STORMWATER MANAGEMENT REPORT

For

Victoria Gardens Major Site Plan

Neptune Township Monmouth County, New Jersey

Prepared By:

PROFESSIONAL **D**ESIGN **S**ERVICES, LLC

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June 24, 2021

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1.0 **PROJECT DESCRIPTION**

It is proposed to develop the Victoria Gardens multi-family residential project at the property located Hovchild Boulevard in Neptune Township. Figure 1, enclosed, is a copy of the Monmouth County Road Map illustrating the site's location.

The project is depicted in detail on the Site Plans, prepared by Professional Design Services, LLC.

This report outlines the methodologies and results for management of the increased stormwater runoff created as a result of the development.

2.0 EXISTING SITE CONDITIONS

The following analysis describes the existing environmental conditions based upon literature review and field investigation.

2.1 Topography and Hydrology

The topography of the site is generally minor relief and the site is surrounded by existing development.

Figure 2 is a copy of the USGS Quadrangle Topography Map with the site located.

2.2 Soils

The project site is underlain by the following soils as depicted by the U.S. Department of Agriculture; Monmouth County Soil Survey. Figure 3 is a copy of the Soil Survey with the site located.

Soil Type	% Slope	Depth to SHWT*
LwB - Lakewood sand	0-5	>6'
TnB - Tinton sand	0-5	>6'
HnB – Hammonton sandy loam	0-3	1.5 - 4'
At – Atsion sand	0-2	0-1'
Sh – Shrewsbury fine sandy loam	0-2	1-5'

Lakewood Sands are well drained soils mapped along Monmouth Road. Tinton sands are also well drained soils mapped in the central portion of the site. Hammonton sandy loam ranges from moderately well drained to somewhat poorly drained and is mapped in the western portion of the site adjacent to Lot 1. Atsion Sands and Shrewsbury fine sandy loam are poorly drained soils found in depressional areas and on low, broad flats and are mapped within the freshwater wetland areas, Shrewsbury in the front wetland area and Atsion the rear wetland area. Of these soils, only Atsion and Shrewsbury are listed as hydric on the USDA's Hydric Soils List for Monmouth County, New Jersey (1990). The Lakewood and Tinton soils are hydrologic soil group "A". Hammonton Sandy loam is HSG "B". No development is proposed within the Atsion and Shrewsbury soils

3.0 <u>REGULATORY STANDARDS</u>

A. <u>Applicable Regulations</u>

All increased stormwater runoff resulting from the proposed development must be managed both qualitatively and quantitatively in accordance with New Jersey and Neptune Township Regulations.

The Stormwater Management Regulations (NJAC 7:8), as administered by the Neptune Township require the utilization of best available technology to minimize the amount of stormwater runoff, maintain existing onsite infiltration, simulate natural drainage systems and minimize the discharge of pollutants to ground or surface waters. The overall goal of the post-construction stormwater management system design shall be to meet the erosion control, groundwater recharge, stormwater runoff quantity and quality standards at N.J.A.C. 7:8-5.4 and 5.5.

The stormwater management must be design to:

- 1. Reduce flood damage, including damage to life and property;
- 2. Minimize, to the extent practical, any increase in stormwater runoff from any new development;
- 3. Reduce soil erosion from any development or construction project;
- 4. Assure the adequacy of exiting and proposed culverts and bridges, and other in-stream structures;
- 5. Maintain groundwater recharge;
- 6. Prevent, to the greatest extent feasible, an increase in nonpoint pollution;
- 7. Maintain the integrity of stream channels for their biological functions, as well as for drainage;
- 8. Minimize pollutants in stormwater runoff from new and existing development in order to restore, enhance and maintain the chemical, physical, and biological integrity of the waters of the State, to protect public health, to safeguard fish and aquatic life and scenic and ecological values and to enhance the domestic, municipal, recreational, industrial and other uses of water; and
- 9. Protect public safety through the proper design and operation of stormwater management basins.

B. <u>Design and Performance Standards</u>

1. <u>Erosion Control</u>

The minimum design and performance standards for erosion control are those established under the Soil Erosion and Sediment Control Act, N.J.S.A. 4:24-39 et seq. and implementing rules.

2. <u>Groundwater Recharge</u>

The minimum design and performance standards for groundwater recharge require compliance with either of the following:

- a. Demonstrate through hydrologic and hydraulic analysis that the site and its stormwater management measures maintain 100 percent of the average annual pre-construction groundwater recharge volume for the site.
- b. Demonstrate through hydrologic and hydraulic analysis that the increase of stormwater runoff volume from pre-construction to post-construction for the two-year storm is infiltrated.
- 3. <u>Runoff Quality</u>

In order to control stormwater runoff quantity impacts one of the following must be demonstrated:

- a. Demonstrate through hydrologic and hydraulic analysis that for stormwater leaving the site, post-construction runoff hydrographs for the two, 10 and 100-year storm events do not exceed, at any point in time, the pre-construction runoff hydrographs for the same storm events;
- b. Demonstrate through hydrologic and hydraulic analysis that there is no increase, as compared to the pre-construction condition, in the peak runoff rates of stormwater leaving the site for the two, 10 and 100-year storm events and that the increase volume or change in timing of stormwater runoff will not increase flood damage at or downstream of the site. This analysis shall include the analysis of impacts of existing land uses and projected land uses assuming full development under existing zoning and land use ordinances in the drainage area;
- c. Design stormwater management measures so that the postconstruction peak runoff rates for the two, 10 and 100-year storm events are 50, 75 and 80 percent, respectively, of the pre-construction peak runoff rates. The percentages apply only to the postconstruction stormwater runoff that is attributable to the portion of the site on which the proposed development or project is to be constructed.
- 4. <u>Water Quality</u>

Stormwater management measures shall be designed to reduce the post-construction load of total suspended solids (TSS) in stormwater runoff generated from the water quality design storm by 80 percent of the anticipated load from the development site expressed as an annual average.

In accordance with the definition of FW1 at N.J.A.C. 7:9B-1.4, stormwater management measures shall be designed to prevent any increase in stormwater runoff to waters classified as FW1.

Special water resource protection areas shall be established along all waters designated Category One at N.J.A.C. 7:9B and perennial or intermittent streams that drain into or upstream of the Category One waters as shown on the USGS Quadrangle Maps or in the County Soil Surveys, within the associated HUC 14 drainage. These areas shall be established for the protection of water quality, aesthetic value, exceptional ecological significance, exceptional recreational significance, exception water supply significance, and exception fisheries significance of those established Category One waters. These areas shall be designated and protected as follows:

- a. The applicant shall preserve and maintain a special water resource protection area in accordance with one of the following:
 - i. A 300-foot special water resource protection area shall be provided on each side of the waterway, measured perpendicular to the waterway from the top of bank outwards, or from the centerline of the waterway where the bank is not defined, consisting of existing vegetation or vegetation allowed to follow natural succession is provided.
 - ii. Encroachment within the designated special water resource protection area under 1i. above shall only be allowed where previous development or disturbance has occurred. The encroachment shall only be allowed where the project demonstrates that the functional value and overall condition of the special water resource protection area will be maintained to the maximum extent practicable. In no case shall the remaining special water resource protection area be reduced to less than 150 feet as measured perpendicular to the top of bank of the waterway or centerline of the waterway where the bank is undefined.

All stormwater shall be discharged outside of but may flow through the special water resource protection area and shall comply with the Standard for Offsite Stability in the "Standards for Soil Erosion and Sediment Control in New Jersey."

The NJDEP adopted amendments to the Stormwater Management Regulations, effective March 2, 2021, to require the use of green infrastructure. Green infrastructure refers to a set of stormwater management practices that use or mimic the natural water cycle to capture, filter, absorb

and/or re-use stormwater. The fundamental difference is that the new rules will require decentralized, distributed stormwater management practices that enable stormwater to infiltrate and more closely resemble the natural water cycle. These "best management practices" (BMPs) include vegetated swales, bioretention, green roofs, cisterns, wet ponds, infiltration basins and constructed wetlands.

4.0 PROPOSED STORMWATER MANAGEMENT PLAN

As shown on the Site Plans, the proposed stormwater management plan consists of a series of rain gardens and infiltration/ detention basins to provide green infrastructure and create a decentralized, distributed stormwater management practice to enable stormwater runoff to infiltrate and more closely resemble the natural water cycle. The overall system will perform water quality control, groundwater recharge and flood control to reduce the peak runoff rates of the 2, 10 and 100 year storm events.

5.0 <u>METHODOLOGY</u>

The methodology used to estimate the stormwater runoff peak flows and volumes for the required storm events is the 24 hour storm using the rainfall distribution recommended by the U.S. Department of Agriculture Soil Conservation Service.

The Stormwater Management Rules (NJAC 7:8) require the utilization of best available technology to minimize the amount of stormwater runoff, maintain existing onsite infiltration, simulate natural drainage systems and minimize the discharge of pollutants to ground or surface waters. The overall goal of the post-construction stormwater management system design shall be the reduction to the pre-development level of total suspended solids (TSS) and soluble contaminants in the stormwater, recharge the two year storm volume and provide flood control.

In order to provide adequate control it is necessary to design the stormwater system so that the post-development peak runoff rate for the two year storm event is 50 percent of the predevelopment peak runoff rate for the 10 and 100 year storm events are 75 and 80 percent, respectively, of the pre-development peak runoff rate. The predevelopment runoff rate has been calculated with the site in its current condition (forested) which has existed for more than 5 years. The runoff calculations separately tabulate the impervious and pervious contributory drainage areas and sequentially route the inflow through the basin system for each design storm to ensure that each of the design goals are met.

Copies of the computations are contained within the appendices of this report.

6.0 <u>SUMMARY</u>

Erosion Control

The project complies with the "New Jersey Standards for Soil Erosion and Sediment Control." Certification for the project must be granted by the Monmouth County Soil Conservation District.

Groundwater Recharge

The rain gardens and basins will contain adequate volume to recharge and infiltrate the increased runoff volume for the 2 year storm.

Since adequate storage volume is provided it is not required to complete the NJDEP groundwater recharge spreadsheet.

Green Infrasture

The system contains six (6) rain garden and infiltration basins that serve to decentralize and distribute the stormwater runoff consistent with the green infrastructure amendment to the Stormwater Rules.

Runoff Quantity

The following is a summary of the runoff from the project site for the flood storm events:

Storm Event	Pre-Developed Peak Flow	Allowable Peak Flow	Post-Developed Peak Flow
2	0.1	0.05	0.03
10	0.4	0.3	0.3
100	6.2	5.0	2.4

Water Quality

The project site is contributory to surface waters not classified as Category One. It is necessary to provide an 80% TSS removal rate. The proposed basins contain adequate volume to retain the entire water quality storm thereby providing a 100% TSS removal rate, complying with the standards.

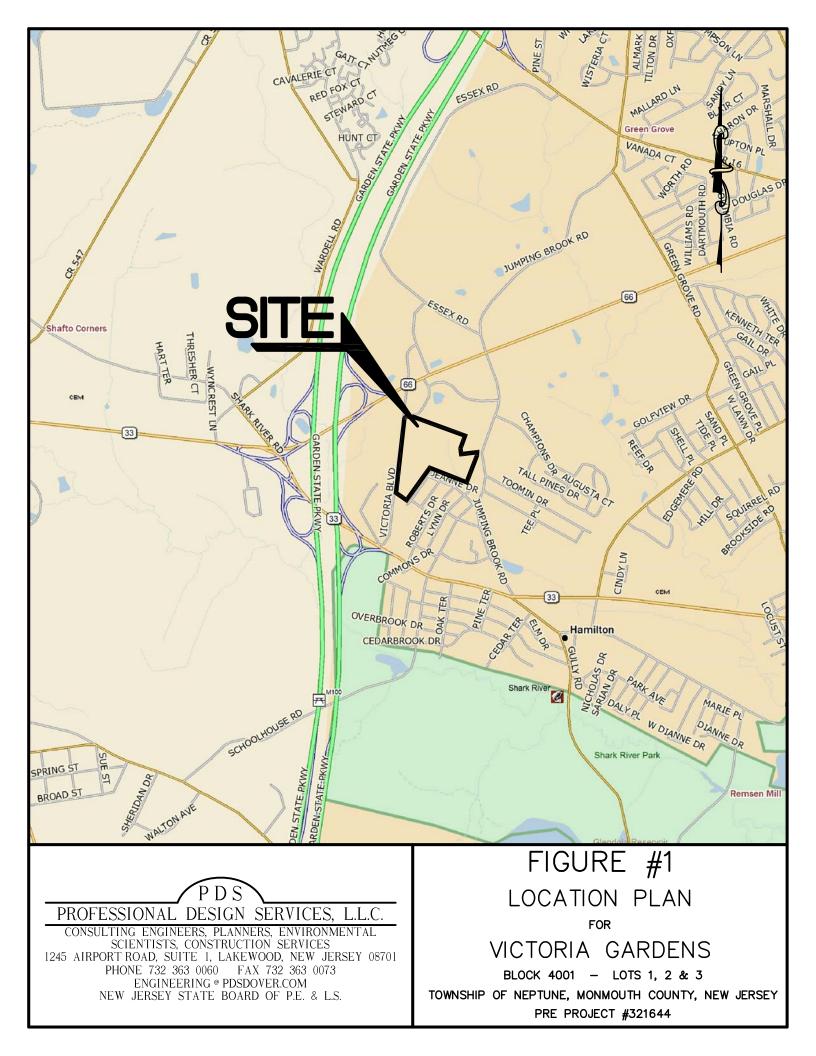
The stormwater management system complies with the design parameters as set forth in the stormwater regulations.

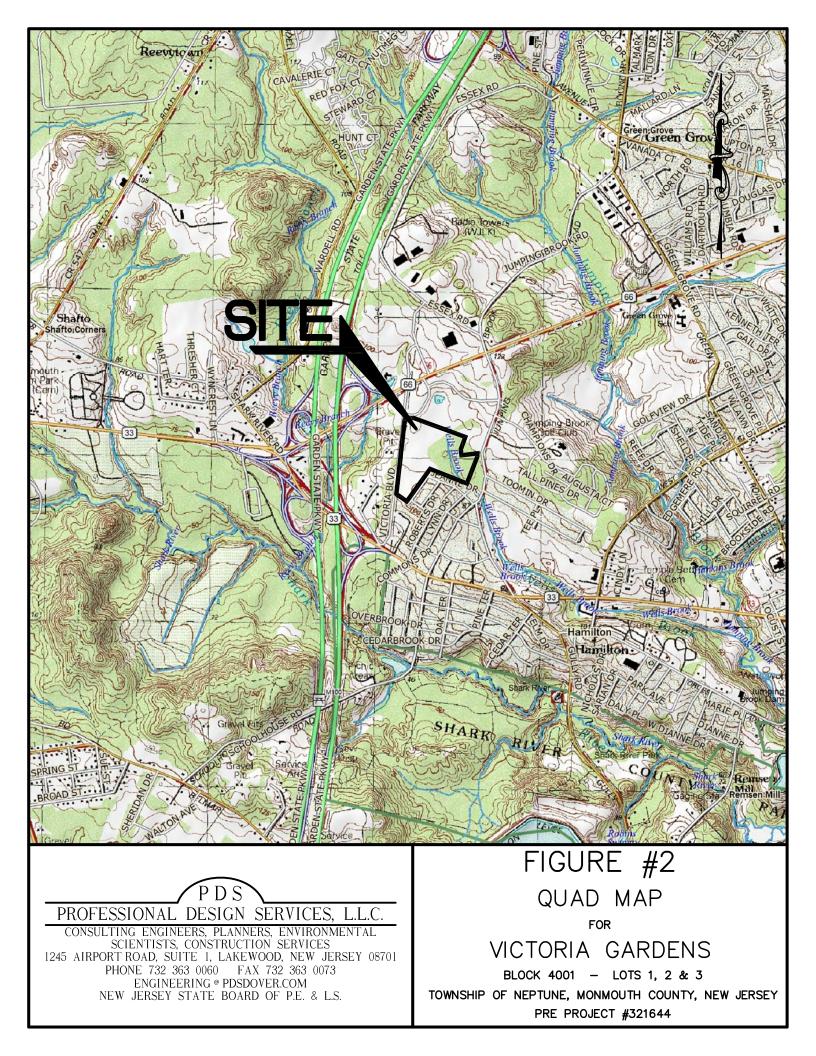
The project complies with applicable NJDEP and Neptune Township regulations.

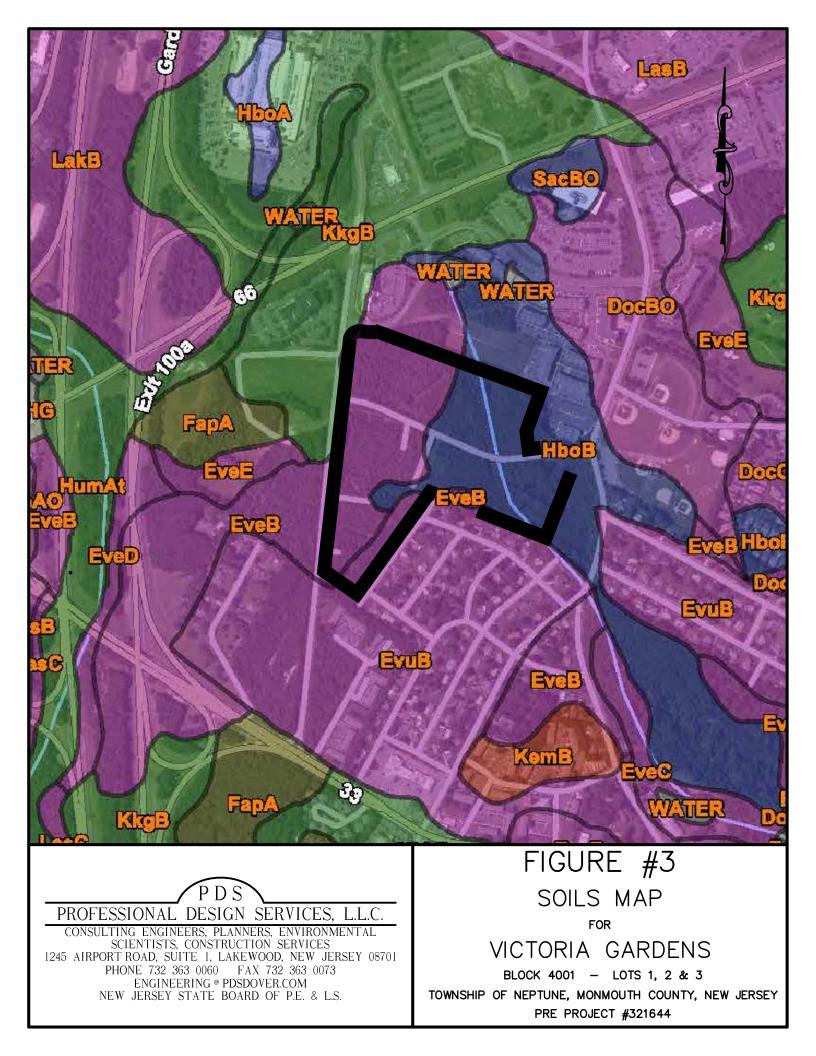
7.0 <u>MAINTENANCE</u>

All maintenance activities for the stormwater collection system and management basins will be the responsibility of the property owner. A stormwater maintenance plan is included in the site plans which illustrates and describes the required inspection & maintenance activities.

All maintenance and inspection activities must be performed in accordance with the Best Management Practices Manual prepared by NJDEP.



