58' Field Height

6 Chambers x 386.0 cf + 13.08' Header x 19.30 sf x 2 = 2,821.1 cf Chamber Storage
6 Chambers x 458.2 cf + 13.08' Header x 22.91 sf x 2 = 3,348.9 cf Displacement

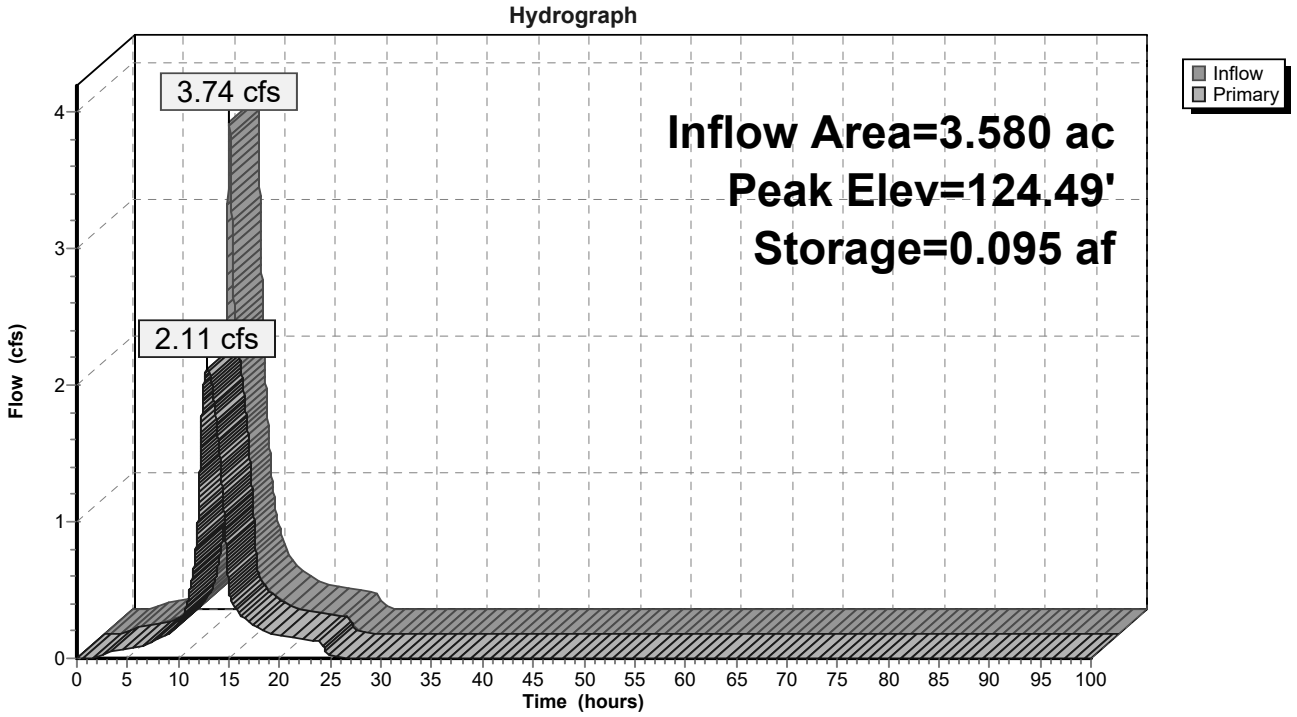
7,854.1 cf Field - 3,348.9 cf Chambers = 4,505.2 cf Stone x 0.0% Voids = 0.0 cf Stone Storage

Chamber Storage = 2,821.1 cf = 0.065 af
Overall Storage Efficiency = 35.9%
Overall System Size = 74.17' x 16.08' x 6.58'

6 Chambers
290.9 cy Field
166.9 cy Stone



Pond A: BASIN-A



Summary for Pond B: BASIN-B

Inflow Area = 0.510 ac, 94.12% Impervious, Inflow Depth = 3.05" for A-2 YR event
Inflow = 1.29 cfs @ 12.14 hrs, Volume= 0.130 af
Outflow = 0.07 cfs @ 12.59 hrs, Volume= 0.087 af, Atten= 95%, Lag= 27.1 min
Primary = 0.07 cfs @ 12.59 hrs, Volume= 0.087 af

Routing by Stor-Ind method, Time Span= 0.00-100.00 hrs, dt= 0.01 hrs
Peak Elev= 129.01' @ 14.53 hrs Surf.Area= 0.126 ac Storage= 0.090 af

Plug-Flow detention time= 571.6 min calculated for 0.087 af (67% of inflow)
Center-of-Mass det. time= 463.2 min (1,226.8 - 763.6)

Volume	Invert	Avail.Storage	Storage Description
#1A	127.50'	0.131 af	**50.24'W x 109.00'L x 4.00'H Field A** 0.503 af Overall - 0.176 af Embedded = 0.327 af x 40.0% Voids
#2A	128.00'	0.134 af	**ADS N-12 30"** x 55 Inside #1 Inside= 30.0"W x 30.0"H => 4.90 sf x 20.00'L = 98.0 cf Outside= 36.0"W x 36.0"H => 6.41 sf x 20.00'L = 128.3 cf 55 Chambers in 11 Rows 47.24' Header x 4.90 sf x 2 = 463.0 cf Inside
		0.265 af	Total Available Storage

Storage Group A created with Chamber Wizard

Device	Routing	Invert	Outlet Devices
#1	Primary	128.40'	**15.0" Round Culvert** L= 81.0' CPP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 128.40' / 127.96' S= 0.0054 '/' Cc= 0.900 n= 0.012, Flow Area= 1.23 sf
#2	Device 1	128.40'	**Reg-U-Flo SH 3.0-in**
#3	Device 1	129.10'	**4.0" Vert. Orifice/Grate** C= 0.600 Limited to weir flow at low heads
#4	Device 1	130.40'	**4.0' long Sharp-Crested Rectangular Weir** 2 End Contraction(s)

Primary OutFlow Max=0.07 cfs @ 12.59 hrs HW=128.90' (Free Discharge)
└**1=Culvert** (Passes 0.07 cfs of 0.87 cfs potential flow)
  ├**2=Reg-U-Flo SH 3.0-in** (Custom Controls 0.07 cfs)
  ├**3=Orifice/Grate** (Controls 0.00 cfs)
  └**4=Sharp-Crested Rectangular Weir** (Controls 0.00 cfs)

Pond B: BASIN-B - Chamber Wizard Field A

Chamber Model = ADS N-12 30" (ADS N-12® Pipe)
Inside= 30.0"W x 30.0"H => 4.90 sf x 20.00'L = 98.0 cf
Outside= 36.0"W x 36.0"H => 6.41 sf x 20.00'L = 128.3 cf

36.0" Wide + 17.1" Spacing = 53.1" C-C Row Spacing

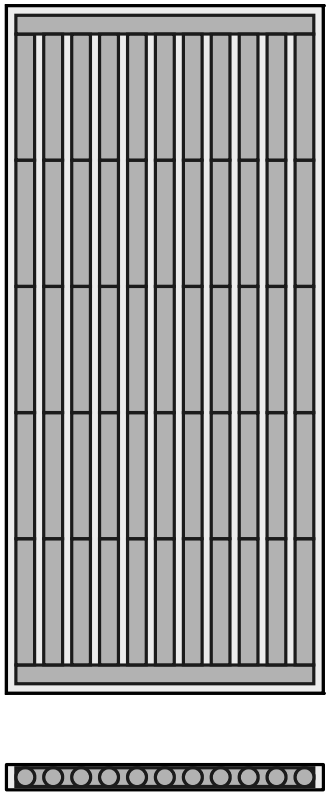
5 Chambers/Row x 20.00' Long +3.00' Header x 2 = 106.00' Row Length +18.0" End Stone x 2 = 109.00' Base Length
11 Rows x 36.0" Wide + 17.1" Spacing x 10 + 18.0" Side Stone x 2 = 50.24' Base Width
6.0" Stone Base + 36.0" Chamber Height + 6.0" Stone Cover = 4.00' Field Height

55 Chambers x 98.0 cf + 47.24' Header x 4.90 sf x 2 = 5,853.0 cf Chamber Storage
55 Chambers x 128.3 cf + 47.24' Header x 6.41 sf x 2 = 7,660.4 cf Displacement

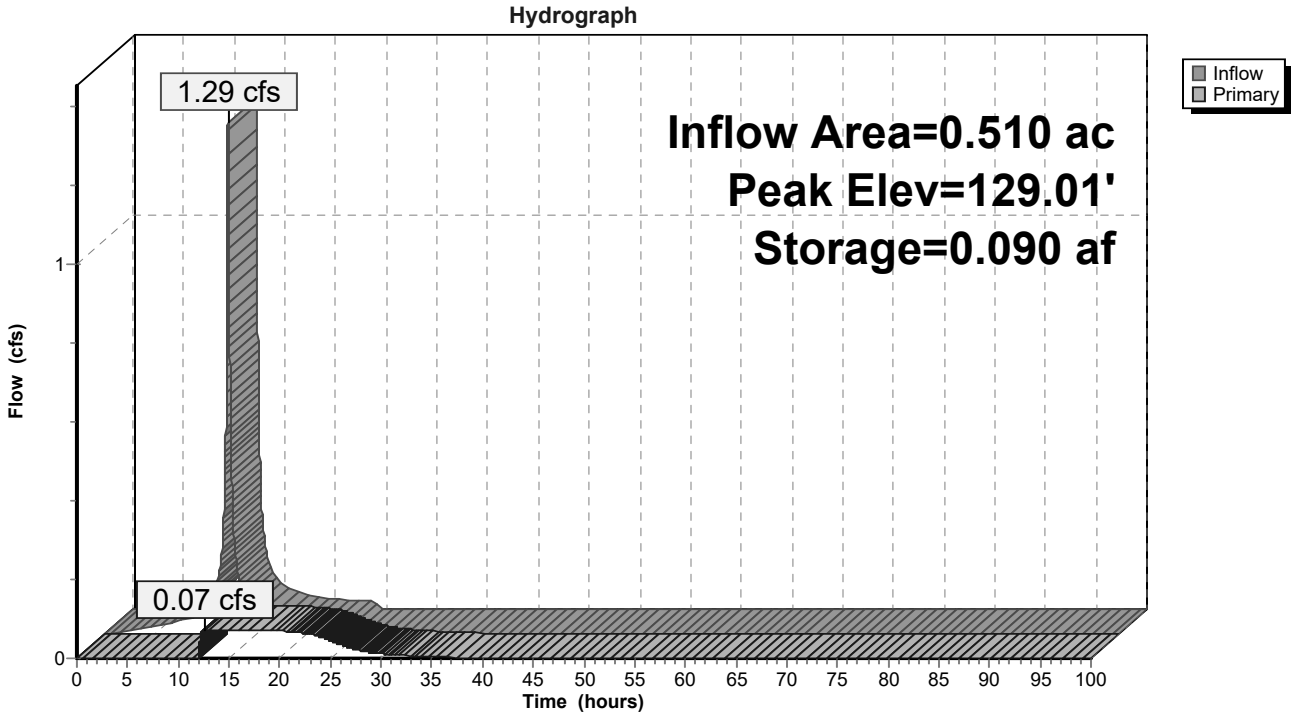
21,903.0 cf Field - 7,660.4 cf Chambers = 14,242.6 cf Stone x 40.0% Voids = 5,697.0 cf Stone Storage

Chamber Storage + Stone Storage = 11,550.0 cf = 0.265 af
Overall Storage Efficiency = 52.7%
Overall System Size = 109.00' x 50.24' x 4.00'

55 Chambers
811.2 cy Field
527.5 cy Stone



Pond B: BASIN-B

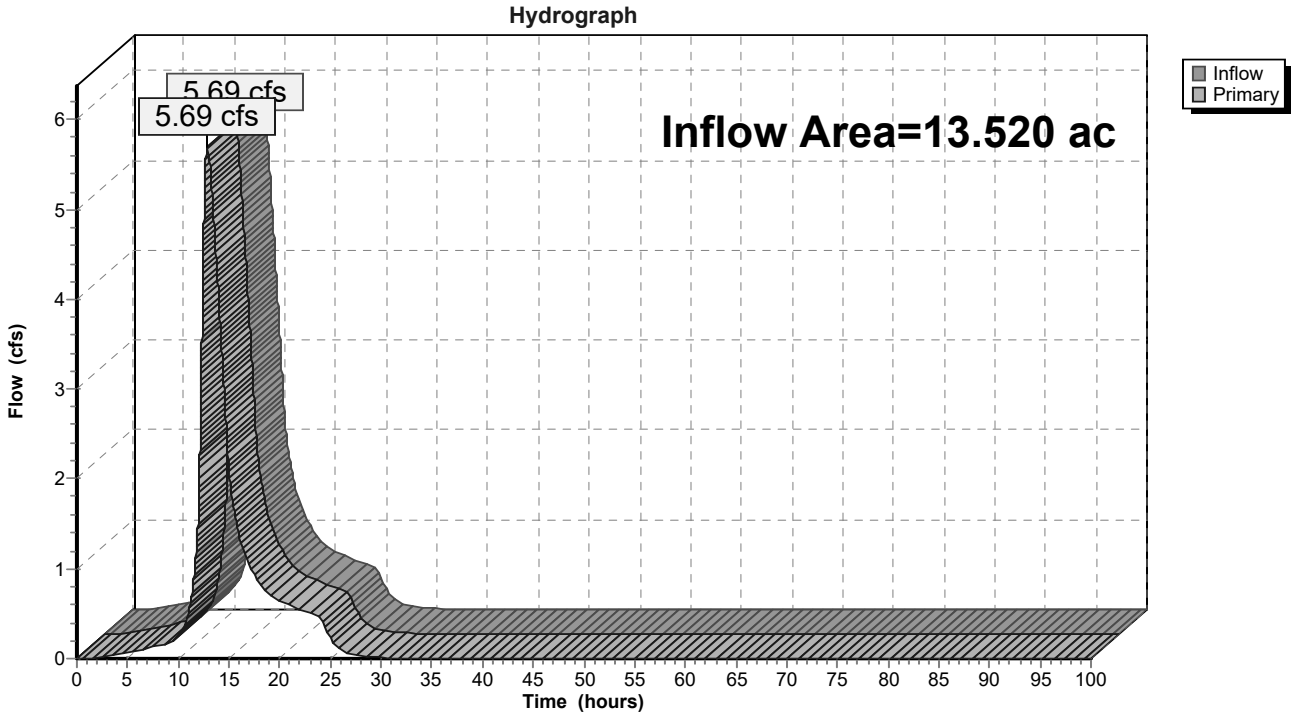


Summary for Link DP*: DP

Inflow Area = 13.520 ac, 18.05% Impervious, Inflow Depth = 1.64" for A-2 YR event
Inflow = 5.69 cfs @ 12.81 hrs, Volume= 1.851 af
Primary = 5.69 cfs @ 12.81 hrs, Volume= 1.851 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-100.00 hrs, dt= 0.01 hrs

Link DP*: DP

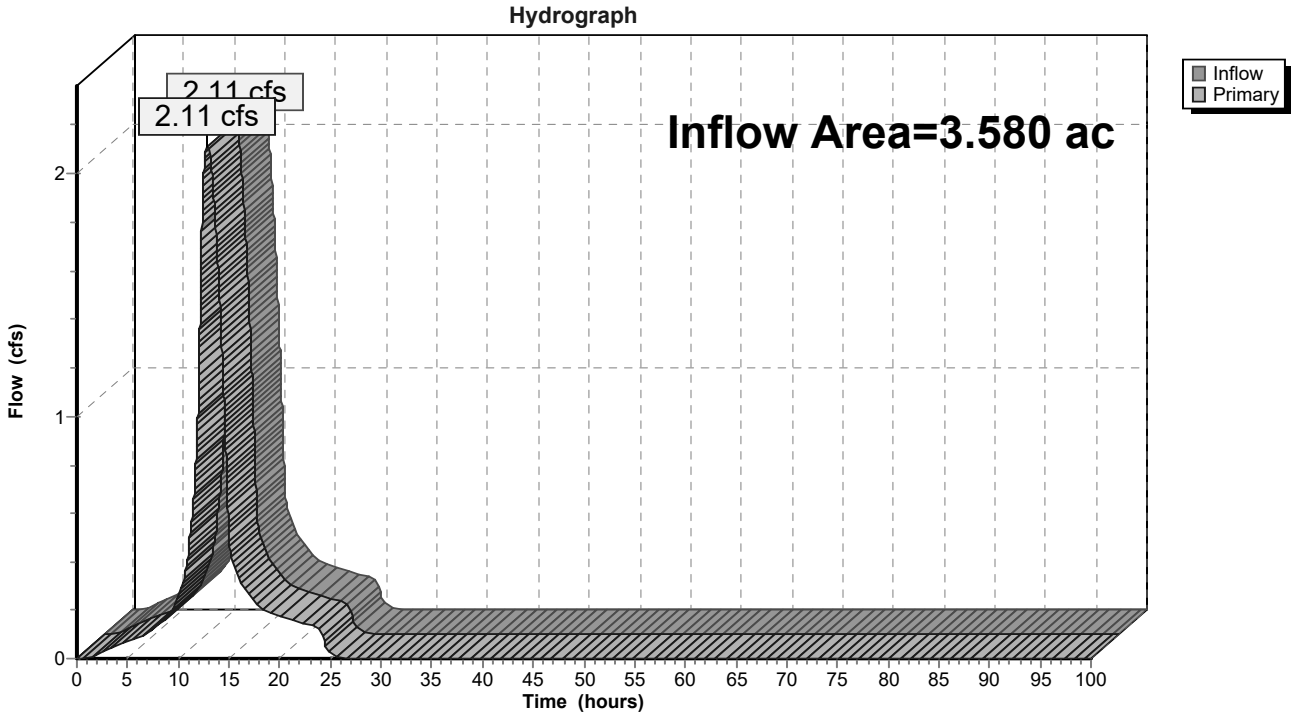


Summary for Link POA-1*: POA-1

Inflow Area = 3.580 ac, 54.47% Impervious, Inflow Depth = 2.38" for A-2 YR event
Inflow = 2.11 cfs @ 12.85 hrs, Volume= 0.709 af
Primary = 2.11 cfs @ 12.85 hrs, Volume= 0.709 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-100.00 hrs, dt= 0.01 hrs

Link POA-1*: POA-1

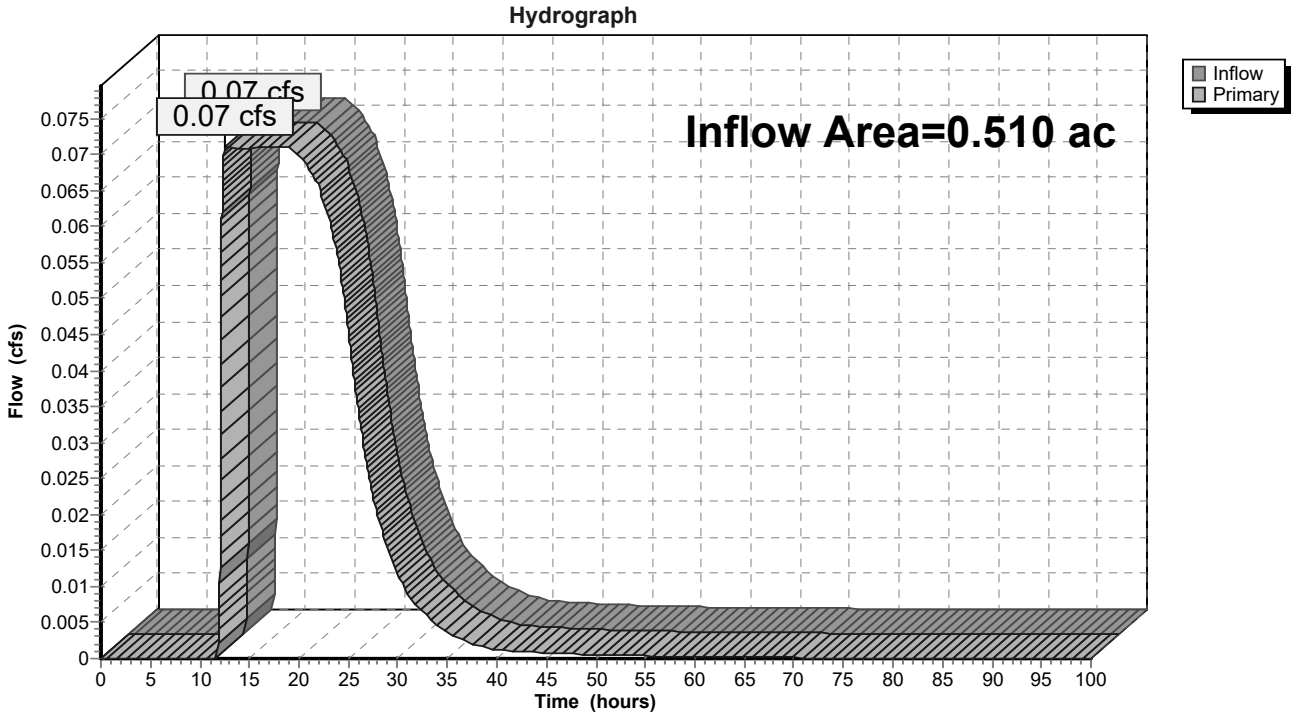


Summary for Link POA-2*: POA-2

Inflow Area = 0.510 ac, 94.12% Impervious, Inflow Depth > 2.04" for A-2 YR event
Inflow = 0.07 cfs @ 12.59 hrs, Volume= 0.087 af
Primary = 0.07 cfs @ 12.59 hrs, Volume= 0.087 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-100.00 hrs, dt= 0.01 hrs

Link POA-2*: POA-2



Time span=0.00-100.00 hrs, dt=0.01 hrs, 10001 points
Runoff by SCS TR-20 method, UH=Delmarva, Split Pervious/Imperv. UI as Pervious
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Subcatchment PD-2I: PD-2 - Imprv. Runoff Area=1.220 ac 100.00% Impervious Runoff Depth=4.99"
Tc=24.5 min CN=0/98 Runoff=2.60 cfs 0.508 af

Subcatchment PD-2P: PD-2 Perv. Runoff Area=0.570 ac 0.00% Impervious Runoff Depth=3.09"
Tc=10.0 min CN=80/0 Runoff=1.32 cfs 0.147 af

Subcatchment PD-3P: PD-3 Imprv. Runoff Area=0.510 ac 94.12% Impervious Runoff Depth=4.88"
Tc=6.0 min CN=80/98 Runoff=2.04 cfs 0.207 af

Subcatchment PO-1: PO-1 Runoff Area=0.050 ac 0.00% Impervious Runoff Depth=2.82"
Flow Length=896' Tc=29.3 min CN=77/0 Runoff=0.06 cfs 0.012 af

Subcatchment PO-2 Imprv.: PO-2 Imprv. Runoff Area=0.730 ac 100.00% Impervious Runoff Depth=4.99"
Tc=10.0 min CN=0/98 Runoff=2.41 cfs 0.304 af

Subcatchment PO-2 Perv.: PO-2 Perv. Runoff Area=1.010 ac 0.00% Impervious Runoff Depth=2.91"
Flow Length=1,319' Tc=43.3 min CN=78/0 Runoff=0.98 cfs 0.245 af

Subcatchment PU-1: PU-1 Runoff Area=9.430 ac 0.11% Impervious Runoff Depth=2.82"
Flow Length=1,382' Tc=53.8 min CN=77/98 Runoff=7.76 cfs 2.215 af

Pond A: BASIN-A Peak Elev=125.43' Storage=0.170 af Inflow=6.31 cfs 1.215 af
Outflow=4.15 cfs 1.215 af

Pond B: BASIN-B Peak Elev=129.46' Storage=0.129 af Inflow=2.04 cfs 0.207 af
Outflow=0.26 cfs 0.164 af

Link DP*: DP Inflow=12.14 cfs 3.594 af
Primary=12.14 cfs 3.594 af

Link POA-1*: POA-1 Inflow=4.15 cfs 1.215 af
Primary=4.15 cfs 1.215 af

Link POA-2*: POA-2 Inflow=0.26 cfs 0.164 af
Primary=0.26 cfs 0.164 af

Total Runoff Area = 13.520 ac Runoff Volume = 3.637 af Average Runoff Depth = 3.23"
81.95% Pervious = 11.080 ac 18.05% Impervious = 2.440 ac

Summary for Subcatchment PD-2I: PD-2 - Imprv.

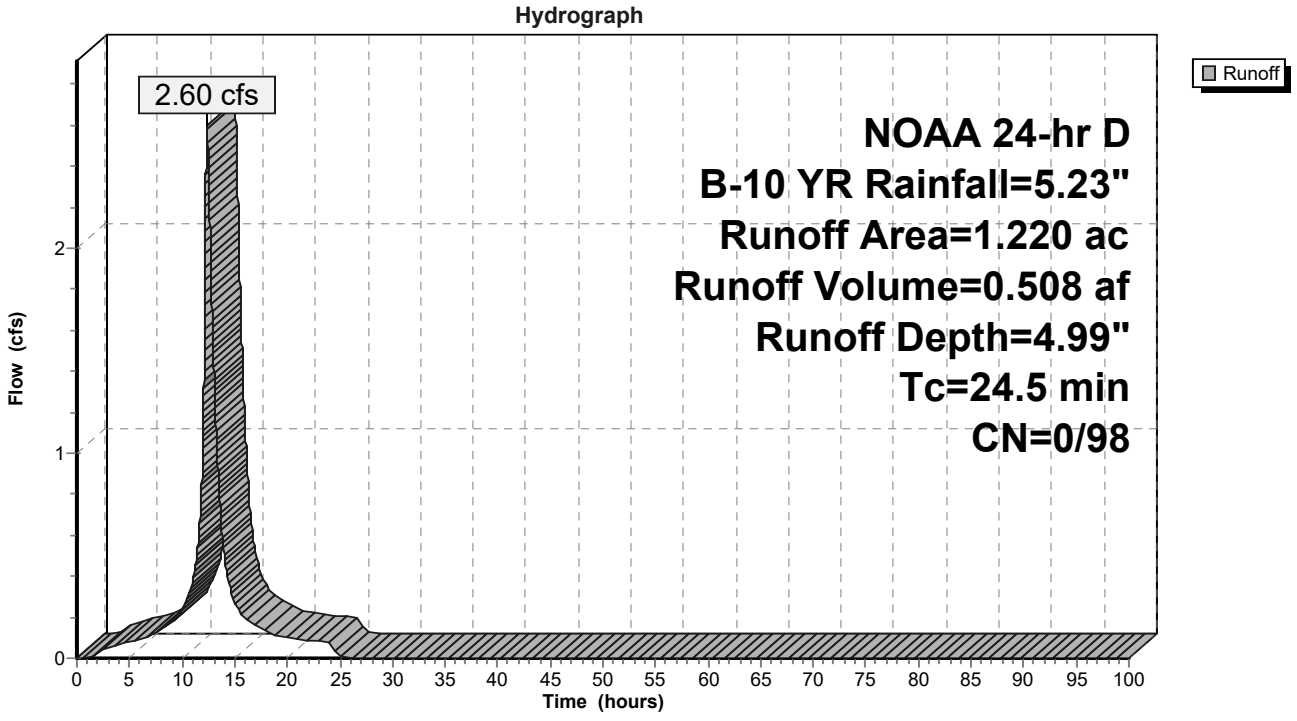
Runoff = 2.60 cfs @ 12.36 hrs, Volume= 0.508 af, Depth= 4.99"

Runoff by SCS TR-20 method, UH=Delmarva, Split Pervious/Imperv. UI as Pervious, Time Span= 0.00-100.00 hrs, dt=
NOAA 24-hr D B-10 YR Rainfall=5.23"

Area (ac)	CN	Description
0.180	98	Roofs, HSG D
1.040	98	Paved parking, HSG D
1.220	98	Weighted Average
1.220	98	100.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					**Direct Entry, Tc**
18.5					**Direct Entry, EU-2**
24.5	0	Total			

Subcatchment PD-2I: PD-2 - Imprv.



Summary for Subcatchment PD-2P: PD-2 Perv.

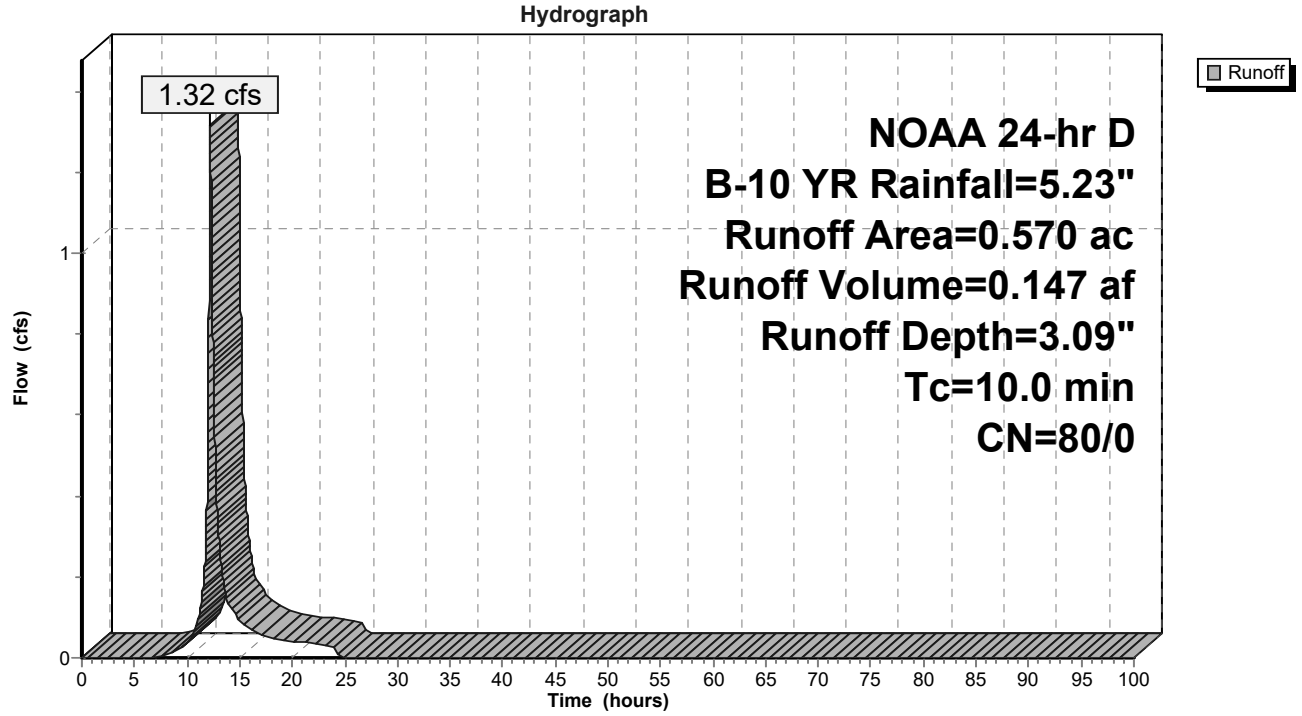
Runoff = 1.32 cfs @ 12.19 hrs, Volume= 0.147 af, Depth= 3.09"

Runoff by SCS TR-20 method, UH=Delmarva, Split Pervious/Imperv. UI as Pervious, Time Span= 0.00-100.00 hrs, dt=
NOAA 24-hr D B-10 YR Rainfall=5.23"

Area (ac)	CN	Description
0.570	80	>75% Grass cover, Good, HSG D
0.570	80	100.00% Pervious Area

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

Subcatchment PD-2P: PD-2 Perv.



Summary for Subcatchment PD-3P: PD-3 Imprv.

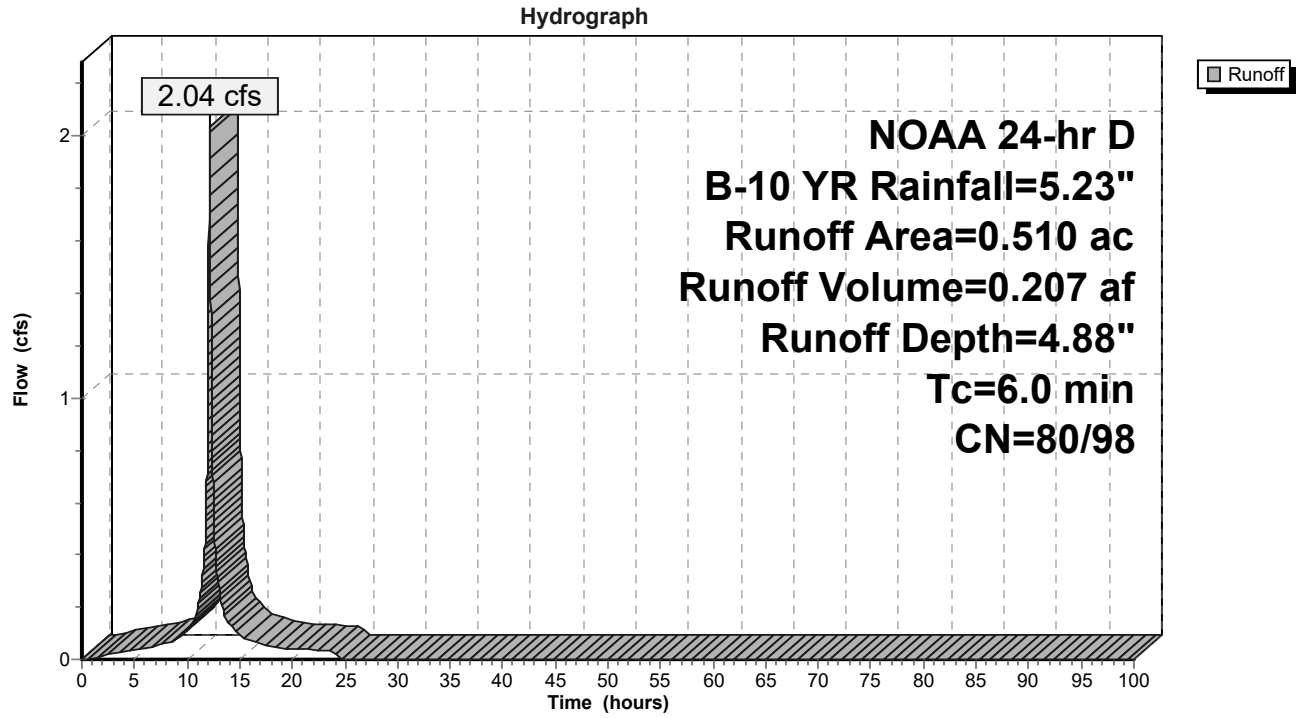
Runoff = 2.04 cfs @ 12.14 hrs, Volume= 0.207 af, Depth= 4.88"

Runoff by SCS TR-20 method, UH=Delmarva, Split Pervious/Imperv. UI as Pervious, Time Span= 0.00-100.00 hrs, dt=
NOAA 24-hr D B-10 YR Rainfall=5.23"

Area (ac)	CN	Description
0.480	98	Roofs, HSG D
0.030	80	>75% Grass cover, Good, HSG D
0.510	97	Weighted Average
0.030	80	5.88% Pervious Area
0.480	98	94.12% Impervious Area

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

Subcatchment PD-3P: PD-3 Imprv.



Summary for Subcatchment PO-1: PO-1

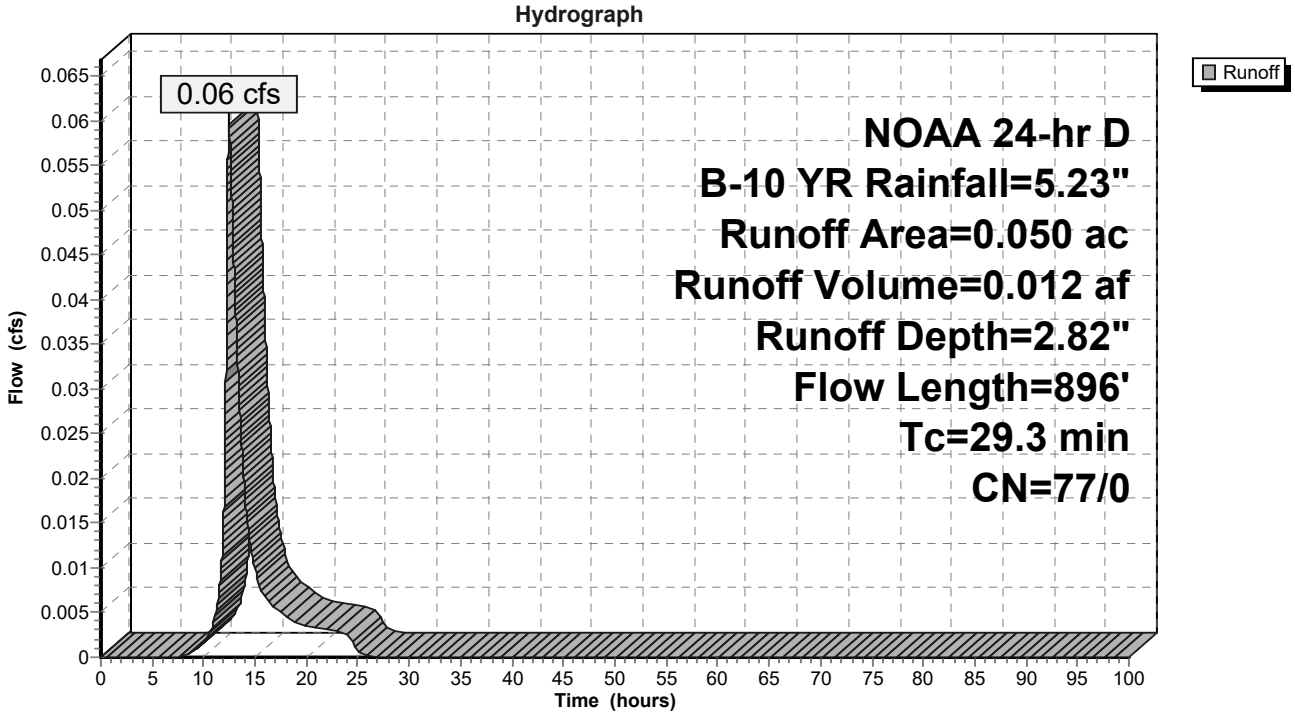
Runoff = 0.06 cfs @ 12.44 hrs, Volume= 0.012 af, Depth= 2.82"

Runoff by SCS TR-20 method, UH=Delmarva, Split Pervious/Imperv. UI as Pervious, Time Span= 0.00-100.00 hrs, dt=
NOAA 24-hr D B-10 YR Rainfall=5.23"

Area (ac)	CN	Description
0.050	77	Woods, Good, HSG D
0.050	77	100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
11.9	682	0.0365	0.96		**Shallow Concentrated Flow, EU-1** Woodland Kv= 5.0 fps
0.7	110	0.3130	2.80		**Shallow Concentrated Flow, ED-1B** Woodland Kv= 5.0 fps
7.6	27	0.0185	0.06		**Sheet Flow, ED-1A** Woods: Light underbrush n= 0.400 P2= 3.38"
9.1	77	0.0960	0.14		**Sheet Flow, EO-1** Woods: Light underbrush n= 0.400 P2= 3.38"
29.3	896	Total			

Subcatchment PO-1: PO-1



Summary for Subcatchment PO-2 Imprv.: PO-2 Imprv.

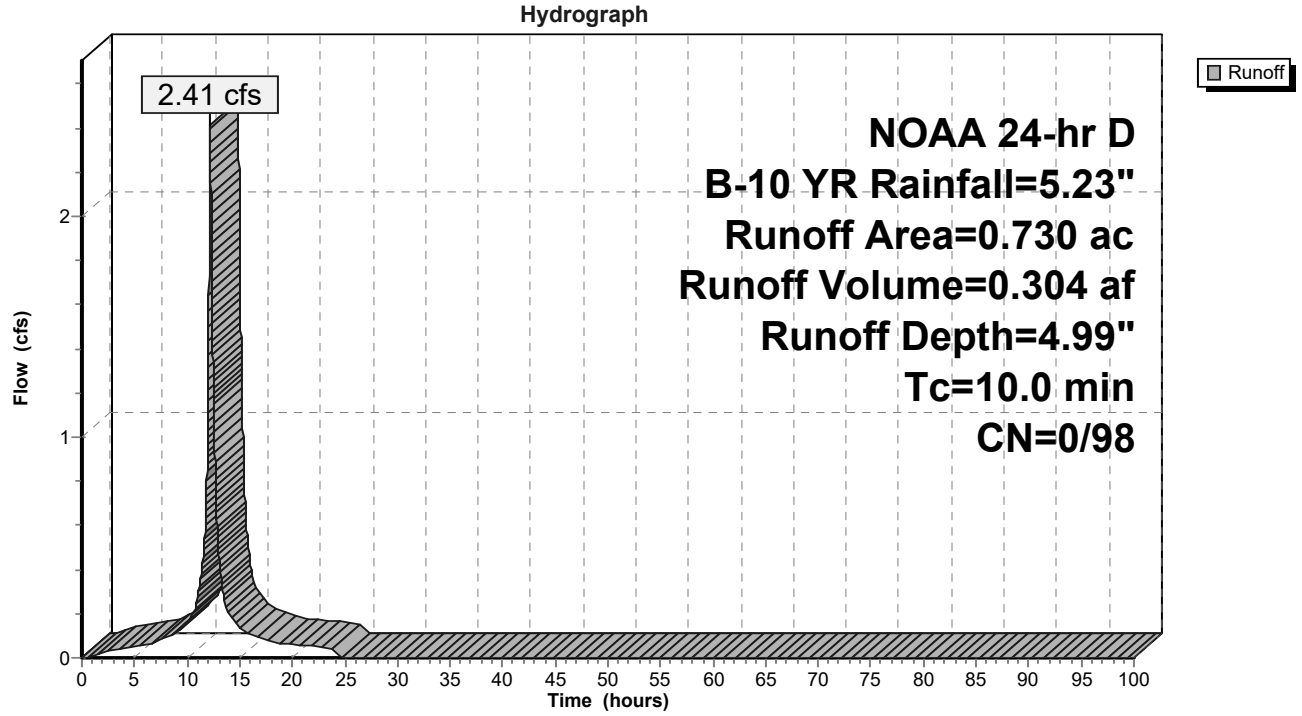
Runoff = 2.41 cfs @ 12.18 hrs, Volume= 0.304 af, Depth= 4.99"

Runoff by SCS TR-20 method, UH=Delmarva, Split Pervious/Imperv. UI as Pervious, Time Span= 0.00-100.00 hrs, dt=
NOAA 24-hr D B-10 YR Rainfall=5.23"

Area (ac)	CN	Description
0.730	98	Paved parking, HSG D
0.730	98	100.00% Impervious Area

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

Subcatchment PO-2 Imprv.: PO-2 Imprv.



Summary for Subcatchment PO-2 Perv.: PO-2 Perv.

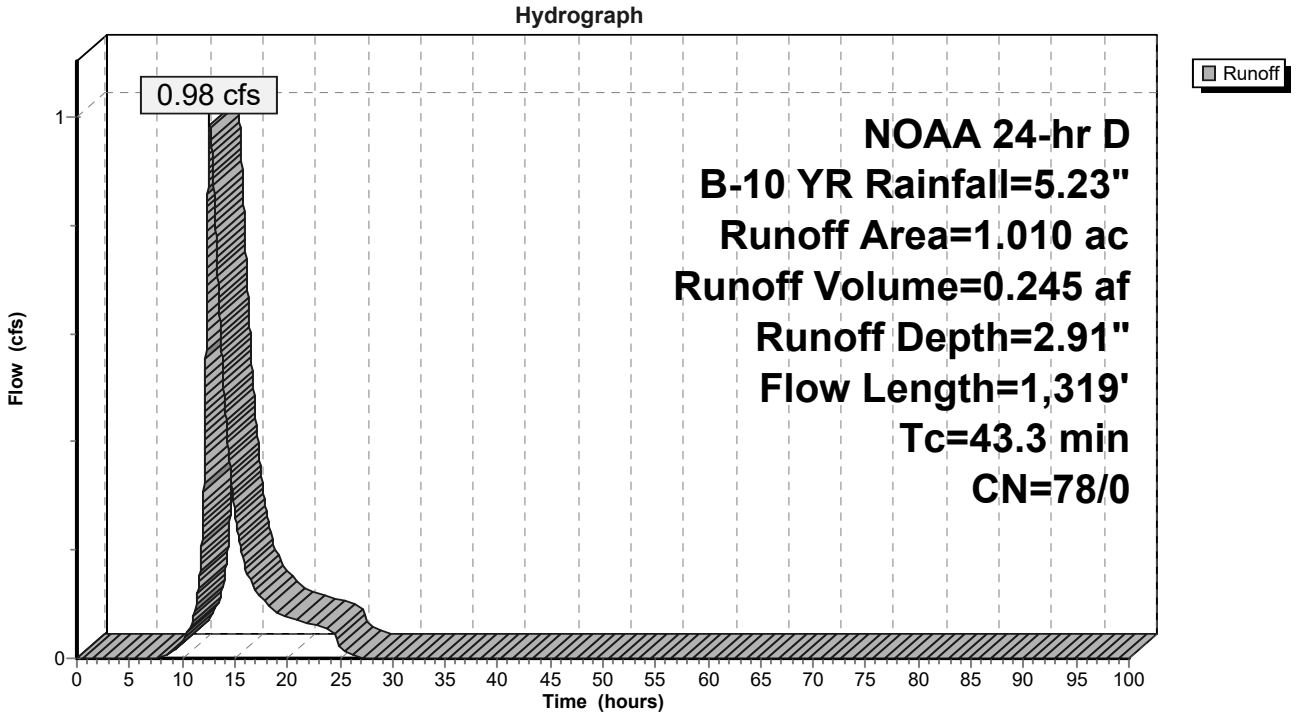
Runoff = 0.98 cfs @ 12.61 hrs, Volume= 0.245 af, Depth= 2.91"

Runoff by SCS TR-20 method, UH=Delmarva, Split Pervious/Imperv. UI as Pervious, Time Span= 0.00-100.00 hrs, dt=
NOAA 24-hr D B-10 YR Rainfall=5.23"

Area (ac)	CN	Description
0.250	80	>75% Grass cover, Good, HSG D
0.760	77	Woods, Good, HSG D
1.010	78	Weighted Average
1.010	78	100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
18.5	628	0.0128	0.57		**Shallow Concentrated Flow, EU-2** Woodland Kv= 5.0 fps
8.8	347	0.0173	0.66		**Shallow Concentrated Flow, ED-2** Woodland Kv= 5.0 fps
9.8	100	0.0189	0.17		**Sheet Flow, EO-2** Grass: Short n= 0.150 P2= 3.38"
0.1	61	0.1890	8.83		**Shallow Concentrated Flow, EO-2 PAVED** Paved Kv= 20.3 fps
1.6	140	0.0010	1.48	1.43	**Pipe Channel, EO-2 PIPE FLOW** 15.0" Round w/ 4.0" inside fill Area= 1.0 sf Perim= 3.7' r= 0.26' n= 0.013 Concrete pipe, bends & connections
4.5	43	0.0010	0.16		**Shallow Concentrated Flow, EO-2 FES** Woodland Kv= 5.0 fps
43.3	1,319	Total			

Subcatchment PO-2 Perv.: PO-2 Perv.



