

STORMWATER MANAGEMENT REPORT

for:

Rockefeller Group Logistics at Eastampton

Block(s): 800

Lot(s): 9.03

Township of Eastampton

Burlington County, New Jersey

Prepared By:

Menlo Engineering Associates, Inc
261 Cleveland Avenue
Highland Park, New Jersey 08904
T.: 732.846.8585
F.: 732.846.9439

Under the Immediate Supervision of:



Scott H. Turner
NJPE# 43811

ST/MM/hc
MEA # 2020.014
Dated: January 12, 2021
Revised: April 22, 2021



O:\Documents\2020\2020.014\SWM\2020.014-STORMWATER MANAGEMENT REPORT.docx

CONTENTS

INTRODUCTION	1
CRITERIA	1
PROJECT LOCATION AND DESCRIPTION	1
USGS Map	2
Soils Map	3
Road Map	4
STORMWATER MANAGEMENT PLAN AND DESIGN	5
Summary of the Runoff Analysis	5
Summary Tables	5
Summary of the Groundwater Recharge Analysis	6
Summary of the Water Quality Analysis	6
APPENDIX A: Existing Conditions	A1-A13
APPENDIX B: Proposed Conditions	B1-B41
APPENDIX C: Pipe Calculations	C1-C10
APPENDIX D: Infiltration Calculations	D1-D5
APPENDIX E: Water Quality Calculations	E1-D11
APPENDIX F: LID Checklist	F1-F13
DRAINAGE AREA MAPS	EDA-PDA

INTRODUCTION

The following Stormwater Management Report details the design of the stormwater management plan for a proposed 345,600 located in Eastampton Township, Burlington County, New Jersey and has been prepared by Menlo Engineering Associates, Inc. in accordance with the standards of Eastampton Township, the County of Burlington, the New Jersey Soil Conservation Service, and the New Jersey Department of Environmental Protection. This report supplements, and should be reviewed in conjunction with, the project development plans prepared by Menlo Engineering Associates, Inc.

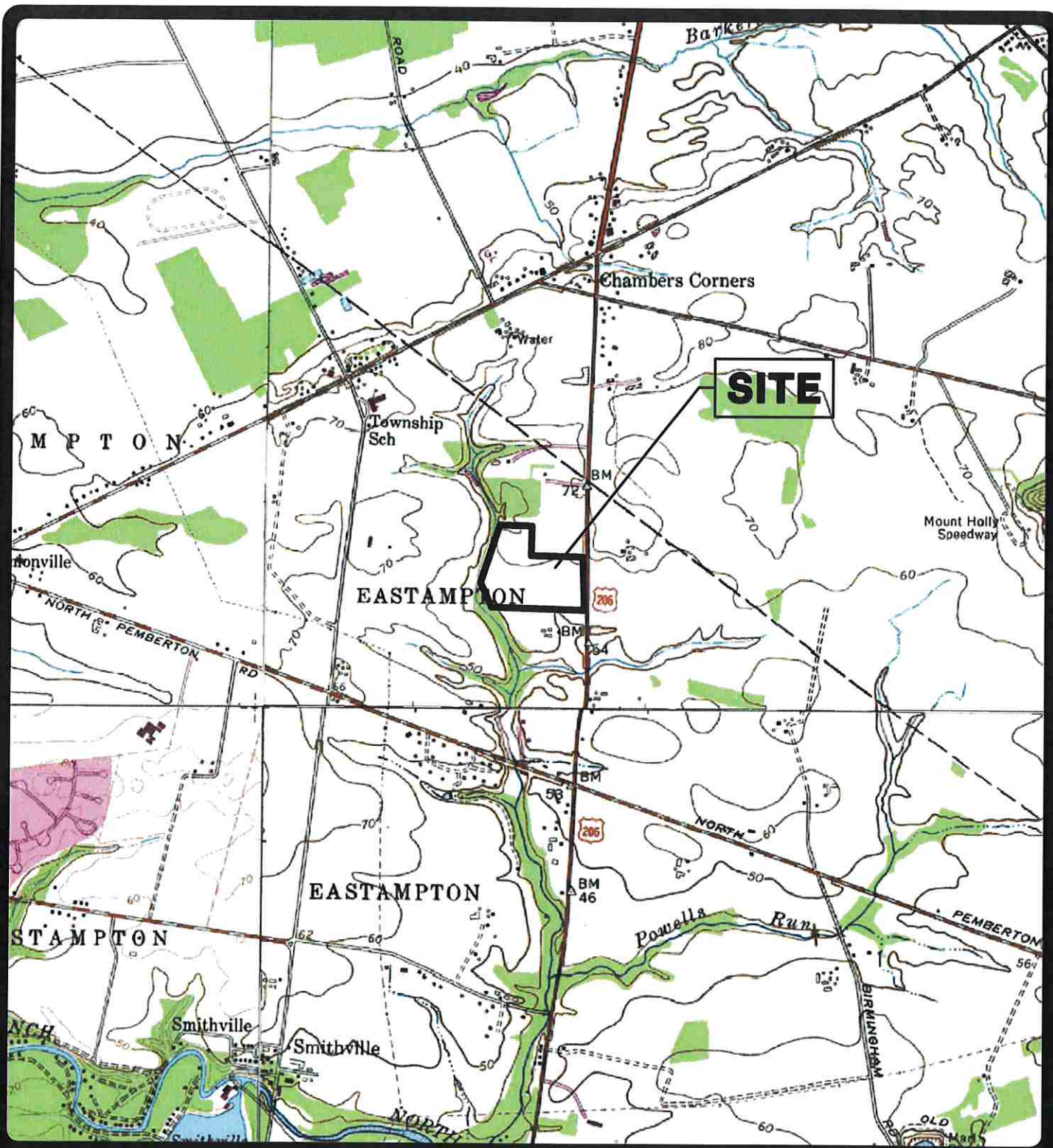
It is the intent of this report to aid and assist Engineers at the Municipal, County, and State levels in evaluating the drainage calculations and considerations incorporated in the design as shown on the plans submitted. This office will readily respond to questions and requests for additional calculations or verification of the proposed design by Municipal, County, or State Engineers, and will be responsive to their suggestions and modifications to the design in conformance to the applicable codes in the interest of land use control consistent with environmental protection.

CRITERIA

In the hydraulic designs involved in this project, the drainage areas have been determined by electronic digitizer from the U.S.G.S. Quadrangle map, topographic survey prepared by Control Layouts Inc. and field observations to determine basin limits and off-site and on-site areas. The Soil Conservation Service Soil Survey maps are used for hydrological soil group classification. Existing and proposed conditions are calculated for the 2, 10, 25 and 100-year flows. On-site storm sewer collection systems were sized for the 25-year storm and employed the Rational Method for design calculations.

PROJECT LOCATION & DESCRIPTION

This report examines the drainage characteristics and designs for a 27.8-acre tract of land situated in Eastampton Township, Burlington County, New Jersey. The applicant proposes to construct a 345,600 square foot warehouse building and its associated parking and loading. Access to the site is provided from US Route 206 via two (2) access drives.



U.S.G.S. MAP

Quad Name: Columbus
 Eastampton Township
 Burlington County

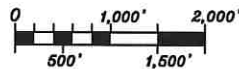


BLOCK
800

LOT
9.03

MENLO ENGINEERING ASSOCIATES, INC.
 261 CLEVELAND AVENUE
 HIGHLAND PARK, NJ 08904
 (732) 846-8585

State Plane Coordinates:
 N: 426,875.33 ft.
 E: 426,045.54 ft.



Scale: 1"=2,000±ft Job # 2020.014

Hydrologic Soil Group—Burlington County, New Jersey



Soil Map may not be valid at this scale.

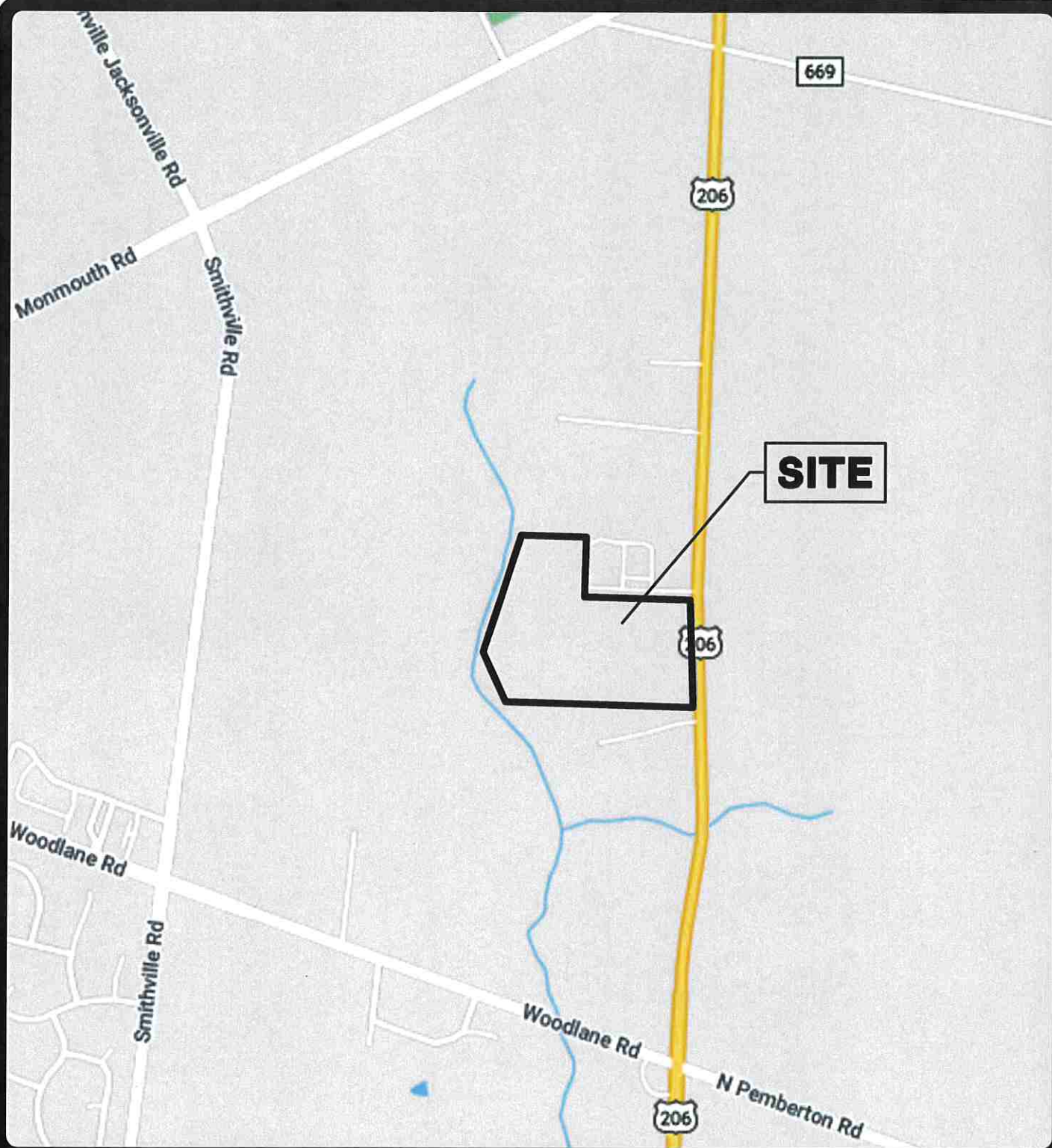
Map Scale: 1:3,170 if printed on A landscape (11" x 8.5") sheet.



Map projection: Web Mercator Corner coordinates: WGS84 Edge tics: UTM Zone 18N WGS84

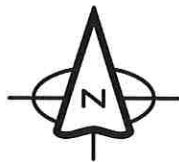
Hydrologic Soil Group

Map unit symbol	Map unit name	Rating	Acres in AOI	Percent of AOI
AdmA	Adelphia fine sandy loam, 0 to 2 percent slopes	C	15.7	52.9%
ComB	Collington fine sandy loam, 2 to 5 percent slopes	B	12.5	42.1%
FmhAt	Fluvaquents, loamy, 0 to 3 percent slopes, frequently flooded	B/D	1.5	4.9%
Totals for Area of Interest			29.6	100.0%



ROAD MAP

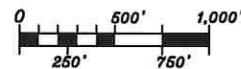
Eastampton Township
Burlington County



BLOCK
800

LOT
9.03

MENLO ENGINEERING ASSOCIATES, INC.
261 CLEVELAND AVENUE
HIGHLAND PARK, NJ 08904
(732) 846-8585



Scale: 1"=1,000±ft Job # 2020.014

STORMWATER MANAGEMENT PLAN & DESIGN

The guidelines for hydraulic design, as prepared by the Soil Conservation District, Eastampton Township, Burlington County and the New Jersey Department of Environmental Protection have been utilized for the drainage design of this project. The purpose of the drainage design is for the post-development peak drainage flow pattern to continue, as it exists today.

The stormwater management plan for the site is to construct a stormwater collection system that will convey runoff in the proposed condition to a permanent pond retention facility on the western portion of the site. These facilities have been designed in accordance with the applicable standards utilizing the Rational Method for pipe capacity calculations and TR-20 method for basin routing. All required reductions are met.

Summary of the Runoff Analysis:

The 27.8-acre parcel is currently developed as a cultivated farm. The existing drainage pattern drains generally from the north to the southern and eastern site boundaries. All runoff from the site ends up in Powell Run.

Summary Tables:

The following tables summarize the reduction of runoff for the 2, 10, 25, and 100-year storm events:

EXISTING & PROPOSED CONDITIONS

STORM	EXISTING RUNOFF FROM EDA-1A (CFS)	TOTAL FLOW FROM UNDETAIN NORTH-WEST & LINE C (CFS)
100	23.84	23.56
25	15.62	14.22
10	11.34	9.65
2	5.60	4.08

STORM	EXISTING RUNOFF FROM EDA-1B (CFS)	TOTAL FLOW FROM UNDETAIN SOUTH-WEST & WETPOND (CFS)	FLOW REDUCTION (%)
100	45.97	29.82	35.1
25	31.39	17.64	43.8
10	23.55	12.83	45.5
2	12.52	5.82	53.5

STORM	EXISTING RUNOFF FROM EDA-2 (CFS)	UNDETAIN FROM SOUTH-EAST & LINE D (CFS)
100	71.77	7.84
25	49.75	5.15
10	37.91	3.74
2	21.22	1.86

Summary of the Groundwater Recharge Analysis:

The following tables summarizes the groundwater recharge rates:

Pre-Developed Condition
 Total Annual Recharge (cf) = 1,149,250

Post Development Conditions
 Annual Recharge Deficit (cf) = 604,438
 Annual Recharge Provided (cf) = 615,469

In accordance with N.J.A.C. 7:8-5.6(b)1, the infiltration of the building roof runoff by an infiltration trench will meet the post development ground water recharge deficit (See Appendix D for the spreadsheet).

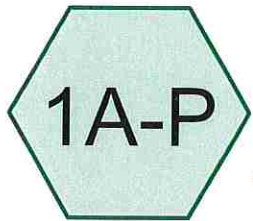
Summary of the Water Quality Analysis:

Wet Pond achieves water quality through the requirements of the New Jersey Best Management Practices (BMP) Manual, section 9.11. A TSS removal rate of 90% is achieved through a detention time of more than 24 hours. (See Appendix E for detailed calculations).

Summary of the Low Impact Development Strategies:

Low Impact Development Strategies have been utilized throughout the design meeting the intent of the regulations. The Low Impact Development Checklist is included as Appendix F of this report.

APPENDIX A: EXISTING CONDITIONS



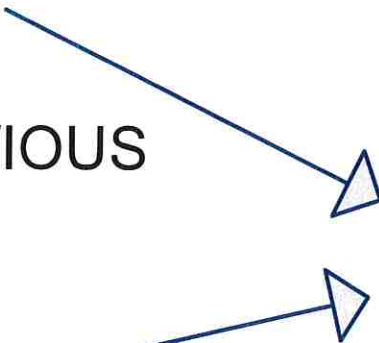
EDA-1A PERVIOUS



EDA-1A IMPERVIOUS



EDA-1A



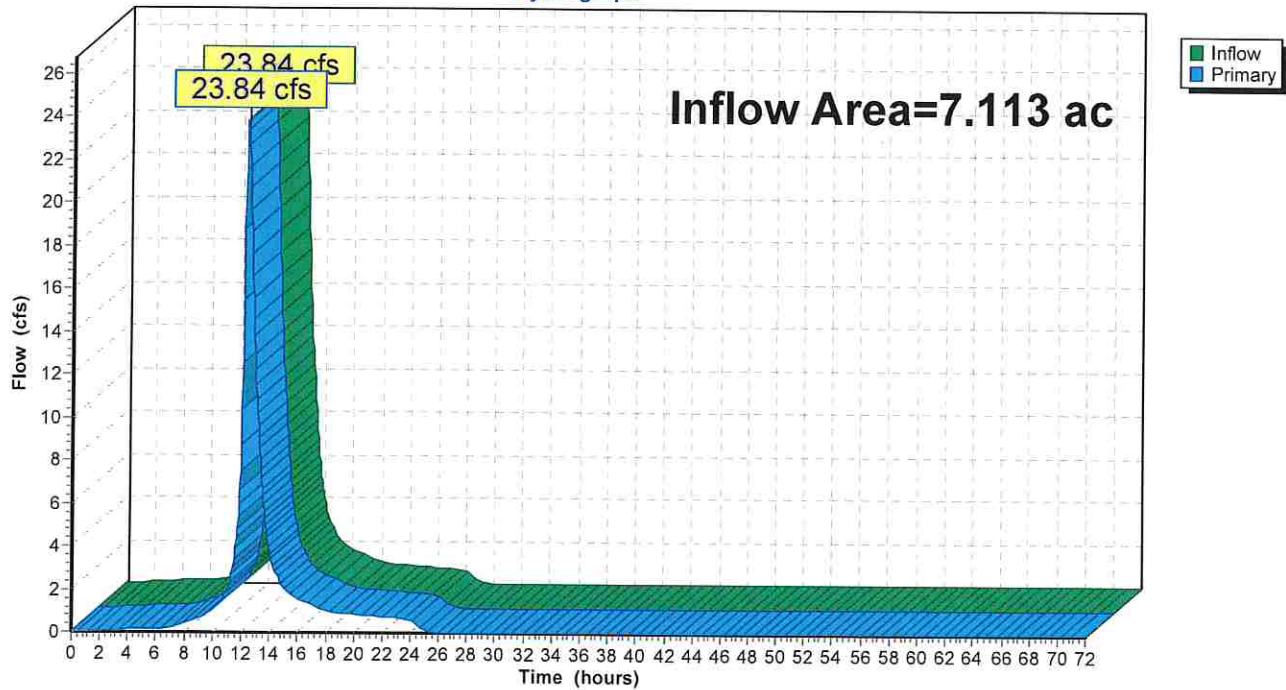
Summary for Link 1A: EDA-1A

Inflow Area = 7.113 ac, 17.71% Impervious, Inflow Depth = 6.27" for 100-Year event
Inflow = 23.84 cfs @ 12.35 hrs, Volume= 3.718 af
Primary = 23.84 cfs @ 12.35 hrs, Volume= 3.718 af, Atten= 0%, Lag= 0.0 min

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

Link 1A: EDA-1A

Hydrograph



Summary for Subcatchment 1A-I: EDA-1A IMPERVIOUS

Runoff = 5.28 cfs @ 12.34 hrs, Volume= 0.900 af, Depth= 8.57"

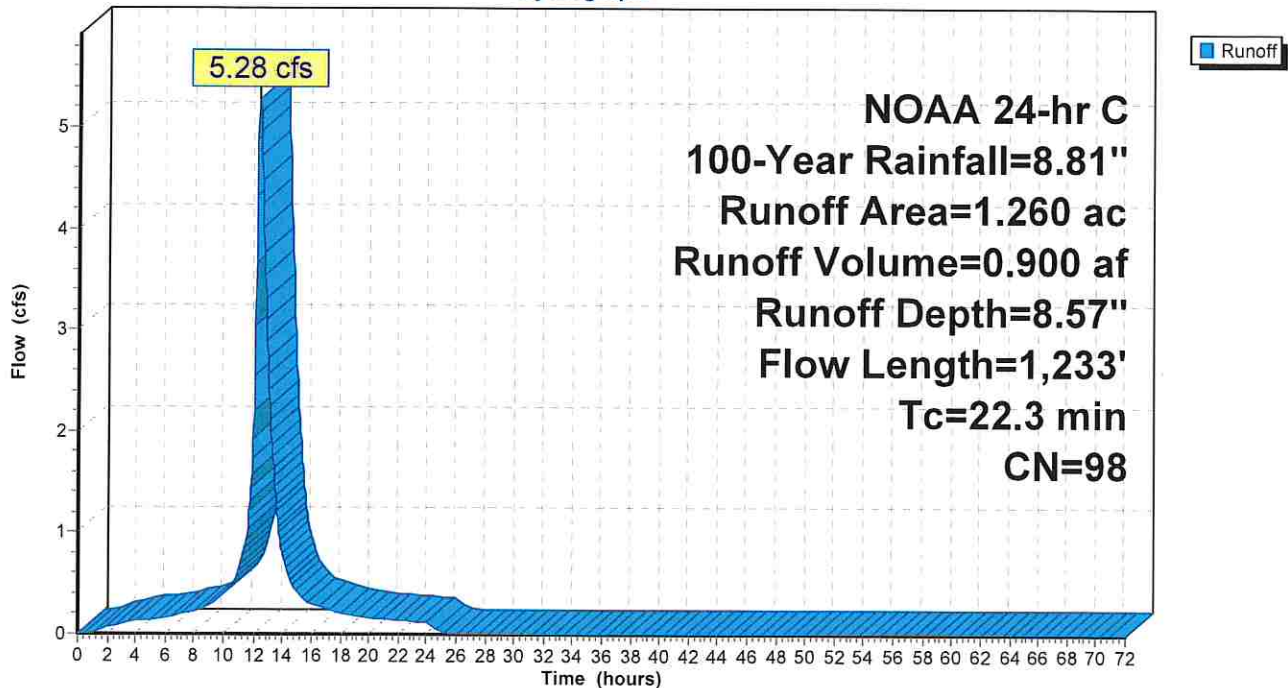
Runoff by SCS TR-20 method, UH=Delmarva, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
 NOAA 24-hr C 100-Year Rainfall=8.81"

Area (ac)	CN	Description
1.260	98	Paved parking, HSG B
1.260	98	100.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
9.6	100	0.0200	0.17		Sheet Flow, Grass: Short n= 0.150 P2= 3.36"
1.9	245	0.0200	2.12		Shallow Concentrated Flow, Grassed Waterway Kv= 15.0 fps
3.1	333	0.0040	1.77	19.42	Channel Flow, Area= 11.0 sf Perim= 26.0' r= 0.42' n= 0.030 Stream, clean & straight
7.7	555	0.0180	1.21		Shallow Concentrated Flow, Cultivated Straight Rows Kv= 9.0 fps
22.3	1,233	Total			

Subcatchment 1A-I: EDA-1A IMPERVIOUS

Hydrograph



Summary for Subcatchment 1A-P: EDA-1A PERVIOUS

Runoff = 18.56 cfs @ 12.36 hrs, Volume= 2.818 af, Depth= 5.78"

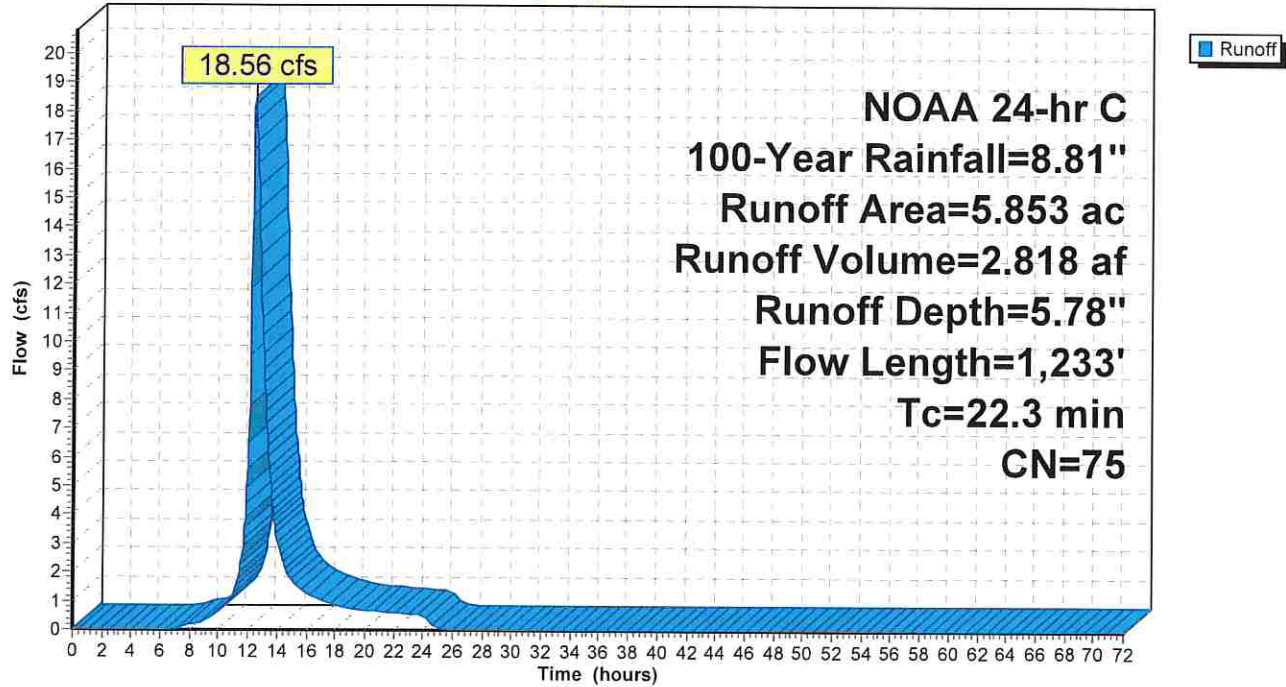
Runoff by SCS TR-20 method, UH=Delmarva, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
 NOAA 24-hr C 100-Year Rainfall=8.81"

Area (ac)	CN	Description
0.851	61	>75% Grass cover, Good, HSG B
1.027	55	Woods, Good, HSG B
3.975	83	Fallow, crop residue, Good, HSG B
5.853	75	Weighted Average
5.853	75	100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
9.6	100	0.0200	0.17		Sheet Flow, Grass: Short n= 0.150 P2= 3.36"
1.9	245	0.0200	2.12		Shallow Concentrated Flow, Grassed Waterway Kv= 15.0 fps
3.1	333	0.0040	1.77	19.42	Channel Flow, Area= 11.0 sf Perim= 26.0' r= 0.42' n= 0.030 Stream, clean & straight
7.7	555	0.0180	1.21		Shallow Concentrated Flow, Cultivated Straight Rows Kv= 9.0 fps
22.3	1,233	Total			

Subcatchment 1A-P: EDA-1A PERVIOUS

Hydrograph



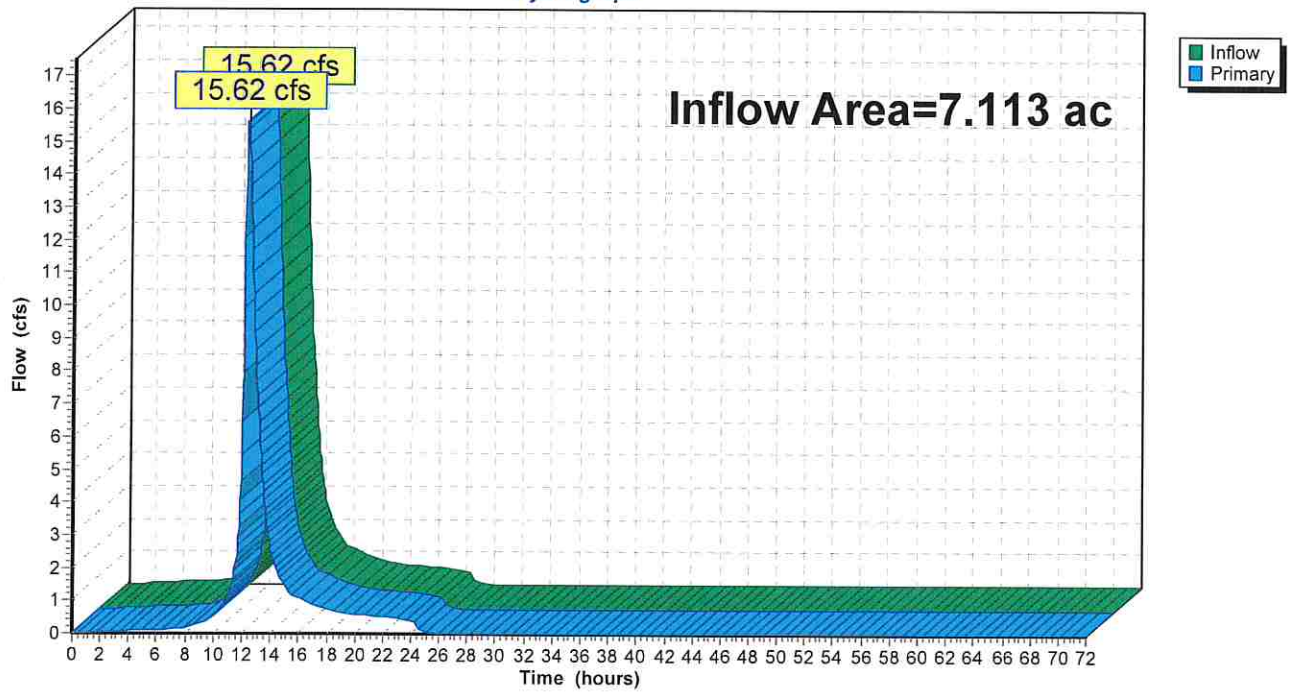
Summary for Link 1A: EDA-1A

Inflow Area = 7.113 ac, 17.71% Impervious, Inflow Depth = 4.12" for 25-Year event
Inflow = 15.62 cfs @ 12.36 hrs, Volume= 2.442 af
Primary = 15.62 cfs @ 12.36 hrs, Volume= 2.442 af, Atten= 0%, Lag= 0.0 min

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

Link 1A: EDA-1A

Hydrograph



Summary for Subcatchment 1A-I: EDA-1A IMPERVIOUS

Runoff = 3.86 cfs @ 12.34 hrs, Volume= 0.652 af, Depth= 6.21"

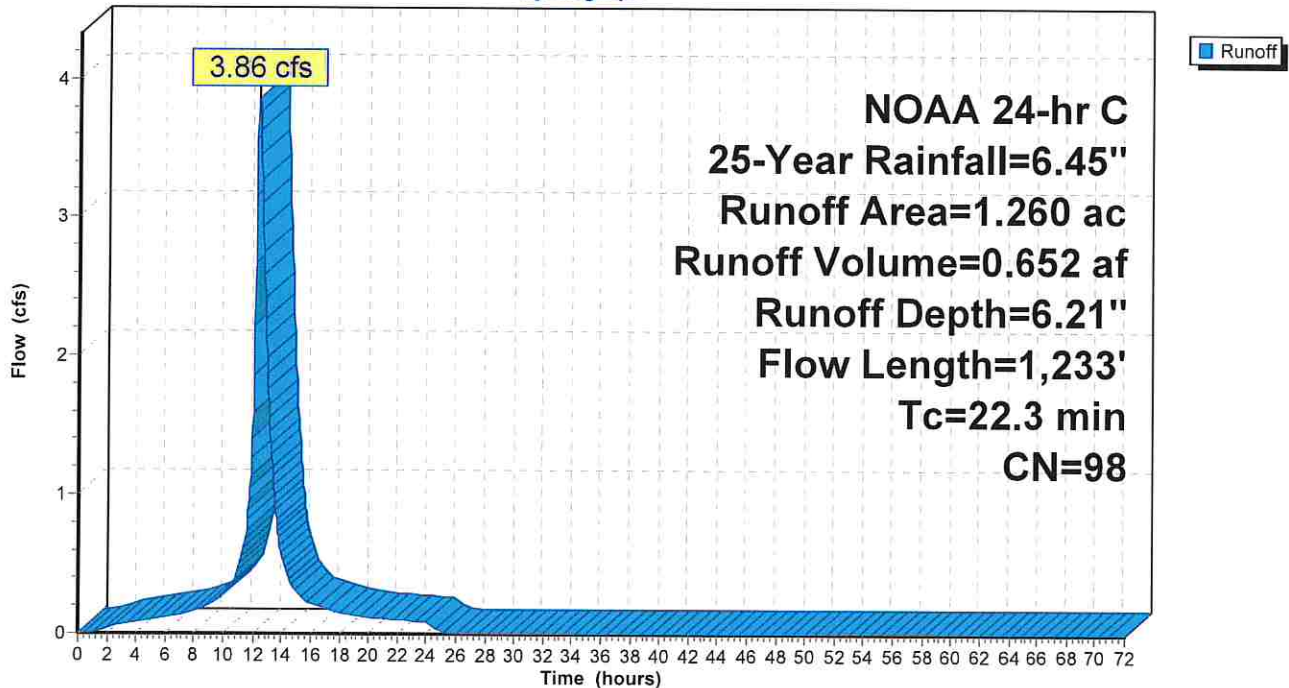
Runoff by SCS TR-20 method, UH=Delmarva, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
 NOAA 24-hr C 25-Year Rainfall=6.45"

Area (ac)	CN	Description
1.260	98	Paved parking, HSG B
1.260	98	100.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
9.6	100	0.0200	0.17		Sheet Flow, Grass: Short n= 0.150 P2= 3.36"
1.9	245	0.0200	2.12		Shallow Concentrated Flow, Grassed Waterway Kv= 15.0 fps
3.1	333	0.0040	1.77	19.42	Channel Flow, Area= 11.0 sf Perim= 26.0' r= 0.42' n= 0.030 Stream, clean & straight
7.7	555	0.0180	1.21		Shallow Concentrated Flow, Cultivated Straight Rows Kv= 9.0 fps
22.3	1,233	Total			

Subcatchment 1A-I: EDA-1A IMPERVIOUS

Hydrograph



Summary for Subcatchment 1A-P: EDA-1A PERVIOUS

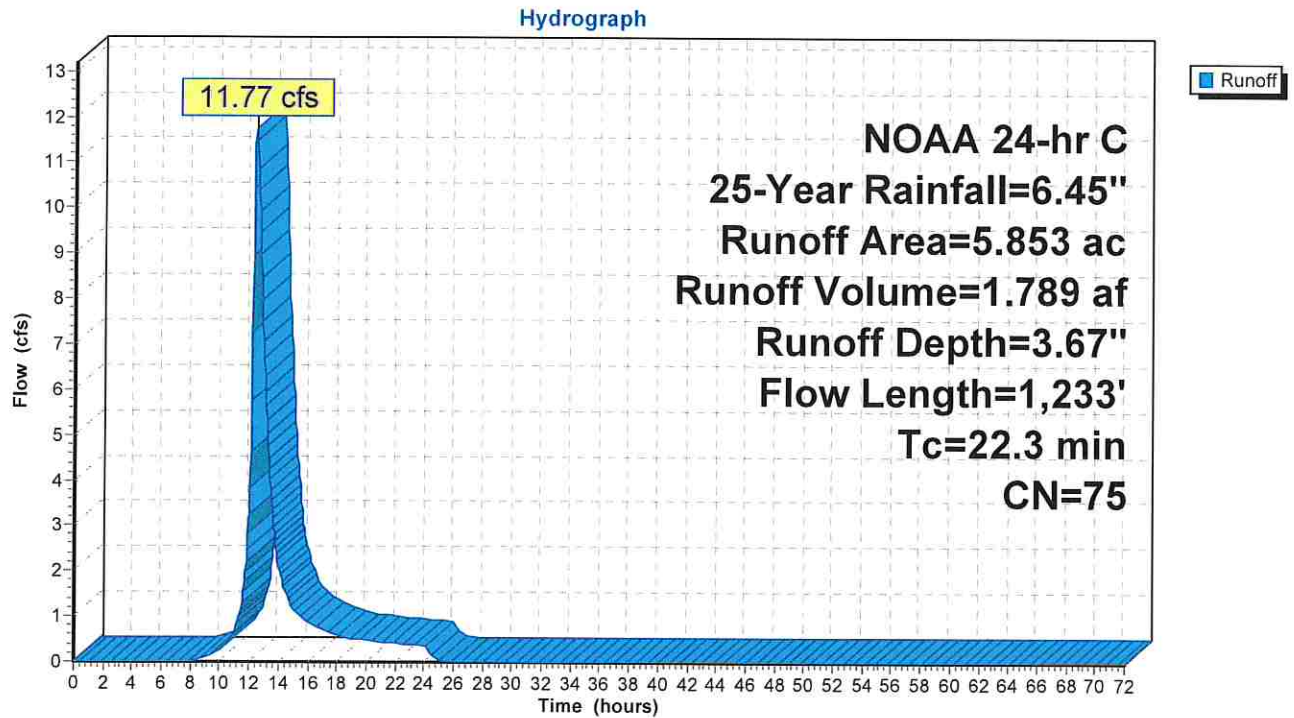
Runoff = 11.77 cfs @ 12.36 hrs, Volume= 1.789 af, Depth= 3.67"

Runoff by SCS TR-20 method, UH=Delmarva, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
 NOAA 24-hr C 25-Year Rainfall=6.45"

Area (ac)	CN	Description
0.851	61	>75% Grass cover, Good, HSG B
1.027	55	Woods, Good, HSG B
3.975	83	Fallow, crop residue, Good, HSG B
5.853	75	Weighted Average
5.853	75	100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
9.6	100	0.0200	0.17		Sheet Flow, Grass: Short n= 0.150 P2= 3.36"
1.9	245	0.0200	2.12		Shallow Concentrated Flow, Grassed Waterway Kv= 15.0 fps
3.1	333	0.0040	1.77	19.42	Channel Flow, Area= 11.0 sf Perim= 26.0' r= 0.42' n= 0.030 Stream, clean & straight
7.7	555	0.0180	1.21		Shallow Concentrated Flow, Cultivated Straight Rows Kv= 9.0 fps
22.3	1,233	Total			

Subcatchment 1A-P: EDA-1A PERVIOUS



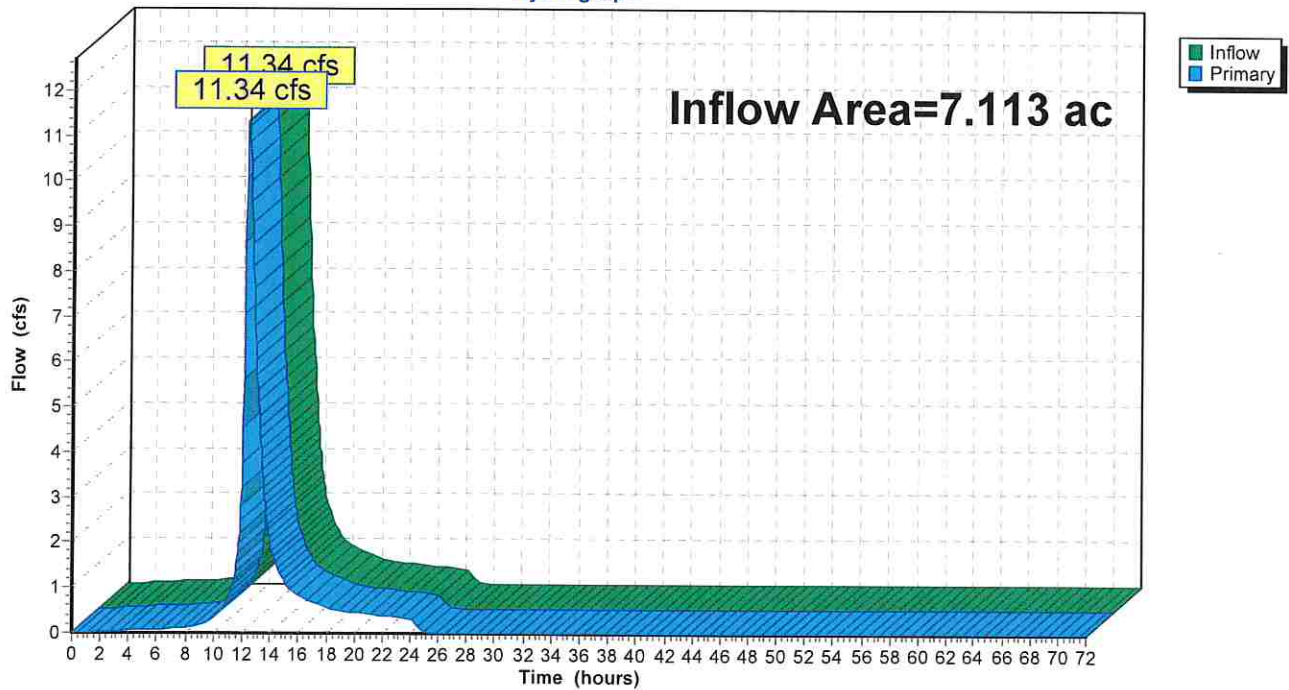
Summary for Link 1A: EDA-1A

Inflow Area = 7.113 ac, 17.71% Impervious, Inflow Depth = 3.01" for 10-Year event
Inflow = 11.34 cfs @ 12.36 hrs, Volume= 1.785 af
Primary = 11.34 cfs @ 12.36 hrs, Volume= 1.785 af, Atten= 0%, Lag= 0.0 min

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

Link 1A: EDA-1A

Hydrograph



Summary for Subcatchment 1A-I: EDA-1A IMPERVIOUS

Runoff = 3.09 cfs @ 12.34 hrs, Volume= 0.519 af, Depth= 4.94"

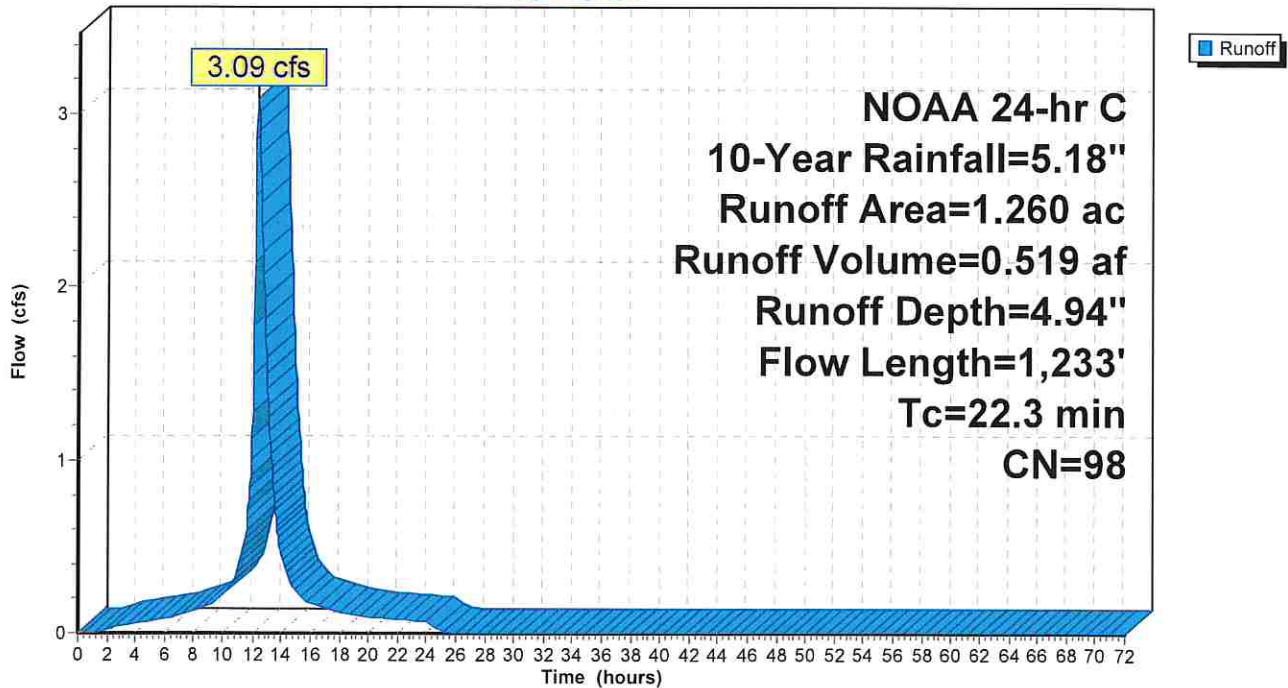
Runoff by SCS TR-20 method, UH=Delmarva, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
 NOAA 24-hr C 10-Year Rainfall=5.18"

Area (ac)	CN	Description
1.260	98	Paved parking, HSG B
1.260	98	100.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
9.6	100	0.0200	0.17		Sheet Flow, Grass: Short n= 0.150 P2= 3.36"
1.9	245	0.0200	2.12		Shallow Concentrated Flow, Grassed Waterway Kv= 15.0 fps
3.1	333	0.0040	1.77	19.42	Channel Flow, Area= 11.0 sf Perim= 26.0' r= 0.42' n= 0.030 Stream, clean & straight
7.7	555	0.0180	1.21		Shallow Concentrated Flow, Cultivated Straight Rows Kv= 9.0 fps
22.3	1,233	Total			

Subcatchment 1A-I: EDA-1A IMPERVIOUS

Hydrograph



Summary for Subcatchment 1A-P: EDA-1A PERVIOUS

Runoff = 8.25 cfs @ 12.37 hrs, Volume= 1.266 af, Depth= 2.60"

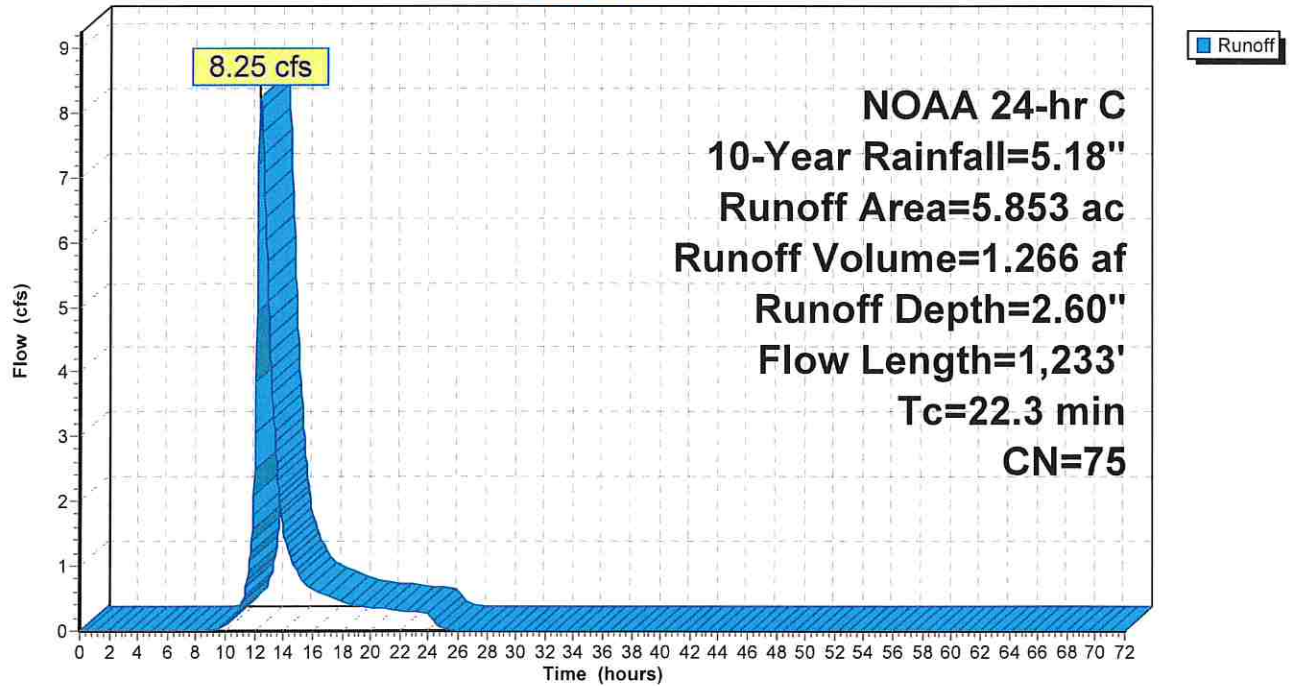
Runoff by SCS TR-20 method, UH=Delmarva, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
NOAA 24-hr C 10-Year Rainfall=5.18"

Area (ac)	CN	Description
0.851	61	>75% Grass cover, Good, HSG B
1.027	55	Woods, Good, HSG B
3.975	83	Fallow, crop residue, Good, HSG B
5.853	75	Weighted Average
5.853	75	100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
9.6	100	0.0200	0.17		Sheet Flow, Grass: Short n= 0.150 P2= 3.36"
1.9	245	0.0200	2.12		Shallow Concentrated Flow, Grassed Waterway Kv= 15.0 fps
3.1	333	0.0040	1.77	19.42	Channel Flow, Area= 11.0 sf Perim= 26.0' r= 0.42' n= 0.030 Stream, clean & straight
7.7	555	0.0180	1.21		Shallow Concentrated Flow, Cultivated Straight Rows Kv= 9.0 fps
22.3	1,233	Total			

Subcatchment 1A-P: EDA-1A PERVIOUS

Hydrograph



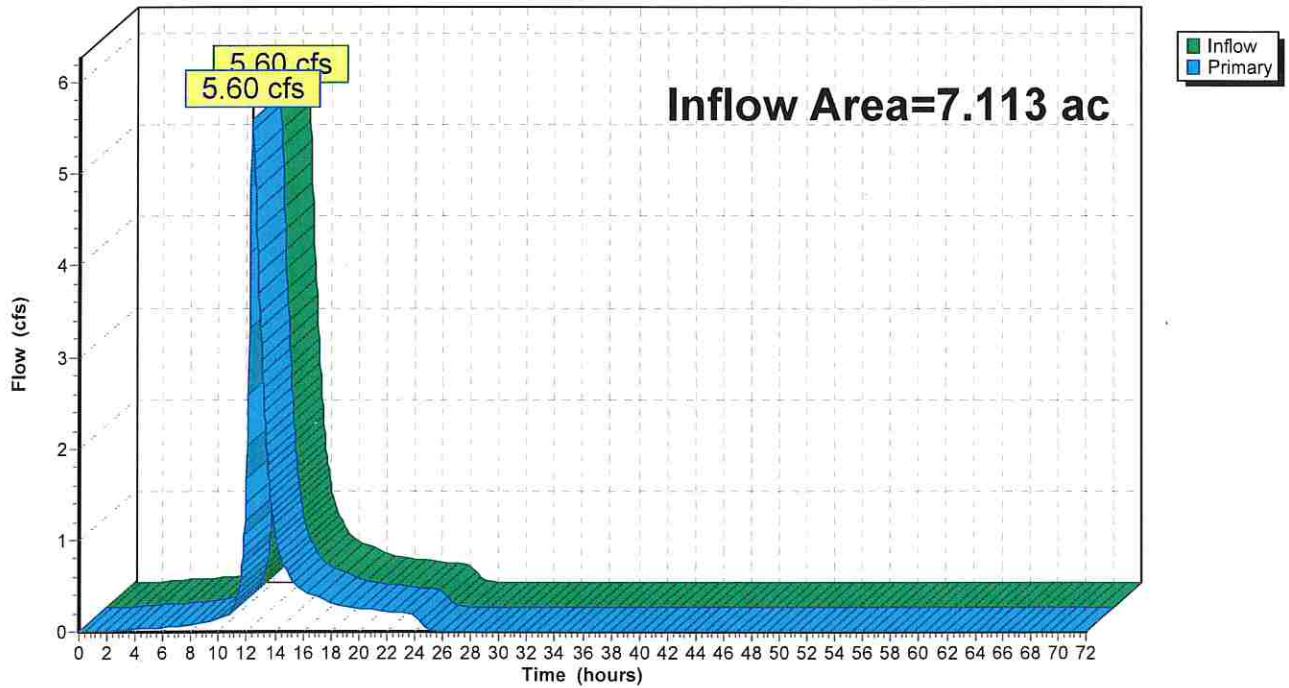
Summary for Link 1A: EDA-1A

Inflow Area = 7.113 ac, 17.71% Impervious, Inflow Depth = 1.54" for 2-Year event
Inflow = 5.60 cfs @ 12.37 hrs, Volume= 0.915 af
Primary = 5.60 cfs @ 12.37 hrs, Volume= 0.915 af, Atten= 0%, Lag= 0.0 min

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

Link 1A: EDA-1A

Hydrograph



Summary for Subcatchment 1A-I: EDA-1A IMPERVIOUS

Runoff = 1.99 cfs @ 12.34 hrs, Volume= 0.328 af, Depth= 3.13"