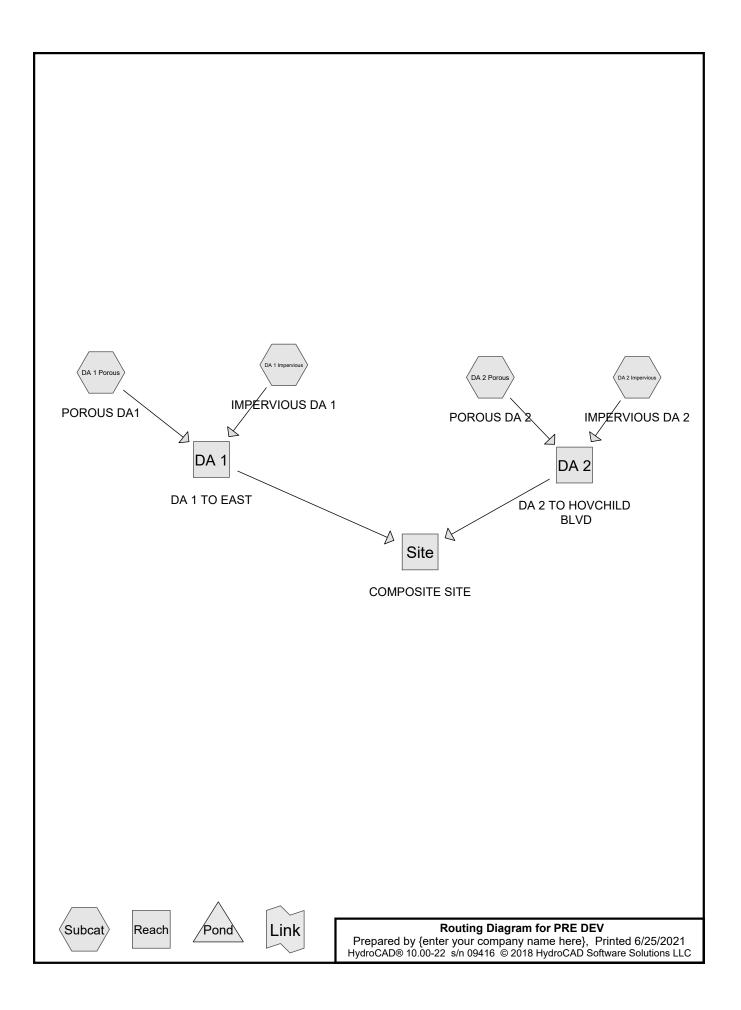




APPENDIX A

EXISTING CONDITION CALCULATIONS

• EXISTING RUNOFF HYDROGRAPHS



	Pre Development.
PRE DEV	NOAA 24-hr D 2 YEAR Rainfall=3.38"
Prepared by {enter your company name	•
HydroCAD® 10.00-22 s/n 09416 © 2018 Hydro	CAD Software Solutions LLC Page 2
Runoff by SCS TR-20	-20.00 hrs, dt=0.05 hrs, 301 points 0 method, UH=Delmarva, Weighted-CN ans method - Pond routing by Stor-Ind method
Subcatchment DA 1 Impervious:	Runoff Area=0.040 ac 100.00% Impervious Runoff Depth>2.87" Tc=22.3 min CN=98 Runoff=0.06 cfs 0.010 af
Subcatchment DA 1 Porous: POROUS DA Flow Length=100'	1 Runoff Area=4.860 ac 0.00% Impervious Runoff Depth>0.00" Slope=0.0170 '/' Tc=22.3 min CN=39 Runoff=0.00 cfs 0.000 af
Subcatchment DA 2 Impervious:	Runoff Area=0.070 ac 100.00% Impervious Runoff Depth>2.86" Tc=38.6 min CN=98 Runoff=0.07 cfs 0.017 af
	2 Runoff Area=12.530 ac 0.00% Impervious Runoff Depth=0.00" ow Length=1,140' Tc=38.6 min CN=36 Runoff=0.00 cfs 0.000 af
Reach DA 1: DA 1 TO EAST	Inflow=0.06 cfs 0.010 af Outflow=0.06 cfs 0.010 af
Reach DA 2: DA 2 TO HOVCHILD BLVD	Inflow=0.07 cfs_0.017 af
	Outflow=0.07 cfs 0.017 af
Reach Site: COMPOSITE SITE	Inflow=0.13 cfs_0.026 af
	Outflow=0.13 cfs 0.026 af

Total Runoff Area = 17.500 acRunoff Volume = 0.026 afAverage Runoff Depth = 0.02"99.37% Pervious = 17.390 ac0.63% Impervious = 0.110 ac

Summary for Subcatchment DA 1 Impervious: IMPERVIOUS DA 1

Runoff = 0.06 cfs @ 12.34 hrs, Volume= 0.010 af, Depth> 2.87"

Runoff by SCS TR-20 method, UH=Delmarva, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs NOAA 24-hr D 2 YEAR Rainfall=3.38"

Area (ac)	CN	Desc	ription		
0.040	98	Pave	d parking,	HSG A	
0.040		100.0	00% Imper	vious Area	l
Tc Leng (min) (fee		Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
22.3					Direct Entry,

Summary for Subcatchment DA 1 Porous: POROUS DA1

Runoff	=	0.00 cfs @	20.00 hrs,	Volume=	0.000 af, Depth>	0.00"
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Runoff by SCS TR-20 method, UH=Delmarva, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs NOAA 24-hr D 2 YEAR Rainfall=3.38"

_	Area	(ac) (CN	Desc	cription		
	3.	380	32	Woo	ds/grass c	omb., Goo	d, HSG A
	0.	380	39	>75%	% Grass co	over, Good	, HSG A
	0.	380	58	Woo	ds/grass c	omb., Goo	id, HSG B
_	0.	720	61	>75%	% Grass co	over, Good	, HSG B
	4.	860	39	Weig	phted Aver	age	
	4.	860		100.	00% Pervi	ous Area	
	Tc (min)	Length (feet)		ope ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
	22.3	100	0.0	170	0.07		Sheet Flow,
_	4. 4. Tc (min)	860 860 Length (feet)	39 Sl	Weig 100. ope ft/ft)	phted Aver 00% Pervi Velocity (ft/sec)	age ous Area Capacity	Description

Summary for Subcatchment DA 2 Impervious: IMPERVIOUS DA 2

Runoff = 0.07 cfs @ 12.55 hrs, Volume= 0.017 af, Depth> 2.86"

Runoff by SCS TR-20 method, UH=Delmarva, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs NOAA 24-hr D 2 YEAR Rainfall=3.38"

Area (ac)	CN	Description
0.060	98	Paved parking, HSG A
0.010	98	Paved parking, HSG B
0.070	98	Weighted Average
0.070		100.00% Impervious Area

PRE DEV NOAA 24-hr D 2 YEAR Rate	evelopment. <i>infall=</i> 3.38″ d 6/25/2021 <u>Page 4</u>
Tc Length Slope Velocity Capacity Description (min) (feet) (ft/ft) (ft/sec) (cfs)	
38.6 Direct Entry,	
Summary for Subcatchment DA 2 Porous: POROUS DA 2	
Runoff = 0.00 cfs @ 5.00 hrs, Volume= 0.000 af, Depth= 0.00"	
Runoff by SCS TR-20 method, UH=Delmarva, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= NOAA 24-hr D_2 YEAR Rainfall=3.38"	0.05 hrs
Area (ac) CN Description	
6.250 32 Woods/grass comb., Good, HSG A	
5.920 39 >75% Grass cover, Good, HSG A	
0.230 58 Woods/grass comb., Good, HSG B	
0.130 61 >75% Grass cover, Good, HSG B	
12.530 36 Weighted Average	
12.530 100.00% Pervious Area	
To Longth Clans, Malasity Conseity Description	
Tc Length Slope Velocity Capacity Description (min) (feet) (ft/ft) (ft/sec) (cfs)	
15.8 100 0.0400 0.11 Sheet Flow,	
Woods: Light underbrush $n = 0.400$ P2= 3.3	38"
19.0 360 0.0040 0.32 Shallow Concentrated Flow,	00
Woodland Kv= 5.0 fps	
<u>3.8 680 3.00 Direct Entry,</u>	

38.6 1,140 Total

Summary for Reach DA 1: DA 1 TO EAST

Inflow Area	a =	4.900 ac,	0.82% Impervious	, Inflow Depth >	0.02"	for 2 YEAR event
Inflow	=	0.06 cfs @	12.34 hrs, Volum	e= 0.010	af	
Outflow	=	0.06 cfs @	12.34 hrs, Volum	e= 0.010	af, Atte	en= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs

Summary for Reach DA 2: DA 2 TO HOVCHILD BLVD

Inflow Area =	12.600 ac,	0.56% Impervious, Inflow	/ Depth > 0.02"	for 2 YEAR event
Inflow =	0.07 cfs @	12.55 hrs, Volume=	0.017 af	
Outflow =	0.07 cfs @	12.55 hrs, Volume=	0.017 af, Atte	en= 0%, Lag= 0.0 min

Summary for Reach Site: COMPOSITE SITE

Inflow Area	=	17.500 ac,	0.63% Impervious,	Inflow Depth >	0.02"	for 2 YEAR event
Inflow =	=	0.13 cfs @	12.46 hrs, Volume	= 0.026	af	
Outflow =	=	0.13 cfs @	12.46 hrs, Volume	= 0.026	af, Atte	en= 0%, Lag= 0.0 min

PRE DEV Prepared by {enter your company name HydroCAD® 10.00-22_s/n 09416 © 2018 Hydro	
Runoff by SCS TR-20	-20.00 hrs, dt=0.05 hrs, 301 points 0 method, UH=Delmarva, Weighted-CN ans method . Pond routing by Stor-Ind method
SubcatchmentDA 1 Impervious:	Runoff Area=0.040 ac 100.00% Impervious Runoff Depth>4.52" Tc=22.3 min CN=98 Runoff=0.09 cfs 0.015 af
Subcatchment DA 1 Porous: POROUS DA Flow Length=100'	1 Runoff Area=4.860 ac 0.00% Impervious Runoff Depth>0.18" Slope=0.0170 '/' Tc=22.3 min CN=39 Runoff=0.18 cfs 0.074 af
Subcatchment DA 2 Impervious:	Runoff Area=0.070 ac 100.00% Impervious Runoff Depth>4.51" Tc=38.6 min CN=98 Runoff=0.12 cfs 0.026 af
	2 Runoff Area=12.530 ac 0.00% Impervious Runoff Depth>0.09" ow Length=1,140' Tc=38.6 min CN=36 Runoff=0.20 cfs 0.095 af
Reach DA 1: DA 1 TO EAST	Inflow=0.21 cfs 0.089 af Outflow=0.21 cfs 0.089 af
Reach DA 2: DA 2 TO HOVCHILD BLVD	Inflow=0.22 cfs 0.122 af Outflow=0.22 cfs 0.122 af
Reach Site: COMPOSITE SITE	Inflow=0.39 cfs 0.210 af Outflow=0.39 cfs 0.210 af

Total Runoff Area = 17.500 acRunoff Volume = 0.210 af
99.37% Pervious = 17.390 acAverage Runoff Depth = 0.14"
0.63% Impervious = 0.110 ac

Summary for Subcatchment DA 1 Impervious: IMPERVIOUS DA 1

Runoff = 0.09 cfs @ 12.34 hrs, Volume= 0.015 af, Depth> 4.52"

Runoff by SCS TR-20 method, UH=Delmarva, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs NOAA 24-hr D 10 YEAR Rainfall=5.23"

Area	(ac)	CN	Desc	ription		
0.	040	98	Pave	d parking,	HSG A	
0.	040		100.0	00% Impe	rvious Area	l .
Tc (min)	Length (feet		Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
22.3						Direct Entry,

Summary for Subcatchment DA 1 Porous: POROUS DA1

Runoff	=	0.18 cfs @	13.45 hrs, \	Volume=	0.074 af, Depth> 0.18"
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Runoff by SCS TR-20 method, UH=Delmarva, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs NOAA 24-hr D 10 YEAR Rainfall=5.23"

Area	(ac) (CN Des	cription		
3	.380	32 Wo	ods/grass o	comb., Goo	d, HSG A
0	.380	39 >75	% Grass c	over, Good	, HSG A
0	.380	58 Wo	ods/grass o	comb., Goo	id, HSG B
0	.720	61 >75	% Grass c	over, Good	, HSG B
4	.860	39 We	ighted Aver	age	
4	.860	100	.00% Pervi	ous Area	
Tc (min)	Length (feet)			Capacity (cfs)	Description
22.3	100	/	· /		Sheet Flow, Woods: Light underbrush n= 0.400 P2= 3.38"

Summary for Subcatchment DA 2 Impervious: IMPERVIOUS DA 2

Runoff = 0.12 cfs @ 12.55 hrs, Volume= 0.026 af, Depth> 4.51"

Runoff by SCS TR-20 method, UH=Delmarva, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs NOAA 24-hr D 10 YEAR Rainfall=5.23"

Area (ac)	CN	Description
0.060	98	Paved parking, HSG A
0.010	98	Paved parking, HSG B
0.070	98	Weighted Average
0.070		100.00% Impervious Area

PRE D	=v				NOAA 24-hr D 10 YEAR Rainfall=5.23"
		tor vour (romnanv	name here	
					D Software Solutions LLC Page 8
<u>- 11y aro 67 a</u>	00 10.00	22 0/1100	110 0 201		
Тс	Length	Slope	Velocity	Capacity	Description
(min)	(feet)	(ft/ft)	(ft/sec)	(cfs)	•
38.6					Direct Entry,
		-			
		Summa	ary for S	ubcatchn	ment DA 2 Porous: POROUS DA 2
Runoff	=	0.20 cfs	s@ 15.1	0 hrs, Volu	ume= 0.095 af, Depth> 0.09"
			nod, UH=D Rainfall=5.2		Veighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Area	(ac) C	N Desc	cription		
6.				omb., Goo	
				over, Good	
				omb., Goo	
				over, Good	, HSG B
			phted Aver		
12.	530	100.	00% Pervi	ous Area	
Та	l e ve extle	Clana	Valasity	Consister	Description
Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
	100	0.0400	0.11	(015)	Shoot Flow
15.8	100	0.0400	0.11		Sheet Flow, Woods: Light underbrush n= 0.400 P2= 3.38"
19.0	360	0.0040	0.32		Shallow Concentrated Flow,
13.0	000	0.00-0	0.02		Woodland Kv= 5.0 fps
3.8	680		3.00		Direct Entry,
		T : 4 : 1	0.00		

Pre Development.

38.6 1,140 Total

Summary for Reach DA 1: DA 1 TO EAST

Inflow Area	a =	4.900 ac,	0.82% Impervious	, Inflow Depth >	0.22"	for 10 YEAR event
Inflow	=	0.21 cfs @	13.25 hrs, Volum	e= 0.089	af	
Outflow	=	0.21 cfs @	13.25 hrs, Volum	e= 0.089	af, Atte	en= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs

Summary for Reach DA 2: DA 2 TO HOVCHILD BLVD

Inflow Area =	12.600 ac,	0.56% Impervious, Inflow I	Depth > 0.12"	for 10 YEAR event
Inflow =	0.22 cfs @	14.86 hrs, Volume=	0.122 af	
Outflow =	0.22 cfs @	14.86 hrs, Volume=	0.122 af, Atte	en= 0%, Lag= 0.0 min

Summary for Reach Site: COMPOSITE SITE

Inflow Area =	17.500 ac,	0.63% Impervious,	Inflow Depth >	0.14"	for 10 YEAR event
Inflow =	0.39 cfs @	13.71 hrs, Volume	= 0.210 a	af	
Outflow =	0.39 cfs @	13.71 hrs, Volume	= 0.210 a	af, Atte	en= 0%, Lag= 0.0 min

PRE DEV Prepared by {enter your company name HydroCAD® 10.00-22_s/n 09416_© 2018 Hydro	
Runoff by SCS TR-20	-20.00 hrs, dt=0.05 hrs, 301 points 0 method, UH=Delmarva, Weighted-CN ans method . Pond routing by Stor-Ind method
SubcatchmentDA 1 Impervious:	Runoff Area=0.040 ac 100.00% Impervious Runoff Depth>7.81" Tc=22.3 min CN=98 Runoff=0.15 cfs 0.026 af
Subcatchment DA 1 Porous: POROUS DA Flow Length=100'	1 Runoff Area=4.860 ac 0.00% Impervious Runoff Depth>1.33" Slope=0.0170 '/' Tc=22.3 min CN=39 Runoff=2.66 cfs 0.537 af
Subcatchment DA 2 Impervious:	Runoff Area=0.070 ac 100.00% Impervious Runoff Depth>7.80" Tc=38.6 min CN=98 Runoff=0.20 cfs 0.045 af
	2 Runoff Area=12.530 ac 0.00% Impervious Runoff Depth>1.01" ow Length=1,140' Tc=38.6 min CN=36 Runoff=3.58 cfs 1.056 af
Reach DA 1: DA 1 TO EAST	Inflow=2.80 cfs 0.563 af Outflow=2.80 cfs 0.563 af
Reach DA 2: DA 2 TO HOVCHILD BLVD	Inflow=3.75 cfs 1.102 af Outflow=3.75 cfs 1.102 af
Reach Site: COMPOSITE SITE	Inflow=6.20 cfs 1.665 af Outflow=6.20 cfs 1.665 af
Total Bunoff Area = 17 500 a	Do Bunoff Volume = 1 665 of Average Bunoff Donth = 1 14

Total Runoff Area = 17.500 acRunoff Volume = 1.665 afAverage Runoff Depth = 1.14"99.37% Pervious = 17.390 ac0.63% Impervious = 0.110 ac

Summary for Subcatchment DA 1 Impervious: IMPERVIOUS DA 1

Runoff = 0.15 cfs @ 12.34 hrs, Volume= 0.026 af, Depth> 7.81"

Runoff by SCS TR-20 method, UH=Delmarva, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs NOAA 24-hr D 100 YEAR Rainfall=8.94"

Area	(ac)	CN	Desc	cription		
0.	040	98	Pave	ed parking,	HSG A	
0.	040		100.	00% Impe	rvious Area	1
Tc (min)	Lengtł (feet		lope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
22.3						Direct Entry,

Summary for Subcatchment DA 1 Porous: POROUS DA1

Runoff = 2.66 cfs @ 12.47 hrs, Volume= 0.537 af, Depth> 1.33"

Runoff by SCS TR-20 method, UH=Delmarva, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs NOAA 24-hr D 100 YEAR Rainfall=8.94"

Are	a (ac)	CI	N Desc	cription		
	3.380	3	2 Woo	ds/grass c	omb., Goo	d, HSG A
	0.380	3	9 >759	% Grass co	over, Good	, HSG A
	0.380	5	8 Woo	ds/grass c	omb., Goo	d, HSG B
	0.720	6	1 >759	% Grass co	over, Good	, HSG B
	4.860	3	9 Weig	ghted Aver	age	
	4.860		100.	00% Pervi	ous Area	
To (min		· .	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
22.3	/	00	0.0170	0.07	(010)	Sheet Flow, Woods: Light underbrush n= 0.400 P2= 3.38"

Summary for Subcatchment DA 2 Impervious: IMPERVIOUS DA 2

Runoff = 0.20 cfs @ 12.55 hrs, Volume= 0.045 af, Depth> 7.80"

Runoff by SCS TR-20 method, UH=Delmarva, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs NOAA 24-hr D 100 YEAR Rainfall=8.94"

Area (ac)	CN	Description
0.060	98	Paved parking, HSG A
0.010	98	Paved parking, HSG B
0.070	98	Weighted Average
0.070		100.00% Impervious Area

	d by {en			name here 8 HydroCAE			Pre Development. 100 YEAR Rainfall=8.94" Printed 6/25/2021 Page 12		
Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description				
38.6					Direct Entry	,			
	Summary for Subcatchment DA 2 Porous: POROUS DA 2								
Runoff	=	3.58 cfs	s@ 12.9	4 hrs, Volu	me=	1.056 af, Depth	> 1.01"		
			nod, UH=D Rainfall=8		/eighted-CN, ⊺	Fime Span= 5.00	0-20.00 hrs, dt= 0.05 hrs		
Area	(ac) C	N Desc	cription						
-				omb., Goo					
				over, Good					
				omb., Goo over, Good					
		_	ted Aver		1150 D				
	.530		00% Pervi						
		100.		0407404					
Тс	Length	Slope	Velocity	Capacity	Description				
(min)	(feet)	(ft/ft)	(ft/sec)	(cfs)					
15.8	100	0.0400	0.11		Sheet Flow,				
40.0	200	0.0040	0.00				= 0.400 P2= 3.38"		
19.0	360	0.0040	0.32		Woodland	ncentrated Flov	ν,		
3.8	680		3.00		Direct Entry				
		Tatal				,			

38.6 1,140 Total

Summary for Reach DA 1: DA 1 TO EAST

Inflow Area	=	4.900 ac,	0.82% Impervious, Inflow	v Depth > 1.38"	for 100 YEAR event
Inflow =	=	2.80 cfs @	12.47 hrs, Volume=	0.563 af	
Outflow =	=	2.80 cfs @	12.47 hrs, Volume=	0.563 af, Att	en= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs

Summary for Reach DA 2: DA 2 TO HOVCHILD BLVD

Inflow Area =	12.600 ac,	0.56% Impervious, Inflow	/ Depth > 1.05"	for 100 YEAR event
Inflow =	3.75 cfs @	12.92 hrs, Volume=	1.102 af	
Outflow =	3.75 cfs @	12.92 hrs, Volume=	1.102 af, Atte	en= 0%, Lag= 0.0 min

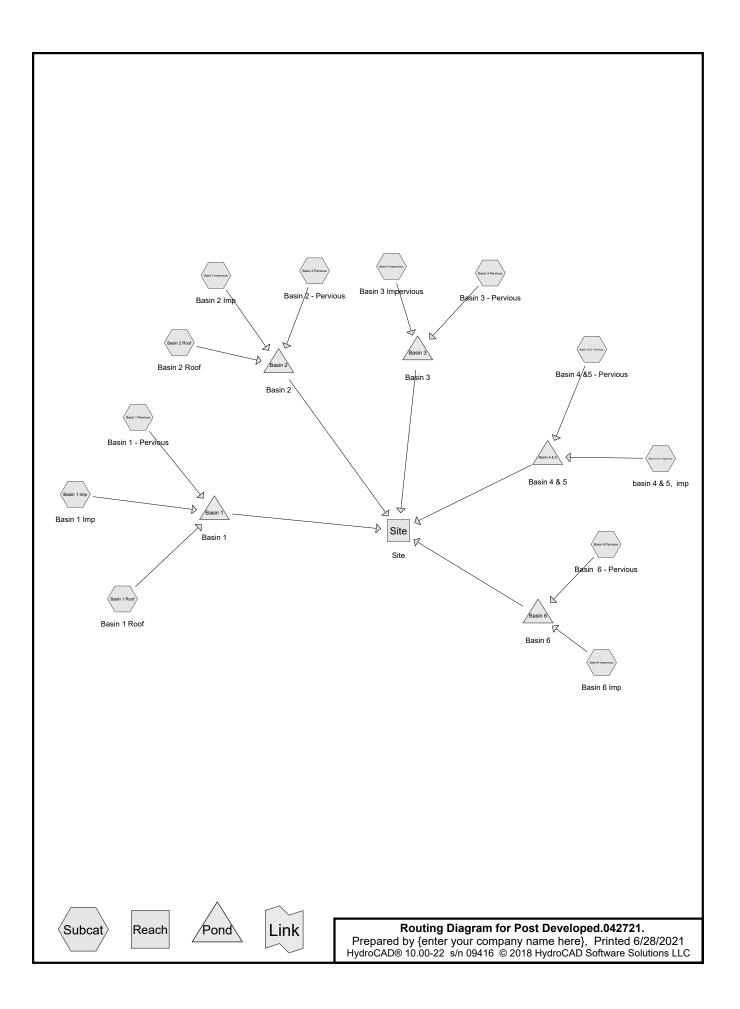
Summary for Reach Site: COMPOSITE SITE

Inflow Area =	17.500 ac,	0.63% Impervious, In	flow Depth > 1.14"	for 100 YEAR event
Inflow =	6.20 cfs @	12.72 hrs, Volume=	1.665 af	
Outflow =	6.20 cfs @	12.72 hrs, Volume=	1.665 af, Atte	en= 0%, Lag= 0.0 min

APPENDIX B

PROPOSED CONDITION CALCULATIONS

- PROPOSED RUNOFF HYDROGRAPHS
 - VOLUME CALCULATIONS
 - OUTLET CALCULATIONS
 - FLOOD ROUTING CALCULATIONS
 - TIME TO DRAIN CALCULATIONS



Post Developed.042721. Prepared by {enter your company name here} HydroCAD® 10.00-22 s/n 09416 © 2018 HydroCAD Software Solutions	Post Development. NRCC 24-hr D 2 year Rainfall=3.40" Printed 6/28/2021 <u>S LLC Page 2</u>
Time span=5.00-30.00 hrs, dt=0.05 hrs Runoff by SCS TR-20 method, UH=Delmar Reach routing by Stor-Ind+Trans method - Pond ro	va, Weighted-CN
	100.00% Impervious Runoff Depth>3.06" 5.0 min CN=98 Runoff=0.98 cfs 0.153 af
	ac 0.00% Impervious Runoff Depth=0.00" 7.3 min CN=39 Runoff=0.00 cfs 0.001 af
SubcatchmentBasin 1 Roof: Basin 1 Roof Runoff Area=0.500 ac Tc=1	100.00% Impervious Runoff Depth>3.06" 5.0 min CN=98 Runoff=0.82 cfs 0.127 af
Subcatchment Basin 2 Impervious: Basin Runoff Area=0.800 ac Tc=1	100.00% Impervious Runoff Depth>3.06" 5.0 min CN=98 Runoff=1.31 cfs 0.204 af
	ac 0.00% Impervious Runoff Depth=0.00" 7.3 min CN=39 Runoff=0.00 cfs 0.001 af
Subcatchment Basin 2 Roof: Basin 2 Roof Runoff Area=0.350 ac Tc=1	100.00% Impervious Runoff Depth>3.06" 5.0 min CN=98 Runoff=0.57 cfs 0.089 af
Subcatchment Basin 3 Impervious: Basin Runoff Area=1.200 ac Tc=1	100.00% Impervious Runoff Depth>3.06" 5.0 min CN=98 Runoff=1.96 cfs 0.306 af
	ac 0.00% Impervious Runoff Depth=0.00" 7.3 min CN=39 Runoff=0.00 cfs 0.001 af
Subcatchment Basin 4 & 5 - Pervious: Basin Runoff Area=2.800 a Flow Length=1,440' Tc=1	ac 0.00% Impervious Runoff Depth=0.00" 7.3 min CN=39 Runoff=0.00 cfs 0.001 af
	100.00% Impervious Runoff Depth>3.06" 5.0 min CN=98 Runoff=1.47 cfs 0.229 af
Subcatchment Basin 6 Impervious: Basin Runoff Area=0.700 ac Tc=1	100.00% Impervious Runoff Depth>3.06" 5.0 min CN=98 Runoff=1.14 cfs 0.178 af
Subcatchment Basin 6 Pervious: Basin 6 - Runoff Area=2.500 a Flow Length=1,580' Tc=2	ac 0.00% Impervious Runoff Depth=0.00" 7.3 min CN=39 Runoff=0.00 cfs 0.001 af
Reach Site: Site	Inflow=0.00 cfs 0.000 af Outflow=0.00 cfs 0.000 af
Pond Basin 1: Basin 1 Peak Elev=90.46'	Storage=0.281 af Inflow=1.80 cfs 0.281 af Outflow=0.00 cfs 0.000 af
Pond Basin 2: Basin 2 Peak Elev=88.91'	Storage=0.294 af Inflow=1.88 cfs 0.294 af Outflow=0.00 cfs 0.000 af
Pond Basin 3: Basin 3 Peak Elev=89.21'	Storage=0.307 af Inflow=1.96 cfs 0.307 af Outflow=0.00 cfs 0.000 af

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Pond Basin 4 & 5: Basin 4 & 5

Peak Elev=86.69' Storage=0.230 af Inflow=1.47 cfs 0.230 af Outflow=0.00 cfs 0.000 af

Pond Basin 6: Basin 6

Peak Elev=91.80' Storage=0.179 af Inflow=1.14 cfs 0.179 af Outflow=0.00 cfs 0.000 af

Total Runoff Area = 17.800 acRunoff Volume = 1.291 afAverage Runoff Depth = 0.87"71.63% Pervious = 12.750 ac28.37% Impervious = 5.050 ac

Summary for Subcatchment Basin 1 Imp: Basin 1 Imp

Runoff = 0.98 cfs @ 12.25 hrs, Volume= 0.153 af, Depth> 3.06"

Runoff by SCS TR-20 method, UH=Delmarva, Weighted-CN, Time Span= 5.00-30.00 hrs, dt= 0.05 hrs NRCC 24-hr D 2 year Rainfall=3.40"

	Area	(ac)	CN	Desc	cription					
*	0.	350	98	Pave	Pavement & Sidewalk					
*	0.	250	98	Drive	Driveways					
	0.	0.600 98 Weighted Average								
0.600 100.00% Impervious Area										
	Тс	Leng	ıth	Slope	Velocity	Capacity	Description			
	(min)	(fee		(ft/ft)	(ft/sec)	(cfs)	l l			
	15.0						Direct Entry, pavement and pipe			

Summary for Subcatchment Basin 1 Pervious: Basin 1 - Pervious

Runoff	=	0.00 cfs @	24.08 hrs,	Volume=	0.001 af, Depth= 0.00"
1 tonion				V OIGHINO	

Runoff by SCS TR-20 method, UH=Delmarva, Weighted-CN, Time Span= 5.00-30.00 hrs, dt= 0.05 hrs NRCC 24-hr D 2 year Rainfall=3.40"

	Area	(ac) C	N Desc	cription		
*	2.	100 3	39 lawn	, A soils		
	2.	100	100.	00% Pervi	ous Area	
	Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
	20.5	100	0.0200	0.08		Sheet Flow, sheet flow Woods: Light underbrush n= 0.400 P2= 3.50"
	2.2	300	0.0200	2.28		Shallow Concentrated Flow, shallow conc Unpaved Kv= 16.1 fps
	4.6	1,180	0.0030	4.27	13.42	Pipe Channel, pipe flow 24.0" Round Area= 3.1 sf Perim= 6.3' r= 0.50' n= 0.012
_	27.3	1,580	Total			

Summary for Subcatchment Basin 1 Roof: Basin 1 Roof

Runoff = 0.82 cfs @ 12.25 hrs, Volume= 0.127 af, Depth> 3.06"

Runoff by SCS TR-20 method, UH=Delmarva, Weighted-CN, Time Span= 5.00-30.00 hrs, dt= 0.05 hrs NRCC 24-hr D 2 year Rainfall=3.40"

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Area	(ac) C	N Dese	cription						
-		8 Root							
0.	500	100.	00% Impe	rvious Area	1				
Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description				
15.0					Direct Entry, pavement				
Summary for Subcatchment Basin 2 Impervious: Basin 2 Imp									
Runoff	=	1.31 cfs	s @ 12.2	5 hrs, Volu	me= 0.204 af, Depth> 3.06"				
Runoff by SCS TR-20 method, UH=Delmarva, Weighted-CN, Time Span= 5.00-30.00 hrs, dt= 0.05 hrs NRCC 24-hr D_2 year Rainfall=3.40"									
Area	(ac) C	N Dese	cription						
			ement & Si	idewalk					
-			eways ghted Aver						
	.800 s .800			age rvious Area					
			-						
Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description				
15.0	(1001)	(1011)	(10000)	(010)	Direct Entry, pavement and pipe				
	-								
	Sur	nmary f	or Subc	atchment	t Basin 2 Pervious: Basin 2 - Pervious				
Runoff	=	0.00 cfs	s@ 24.0	8 hrs, Volu	me= 0.001 af, Depth= 0.00"				
				elmarva, V	Veighted-CN, Time Span= 5.00-30.00 hrs, dt= 0.05 hrs				
NRCC 2	4-hr D 2	year Rair	nfall=3.40"						
Area	(ac) C	N Dese	cription						
			, A soils						
2.	.050	100.	00% Pervi	ous Area					
Тс	Length	Slope	Velocity	Capacity	Description				
(min)	(feet)	(ft/ft)	(ft/sec)	(cfs)					
20.5	100	0.0200	0.08		Sheet Flow, sheet flow				
2.2	300	0.0200	2.28		Woods: Light underbrush n= 0.400 P2= 3.50" Shallow Concentrated Flow, shallow conc Unpaved Kv= 16.1 fps				
4.6	1,180	0.0030	4.27	13.42	1 1				

n= 0.012

27.3 1,580 Total

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Summary for Subcatchment Basi	n 2 Roof: Basin 2 Roof						
Runoff = 0.57 cfs @ 12.25 hrs, Volume=	0.089 af, Depth> 3.06"						
Runoff by SCS TR-20 method, UH=Delmarva, Weighted-CN, NRCC 24-hr D 2 year Rainfall=3.40"	Time Span= 5.00-30.00 hrs, dt= 0.05 hrs						
Area (ac) CN Description							
* 0.350 98 Roof							
0.350 100.00% Impervious Area							
Tc Length Slope Velocity Capacity Description (min) (feet) (ft/ft) (ft/sec) (cfs)							
	y, pavement						
Summary for Subcatchment Basin 3 Imp	pervious: Basin 3 Impervious						
Runoff = 1.96 cfs @ 12.25 hrs, Volume=	0.306 af, Depth> 3.06"						
Runoff by SCS TR-20 method, UH=Delmarva, Weighted-CN, NRCC 24-hr D 2 year Rainfall=3.40"	Time Span= 5.00-30.00 hrs, dt= 0.05 hrs						
Area (ac) CN Description							
* 0.550 98 Pavement & Sidewalk							
* 0.250 98 Driveways							
* 0.400 98 Roof							
1.20098Weighted Average1.200100.00% Impervious Area							
Tc Length Slope Velocity Capacity Description (min) (feet) (ft/ft) (ft/sec) (cfs)							
15.0 Direct Entr	y, pavement and pipe						
Summary for Subcatchment Basin 3 Pervious: Basin 3 - Pervious							
Runoff = 0.00 cfs @ 24.08 hrs, Volume=	0.001 af, Depth= 0.00"						
Runoff by SCS TR-20 method, UH=Delmarva, Weighted-CN, NRCC 24-hr D 2 year Rainfall=3.40"	Time Span= 5.00-30.00 hrs, dt= 0.05 hrs						
Area (ac) CN Description							
* 3.300 39 lawn, A soils							
3.300 100.00% Pervious Area							

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Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
20.5	100	0.0200	0.08		Sheet Flow, sheet flow Woods: Light underbrush n= 0.400 P2= 3.50"
2.2	300	0.0200	2.28		Shallow Concentrated Flow, shallow conc Unpaved Kv= 16.1 fps
 4.6	1,180	0.0030	4.27	13.42	

27.3 1,580 Total

Summary for Subcatchment Basin 4 & 5 - Pervious: Basin 4 & 5 - Pervious

Runoff = 0.00 cfs @ 24.03 hrs, Volume= 0.001 af, Depth= 0.00"

Runoff by SCS TR-20 method, UH=Delmarva, Weighted-CN, Time Span= 5.00-30.00 hrs, dt= 0.05 hrs NRCC 24-hr D 2 year Rainfall=3.40"

_	Area	(ac) C	N Desc	cription		
*	2.	800 3	9 Lawı	n. A Soils		
	2.800 100.00% Pervio			00% Pervi	ous Area	
	Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
	6.6	640	0.0100	1.61		Shallow Concentrated Flow, shallow concentrated
_	10.7	800	0.0060	1.25		Unpaved Kv= 16.1 fps Shallow Concentrated Flow, shallow concentrated Unpaved Kv= 16.1 fps

17.3 1,440 Total

Summary for Subcatchment Basin 4 & 5- Impervious: basin 4 & 5, imp

Runoff = 1.47 cfs @ 12.25 hrs, Volume= 0.229 af, Depth> 3.06"

Runoff by SCS TR-20 method, UH=Delmarva, Weighted-CN, Time Span= 5.00-30.00 hrs, dt= 0.05 hrs NRCC 24-hr D 2 year Rainfall=3.40"

	Area	(ac)	CN	Desc	cription		
*	0.	200	98	Pave	ement		
*	0.	200	98	Drive	eways		
*	0.	500	98	Roof			
	0.	900	98	Weig	phted Aver	age	
	0.	900		100.	00% Impe	rvious Area	
	Tc (min)	Leng (fee		Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
	15.0						Direct Entry, pavement

Summary for Subcatchment Basin 6 Impervious: Basin 6 Imp

Runoff = 1.14 cfs @ 12.25 hrs, Volume= 0.178 af, Depth> 3.06"

Runoff by SCS TR-20 method, UH=Delmarva, Weighted-CN, Time Span= 5.00-30.00 hrs, dt= 0.05 hrs NRCC 24-hr D 2 year Rainfall=3.40"

	Area	(ac)	CN	Desc	cription		
*	0.	250	98	Pave	ement & Si	idewalk	
*	0.	250	98	Drive	eways		
*	0.	200	98	Roof			
	-	700 700	98		hted Aver 00% Impe	age rvious Area	I
	Tc (min)	Leng (fee		Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
	15.0						Direct Entry, pavement and pipe

Summary for Subcatchment Basin 6 Pervious: Basin 6 - Pervious

Runoff = 0.00 cfs @ 24.08 hrs, Volume= 0.001 af, Depth= 0.00"

Runoff by SCS TR-20 method, UH=Delmarva, Weighted-CN, Time Span= 5.00-30.00 hrs, dt= 0.05 hrs NRCC 24-hr D 2 year Rainfall=3.40"

_	Area	(ac) C	N Dese	cription		
*	2.	500 3	39 lawn	, A soils		
	2.	500	100.	00% Pervi	ous Area	
	Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
	20.5	100	0.0200	0.08		Sheet Flow, sheet flow Woods: Light underbrush n= 0.400 P2= 3.50"
	2.2	300	0.0200	2.28		Shallow Concentrated Flow, shallow conc Unpaved Kv= 16.1 fps
	4.6	1,180	0.0030	4.27	13.42	
_	07.0	4 500	— · ·			

27.3 1,580 Total

Summary for Reach Site: Site

Inflow Area	=	17.800 ac, 28	8.37% Impervious	s, Inflow Depth =	0.00"	for 2 year event
Inflow	=	0.00 cfs @	5.00 hrs, Volun	ne= 0.000) af	
Outflow	=	0.00 cfs @	5.00 hrs, Volun	ne= 0.000	af, Att	en= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 5.00-30.00 hrs, dt= 0.05 hrs

Summary for Pond Basin 1: Basin 1

Inflow Area =	3.200 ac, 34.38% Impervious, Inflow De	epth > 1.05" for 2 year event
Inflow =	1.80 cfs @ 12.25 hrs, Volume=	0.281 af
Outflow =	0.00 cfs @ 5.00 hrs, Volume=	0.000 af, Atten= 100%, Lag= 0.0 min
Primary =	0.00 cfs $\overline{@}$ 5.00 hrs, Volume=	0.000 af

Routing by Stor-Ind method, Time Span= 5.00-30.00 hrs, dt= 0.05 hrs Peak Elev= 90.46' @ 27.05 hrs Surf.Area= 0.173 ac Storage= 0.281 af

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

Volume	Inver	t Av	ail.Storage	Storag	ge Description				
#1	88.00	•	0.885 af	Rain	Garden Basin (Prismatio	c) Listed belo	W	
_					a a <i>i</i>				
Elevatio		.Area	Inc.S		Cum.Store				
(fee	et) (a	cres)	(acre-f	feet)	(acre-feet)				
88.0)0 (0.050	0.	.000	0.000				
89.0)0 (0.100	0.	.075	0.075				
90.0)0 (0.150	0.	.125	0.200				
91.0)0 (0.200	0.	.175	0.375				
92.0)0 (0.250	0.	.225	0.600				
93.0)0 (0.320	0.	.285	0.885				
Device	Routing		Invert O	utlet Dev	vices				
#1	Primary		91.00' 3.	0" Vert.	Orifice/Grate	C= 0.600)		
#2	Primary		92.00' 42	2.0" x 42	2.0" Horiz. Orifi	ce/Grate	C= 0.600		
	2		Li	mited to	weir flow at low	heads			
Primary OutFlow Max=0.00 cfs @ 5.00 hrs HW=88.00' (Free Discharge)									
	-1=Orifice/Grate (Controls 0.00 cfs)								
└─2=Or	ifice/Grate	(Cont	rols 0.00 cf	s)					

Summary for Pond Basin 2: Basin 2

Inflow Area =	3.200 ac, 35.94% Impervious, Inflow E	Depth > 1.10" for 2 year event
Inflow =	1.88 cfs @ 12.25 hrs, Volume=	0.294 af
Outflow =	0.00 cfs @ 5.00 hrs, Volume=	0.000 af, Atten= 100%, Lag= 0.0 min
Primary =	0.00 cfs $\overline{@}$ 5.00 hrs, Volume=	0.000 af