Summary for Subcatchment PU-1: PU-1

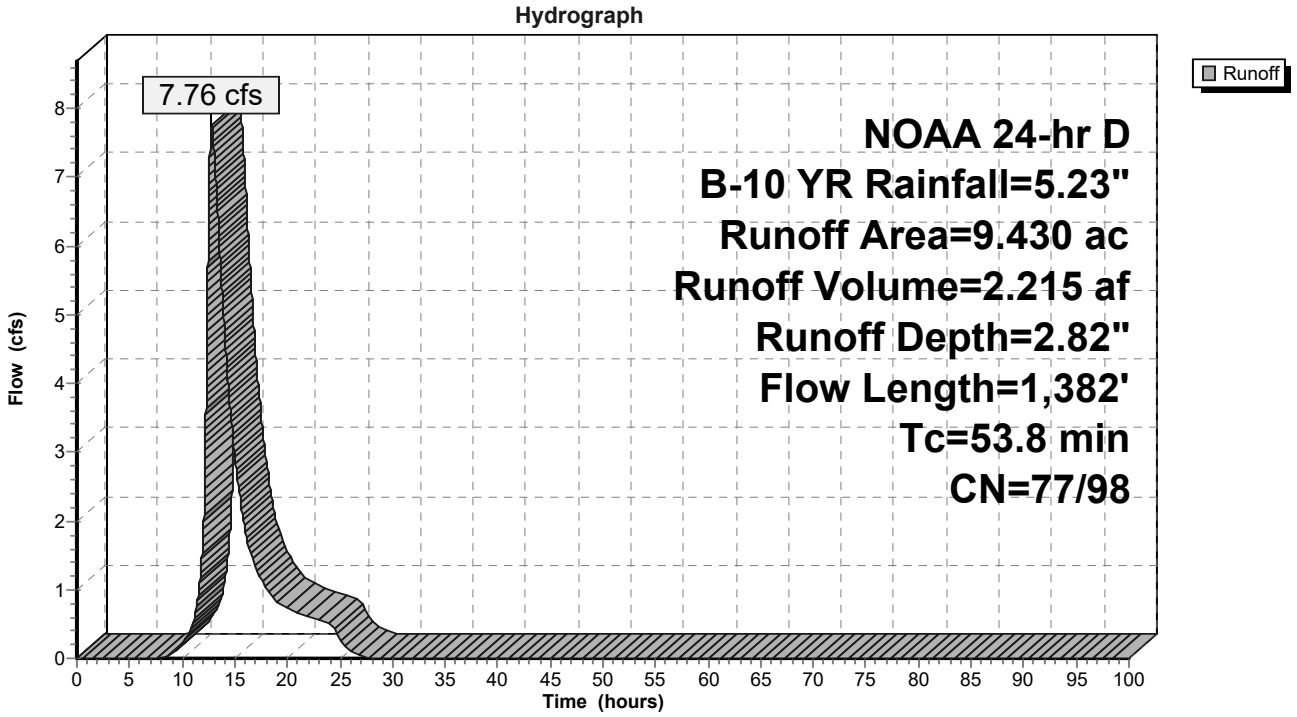
Runoff = 7.76 cfs @ 12.79 hrs, Volume= 2.215 af, Depth= 2.82"

Runoff by SCS TR-20 method, UH=Delmarva, Split Pervious/Imperv. UI as Pervious, Time Span= 0.00-100.00 hrs, dt=
NOAA 24-hr D B-10 YR Rainfall=5.23"

Area (ac)	CN	Description
9.355	77	Woods, Good, HSG D
0.010	98	Paved parking, HSG D
0.065	80	>75% Grass cover, Good, HSG D
9.430	77	Weighted Average
9.420	77	99.89% Pervious Area
0.010	98	0.11% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
16.6	100	0.0050	0.10		**Sheet Flow, PU-1** Grass: Short n= 0.150 P2= 3.38"
2.1	110	0.0153	0.87		**Shallow Concentrated Flow, PU-1O** Short Grass Pasture Kv= 7.0 fps
0.1	23	0.0138	6.98	12.34	**Pipe Channel, PU-1O** 18.0" Round Area= 1.8 sf Perim= 4.7' r= 0.38' n= 0.013
35.0	1,149	0.0120	0.55		**Shallow Concentrated Flow, EU-2** Woodland Kv= 5.0 fps
53.8	1,382	Total			

Subcatchment PU-1: PU-1



Summary for Pond A: BASIN-A

Inflow Area = 3.580 ac, 54.47% Impervious, Inflow Depth = 4.07" for B-10 YR event
Inflow = 6.31 cfs @ 12.25 hrs, Volume= 1.215 af
Outflow = 4.15 cfs @ 12.73 hrs, Volume= 1.215 af, Atten= 34%, Lag= 28.6 min
Primary = 4.15 cfs @ 12.73 hrs, Volume= 1.215 af

Routing by Stor-Ind method, Time Span= 0.00-100.00 hrs, dt= 0.01 hrs
Peak Elev= 125.43' @ 12.73 hrs Surf.Area= 0.129 ac Storage= 0.170 af

Plug-Flow detention time= (not calculated: outflow precedes inflow)
Center-of-Mass det. time= 16.7 min (822.8 - 806.1)

Volume	Invert	Avail.Storage	Storage Description
#1A	122.00'	0.000 af	**38.59'W x 114.17'L x 6.58'H Field A** 0.666 af Overall - 0.301 af Embedded = 0.365 af x 0.0% Voids
#2A	122.50'	0.253 af	**ADS N-12 60"** x 25 Inside #1 Inside= 59.5"W x 59.5"H => 19.30 sf x 20.00'L = 386.0 cf Outside= 67.0"W x 67.0"H => 22.91 sf x 20.00'L = 458.2 cf 25 Chambers in 5 Rows 35.59' Header x 19.30 sf x 2 = 1,373.6 cf Inside
#3B	122.00'	0.000 af	**16.08'W x 74.17'L x 6.58'H Field B** 0.180 af Overall - 0.077 af Embedded = 0.103 af x 0.0% Voids
#4B	122.50'	0.065 af	**ADS N-12 60"** x 6 Inside #3 Inside= 59.5"W x 59.5"H => 19.30 sf x 20.00'L = 386.0 cf Outside= 67.0"W x 67.0"H => 22.91 sf x 20.00'L = 458.2 cf 6 Chambers in 2 Rows 13.08' Header x 19.30 sf x 2 = 505.1 cf Inside
		0.318 af	Total Available Storage

Storage Group A created with Chamber Wizard
Storage Group B created with Chamber Wizard

Device	Routing	Invert	Outlet Devices
#1	Primary	122.50'	**18.0" Round Culvert** L= 26.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 122.50' / 122.00' S= 0.0192 '/' Cc= 0.900 n= 0.012, Flow Area= 1.77 sf
#2	Device 1	122.50'	**5.5" Vert. Orifice/Grate X 2.00** C= 0.600 Limited to weir flow at low heads
#3	Device 1	124.50'	**10.0" W x 5.5" H Vert. Orifice/Grate** C= 0.600 Limited to weir flow at low heads
#4	Device 1	125.45'	**8.0" W x 4.0" H Vert. Orifice/Grate** C= 0.600 Limited to weir flow at low heads
#5	Device 1	128.25'	**4.0' long Sharp-Crested Rectangular Weir** 2 End Contraction(s)

Primary OutFlow Max=4.15 cfs @ 12.73 hrs HW=125.43' (Free Discharge)
- **1=Culvert** (Passes 4.15 cfs of 12.57 cfs potential flow)
  - **2=Orifice/Grate** (Orifice Controls 2.61 cfs @ 7.92 fps)
  - **3=Orifice/Grate** (Orifice Controls 1.53 cfs @ 4.02 fps)
  - **4=Orifice/Grate** (Controls 0.00 cfs)
  - **5=Sharp-Crested Rectangular Weir** (Controls 0.00 cfs)

Pond A: BASIN-A - Chamber Wizard Field A

Chamber Model = ADS N-12 60" (ADS N-12® Pipe)
Inside= 59.5"W x 59.5"H => 19.30 sf x 20.00'L = 386.0 cf
Outside= 67.0"W x 67.0"H => 22.91 sf x 20.00'L = 458.2 cf

67.0" Wide + 23.0" Spacing = 90.0" C-C Row Spacing

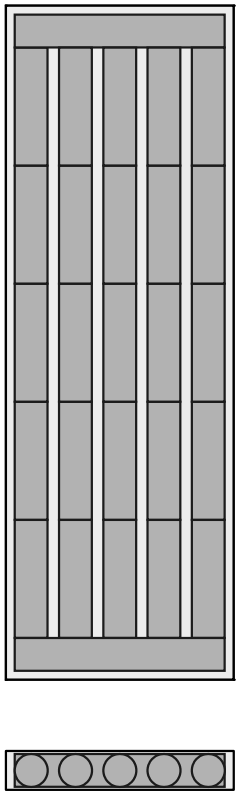
5 Chambers/Row x 20.00' Long +5.58' Header x 2 = 111.17' Row Length +18.0" End Stone x 2 = 114.17' Base Length
5 Rows x 67.0" Wide + 23.0" Spacing x 4 + 18.0" Side Stone x 2 = 38.59' Base Width
6.0" Stone Base + 67.0" Chamber Height + 6.0" Stone Cover = 6.58' Field Height

25 Chambers x 386.0 cf + 35.59' Header x 19.30 sf x 2 = 11,023.6 cf Chamber Storage
25 Chambers x 458.2 cf + 35.59' Header x 22.91 sf x 2 = 13,086.2 cf Displacement

29,003.5 cf Field - 13,086.2 cf Chambers = 15,917.3 cf Stone x 0.0% Voids = 0.0 cf Stone Storage

Chamber Storage = 11,023.6 cf = 0.253 af
Overall Storage Efficiency = 38.0%
Overall System Size = 114.17' x 38.59' x 6.58'

25 Chambers
1,074.2 cy Field
589.5 cy Stone



Pond A: BASIN-A - Chamber Wizard Field B

Chamber Model = ADS N-12 60" (ADS N-12® Pipe)
Inside= 59.5"W x 59.5"H => 19.30 sf x 20.00'L = 386.0 cf
Outside= 67.0"W x 67.0"H => 22.91 sf x 20.00'L = 458.2 cf

67.0" Wide + 23.0" Spacing = 90.0" C-C Row Spacing

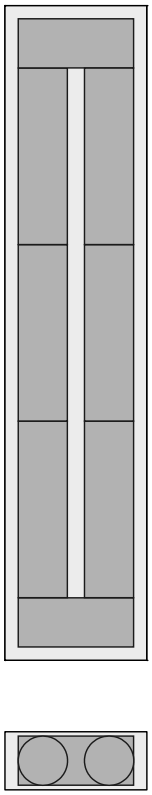
3 Chambers/Row x 20.00' Long +5.58' Header x 2 = 71.17' Row Length +18.0" End Stone x 2 = 74.17' Base Length
2 Rows x 67.0" Wide + 23.0" Spacing x 1 + 18.0" Side Stone x 2 = 16.08' Base Width
6.0" Stone Base + 67.0" Chamber Height + 6.0" Stone Cover = 6.58' Field Height

6 Chambers x 386.0 cf + 13.08' Header x 19.30 sf x 2 = 2,821.1 cf Chamber Storage
6 Chambers x 458.2 cf + 13.08' Header x 22.91 sf x 2 = 3,348.9 cf Displacement

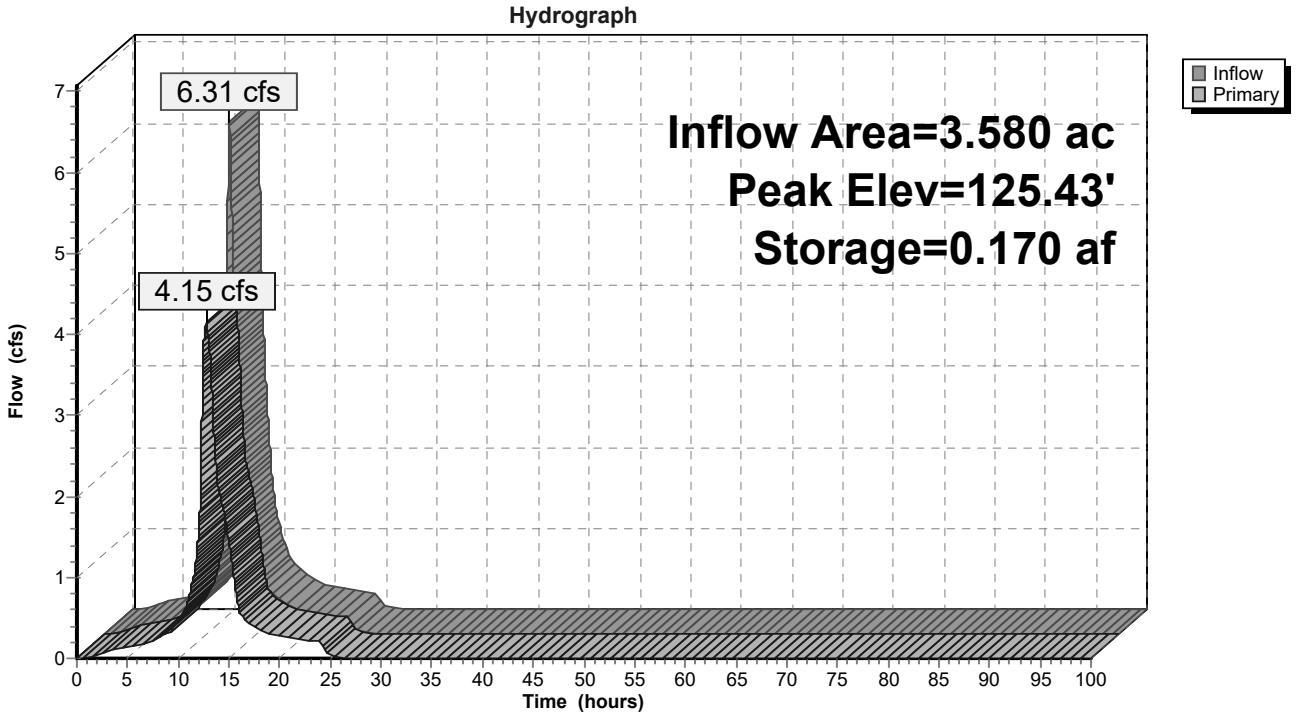
7,854.1 cf Field - 3,348.9 cf Chambers = 4,505.2 cf Stone x 0.0% Voids = 0.0 cf Stone Storage

Chamber Storage = 2,821.1 cf = 0.065 af
Overall Storage Efficiency = 35.9%
Overall System Size = 74.17' x 16.08' x 6.58'

6 Chambers
290.9 cy Field
166.9 cy Stone



Pond A: BASIN-A



Summary for Pond B: BASIN-B

Inflow Area = 0.510 ac, 94.12% Impervious, Inflow Depth = 4.88" for B-10 YR event
Inflow = 2.04 cfs @ 12.14 hrs, Volume= 0.207 af
Outflow = 0.26 cfs @ 13.07 hrs, Volume= 0.164 af, Atten= 87%, Lag= 55.9 min
Primary = 0.26 cfs @ 13.07 hrs, Volume= 0.164 af

Routing by Stor-Ind method, Time Span= 0.00-100.00 hrs, dt= 0.01 hrs
Peak Elev= 129.46' @ 13.07 hrs Surf.Area= 0.126 ac Storage= 0.129 af

Plug-Flow detention time= 528.9 min calculated for 0.164 af (79% of inflow)
Center-of-Mass det. time= 443.0 min (1,198.1 - 755.1)

Volume	Invert	Avail.Storage	Storage Description
#1A	127.50'	0.131 af	**50.24'W x 109.00'L x 4.00'H Field A** 0.503 af Overall - 0.176 af Embedded = 0.327 af x 40.0% Voids
#2A	128.00'	0.134 af	**ADS N-12 30"** x 55 Inside #1 Inside= 30.0"W x 30.0"H => 4.90 sf x 20.00'L = 98.0 cf Outside= 36.0"W x 36.0"H => 6.41 sf x 20.00'L = 128.3 cf 55 Chambers in 11 Rows 47.24' Header x 4.90 sf x 2 = 463.0 cf Inside
		0.265 af	Total Available Storage

Storage Group A created with Chamber Wizard

Device	Routing	Invert	Outlet Devices
#1	Primary	128.40'	**15.0" Round Culvert** L= 81.0' CPP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 128.40' / 127.96' S= 0.0054 '/' Cc= 0.900 n= 0.012, Flow Area= 1.23 sf
#2	Device 1	128.40'	**Reg-U-Flo SH 3.0-in**
#3	Device 1	129.10'	**4.0" Vert. Orifice/Grate** C= 0.600 Limited to weir flow at low heads
#4	Device 1	130.40'	**4.0' long Sharp-Crested Rectangular Weir** 2 End Contraction(s)

Primary OutFlow Max=0.26 cfs @ 13.07 hrs HW=129.46' (Free Discharge)
└**1=Culvert** (Passes 0.26 cfs of 3.07 cfs potential flow)
  ├**2=Reg-U-Flo SH 3.0-in** (Custom Controls 0.07 cfs)
  ├**3=Orifice/Grate** (Orifice Controls 0.18 cfs @ 2.12 fps)
  └**4=Sharp-Crested Rectangular Weir** (Controls 0.00 cfs)

Pond B: BASIN-B - Chamber Wizard Field A

Chamber Model = ADS N-12 30" (ADS N-12® Pipe)
Inside= 30.0"W x 30.0"H => 4.90 sf x 20.00'L = 98.0 cf
Outside= 36.0"W x 36.0"H => 6.41 sf x 20.00'L = 128.3 cf

36.0" Wide + 17.1" Spacing = 53.1" C-C Row Spacing

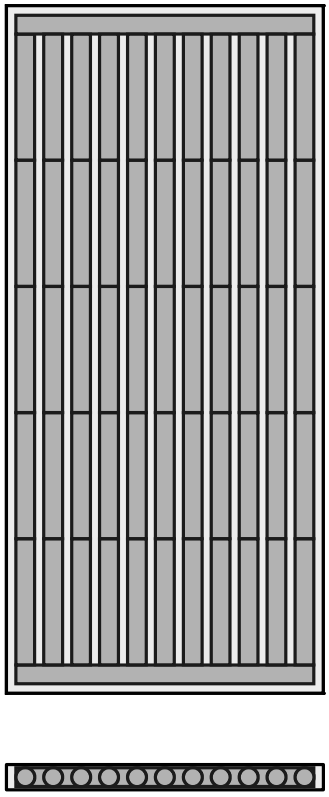
5 Chambers/Row x 20.00' Long +3.00' Header x 2 = 106.00' Row Length +18.0" End Stone x 2 = 109.00' Base Length
11 Rows x 36.0" Wide + 17.1" Spacing x 10 + 18.0" Side Stone x 2 = 50.24' Base Width
6.0" Stone Base + 36.0" Chamber Height + 6.0" Stone Cover = 4.00' Field Height

55 Chambers x 98.0 cf + 47.24' Header x 4.90 sf x 2 = 5,853.0 cf Chamber Storage
55 Chambers x 128.3 cf + 47.24' Header x 6.41 sf x 2 = 7,660.4 cf Displacement

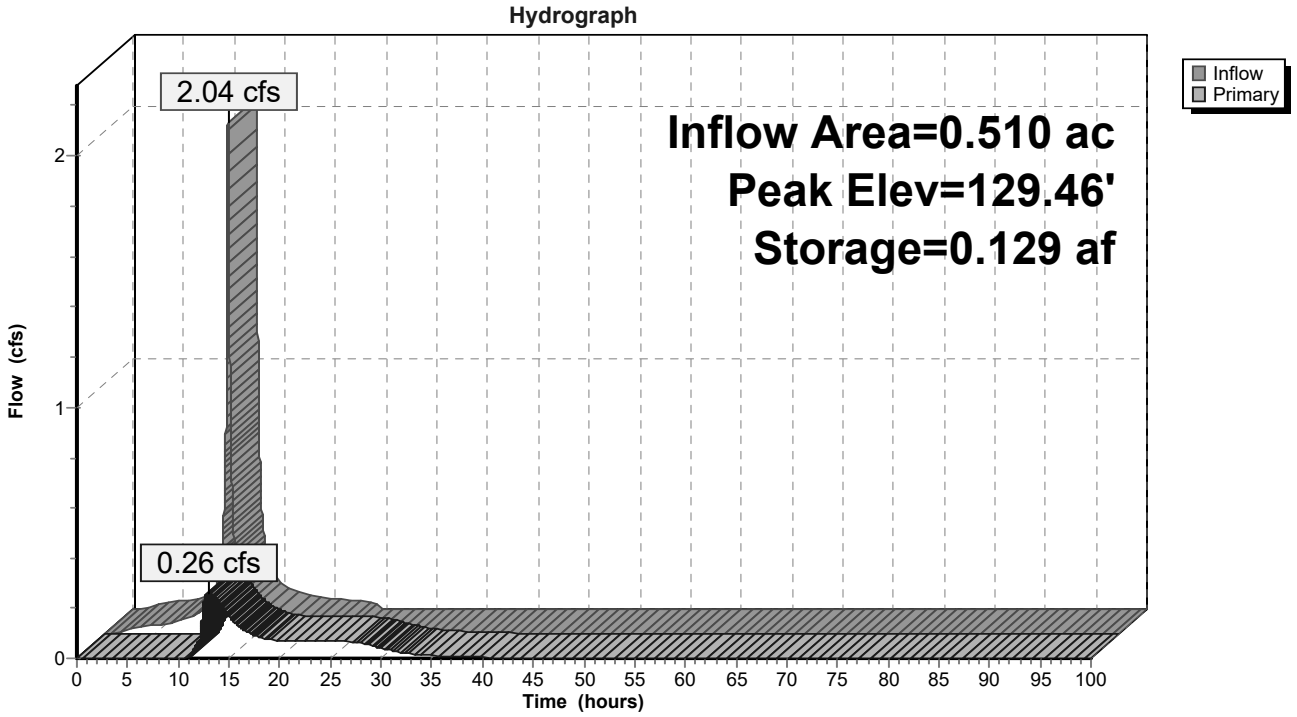
21,903.0 cf Field - 7,660.4 cf Chambers = 14,242.6 cf Stone x 40.0% Voids = 5,697.0 cf Stone Storage

Chamber Storage + Stone Storage = 11,550.0 cf = 0.265 af
Overall Storage Efficiency = 52.7%
Overall System Size = 109.00' x 50.24' x 4.00'

55 Chambers
811.2 cy Field
527.5 cy Stone



Pond B: BASIN-B

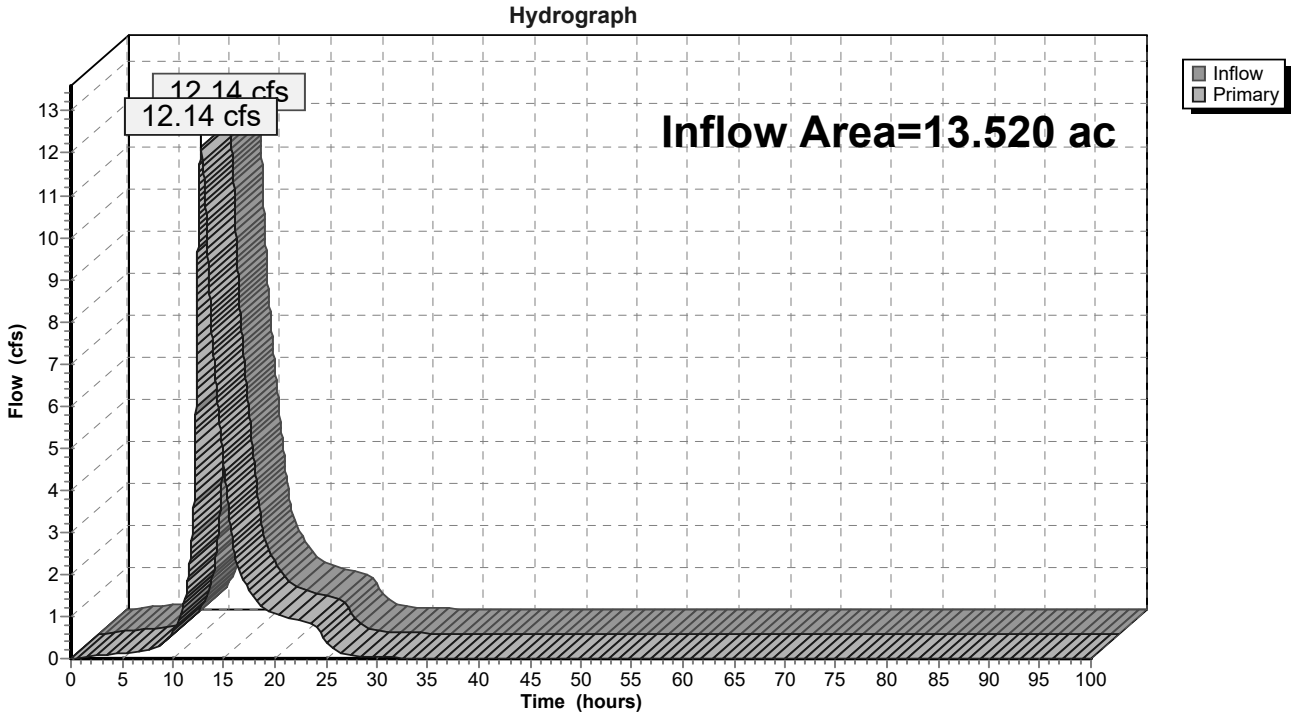


Summary for Link DP*: DP

Inflow Area = 13.520 ac, 18.05% Impervious, Inflow Depth = 3.19" for B-10 YR event
Inflow = 12.14 cfs @ 12.79 hrs, Volume= 3.594 af
Primary = 12.14 cfs @ 12.79 hrs, Volume= 3.594 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-100.00 hrs, dt= 0.01 hrs

Link DP*: DP

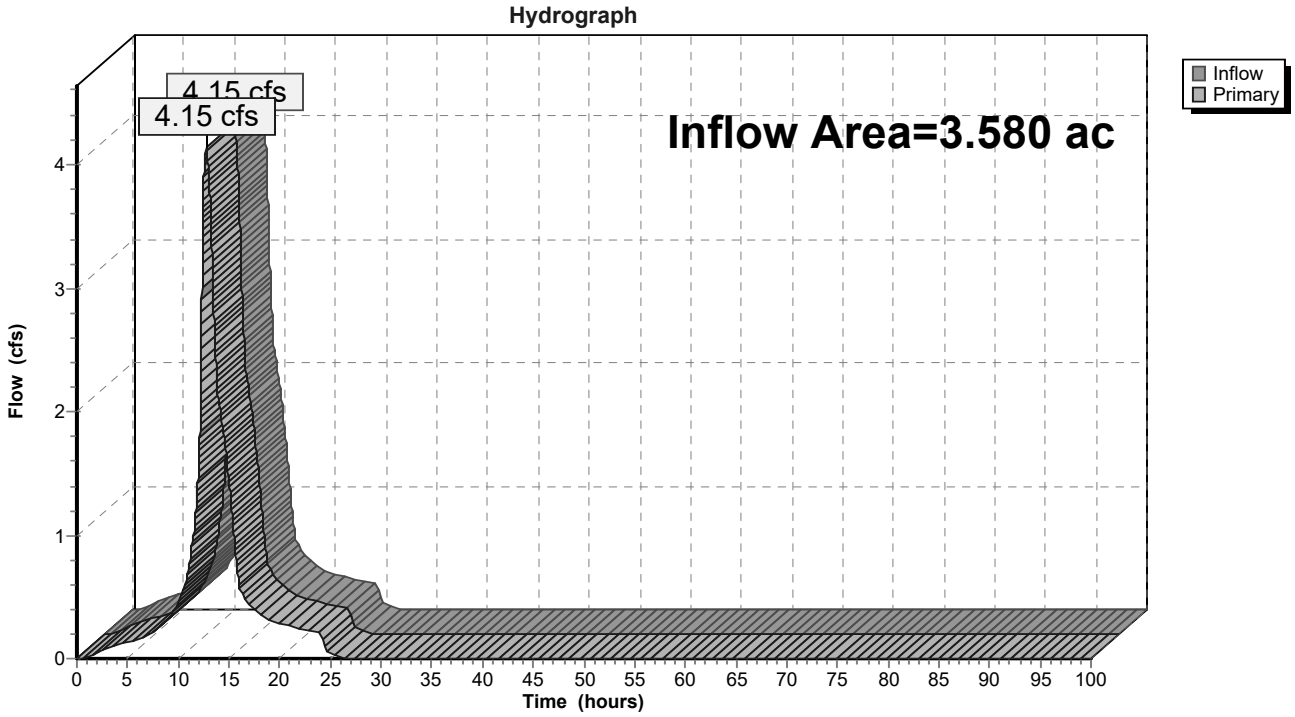


Summary for Link POA-1*: POA-1

Inflow Area = 3.580 ac, 54.47% Impervious, Inflow Depth = 4.07" for B-10 YR event
Inflow = 4.15 cfs @ 12.73 hrs, Volume= 1.215 af
Primary = 4.15 cfs @ 12.73 hrs, Volume= 1.215 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-100.00 hrs, dt= 0.01 hrs

Link POA-1*: POA-1

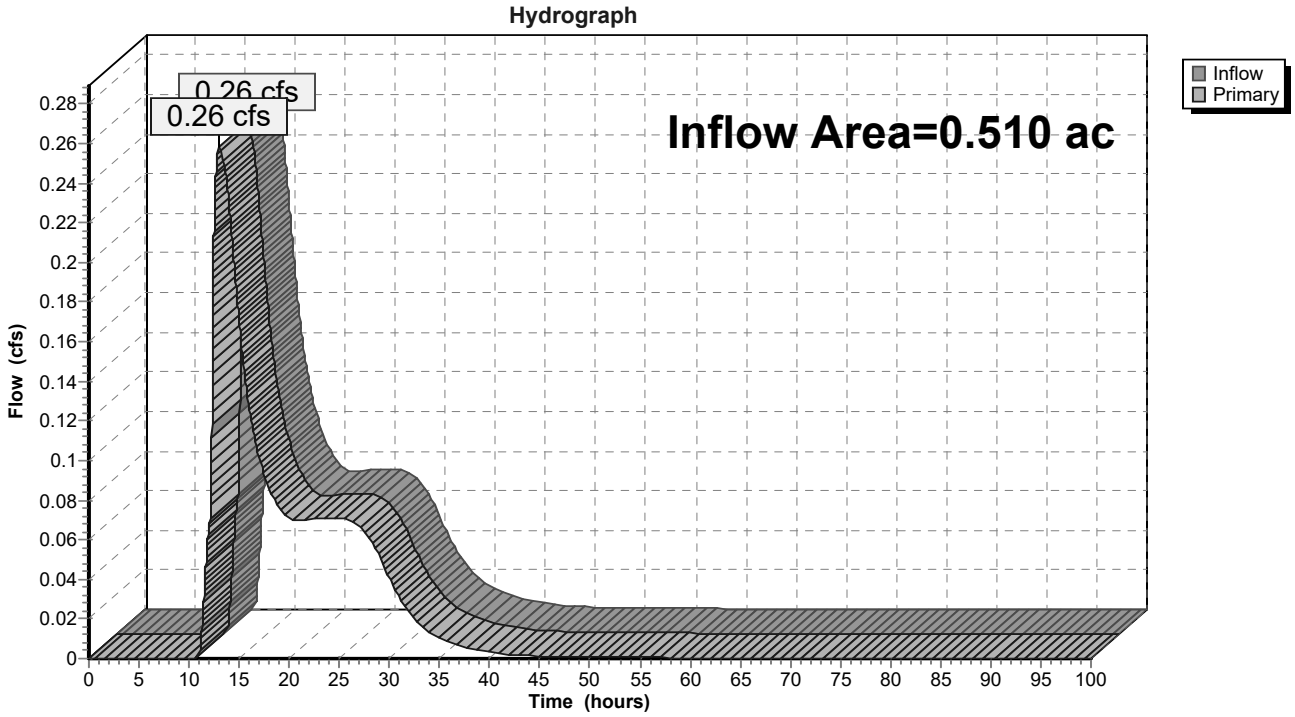


Summary for Link POA-2*: POA-2

Inflow Area = 0.510 ac, 94.12% Impervious, Inflow Depth = 3.87" for B-10 YR event
Inflow = 0.26 cfs @ 13.07 hrs, Volume= 0.164 af
Primary = 0.26 cfs @ 13.07 hrs, Volume= 0.164 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-100.00 hrs, dt= 0.01 hrs

Link POA-2*: POA-2



Time span=0.00-100.00 hrs, dt=0.01 hrs, 10001 points
Runoff by SCS TR-20 method, UH=Delmarva, Split Pervious/Imperv. UI as Pervious
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Subcatchment PD-2I: PD-2 - Imprv. Runoff Area=1.220 ac 100.00% Impervious Runoff Depth=6.29"
Tc=24.5 min CN=0/98 Runoff=3.26 cfs 0.640 af

Subcatchment PD-2P: PD-2 Perv. Runoff Area=0.570 ac 0.00% Impervious Runoff Depth=4.26"
Tc=10.0 min CN=80/0 Runoff=1.81 cfs 0.202 af

Subcatchment PD-3P: PD-3 Imprv. Runoff Area=0.510 ac 94.12% Impervious Runoff Depth=6.17"
Tc=6.0 min CN=80/98 Runoff=2.56 cfs 0.262 af

Subcatchment PO-1: PO-1 Runoff Area=0.050 ac 0.00% Impervious Runoff Depth=3.95"
Flow Length=896' Tc=29.3 min CN=77/0 Runoff=0.08 cfs 0.016 af

Subcatchment PO-2 Imprv.: PO-2 Imprv. Runoff Area=0.730 ac 100.00% Impervious Runoff Depth=6.29"
Tc=10.0 min CN=0/98 Runoff=3.02 cfs 0.383 af

Subcatchment PO-2 Perv.: PO-2 Perv. Runoff Area=1.010 ac 0.00% Impervious Runoff Depth=4.05"
Flow Length=1,319' Tc=43.3 min CN=78/0 Runoff=1.38 cfs 0.341 af

Subcatchment PU-1: PU-1 Runoff Area=9.430 ac 0.11% Impervious Runoff Depth=3.95"
Flow Length=1,382' Tc=53.8 min CN=77/98 Runoff=10.97 cfs 3.103 af

Pond A: BASIN-A Peak Elev=126.04' Storage=0.219 af Inflow=8.16 cfs 1.582 af
Outflow=5.69 cfs 1.582 af

Pond B: BASIN-B Peak Elev=129.76' Storage=0.155 af Inflow=2.56 cfs 0.262 af
Outflow=0.37 cfs 0.219 af

Link DP*: DP Inflow=16.96 cfs 4.904 af
Primary=16.96 cfs 4.904 af

Link POA-1*: POA-1 Inflow=5.69 cfs 1.582 af
Primary=5.69 cfs 1.582 af

Link POA-2*: POA-2 Inflow=0.37 cfs 0.219 af
Primary=0.37 cfs 0.219 af

Total Runoff Area = 13.520 ac Runoff Volume = 4.947 af Average Runoff Depth = 4.39"
81.95% Pervious = 11.080 ac 18.05% Impervious = 2.440 ac

Summary for Subcatchment PD-2I: PD-2 - Imprv.

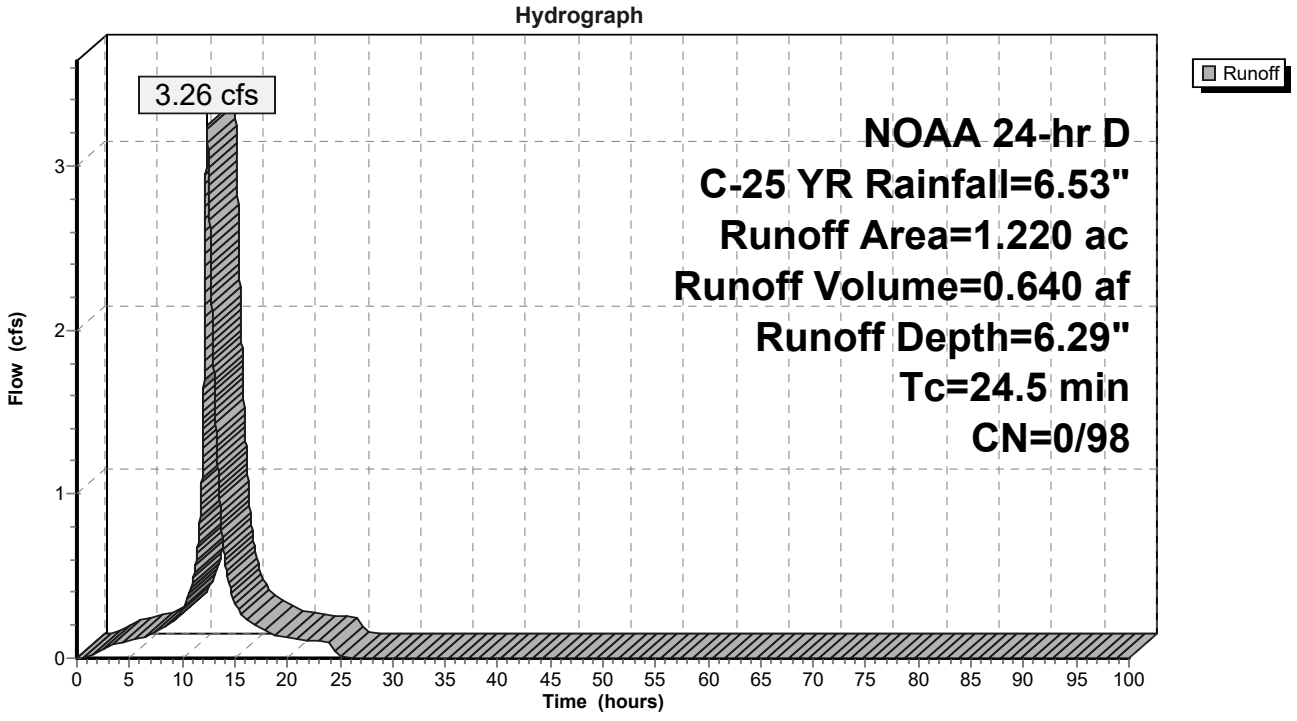
Runoff = 3.26 cfs @ 12.36 hrs, Volume= 0.640 af, Depth= 6.29"

Runoff by SCS TR-20 method, UH=Delmarva, Split Pervious/Imperv. UI as Pervious, Time Span= 0.00-100.00 hrs, dt=
NOAA 24-hr D C-25 YR Rainfall=6.53"

Area (ac)	CN	Description
0.180	98	Roofs, HSG D
1.040	98	Paved parking, HSG D
1.220	98	Weighted Average
1.220	98	100.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					**Direct Entry, Tc**
18.5					**Direct Entry, EU-2**
24.5	0	Total			

Subcatchment PD-2I: PD-2 - Imprv.



Summary for Subcatchment PD-2P: PD-2 Perv.

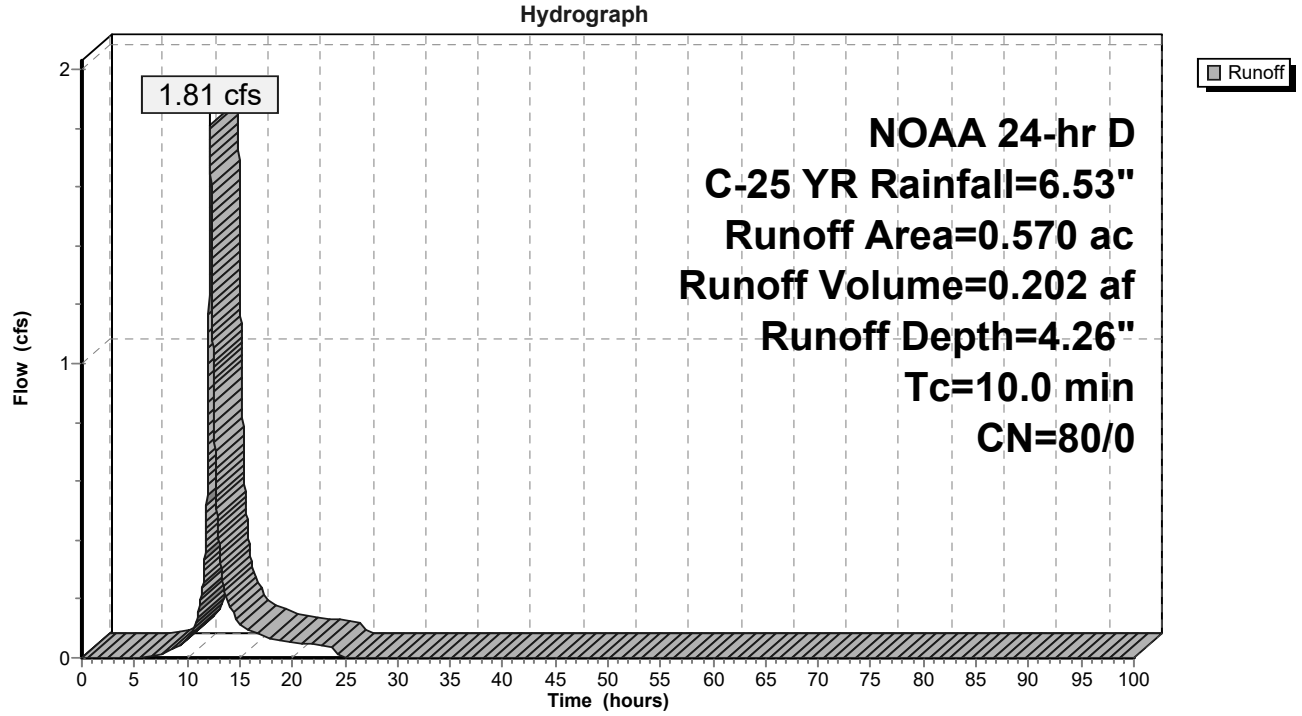
Runoff = 1.81 cfs @ 12.18 hrs, Volume= 0.202 af, Depth= 4.26"

Runoff by SCS TR-20 method, UH=Delmarva, Split Pervious/Imperv. UI as Pervious, Time Span= 0.00-100.00 hrs, dt=
NOAA 24-hr D C-25 YR Rainfall=6.53"

Area (ac)	CN	Description
0.570	80	>75% Grass cover, Good, HSG D
0.570	80	100.00% Pervious Area

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

Subcatchment PD-2P: PD-2 Perv.



Summary for Subcatchment PD-3P: PD-3 Imprv.

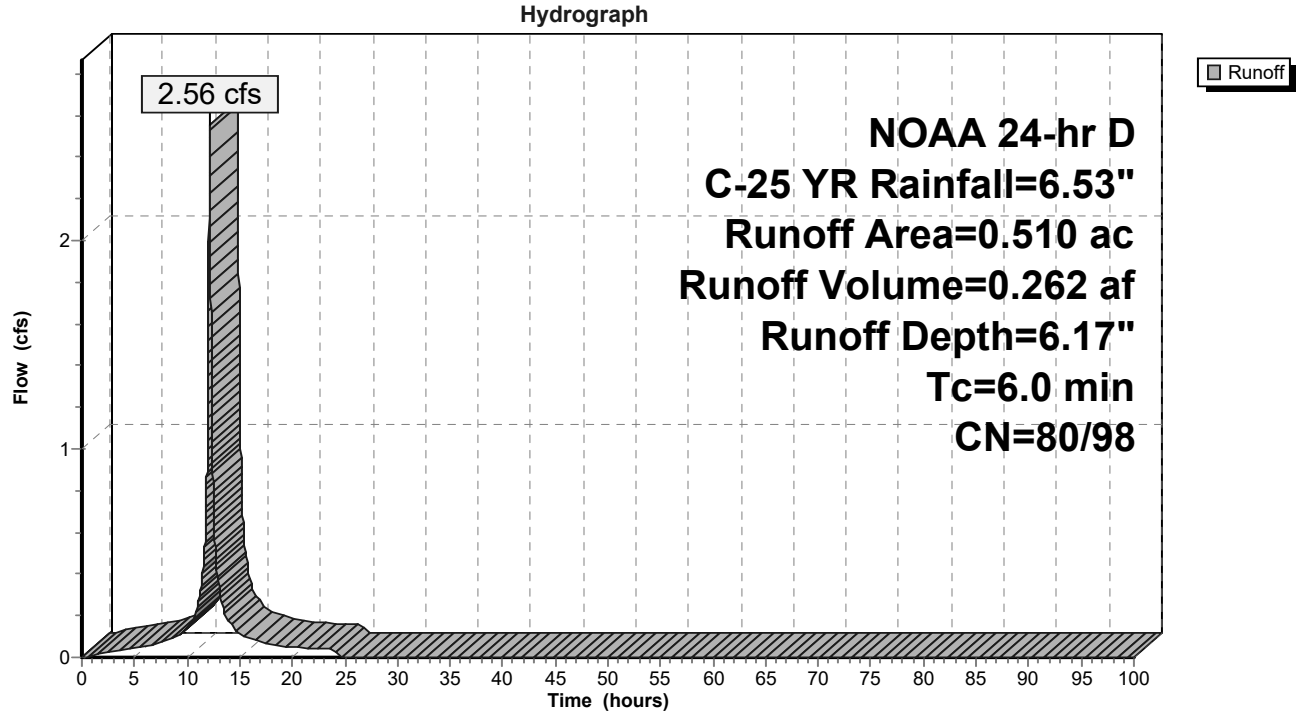
Runoff = 2.56 cfs @ 12.14 hrs, Volume= 0.262 af, Depth= 6.17"

Runoff by SCS TR-20 method, UH=Delmarva, Split Pervious/Imperv. UI as Pervious, Time Span= 0.00-100.00 hrs, dt=
NOAA 24-hr D C-25 YR Rainfall=6.53"

Area (ac)	CN	Description
0.480	98	Roofs, HSG D
0.030	80	>75% Grass cover, Good, HSG D
0.510	97	Weighted Average
0.030	80	5.88% Pervious Area
0.480	98	94.12% Impervious Area

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

Subcatchment PD-3P: PD-3 Imprv.



Summary for Subcatchment PO-1: PO-1

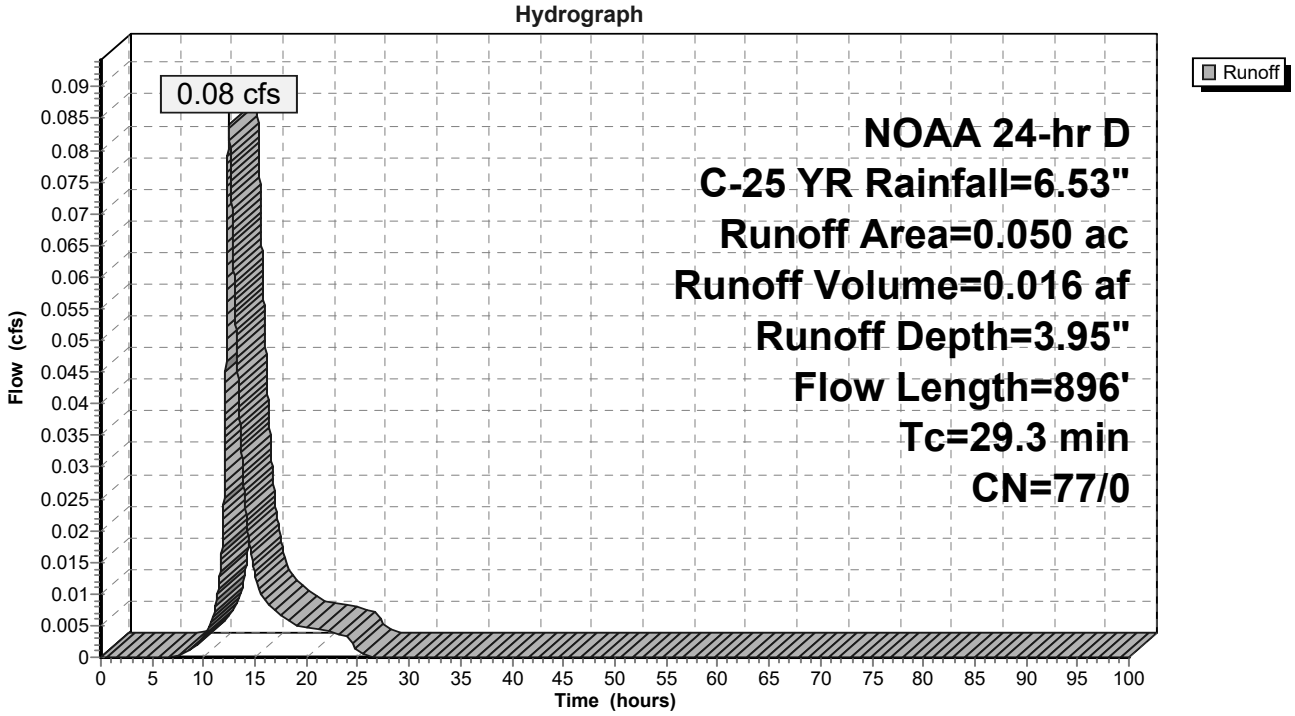
Runoff = 0.08 cfs @ 12.44 hrs, Volume= 0.016 af, Depth= 3.95"

Runoff by SCS TR-20 method, UH=Delmarva, Split Pervious/Imperv. UI as Pervious, Time Span= 0.00-100.00 hrs, dt=
NOAA 24-hr D C-25 YR Rainfall=6.53"

Area (ac)	CN	Description
0.050	77	Woods, Good, HSG D
0.050	77	100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
11.9	682	0.0365	0.96		**Shallow Concentrated Flow, EU-1** Woodland Kv= 5.0 fps
0.7	110	0.3130	2.80		**Shallow Concentrated Flow, ED-1B** Woodland Kv= 5.0 fps
7.6	27	0.0185	0.06		**Sheet Flow, ED-1A** Woods: Light underbrush n= 0.400 P2= 3.38"
9.1	77	0.0960	0.14		**Sheet Flow, EO-1** Woods: Light underbrush n= 0.400 P2= 3.38"
29.3	896	Total			

Subcatchment PO-1: PO-1



Summary for Subcatchment PO-2 Imprv.: PO-2 Imprv.

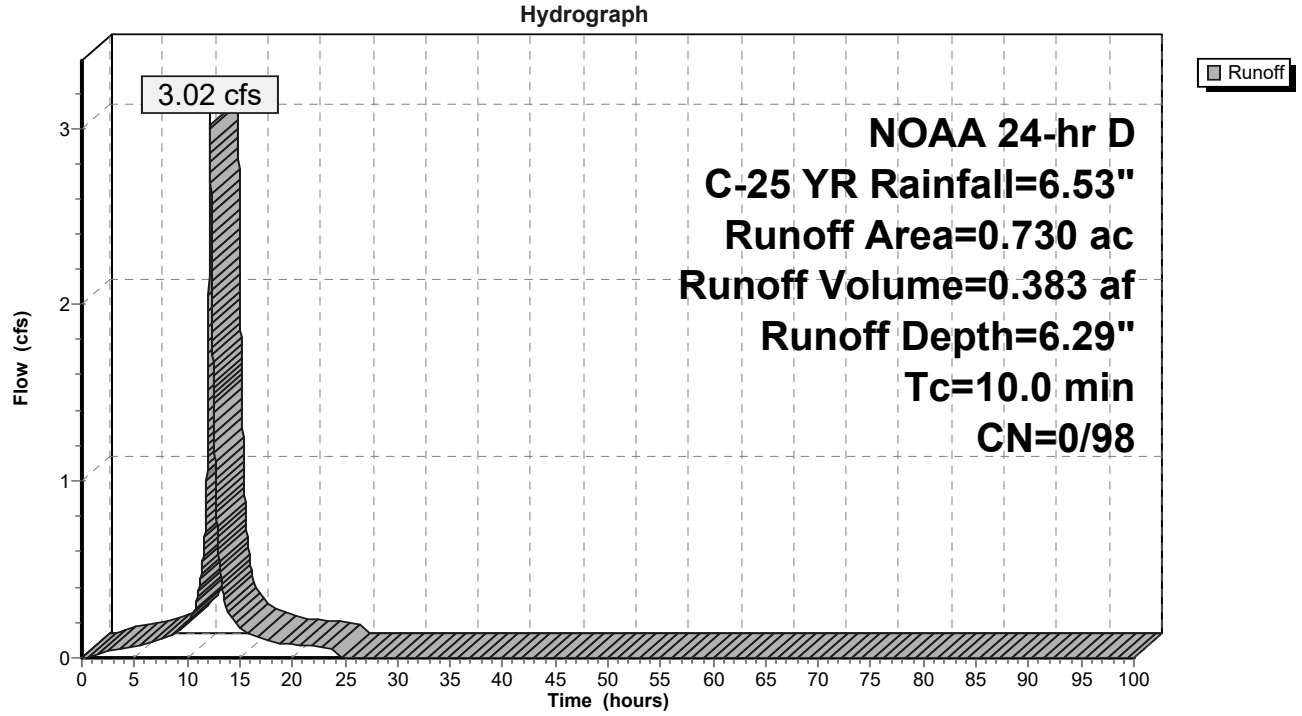
Runoff = 3.02 cfs @ 12.18 hrs, Volume= 0.383 af, Depth= 6.29"

Runoff by SCS TR-20 method, UH=Delmarva, Split Pervious/Imperv. UI as Pervious, Time Span= 0.00-100.00 hrs, dt=
NOAA 24-hr D C-25 YR Rainfall=6.53"

Area (ac)	CN	Description
0.730	98	Paved parking, HSG D
0.730	98	100.00% Impervious Area

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

Subcatchment PO-2 Imprv.: PO-2 Imprv.



Summary for Subcatchment PO-2 Perv.: PO-2 Perv.

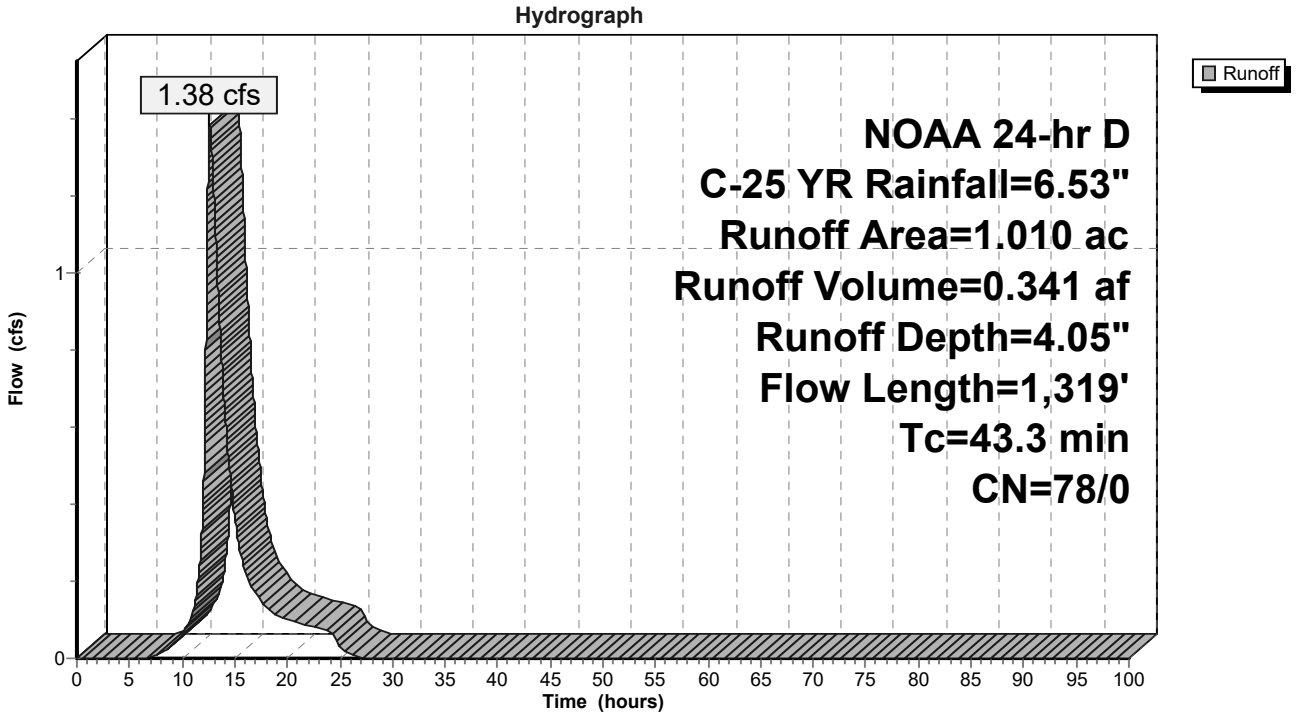
Runoff = 1.38 cfs @ 12.61 hrs, Volume= 0.341 af, Depth= 4.05"

Runoff by SCS TR-20 method, UH=Delmarva, Split Pervious/Imperv. UI as Pervious, Time Span= 0.00-100.00 hrs, dt=
NOAA 24-hr D C-25 YR Rainfall=6.53"

Area (ac)	CN	Description
0.250	80	>75% Grass cover, Good, HSG D
0.760	77	Woods, Good, HSG D
1.010	78	Weighted Average
1.010	78	100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
18.5	628	0.0128	0.57		**Shallow Concentrated Flow, EU-2** Woodland Kv= 5.0 fps
8.8	347	0.0173	0.66		**Shallow Concentrated Flow, ED-2** Woodland Kv= 5.0 fps
9.8	100	0.0189	0.17		**Sheet Flow, EO-2** Grass: Short n= 0.150 P2= 3.38"
0.1	61	0.1890	8.83		**Shallow Concentrated Flow, EO-2 PAVED** Paved Kv= 20.3 fps
1.6	140	0.0010	1.48	1.43	**Pipe Channel, EO-2 PIPE FLOW** 15.0" Round w/ 4.0" inside fill Area= 1.0 sf Perim= 3.7' r= 0.26' n= 0.013 Concrete pipe, bends & connections
4.5	43	0.0010	0.16		**Shallow Concentrated Flow, EO-2 FES** Woodland Kv= 5.0 fps
43.3	1,319	Total			

Subcatchment PO-2 Perv.: PO-2 Perv.