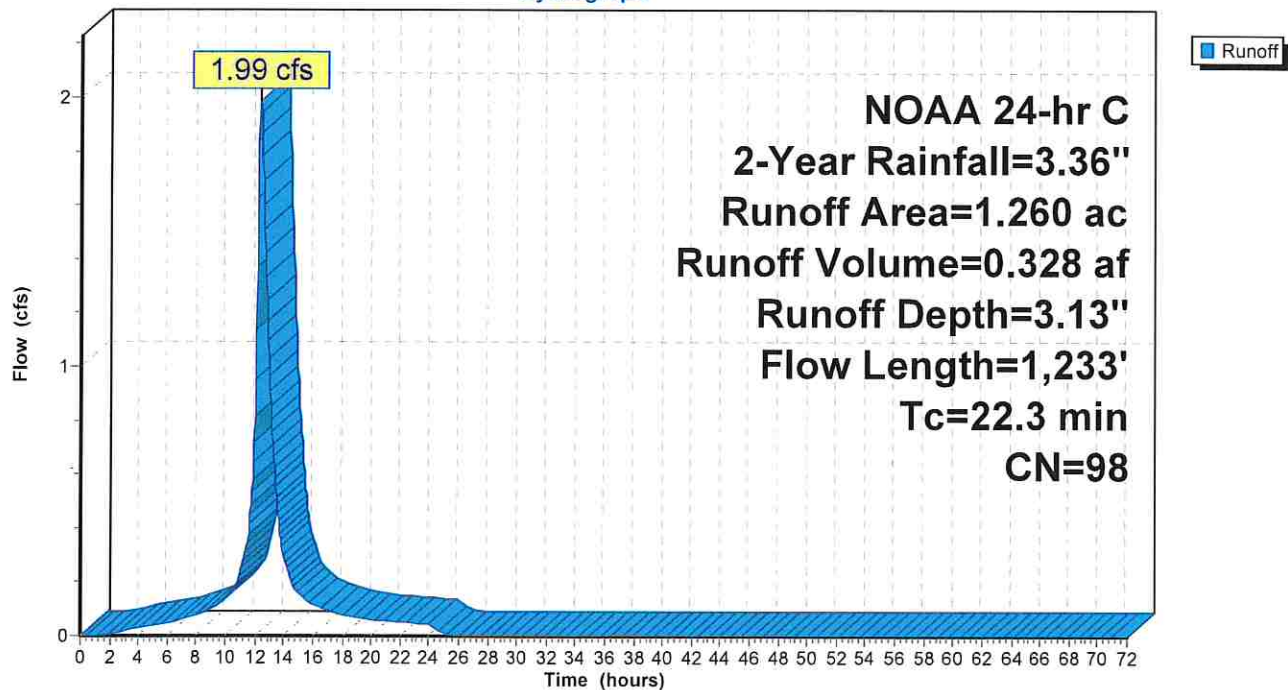
Runoff by SCS TR-20 method, UH=Delmarva, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
 NOAA 24-hr C 2-Year Rainfall=3.36"

Area (ac)	CN	Description
1.260	98	Paved parking, HSG B
1.260	98	100.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
9.6	100	0.0200	0.17		Sheet Flow, Grass: Short n= 0.150 P2= 3.36"
1.9	245	0.0200	2.12		Shallow Concentrated Flow, Grassed Waterway Kv= 15.0 fps
3.1	333	0.0040	1.77	19.42	Channel Flow, Area= 11.0 sf Perim= 26.0' r= 0.42' n= 0.030 Stream, clean & straight
7.7	555	0.0180	1.21		Shallow Concentrated Flow, Cultivated Straight Rows Kv= 9.0 fps
22.3	1,233	Total			

Subcatchment 1A-I: EDA-1A IMPERVIOUS

Hydrograph



Summary for Subcatchment 1A-P: EDA-1A PERVIOUS

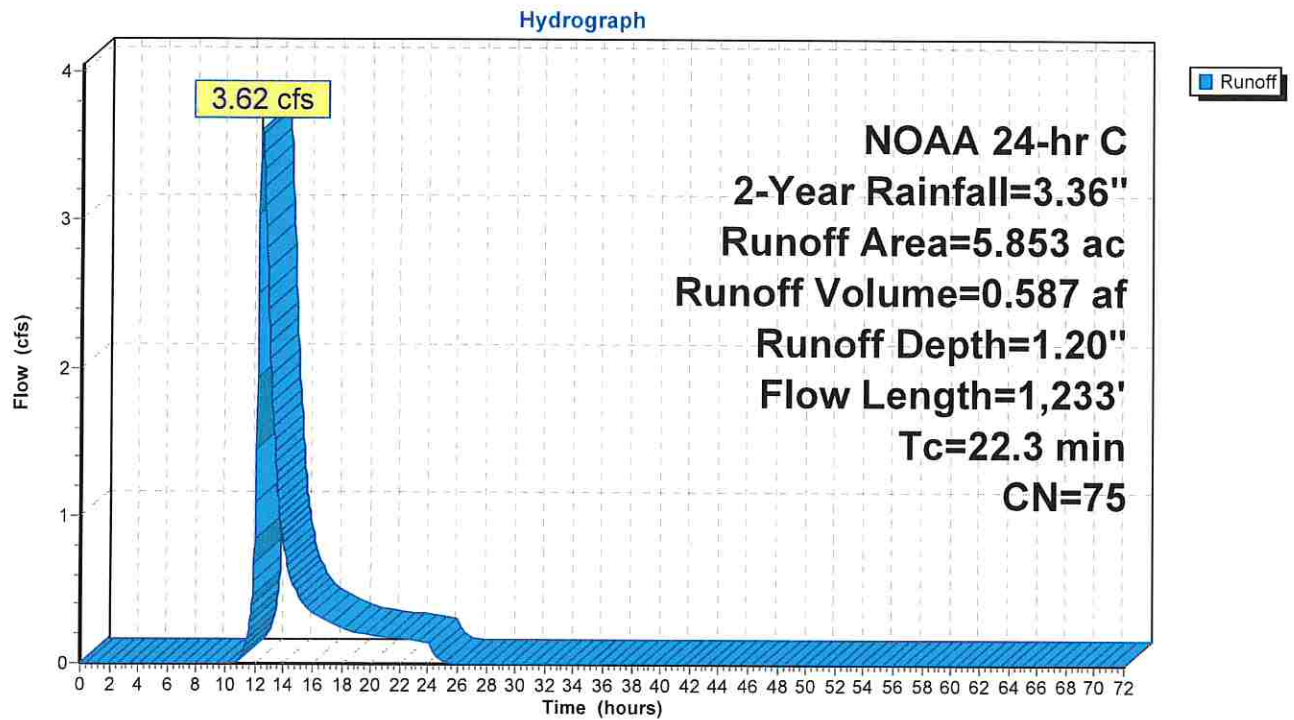
Runoff = 3.62 cfs @ 12.39 hrs, Volume= 0.587 af, Depth= 1.20"

Runoff by SCS TR-20 method, UH=Delmarva, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
 NOAA 24-hr C 2-Year Rainfall=3.36"

Area (ac)	CN	Description
0.851	61	>75% Grass cover, Good, HSG B
1.027	55	Woods, Good, HSG B
3.975	83	Fallow, crop residue, Good, HSG B
5.853	75	Weighted Average
5.853	75	100.00% Pervious Area

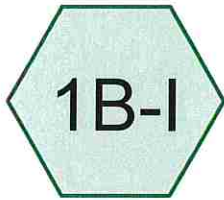
Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
9.6	100	0.0200	0.17		Sheet Flow, Grass: Short n= 0.150 P2= 3.36"
1.9	245	0.0200	2.12		Shallow Concentrated Flow, Grassed Waterway Kv= 15.0 fps
3.1	333	0.0040	1.77	19.42	Channel Flow, Area= 11.0 sf Perim= 26.0' r= 0.42' n= 0.030 Stream, clean & straight
7.7	555	0.0180	1.21		Shallow Concentrated Flow, Cultivated Straight Rows Kv= 9.0 fps
22.3	1,233	Total			

Subcatchment 1A-P: EDA-1A PERVIOUS

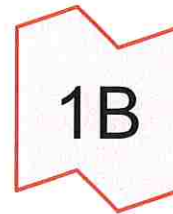




EDA-1B PERVIOUS



EDA-1B IMPERVIOUS



EDA-1B



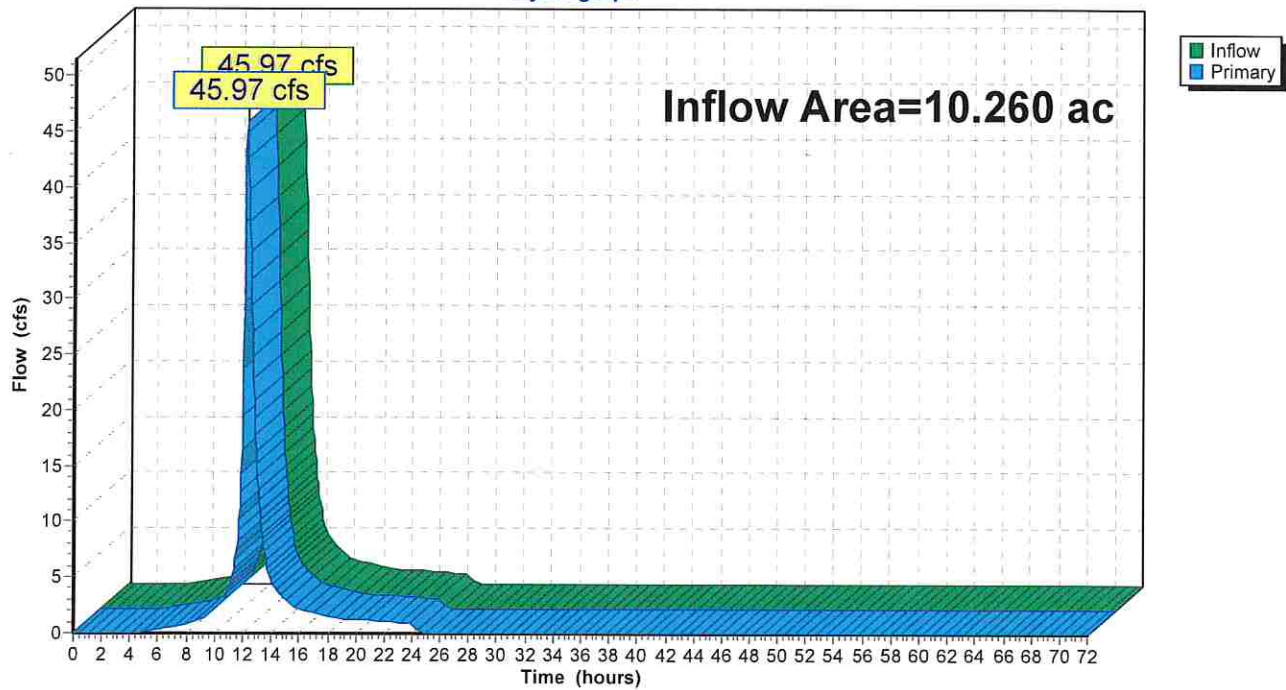
Summary for Link 1B: EDA-1B

Inflow Area = 10.260 ac, 2.16% Impervious, Inflow Depth = 6.91" for 100-Year event
Inflow = 45.97 cfs @ 12.26 hrs, Volume= 5.910 af
Primary = 45.97 cfs @ 12.26 hrs, Volume= 5.910 af, Atten= 0%, Lag= 0.0 min

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

Link 1B: EDA-1B

Hydrograph



Summary for Subcatchment 1B-I: EDA-1B IMPERVIOUS

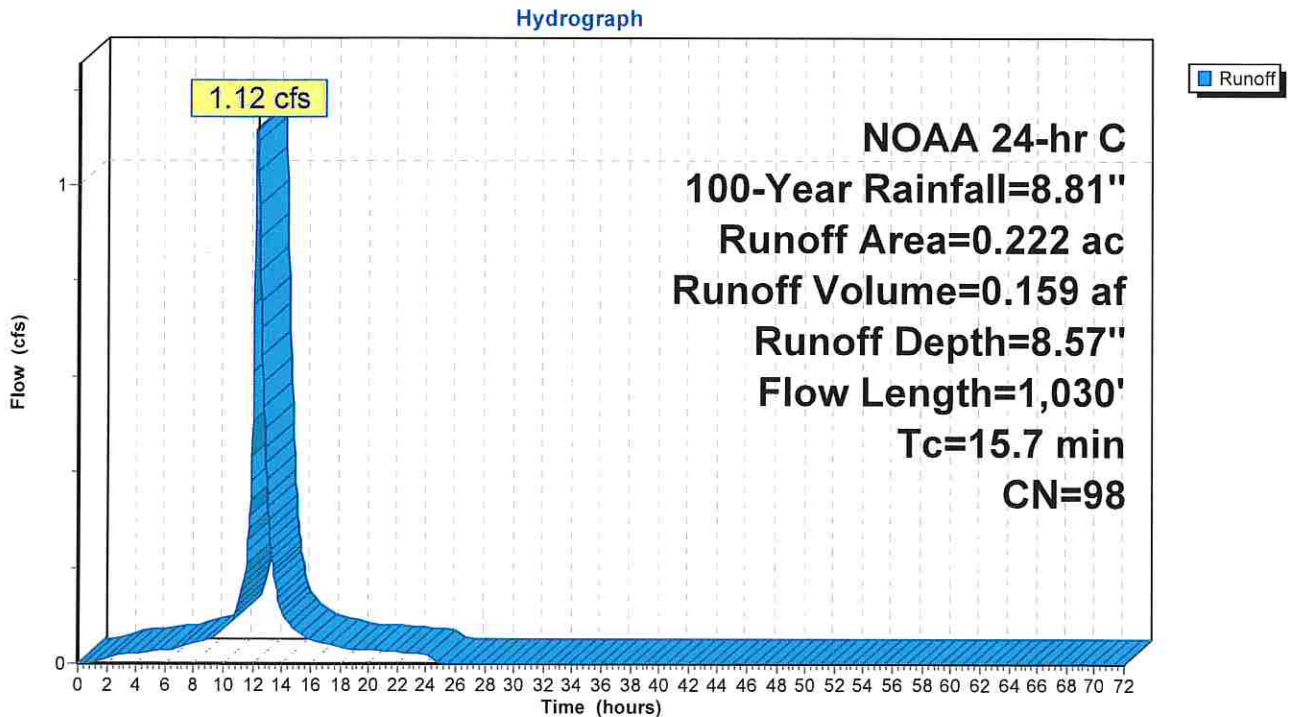
Runoff = 1.12 cfs @ 12.26 hrs, Volume= 0.159 af, Depth= 8.57"

Runoff by SCS TR-20 method, UH=Delmarva, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
 NOAA 24-hr C 100-Year Rainfall=8.81"

Area (ac)	CN	Description
0.222	98	Paved parking, HSG B
0.222	98	100.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
1.6	100	0.0100	1.07		Sheet Flow, Smooth surfaces n= 0.011 P2= 3.36"
14.1	930	0.0150	1.10		Shallow Concentrated Flow, Cultivated Straight Rows Kv= 9.0 fps
15.7	1,030	Total			

Subcatchment 1B-I: EDA-1B IMPERVIOUS



Summary for Subcatchment 1B-P: EDA-1B PERVIOUS

Runoff = 44.86 cfs @ 12.26 hrs, Volume= 5.751 af, Depth= 6.88"

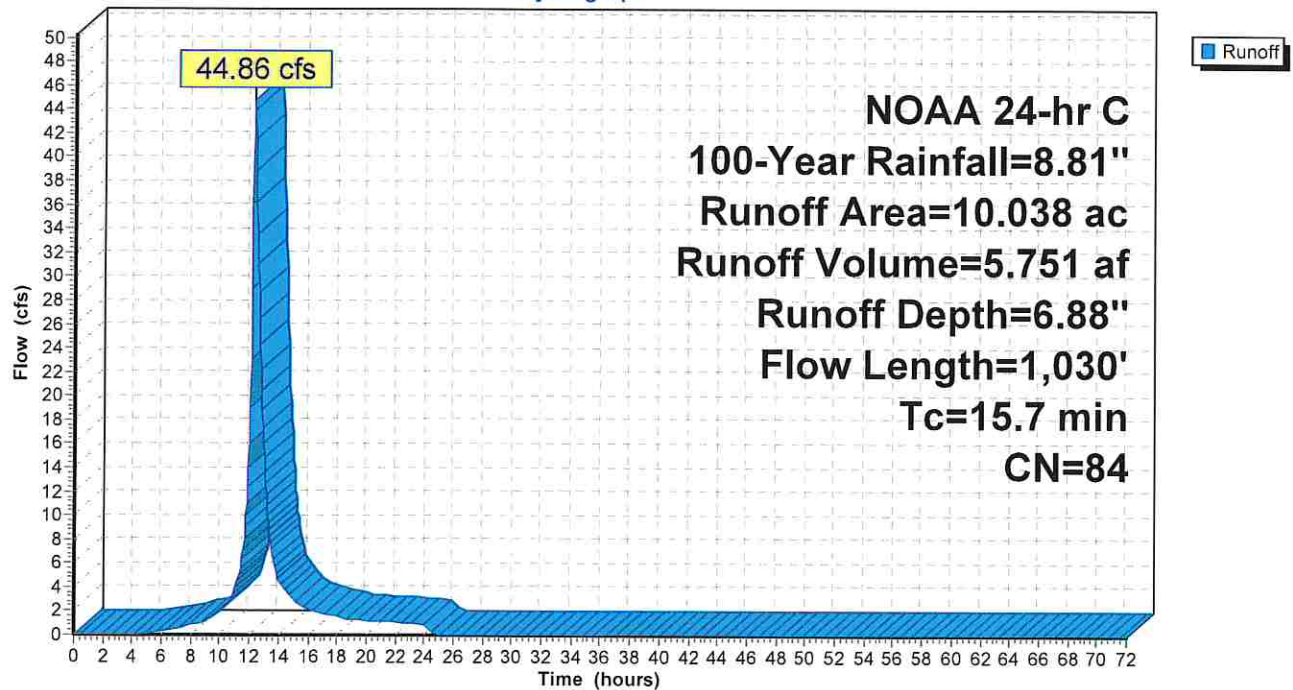
Runoff by SCS TR-20 method, UH=Delmarva, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
 NOAA 24-hr C 100-Year Rainfall=8.81"

Area (ac)	CN	Description
1.519	83	Fallow, crop residue, Good, HSG B
7.265	88	Fallow, crop residue, Good, HSG C
0.185	55	Woods, Good, HSG B
0.381	70	Woods, Good, HSG C
0.688	61	>75% Grass cover, Good, HSG B
10.038	84	Weighted Average
10.038	84	100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
1.6	100	0.0100	1.07		Sheet Flow, Smooth surfaces n= 0.011 P2= 3.36"
14.1	930	0.0150	1.10		Shallow Concentrated Flow, Cultivated Straight Rows Kv= 9.0 fps
15.7	1,030	Total			

Subcatchment 1B-P: EDA-1B PERVIOUS

Hydrograph



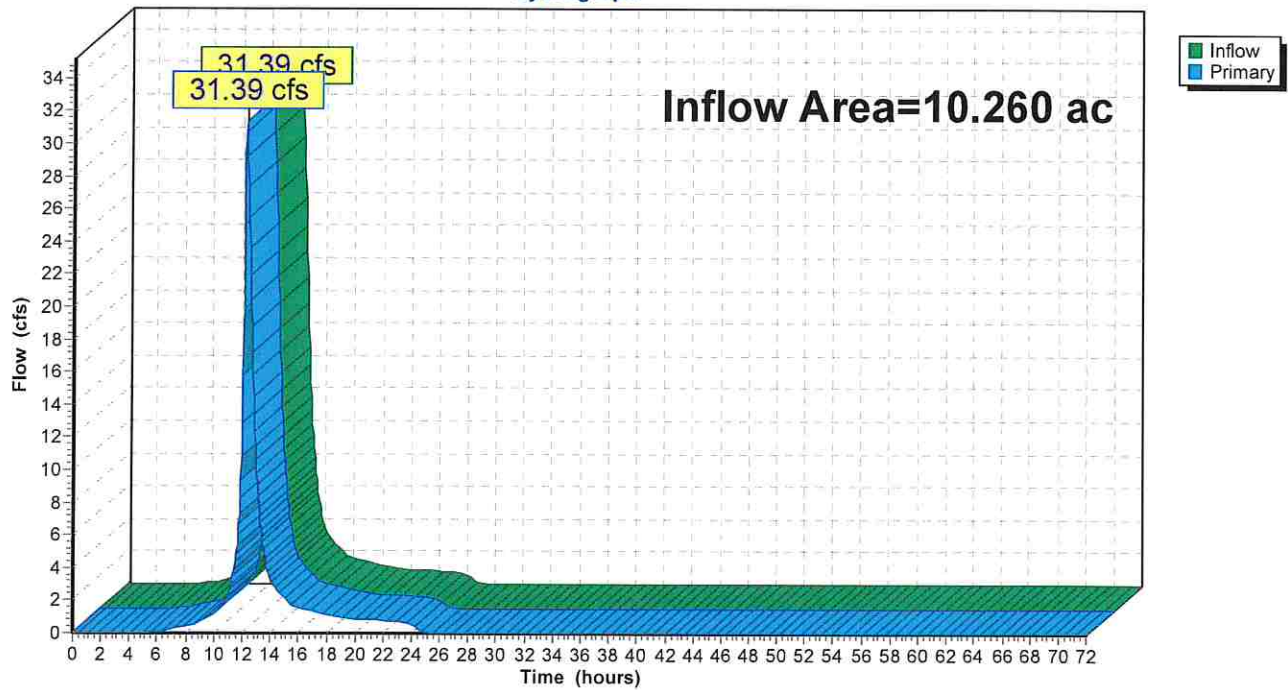
Summary for Link 1B: EDA-1B

Inflow Area = 10.260 ac, 2.16% Impervious, Inflow Depth = 4.65" for 25-Year event
Inflow = 31.39 cfs @ 12.26 hrs, Volume= 3.979 af
Primary = 31.39 cfs @ 12.26 hrs, Volume= 3.979 af, Atten= 0%, Lag= 0.0 min

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

Link 1B: EDA-1B

Hydrograph



Summary for Subcatchment 1B-I: EDA-1B IMPERVIOUS

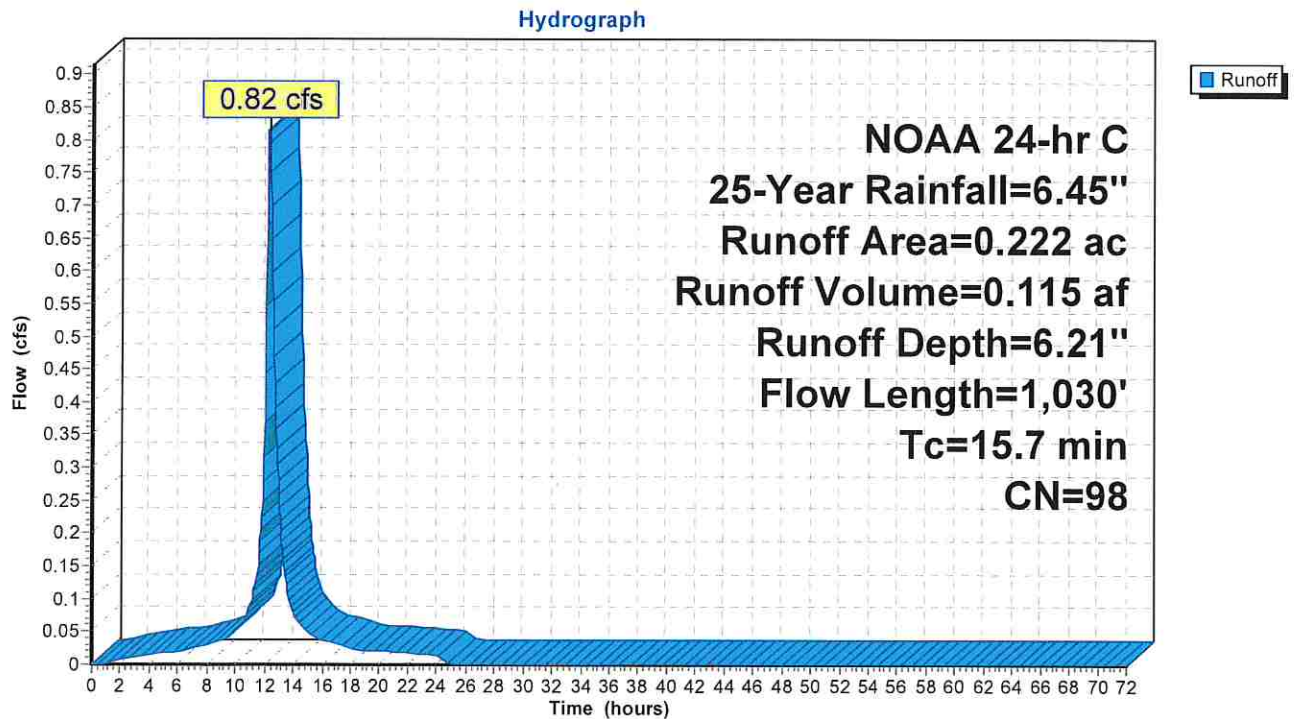
Runoff = 0.82 cfs @ 12.26 hrs, Volume= 0.115 af, Depth= 6.21"

Runoff by SCS TR-20 method, UH=Delmarva, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
 NOAA 24-hr C 25-Year Rainfall=6.45"

Area (ac)	CN	Description
0.222	98	Paved parking, HSG B
0.222	98	100.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
1.6	100	0.0100	1.07		Sheet Flow, Smooth surfaces n= 0.011 P2= 3.36"
14.1	930	0.0150	1.10		Shallow Concentrated Flow, Cultivated Straight Rows Kv= 9.0 fps
15.7	1,030	Total			

Subcatchment 1B-I: EDA-1B IMPERVIOUS



Summary for Subcatchment 1B-P: EDA-1B PERVIOUS

Runoff = 30.57 cfs @ 12.26 hrs, Volume= 3.864 af, Depth= 4.62"

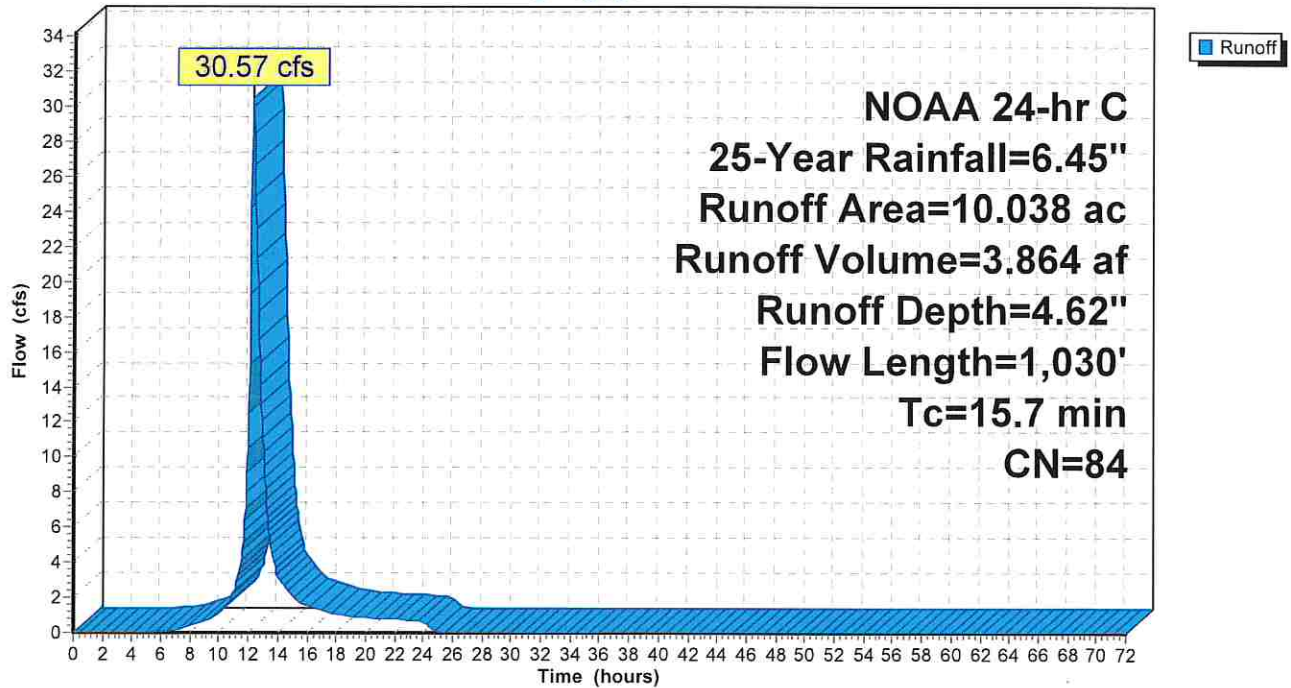
Runoff by SCS TR-20 method, UH=Delmarva, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
 NOAA 24-hr C 25-Year Rainfall=6.45"

Area (ac)	CN	Description
1.519	83	Fallow, crop residue, Good, HSG B
7.265	88	Fallow, crop residue, Good, HSG C
0.185	55	Woods, Good, HSG B
0.381	70	Woods, Good, HSG C
0.688	61	>75% Grass cover, Good, HSG B
10.038	84	Weighted Average
10.038	84	100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
1.6	100	0.0100	1.07		Sheet Flow, Smooth surfaces n= 0.011 P2= 3.36"
14.1	930	0.0150	1.10		Shallow Concentrated Flow, Cultivated Straight Rows Kv= 9.0 fps
15.7	1,030	Total			

Subcatchment 1B-P: EDA-1B PERVIOUS

Hydrograph



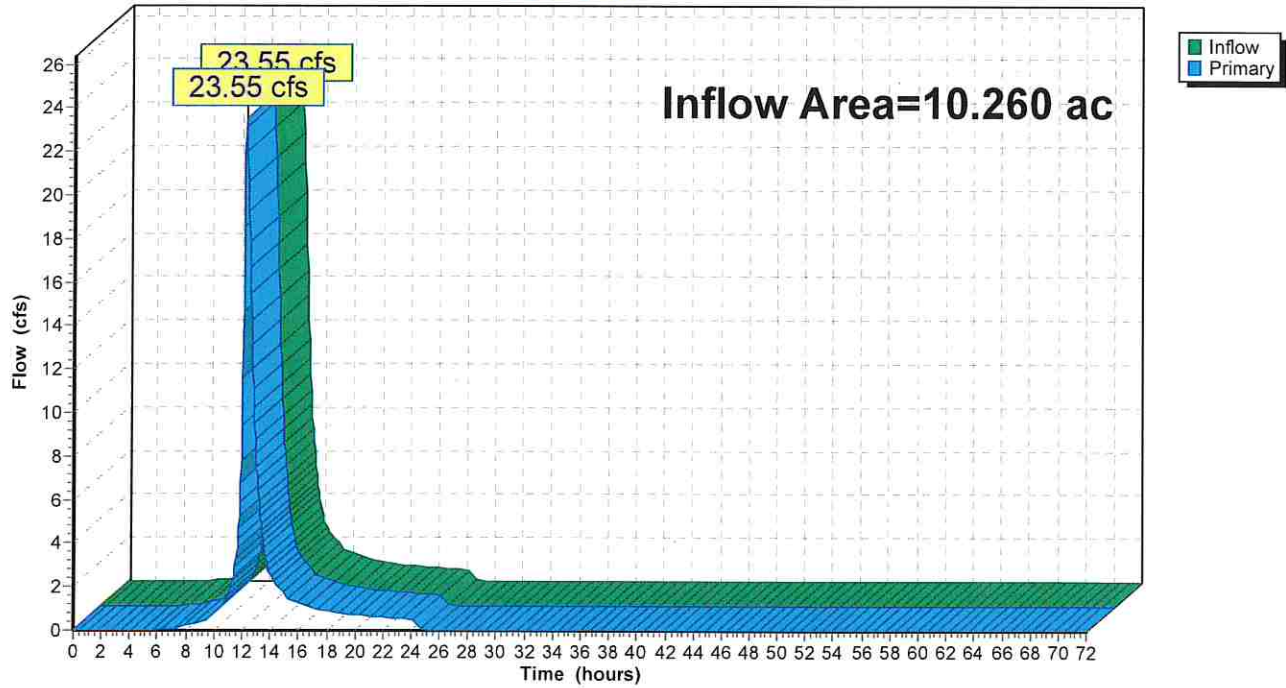
Summary for Link 1B: EDA-1B

Inflow Area = 10.260 ac, 2.16% Impervious, Inflow Depth = 3.47" for 10-Year event
Inflow = 23.55 cfs @ 12.27 hrs, Volume= 2.965 af
Primary = 23.55 cfs @ 12.27 hrs, Volume= 2.965 af, Atten= 0%, Lag= 0.0 min

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

Link 1B: EDA-1B

Hydrograph



Summary for Subcatchment 1B-I: EDA-1B IMPERVIOUS

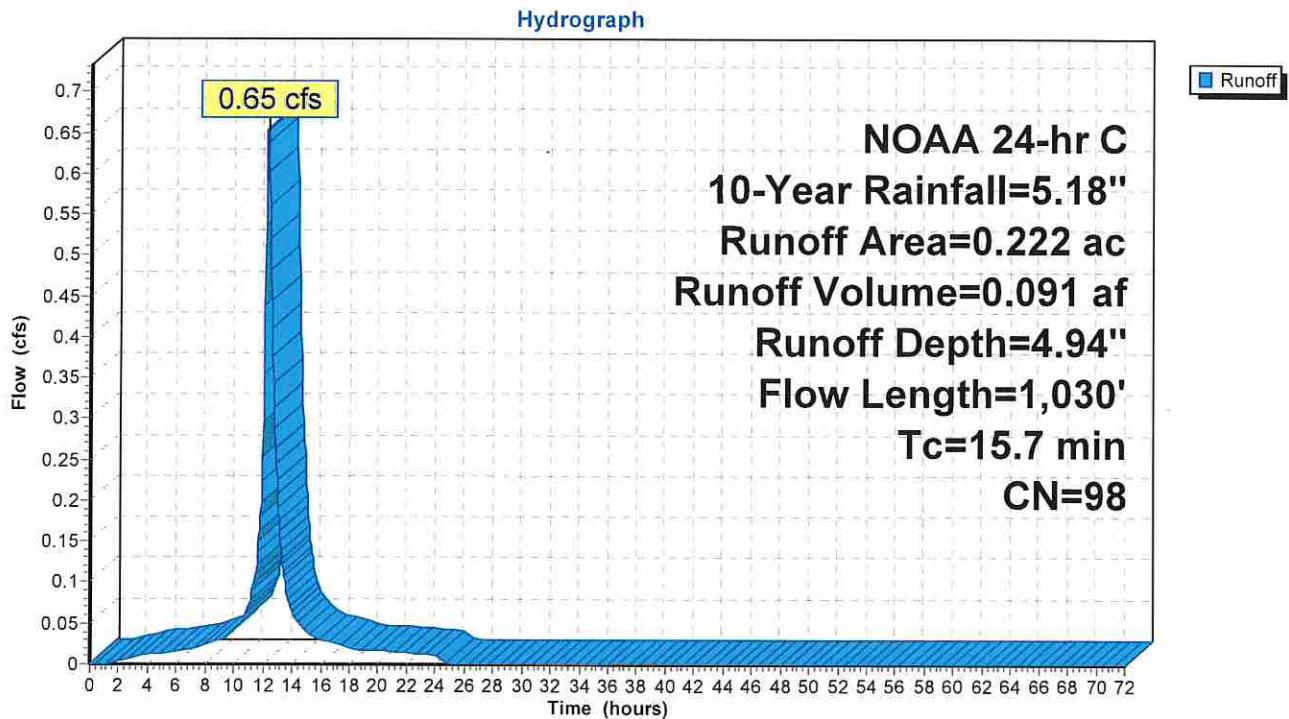
Runoff = 0.65 cfs @ 12.26 hrs, Volume= 0.091 af, Depth= 4.94"

Runoff by SCS TR-20 method, UH=Delmarva, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
 NOAA 24-hr C 10-Year Rainfall=5.18"

Area (ac)	CN	Description
0.222	98	Paved parking, HSG B
0.222	98	100.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
1.6	100	0.0100	1.07		Sheet Flow, Smooth surfaces n= 0.011 P2= 3.36"
14.1	930	0.0150	1.10		Shallow Concentrated Flow, Cultivated Straight Rows Kv= 9.0 fps
15.7	1,030	Total			

Subcatchment 1B-I: EDA-1B IMPERVIOUS



Summary for Subcatchment 1B-P: EDA-1B PERVIOUS

Runoff = 22.89 cfs @ 12.27 hrs, Volume= 2.874 af, Depth= 3.44"

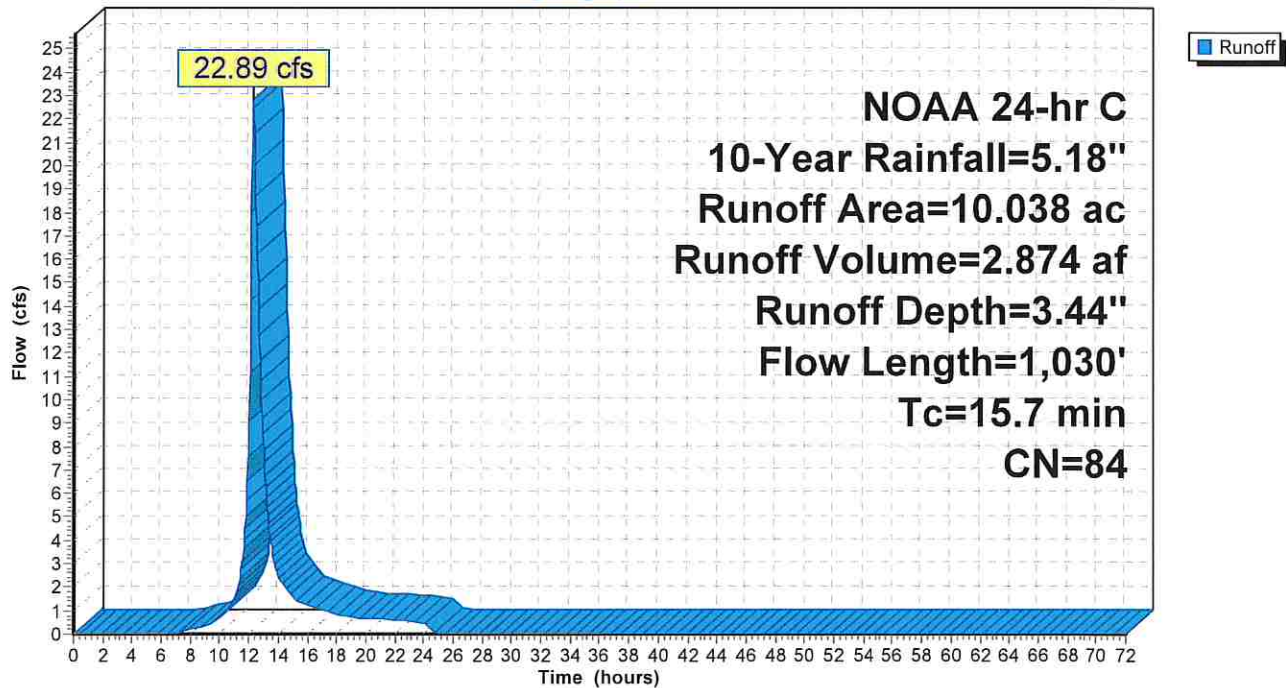
Runoff by SCS TR-20 method, UH=Delmarva, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
 NOAA 24-hr C 10-Year Rainfall=5.18"

Area (ac)	CN	Description
1.519	83	Fallow, crop residue, Good, HSG B
7.265	88	Fallow, crop residue, Good, HSG C
0.185	55	Woods, Good, HSG B
0.381	70	Woods, Good, HSG C
0.688	61	>75% Grass cover, Good, HSG B
10.038	84	Weighted Average
10.038	84	100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
1.6	100	0.0100	1.07		Sheet Flow, Smooth surfaces n= 0.011 P2= 3.36"
14.1	930	0.0150	1.10		Shallow Concentrated Flow, Cultivated Straight Rows Kv= 9.0 fps
15.7	1,030	Total			

Subcatchment 1B-P: EDA-1B PERVIOUS

Hydrograph



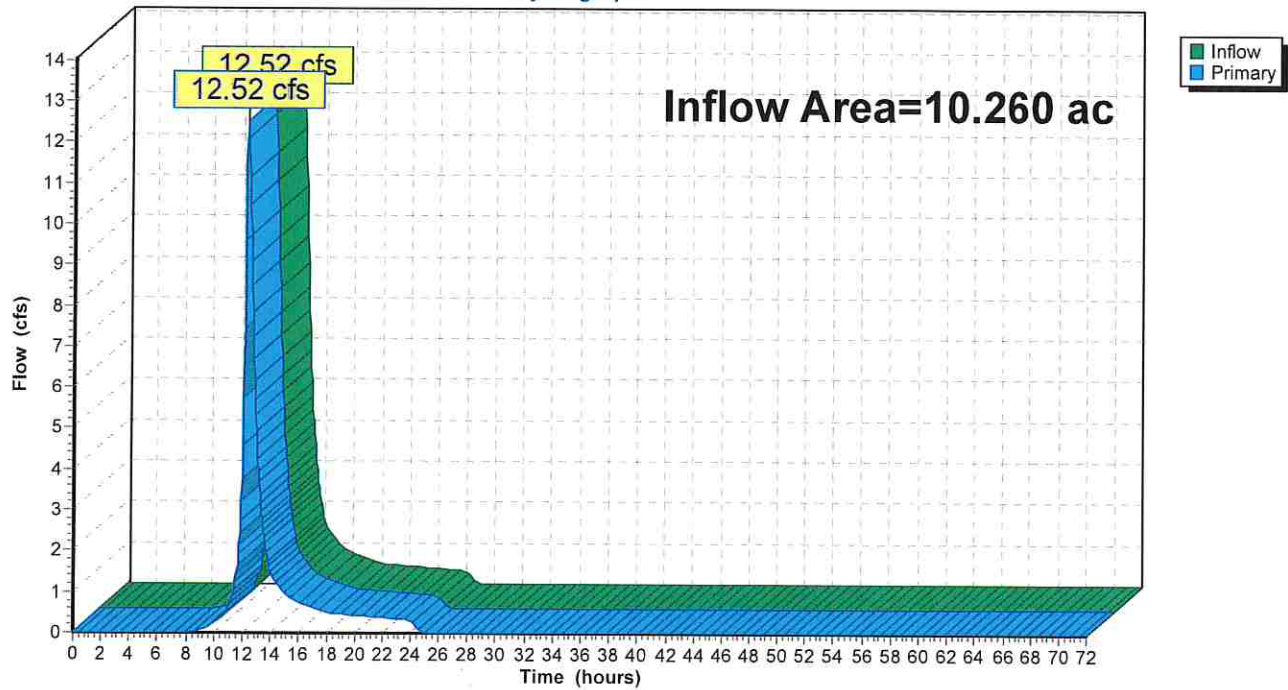
Summary for Link 1B: EDA-1B

Inflow Area = 10.260 ac, 2.16% Impervious, Inflow Depth = 1.85" for 2-Year event
Inflow = 12.52 cfs @ 12.27 hrs, Volume= 1.578 af
Primary = 12.52 cfs @ 12.27 hrs, Volume= 1.578 af, Atten= 0%, Lag= 0.0 min

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

Link 1B: EDA-1B

Hydrograph



Summary for Subcatchment 1B-I: EDA-1B IMPERVIOUS

Runoff = 0.42 cfs @ 12.26 hrs, Volume= 0.058 af, Depth= 3.13"

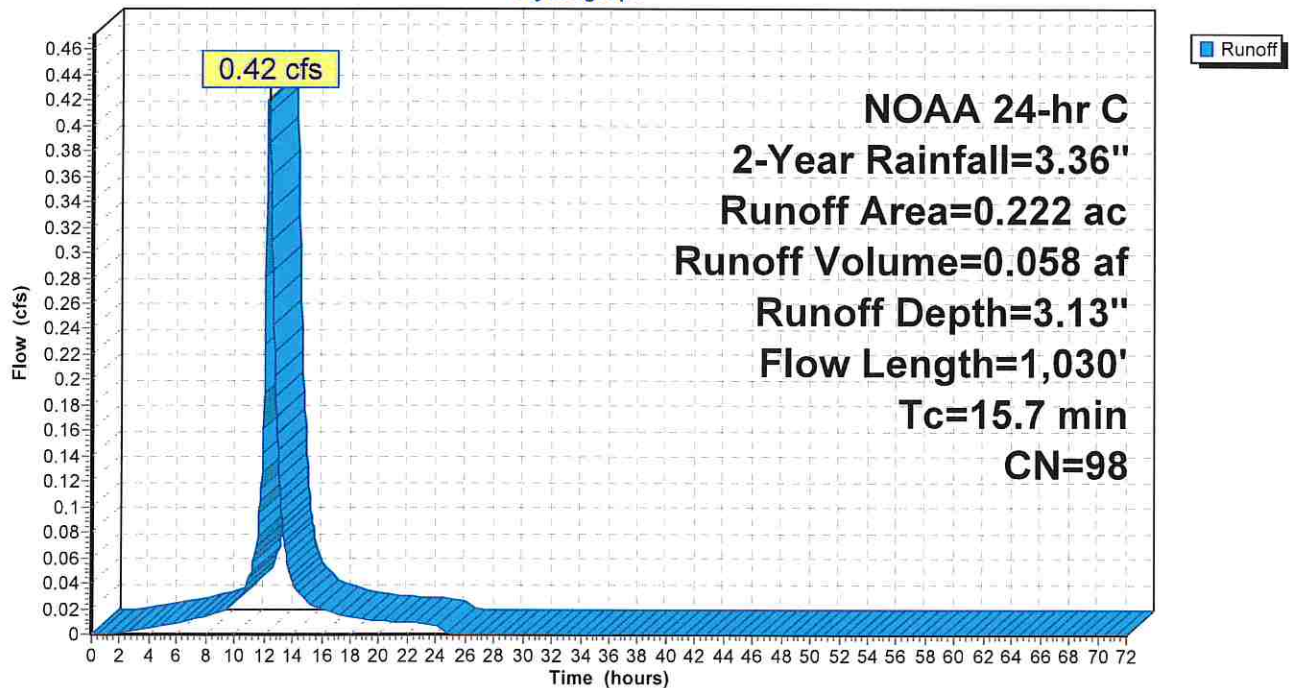
Runoff by SCS TR-20 method, UH=Delmarva, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
 NOAA 24-hr C 2-Year Rainfall=3.36"

Area (ac)	CN	Description
0.222	98	Paved parking, HSG B
0.222	98	100.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
1.6	100	0.0100	1.07		Sheet Flow, Smooth surfaces n= 0.011 P2= 3.36"
14.1	930	0.0150	1.10		Shallow Concentrated Flow, Cultivated Straight Rows Kv= 9.0 fps
15.7	1,030	Total			

Subcatchment 1B-I: EDA-1B IMPERVIOUS

Hydrograph



Summary for Subcatchment 1B-P: EDA-1B PERVIOUS

Runoff = 12.10 cfs @ 12.27 hrs, Volume= 1.520 af, Depth= 1.82"

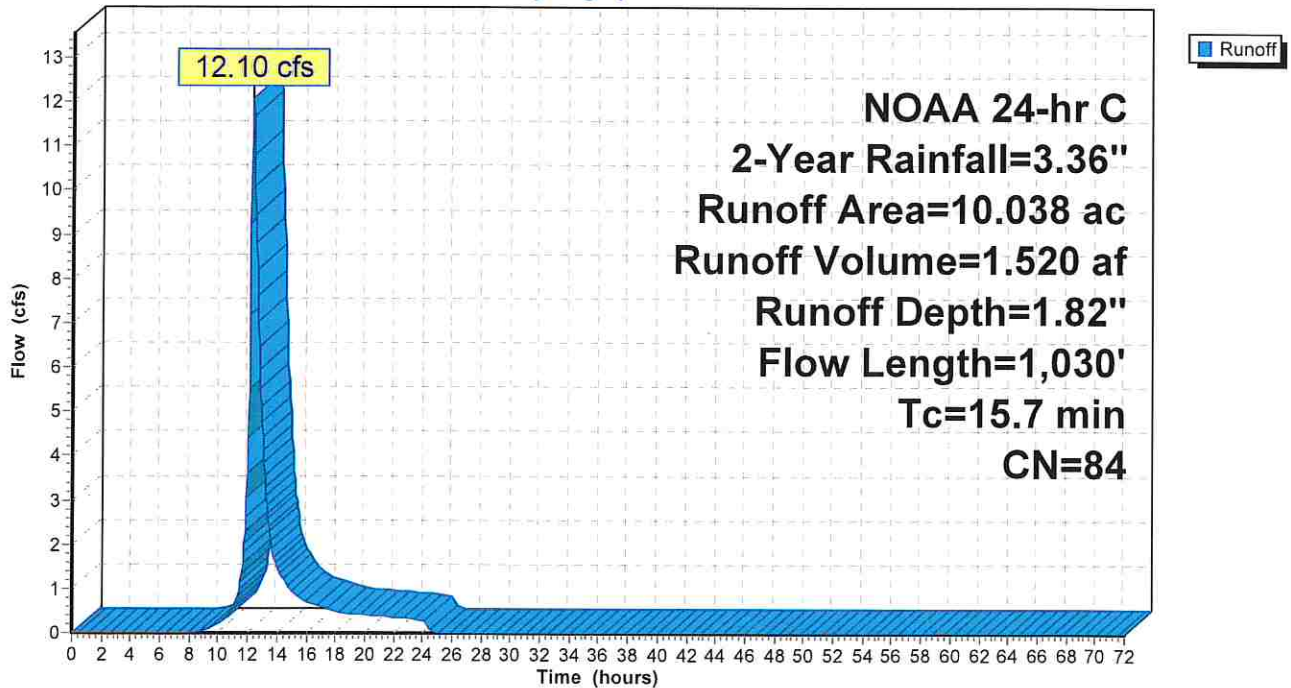
Runoff by SCS TR-20 method, UH=Delmarva, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
 NOAA 24-hr C 2-Year Rainfall=3.36"

Area (ac)	CN	Description
1.519	83	Fallow, crop residue, Good, HSG B
7.265	88	Fallow, crop residue, Good, HSG C
0.185	55	Woods, Good, HSG B
0.381	70	Woods, Good, HSG C
0.688	61	>75% Grass cover, Good, HSG B
10.038	84	Weighted Average
10.038	84	100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
1.6	100	0.0100	1.07		Sheet Flow, Smooth surfaces n= 0.011 P2= 3.36"
14.1	930	0.0150	1.10		Shallow Concentrated Flow, Cultivated Straight Rows Kv= 9.0 fps
15.7	1,030	Total			

Subcatchment 1B-P: EDA-1B PERVIOUS

Hydrograph





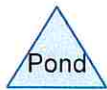
EDA-2 PERVIOUS



EDA-2 IMPERVIOUS



EDA-2 PROPOSED
RUNOFF



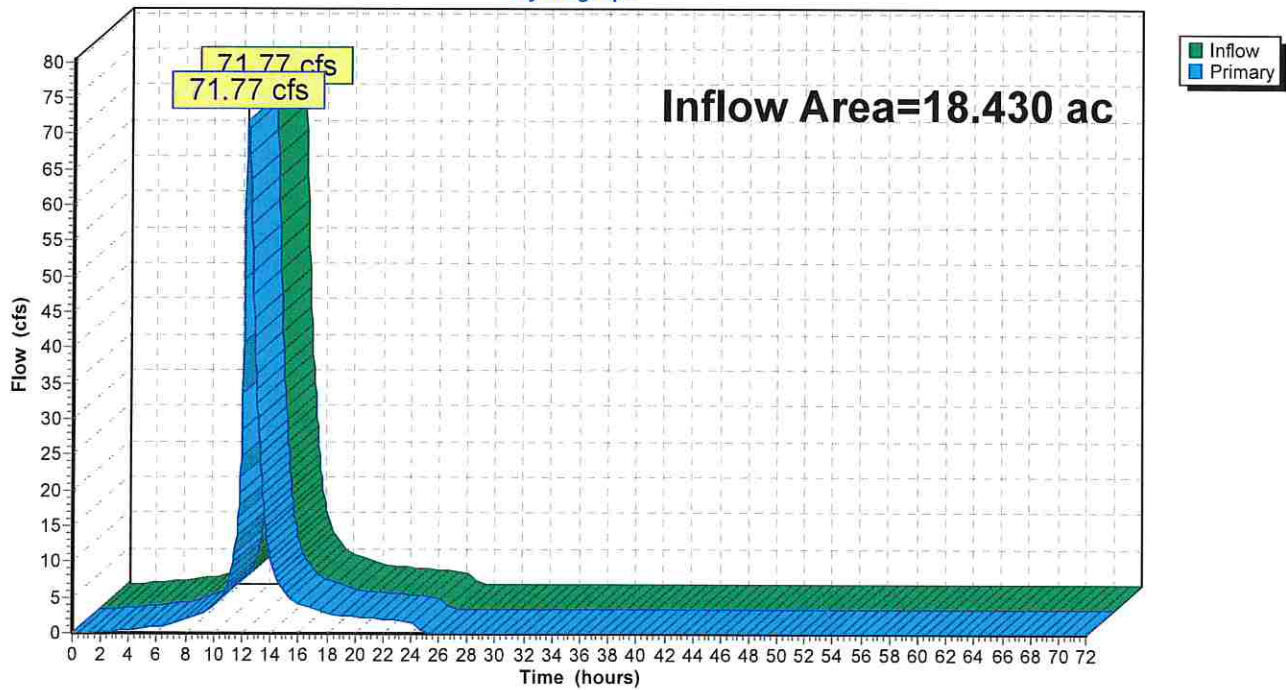
Summary for Link 2: EDA-2 PROPOSED RUNOFF

Inflow Area = 18.430 ac, 23.16% Impervious, Inflow Depth = 7.27" for 100-Year event
Inflow = 71.77 cfs @ 12.34 hrs, Volume= 11.162 af
Primary = 71.77 cfs @ 12.34 hrs, Volume= 11.162 af, Atten= 0%, Lag= 0.0 min

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

Link 2: EDA-2 PROPOSED RUNOFF

Hydrograph



Summary for Subcatchment 2-I: EDA-2 IMPERVIOUS

Runoff = 18.25 cfs @ 12.33 hrs, Volume= 3.048 af, Depth= 8.57"