Routing by Stor-Ind method, Time Span= 5.00-30.00 hrs, dt= 0.05 hrs Peak Elev= 88.91' @ 27.05 hrs Surf.Area= 0.223 ac Storage= 0.294 af

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

89.00

90.00

91.00

92.00

93.00

Routing

Primary

Primary

Device

#1

#2

0.280

0.360

0.420

0.500

0.580

0.240

0.320

0.390

0.460

0.540

Invert Outlet Devices

90.00'

92.00'

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Volume	Invert /	Avail.Storage	Storage Description	on			
#1	87.00'	1.330 af	Rain Garden Bas	in (Prismatic)Listed below			
Elevatio							
(feet	t) (acres) (acre-f	eet) (acre-feet	<u>)</u>			
87.0	0.090) 0.	000 0.000)			
88.0			120 0.120)			
89.0			190 0.310				
90.0			265 0.57				
91.0			340 0.91				
92.0	0 0.450) 0.	415 1.330)			
Device	Routing	Invert Ou	utlet Devices				
#1	Primary	89.00' 3. (0" Vert. Orifice/Gra	te C= 0.600			
#2	Primary			Drifice/Grate C= 0.600			
		Lir	nited to weir flow at	low heads			
f−1=Ori	OutFlow Max= fice/Grate(Co fice/Grate(Co	ntrols 0.00 cfs		(Free Discharge)			
		Sumr	mary for Pond B	asin 3: Basin 3			
Inflow Ar	ea = 4.50	0 ac, 26.67%	Impervious, Inflow	Depth > 0.82" for 2 year event			
Inflow	= 1.96	cfs @ 12.25	hrs, Volume=	0.307 af			
Outflow	= 0.00	cfs @ 5.00	hrs, Volume=	0.000 af, Atten= 100%, Lag= 0.0 min			
Primary	= 0.00	cfs @ 5.00	hrs, Volume=	0.000 af			
Routing by Stor-Ind method, Time Span= 5.00-30.00 hrs, dt= 0.05 hrs Peak Elev= 89.21' @ 27.05 hrs Surf.Area= 0.297 ac Storage= 0.307 af							
Plug-Flow detention time= (not calculated: initial storage exceeds outflow) Center-of-Mass det. time= (not calculated: no outflow)							
Volume	Invert /	Avail.Storage	Storage Description	on			
#1	88.00'	1.950 af		in (Prismatic)Listed below			
	0 ()						
Elevatio			-				
(feet							
88.0	0 0.200) 0.	000 0.000)			

0.240

0.560

0.950

1.410

1.950

42.0" x 42.0" Horiz. Orifice/Grate C= 0.600

3.0" Vert. Orifice/Grate C= 0.600

Limited to weir flow at low heads

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Primary OutFlow Max=0.00 cfs @ 5.00 hrs HW=88.00' (Free Discharge) 1=Orifice/Grate (Controls 0.00 cfs) 2=Orifice/Grate (Controls 0.00 cfs)

Summary for Pond Basin 4 & 5: Basin 4 & 5

Inflow Area =	3.700 ac, 1	24.32% Impervious,	Inflow Depth > 0.7	75" for 2 year event
Inflow =	1.47 cfs @	12.25 hrs, Volume	= 0.230 af	
Outflow =	0.00 cfs @	5.00 hrs, Volume	= 0.000 af,	Atten= 100%, Lag= 0.0 min
Primary =	0.00 cfs @	5.00 hrs, Volume	= 0.000 af	

Routing by Stor-Ind method, Time Span= 5.00-30.00 hrs, dt= 0.05 hrs Peak Elev= 86.69' @ 25.95 hrs Surf.Area= 0.188 ac Storage= 0.230 af

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

Volume	Inve	rt Avail	.Storage	Storage [Description			
#1	85.0	0'	1.690 af	Rain Gar	rden Basin	4 & 5 (Prisma	atic)Listed below	_
	_			_				
Elevatio		f.Area	Inc.St		Cum.Store			
(fee	/	acres)	(acre-fe		<u>acre-feet)</u>			
85.0	00	0.080		00	0.000			
86.0		0.140	0.1	10	0.110			
87.0	-	0.210	0.1	-	0.285			
88.0	00	0.280		45	0.530			
89.0	-	0.350	0.3	15	0.845			
90.0		0.420	0.3	85	1.230			
91.0	00	0.500	0.4	-60	1.690			
Device	Routing	lr	nvert Ou	let Device	es			
#1	Primary	87	7.50' 3.0	" Vert. Ori	ifice/Grate	C= 0.600		
#2	Primary	90	0.00' 42.	0" x 42.0"	' Horiz. Orif	ice/Grate C=	= 0.600	
			Lim	ited to we	ir flow at low	/ heads		
					/=85.00' (F	ree Discharge	e)	
	ifice/Grate							
└2=Or	ifice/Grate	e (Control	ls 0.00 cfs])				
Summary for Pond Basin 6: Basin 6								
Inflow Ai Inflow	=	1.14 cfs	@ 12.25	hrs, Volur	me=	0.179 af	for 2 year event	
Outflow Primary	=	0.00 cfs 0.00 cfs		hrs, Volur hrs, Volur	me= me=	0.000 af, At 0.000 af	ten= 100%, Lag= 0.0 min	

Routing by Stor-Ind method, Time Span= 5.00-30.00 hrs, dt= 0.05 hrs

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Peak Elev= 91.80' @ 27.05 hrs Surf.Area= 0.269 ac Storage= 0.179 af

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

Volume	Inv	vert Av	/ail.Storag	e Stor	age Description			
#1	91.	00'	1.350 a	af Rair	n Garden Basin	(Prismatic)Listed below		
Elevatio (fee 91.0	et)	urf.Area <u>(acres)</u> 0.150	(acre	.Store e-feet) 0.000	Cum.Store (acre-feet) 0.000			
92.0	-	0.300		0.225	0.225			
93.0	00	0.350		0.325	0.550			
94.0	00	0.400		0.375	0.925			
95.0	00	0.450		0.425	1.350			
Device	Routing			Outlet D				
#1	Primary				t. Orifice/Grate			
#2	Primary			-	42.0" Horiz. Orif to weir flow at lov	fice/Grate C= 0.600 w heads		
Drimony	Primary OutElow Max-0.00 of $(0.5, 0.0)$ brought HW-01.00' (Free Discharge)							

Primary OutFlow Max=0.00 cfs @ 5.00 hrs HW=91.00' (Free Discharge)

-1=Orifice/Grate (Controls 0.00 cfs) -2=Orifice/Grate (Controls 0.00 cfs)

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Time span=5.00-30.00 hr Runoff by SCS TR-20 method Reach routing by Stor-Ind+Trans meth	, UH=Delmarva, Weighted-CN
Subcatchment Basin 1 Imp: Basin 1 Imp Runoff A	Area=0.600 ac 100.00% Impervious Runoff Depth>4.93" Tc=15.0 min CN=98 Runoff=1.57 cfs 0.246 af
	ff Area=2.100 ac 0.00% Impervious Runoff Depth=0.29" =1,580' Tc=27.3 min CN=39 Runoff=0.07 cfs 0.050 af
SubcatchmentBasin 1 Roof: Basin 1 Roof Runoff A	Area=0.500 ac 100.00% Impervious Runoff Depth>4.93" Tc=15.0 min CN=98 Runoff=1.31 cfs 0.205 af
Subcatchment Basin 2 Impervious: Basin Runoff A	Area=0.800 ac 100.00% Impervious Runoff Depth>4.93" Tc=15.0 min CN=98 Runoff=2.09 cfs 0.328 af
	ff Area=2.050 ac 0.00% Impervious Runoff Depth=0.29" =1,580' Tc=27.3 min CN=39 Runoff=0.07 cfs 0.049 af
Subcatchment Basin 2 Roof: Basin 2 Roof Runoff A	Area=0.350 ac 100.00% Impervious Runoff Depth>4.93" Tc=15.0 min CN=98 Runoff=0.91 cfs 0.144 af
Subcatchment Basin 3 Impervious: Basin Runoff A	Area=1.200 ac 100.00% Impervious Runoff Depth>4.93" Tc=15.0 min CN=98 Runoff=3.14 cfs 0.493 af
	ff Area=3.300 ac 0.00% Impervious Runoff Depth=0.29" =1,580' Tc=27.3 min CN=39 Runoff=0.12 cfs 0.079 af
	ff Area=2.800 ac 0.00% Impervious Runoff Depth=0.29" =1,440' Tc=17.3 min CN=39 Runoff=0.11 cfs 0.067 af
Subcatchment Basin 4 & 5- Impervious: Runoff A	Area=0.900 ac 100.00% Impervious Runoff Depth>4.93" Tc=15.0 min CN=98 Runoff=2.35 cfs 0.370 af
Subcatchment Basin 6 Impervious: Basin Runoff A	Area=0.700 ac 100.00% Impervious Runoff Depth>4.93" Tc=15.0 min CN=98 Runoff=1.83 cfs 0.287 af
	ff Area=2.500 ac 0.00% Impervious Runoff Depth=0.29" =1,580' Tc=27.3 min CN=39 Runoff=0.09 cfs 0.060 af
Reach Site: Site	Inflow=0.34 cfs 0.320 af Outflow=0.34 cfs 0.320 af
Pond Basin 1: Basin 1 Peak	Elev=91.32' Storage=0.447 af Inflow=2.88 cfs 0.502 af Outflow=0.10 cfs 0.089 af
Pond Basin 2: Basin 2 Peak	Elev=89.42' Storage=0.422 af Inflow=3.01 cfs 0.521 af Outflow=0.13 cfs 0.148 af
Pond Basin 3: Basin 3 Peak	Elev=90.03' Storage=0.571 af Inflow=3.14 cfs 0.572 af Outflow=0.00 cfs 0.001 af

		Post Development.
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Pond Basin 4 & 5: Basin 4 & 5

Peak Elev=87.61' Storage=0.434 af Inflow=2.36 cfs 0.437 af Outflow=0.02 cfs 0.010 af

Pond Basin 6: Basin 6

Peak Elev=92.24' Storage=0.303 af Inflow=1.83 cfs 0.347 af Outflow=0.08 cfs 0.072 af

Total Runoff Area = 17.800 acRunoff Volume = 2.380 afAverage Runoff Depth = 1.60"71.63% Pervious = 12.750 ac28.37% Impervious = 5.050 ac

Summary for Subcatchment Basin 1 Imp: Basin 1 Imp

Runoff = 1.57 cfs @ 12.25 hrs, Volume= 0.246 af, Depth> 4.93"

Runoff by SCS TR-20 method, UH=Delmarva, Weighted-CN, Time Span= 5.00-30.00 hrs, dt= 0.05 hrs NRCC 24-hr D 10 year Rainfall=5.40"

	Area	(ac)	CN	Desc	cription				
*	0.	350	98	Pave	ement & Si	dewalk			
*	0.	250	98	Drive	Driveways				
	0.	600	98	Weig	ghted Aver	age			
	0.	0.600 100.00% Impervious Area							
	Tc (min)	Leng (fee		Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description		
	15.0						Direct Entry, pavement and pipe		

Summary for Subcatchment Basin 1 Pervious: Basin 1 - Pervious

Runoff	=	0.07 cfs @	13.63 hrs, Volume=	0.050 af, Depth= 0.29"
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Runoff by SCS TR-20 method, UH=Delmarva, Weighted-CN, Time Span= 5.00-30.00 hrs, dt= 0.05 hrs NRCC 24-hr D 10 year Rainfall=5.40"

	Area	(ac) C	N Desc	cription		
*	2.	100 3	89 lawn	, A soils		
	2.	100	100.	00% Pervi	ous Area	
	Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
	20.5	100	0.0200	0.08		Sheet Flow, sheet flow
	2.2	300	0.0200	2.28		Woods: Light underbrush n= 0.400 P2= 3.50" Shallow Concentrated Flow, shallow conc Unpaved Kv= 16.1 fps
	4.6	1,180	0.0030	4.27	13.42	Pipe Channel, pipe flow
						24.0" Round Area= 3.1 sf Perim= 6.3' r= 0.50' n= 0.012
	27.3	1,580	Total			

Summary for Subcatchment Basin 1 Roof: Basin 1 Roof

Runoff = 1.31 cfs @ 12.25 hrs, Volume= 0.205 af, Depth> 4.93"

Runoff by SCS TR-20 method, UH=Delmarva, Weighted-CN, Time Span= 5.00-30.00 hrs, dt= 0.05 hrs NRCC 24-hr D 10 year Rainfall=5.40"

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Area (ac) CN Description								
* 0.500 98 Roof								
0.500 100.00% Impervious Area								
Tc Length Slope Velocity Capacity Description (min) (feet) (ft/ft) (ft/sec) (cfs)								
15.0 Direct Entry, pavement								
Summary for Subcatchment Basin 2 Impervious: Basin 2 Imp								
Runoff = 2.09 cfs @ 12.25 hrs, Volume= 0.328 af, Depth> 4.93"								
Runoff by SCS TR-20 method, UH=Delmarva, Weighted-CN, Time Span= 5.00-30.00 hrs, dt= 0.05 hrs NRCC 24-hr D 10 year Rainfall=5.40"								
Area (ac) CN Description								
* 0.500 98 Pavement & Sidewalk								
* 0.300 98 Driveways								
0.800 98 Weighted Average 0.800 100.00% Impervious Area								
Tc Length Slope Velocity Capacity Description (min) (feet) (ft/ft) (ft/sec) (cfs)								
15.0 Direct Entry, pavement and pipe								
Summary for Subcatchment Basin 2 Pervious: Basin 2 - Pervious								
Runoff = 0.07 cfs @ 13.63 hrs, Volume= 0.049 af, Depth= 0.29"								
Runoff by SCS TR-20 method, UH=Delmarva, Weighted-CN, Time Span= 5.00-30.00 hrs, dt= 0.05 hrs NRCC 24-hr D 10 year Rainfall=5.40"								
Area (ac) CN Description								
* 2.050 39 lawn, A soils								
2.050 100.00% Pervious Area								
Tc Length Slope Velocity Capacity Description (min) (feet) (ft/ft) (ft/sec) (cfs)								
20.5 100 0.0200 0.08 Sheet Flow, sheet flow								
2.23000.02002.28Woods: Light underbrushn= 0.400P2= 3.50"Shallow Concentrated Flow, shallow conc								
Unpaved Kv= 16.1 fps 4.6 1,180 0.0030 4.27 13.42 Pipe Channel, pipe flow 24.0" Round Area= 3.1 sf Perim= 6.3' r= 0.50'								
n= 0.012								

1,580 Total 27.3

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Summary for Subcatchment Basin 2 Roof: Basin 2 Roof						
Runoff = 0.91 cfs @ 12.25 hrs, Volume= 0.144 af, Depth> 4.93"						
Runoff by SCS TR-20 method, UH=Delmarva, Weighted-CN, Time Span= 5.00-30.00 hrs, dt= 0.05 hrs NRCC 24-hr D 10 year Rainfall=5.40"						
Area (ac) CN Description						
* 0.350 98 Roof						
0.350 100.00% Impervious Area						
Tc Length Slope Velocity Capacity Description (min) (feet) (ft/ft) (ft/sec) (cfs)						
15.0 Direct Entry, pavement						
Summary for Subcatchment Basin 3 Impervious: Basin 3 Impervious						
Runoff = 3.14 cfs @ 12.25 hrs, Volume= 0.493 af, Depth> 4.93"						
Runoff by SCS TR-20 method, UH=Delmarva, Weighted-CN, Time Span= 5.00-30.00 hrs, dt= 0.05 hrs NRCC 24-hr D 10 year Rainfall=5.40"						
Area (ac) CN Description						
* 0.550 98 Pavement & Sidewalk						
* 0.250 98 Driveways * 0.400 98 Roof						
1.200 98 Weighted Average						
1.200 100.00% Impervious Area						
Tc Length Slope Velocity Capacity Description (min) (feet) (ft/ft) (ft/sec) (cfs)						
15.0 Direct Entry, pavement and pipe						
Summer for Subsetebrent Desir 2 Demisus, Desir 2 Demisus						
Summary for Subcatchment Basin 3 Pervious: Basin 3 - Pervious						
Runoff = 0.12 cfs @ 13.63 hrs, Volume= 0.079 af, Depth= 0.29"						
Runoff by SCS TR-20 method, UH=Delmarva, Weighted-CN, Time Span= 5.00-30.00 hrs, dt= 0.05 hrs NRCC 24-hr D 10 year Rainfall=5.40"						
Area (ac) CN Description						
* 3.300 39 lawn, A soils						
3.300 100.00% Pervious Area						

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Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
20.5	100	0.0200	0.08		Sheet Flow, sheet flow Woods: Light underbrush n= 0.400 P2= 3.50"
2.2	300	0.0200	2.28		Shallow Concentrated Flow, shallow conc Unpaved Kv= 16.1 fps
 4.6	1,180	0.0030	4.27	13.42	Pipe Channel, pipe flow 24.0" Round Area= 3.1 sf Perim= 6.3' r= 0.50' n= 0.012

27.3 1,580 Total

Summary for Subcatchment Basin 4 & 5 - Pervious: Basin 4 & 5 - Pervious

Runoff = 0.11 cfs @ 13.32 hrs, Volume= 0.067 af, Depth= 0.29"

Runoff by SCS TR-20 method, UH=Delmarva, Weighted-CN, Time Span= 5.00-30.00 hrs, dt= 0.05 hrs NRCC 24-hr D 10 year Rainfall=5.40"

	Area	(ac) C	N Dese	cription		
*	2.	800 3	89 Lawi	n. A Soils		
	2.800 100.00% Pervious Area			00% Pervi	ous Area	
	Тс	Length	Slope	Velocity	Capacity	Description
_	(min)	(feet)	(ft/ft)	(ft/sec)	(cfs)	
	6.6	640	0.0100	1.61		Shallow Concentrated Flow, shallow concentrated
	10.7	800	0.0060	1.25		Unpaved Kv= 16.1 fps Shallow Concentrated Flow, shallow concentrated Unpaved Kv= 16.1 fps
_						

17.3 1,440 Total

Summary for Subcatchment Basin 4 & 5- Impervious: basin 4 & 5, imp

Runoff = 2.35 cfs @ 12.25 hrs, Volume= 0.370 af, Depth> 4.93"

Runoff by SCS TR-20 method, UH=Delmarva, Weighted-CN, Time Span= 5.00-30.00 hrs, dt= 0.05 hrs NRCC 24-hr D 10 year Rainfall=5.40"

	Area	(ac)	CN	Desc	cription		
*	0.	200	98	Pave	ement		
*	0.	200	98	Drive	eways		
*	0.	500	98	Roof			
	0.	0.900 98 Weighted Average					
	0.900 100.00% Impervious Are			00% Impe	rvious Area		
	Tc (min)	Leng (fee		Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
	15.0	•	•		· · ·		Direct Entry, pavement

Summary for Subcatchment Basin 6 Impervious: Basin 6 Imp

Runoff = 1.83 cfs @ 12.25 hrs, Volume= 0.287 af, Depth> 4.93"

Runoff by SCS TR-20 method, UH=Delmarva, Weighted-CN, Time Span= 5.00-30.00 hrs, dt= 0.05 hrs NRCC 24-hr D 10 year Rainfall=5.40"

	Area	(ac)	CN	Desc	cription		
*	0.	250	98	Pave	ement & Si	idewalk	
*	0.	250	98	Drive	eways		
*	0.	200	98	Roof			
	0.70098Weighted Average0.700100.00% Impervious Area						I
	Tc (min)	Leng (fee		Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
	15.0						Direct Entry, pavement and pipe

Summary for Subcatchment Basin 6 Pervious: Basin 6 - Pervious

Runoff = 0.09 cfs @ 13.63 hrs, Volume= 0.060 af, Depth= 0.29"

Runoff by SCS TR-20 method, UH=Delmarva, Weighted-CN, Time Span= 5.00-30.00 hrs, dt= 0.05 hrs NRCC 24-hr D 10 year Rainfall=5.40"

	Area	(ac) C	N Dese	cription		
*	2.	500 3	39 lawn	, A soils		
	2.	500	100.	00% Pervi	ous Area	
_	Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
	20.5	100	0.0200	0.08		Sheet Flow, sheet flow Woods: Light underbrush n= 0.400 P2= 3.50"
	2.2	300	0.0200	2.28		Shallow Concentrated Flow, shallow conc Unpaved Kv= 16.1 fps
	4.6	1,180	0.0030	4.27	13.42	
-	07.0	4 500	T ()			