Summary for Subcatchment PU-1: PU-1

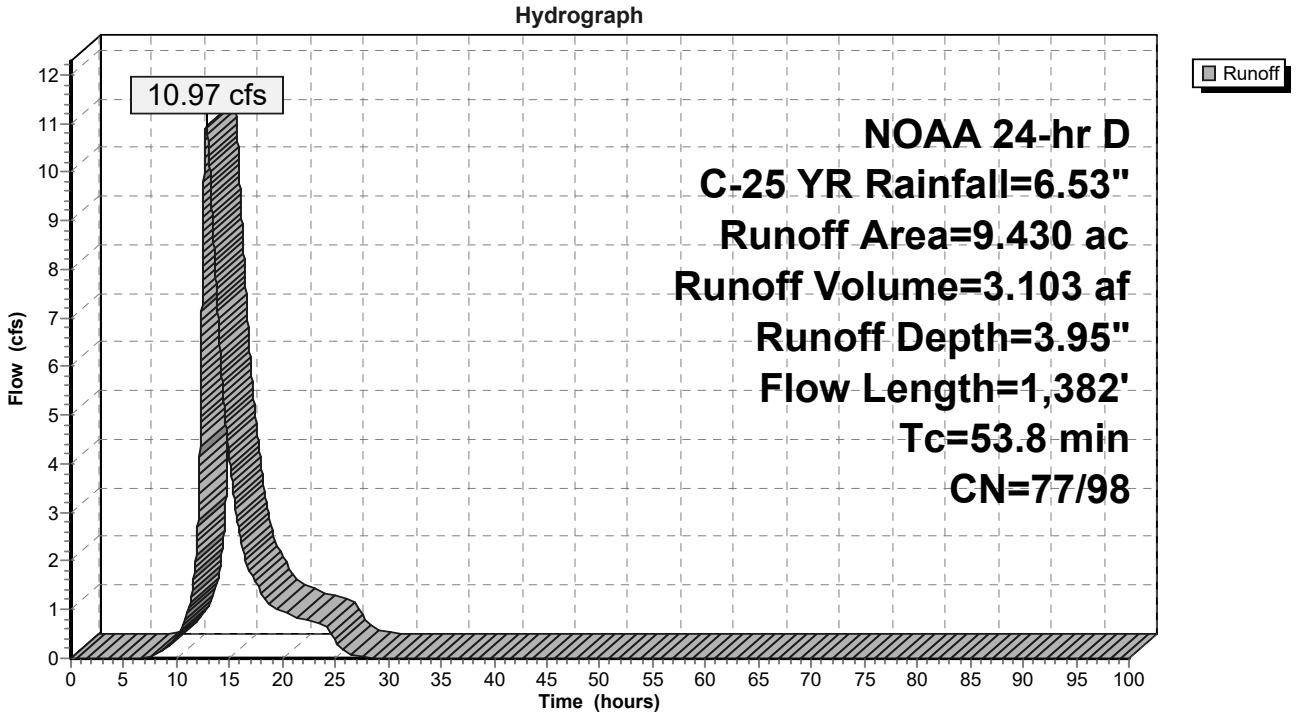
Runoff = 10.97 cfs @ 12.79 hrs, Volume= 3.103 af, Depth= 3.95"

Runoff by SCS TR-20 method, UH=Delmarva, Split Pervious/Imperv. UI as Pervious, Time Span= 0.00-100.00 hrs, dt=
NOAA 24-hr D C-25 YR Rainfall=6.53"

Area (ac)	CN	Description
9.355	77	Woods, Good, HSG D
0.010	98	Paved parking, HSG D
0.065	80	>75% Grass cover, Good, HSG D
9.430	77	Weighted Average
9.420	77	99.89% Pervious Area
0.010	98	0.11% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
16.6	100	0.0050	0.10		**Sheet Flow, PU-1** Grass: Short n= 0.150 P2= 3.38"
2.1	110	0.0153	0.87		**Shallow Concentrated Flow, PU-1O** Short Grass Pasture Kv= 7.0 fps
0.1	23	0.0138	6.98	12.34	**Pipe Channel, PU-1O** 18.0" Round Area= 1.8 sf Perim= 4.7' r= 0.38' n= 0.013
35.0	1,149	0.0120	0.55		**Shallow Concentrated Flow, EU-2** Woodland Kv= 5.0 fps
53.8	1,382	Total			

Subcatchment PU-1: PU-1



Summary for Pond A: BASIN-A

Inflow Area = 3.580 ac, 54.47% Impervious, Inflow Depth = 5.30" for C-25 YR event
Inflow = 8.16 cfs @ 12.25 hrs, Volume= 1.582 af
Outflow = 5.69 cfs @ 12.68 hrs, Volume= 1.582 af, Atten= 30%, Lag= 25.6 min
Primary = 5.69 cfs @ 12.68 hrs, Volume= 1.582 af

Routing by Stor-Ind method, Time Span= 0.00-100.00 hrs, dt= 0.01 hrs
Peak Elev= 126.04' @ 12.68 hrs Surf.Area= 0.129 ac Storage= 0.219 af

Plug-Flow detention time= (not calculated: outflow precedes inflow)
Center-of-Mass det. time= 17.8 min (820.1 - 802.4)

Volume	Invert	Avail.Storage	Storage Description
#1A	122.00'	0.000 af	**38.59'W x 114.17'L x 6.58'H Field A** 0.666 af Overall - 0.301 af Embedded = 0.365 af x 0.0% Voids
#2A	122.50'	0.253 af	**ADS N-12 60"** x 25 Inside #1 Inside= 59.5"W x 59.5"H => 19.30 sf x 20.00'L = 386.0 cf Outside= 67.0"W x 67.0"H => 22.91 sf x 20.00'L = 458.2 cf 25 Chambers in 5 Rows 35.59' Header x 19.30 sf x 2 = 1,373.6 cf Inside
#3B	122.00'	0.000 af	**16.08'W x 74.17'L x 6.58'H Field B** 0.180 af Overall - 0.077 af Embedded = 0.103 af x 0.0% Voids
#4B	122.50'	0.065 af	**ADS N-12 60"** x 6 Inside #3 Inside= 59.5"W x 59.5"H => 19.30 sf x 20.00'L = 386.0 cf Outside= 67.0"W x 67.0"H => 22.91 sf x 20.00'L = 458.2 cf 6 Chambers in 2 Rows 13.08' Header x 19.30 sf x 2 = 505.1 cf Inside
		0.318 af	Total Available Storage

Storage Group A created with Chamber Wizard
Storage Group B created with Chamber Wizard

Device	Routing	Invert	Outlet Devices
#1	Primary	122.50'	**18.0" Round Culvert** L= 26.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 122.50' / 122.00' S= 0.0192 '/' Cc= 0.900 n= 0.012, Flow Area= 1.77 sf
#2	Device 1	122.50'	**5.5" Vert. Orifice/Grate X 2.00** C= 0.600 Limited to weir flow at low heads
#3	Device 1	124.50'	**10.0" W x 5.5" H Vert. Orifice/Grate** C= 0.600 Limited to weir flow at low heads
#4	Device 1	125.45'	**8.0" W x 4.0" H Vert. Orifice/Grate** C= 0.600 Limited to weir flow at low heads
#5	Device 1	128.25'	**4.0' long Sharp-Crested Rectangular Weir** 2 End Contraction(s)

Primary OutFlow Max=5.69 cfs @ 12.68 hrs HW=126.04' (Free Discharge)
↑—**1=Culvert** (Passes 5.69 cfs of 14.22 cfs potential flow)
↑—**2=Orifice/Grate** (Orifice Controls 2.89 cfs @ 8.77 fps)
—**3=Orifice/Grate** (Orifice Controls 2.11 cfs @ 5.52 fps)
—**4=Orifice/Grate** (Orifice Controls 0.70 cfs @ 3.13 fps)
—**5=Sharp-Crested Rectangular Weir** (Controls 0.00 cfs)

Pond A: BASIN-A - Chamber Wizard Field A

Chamber Model = ADS N-12 60" (ADS N-12® Pipe)
Inside= 59.5"W x 59.5"H => 19.30 sf x 20.00'L = 386.0 cf
Outside= 67.0"W x 67.0"H => 22.91 sf x 20.00'L = 458.2 cf

67.0" Wide + 23.0" Spacing = 90.0" C-C Row Spacing

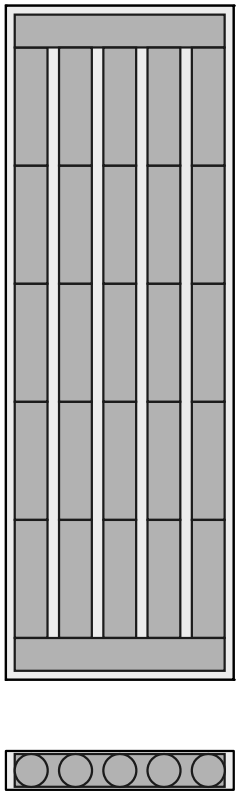
5 Chambers/Row x 20.00' Long +5.58' Header x 2 = 111.17' Row Length +18.0" End Stone x 2 = 114.17' Base Length
5 Rows x 67.0" Wide + 23.0" Spacing x 4 + 18.0" Side Stone x 2 = 38.59' Base Width
6.0" Stone Base + 67.0" Chamber Height + 6.0" Stone Cover = 6.58' Field Height

25 Chambers x 386.0 cf + 35.59' Header x 19.30 sf x 2 = 11,023.6 cf Chamber Storage
25 Chambers x 458.2 cf + 35.59' Header x 22.91 sf x 2 = 13,086.2 cf Displacement

29,003.5 cf Field - 13,086.2 cf Chambers = 15,917.3 cf Stone x 0.0% Voids = 0.0 cf Stone Storage

Chamber Storage = 11,023.6 cf = 0.253 af
Overall Storage Efficiency = 38.0%
Overall System Size = 114.17' x 38.59' x 6.58'

25 Chambers
1,074.2 cy Field
589.5 cy Stone



Pond A: BASIN-A - Chamber Wizard Field B

Chamber Model = ADS N-12 60" (ADS N-12® Pipe)
Inside= 59.5"W x 59.5"H => 19.30 sf x 20.00'L = 386.0 cf
Outside= 67.0"W x 67.0"H => 22.91 sf x 20.00'L = 458.2 cf

67.0" Wide + 23.0" Spacing = 90.0" C-C Row Spacing

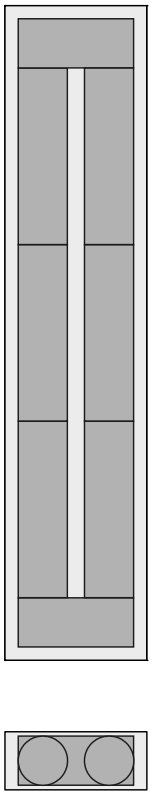
3 Chambers/Row x 20.00' Long +5.58' Header x 2 = 71.17' Row Length +18.0" End Stone x 2 = 74.17' Base Length
2 Rows x 67.0" Wide + 23.0" Spacing x 1 + 18.0" Side Stone x 2 = 16.08' Base Width
6.0" Stone Base + 67.0" Chamber Height + 6.0" Stone Cover = 6.58' Field Height

6 Chambers x 386.0 cf + 13.08' Header x 19.30 sf x 2 = 2,821.1 cf Chamber Storage
6 Chambers x 458.2 cf + 13.08' Header x 22.91 sf x 2 = 3,348.9 cf Displacement

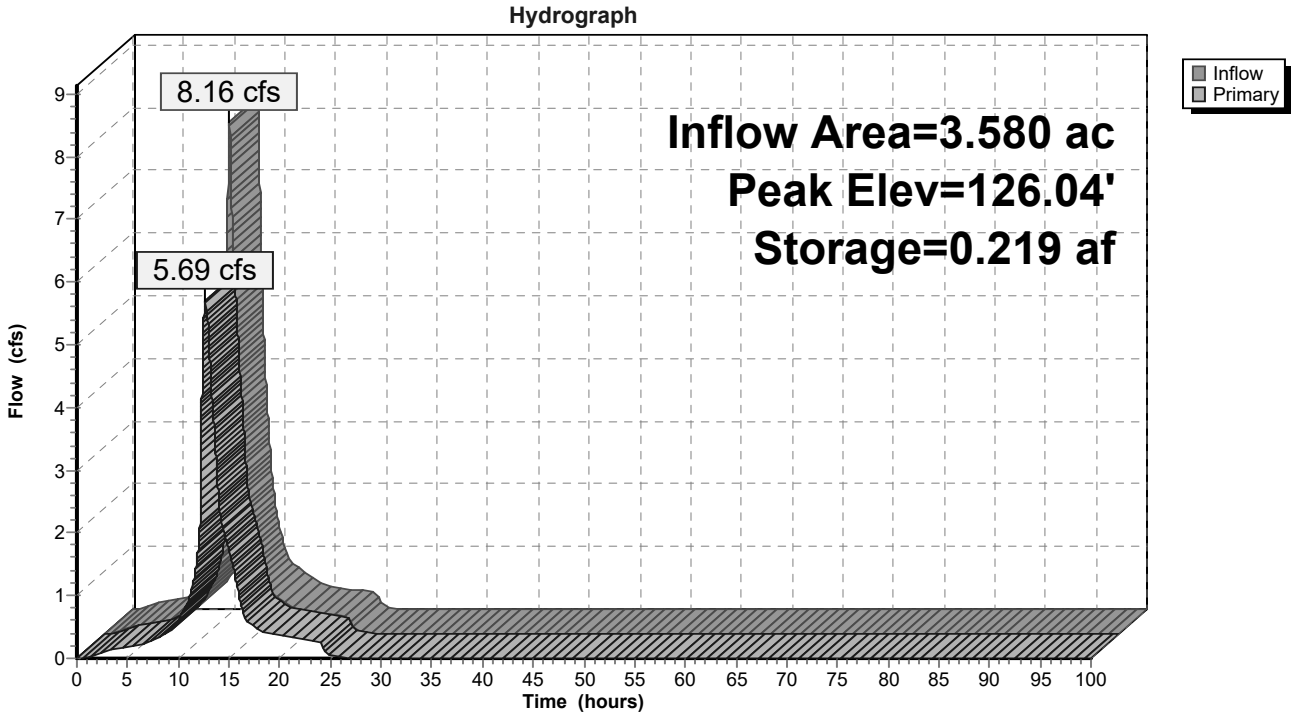
7,854.1 cf Field - 3,348.9 cf Chambers = 4,505.2 cf Stone x 0.0% Voids = 0.0 cf Stone Storage

Chamber Storage = 2,821.1 cf = 0.065 af
Overall Storage Efficiency = 35.9%
Overall System Size = 74.17' x 16.08' x 6.58'

6 Chambers
290.9 cy Field
166.9 cy Stone



Pond A: BASIN-A



Summary for Pond B: BASIN-B

Inflow Area = 0.510 ac, 94.12% Impervious, Inflow Depth = 6.17" for C-25 YR event
Inflow = 2.56 cfs @ 12.14 hrs, Volume= 0.262 af
Outflow = 0.37 cfs @ 12.93 hrs, Volume= 0.219 af, Atten= 85%, Lag= 47.4 min
Primary = 0.37 cfs @ 12.93 hrs, Volume= 0.219 af

Routing by Stor-Ind method, Time Span= 0.00-100.00 hrs, dt= 0.01 hrs
Peak Elev= 129.76' @ 12.93 hrs Surf.Area= 0.126 ac Storage= 0.155 af

Plug-Flow detention time= 469.7 min calculated for 0.219 af (84% of inflow)
Center-of-Mass det. time= 394.2 min (1,145.7 - 751.5)

Volume	Invert	Avail.Storage	Storage Description
#1A	127.50'	0.131 af	**50.24'W x 109.00'L x 4.00'H Field A** 0.503 af Overall - 0.176 af Embedded = 0.327 af x 40.0% Voids
#2A	128.00'	0.134 af	**ADS N-12 30"** x 55 Inside #1 Inside= 30.0"W x 30.0"H => 4.90 sf x 20.00'L = 98.0 cf Outside= 36.0"W x 36.0"H => 6.41 sf x 20.00'L = 128.3 cf 55 Chambers in 11 Rows 47.24' Header x 4.90 sf x 2 = 463.0 cf Inside
		0.265 af	Total Available Storage

Storage Group A created with Chamber Wizard

Device	Routing	Invert	Outlet Devices
#1	Primary	128.40'	**15.0" Round Culvert** L= 81.0' CPP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 128.40' / 127.96' S= 0.0054 '/' Cc= 0.900 n= 0.012, Flow Area= 1.23 sf
#2	Device 1	128.40'	**Reg-U-Flo SH 3.0-in**
#3	Device 1	129.10'	**4.0" Vert. Orifice/Grate** C= 0.600 Limited to weir flow at low heads
#4	Device 1	130.40'	**4.0' long Sharp-Crested Rectangular Weir** 2 End Contraction(s)

Primary OutFlow Max=0.37 cfs @ 12.93 hrs HW=129.76' (Free Discharge)
└**1=Culvert** (Passes 0.37 cfs of 3.99 cfs potential flow)
  ├**2=Reg-U-Flo SH 3.0-in** (Custom Controls 0.08 cfs)
  ├**3=Orifice/Grate** (Orifice Controls 0.29 cfs @ 3.37 fps)
  └**4=Sharp-Crested Rectangular Weir** (Controls 0.00 cfs)

Pond B: BASIN-B - Chamber Wizard Field A

Chamber Model = ADS N-12 30" (ADS N-12® Pipe)
Inside= 30.0"W x 30.0"H => 4.90 sf x 20.00'L = 98.0 cf
Outside= 36.0"W x 36.0"H => 6.41 sf x 20.00'L = 128.3 cf

36.0" Wide + 17.1" Spacing = 53.1" C-C Row Spacing

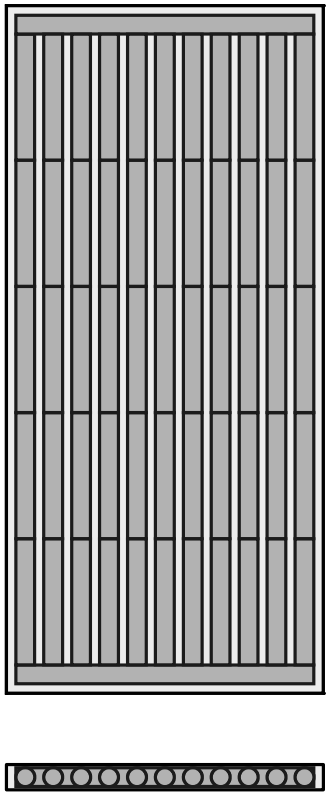
5 Chambers/Row x 20.00' Long +3.00' Header x 2 = 106.00' Row Length +18.0" End Stone x 2 = 109.00' Base Length
11 Rows x 36.0" Wide + 17.1" Spacing x 10 + 18.0" Side Stone x 2 = 50.24' Base Width
6.0" Stone Base + 36.0" Chamber Height + 6.0" Stone Cover = 4.00' Field Height

55 Chambers x 98.0 cf + 47.24' Header x 4.90 sf x 2 = 5,853.0 cf Chamber Storage
55 Chambers x 128.3 cf + 47.24' Header x 6.41 sf x 2 = 7,660.4 cf Displacement

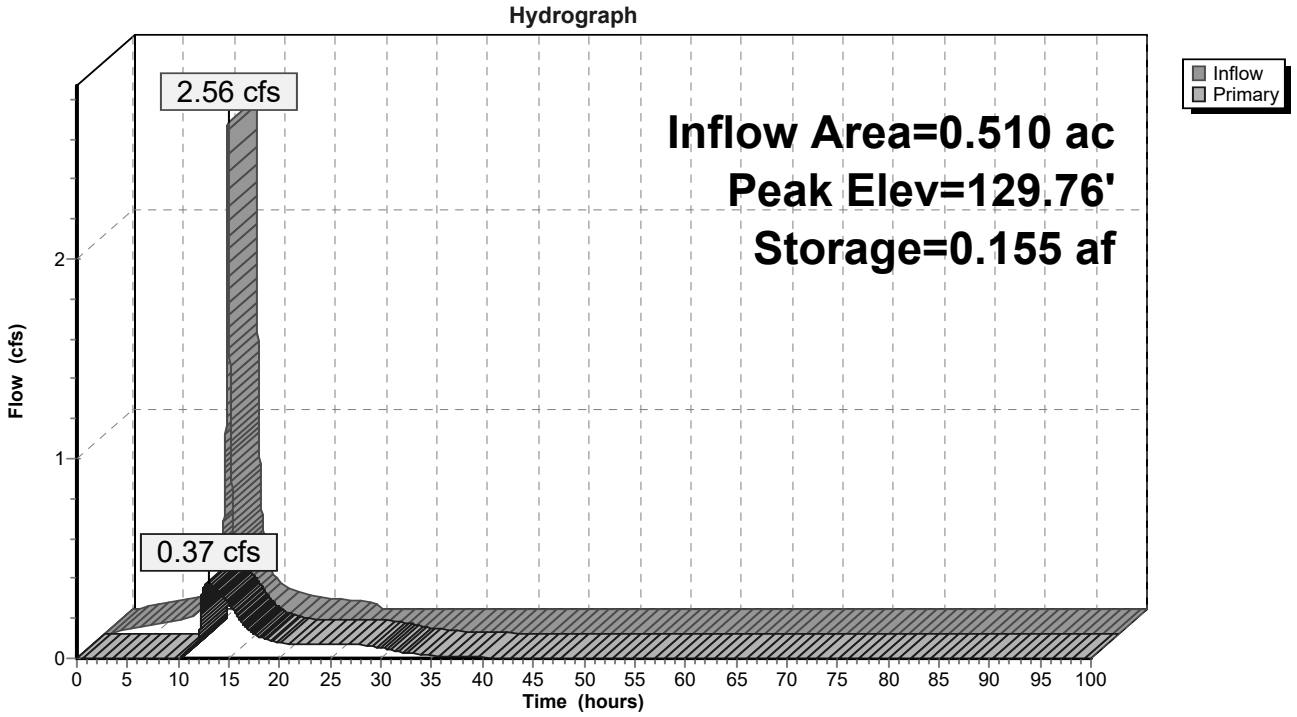
21,903.0 cf Field - 7,660.4 cf Chambers = 14,242.6 cf Stone x 40.0% Voids = 5,697.0 cf Stone Storage

Chamber Storage + Stone Storage = 11,550.0 cf = 0.265 af
Overall Storage Efficiency = 52.7%
Overall System Size = 109.00' x 50.24' x 4.00'

55 Chambers
811.2 cy Field
527.5 cy Stone



Pond B: BASIN-B

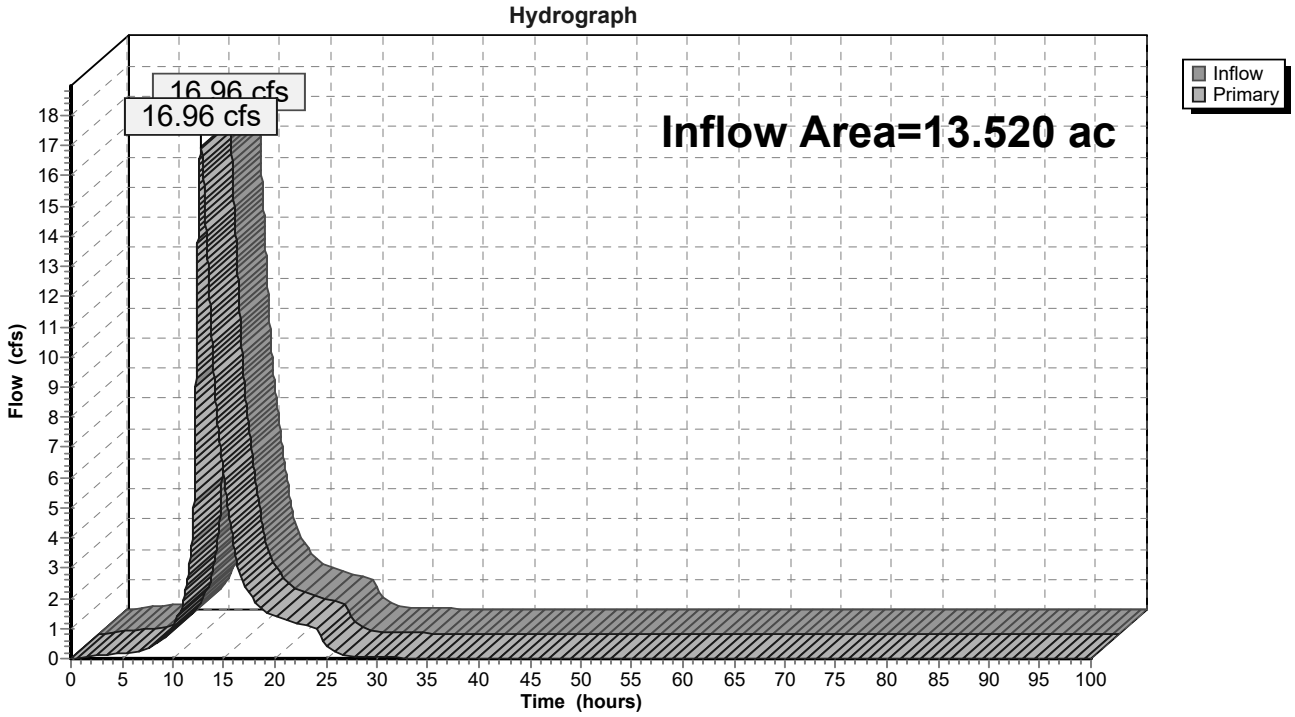


Summary for Link DP*: DP

Inflow Area = 13.520 ac, 18.05% Impervious, Inflow Depth = 4.35" for C-25 YR event
Inflow = 16.96 cfs @ 12.79 hrs, Volume= 4.904 af
Primary = 16.96 cfs @ 12.79 hrs, Volume= 4.904 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-100.00 hrs, dt= 0.01 hrs

Link DP*: DP

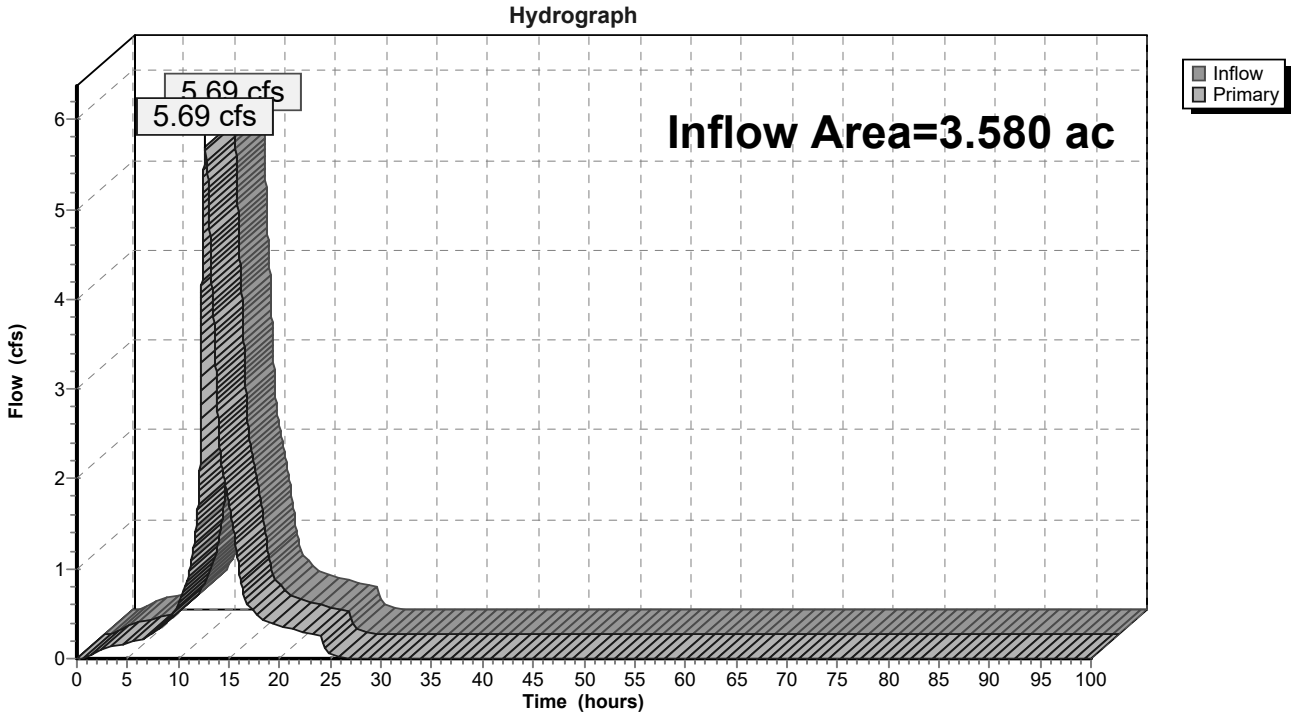


Summary for Link POA-1*: POA-1

Inflow Area = 3.580 ac, 54.47% Impervious, Inflow Depth = 5.30" for C-25 YR event
Inflow = 5.69 cfs @ 12.68 hrs, Volume= 1.582 af
Primary = 5.69 cfs @ 12.68 hrs, Volume= 1.582 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-100.00 hrs, dt= 0.01 hrs

Link POA-1*: POA-1

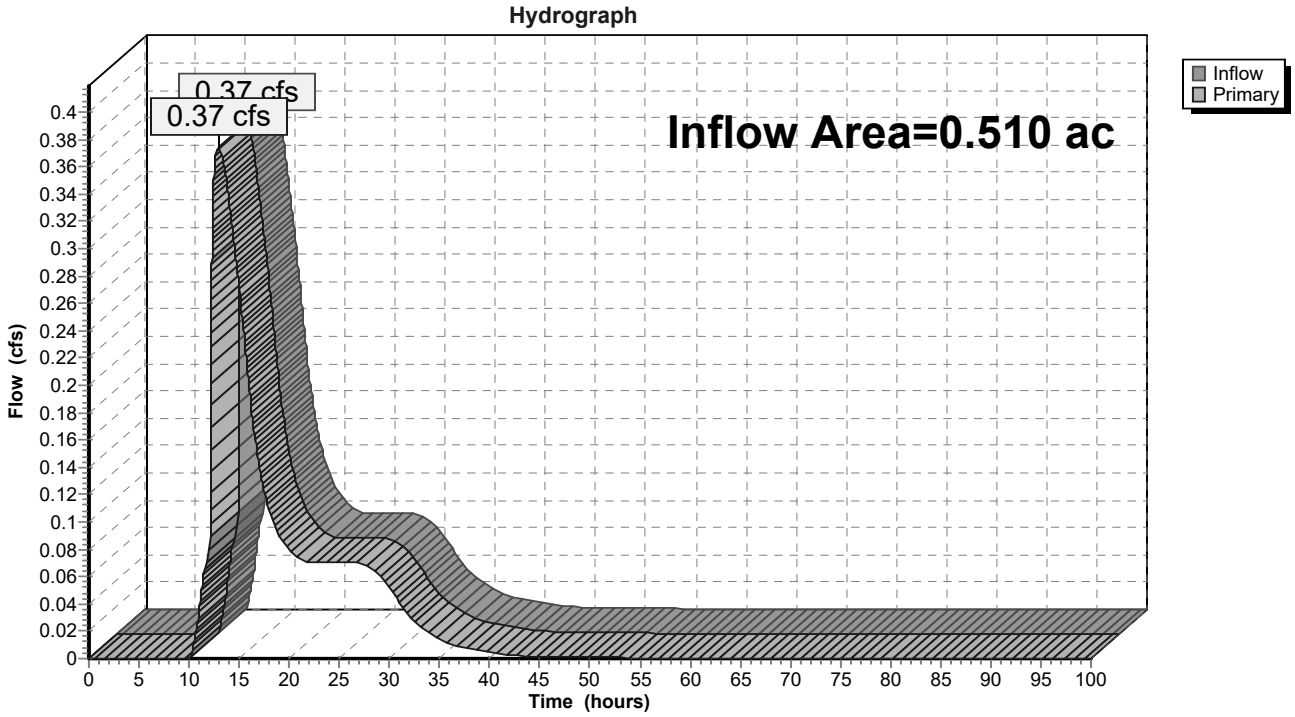


Summary for Link POA-2*: POA-2

Inflow Area = 0.510 ac, 94.12% Impervious, Inflow Depth = 5.16" for C-25 YR event
Inflow = 0.37 cfs @ 12.93 hrs, Volume= 0.219 af
Primary = 0.37 cfs @ 12.93 hrs, Volume= 0.219 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-100.00 hrs, dt= 0.01 hrs

Link POA-2*: POA-2



Time span=0.00-100.00 hrs, dt=0.01 hrs, 10001 points
Runoff by SCS TR-20 method, UH=Delmarva, Split Pervious/Imperv. UI as Pervious
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Subcatchment PD-2I: PD-2 - Imprv. Runoff Area=1.220 ac 100.00% Impervious Runoff Depth=8.70"
Tc=24.5 min CN=0/98 Runoff=4.47 cfs 0.884 af

Subcatchment PD-2P: PD-2 Perv. Runoff Area=0.570 ac 0.00% Impervious Runoff Depth=6.51"
Tc=10.0 min CN=80/0 Runoff=2.74 cfs 0.309 af

Subcatchment PD-3P: PD-3 Imprv. Runoff Area=0.510 ac 94.12% Impervious Runoff Depth=8.57"
Tc=6.0 min CN=80/98 Runoff=3.52 cfs 0.364 af

Subcatchment PO-1: PO-1 Runoff Area=0.050 ac 0.00% Impervious Runoff Depth=6.14"
Flow Length=896' Tc=29.3 min CN=77/0 Runoff=0.13 cfs 0.026 af

Subcatchment PO-2 Imprv.: PO-2 Imprv. Runoff Area=0.730 ac 100.00% Impervious Runoff Depth=8.70"
Tc=10.0 min CN=0/98 Runoff=4.14 cfs 0.529 af

Subcatchment PO-2 Perv.: PO-2 Perv. Runoff Area=1.010 ac 0.00% Impervious Runoff Depth=6.27"
Flow Length=1,319' Tc=43.3 min CN=78/0 Runoff=2.14 cfs 0.527 af

Subcatchment PU-1: PU-1 Runoff Area=9.430 ac 0.11% Impervious Runoff Depth=6.15"
Flow Length=1,382' Tc=53.8 min CN=77/98 Runoff=17.12 cfs 4.830 af

Pond A: BASIN-A Peak Elev=127.73' Storage=0.317 af Inflow=11.60 cfs 2.276 af
Outflow=8.29 cfs 2.276 af

Pond B: BASIN-B Peak Elev=130.37' Storage=0.207 af Inflow=3.52 cfs 0.364 af
Outflow=0.54 cfs 0.321 af

Link DP*: DP Inflow=25.69 cfs 7.427 af
Primary=25.69 cfs 7.427 af

Link POA-1*: POA-1 Inflow=8.29 cfs 2.276 af
Primary=8.29 cfs 2.276 af

Link POA-2*: POA-2 Inflow=0.54 cfs 0.321 af
Primary=0.54 cfs 0.321 af

Total Runoff Area = 13.520 ac Runoff Volume = 7.470 af Average Runoff Depth = 6.63"
81.95% Pervious = 11.080 ac 18.05% Impervious = 2.440 ac

Summary for Subcatchment PD-2I: PD-2 - Imprv.

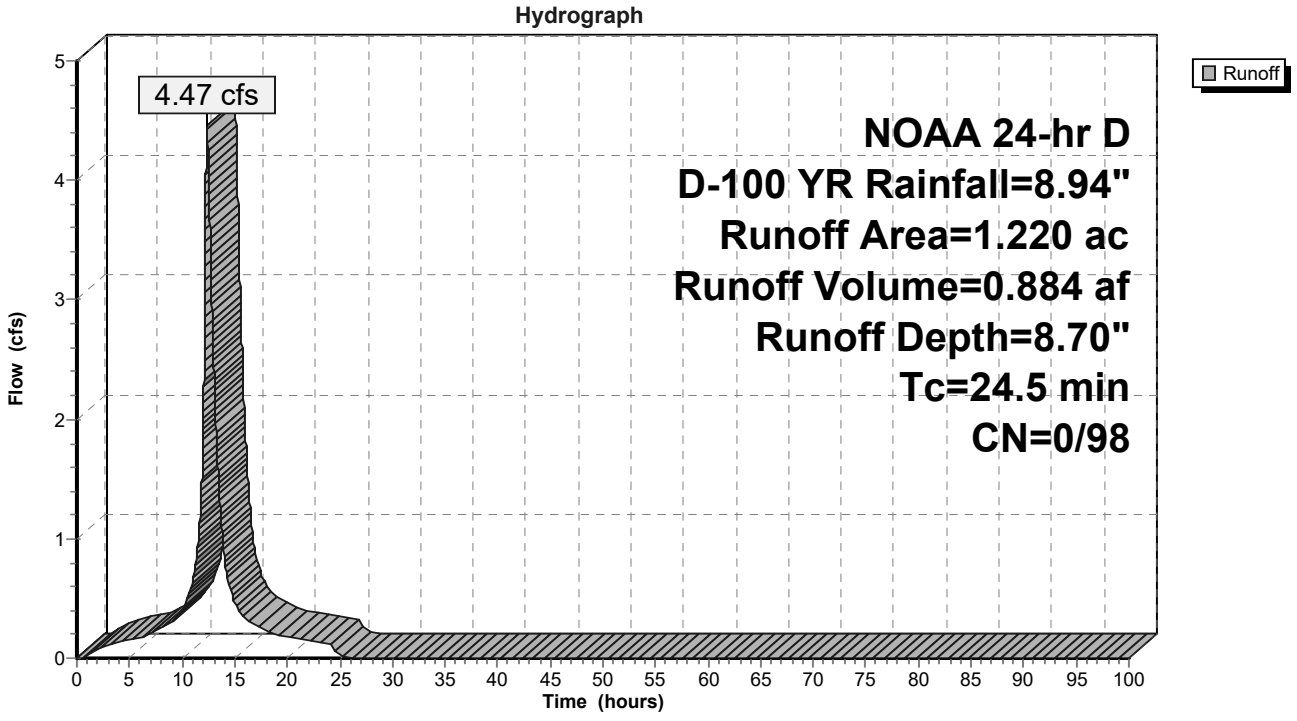
Runoff = 4.47 cfs @ 12.36 hrs, Volume= 0.884 af, Depth= 8.70"

Runoff by SCS TR-20 method, UH=Delmarva, Split Pervious/Imperv. UI as Pervious, Time Span= 0.00-100.00 hrs, dt=
NOAA 24-hr D D-100 YR Rainfall=8.94"

Area (ac)	CN	Description
0.180	98	Roofs, HSG D
1.040	98	Paved parking, HSG D
1.220	98	Weighted Average
1.220	98	100.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					**Direct Entry, Tc**
18.5					**Direct Entry, EU-2**
24.5	0	Total			

Subcatchment PD-2I: PD-2 - Imprv.



Summary for Subcatchment PD-2P: PD-2 Perv.

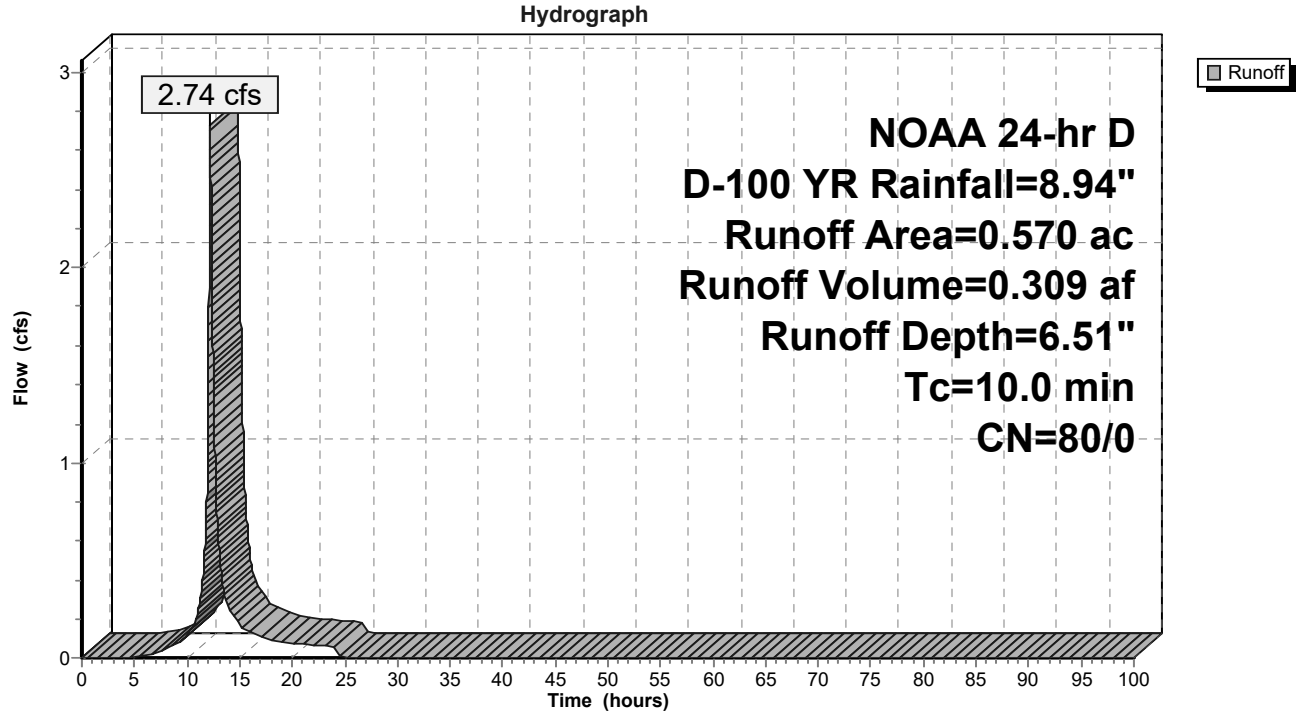
Runoff = 2.74 cfs @ 12.18 hrs, Volume= 0.309 af, Depth= 6.51"

Runoff by SCS TR-20 method, UH=Delmarva, Split Pervious/Imperv. UI as Pervious, Time Span= 0.00-100.00 hrs, dt=
NOAA 24-hr D D-100 YR Rainfall=8.94"

Area (ac)	CN	Description
0.570	80	>75% Grass cover, Good, HSG D
0.570	80	100.00% Pervious Area

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

Subcatchment PD-2P: PD-2 Perv.



Summary for Subcatchment PD-3P: PD-3 Imprv.

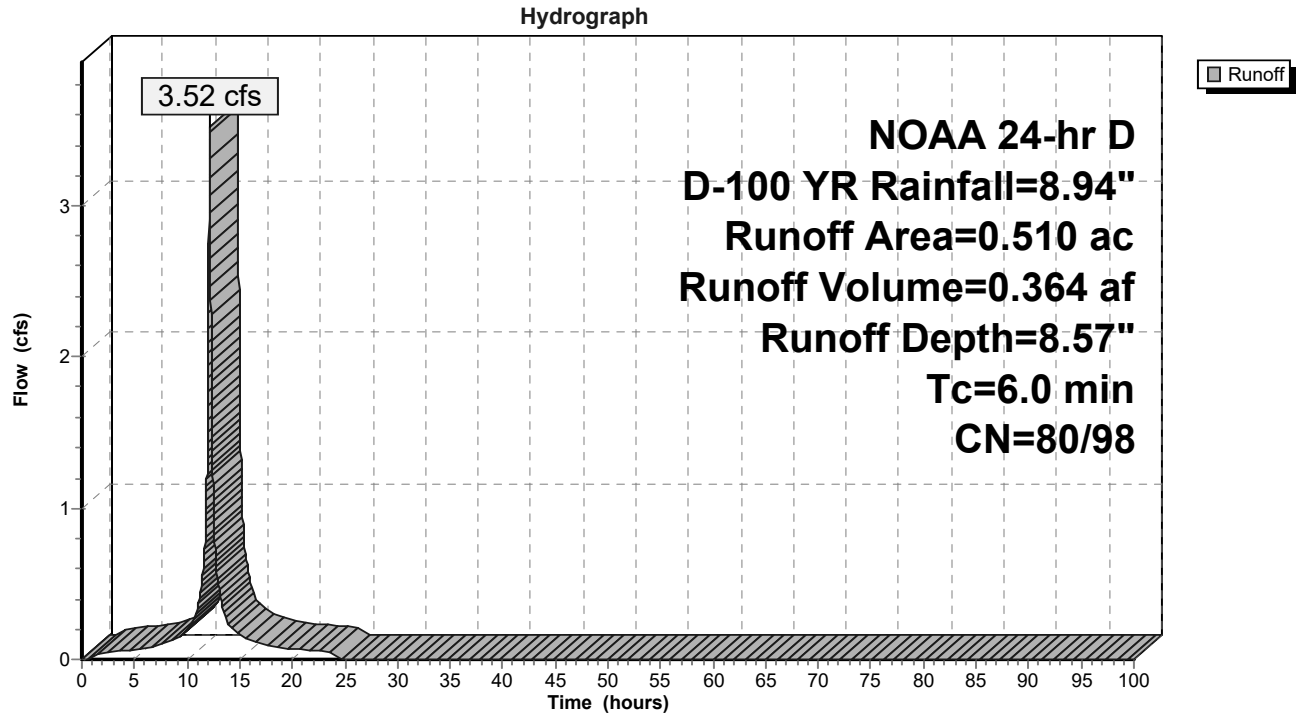
Runoff = 3.52 cfs @ 12.14 hrs, Volume= 0.364 af, Depth= 8.57"

Runoff by SCS TR-20 method, UH=Delmarva, Split Pervious/Imperv. UI as Pervious, Time Span= 0.00-100.00 hrs, dt=
NOAA 24-hr D D-100 YR Rainfall=8.94"

Area (ac)	CN	Description
0.480	98	Roofs, HSG D
0.030	80	>75% Grass cover, Good, HSG D
0.510	97	Weighted Average
0.030	80	5.88% Pervious Area
0.480	98	94.12% Impervious Area

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

Subcatchment PD-3P: PD-3 Imprv.



Summary for Subcatchment PO-1: PO-1

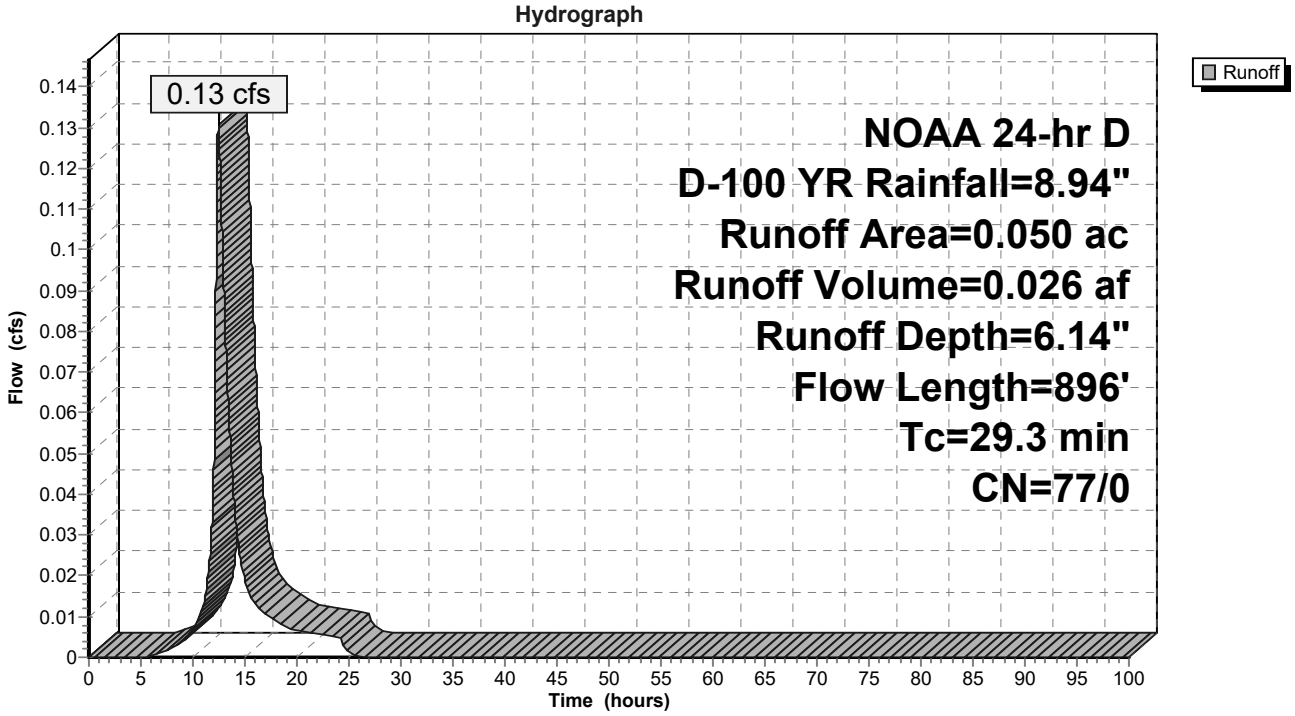
Runoff = 0.13 cfs @ 12.44 hrs, Volume= 0.026 af, Depth= 6.14"

Runoff by SCS TR-20 method, UH=Delmarva, Split Pervious/Imperv. UI as Pervious, Time Span= 0.00-100.00 hrs, dt=
NOAA 24-hr D D-100 YR Rainfall=8.94"

Area (ac)	CN	Description
0.050	77	Woods, Good, HSG D
0.050	77	100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
11.9	682	0.0365	0.96		**Shallow Concentrated Flow, EU-1** Woodland Kv= 5.0 fps
0.7	110	0.3130	2.80		**Shallow Concentrated Flow, ED-1B** Woodland Kv= 5.0 fps
7.6	27	0.0185	0.06		**Sheet Flow, ED-1A** Woods: Light underbrush n= 0.400 P2= 3.38"
9.1	77	0.0960	0.14		**Sheet Flow, EO-1** Woods: Light underbrush n= 0.400 P2= 3.38"
29.3	896	Total			

Subcatchment PO-1: PO-1



Summary for Subcatchment PO-2 Imprv.: PO-2 Imprv.

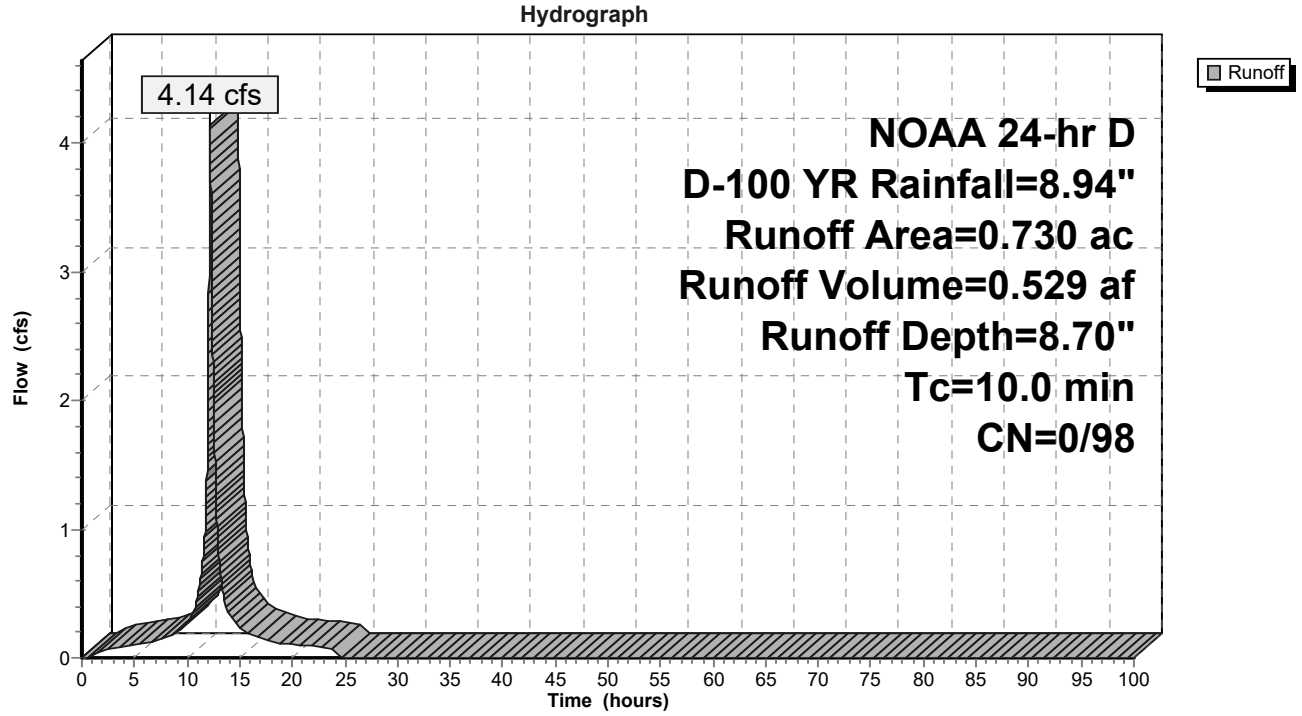
Runoff = 4.14 cfs @ 12.18 hrs, Volume= 0.529 af, Depth= 8.70"

Runoff by SCS TR-20 method, UH=Delmarva, Split Pervious/Imperv. UI as Pervious, Time Span= 0.00-100.00 hrs, dt=
NOAA 24-hr D D-100 YR Rainfall=8.94"

Area (ac)	CN	Description
0.730	98	Paved parking, HSG D
0.730	98	100.00% Impervious Area

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

Subcatchment PO-2 Imprv.: PO-2 Imprv.