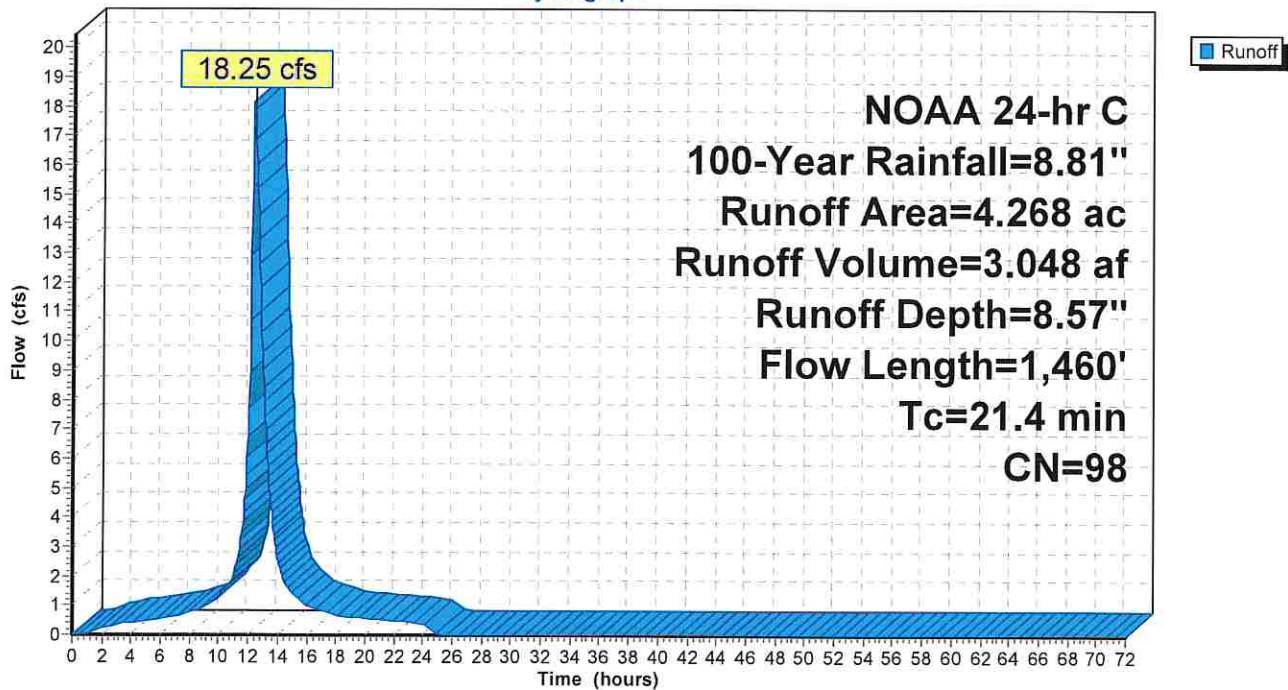
Runoff by SCS TR-20 method, UH=Delmarva, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
 NOAA 24-hr C 100-Year Rainfall=8.81"

Area (ac)	CN	Description
4.268	98	Paved parking, HSG B
4.268	98	100.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
1.6	100	0.0100	1.07		Sheet Flow, Smooth surfaces n= 0.011 P2= 3.36"
1.3	360	0.0111	4.78	28.68	Channel Flow, Area= 6.0 sf Perim= 24.0' r= 0.25' n= 0.013 Asphalt, smooth
18.5	1,000	0.0100	0.90		Shallow Concentrated Flow, Cultivated Straight Rows Kv= 9.0 fps
21.4	1,460	Total			

Subcatchment 2-I: EDA-2 IMPERVIOUS

Hydrograph



Summary for Subcatchment 2-P: EDA-2 PERVIOUS

[47] Hint: Peak is 187% of capacity of segment #2

Runoff = 53.53 cfs @ 12.34 hrs, Volume= 8.114 af, Depth= 6.88"

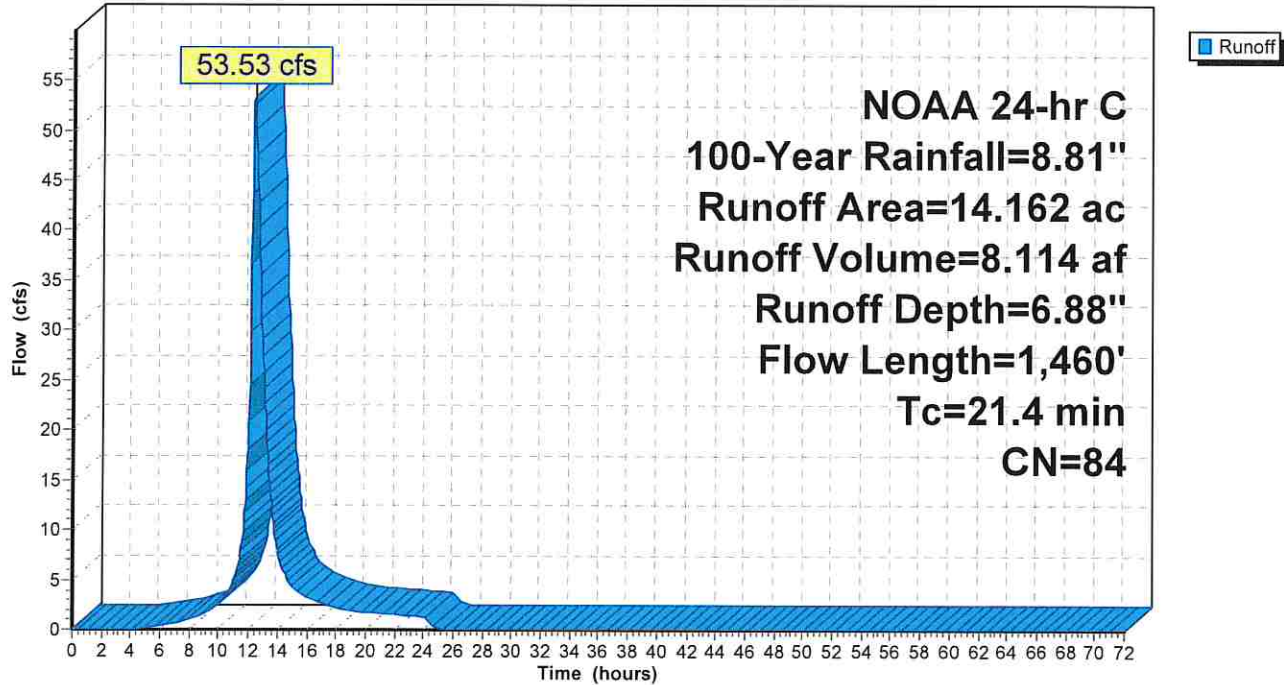
Runoff by SCS TR-20 method, UH=Delmarva, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
NOAA 24-hr C 100-Year Rainfall=8.81"

Area (ac)	CN	Description
6.830	88	Fallow, crop residue, Good, HSG C
6.153	83	Fallow, crop residue, Good, HSG B
1.179	61	>75% Grass cover, Good, HSG B
14.162	84	Weighted Average
14.162	84	100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
1.6	100	0.0100	1.07		Sheet Flow, Smooth surfaces n= 0.011 P2= 3.36"
1.3	360	0.0111	4.78	28.68	Channel Flow, Area= 6.0 sf Perim= 24.0' r= 0.25' n= 0.013 Asphalt, smooth
18.5	1,000	0.0100	0.90		Shallow Concentrated Flow, Cultivated Straight Rows Kv= 9.0 fps
21.4	1,460	Total			

Subcatchment 2-P: EDA-2 PERVIOUS

Hydrograph



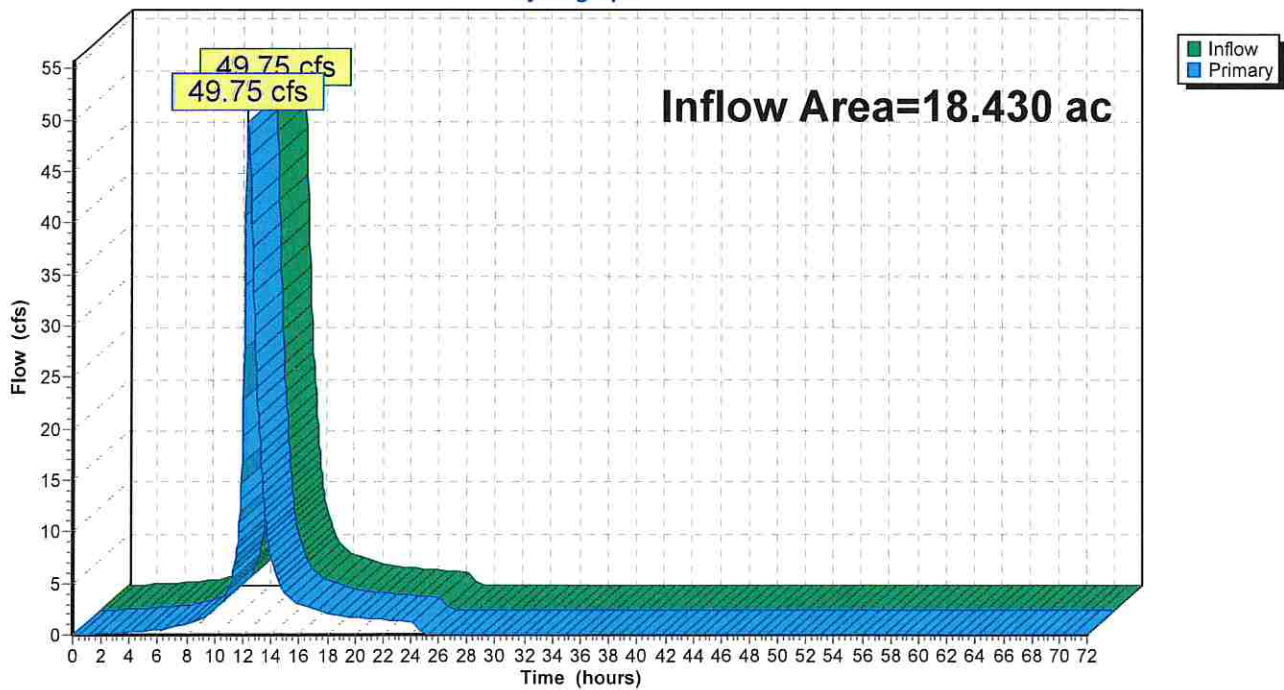
Summary for Link 2: EDA-2 PROPOSED RUNOFF

Inflow Area = 18.430 ac, 23.16% Impervious, Inflow Depth = 4.99" for 25-Year event
Inflow = 49.75 cfs @ 12.34 hrs, Volume= 7.661 af
Primary = 49.75 cfs @ 12.34 hrs, Volume= 7.661 af, Atten= 0%, Lag= 0.0 min

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

Link 2: EDA-2 PROPOSED RUNOFF

Hydrograph



Summary for Subcatchment 2-I: EDA-2 IMPERVIOUS

Runoff = 13.33 cfs @ 12.33 hrs, Volume= 2.209 af, Depth= 6.21"

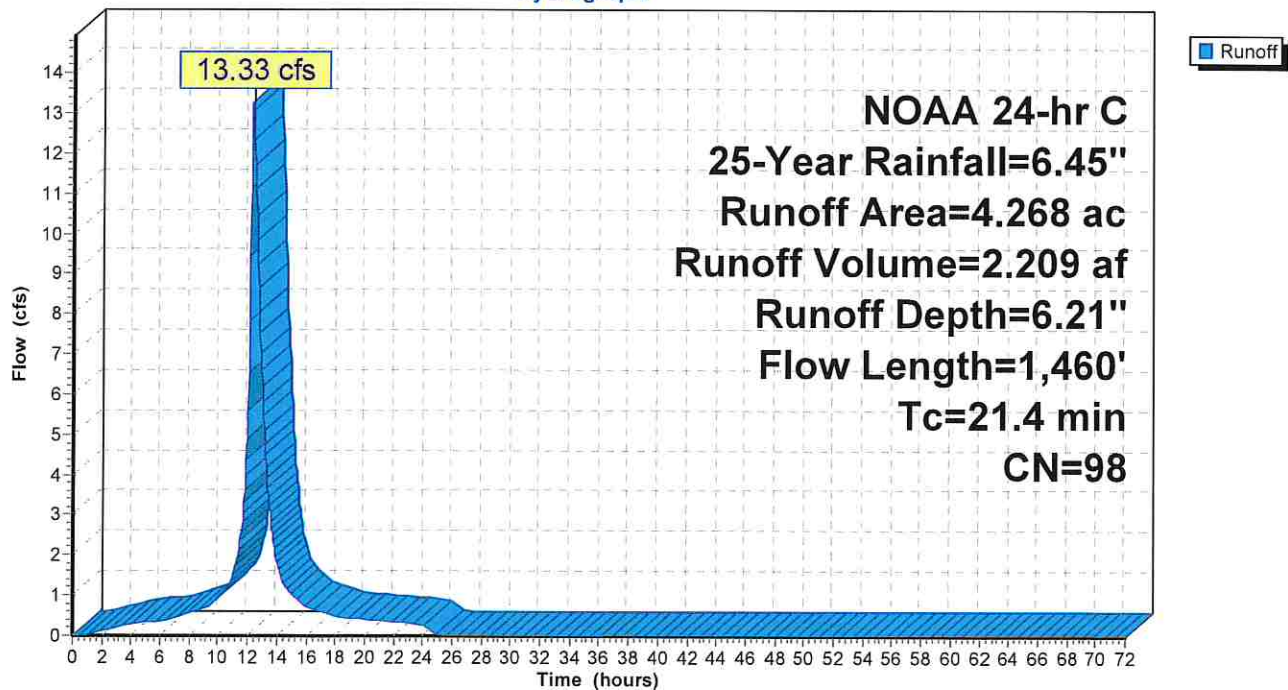
Runoff by SCS TR-20 method, UH=Delmarva, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
 NOAA 24-hr C 25-Year Rainfall=6.45"

Area (ac)	CN	Description
4.268	98	Paved parking, HSG B
4.268	98	100.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
1.6	100	0.0100	1.07		Sheet Flow, Smooth surfaces n= 0.011 P2= 3.36"
1.3	360	0.0111	4.78	28.68	Channel Flow, Area= 6.0 sf Perim= 24.0' r= 0.25' n= 0.013 Asphalt, smooth
18.5	1,000	0.0100	0.90		Shallow Concentrated Flow, Cultivated Straight Rows Kv= 9.0 fps
21.4	1,460	Total			

Subcatchment 2-I: EDA-2 IMPERVIOUS

Hydrograph



Summary for Subcatchment 2-P: EDA-2 PERVIOUS

[47] Hint: Peak is 127% of capacity of segment #2

Runoff = 36.43 cfs @ 12.34 hrs, Volume= 5.452 af, Depth= 4.62"

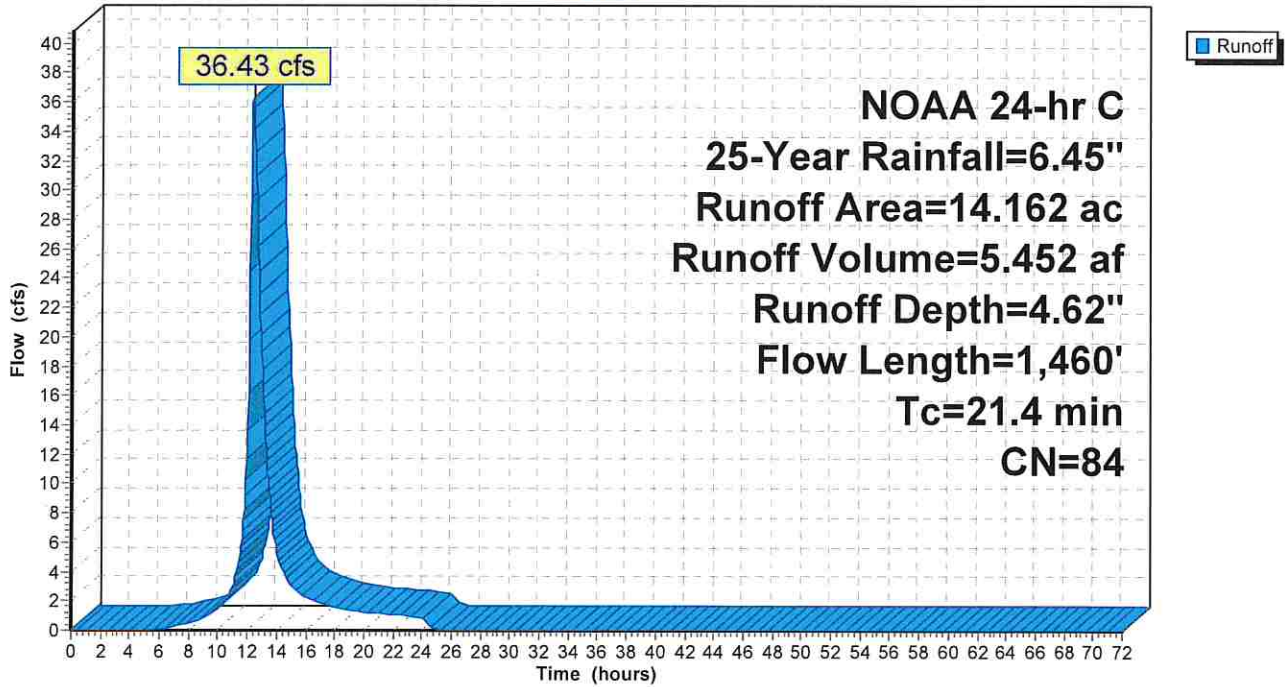
Runoff by SCS TR-20 method, UH=Delmarva, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
 NOAA 24-hr C 25-Year Rainfall=6.45"

Area (ac)	CN	Description
6.830	88	Fallow, crop residue, Good, HSG C
6.153	83	Fallow, crop residue, Good, HSG B
1.179	61	>75% Grass cover, Good, HSG B
14.162	84	Weighted Average
14.162	84	100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
1.6	100	0.0100	1.07		Sheet Flow, Smooth surfaces n= 0.011 P2= 3.36"
1.3	360	0.0111	4.78	28.68	Channel Flow, Area= 6.0 sf Perim= 24.0' r= 0.25' n= 0.013 Asphalt, smooth
18.5	1,000	0.0100	0.90		Shallow Concentrated Flow, Cultivated Straight Rows Kv= 9.0 fps
21.4	1,460	Total			

Subcatchment 2-P: EDA-2 PERVIOUS

Hydrograph



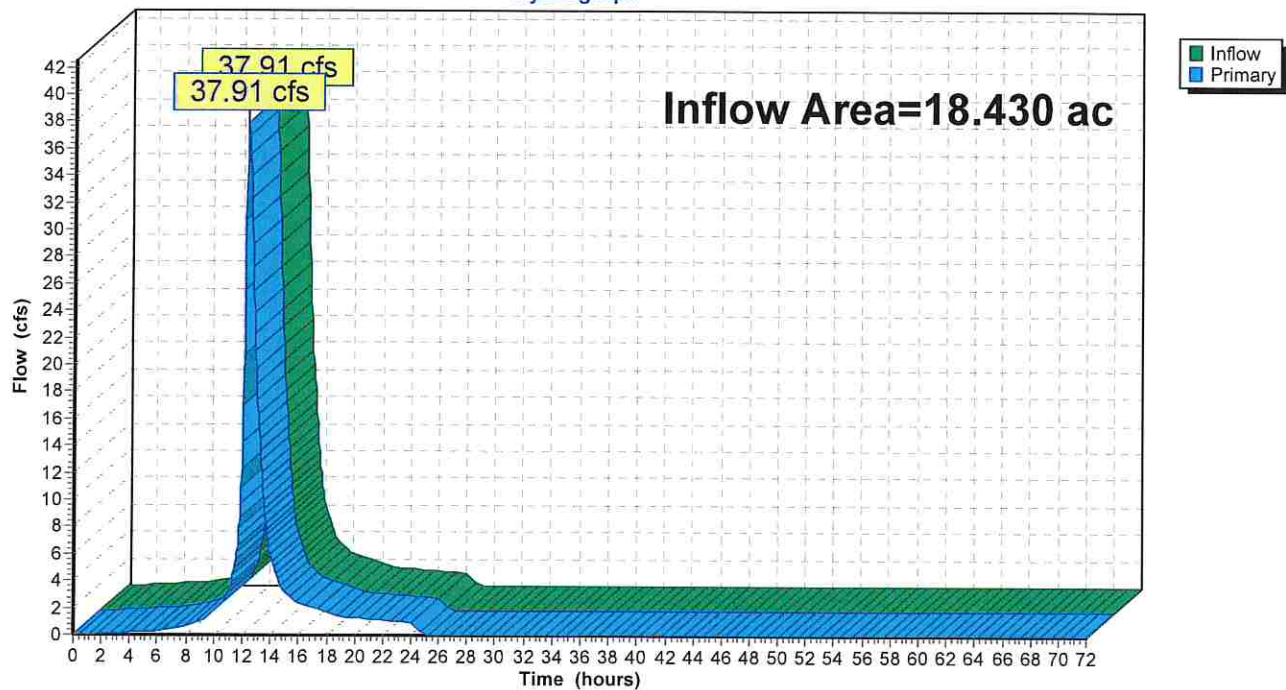
Summary for Link 2: EDA-2 PROPOSED RUNOFF

Inflow Area = 18.430 ac, 23.16% Impervious, Inflow Depth = 3.78" for 10-Year event
Inflow = 37.91 cfs @ 12.34 hrs, Volume= 5.812 af
Primary = 37.91 cfs @ 12.34 hrs, Volume= 5.812 af, Atten= 0%, Lag= 0.0 min

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

Link 2: EDA-2 PROPOSED RUNOFF

Hydrograph



Summary for Subcatchment 2-I: EDA-2 IMPERVIOUS

Runoff = 10.68 cfs @ 12.33 hrs, Volume= 1.758 af, Depth= 4.94"

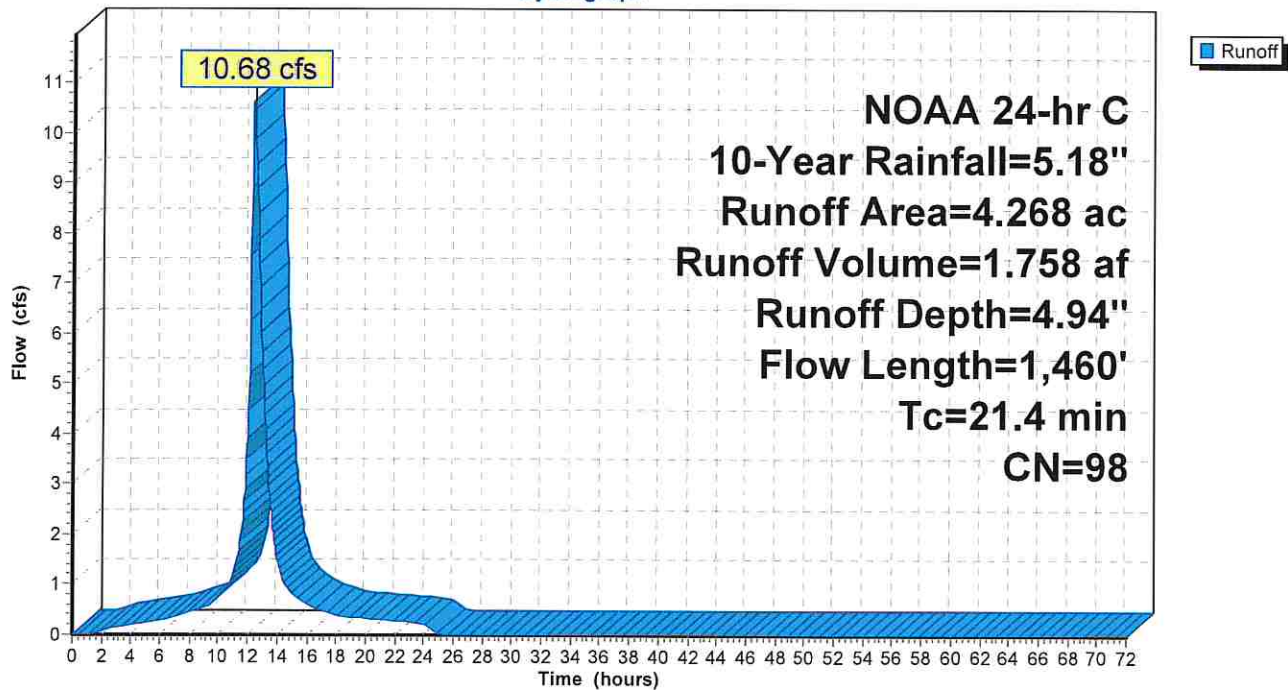
Runoff by SCS TR-20 method, UH=Delmarva, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
 NOAA 24-hr C 10-Year Rainfall=5.18"

Area (ac)	CN	Description
4.268	98	Paved parking, HSG B
4.268	98	100.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
1.6	100	0.0100	1.07		Sheet Flow, Smooth surfaces n= 0.011 P2= 3.36"
1.3	360	0.0111	4.78	28.68	Channel Flow, Area= 6.0 sf Perim= 24.0' r= 0.25' n= 0.013 Asphalt, smooth
18.5	1,000	0.0100	0.90		Shallow Concentrated Flow, Cultivated Straight Rows Kv= 9.0 fps
21.4	1,460	Total			

Subcatchment 2-I: EDA-2 IMPERVIOUS

Hydrograph



Summary for Subcatchment 2-P: EDA-2 PERVIOUS

Runoff = 27.24 cfs @ 12.35 hrs, Volume= 4.054 af, Depth= 3.44"

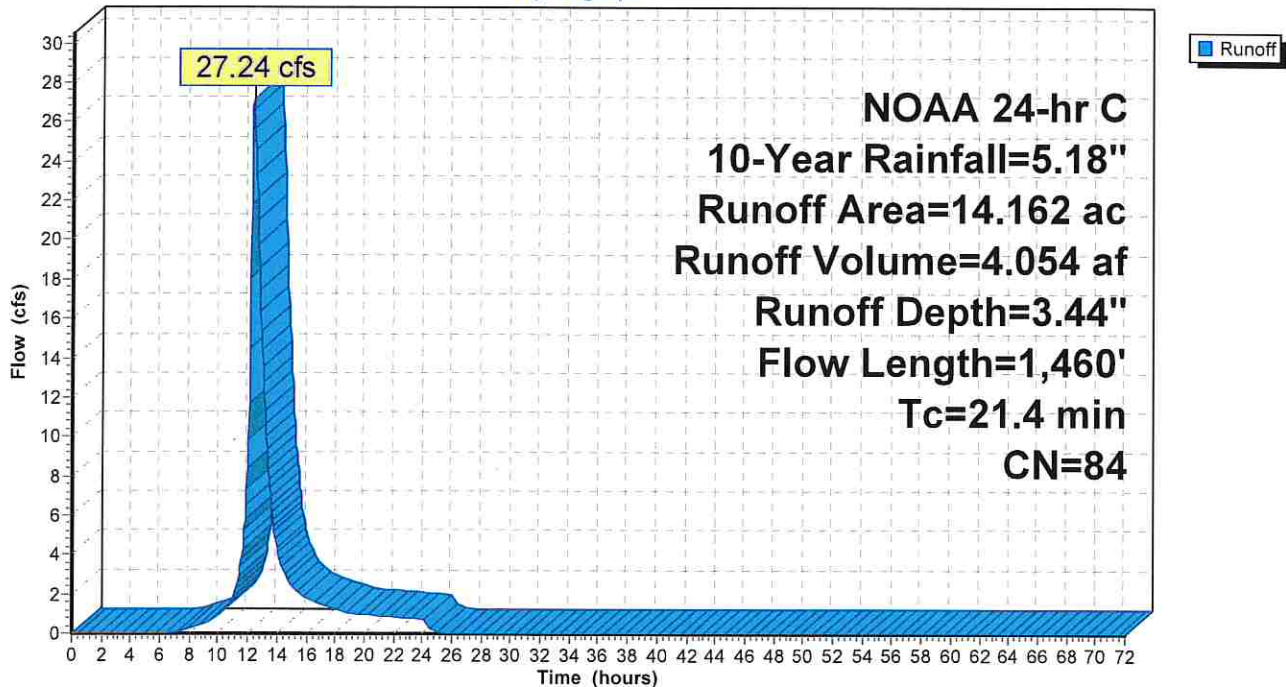
Runoff by SCS TR-20 method, UH=Delmarva, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
 NOAA 24-hr C 10-Year Rainfall=5.18"

Area (ac)	CN	Description
6.830	88	Fallow, crop residue, Good, HSG C
6.153	83	Fallow, crop residue, Good, HSG B
1.179	61	>75% Grass cover, Good, HSG B
14.162	84	Weighted Average
14.162	84	100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
1.6	100	0.0100	1.07		Sheet Flow, Smooth surfaces n= 0.011 P2= 3.36"
1.3	360	0.0111	4.78	28.68	Channel Flow, Area= 6.0 sf Perim= 24.0' r= 0.25' n= 0.013 Asphalt, smooth
18.5	1,000	0.0100	0.90		Shallow Concentrated Flow, Cultivated Straight Rows Kv= 9.0 fps
21.4	1,460	Total			

Subcatchment 2-P: EDA-2 PERVIOUS

Hydrograph

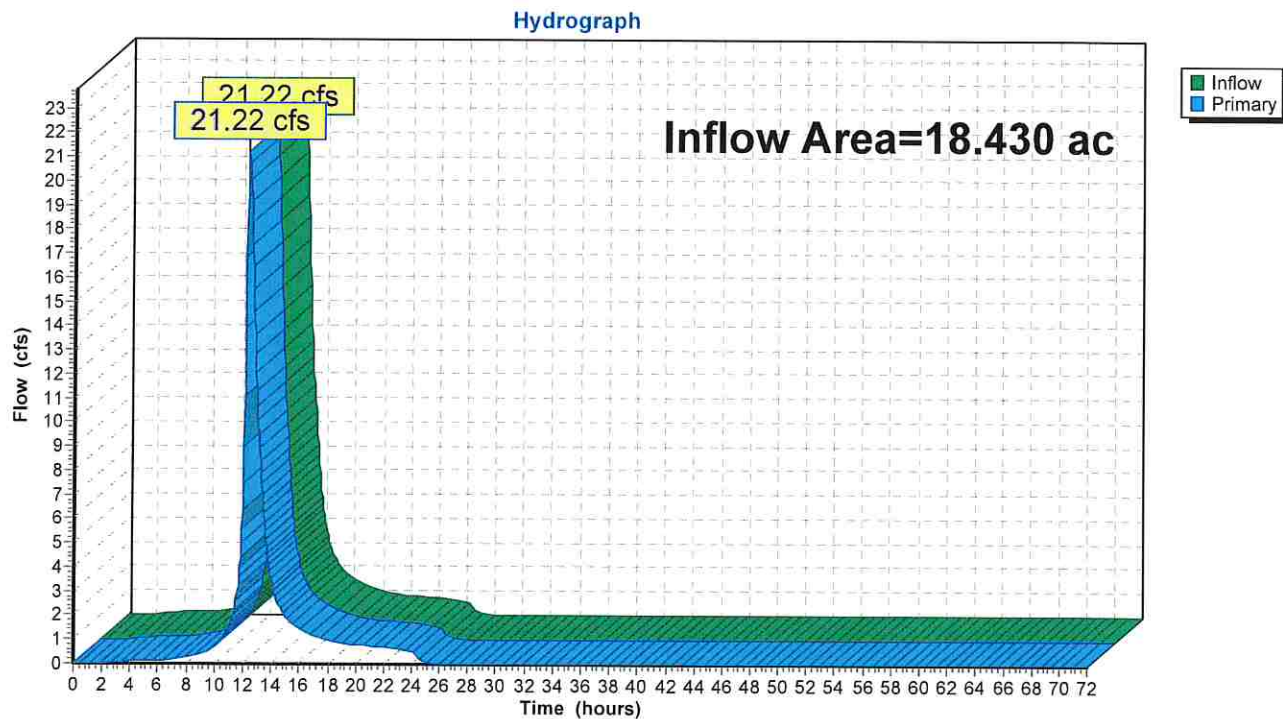


Summary for Link 2: EDA-2 PROPOSED RUNOFF

Inflow Area = 18.430 ac, 23.16% Impervious, Inflow Depth = 2.12" for 2-Year event
Inflow = 21.22 cfs @ 12.35 hrs, Volume= 3.257 af
Primary = 21.22 cfs @ 12.35 hrs, Volume= 3.257 af, Atten= 0%, Lag= 0.0 min

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

Link 2: EDA-2 PROPOSED RUNOFF



Summary for Subcatchment 2-I: EDA-2 IMPERVIOUS

Runoff = 6.87 cfs @ 12.33 hrs, Volume= 1.112 af, Depth= 3.13"

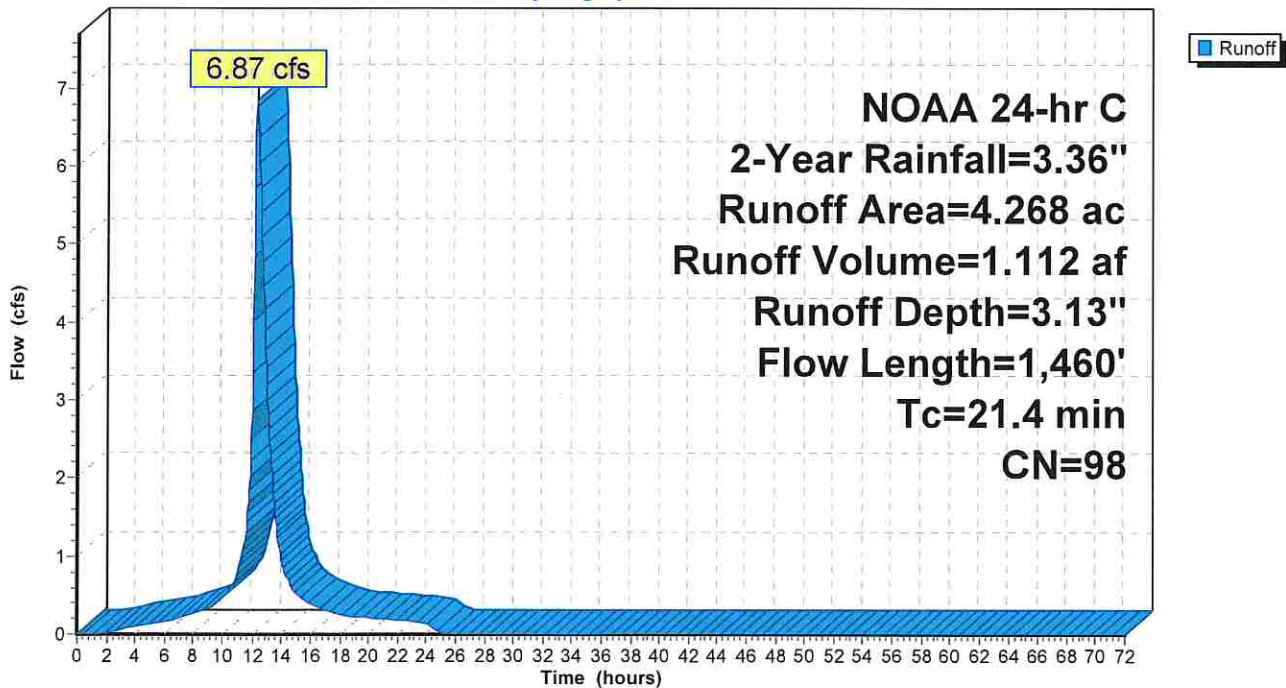
Runoff by SCS TR-20 method, UH=Delmarva, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
 NOAA 24-hr C 2-Year Rainfall=3.36"

Area (ac)	CN	Description
4.268	98	Paved parking, HSG B
4.268	98	100.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
1.6	100	0.0100	1.07		Sheet Flow, Smooth surfaces n= 0.011 P2= 3.36"
1.3	360	0.0111	4.78	28.68	Channel Flow, Area= 6.0 sf Perim= 24.0' r= 0.25' n= 0.013 Asphalt, smooth
18.5	1,000	0.0100	0.90		Shallow Concentrated Flow, Cultivated Straight Rows Kv= 9.0 fps
21.4	1,460	Total			

Subcatchment 2-I: EDA-2 IMPERVIOUS

Hydrograph



Summary for Subcatchment 2-P: EDA-2 PERVIOUS

Runoff = 14.36 cfs @ 12.36 hrs, Volume= 2.145 af, Depth= 1.82"

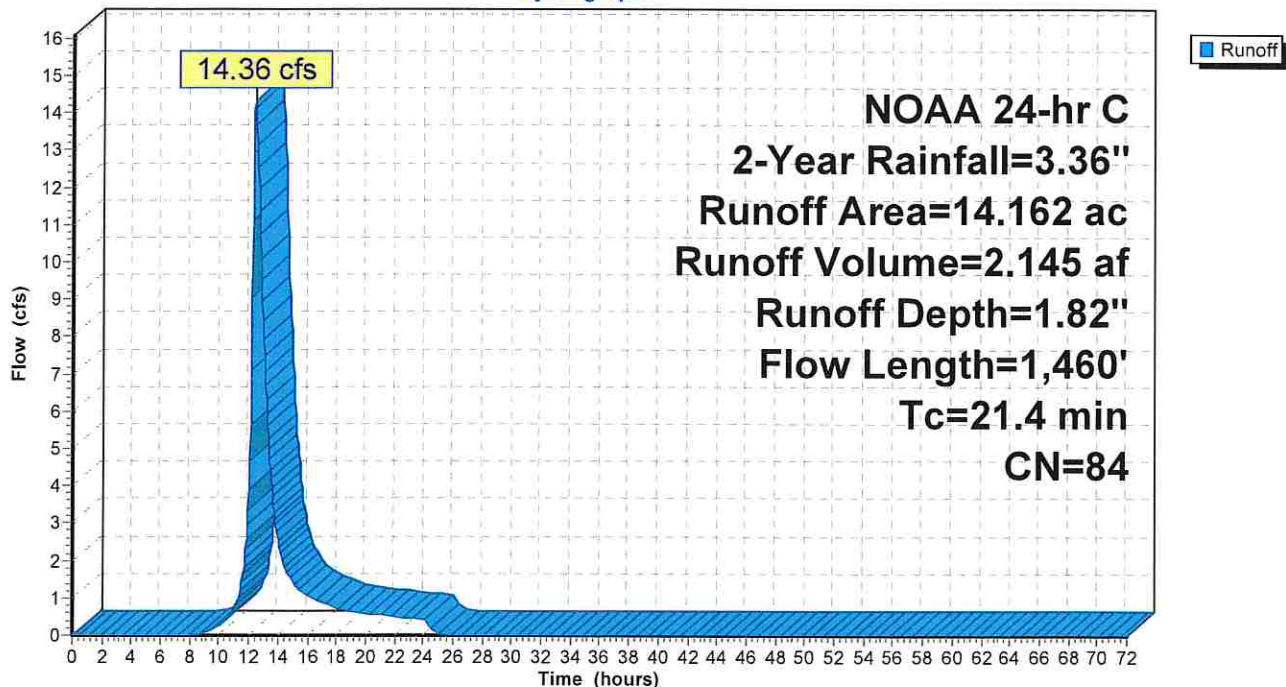
Runoff by SCS TR-20 method, UH=Delmarva, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
 NOAA 24-hr C 2-Year Rainfall=3.36"

Area (ac)	CN	Description
6.830	88	Fallow, crop residue, Good, HSG C
6.153	83	Fallow, crop residue, Good, HSG B
1.179	61	>75% Grass cover, Good, HSG B
14.162	84	Weighted Average
14.162	84	100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
1.6	100	0.0100	1.07		Sheet Flow, Smooth surfaces n= 0.011 P2= 3.36"
1.3	360	0.0111	4.78	28.68	Channel Flow, Area= 6.0 sf Perim= 24.0' r= 0.25' n= 0.013 Asphalt, smooth
18.5	1,000	0.0100	0.90		Shallow Concentrated Flow, Cultivated Straight Rows Kv= 9.0 fps
21.4	1,460	Total			

Subcatchment 2-P: EDA-2 PERVIOUS

Hydrograph



APPENDIX B: PROPOSED CONDITIONS



UNDETAIN
NORTH-WEST



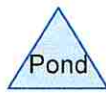
LINE C IMPERVIOUS



LINE C PERVIOUS



PROPOSED RUNOFF
FOR EDA-1A



Summary for Subcatchment 7S: LINE C IMPERVIOUS

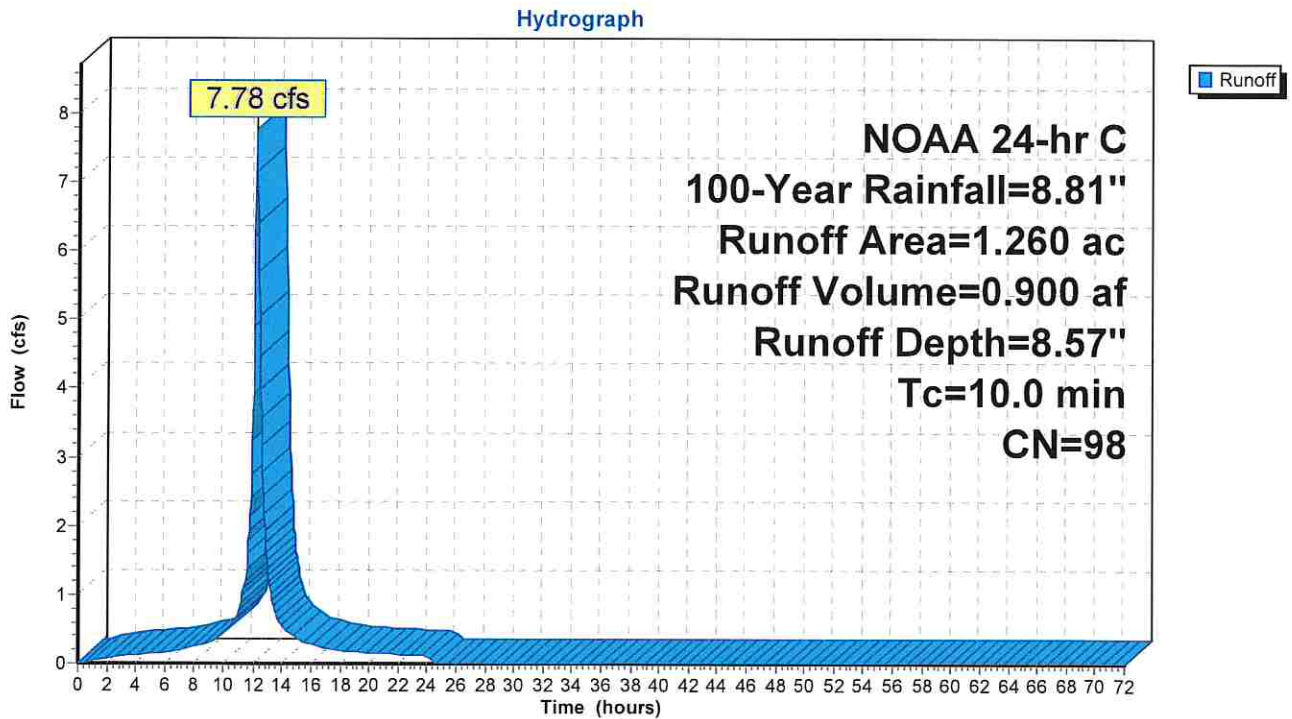
Runoff = 7.78 cfs @ 12.19 hrs, Volume= 0.900 af, Depth= 8.57"

Runoff by SCS TR-20 method, UH=Delmarva, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
 NOAA 24-hr C 100-Year Rainfall=8.81"

Area (ac)	CN	Description
1.260	98	Paved parking, HSG B
1.260	98	100.00% Impervious Area

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

Subcatchment 7S: LINE C IMPERVIOUS



Summary for Subcatchment 8S: LINE C PERVIOUS

Runoff = 12.54 cfs @ 12.20 hrs, Volume= 1.273 af, Depth= 4.07"

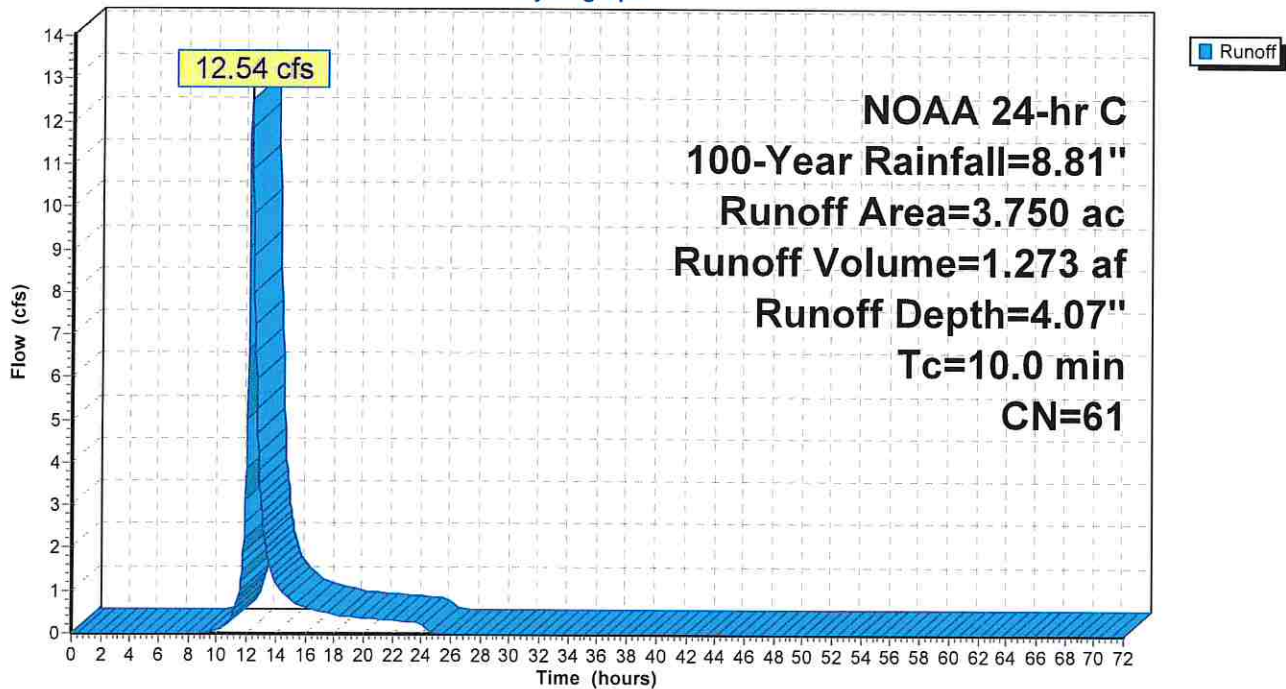
Runoff by SCS TR-20 method, UH=Delmarva, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
 NOAA 24-hr C 100-Year Rainfall=8.81"

Area (ac)	CN	Description
3.750	61	>75% Grass cover, Good, HSG B
3.750	61	100.00% Pervious Area

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

Subcatchment 8S: LINE C PERVIOUS

Hydrograph



Summary for Subcatchment 9S: UNDETAIN NORTH-WEST

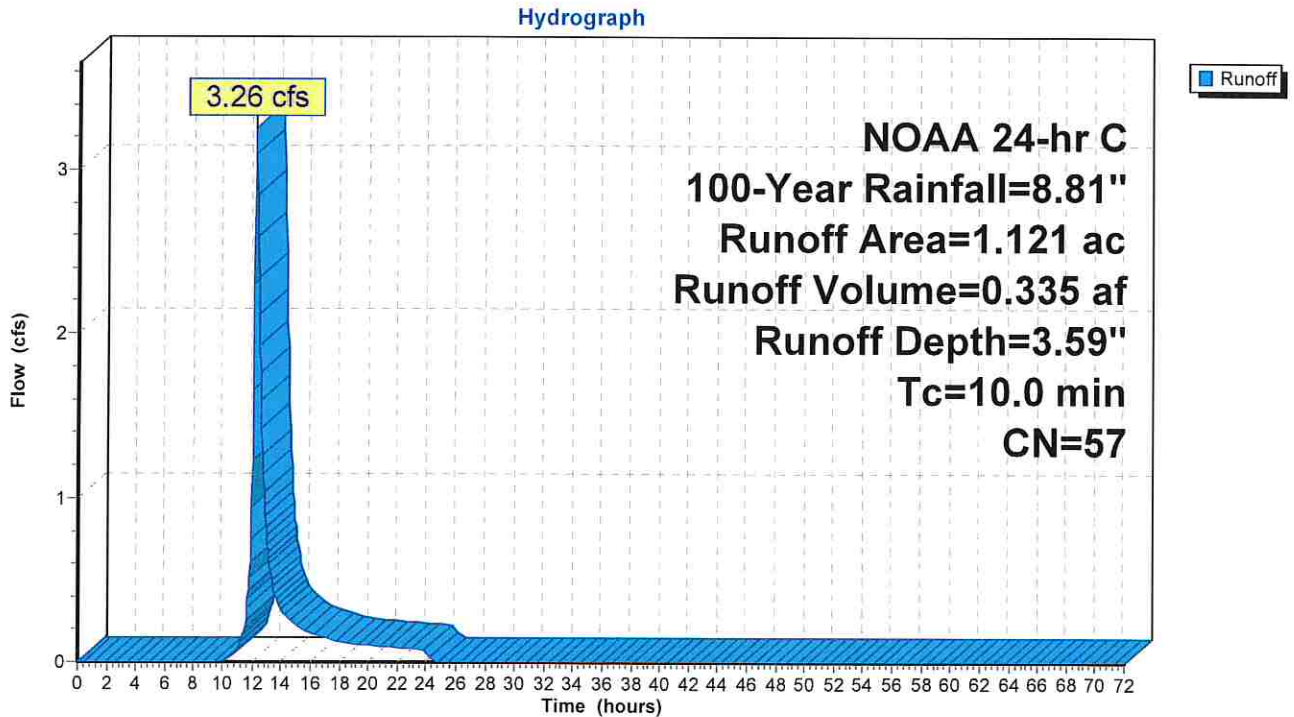
Runoff = 3.26 cfs @ 12.21 hrs, Volume= 0.335 af, Depth= 3.59"

Runoff by SCS TR-20 method, UH=Delmarva, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
 NOAA 24-hr C 100-Year Rainfall=8.81"

Area (ac)	CN	Description
0.771	55	Woods, Good, HSG B
0.350	61	>75% Grass cover, Good, HSG B
1.121	57	Weighted Average
1.121	57	100.00% Pervious Area

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

Subcatchment 9S: UNDETAIN NORTH-WEST



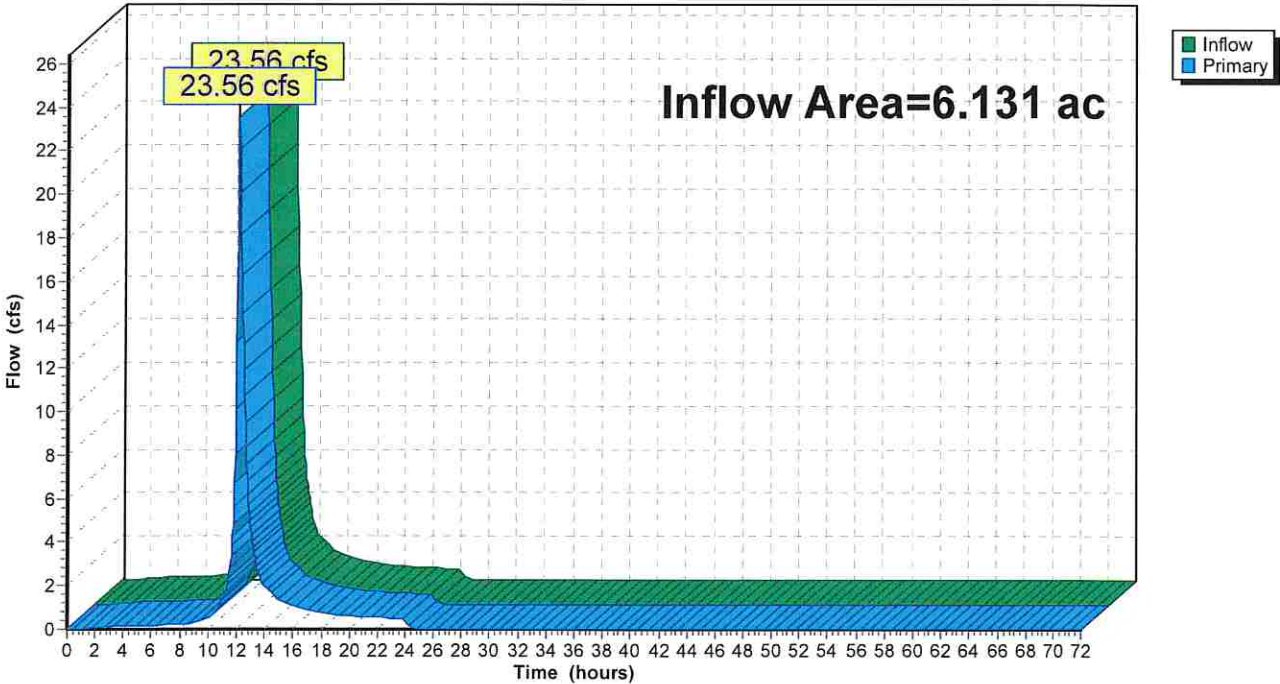
Summary for Link 10L: PROPOSED RUNOFF FOR EDA-1A

Inflow Area = 6.131 ac, 20.55% Impervious, Inflow Depth = 4.91" for 100-Year event
Inflow = 23.56 cfs @ 12.20 hrs, Volume= 2.508 af
Primary = 23.56 cfs @ 12.20 hrs, Volume= 2.508 af, Atten= 0%, Lag= 0.0 min

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

Link 10L: PROPOSED RUNOFF FOR EDA-1A

Hydrograph



Summary for Subcatchment 7S: LINE C IMPERVIOUS

Runoff = 5.69 cfs @ 12.19 hrs, Volume= 0.652 af, Depth= 6.21"