27.3 1,580 Total

Summary for Reach Site: Site

Inflow Area =	17.800 ac, 28.37% Impervious, Inflow D	epth > 0.22" for 10 year event
Inflow =	0.34 cfs @ 24.31 hrs, Volume=	0.320 af
Outflow =	0.34 cfs @ 24.31 hrs, Volume=	0.320 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 5.00-30.00 hrs, dt= 0.05 hrs

Summary for Pond Basin 1: Basin 1

Inflow Area =	3.200 ac, 34.38% Impervious, Inflow D	epth > 1.88" for 10 year event
Inflow =	2.88 cfs @ 12.25 hrs, Volume=	0.502 af
Outflow =	0.10 cfs @ 24.18 hrs, Volume=	0.089 af, Atten= 96%, Lag= 716.0 min
Primary =	0.10 cfs @ 24.18 hrs, Volume=	0.089 af

Routing by Stor-Ind method, Time Span= 5.00-30.00 hrs, dt= 0.05 hrs Peak Elev= 91.32' @ 24.18 hrs Surf.Area= 0.216 ac Storage= 0.447 af

Plug-Flow detention time= 879.1 min calculated for 0.089 af (18% of inflow) Center-of-Mass det. time= 578.2 min (1,400.4 - 822.2)

Volume	Invert	Avail.Storage	e Storage Description	
#1	88.00'	0.885 a	af Rain Garden Basin (Prismatic)Listed below	
Elevatio (fee 88.0 90.0 91.0 92.0 93.0	(acres) 00 0.050 00 0.100 00 0.150 00 0.200 00 0.200) (acre-) (2) (0)) (0)) (0)) (0)) (0)	StoreCum.Store $acre-feet$)(acre-feet) 0.000 0.000 0.075 0.075 0.125 0.200 0.175 0.375 0.225 0.600 0.285 0.885	
Device #1 #2	Routing Primary Primary	91.00' 3 92.00' 4	Outlet Devices 3.0" Vert. Orifice/Grate C= 0.600 42.0" x 42.0" Horiz. Orifice/Grate C= 0.600 Limited to weir flow at low heads	

Primary OutFlow Max=0.10 cfs @ 24.18 hrs HW=91.32' (Free Discharge) -1=Orifice/Grate (Orifice Controls 0.10 cfs @ 2.13 fps) -2=Orifice/Grate (Controls 0.00 cfs)

Summary for Pond Basin 2: Basin 2

Inflow Area =	=	3.200 ac, 35.94% Impervious, Inflow Depth > 1.96" for 10 year event
Inflow =	=	3.01 cfs @ 12.25 hrs, Volume= 0.521 af
Outflow =	=	0.13 cfs @ 23.97 hrs, Volume= 0.148 af, Atten= 96%, Lag= 703.1 min
Primary =	=	0.13 cfs @ 23.97 hrs, Volume= 0.148 af

Routing by Stor-Ind method, Time Span= 5.00-30.00 hrs, dt= 0.05 hrs Peak Elev= 89.42' @ 23.97 hrs Surf.Area= 0.259 ac Storage= 0.422 af

Plug-Flow detention time= 733.5 min calculated for 0.147 af (28% of inflow) Center-of-Mass det. time= 499.7 min (1,320.2 - 820.5)

Post Development. NRCC 24-hr D 10 year Rainfall=5.40" Printed 6/28/2021 tions LLC Page 21

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Volume	Invert	Avail.Storage	Storage Description							
#1	87.00'	1.330 af	Rain Garden Basin (Prismatic)Listed							
Elevation Surf Area		ea Inc St	ore Cum Store							

Elevalit	JII Su	III.Alea	111	0.31016	Cum.Store				
(fee	et)	(acres)	(ac	re-feet)	(acre-feet)				
87.0	00	0.090		0.000	0.000				
88.0	00	0.150		0.120	0.120				
89.0	00	0.230		0.190	0.310				
90.0	00	0.300		0.265	0.575				
91.0	00	0.380		0.340	0.915				
92.0	00	0.450		0.415	1.330				
Device	Routing		Invert	Outlet D	evices				
#1	Primary		89.00'	3.0" Vei	rt. Orifice/Grate	C= 0.600			
#2	Primary		91.00'	42.0" x 42.0" Horiz. Orifice/Grate C= 0.600					
				Limited	to weir flow at lov	v heads			

Primary OutFlow Max=0.13 cfs @ 23.97 hrs HW=89.42' (Free Discharge) -1=Orifice/Grate (Orifice Controls 0.13 cfs @ 2.62 fps) -2=Orifice/Grate (Controls 0.00 cfs)

Summary for Pond Basin 3: Basin 3

Inflow Area =	4.500 ac, 26.67% Impervious, Inflow Depth > 1.53" for 10 year event
Inflow =	3.14 cfs @ 12.25 hrs, Volume= 0.572 af
Outflow =	0.00 cfs @ 25.65 hrs, Volume= 0.001 af, Atten= 100%, Lag= 804.1 min
Primary =	0.00 cfs @ 25.65 hrs, Volume= 0.001 af

Routing by Stor-Ind method, Time Span= 5.00-30.00 hrs, dt= 0.05 hrs Peak Elev= 90.03' @ 25.65 hrs Surf.Area= 0.362 ac Storage= 0.571 af

Plug-Flow detention time= 1,343.9 min calculated for 0.001 af (0% of inflow) Center-of-Mass det. time= 786.6 min (1,619.7 - 833.1)

Volume	Inve	ert Av	/ail.Storag	je St	orage Desc	ription	
#1	88.0)0'	1.950	af R a	ain Garden	Basin	(Prismatic)Listed below
Elevatic (fee		rf.Area (acres)		.Store e-feet)	Cum.s (acre-		
88.0	0	0.200		0.000	C	000.	
89.0	00	0.280		0.240	C).240	
90.0	0	0.360		0.320	C).560	
91.0	0	0.420		0.390	C).950	
92.0	00	0.500		0.460	1	.410	
93.0	00	0.580		0.540	1	.950	
Device	Routing			-	Devices		
#1Primary90.00' 3.0" Vert. Orifice/Grate C= 0.600#2Primary92.00' 42.0" x 42.0" Horiz. Orifice/Grate C= 0.600Limited to weir flow at low heads				fice/Grate C= 0.600			

Primary OutFlow Max=0.00 cfs @ 25.65 hrs HW=90.03' (Free Discharge) -1=Orifice/Grate (Orifice Controls 0.00 cfs @ 0.58 fps) -2=Orifice/Grate (Controls 0.00 cfs)

Summary for Pond Basin 4 & 5: Basin 4 & 5

Inflow Area =	3.700 ac, 24.32% Impervious, Inflow De	epth > 1.42" for 10 year event
Inflow =	2.36 cfs @ 12.25 hrs, Volume=	0.437 af
Outflow =	0.02 cfs @ 24.62 hrs, Volume=	0.010 af, Atten= 99%, Lag= 742.2 min
Primary =	0.02 cfs $\overline{@}$ 24.62 hrs, Volume=	0.010 af

Routing by Stor-Ind method, Time Span= 5.00-30.00 hrs, dt= 0.05 hrs Peak Elev= 87.61' @ 24.62 hrs Surf.Area= 0.252 ac Storage= 0.434 af

Plug-Flow detention time= 1,232.9 min calculated for 0.010 af (2% of inflow) Center-of-Mass det. time= 736.7 min (1,571.8 - 835.1)

Volume	Inve	ert Av	ail.Storage	Storag	ge Description			
#1	85.0	0'	1.690 af Rai r		Garden Basin	4 & 5 (Prismatic)Listed below		
	-							
Elevatio		f.Area	Inc.S		Cum.Store			
(fee	/	acres)	(acre-f	eet)	(acre-feet)			
85.0	-	0.080	0.	000	0.000			
86.0		0.140	0.	110	0.110			
87.0	-	0.210	0.	175	0.285			
88.0		0.280	-	245	0.530			
89.0		0.350		315	0.845			
90.0		0.420		385	1.230			
91.0	00	0.500	0.	460	1.690			
Device	Routing			utlet Dev				
#1	Primary		87.50' 3.	0" Vert.	Orifice/Grate	C= 0.600		
#2	Primary	ary 90.00' 4		42.0" x 42.0" Horiz. Orifice/Grate C= 0.600				
			Lir	mited to	weir flow at low	v heads		
						Free Discharge)		
					@ 1.11 fps)			
└─2=Or	ifice/Grate	e(Cont	rols 0.00 cfs	s)				
			Sumr	nary fo	or Pond Bas	in 6: Basin 6		
Inflow A	rea =	3.200	ac. 21.88%	6 Imperv	vious. Inflow D	epth > 1.30" for 10 year event		
Inflow	=				olume=	0.347 af		
Outflow	=				olume=			
Primary			fs @ 24.22			0.072 af		
. innary		5.00 0						

Routing by Stor-Ind method, Time Span= 5.00-30.00 hrs, dt= 0.05 hrs

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Peak Elev= 92.24' @ 24.22 hrs Surf.Area= 0.312 ac Storage= 0.303 af

Plug-Flow detention time= 838.0 min calculated for 0.071 af (21% of inflow) Center-of-Mass det. time= 550.2 min (1,393.1 - 842.9)

Volume	Inv	vert Av	/ail.Stora	ge Sto	rage Description				
#1	91.	00'	1.350	af Rai	n Garden Basin	(Prismatic)Listed below			
Elevatio (fee		urf.Area (acres)		c.Store e-feet)	Cum.Store (acre-feet)				
91.0	0	0.150		0.000	0.000				
92.0	0	0.300		0.225	0.225				
93.0	0	0.350		0.325	0.550				
94.0	0	0.400		0.375	0.925				
95.0	0	0.450		0.425	1.350				
Device	Routing		Invert	Outlet D)evices				
#1	Primary		92.00'	3.0" Ve	rt. Orifice/Grate	C= 0.600			
#2	Primary		94.00'	42.0" x	42.0" Horiz. Orif	fice/Grate C= 0.600			
				Limited	to weir flow at low	w heads			
Primary	Primary OutFlow Max=0.08 cfs @ 24.22 hrs HW=92.24' (Free Discharge)								

-1=Orifice/Grate (Orifice Controls 0.08 cfs @ 1.67 fps) -2=Orifice/Grate (Controls 0.00 cfs)

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Runoff by SCS TR-20 metho	nrs, dt=0.05 hrs, 501 points d, UH=Delmarva, Weighted-CN hod - Pond routing by Stor-Ind method
SubcatchmentBasin 1 Imp: Basin 1 Imp Runoff	Area=0.600 ac 100.00% Impervious Runoff Depth>5.67" Tc=15.0 min CN=98 Runoff=1.80 cfs 0.284 af
	off Area=2.100 ac 0.00% Impervious Runoff Depth=0.50" th=1,580' Tc=27.3 min CN=39 Runoff=0.17 cfs 0.088 af
Subcatchment Basin 1 Roof: Basin 1 Roof Runoff	Area=0.500 ac 100.00% Impervious Runoff Depth>5.67" Tc=15.0 min CN=98 Runoff=1.50 cfs 0.236 af
Subcatchment Basin 2 Impervious: Basin Runoff	Area=0.800 ac 100.00% Impervious Runoff Depth>5.67" Tc=15.0 min CN=98 Runoff=2.40 cfs 0.378 af
	off Area=2.050 ac 0.00% Impervious Runoff Depth=0.50" h=1,580' Tc=27.3 min CN=39 Runoff=0.16 cfs 0.086 af
Subcatchment Basin 2 Roof: Basin 2 Roof Runoff	Area=0.350 ac 100.00% Impervious Runoff Depth>5.67" Tc=15.0 min CN=98 Runoff=1.05 cfs 0.165 af
Subcatchment Basin 3 Impervious: Basin Runoff	Area=1.200 ac 100.00% Impervious Runoff Depth>5.67" Tc=15.0 min CN=98 Runoff=3.61 cfs 0.567 af
	off Area=3.300 ac 0.00% Impervious Runoff Depth=0.50" th=1,580' Tc=27.3 min CN=39 Runoff=0.26 cfs 0.139 af
	off Area=2.800 ac 0.00% Impervious Runoff Depth=0.50" th=1,440' Tc=17.3 min CN=39 Runoff=0.25 cfs 0.118 af
Subcatchment Basin 4 & 5- Impervious: Runoff	Area=0.900 ac 100.00% Impervious Runoff Depth>5.67" Tc=15.0 min CN=98 Runoff=2.70 cfs 0.425 af
Subcatchment Basin 6 Impervious: Basin Runoff	Area=0.700 ac 100.00% Impervious Runoff Depth>5.67" Tc=15.0 min CN=98 Runoff=2.10 cfs 0.331 af
	off Area=2.500 ac 0.00% Impervious Runoff Depth=0.50" h=1,580' Tc=27.3 min CN=39 Runoff=0.20 cfs 0.105 af
Reach Site: Site	Inflow=0.65 cfs 0.675 af Outflow=0.65 cfs 0.675 af
Pond Basin 1: Basin 1 Pea	ak Elev=91.54' Storage=0.495 af Inflow=3.33 cfs 0.608 af Outflow=0.15 cfs 0.169 af
Pond Basin 2: Basin 2 Pea	ak Elev=89.65' Storage=0.482 af Inflow=3.48 cfs 0.630 af Outflow=0.17 cfs 0.216 af
Pond Basin 3: Basin 3 Pea	ak Elev=90.29' Storage=0.671 af Inflow=3.65 cfs 0.706 af Outflow=0.09 cfs 0.068 af

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Pond Basin 4 & 5: Basin 4 & 5

Peak Elev=87.85' Storage=0.493 af Inflow=2.82 cfs 0.543 af Outflow=0.11 cfs 0.089 af

Pond Basin 6: Basin 6

Peak Elev=92.38' Storage=0.347 af Inflow=2.13 cfs 0.436 af Outflow=0.12 cfs 0.133 af

Total Runoff Area = 17.800 acRunoff Volume = 2.923 afAverage Runoff Depth = 1.97"71.63% Pervious = 12.750 ac28.37% Impervious = 5.050 ac

Summary for Subcatchment Basin 1 Imp: Basin 1 Imp

Runoff = 1.80 cfs @ 12.25 hrs, Volume= 0.284 af, Depth> 5.67"

Runoff by SCS TR-20 method, UH=Delmarva, Weighted-CN, Time Span= 5.00-30.00 hrs, dt= 0.05 hrs NRCC 24-hr D 25 Year Rainfall=6.20"

	Area	(ac)	CN	Desc	cription					
*	0.	350	98	Pave	ement & Si	dewalk				
*	0.	250	98	Drive	Driveways					
	0.600 98 Weighted Average									
	0.600 100.00% Impervious Area				00% Impe	rvious Area	I			
	Tc (min)	Leng (fee		Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description			
	15.0						Direct Entry, pavement and pipe			

Summary for Subcatchment Basin 1 Pervious: Basin 1 - Pervious

Runoff	=	0.17 cfs @	13.15 hrs, Volume	e= 0.088 af,	Depth= 0.50"
--------	---	------------	-------------------	--------------	--------------

Runoff by SCS TR-20 method, UH=Delmarva, Weighted-CN, Time Span= 5.00-30.00 hrs, dt= 0.05 hrs NRCC 24-hr D 25 Year Rainfall=6.20"

_	Area	(ac) C	N Dese	cription		
*	2.	100 3	89 lawn	, A soils		
	2.	100	100.	00% Pervi	ous Area	
	Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
	20.5	100	0.0200	0.08		Sheet Flow, sheet flow Woods: Light underbrush n= 0.400 P2= 3.50"
	2.2	300	0.0200	2.28		Shallow Concentrated Flow, shallow conc Unpaved Kv= 16.1 fps
	4.6	1,180	0.0030	4.27	13.42	Pipe Channel, pipe flow 24.0" Round Area= 3.1 sf Perim= 6.3' r= 0.50' n= 0.012
	27.3	1,580	Total			

Summary for Subcatchment Basin 1 Roof: Basin 1 Roof

Runoff = 1.50 cfs @ 12.25 hrs, Volume= 0.236 af, Depth> 5.67"

Runoff by SCS TR-20 method, UH=Delmarva, Weighted-CN, Time Span= 5.00-30.00 hrs, dt= 0.05 hrs NRCC 24-hr D 25 Year Rainfall=6.20"

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Area	(ac) C	N Desc	cription							
* 0.	.500 9	98 Roof								
0.500 100.00% Impervious Area										
Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description					
15.0		<u> </u>		.	Direct Entry, pavement					
	_									
	Summary for Subcatchment Basin 2 Impervious: Basin 2 Imp									
Runoff	=	2.40 cfs	s @ 12.2	5 hrs, Volu	me= 0.378 af, Depth> 5.67"					
Runoff by SCS TR-20 method, UH=Delmarva, Weighted-CN, Time Span= 5.00-30.00 hrs, dt= 0.05 hrs NRCC 24-hr D_25 Year Rainfall=6.20"										
Area	(ac) C	N Deso	cription							
			ement & Si	dewalk						
<u>* 0</u> .			eways							
			ghted Aver	0						
0.	.800	100.	00% Impe	rvious Area						
Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description					
15.0	(/	(1411)	()	()	Direct Entry, pavement and pipe					
	Sur	nmary f	or Subca	atchment	Basin 2 Pervious: Basin 2 - Pervious					
Runoff	=	0.16 cfs	s @ 13.1	5 hrs, Volu	me= 0.086 af, Depth= 0.50"					
			nod, UH=D ainfall=6.20		/eighted-CN, Time Span= 5.00-30.00 hrs, dt= 0.05 hrs					
Area	(ac) C	N Desc	cription							
			, A soils							
-	.050		00% Pervi	ous Area						
-		0	.	o						
Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description					
20.5	100	0.0200	0.08	(05)	Sheet Flow, sheet flow					
20.5	100	0.0200	0.00		Woods: Light underbrush n= 0.400 P2= 3.50"					
2.2	300	0.0200	2.28		Shallow Concentrated Flow, shallow conc					
4.0	4 400	0.0000	4.07	40.40	Unpaved Kv= 16.1 fps					
4.6	1,180	0.0030	4.27	13.42	Pipe Channel, pipe flow 24.0" Round Area= 3.1 sf Perim= 6.3' r= 0.50' n= 0.012					

27.3 1,580 Total

Summary for Subcatchment Basin 2 Roof: Basin 2 Roof

Runoff = 1.05 cfs @ 12.25 hrs, Volume= 0.165 af, Depth> 5.67"

Runoff by SCS TR-20 method, UH=Delmarva, Weighted-CN, Time Span= 5.00-30.00 hrs, dt= 0.05 hrs NRCC 24-hr D 25 Year Rainfall=6.20"

Area (ac) CN Description							
* 0.350 98 Roof							
0.350 100.00% Impervious Area							
Tc Length Slope Velocity Capacity Description (min) (feet) (ft/ft) (ft/sec) (cfs)							
15.0 Direct Entry, pavement							
Summary for Subcatchment Basin 3 Impervious: Basin 3 Impervious							
Runoff = 3.61 cfs @ 12.25 hrs, Volume= 0.567 af, Depth> 5.67"							
Runoff by SCS TR-20 method, UH=Delmarva, Weighted-CN, Time Span= 5.00-30.00 hrs, dt= 0.05 hrs NRCC 24-hr D_25 Year Rainfall=6.20"							
Area (ac) CN Description							
* 0.550 98 Pavement & Sidewalk							
* 0.250 98 Driveways							
* 0.400 98 Roof 1.200 98 Weighted Average							
1.20098Weighted Average1.200100.00% Impervious Area							
Tc Length Slope Velocity Capacity Description (min) (feet) (ft/ft) (ft/sec) (cfs)							
15.0 Direct Entry, pavement and pipe							
Summary for Subcatchment Basin 3 Pervious: Basin 3 - Pervious							
Runoff = 0.26 cfs @ 13.15 hrs, Volume= 0.139 af, Depth= 0.50"							
Runoff by SCS TR-20 method, UH=Delmarva, Weighted-CN, Time Span= 5.00-30.00 hrs, dt= 0.05 hrs NRCC 24-hr D 25 Year Rainfall=6.20"							
Area (ac) CN Description							
* 3.300 39 lawn, A soils							
3.300 100.00% Pervious Area							