Summary for Subcatchment PO-2 Perv.: PO-2 Perv.

[47] Hint: Peak is 150% of capacity of segment #5

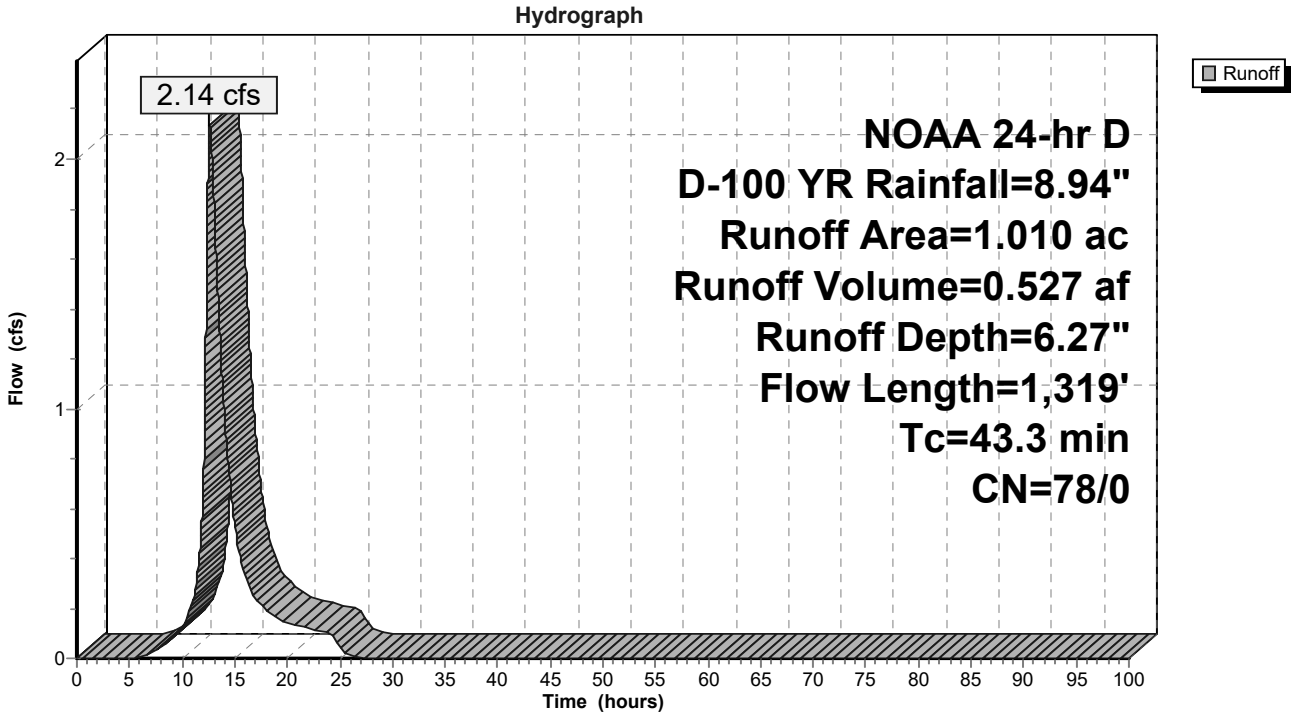
Runoff = 2.14 cfs @ 12.61 hrs, Volume= 0.527 af, Depth= 6.27"

Runoff by SCS TR-20 method, UH=Delmarva, Split Pervious/Imperv. UI as Pervious, Time Span= 0.00-100.00 hrs, dt=
NOAA 24-hr D D-100 YR Rainfall=8.94"

Area (ac)	CN	Description
0.250	80	>75% Grass cover, Good, HSG D
0.760	77	Woods, Good, HSG D
1.010	78	Weighted Average
1.010	78	100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
18.5	628	0.0128	0.57		**Shallow Concentrated Flow, EU-2** Woodland Kv= 5.0 fps
8.8	347	0.0173	0.66		**Shallow Concentrated Flow, ED-2** Woodland Kv= 5.0 fps
9.8	100	0.0189	0.17		**Sheet Flow, EO-2** Grass: Short n= 0.150 P2= 3.38"
0.1	61	0.1890	8.83		**Shallow Concentrated Flow, EO-2 PAVED** Paved Kv= 20.3 fps
1.6	140	0.0010	1.48	1.43	**Pipe Channel, EO-2 PIPE FLOW** 15.0" Round w/ 4.0" inside fill Area= 1.0 sf Perim= 3.7' r= 0.26' n= 0.013 Concrete pipe, bends & connections
4.5	43	0.0010	0.16		**Shallow Concentrated Flow, EO-2 FES** Woodland Kv= 5.0 fps
43.3	1,319	Total			

Subcatchment PO-2 Perv.: PO-2 Perv.



Summary for Subcatchment PU-1: PU-1

[47] Hint: Peak is 139% of capacity of segment #3

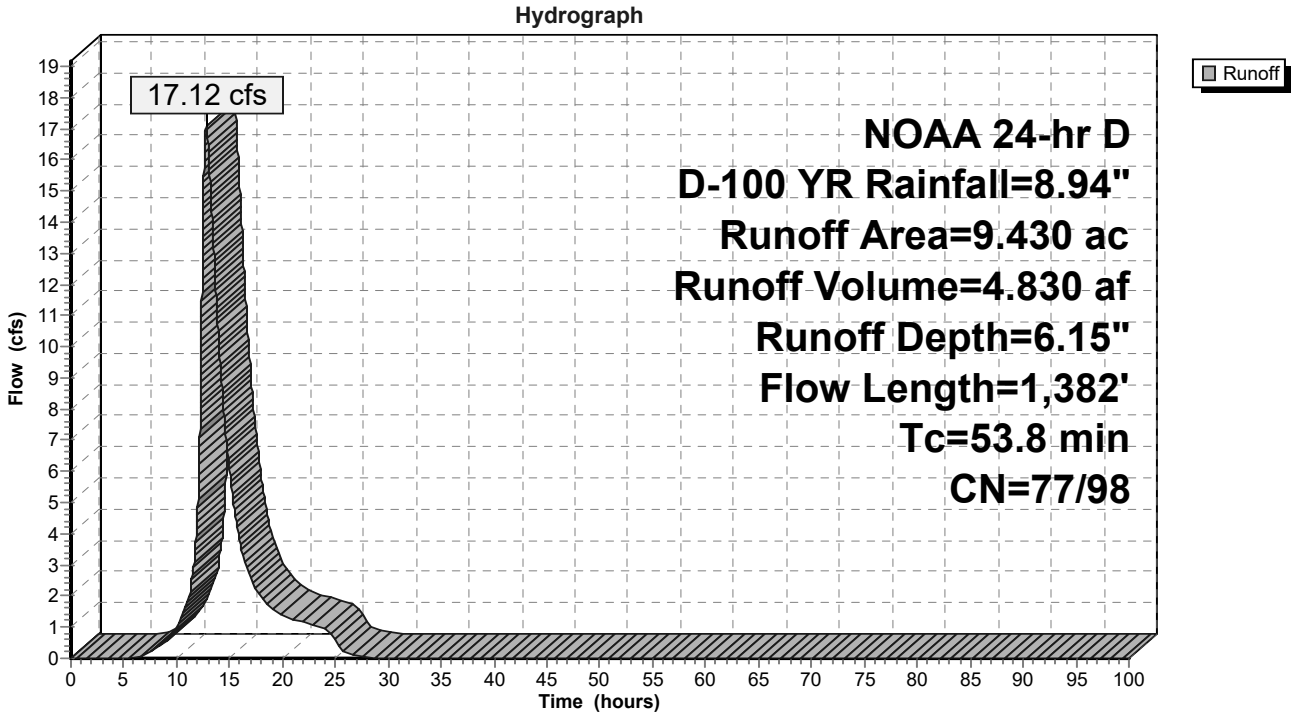
Runoff = 17.12 cfs @ 12.79 hrs, Volume= 4.830 af, Depth= 6.15"

Runoff by SCS TR-20 method, UH=Delmarva, Split Pervious/Imperv. UI as Pervious, Time Span= 0.00-100.00 hrs, dt=
NOAA 24-hr D D-100 YR Rainfall=8.94"

Area (ac)	CN	Description
9.355	77	Woods, Good, HSG D
0.010	98	Paved parking, HSG D
0.065	80	>75% Grass cover, Good, HSG D
9.430	77	Weighted Average
9.420	77	99.89% Pervious Area
0.010	98	0.11% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
16.6	100	0.0050	0.10		**Sheet Flow, PU-1** Grass: Short n= 0.150 P2= 3.38"
2.1	110	0.0153	0.87		**Shallow Concentrated Flow, PU-1O** Short Grass Pasture Kv= 7.0 fps
0.1	23	0.0138	6.98	12.34	**Pipe Channel, PU-1O** 18.0" Round Area= 1.8 sf Perim= 4.7' r= 0.38' n= 0.013
35.0	1,149	0.0120	0.55		**Shallow Concentrated Flow, EU-2** Woodland Kv= 5.0 fps
53.8	1,382	Total			

Subcatchment PU-1: PU-1



Summary for Pond A: BASIN-A

Inflow Area = 3.580 ac, 54.47% Impervious, Inflow Depth = 7.63" for D-100 YR event
Inflow = 11.60 cfs @ 12.25 hrs, Volume= 2.276 af
Outflow = 8.29 cfs @ 12.66 hrs, Volume= 2.276 af, Atten= 29%, Lag= 24.6 min
Primary = 8.29 cfs @ 12.66 hrs, Volume= 2.276 af

Routing by Stor-Ind method, Time Span= 0.00-100.00 hrs, dt= 0.01 hrs
Peak Elev= 127.73' @ 12.66 hrs Surf.Area= 0.129 ac Storage= 0.317 af

Plug-Flow detention time= (not calculated: outflow precedes inflow)
Center-of-Mass det. time= 19.5 min (816.5 - 797.0)

Volume	Invert	Avail.Storage	Storage Description
#1A	122.00'	0.000 af	**38.59'W x 114.17'L x 6.58'H Field A** 0.666 af Overall - 0.301 af Embedded = 0.365 af x 0.0% Voids
#2A	122.50'	0.253 af	**ADS N-12 60"** x 25 Inside #1 Inside= 59.5"W x 59.5"H => 19.30 sf x 20.00'L = 386.0 cf Outside= 67.0"W x 67.0"H => 22.91 sf x 20.00'L = 458.2 cf 25 Chambers in 5 Rows 35.59' Header x 19.30 sf x 2 = 1,373.6 cf Inside
#3B	122.00'	0.000 af	**16.08'W x 74.17'L x 6.58'H Field B** 0.180 af Overall - 0.077 af Embedded = 0.103 af x 0.0% Voids
#4B	122.50'	0.065 af	**ADS N-12 60"** x 6 Inside #3 Inside= 59.5"W x 59.5"H => 19.30 sf x 20.00'L = 386.0 cf Outside= 67.0"W x 67.0"H => 22.91 sf x 20.00'L = 458.2 cf 6 Chambers in 2 Rows 13.08' Header x 19.30 sf x 2 = 505.1 cf Inside
		0.318 af	Total Available Storage

Storage Group A created with Chamber Wizard
Storage Group B created with Chamber Wizard

Device	Routing	Invert	Outlet Devices
#1	Primary	122.50'	**18.0" Round Culvert** L= 26.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 122.50' / 122.00' S= 0.0192 '/' Cc= 0.900 n= 0.012, Flow Area= 1.77 sf
#2	Device 1	122.50'	**5.5" Vert. Orifice/Grate X 2.00** C= 0.600 Limited to weir flow at low heads
#3	Device 1	124.50'	**10.0" W x 5.5" H Vert. Orifice/Grate** C= 0.600 Limited to weir flow at low heads
#4	Device 1	125.45'	**8.0" W x 4.0" H Vert. Orifice/Grate** C= 0.600 Limited to weir flow at low heads
#5	Device 1	128.25'	**4.0' long Sharp-Crested Rectangular Weir** 2 End Contraction(s)

Primary OutFlow Max=8.29 cfs @ 12.66 hrs HW=127.73' (Free Discharge)
- **1=Culvert** (Passes 8.29 cfs of 18.01 cfs potential flow)
  - **2=Orifice/Grate** (Orifice Controls 3.55 cfs @ 10.77 fps)
  - **3=Orifice/Grate** (Orifice Controls 3.19 cfs @ 8.34 fps)
  - **4=Orifice/Grate** (Orifice Controls 1.56 cfs @ 7.00 fps)
  - **5=Sharp-Crested Rectangular Weir** (Controls 0.00 cfs)

Pond A: BASIN-A - Chamber Wizard Field A

Chamber Model = ADS N-12 60" (ADS N-12® Pipe)
Inside= 59.5"W x 59.5"H => 19.30 sf x 20.00'L = 386.0 cf
Outside= 67.0"W x 67.0"H => 22.91 sf x 20.00'L = 458.2 cf

67.0" Wide + 23.0" Spacing = 90.0" C-C Row Spacing

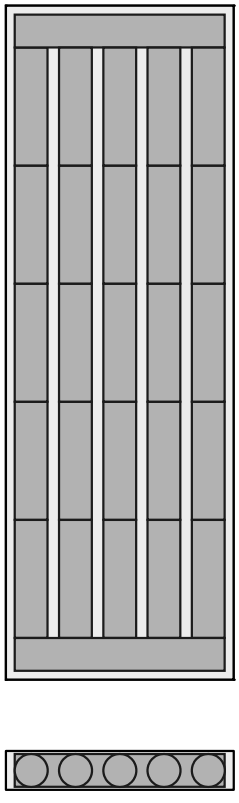
5 Chambers/Row x 20.00' Long +5.58' Header x 2 = 111.17' Row Length +18.0" End Stone x 2 = 114.17' Base Length
5 Rows x 67.0" Wide + 23.0" Spacing x 4 + 18.0" Side Stone x 2 = 38.59' Base Width
6.0" Stone Base + 67.0" Chamber Height + 6.0" Stone Cover = 6.58' Field Height

25 Chambers x 386.0 cf + 35.59' Header x 19.30 sf x 2 = 11,023.6 cf Chamber Storage
25 Chambers x 458.2 cf + 35.59' Header x 22.91 sf x 2 = 13,086.2 cf Displacement

29,003.5 cf Field - 13,086.2 cf Chambers = 15,917.3 cf Stone x 0.0% Voids = 0.0 cf Stone Storage

Chamber Storage = 11,023.6 cf = 0.253 af
Overall Storage Efficiency = 38.0%
Overall System Size = 114.17' x 38.59' x 6.58'

25 Chambers
1,074.2 cy Field
589.5 cy Stone



Pond A: BASIN-A - Chamber Wizard Field B

Chamber Model = ADS N-12 60" (ADS N-12® Pipe)
Inside= 59.5"W x 59.5"H => 19.30 sf x 20.00'L = 386.0 cf
Outside= 67.0"W x 67.0"H => 22.91 sf x 20.00'L = 458.2 cf

67.0" Wide + 23.0" Spacing = 90.0" C-C Row Spacing

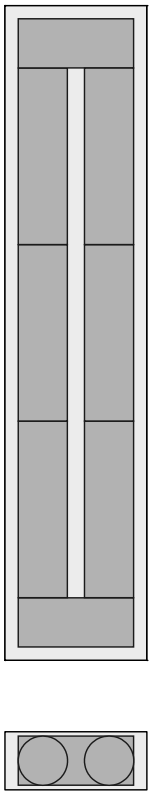
3 Chambers/Row x 20.00' Long +5.58' Header x 2 = 71.17' Row Length +18.0" End Stone x 2 = 74.17' Base Length
2 Rows x 67.0" Wide + 23.0" Spacing x 1 + 18.0" Side Stone x 2 = 16.08' Base Width
6.0" Stone Base + 67.0" Chamber Height + 6.0" Stone Cover = 6.58' Field Height

6 Chambers x 386.0 cf + 13.08' Header x 19.30 sf x 2 = 2,821.1 cf Chamber Storage
6 Chambers x 458.2 cf + 13.08' Header x 22.91 sf x 2 = 3,348.9 cf Displacement

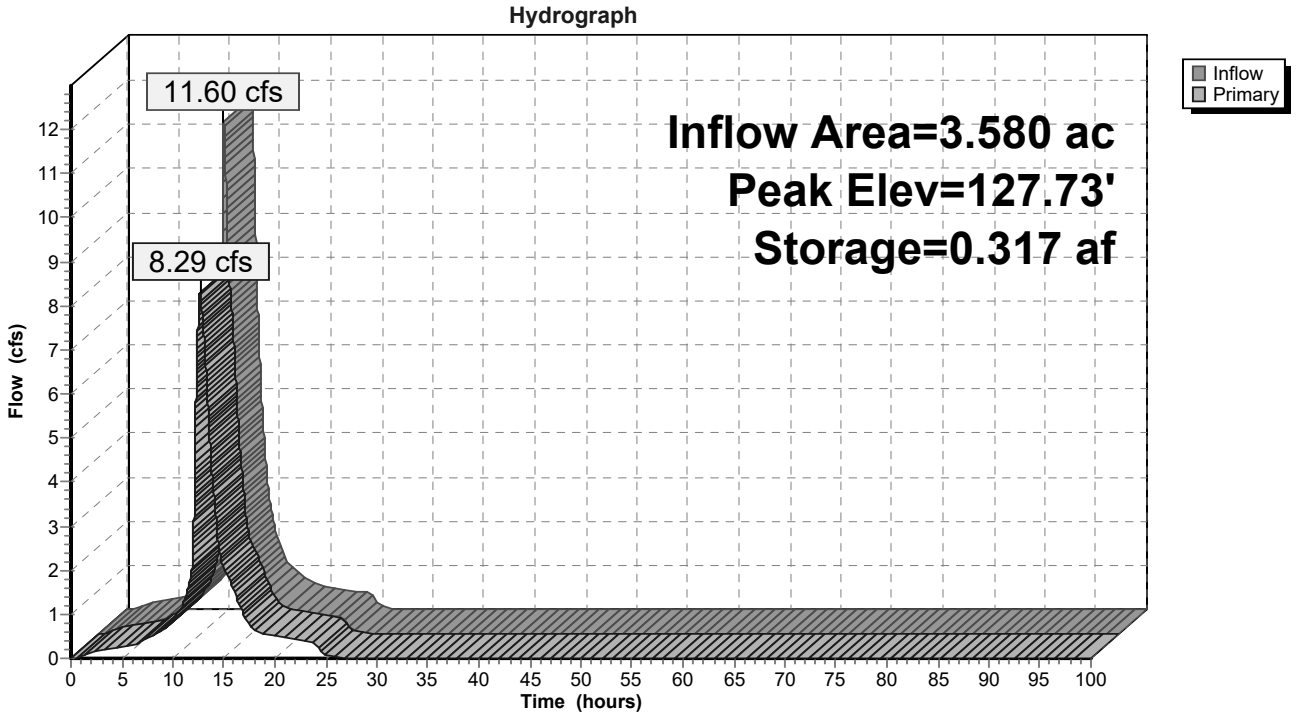
7,854.1 cf Field - 3,348.9 cf Chambers = 4,505.2 cf Stone x 0.0% Voids = 0.0 cf Stone Storage

Chamber Storage = 2,821.1 cf = 0.065 af
Overall Storage Efficiency = 35.9%
Overall System Size = 74.17' x 16.08' x 6.58'

6 Chambers
290.9 cy Field
166.9 cy Stone



Pond A: BASIN-A



Summary for Pond B: BASIN-B

Inflow Area = 0.510 ac, 94.12% Impervious, Inflow Depth = 8.57" for D-100 YR event
Inflow = 3.52 cfs @ 12.14 hrs, Volume= 0.364 af
Outflow = 0.54 cfs @ 12.88 hrs, Volume= 0.321 af, Atten= 85%, Lag= 44.6 min
Primary = 0.54 cfs @ 12.88 hrs, Volume= 0.321 af

Routing by Stor-Ind method, Time Span= 0.00-100.00 hrs, dt= 0.01 hrs
Peak Elev= 130.37' @ 12.88 hrs Surf.Area= 0.126 ac Storage= 0.207 af

Plug-Flow detention time= 407.0 min calculated for 0.321 af (88% of inflow)
Center-of-Mass det. time= 346.4 min (1,093.5 - 747.2)

Volume	Invert	Avail.Storage	Storage Description
#1A	127.50'	0.131 af	**50.24'W x 109.00'L x 4.00'H Field A** 0.503 af Overall - 0.176 af Embedded = 0.327 af x 40.0% Voids
#2A	128.00'	0.134 af	**ADS N-12 30"** x 55 Inside #1 Inside= 30.0"W x 30.0"H => 4.90 sf x 20.00'L = 98.0 cf Outside= 36.0"W x 36.0"H => 6.41 sf x 20.00'L = 128.3 cf 55 Chambers in 11 Rows 47.24' Header x 4.90 sf x 2 = 463.0 cf Inside
		0.265 af	Total Available Storage

Storage Group A created with Chamber Wizard

Device	Routing	Invert	Outlet Devices
#1	Primary	128.40'	**15.0" Round Culvert** L= 81.0' CPP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 128.40' / 127.96' S= 0.0054 '/' Cc= 0.900 n= 0.012, Flow Area= 1.23 sf
#2	Device 1	128.40'	**Reg-U-Flo SH 3.0-in**
#3	Device 1	129.10'	**4.0" Vert. Orifice/Grate** C= 0.600 Limited to weir flow at low heads
#4	Device 1	130.40'	**4.0' long Sharp-Crested Rectangular Weir** 2 End Contraction(s)

Primary OutFlow Max=0.54 cfs @ 12.88 hrs HW=130.37' (Free Discharge)
└**1=Culvert** (Passes 0.54 cfs of 5.42 cfs potential flow)
  ├**2=Reg-U-Flo SH 3.0-in** (Custom Controls 0.10 cfs)
  ├**3=Orifice/Grate** (Orifice Controls 0.44 cfs @ 5.07 fps)
  └**4=Sharp-Crested Rectangular Weir** (Controls 0.00 cfs)

Pond B: BASIN-B - Chamber Wizard Field A

Chamber Model = ADS N-12 30" (ADS N-12® Pipe)
Inside= 30.0"W x 30.0"H => 4.90 sf x 20.00'L = 98.0 cf
Outside= 36.0"W x 36.0"H => 6.41 sf x 20.00'L = 128.3 cf

36.0" Wide + 17.1" Spacing = 53.1" C-C Row Spacing

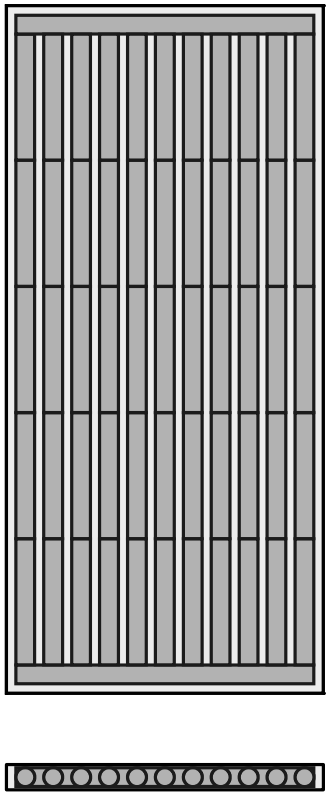
5 Chambers/Row x 20.00' Long +3.00' Header x 2 = 106.00' Row Length +18.0" End Stone x 2 = 109.00' Base Length
11 Rows x 36.0" Wide + 17.1" Spacing x 10 + 18.0" Side Stone x 2 = 50.24' Base Width
6.0" Stone Base + 36.0" Chamber Height + 6.0" Stone Cover = 4.00' Field Height

55 Chambers x 98.0 cf + 47.24' Header x 4.90 sf x 2 = 5,853.0 cf Chamber Storage
55 Chambers x 128.3 cf + 47.24' Header x 6.41 sf x 2 = 7,660.4 cf Displacement

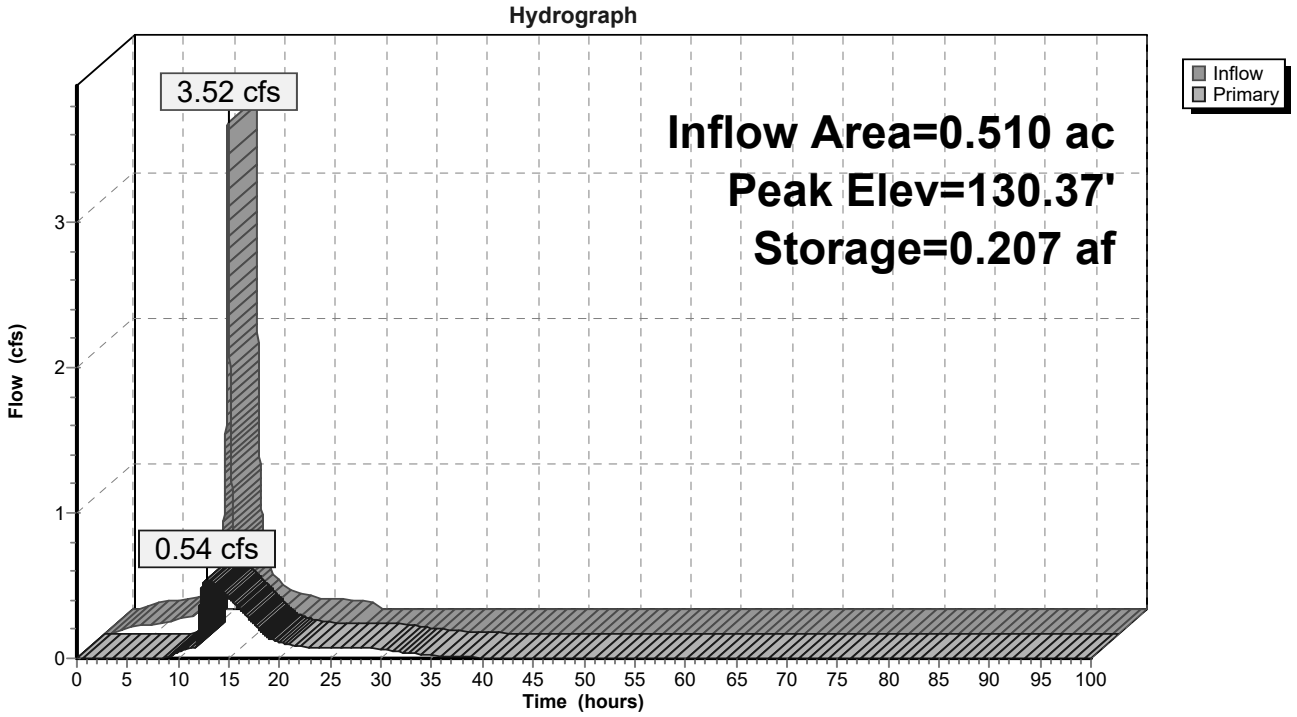
21,903.0 cf Field - 7,660.4 cf Chambers = 14,242.6 cf Stone x 40.0% Voids = 5,697.0 cf Stone Storage

Chamber Storage + Stone Storage = 11,550.0 cf = 0.265 af
Overall Storage Efficiency = 52.7%
Overall System Size = 109.00' x 50.24' x 4.00'

55 Chambers
811.2 cy Field
527.5 cy Stone



Pond B: BASIN-B

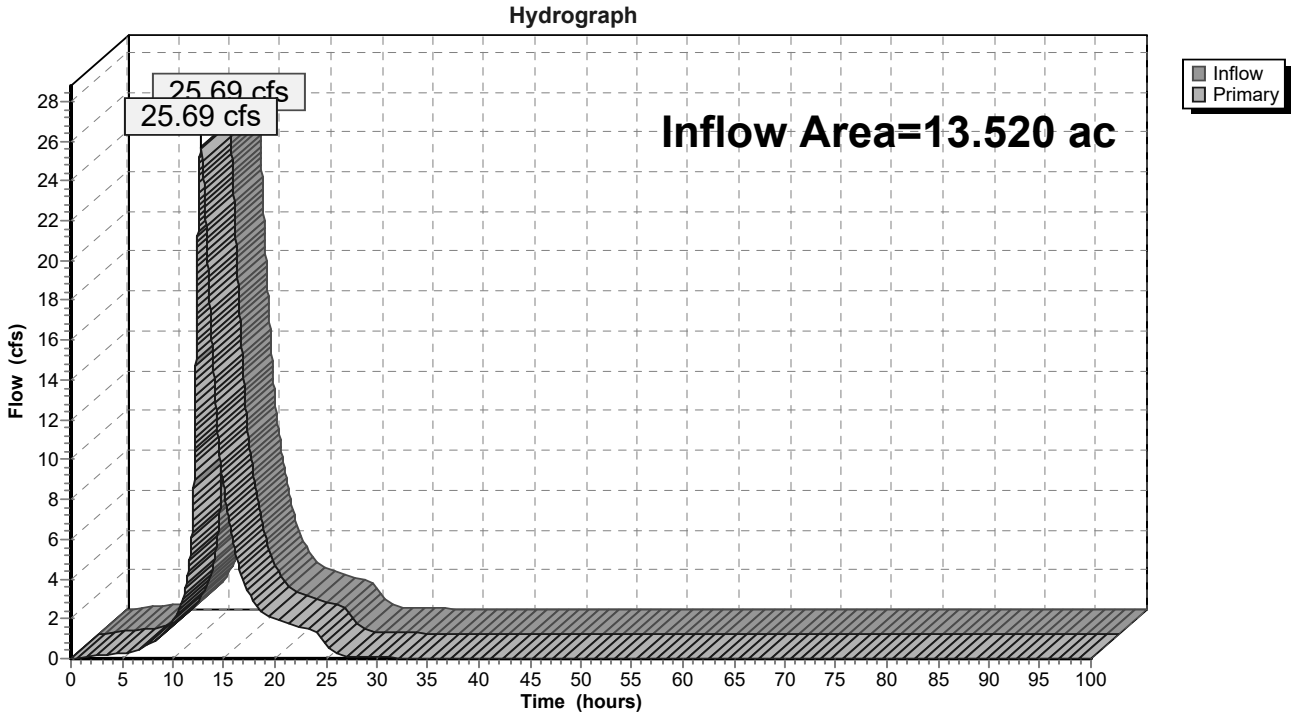


Summary for Link DP*: DP

Inflow Area = 13.520 ac, 18.05% Impervious, Inflow Depth = 6.59" for D-100 YR event
Inflow = 25.69 cfs @ 12.75 hrs, Volume= 7.427 af
Primary = 25.69 cfs @ 12.75 hrs, Volume= 7.427 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-100.00 hrs, dt= 0.01 hrs

Link DP*: DP

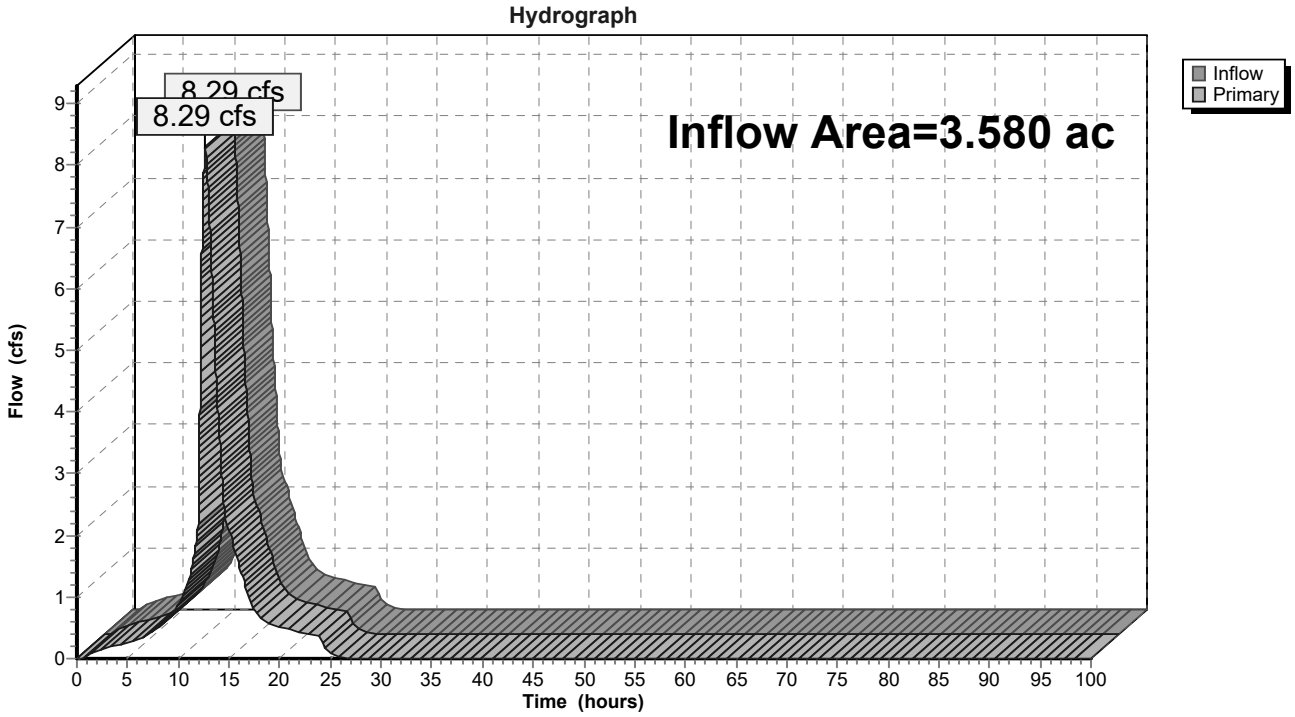


Summary for Link POA-1*: POA-1

Inflow Area = 3.580 ac, 54.47% Impervious, Inflow Depth = 7.63" for D-100 YR event
Inflow = 8.29 cfs @ 12.66 hrs, Volume= 2.276 af
Primary = 8.29 cfs @ 12.66 hrs, Volume= 2.276 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-100.00 hrs, dt= 0.01 hrs

Link POA-1*: POA-1

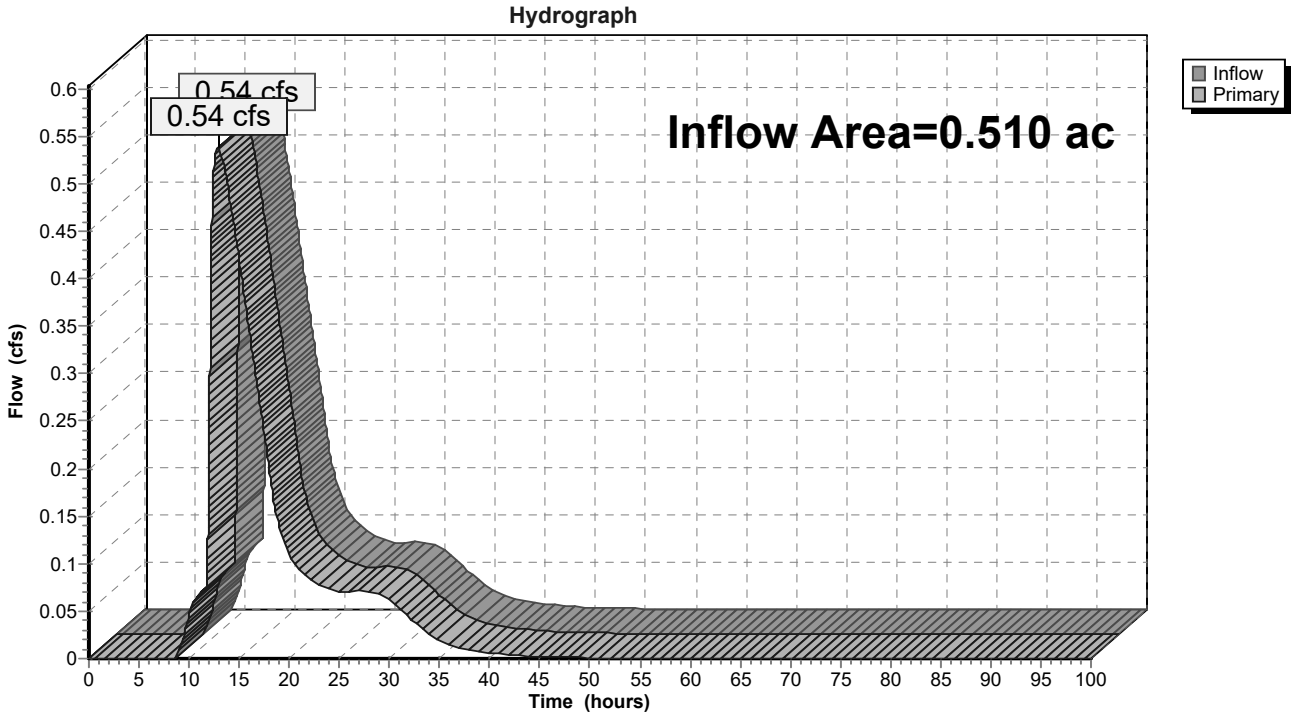


Summary for Link POA-2*: POA-2

Inflow Area = 0.510 ac, 94.12% Impervious, Inflow Depth = 7.56" for D-100 YR event
Inflow = 0.54 cfs @ 12.88 hrs, Volume= 0.321 af
Primary = 0.54 cfs @ 12.88 hrs, Volume= 0.321 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-100.00 hrs, dt= 0.01 hrs

Link POA-2*: POA-2



Time span=0.00-100.00 hrs, dt=0.01 hrs, 10001 points
Runoff by SCS TR-20 method, UH=Delmarva, Split Pervious/Imperv. UI as Pervious
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Subcatchment PD-2I: PD-2 - Imprv. Runoff Area=1.220 ac 100.00% Impervious Runoff Depth=1.03"
Tc=24.5 min CN=0/98 Runoff=1.32 cfs 0.105 af

Subcatchment PD-2P: PD-2 Perv. Runoff Area=0.570 ac 0.00% Impervious Runoff Depth=0.17"
Tc=10.0 min CN=80/0 Runoff=0.15 cfs 0.008 af

Subcatchment PD-3P: PD-3 Imprv. Runoff Area=0.510 ac 94.12% Impervious Runoff Depth=0.98"
Tc=6.0 min CN=80/98 Runoff=1.15 cfs 0.042 af

Subcatchment PO-1: PO-1 Runoff Area=0.050 ac 0.00% Impervious Runoff Depth=0.12"
Flow Length=896' Tc=29.3 min CN=77/0 Runoff=0.00 cfs 0.000 af

Subcatchment PO-2 Imprv.: PO-2 Imprv. Runoff Area=0.730 ac 100.00% Impervious Runoff Depth=1.03"
Tc=10.0 min CN=0/98 Runoff=1.36 cfs 0.063 af

Subcatchment PO-2 Perv.: PO-2 Perv. Runoff Area=1.010 ac 0.00% Impervious Runoff Depth=0.13"
Flow Length=1,319' Tc=43.3 min CN=78/0 Runoff=0.09 cfs 0.011 af

Subcatchment PU-1: PU-1 Runoff Area=9.430 ac 0.11% Impervious Runoff Depth=0.12"
Flow Length=1,382' Tc=53.8 min CN=77/98 Runoff=0.62 cfs 0.093 af

Pond A: BASIN-A Peak Elev=123.71' Storage=0.039 af Inflow=2.52 cfs 0.188 af
Outflow=1.57 cfs 0.188 af

Pond B: BASIN-B Peak Elev=128.38' Storage=0.042 af Inflow=1.15 cfs 0.042 af
Outflow=0.00 cfs 0.000 af

Link DP*: DP Inflow=2.09 cfs 0.281 af
Primary=2.09 cfs 0.281 af

Link POA-1*: POA-1 Inflow=1.57 cfs 0.188 af
Primary=1.57 cfs 0.188 af

Link POA-2*: POA-2 Inflow=0.00 cfs 0.000 af
Primary=0.00 cfs 0.000 af

Total Runoff Area = 13.520 ac Runoff Volume = 0.323 af Average Runoff Depth = 0.29"
81.95% Pervious = 11.080 ac 18.05% Impervious = 2.440 ac

Summary for Subcatchment PD-2I: PD-2 - Imprv.

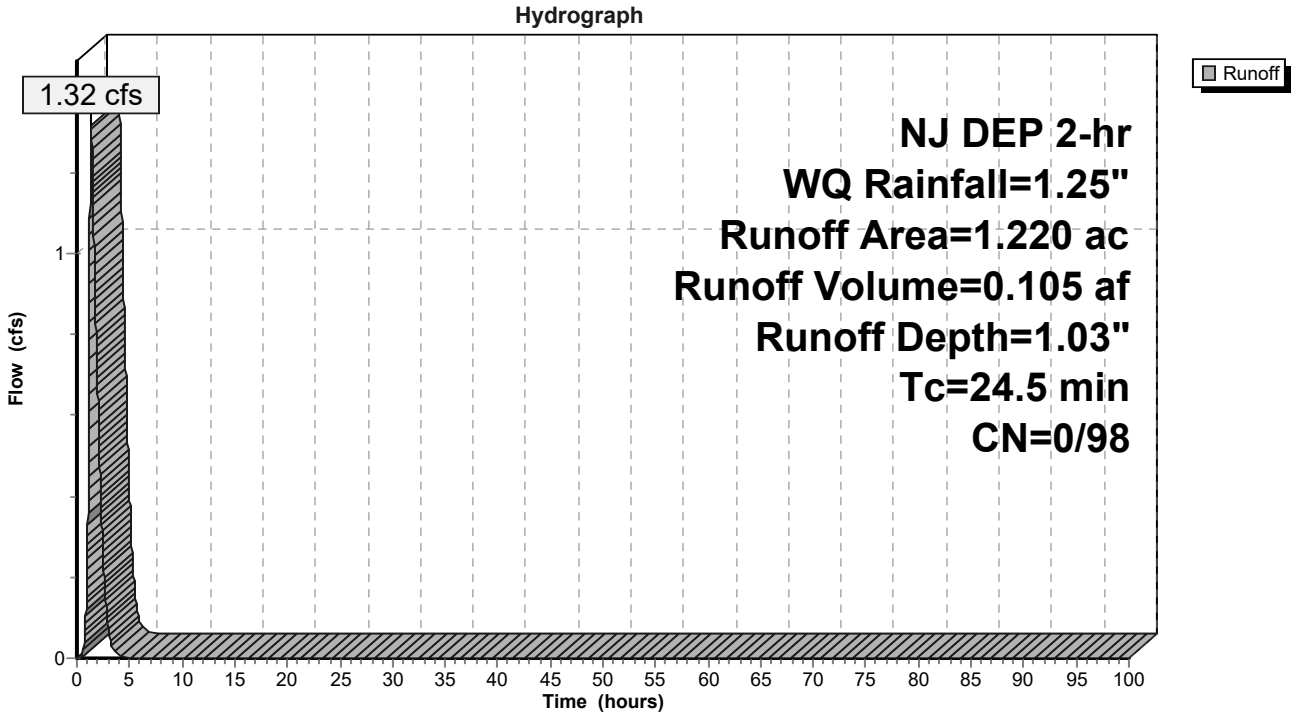
Runoff = 1.32 cfs @ 1.36 hrs, Volume= 0.105 af, Depth= 1.03"

Runoff by SCS TR-20 method, UH=Delmarva, Split Pervious/Imperv. UI as Pervious, Time Span= 0.00-100.00 hrs, dt=
NJ DEP 2-hr WQ Rainfall=1.25"

Area (ac)	CN	Description
0.180	98	Roofs, HSG D
1.040	98	Paved parking, HSG D
1.220	98	Weighted Average
1.220	98	100.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					**Direct Entry, Tc**
18.5					**Direct Entry, EU-2**
24.5	0	Total			

Subcatchment PD-2I: PD-2 - Imprv.



Summary for Subcatchment PD-2P: PD-2 Perv.

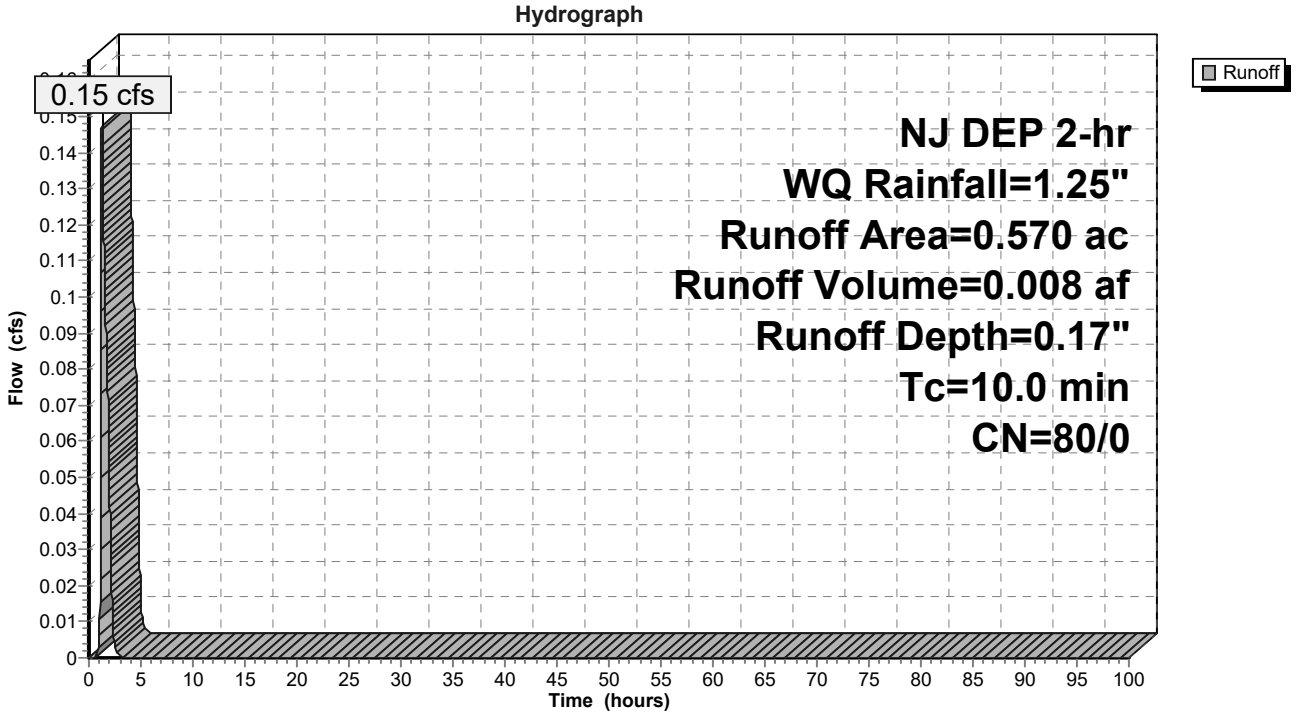
Runoff = 0.15 cfs @ 1.26 hrs, Volume= 0.008 af, Depth= 0.17"

Runoff by SCS TR-20 method, UH=Delmarva, Split Pervious/Imperv. UI as Pervious, Time Span= 0.00-100.00 hrs, dt=
NJ DEP 2-hr WQ Rainfall=1.25"

Area (ac)	CN	Description
0.570	80	>75% Grass cover, Good, HSG D
0.570	80	100.00% Pervious Area

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

Subcatchment PD-2P: PD-2 Perv.



Summary for Subcatchment PD-3P: PD-3 Imprv.

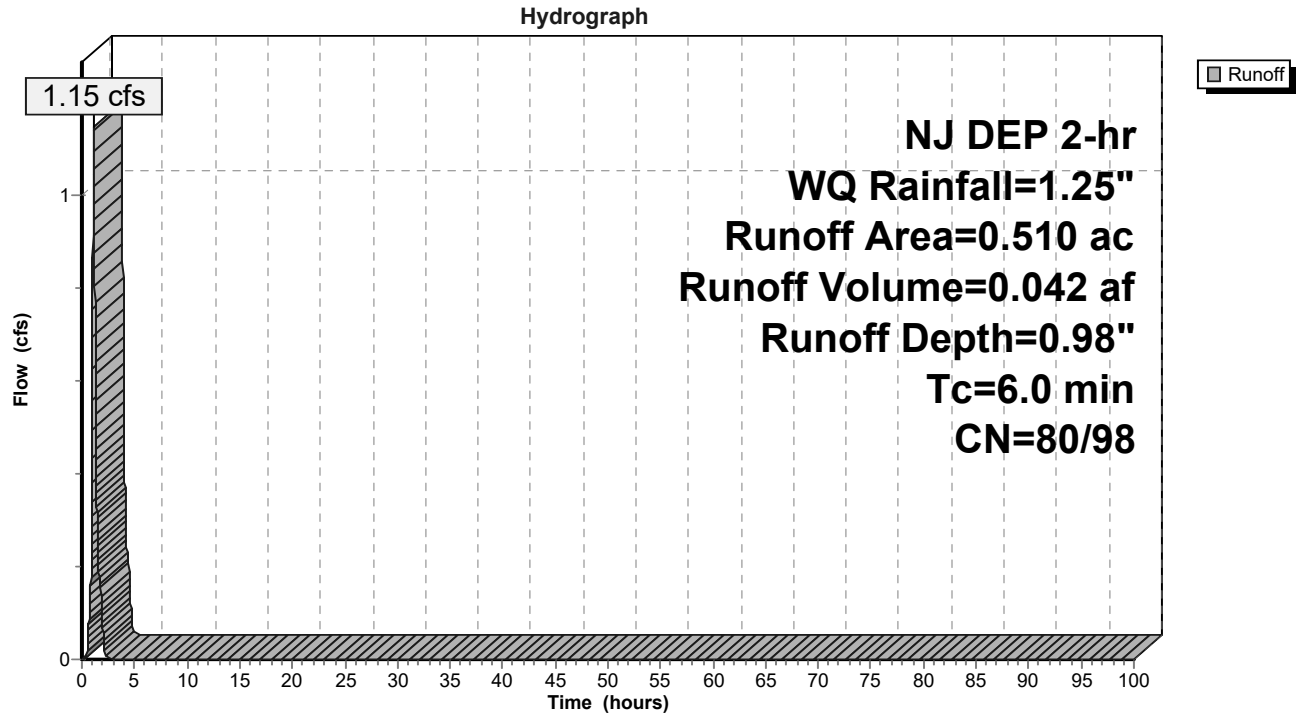
Runoff = 1.15 cfs @ 1.12 hrs, Volume= 0.042 af, Depth= 0.98"

Runoff by SCS TR-20 method, UH=Delmarva, Split Pervious/Imperv. UI as Pervious, Time Span= 0.00-100.00 hrs, dt=
NJ DEP 2-hr WQ Rainfall=1.25"

Area (ac)	CN	Description
0.480	98	Roofs, HSG D
0.030	80	>75% Grass cover, Good, HSG D
0.510	97	Weighted Average
0.030	80	5.88% Pervious Area
0.480	98	94.12% Impervious Area

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

Subcatchment PD-3P: PD-3 Imprv.