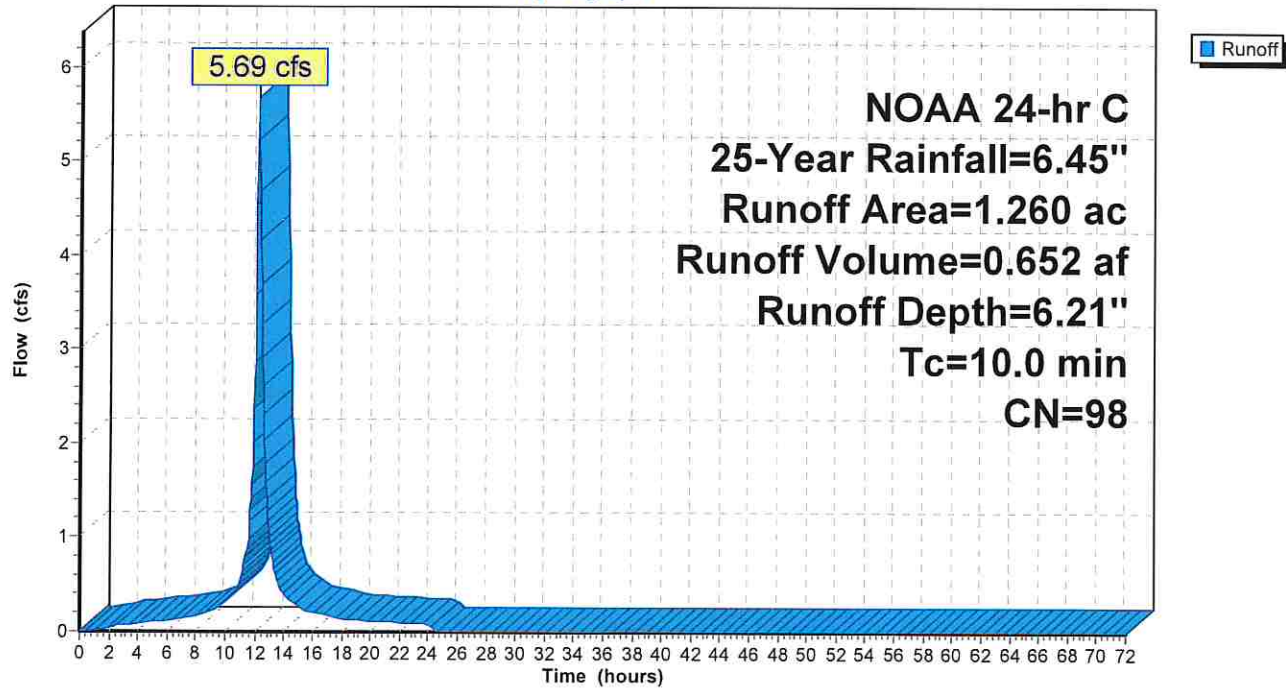
Runoff by SCS TR-20 method, UH=Delmarva, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
 NOAA 24-hr C 25-Year Rainfall=6.45"

Area (ac)	CN	Description
1.260	98	Paved parking, HSG B
1.260	98	100.00% Impervious Area

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

Subcatchment 7S: LINE C IMPERVIOUS

Hydrograph



Summary for Subcatchment 8S: LINE C PERVIOUS

Runoff = 6.89 cfs @ 12.21 hrs, Volume= 0.723 af, Depth= 2.31"

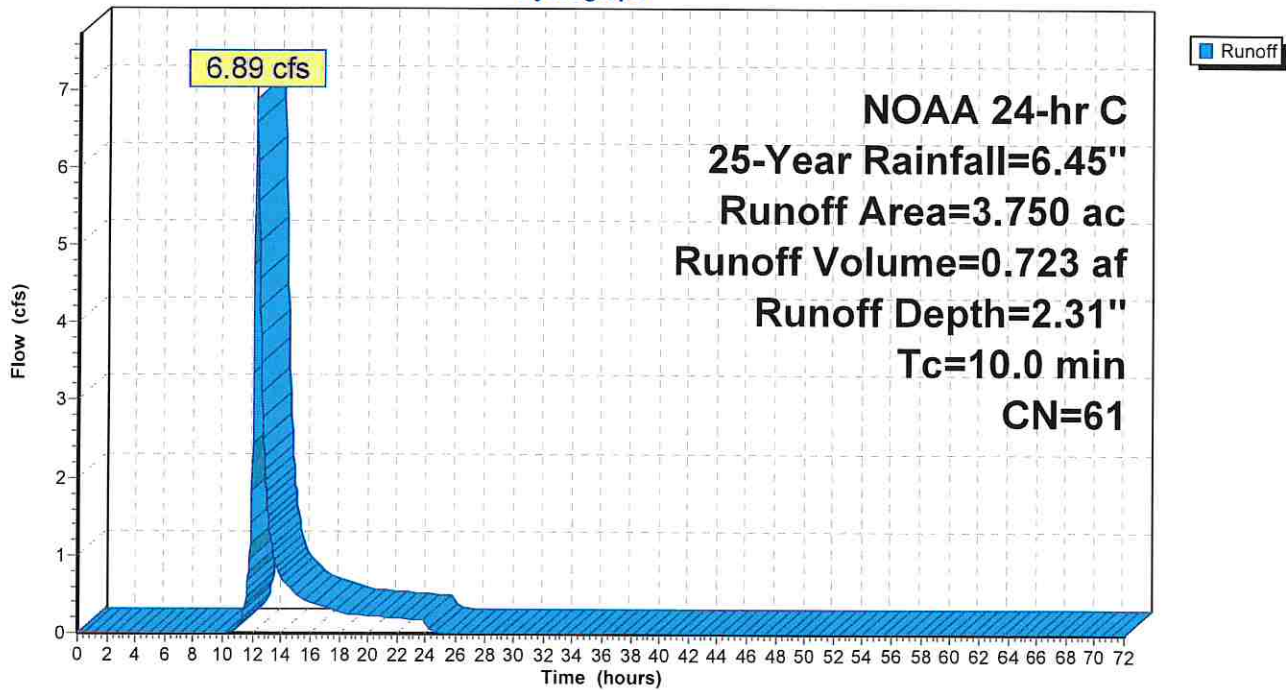
Runoff by SCS TR-20 method, UH=Delmarva, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
 NOAA 24-hr C 25-Year Rainfall=6.45"

Area (ac)	CN	Description
3.750	61	>75% Grass cover, Good, HSG B
3.750	61	100.00% Pervious Area

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

Subcatchment 8S: LINE C PERVIOUS

Hydrograph



Summary for Subcatchment 9S: UNDETAIN NORTH-WEST

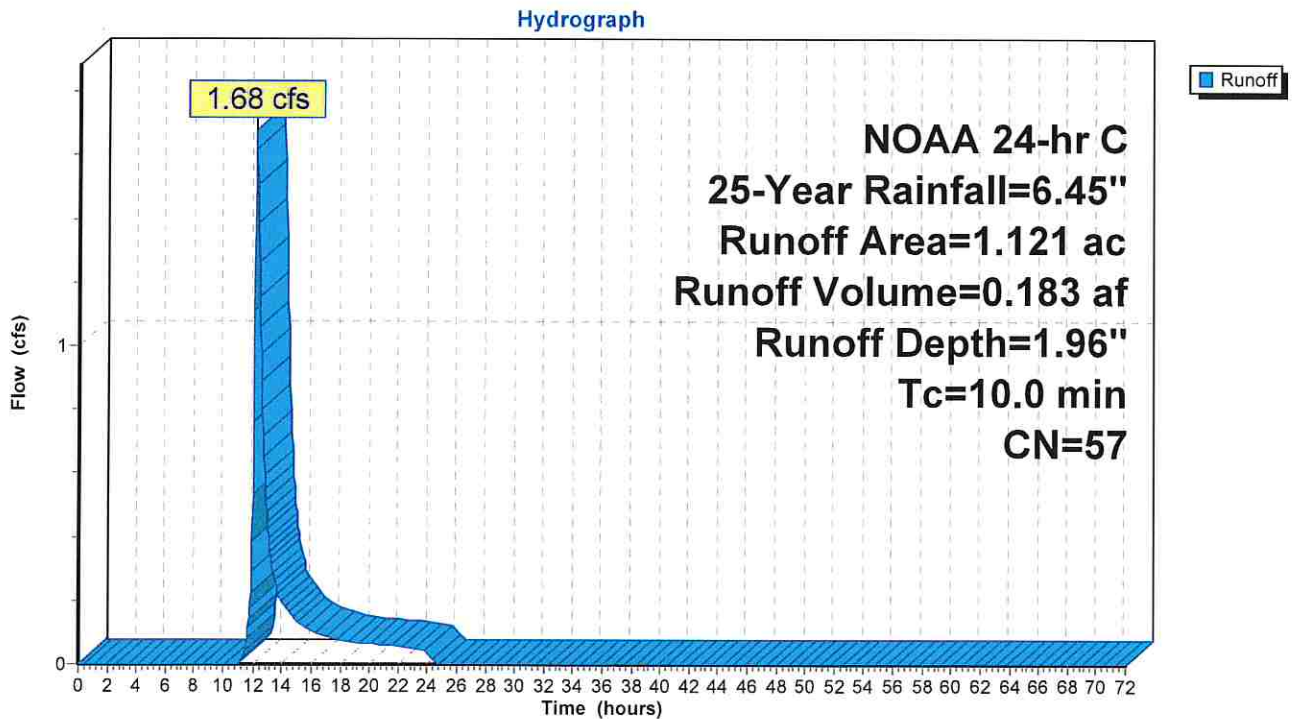
Runoff = 1.68 cfs @ 12.21 hrs, Volume= 0.183 af, Depth= 1.96"

Runoff by SCS TR-20 method, UH=Delmarva, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
 NOAA 24-hr C 25-Year Rainfall=6.45"

Area (ac)	CN	Description
0.771	55	Woods, Good, HSG B
0.350	61	>75% Grass cover, Good, HSG B
1.121	57	Weighted Average
1.121	57	100.00% Pervious Area

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

Subcatchment 9S: UNDETAIN NORTH-WEST

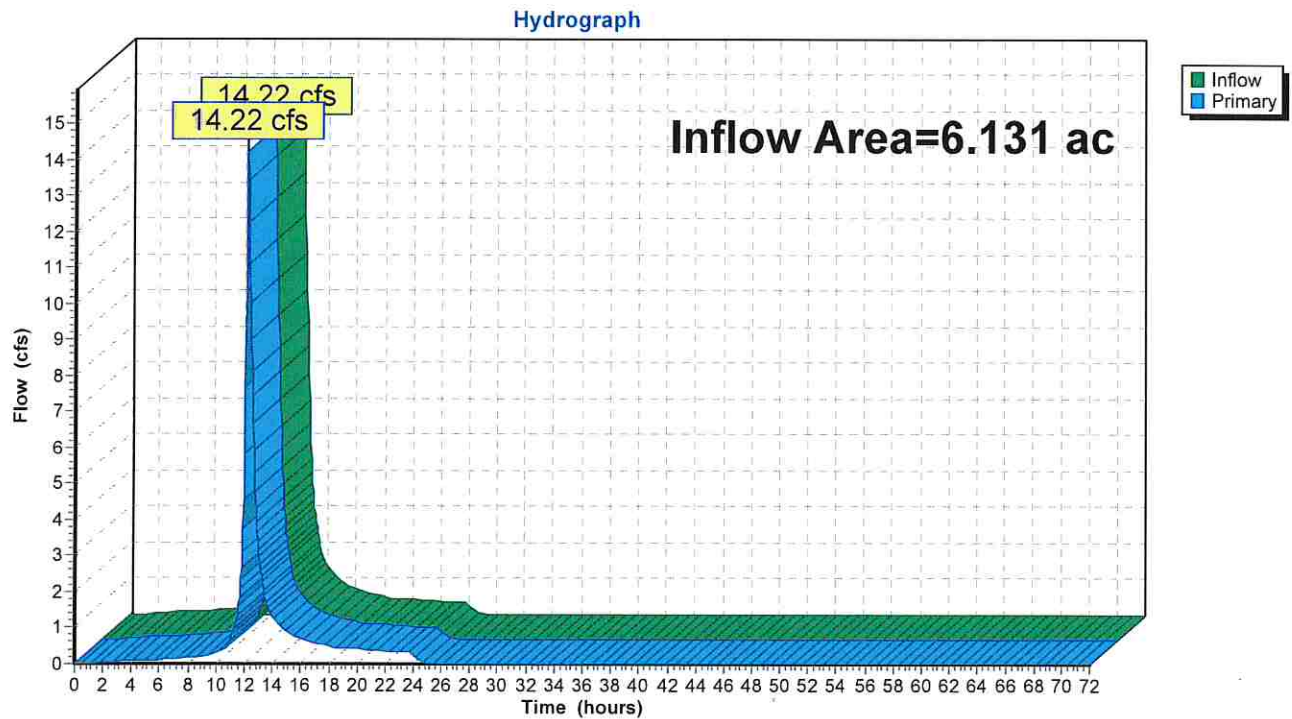


Summary for Link 10L: PROPOSED RUNOFF FOR EDA-1A

Inflow Area = 6.131 ac, 20.55% Impervious, Inflow Depth = 3.05" for 25-Year event
Inflow = 14.22 cfs @ 12.20 hrs, Volume= 1.558 af
Primary = 14.22 cfs @ 12.20 hrs, Volume= 1.558 af, Atten= 0%, Lag= 0.0 min

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

Link 10L: PROPOSED RUNOFF FOR EDA-1A



Summary for Subcatchment 7S: LINE C IMPERVIOUS

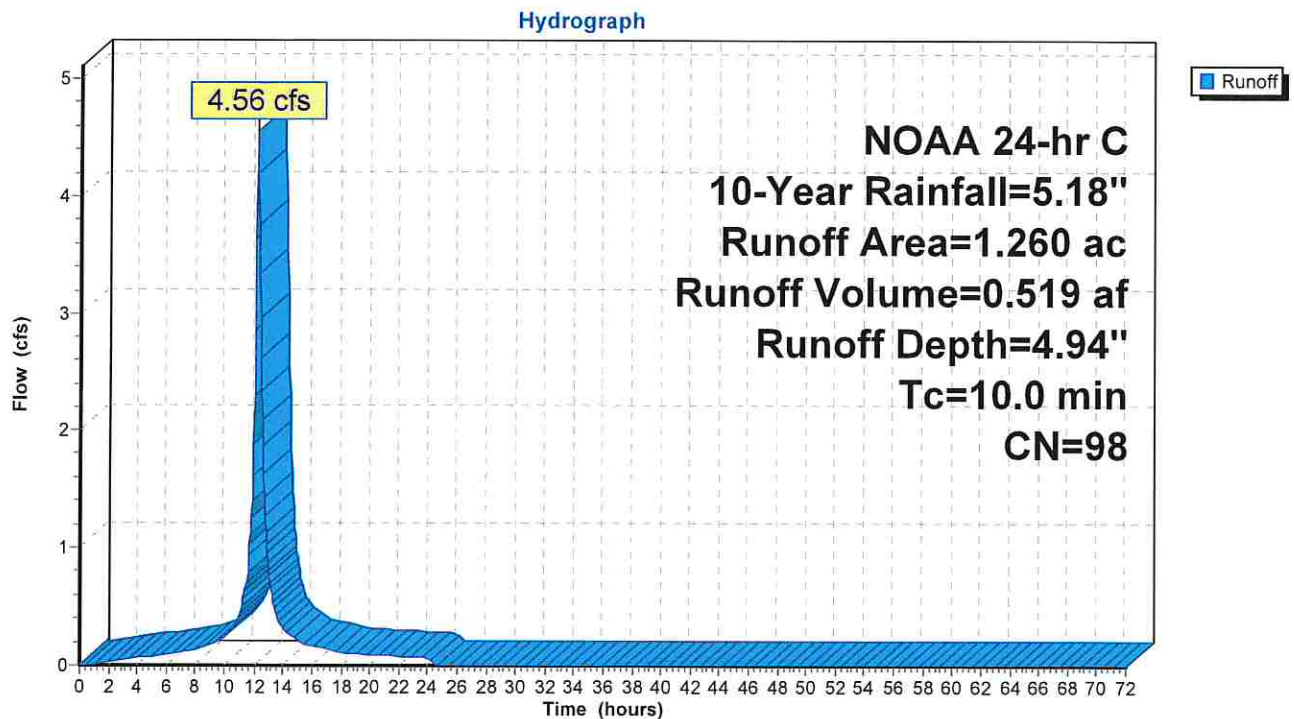
Runoff = 4.56 cfs @ 12.19 hrs, Volume= 0.519 af, Depth= 4.94"

Runoff by SCS TR-20 method, UH=Delmarva, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
 NOAA 24-hr C 10-Year Rainfall=5.18"

Area (ac)	CN	Description
1.260	98	Paved parking, HSG B
1.260	98	100.00% Impervious Area

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

Subcatchment 7S: LINE C IMPERVIOUS



Summary for Subcatchment 8S: LINE C PERVIOUS

Runoff = 4.18 cfs @ 12.21 hrs, Volume= 0.462 af, Depth= 1.48"

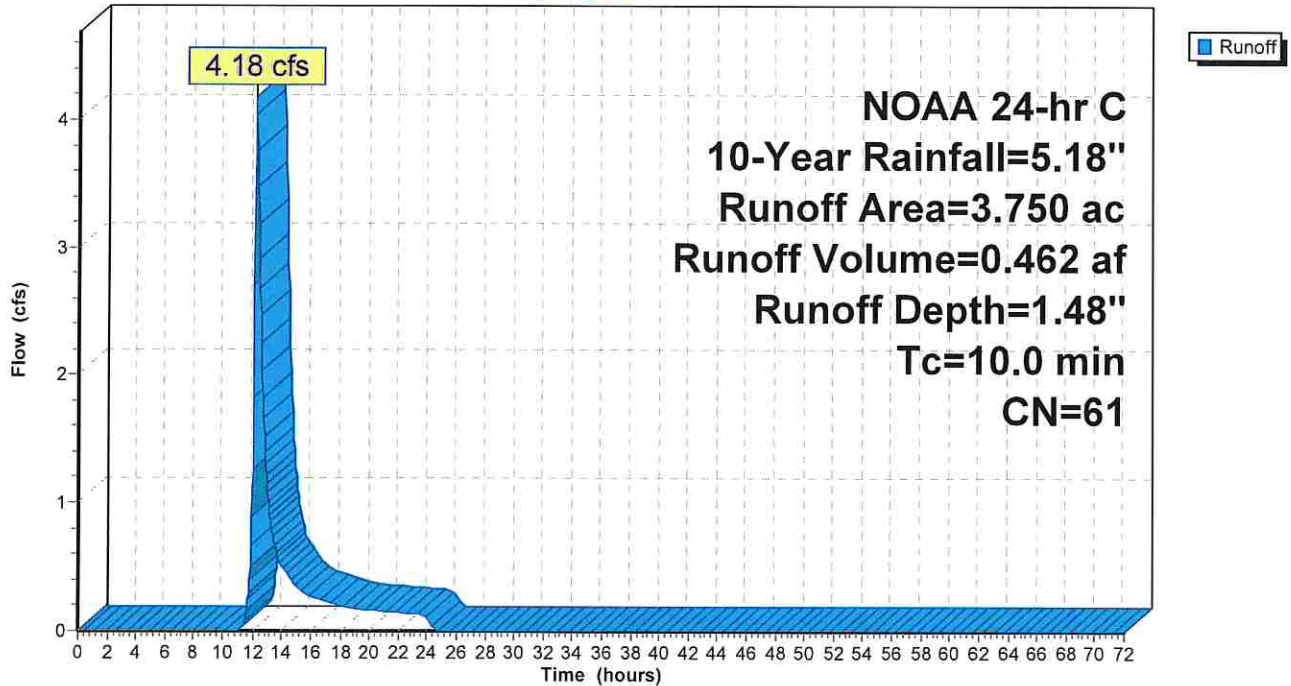
Runoff by SCS TR-20 method, UH=Delmarva, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
 NOAA 24-hr C 10-Year Rainfall=5.18"

Area (ac)	CN	Description
3.750	61	>75% Grass cover, Good, HSG B
3.750	61	100.00% Pervious Area

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

Subcatchment 8S: LINE C PERVIOUS

Hydrograph



Summary for Subcatchment 9S: UNDETAIN NORTH-WEST

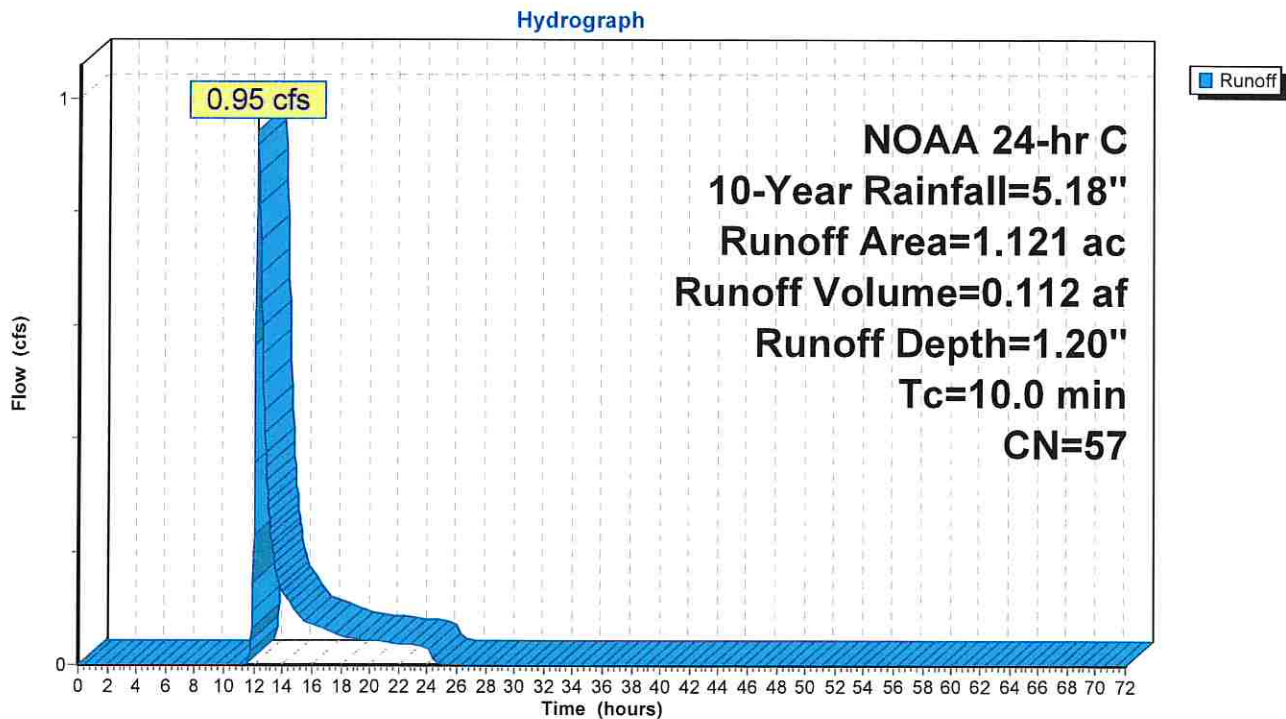
Runoff = 0.95 cfs @ 12.22 hrs, Volume= 0.112 af, Depth= 1.20"

Runoff by SCS TR-20 method, UH=Delmarva, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
 NOAA 24-hr C 10-Year Rainfall=5.18"

Area (ac)	CN	Description
0.771	55	Woods, Good, HSG B
0.350	61	>75% Grass cover, Good, HSG B
1.121	57	Weighted Average
1.121	57	100.00% Pervious Area

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

Subcatchment 9S: UNDETAIN NORTH-WEST



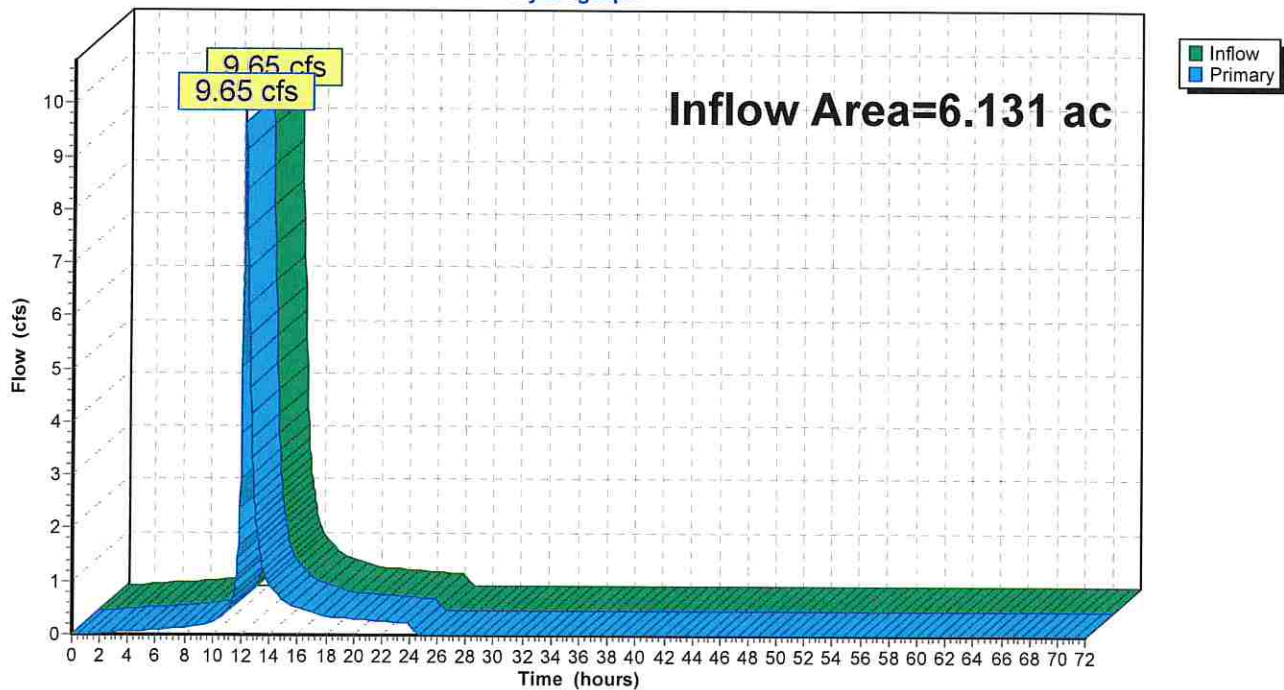
Summary for Link 10L: PROPOSED RUNOFF FOR EDA-1A

Inflow Area = 6.131 ac, 20.55% Impervious, Inflow Depth = 2.14" for 10-Year event
Inflow = 9.65 cfs @ 12.20 hrs, Volume= 1.093 af
Primary = 9.65 cfs @ 12.20 hrs, Volume= 1.093 af, Atten= 0%, Lag= 0.0 min

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

Link 10L: PROPOSED RUNOFF FOR EDA-1A

Hydrograph



Summary for Subcatchment 7S: LINE C IMPERVIOUS

Runoff = 2.93 cfs @ 12.19 hrs, Volume= 0.328 af, Depth= 3.13"

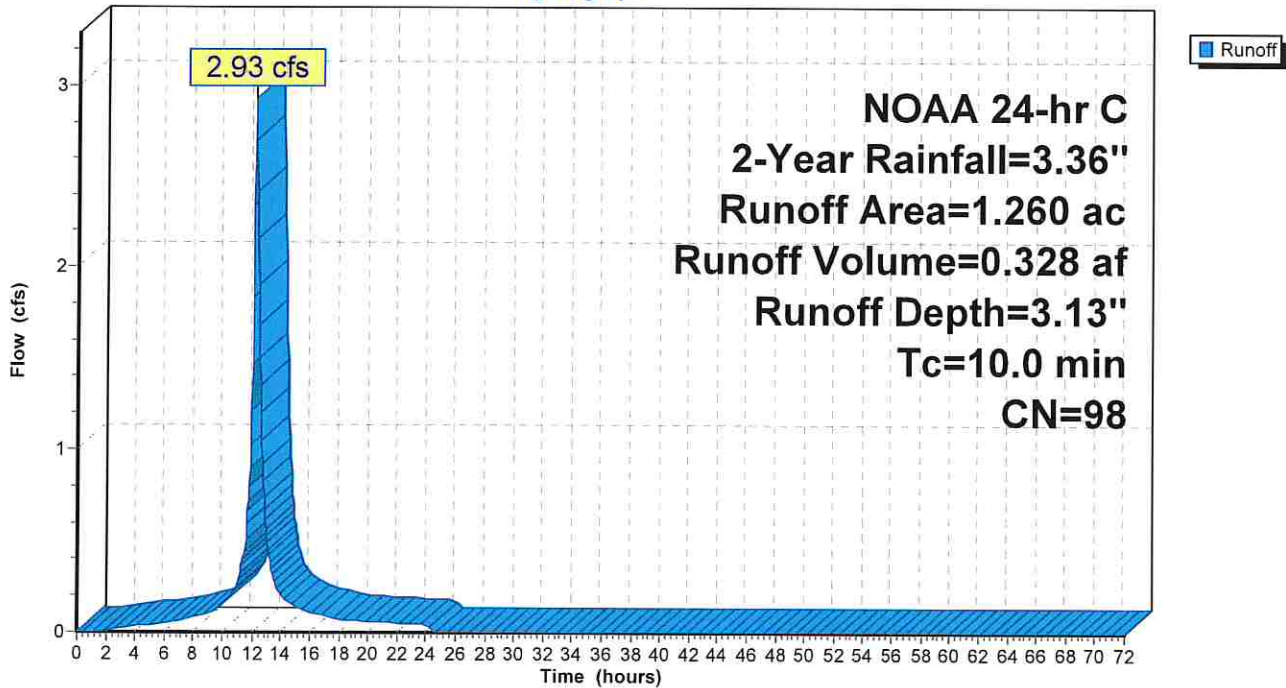
Runoff by SCS TR-20 method, UH=Delmarva, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
 NOAA 24-hr C 2-Year Rainfall=3.36"

Area (ac)	CN	Description
1.260	98	Paved parking, HSG B
1.260	98	100.00% Impervious Area

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

Subcatchment 7S: LINE C IMPERVIOUS

Hydrograph



Summary for Subcatchment 8S: LINE C PERVIOUS

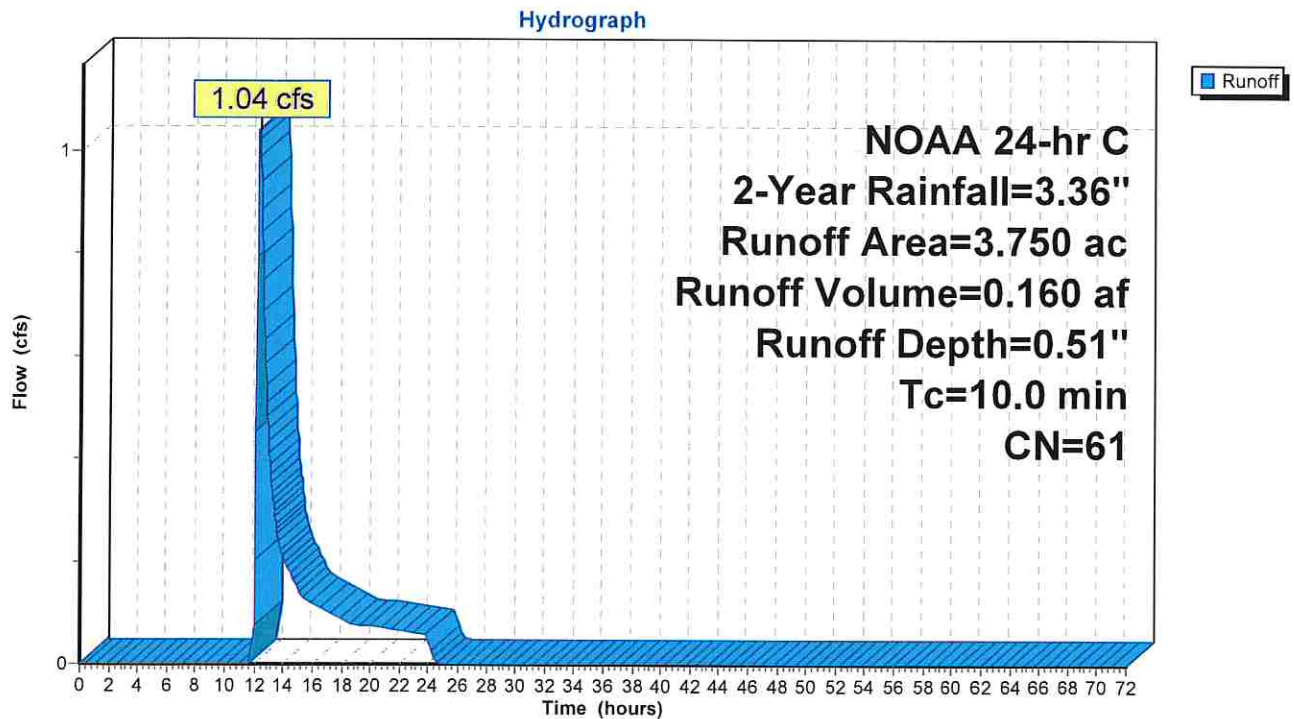
Runoff = 1.04 cfs @ 12.26 hrs, Volume= 0.160 af, Depth= 0.51"

Runoff by SCS TR-20 method, UH=Delmarva, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
 NOAA 24-hr C 2-Year Rainfall=3.36"

Area (ac)	CN	Description
3.750	61	>75% Grass cover, Good, HSG B
3.750	61	100.00% Pervious Area

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

Subcatchment 8S: LINE C PERVIOUS



Summary for Subcatchment 9S: UNDETAIN NORTH-WEST

Runoff = 0.17 cfs @ 12.35 hrs, Volume= 0.034 af, Depth= 0.36"

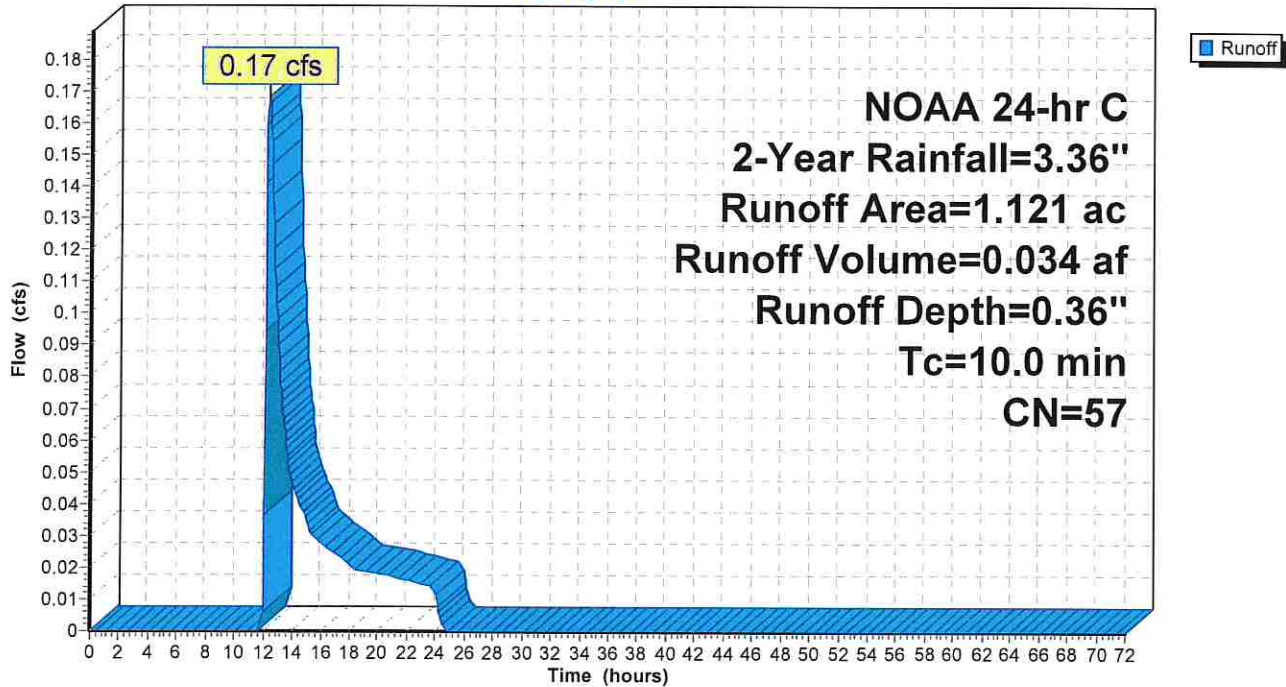
Runoff by SCS TR-20 method, UH=Delmarva, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
 NOAA 24-hr C 2-Year Rainfall=3.36"

Area (ac)	CN	Description
0.771	55	Woods, Good, HSG B
0.350	61	>75% Grass cover, Good, HSG B
1.121	57	Weighted Average
1.121	57	100.00% Pervious Area

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

Subcatchment 9S: UNDETAIN NORTH-WEST

Hydrograph



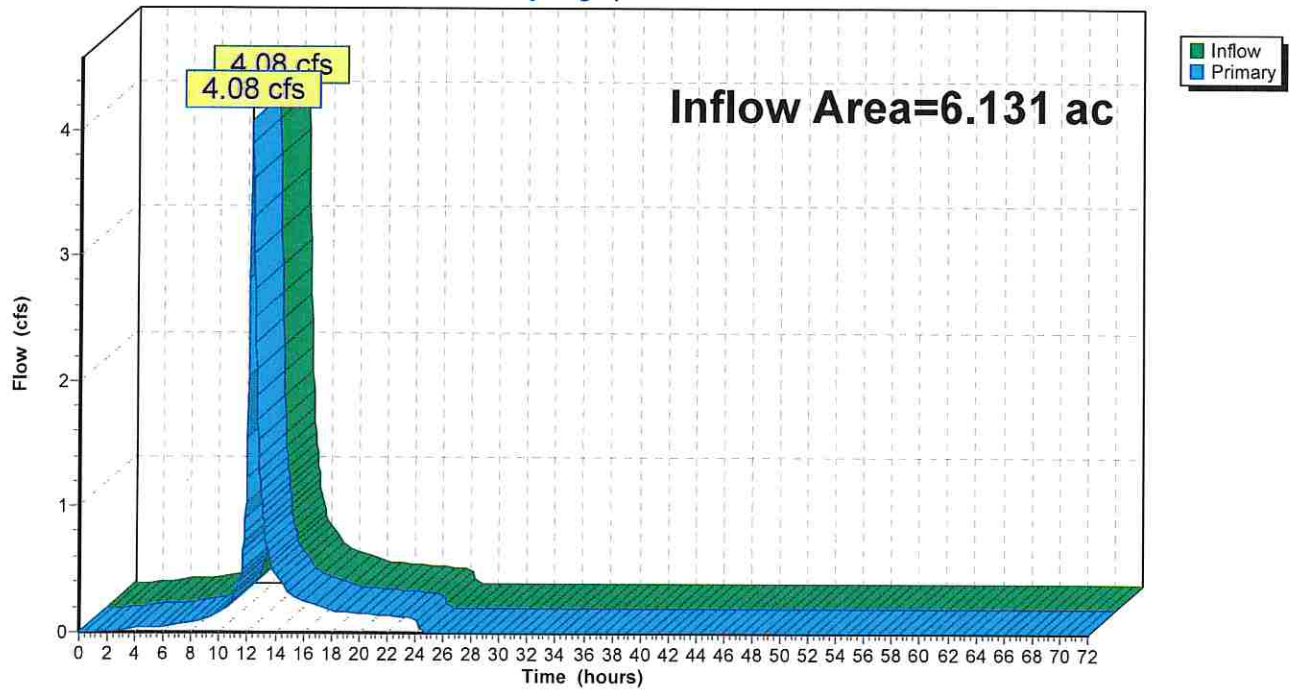
Summary for Link 10L: PROPOSED RUNOFF FOR EDA-1A

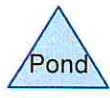
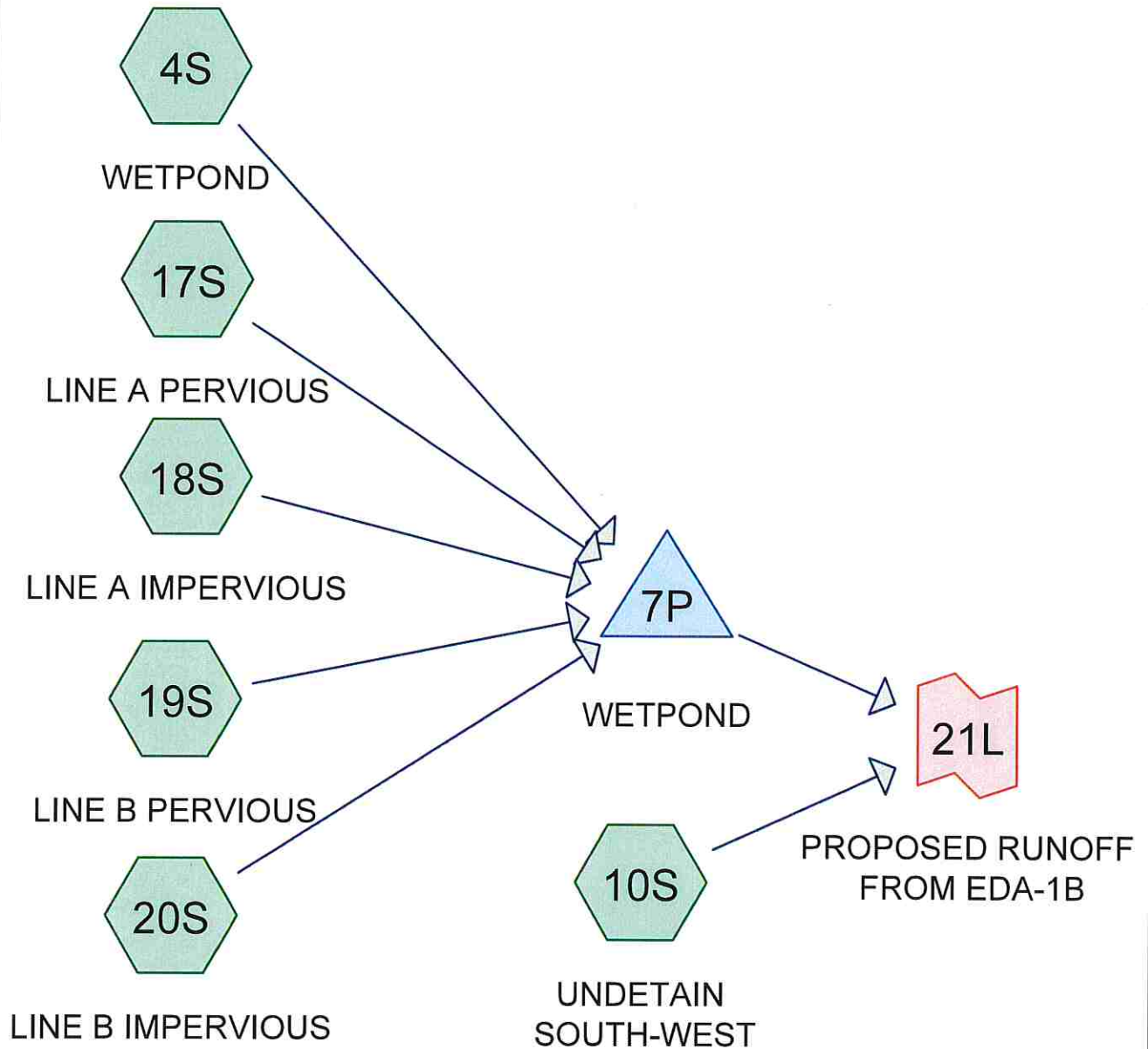
Inflow Area = 6.131 ac, 20.55% Impervious, Inflow Depth = 1.02" for 2-Year event
Inflow = 4.08 cfs @ 12.21 hrs, Volume= 0.522 af
Primary = 4.08 cfs @ 12.21 hrs, Volume= 0.522 af, Atten= 0%, Lag= 0.0 min

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

Link 10L: PROPOSED RUNOFF FOR EDA-1A

Hydrograph





Routing Diagram for 2020.014-ROACKEFELLER EASTAMPTON(4-16-21)
 Prepared by Menlo Engineering Associates, Inc., Printed 4/21/2021
 HydroCAD® 10.10-4a s/n 01129 © 2020 HydroCAD Software Solutions LLC

Summary for Subcatchment 4S: WETPOND

Runoff = 9.14 cfs @ 12.19 hrs, Volume= 0.969 af, Depth= 7.36"

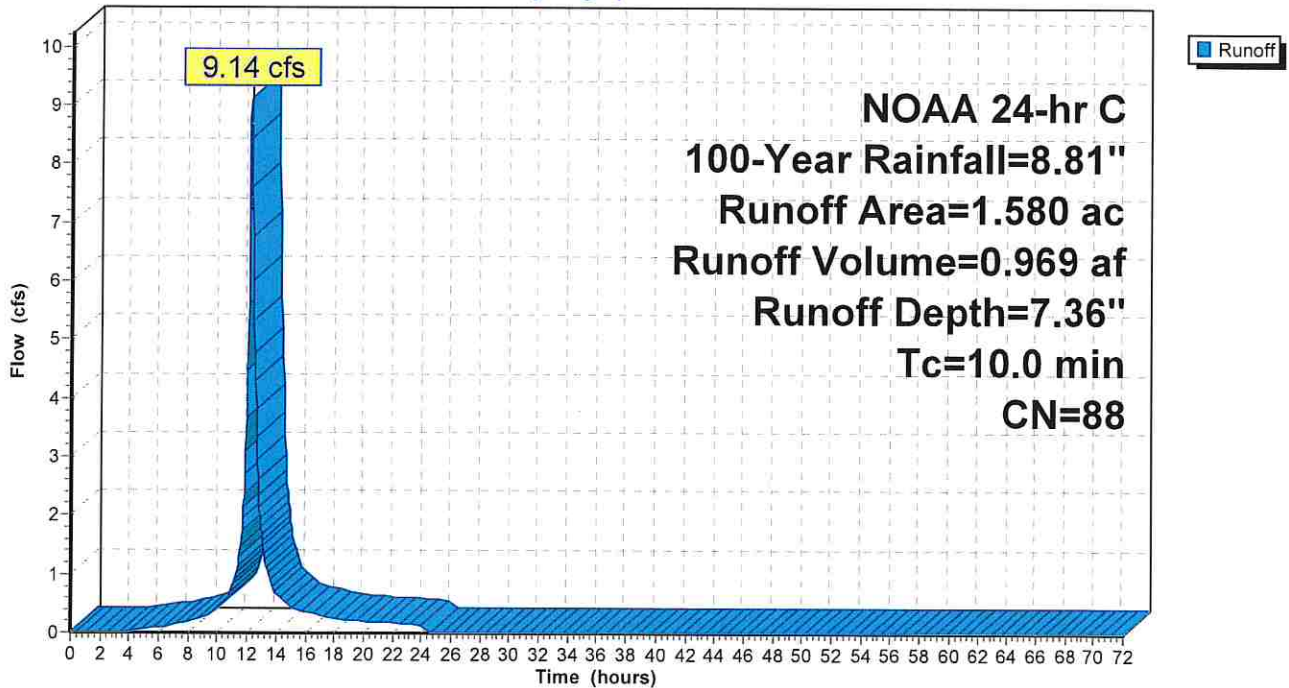
Runoff by SCS TR-20 method, UH=Delmarva, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
 NOAA 24-hr C 100-Year Rainfall=8.81"

Area (ac)	CN	Description
0.980	98	Water Surface, 0% imp, HSG C
0.438	74	>75% Grass cover, Good, HSG C
0.162	61	>75% Grass cover, Good, HSG B
1.580	88	Weighted Average
1.580	88	100.00% Pervious Area

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

Subcatchment 4S: WETPOND

Hydrograph



Summary for Subcatchment 10S: UNDETAIN SOUTH-WEST

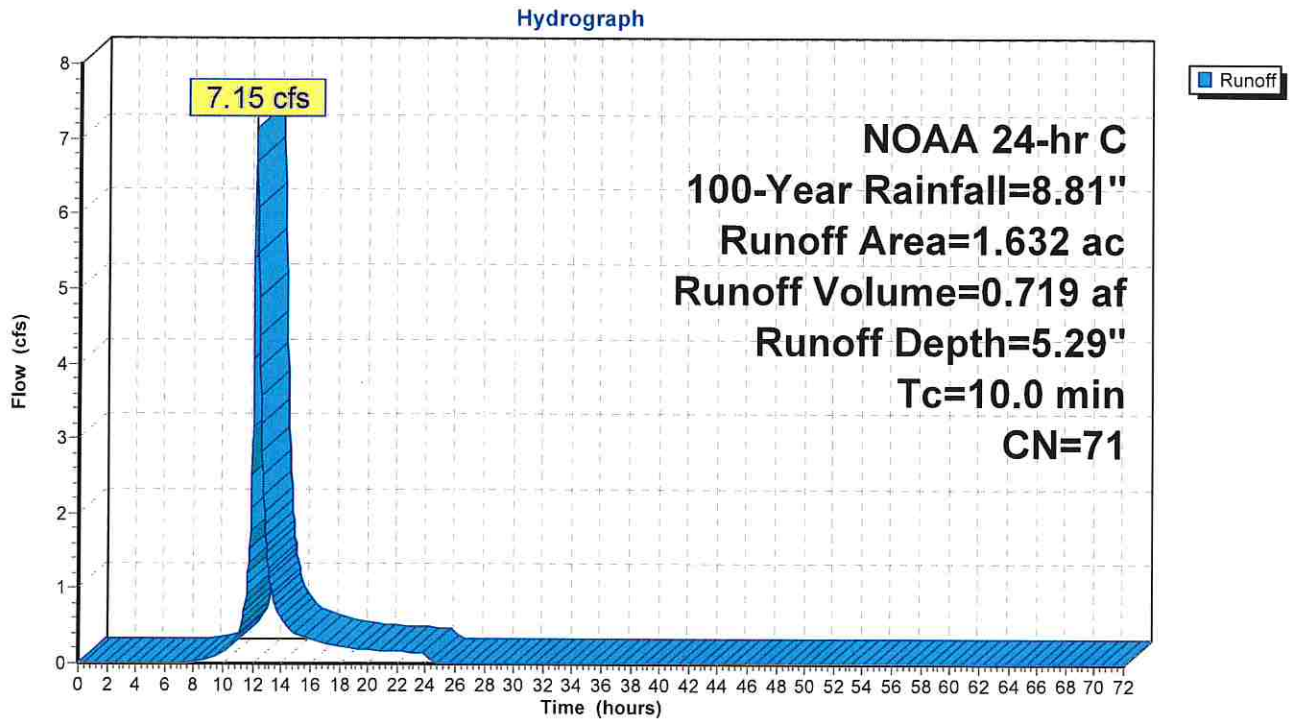
Runoff = 7.15 cfs @ 12.20 hrs, Volume= 0.719 af, Depth= 5.29"

Runoff by SCS TR-20 method, UH=Delmarva, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
 NOAA 24-hr C 100-Year Rainfall=8.81"

Area (ac)	CN	Description
0.185	55	Woods, Good, HSG B
0.381	70	Woods, Good, HSG C
1.066	74	>75% Grass cover, Good, HSG C
1.632	71	Weighted Average
1.632	71	100.00% Pervious Area

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

Subcatchment 10S: UNDETAIN SOUTH-WEST



Summary for Subcatchment 17S: LINE A PERVIOUS

Runoff = 9.63 cfs @ 12.31 hrs, Volume= 1.314 af, Depth= 4.19"

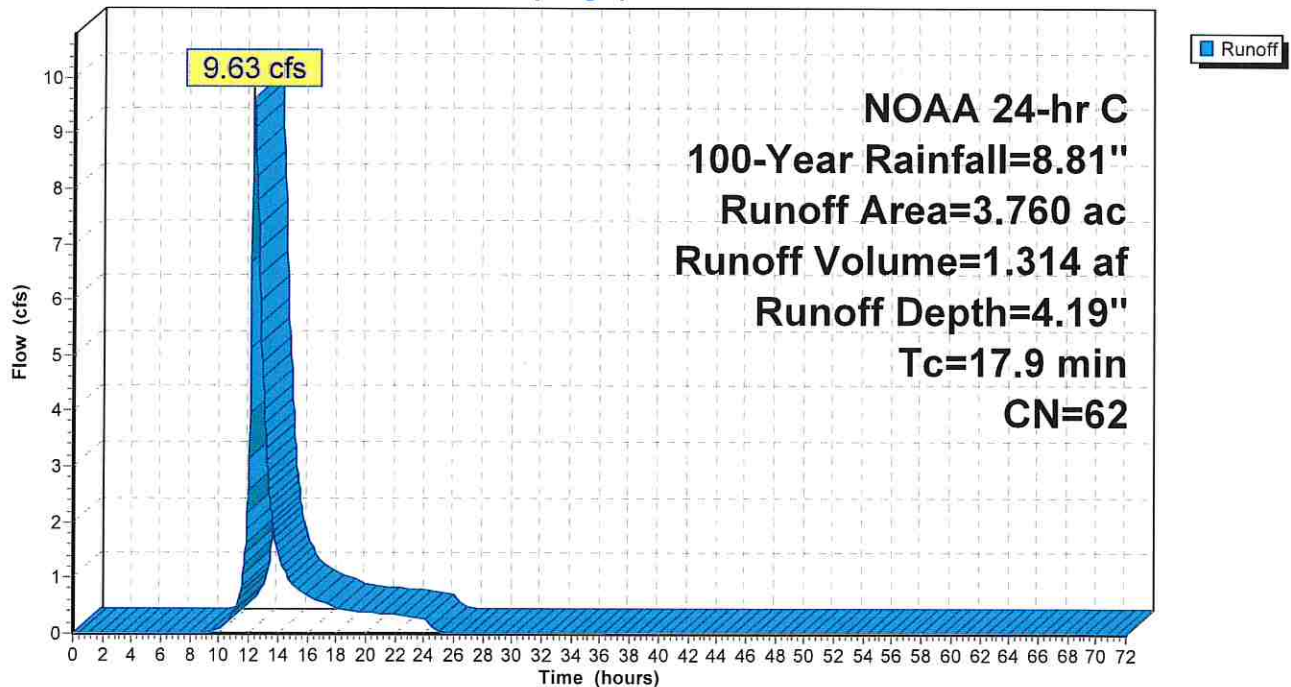
Runoff by SCS TR-20 method, UH=Delmarva, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
 NOAA 24-hr C 100-Year Rainfall=8.81"