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Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
20.5	100	0.0200	0.08		Sheet Flow, sheet flow Woods: Light underbrush n= 0.400 P2= 3.50"
2.2	300	0.0200	2.28		Shallow Concentrated Flow, shallow conc Unpaved Kv= 16.1 fps
4.6	1,180	0.0030	4.27	13.42	Pipe Channel, pipe flow 24.0" Round Area= 3.1 sf Perim= 6.3' r= 0.50' n= 0.012

27.3 1,580 Total

Summary for Subcatchment Basin 4 & 5 - Pervious: Basin 4 & 5 - Pervious

Runoff = 0.25 cfs @ 12.71 hrs, Volume= 0.118 af, Depth= 0.50"

Runoff by SCS TR-20 method, UH=Delmarva, Weighted-CN, Time Span= 5.00-30.00 hrs, dt= 0.05 hrs NRCC 24-hr D 25 Year Rainfall=6.20"

	Area	(ac) C	N Dese	cription		
*	2.	800 3	89 Lawi	n. A Soils		
	2.800 100.00% Pervious Area					
	Тс	Length	Slope	Velocity	Capacity	Description
_	(min)	(feet)	(ft/ft)	(ft/sec)	(cfs)	
	6.6	640	0.0100	1.61		Shallow Concentrated Flow, shallow concentrated
	10.7	800	0.0060	1.25		Unpaved Kv= 16.1 fps Shallow Concentrated Flow, shallow concentrated Unpaved Kv= 16.1 fps
_						

17.3 1,440 Total

Summary for Subcatchment Basin 4 & 5- Impervious: basin 4 & 5, imp

Runoff = 2.70 cfs @ 12.25 hrs, Volume= 0.425 af, Depth> 5.67"

Runoff by SCS TR-20 method, UH=Delmarva, Weighted-CN, Time Span= 5.00-30.00 hrs, dt= 0.05 hrs NRCC 24-hr D 25 Year Rainfall=6.20"

	Area	(ac)	CN	Desc	cription		
*	0.	200	98	Pave	ement		
*	0.	0.200 98 Driveways					
*	0.	500	98	Root			
0.900 98 Weighted Average							
	0.900 100.00% Impervious Area				00% Impe	rvious Area	
	Tc (min)	Leng (fee		Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
	15.0	•			· · ·		Direct Entry, pavement

Summary for Subcatchment Basin 6 Impervious: Basin 6 Imp

Runoff = 2.10 cfs @ 12.25 hrs, Volume= 0.331 af, Depth> 5.67"

Runoff by SCS TR-20 method, UH=Delmarva, Weighted-CN, Time Span= 5.00-30.00 hrs, dt= 0.05 hrs NRCC 24-hr D 25 Year Rainfall=6.20"

	Area	(ac)	CN	Desc	cription		
*	0.	250	98	Pave	ement & Si	idewalk	
*	0.	250	98	Drive	eways		
*	0.	200	98	Roof			
	0.700 98 Weighted Average 0.700 100.00% Impervious Area						I
	Tc (min)	Leng (fee		Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
	15.0						Direct Entry, pavement and pipe

Summary for Subcatchment Basin 6 Pervious: Basin 6 - Pervious

Runoff = 0.20 cfs @ 13.15 hrs, Volume= 0.105 af, Depth= 0.50"

Runoff by SCS TR-20 method, UH=Delmarva, Weighted-CN, Time Span= 5.00-30.00 hrs, dt= 0.05 hrs NRCC 24-hr D 25 Year Rainfall=6.20"

	Area	(ac) C	N Dese	cription		
*	2.	500 3	39 lawn	, A soils		
	2.500 100.00% Pervious					
_	Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
	20.5	100	0.0200	0.08		Sheet Flow, sheet flow Woods: Light underbrush n= 0.400 P2= 3.50"
	2.2	300	0.0200	2.28		Shallow Concentrated Flow, shallow conc Unpaved Kv= 16.1 fps
	4.6	1,180	0.0030	4.27	13.42	
-	07.0	4 500	T ()			

27.3 1,580 Total

Summary for Reach Site: Site

Inflow Area =	17.800 ac, 28.37% Impervious, Inflow D	epth > 0.46" for 25 Year event
Inflow =	0.65 cfs @ 24.21 hrs, Volume=	0.675 af
Outflow =	0.65 cfs @ 24.21 hrs, Volume=	0.675 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 5.00-30.00 hrs, dt= 0.05 hrs

Summary for Pond Basin 1: Basin 1

Inflow Area =	3.200 ac, 34.38% Impervious, Inflow De	epth > 2.28" for 25 Year event
Inflow =	3.33 cfs @ 12.25 hrs, Volume=	0.608 af
Outflow =	0.15 cfs @ 24.09 hrs, Volume=	0.169 af, Atten= 95%, Lag= 710.2 min
Primary =	0.15 cfs @ 24.09 hrs, Volume=	0.169 af

Routing by Stor-Ind method, Time Span= 5.00-30.00 hrs, dt= 0.05 hrs Peak Elev= 91.54' @ 24.09 hrs Surf.Area= 0.227 ac Storage= 0.495 af

Plug-Flow detention time= 741.2 min calculated for 0.169 af (28% of inflow) Center-of-Mass det. time= 503.1 min (1,331.8 - 828.7)

Volume	Invert	Avail.Stor	age Stor	rage Description
#1	88.00'	0.88	5 af Rair	n Garden Basin (Prismatic)Listed below
Elevatio (fee	et) (acr	es) (ad	nc.Store cre-feet)	Cum.Store (acre-feet)
88.0)50	0.000	0.000
89.0		100	0.075	0.075
90.0	00 0. ⁻	150	0.125	0.200
91.0	0.2	200	0.175	0.375
92.0	0.2	250	0.225	0.600
93.0	0.0	320	0.285	0.885
Device #1	Routing Primary	Invert 91.00'		rt. Orifice/Grate C= 0.600
#2	Primary	92.00'		42.0" Horiz. Orifice/Grate C= 0.600 to weir flow at low heads

Primary OutFlow Max=0.15 cfs @ 24.09 hrs HW=91.54' (Free Discharge) 1=Orifice/Grate (Orifice Controls 0.15 cfs @ 3.08 fps) 2=Orifice/Grate (Controls 0.00 cfs)

Summary for Pond Basin 2: Basin 2

Inflow Area =	3.200 ac, 35.94% Impervious, Inflow D	Depth > 2.36" for 25 Year event
Inflow =	3.48 cfs @ 12.25 hrs, Volume=	0.630 af
Outflow =	0.17 cfs @ 22.83 hrs, Volume=	0.216 af, Atten= 95%, Lag= 634.7 min
Primary =	0.17 cfs @ 22.83 hrs, Volume=	0.216 af

Routing by Stor-Ind method, Time Span= 5.00-30.00 hrs, dt= 0.05 hrs Peak Elev= 89.65' @ 22.83 hrs Surf.Area= 0.275 ac Storage= 0.482 af

Plug-Flow detention time= 679.8 min calculated for 0.215 af (34% of inflow) Center-of-Mass det. time= 469.0 min (1,295.7 - 826.7)

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Volume	Invert	Avail.Storage	Storage Description
#1	87.00'	1.330 af	Rain Garden Basin (Prismatic)Listed below
Elevatio	on Surf.Are	ea Inc.S	tore Cum.Store
(fee			
87.0			000 0.000
88.0			120 0.120
89.0			190 0.310
90.0			265 0.575
91.0			340 0.915 415 1.220
92.0	00 0.45	JU U.	415 1.330
	Routing		utlet Devices
#1	Primary		0" Vert. Orifice/Grate C= 0.600
#2	Primary		2.0" x 42.0" Horiz. Orifice/Grate C= 0.600
		LII	mited to weir flow at low heads
Primary	OutFlow Max	=0.17 cfs @ 2	2.83 hrs HW=89.65' (Free Discharge)
			0.17 cfs @ 3.49 fps)
	ifice/Grate (C		
	·		
		Sum	nary for Pond Basin 3: Basin 3
Inflow A	rea = 4.5	500 ac 26 67%	6 Impervious, Inflow Depth > 1.88" for 25 Year event
Inflow			5 hrs, Volume= 0.706 af
Outflow			B hrs, Volume= 0.068 af, Atten= 97%, Lag= 730.5 min
Primary			3 hrs, Volume= 0.068 af
			an= 5.00-30.00 hrs, dt= 0.05 hrs
Peak Ele	ev= 90.29' @ 2	4.43 hrs Surf.	Area= 0.377 ac Storage= 0.671 af
Plug-Flo	w detention tim	ne= 1 031 1 mi	n calculated for 0.068 af (10% of inflow)
			(1,484.2 - 841.5)
\ / . I	lt		
Volume		H	Storage Description
#1	88.00'	1.950 af	Rain Garden Basin (Prismatic)Listed below
Elevatio	on Surf.Are	ea Inc.S	tore Cum.Store
(fee	et) (acre	s) (acre-f	eet) (acre-feet)
88.0	0.20	00 0.	000 0.000
89.0	0.28	30 0.	240 0.240
90.0			320 0.560
91.0			390 0.950
92.0			460 1.410
93.0	0.58	30 0.	540 1.950
Device	Routing	Invert O	utlet Devices
#1	Primary		0" Vert. Orifice/Grate C= 0.600
#2	Primary		2.0" x 42.0" Horiz. Orifice/Grate C= 0.600
	,		mited to weir flow at low heads

Limited to weir flow at low heads

Primary OutFlow Max=0.09 cfs @ 24.43 hrs HW=90.29' (Free Discharge) -1=Orifice/Grate (Orifice Controls 0.09 cfs @ 1.93 fps) -2=Orifice/Grate (Controls 0.00 cfs)

Summary for Pond Basin 4 & 5: Basin 4 & 5

Inflow Area =	3.700 ac, 24.32% Impervious, Inflow E	Depth > 1.76" for 25 Year event
Inflow =	2.82 cfs @ 12.26 hrs, Volume=	0.543 af
Outflow =	0.11 cfs @ 24.23 hrs, Volume=	0.089 af, Atten= 96%, Lag= 718.0 min
Primary =	0.11 cfs $\overline{@}$ 24.23 hrs, Volume=	0.089 af

Routing by Stor-Ind method, Time Span= 5.00-30.00 hrs, dt= 0.05 hrs Peak Elev= 87.85' @ 24.23 hrs Surf.Area= 0.269 ac Storage= 0.493 af

Plug-Flow detention time= 903.3 min calculated for 0.089 af (16% of inflow) Center-of-Mass det. time= 588.3 min (1,431.4 - 843.1)

Volume	Inve	ert Av	ail.Storage	Storag	e Description	
#1	85.0	0'	1.690 af	Rain	Garden Basin 4 & 5	6 (Prismatic)Listed below
Elevatio		f.Area	Inc.S		Cum.Store	
(fee		acres)	(acre-		(acre-feet)	
85.0	-	0.080	-	.000	0.000	
86.0	-	0.140		.110	0.110	
87.0	-	0.210		.175	0.285	
88.0		0.280		.245	0.530	
89.0		0.350		.315	0.845	
90.0	-	0.420	-	.385	1.230	
91.0	00	0.500	0	.460	1.690	
Device	Routing		_	utlet Dev		
#1	Primary		-		Orifice/Grate C= 0	
#2	Primary				.0" Horiz. Orifice/G	
			LI	mited to	weir flow at low head	ds
f−1=Ori	Primary OutFlow Max=0.11 cfs @ 24.23 hrs HW=87.85' (Free Discharge) 1=Orifice/Grate (Orifice Controls 0.11 cfs @ 2.27 fps) 2=Orifice/Grate (Controls 0.00 cfs)					
			Sum	mary fo	r Pond Basin 6:	Basin 6
Inflow Ar Inflow Outflow Primary	=	2.13 ct 0.12 ct	fs @ 12.25	5 hrs, Vo 6 hrs, Vo	olume= 0.43 olume= 0.13	33 af, Atten= 94%, Lag= 714.2 min

Routing by Stor-Ind method, Time Span= 5.00-30.00 hrs, dt= 0.05 hrs

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Peak Elev= 92.38' @ 24.16 hrs Surf.Area= 0.319 ac Storage= 0.347 af

Plug-Flow detention time= 717.1 min calculated for 0.133 af (31% of inflow) Center-of-Mass det. time= 482.1 min (1,334.6 - 852.5)

Volume	١n	vert Av	vail.Storag	je Stor	age Description		
#1	91.	00'	1.350 a	af Rair	n Garden Basin	(Prismatic)Listed below	
Elevatio	t)	urf.Area (acres)	(acre	Store e-feet)	Cum.Store (acre-feet)		
91.0	•	0.150		0.000	0.000		
92.0	-	0.300		0.225	0.225		
93.0	0	0.350		0.325	0.550		
94.0	0	0.400		0.375	0.925		
95.0	00	0.450		0.425	1.350		
Device	Routing		Invert	Outlet D	evices		
#1	Primary		92.00'	3.0" Ver	t. Orifice/Grate	C= 0.600	
#2	Primary		94.00'	42.0" x 4	42.0" Horiz. Orif	fice/Grate C= 0.600	
	5			Limited t	o weir flow at lov	w heads	
Primary	Primary OutFlow Max=0.12 cfs @ 24.16 hrs HW=92.38' (Free Discharge)						

-1=Orifice/Grate (Orifice Controls 0.12 cfs @ 2.41 fps) -2=Orifice/Grate (Controls 0.00 cfs)

Post Developed.042721.NRCC 24-hr D100 year Rainfall=9.20"Prepared by {enter your company name here}Printed 6/28/2021Printed 6/28/2021HydroCAD® 10.00-22 s/n 09416 © 2018 HydroCAD Software Solutions LLCPage 35
Time span=5.00-30.00 hrs, dt=0.05 hrs, 501 points Runoff by SCS TR-20 method, UH=Delmarva, Weighted-CN Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method
Subcatchment Basin 1 Imp: Basin 1 Imp Runoff Area=0.600 ac 100.00% Impervious Runoff Depth>8.46" Tc=15.0 min CN=98 Runoff=2.68 cfs 0.423 af
Subcatchment Basin 1 Pervious: Basin 1 - Runoff Area=2.100 ac 0.00% Impervious Runoff Depth=1.70" Flow Length=1,580' Tc=27.3 min CN=39 Runoff=1.03 cfs 0.297 af
SubcatchmentBasin 1 Roof: Basin 1 Roof Runoff Area=0.500 ac 100.00% Impervious Runoff Depth>8.46" Tc=15.0 min CN=98 Runoff=2.23 cfs 0.353 af
Subcatchment Basin 2 Impervious: Basin Runoff Area=0.800 ac 100.00% Impervious Runoff Depth>8.46" Tc=15.0 min CN=98 Runoff=3.58 cfs 0.564 af
Subcatchment Basin 2 Pervious: Basin 2 - Runoff Area=2.050 ac 0.00% Impervious Runoff Depth=1.70" Flow Length=1,580' Tc=27.3 min CN=39 Runoff=1.01 cfs 0.290 af
Subcatchment Basin 2 Roof: Basin 2 Roof Runoff Area=0.350 ac 100.00% Impervious Runoff Depth>8.46" Tc=15.0 min CN=98 Runoff=1.56 cfs 0.247 af
Subcatchment Basin 3 Impervious: Basin Runoff Area=1.200 ac 100.00% Impervious Runoff Depth>8.46" Tc=15.0 min CN=98 Runoff=5.36 cfs 0.846 af
Subcatchment Basin 3 Pervious: Basin 3 - Runoff Area=3.300 ac 0.00% Impervious Runoff Depth=1.70" Flow Length=1,580' Tc=27.3 min CN=39 Runoff=1.62 cfs 0.467 af
Subcatchment Basin 4 & 5 - Pervious: Basin Runoff Area=2.800 ac 0.00% Impervious Runoff Depth=1.70" Flow Length=1,440' Tc=17.3 min CN=39 Runoff=1.80 cfs 0.396 af
Subcatchment Basin 4 & 5- Impervious: Runoff Area=0.900 ac 100.00% Impervious Runoff Depth>8.46" Tc=15.0 min CN=98 Runoff=4.02 cfs 0.635 af
Subcatchment Basin 6 Impervious: Basin Runoff Area=0.700 ac 100.00% Impervious Runoff Depth>8.46" Tc=15.0 min CN=98 Runoff=3.13 cfs 0.494 af
Subcatchment Basin 6 Pervious: Basin 6 - Runoff Area=2.500 ac 0.00% Impervious Runoff Depth=1.70" Flow Length=1,580' Tc=27.3 min CN=39 Runoff=1.23 cfs 0.354 af
Reach Site: SiteInflow=1.98 cfs1.959 afOutflow=1.98 cfs1.959 af
Pond Basin 1: Basin 1Peak Elev=92.07' Storage=0.621 af Inflow=5.55 cfs 1.073 af Outflow=1.20 cfs 0.558 af
Pond Basin 2: Basin 2Peak Elev=90.72' Storage=0.819 af Inflow=5.75 cfs 1.101 af Outflow=0.30 cfs 0.409 af
Pond Basin 3: Basin 3Peak Elev=91.31' Storage=1.095 af Inflow=6.34 cfs 1.313 af Outflow=0.26 cfs 0.325 af

		Post Development.
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Pond Basin 4 & 5: Basin 4 & 5

Peak Elev=88.86' Storage=0.802 af Inflow=5.71 cfs 1.031 af Outflow=0.26 cfs 0.340 af

Pond Basin 6: Basin 6

Peak Elev=93.20' Storage=0.623 af Inflow=3.90 cfs 0.847 af Outflow=0.24 cfs 0.326 af

Total Runoff Area = 17.800 acRunoff Volume = 5.365 afAverage Runoff Depth = 3.62"71.63% Pervious = 12.750 ac28.37% Impervious = 5.050 ac

Summary for Subcatchment Basin 1 Imp: Basin 1 Imp

Runoff = 2.68 cfs @ 12.25 hrs, Volume= 0.423 af, Depth> 8.46"

Runoff by SCS TR-20 method, UH=Delmarva, Weighted-CN, Time Span= 5.00-30.00 hrs, dt= 0.05 hrs NRCC 24-hr D 100 year Rainfall=9.20"

	Area	(ac)	CN	Desc	cription		
*	0.	350	98	Pave	ement & Si	dewalk	
*	0.	250	98	Drive	eways		
	0.	600	98	Weig	ghted Aver	age	
	0.	600		100.	00% Impe	rvious Area	l
	Tc	Leng		Slope	Velocity	Capacity	Description
	(min) (feet) (ft/ft) (ft/sec) (cfs)				(ft/sec)	(cfs)	
	15.0						Direct Entry, pavement and pipe

Summary for Subcatchment Basin 1 Pervious: Basin 1 - Pervious

Runoff	=	1.03 cfs @	12.52 hrs, Volume=	0.297 af, Depth= 1.70"
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Runoff by SCS TR-20 method, UH=Delmarva, Weighted-CN, Time Span= 5.00-30.00 hrs, dt= 0.05 hrs NRCC 24-hr D 100 year Rainfall=9.20"

_	Area	(ac) C	N Desc	cription		
*	2.	100 3	89 lawn	, A soils		
	2.	100	100.	00% Pervi	ous Area	
	Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
	20.5	100	0.0200	0.08		Sheet Flow, sheet flow Woods: Light underbrush n= 0.400 P2= 3.50"
	2.2	300	0.0200	2.28		Shallow Concentrated Flow, shallow conc Unpaved Kv= 16.1 fps
	4.6	1,180	0.0030	4.27	13.42	Pipe Channel, pipe flow 24.0" Round Area= 3.1 sf Perim= 6.3' r= 0.50' n= 0.012
	27.3	1,580	Total			

Summary for Subcatchment Basin 1 Roof: Basin 1 Roof

Runoff = 2.23 cfs @ 12.25 hrs, Volume= 0.353 af, Depth> 8.46"

Runoff by SCS TR-20 method, UH=Delmarva, Weighted-CN, Time Span= 5.00-30.00 hrs, dt= 0.05 hrs NRCC 24-hr D 100 year Rainfall=9.20"