Summary for Subcatchment PO-1: PO-1

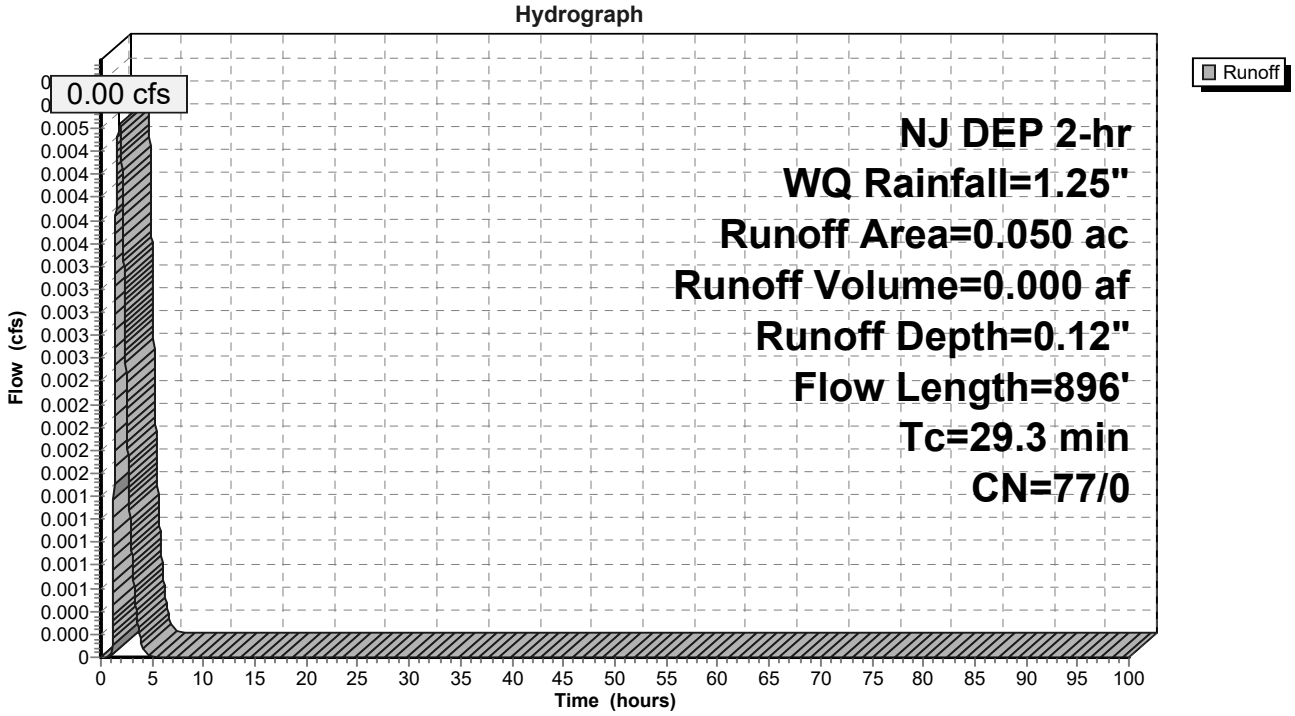
Runoff = 0.00 cfs @ 1.82 hrs, Volume= 0.000 af, Depth= 0.12"

Runoff by SCS TR-20 method, UH=Delmarva, Split Pervious/Imperv. UI as Pervious, Time Span= 0.00-100.00 hrs, dt=
NJ DEP 2-hr WQ Rainfall=1.25"

Area (ac)	CN	Description
0.050	77	Woods, Good, HSG D
0.050	77	100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
11.9	682	0.0365	0.96		**Shallow Concentrated Flow, EU-1** Woodland Kv= 5.0 fps
0.7	110	0.3130	2.80		**Shallow Concentrated Flow, ED-1B** Woodland Kv= 5.0 fps
7.6	27	0.0185	0.06		**Sheet Flow, ED-1A** Woods: Light underbrush n= 0.400 P2= 3.38"
9.1	77	0.0960	0.14		**Sheet Flow, EO-1** Woods: Light underbrush n= 0.400 P2= 3.38"
29.3	896	Total			

Subcatchment PO-1: PO-1



Summary for Subcatchment PO-2 Imprv.: PO-2 Imprv.

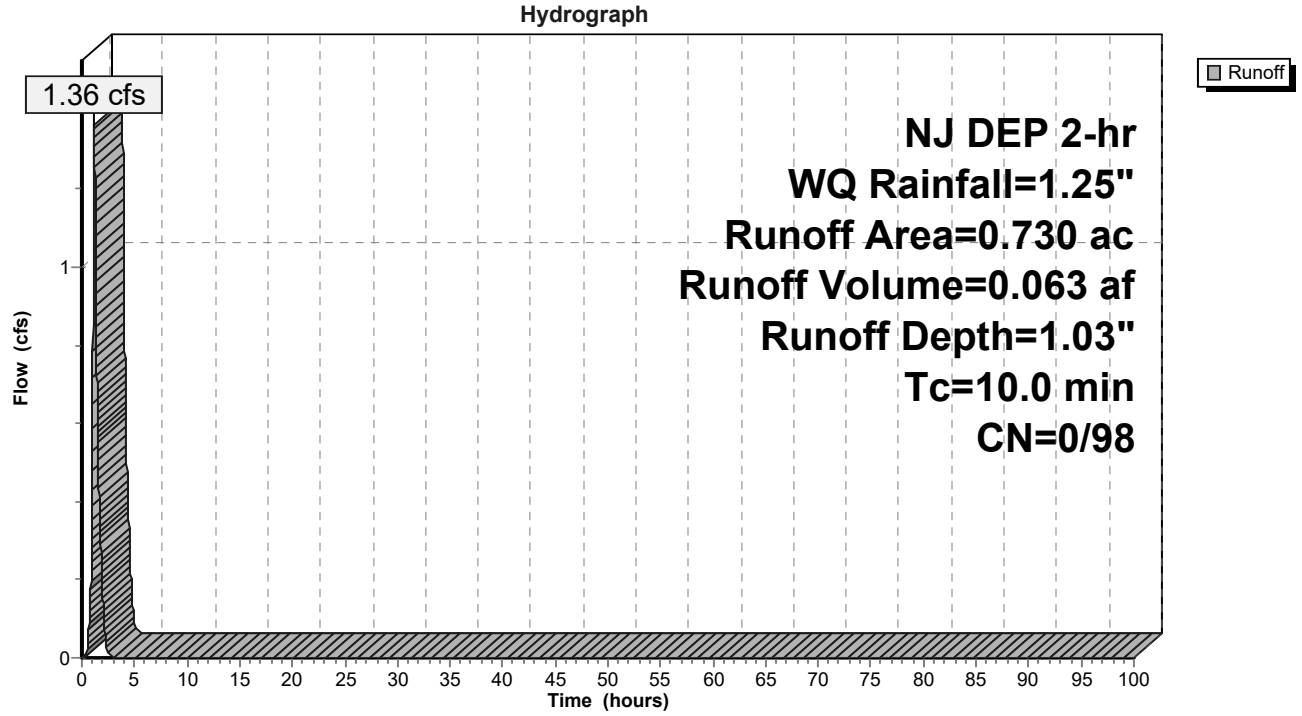
Runoff = 1.36 cfs @ 1.17 hrs, Volume= 0.063 af, Depth= 1.03"

Runoff by SCS TR-20 method, UH=Delmarva, Split Pervious/Imperv. UI as Pervious, Time Span= 0.00-100.00 hrs, dt=
NJ DEP 2-hr WQ Rainfall=1.25"

Area (ac)	CN	Description
0.730	98	Paved parking, HSG D
0.730	98	100.00% Impervious Area

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

Subcatchment PO-2 Imprv.: PO-2 Imprv.



Summary for Subcatchment PO-2 Perv.: PO-2 Perv.

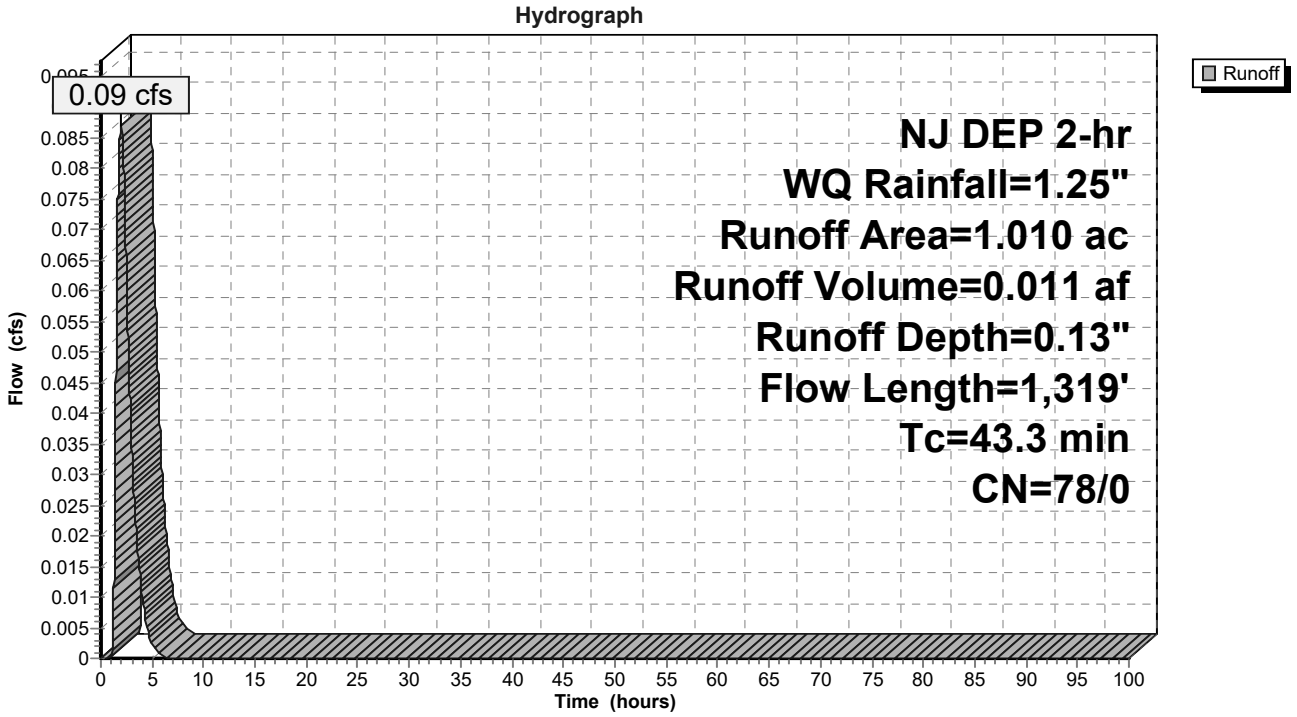
Runoff = 0.09 cfs @ 2.01 hrs, Volume= 0.011 af, Depth= 0.13"

Runoff by SCS TR-20 method, UH=Delmarva, Split Pervious/Imperv. UI as Pervious, Time Span= 0.00-100.00 hrs, dt=
NJ DEP 2-hr WQ Rainfall=1.25"

Area (ac)	CN	Description
0.250	80	>75% Grass cover, Good, HSG D
0.760	77	Woods, Good, HSG D
1.010	78	Weighted Average
1.010	78	100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
18.5	628	0.0128	0.57		**Shallow Concentrated Flow, EU-2** Woodland Kv= 5.0 fps
8.8	347	0.0173	0.66		**Shallow Concentrated Flow, ED-2** Woodland Kv= 5.0 fps
9.8	100	0.0189	0.17		**Sheet Flow, EO-2** Grass: Short n= 0.150 P2= 3.38"
0.1	61	0.1890	8.83		**Shallow Concentrated Flow, EO-2 PAVED** Paved Kv= 20.3 fps
1.6	140	0.0010	1.48	1.43	**Pipe Channel, EO-2 PIPE FLOW** 15.0" Round w/ 4.0" inside fill Area= 1.0 sf Perim= 3.7' r= 0.26' n= 0.013 Concrete pipe, bends & connections
4.5	43	0.0010	0.16		**Shallow Concentrated Flow, EO-2 FES** Woodland Kv= 5.0 fps
43.3	1,319	Total			

Subcatchment PO-2 Perv.: PO-2 Perv.



Summary for Subcatchment PU-1: PU-1

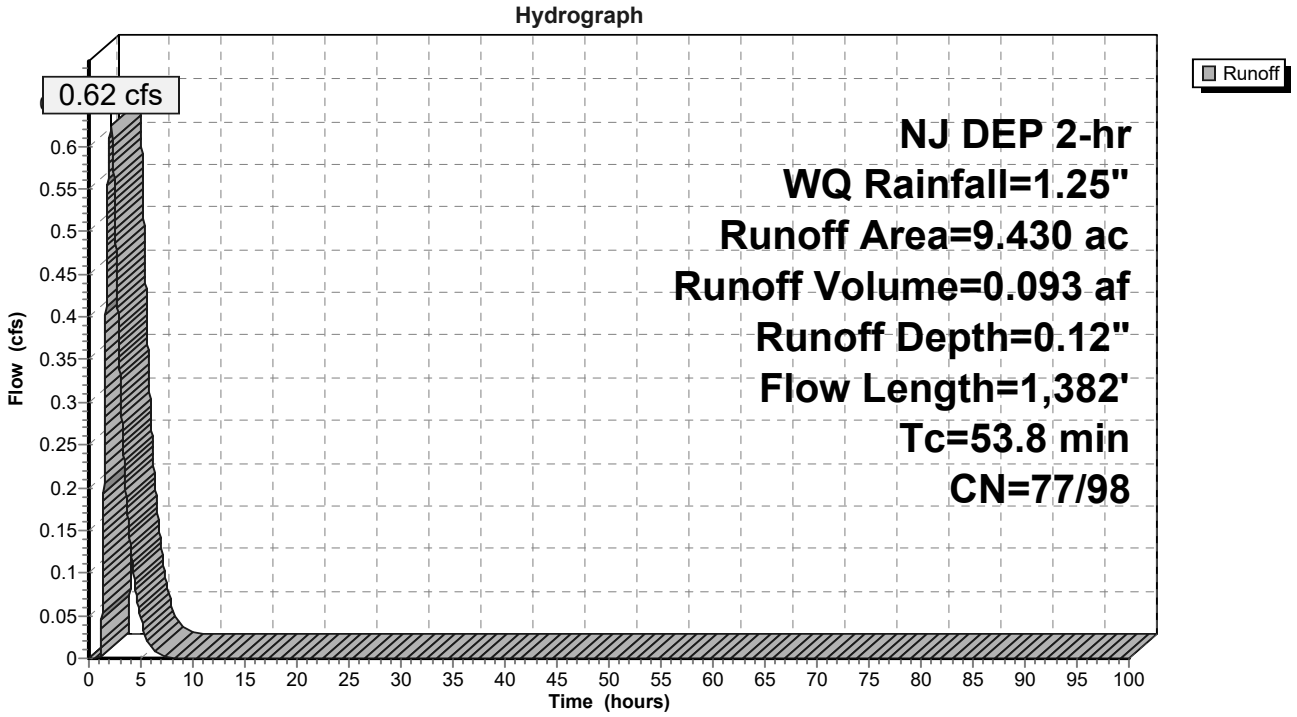
Runoff = 0.62 cfs @ 2.15 hrs, Volume= 0.093 af, Depth= 0.12"

Runoff by SCS TR-20 method, UH=Delmarva, Split Pervious/Imperv. UI as Pervious, Time Span= 0.00-100.00 hrs, dt=
NJ DEP 2-hr WQ Rainfall=1.25"

Area (ac)	CN	Description
9.355	77	Woods, Good, HSG D
0.010	98	Paved parking, HSG D
0.065	80	>75% Grass cover, Good, HSG D
9.430	77	Weighted Average
9.420	77	99.89% Pervious Area
0.010	98	0.11% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
16.6	100	0.0050	0.10		**Sheet Flow, PU-1** Grass: Short n= 0.150 P2= 3.38"
2.1	110	0.0153	0.87		**Shallow Concentrated Flow, PU-1O** Short Grass Pasture Kv= 7.0 fps
0.1	23	0.0138	6.98	12.34	**Pipe Channel, PU-1O** 18.0" Round Area= 1.8 sf Perim= 4.7' r= 0.38' n= 0.013
35.0	1,149	0.0120	0.55		**Shallow Concentrated Flow, EU-2** Woodland Kv= 5.0 fps
53.8	1,382	Total			

Subcatchment PU-1: PU-1



Summary for Pond A: BASIN-A

[85] Warning: Oscillations may require smaller dt or Finer Routing (severity=99)

Inflow Area = 3.580 ac, 54.47% Impervious, Inflow Depth = 0.63" for WQ event
Inflow = 2.52 cfs @ 1.25 hrs, Volume= 0.188 af
Outflow = 1.57 cfs @ 1.64 hrs, Volume= 0.188 af, Atten= 38%, Lag= 23.3 min
Primary = 1.57 cfs @ 1.64 hrs, Volume= 0.188 af

Routing by Stor-Ind method, Time Span= 0.00-100.00 hrs, dt= 0.01 hrs
Peak Elev= 123.71' @ 1.64 hrs Surf.Area= 0.129 ac Storage= 0.039 af

Plug-Flow detention time= (not calculated: outflow precedes inflow)
Center-of-Mass det. time= 11.7 min (108.8 - 97.1)

Volume	Invert	Avail.Storage	Storage Description
#1A	122.00'	0.000 af	**38.59'W x 114.17'L x 6.58'H Field A** 0.666 af Overall - 0.301 af Embedded = 0.365 af x 0.0% Voids
#2A	122.50'	0.253 af	**ADS N-12 60"** x 25 Inside #1 Inside= 59.5"W x 59.5"H => 19.30 sf x 20.00'L = 386.0 cf Outside= 67.0"W x 67.0"H => 22.91 sf x 20.00'L = 458.2 cf 25 Chambers in 5 Rows 35.59' Header x 19.30 sf x 2 = 1,373.6 cf Inside
#3B	122.00'	0.000 af	**16.08'W x 74.17'L x 6.58'H Field B** 0.180 af Overall - 0.077 af Embedded = 0.103 af x 0.0% Voids
#4B	122.50'	0.065 af	**ADS N-12 60"** x 6 Inside #3 Inside= 59.5"W x 59.5"H => 19.30 sf x 20.00'L = 386.0 cf Outside= 67.0"W x 67.0"H => 22.91 sf x 20.00'L = 458.2 cf 6 Chambers in 2 Rows 13.08' Header x 19.30 sf x 2 = 505.1 cf Inside
		0.318 af	Total Available Storage

Storage Group A created with Chamber Wizard
Storage Group B created with Chamber Wizard

Device	Routing	Invert	Outlet Devices
#1	Primary	122.50'	**18.0" Round Culvert** L= 26.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 122.50' / 122.00' S= 0.0192 '/' Cc= 0.900 n= 0.012, Flow Area= 1.77 sf
#2	Device 1	122.50'	**5.5" Vert. Orifice/Grate X 2.00** C= 0.600 Limited to weir flow at low heads
#3	Device 1	124.50'	**10.0" W x 5.5" H Vert. Orifice/Grate** C= 0.600 Limited to weir flow at low heads
#4	Device 1	125.45'	**8.0" W x 4.0" H Vert. Orifice/Grate** C= 0.600 Limited to weir flow at low heads
#5	Device 1	128.25'	**4.0' long Sharp-Crested Rectangular Weir** 2 End Contraction(s)

Primary OutFlow Max=1.57 cfs @ 1.64 hrs HW=123.71' (Free Discharge)
└─**1=Culvert** (Passes 1.57 cfs of 5.69 cfs potential flow)
  ├─**2=Orifice/Grate** (Orifice Controls 1.57 cfs @ 4.76 fps)
  ├─**3=Orifice/Grate** (Controls 0.00 cfs)
  ├─**4=Orifice/Grate** (Controls 0.00 cfs)
  └─**5=Sharp-Crested Rectangular Weir** (Controls 0.00 cfs)

Pond A: BASIN-A - Chamber Wizard Field A

Chamber Model = ADS N-12 60" (ADS N-12® Pipe)
Inside= 59.5"W x 59.5"H => 19.30 sf x 20.00'L = 386.0 cf
Outside= 67.0"W x 67.0"H => 22.91 sf x 20.00'L = 458.2 cf

67.0" Wide + 23.0" Spacing = 90.0" C-C Row Spacing

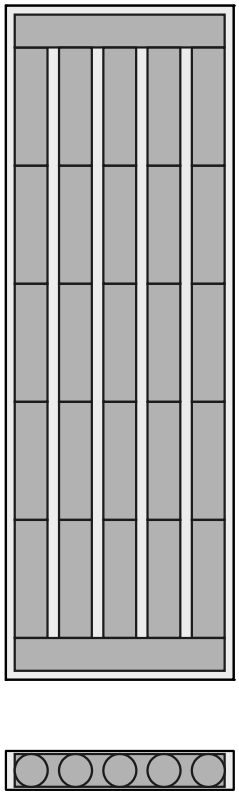
5 Chambers/Row x 20.00' Long +5.58' Header x 2 = 111.17' Row Length +18.0" End Stone x 2 = 114.17' Base Length
5 Rows x 67.0" Wide + 23.0" Spacing x 4 + 18.0" Side Stone x 2 = 38.59' Base Width
6.0" Stone Base + 67.0" Chamber Height + 6.0" Stone Cover = 6.58' Field Height

25 Chambers x 386.0 cf + 35.59' Header x 19.30 sf x 2 = 11,023.6 cf Chamber Storage
25 Chambers x 458.2 cf + 35.59' Header x 22.91 sf x 2 = 13,086.2 cf Displacement

29,003.5 cf Field - 13,086.2 cf Chambers = 15,917.3 cf Stone x 0.0% Voids = 0.0 cf Stone Storage

Chamber Storage = 11,023.6 cf = 0.253 af
Overall Storage Efficiency = 38.0%
Overall System Size = 114.17' x 38.59' x 6.58'

25 Chambers
1,074.2 cy Field
589.5 cy Stone



Pond A: BASIN-A - Chamber Wizard Field B

Chamber Model = ADS N-12 60" (ADS N-12® Pipe)
Inside= 59.5"W x 59.5"H => 19.30 sf x 20.00'L = 386.0 cf
Outside= 67.0"W x 67.0"H => 22.91 sf x 20.00'L = 458.2 cf

67.0" Wide + 23.0" Spacing = 90.0" C-C Row Spacing

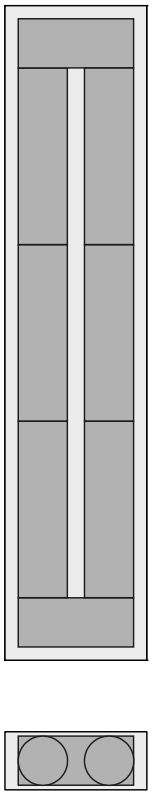
3 Chambers/Row x 20.00' Long +5.58' Header x 2 = 71.17' Row Length +18.0" End Stone x 2 = 74.17' Base Length
2 Rows x 67.0" Wide + 23.0" Spacing x 1 + 18.0" Side Stone x 2 = 16.08' Base Width
6.0" Stone Base + 67.0" Chamber Height + 6.0" Stone Cover = 6.58' Field Height

6 Chambers x 386.0 cf + 13.08' Header x 19.30 sf x 2 = 2,821.1 cf Chamber Storage
6 Chambers x 458.2 cf + 13.08' Header x 22.91 sf x 2 = 3,348.9 cf Displacement

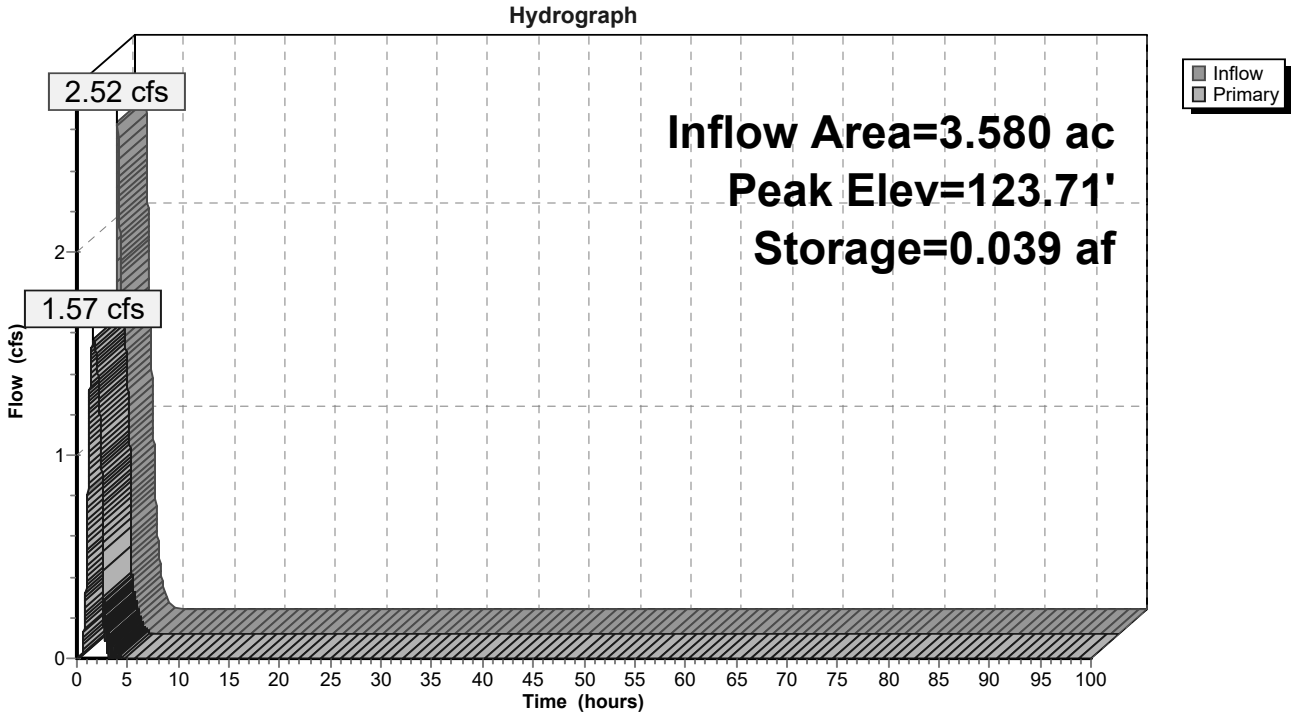
7,854.1 cf Field - 3,348.9 cf Chambers = 4,505.2 cf Stone x 0.0% Voids = 0.0 cf Stone Storage

Chamber Storage = 2,821.1 cf = 0.065 af
Overall Storage Efficiency = 35.9%
Overall System Size = 74.17' x 16.08' x 6.58'

6 Chambers
290.9 cy Field
166.9 cy Stone



Pond A: BASIN-A



Summary for Pond B: BASIN-B

Inflow Area = 0.510 ac, 94.12% Impervious, Inflow Depth = 0.98" for WQ event
Inflow = 1.15 cfs @ 1.12 hrs, Volume= 0.042 af
Outflow = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af, Atten= 100%, Lag= 0.0 min
Primary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af

Routing by Stor-Ind method, Time Span= 0.00-100.00 hrs, dt= 0.01 hrs
Peak Elev= 128.38' @ 2.66 hrs Surf.Area= 0.126 ac Storage= 0.042 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
#1A	127.50'	0.131 af	**50.24'W x 109.00'L x 4.00'H Field A** 0.503 af Overall - 0.176 af Embedded = 0.327 af x 40.0% Voids
#2A	128.00'	0.134 af	**ADS N-12 30"** x 55 Inside #1 Inside= 30.0"W x 30.0"H => 4.90 sf x 20.00'L = 98.0 cf Outside= 36.0"W x 36.0"H => 6.41 sf x 20.00'L = 128.3 cf 55 Chambers in 11 Rows 47.24' Header x 4.90 sf x 2 = 463.0 cf Inside
		0.265 af	Total Available Storage

Storage Group A created with Chamber Wizard

Device	Routing	Invert	Outlet Devices
#1	Primary	128.40'	**15.0" Round Culvert** L= 81.0' CPP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 128.40' / 127.96' S= 0.0054 '/' Cc= 0.900 n= 0.012, Flow Area= 1.23 sf
#2	Device 1	128.40'	**Reg-U-Flo SH 3.0-in**
#3	Device 1	129.10'	**4.0" Vert. Orifice/Grate** C= 0.600 Limited to weir flow at low heads
#4	Device 1	130.40'	**4.0' long Sharp-Crested Rectangular Weir** 2 End Contraction(s)

Primary OutFlow Max=0.00 cfs @ 0.00 hrs HW=127.50' (Free Discharge)
└**1=Culvert** (Controls 0.00 cfs)
  ├**2=Reg-U-Flo SH 3.0-in** (Controls 0.00 cfs)
  ├**3=Orifice/Grate** (Controls 0.00 cfs)
  └**4=Sharp-Crested Rectangular Weir** (Controls 0.00 cfs)

Pond B: BASIN-B - Chamber Wizard Field A

Chamber Model = ADS N-12 30" (ADS N-12® Pipe)
Inside= 30.0"W x 30.0"H => 4.90 sf x 20.00'L = 98.0 cf
Outside= 36.0"W x 36.0"H => 6.41 sf x 20.00'L = 128.3 cf

36.0" Wide + 17.1" Spacing = 53.1" C-C Row Spacing

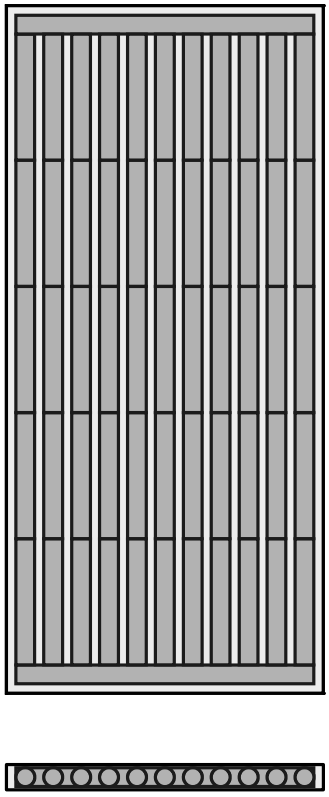
5 Chambers/Row x 20.00' Long +3.00' Header x 2 = 106.00' Row Length +18.0" End Stone x 2 = 109.00' Base Length
11 Rows x 36.0" Wide + 17.1" Spacing x 10 + 18.0" Side Stone x 2 = 50.24' Base Width
6.0" Stone Base + 36.0" Chamber Height + 6.0" Stone Cover = 4.00' Field Height

55 Chambers x 98.0 cf + 47.24' Header x 4.90 sf x 2 = 5,853.0 cf Chamber Storage
55 Chambers x 128.3 cf + 47.24' Header x 6.41 sf x 2 = 7,660.4 cf Displacement

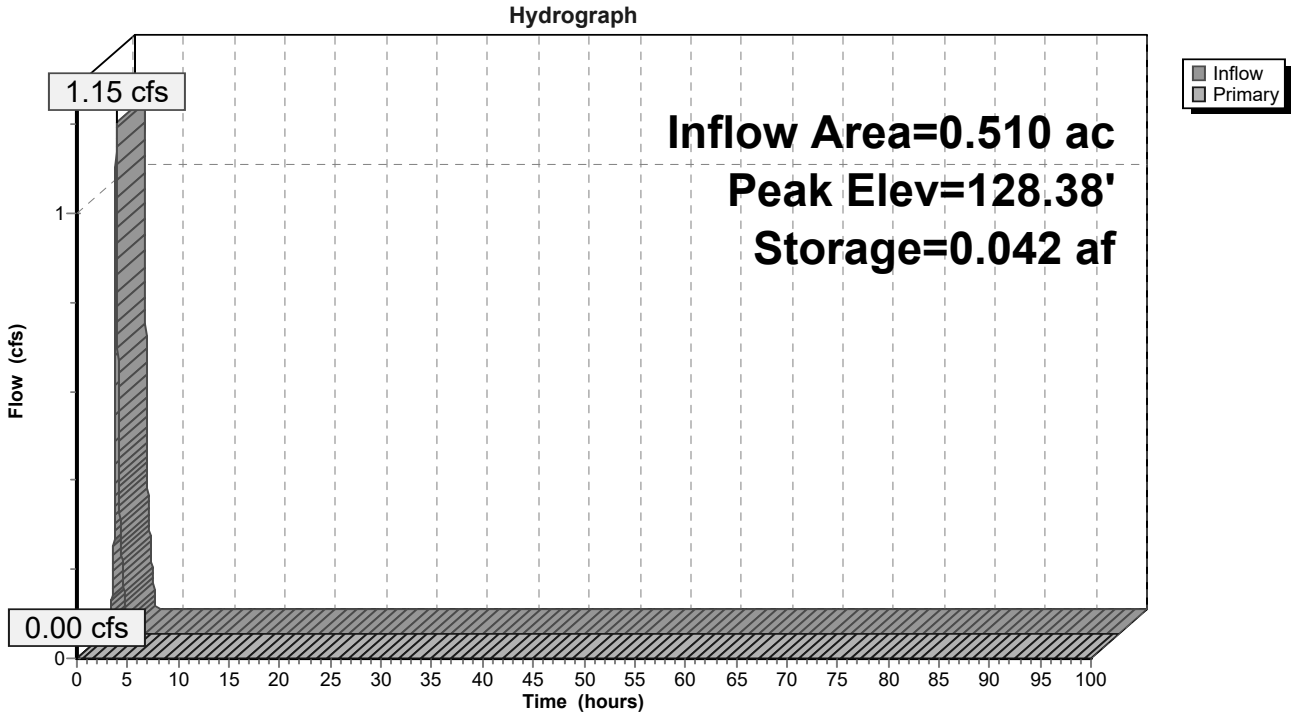
21,903.0 cf Field - 7,660.4 cf Chambers = 14,242.6 cf Stone x 40.0% Voids = 5,697.0 cf Stone Storage

Chamber Storage + Stone Storage = 11,550.0 cf = 0.265 af
Overall Storage Efficiency = 52.7%
Overall System Size = 109.00' x 50.24' x 4.00'

55 Chambers
811.2 cy Field
527.5 cy Stone



Pond B: BASIN-B

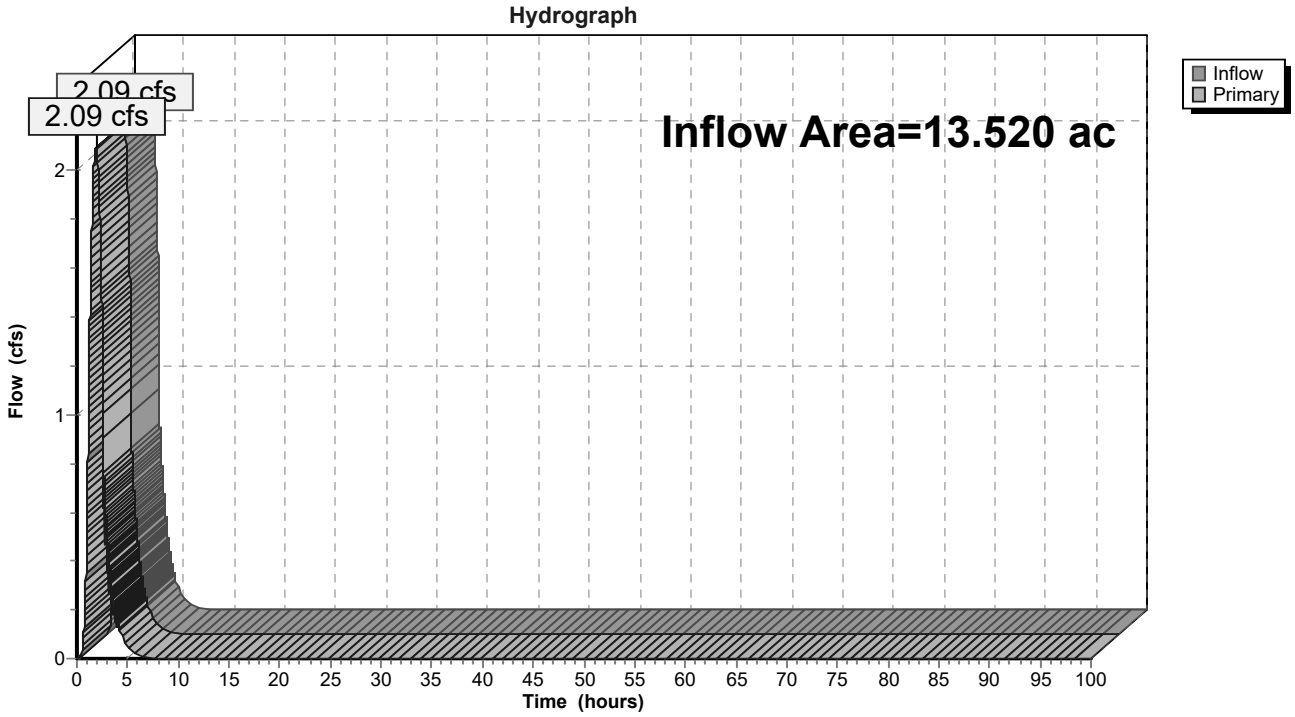


Summary for Link DP*: DP

Inflow Area = 13.520 ac, 18.05% Impervious, Inflow Depth = 0.25" for WQ event
Inflow = 2.09 cfs @ 1.88 hrs, Volume= 0.281 af
Primary = 2.09 cfs @ 1.88 hrs, Volume= 0.281 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-100.00 hrs, dt= 0.01 hrs

Link DP*: DP

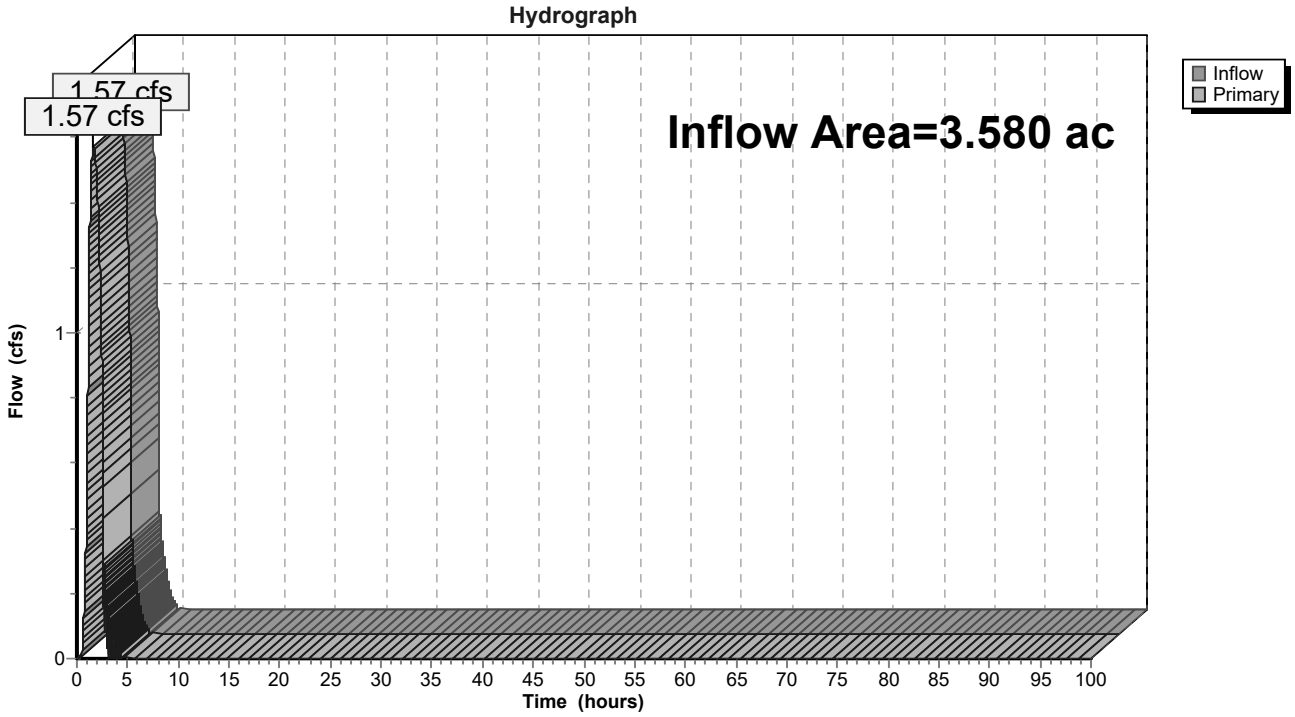


Summary for Link POA-1*: POA-1

Inflow Area = 3.580 ac, 54.47% Impervious, Inflow Depth = 0.63" for WQ event
Inflow = 1.57 cfs @ 1.64 hrs, Volume= 0.188 af
Primary = 1.57 cfs @ 1.64 hrs, Volume= 0.188 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-100.00 hrs, dt= 0.01 hrs

Link POA-1*: POA-1

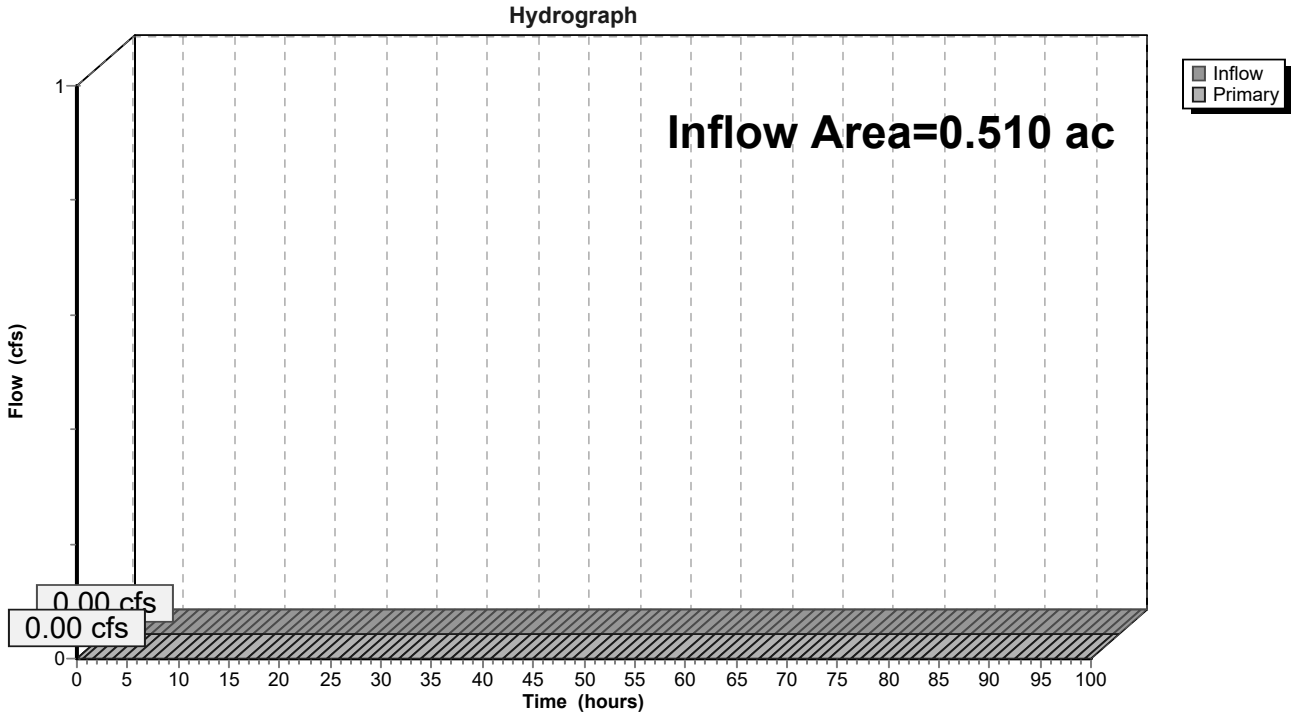


Summary for Link POA-2*: POA-2

Inflow Area = 0.510 ac, 94.12% Impervious, Inflow Depth = 0.00" for 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

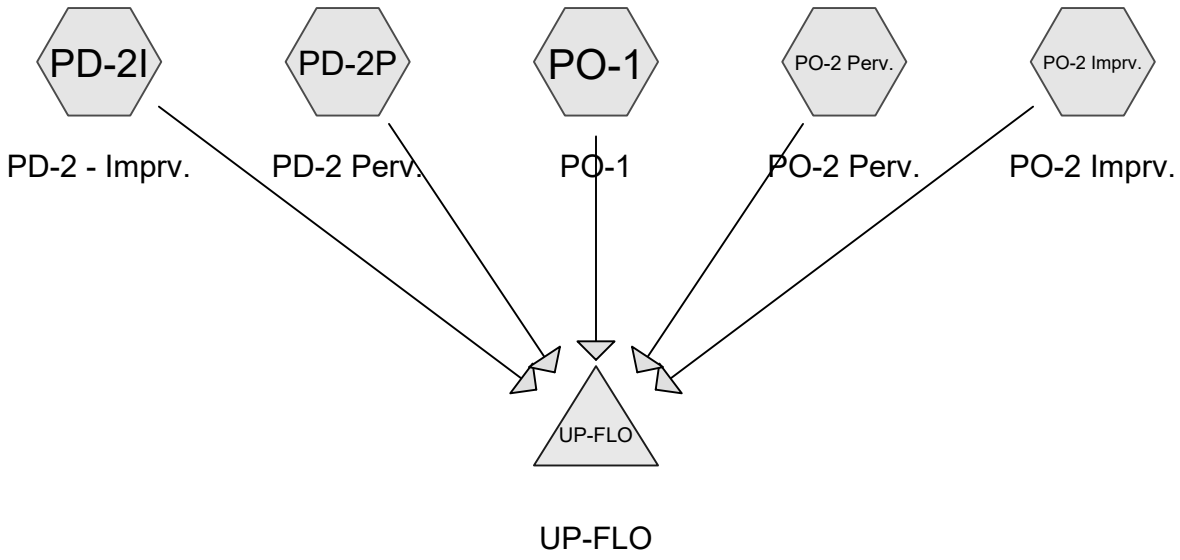
Primary outflow = Inflow, Time Span= 0.00-100.00 hrs, dt= 0.01 hrs

Link POA-2*: POA-2



APPENDIX D

WATER QUALITY ROUTINGS



Subcat Reach Pond Link

Routing Diagram for 200715A_Analysis
Prepared by Maser Consulting, Printed 7/30/2020
HydroCAD® 10.10-3a s/n 10901 © 2020 HydroCAD Software Solutions LLC

Rainfall Events Listing

Event#	Event Name	Storm Type	Curve	Mode	Duration (hours)	B/B	Depth (inches)	AMC
1	A-2 YR	NOAA 24-hr	D	Default	24.00	1	3.38	2
2	B-10 YR	NOAA 24-hr	D	Default	24.00	1	5.23	2
3	C-25 YR	NOAA 24-hr	D	Default	24.00	1	6.53	2
4	D-100 YR	NOAA 24-hr	D	Default	24.00	1	8.94	2
5	WQ	NJ DEP 2-hr		Default	2.00	1	1.25	2

Area Listing (selected nodes)

Area (acres)	CN	Description (subcatchment-numbers)
0.820	80	>75% Grass cover, Good, HSG D (PD-2P, PO-2 Perv.)
1.770	98	Paved parking, HSG D (PD-2I, PO-2 Imprv.)
0.180	98	Roofs, HSG D (PD-2I)
0.810	77	Woods, Good, HSG D (PO-1, PO-2 Perv.)
3.580	**89**	**TOTAL AREA**

Soil Listing (selected nodes)

Area (acres)	Soil Group	Subcatchment Numbers
0.000	HSG A	
0.000	HSG B	
0.000	HSG C	
3.580	HSG D	PD-2I, PD-2P, PO-1, PO-2 Imprv., PO-2 Perv.
0.000	Other	
3.580		**TOTAL AREA**

Ground Covers (selected nodes)

HSG-A (acres)	HSG-B (acres)	HSG-C (acres)	HSG-D (acres)	Other (acres)	Total (acres)	Ground Cover	Subcatchment Numbers
0.000	0.000	0.000	0.820	0.000	0.820	>75% Grass cover, Good	PD-2P, PO-2 Perv.
0.000	0.000	0.000	1.770	0.000	1.770	Paved parking	PD-2I, PO-2 Imprv.
0.000	0.000	0.000	0.180	0.000	0.180	Roofs	PD-2I
0.000	0.000	0.000	0.810	0.000	0.810	Woods, Good	PO-1, PO-2 Perv.
0.000	**0.000**	**0.000**	**3.580**	**0.000**	**3.580**	**TOTAL AREA**	

Pipe Listing (selected nodes)

Line#	Node Number	In-Invert (feet)	Out-Invert (feet)	Length (feet)	Slope (ft/ft)	n	Diam/Width (inches)	Height (inches)	Inside-Fill (inches)
1	PO-2 Perv.	0.00	0.00	140.0	0.0010	0.013	15.0	0.0	4.0
2	UP-FLO	122.50	122.00	26.0	0.0192	0.012	18.0	0.0	0.0

Time span=0.00-100.00 hrs, dt=0.01 hrs, 10001 points
Runoff by SCS TR-20 method, UH=SCS, Split Pervious/Imperv. UI as Pervious
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Subcatchment PD-2I: PD-2 - Imprv. Runoff Area=1.220 ac 100.00% Impervious Runoff Depth=3.15"
Tc=24.5 min CN=0/98 Runoff=2.37 cfs 0.320 af

Subcatchment PD-2P: PD-2 Perv. Runoff Area=0.570 ac 0.00% Impervious Runoff Depth=1.54"
Tc=10.0 min CN=80/0 Runoff=0.89 cfs 0.073 af

Subcatchment PO-1: PO-1 Runoff Area=0.050 ac 0.00% Impervious Runoff Depth=1.34"
Flow Length=896' Tc=29.3 min CN=77/0 Runoff=0.04 cfs 0.006 af

Subcatchment PO-2 Imprv.: PO-2 Imprv. Runoff Area=0.730 ac 100.00% Impervious Runoff Depth=3.15"
Tc=10.0 min CN=0/98 Runoff=2.04 cfs 0.191 af

Subcatchment PO-2 Perv.: PO-2 Perv. Runoff Area=1.010 ac 0.00% Impervious Runoff Depth=1.41"
Flow Length=1,319' Tc=43.3 min CN=78/0 Runoff=0.71 cfs 0.118 af

Pond UP-FLO: UP-FLO Peak Elev=124.73' Storage=0.113 af Inflow=4.94 cfs 0.709 af
Outflow=2.54 cfs 0.709 af

Total Runoff Area = 3.580 ac Runoff Volume = 0.709 af Average Runoff Depth = 2.38"
45.53% Pervious = 1.630 ac 54.47% Impervious = 1.950 ac

Summary for Subcatchment PD-2I: PD-2 - Imprv.

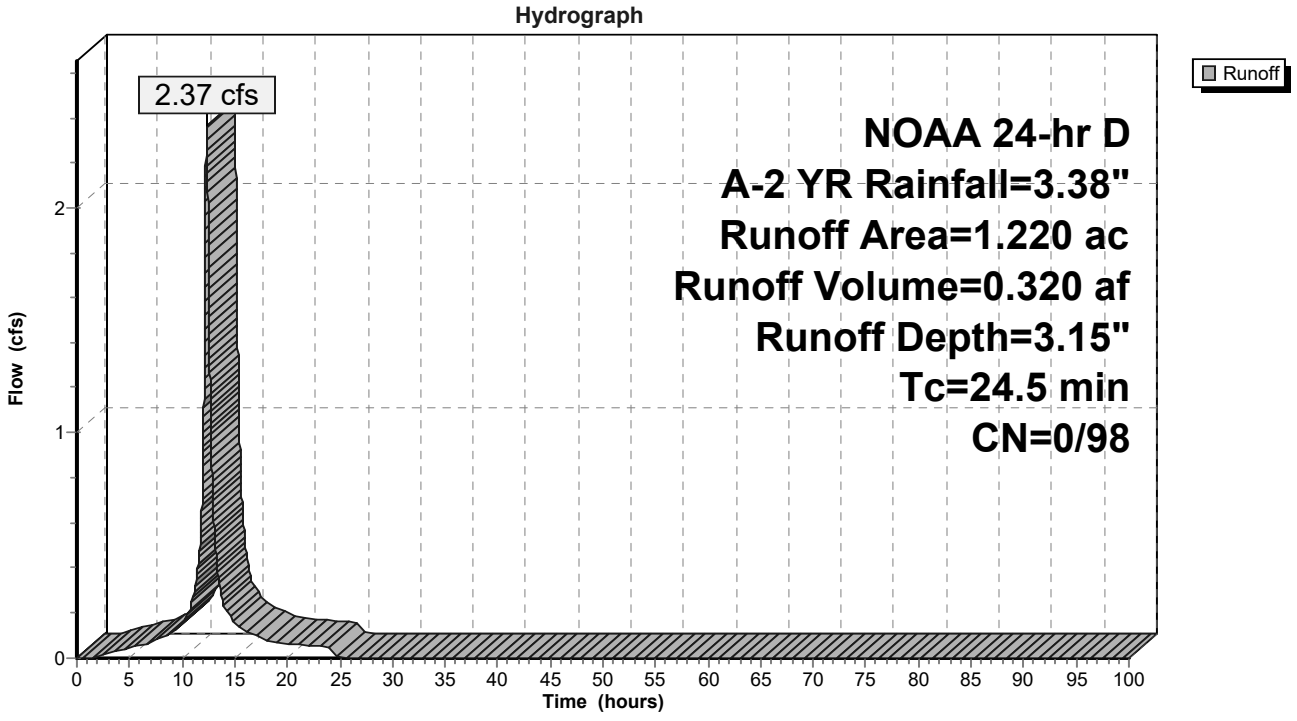
Runoff = 2.37 cfs @ 12.33 hrs, Volume= 0.320 af, Depth= 3.15"

Runoff by SCS TR-20 method, UH=SCS, Split Pervious/Imperv. UI as Pervious, Time Span= 0.00-100.00 hrs, dt= 0.0
NOAA 24-hr D A-2 YR Rainfall=3.38"

Area (ac)	CN	Description
0.180	98	Roofs, HSG D
1.040	98	Paved parking, HSG D
1.220	98	Weighted Average
1.220	98	100.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					**Direct Entry, Tc**
18.5					**Direct Entry, EU-2**
24.5	0	Total			

Subcatchment PD-2I: PD-2 - Imprv.