Area (ac)	CN	Description
3.600	61	>75% Grass cover, Good, HSG B
0.160	74	>75% Grass cover, Good, HSG C
3.760	62	Weighted Average
3.760	62	100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
17.9					Direct Entry, PIPE CALCS

Subcatchment 17S: LINE A PERVIOUS

Hydrograph



Summary for Subcatchment 18S: LINE A IMPERVIOUS

Runoff = 49.21 cfs @ 12.29 hrs, Volume= 7.484 af, Depth= 8.57"

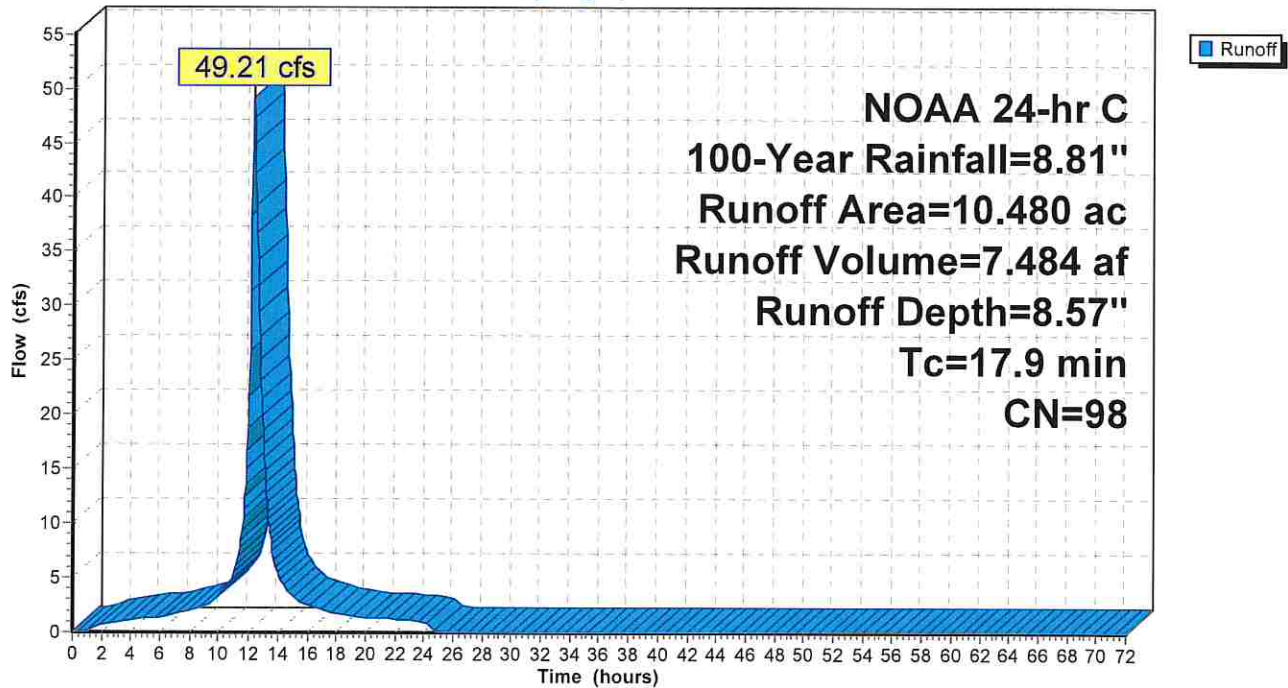
Runoff by SCS TR-20 method, UH=Delmarva, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
 NOAA 24-hr C 100-Year Rainfall=8.81"

Area (ac)	CN	Description
10.480	98	Paved parking, HSG B
10.480	98	100.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
17.9					Direct Entry, PIPE CALCS

Subcatchment 18S: LINE A IMPERVIOUS

Hydrograph



Summary for Subcatchment 19S: LINE B PERVIOUS

Runoff = 2.24 cfs @ 12.31 hrs, Volume= 0.306 af, Depth= 5.66"

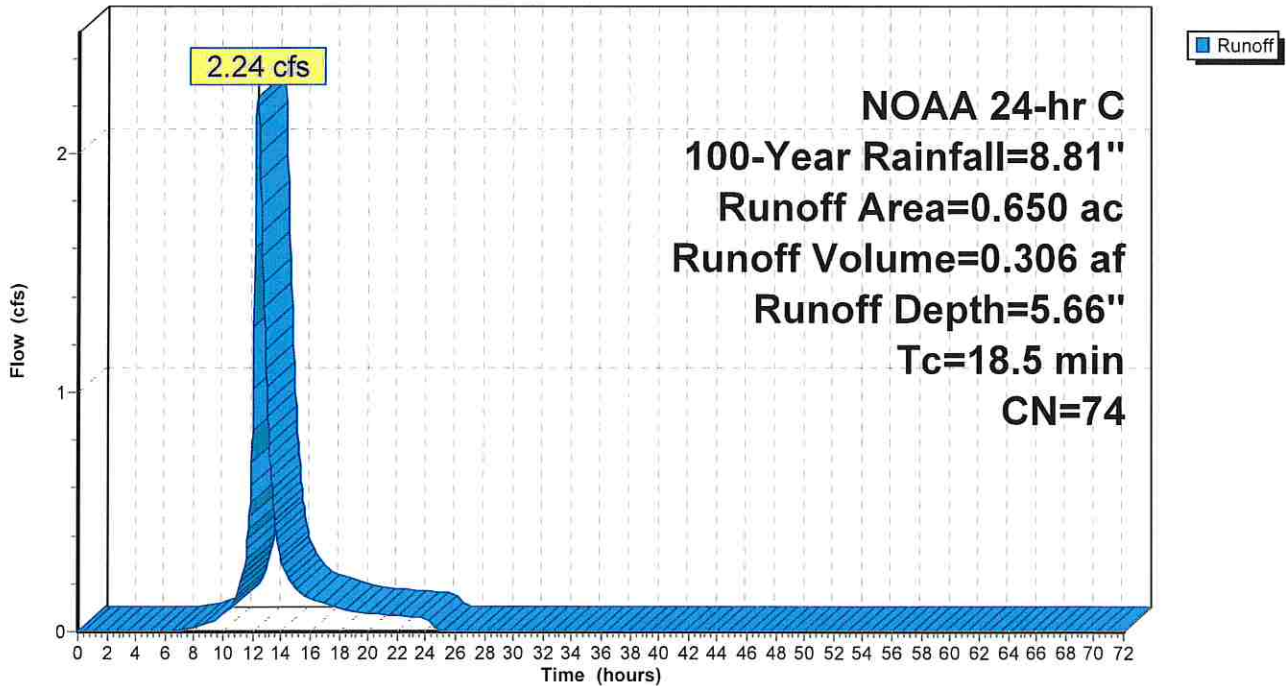
Runoff by SCS TR-20 method, UH=Delmarva, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
 NOAA 24-hr C 100-Year Rainfall=8.81"

Area (ac)	CN	Description
0.650	74	>75% Grass cover, Good, HSG C
0.650	74	100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
18.5					Direct Entry, PIPE CALCS

Subcatchment 19S: LINE B PERVIOUS

Hydrograph



Summary for Subcatchment 20S: LINE B IMPERVIOUS

Runoff = 46.01 cfs @ 12.30 hrs, Volume= 7.113 af, Depth= 8.57"

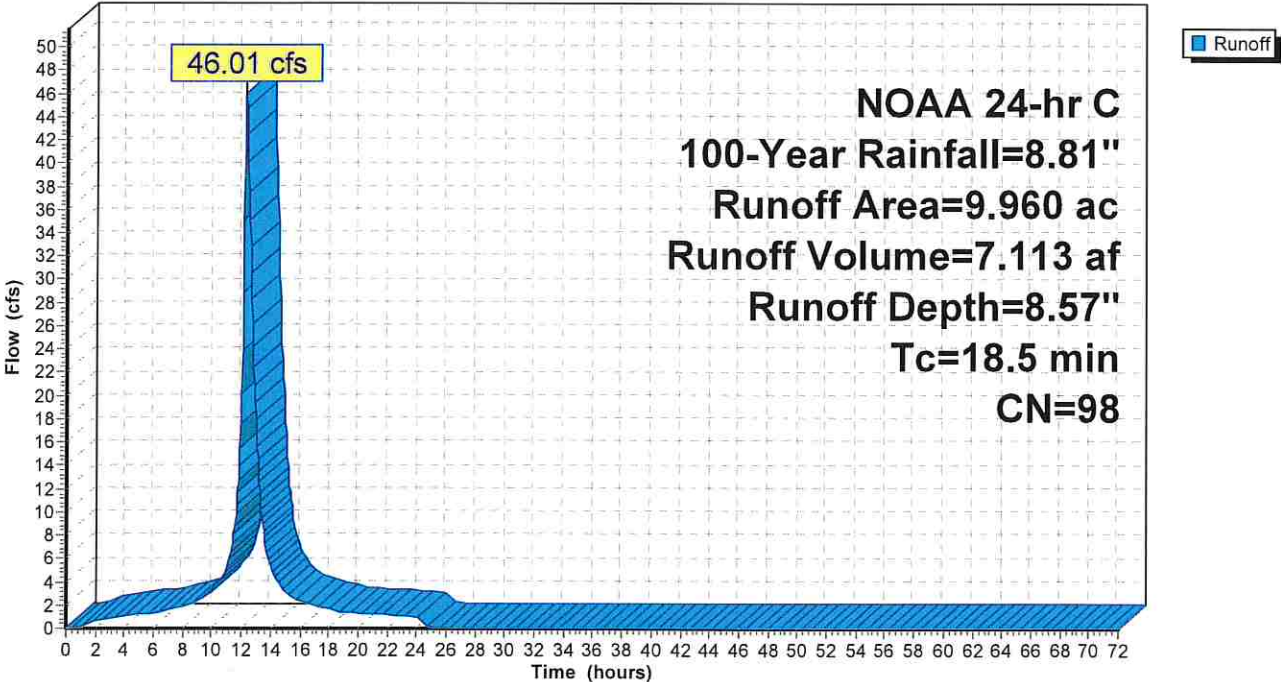
Runoff by SCS TR-20 method, UH=Delmarva, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
NOAA 24-hr C 100-Year Rainfall=8.81"

Area (ac)	CN	Description
9.960	98	Paved parking, HSG C
9.960	98	100.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
18.5					Direct Entry, PIPE CALCS

Subcatchment 20S: LINE B IMPERVIOUS

Hydrograph



2020.014-ROACKEFELLER EASTAMPTON(4-16-21)NOAA 24-hr C 100-Year Rainfall=8.81"

Prepared by Menlo Engineering Associates, Inc.

Printed 4/21/2021

HydroCAD® 10.10-4a s/n 01129 © 2020 HydroCAD Software Solutions LLC

Summary for Pond 7P: WETPOND

Inflow Area = 26.430 ac, 77.34% Impervious, Inflow Depth = 7.80" for 100-Year event
 Inflow = 114.79 cfs @ 12.29 hrs, Volume= 17.187 af
 Outflow = 28.77 cfs @ 13.29 hrs, Volume= 16.850 af, Atten= 75%, Lag= 60.2 min
 Primary = 28.77 cfs @ 13.29 hrs, Volume= 16.850 af

Routing by Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
 Peak Elev= 53.54' @ 13.29 hrs Surf.Area= 1.416 ac Storage= 9.332 af

Plug-Flow detention time= 457.8 min calculated for 16.850 af (98% of inflow)
 Center-of-Mass det. time= 444.9 min (1,218.4 - 773.5)

Volume	Invert	Avail.Storage	Storage Description
#1	46.00'	9.985 af	Custom Stage Data (Prismatic) Listed below (Recalc)

Elevation (feet)	Surf.Area (acres)	Inc.Store (acre-feet)	Cum.Store (acre-feet)
46.00	1.019	0.000	0.000
47.00	1.058	1.038	1.038
47.50	1.098	0.539	1.577
48.00	1.179	0.569	2.147
49.00	1.221	1.200	3.347
50.00	1.263	1.242	4.589
51.00	1.305	1.284	5.873
52.00	1.349	1.327	7.200
53.00	1.392	1.370	8.570
54.00	1.437	1.414	9.985

Device	Routing	Invert	Outlet Devices
#1	Device 3	46.00'	5.0" Vert. Orifice/Grate C= 0.600 Limited to weir flow at low heads
#2	Device 3	48.10'	1.3' long Sharp-Crested Rectangular Weir 2 End Contraction(s)
#3	Primary	46.00'	30.0" Round RCP_Round 30" L= 147.0' RCP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 46.00' / 45.15' S= 0.0058 ' S= 0.0058 ' Cc= 0.900 n= 0.013 Concrete sewer w/manholes & inlets, Flow Area= 4.91 sf

Primary OutFlow Max=28.76 cfs @ 13.29 hrs HW=53.54' (Free Discharge)

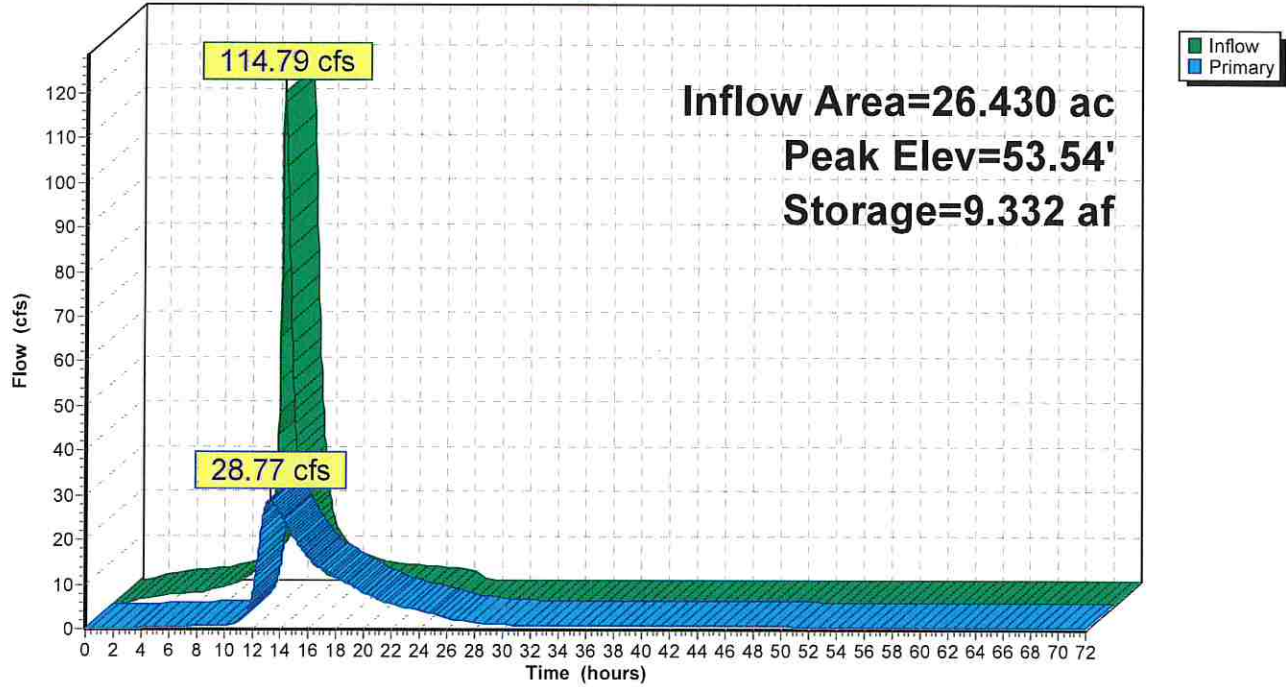
↑ **3=RCP_Round 30"** (Passes 28.76 cfs of 56.54 cfs potential flow)

↑ **1=Orifice/Grate** (Orifice Controls 1.78 cfs @ 13.04 fps)

↑ **2=Sharp-Crested Rectangular Weir** (Weir Controls 26.99 cfs @ 7.63 fps)

Pond 7P: WETPOND

Hydrograph

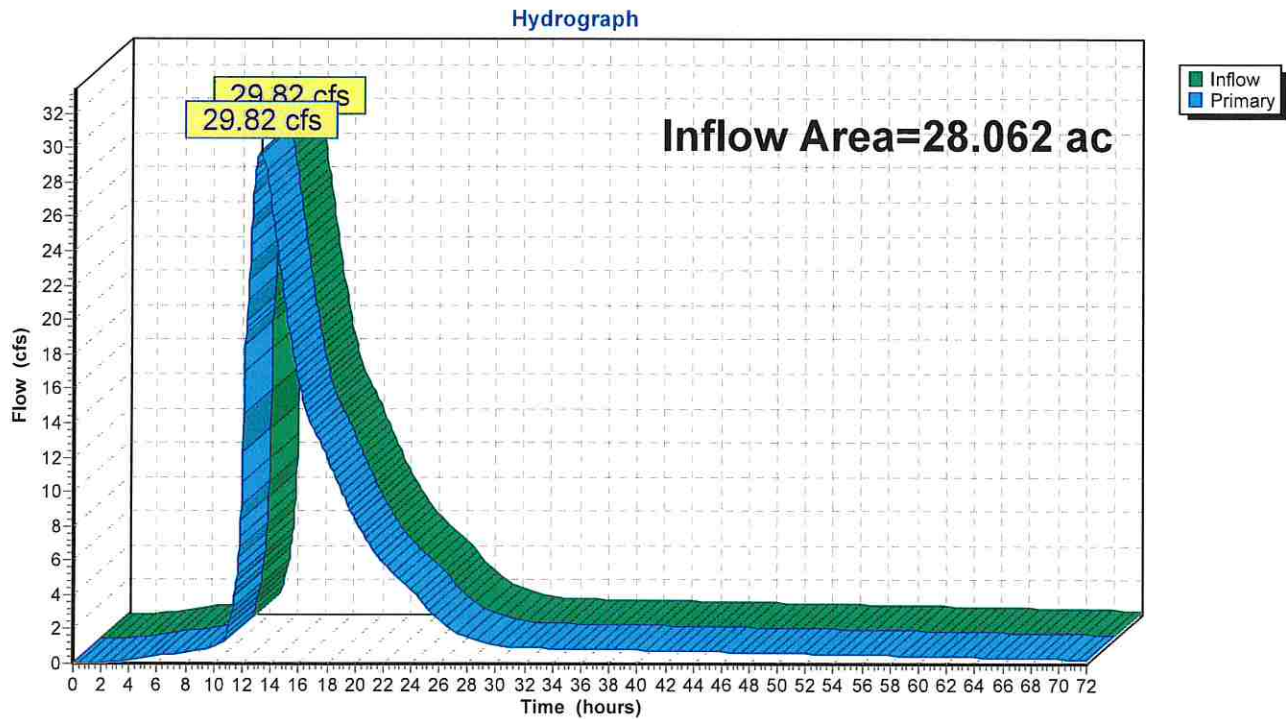


Summary for Link 21L: PROPOSED RUNOFF FROM EDA-1B

Inflow Area = 28.062 ac, 72.84% Impervious, Inflow Depth > 7.51" for 100-Year event
Inflow = 29.82 cfs @ 13.23 hrs, Volume= 17.570 af
Primary = 29.82 cfs @ 13.23 hrs, Volume= 17.570 af, Atten= 0%, Lag= 0.0 min

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

Link 21L: PROPOSED RUNOFF FROM EDA-1B



Summary for Subcatchment 4S: WETPOND

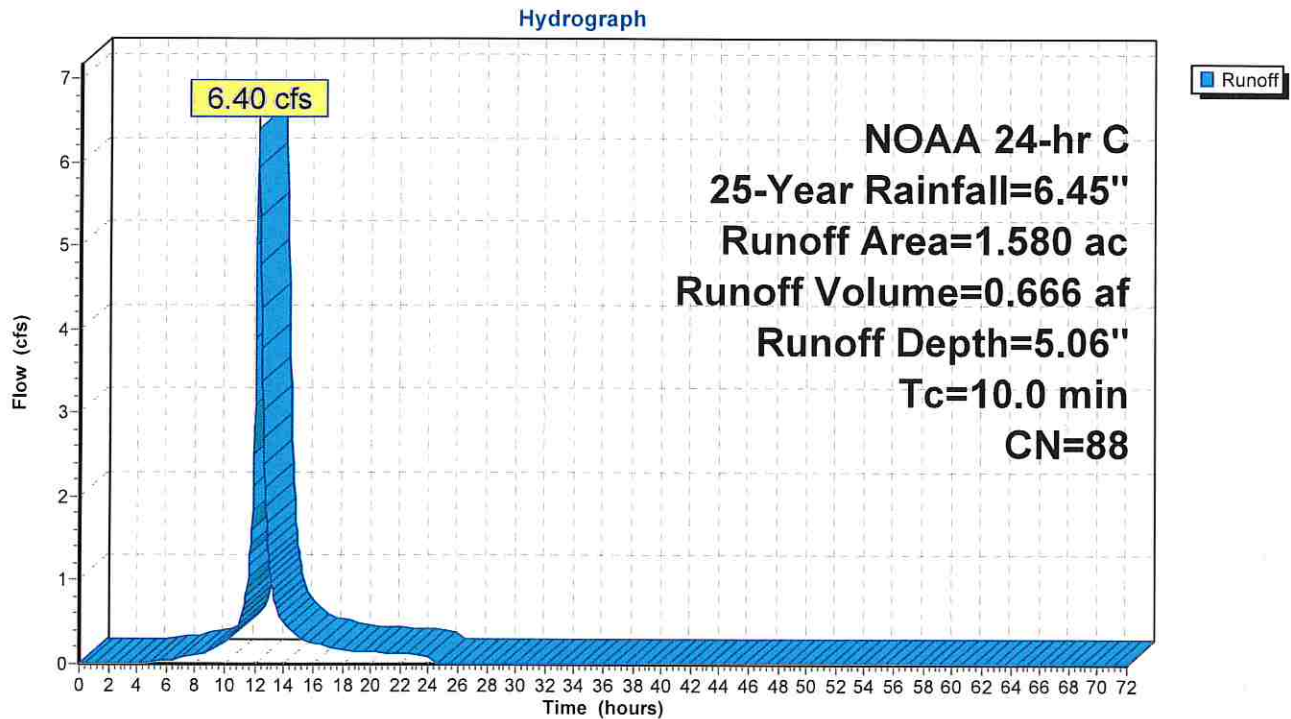
Runoff = 6.40 cfs @ 12.19 hrs, Volume= 0.666 af, Depth= 5.06"

Runoff by SCS TR-20 method, UH=Delmarva, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
 NOAA 24-hr C 25-Year Rainfall=6.45"

Area (ac)	CN	Description
0.980	98	Water Surface, 0% imp, HSG C
0.438	74	>75% Grass cover, Good, HSG C
0.162	61	>75% Grass cover, Good, HSG B
1.580	88	Weighted Average
1.580	88	100.00% Pervious Area

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

Subcatchment 4S: WETPOND



Summary for Subcatchment 10S: UNDETAIN SOUTH-WEST

Runoff = 4.40 cfs @ 12.20 hrs, Volume= 0.444 af, Depth= 3.27"

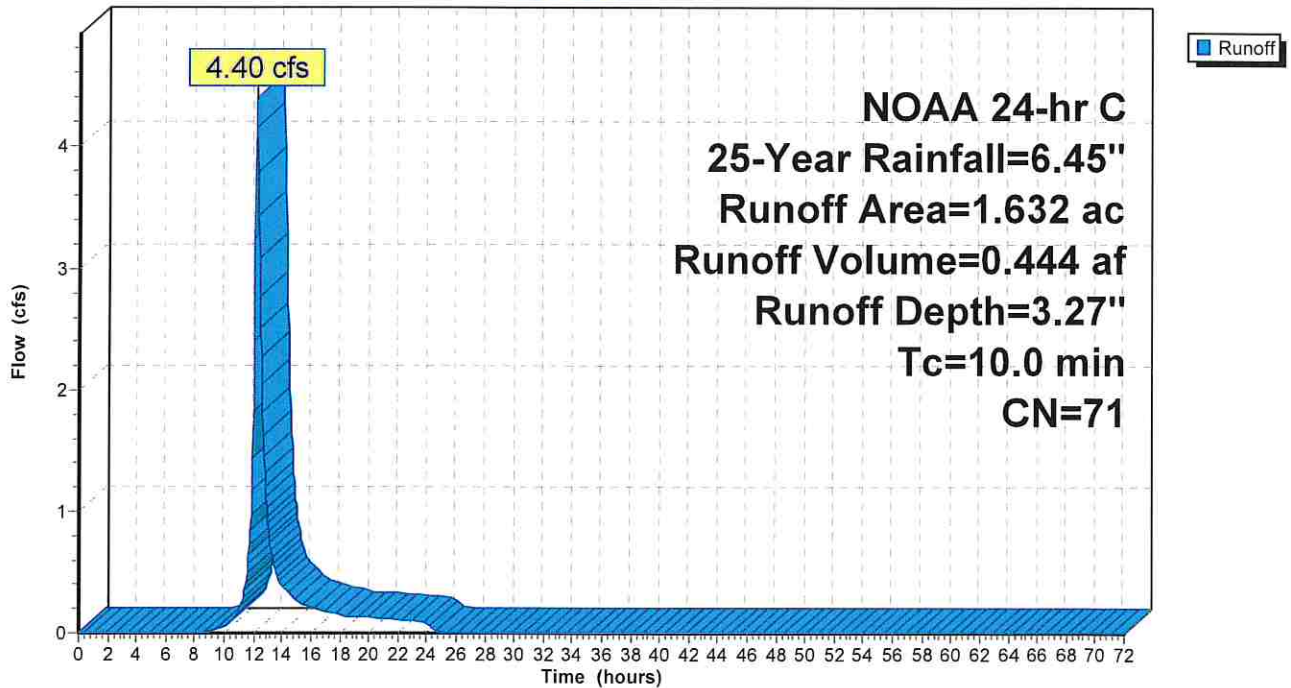
Runoff by SCS TR-20 method, UH=Delmarva, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
 NOAA 24-hr C 25-Year Rainfall=6.45"

Area (ac)	CN	Description
0.185	55	Woods, Good, HSG B
0.381	70	Woods, Good, HSG C
1.066	74	>75% Grass cover, Good, HSG C
1.632	71	Weighted Average
1.632	71	100.00% Pervious Area

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

Subcatchment 10S: UNDETAIN SOUTH-WEST

Hydrograph



Summary for Subcatchment 17S: LINE A PERVIOUS

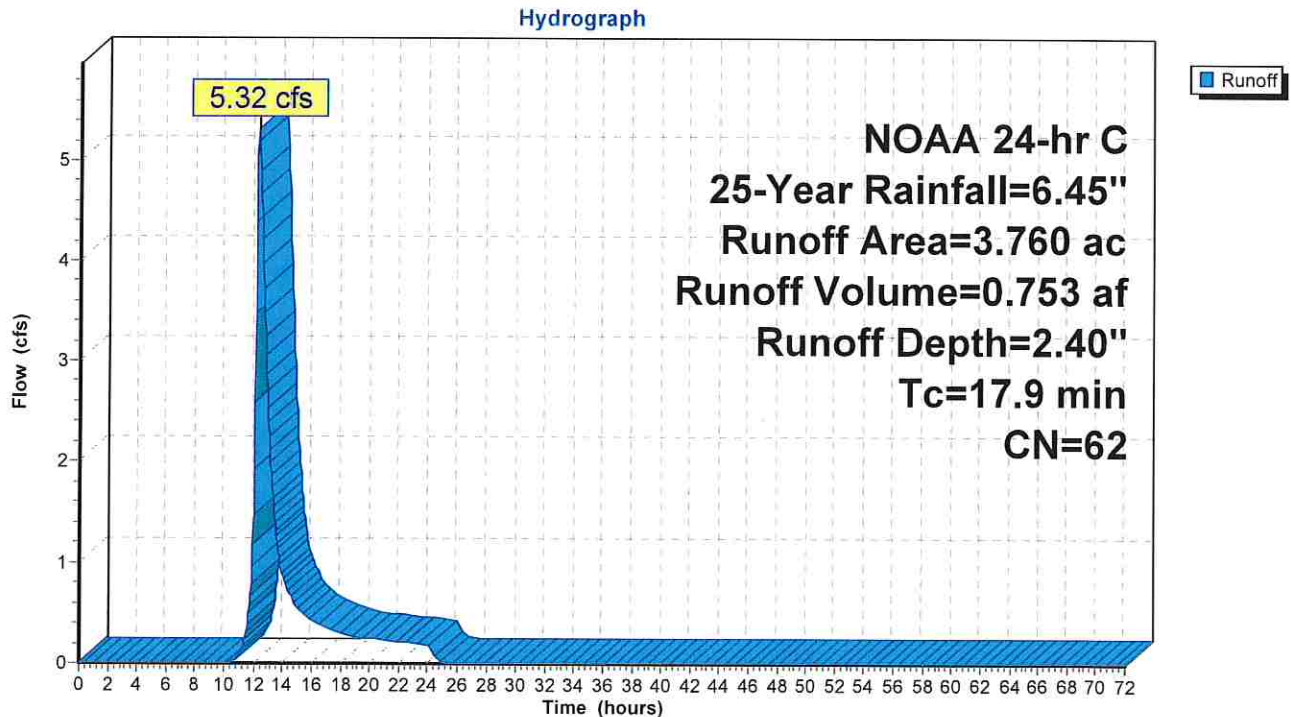
Runoff = 5.32 cfs @ 12.32 hrs, Volume= 0.753 af, Depth= 2.40"

Runoff by SCS TR-20 method, UH=Delmarva, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
 NOAA 24-hr C 25-Year Rainfall=6.45"

Area (ac)	CN	Description
3.600	61	>75% Grass cover, Good, HSG B
0.160	74	>75% Grass cover, Good, HSG C
3.760	62	Weighted Average
3.760	62	100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
17.9					Direct Entry, PIPE CALCS

Subcatchment 17S: LINE A PERVIOUS



Summary for Subcatchment 18S: LINE A IMPERVIOUS

Runoff = 35.95 cfs @ 12.29 hrs, Volume= 5.425 af, Depth= 6.21"

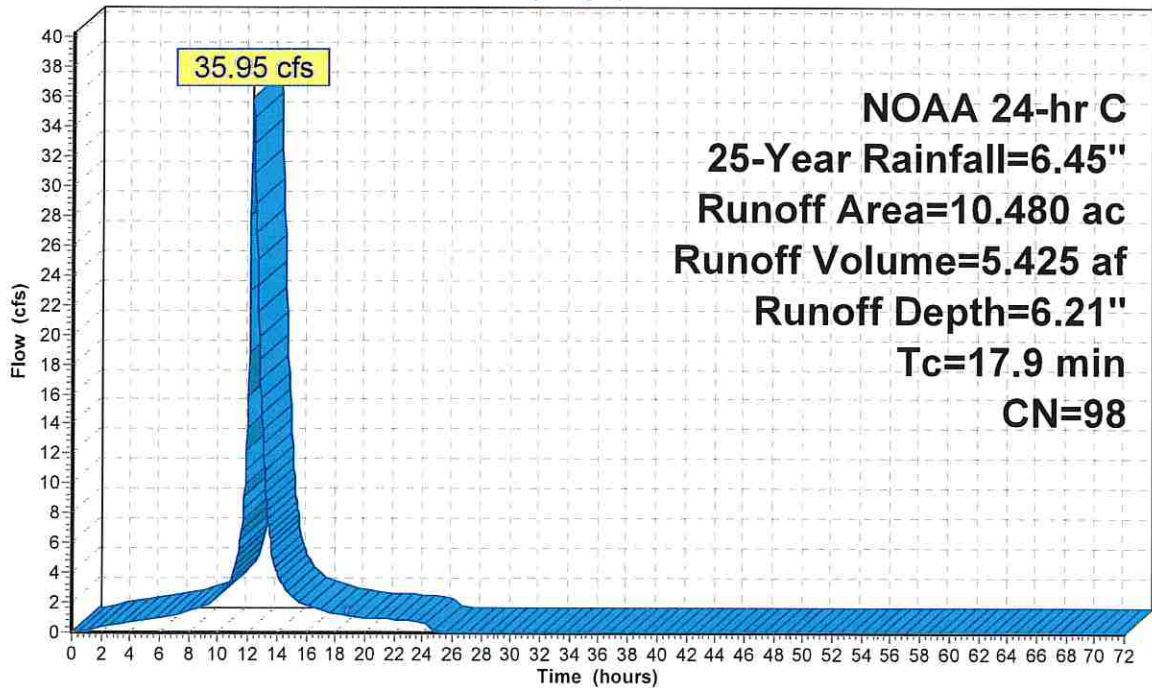
Runoff by SCS TR-20 method, UH=Delmarva, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
 NOAA 24-hr C 25-Year Rainfall=6.45"

Area (ac)	CN	Description
10.480	98	Paved parking, HSG B
10.480	98	100.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
17.9					Direct Entry, PIPE CALCS

Subcatchment 18S: LINE A IMPERVIOUS

Hydrograph



Runoff

**NOAA 24-hr C
 25-Year Rainfall=6.45"
 Runoff Area=10.480 ac
 Runoff Volume=5.425 af
 Runoff Depth=6.21"
 Tc=17.9 min
 CN=98**

Summary for Subcatchment 19S: LINE B PERVIOUS

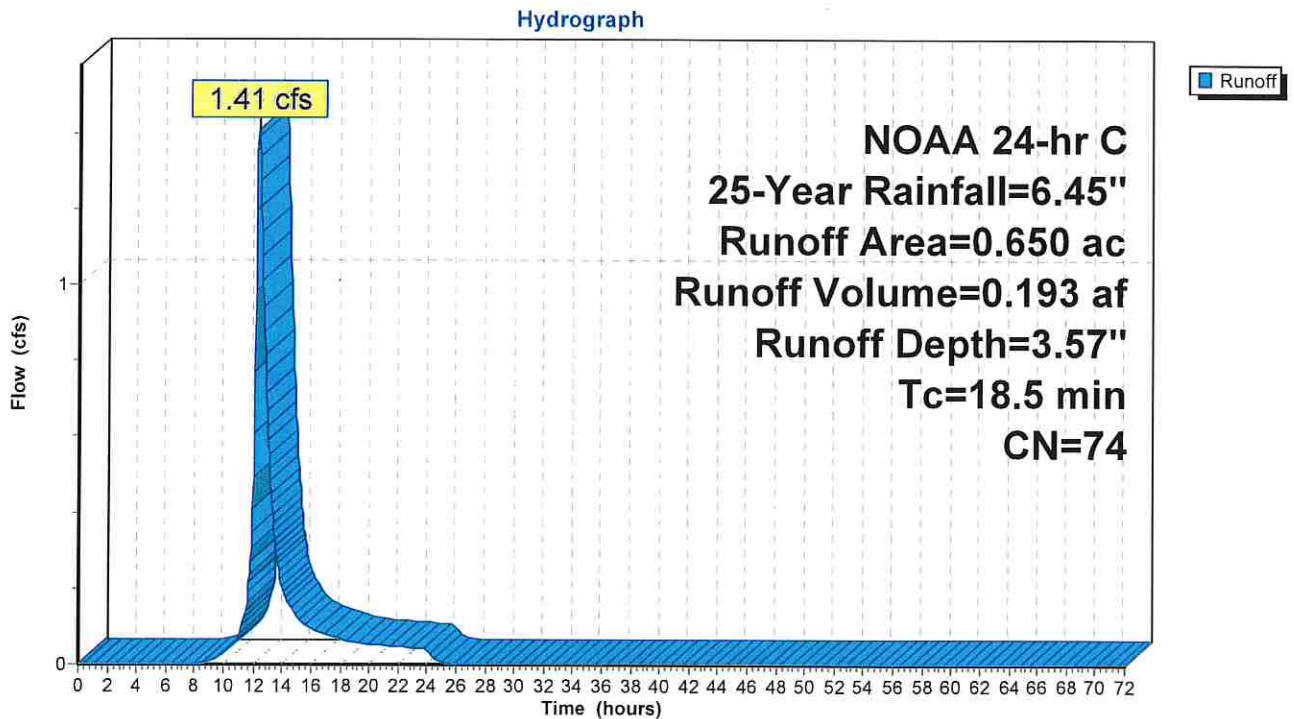
Runoff = 1.41 cfs @ 12.31 hrs, Volume= 0.193 af, Depth= 3.57"

Runoff by SCS TR-20 method, UH=Delmarva, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
 NOAA 24-hr C 25-Year Rainfall=6.45"

Area (ac)	CN	Description
0.650	74	>75% Grass cover, Good, HSG C
0.650	74	100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
18.5					Direct Entry, PIPE CALCS

Subcatchment 19S: LINE B PERVIOUS



Summary for Subcatchment 20S: LINE B IMPERVIOUS

Runoff = 33.62 cfs @ 12.30 hrs, Volume= 5.155 af, Depth= 6.21"

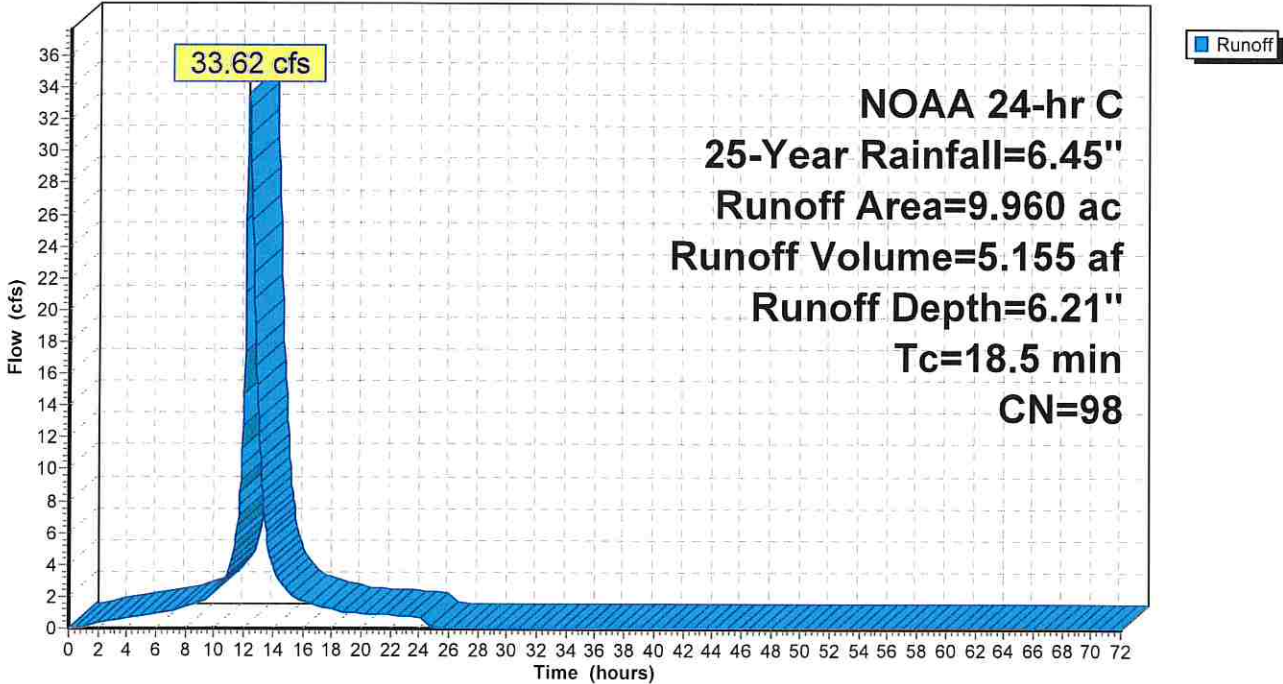
Runoff by SCS TR-20 method, UH=Delmarva, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
NOAA 24-hr C 25-Year Rainfall=6.45"

Area (ac)	CN	Description
9.960	98	Paved parking, HSG C
9.960	98	100.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
18.5					Direct Entry, PIPE CALCS

Subcatchment 20S: LINE B IMPERVIOUS

Hydrograph



Summary for Pond 7P: WETPOND

Inflow Area = 26.430 ac, 77.34% Impervious, Inflow Depth = 5.54" for 25-Year event
 Inflow = 81.69 cfs @ 12.29 hrs, Volume= 12.193 af
 Outflow = 17.03 cfs @ 13.43 hrs, Volume= 11.875 af, Atten= 79%, Lag= 68.5 min
 Primary = 17.03 cfs @ 13.43 hrs, Volume= 11.875 af

Routing by Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
 Peak Elev= 51.86' @ 13.43 hrs Surf.Area= 1.343 ac Storage= 7.005 af

Plug-Flow detention time= 551.5 min calculated for 11.867 af (97% of inflow)
 Center-of-Mass det. time= 536.4 min (1,313.7 - 777.3)

Volume	Invert	Avail.Storage	Storage Description
#1	46.00'	9.985 af	Custom Stage Data (Prismatic) Listed below (Recalc)

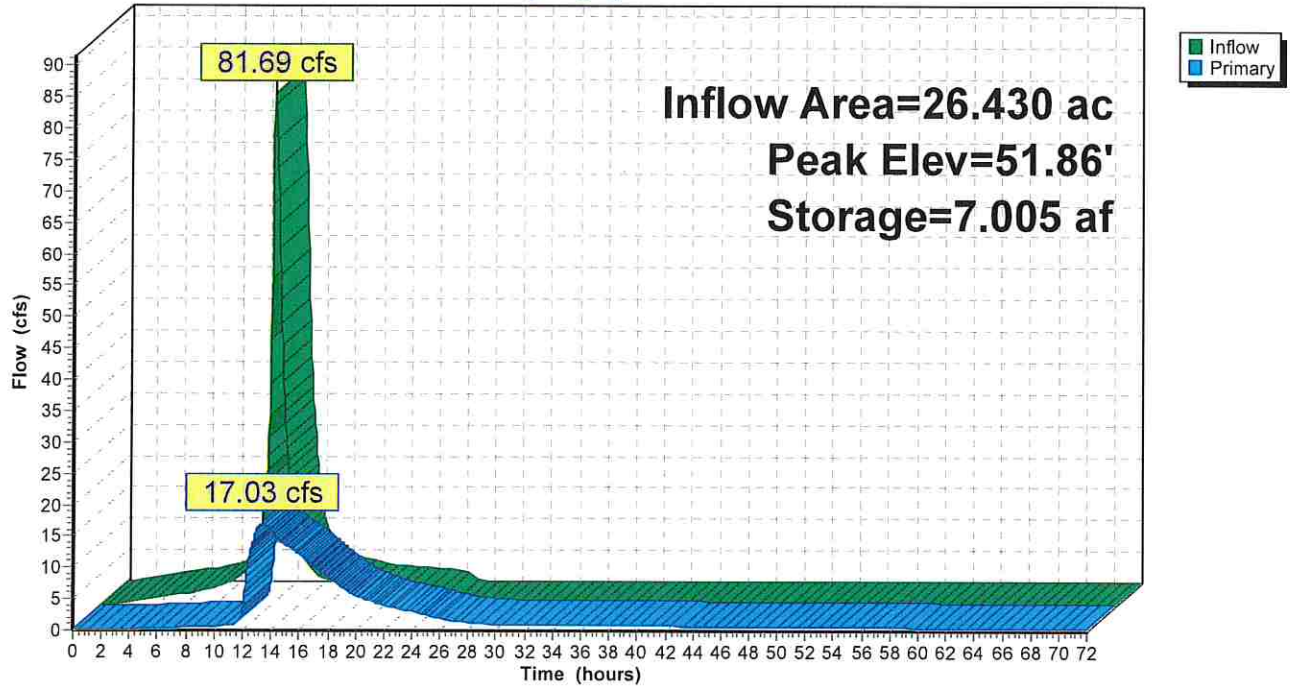
Elevation (feet)	Surf.Area (acres)	Inc.Store (acre-feet)	Cum.Store (acre-feet)
46.00	1.019	0.000	0.000
47.00	1.058	1.038	1.038
47.50	1.098	0.539	1.577
48.00	1.179	0.569	2.147
49.00	1.221	1.200	3.347
50.00	1.263	1.242	4.589
51.00	1.305	1.284	5.873
52.00	1.349	1.327	7.200
53.00	1.392	1.370	8.570
54.00	1.437	1.414	9.985

Device	Routing	Invert	Outlet Devices
#1	Device 3	46.00'	5.0" Vert. Orifice/Grate C= 0.600 Limited to weir flow at low heads
#2	Device 3	48.10'	1.3' long Sharp-Crested Rectangular Weir 2 End Contraction(s)
#3	Primary	46.00'	30.0" Round RCP_Round 30" L= 147.0' RCP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 46.00' / 45.15' S= 0.0058 ' S= 0.0058 ' Cc= 0.900 n= 0.013 Concrete sewer w/manholes & inlets, Flow Area= 4.91 sf

Primary OutFlow Max=17.03 cfs @ 13.43 hrs HW=51.85' (Free Discharge)
 3=RCP_Round 30" (Passes 17.03 cfs of 47.76 cfs potential flow)
 1=Orifice/Grate (Orifice Controls 1.56 cfs @ 11.44 fps)
 2=Sharp-Crested Rectangular Weir (Weir Controls 15.47 cfs @ 6.34 fps)

Pond 7P: WETPOND

Hydrograph



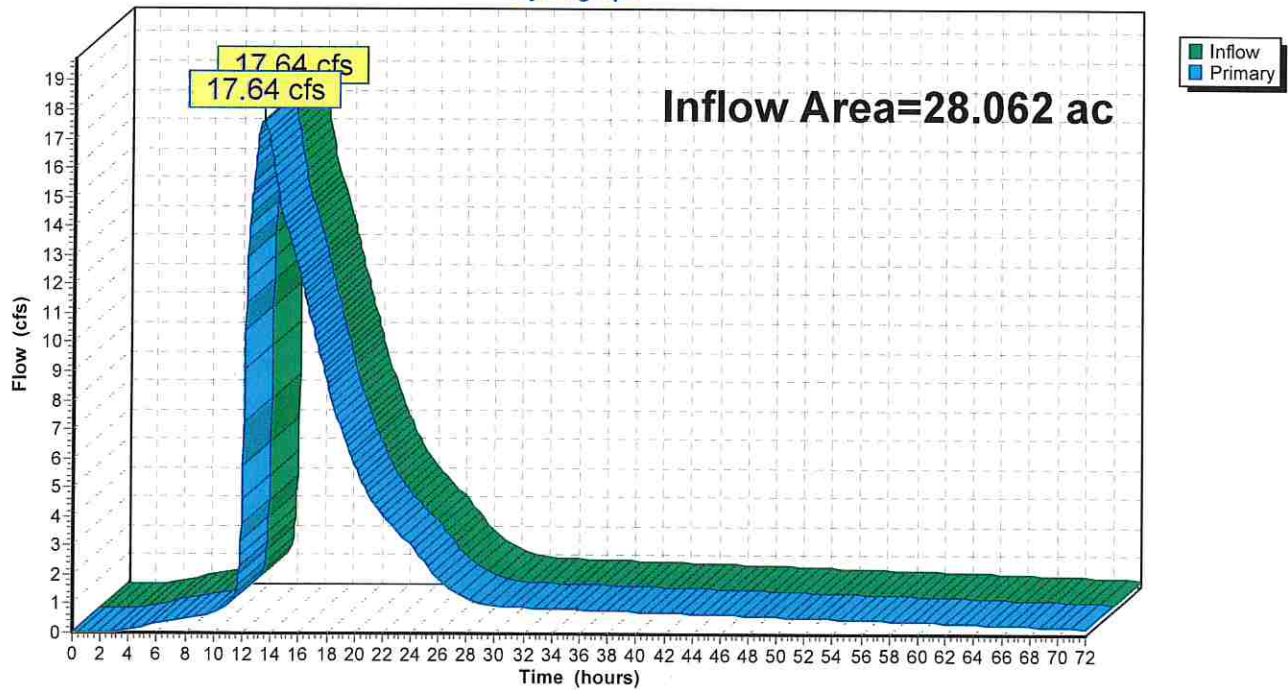
Summary for Link 21L: PROPOSED RUNOFF FROM EDA-1B

Inflow Area = 28.062 ac, 72.84% Impervious, Inflow Depth > 5.27" for 25-Year event
Inflow = 17.64 cfs @ 13.37 hrs, Volume= 12.319 af
Primary = 17.64 cfs @ 13.37 hrs, Volume= 12.319 af, Atten= 0%, Lag= 0.0 min

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

Link 21L: PROPOSED RUNOFF FROM EDA-1B

Hydrograph



Summary for Subcatchment 4S: WETPOND

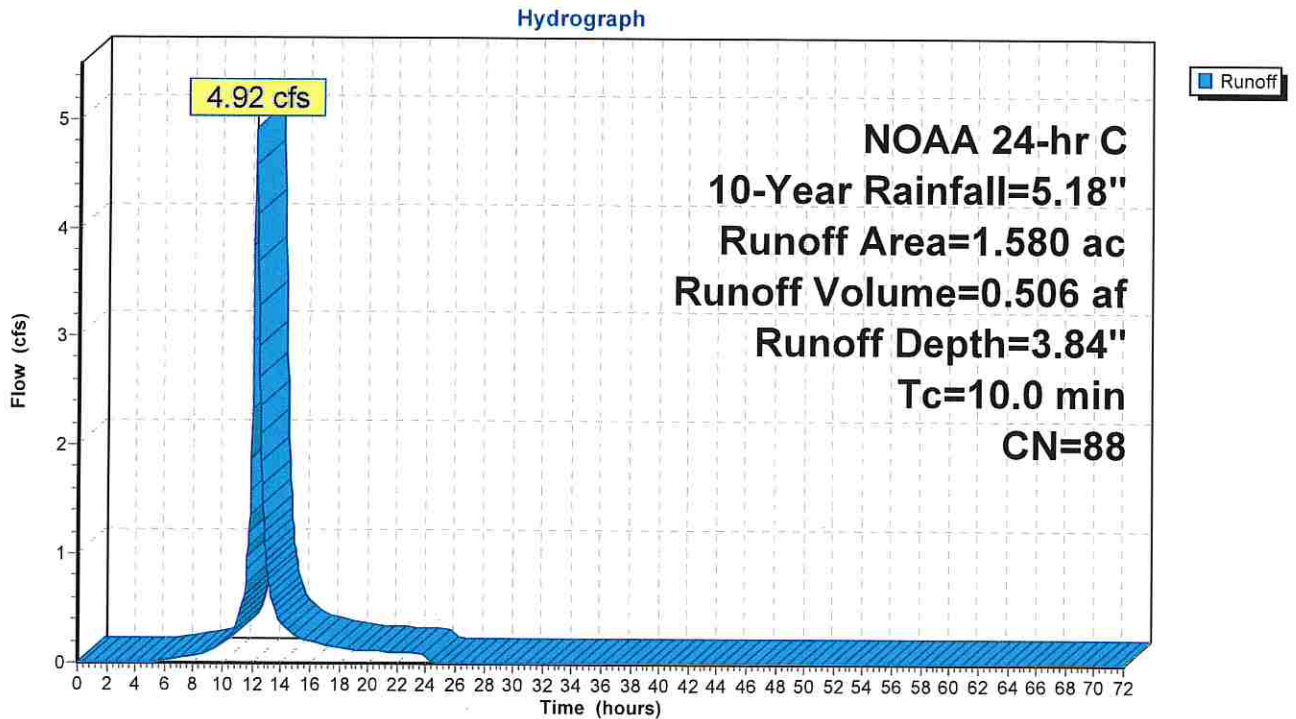
Runoff = 4.92 cfs @ 12.19 hrs, Volume= 0.506 af, Depth= 3.84"

Runoff by SCS TR-20 method, UH=Delmarva, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
 NOAA 24-hr C 10-Year Rainfall=5.18"

Area (ac)	CN	Description
0.980	98	Water Surface, 0% imp, HSG C
0.438	74	>75% Grass cover, Good, HSG C
0.162	61	>75% Grass cover, Good, HSG B
1.580	88	Weighted Average
1.580	88	100.00% Pervious Area

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

Subcatchment 4S: WETPOND



Summary for Pond 7P: WETPOND

Inflow Area = 26.430 ac, 77.34% Impervious, Inflow Depth = 4.33" for 10-Year event
 Inflow = 64.12 cfs @ 12.29 hrs, Volume= 9.547 af
 Outflow = 12.40 cfs @ 13.49 hrs, Volume= 9.243 af, Atten= 81%, Lag= 72.3 min
 Primary = 12.40 cfs @ 13.49 hrs, Volume= 9.243 af

Routing by Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
 Peak Elev= 50.79' @ 13.49 hrs Surf.Area= 1.296 ac Storage= 5.601 af

Plug-Flow detention time= 631.9 min calculated for 9.243 af (97% of inflow)
 Center-of-Mass det. time= 611.9 min (1,392.1 - 780.2)

Volume	Invert	Avail.Storage	Storage Description
#1	46.00'	9.985 af	Custom Stage Data (Prismatic) Listed below (Recalc)

Elevation (feet)	Surf.Area (acres)	Inc.Store (acre-feet)	Cum.Store (acre-feet)
46.00	1.019	0.000	0.000
47.00	1.058	1.038	1.038
47.50	1.098	0.539	1.577
48.00	1.179	0.569	2.147
49.00	1.221	1.200	3.347
50.00	1.263	1.242	4.589
51.00	1.305	1.284	5.873
52.00	1.349	1.327	7.200
53.00	1.392	1.370	8.570
54.00	1.437	1.414	9.985