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Area	(ac) C	N Des	cription									
-		8 Root										
0.500 100.00% Impervious Area												
Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description							
15.0					Direct Entry, pavement							
	Summary for Subcatchment Basin 2 Impervious: Basin 2 Imp											
Runoff	=	3.58 cfs	s@ 12.2	5 hrs, Volu	me= 0.564 af, Depth> 8.46"							
	Runoff by SCS TR-20 method, UH=Delmarva, Weighted-CN, Time Span= 5.00-30.00 hrs, dt= 0.05 hrs NRCC 24-hr D 100 year Rainfall=9.20"											
Area	(ac) C	N Dese	cription									
			ement & Si	dewalk								
-			eways ghted Aver	200								
	.800			rvious Area	1							
Тс	Length	Slope	Velocity	Capacity	Description							
(min)	(feet)	(ft/ft)	(ft/sec)	(cfs)								
15.0					Direct Entry, pavement and pipe							
	Sur	nmary f	or Subc	atchment	t Basin 2 Pervious: Basin 2 - Pervious							
Runoff	=	1.01 cfs	s@ 12.5	2 hrs, Volu	me= 0.290 af, Depth= 1.70"							
					Veighted-CN, Time Span= 5.00-30.00 hrs, dt= 0.05 hrs							
NRCC 24	4-hr D 10	00 year R	ainfall=9.2	0"								
Area			cription									
			, A soils	•								
2.	.050	100.	00% Pervi	ous Area								
Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description							
20.5	100	0.0200	0.08	(015)	Sheet Flow, sheet flow							
2.2	300	0.0200	2.28		Woods: Light underbrush n= 0.400 P2= 3.50" Shallow Concentrated Flow, shallow conc							
4.6	1,180	0.0030	4.27	13.42	Unpaved Kv= 16.1 fps Pipe Channel, pipe flow 24.0" Round Area= 3.1 sf Perim= 6.3' r= 0.50' p= 0.012							

n= 0.012

27.3 1,580 Total

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Summary for Subcatchment Basin 2 Roof: Basin 2 Roof												
Runoff = 1.56 cfs @ 12.25 hrs, Volume= 0.247 a	f, Depth> 8.46"											
Runoff by SCS TR-20 method, UH=Delmarva, Weighted-CN, Time S NRCC 24-hr D 100 year Rainfall=9.20"	oan= 5.00-30.00 hrs, dt= 0.05 hrs											
Area (ac) CN Description												
* 0.350 98 Roof 0.350 100.00% Impervious Area												
Tc Length Slope Velocity Capacity Description (min) (feet) (ft/ft) (ft/sec) (cfs)												
15.0 Direct Entry, pave	nent											
Summary for Subcatchment Basin 3 Imperviou	ıs: Basin 3 Impervious											
Runoff = 5.36 cfs @ 12.25 hrs, Volume= 0.846 a	f, Depth> 8.46"											
Runoff by SCS TR-20 method, UH=Delmarva, Weighted-CN, Time S NRCC 24-hr D 100 year Rainfall=9.20"	oan= 5.00-30.00 hrs, dt= 0.05 hrs											
Area (ac) CN Description												
 * 0.550 98 Pavement & Sidewalk * 0.250 98 Driveways * 0.400 98 Roof 												
* 0.400 98 Roof 1.200 98 Weighted Average 1.200 100.00% Impervious Area												
Tc Length Slope Velocity Capacity Description _ (min) (feet) (ft/ft) (ft/sec) (cfs)												
15.0 Direct Entry, pave	ment and pipe											
Summary for Subcatchment Basin 3 Perviou	s: Basin 3 - Pervious											
Runoff = 1.62 cfs @ 12.52 hrs, Volume= 0.467 a	f, Depth= 1.70"											
Runoff by SCS TR-20 method, UH=Delmarva, Weighted-CN, Time S NRCC 24-hr D 100 year Rainfall=9.20"	oan= 5.00-30.00 hrs, dt= 0.05 hrs											
Area (ac) CN Description												

_	Area (ac)	CN	Description
*	3.300	39	lawn, A soils
	3.300		100.00% Pervious Area

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Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
20.5	100	0.0200	0.08		Sheet Flow, sheet flow
2.2	300	0.0200	2.28		Woods: Light underbrush n= 0.400 P2= 3.50" Shallow Concentrated Flow, shallow conc Unpaved Kv= 16.1 fps
4.6	1,180	0.0030	4.27	13.42	Pipe Channel, pipe flow 24.0" Round Area= 3.1 sf Perim= 6.3' r= 0.50' n= 0.012

27.3 1,580 Total

Summary for Subcatchment Basin 4 & 5 - Pervious: Basin 4 & 5 - Pervious

Runoff = 1.80 cfs @ 12.35 hrs, Volume= 0.396 af, Depth= 1.70"

Runoff by SCS TR-20 method, UH=Delmarva, Weighted-CN, Time Span= 5.00-30.00 hrs, dt= 0.05 hrs NRCC 24-hr D 100 year Rainfall=9.20"

	Area	(ac) C	N Dese	cription		
*	2.	800 3	9 Law	n. A Soils		
	2.800		100.	00% Pervi	ous Area	
	Tc	Length	Slope	Velocity	Capacity	Description
_	(min) 6.6	(feet) 640	(ft/ft) 0.0100	(ft/sec) 1.61	(cfs)	Shallow Concentrated Flow, shallow concentrated
	0.0	040	0.0100	1.01		Shallow Concentrated Flow, shallow concentrated Unpaved Kv= 16.1 fps
	10.7	800	0.0060	1.25		Shallow Concentrated Flow, shallow concentrated
						Unpaved Kv= 16.1 fps

17.3 1,440 Total

Summary for Subcatchment Basin 4 & 5- Impervious: basin 4 & 5, imp

Runoff = 4.02 cfs @ 12.25 hrs, Volume= 0.635 af, Depth> 8.46"

Runoff by SCS TR-20 method, UH=Delmarva, Weighted-CN, Time Span= 5.00-30.00 hrs, dt= 0.05 hrs NRCC 24-hr D 100 year Rainfall=9.20"

	Area (ac) CN Description						
*	0.	200	98	Pave	ement		
*	0.	200	98	Drive	eways		
*	0.	500	98	Roof			
	0.	900	98	Weig	hted Aver	age	
	0.	900		100.	00% Impei	rvious Area	
	Tc Leng		Length Slope Velocity		Capacity	Description	
_	(min) (feet)		et)	(ft/ft)	(ft/sec)	(cfs)	
	15.0						Direct Entry, pavement

Summary for Subcatchment Basin 6 Impervious: Basin 6 Imp

Runoff = 3.13 cfs @ 12.25 hrs, Volume= 0.494 af, Depth> 8.46"

Runoff by SCS TR-20 method, UH=Delmarva, Weighted-CN, Time Span= 5.00-30.00 hrs, dt= 0.05 hrs NRCC 24-hr D 100 year Rainfall=9.20"

	Area	(ac)	CN	Desc	cription		
*	0.	250	98	Pave	ement & Si	idewalk	
*	0.	250	98	Drive	eways		
*	0.	200	98	Roof			
	0.70098Weighted Average0.700100.00% Impervious Area						I
	Tc (min)	Leng (fee		Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
	15.0						Direct Entry, pavement and pipe

Summary for Subcatchment Basin 6 Pervious: Basin 6 - Pervious

Runoff = 1.23 cfs @ 12.52 hrs, Volume= 0.354 af, Depth= 1.70"

Runoff by SCS TR-20 method, UH=Delmarva, Weighted-CN, Time Span= 5.00-30.00 hrs, dt= 0.05 hrs NRCC 24-hr D 100 year Rainfall=9.20"

_	Area	(ac) C	N Dese	cription		
*	2.	500 3	89 lawn	, A soils		
	2.	500	100.	00% Pervi	ous Area	
	Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
	20.5	100	0.0200	0.08		Sheet Flow, sheet flow Woods: Light underbrush n= 0.400 P2= 3.50"
	2.2	300	0.0200	2.28		Shallow Concentrated Flow, shallow conc Unpaved Kv= 16.1 fps
	4.6	1,180	0.0030	4.27	13.42	
_		1				

27.3 1,580 Total

Summary for Reach Site: Site

Inflow Area =	17.800 ac, 28.37% Impervious, In	flow Depth > 1.32" for 100 year event
Inflow =	1.98 cfs @ 13.82 hrs, Volume=	1.959 af
Outflow =	1.98 cfs @ 13.82 hrs, Volume=	1.959 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 5.00-30.00 hrs, dt= 0.05 hrs

Summary for Pond Basin 1: Basin 1

Inflow Area =	3.200 ac, 34.38% Impervious, Inflow	Depth > 4.02" for 100 year event
Inflow =	5.55 cfs @ 12.27 hrs, Volume=	1.073 af
Outflow =	1.20 cfs @ 13.78 hrs, Volume=	0.558 af, Atten= 78%, Lag= 90.4 min
Primary =	1.20 cfs @ 13.78 hrs, Volume=	0.558 af

Routing by Stor-Ind method, Time Span= 5.00-30.00 hrs, dt= 0.05 hrs Peak Elev= 92.07' @ 13.78 hrs Surf.Area= 0.255 ac Storage= 0.621 af

Plug-Flow detention time= 464.2 min calculated for 0.558 af (52% of inflow) Center-of-Mass det. time= 298.6 min (1,140.5 - 841.9)

Volume	Invert	Avail.Stora	age Stor	age Description	
#1	88.00'	0.885	5 af Rair	n Garden Basin	(Prismatic)Listed below
Elevatio	et) (acr	res) (ac	c.Store	Cum.Store (acre-feet)	
88.0 89.0		050 100	0.000 0.075	0.000 0.075	
90.0		150	0.125	0.200	
91.0	0.2	200	0.175	0.375	
92.0	0.2	250	0.225	0.600	
93.0	0.0	320	0.285	0.885	
Device	Routing	Invert	Outlet D		
#1	Primary	91.00'		t. Orifice/Grate	
#2	Primary	92.00'	-	42.0" Horiz. Orif to weir flow at low	fice/Grate C= 0.600 w heads
Primary	OutFlow Ma	ax=1 16 cfs (ົກ 13 78 hi	rs HW=92.07' ((Free Discharge)

Primary OutFlow Max=1.16 cfs @ 13.78 hrs HW=92.07' (Free Discharge) 1=Orifice/Grate (Orifice Controls 0.23 cfs @ 4.69 fps) 2=Orifice/Grate (Weir Controls 0.93 cfs @ 0.89 fps)

Summary for Pond Basin 2: Basin 2

Inflow Area =	3.200 ac, 35.94% Impervious, Inflow	Depth > 4.13" for 100 year event
Inflow =	5.75 cfs @ 12.27 hrs, Volume=	1.101 af
Outflow =	0.30 cfs @ 23.38 hrs, Volume=	0.409 af, Atten= 95%, Lag= 666.7 min
Primary =	0.30 cfs @ 23.38 hrs, Volume=	0.409 af

Routing by Stor-Ind method, Time Span= 5.00-30.00 hrs, dt= 0.05 hrs Peak Elev= 90.72' @ 23.38 hrs Surf.Area= 0.358 ac Storage= 0.819 af

Plug-Flow detention time= 639.7 min calculated for 0.408 af (37% of inflow) Center-of-Mass det. time= 441.6 min (1,281.1 - 839.5)

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HydroCAD	® 10.00-22	s/n 09416	5 © 2018	Hydro	CAD Software So	olutions LLC	Page
Volume	Inver	t Avail.	Storage	Stora	age Description		
#1	87.00	· ,	1.330 af	Rain	Garden Basin	(Prismatic)Listed below	
Elevation	Surf.	Area	Inc.St	ore	Cum.Store		
(feet)) (a	cres)	(acre-fe	eet)	(acre-feet)		
87.00		0.090	0.0	000	0.000		
88.00).150	0.1	120	0.120		
89.00).230	0.1	190	0.310		
90.00).300	0.2	265	0.575		
91.00).380	0.3	340	0.915		
92.00	0).450	0.4	415	1.330		
Device F	Routing	Inv	vert Ou	tlet De	evices		
#1 F	Primary	89	.00' 3.0	" Vert	. Orifice/Grate	C= 0.600	
	Primary	91	.00' 42	.0" x 4	2.0" Horiz. Orif	fice/Grate C= 0.600	
			Lin	nited to	o weir flow at lov	w heads	
Primary C	DutFlow N	/lax=0.30	cfs @ 23	.38 hr	s HW=90.72' ((Free Discharge)	
					s @ 6.08 fps)	Č ,	
	ice/Grate				0 1 /		
				,			
			Sumn	narv f	for Pond Bas	in 3: Basin 3	
			Udini	iai y i			
Inflow Are		1 500 20	26 67%	Imnor	vious Inflow D	epth > 3.50" for 100 year e	went
Inflow					/olume=		vent
Outflow					/olume=		721 2 min
Primary					/olume=	0.325 af	121.211111
i iiiiai y	-	0.20 013 (0	y 24.00	113, \		0.020 ai	
Routing by	y Stor-Ind	method, 1	Гime Spa	n= 5.0	0-30.00 hrs, dt=	= 0.05 hrs	

Routing by Stor-Ind method, Time Span= 5.00-30.00 hrs, dt= 0.05 hrs Peak Elev= 91.31' @ 24.30 hrs Surf.Area= 0.445 ac Storage= 1.095 af

Plug-Flow detention time= 708.0 min calculated for 0.325 af (25% of inflow) Center-of-Mass det. time= 461.6 min (1,317.8 - 856.2)

Volume	Inv	ert Av	/ail.Storag	ge St	Storage Description	
#1	88.	00'	1.950	af Ra	Rain Garden Basin (Prismatic)Listed below	
Elevatio	et)	urf.Area (acres)		Store e-feet)	et) (acre-feet)	
88.0	-	0.200		0.000		
89.0	•	0.280		0.240		
90.0)0	0.360		0.320	20 0.560	
91.0	0	0.420		0.390	00 0.950	
92.0	0	0.500		0.460	60 1.410	
93.0	00	0.580		0.540	40 1.950	
Device	Routing		Invert	Outlet	et Devices	
#1 #2	Primary Primary		92.00'	42.0"	Vert. Orifice/Grate C= 0.600 " x 42.0" Horiz. Orifice/Grate C= 0.600 ted to weir flow at low heads	

Primary OutFlow Max=0.26 cfs @ 24.30 hrs HW=91.31' (Free Discharge) -1=Orifice/Grate (Orifice Controls 0.26 cfs @ 5.25 fps) -2=Orifice/Grate (Controls 0.00 cfs)

Summary for Pond Basin 4 & 5: Basin 4 & 5

Inflow Area =	3.700 ac, 24.32% Impervious, Inflow D	epth > 3.34" for 100 year event
Inflow =	5.71 cfs @ 12.27 hrs, Volume=	1.031 af
Outflow =	0.26 cfs @ 24.15 hrs, Volume=	0.340 af, Atten= 95%, Lag= 712.7 min
Primary =	0.26 cfs @ 24.15 hrs, Volume=	0.340 af

Routing by Stor-Ind method, Time Span= 5.00-30.00 hrs, dt= 0.05 hrs Peak Elev= 88.86' @ 24.15 hrs Surf.Area= 0.340 ac Storage= 0.802 af

Plug-Flow detention time= 653.9 min calculated for 0.339 af (33% of inflow) Center-of-Mass det. time= 445.0 min (1,300.5 - 855.5)

Volume	Invert	Avail.Sto	orage Stora	ge Description
#1	85.00'	1.6	90 af Rain	Garden Basin 4 & 5 (Prismatic)Listed below
Elevation			Inc.Store	Cum.Store
(feet	,		acre-feet)	(acre-feet)
85.00	-	.080	0.000	0.000
86.00		.140	0.110	0.110
87.00	-	.210	0.175	0.285
88.00		.280	0.245	0.530
89.00		.350	0.315	0.845
90.00		.420	0.385	1.230
91.00) 0	.500	0.460	1.690
Device	Routing	Inver	t Outlet Dev	vices
			-	
	Primary Primary	87.50		Orifice/Grate C= 0.600
#2	Primary	90.00	-	2.0" Horiz. Orifice/Grate C= 0.600 weir flow at low heads
			Linited to	well now at low neads
	ice/Grate (trols 0.26 cfs	B HW=88.86' (Free Discharge) @ 5.36 fps)
		S	Summary fo	or Pond Basin 6: Basin 6
Inflow Are Inflow Outflow Primary	= 3 = 0	8.90 cfs @ 9.24 cfs @	12.30 hrs, V	vious, Inflow Depth > 3.18" for 100 year event 'olume= 0.847 af 'olume= 0.326 af, Atten= 94%, Lag= 709.2 min 'olume= 0.326 af

Routing by Stor-Ind method, Time Span= 5.00-30.00 hrs, dt= 0.05 hrs

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Peak Elev= 93.20' @ 24.12 hrs Surf.Area= 0.360 ac Storage= 0.623 af

Plug-Flow detention time= 624.2 min calculated for 0.325 af (38% of inflow) Center-of-Mass det. time= 423.9 min (1,291.4 - 867.5)

Volume	Invert	Avail.Storag	e Stor	age Description		
#1	91.00'	1.350 a	f Rair	n Garden Basin	(Prismatic)Listed below	
Elevatio (fee 91.0 92.0 93.0 94.0 95.0	t) (acre 0 0.15 0 0.30 0 0.35 0 0.40	s) (acre 50 00 50 00	Store <u>-feet)</u> 0.000 0.225 0.325 0.375 0.425	Cum.Store (acre-feet) 0.000 0.225 0.550 0.925 1.350		
Device	Routing	Invert (Dutlet D	evices		
#1 #2	Primary Primary	94.00'	2.0" x 4	t. Orifice/Grate 42.0" Horiz. Orif to weir flow at lov	fice/Grate C= 0.600	
Primary OutFlow Max=0.24 cfs @ 24.12 hrs HW=93.20' (Free Discharge) -1=Orifice/Grate (Orifice Controls 0.24 cfs @ 4.98 fps)						

-2=Orifice/Grate (Controls 0.00 cfs)

Post Developed.042721.Post Development.Prepared by {enter your company name here}WQ storm Rainfall=1.25"HydroCAD® 10.00-22 s/n 09416 © 2018 HydroCAD Software Solutions LLCPrinted 6/28/2021
Time span=5.00-30.00 hrs, dt=0.05 hrs, 501 points Runoff by SCS TR-20 method, UH=Delmarva, Weighted-CN Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method
SubcatchmentBasin 1 Imp: Basin 1 Imp Runoff Area=0.600 ac 100.00% Impervious Runoff Depth>1.02" Tc=15.0 min CN=98 Runoff=0.34 cfs 0.051 af
SubcatchmentBasin 1 Pervious: Basin 1 - Runoff Area=2.100 ac 0.00% Impervious Runoff Depth=0.00" Flow Length=1,580' Tc=27.3 min CN=39 Runoff=0.00 cfs 0.000 af
SubcatchmentBasin 1 Roof: Basin 1 Roof Runoff Area=0.500 ac 100.00% Impervious Runoff Depth>1.02" Tc=15.0 min CN=98 Runoff=0.28 cfs 0.043 af
SubcatchmentBasin 2 Impervious: Basin Runoff Area=0.800 ac 100.00% Impervious Runoff Depth>1.02" Tc=15.0 min CN=98 Runoff=0.45 cfs 0.068 af
Subcatchment Basin 2 Pervious: Basin 2 - Runoff Area=2.050 ac 0.00% Impervious Runoff Depth=0.00" Flow Length=1,580' Tc=27.3 min CN=39 Runoff=0.00 cfs 0.000 af
Subcatchment Basin 2 Roof: Basin 2 Roof Runoff Area=0.350 ac 100.00% Impervious Runoff Depth>1.02" Tc=15.0 min CN=98 Runoff=0.20 cfs 0.030 af
Subcatchment Basin 3 Impervious: Basin Runoff Area=1.200 ac 100.00% Impervious Runoff Depth>1.02" Tc=15.0 min CN=98 Runoff=0.68 cfs 0.102 af
Subcatchment Basin 3 Pervious: Basin 3 - Runoff Area=3.300 ac 0.00% Impervious Runoff Depth=0.00" Flow Length=1,580' Tc=27.3 min CN=39 Runoff=0.00 cfs 0.000 af
SubcatchmentBasin 4 & 5 - Pervious: Basin Runoff Area=2.800 ac 0.00% Impervious Runoff Depth=0.00" Flow Length=1,440' Tc=17.3 min CN=39 Runoff=0.00 cfs 0.000 af
Subcatchment Basin 4 & 5- Impervious: Runoff Area=0.900 ac 100.00% Impervious Runoff Depth>1.02" Tc=15.0 min CN=98 Runoff=0.51 cfs 0.077 af
SubcatchmentBasin 6 Impervious: Basin Runoff Area=0.700 ac 100.00% Impervious Runoff Depth>1.02" Tc=15.0 min CN=98 Runoff=0.40 cfs 0.060 af
SubcatchmentBasin 6 Pervious: Basin 6 - Runoff Area=2.500 ac 0.00% Impervious Runoff Depth=0.00" Flow Length=1,580' Tc=27.3 min CN=39 Runoff=0.00 cfs 0.000 af
Reach Site: Site Inflow=0.00 cfs 0.000 af Outflow=0.00 cfs 0.000 af
Pond Basin 1: Basin 1 Peak Elev=89.15' Storage=0.094 af Inflow=0.62 cfs 0.094 af Outflow=0.00 cfs 0.000 af
Pond Basin 2: Basin 2 Peak Elev=87.82' Storage=0.098 af Inflow=0.65 cfs 0.098 af Outflow=0.00 cfs 0.000 af
Pond Basin 3: Basin 3Peak Elev=88.43' Storage=0.102 af Inflow=0.68 cfs 0.102 af Outflow=0.00 cfs 0.000 af