Summary for Subcatchment PD-2P: PD-2 Perv.

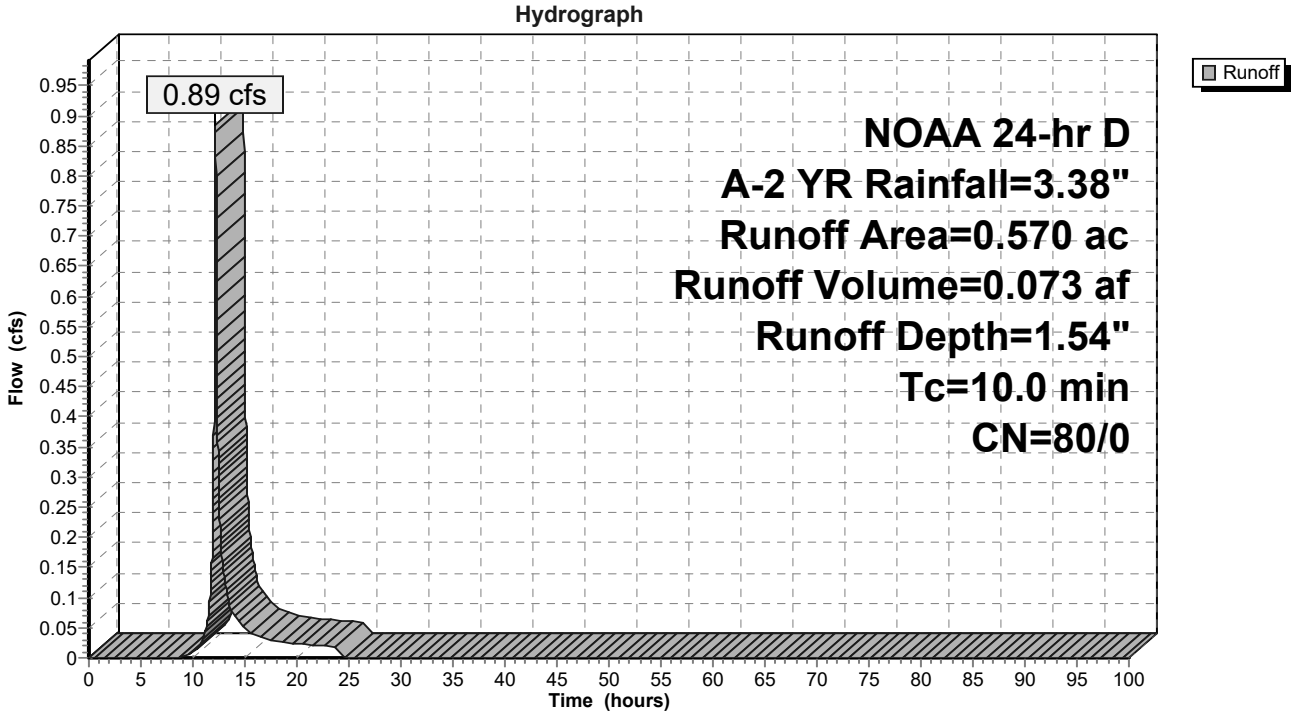
Runoff = 0.89 cfs @ 12.18 hrs, Volume= 0.073 af, Depth= 1.54"

Runoff by SCS TR-20 method, UH=SCS, Split Pervious/Imperv. UI as Pervious, Time Span= 0.00-100.00 hrs, dt= 0.0
NOAA 24-hr D A-2 YR Rainfall=3.38"

Area (ac)	CN	Description
0.570	80	>75% Grass cover, Good, HSG D
0.570	80	100.00% Pervious Area

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

Subcatchment PD-2P: PD-2 Perv.



Summary for Subcatchment PO-1: PO-1

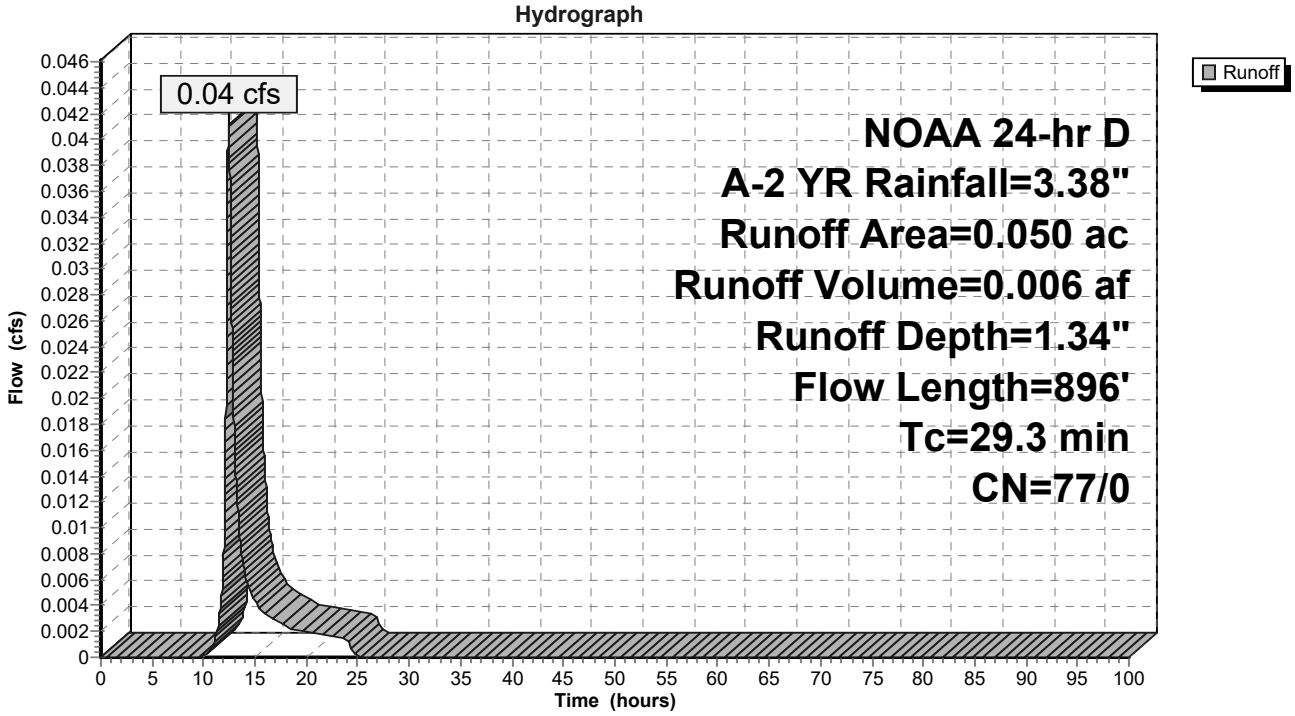
Runoff = 0.04 cfs @ 12.41 hrs, Volume= 0.006 af, Depth= 1.34"

Runoff by SCS TR-20 method, UH=SCS, Split Pervious/Imperv. UI as Pervious, Time Span= 0.00-100.00 hrs, dt= 0.0
NOAA 24-hr D A-2 YR Rainfall=3.38"

Area (ac)	CN	Description
0.050	77	Woods, Good, HSG D
0.050	77	100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
11.9	682	0.0365	0.96		**Shallow Concentrated Flow, EU-1** Woodland Kv= 5.0 fps
0.7	110	0.3130	2.80		**Shallow Concentrated Flow, ED-1B** Woodland Kv= 5.0 fps
7.6	27	0.0185	0.06		**Sheet Flow, ED-1A** Woods: Light underbrush n= 0.400 P2= 3.38"
9.1	77	0.0960	0.14		**Sheet Flow, EO-1** Woods: Light underbrush n= 0.400 P2= 3.38"
29.3	896	Total			

Subcatchment PO-1: PO-1



Summary for Subcatchment PO-2 Imprv.: PO-2 Imprv.

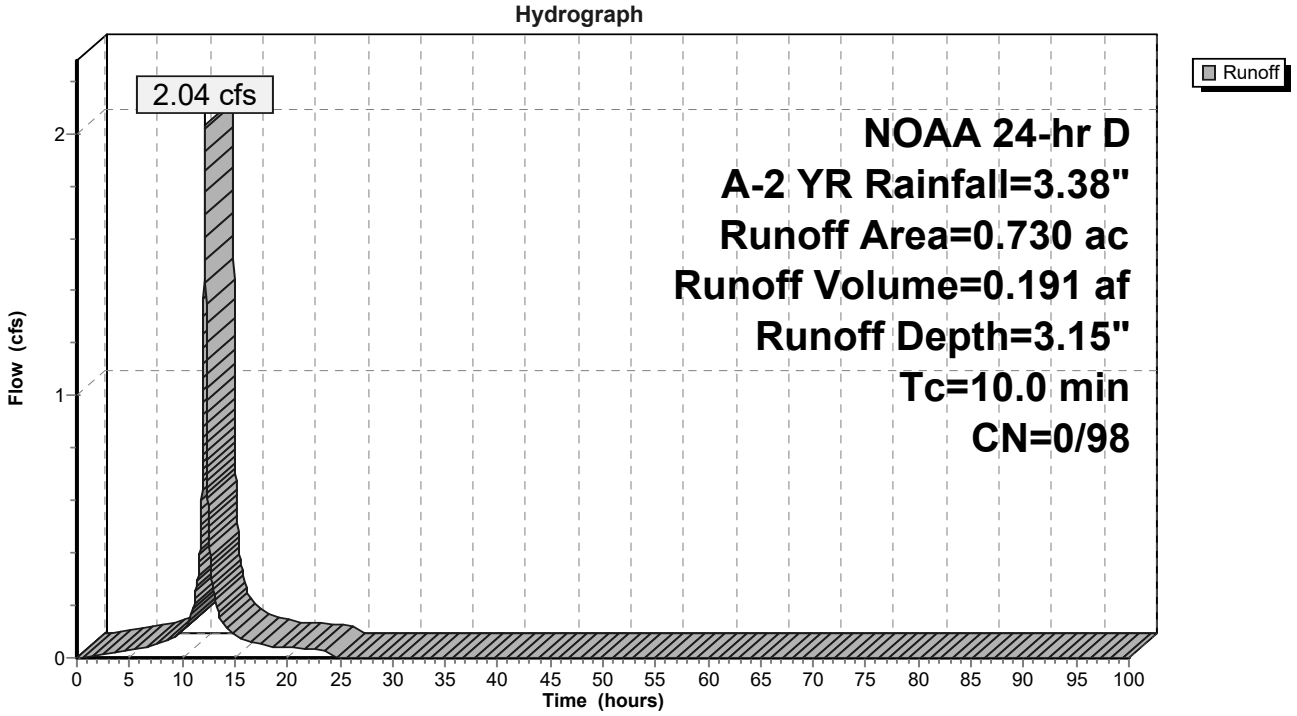
Runoff = 2.04 cfs @ 12.17 hrs, Volume= 0.191 af, Depth= 3.15"

Runoff by SCS TR-20 method, UH=SCS, Split Pervious/Imperv. UI as Pervious, Time Span= 0.00-100.00 hrs, dt= 0.0
NOAA 24-hr D A-2 YR Rainfall=3.38"

Area (ac)	CN	Description
0.730	98	Paved parking, HSG D
0.730	98	100.00% Impervious Area

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

Subcatchment PO-2 Imprv.: PO-2 Imprv.



Summary for Subcatchment PO-2 Perv.: PO-2 Perv.

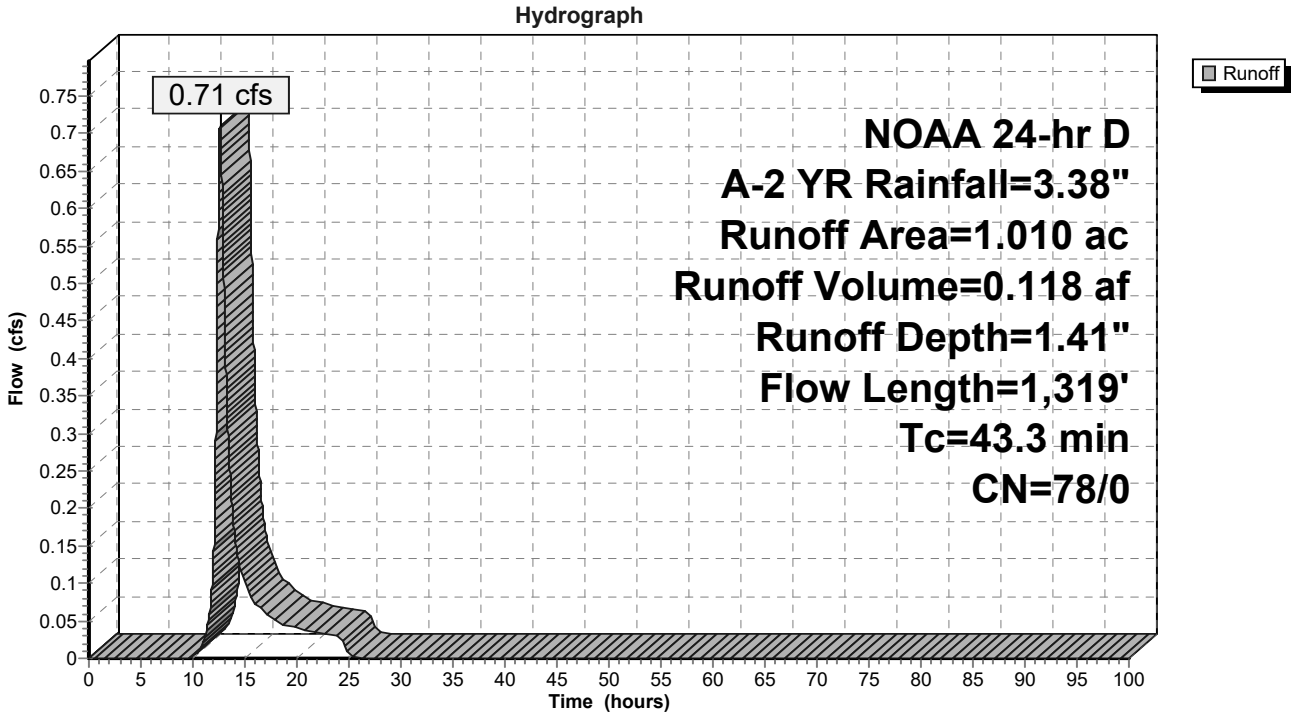
Runoff = 0.71 cfs @ 12.61 hrs, Volume= 0.118 af, Depth= 1.41"

Runoff by SCS TR-20 method, UH=SCS, Split Pervious/Imperv. UI as Pervious, Time Span= 0.00-100.00 hrs, dt= 0.0
NOAA 24-hr D A-2 YR Rainfall=3.38"

Area (ac)	CN	Description
0.250	80	>75% Grass cover, Good, HSG D
0.760	77	Woods, Good, HSG D
1.010	78	Weighted Average
1.010	78	100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
18.5	628	0.0128	0.57		**Shallow Concentrated Flow, EU-2** Woodland Kv= 5.0 fps
8.8	347	0.0173	0.66		**Shallow Concentrated Flow, ED-2** Woodland Kv= 5.0 fps
9.8	100	0.0189	0.17		**Sheet Flow, EO-2** Grass: Short n= 0.150 P2= 3.38"
0.1	61	0.1890	8.83		**Shallow Concentrated Flow, EO-2 PAVED** Paved Kv= 20.3 fps
1.6	140	0.0010	1.48	1.43	**Pipe Channel, EO-2 PIPE FLOW** 15.0" Round w/ 4.0" inside fill Area= 1.0 sf Perim= 3.7' r= 0.26' n= 0.013 Concrete pipe, bends & connections
4.5	43	0.0010	0.16		**Shallow Concentrated Flow, EO-2 FES** Woodland Kv= 5.0 fps
43.3	1,319	Total			

Subcatchment PO-2 Perv.: PO-2 Perv.



Summary for Pond UP-FLO: UP-FLO

Inflow Area = 3.580 ac, 54.47% Impervious, Inflow Depth = 2.38" for A-2 YR event
Inflow = 4.94 cfs @ 12.19 hrs, Volume= 0.709 af
Outflow = 2.54 cfs @ 12.66 hrs, Volume= 0.709 af, Atten= 49%, Lag= 27.7 min
Primary = 2.54 cfs @ 12.66 hrs, Volume= 0.709 af

Routing by Stor-Ind method, Time Span= 0.00-100.00 hrs, dt= 0.01 hrs
Peak Elev= 124.73' @ 12.66 hrs Surf.Area= 0.129 ac Storage= 0.113 af

Plug-Flow detention time= (not calculated: outflow precedes inflow)
Center-of-Mass det. time= 13.7 min (813.2 - 799.5)

Volume	Invert	Avail.Storage	Storage Description
#1A	122.00'	0.000 af	**38.59'W x 114.17'L x 6.58'H Field A** 0.666 af Overall - 0.301 af Embedded = 0.365 af x 0.0% Voids
#2A	122.50'	0.253 af	**ADS N-12 60"** x 25 Inside #1 Inside= 59.5"W x 59.5"H => 19.30 sf x 20.00'L = 386.0 cf Outside= 67.0"W x 67.0"H => 22.91 sf x 20.00'L = 458.2 cf 25 Chambers in 5 Rows 35.59' Header x 19.30 sf x 2 = 1,373.6 cf Inside
#3B	122.00'	0.000 af	**16.08'W x 74.17'L x 6.58'H Field B** 0.180 af Overall - 0.077 af Embedded = 0.103 af x 0.0% Voids
#4B	122.50'	0.065 af	**ADS N-12 60"** x 6 Inside #3 Inside= 59.5"W x 59.5"H => 19.30 sf x 20.00'L = 386.0 cf Outside= 67.0"W x 67.0"H => 22.91 sf x 20.00'L = 458.2 cf 6 Chambers in 2 Rows 13.08' Header x 19.30 sf x 2 = 505.1 cf Inside
		0.318 af	Total Available Storage

Storage Group A created with Chamber Wizard
Storage Group B created with Chamber Wizard

Device	Routing	Invert	Outlet Devices
#1	Primary	122.50'	**18.0" Round Culvert** L= 26.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 122.50' / 122.00' S= 0.0192 '/' Cc= 0.900 n= 0.012, Flow Area= 1.77 sf
#2	Device 1	122.50'	**5.5" Vert. Orifice/Grate X 2.00** C= 0.600 Limited to weir flow at low heads
#3	Device 1	124.50'	**10.0" W x 5.5" H Vert. Orifice/Grate** C= 0.600 Limited to weir flow at low heads
#4	Device 1	125.45'	**8.0" W x 4.0" H Vert. Orifice/Grate** C= 0.600 Limited to weir flow at low heads
#5	Device 1	128.25'	**4.0' long Sharp-Crested Rectangular Weir** 2 End Contraction(s)

Primary OutFlow Max=2.54 cfs @ 12.66 hrs HW=124.73' (Free Discharge)
↑**1=Culvert** (Passes 2.54 cfs of 10.35 cfs potential flow)
↑**2=Orifice/Grate** (Orifice Controls 2.25 cfs @ 6.81 fps)
3=Orifice/Grate (Orifice Controls 0.29 cfs @ 1.54 fps)
4=Orifice/Grate (Controls 0.00 cfs)
5=Sharp-Crested Rectangular Weir (Controls 0.00 cfs)

Pond UP-FLO: UP-FLO - Chamber Wizard Field A

Chamber Model = ADS N-12 60" (ADS N-12® Pipe)
Inside= 59.5"W x 59.5"H => 19.30 sf x 20.00'L = 386.0 cf
Outside= 67.0"W x 67.0"H => 22.91 sf x 20.00'L = 458.2 cf

67.0" Wide + 23.0" Spacing = 90.0" C-C Row Spacing

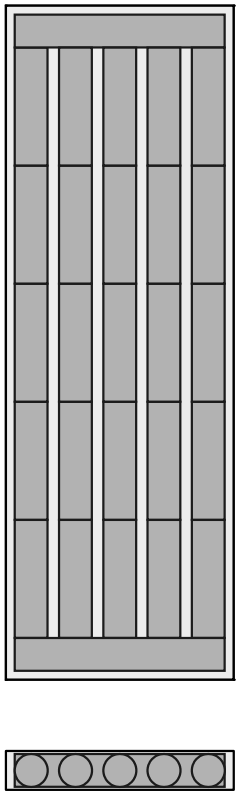
5 Chambers/Row x 20.00' Long +5.58' Header x 2 = 111.17' Row Length +18.0" End Stone x 2 = 114.17' Base Length
5 Rows x 67.0" Wide + 23.0" Spacing x 4 + 18.0" Side Stone x 2 = 38.59' Base Width
6.0" Stone Base + 67.0" Chamber Height + 6.0" Stone Cover = 6.58' Field Height

25 Chambers x 386.0 cf + 35.59' Header x 19.30 sf x 2 = 11,023.6 cf Chamber Storage
25 Chambers x 458.2 cf + 35.59' Header x 22.91 sf x 2 = 13,086.2 cf Displacement

29,003.5 cf Field - 13,086.2 cf Chambers = 15,917.3 cf Stone x 0.0% Voids = 0.0 cf Stone Storage

Chamber Storage = 11,023.6 cf = 0.253 af
Overall Storage Efficiency = 38.0%
Overall System Size = 114.17' x 38.59' x 6.58'

25 Chambers
1,074.2 cy Field
589.5 cy Stone



Pond UP-FLO: UP-FLO - Chamber Wizard Field B

Chamber Model = ADS N-12 60" (ADS N-12® Pipe)
Inside= 59.5"W x 59.5"H => 19.30 sf x 20.00'L = 386.0 cf
Outside= 67.0"W x 67.0"H => 22.91 sf x 20.00'L = 458.2 cf

67.0" Wide + 23.0" Spacing = 90.0" C-C Row Spacing

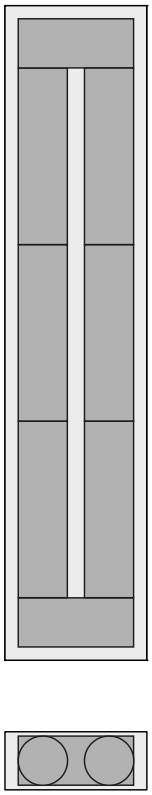
3 Chambers/Row x 20.00' Long +5.58' Header x 2 = 71.17' Row Length +18.0" End Stone x 2 = 74.17' Base Length
2 Rows x 67.0" Wide + 23.0" Spacing x 1 + 18.0" Side Stone x 2 = 16.08' Base Width
6.0" Stone Base + 67.0" Chamber Height + 6.0" Stone Cover = 6.58' Field Height

6 Chambers x 386.0 cf + 13.08' Header x 19.30 sf x 2 = 2,821.1 cf Chamber Storage
6 Chambers x 458.2 cf + 13.08' Header x 22.91 sf x 2 = 3,348.9 cf Displacement

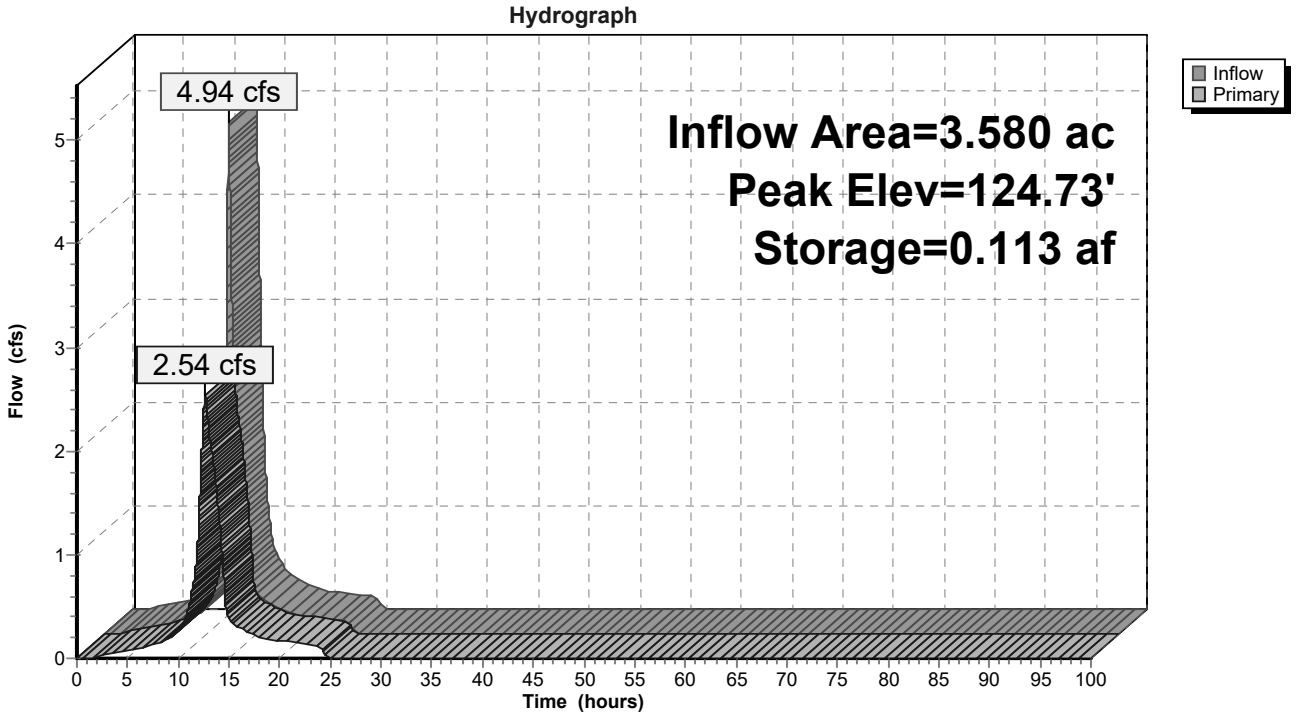
7,854.1 cf Field - 3,348.9 cf Chambers = 4,505.2 cf Stone x 0.0% Voids = 0.0 cf Stone Storage

Chamber Storage = 2,821.1 cf = 0.065 af
Overall Storage Efficiency = 35.9%
Overall System Size = 74.17' x 16.08' x 6.58'

6 Chambers
290.9 cy Field
166.9 cy Stone



Pond UP-FLO: UP-FLO



NJDEP Sizing Summary
July 24, 2020
Senior Housing Tinton Falls

Prepared for: Tyler Lucas, Maser Consulting
Prepared by: Nick Burns, Hydro International
Product: Up Flo Filter with Extended Maintenance Cartridge (UFF EMC) – 18" tall cartridge

80% TSS Product Brief

The Up-Flo® Filter EMC (Extended Maintenance Cartridge) is a stormwater treatment product that consists of a highly configurable array of cartridges containing engineered filtration media that can be employed as an upward flow media bed filter or as an upward flow membrane filter that utilizes filter ribbons as the media type. The Up Flo Filter EMC is recognized by the NJDEP as being an 80% TSS removal manufactured treatment device. Three cartridge heights are available each with a rating for drainage area and water quality treatment flow rate.

NJDEP Certification Letter

https://njstormwater.org/pdf/Hydro_International_Up-Flo_Filter_EMC_Certification&Maint-FINAL_2-10-2020.pdf

Highlights of NJDEP Certification Letter

Table 1: Up-Flo® Filter EMC Cartridge Design Specifications

Individual Cartridge Height (inches)	MTFR (gpm)	MTFR (cfs)	Max Drainage Area Per Cartridge (acre)
18	5.40	0.012	0.05
27	8.90	0.020	0.08
36	12.4	0.028	0.12

Hydro International, 94 Hutchins Drive, Portland ME 04102
Tel: (207) 756-6200 Fax: (207) 756-6212 Web: www.hydro-int.com

Design Sizing Table

The Up Flo Filter on this site is sized for both the water quality treatment flow rate and the impervious drainage area (mass load). Both sizings are shown below for reference. The more conservative sizing will govern and is highlighted below.

Structure	Impervious Drainage Area (ac)	Drainage Area Based Filter Count	WQ Flow (cfs)	WQ Flow Based Filter Count	Vault Size
MTD-A1-2	1.04	21	1.77	148	Twin 8'x18.5's

*0.012 cfs per filter
**0.05 acres per filter

Maintenance

Nobody maintains our systems better than we do. To ensure optimal, ongoing device performance, be sure to recommend Hydro International as a preferred service and maintenance provider to your clients. Call **1 (800) 848-2706** to schedule an inspection and cleanout or learn more at **hydro-int.com/service.**

State of New Jersey

PHILIP D. MURPHY
Governor

SHEILA Y. OLIVER
Lt. Governor

Division of Water Quality
Bureau of Nonpoint Pollution Control
401 East State Street
P.O. Box 420 Mail Code 401-02B
Trenton, New Jersey 08625-0420
Phone: 609-633-7021 / Fax: 609-777-0432
http://www.state.nj.us/dep/dwq/bnpc_home.htm

CATHERINE R. McCABE
Commissioner

February 10, 2020

Jeremy Fink, P.E.
Principal Product Development Engineer
Hydro International
94 Hutchins Drive
Portland, ME 04102

Re: MTD Laboratory Certification
Up-Flo® Filter EMC (Extended Maintenance Cartridge)
Off-line Installation

TSS Removal Rate 80%

Dear Mr. Fink:

The Stormwater Management rules under N.J.A.C. 7:8-5.5(b) and 5.7(c) allow the use of manufactured treatment devices (MTDs) for compliance with the design and performance standards at N.J.A.C. 7:8-5 if the pollutant removal rates have been verified by the New Jersey Corporation for Advanced Technology (NJCAT) and have been certified by the New Jersey Department of Environmental Protection (NJDEP). Hydro International has requested a Laboratory Certification for the Up-Flo® Filter EMC.

This project falls under the "Procedure for Obtaining Verification of a Stormwater Manufactured Treatment Device from New Jersey Corporation for Advanced Technology" dated January 25, 2013. The applicable protocol is the "New Jersey Department of Environmental Protection Laboratory Protocol to Assess Total Suspended Solids Removal by a Filtration Manufactured Treatment Device" dated January 25, 2013.

NJCAT verification documents submitted to the NJDEP indicate that the requirements of the afore-mentioned protocol have been met or exceeded. The NJCAT letter also included a recommended certification TSS removal rate and the required maintenance plan. The NJCAT Verification Report with the Verification Appendix (dated January 2020) for this device is published online at http://www.njcat.org/uploads/newDocs/NJCATUPFLOFILTERwithEXTMAINTCARTFINAL.pdf.

The State of New Jersey is an equal-opportunity employer. Printed on recycled and recyclable paper.

The NJDEP certifies the use of the Up-Flo® Filter EMC by Hydro International at a TSS removal rate of 80%, when designed, operated and maintained in accordance with the information provided in the Verification Appendix and subject to the following conditions:

1. The maximum treatment flow rate (MTFR) for the manufactured treatment device (MTD) is calculated using the New Jersey Water Quality Design Storm (1.25 inches in 2 hrs) in N.J.A.C. 7:8-5.5. The MTFR is calculated based on a verified loading rate of 0.96 gpm/sf of effective filtration treatment area.

2. The Up-Flo® Filter EMC shall be installed using the same configuration as the unit verified by NJCAT and sized in accordance with the criteria specified in item 6 below.

3. This device cannot be used in series with another MTD or a media filter (such as a sand filter), to achieve an enhanced removal rate for total suspended solids (TSS) removal under N.J.A.C. 7:8-5.5.

4. Additional design criteria for MTDs can be found in Chapter 9.6 of the New Jersey Stormwater Best Management Practices (NJ Stormwater BMP) Manual which can be found on-line at www.njstormwater.org.

5. The maintenance plan for a site using this device shall incorporate, at a minimum, the maintenance requirements for the Up-Flo® Filter EMC, which is attached to this document. However, it is recommended to review the maintenance website at https://www.hydro-int.com/sites/default/files/up-flo_filter_emc_operation_maintenance_manual.pdf for any changes to the maintenance requirements.

6. Sizing Requirements:

   The example below demonstrates the sizing procedure for an Up-Flo® Filter EMC. After determining the number of filter modules necessary, the corresponding model selection must be appropriate to hold at least that minimum number of filters.

   Example: A 0.25-acre impervious site is to be treated to 80% TSS removal using an Up-Flo® Filter EMC. The impervious site runoff (Q) based on the New Jersey Water Quality Design Storm was determined to be 0.79 cfs or 354.58 gpm.

   The selection of configuration for use in the Up-Flo® Filter EMC is based upon both the MTFR and the maximum inflow drainage area. It is necessary to select the configuration using both methods and to rely on the method that results in the larger configuration determined by the two methods.

   Inflow Drainage Area Evaluation:

   The drainage area to the Up-Flo® Filter EMC in this example is 0.25 acres. Based upon the information in Tables 1 and 2 below, the following minimum

configuration is required for an Up-Flo® Filter EMC to treat the impervious area without exceeding the maximum drainage area:

Using Table 2, all vault sizes for the 18", 27", 36" and 48" cartridges would be able to treat runoff without exceeding the maximum allowable drainage area. A minimum of 5, 4, 3, or 2 cartridges for the 18", 27", 36", or 48" cartridge sizes, respectively, would be required to avoid exceeding the maximum allowable drainage area.

Maximum Treatment Flow Rate (MTFR) Evaluation:

The site runoff (Q) was determined based on the following:

time of concentration = 10 minutes
i = 3.2 in/hr (page 5-8, Fig. 5-3 of the NJ Stormwater BMP Manual)
c = 0.99 (runoff coefficient for impervious)
Q = ciA = 0.99 x 3.2x 0.25=0.79 cfs = 0.79 x 448.83 gpm/cfs = 354.58 gpm

Based on a flow rate of 354.58 gpm, the following minimum configurations are required for an Up-Flo® Filter EMC to treat the impervious area without exceeding the MTFR:

For 18" cartridge: 8 x 18.5 ft. vault size with 66 cartridges
For 27" cartridge: 8 x 10 ft. or 6 x 14 ft. vault size with 40 cartridges
For 36" cartridge: 8 x 8 ft. or 6 x 10 ft. vault size with 29 cartridges
For 48" cartridge: 6 x 8 ft. vault size with 21 cartridges

The MTFR evaluation results will be used since that method results in the higher minimum configuration determined by the two methods.

The sizing table corresponding to the available system models are noted in the Design Specifications and Vault Arrangements noted below.

Table 1: Up-Flo® Filter EMC Cartridge Design Specifications

Individual Cartridge Height (inches)	MTFR (gpm)	MTFR (cfs)	Max Drainage Area Per Cartridge (acre)
18	5.40	0.012	0.05
27	8.90	0.020	0.08
36	12.4	0.028	0.12
48	17.0	0.038	0.16

Table 2: Up-Flo® Filter EMC Typical Vault Arrangements*

			18-inch Cartridge			27-inch Cartridge			36-inch Cartridge			48-inch Cartridge		
Vault Size (ft.)	Width (ft.)	Vault Length (ft.)	Max. No. Carts.	MTFR (cfs)	Max Drain Area (ac)	Max. No. Carts.	MTFR (cfs)	Max Drain Area (ac)	No. Carts.	MTFR (cfs)	Max Drain Area (ac)	Max. No. Carts.	MTFR (cfs)	Max Drain Area (ac)
4x4	4	4	6	0.071	0.31	6	0.118	0.51	6	0.165	0.71	6	0.227	0.97
4x6	4	6	11	0.134	0.57	11	0.218	0.93	11	0.303	1.29	11	0.417	1.78
4x8	4	8	15	0.180	0.77	15	0.296	1.27	15	0.412	1.76	15	0.568	2.43
6x6	6	6	17	0.205	0.87	17	0.336	1.44	17	0.468	2.00	15	0.568	2.43
6x8	6	8	24	0.290	1.23	24	0.475	2.03	23	0.633	2.70	23	0.871	3.72
6x10	6	10	31	0.374	1.59	30	0.595	2.54	30	0.827	3.53	28	1.061	4.53
6x12	6	12	38	0.459	1.95	37	0.733	3.13	35	0.965	4.12	34	1.288	5.50
6x14	6	14	45	0.541	2.31	44	0.871	3.72	41	1.130	4.82	39	1.477	6.31
8x8	8	8	32	0.385	1.65	31	0.613	2.62	30	0.827	3.53	29	1.098	4.69
8x10	8	10	41	0.495	2.11	40	0.791	3.38	38	1.047	4.47	36	1.364	5.82
8x13	8	13	55	0.664	2.83	49	0.970	4.14	50	1.377	5.88	46	1.742	7.44
8x14	8	14	59	0.711	3.03	57	1.130	4.82	53	1.459	6.23	49	1.856	7.92
8x15	8	15	63	0.760	3.24	61	1.208	5.15	57	1.571	6.70	53	2.007	8.57
8x18.5	8	18.5	80	0.965	4.12	75	1.484	6.34	70	1.927	8.23	64	2.424	10.35
8x24	8	24	102	1.230	5.25	96	1.900	8.11	87	2.397	10.23	79	2.992	12.77

*-Vault sizes are noted with the maximum number of cartridges.

Be advised a detailed maintenance plan is mandatory for any project with a Stormwater BMP subject to the Stormwater Management Rules, N.J.A.C. 7:8. The plan must include all of the items identified in Stormwater Management Rules, N.J.A.C. 7:8-5.8. Such items include, but are not limited to, the list of indication of problems in the system, and training of maintenance personnel. Additional information can be found in Chapter 8: Maintenance and Retrofit of Stormwater Management Measures.

If you have any questions regarding the above information, please contact Anthony Robalik or Minesh Patel of my office at (609) 633-7021.

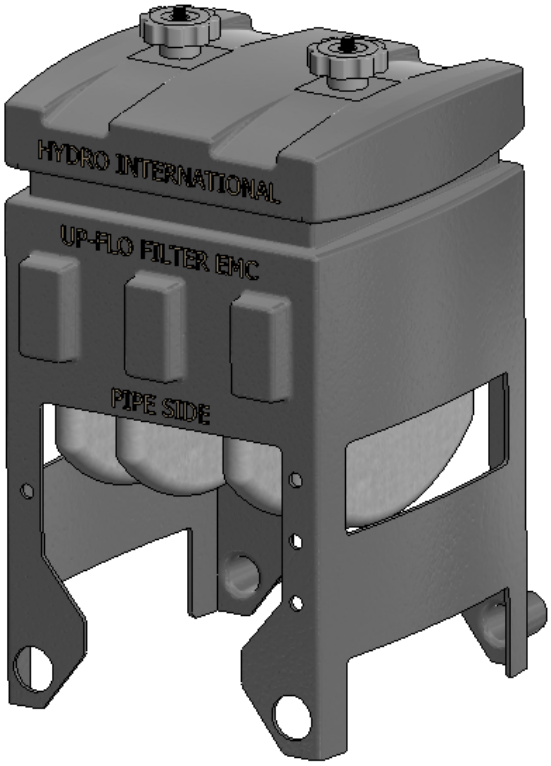
Sincerely,



Gabriel Mahon, Chief
Bureau of Nonpoint Pollution Control

Attachment: Maintenance Plan

cc: Chron File
Richard Magee, NJCAT
Vince Mazzei, NJDEP - DLUR
James Murphy, NJDEP - BNPC
Anthony Robalik NJDEP – BNPC
Minesh Patel NJDEP – BNPC



Up-Flo Filter® Extended Maintenance Cartridge Operation and Maintenance Manual

October 2019
Rev. A

hydro-int.com

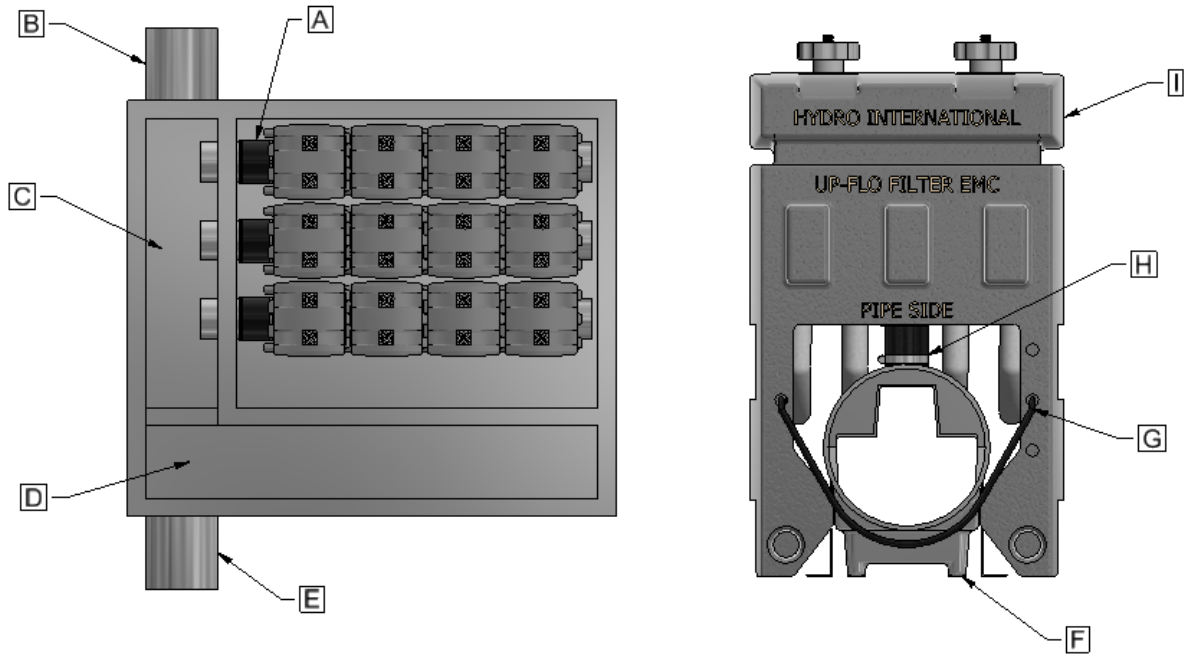
Hydro International®

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Overview and Product Description

The Up-Flo® Filter is a modular high-rate stormwater filtration device designed to capture trash, oil, sediment and remove fine pollutants such as particulate metals and nutrients from stormwater runoff. Designed with efficiency, longevity and upkeep in mind, this high performance, low maintenance filter option that offers higher loading rates and longer membrane life for higher quality stormwater for longer periods between servicing. In general, a minimum of two inspections are required per year to monitor sediment and gross pollutant accumulations. In order to achieve an annual TSS removal rate of 80% for the Up-Flo® Filter, the minimum maintenance frequency specified in the maintenance section for replacement of the filter inserts and removal of accumulated sediment from the sump is mandatory.



System Components			
A.	Underdrain Coupling	F.	Underdrain
B.	Outlet Pipe	G.	Cartridge Restraining Cord
C.	Outlet Bay	H.	Cartridge Connection Boot
D.	Inlet Bay	I.	Filter Cartridge
E.	Inlet Pipe		

Figure 1: The Up-Flo® Filter EMC

Operation

Introduction

The Up-Flo® Filter operates on simple fluid hydraulics. It is self-activating, has no moving parts, no external power requirements and is fabricated with durable non-corrosive components. Personnel are not required to operate the unit and maintenance is limited to periodic inspections, sediment and floatables removal and cartridge replacement.

Pollutant Capture

The Up-Flo® Filter is designed to operate as a “treatment train” by incorporating multiple treatment technologies into a single device. Trash and gross debris are removed by sedimentation and screening before they are introduced to the filtration membranes, delaying surface blinding. The Up-Flo® Filter is a wet-sump device. Between storm events, oil and floatables are stored on the water surface separate from the sediment storage volume in the sump.

Best Practices

Good housekeeping upstream of the Up-Flo® Filter can significantly extend maintenance interval. For example, sweeping paved surfaces, collecting leaves and grass trimmings, and protecting bare ground from erosion will reduce loading to the system. The filter cartridges should not be installed until construction activities are complete and site stabilization is effective.

Damage Due to Lack of Maintenance

Delayed maintenance would result in clogged filters. In that situation, an Up-Flo® Filter could go into bypass and there would be no treatment of the incoming stormwater. Replacement of the filter cartridges and removal of sediment from the sump would restore the Up-Flo® Filter to its original treatment efficiency. Establishing and adhering to a regular maintenance schedule ensures optimal performance of the system.

Inspection & Maintenance

Overview

The Up-Flo® Filter protects the environment by removing a wide range of pollutants from stormwater runoff. Periodic removal of these captured pollutants is essential to the proper functioning of the Up-Flo® Filter.

Replacement of filter cartridges must be performed inside the vessel. A vactor truck is required for removal of oils, water, sediment, and to completely pump out the vessel to allow for maintenance inside. If you are not using Hydro International or a trained service provider, you must follow OSHA (or other regional) Confined Space Entry procedures when entering the Up-Flo® vessel.

The minimum required frequency for replacement of the filter cartridges is annually, whereas the minimum required frequency for removal of accumulated sediment from the sump is dependent on the Up-Flo® Filter configuration. Configurations with a larger sediment storage volume per module will require less frequent removal of accumulated sediment. Regardless, whenever sediment depth in the sump is found to be greater than 6 inches (15 cm), sediment removal is required.

Inspection and Maintenance

Routine Inspection

Inspection is a simple process that requires monitoring pollutant accumulations. Maintenance crews should be familiar with the Up-Flo® Filter and its components prior to inspection.

The following instructions are intended for non-Hydro maintenance service providers and/or those intending to maintain their own Up-Flo® Filter:

Routine Inspection Procedures

1. Set up any necessary safety equipment (such as traffic cones) to provide access to the Up-Flo® Filter. Safety equipment should notify passing pedestrian and road traffic that work is being done.
2. Remove the grate or lid to the manhole or vault.
3. Without entering the vessel, look down into the chamber to inspect the inside and to make note of any irregularities.
4. Without entering the vessel, use the pole with the skimmer net to remove floatables and loose debris from the chamber.
5. Using a sediment probe such as a Sludge-Judge®, measure the depth of sediment that has collected in the sump of the vessel. Maximum sediment depth is 6 inches (15 cm).
6. On the Maintenance Log provided by Hydro International, record the date, unit location, estimated volume of floatables and gross debris removed, and the depth of sediment measured. Also note any apparent irregularities such as damaged components or a high standing water level.
7. Securely replace the grate or lid.
8. Remove safety equipment.
9. Contact Hydro International to discuss any irregularities noted during inspection.

Routine Maintenance

The access port located at the top of the manhole or vault provides access to the Up-Flo® vessel for maintenance personnel to enter the vessel and remove and replace filter cartridges. The same access would be used for maintenance personnel working from the surface to vactor out sediment, oil, and water (Figure 2). Unless the Up-Flo® Filter has been installed in a very shallow configuration, it is necessary to have personnel with OSHA Confined Space Entry training performing the maintenance that occurs inside the vessel.

Maintenance intervals are determined from monitoring the Up-Flo® Filter during its first year of operation. Depending on the site, some maintenance activities may have to be performed on a more frequent basis than others.

A vactor truck is normally required for oil removal, removal of sediment from the sump, and to dewater the vessel for replacement of the filter cartridges. All inspection and maintenance activities would be recorded in an Inspection and Maintenance Log.

The access port located at the top of the manhole provides unobstructed access for a vactor hose and/or skimmer pole to be lowered to the base of the sump.



Figure 2: Sediment is removed from the sump with a vactor hose. Confined space entry is not required for this step.

Maintenance Scheduling

- Call Hydro International to order replacement filter cartridges prior to scheduling maintenance.
- Because filter cartridge replacement requires entry into the Up-Flo® chamber, maintenance events should be scheduled during dry weather.
- Filter cartridge replacement should occur immediately after a contaminated spill in the contributing drainage area.

Recommended Equipment

- Safety Equipment (traffic cones, etc.)
- Crow bar to remove grate or lid
- Vactor truck (flexible hose preferred)
- Pressure nozzle attachment
- OSHA Confined Space Entry Equipment
- Replacement Up-Flo® Filter Cartridges (available from Hydro International)
- Hydro International Up-Flo® Filter Maintenance Log
- Screwdriver (flat head)

Surface Maintenance Procedure

1. Set up any necessary safety equipment (such as traffic cones) around the access of the Up-Flo® Filter. Safety equipment should notify passing pedestrian and road traffic that work is being done.
2. Remove the grate or lid to the manhole or vault.
3. Without entering the vessel, look down into the chamber to inspect the inside. Make note of any irregularities.
4. Once all floatables and oil have been removed, drop the vactor hose to the base of the sump. Vactor out the sediment and gross debris from the sump floor.

5. Retract the vactor hose from the vessel.
6. On the Maintenance Log provided by Hydro International, record the date, unit location, estimated volume of floatables, oils, and gross debris removed, and the depth of sediment measured. Note any apparent irregularities such as damaged components or blockages.
7. Securely replace the grate or lid. Remove safety equipment.
8. Dispose of sediment and gross debris following local regulations.
9. Dispose of oil and sump water at a licensed water treatment facility or following local regulations.
10. Contact Hydro International to discuss any irregularities noted during cleanout.

Filter Cartridge Replacement

1. Following OSHA or region specific Confined Space Entry procedures, enter the Up-Flo® Filter Chamber.
2. Starting at the end of the filter cartridge row furthest from the Outlet Bay (Figure 1, Item C) remove each Filter Cartridge (Figure 1, Item I) from the Underdrain (Figure 1, Item A) as described below:
    a. Unfasten Cartridge Restraining Cord (Figure 1, Item G)
    b. Loosen Cartridge Connection Boot (Figure 1, Item H) using flathead screwdriver
    c. Remove Filter Cartridge and transfer to surface.
3. Starting at the end of the Underdrain closest to the Outlet Bay, install new Filter Cartridges, supplied by Hydro International.
    - Orient Filter Cartridge with the labeled “Pipe Side” facing away from the Outlet Bay.
    - Tighten Cartridge Connection Boot using flathead screwdriver
    - Fasten Cartridge Restraining Cord
4. Exit the Up-Flo® Filter chamber and securely replace the grate or lid.
5. On the Maintenance Log provided by Hydro International, record the date, unit location, estimated volume of floatables, oil and gross debris removed, and the depth of sediment measured. Note the number of filter cartridges replaced. Note any irregularities such as damaged components or blockages.
6. Remove safety equipment.
7. Return spent filter cartridges to Hydro International for refurbishment.
8. Contact Hydro International to discuss any irregularities noted during annual maintenance.

Up-Flo® Filter Installation Log

SITE REFERENCE NAME OR NUMBER FOR THIS UP-FLO® FILTER LOCATION:	
SITE NAME:	
SITE LOCATIONS:	
OWNER:	**SITE CONTRACTOR:**
CONTACT NAME:	**CONTACT NAME:**
COMPANY NAME:	**COMPANY NAME:**
ADDRESS:	**ADDRESS:**
TELEPHONE:	**TELEPHONE:**
FAX:	**FAX:**

INSTALLATION DATE: _____ /_____/_____

TOTAL NUMBER OF UP-FLO® FILTER CARTRIDGES: _____

Up-Flo® Filter Inspection Log

Site Name: _____

Location: _____

Owner Name: _____

Address: _____ Phone Number:_____

Site Status: _____

Date: _____ Time: _____ Site Conditions*: _____
*(Stable, Under Construction, Needing Maintenance, etc.)