Device	Routing	Invert	Outlet Devices
#1	Device 3	46.00'	5.0" Vert. Orifice/Grate C= 0.600 Limited to weir flow at low heads
#2	Device 3	48.10'	1.3' long Sharp-Crested Rectangular Weir 2 End Contraction(s)
#3	Primary	46.00'	30.0" Round RCP_Round 30" L= 147.0' RCP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 46.00' / 45.15' S= 0.0058 '/ Cc= 0.900 n= 0.013 Concrete sewer w/manholes & inlets, Flow Area= 4.91 sf

Primary OutFlow Max=12.40 cfs @ 13.49 hrs HW=50.79' (Free Discharge)

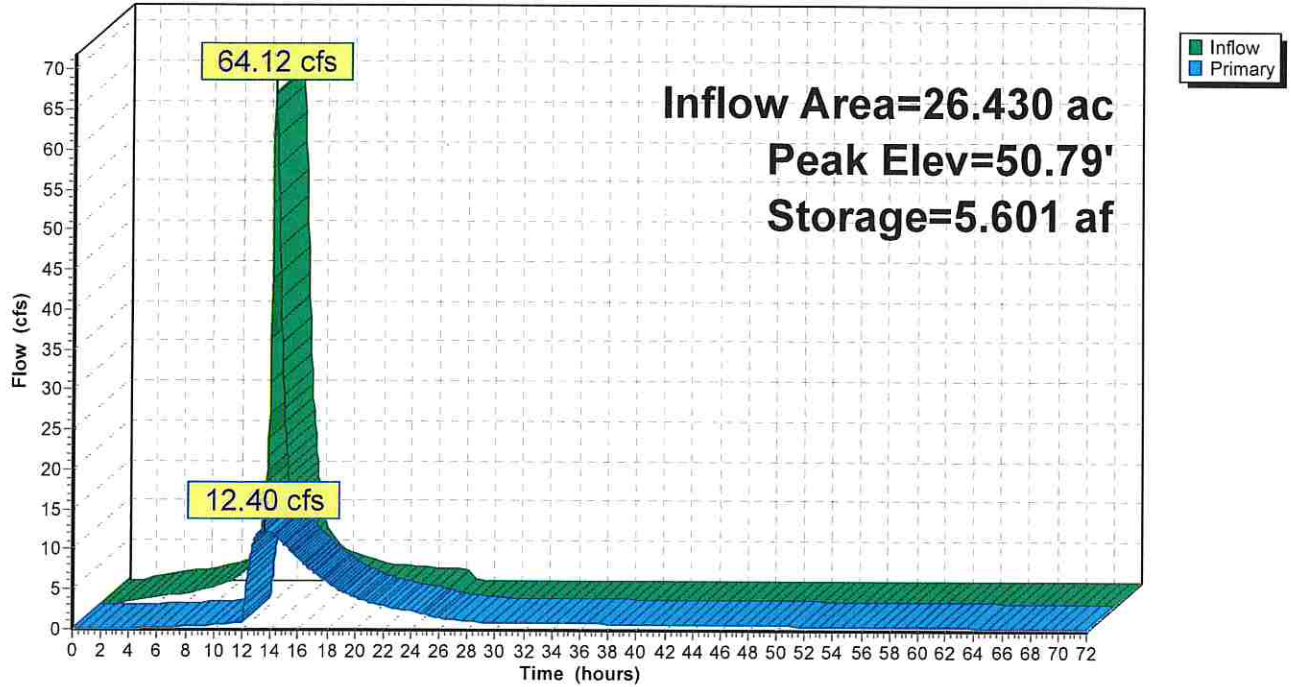
↳ 3=RCP_Round 30" (Passes 12.40 cfs of 41.27 cfs potential flow)

↳ 1=Orifice/Grate (Orifice Controls 1.41 cfs @ 10.31 fps)

↳ 2=Sharp-Crested Rectangular Weir (Weir Controls 11.00 cfs @ 5.36 fps)

Pond 7P: WETPOND

Hydrograph



Summary for Subcatchment 10S: UNDETAIN SOUTH-WEST

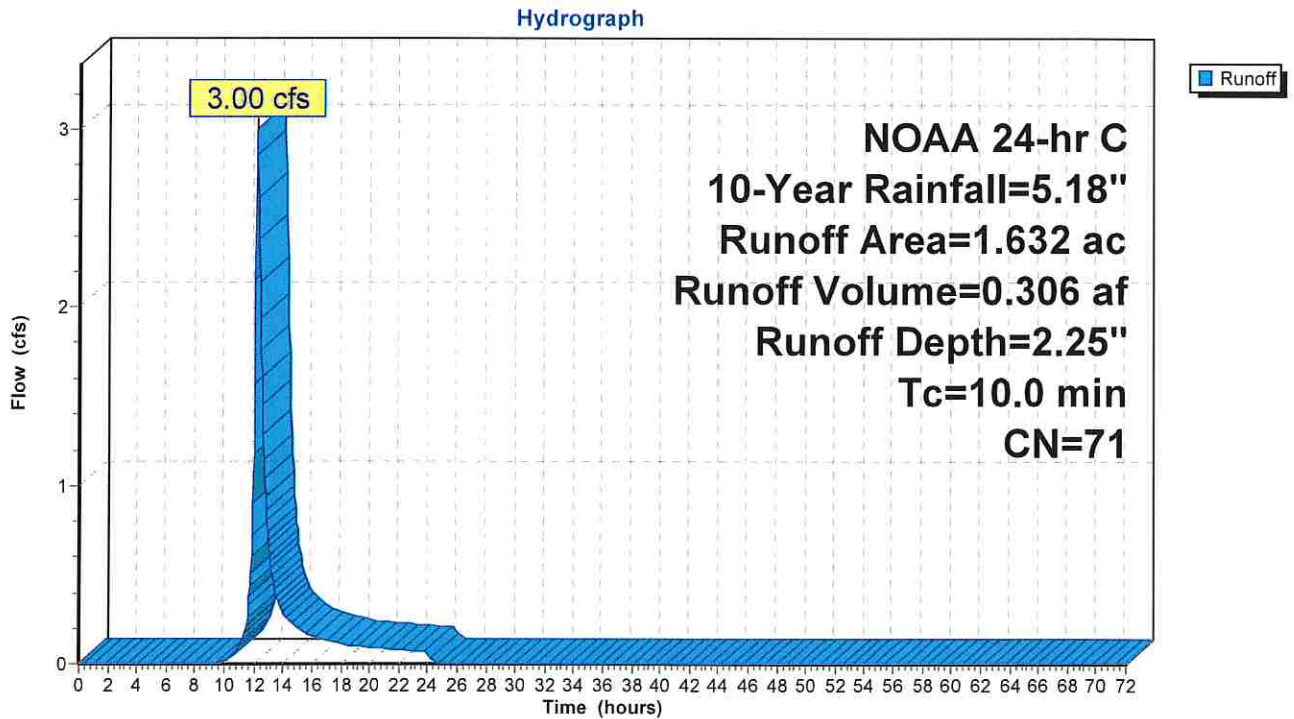
Runoff = 3.00 cfs @ 12.20 hrs, Volume= 0.306 af, Depth= 2.25"

Runoff by SCS TR-20 method, UH=Delmarva, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
 NOAA 24-hr C 10-Year Rainfall=5.18"

Area (ac)	CN	Description
0.185	55	Woods, Good, HSG B
0.381	70	Woods, Good, HSG C
1.066	74	>75% Grass cover, Good, HSG C
1.632	71	Weighted Average
1.632	71	100.00% Pervious Area

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

Subcatchment 10S: UNDETAIN SOUTH-WEST



Summary for Subcatchment 17S: LINE A PERVIOUS

Runoff = 3.24 cfs @ 12.33 hrs, Volume= 0.486 af, Depth= 1.55"

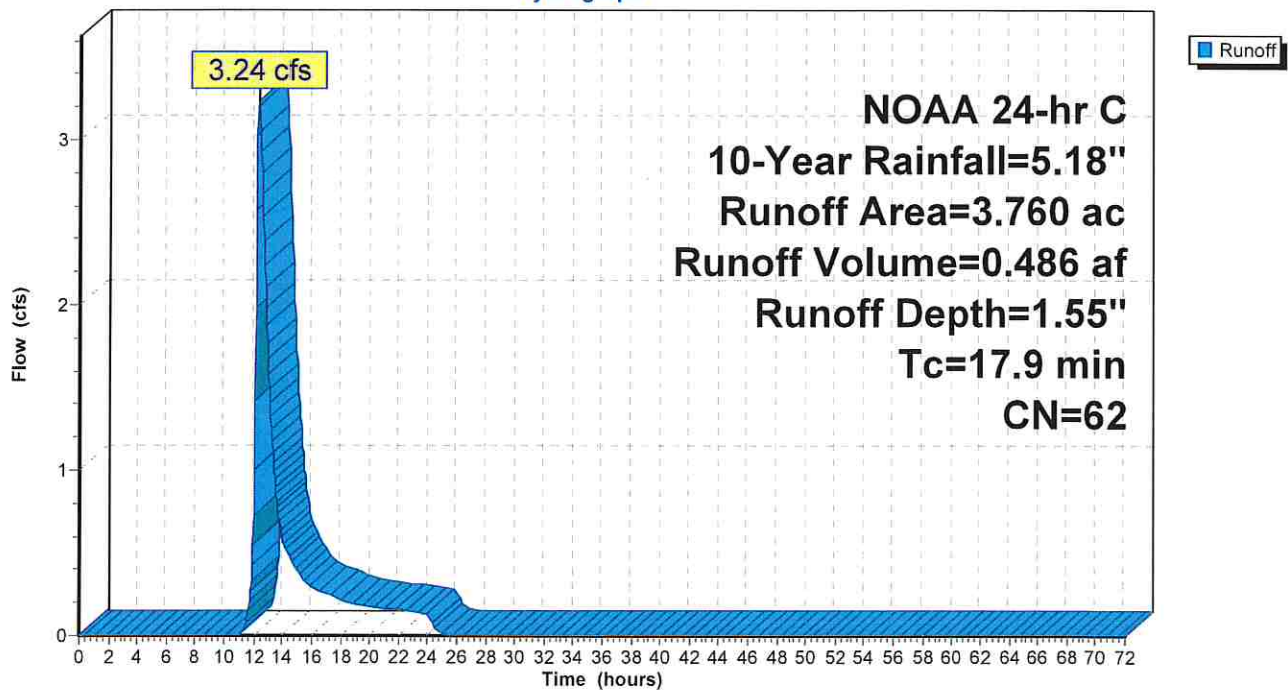
Runoff by SCS TR-20 method, UH=Delmarva, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
 NOAA 24-hr C 10-Year Rainfall=5.18"

Area (ac)	CN	Description
3.600	61	>75% Grass cover, Good, HSG B
0.160	74	>75% Grass cover, Good, HSG C
3.760	62	Weighted Average
3.760	62	100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
17.9					Direct Entry, PIPE CALCS

Subcatchment 17S: LINE A PERVIOUS

Hydrograph



Summary for Subcatchment 18S: LINE A IMPERVIOUS

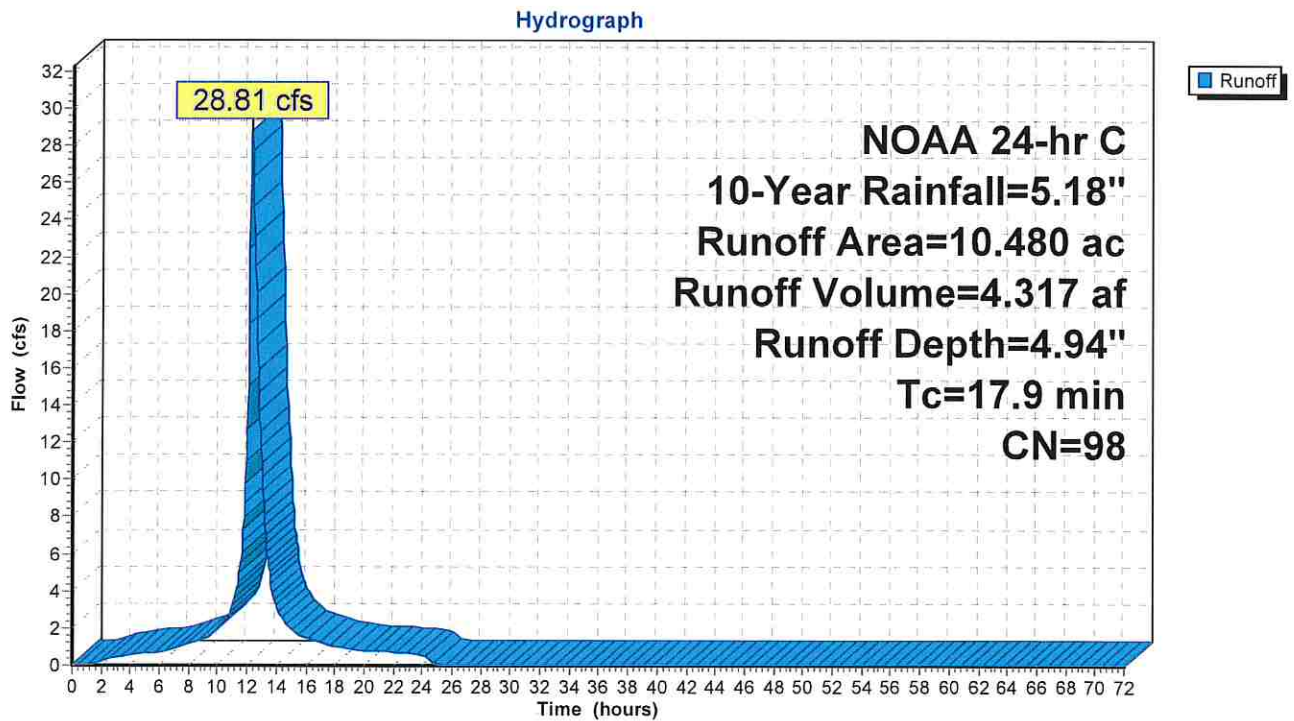
Runoff = 28.81 cfs @ 12.29 hrs, Volume= 4.317 af, Depth= 4.94"

Runoff by SCS TR-20 method, UH=Delmarva, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
 NOAA 24-hr C 10-Year Rainfall=5.18"

Area (ac)	CN	Description
10.480	98	Paved parking, HSG B
10.480	98	100.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
17.9					Direct Entry, PIPE CALCS

Subcatchment 18S: LINE A IMPERVIOUS



Summary for Subcatchment 19S: LINE B PERVIOUS

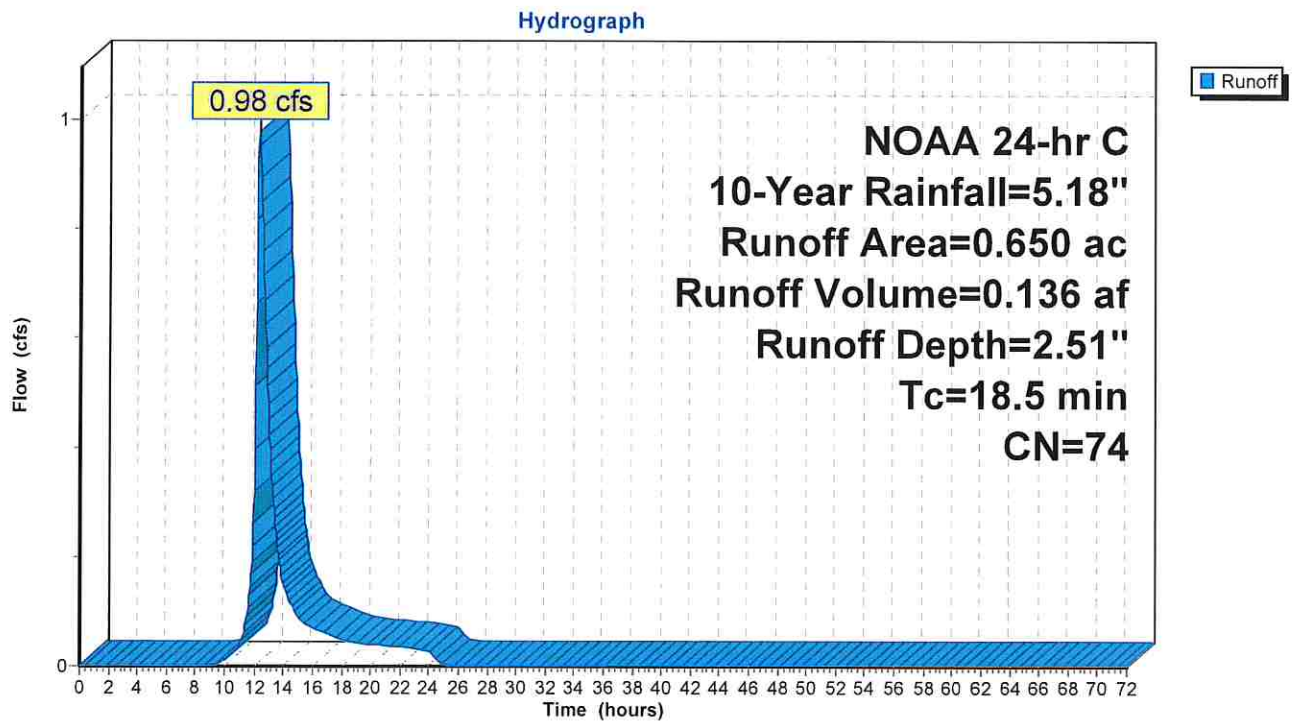
Runoff = 0.98 cfs @ 12.32 hrs, Volume= 0.136 af, Depth= 2.51"

Runoff by SCS TR-20 method, UH=Delmarva, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
 NOAA 24-hr C 10-Year Rainfall=5.18"

Area (ac)	CN	Description
0.650	74	>75% Grass cover, Good, HSG C
0.650	74	100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
18.5					Direct Entry, PIPE CALCS

Subcatchment 19S: LINE B PERVIOUS



Summary for Subcatchment 20S: LINE B IMPERVIOUS

Runoff = 26.94 cfs @ 12.30 hrs, Volume= 4.103 af, Depth= 4.94"

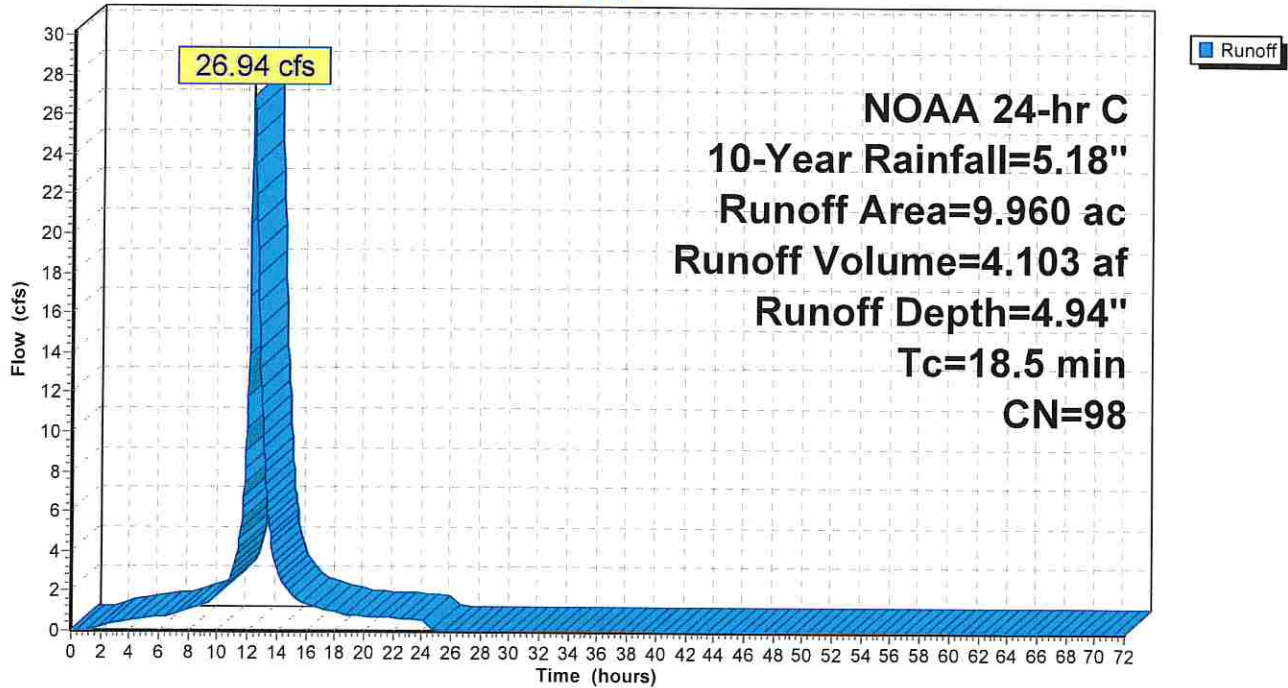
Runoff by SCS TR-20 method, UH=Delmarva, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
 NOAA 24-hr C 10-Year Rainfall=5.18"

Area (ac)	CN	Description
9.960	98	Paved parking, HSG C
9.960	98	100.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
18.5					Direct Entry, PIPE CALCS

Subcatchment 20S: LINE B IMPERVIOUS

Hydrograph



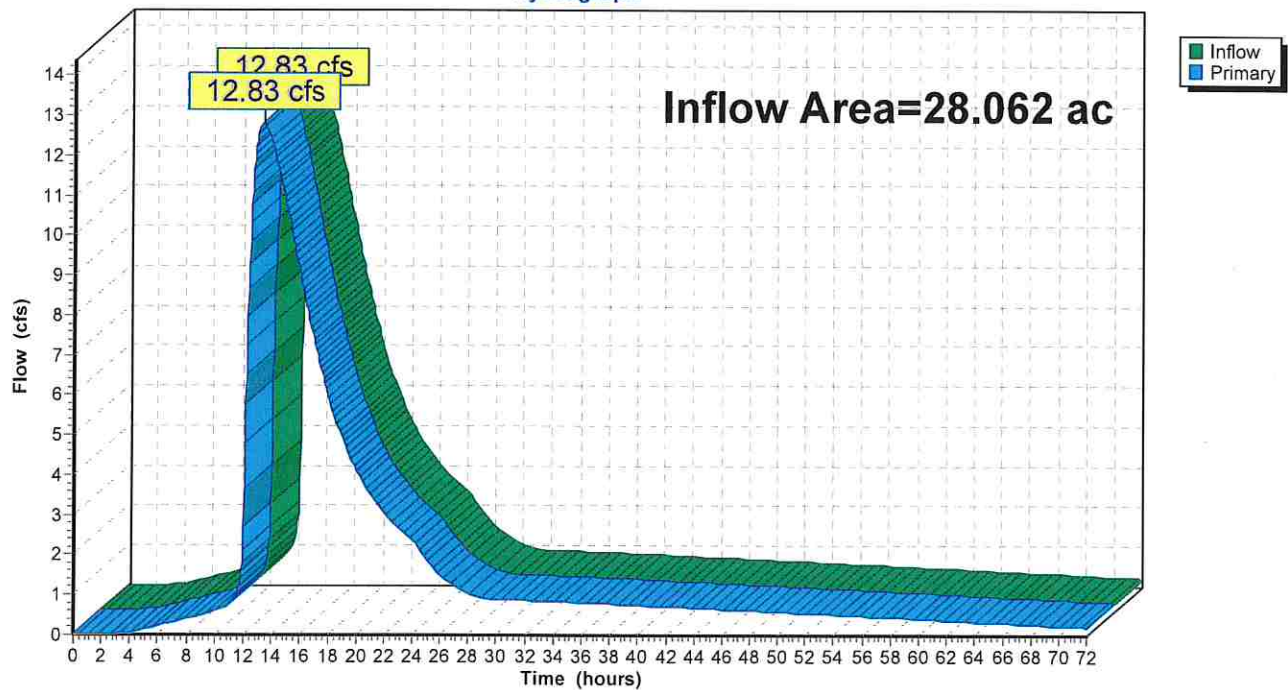
Summary for Link 21L: PROPOSED RUNOFF FROM EDA-1B

Inflow Area = 28.062 ac, 72.84% Impervious, Inflow Depth > 4.08" for 10-Year event
Inflow = 12.83 cfs @ 13.39 hrs, Volume= 9.550 af
Primary = 12.83 cfs @ 13.39 hrs, Volume= 9.550 af, Atten= 0%, Lag= 0.0 min

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

Link 21L: PROPOSED RUNOFF FROM EDA-1B

Hydrograph



Summary for Subcatchment 4S: WETPOND

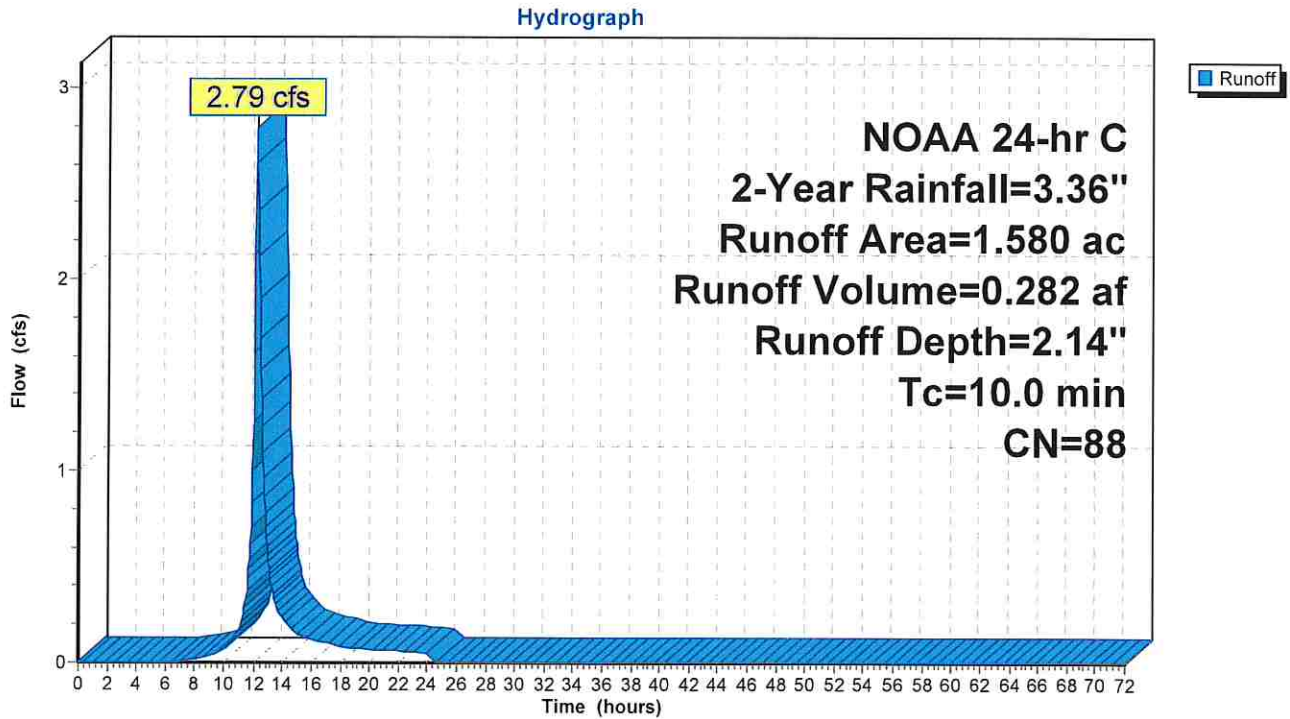
Runoff = 2.79 cfs @ 12.20 hrs, Volume= 0.282 af, Depth= 2.14"

Runoff by SCS TR-20 method, UH=Delmarva, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
 NOAA 24-hr C 2-Year Rainfall=3.36"

Area (ac)	CN	Description
0.980	98	Water Surface, 0% imp, HSG C
0.438	74	>75% Grass cover, Good, HSG C
0.162	61	>75% Grass cover, Good, HSG B
1.580	88	Weighted Average
1.580	88	100.00% Pervious Area

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

Subcatchment 4S: WETPOND



Summary for Subcatchment 10S: UNDETAIN SOUTH-WEST

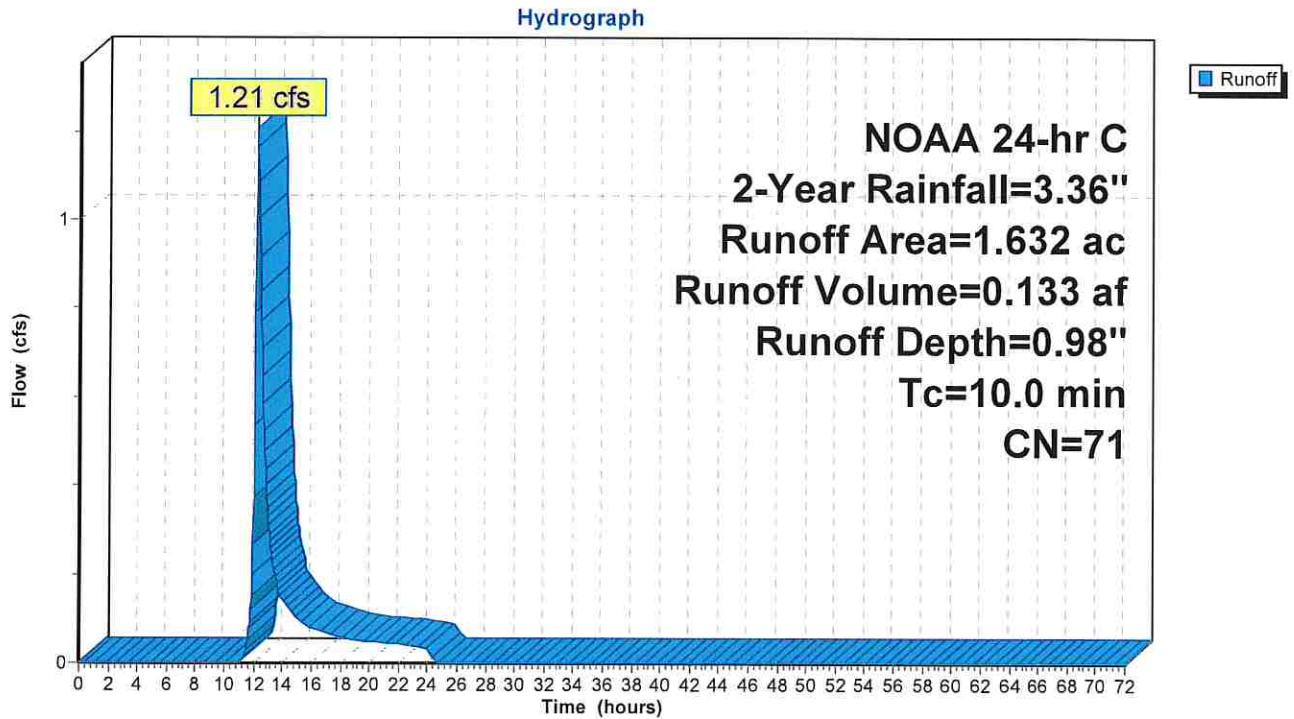
Runoff = 1.21 cfs @ 12.21 hrs, Volume= 0.133 af, Depth= 0.98"

Runoff by SCS TR-20 method, UH=Delmarva, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
 NOAA 24-hr C 2-Year Rainfall=3.36"

Area (ac)	CN	Description
0.185	55	Woods, Good, HSG B
0.381	70	Woods, Good, HSG C
1.066	74	>75% Grass cover, Good, HSG C
1.632	71	Weighted Average
1.632	71	100.00% Pervious Area

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

Subcatchment 10S: UNDETAIN SOUTH-WEST



Summary for Subcatchment 17S: LINE A PERVIOUS

Runoff = 0.88 cfs @ 12.42 hrs, Volume= 0.173 af, Depth= 0.55"

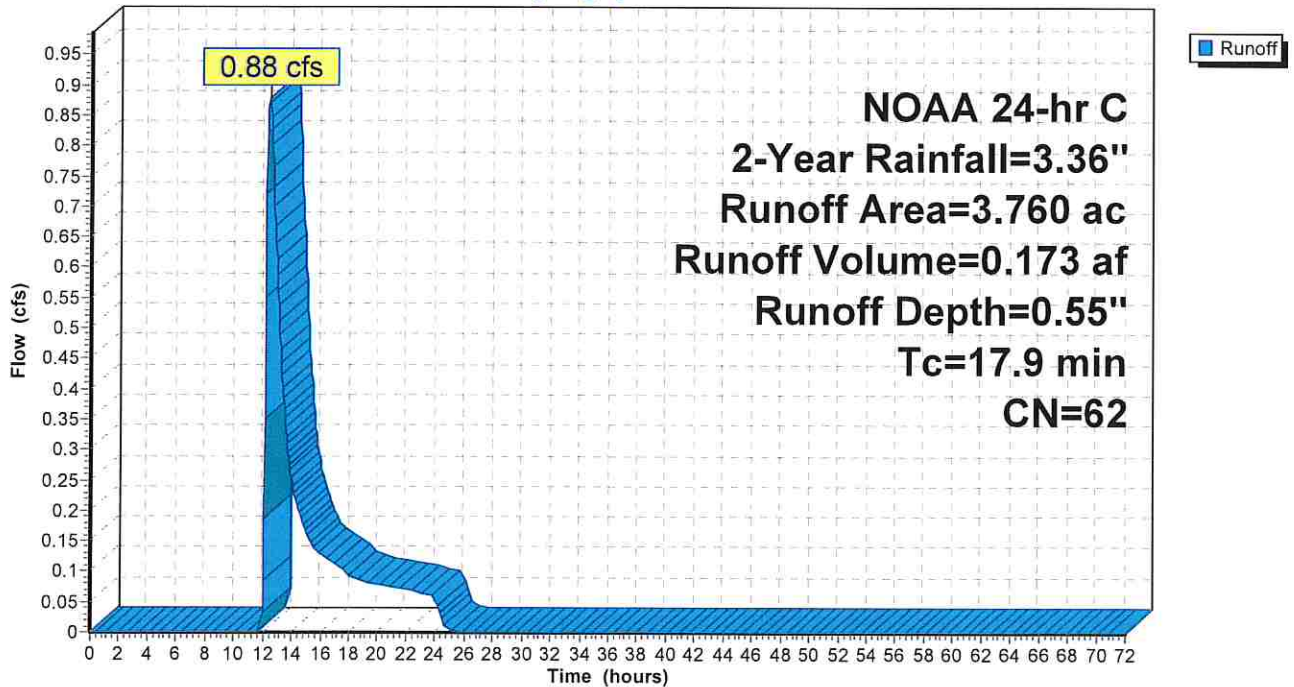
Runoff by SCS TR-20 method, UH=Delmarva, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
 NOAA 24-hr C 2-Year Rainfall=3.36"

Area (ac)	CN	Description
3.600	61	>75% Grass cover, Good, HSG B
0.160	74	>75% Grass cover, Good, HSG C
3.760	62	Weighted Average
3.760	62	100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
17.9					Direct Entry, PIPE CALCS

Subcatchment 17S: LINE A PERVIOUS

Hydrograph



Summary for Subcatchment 18S: LINE A IMPERVIOUS

Runoff = 18.54 cfs @ 12.29 hrs, Volume= 2.731 af, Depth= 3.13"

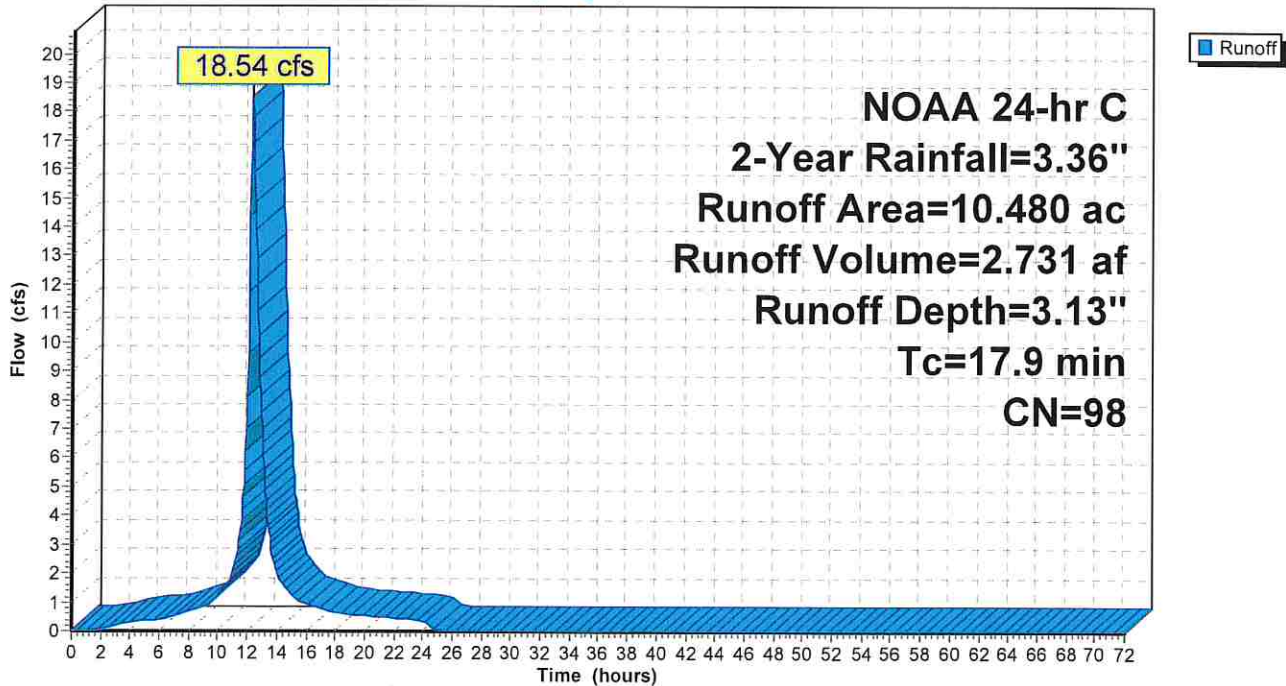
Runoff by SCS TR-20 method, UH=Delmarva, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
 NOAA 24-hr C 2-Year Rainfall=3.36"

Area (ac)	CN	Description
10.480	98	Paved parking, HSG B
10.480	98	100.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
17.9					Direct Entry, PIPE CALCS

Subcatchment 18S: LINE A IMPERVIOUS

Hydrograph



Summary for Subcatchment 19S: LINE B PERVIOUS

Runoff = 0.42 cfs @ 12.33 hrs, Volume= 0.062 af, Depth= 1.14"

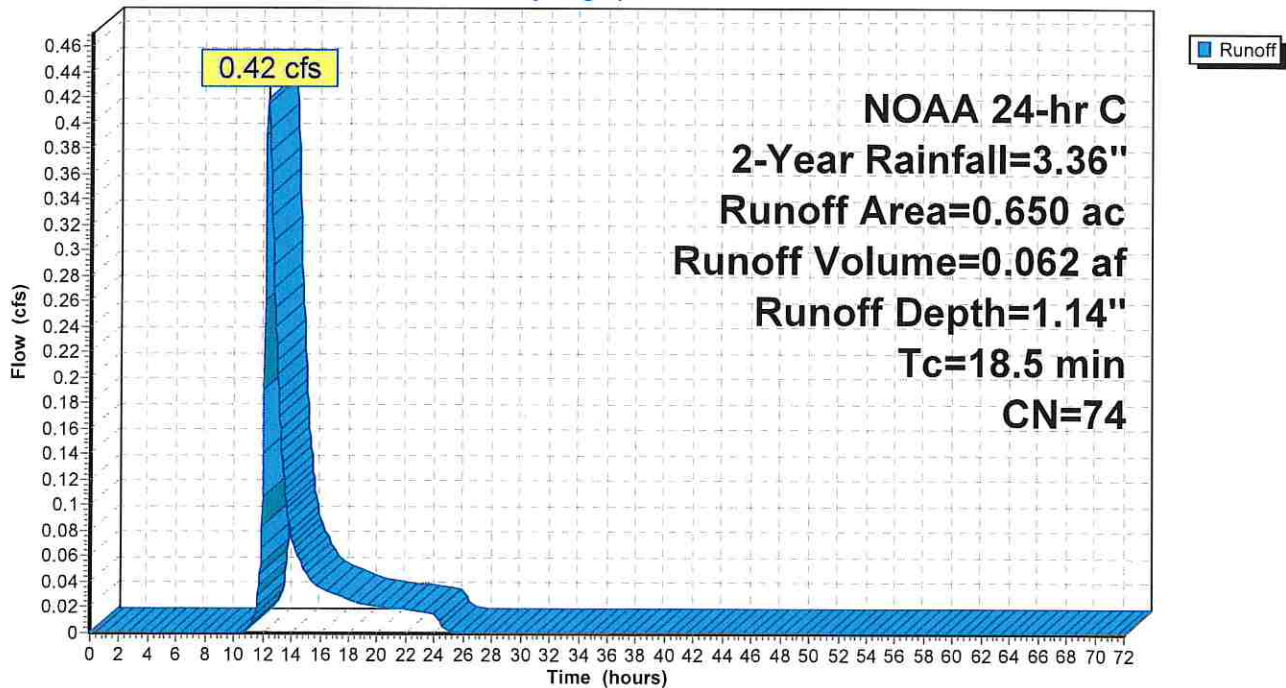
Runoff by SCS TR-20 method, UH=Delmarva, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
 NOAA 24-hr C 2-Year Rainfall=3.36"

Area (ac)	CN	Description
0.650	74	>75% Grass cover, Good, HSG C
0.650	74	100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
18.5					Direct Entry, PIPE CALCS

Subcatchment 19S: LINE B PERVIOUS

Hydrograph



Summary for Subcatchment 20S: LINE B IMPERVIOUS

Runoff = 17.33 cfs @ 12.30 hrs, Volume= 2.595 af, Depth= 3.13"

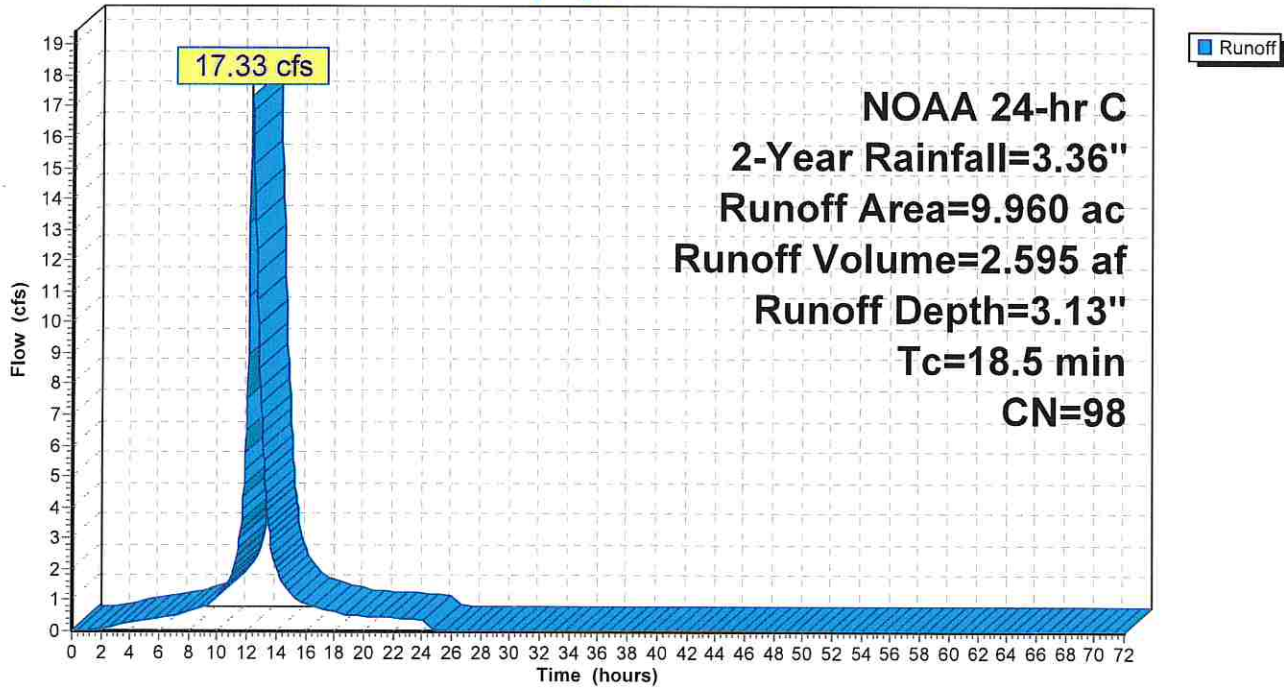
Runoff by SCS TR-20 method, UH=Delmarva, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
 NOAA 24-hr C 2-Year Rainfall=3.36"

Area (ac)	CN	Description
9.960	98	Paved parking, HSG C
9.960	98	100.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
18.5					Direct Entry, PIPE CALCS

Subcatchment 20S: LINE B IMPERVIOUS

Hydrograph



Summary for Pond 7P: WETPOND

Inflow Area = 26.430 ac, 77.34% Impervious, Inflow Depth = 2.65" for 2-Year event
 Inflow = 39.50 cfs @ 12.29 hrs, Volume= 5.843 af
 Outflow = 5.66 cfs @ 13.77 hrs, Volume= 5.566 af, Atten= 86%, Lag= 88.8 min
 Primary = 5.66 cfs @ 13.77 hrs, Volume= 5.566 af

Routing by Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
 Peak Elev= 49.29' @ 13.77 hrs Surf.Area= 1.233 ac Storage= 3.703 af

Plug-Flow detention time= 867.3 min calculated for 5.562 af (95% of inflow)
 Center-of-Mass det. time= 840.4 min (1,627.2 - 786.8)

Volume #1	Invert	Avail.Storage	Storage Description
	46.00'	9.985 af	Custom Stage Data (Prismatic) Listed below (Recalc)

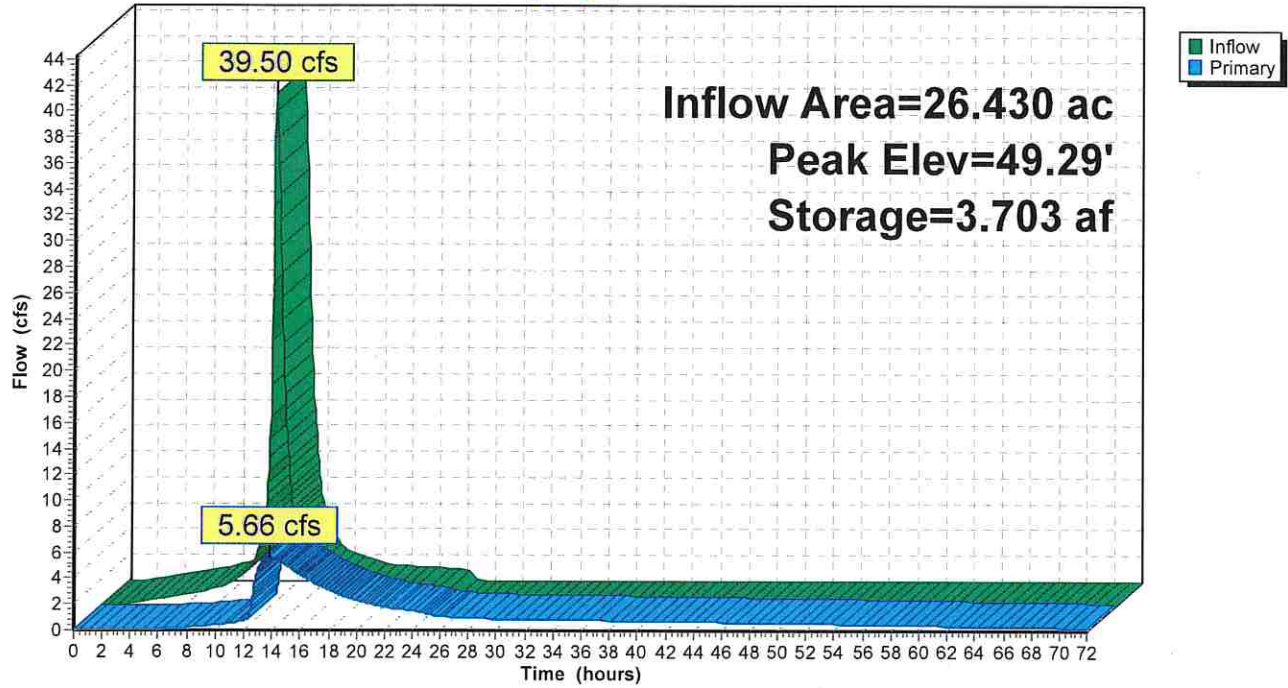
Elevation (feet)	Surf.Area (acres)	Inc.Store (acre-feet)	Cum.Store (acre-feet)
46.00	1.019	0.000	0.000
47.00	1.058	1.038	1.038
47.50	1.098	0.539	1.577
48.00	1.179	0.569	2.147
49.00	1.221	1.200	3.347
50.00	1.263	1.242	4.589
51.00	1.305	1.284	5.873
52.00	1.349	1.327	7.200
53.00	1.392	1.370	8.570
54.00	1.437	1.414	9.985

Device	Routing	Invert	Outlet Devices
#1	Device 3	46.00'	5.0" Vert. Orifice/Grate C= 0.600 Limited to weir flow at low heads
#2	Device 3	48.10'	1.3' long Sharp-Crested Rectangular Weir 2 End Contraction(s)
#3	Primary	46.00'	30.0" Round RCP_Round 30" L= 147.0' RCP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 46.00' / 45.15' S= 0.0058 1' Cc= 0.900 n= 0.013 Concrete sewer w/manholes & inlets, Flow Area= 4.91 sf

Primary OutFlow Max=5.66 cfs @ 13.77 hrs HW=49.29' (Free Discharge)
 ← **3=RCP_Round 30"** (Passes 5.66 cfs of 30.73 cfs potential flow)
 ← **1=Orifice/Grate** (Orifice Controls 1.15 cfs @ 8.45 fps)
 ← **2=Sharp-Crested Rectangular Weir** (Weir Controls 4.51 cfs @ 3.57 fps)

Pond 7P: WETPOND

Hydrograph

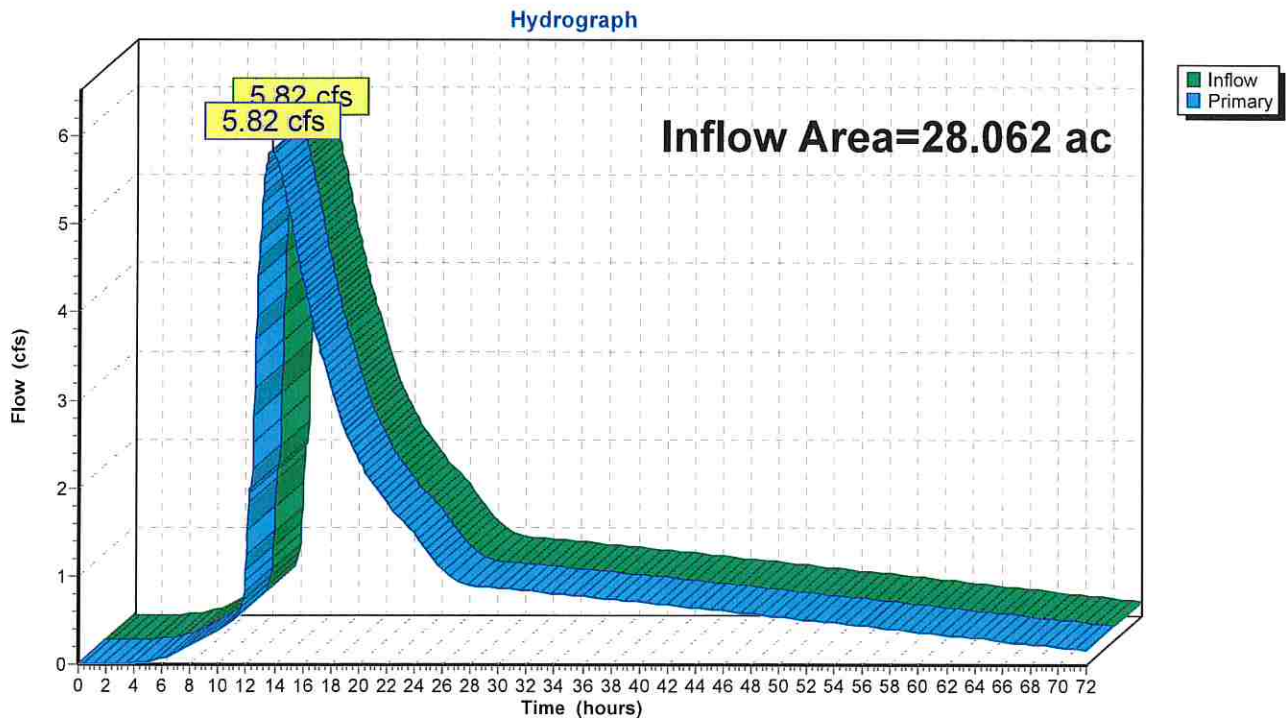


Summary for Link 21L: PROPOSED RUNOFF FROM EDA-1B

Inflow Area = 28.062 ac, 72.84% Impervious, Inflow Depth > 2.44" for 2-Year event
Inflow = 5.82 cfs @ 13.71 hrs, Volume= 5.699 af
Primary = 5.82 cfs @ 13.71 hrs, Volume= 5.699 af, Atten= 0%, Lag= 0.0 min