Inspection Frequency Key: A=annual; M=Monthly; S=after major storms

	Inspection Items	Inspection Frequency	Inspected? (Y/N)	Maintenance Needed? (Y/N)	Comments/ Description
Debris Removal	Adjacent area free of debris?				
	Inlets and outlets free of debris?				
	Facility (internally) free of debris?				
Vegetation	Surrounding area fully stabilized?				
	Grass mowed?				
Water retention where required	Water holding chamber(s) at normal pool				
	Evidence of erosion?				
Sediment deposition	Filtration chamber free of sediments?				
	Sedimentation sump not more than 50% full?				
Structural components	Any evidence of structural deterioration?				
	Grates in good condition?				
	Spalling or cracking of structural parts?				
	Outlet/overflow spillway				
Other	Noticeable odors?				
	Any evidence of filter(s) clogging?				
	Evidence of flow bypassing facility?				

Inspector Comments: _____

_____

Overall Condition of Up-Flo® Filter**: Acceptable / Unacceptable

**Acceptable would mean properly functioning; unacceptable would mean damaged or required further maintenance

If any of the above Inspection Items are checked “Yes” for “Maintenance Needed”, list Maintenance actions and their completion dates below or on the Maintenance Log provided on page 11 of the Up-Flo® Filter Operation & Maintenance Manual:

Maintenance Action Needed	Due Date

The next routine inspection is scheduled for approximately: (date) _____

Inspected by: (signature) _____

Inspected by: (printed) _____

Up-Flo® Filter Maintenance Log

Site Name: _____

Location: _____

Owner Name: _____

Address: _____ Phone Number:_____

Site Status: _____

Date: _____ Time: _____ Site Conditions*: _____
*(Stable, Under Construction, Needing Maintenance, etc.)

Estimated volume of oil/floatable trash removed: _____

Sediment depth measured in sump prior to removal: _____

Number of Filter Cartridges replaced: _____

Inspector Comments: _____

_____

Overall Condition of Up-Flo® Filter**: Acceptable / Unacceptable

**Acceptable would mean properly functioning; unacceptable would mean damaged or required further maintenance

Maintained by: (signature) _____

Maintained by: (printed) _____

APPENDIX E

STORMWATER CONVEYANCE SYSTEM DESIGN

MASER

Line No.	Line ID	DnStm Ln No	Inlet ID	Drng Area (ac)	Runoff Coeff (C)	Incr CxA	Total CxA	i Inlet (in/hr)	Incr Q (cfs)	Total Runoff (cfs)	Capac Full (cfs)	Vel Ave (ft/s)	Line Size (in)	Line Type	n-val Pipe	Line Length (ft)	Line Slope (%)	Invert Up (ft)	Invert Dn (ft)	Gnd/Rim El Up (ft)
1	P-18	Outfall	S-18	0.01	0.99	0.01	0.02	8.78	0.09	0.16	1.14	2.20	8	Cir	0.012	55.291	0.76	130.42	130.00	133.75
2	P-19	1	S-19	0.01	0.99	0.01	0.01	8.78	0.09	0.09	1.32	1.42	8	Cir	0.012	24.490	1.02	130.67	130.42	133.75
3	P-0	Outfall	S-0	0.00	0.00	0.00	1.38	0.00	0.00	9.56	15.28	4.70	24	Cir	0.012	12.850	0.39	122.55	122.50	131.15
4	P-1	3	S-1	0.00	0.00	0.00	1.38	0.00	0.00	9.58	21.12	4.70	24	Cir	0.012	13.464	0.74	123.58	123.48	131.60
5	P-2	4	S-2	0.24	0.99	0.24	1.14	8.78	2.09	7.96	16.98	4.19	24	Cir	0.012	33.305	0.48	123.74	123.58	129.97
6	P-3	5	S-3	0.33	0.99	0.33	0.91	8.78	2.87	6.44	21.25	3.88	24	Cir	0.012	174.209	0.75	125.05	123.74	131.80
7	P-4	6	S-15	0.01	0.99	0.01	0.53	7.70	0.08	4.12	21.19	3.25	24	Cir	0.012	80.207	0.75	125.65	125.05	132.97
8	P-8	7	S-8	0.00	0.00	0.00	0.00	0.00	5.19	0.00	24.53	7.92	18	Cir	0.012	6.454	4.65	128.40	128.10	130.53
9	P-4A	7	S-4	0.13	0.99	0.13	0.52	8.78	1.13	4.29	9.92	2.43	18	Cir	0.012	49.943	0.76	126.04	125.66	132.40
10	P-5	9	S-5	0.00	0.00	0.00	0.40	0.00	0.00	3.29	9.83	1.93	18	Cir	0.012	57.552	0.75	126.47	126.04	133.40
11	P-6	10	S-6	0.23	0.99	0.23	0.23	8.78	2.00	2.00	8.57	2.68	15	Cir	0.012	158.088	1.50	128.84	126.47	132.30
12	P-7	10	S-7	0.17	0.99	0.17	0.17	8.78	1.48	1.48	6.13	1.20	15	Cir	0.012	18.208	0.77	126.61	126.47	132.86
13	P-25	6	S-25	0.00	0.00	0.00	0.05	0.00	0.00	0.36	2.78	0.45	12	Cir	0.012	103.728	0.52	126.09	125.55	132.05
14	P-27	13	S-27	0.02	0.90	0.02	0.02	8.78	0.16	0.16	3.85	0.24	12	Cir	0.012	39.074	1.00	126.48	126.09	133.82
15	P-26	13	S-26	0.03	0.90	0.03	0.03	8.78	0.24	0.24	3.86	0.36	12	Cir	0.012	39.018	1.00	126.48	126.09	133.82
16	P-9	4	S-10	0.24	0.99	0.24	0.24	8.78	2.09	2.09	8.59	1.70	15	Cir	0.012	35.172	1.51	124.11	123.58	130.66
17	P-21	Outfall	S-21	0.05	0.90	0.05	1.54	8.78	0.40	12.95	26.54	7.21	24	Cir	0.012	21.302	1.17	126.00	125.75	133.83
18	P-22	17	S-22	0.70	0.90	0.63	1.49	8.78	5.53	12.69	24.78	5.94	24	Cir	0.012	70.404	1.02	126.72	126.00	133.50
19	P-23	18	S-23	0.03	0.90	0.03	0.86	8.78	0.24	7.48	24.47	4.23	24	Cir	0.012	82.220	1.00	127.54	126.72	133.70
20	P-23A	19	S-23A	0.03	0.90	0.03	0.84	8.78	0.24	7.30	12.28	5.79	18	Cir	0.012	48.946	1.16	128.11	127.54	133.60
21	P-24	20	S-24	0.90	0.90	0.81	0.81	8.78	7.11	7.11	12.15	5.45	18	Cir	0.012	48.214	1.14	128.66	128.11	133.30

Project File: 200713_Storm System.stm | Number of lines: 21 | Date: 7/30/2020

NOTES: Intensity = 467.33 / (Inlet time + 26.80) ^ 1.14 -- Return period = 100 Yrs. ; ** Critical depth

HGL Up (ft)	HGL Dn (ft)	
130.61	130.17	
130.80 j	130.61	
125.48	125.43	
125.58	125.53	
126.02	125.92	
126.76	126.42	
127.21	127.15	
129.28	128.57	
127.67	127.59	
127.80	127.76	
129.40 j	127.85	
127.85	127.85	
127.15	127.15	
127.16	127.16	
127.16	127.16	
125.95	125.92	
127.29	126.74	
128.00 j	127.29	
128.51 j	128.00	
129.16	128.51	
129.69 j	129.16	

Project File: 200713_Storm System.stm	Number of lines: 21	Date: 7/30/2020

NOTES: ** Critical depth

APPENDIX F

CONDUIT OUTLET PROTECTION

MASER CONSULTING P.A.

Consulting, Municipal & Environmental Engineers
Planners ▪ Surveyors ▪ Landscape Architects

PROJECT- AAALTF
NUMBER- 18006673A
BY- TL
DATE- 7/9/2020

CONDUIT OUTLET PROTECTION CALCULATIONS

TAILWATER < 0.5 x Do

18 " HDPE WW#100

D_O =	1.50	
$Q_{(100)}$ =	8.29	CFS
TW =	0.00	CFS (100-yr storm)
W_o=	1.50	(Width of culvert @ widest point)
q=	5.53	CFS/ft (Q/Wo)

LENGTH OF APRON

$$L_a = \frac{1.8 \times q}{D_o^{1/2}} + 7 \times (Do) = 18.62 \text{ FEET}$$

USE 19.0 FEET

WIDTH OF APRON

W = (3 x Wo) + La = 23.12 FEET

USE 24.0 FEET

RIPRAP SIZE

$$D_{(50)} = \frac{0.016}{Tw} q^{4/3} = \text{\#DIV/0!} \text{ INCHES}$$

USE 4.0 INCHES

APRON THICKNESS

T = 2 x D (50) w/ FILTER FABRIC	T = 3 x D (50)
= 0.67 FEET	= 1.00 FEET
USE [ ]	USE [X]

RIP RAP QUANTITY VOLUME = $\frac{(1/2)(3Wo+W)(La)(T)}{27}$ =

= 0 CUBIC YARDS = 10 CUBIC YARDS

MASER CONSULTING P.A.

Consulting, Municipal & Environmental Engineers
Planners ▪ Surveyors ▪ Landscape Architects

PROJECT- AAALTF
NUMBER- 18006673A
BY- TL
DATE- 7/9/2020

CONDUIT OUTLET PROTECTION CALCULATIONS

TAILWATER < 0.5 x Do

15 " HDPE WW#200

D_O =	1.25	
$Q_{(100)}$ =	0.54	CFS (100-yr storm)
TW =	0.00	(2-yr Storm)
W_o=	1.25	(Width of culvert @ widest point)
q=	0.46	CFS/ft (Q/Wo)

LENGTH OF APRON

$$L_a = \frac{1.8 \times q}{D_o^{1/2}} + 7 \times (Do) = 9.50 \text{ FEET}$$

USE 10.0 FEET

WIDTH OF APRON

W = (3 x Wo) + La = 13.25 FEET

USE 14.0 FEET

RIPRAP SIZE

$$D_{(50)} = \frac{0.016}{Tw} q^{4/3} = \text{\#DIV/0!} \text{ INCHES}$$

USE 4.0 INCHES

APRON THICKNESS

T = 2 x D (50) w/ FILTER FABRIC	T = 3 x D (50)
= 0.67 FEET	= 1.00 FEET
USE [ ]	USE [X]

RIP RAP QUANTITY VOLUME = $\frac{(1/2)(3Wo+W)(La)(T)}{27}$ =

= 0 CUBIC YARDS = 3 CUBIC YARDS

APPENDIX G

RECHARGE

Senior Housing Recharge Calculations

18006673a

7/30/20

Storage volume up to elevation 128.40 (first outlet) = 1,873 cf

Total footprint of BMP = 5,476 sf

dBMP= 1,873 cf/5,476 sf = 0.342 ft or 4.1 in.***

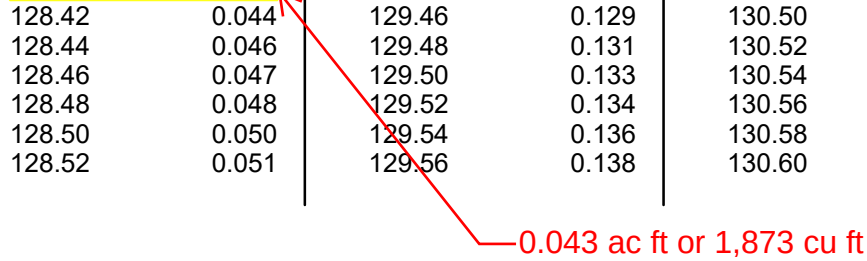
dBMPu = 18 in. (Elevation difference between ground surface to top of system)

dEXC = 66 in. (Elevation difference between ground surface to bottom of system)

***Per page 6-22 of the NJDEP BMP manual, it states “For recharge BMPs that consist of a combination of filled and open areas (e.g., a perforated pipe within a stone filled trench) dBMP can be computed by dividing the BMP’s total storage volume by its surface area.”

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

Elevation (feet)	Storage (acre-feet)	Elevation (feet)	Storage (acre-feet)	Elevation (feet)	Storage (acre-feet)
127.50	0.000	128.54	0.052	129.58	0.140
127.52	0.001	128.56	0.054	129.60	0.141
127.54	0.002	128.58	0.055	129.62	0.143
127.56	0.003	128.60	0.057	129.64	0.145
127.58	0.004	128.62	0.058	129.66	0.147
127.60	0.005	128.64	0.060	129.68	0.149
127.62	0.006	128.66	0.061	129.70	0.150
127.64	0.007	128.68	0.063	129.72	0.152
127.66	0.008	128.70	0.064	129.74	0.154
127.68	0.009	128.72	0.066	129.76	0.156
127.70	0.010	128.74	0.067	129.78	0.157
127.72	0.011	128.76	0.069	129.80	0.159
127.74	0.012	128.78	0.071	129.82	0.161
127.76	0.013	128.80	0.072	129.84	0.163
127.78	0.014	128.82	0.074	129.86	0.164
127.80	0.015	128.84	0.075	129.88	0.166
127.82	0.016	128.86	0.077	129.90	0.168
127.84	0.017	128.88	0.079	129.92	0.170
127.86	0.018	128.90	0.080	129.94	0.171
127.88	0.019	128.92	0.082	129.96	0.173
127.90	0.020	128.94	0.084	129.98	0.175
127.92	0.021	128.96	0.085	130.00	0.176
127.94	0.022	128.98	0.087	130.02	0.178
127.96	0.023	129.00	0.089	130.04	0.180
127.98	0.024	129.02	0.090	130.06	0.181
128.00	0.025	129.04	0.092	130.08	0.183
128.02	0.026	129.06	0.094	130.10	0.185
128.04	0.027	129.08	0.096	130.12	0.186
128.06	0.028	129.10	0.097	130.14	0.188
128.08	0.029	129.12	0.099	130.16	0.190
128.10	0.029	129.14	0.101	130.18	0.191
128.12	0.030	129.16	0.103	130.20	0.193
128.14	0.031	129.18	0.104	130.22	0.195
128.16	0.032	129.20	0.106	130.24	0.196
128.18	0.032	129.22	0.108	130.26	0.198
128.20	0.033	129.24	0.110	130.28	0.199
128.22	0.034	129.26	0.111	130.30	0.201
128.24	0.035	129.28	0.113	130.32	0.202
128.26	0.035	129.30	0.115	130.34	0.204
128.28	0.036	129.32	0.117	130.36	0.205
128.30	0.037	129.34	0.118	130.38	0.207
128.32	0.038	129.36	0.120	130.40	0.208
128.34	0.039	129.38	0.122	130.42	0.210
128.36	0.041	129.40	0.124	130.44	0.211
128.38	0.042	129.42	0.125	130.46	0.213
128.40	0.043	129.44	0.127	130.48	0.214
128.42	0.044	129.46	0.129	130.50	0.216
128.44	0.046	129.48	0.131	130.52	0.217
128.46	0.047	129.50	0.133	130.54	0.218
128.48	0.048	129.52	0.134	130.56	0.220
128.50	0.050	129.54	0.136	130.58	0.221
128.52	0.051	129.56	0.138	130.60	0.222



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
MONMOUTH CO., TINTON FALLS BORO	47.4	1.55

Project Name:	AAALTF
Description:	Assisted Living Facility
Analysis Date:	07/15/20

Pre-Developed Conditions

Land Segment	Area (acres)	TR-55 Land Cover	Soil	Annual Recharge (in)	Annual Recharge (cu.ft)
1	0.69	Woods	Sand Pits	17.7	44,253
2	1.76	Woods	Atsion	0.0	-
3					
4					
5					
6					
7					
8					
9					
10					
11					
12					
13					
14					
15					
Total =	2.5			Total Annual Recharge (in)	Total Annual Recharge (cu-ft)
				5.0	44,253

Post-Developed Conditions

Land Segment	Area (acres)	TR-55 Land Cover	Soil	Annual Recharge (in)	Annual Recharge (cu.ft)
1	0.12	Open space	Sand Pits	18.4	8,006
2	0.57	Impervious areas	Sand Pits	0.0	-
3	0.59	Open space	Atsion	0.0	-
4	1.18	Impervious areas	Atsion	0.0	-
5					
6					
7					
8					
9					
10					
11					
12					
13					
14					
15					
Total =	2.5	Warning: make total area equal to Pre-Developed Condition		Total Annual Recharge (in)	Total Annual Recharge (cu.ft)
				0.9	8,006

Annual Recharge Requirements Calculation ↓

% of Pre-Developed Annual Recharge to Preserve =	100%	Total Impervious Area (sq.ft)	76,230
Post-Development Annual Recharge Deficit=	***36,247***	(cubic feet)	

Recharge Efficiency Parameters Calculations (area averages)

RWC=	#N/A	(in)	DRWC=	#N/A	(in)
ERWC =	#N/A	(in)	EDRWC=	#N/A	(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
AAALTF	Assisted Living Facility	07/15/20	

Recharge BMP Input Parameters

Parameter	Symbol	Value	Unit
BMP Area	ABMP	5476.2	sq.ft
BMP Effective Depth, this is the design variable	dBMP	4.1	in
Upper level of the BMP surface (negative if above ground)	dBMPu	18.0	in
Depth of lower surface of BMP, must be>=dBMPu	dEXC	66.0	in
Post-development Land Segment Location of BMP , Input Zero if Location is distributed or undetermined	SegBMP	2	unitless

Root Zone Water capacity Calculated Parameters

Parameter	Symbol	Value	Unit
Empty Portion of RWC under Post-D Natural Recharge	ERWC	0.15	in
ERWC Modified to consider dEXC	EDRWC	0.00	in
Empty Portion of RWC under Infilt. BMP	RERWC	0.00	in

Recharge Design Parameters

Parameter	Symbol	Value	Unit
Inches of Runoff to capture	Qdesign	1.02	in
Inches of Rainfall to capture	Pdesign	1.23	in
Recharge Provided Avg. over Imp. Area		31.7	in
Runoff Captured Avg. over imp. Area		31.7	in

BMP Calculated Size Parameters

ABMP/Aimp	Aratio	0.24	unitless
BMP Volume	VBMP	1,871	cu.ft

CALCULATION CHECK MESSAGES

Volume Balance-> Solve Problem to satisfy Annual Recharge
dBMP Check---> OK
dEXC Check---> OK
BMP Location---> OK

Parameters from Annual Recharge Worksheet

Post-D Deficit Recharge (or desired recharge volume)	Vdef	36,247	cu.ft
Post-D Impervious Area (or target Impervious Area)	Aimp	22,651	sq.ft
Root Zone Water Capacity	RWC	0.65	in
RWC Modified to consider dEXC	DRWC	0.00	in
Climatic Factor	C-factor	1.55	no units
Average Annual P	Pavg	47.4	in
Recharge Requirement over Imp. Area	dr	5.7	in

System Performance Calculated Parameters

Annual BMP Recharge Volume		59,801	cu.ft
Avg BMP Recharge Efficiency		100.0%	Represents % Infiltration Recharged
%Rainfall became Runoff		78.2%	%
%Runoff Infiltrated		85.5%	%
%Runoff Recharged		25.4%	%
%Rainfall Recharged		19.9%	%

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.

APPENDIX H

DRAIN DOWN CALCULATIONS

Basin Drain Down Time
Closed System

Hydrograph for Pond A: BASIN-A

Time (hours)	Inflow (cfs)	Storage (acre-feet)	Elevation (feet)	Primary (cfs)
0.00	0.00	0.000	122.50	0.00
0.20	0.00	0.000	122.50	0.00
0.40	0.00	0.000	122.50	0.00
0.60	0.00	0.000	122.51	0.00
0.80	0.02	0.000	122.55	0.02
1.00	0.04	0.000	122.58	0.04
1.20	0.06	0.000	122.60	0.06
1.40	0.08	0.000	122.62	0.08
1.60	0.10	0.000	122.63	0.10
1.80	0.11	0.000	122.64	0.11
2.00	0.13	0.000	122.65	0.13
2.20	0.14	0.000	122.66	0.14
2.40	0.16	0.000	122.67	0.16
2.60	0.17	0.000	122.68	0.17
2.80	0.18	0.000	122.68	0.18
3.00	0.19	0.000	122.69	0.19
3.20	0.20	0.000	122.69	0.20
3.40	0.20	0.000	122.70	0.20
3.60	0.21	0.000	122.70	0.21
3.80	0.22	0.000	122.70	0.22
4.00	0.23	0.000	122.71	0.23
4.20	0.23	0.000	122.71	0.23
4.40	0.24	0.000	122.71	0.24
4.60	0.25	0.000	122.72	0.25
4.80	0.25	0.000	122.72	0.25
5.00	0.26	0.000	122.73	0.26
5.20	0.27	0.000	122.73	0.27
5.40	0.28	0.000	122.73	0.28
5.60	0.28	0.000	122.74	0.28
5.80	0.29	0.000	122.74	0.29
6.00	0.30	0.000	122.74	0.30
6.20	0.31	0.000	122.75	0.31
6.40	0.33	0.000	122.76	0.33
6.60	0.35	0.000	122.76	0.35
6.80	0.37	0.000	122.77	0.37
7.00	0.39	0.000	122.78	0.39
7.20	0.41	0.000	122.79	0.41
7.40	0.44	0.000	122.80	0.43
7.60	0.46	0.000	122.81	0.46
7.80	0.49	0.000	122.82	0.48
8.00	0.51	0.000	122.83	0.51
8.20	0.54	0.000	122.84	0.53
8.40	0.56	0.000	122.85	0.55
8.60	0.59	0.001	122.87	0.58
8.80	0.62	0.001	122.88	0.61
9.00	0.65	0.001	122.89	0.63
9.20	0.68	0.001	122.90	0.66
9.40	0.73	0.002	122.92	0.70
9.60	0.80	0.002	122.95	0.75
9.80	0.87	0.003	122.98	0.80
10.00	0.95	0.005	123.02	0.86
10.20	1.03	0.006	123.07	0.93

Hydrograph for Pond A: BASIN-A (continued)

Time (hours)	Inflow (cfs)	Storage (acre-feet)	Elevation (feet)	Primary (cfs)
10.40	1.12	0.008	123.12	0.99
10.60	1.21	0.010	123.18	1.06
10.80	1.37	0.013	123.24	1.14
11.00	1.58	0.018	123.34	1.24
11.20	1.87	0.025	123.47	1.37
11.40	2.25	0.035	123.64	1.52
11.60	2.76	0.050	123.87	1.70
11.80	3.67	0.072	124.20	1.92
12.00	5.95	0.113	124.73	2.54
12.20	**11.49**	0.198	125.78	5.05
12.40	**10.78**	0.282	126.93	7.21
12.60	8.87	**0.316**	**127.66**	**8.20**
12.80	7.06	**0.311**	**127.51**	**8.01**
13.00	5.78	0.289	127.05	7.39
13.20	4.79	0.260	126.59	6.69
13.40	4.03	0.228	126.16	5.93
13.60	3.39	0.199	125.78	5.06
13.80	2.87	0.174	125.48	4.23
14.00	2.48	0.152	125.21	3.76
14.20	2.19	0.133	124.97	3.23
14.40	1.96	0.118	124.79	2.70
14.60	1.76	0.107	124.65	2.36
14.80	1.59	0.098	124.53	2.15
15.00	1.43	0.088	124.40	2.06
15.20	1.30	0.077	124.26	1.97
15.40	1.19	0.066	124.11	1.87
15.60	1.11	0.055	123.95	1.76
15.80	1.04	0.045	123.80	1.64
16.00	0.99	0.035	123.65	1.52
16.20	0.94	0.027	123.51	1.40
16.40	0.90	0.020	123.38	1.28
16.60	0.86	0.015	123.27	1.16
16.80	0.82	0.010	123.17	1.05
17.00	0.79	0.007	123.09	0.95
17.20	0.76	0.005	123.03	0.86
17.40	0.73	0.003	122.98	0.80
17.60	0.70	0.002	122.95	0.75
17.80	0.67	0.002	122.92	0.70
18.00	0.64	0.001	122.90	0.67
18.20	0.61	0.001	122.89	0.63
18.40	0.59	0.001	122.88	0.60
18.60	0.57	0.001	122.87	0.58
18.80	0.56	0.001	122.86	0.57
19.00	0.55	0.000	122.85	0.55
19.20	0.54	0.000	122.85	0.54
19.40	0.53	0.000	122.85	0.53
19.60	0.52	0.000	122.84	0.52
19.80	0.51	0.000	122.84	0.51
20.00	0.50	0.000	122.83	0.50
20.20	0.50	0.000	122.83	0.50
20.40	0.49	0.000	122.83	0.49
20.60	0.48	0.000	122.82	0.48

Hydrograph for Pond A: BASIN-A (continued)

Time (hours)	Inflow (cfs)	Storage (acre-feet)	Elevation (feet)	Primary (cfs)
20.80	0.47	0.000	122.82	0.48
21.00	0.47	0.000	122.82	0.47
21.20	0.46	0.000	122.81	0.46
21.40	0.45	0.000	122.81	0.45
21.60	0.45	0.000	122.81	0.45
21.80	0.44	0.000	122.81	0.44
22.00	0.43	0.000	122.80	0.43
22.20	0.43	0.000	122.80	0.43
22.40	0.42	0.000	122.80	0.42
22.60	0.41	0.000	122.79	0.41
22.80	0.40	0.000	122.79	0.41
23.00	0.40	0.000	122.79	0.40
23.20	0.39	0.000	122.78	0.39
23.40	0.38	0.000	122.78	0.38
23.60	0.38	0.000	122.78	0.38
23.80	0.37	0.000	122.78	0.37
24.00	0.36	0.000	122.77	0.36
24.20	0.29	0.000	122.74	0.29
24.40	0.19	0.000	122.69	0.19
24.60	0.13	0.000	122.66	0.13
24.80	0.09	0.000	122.63	0.09
25.00	0.07	0.000	122.61	0.07
25.20	0.05	0.000	122.59	0.05
25.40	0.04	0.000	122.58	0.04
25.60	0.03	0.000	122.57	0.03
25.80	0.02	0.000	122.56	0.02
26.00	0.01	0.000	122.55	0.01
26.20	0.01	0.000	122.53	0.01
26.40	0.01	0.000	122.52	0.01
26.60	0.01	0.000	122.52	0.01
26.80	0.00	0.000	122.51	0.00
27.00	0.00	0.000	122.51	0.00
27.20	0.00	0.000	122.51	0.00
27.40	0.00	0.000	122.50	0.00
27.60	0.00	0.000	122.50	0.00
27.80	0.00	0.000	122.50	0.00
28.00	0.00	0.000	122.50	0.00
28.20	0.00	0.000	122.50	0.00
28.40	0.00	0.000	122.50	0.00
28.60	0.00	0.000	122.50	0.00
28.80	0.00	0.000	122.50	0.00
29.00	0.00	0.000	122.50	0.00
29.20	0.00	0.000	122.50	0.00
29.40	0.00	0.000	122.50	0.00
29.60	0.00	0.000	122.50	0.00
29.80	0.00	0.000	122.50	0.00
30.00	0.00	0.000	122.50	0.00
30.20	0.00	0.000	122.50	0.00
30.40	0.00	0.000	122.50	0.00
30.60	0.00	0.000	122.50	0.00
30.80	0.00	0.000	122.50	0.00
31.00	0.00	0.000	122.50	0.00



Hydrograph for Pond A: BASIN-A (continued)

Time (hours)	Inflow (cfs)	Storage (acre-feet)	Elevation (feet)	Primary (cfs)
31.20	0.00	0.000	122.50	0.00
31.40	0.00	0.000	122.50	0.00
31.60	0.00	0.000	122.50	0.00
31.80	0.00	0.000	122.50	0.00
32.00	0.00	0.000	122.50	0.00
32.20	0.00	0.000	122.50	0.00
32.40	0.00	0.000	122.50	0.00
32.60	0.00	0.000	122.50	0.00
32.80	0.00	0.000	122.50	0.00
33.00	0.00	0.000	122.50	0.00
33.20	0.00	0.000	122.50	0.00
33.40	0.00	0.000	122.50	0.00
33.60	0.00	0.000	122.50	0.00
33.80	0.00	0.000	122.50	0.00
34.00	0.00	0.000	122.50	0.00
34.20	0.00	0.000	122.50	0.00
34.40	0.00	0.000	122.50	0.00
34.60	0.00	0.000	122.50	0.00
34.80	0.00	0.000	122.50	0.00
35.00	0.00	0.000	122.50	0.00
35.20	0.00	0.000	122.50	0.00
35.40	0.00	0.000	122.50	0.00
35.60	0.00	0.000	122.50	0.00
35.80	0.00	0.000	122.50	0.00
36.00	0.00	0.000	122.50	0.00
36.20	0.00	0.000	122.50	0.00
36.40	0.00	0.000	122.50	0.00
36.60	0.00	0.000	122.50	0.00
36.80	0.00	0.000	122.50	0.00
37.00	0.00	0.000	122.50	0.00
37.20	0.00	0.000	122.50	0.00
37.40	0.00	0.000	122.50	0.00
37.60	0.00	0.000	122.50	0.00
37.80	0.00	0.000	122.50	0.00
38.00	0.00	0.000	122.50	0.00
38.20	0.00	0.000	122.50	0.00
38.40	0.00	0.000	122.50	0.00
38.60	0.00	0.000	122.50	0.00
38.80	0.00	0.000	122.50	0.00
39.00	0.00	0.000	122.50	0.00
39.20	0.00	0.000	122.50	0.00
39.40	0.00	0.000	122.50	0.00
39.60	0.00	0.000	122.50	0.00
39.80	0.00	0.000	122.50	0.00
40.00	0.00	0.000	122.50	0.00
40.20	0.00	0.000	122.50	0.00
40.40	0.00	0.000	122.50	0.00
40.60	0.00	0.000	122.50	0.00
40.80	0.00	0.000	122.50	0.00
41.00	0.00	0.000	122.50	0.00
41.20	0.00	0.000	122.50	0.00
41.40	0.00	0.000	122.50	0.00

Hydrograph for Pond A: BASIN-A (continued)

Time (hours)	Inflow (cfs)	Storage (acre-feet)	Elevation (feet)	Primary (cfs)
41.60	0.00	0.000	122.50	0.00
41.80	0.00	0.000	122.50	0.00
42.00	0.00	0.000	122.50	0.00
42.20	0.00	0.000	122.50	0.00
42.40	0.00	0.000	122.50	0.00
42.60	0.00	0.000	122.50	0.00
42.80	0.00	0.000	122.50	0.00
43.00	0.00	0.000	122.50	0.00
43.20	0.00	0.000	122.50	0.00
43.40	0.00	0.000	122.50	0.00
43.60	0.00	0.000	122.50	0.00
43.80	0.00	0.000	122.50	0.00
44.00	0.00	0.000	122.50	0.00
44.20	0.00	0.000	122.50	0.00
44.40	0.00	0.000	122.50	0.00
44.60	0.00	0.000	122.50	0.00
44.80	0.00	0.000	122.50	0.00
45.00	0.00	0.000	122.50	0.00
45.20	0.00	0.000	122.50	0.00
45.40	0.00	0.000	122.50	0.00
45.60	0.00	0.000	122.50	0.00
45.80	0.00	0.000	122.50	0.00
46.00	0.00	0.000	122.50	0.00
46.20	0.00	0.000	122.50	0.00
46.40	0.00	0.000	122.50	0.00
46.60	0.00	0.000	122.50	0.00
46.80	0.00	0.000	122.50	0.00
47.00	0.00	0.000	122.50	0.00
47.20	0.00	0.000	122.50	0.00
47.40	0.00	0.000	122.50	0.00
47.60	0.00	0.000	122.50	0.00
47.80	0.00	0.000	122.50	0.00
48.00	0.00	0.000	122.50	0.00
48.20	0.00	0.000	122.50	0.00
48.40	0.00	0.000	122.50	0.00
48.60	0.00	0.000	122.50	0.00
48.80	0.00	0.000	122.50	0.00
49.00	0.00	0.000	122.50	0.00
49.20	0.00	0.000	122.50	0.00
49.40	0.00	0.000	122.50	0.00
49.60	0.00	0.000	122.50	0.00
49.80	0.00	0.000	122.50	0.00
50.00	0.00	0.000	122.50	0.00
50.20	0.00	0.000	122.50	0.00
50.40	0.00	0.000	122.50	0.00
50.60	0.00	0.000	122.50	0.00
50.80	0.00	0.000	122.50	0.00
51.00	0.00	0.000	122.50	0.00
51.20	0.00	0.000	122.50	0.00
51.40	0.00	0.000	122.50	0.00
51.60	0.00	0.000	122.50	0.00
51.80	0.00	0.000	122.50	0.00

Hydrograph for Pond A: BASIN-A (continued)

Time (hours)	Inflow (cfs)	Storage (acre-feet)	Elevation (feet)	Primary (cfs)
52.00	0.00	0.000	122.50	0.00
52.20	0.00	0.000	122.50	0.00
52.40	0.00	0.000	122.50	0.00
52.60	0.00	0.000	122.50	0.00
52.80	0.00	0.000	122.50	0.00
53.00	0.00	0.000	122.50	0.00
53.20	0.00	0.000	122.50	0.00
53.40	0.00	0.000	122.50	0.00
53.60	0.00	0.000	122.50	0.00
53.80	0.00	0.000	122.50	0.00
54.00	0.00	0.000	122.50	0.00
54.20	0.00	0.000	122.50	0.00
54.40	0.00	0.000	122.50	0.00
54.60	0.00	0.000	122.50	0.00
54.80	0.00	0.000	122.50	0.00
55.00	0.00	0.000	122.50	0.00
55.20	0.00	0.000	122.50	0.00
55.40	0.00	0.000	122.50	0.00
55.60	0.00	0.000	122.50	0.00
55.80	0.00	0.000	122.50	0.00
56.00	0.00	0.000	122.50	0.00
56.20	0.00	0.000	122.50	0.00
56.40	0.00	0.000	122.50	0.00
56.60	0.00	0.000	122.50	0.00
56.80	0.00	0.000	122.50	0.00
57.00	0.00	0.000	122.50	0.00
57.20	0.00	0.000	122.50	0.00
57.40	0.00	0.000	122.50	0.00
57.60	0.00	0.000	122.50	0.00
57.80	0.00	0.000	122.50	0.00
58.00	0.00	0.000	122.50	0.00
58.20	0.00	0.000	122.50	0.00
58.40	0.00	0.000	122.50	0.00
58.60	0.00	0.000	122.50	0.00
58.80	0.00	0.000	122.50	0.00
59.00	0.00	0.000	122.50	0.00
59.20	0.00	0.000	122.50	0.00
59.40	0.00	0.000	122.50	0.00
59.60	0.00	0.000	122.50	0.00
59.80	0.00	0.000	122.50	0.00
60.00	0.00	0.000	122.50	0.00
60.20	0.00	0.000	122.50	0.00
60.40	0.00	0.000	122.50	0.00
60.60	0.00	0.000	122.50	0.00
60.80	0.00	0.000	122.50	0.00
61.00	0.00	0.000	122.50	0.00
61.20	0.00	0.000	122.50	0.00
61.40	0.00	0.000	122.50	0.00
61.60	0.00	0.000	122.50	0.00
61.80	0.00	0.000	122.50	0.00
62.00	0.00	0.000	122.50	0.00
62.20	0.00	0.000	122.50	0.00

Hydrograph for Pond A: BASIN-A (continued)

Time (hours)	Inflow (cfs)	Storage (acre-feet)	Elevation (feet)	Primary (cfs)
62.40	0.00	0.000	122.50	0.00
62.60	0.00	0.000	122.50	0.00
62.80	0.00	0.000	122.50	0.00
63.00	0.00	0.000	122.50	0.00
63.20	0.00	0.000	122.50	0.00
63.40	0.00	0.000	122.50	0.00
63.60	0.00	0.000	122.50	0.00
63.80	0.00	0.000	122.50	0.00
64.00	0.00	0.000	122.50	0.00
64.20	0.00	0.000	122.50	0.00
64.40	0.00	0.000	122.50	0.00
64.60	0.00	0.000	122.50	0.00
64.80	0.00	0.000	122.50	0.00
65.00	0.00	0.000	122.50	0.00
65.20	0.00	0.000	122.50	0.00
65.40	0.00	0.000	122.50	0.00
65.60	0.00	0.000	122.50	0.00
65.80	0.00	0.000	122.50	0.00
66.00	0.00	0.000	122.50	0.00
66.20	0.00	0.000	122.50	0.00
66.40	0.00	0.000	122.50	0.00
66.60	0.00	0.000	122.50	0.00
66.80	0.00	0.000	122.50	0.00
67.00	0.00	0.000	122.50	0.00
67.20	0.00	0.000	122.50	0.00
67.40	0.00	0.000	122.50	0.00
67.60	0.00	0.000	122.50	0.00
67.80	0.00	0.000	122.50	0.00
68.00	0.00	0.000	122.50	0.00
68.20	0.00	0.000	122.50	0.00
68.40	0.00	0.000	122.50	0.00
68.60	0.00	0.000	122.50	0.00
68.80	0.00	0.000	122.50	0.00
69.00	0.00	0.000	122.50	0.00
69.20	0.00	0.000	122.50	0.00
69.40	0.00	0.000	122.50	0.00
69.60	0.00	0.000	122.50	0.00
69.80	0.00	0.000	122.50	0.00
70.00	0.00	0.000	122.50	0.00
70.20	0.00	0.000	122.50	0.00
70.40	0.00	0.000	122.50	0.00
70.60	0.00	0.000	122.50	0.00
70.80	0.00	0.000	122.50	0.00
71.00	0.00	0.000	122.50	0.00
71.20	0.00	0.000	122.50	0.00
71.40	0.00	0.000	122.50	0.00
71.60	0.00	0.000	122.50	0.00
71.80	0.00	0.000	122.50	0.00
72.00	0.00	0.000	122.50	0.00
72.20	0.00	0.000	122.50	0.00
72.40	0.00	0.000	122.50	0.00
72.60	0.00	0.000	122.50	0.00

Hydrograph for Pond A: BASIN-A (continued)

Time (hours)	Inflow (cfs)	Storage (acre-feet)	Elevation (feet)	Primary (cfs)
72.80	0.00	0.000	122.50	0.00
73.00	0.00	0.000	122.50	0.00
73.20	0.00	0.000	122.50	0.00
73.40	0.00	0.000	122.50	0.00
73.60	0.00	0.000	122.50	0.00
73.80	0.00	0.000	122.50	0.00
74.00	0.00	0.000	122.50	0.00
74.20	0.00	0.000	122.50	0.00
74.40	0.00	0.000	122.50	0.00
74.60	0.00	0.000	122.50	0.00
74.80	0.00	0.000	122.50	0.00
75.00	0.00	0.000	122.50	0.00
75.20	0.00	0.000	122.50	0.00
75.40	0.00	0.000	122.50	0.00
75.60	0.00	0.000	122.50	0.00
75.80	0.00	0.000	122.50	0.00
76.00	0.00	0.000	122.50	0.00
76.20	0.00	0.000	122.50	0.00
76.40	0.00	0.000	122.50	0.00
76.60	0.00	0.000	122.50	0.00
76.80	0.00	0.000	122.50	0.00
77.00	0.00	0.000	122.50	0.00
77.20	0.00	0.000	122.50	0.00
77.40	0.00	0.000	122.50	0.00
77.60	0.00	0.000	122.50	0.00
77.80	0.00	0.000	122.50	0.00
78.00	0.00	0.000	122.50	0.00
78.20	0.00	0.000	122.50	0.00
78.40	0.00	0.000	122.50	0.00
78.60	0.00	0.000	122.50	0.00
78.80	0.00	0.000	122.50	0.00
79.00	0.00	0.000	122.50	0.00
79.20	0.00	0.000	122.50	0.00
79.40	0.00	0.000	122.50	0.00
79.60	0.00	0.000	122.50	0.00
79.80	0.00	0.000	122.50	0.00
80.00	0.00	0.000	122.50	0.00
80.20	0.00	0.000	122.50	0.00
80.40	0.00	0.000	122.50	0.00
80.60	0.00	0.000	122.50	0.00
80.80	0.00	0.000	122.50	0.00
81.00	0.00	0.000	122.50	0.00
81.20	0.00	0.000	122.50	0.00
81.40	0.00	0.000	122.50	0.00
81.60	0.00	0.000	122.50	0.00
81.80	0.00	0.000	122.50	0.00
82.00	0.00	0.000	122.50	0.00
82.20	0.00	0.000	122.50	0.00
82.40	0.00	0.000	122.50	0.00
82.60	0.00	0.000	122.50	0.00
82.80	0.00	0.000	122.50	0.00
83.00	0.00	0.000	122.50	0.00

Hydrograph for Pond A: BASIN-A (continued)

Time (hours)	Inflow (cfs)	Storage (acre-feet)	Elevation (feet)	Primary (cfs)
83.20	0.00	0.000	122.50	0.00
83.40	0.00	0.000	122.50	0.00
83.60	0.00	0.000	122.50	0.00
83.80	0.00	0.000	122.50	0.00
84.00	0.00	0.000	122.50	0.00
84.20	0.00	0.000	122.50	0.00
84.40	0.00	0.000	122.50	0.00
84.60	0.00	0.000	122.50	0.00
84.80	0.00	0.000	122.50	0.00
85.00	0.00	0.000	122.50	0.00
85.20	0.00	0.000	122.50	0.00
85.40	0.00	0.000	122.50	0.00
85.60	0.00	0.000	122.50	0.00
85.80	0.00	0.000	122.50	0.00
86.00	0.00	0.000	122.50	0.00
86.20	0.00	0.000	122.50	0.00
86.40	0.00	0.000	122.50	0.00
86.60	0.00	0.000	122.50	0.00
86.80	0.00	0.000	122.50	0.00
87.00	0.00	0.000	122.50	0.00
87.20	0.00	0.000	122.50	0.00
87.40	0.00	0.000	122.50	0.00
87.60	0.00	0.000	122.50	0.00
87.80	0.00	0.000	122.50	0.00
88.00	0.00	0.000	122.50	0.00
88.20	0.00	0.000	122.50	0.00
88.40	0.00	0.000	122.50	0.00
88.60	0.00	0.000	122.50	0.00
88.80	0.00	0.000	122.50	0.00
89.00	0.00	0.000	122.50	0.00
89.20	0.00	0.000	122.50	0.00
89.40	0.00	0.000	122.50	0.00
89.60	0.00	0.000	122.50	0.00
89.80	0.00	0.000	122.50	0.00
90.00	0.00	0.000	122.50	0.00
90.20	0.00	0.000	122.50	0.00
90.40	0.00	0.000	122.50	0.00
90.60	0.00	0.000	122.50	0.00
90.80	0.00	0.000	122.50	0.00
91.00	0.00	0.000	122.50	0.00
91.20	0.00	0.000	122.50	0.00
91.40	0.00	0.000	122.50	0.00
91.60	0.00	0.000	122.50	0.00
91.80	0.00	0.000	122.50	0.00
92.00	0.00	0.000	122.50	0.00
92.20	0.00	0.000	122.50	0.00
92.40	0.00	0.000	122.50	0.00
92.60	0.00	0.000	122.50	0.00
92.80	0.00	0.000	122.50	0.00
93.00	0.00	0.000	122.50	0.00
93.20	0.00	0.000	122.50	0.00
93.40	0.00	0.000	122.50	0.00

Hydrograph for Pond A: BASIN-A (continued)

Time (hours)	Inflow (cfs)	Storage (acre-feet)	Elevation (feet)	Primary (cfs)
93.60	0.00	0.000	122.50	0.00
93.80	0.00	0.000	122.50	0.00
94.00	0.00	0.000	122.50	0.00
94.20	0.00	0.000	122.50	0.00
94.40	0.00	0.000	122.50	0.00
94.60	0.00	0.000	122.50	0.00
94.80	0.00	0.000	122.50	0.00
95.00	0.00	0.000	122.50	0.00
95.20	0.00	0.000	122.50	0.00
95.40	0.00	0.000	122.50	0.00
95.60	0.00	0.000	122.50	0.00
95.80	0.00	0.000	122.50	0.00
96.00	0.00	0.000	122.50	0.00
96.20	0.00	0.000	122.50	0.00
96.40	0.00	0.000	122.50	0.00
96.60	0.00	0.000	122.50	0.00
96.80	0.00	0.000	122.50	0.00
97.00	0.00	0.000	122.50	0.00
97.20	0.00	0.000	122.50	0.00
97.40	0.00	0.000	122.50	0.00
97.60	0.00	0.000	122.50	0.00
97.80	0.00	0.000	122.50	0.00
98.00	0.00	0.000	122.50	0.00
98.20	0.00	0.000	122.50	0.00
98.40	0.00	0.000	122.50	0.00
98.60	0.00	0.000	122.50	0.00
98.80	0.00	0.000	122.50	0.00
99.00	0.00	0.000	122.50	0.00
99.20	0.00	0.000	122.50	0.00
99.40	0.00	0.000	122.50	0.00
99.60	0.00	0.000	122.50	0.00
99.80	0.00	0.000	122.50	0.00
100.00	0.00	0.000	122.50	0.00

Basin Drain Down Time
Using a Design Infiltration Rate of 1.34 in/ hr /2 = 0.68 in /hr (TP-2)

Hydrograph for Pond B: BASIN-B

Time (hours)	Inflow (cfs)	Storage (acre-feet)	Elevation (feet)	Outflow (cfs)	Discarded (cfs)	Primary (cfs)
0.00	0.00	0.000	127.50	0.00	0.00	0.00
0.20	0.00	0.000	127.50	0.00	0.00	0.00
0.40	0.00	0.000	127.50	0.00	0.00	0.00
0.60	0.00	0.000	127.50	0.00	0.00	0.00
0.80	0.01	0.000	127.50	0.00	0.00	0.00
1.00	0.02	0.000	127.51	0.01	0.01	0.00
1.20	0.02	0.000	127.51	0.01	0.01	0.00
1.40	0.03	0.001	127.51	0.02	0.02	0.00
1.60	0.03	0.001	127.52	0.02	0.02	0.00
1.80	0.04	0.001	127.52	0.02	0.02	0.00
2.00	0.04	0.001	127.52	0.03	0.03	0.00
2.20	0.04	0.001	127.53	0.03	0.03	0.00
2.40	0.04	0.001	127.53	0.04	0.04	0.00
2.60	0.05	0.002	127.53	0.04	0.04	0.00
2.80	0.05	0.002	127.53	0.04	0.04	0.00
3.00	0.05	0.002	127.54	0.04	0.04	0.00
3.20	0.05	0.002	127.54	0.05	0.05	0.00
3.40	0.05	0.002	127.54	0.05	0.05	0.00
3.60	0.06	0.002	127.54	0.05	0.05	0.00
3.80	0.06	0.002	127.54	0.05	0.05	0.00
4.00	0.06	0.002	127.54	0.06	0.06	0.00
4.20	0.06	0.002	127.55	0.06	0.06	0.00
4.40	0.06	0.002	127.55	0.06	0.06	0.00
4.60	0.06	0.002	127.55	0.06	0.06	0.00
4.80	0.07	0.003	127.55	0.06	0.06	0.00
5.00	0.07	0.003	127.55	0.06	0.06	0.00
5.20	0.07	0.003	127.55	0.06	0.06	0.00
5.40	0.07	0.003	127.55	0.07	0.07	0.00
5.60	0.07	0.003	127.55	0.07	0.07	0.00
5.80	0.07	0.003	127.56	0.07	0.07	0.00
6.00	0.07	0.003	127.56	0.07	0.07	0.00
6.20	0.08	0.003	127.56	0.07	0.07	0.00
6.40	0.08	0.003	127.56	0.07	0.07	0.00
6.60	0.08	0.003	127.56	0.08	0.08	0.00
6.80	0.09	0.003	127.57	0.08	0.08	0.00
7.00	0.09	0.003	127.57	0.08	**0.08**	0.00
7.20	0.10	0.004	127.57	0.08	**0.08**	0.00
7.40	0.10	0.004	127.58	0.08	0.08	0.00
7.60	0.11	0.004	127.58	0.08	0.08	0.00
7.80	0.11	0.005	127.59	0.08	0.08	0.00
8.00	0.11	0.005	127.60	0.08	0.08	0.00
8.20	0.12	0.006	127.61	0.08	0.08	0.00
8.40	0.12	0.006	127.62	0.08	0.08	0.00
8.60	0.13	0.007	127.63	0.08	0.08	0.00
8.80	0.13	0.007	127.65	0.08	0.08	0.00
9.00	0.14	0.008	127.67	0.08	0.08	0.00
9.20	0.15	0.009	127.68	0.08	0.08	0.00
9.40	0.16	0.010	127.71	0.08	0.08	0.00
9.60	0.17	0.012	127.73	0.08	0.08	0.00
9.80	0.19	0.013	127.76	0.08	0.08	0.00
10.00	0.20	0.015	127.80	0.08	0.08	0.00
10.20	0.22	0.017	127.84	0.08	0.08	0.00

Hydrograph for Pond B: BASIN-B (continued)

Time (hours)	Inflow (cfs)	Storage (acre-feet)	Elevation (feet)	Outflow (cfs)	Discarded (cfs)	Primary (cfs)
10.40	0.23	0.020	127.89	0.08	0.08	0.00
10.60	0.26	0.022	127.94	0.08	0.08	0.00
10.80	0.30	0.025	128.00	0.08	0.08	0.00
11.00	0.35	0.029	128.10	0.08	0.08	0.00
11.20	0.43	0.034	128.23	0.08	0.08	0.00
11.40	0.52	0.041	128.36	0.08	0.08	0.00
11.60	0.68	0.049	128.49	0.10	0.08	0.01
11.80	0.97	0.060	128.65	0.14	0.08	0.05
12.00	**1.98**	0.080	128.89	0.16	0.08	0.07
12.20	**3.01**	0.126	129.42	0.33	0.08	0.24
12.40	1.45	0.154	129.75	0.46	0.08	0.37
12.60	0.85	0.165	129.86	0.49	0.08	0.41
12.80	0.60	**0.168**	**129.90**	**0.50**	0.08	**0.42**
13.00	0.49	**0.169**	**129.91**	**0.51**	0.08	**0.42**
13.20	0.40	0.168	129.90	0.50	0.08	0.42
13.40	0.34	0.165	129.87	0.50	0.08	0.41
13.60	0.28	0.162	129.84	0.48	0.08	0.40
13.80	0.25	0.159	129.80	0.47	0.08	0.39
14.00	0.23	0.155	129.75	0.46	0.08	0.37
14.20	0.22	0.151	129.71	0.44	0.08	0.36
14.40	0.20	0.148	129.67	0.43	0.08	0.34
14.60	0.19	0.144	129.63	0.41	0.08	0.33
14.80	0.17	0.140	129.59	0.40	0.08	0.31
15.00	0.16	0.137	129.54	0.38	0.08	0.30
15.20	0.15	0.133	129.50	0.36	0.08	0.28
15.40	0.14	0.129	129.46	0.35	0.08	0.26
15.60	0.14	0.126	129.43	0.33	0.08	0.24
15.80	0.13	0.123	129.39	0.31	0.08	0.22
16.00	0.13	0.120	129.36	0.29	0.08	0.20
16.20	0.12	0.118	129.33	0.26	0.08	0.18
16.40	0.12	0.116	129.31	0.25	0.08	0.16
16.60	0.12	0.114	129.29	0.23	0.08	0.14
16.80	0.11	0.112	129.27	0.22	0.08	0.13
17.00	0.11	0.110	129.25	0.20	0.08	0.12
17.20	0.10	0.109	129.23	0.19	0.08	0.11
17.40	0.10	0.107	129.21	0.18	0.08	0.10
17.60	0.09	0.106	129.20	0.18	0.08	0.09
17.80	0.09	0.104	129.18	0.17	0.08	0.09
18.00	0.09	0.103	129.17	0.17	0.08	0.08
18.20	0.08	0.102	129.15	0.16	0.08	0.08
18.40	0.08	0.100	129.14	0.16	0.08	0.07
18.60	0.08	0.099	129.12	0.16	0.08	0.07
18.80	0.08	0.098	129.11	0.16	0.08	0.07
19.00	0.08	0.097	129.09	0.15	0.08	0.07
19.20	0.08	0.095	129.08	0.15	0.08	0.07
19.40	0.08	0.094	129.06	0.15	0.08	0.07
19.60	0.07	0.093	129.05	0.16	0.08	0.07
19.80	0.07	0.091	129.03	0.16	0.08	0.07
20.00	0.07	0.090	129.02	0.16	0.08	0.07
20.20	0.07	0.089	129.00	0.16	0.08	0.07
20.40	0.07	0.087	128.98	0.16	0.08	0.07
20.60	0.07	0.086	128.97	0.16	0.08	0.07

Hydrograph for Pond B: BASIN-B (continued)

Time (hours)	Inflow (cfs)	Storage (acre-feet)	Elevation (feet)	Outflow (cfs)	Discarded (cfs)	Primary (cfs)
20.80	0.07	0.084	128.95	0.16	0.08	0.07
21.00	0.07	0.083	128.93	0.16	0.08	0.07
21.20	0.07	0.081	128.91	0.16	0.08	0.07
21.40	0.07	0.080	128.90	0.16	0.08	0.07
21.60	0.06	0.078	128.88	0.16	0.08	0.07
21.80	0.06	0.077	128.86	0.16	0.08	0.07
22.00	0.06	0.075	128.84	0.15	0.08	0.07
22.20	0.06	0.074	128.82	0.15	0.08	0.07
22.40	0.06	0.072	128.80	0.15	0.08	0.07
22.60	0.06	0.071	128.78	0.15	0.08	0.07
22.80	0.06	0.069	128.76	0.15	0.08	0.07
23.00	0.06	0.068	128.74	0.15	0.08	0.06
23.20	0.06	0.066	128.72	0.15	0.08	0.06
23.40	0.05	0.065	128.71	0.15	0.08	0.06
23.60	0.05	0.063	128.69	0.14	0.08	0.06
23.80	0.05	0.062	128.67	0.14	0.08	0.05
24.00	0.05	0.060	128.65	0.14	0.08	0.05
24.20	0.01	0.059	128.63	0.13	0.08	0.05
24.40	0.00	0.057	128.60	0.13	0.08	0.04
24.60	0.00	0.055	128.57	0.12	0.08	0.03
24.80	0.00	0.053	128.55	0.11	0.08	0.03
25.00	0.00	0.051	128.52	0.11	0.08	0.02
25.20	0.00	0.049	128.50	0.10	0.08	0.02
25.40	0.00	0.048	128.47	0.10	0.08	0.01
25.60	0.00	0.046	128.45	0.09	0.08	0.01
25.80	0.00	0.045	128.43	0.09	0.08	0.00
26.00	0.00	0.043	128.40	0.09	0.08	0.00
26.20	0.00	0.042	128.38	0.08	0.08	0.00
26.40	0.00	0.040	128.36	0.08	0.08	0.00
26.60	0.00	0.039	128.33	0.08	0.08	0.00
26.80	0.00	0.038	128.31	0.08	0.08	0.00
27.00	0.00	0.036	128.28	0.08	0.08	0.00
27.20	0.00	0.035	128.24	0.08	0.08	0.00
27.40	0.00	0.033	128.20	0.08	0.08	0.00
27.60	0.00	0.032	128.17	0.08	0.08	0.00
27.80	0.00	0.031	128.13	0.08	0.08	0.00
28.00	0.00	0.029	128.09	0.08	0.08	0.00
28.20	0.00	0.028	128.06	0.08	0.08	0.00
28.40	0.00	0.026	128.02	0.08	0.08	0.00
28.60	0.00	0.025	128.00	0.08	0.08	0.00
28.80	0.00	0.024	127.97	0.08	0.08	0.00
29.00	0.00	0.022	127.94	0.08	0.08	0.00
29.20	0.00	0.021	127.91	0.08	0.08	0.00
29.40	0.00	0.019	127.88	0.08	0.08	0.00
29.60	0.00	0.018	127.86	0.08	0.08	0.00
29.80	0.00	0.016	127.83	0.08	0.08	0.00
30.00	0.00	0.015	127.80	0.08	0.08	0.00
30.20	0.00	0.014	127.77	0.08	0.08	0.00
30.40	0.00	0.012	127.74	0.08	0.08	0.00
30.60	0.00	0.011	127.72	0.08	0.08	0.00
30.80	0.00	0.009	127.69	0.08	0.08	0.00
31.00	0.00	0.008	127.66	0.08	0.08	0.00

Hydrograph for Pond B: BASIN-B (continued)

Time (hours)	Inflow (cfs)	Storage (acre-feet)	Elevation (feet)	Outflow (cfs)	Discarded (cfs)	Primary (cfs)
31.20	0.00	0.007	127.63	0.08	0.08	0.00
31.40	0.00	0.005	127.60	0.08	0.08	0.00
31.60	0.00	0.004	127.58	0.08	0.08	0.00
31.80	0.00	0.003	127.55	0.06	0.06	0.00
32.00	0.00	0.002	127.53	0.04	0.04	0.00
32.20	0.00	0.001	127.52	0.03	0.03	0.00
32.40	0.00	0.001	127.52	0.02	0.02	0.00
32.60	0.00	0.001	127.51	0.01	0.01	0.00
32.80	0.00	0.000	127.51	0.01	0.01	0.00
33.00	0.00	0.000	127.50	0.01	0.01	0.00
33.20	0.00	0.000	127.50	0.00	0.00	0.00
33.40	0.00	0.000	127.50	0.00	0.00	0.00
33.60	0.00	0.000	127.50	0.00	0.00	0.00
33.80	0.00	0.000	127.50	0.00	0.00	0.00
34.00	0.00	0.000	127.50	0.00	0.00	0.00
34.20	0.00	0.000	127.50	0.00	0.00	0.00
34.40	0.00	0.000	127.50	0.00	0.00	0.00
34.60	0.00	0.000	127.50	0.00	0.00	0.00
34.80	0.00	0.000	127.50	0.00	0.00	0.00
35.00	0.00	0.000	127.50	0.00	0.00	0.00
35.20	0.00	0.000	127.50	0.00	0.00	0.00
35.40	0.00	0.000	127.50	0.00	0.00	0.00
35.60	0.00	0.000	127.50	0.00	0.00	0.00
35.80	0.00	0.000	127.50	0.00	0.00	0.00
36.00	0.00	0.000	127.50	0.00	0.00	0.00
36.20	0.00	0.000	127.50	0.00	0.00	0.00
36.40	0.00	0.000	127.50	0.00	0.00	0.00
36.60	0.00	0.000	127.50	0.00	0.00	0.00
36.80	0.00	0.000	127.50	0.00	0.00	0.00
37.00	0.00	0.000	127.50	0.00	0.00	0.00
37.20	0.00	0.000	127.50	0.00	0.00	0.00
37.40	0.00	0.000	127.50	0.00	0.00	0.00
37.60	0.00	0.000	127.50	0.00	0.00	0.00
37.80	0.00	0.000	127.50	0.00	0.00	0.00
38.00	0.00	0.000	127.50	0.00	0.00	0.00
38.20	0.00	0.000	127.50	0.00	0.00	0.00
38.40	0.00	0.000	127.50	0.00	0.00	0.00
38.60	0.00	0.000	127.50	0.00	0.00	0.00
38.80	0.00	0.000	127.50	0.00	0.00	0.00
39.00	0.00	0.000	127.50	0.00	0.00	0.00
39.20	0.00	0.000	127.50	0.00	0.00	0.00
39.40	0.00	0.000	127.50	0.00	0.00	0.00
39.60	0.00	0.000	127.50	0.00	0.00	0.00
39.80	0.00	0.000	127.50	0.00	0.00	0.00
40.00	0.00	0.000	127.50	0.00	0.00	0.00
40.20	0.00	0.000	127.50	0.00	0.00	0.00
40.40	0.00	0.000	127.50	0.00	0.00	0.00
40.60	0.00	0.000	127.50	0.00	0.00	0.00
40.80	0.00	0.000	127.50	0.00	0.00	0.00
41.00	0.00	0.000	127.50	0.00	0.00	0.00
41.20	0.00	0.000	127.50	0.00	0.00	0.00
41.40	0.00	0.000	127.50	0.00	0.00	0.00

Basin drains in 33.00 hours

Hydrograph for Pond B: BASIN-B (continued)

Time (hours)	Inflow (cfs)	Storage (acre-feet)	Elevation (feet)	Outflow (cfs)	Discarded (cfs)	Primary (cfs)
41.60	0.00	0.000	127.50	0.00	0.00	0.00
41.80	0.00	0.000	127.50	0.00	0.00	0.00
42.00	0.00	0.000	127.50	0.00	0.00	0.00
42.20	0.00	0.000	127.50	0.00	0.00	0.00
42.40	0.00	0.000	127.50	0.00	0.00	0.00
42.60	0.00	0.000	127.50	0.00	0.00	0.00
42.80	0.00	0.000	127.50	0.00	0.00	0.00
43.00	0.00	0.000	127.50	0.00	0.00	0.00
43.20	0.00	0.000	127.50	0.00	0.00	0.00
43.40	0.00	0.000	127.50	0.00	0.00	0.00
43.60	0.00	0.000	127.50	0.00	0.00	0.00
43.80	0.00	0.000	127.50	0.00	0.00	0.00
44.00	0.00	0.000	127.50	0.00	0.00	0.00
44.20	0.00	0.000	127.50	0.00	0.00	0.00
44.40	0.00	0.000	127.50	0.00	0.00	0.00
44.60	0.00	0.000	127.50	0.00	0.00	0.00
44.80	0.00	0.000	127.50	0.00	0.00	0.00
45.00	0.00	0.000	127.50	0.00	0.00	0.00
45.20	0.00	0.000	127.50	0.00	0.00	0.00
45.40	0.00	0.000	127.50	0.00	0.00	0.00
45.60	0.00	0.000	127.50	0.00	0.00	0.00
45.80	0.00	0.000	127.50	0.00	0.00	0.00
46.00	0.00	0.000	127.50	0.00	0.00	0.00
46.20	0.00	0.000	127.50	0.00	0.00	0.00
46.40	0.00	0.000	127.50	0.00	0.00	0.00
46.60	0.00	0.000	127.50	0.00	0.00	0.00
46.80	0.00	0.000	127.50	0.00	0.00	0.00
47.00	0.00	0.000	127.50	0.00	0.00	0.00
47.20	0.00	0.000	127.50	0.00	0.00	0.00
47.40	0.00	0.000	127.50	0.00	0.00	0.00
47.60	0.00	0.000	127.50	0.00	0.00	0.00
47.80	0.00	0.000	127.50	0.00	0.00	0.00
48.00	0.00	0.000	127.50	0.00	0.00	0.00
48.20	0.00	0.000	127.50	0.00	0.00	0.00
48.40	0.00	0.000	127.50	0.00	0.00	0.00
48.60	0.00	0.000	127.50	0.00	0.00	0.00
48.80	0.00	0.000	127.50	0.00	0.00	0.00
49.00	0.00	0.000	127.50	0.00	0.00	0.00
49.20	0.00	0.000	127.50	0.00	0.00	0.00
49.40	0.00	0.000	127.50	0.00	0.00	0.00
49.60	0.00	0.000	127.50	0.00	0.00	0.00
49.80	0.00	0.000	127.50	0.00	0.00	0.00
50.00	0.00	0.000	127.50	0.00	0.00	0.00
50.20	0.00	0.000	127.50	0.00	0.00	0.00
50.40	0.00	0.000	127.50	0.00	0.00	0.00
50.60	0.00	0.000	127.50	0.00	0.00	0.00
50.80	0.00	0.000	127.50	0.00	0.00	0.00
51.00	0.00	0.000	127.50	0.00	0.00	0.00
51.20	0.00	0.000	127.50	0.00	0.00	0.00
51.40	0.00	0.000	127.50	0.00	0.00	0.00
51.60	0.00	0.000	127.50	0.00	0.00	0.00
51.80	0.00	0.000	127.50	0.00	0.00	0.00

Hydrograph for Pond B: BASIN-B (continued)

Time (hours)	Inflow (cfs)	Storage (acre-feet)	Elevation (feet)	Outflow (cfs)	Discarded (cfs)	Primary (cfs)
52.00	0.00	0.000	127.50	0.00	0.00	0.00
52.20	0.00	0.000	127.50	0.00	0.00	0.00
52.40	0.00	0.000	127.50	0.00	0.00	0.00
52.60	0.00	0.000	127.50	0.00	0.00	0.00
52.80	0.00	0.000	127.50	0.00	0.00	0.00
53.00	0.00	0.000	127.50	0.00	0.00	0.00
53.20	0.00	0.000	127.50	0.00	0.00	0.00
53.40	0.00	0.000	127.50	0.00	0.00	0.00
53.60	0.00	0.000	127.50	0.00	0.00	0.00
53.80	0.00	0.000	127.50	0.00	0.00	0.00
54.00	0.00	0.000	127.50	0.00	0.00	0.00
54.20	0.00	0.000	127.50	0.00	0.00	0.00
54.40	0.00	0.000	127.50	0.00	0.00	0.00
54.60	0.00	0.000	127.50	0.00	0.00	0.00
54.80	0.00	0.000	127.50	0.00	0.00	0.00
55.00	0.00	0.000	127.50	0.00	0.00	0.00
55.20	0.00	0.000	127.50	0.00	0.00	0.00
55.40	0.00	0.000	127.50	0.00	0.00	0.00
55.60	0.00	0.000	127.50	0.00	0.00	0.00
55.80	0.00	0.000	127.50	0.00	0.00	0.00
56.00	0.00	0.000	127.50	0.00	0.00	0.00
56.20	0.00	0.000	127.50	0.00	0.00	0.00
56.40	0.00	0.000	127.50	0.00	0.00	0.00
56.60	0.00	0.000	127.50	0.00	0.00	0.00
56.80	0.00	0.000	127.50	0.00	0.00	0.00
57.00	0.00	0.000	127.50	0.00	0.00	0.00
57.20	0.00	0.000	127.50	0.00	0.00	0.00
57.40	0.00	0.000	127.50	0.00	0.00	0.00
57.60	0.00	0.000	127.50	0.00	0.00	0.00
57.80	0.00	0.000	127.50	0.00	0.00	0.00
58.00	0.00	0.000	127.50	0.00	0.00	0.00
58.20	0.00	0.000	127.50	0.00	0.00	0.00
58.40	0.00	0.000	127.50	0.00	0.00	0.00
58.60	0.00	0.000	127.50	0.00	0.00	0.00
58.80	0.00	0.000	127.50	0.00	0.00	0.00
59.00	0.00	0.000	127.50	0.00	0.00	0.00
59.20	0.00	0.000	127.50	0.00	0.00	0.00
59.40	0.00	0.000	127.50	0.00	0.00	0.00
59.60	0.00	0.000	127.50	0.00	0.00	0.00
59.80	0.00	0.000	127.50	0.00	0.00	0.00
60.00	0.00	0.000	127.50	0.00	0.00	0.00
60.20	0.00	0.000	127.50	0.00	0.00	0.00
60.40	0.00	0.000	127.50	0.00	0.00	0.00
60.60	0.00	0.000	127.50	0.00	0.00	0.00
60.80	0.00	0.000	127.50	0.00	0.00	0.00
61.00	0.00	0.000	127.50	0.00	0.00	0.00
61.20	0.00	0.000	127.50	0.00	0.00	0.00
61.40	0.00	0.000	127.50	0.00	0.00	0.00
61.60	0.00	0.000	127.50	0.00	0.00	0.00
61.80	0.00	0.000	127.50	0.00	0.00	0.00
62.00	0.00	0.000	127.50	0.00	0.00	0.00
62.20	0.00	0.000	127.50	0.00	0.00	0.00

Hydrograph for Pond B: BASIN-B (continued)

Time (hours)	Inflow (cfs)	Storage (acre-feet)	Elevation (feet)	Outflow (cfs)	Discarded (cfs)	Primary (cfs)
62.40	0.00	0.000	127.50	0.00	0.00	0.00
62.60	0.00	0.000	127.50	0.00	0.00	0.00
62.80	0.00	0.000	127.50	0.00	0.00	0.00
63.00	0.00	0.000	127.50	0.00	0.00	0.00
63.20	0.00	0.000	127.50	0.00	0.00	0.00
63.40	0.00	0.000	127.50	0.00	0.00	0.00
63.60	0.00	0.000	127.50	0.00	0.00	0.00
63.80	0.00	0.000	127.50	0.00	0.00	0.00
64.00	0.00	0.000	127.50	0.00	0.00	0.00
64.20	0.00	0.000	127.50	0.00	0.00	0.00
64.40	0.00	0.000	127.50	0.00	0.00	0.00
64.60	0.00	0.000	127.50	0.00	0.00	0.00
64.80	0.00	0.000	127.50	0.00	0.00	0.00
65.00	0.00	0.000	127.50	0.00	0.00	0.00
65.20	0.00	0.000	127.50	0.00	0.00	0.00
65.40	0.00	0.000	127.50	0.00	0.00	0.00
65.60	0.00	0.000	127.50	0.00	0.00	0.00
65.80	0.00	0.000	127.50	0.00	0.00	0.00
66.00	0.00	0.000	127.50	0.00	0.00	0.00
66.20	0.00	0.000	127.50	0.00	0.00	0.00
66.40	0.00	0.000	127.50	0.00	0.00	0.00
66.60	0.00	0.000	127.50	0.00	0.00	0.00
66.80	0.00	0.000	127.50	0.00	0.00	0.00
67.00	0.00	0.000	127.50	0.00	0.00	0.00
67.20	0.00	0.000	127.50	0.00	0.00	0.00
67.40	0.00	0.000	127.50	0.00	0.00	0.00
67.60	0.00	0.000	127.50	0.00	0.00	0.00
67.80	0.00	0.000	127.50	0.00	0.00	0.00
68.00	0.00	0.000	127.50	0.00	0.00	0.00
68.20	0.00	0.000	127.50	0.00	0.00	0.00
68.40	0.00	0.000	127.50	0.00	0.00	0.00
68.60	0.00	0.000	127.50	0.00	0.00	0.00
68.80	0.00	0.000	127.50	0.00	0.00	0.00
69.00	0.00	0.000	127.50	0.00	0.00	0.00
69.20	0.00	0.000	127.50	0.00	0.00	0.00
69.40	0.00	0.000	127.50	0.00	0.00	0.00
69.60	0.00	0.000	127.50	0.00	0.00	0.00
69.80	0.00	0.000	127.50	0.00	0.00	0.00
70.00	0.00	0.000	127.50	0.00	0.00	0.00
70.20	0.00	0.000	127.50	0.00	0.00	0.00
70.40	0.00	0.000	127.50	0.00	0.00	0.00
70.60	0.00	0.000	127.50	0.00	0.00	0.00
70.80	0.00	0.000	127.50	0.00	0.00	0.00
71.00	0.00	0.000	127.50	0.00	0.00	0.00
71.20	0.00	0.000	127.50	0.00	0.00	0.00
71.40	0.00	0.000	127.50	0.00	0.00	0.00
71.60	0.00	0.000	127.50	0.00	0.00	0.00
71.80	0.00	0.000	127.50	0.00	0.00	0.00
72.00	0.00	0.000	127.50	0.00	0.00	0.00
72.20	0.00	0.000	127.50	0.00	0.00	0.00
72.40	0.00	0.000	127.50	0.00	0.00	0.00
72.60	0.00	0.000	127.50	0.00	0.00	0.00

Hydrograph for Pond B: BASIN-B (continued)

Time (hours)	Inflow (cfs)	Storage (acre-feet)	Elevation (feet)	Outflow (cfs)	Discarded (cfs)	Primary (cfs)
72.80	0.00	0.000	127.50	0.00	0.00	0.00
73.00	0.00	0.000	127.50	0.00	0.00	0.00
73.20	0.00	0.000	127.50	0.00	0.00	0.00
73.40	0.00	0.000	127.50	0.00	0.00	0.00
73.60	0.00	0.000	127.50	0.00	0.00	0.00
73.80	0.00	0.000	127.50	0.00	0.00	0.00
74.00	0.00	0.000	127.50	0.00	0.00	0.00
74.20	0.00	0.000	127.50	0.00	0.00	0.00
74.40	0.00	0.000	127.50	0.00	0.00	0.00
74.60	0.00	0.000	127.50	0.00	0.00	0.00
74.80	0.00	0.000	127.50	0.00	0.00	0.00
75.00	0.00	0.000	127.50	0.00	0.00	0.00
75.20	0.00	0.000	127.50	0.00	0.00	0.00
75.40	0.00	0.000	127.50	0.00	0.00	0.00
75.60	0.00	0.000	127.50	0.00	0.00	0.00
75.80	0.00	0.000	127.50	0.00	0.00	0.00
76.00	0.00	0.000	127.50	0.00	0.00	0.00
76.20	0.00	0.000	127.50	0.00	0.00	0.00
76.40	0.00	0.000	127.50	0.00	0.00	0.00
76.60	0.00	0.000	127.50	0.00	0.00	0.00
76.80	0.00	0.000	127.50	0.00	0.00	0.00
77.00	0.00	0.000	127.50	0.00	0.00	0.00
77.20	0.00	0.000	127.50	0.00	0.00	0.00
77.40	0.00	0.000	127.50	0.00	0.00	0.00
77.60	0.00	0.000	127.50	0.00	0.00	0.00
77.80	0.00	0.000	127.50	0.00	0.00	0.00
78.00	0.00	0.000	127.50	0.00	0.00	0.00
78.20	0.00	0.000	127.50	0.00	0.00	0.00
78.40	0.00	0.000	127.50	0.00	0.00	0.00
78.60	0.00	0.000	127.50	0.00	0.00	0.00
78.80	0.00	0.000	127.50	0.00	0.00	0.00
79.00	0.00	0.000	127.50	0.00	0.00	0.00
79.20	0.00	0.000	127.50	0.00	0.00	0.00
79.40	0.00	0.000	127.50	0.00	0.00	0.00
79.60	0.00	0.000	127.50	0.00	0.00	0.00
79.80	0.00	0.000	127.50	0.00	0.00	0.00
80.00	0.00	0.000	127.50	0.00	0.00	0.00
80.20	0.00	0.000	127.50	0.00	0.00	0.00
80.40	0.00	0.000	127.50	0.00	0.00	0.00
80.60	0.00	0.000	127.50	0.00	0.00	0.00
80.80	0.00	0.000	127.50	0.00	0.00	0.00
81.00	0.00	0.000	127.50	0.00	0.00	0.00
81.20	0.00	0.000	127.50	0.00	0.00	0.00
81.40	0.00	0.000	127.50	0.00	0.00	0.00
81.60	0.00	0.000	127.50	0.00	0.00	0.00
81.80	0.00	0.000	127.50	0.00	0.00	0.00
82.00	0.00	0.000	127.50	0.00	0.00	0.00
82.20	0.00	0.000	127.50	0.00	0.00	0.00
82.40	0.00	0.000	127.50	0.00	0.00	0.00
82.60	0.00	0.000	127.50	0.00	0.00	0.00
82.80	0.00	0.000	127.50	0.00	0.00	0.00
83.00	0.00	0.000	127.50	0.00	0.00	0.00

Hydrograph for Pond B: BASIN-B (continued)

Time (hours)	Inflow (cfs)	Storage (acre-feet)	Elevation (feet)	Outflow (cfs)	Discarded (cfs)	Primary (cfs)
83.20	0.00	0.000	127.50	0.00	0.00	0.00
83.40	0.00	0.000	127.50	0.00	0.00	0.00
83.60	0.00	0.000	127.50	0.00	0.00	0.00
83.80	0.00	0.000	127.50	0.00	0.00	0.00
84.00	0.00	0.000	127.50	0.00	0.00	0.00
84.20	0.00	0.000	127.50	0.00	0.00	0.00
84.40	0.00	0.000	127.50	0.00	0.00	0.00
84.60	0.00	0.000	127.50	0.00	0.00	0.00
84.80	0.00	0.000	127.50	0.00	0.00	0.00
85.00	0.00	0.000	127.50	0.00	0.00	0.00
85.20	0.00	0.000	127.50	0.00	0.00	0.00
85.40	0.00	0.000	127.50	0.00	0.00	0.00
85.60	0.00	0.000	127.50	0.00	0.00	0.00
85.80	0.00	0.000	127.50	0.00	0.00	0.00
86.00	0.00	0.000	127.50	0.00	0.00	0.00
86.20	0.00	0.000	127.50	0.00	0.00	0.00
86.40	0.00	0.000	127.50	0.00	0.00	0.00
86.60	0.00	0.000	127.50	0.00	0.00	0.00
86.80	0.00	0.000	127.50	0.00	0.00	0.00
87.00	0.00	0.000	127.50	0.00	0.00	0.00
87.20	0.00	0.000	127.50	0.00	0.00	0.00
87.40	0.00	0.000	127.50	0.00	0.00	0.00
87.60	0.00	0.000	127.50	0.00	0.00	0.00
87.80	0.00	0.000	127.50	0.00	0.00	0.00
88.00	0.00	0.000	127.50	0.00	0.00	0.00
88.20	0.00	0.000	127.50	0.00	0.00	0.00
88.40	0.00	0.000	127.50	0.00	0.00	0.00
88.60	0.00	0.000	127.50	0.00	0.00	0.00
88.80	0.00	0.000	127.50	0.00	0.00	0.00
89.00	0.00	0.000	127.50	0.00	0.00	0.00
89.20	0.00	0.000	127.50	0.00	0.00	0.00
89.40	0.00	0.000	127.50	0.00	0.00	0.00
89.60	0.00	0.000	127.50	0.00	0.00	0.00
89.80	0.00	0.000	127.50	0.00	0.00	0.00
90.00	0.00	0.000	127.50	0.00	0.00	0.00
90.20	0.00	0.000	127.50	0.00	0.00	0.00
90.40	0.00	0.000	127.50	0.00	0.00	0.00
90.60	0.00	0.000	127.50	0.00	0.00	0.00
90.80	0.00	0.000	127.50	0.00	0.00	0.00
91.00	0.00	0.000	127.50	0.00	0.00	0.00
91.20	0.00	0.000	127.50	0.00	0.00	0.00
91.40	0.00	0.000	127.50	0.00	0.00	0.00
91.60	0.00	0.000	127.50	0.00	0.00	0.00
91.80	0.00	0.000	127.50	0.00	0.00	0.00
92.00	0.00	0.000	127.50	0.00	0.00	0.00
92.20	0.00	0.000	127.50	0.00	0.00	0.00
92.40	0.00	0.000	127.50	0.00	0.00	0.00
92.60	0.00	0.000	127.50	0.00	0.00	0.00
92.80	0.00	0.000	127.50	0.00	0.00	0.00
93.00	0.00	0.000	127.50	0.00	0.00	0.00
93.20	0.00	0.000	127.50	0.00	0.00	0.00
93.40	0.00	0.000	127.50	0.00	0.00	0.00

Hydrograph for Pond B: BASIN-B (continued)

Time (hours)	Inflow (cfs)	Storage (acre-feet)	Elevation (feet)	Outflow (cfs)	Discarded (cfs)	Primary (cfs)
93.60	0.00	0.000	127.50	0.00	0.00	0.00
93.80	0.00	0.000	127.50	0.00	0.00	0.00
94.00	0.00	0.000	127.50	0.00	0.00	0.00
94.20	0.00	0.000	127.50	0.00	0.00	0.00
94.40	0.00	0.000	127.50	0.00	0.00	0.00
94.60	0.00	0.000	127.50	0.00	0.00	0.00
94.80	0.00	0.000	127.50	0.00	0.00	0.00
95.00	0.00	0.000	127.50	0.00	0.00	0.00
95.20	0.00	0.000	127.50	0.00	0.00	0.00
95.40	0.00	0.000	127.50	0.00	0.00	0.00
95.60	0.00	0.000	127.50	0.00	0.00	0.00
95.80	0.00	0.000	127.50	0.00	0.00	0.00
96.00	0.00	0.000	127.50	0.00	0.00	0.00
96.20	0.00	0.000	127.50	0.00	0.00	0.00
96.40	0.00	0.000	127.50	0.00	0.00	0.00
96.60	0.00	0.000	127.50	0.00	0.00	0.00
96.80	0.00	0.000	127.50	0.00	0.00	0.00
97.00	0.00	0.000	127.50	0.00	0.00	0.00
97.20	0.00	0.000	127.50	0.00	0.00	0.00
97.40	0.00	0.000	127.50	0.00	0.00	0.00
97.60	0.00	0.000	127.50	0.00	0.00	0.00
97.80	0.00	0.000	127.50	0.00	0.00	0.00
98.00	0.00	0.000	127.50	0.00	0.00	0.00
98.20	0.00	0.000	127.50	0.00	0.00	0.00
98.40	0.00	0.000	127.50	0.00	0.00	0.00
98.60	0.00	0.000	127.50	0.00	0.00	0.00
98.80	0.00	0.000	127.50	0.00	0.00	0.00
99.00	0.00	0.000	127.50	0.00	0.00	0.00
99.20	0.00	0.000	127.50	0.00	0.00	0.00
99.40	0.00	0.000	127.50	0.00	0.00	0.00
99.60	0.00	0.000	127.50	0.00	0.00	0.00
99.80	0.00	0.000	127.50	0.00	0.00	0.00
100.00	0.00	0.000	127.50	0.00	0.00	0.00

APPENDIX I

DRAINAGE AREA MAPS

LEGEND

- TRAVERSE LINE, CENTER LINE OR BASELINE
- RIGHT OF WAY LINE
- PROPERTY LINE
- EDGE OF PAVEMENT
- FACE CURB LINE
- BACK D.C. DEPRESSED CURB
- CHAIN FENCE
- WETLAND LINE
- MUNICIPAL BOUNDARY
- TREELINE
- ELECTRICAL MANHOLE
- WATER MANHOLE
- TELEPHONE MANHOLE
- UNMARKED MANHOLE
- SANITARY MANHOLE
- DRAINAGE MANHOLE
- MAJOR CONTOUR
- MINOR CONTOUR
- × G 29.0 SPOT ELEVATION
- × TC 29.0 TOP OF CURB ELEV.
- × BC 29.0 BOTTOM OF CURB ELEV.
- CATV U/G CABLE TV LINE
- FO FO U/G FIBER OPTIC LINE
- T U/G TELEPHONE LINE
- E E U/G ELECTRIC LINE
- OHW OHW OVERHEAD WIRE
- W W WATER MAIN
- G G GAS MAIN
- S S SAN. SEWER LATERAL
- SAN. SEWER MAIN
- STORM PIPE
- WETLAND MARKER
- TREE
- ROADWAY SIGNS
- TRAFFIC FLOW
- MAILBOX
- TRAFFIC SIGNAL POLE
- POLE MOUNTED LIGHT
- UTILITY POLE
- GUY WIRE
- TRANSFORMER
- FDC FIRE DEPT. CONNECTION
- FIRE HYDRANT
- WV WATER VALVE
- GV GAS VALVE
- CO SANITARY CLEANOUT
- CONCRETE MONUMENT
- CAPPED REBAR/IRON PIPE
- STORM INLET TYPE 'A'
- STORM INLET TYPE 'B'
- STM. DBL. INLET TYPE 'B'
- STORM INLET TYPE 'C'
- STM. DBL. INLET TYPE 'E'
- FLARED END SECTION
- HEADWALL

ABBREVIATIONS

D.C.	= DEPRESSED CURB	DEP	= DEPRESSED
BC	= BOTTOM OF CURB	CL	= CENTERLINE
TC	= TOP OF CURB	PM	= PARKING METER
BOL	= BOLLARD	MHWL	= MEAN HIGH WATERLINE
GRT	= GRATE		
MB	= MAILBOX	MLWL	= MEAN LOW WATERLINE
FF	= FINISH FLOOR		
UV	= UNKNOWN VALVE	TW	= TOP OF WALL
MH	= MANHOLE	BW	= BOTTOM WALL

N 40°19'31" E
525.40'
TO SETBACK LINE
319.45'
N 01°20'00" E
652.60'
S 88°40'00" E
293.88'
S 35°48'00" W
658.20'
S 20°35'00" E
276.10'
S 21°35'00" E
469.75'
N 49°40'29" W
BLOCK LIMIT
40' SETBACK LINE
10' SETBACK LINE
50'
15' MIDDLE JERSEY GAS EASEMENT PER REF. MAP NO. 2A
PER REF. MAP NO. 2A (POSSIBLE OVERLAP)
COMMON DRIVEWAY EASEMENT
FRONT SETBACK LINE
MODIFIED TRANSITION AREA LIMIT
WEST PARK AVENUE (R.O.W. VARIES)

BLOCK 124.63 LOT 30
BLOCK 124.51 LOT 1004
BLOCK 124.63 LOT 30.01 539,546 S.F. 12.386 ACRES VACANT LAND
BLOCK 124.51 LOT 1002
BLOCK 124.51 LOT 1001
BLOCK 124.63 LOT 34.01
LOT 30.01

EO-1 0.05 AC.
EO-2 1.74 AC.
ED-1 0.22 AC.
ED-2 1.69 AC.
ED-3 0.56 AC.
EU-1 9.26 AC.
POA #1
POA #2
EXISTING POND
DP

AtsAO SOIL A/D RATING
PHG SOIL
PLuG SOIL

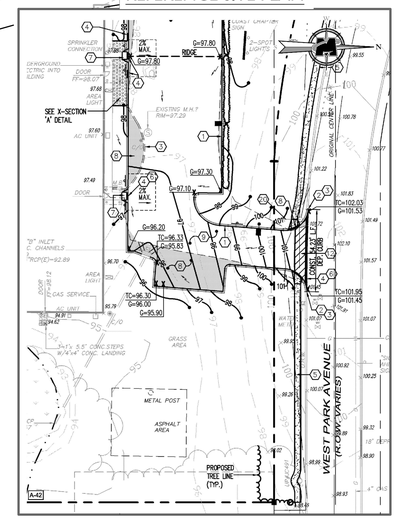
APPROXIMATE LOCATION OF FRESHWATER WETLANDS BUFFER (TYP.)
APPROXIMATE LOCATION OF FRESHWATER WETLANDS (TYP.) (SEE NOTE 2)

SHEET FLOW TOC= 43.2 MIN. SLOPE= 0.0169 FT/FT LENGTH= 100 FT
SHEET FLOW TOC= 29.3 MIN. SLOPE= 0.0960 FT/FT LENGTH= 77 FT
SHALLOW CONCENTRATED FLOW TOC= 20.2 MIN. SLOPE= 0.0165 FT/FT LENGTH= 27 FT
SHALLOW CONCENTRATED FLOW TOC= 21.6 MIN. SLOPE= 0.0313 FT/FT LENGTH= 110 FT
PIPE FLOW TOC= 33.4 MIN. SLOPE= 0.001 FT/FT LENGTH= 140 FT
SHALLOW CONCENTRATED FLOW TOC= 31.8 MIN. SLOPE= 0.001 FT/FT LENGTH= 43 FT
SHEET FLOW TOC= 54.0 MIN. SLOPE= 0.0173 FT/FT LENGTH= 100 FT
SHALLOW CONCENTRATED FLOW TOC= 27.3 MIN. SLOPE= 0.0173 FT/FT LENGTH= 347 FT
SHALLOW CONCENTRATED FLOW TOC= 54.0 MIN. SLOPE= 0.0173 FT/FT LENGTH= 430 FT
SHEET FLOW TOC= 73.4 MIN. SLOPE= 0.0220 FT/FT LENGTH= 100 FT
SHALLOW CONCENTRATED FLOW TOC = 11.9 MIN. SLOPE = 0.0365 FT/FT LENGTH = 60 FT
SHALLOW CONCENTRATED FLOW TOC = 18.5 MIN. SLOPE = 0.0128 FT/FT LENGTH = 628 FT
SHALLOW CONCENTRATED FLOW TOC = 52.6 MIN. SLOPE = 0.0185 FT/FT LENGTH = 1,065 FT

FRESHWATER WETLAND LOCATIONS SHOWN HEREON DELINEATED BY ENVIRONMENTAL MANAGEMENT GROUP, INC. ON DECEMBER 19, 2018 AND SURVEYED BY MASER CONSULTING, P.A. ON JANUARY 10, 2019 AND JANUARY 15, 2019.

FRESHWATER WETLAND LOCATIONS SHOWN HEREON DELINEATED BY ENVIRONMENTAL MANAGEMENT GROUP, INC. ON DECEMBER 19, 2018 AND SURVEYED BY MASER CONSULTING, P.A. ON JANUARY 10, 2019 AND JANUARY 15, 2019.

REFERENCE SITE PLAN



GENERAL NOTES:

1. THE SUBJECT PROPERTY IS KNOWN AS LOT 30.01 IN BLOCK 124.63 AS SHOWN ON SHEET 60 OF THE OFFICIAL TAX MAP OF THE BOROUGH OF TINTON FALLS, MONMOUTH COUNTY, NEW JERSEY, DATED DECEMBER 2005, ADOPTED OCTOBER 2007.
2. THE CENTER OF THE SITE IS LOCATED AT THE FOLLOWING APPROXIMATE LOCATION (STATE PLANE COORDINATES):
   NORTHING: 518,405
   EASTING: 606,910
3. TOPOGRAPHIC INFORMATION SHOWN HEREON IS TAKEN FROM PLANS ENTITLED "TOPOGRAPHIC SURVEY FOR SENIOR HOUSING DEVELOPMENT, LLC TINTON FALLS", SHEETS 2 OF 2, DATED JANUARY 31, 2020, PREPARED BY MASER CONSULTING P.A.. REFERENCE BOUNDARY INFORMATION TAKEN FROM PLAN ENTITLED "BOUNDARY AND TOPOGRAPHIC SURVEY OF TAX MAP LOT 30.01, BLOCK124.63, BOROUGH OF TINTON FALLS, MONMOUTH COUNTY, NEW JERSEY", SHEET 1 OF 1, DATED FEBRUARY 11, 2004, REVISED THROUGH SEPTEMBER 13, 2005, PREPARED BY KENDERIAN ZILINSKI ASSOCIATES.
4. HORIZONTAL DATUM = SURVEY REFERENCE, "BOUNDARY AND TOPOGRAPHIC SURVEY OF TAX MAP LOT 30.01, BLOCK124.63, BOROUGH OF TINTON FALLS, MONMOUTH COUNTY, NEW JERSEY", SHEET 1 OF 1, DATED FEBRUARY 11, 2004, REVISED THROUGH SEPTEMBER 13, 2005, PREPARED BY KENDERIAN ZILINSKI ASSOCIATES.

   VERTICAL DATUM = NORTH AMERICAN VERTICAL DATUM OF 1988 (NAVD 88) BASED ON GPS OBSERVATIONS USING NATIONAL GEODETIC SURVEY MONUMENT STAMPED "TINTON 1" PID (KV6989), ELEVATION 68.64, NAD 1983(1996) AS A BASE STATION. THE CONVERSION FACTOR BETWEEN NAVD 1988 AND NGVD 1929 IS 1.09 FEET (I.E. NAVD 1988 ELEVATION + 1.09 FEET = NGVD 1929 ELEVATION).
5. THE OFFSITE DRAINAGE AREA SHOWN WAS DETERMINED ACCORDING TO THE UNITED STATES GEOLOGICAL SURVEY STREAM STATS DATABASE. ON SITE DRAINAGE AREA WAS DETERMINED BASED UPON TOPOGRAPHIC INFORMATION STATED IN NOTE 3.
4. SURFACE TOPOGRAPHY FOR DRAINAGE AREA EO-2 IS SUPPLEMENTED VIA THE PROVIDED REFERENCED SITE PLAN, TITLED " PRELIMINARY AND FINAL SITE PLANS GRADING AND UTILITY PLAN FOR AMERICAN RED CROSS TAX MAP LOT 30 BLOCK 124.63 BOROUGH OF TINTON FALLS, MONMOUTH COUNTY, NEW JERSEY", SHEET 4 OF 7, PREPARED BY KENDERIAN ZILINSKI ASSOCIATES DATED DECEMBER 20, 2000 REVISED THROUGH OCTOBER 9, 2001.

40 0 40 80
SCALE : 1" = 40'

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1	7/1/20	TL	REVISED PER MUNICIPAL AND FCD COMMENTS

MARK LESCAVAGE
NEW JERSEY PROFESSIONAL ENGINEER - LICENSE NUMBER: GE40346

DRAINAGE AREA MAP

FOR

ALL AMERICAN ASSISTED LIVING OF TINTON FALLS

BLOCK 124.63
LOT 30.01

BOROUGH OF TINTON FALLS
MONMOUTH COUNTY
NEW JERSEY

RED BANK OFFICE
Corporate Headquarters
331 Newman Springs Road
Suite 203
Red Bank, NJ 07701
Phone: 732.383.1950
Fax: 732.383.1964

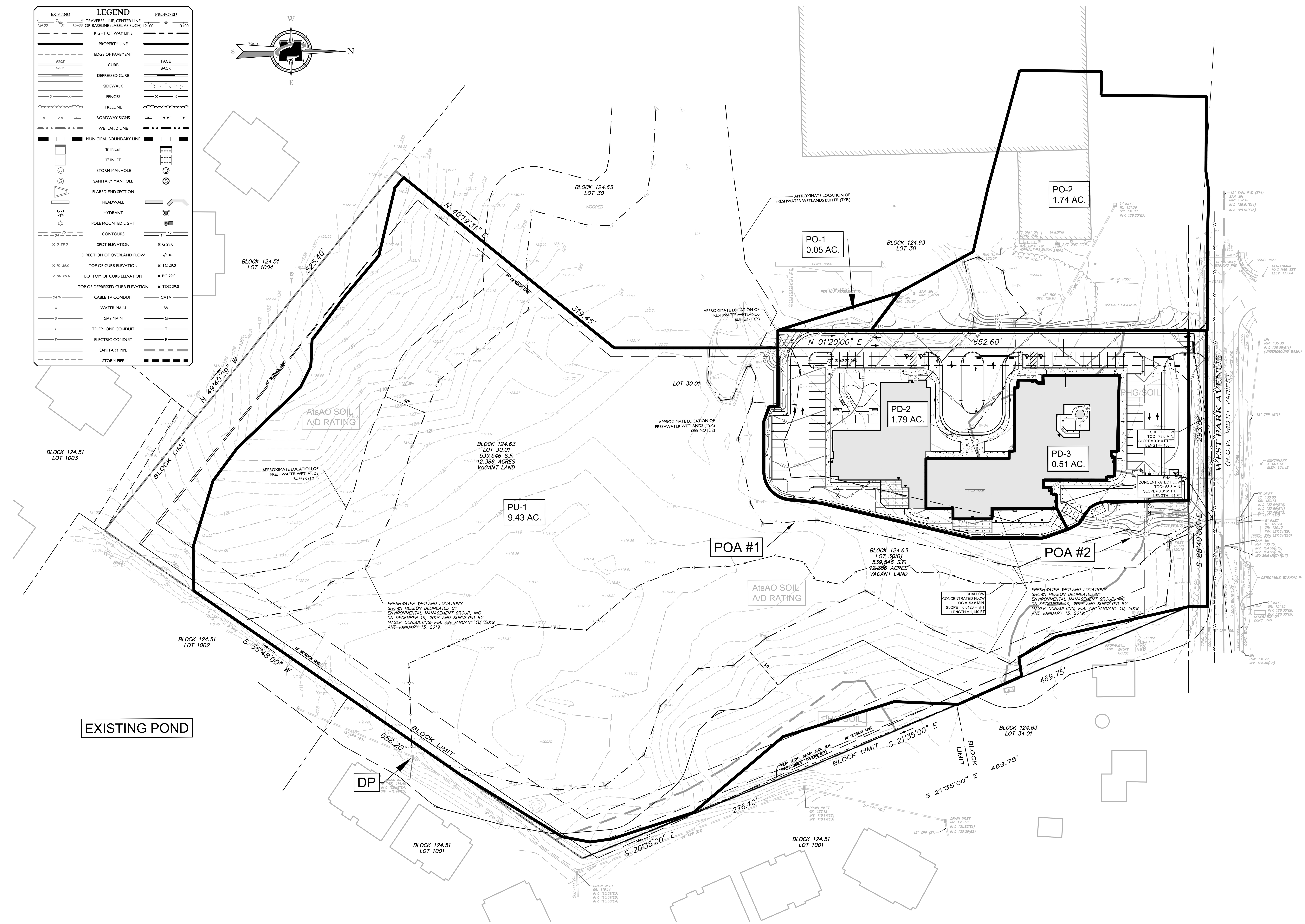
SCALE:	DATE:	DRAWN BY:	CHECKED BY:
AS SHOWN	1/17/20	TL	ML

PROJECT NUMBER: 18006673A
DRAWING NAME: C-DRNG

SHEET TITLE:
EXISTING DRAINAGE AREA MAP

SHEET NUMBER:
1 of 3

J:\18-18006673A\Engineering\Drawings\Maser\C-DRNG.dwg, C-EXIST. DRAINAGE MAP 8a, 7/21/20, 8:46:45 AM, tlescavage



GENERAL NOTES:

1. THE SUBJECT PROPERTY IS KNOWN AS LOT 30.01 IN BLOCK 124.63 AS SHOWN ON SHEET 60 OF THE OFFICIAL TAX MAP OF THE BOROUGH OF TINTON FALLS, MONMOUTH COUNTY, NEW JERSEY, DATED DECEMBER 2005, ADOPTED OCTOBER 2007.

2. THE CENTER OF THE SITE IS LOCATED AT THE FOLLOWING APPROXIMATE LOCATION (STATE PLANE COORDINATES):
   NORTHING: 518,405
   EASTING: 606,910

3. TOPOGRAPHIC INFORMATION SHOWN HEREON IS TAKEN FROM PLANS ENTITLED "TOPOGRAPHIC SURVEY FOR SENIOR HOUSING DEVELOPMENT, LLC TINTON FALLS", SHEETS 2 OF 2, DATED JANUARY 31, 2020, PREPARED BY MASER CONSULTING P.A.. REFERENCE BOUNDARY INFORMATION TAKEN FROM PLAN ENTITLED "BOUNDARY AND TOPOGRAPHIC SURVEY OF TAX MAP LOT 30.01, BLOCK124.63, BOROUGH OF TINTON FALLS, MONMOUTH COUNTY, NEW JERSEY", SHEET 1 OF 1, DATED FEBRUARY 11, 2004, REVISED THROUGH SEPTEMBER 13, 2005, PREPARED BY KENDERIAN ZILINSKI ASSOCIATES.

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5. THE OFFSITE DRAINAGE AREA SHOWN WAS DETERMINED ACCORDING TO THE UNITED STATES GEOLOGICAL SURVEY STREAM STATS DATABASE. ON SITE DRAINAGE AREA WAS DETERMINED BASED UPON TOPOGRAPHIC INFORMATION STATED IN NOTE 3.

MARK LESCAVAGE
NEW JERSEY PROFESSIONAL
ENGINEER - LICENSE NUMBER: GE40346

DRAINAGE AREA MAP

FOR

ALL AMERICAN ASSISTED LIVING OF TINTON FALLS

BLOCK 124.63
LOT 30.01

BOROUGH OF TINTON FALLS
MONMOUTH COUNTY
NEW JERSEY

RED BANK OFFICE
Corporate Headquarters
331 Newman Springs Road
Suite 203
Red Bank, NJ 07701

Phone: 732.383.1950
Fax: 732.383.1984

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18006673A	C-DRNG-PROP

SHEET TITLE:
PROPOSED
DRAINAGE AREA MAP

SHEET NUMBER:
2 of 3

LEGEND

EXISTING		PROPOSED
12+00 PI 13+00	TRAVERSE LINE, CENTER LINE OR BASELINE (LABEL AS SUCH)	12+00 PI 13+00
	RIGHT OF WAY LINE	
	PROPERTY LINE	
	EDGE OF PAVEMENT	
FACE BACK	CURB	FACE BACK
	DEPRESSED CURB	
	SIDEWALK	
X X	FENCES	X X
	TREELINE	
	ROADWAY SIGNS	
	WETLAND LINE	
	MUNICIPAL BOUNDARY LINE	
	'B' INLET	
	'E' INLET	
D	STORM MANHOLE	D
S	SANITARY MANHOLE	S
	FLARED END SECTION	
	HEADWALL	
	HYDRANT	
	POLE MOUNTED LIGHT	
CATV	CABLE TV CONDUIT	CATV
W	WATER MAIN	W
G	GAS MAIN	G
T	TELEPHONE CONDUIT	T
E	ELECTRIC CONDUIT	E
	SANITARY PIPE	
	STORM PIPE	

BLOCK 124.63
LOT 30

LOT 30.01

BLOCK 124.63
LOT 30.01
539,546 S.F.
12.386 ACRES
VACANT LAND

N 01°20'00" E
652.60'

S 88°40'00" E
293.88'

40.0' WIDE ACCESS EASEMENT

COMMON DRIVEWAY EASEMENT

10' SIDE YARD SETBACK

50' FRONT YARD SETBACK

10' SETBACK LINE

24" WIDE STOP BAR

350' LINE OF SIGHTPER TOWNSHIP ORDINANCE SECTION 40-26 UI & 8

APPROXIMATE LOCATION OF FRESHWATER WETLANDS BUFFER (TYP.)

APPROXIMATE LOCATION OF FRESHWATER WETLANDS (TYP.) (SEE NOTE 2)

50' WETLAND BUFFER (TYP.)

4 FT VINYL FENCE

4 FT CHAIN LINK FENCE (TYP.)

RETAINING WALL (TYP.)

BOLLARDS (TYP.)

PATIO

PUTTING GREEN

BENCH (TYP.)

BOCCE COURT

2 STORY ASSISTED LIVING
58 UNITS
58,000 SF ±

BASIN A

BASIN B

A-1 0.24 AC.
A-2 0.33 AC.
A-3 0.24 AC.
A-4 0.19 AC.
A-5 0.02 AC.
A-6 0.13 AC.
A-7 0.12 AC.
A-9 0.18 AC.
A-10 0.23 AC.
A-11 0.03 AC.
A-12 0.07 AC.
A-13 0.03 AC.
A-14 0.04 AC.
A-15 0.49 AC.
A-16 0.01 ACRES
A-16 0.03 ACRES
MEMORIAL SUBSOIL A-17 GRADE 0.01 ACRES

ADS SYSTEM
INFILTRATION
11 ROWS AT 100 LF
30" PERFORATED PIPE
INV. ELEV: 120

ADS SYSTEM
INFILTRATION
2 ROWS AT 60 LF
60" SOLID PIPE
INV. ELEV: 122.5

PROPSOED GREASE TRAP
RIM: 133.37
INV. (IN): 127.30
INV.(OUT): 127.10

WEST PARK AVENUE (R.O.W. WIDTH VARIES)

SAN. DOGHOUSE MH S-15
RIM: +/-131.00
INV.(IN): 125.31 (P-25)
INV.(OUT): 124.81 (E-15)
INV.(OUT): 124.81 (E-15)

BENCHMARK
X-CUT SET
ELEV. 134.4

FRESHWATER WETLAND LOCATIONS SHOWN HEREON DELINEATED BY ENVIRONMENTAL MANAGEMENT GROUP, INC. ON DECEMBER 19, 2018 AND SURVEYED BY MASER CONSULTING, P.A. ON JANUARY 10, 2019 AND JANUARY 15, 2019.

AtsAO SOIL
A/D RATING

SCALE : 1" = 20'

GENERAL NOTES:

1. THE SUBJECT PROPERTY IS KNOWN AS LOT 30.01 IN BLOCK 124.63 AS SHOWN ON SHEET 60 OF THE OFFICIAL TAX MAP OF THE BOROUGH OF TINTON FALLS, MONMOUTH COUNTY, NEW JERSEY, DATED DECEMBER 2005, ADOPTED OCTOBER 2007.

2. THE CENTER OF THE SITE IS LOCATED AT THE FOLLOWING APPROXIMATE LOCATION (STATE PLANE COORDINATES):
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REV	DATE	DRAWN BY	DESCRIPTION
1	7/1/20	TL	REVISED PER MUNICIPAL AND RSDG COMMENTS

MARK LESCAVAGE
NEW JERSEY PROFESSIONAL ENGINEER - LICENSE NUMBER: GE40346

DRAINAGE AREA MAP

FOR

ALL AMERICAN ASSISTED LIVING OF TINTON FALLS

BLOCK 124.63
LOT 30.01

BOROUGH OF TINTON FALLS
MONMOUTH COUNTY
NEW JERSEY

RED BANK OFFICE
Corporate Headquarters
331 Newman Springs Road
Suite 203
Red Bank, NJ 07701
Phone: 732.383.1950
Fax: 732.383.1984

SCALE:	DATE:	DRAWN BY:	CHECKED BY:
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PROJECT NUMBER: 18006673A
DRAWING NAME: C-DRNG-INLET

SHEET TITLE:
PROPOSED INLET DRAINAGE AREA MAP

SHEET NUMBER:
3 of 3

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