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

Link 21L: PROPOSED RUNOFF FROM EDA-1B





UNDETAIN SOUTH
EAST & LINE D
PERVIOUS



UNDETAIN SOUTH
EAST & LINE D
IMPERVIOUS



PROPOSED RUNOFF
FOR EDA-2



Summary for Subcatchment 14S: UNDETAIN SOUTH EAST & LINE D PERVIOUS

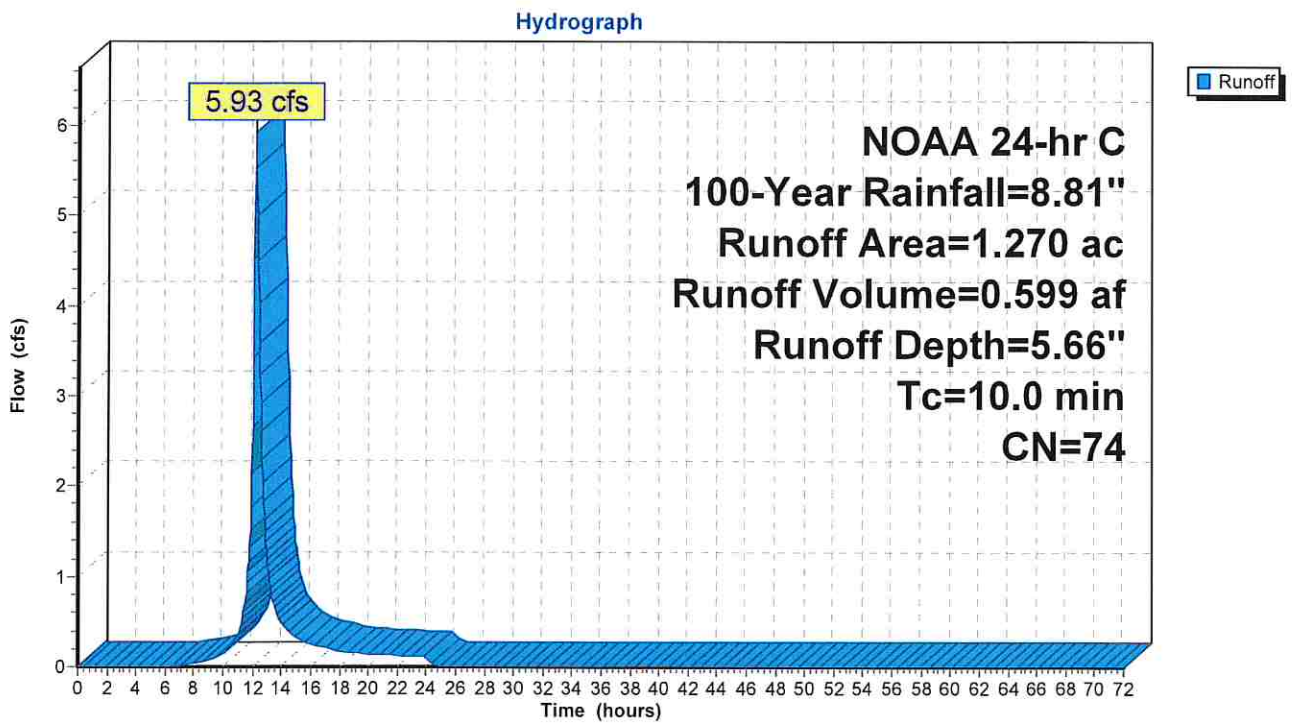
Runoff = 5.93 cfs @ 12.20 hrs, Volume= 0.599 af, Depth= 5.66"

Runoff by SCS TR-20 method, UH=Delmarva, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
 NOAA 24-hr C 100-Year Rainfall=8.81"

Area (ac)	CN	Description
1.270	74	>75% Grass cover, Good, HSG C
1.270	74	100.00% Pervious Area

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

Subcatchment 14S: UNDETAIN SOUTH EAST & LINE D PERVIOUS



Summary for Subcatchment 15S: UNDETAIN SOUTH EAST & LINE D IMPERVIOUS

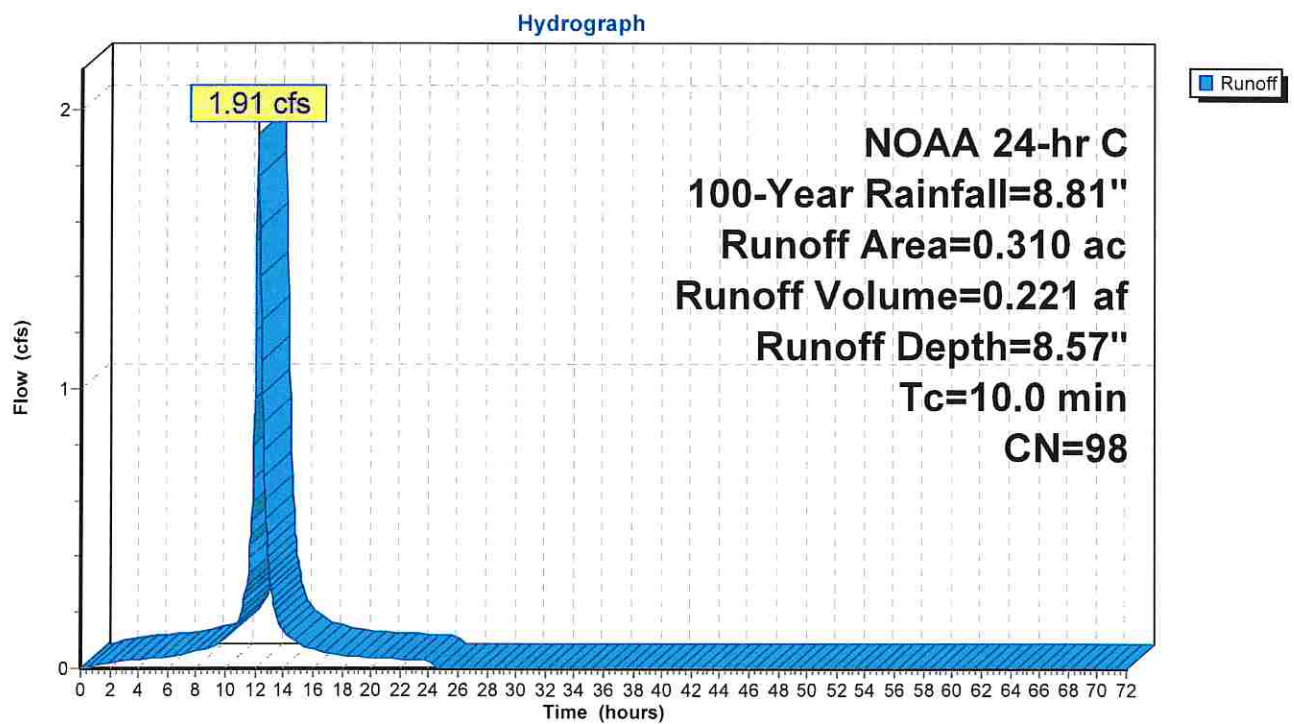
Runoff = 1.91 cfs @ 12.19 hrs, Volume= 0.221 af, Depth= 8.57"

Runoff by SCS TR-20 method, UH=Delmarva, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
 NOAA 24-hr C 100-Year Rainfall=8.81"

Area (ac)	CN	Description
0.310	98	Paved parking, HSG C
0.310	98	100.00% Impervious Area

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

Subcatchment 15S: UNDETAIN SOUTH EAST & LINE D IMPERVIOUS



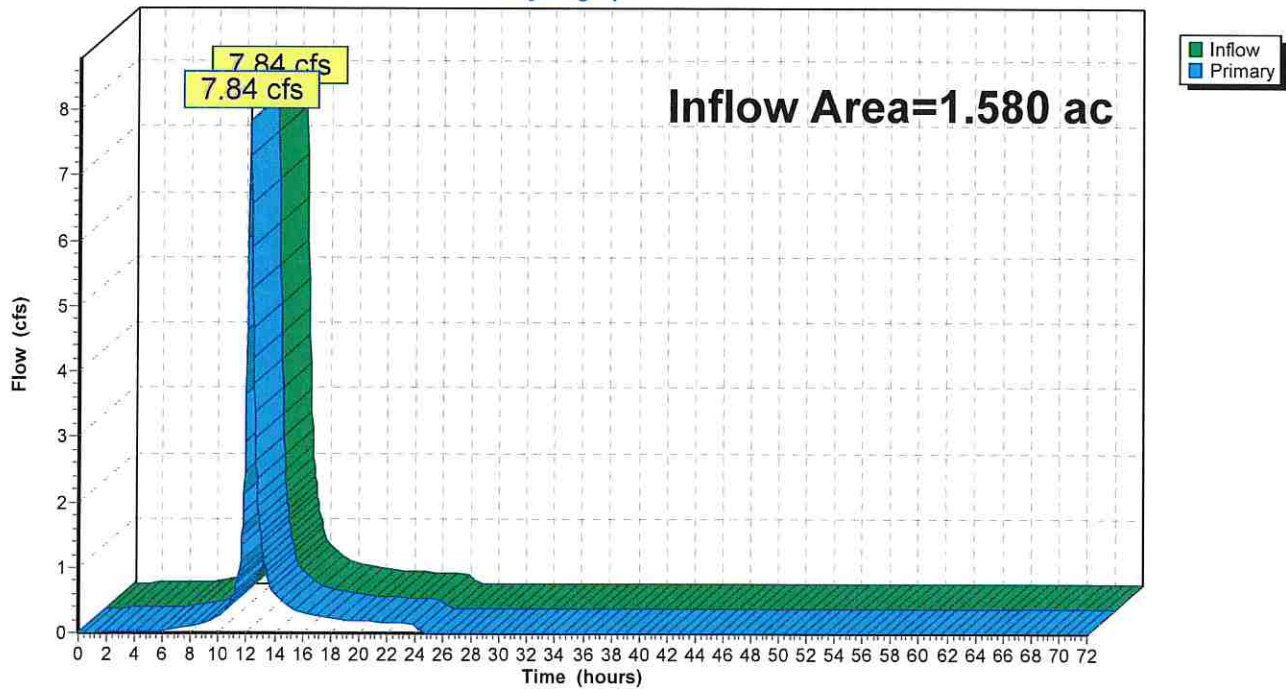
Summary for Link 2-PROP: PROPOSED RUNOFF FOR EDA-2

Inflow Area = 1.580 ac, 19.62% Impervious, Inflow Depth = 6.23" for 100-Year event
Inflow = 7.84 cfs @ 12.19 hrs, Volume= 0.820 af
Primary = 7.84 cfs @ 12.19 hrs, Volume= 0.820 af, Atten= 0%, Lag= 0.0 min

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

Link 2-PROP: PROPOSED RUNOFF FOR EDA-2

Hydrograph



Summary for Subcatchment 14S: UNDETAIN SOUTH EAST & LINE D PERVIOUS

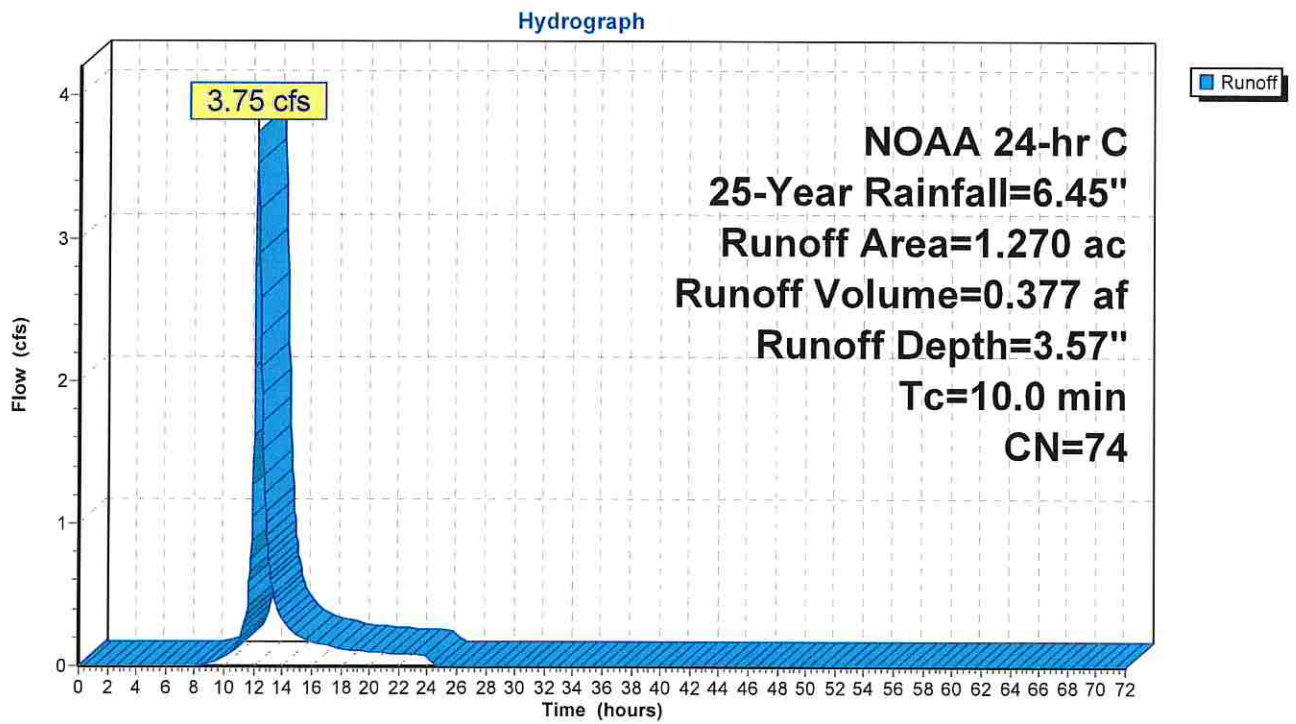
Runoff = 3.75 cfs @ 12.20 hrs, Volume= 0.377 af, Depth= 3.57"

Runoff by SCS TR-20 method, UH=Delmarva, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
 NOAA 24-hr C 25-Year Rainfall=6.45"

Area (ac)	CN	Description
1.270	74	>75% Grass cover, Good, HSG C
1.270	74	100.00% Pervious Area

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

Subcatchment 14S: UNDETAIN SOUTH EAST & LINE D PERVIOUS



Summary for Subcatchment 15S: UNDETAIN SOUTH EAST & LINE D IMPERVIOUS

Runoff = 1.40 cfs @ 12.19 hrs, Volume= 0.160 af, Depth= 6.21"

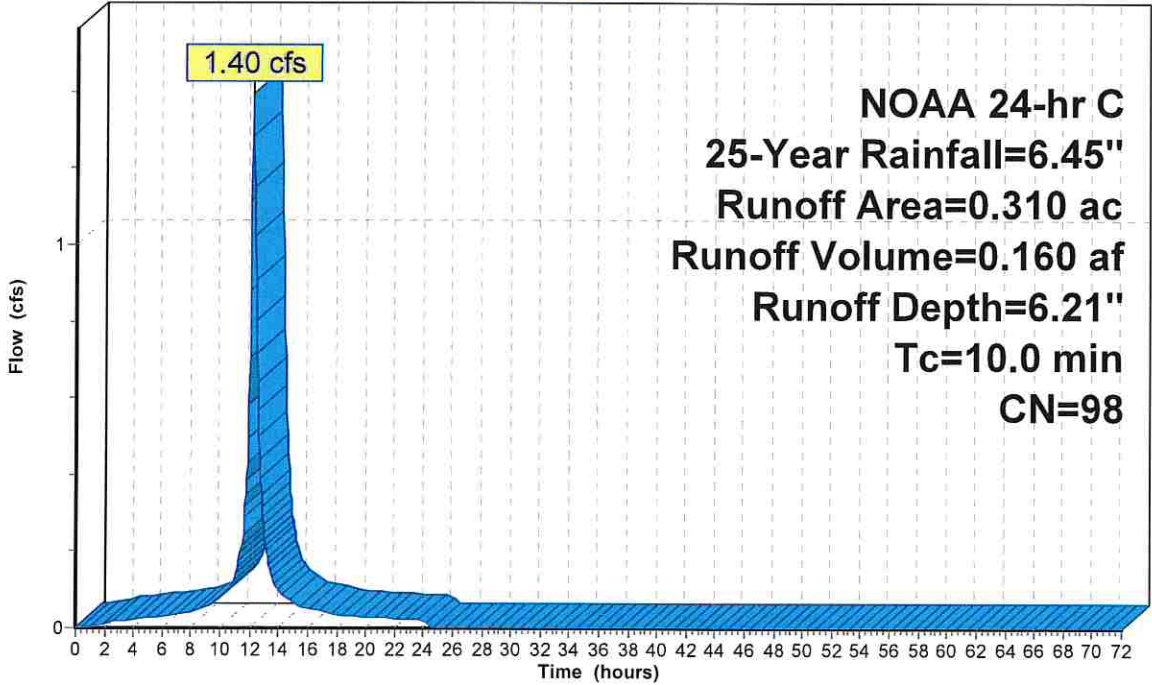
Runoff by SCS TR-20 method, UH=Delmarva, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
NOAA 24-hr C 25-Year Rainfall=6.45"

Area (ac)	CN	Description
0.310	98	Paved parking, HSG C
0.310	98	100.00% Impervious Area

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

Subcatchment 15S: UNDETAIN SOUTH EAST & LINE D IMPERVIOUS

Hydrograph



Runoff

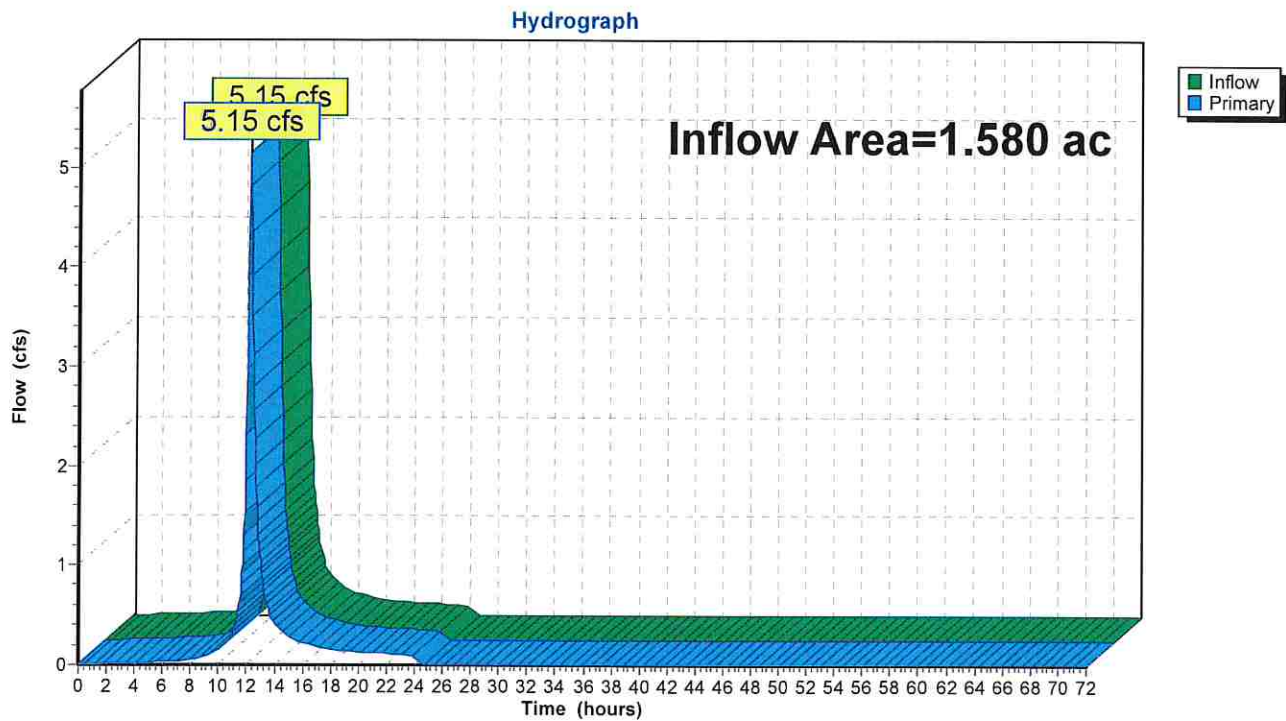
NOAA 24-hr C
 25-Year Rainfall=6.45"
 Runoff Area=0.310 ac
 Runoff Volume=0.160 af
 Runoff Depth=6.21"
 Tc=10.0 min
 CN=98

Summary for Link 2-PROP: PROPOSED RUNOFF FOR EDA-2

Inflow Area = 1.580 ac, 19.62% Impervious, Inflow Depth = 4.09" for 25-Year event
Inflow = 5.15 cfs @ 12.20 hrs, Volume= 0.538 af
Primary = 5.15 cfs @ 12.20 hrs, Volume= 0.538 af, Atten= 0%, Lag= 0.0 min

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

Link 2-PROP: PROPOSED RUNOFF FOR EDA-2



Summary for Subcatchment 14S: UNDETAIN SOUTH EAST & LINE D PERVIOUS

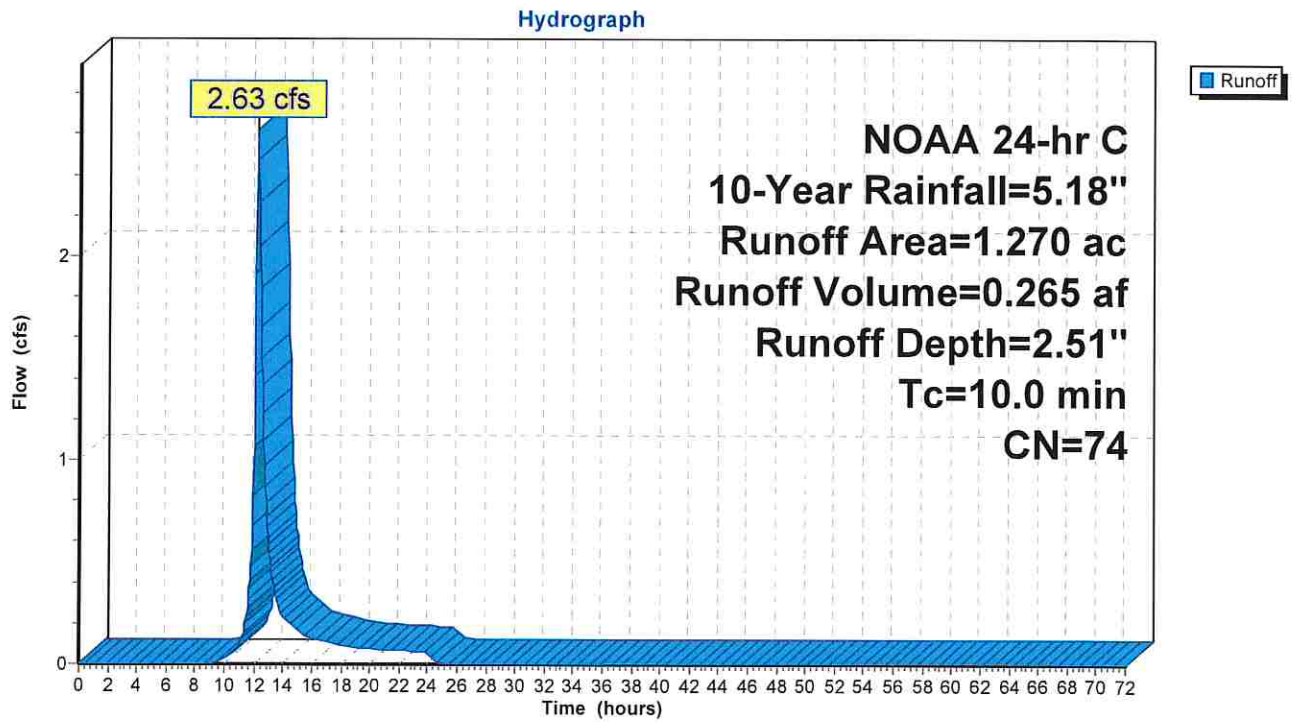
Runoff = 2.63 cfs @ 12.20 hrs, Volume= 0.265 af, Depth= 2.51"

Runoff by SCS TR-20 method, UH=Delmarva, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
 NOAA 24-hr C 10-Year Rainfall=5.18"

Area (ac)	CN	Description
1.270	74	>75% Grass cover, Good, HSG C
1.270	74	100.00% Pervious Area

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

Subcatchment 14S: UNDETAIN SOUTH EAST & LINE D PERVIOUS



Summary for Subcatchment 15S: UNDETAIN SOUTH EAST & LINE D IMPERVIOUS

Runoff = 1.12 cfs @ 12.19 hrs, Volume= 0.128 af, Depth= 4.94"

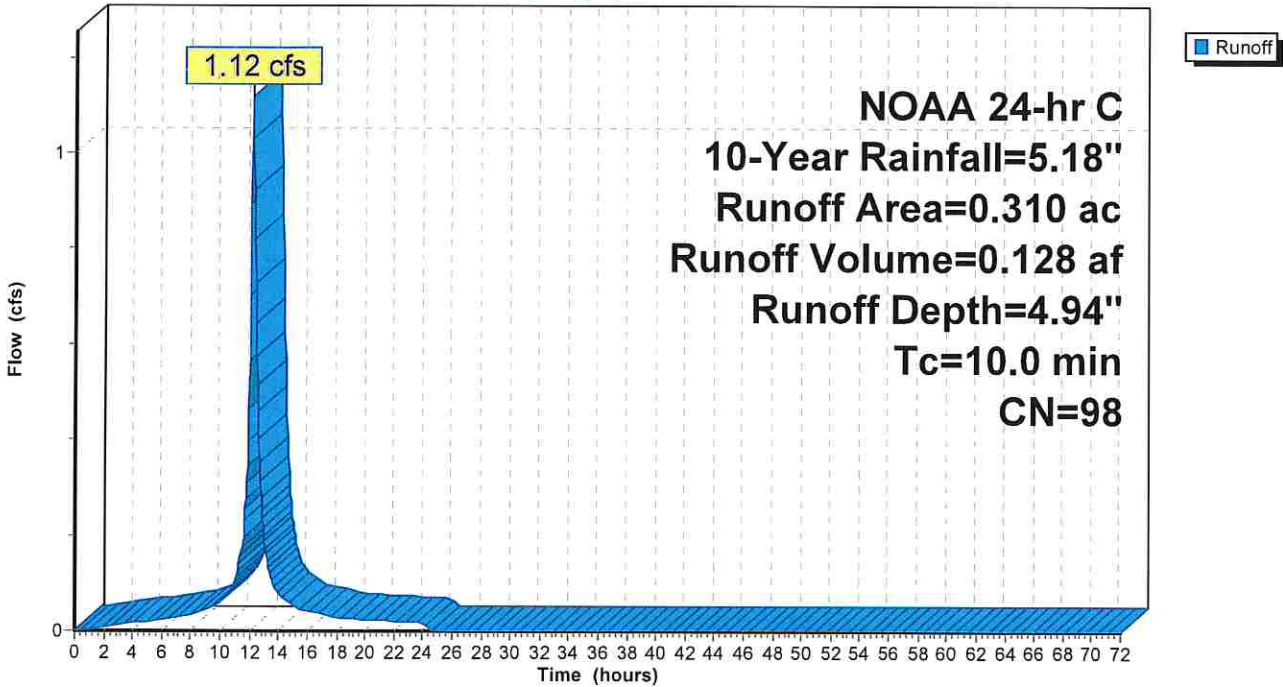
Runoff by SCS TR-20 method, UH=Delmarva, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
NOAA 24-hr C 10-Year Rainfall=5.18"

Area (ac)	CN	Description
0.310	98	Paved parking, HSG C
0.310	98	100.00% Impervious Area

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

Subcatchment 15S: UNDETAIN SOUTH EAST & LINE D IMPERVIOUS

Hydrograph



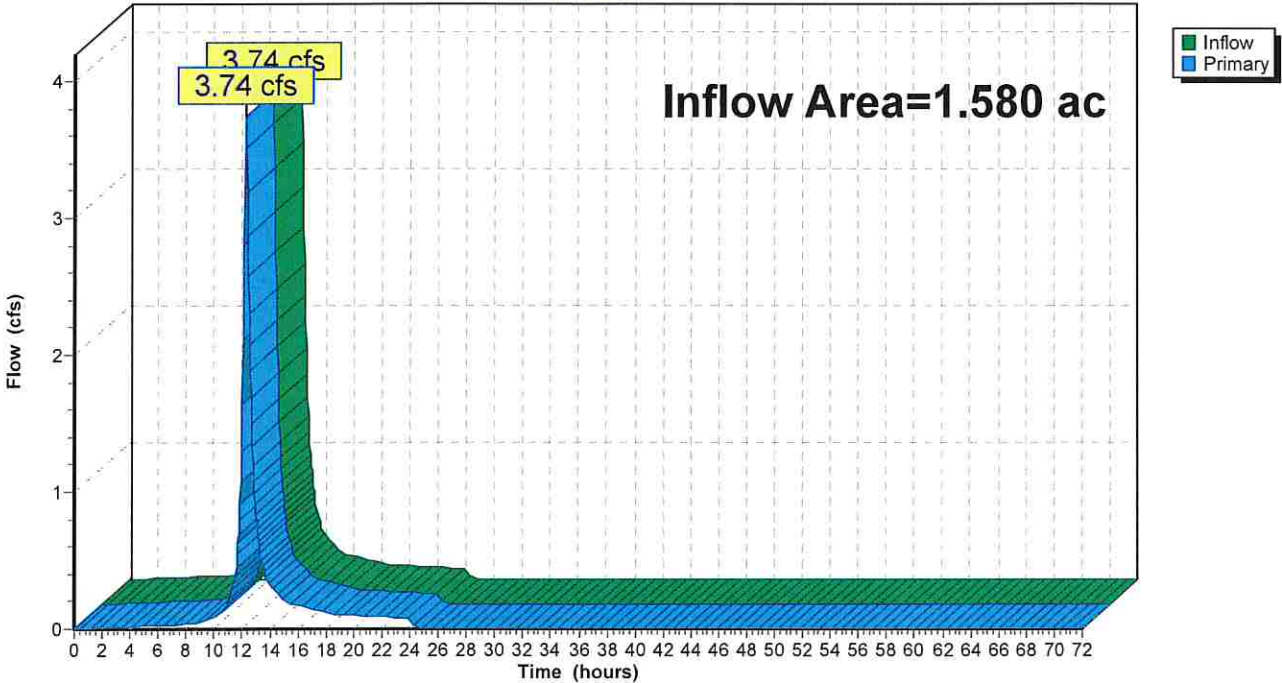
Summary for Link 2-PROP: PROPOSED RUNOFF FOR EDA-2

Inflow Area = 1.580 ac, 19.62% Impervious, Inflow Depth = 2.99" for 10-Year event
Inflow = 3.74 cfs @ 12.20 hrs, Volume= 0.393 af
Primary = 3.74 cfs @ 12.20 hrs, Volume= 0.393 af, Atten= 0%, Lag= 0.0 min

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

Link 2-PROP: PROPOSED RUNOFF FOR EDA-2

Hydrograph



Summary for Subcatchment 14S: UNDETAIN SOUTH EAST & LINE D PERVIOUS

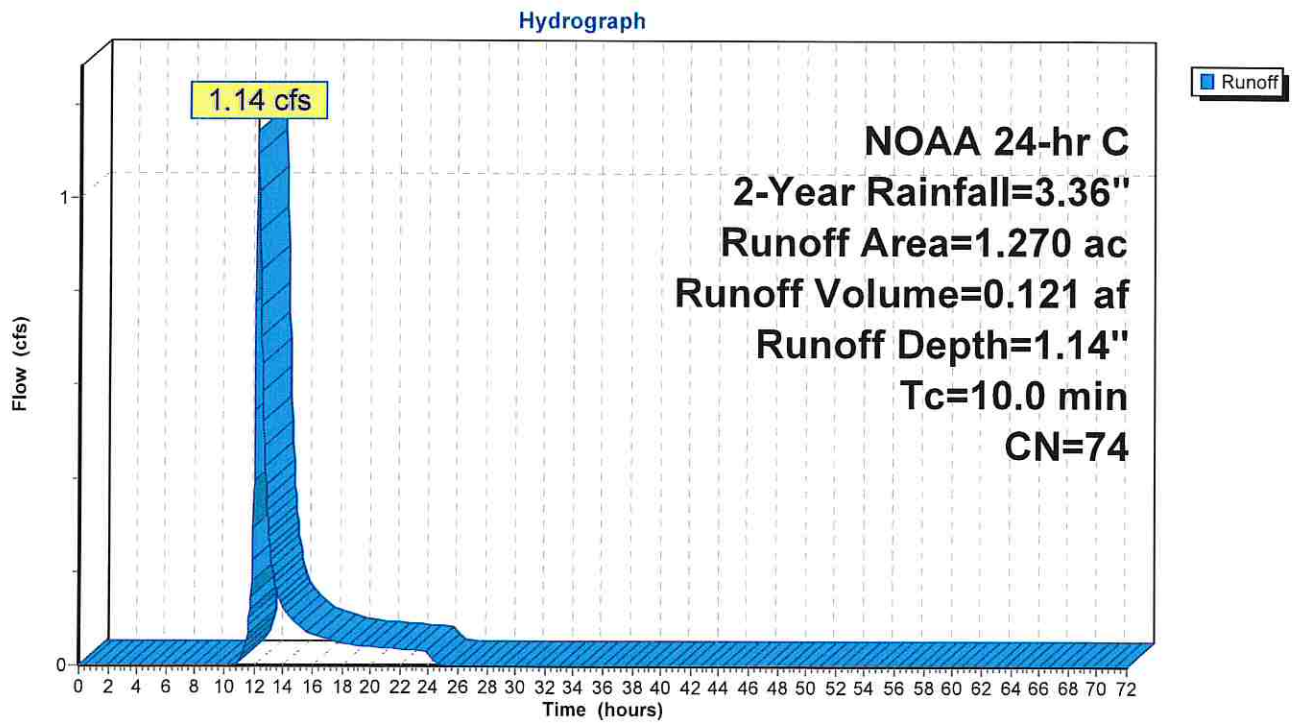
Runoff = 1.14 cfs @ 12.21 hrs, Volume= 0.121 af, Depth= 1.14"

Runoff by SCS TR-20 method, UH=Delmarva, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
 NOAA 24-hr C 2-Year Rainfall=3.36"

Area (ac)	CN	Description
1.270	74	>75% Grass cover, Good, HSG C
1.270	74	100.00% Pervious Area

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

Subcatchment 14S: UNDETAIN SOUTH EAST & LINE D PERVIOUS



Summary for Subcatchment 15S: UNDETAIN SOUTH EAST & LINE D IMPERVIOUS

Runoff = 0.72 cfs @ 12.19 hrs, Volume= 0.081 af, Depth= 3.13"

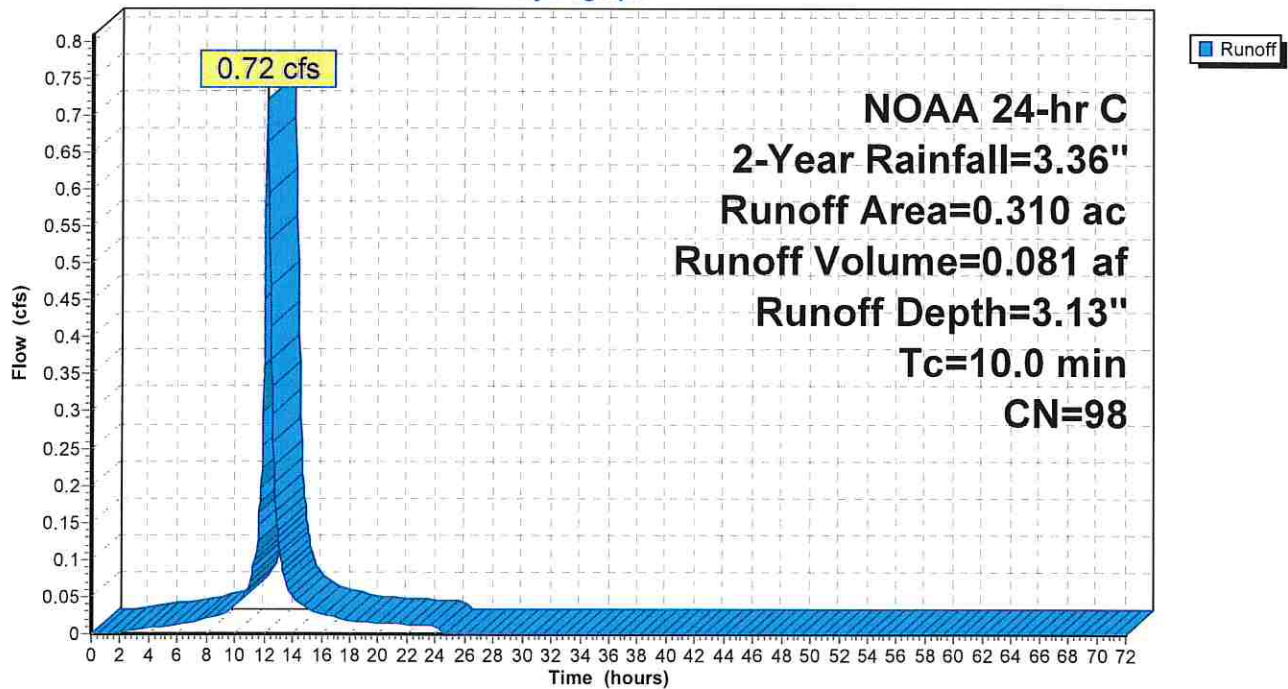
Runoff by SCS TR-20 method, UH=Delmarva, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
 NOAA 24-hr C 2-Year Rainfall=3.36"

Area (ac)	CN	Description
0.310	98	Paved parking, HSG C
0.310	98	100.00% Impervious Area

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

Subcatchment 15S: UNDETAIN SOUTH EAST & LINE D IMPERVIOUS

Hydrograph

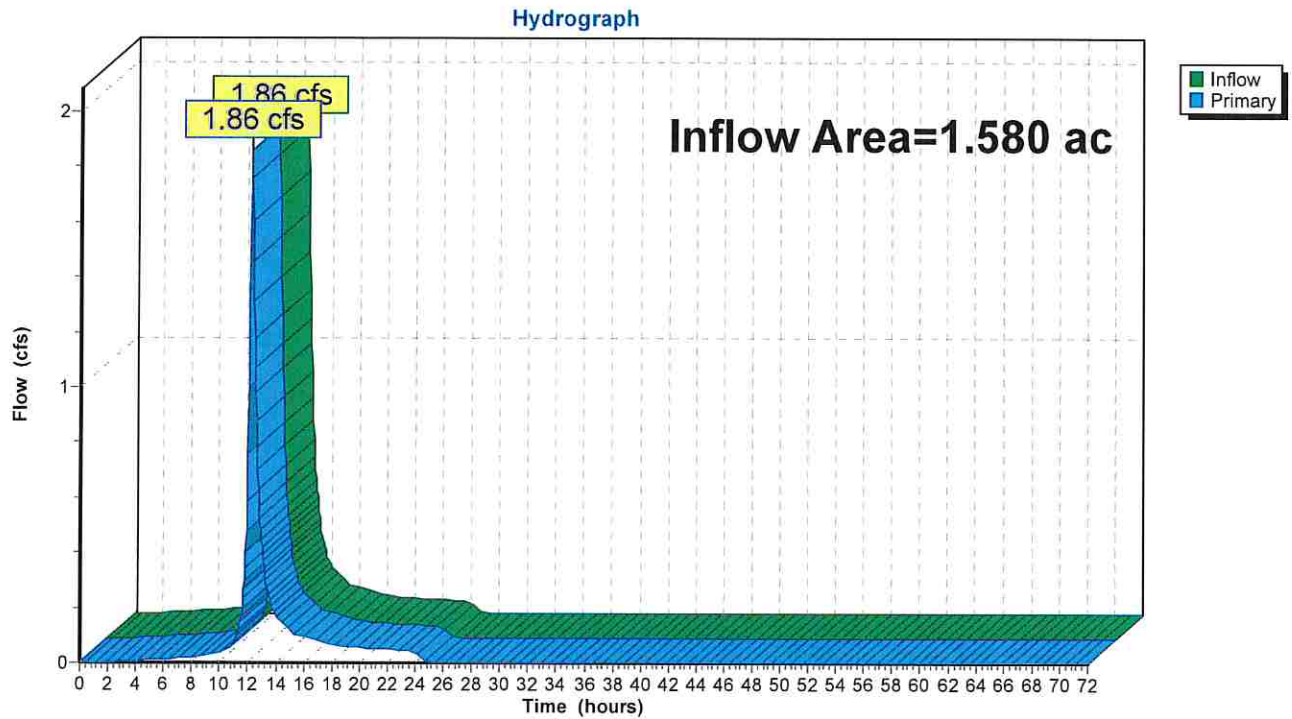


Summary for Link 2-PROP: PROPOSED RUNOFF FOR EDA-2

Inflow Area = 1.580 ac, 19.62% Impervious, Inflow Depth = 1.53" for 2-Year event
Inflow = 1.86 cfs @ 12.20 hrs, Volume= 0.202 af
Primary = 1.86 cfs @ 12.20 hrs, Volume= 0.202 af, Atten= 0%, Lag= 0.0 min

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

Link 2-PROP: PROPOSED RUNOFF FOR EDA-2



APPENDIX C: PIPE CALCULATIONS

ROCKEFELLER EASTAMPTON WAREHOUSE- WEIGHTED 'C' VALUES

SOIL TYPES : ComB - Collington fine sandy loam, 2 to 5 percent slopes (TYPE 'B')
 AdmA - Adelpia fine sandy loam, 0 to 2 percent slopes (TYPE 'C')

STRUCTUR	TOTAL AREA (acres)		TOTAL WEIGHT D 'C'		IMPERVIOUS COVERAGE				TYPE 'B' SOILS				TYPE 'C' SOILS					
	AREA (acres)	WEIGHT D 'C'	AREA (acres)	WEIGHT D 'C'	AREA (acres)	%	'C'	'C' =	IMPERV 'C'	AREA (acres)	%	'C'	'C' =	GRASS	AREA (acres)	%	'C'	'C' =
A1	0.37	0.91	0.31	0.91	0.31	84%	0.99	0.99	0.83	0.09	0%	0.25	0.25	0.00	0.06	16%	0.51	0.08
A2	1.19	0.91	1.03	0.91	1.03	87%	0.99	0.99	0.86	0.09	8%	0.25	0.25	0.02	0.07	6%	0.51	0.03
A3	1.58	0.84	1.27	0.84	1.27	80%	0.99	0.99	0.80	0.31	20%	0.25	0.25	0.05		0%	0.51	0.00
A3.1	0.74	0.52	0.27	0.52	0.27	36%	0.99	0.99	0.36	0.47	64%	0.25	0.25	0.16		0%	0.51	0.00
A3.2	4.22	0.87	3.52	0.87	3.52	83%	0.99	0.99	0.83	0.70	17%	0.25	0.25	0.04		0%	0.51	0.00
A4	0.90	0.88	0.76	0.88	0.76	85%	0.99	0.99	0.84	0.14	15%	0.25	0.25	0.04		0%	0.51	0.00
A5	1.26	0.76	0.86	0.76	0.86	68%	0.99	0.99	0.68	0.40	32%	0.25	0.25	0.08		0%	0.51	0.00
A6	1.30	0.85	1.05	0.85	1.05	81%	0.99	0.99	0.80	0.25	19%	0.25	0.25	0.05		0%	0.51	0.00
A7	0.36	0.76	0.25	0.76	0.25	69%	0.99	0.99	0.69	0.11	31%	0.25	0.25	0.08		0%	0.51	0.00
A8	0.14	0.88	0.12	0.88	0.12	86%	0.99	0.99	0.85	0.02	14%	0.25	0.25	0.04		0%	0.51	0.00
A9	0.28	0.82	0.21	0.82	0.21	75%	0.99	0.99	0.74	0.05	18%	0.25	0.25	0.04	0.02	7%	0.51	0.04
A9.1	0.26	0.52	0.09	0.52	0.09	35%	0.99	0.99	0.34	0.16	62%	0.25	0.25	0.15	0.01	4%	0.51	0.02
A9.3	1.12	0.57	0.49	0.57	0.49	44%	0.99	0.99	0.43	0.63	56%	0.25	0.25	0.14		0%	0.51	0.00
A10	0.20	0.81	0.15	0.81	0.15	75%	0.99	0.99	0.74	0.05	25%	0.25	0.25	0.06		0%	0.51	0.00
A11	0.32	0.48	0.10	0.48	0.10	31%	0.99	0.99	0.31	0.22	69%	0.25	0.25	0.17		0%	0.51	0.00
TOTALS	14.24		10.48		10.48	74%	0.99	0.99	0.73	3.60	25%	0.25	0.25	0.06	0.16	1%	0.51	0.01

Pipe Calc

Line No.	Inlet ID	Line ID	Gnd/Rim El Up (ft)	Line Length (ft)	Drng Area (ac)	Runoff Coeff (C)	Inlet Time (min)	i Inlet (in/hr)	Incr Q (cfs)	Total Area (ac)	Tc (min)	i Sys (in/hr)	Total Runoff (cfs)	Known Q (cfs)	Flow Rate (cfs)	Capac Full (cfs)	Line Size (in)	Line Slope (%)	Vel Ave (ft/s)	Invert Up (ft)	Invert Dn (ft)	n-val Pipe
1	B2	P1	56.00	7.546	0.46	0.85	10.0	6.73	2.63	10.61	20.3	4.74	48.27	0.00	48.27	81.90	42	0.66	7.71	46.05	46.00	0.013
2	B3	P2	56.40	15.000	0.00	0.00	0.0	0.00	0.00	10.15	20.2	4.74	46.48	0.00	46.48	82.15	42	0.67	7.51	46.15	46.05	0.013
3	B4	P3	57.75	156.518	0.00	0.00	0.0	0.00	0.00	10.15	19.7	4.80	47.09	0.00	47.09	56.86	42	0.32	6.60	46.65	46.15	0.013
4	B5	P4	55.90	115.408	0.48	0.84	10.0	6.73	2.71	10.15	19.4	4.85	47.55	0.00	47.55	55.40	42	0.30	5.49	47.00	46.65	0.013
5	B6	P5	55.90	298.136	0.55	0.88	10.0	6.73	3.26	1.74	17.6	5.11	7.90	0.00	7.90	12.43	24	0.30	2.80	49.40	48.50	0.013
6	B7	P6	55.90	296.971	0.54	0.88	10.0	6.73	3.20	1.19	15.2	5.51	5.86	0.00	5.86	12.45	24	0.30	2.89	50.30	49.40	0.013
7	B8	P7	55.75	303.059	0.34	0.88	10.0	6.73	2.01	0.65	12.8	5.99	3.52	0.00	3.52	5.85	18	0.31	3.46	51.75	50.81	0.013
8	B9	P8	55.40	63.211	0.16	0.93	10.0	6.73	1.00	0.31	12.2	6.15	1.77	0.00	1.77	5.45	15	0.71	2.90	52.45	52.00	0.013
9	B10	P9	56.60	99.000	0.15	0.93	10.0	6.73	0.94	0.15	10.0	6.73	0.94	0.00	0.94	6.96	15	1.16	2.44	53.60	52.45	0.013
10	B5.1	P5.1	56.90	25.303	7.93	0.99	10.0	6.73	52.84	7.93	10.0	6.73	52.84	0.00	52.84	63.25	42	0.40	7.36	49.90	49.80	0.013

Project File: 2020.014-LINE B.stm Number of lines: 10 Date: 4/21/2021

NOTES: Intensity = 42.39 / (Inlet time + 5.10) ^ 0.68 -- Return period = 25 Yrs. ; ** Critical depth

ROCKEFELLER EASTAMPTON WAREHOUSE- WEIGHTED 'C' VALUES

SOIL TYPE(S) : AdmA - Adelpia fine sandy loam, 0 to 2 percent slopes (TYPE 'C')

STRUCTURE	IMPERVIOUS		'C' = 0.99		GRASS		'C' = 0.51		WOODS		'C' = 0.45		TOTAL WEIGHTED 'C' (F+J+N)
	AREA (acres)	%	AREA (acres)	'C'	AREA (acres)	%	AREA (acres)	'C'	AREA (acres)	%	AREA (acres)	'C'	
B2	0.46	72%	0.33	0.99	0.13	28%	0.14	0.51		0%		0.45	0.85
B5	0.48	69%	0.33	0.99	0.15	31%	0.16	0.51		0%		0.45	0.84
B5.1	7.93	100%	7.93	0.99		0%	0.00	0.51		0%		0.45	0.99
B6	0.55	76%	0.42	0.99	0.13	24%	0.12	0.51		0%		0.45	0.88
B7	0.54	78%	0.42	0.99	0.12	22%	0.11	0.51		0%		0.45	0.88
B8	0.34	76%	0.26	0.99	0.08	24%	0.12	0.51		0%		0.45	0.88
B9	0.16	88%	0.14	0.99	0.02	13%	0.06	0.51		0%		0.45	0.93
B10	0.15	87%	0.13	0.99	0.02	13%	0.07	0.51		0%		0.45	0.93
TOTALS	10.61	94%	9.96	0.99	0.65	6%	0.03	0.51	0.00	0%	0.00	0.45	0.00

Pipe Calc

Line No.	Inlet ID	Line ID	Gnd/Rim El Up (ft)	Line Length (ft)	Drng Area (ac)	Runoff Coeff (C)	Inlet Time (min)	i Inlet (in/hr)	Incr Q (cfs)	Total Area (ac)	Tc (min)	i Sys (in/hr)	Total Runoff (cfs)	Known Q (cfs)	Flow Rate (cfs)	Capac Full (cfs)	Line Size (in)	Line Slope (%)	Vel Ave (ft/s)	Invert Up (ft)	Invert Dn (ft)	n-val Pipe
1	A9.3	P9.2	55.96	96.815	1.12	0.57	10.0	6.73	4.30	1.12	10.0	6.73	4.30	0.00	4.30	6.31	18	0.36	4.02	53.75	53.40	0.013
2	A1	P1 (3)	55.35	7.502	0.37	0.91	10.0	6.73	2.27	13.12	17.9	5.06	54.34	0.00	58.64	117.27	48	0.67	7.82	46.05	46.00	0.013
3	A2	P1	52.80	121.561	1.19	0.91	10.0	6.73	7.29	12.75	17.5	5.13	53.33	0.00	57.63	82.40	48	0.33	7.10	46.45	46.05	0.013
4	A3	P2	52.80	179.817	1.58	0.84	10.0	6.73	8.93	11.56	16.9	5.21	48.55	0.00	52.85	55.64	42	0.31	5.84	47.00	46.45	0.013
5	A4	P3	52.80	180.227	0.90	0.88	10.0	6.73	5.33	5.02	16.1	5.35	21.02	0.00	25.32	36.84	36	0.31	3.58	47.55	47.00	0.013
6	A5	P4	52.80	179.907	1.26	0.76	10.0	6.73	6.45	4.12	15.2	5.51	17.32	0.00	21.62	36.88	36	0.31	3.06	48.10	47.55	0.013
7	A6	P5	52.80	180.839	1.30	0.85	10.0	6.73	7.44	2.86	14.3	5.68	12.39	0.00	16.69	22.62	30	0.30	3.40	48.65	48.10	0.013
8	A7	P6	54.75	214.269	0.36	0.76	10.0	6.73	1.84	1.56	13.3	5.89	6.34	0.00	10.64	12.46	24	0.30	3.39	49.30	48.65	0.013
9	A8	P7	56.10	48.550	0.14	0.88	10.0	6.73	0.83	1.20	13.0	5.95	4.78	0.00	9.08	12.57	24	0.31	2.89	49.45	49.30	0.013
10	A9	P8	55.15	56.921	0.28	0.82	10.0	6.73	1.55	1.06	12.7	6.03	4.10	0.00	8.40	13.41	24	0.35	2.67	49.65	49.45	0.013
11	A10	P9	56.60	153.000	0.20	0.81	10.0	6.73	1.09	0.52	11.2	6.40	2.02	0.00	2.02	6.60	15	1.05	1.87	52.00	50.40	0.013
12	A11	P10	55.94	59.601	0.32	0.48	10.0	6.73	1.03	0.32	10.0	6.73	1.03	0.00	1.03	11.83	15	3.36	2.02	54.00	52.00	0.013
13	A9.1	P9.1	55.21	39.791	0.26	0.52	10.0	6.73	5.21	0.26	10.0	6.73	0.91	4.30	5.21	24.69	18	5.53	3.90	53.00	50.80	0.013
14	A3.1	P3.1	55.45	116.539	0.74	0.52	10.0	6.73	2.59	4.96	12.9	5.97	24.20	0.00	24.20	36.55	36	0.30	3.45	47.85	47.50	0.013
15	A3.2	P3.2	54.00	616.853	4.22	0.87	10.0	6.73	24.71	4.22	10.0	6.73	24.71	0.00	24.71	36.52	36	0.30	4.10	49.70	47.85	0.013

Project File: 2020.014-LINE A.strm Number of lines: 15 Date: 4/21/2021

NOTES: Intensity = 42.39 / (inlet time + 5.10) ^ 0.68 — Return period = 25 Yrs.; ** Critical depth

ROCKEFELLER EASTAMPTON WAREHOUSE- WEIGHTED 'C' VALUES

SOIL TYPE(S) : ComB - Collington fine sandy loam, 2 to 5 percent slopes (TYPE 'B')

STRUCTURE	IMPERVIOUS		GRASS		'C' = 0.99		WOODS		'C' = 0.45		TOTAL WEIGHT D 'C' (F+J+N)
	AREA (acres)	%	AREA (acres)	%	AREA (acres)	IMPERV 'C'	AREA (acres)	%	GRASS 'C'	WOODS 'C'	
C2.1	2.11	0%	2.11	100%	0.00	0.00	2.11	0%	0.25	0.00	0.25
C3	2.90	43%	1.64	57%	0.43	0.25	1.64	0%	0.14	0.45	0.57
TOTALS	5.01	25%	3.75	75%	0.25	0.19	0.00	0%	0.45	0.00	0.57

Pipe Calc

Line No.	Inlet ID	Line ID	Gnd/Rim El Up (ft)	Line Length (ft)	Drng Area (ac)	Runoff Coeff (C)	Inlet Time (min)	i Inlet (in/hr)	Incr Q (cfs)	Total Area (ac)	Tc (min)	i Sys (in/hr)	Total Runoff (cfs)	Known Q (cfs)	Flow Rate (cfs)	Capac Full (cfs)	Line Size (in)	Line Slope (%)	Vel Ave (ft/s)	Invert Up (ft)	Invert Dn (ft)	n-val Pipe
1	C2	P1	55.85	191.646	0.00	0.00	0.0	0.00	0.00	5.01	11.3	6.38	13.91	0.00	13.91	41.37	30	1.02	5.64	48.45	46.50	0.013
2	C3	P2	58.20	247.680	0.00	0.00	0.0	0.00	0.00	2.90	10.1	6.71	11.09	0.00	11.09	12.45	24	0.30	4.48	52.40	51.65	0.013
3	C3.1	P3	56.00	17.290	2.90	0.57	10.0	6.73	11.13	2.90	10.0	6.73	11.13	0.00	11.13	17.20	24	0.58	4.81	52.60	52.50	0.013
4	C2.1	P2.1	53.00	105.520	2.11	0.25	10.0	6.73	3.55	2.11	10.0	6.73	3.55	0.00	3.55	7.23	18	0.47	4.08	50.00	49.50	0.013

Project File: 2020.014-LINE C.stm

Number of lines: 4

Date: 4/16/2021

NOTES: Intensity = 42.39 / (inlet time + 5.10) ^ 0.68 -- Return period = 25 Yrs. ; ** Critical depth

ROCKEFELLER EASTAMPTON WAREHOUSE- WEIGHTED 'C' VALUES

SOIL TYPE(S) : AdmA - Adelpia fine sandy loam, 0 to 2 percent slopes (TYPE 'C')

STRUCTURE	IMPERVIOUS		'C' = 0.99		GRASS		'C' = 0.51		WOODS		'C' = 0.45		TOTAL WEIGHTED 'C' (E+I+N) 0.63
	AREA (acres)	%	AREA (acres)	IMPERV 'C'	AREA (acres)	%	'C'	GRASS 'C'	AREA (acres)	%	'C'	WOODS 'C'	
D2	0.14	25%	0.14	0.25	0.41	75%	0.51	0.38		0%	0.45	0.00	
TOTALS	0.55	25%	0.41	0.25	0.41	75%	0.51	0.38	0.00	0%	0.45	0.00	

Pipe Calc

Line No.	Inlet ID	Line ID	Gnd/Rim El Up (ft)	Line Length (ft)	Dmg Area (ac)	Runoff Coeff (C)	Inlet Time (min)	i Inlet (in/hr)	Incr Q (cfs)	Total Area (ac)	Tc (min)	i Sys (in/hr)	Total Runoff (cfs)	Known Q (cfs)	Flow Rate (cfs)	Capac Full (cfs)	Line Size (in)	Line Slope (%)	Vel Ave (ft/s)	Invert Up (ft)	Invert Dn (ft)	n-val Pipe
1	D2	P1	53.94	70.145	0.55	0.63	10.0	6.73	2.33	0.55	10.0	6.73	2.33	0.00	2.33	3.86	15	0.36	3.46	52.00	51.75	0.013

Project File: 2020.014-LINE D.stm

Number of lines: 1

Date: 3/25/2021

NOTES: Intensity = 42.39 / (Inlet time + 5.10) ^ 0.68 -- Return period = 25 Yrs. ; ** Critical depth

EMERGENCY SPILLWAY CALCULATIONS

<u>BASIN #1</u>				
Inflow	$Q_{100} =$	114.8	cfs	
Target	$Q_{150} =$	150% of Q_{100}	=	172.2 cfs
Height	$\frac{Q}{C} =$	$\frac{L}{H^{3/2}}$		
	172.2 =	3.1 x 220.0	x	$\frac{H^{3/2}}{H^{3/2}}$
	H =	0.4	ft	
Velocity Over Spillway	$Q =$	Velocity (ft/sec) x Length(ft)	x	Height(ft)
	172.2 =	V x 220.0	x	0.4
	V =	2.0	ft/sec	
Check	2.0	≤	2.0 ?	No Erosion Protection Required

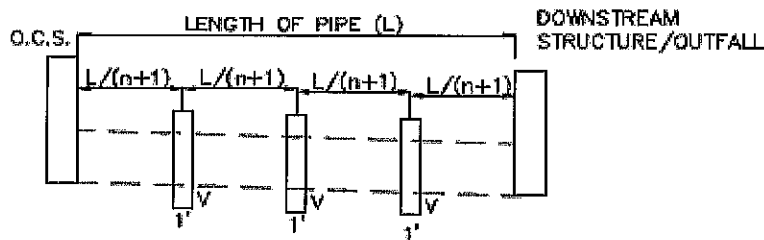
ANTI-SEEP COLLAR DESIGN CALCULATIONS

Height of Collar: $V = 7.5'$

Length of Pipe: $L = 89'$

Number of Collars = $1.15 \times L - L / (2 \times V) = \boxed{1}$

-To be evenly spaced along pipe (25' O.C. Max)



ANTI-SEEP COLLAR CALCULATION:

PERCOLATION PATH LENGTH TO BE INCREASED 15% = $(L) \times 1.15$

NUMBER OF COLLARS (n) = $((1.15 \times L) - L) / (2 \times V)$

WHERE n = NUMBER OF COLLARS

V = HEIGHT OF COLLAR

L = TOTAL LENGTH OF PIPE

PREFORMED SCOUR HOLE CALCULATIONS

The following calculations are done in accordance with The Soil Conservation District's Standards for Conduit Outlet Protection.

Length of Bottom:

$$L = (3)D_o$$

Width of Bottom:

$$W = (2)W_o$$

Length of Side Slopes in all directions:

$$H = (3)Y$$

Y = Depth of Scour Hole

Total Length (L_T):

$$L_T = L + 2(H)$$

Total Width (W_T):

$$W_T = W + 2(H)$$

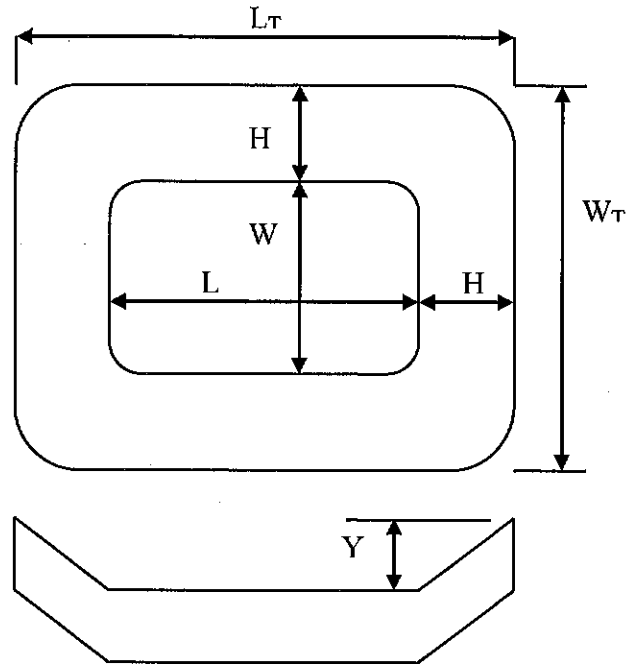
d₅₀ Stone Size:

$$\text{If, } Y = \left(\frac{1}{2}\right)D_o \quad \text{Then, } d_{50} = \left(\frac{0.0125}{T_w}\right)q^{1.33}$$

Where $q = \frac{Q}{D_o}$ in cfs per foot

$$\text{If, } Y = D_o \quad \text{Then, } d_{50} = \left(\frac{0.0082}{T_w}\right)q^{1.33}$$

Minimum d₅₀ = 6.00 inches



Calculations for discharge into a basin based on:

Q of 25 yr storm, and

T_w = difference between 2 yr storm elevation in basin and culvert invert.

For areas where T_w cannot be computed, T_w = 0.2D_o

<u>Outfall</u>	<u>Q(cfs)</u>	<u>Y(in)</u>	<u>D_o(in)</u>	<u>W_o(in)</u>	<u>T_w(ft)</u>	<u>L_T(ft)</u>	<u>W_T(ft)</u>	<u>d₅₀(in)</u>
C1	13.91	30.0	30	30	0.50	22.5	20.0	6.00
D1	2.33	7.5	15	15	0.25	7.5	6.3	6.00
E1	28.77	30.0	30	30	0.50	22.5	20.0	6.00

* Rip-Rap to extend to top of banks of channel

APPENDIX D: INFILTRATION CALCULATIONS

Annual Groundwater Recharge Analysis (based on GSR-32)

Project Name: Rockefeller Eastampton
Description: 2020.014
Analysis Date: 12/18/20

Post-Developed Conditions					
Land Segment	Area (acres)	TR-55 Land Cover	Soil	Annual Recharge (in)	Annual Recharge (cu.ft)
1	6.67	Impervious areas	Collington	0.0	-
2	5.13	Open space	Collington	13.4	248,736
3	0.85	Woods	Collington	13.4	41,431
4	9.02	Impervious areas	Adelphia	0.0	-
5	4.78	Open space	Adelphia	13.3	231,315
6	0.48	Woods	Adelphia	13.4	23,329
7	0.72	Woods	Fluvaquents	0.0	-
8	0				
9	0				
10	0				
11	0				
12	0				
13	0				
14	0				
15	0				
Total =	27.7			Total Annual Recharge (in)	Total Annual Recharge (cu.ft)
				5.4	544,812

Pre-Developed Conditions					
Land Segment	Area (acres)	TR-55 Land Cover	Soil	Annual Recharge (in)	Annual Recharge (cu.ft)
1	0.85	Woods	Collington	13.4	41,431
2	11.8	Row Crop	Collington	11.7	501,175
3	0.48	Woods	Adelphia	13.4	23,329
4	13.8	Row Crop	Adelphia	11.6	583,315
5	0.72	Woods	Fluvaquents	0.0	-
6	0				
7	0				
8	0				
9	0				
10	0				
11	0				
12	0				
13	0				
14	0				
15	0				
Total =	27.7			Total Annual Recharge (in)	Total Annual Recharge (cu-ft)
				11.5	1,149,250

Annual Recharge Requirements Calculation ↓

% of Pre-Developed Annual Recharge to Preserve = **100%**

Post-Development Annual Recharge Deficit= 604,438 (cubic feet)

Recharge Efficiency Parameters Calculations (area averages)

RWC = 4.42 (in) DRWC = 0.65 (in)

ERWC = 1.24 (in) EDRWC = 0.18 (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 Rockefeller Eastampton **Description** 2020.014

Analysis Date 12/18/20

BMP or LID Type INFILTRATION TRENCH (1.5')-(850x25)

Recharge BMP Input Parameters

Parameter	Symbol	Value	Unit
BMP Area	ABMP	21250.0	sq.ft
BMP Effective Depth, this is the design variable Upper level of the BMP surface (negative if above ground)	dBMP	7.2	in
Depth of lower surface of BMP, must be >= dBMPu	dBMPu	24.0	in
Post-development Land Segment Location of BMP	dEXC	42.0	in
Input, Zero if Location is distributed or undetermined	SegBMP	0	unitless

Root Zone Water capacity Calculated Parameters

Parameter	Symbol	Value	Unit
Empty Portion of RWC under Post-D Natural Recharge	ERWC	1.24	in
ERWC Modified to consider dEXC	EDRWC	0.18	in
Empty Portion of RWC under Infiltr. BMP	RERWC	0.14	in

Recharge Design Parameters

Parameter	Symbol	Value	Unit
Inches of Runoff to capture	Cdesign	0.45	in
Inches of Rainfall to capture	Pdesign	0.56	in
Recharge Provided Avg. over Imp. Area		21.4	in
Runoff Captured Avg. over imp. Area		22.1	in

BMP Calculated Size Parameters

Parameter	Symbol	Value	Unit
ABMP/Aimp	Aratio	0.06	unitless
BMP Volume	VBMP	12,750	cu.ft

System Performance Calculated Parameters

Parameter	Value	Unit
Annual BMP Recharge Volume	615,469	cu.ft
Avg BMP Recharge Efficiency	96.9%	%
%Rainfall became Runoff	77.9%	%
%Runoff Infiltrated	61.7%	%
%Runoff Recharged	30.2%	%
%Rainfall Recharged	23.5%	%

Parameters from Annual Recharge Worksheet

Parameter	Value	Unit
Post-D Deficit Recharge (or desired recharge volume)	604,438	cu.ft
Post-D Impervious Area (or target impervious Area)	345,600	sq.ft
Root Zone Water Capacity	4.42	in
RWC Modified to consider dEXC	0.65	in
Climatic Factor	1.44	no units
Average Annual P	45.9	in
Recharge Requirement over Imp. Area	10.6	in

CALCULATION CHECK MESSAGES

Volume Balance-> **Solve Problem to satisfy Annual Recharge**
 dBMP Check-> **OK**
 dEXC Check-> **OK**

BMP Location-> **Location is selected as distributed or undetermined**

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 sensitive 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 click the "Default Vdef & Aimp" button.



ROOF RUNOFF



Routing Diagram for 2020.014-ROACKEFELLER EASTAMPTON(4-16-21)
Prepared by Menlo Engineering Associates, Inc., Printed 4/14/2021
HydroCAD® 10.10-4a s/n 01129 © 2020 HydroCAD Software Solutions LLC

Summary for Subcatchment 13S: ROOF RUNOFF

Runoff = 14.74 cfs @ 1.17 hrs, Volume= 0.684 af, Depth= 1.03"

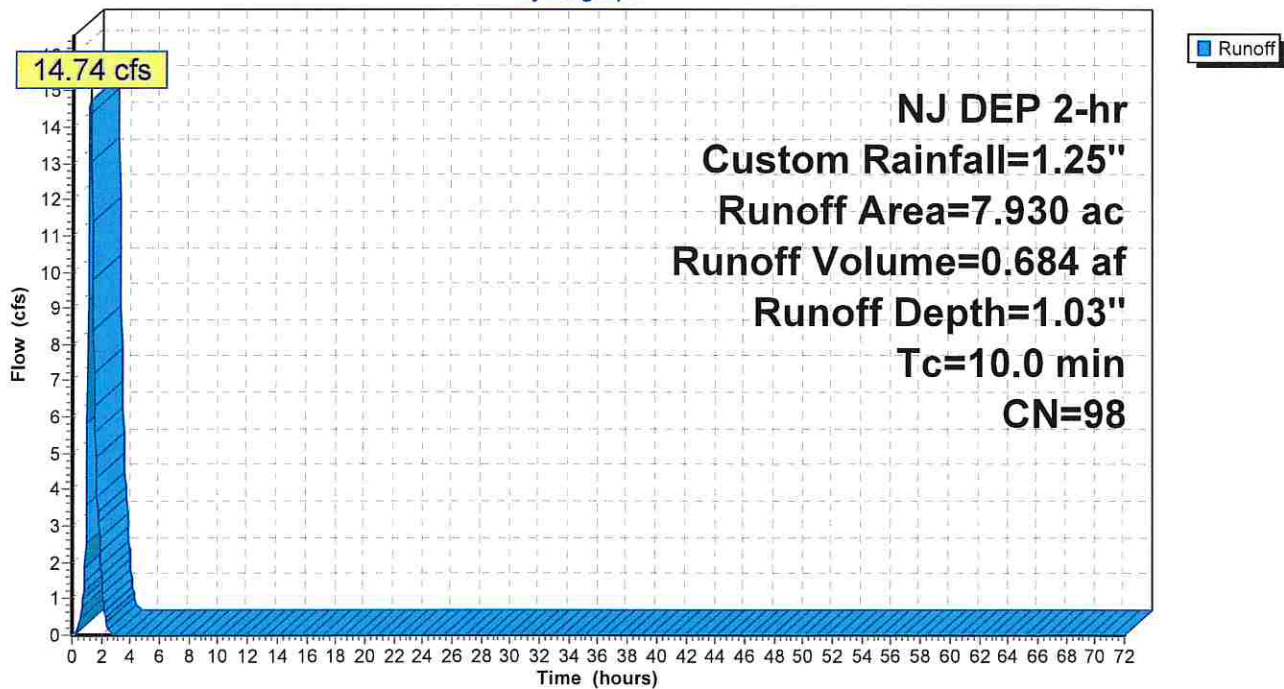
Runoff by SCS TR-20 method, UH=Delmarva, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
 NJ DEP 2-hr Custom Rainfall=1.25"

Area (ac)	CN	Description
7.930	98	Paved parking, HSG C
7.930	98	100.00% Impervious Area

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

Subcatchment 13S: ROOF RUNOFF

Hydrograph



Infiltration Trench Drain Time Calculation

Rockefeller Group Development

Township of Eastampton, Burlington County, New Jersey

2020.014

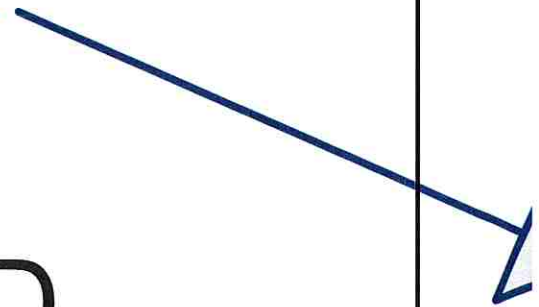
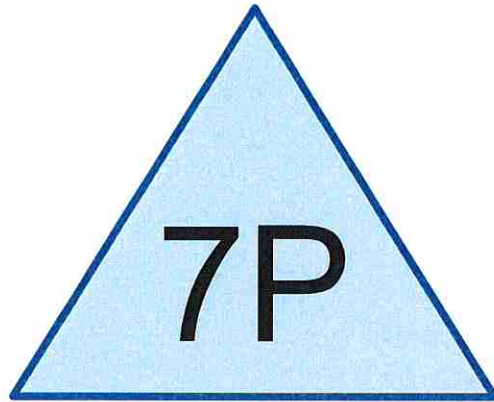
Design Summary:

- WQ Design Storm Volume = 0.684 af = 29,796 cf
- Infiltration Area = 81,250 SF
- Design Permeability Rate (Min) = 0.5 in/hr

$$\text{Drain Time} = \frac{\text{WQ Design Storm Volume}}{(\text{Infiltration Area} \times \text{Design Permeability})} = \frac{29,796 \text{ cf} \times (12 \frac{\text{in}}{\text{ft}})}{(81,250 \text{ sf} \times 0.5 \frac{\text{inch}}{\text{hr}})} = 8.80 \text{ hr} \rightarrow \mathbf{8.8 \text{ Hours}}$$

The Proposed Drain Time for the Infiltration Basin is 8.8 hours which is less than the allowable maximum drain time of 72 hours. Therefore, the infiltration basin drains within the maximum allowable time frame.

APPENDIX E: WATER QUALITY CALCULATIONS



WETPOND



Routing Diagram for 2020.014-ROACKEFELLER EASTAMPTON(4-16-21)
Prepared by Menlo Engineering Associates, Inc., Printed 4/14/2021
HydroCAD® 10.10-4a s/n 01129 © 2020 HydroCAD Software Solutions LLC

Summary for Pond 7P: WETPOND

Inflow Area = 26.430 ac, 77.34% Impervious, Inflow Depth = 0.83" for Custom event
 Inflow = 25.99 cfs @ 1.30 hrs, Volume= 1.820 af
 Outflow = 0.78 cfs @ 2.92 hrs, Volume= 1.725 af, Atten= 97%, Lag= 97.3 min
 Primary = 0.78 cfs @ 2.92 hrs, Volume= 1.725 af

Routing by Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
 Peak Elev= 47.62' @ 2.92 hrs Surf.Area= 1.117 ac Storage= 1.707 af

Plug-Flow detention time= 1,108.7 min calculated for 1.725 af (95% of inflow)
 Center-of-Mass det. time= 1,105.0 min (1,200.6 - 95.6)

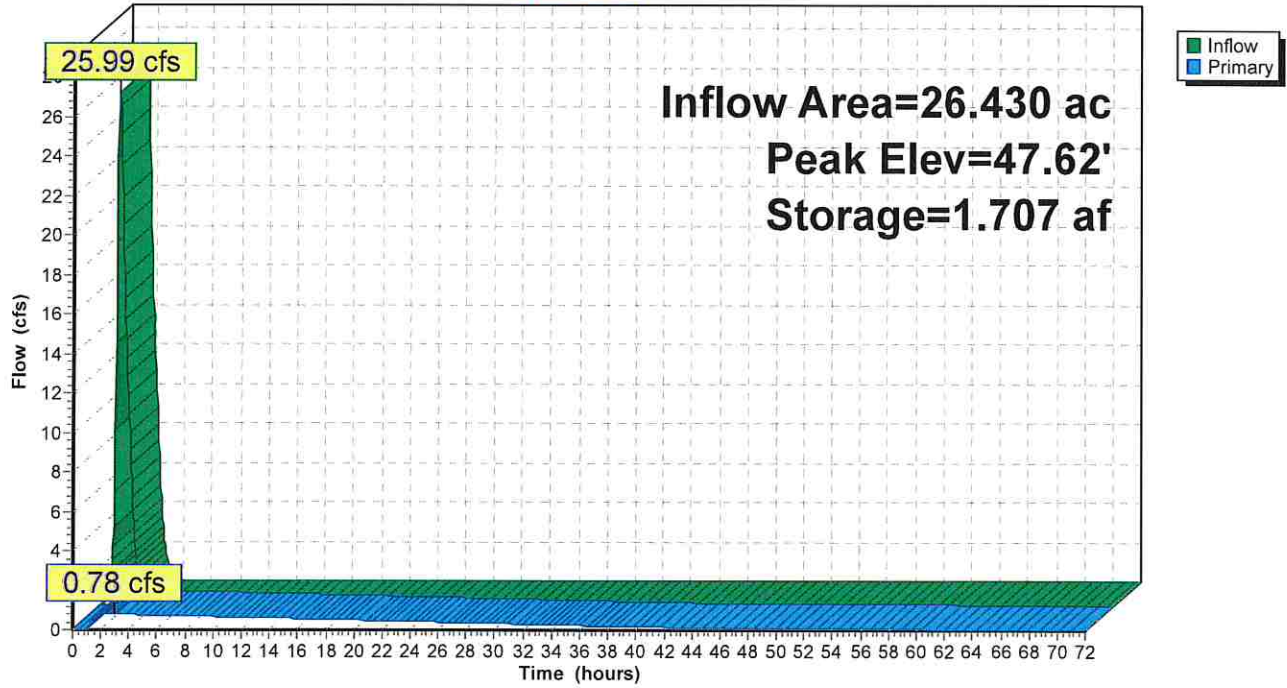
Volume #1	Invert	Avail.Storage	Storage Description
	46.00'	9.985 af	Custom Stage Data (Prismatic) Listed below (Recalc)
Elevation (feet)	Surf.Area (acres)	Inc.Store (acre-feet)	Cum.Store (acre-feet)
46.00	1.019	0.000	0.000
47.00	1.058	1.038	1.038
47.50	1.098	0.539	1.577
48.00	1.179	0.569	2.147
49.00	1.221	1.200	3.347
50.00	1.263	1.242	4.589
51.00	1.305	1.284	5.873
52.00	1.349	1.327	7.200
53.00	1.392	1.370	8.570
54.00	1.437	1.414	9.985

Device	Routing	Invert	Outlet Devices
#1	Device 3	46.00'	5.0" Vert. Orifice/Grate C= 0.600 Limited to weir flow at low heads
#2	Device 3	48.10'	1.3' long Sharp-Crested Rectangular Weir 2 End Contraction(s)
#3	Primary	46.00'	30.0" Round RCP_Round 30" L= 147.0' RCP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 46.00' / 45.15' S= 0.0058 '/ Cc= 0.900 n= 0.013 Concrete sewer w/manholes & inlets, Flow Area= 4.91 sf

Primary OutFlow Max=0.78 cfs @ 2.92 hrs HW=47.62' (Free Discharge)
 3=RCP_Round 30" (Passes 0.78 cfs of 12.46 cfs potential flow)
 1=Orifice/Grate (Orifice Controls 0.78 cfs @ 5.71 fps)
 2=Sharp-Crested Rectangular Weir (Controls 0.00 cfs)

Pond 7P: WETPOND

Hydrograph



Hydrograph for Pond 7P: WETPOND

Time (hours)	Inflow (cfs)	Storage (acre-feet)	Elevation (feet)	Primary (cfs)
0.00	0.00	0.000	46.00	0.00
0.25	0.00	0.000	46.00	0.00
0.50	0.11	0.000	46.00	0.00
0.75	1.41	0.013	46.01	0.00
1.00	5.79	0.074	46.07	0.02
1.25	25.28	0.398	46.39	0.28
1.50	20.77	0.888	46.86	0.53
1.75	14.48	1.236	47.19	0.65
2.00	9.70	1.471	47.40	0.72
2.25	5.55	1.612	47.53	0.76
2.50	2.74	1.679	47.59	0.77
2.75	1.31	1.703	47.61	0.78
3.00	0.60	1.706	47.62	0.78
3.25	0.25	1.698	47.61	0.78
3.50	0.08	1.686	47.60	0.77
3.75	0.03	1.671	47.58	0.77
4.00	0.01	1.655	47.57	0.77
4.25	0.00	1.640	47.56	0.76
4.50	0.00	1.624	47.54	0.76
4.75	0.00	1.608	47.53	0.75
5.00	0.00	1.593	47.51	0.75
5.25	0.00	1.577	47.50	0.75
5.50	0.00	1.562	47.49	0.74
5.75	0.00	1.547	47.47	0.74
6.00	0.00	1.531	47.46	0.73
6.25	0.00	1.516	47.44	0.73
6.50	0.00	1.501	47.43	0.73
6.75	0.00	1.486	47.42	0.72
7.00	0.00	1.471	47.40	0.72
7.25	0.00	1.457	47.39	0.71
7.50	0.00	1.442	47.38	0.71
7.75	0.00	1.427	47.36	0.71
8.00	0.00	1.413	47.35	0.70
8.25	0.00	1.398	47.34	0.70
8.50	0.00	1.384	47.32	0.69
8.75	0.00	1.370	47.31	0.69
9.00	0.00	1.355	47.30	0.68
9.25	0.00	1.341	47.28	0.68
9.50	0.00	1.327	47.27	0.68
9.75	0.00	1.313	47.26	0.67
10.00	0.00	1.300	47.24	0.67
10.25	0.00	1.286	47.23	0.66
10.50	0.00	1.272	47.22	0.66
10.75	0.00	1.259	47.21	0.66
11.00	0.00	1.245	47.19	0.65
11.25	0.00	1.232	47.18	0.65
11.50	0.00	1.218	47.17	0.64
11.75	0.00	1.205	47.16	0.64
12.00	0.00	1.192	47.14	0.63
12.25	0.00	1.179	47.13	0.63
12.50	0.00	1.166	47.12	0.63
12.75	0.00	1.153	47.11	0.62
13.00	0.00	1.140	47.10	0.62

PEAK STORAGE

Hydrograph for Pond 7P: WETPOND (continued)

Time (hours)	Inflow (cfs)	Storage (acre-feet)	Elevation (feet)	Primary (cfs)
13.25	0.00	1.127	47.08	0.61
13.50	0.00	1.115	47.07	0.61
13.75	0.00	1.102	47.06	0.61
14.00	0.00	1.090	47.05	0.60
14.25	0.00	1.077	47.04	0.60
14.50	0.00	1.065	47.02	0.59
14.75	0.00	1.053	47.01	0.59
15.00	0.00	1.041	47.00	0.58
15.25	0.00	1.029	46.99	0.58
15.50	0.00	1.017	46.98	0.58
15.75	0.00	1.005	46.97	0.57
16.00	0.00	0.993	46.96	0.57
16.25	0.00	0.981	46.95	0.56
16.50	0.00	0.970	46.93	0.56
16.75	0.00	0.958	46.92	0.56
17.00	0.00	0.947	46.91	0.55
17.25	0.00	0.935	46.90	0.55
17.50	0.00	0.924	46.89	0.54
17.75	0.00	0.913	46.88	0.54
18.00	0.00	0.902	46.87	0.53
18.25	0.00	0.891	46.86	0.53
18.50	0.00	0.880	46.85	0.53
18.75	0.00	0.869	46.84	0.52
19.00	0.00	0.858	46.83	0.52
19.25	0.00	0.848	46.82	0.51
19.50	0.00	0.837	46.81	0.51
19.75	0.00	0.827	46.80	0.50
20.00	0.00	0.816	46.79	0.50
20.25	0.00	0.806	46.78	0.50
20.50	0.00	0.796	46.77	0.49
20.75	0.00	0.786	46.76	0.49
21.00	0.00	0.776	46.75	0.48
21.25	0.00	0.766	46.74	0.48
21.50	0.00	0.756	46.73	0.47
21.75	0.00	0.746	46.72	0.47
22.00	0.00	0.737	46.71	0.47
22.25	0.00	0.727	46.70	0.46
22.50	0.00	0.717	46.69	0.46
22.75	0.00	0.708	46.69	0.45
23.00	0.00	0.699	46.68	0.45
23.25	0.00	0.690	46.67	0.44
23.50	0.00	0.680	46.66	0.44
23.75	0.00	0.671	46.65	0.44
24.00	0.00	0.662	46.64	0.43
24.25	0.00	0.653	46.63	0.43
24.50	0.00	0.645	46.63	0.42
24.75	0.00	0.636	46.62	0.42
25.00	0.00	0.627	46.61	0.41
25.25	0.00	0.619	46.60	0.41
25.50	0.00	0.610	46.59	0.41
25.75	0.00	0.602	46.58	0.40
26.00	0.00	0.594	46.58	0.40
26.25	0.00	0.586	46.57	0.39

Hydrograph for Pond 7P: WETPOND (continued)

Time (hours)	Inflow (cfs)	Storage (acre-feet)	Elevation (feet)	Primary (cfs)
26.50	0.00	0.577	46.56	0.39
26.75	0.00	0.569	46.55	0.39
27.00	0.00	0.562	46.55	0.38
27.25	0.00	0.554	46.54	0.38
27.50	0.00	0.546	46.53	0.37
27.75	0.00	0.538	46.52	0.37
28.00	0.00	0.531	46.52	0.36
28.25	0.00	0.523	46.51	0.36
28.50	0.00	0.516	46.50	0.35
28.75	0.00	0.509	46.49	0.35
29.00	0.00	0.501	46.49	0.35
29.25	0.00	0.494	46.48	0.34
29.50	0.00	0.487	46.47	0.34
29.75	0.00	0.480	46.47	0.33
30.00	0.00	0.474	46.46	0.33
30.25	0.00	0.467	46.45	0.33
30.50	0.00	0.460	46.45	0.32
30.75	0.00	0.454	46.44	0.32
31.00	0.00	0.447	46.44	0.31
31.25	0.00	0.441	46.43	0.31
31.50	0.00	0.434	46.42	0.30
31.75	0.00	0.428	46.42	0.30
32.00	0.00	0.422	46.41	0.30
32.25	0.00	0.416	46.40	0.29
32.50	0.00	0.410	46.40	0.29
32.75	0.00	0.404	46.39	0.28
33.00	0.00	0.398	46.39	0.28
33.25	0.00	0.392	46.38	0.27
33.50	0.00	0.387	46.38	0.27
33.75	0.00	0.381	46.37	0.26
34.00	0.00	0.376	46.37	0.26
34.25	0.00	0.371	46.36	0.25
34.50	0.00	0.365	46.36	0.25
34.75	0.00	0.360	46.35	0.24
35.00	0.00	0.355	46.35	0.24
35.25	0.00	0.350	46.34	0.24
35.50	0.00	0.345	46.34	0.23
35.75	0.00	0.341	46.33	0.23
36.00	0.00	0.336	46.33	0.22
36.25	0.00	0.331	46.32	0.22
36.50	0.00	0.327	46.32	0.22
36.75	0.00	0.323	46.31	0.21
37.00	0.00	0.318	46.31	0.21
37.25	0.00	0.314	46.31	0.20
37.50	0.00	0.310	46.30	0.20
37.75	0.00	0.306	46.30	0.19
38.00	0.00	0.302	46.29	0.19
38.25	0.00	0.298	46.29	0.19
38.50	0.00	0.294	46.29	0.18
38.75	0.00	0.290	46.28	0.18
39.00	0.00	0.287	46.28	0.18
39.25	0.00	0.283	46.28	0.17
39.50	0.00	0.280	46.27	0.17

Hydrograph for Pond 7P: WETPOND (continued)

Time (hours)	Inflow (cfs)	Storage (acre-feet)	Elevation (feet)	Primary (cfs)
39.75	0.00	0.276	46.27	0.17
40.00	0.00	0.273	46.27	0.16
40.25	0.00	0.269	46.26	0.16
40.50	0.00	0.266	46.26	0.16
40.75	0.00	0.263	46.26	0.15
41.00	0.00	0.260	46.25	0.15
41.25	0.00	0.257	46.25	0.15
41.50	0.00	0.254	46.25	0.14
41.75	0.00	0.251	46.25	0.14
42.00	0.00	0.248	46.24	0.14
42.25	0.00	0.245	46.24	0.14
42.50	0.00	0.242	46.24	0.13
42.75	0.00	0.240	46.23	0.13
43.00	0.00	0.237	46.23	0.13
43.25	0.00	0.234	46.23	0.13
43.50	0.00	0.232	46.23	0.12
43.75	0.00	0.229	46.22	0.12
44.00	0.00	0.227	46.22	0.12
44.25	0.00	0.224	46.22	0.12
44.50	0.00	0.222	46.22	0.12
44.75	0.00	0.220	46.21	0.11
45.00	0.00	0.217	46.21	0.11
45.25	0.00	0.215	46.21	0.11
45.50	0.00	0.213	46.21	0.11
45.75	0.00	0.211	46.21	0.11
46.00	0.00	0.208	46.20	0.10
46.25	0.00	0.206	46.20	0.10
46.50	0.00	0.204	46.20	0.10
46.75	0.00	0.202	46.20	0.10
47.00	0.00	0.200	46.20	0.10
47.25	0.00	0.198	46.19	0.10
47.50	0.00	0.196	46.19	0.09
47.75	0.00	0.194	46.19	0.09
48.00	0.00	0.192	46.19	0.09
48.25	0.00	0.190	46.19	0.09
48.50	0.00	0.189	46.18	0.09
48.75	0.00	0.187	46.18	0.09
49.00	0.00	0.185	46.18	0.08
49.25	0.00	0.183	46.18	0.08
49.50	0.00	0.182	46.18	0.08
49.75	0.00	0.180	46.18	0.08
50.00	0.00	0.178	46.17	0.08
50.25	0.00	0.177	46.17	0.08
50.50	0.00	0.175	46.17	0.08
50.75	0.00	0.174	46.17	0.07
51.00	0.00	0.172	46.17	0.07
51.25	0.00	0.171	46.17	0.07
51.50	0.00	0.169	46.17	0.07
51.75	0.00	0.168	46.16	0.07
52.00	0.00	0.166	46.16	0.07
52.25	0.00	0.165	46.16	0.07
52.50	0.00	0.164	46.16	0.07
52.75	0.00	0.162	46.16	0.06

48.25 HOURS OF
DETENTION TIME

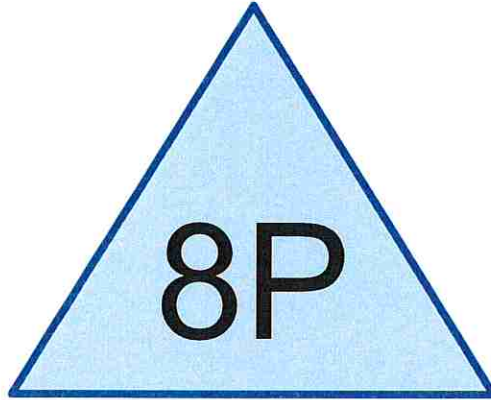
10% OF PEAK STORAGE

Hydrograph for Pond 7P: WETPOND (continued)

Time (hours)	Inflow (cfs)	Storage (acre-feet)	Elevation (feet)	Primary (cfs)
53.00	0.00	0.161	46.16	0.06
53.25	0.00	0.160	46.16	0.06
53.50	0.00	0.158	46.15	0.06
53.75	0.00	0.157	46.15	0.06
54.00	0.00	0.156	46.15	0.06
54.25	0.00	0.154	46.15	0.06
54.50	0.00	0.153	46.15	0.06
54.75	0.00	0.152	46.15	0.06
55.00	0.00	0.151	46.15	0.06
55.25	0.00	0.150	46.15	0.06
55.50	0.00	0.148	46.15	0.06
55.75	0.00	0.147	46.14	0.06
56.00	0.00	0.146	46.14	0.06
56.25	0.00	0.145	46.14	0.05
56.50	0.00	0.144	46.14	0.05
56.75	0.00	0.143	46.14	0.05
57.00	0.00	0.142	46.14	0.05
57.25	0.00	0.141	46.14	0.05
57.50	0.00	0.139	46.14	0.05
57.75	0.00	0.138	46.14	0.05
58.00	0.00	0.137	46.13	0.05
58.25	0.00	0.136	46.13	0.05
58.50	0.00	0.135	46.13	0.05
58.75	0.00	0.134	46.13	0.05
59.00	0.00	0.133	46.13	0.05
59.25	0.00	0.132	46.13	0.05
59.50	0.00	0.131	46.13	0.05
59.75	0.00	0.130	46.13	0.05
60.00	0.00	0.129	46.13	0.05
60.25	0.00	0.129	46.13	0.05
60.50	0.00	0.128	46.12	0.04
60.75	0.00	0.127	46.12	0.04
61.00	0.00	0.126	46.12	0.04
61.25	0.00	0.125	46.12	0.04
61.50	0.00	0.124	46.12	0.04
61.75	0.00	0.123	46.12	0.04
62.00	0.00	0.122	46.12	0.04
62.25	0.00	0.121	46.12	0.04
62.50	0.00	0.121	46.12	0.04
62.75	0.00	0.120	46.12	0.04
63.00	0.00	0.119	46.12	0.04
63.25	0.00	0.118	46.12	0.04
63.50	0.00	0.117	46.11	0.04
63.75	0.00	0.117	46.11	0.04
64.00	0.00	0.116	46.11	0.04
64.25	0.00	0.115	46.11	0.04
64.50	0.00	0.114	46.11	0.04
64.75	0.00	0.113	46.11	0.04
65.00	0.00	0.113	46.11	0.04
65.25	0.00	0.112	46.11	0.04
65.50	0.00	0.111	46.11	0.03
65.75	0.00	0.111	46.11	0.03
66.00	0.00	0.110	46.11	0.03

Hydrograph for Pond 7P: WETPOND (continued)

Time (hours)	Inflow (cfs)	Storage (acre-feet)	Elevation (feet)	Primary (cfs)
66.25	0.00	0.109	46.11	0.03
66.50	0.00	0.108	46.11	0.03
66.75	0.00	0.108	46.11	0.03
67.00	0.00	0.107	46.10	0.03
67.25	0.00	0.106	46.10	0.03
67.50	0.00	0.106	46.10	0.03
67.75	0.00	0.105	46.10	0.03
68.00	0.00	0.104	46.10	0.03
68.25	0.00	0.104	46.10	0.03
68.50	0.00	0.103	46.10	0.03
68.75	0.00	0.103	46.10	0.03
69.00	0.00	0.102	46.10	0.03
69.25	0.00	0.101	46.10	0.03
69.50	0.00	0.101	46.10	0.03
69.75	0.00	0.100	46.10	0.03
70.00	0.00	0.100	46.10	0.03
70.25	0.00	0.099	46.10	0.03
70.50	0.00	0.098	46.10	0.03
70.75	0.00	0.098	46.10	0.03
71.00	0.00	0.097	46.10	0.03
71.25	0.00	0.097	46.09	0.03
71.50	0.00	0.096	46.09	0.03
71.75	0.00	0.096	46.09	0.03
72.00	0.00	0.095	46.09	0.03



WETPOND PERMANENT WATER



Routing Diagram for 2020.014-ROACKEFELLER EASTAMPTON(4-16-21)
Prepared by Menlo Engineering Associates, Inc., Printed 4/14/2021
HydroCAD® 10.10-4a s/n 01129 © 2020 HydroCAD Software Solutions LLC

Summary for Pond 8P: WETPOND PERMANENT WATER

[43] Hint: Has no inflow (Outflow=Zero)

Volume	Invert	Avail.Storage	Storage Description
#1	40.00'	5.192 af	Custom Stage Data (Prismatic) Listed below (Recalc)

Elevation (feet)	Surf.Area (acres)	Inc.Store (acre-feet)	Cum.Store (acre-feet)
40.00	0.726	0.000	0.000
41.00	0.761	0.743	0.743
42.00	0.796	0.779	1.522
43.00	0.832	0.814	2.336
43.50	0.905	0.434	2.770
44.00	0.942	0.462	3.232
45.00	0.980	0.961	4.193
46.00	1.019	0.999	5.192

TSS REMOVAL RATE CALCULATION

Wet Pond TSS removal

Permanent Pool Volume (ac-ft)	WQ Runoff Volume	Extended Detention Period			Ratio of Permanent Pool to WQ Runoff	% TSS Removal
		12 hr.	18 hr.	24 hr.		
5.192	1.707			X	3:1	90

%TSS Removal Rate = 90%

APPENDIX F: LOW IMPACT DEVELOPMENT CHECKLIST

New Jersey Stormwater Best Management Practices Manual

February 2004

<http://www.state.nj.us/dep/watershedmgt/bmpmanualfeb2004.htm>

A P P E N D I X A

Low Impact Development Checklist

A checklist for identifying nonstructural stormwater management strategies incorporated into proposed land development

According to the NJDEP Stormwater Management Rules at N.J.A.C. 7:8, the groundwater recharge, stormwater quality, and stormwater quantity standards established by the Rules for major land development projects must be met by incorporating nine specific nonstructural stormwater management strategies into the project's design to the maximum extent practicable.

To accomplish this, the Rules require an applicant seeking land development approval from a regulatory board or agency to identify those nonstructural strategies that have been incorporated into the project's design. In addition, if an applicant contends that it is not feasible to incorporate any of the specific strategies into the project's design, particularly for engineering, environmental, or safety reasons, the Rules further require that the applicant provide a basis for that contention.

This checklist has been prepared to assist applicants, site designers, and regulatory boards and agencies in ensuring that the nonstructural stormwater management requirements of the Rules are met. It provides an applicant with a means to identify both the nonstructural strategies incorporated into the development's design and the specific low impact development BMPs (LID-BMPs) that have been used to do so. It can also help an applicant explain the engineering, environmental, and/or safety reasons that a specific nonstructural strategy could not be incorporated into the development's design.

The checklist can also assist municipalities and other land development review agencies in the development of specific requirements for both nonstructural strategies and LID-BMPs in zoning and/or land use ordinances and regulations. As such, where requirements consistent with the Rules have been adopted, they may supersede this checklist.

Finally, the checklist can be used during a pre-design meeting between an applicant and pertinent review personnel to discuss local nonstructural strategies and LID-BMPs requirements in order to optimize the development's nonstructural stormwater management design.

Since this checklist is intended to promote the use of nonstructural stormwater management strategies and provide guidance in their incorporation in land development projects, municipalities are permitted to revise it as necessary to meet the goals and objectives of their specific stormwater management program and plan within the limits of N.J.A.C. 7:8.

Low Impact Development Checklist

A checklist for identifying nonstructural stormwater management strategies incorporated into proposed land development

Municipality: Eastampton

County: Burlington Date: December 22, 2020

Review board or agency: NJDEP

Proposed land development name: Rockefeller Group Logistics at Eastampton

Lot(s): 9.03 Block(s): 800

Project or application number: MEA#2020.014

Applicant's name: Rockefeller Group Development

Applicant's address: 1271 Avenue of Americas New York, NY 10020

Telephone: 973-448-3584 Fax: _____

Email address: czsil@rockefellergroup.com

Designer's name: Menlo Engineering Associates, Inc.

Designer's address: 261 Cleveland Avenue

Highland Park, NJ 08904

Telephone: 732-845-8585 Fax: 732-846-9439

Email address: sturner@menloeng.com

Part 2: Review of Local Stormwater Management Regulations

Title and date of stormwater management regulations used in development design:

The Ordinances of the Township of Eastampton, New Jersey

Do regulations include nonstructural requirements? Yes: _____ No:

If yes, briefly describe: _____

List LID-BMPs prohibited by local regulations: none

Pre-design meeting held? Yes: _____ Date: _____ No:

Meeting held with: _____

Pre-design site walk held? Yes: _____ Date: _____ No:

Site walk held with: _____

Other agencies with stormwater review jurisdiction:

Name: Burlington County Soil Conservation District

Required approval: yes

Name: NJDEP

Required approval: yes

Name: _____

Required approval: _____

Part 3: Nonstructural Strategies and LID-BMPs in Design

3.1 Vegetation and Landscaping

Effective management of both existing and proposed site vegetation can reduce a development's adverse impacts on groundwater recharges and runoff quality and quantity. This section of the checklist helps identify the vegetation and landscaping strategies and nonstructural LID-BMPs that have been incorporated into the proposed development's design to help maintain existing recharge rates and/or minimize or prevent increases in runoff quantity and pollutant loading.

A. Has an inventory of existing site vegetation been performed? Yes: _____ No: X

If yes, was this inventory a factor in the site's layout and design? Yes: _____ No: _____

B. Does the site design utilize any of the following nonstructural LID-BMPs?

Preservation of natural areas? Yes: X No: _____ If yes, specify % of site: 7.3%

Native ground cover? Yes: X No: _____ If yes, specify % of site: 7.5%

Vegetated buffers? Yes: X No: _____ If yes, specify % of site: 5.3%

C. Do the land development regulations require these nonstructural LID-BMPs?

Preservation of natural areas? Yes: _____ No: X If yes, specify % of site: _____

Native ground cover? Yes: _____ No: X If yes, specify % of site: _____

Vegetated buffers? Yes: _____ No: X If yes, specify % of site: _____

D. If vegetated filter strips or buffers are utilized, specify their functions:

Reduce runoff volume increases through lower runoff coefficient: Yes: _____ No: X

Reduce runoff pollutant loads through runoff treatment: Yes: _____ No: X

Maintain groundwater recharge by preserving natural areas: Yes: _____ No: X

3.2 Minimize Land Disturbance

Minimizing land disturbance is a nonstructural LID-BMP that can be applied during both the development's construction and post-construction phases. This section of the checklist helps identify those land disturbance strategies and nonstructural LID-BMPs that have been incorporated into the proposed development's design to minimize land disturbance and the resultant change in the site's hydrologic character.

A. Have inventories of existing site soils and slopes been performed? Yes: _____ No: X

If yes, were these inventories factors in the site's layout and design? Yes: _____ No: X

B. Does the development's design utilize any of the following nonstructural LID-BMPs?

Restrict permanent site disturbance by land owners? Yes: _____ No: _____

If yes, how: _____

Restrict temporary site disturbance during construction? Yes: _____ No: X

If yes, how: _____

Consider soils and slopes in selecting disturbance limits? Yes: _____ No: _____

If yes, how: _____

C. Specify percentage of site to be cleared: 88% Regraded: 88%

D. Specify percentage of cleared areas done so for buildings: 28.5%

For driveways and parking: 54% For roadways: n/a

E. What design criteria and/or site changes would be required to reduce the percentages in C and D above?

Reduce parking area size

F. Specify site's hydrologic soil group (HSG) percentages:

HSG A: _____ HSG B: 47% HSG C: 53% HSG D: _____

G. Specify percentage of each HSG that will be permanently disturbed:

HSG A: _____ HSG B: 39% HSG C: 49% HSG D: _____

H. Locating site disturbance within areas with less permeable soils (HSG C and D) and minimizing disturbance within areas with greater permeable soils (HSG A and B) can help maintain groundwater recharge rates and reduce runoff volume increases. In light of the HSG percentages in F and G above, what other practical measures if any can be taken to achieve this?

None

I. Does the site include Karst topography?

Yes: _____ No: X

If yes, discuss measures taken to limit Karst impacts:

3.3 Impervious Area Management

New impervious surfaces at a development site can have the greatest adverse effect on groundwater recharge and stormwater quality and quantity. This section of the checklist helps identify those nonstructural strategies and LID-BMPs that have been incorporated into a proposed development's design to comprehensively manage the extent and impacts of new impervious surfaces.

A. Specify impervious cover at site: Existing: 0 Proposed: 57.5%

B. Specify maximum site impervious coverage allowed by regulations: 65%

C. Compare proposed street cartway widths with those required by regulations:

Type of Street	Proposed Cartway Width (feet)	Required Cartway Width (feet)
Residential access – low intensity		
Residential access – medium intensity		
Residential access – high intensity with parking		
Residential access – high intensity without parking		
Neighborhood		
Minor collector – low intensity without parking		
Minor collector – with one parking lane		
Minor collector – with two parking lanes		
Minor collector – without parking		
Major collector		

D. Compare proposed parking space dimensions with those required by regulations:

Proposed: 9'x18' Regulations: 9'x18'

E. Compare proposed number of parking spaces with those required by regulations:

Proposed: 445 Regulations: 445

F. Specify percentage of total site impervious cover created by buildings: 28.7%

By driveways and parking: 28.8% By roadways: _____

G. What design criteria and/or site changes would be required to reduce the percentages in F above?

Reduce size of proposed parking areas

H. Specify percentage of total impervious area that will be unconnected:

Total site: 0 Buildings: 0 Driveways and parking: 0 Roads: _____

I. Specify percentage of total impervious area that will be porous:

Total site: n/a Buildings: n/a Driveways and parking: n/a Roads: _____

J. Specify percentage of total building roof area that will be vegetated: none

K. Specify percentage of total parking area located beneath buildings: none

L. Specify percentage of total parking located within multi-level parking deck: none

3.4 Time of Concentration Modifications

Decreasing a site's time of concentration (Tc) can lead directly to increased site runoff rates which, in turn, can create new and/or aggravate existing erosion and flooding problems downstream. This section of the checklist helps identify those nonstructural strategies and LID-BMPs that have been incorporated into the proposed development's design to effectively minimize such Tc decreases.

When reviewing Tc modification strategies, it is important to remember that a drainage area's Tc should reflect the general conditions throughout the area. As a result, Tc modifications must generally be applied throughout a drainage area, not just along a specific Tc route.

A. Specify percentage of site's total stormwater conveyance system length that will be:

Storm sewer: 26.3% Vegetated swale: n/a Natural channel: n/a

Stormwater management facility: 73.7% Other: n/a

Note: the total length of the stormwater conveyance system should be measured from the site's downstream property line to the downstream limit of sheet flow at the system's headwaters.

B. What design criteria and/or site changes would be required to reduce the storm sewer percentages and increase the vegetated swale and natural channel percentages in A above?

Use of vegetated swales to maximized site configuration

C. In conveyance system subareas that have overland or sheet flow over impervious surfaces or turf grass, what practical and effective site changes can be made to:

Decrease overland flow slope: slopes are minimized to 1%-2% were possible

Increase overland flow roughness: none

3.5 Preventative Source Controls

The most effective way to address water quality concerns is by pollution prevention. This section of the checklist helps identify those nonstructural strategies and LID-BMPs that have been incorporated into the proposed development's design to reduce the exposure of pollutants to prevent their release into the stormwater runoff.

A. Trash Receptacles

Specify the number of trash receptacles provided: 0

Specify the spacing between the trash receptacles: 0

Compare trash receptacles proposed with those required by regulations:

Proposed: 0 Regulations: n/a

B. Pet Waste Stations

Specify the number of pet waste stations provided: n/a

Specify the spacing between the pet waste stations: _____

Compare pet waste stations proposed with those required by regulations:

Proposed: _____ Regulations: _____

C. Inlets, Trash Racks, and Other Devices that Prevent Discharge of Large Trash and Debris

Specify percentage of total inlets that comply with the NJPDES storm drain inlet criteria: 100%

D. Maintenance

Specify the frequency of the following maintenance activities:

Street sweeping: Proposed: 0 Regulations: _____

Litter collection: Proposed: 0 Regulations: _____

Identify other stormwater management measures on the site that prevent discharge of large trash and debris:

inlet grates and wetpond

E. Prevention and Containment of Spills

Identify locations where pollutants are located on the site, and the features that prevent these pollutants from being exposed to stormwater runoff:

Pollutant: except for vehicles none expected Location: _____

Feature utilized to prevent pollutant exposure, harmful accumulation, or contain spills:

Pollutant: _____ Location: _____

Feature utilized to prevent pollutant exposure, harmful accumulation, or contain spills:

Pollutant: _____ Location: _____

Feature utilized to prevent pollutant exposure, harmful accumulation, or contain spills:

Pollutant: _____ Location: _____

Feature utilized to prevent pollutant exposure, harmful accumulation, or contain spills:

Pollutant: _____ Location: _____

Part 4: Compliance with Nonstructural Requirements of NJDEP Stormwater Management Rules

1. Based upon the checklist responses above, indicate which nonstructural strategies have been incorporated into the proposed development's design in accordance with N.J.A.C. 7:8-5.3(b):

No.	Nonstructural Strategy	Yes	No
1.	Protect areas that provide water quality benefits or areas particularly susceptible to erosion and sediment loss.	X	
2.	Minimize impervious surfaces and break up or disconnect the flow of runoff over impervious surfaces.	X	
3.	Maximize the protection of natural drainage features and vegetation.	X	
4.	Minimize the decrease in the pre-construction time of concentration.	X	
5.	Minimize land disturbance including clearing and grading.	X	
6.	Minimize soil compaction.	X	
7.	Provide low maintenance landscaping that encourages retention and planting of native vegetation and minimizes the use of lawns, fertilizers, and pesticides.	X	
8.	Provide vegetated open-channel conveyance systems discharge into and through stable vegetated areas.		X
9.	Provide preventative source controls.	X	

2. For those strategies that have not been incorporated into the proposed development's design, provide engineering, environmental, and/or safety reasons. Attached additional pages as necessary.

DRAINAGE AREA MAPS