		Post Development.
Post Developed.042721.	NRCC 24-hr D	WQ storm Rainfall=1.25"
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Pond Basin 4 & 5: Basin 4 & 5

Peak Elev=85.70' Storage=0.077 af Inflow=0.51 cfs 0.077 af Outflow=0.00 cfs 0.000 af

Pond Basin 6: Basin 6

Peak Elev=91.27' Storage=0.060 af Inflow=0.40 cfs 0.060 af Outflow=0.00 cfs 0.000 af

Total Runoff Area = 17.800 acRunoff Volume = 0.431 afAverage Runoff Depth = 0.29"71.63% Pervious = 12.750 ac28.37% Impervious = 5.050 ac

Summary for Subcatchment Basin 1 Imp: Basin 1 Imp

Runoff = 0.34 cfs @ 12.25 hrs, Volume= 0.051 af, Depth> 1.02"

Runoff by SCS TR-20 method, UH=Delmarva, Weighted-CN, Time Span= 5.00-30.00 hrs, dt= 0.05 hrs NRCC 24-hr D WQ storm Rainfall=1.25"

	Area	(ac)	CN	Desc	Description			
*	0.	350	98	Pave	ement & S	idewalk		
*	0.	250	98	Drive	eways			
	0.	600	98	Weig	ghted Ave	rage		
	0.	.600 100.00% Impervious Area						
	Та	امم	46	Clana	Valasity	Consolity	Description	
	TC (min)	Leng (fee		Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description	
	(min)	(iee	=1)	(1011)	(II/SEC)	(CIS)		
	15.0						Direct Entry, pavement and pipe	

Summary for Subcatchment Basin 1 Pervious: Basin 1 - Pervious

Runoff by SCS TR-20 method, UH=Delmarva, Weighted-CN, Time Span= 5.00-30.00 hrs, dt= 0.05 hrs NRCC 24-hr D WQ storm Rainfall=1.25"

_	Area	(ac) C	N Desc	cription		
*	2.	100 3	89 lawn	, A soils		
	2.100		100 100.00% Pervi		ous Area	
	Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
	20.5	100	0.0200	0.08		Sheet Flow, sheet flow Woods: Light underbrush n= 0.400 P2= 3.50"
	2.2	300	0.0200	2.28		Shallow Concentrated Flow, shallow conc Unpaved Kv= 16.1 fps
	4.6	1,180	0.0030	4.27	13.42	Pipe Channel, pipe flow 24.0" Round Area= 3.1 sf Perim= 6.3' r= 0.50' n= 0.012
	27.3	1,580	Total			

Summary for Subcatchment Basin 1 Roof: Basin 1 Roof

Runoff = 0.28 cfs @ 12.25 hrs, Volume= 0.043 af, Depth> 1.02"

Runoff by SCS TR-20 method, UH=Delmarva, Weighted-CN, Time Span= 5.00-30.00 hrs, dt= 0.05 hrs NRCC 24-hr D WQ storm Rainfall=1.25"

Post Development.

Post Developed.042721.NRCC 24-hr DWQ storm Rainfall=1.25"Prepared by {enter your company name here}Printed 6/28/2021HydroCAD® 10.00-22 s/n 09416 © 2018 HydroCAD Software Solutions LLCPage 49

Area	(ac) C	N Des	cription							
		8 Root	F							
0.	0.500 100.00% Impervious Area									
Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description					
15.0				`	Direct Entry, pavement					
	Summary for Subcatchment Basin 2 Impervious: Basin 2 Imp									
Runoff	=	0.45 cfs	s@ 12.2	5 hrs, Volu	me= 0.068 af, Depth> 1.02"					
	Runoff by SCS TR-20 method, UH=Delmarva, Weighted-CN, Time Span= 5.00-30.00 hrs, dt= 0.05 hrs NRCC 24-hr D WQ storm Rainfall=1.25"									
Area	(ac) C	N Dese	cription							
			ement & Si	idewalk						
-			eways							
			ghted Aver							
0.	800	100.	00% impe	rvious Area						
Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description					
15.0					Direct Entry, pavement and pipe					
	Sur	nmary f	or Subc	atchment	t Basin 2 Pervious: Basin 2 - Pervious					
Runoff	=	0.00 cfs	s@ 5.0	0 hrs, Volu	me= 0.000 af, Depth= 0.00"					
			nod, UH=D Rainfall=1		Veighted-CN, Time Span= 5.00-30.00 hrs, dt= 0.05 hrs					
Area	(ac) C	N Des	cription							
			, A soils							
-	050		00% Pervi	ous Area						
Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description					
20.5	100	0.0200	0.08		Sheet Flow, sheet flow					
2.2	300	0.0200	2.28		Woods: Light underbrush n= 0.400 P2= 3.50" Shallow Concentrated Flow, shallow conc					
<i>L.L</i>	000	0.0200	2.20		Unpaved Kv= 16.1 fps					
4.6	1,180	0.0030	4.27	13.42	Pipe Channel, pipe flow 24.0" Round Area= 3.1 sf Perim= 6.3' r= 0.50'					
					n= 0.012					

27.3 1,580 Total

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Summary for Subcatchment Bas	Summary for Subcatchment Basin 2 Roof: Basin 2 Roof									
Runoff = 0.20 cfs @ 12.25 hrs, Volume=	0.030 af, Depth> 1.02"									
Runoff by SCS TR-20 method, UH=Delmarva, Weighted-CN NRCC 24-hr D_WQ storm Rainfall=1.25"	l, Time Span= 5.00-30.00 hrs, dt= 0.05 hrs									
Area (ac) CN Description										
* 0.350 98 Roof										
0.350 100.00% Impervious Area										
Tc Length Slope Velocity Capacity Description (min) (feet) (ft/ft) (ft/sec) (cfs)	ז									
15.0 Direct Ent	ry, pavement									
Summary for Subcatchment Basin 3 Im	porvious: Basin 3 Imporvious									
Summary for Subcatchment Basin 5 m	ipervious. Dasin 5 impervious									
Runoff = 0.68 cfs @ 12.25 hrs, Volume=	0.102 af, Depth> 1.02"									
Runoff by SCS TR-20 method, UH=Delmarva, Weighted-CN NRCC 24-hr D WQ storm Rainfall=1.25"	l, Time Span= 5.00-30.00 hrs, dt= 0.05 hrs									
Area (ac) CN Description										
* 0.550 98 Pavement & Sidewalk * 0.250 98 Driveways * 0.400 98 Roof										
1.20098Weighted Average1.200100.00% Impervious Area										
Tc Length Slope Velocity Capacity Description (min) (feet) (ft/ft) (ft/sec) (cfs)	1									
15.0 Direct Ent	ry, pavement and pipe									
Summary for Subcatchment Basin 3 Pervious: Basin 3 - Pervious										
Runoff = 0.00 cfs @ 5.00 hrs, Volume=	0.000 af, Depth= 0.00"									
Runoff by SCS TR-20 method, UH=Delmarva, Weighted-CN NRCC 24-hr D_WQ storm Rainfall=1.25"	I, Time Span= 5.00-30.00 hrs, dt= 0.05 hrs									
Area (ac) CN Description										
* 3.300 39 lawn, A soils										

 5.500	55	iawii, A 30113	
 3.300		100.00% Pervious Area	

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 Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
20.5	100	0.0200	0.08		Sheet Flow, sheet flow Woods: Light underbrush n= 0.400 P2= 3.50"
2.2	300	0.0200	2.28		Shallow Concentrated Flow, shallow conc Unpaved Kv= 16.1 fps
 4.6	1,180	0.0030	4.27	13.42	• •

27.3 1,580 Total

Summary for Subcatchment Basin 4 & 5 - Pervious: Basin 4 & 5 - Pervious

Runoff = 0.00 cfs @ 5.00 hrs, Volume= 0.000 af, Depth= 0.00"

Runoff by SCS TR-20 method, UH=Delmarva, Weighted-CN, Time Span= 5.00-30.00 hrs, dt= 0.05 hrs NRCC 24-hr D WQ storm Rainfall=1.25"

	Area	(ac) C	N Desc	cription		
*	2.	800 3	9 Lawı	n. A Soils		
	2.800 100.00% Pervious Area				ous Area	
	Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
	6.6	640	0.0100	1.61		Shallow Concentrated Flow, shallow concentrated
	10.7	800	0.0060	1.25		Unpaved Kv= 16.1 fps Shallow Concentrated Flow, shallow concentrated Unpaved Kv= 16.1 fps

17.3 1,440 Total

Summary for Subcatchment Basin 4 & 5- Impervious: basin 4 & 5, imp

Runoff = 0.51 cfs @ 12.25 hrs, Volume= 0.077 af, Depth> 1.02"

Runoff by SCS TR-20 method, UH=Delmarva, Weighted-CN, Time Span= 5.00-30.00 hrs, dt= 0.05 hrs NRCC 24-hr D WQ storm Rainfall=1.25"

	Area	(ac)	CN	Desc	cription		
*	0.	200	98	Pave	ement		
*	0.	200	98	Drive	eways		
*	0.	500	98	Roof			
	0.	0.900 98 Weighted Average					
	0.900			100.	00% Impei	rvious Area	
	Тс	Leng		Slope	Velocity	Capacity	Description
_	(min)	(fee	et)	(ft/ft)	(ft/sec)	(cfs)	
	15.0						Direct Entry, pavement

Summary for Subcatchment Basin 6 Impervious: Basin 6 Imp

Runoff = 0.40 cfs @ 12.25 hrs, Volume= 0.060 af, Depth> 1.02"

Runoff by SCS TR-20 method, UH=Delmarva, Weighted-CN, Time Span= 5.00-30.00 hrs, dt= 0.05 hrs NRCC 24-hr D WQ storm Rainfall=1.25"

	Area	(ac)	CN	Desc	cription		
*	0.	250	98	Pave	ement & Si	idewalk	
*	0.	250	98	Drive	eways		
*	0.	200	98	Roof			
	-	0.700 98 Weighted Average 0.700 100.00% Impervious Area					I
	Tc (min)	Leng (fee		Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
	15.0						Direct Entry, pavement and pipe

Summary for Subcatchment Basin 6 Pervious: Basin 6 - Pervious

Runoff = 0.00 cfs @ 5.00 hrs, Volume= 0.000 af, Depth= 0.00"

Runoff by SCS TR-20 method, UH=Delmarva, Weighted-CN, Time Span= 5.00-30.00 hrs, dt= 0.05 hrs NRCC 24-hr D WQ storm Rainfall=1.25"

	Area	(ac) C	N Dese	cription		
*	2.	500 3	39 lawn	, A soils		
	2.	500	100.	00% Pervi	ous Area	
_	Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
	20.5	100	0.0200	0.08		Sheet Flow, sheet flow Woods: Light underbrush n= 0.400 P2= 3.50"
	2.2	300	0.0200	2.28		Shallow Concentrated Flow, shallow conc Unpaved Kv= 16.1 fps
	4.6	1,180	0.0030	4.27	13.42	
-	07.0	4 500	T ()			

27.3 1,580 Total

Summary for Reach Site: Site

Inflow Area	a =	17.800 ac, 28	8.37% Impervious	, Inflow Depth =	0.00"	for WQ storm event
Inflow	=	0.00 cfs @	5.00 hrs, Volum	e= 0.000	af	
Outflow	=	0.00 cfs @	5.00 hrs, Volum	e= 0.000	af, Att	en= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 5.00-30.00 hrs, dt= 0.05 hrs

Summary for Pond Basin 1: Basin 1

Inflow Area =	3.200 ac, 34.38% Impervious, Inflow D	Depth > 0.35" for WQ storm event
Inflow =	0.62 cfs @ 12.25 hrs, Volume=	0.094 af
Outflow =	0.00 cfs @ 5.00 hrs, Volume=	0.000 af, Atten= 100%, Lag= 0.0 min
Primary =	0.00 cfs @ 5.00 hrs, Volume=	0.000 af

Routing by Stor-Ind method, Time Span= 5.00-30.00 hrs, dt= 0.05 hrs Peak Elev= 89.15' @ 25.70 hrs Surf.Area= 0.108 ac Storage= 0.094 af

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

Primary OutFlow Max=0.00 cfs @ 5.00 hrs HW=88.00' (Free Discharge)								
1=Orifice/Grate (Controls 0.00 cfs)								

Summary for Pond Basin 2: Basin 2

Inflow Area =	3.200 ac, 35.94% Impervious, Inflow [Depth > 0.37" for WQ storm event
Inflow =	0.65 cfs @ 12.25 hrs, Volume=	0.098 af
Outflow =	0.00 cfs @ 5.00 hrs, Volume=	0.000 af, Atten= 100%, Lag= 0.0 min
Primary =	0.00 cfs $\overline{@}$ 5.00 hrs, Volume=	0.000 af

Routing by Stor-Ind method, Time Span= 5.00-30.00 hrs, dt= 0.05 hrs Peak Elev= 87.82' @ 25.70 hrs Surf.Area= 0.139 ac Storage= 0.098 af

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

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Post Development. NRCC 24-hr D WQ storm Rainfall=1.25" Printed 6/28/2021 Page 54

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Volume	Inve	ert Av	/ail.Storage	Storag	ige Description		
#1	87.0	0'	1.330 af	Rain	Garden Basin (Prismatic)Listed below		
Elevatio (fee		f.Area acres)	Inc.S (acre-		Cum.Store (acre-feet)		
87.0		0.090		.000	0.000		
88.0		0.150		.120	0.120		
89.0	00	0.230	0	.190	0.310		
90.0	00	0.300	0	.265	0.575		
91.0	00	0.380		.340	0.915		
92.0	00	0.450	0	.415	1.330		
Device	Routing		Invert O	utlet Dev	vices		
#1	Primary				. Orifice/Grate C= 0.600		
#2	Primary			-	2.0" Horiz. Orifice/Grate C= 0.600		
			Li	mited to	weir flow at low heads		
Primary OutFlow Max=0.00 cfs @ 5.00 hrs HW=87.00' (Free Discharge) 1=Orifice/Grate (Controls 0.00 cfs) 2=Orifice/Grate (Controls 0.00 cfs)							
	Summary for Pond Basin 3: Basin 3						
Inflow Ar			-		vious, Inflow Depth > 0.27" for WQ storm event		

Inflow Area = 4.500 ac, 26.67% Impervious, Inflow Depth > 0.27" for	or WQ storm event
Inflow = 0.68 cfs @ 12.25 hrs, Volume= 0.102 af	
Outflow = $0.00 \text{ cfs} (a) = 5.00 \text{ hrs}$, Volume= 0.000 af , Atten=	= 100%, Lag= 0.0 min
Primary = $0.00 \text{ cfs} \ \overline{\textcircled{0}} 5.00 \text{ hrs}$, Volume= 0.000 af	-

Routing by Stor-Ind method, Time Span= 5.00-30.00 hrs, dt= 0.05 hrs Peak Elev= 88.43' @ 25.70 hrs Surf.Area= 0.234 ac Storage= 0.102 af

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

Volume	Inv	vert Av	/ail.Stora	ge Sto	orage Description	
#1	88.	00'	1.950	af Ra	in Garden Basin	(Prismatic)Listed below
Elevatic (fee 88.0	et)	urf.Area <u>(acres)</u> 0.200		:.Store <u>e-feet)</u> 0.000	Cum.Store (acre-feet) 0.000	
89.0	00	0.280		0.240	0.240	
90.0	00	0.360		0.320	0.560	
91.0	00	0.420		0.390	0.950	
92.0	0	0.500		0.460	1.410	
93.0	00	0.580		0.540	1.950	
Device #1 #2	Routing Primary Primary		90.00'	3.0" Ve 42.0" x	Devices ert. Orifice/Grate 42.0" Horiz. Orif to weir flow at low	fice/Grate C= 0.600

Primary OutFlow Max=0.00 cfs @ 5.00 hrs HW=88.00' (Free Discharge) 1=Orifice/Grate (Controls 0.00 cfs) 2=Orifice/Grate (Controls 0.00 cfs)

Summary for Pond Basin 4 & 5: Basin 4 & 5

Inflow Area =	3.700 ac, 24.32% Impervious,	Inflow Depth > 0.25" for WQ storm event
Inflow =	0.51 cfs @ 12.25 hrs, Volume	e= 0.077 af
Outflow =	0.00 cfs @ 5.00 hrs, Volume	= 0.000 af, Atten= 100%, Lag= 0.0 min
Primary =	0.00 cfs @ 5.00 hrs, Volume	e= 0.000 af

Routing by Stor-Ind method, Time Span= 5.00-30.00 hrs, dt= 0.05 hrs Peak Elev= 85.70' @ 25.70 hrs Surf.Area= 0.122 ac Storage= 0.077 af

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

Volume	Inve	ert Ava	ail.Storage	Storag	ge Description	1	
#1	85.0	0'	1.690 af	Rain C	Garden Basin	n 4 & 5 (Prismatic)Listed below	
Elevatio (fee		rf.Area acres)	Inc.Si (acre-fe		Cum.Store (acre-feet)		
85.0		0.080		000	0.000		
86.0	00	0.140	0.	110	0.110		
87.0		0.210	-	175	0.285		
88.0		0.280		245	0.530		
89.0		0.350		315	0.845		
90.0		0.420		385	1.230		
91.0	0	0.500	0.	460	1.690		
Device	Routing		Invert Ou	utlet Dev	/ices		
#1	Primary		87.50' 3.0)" Vert.	Orifice/Grate	e C= 0.600	
#2	Primary			-		ifice/Grate C= 0.600	
			Lir	nited to	weir flow at low	bw heads	
Primary OutFlow Max=0.00 cfs @ 5.00 hrs HW=85.00' (Free Discharge) -1=Orifice/Grate (Controls 0.00 cfs) -2=Orifice/Grate (Controls 0.00 cfs)							
	Summary for Pond Basin 6: Basin 6						
Inflow Ai Inflow Outflow Primary	=	0.40 cf	s@ 12.25 s@ 5.00	hrs, Vo	olume= olume=	Depth > 0.22" for WQ storm event 0.060 af 0.000 af, Atten= 100%, Lag= 0.0 min 0.000 af	

Routing by Stor-Ind method, Time Span= 5.00-30.00 hrs, dt= 0.05 hrs

Peak Elev= 91.27' @ 25.70 hrs Surf.Area= 0.190 ac Storage= 0.060 af

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

Volume	Inv	ert Av	vail.Storag	e Stor	rage Description			
#1	91.	00'	1.350 a	af Rai i	n Garden Basin	(Prismatic)L	isted below	
Elevatio	et)	urf.Area (acres)	(acre	Store	Cum.Store (acre-feet)			
91.0 92.0	-	0.150 0.300		0.000	0.000 0.225			
92.0	-	0.300		0.225	0.225			
94.0	-	0.330		0.375	0.925			
95.0	-	0.450		0.425	1.350			
Device	Routing			<u>Outlet D</u>				
#1 #2	Primary Primary		94.00'	42.0" x	rt. Orifice/Grate 42.0" Horiz. Orif to weir flow at lov	fice/Grate C	= 0.600	
Drimony	OutFlow	Max-0	00 cfc @	5 00 bra		ree Dischard	0)	

Primary OutFlow Max=0.00 cfs @ 5.00 hrs HW=91.00' (Free Discharge)

-1=Orifice/Grate (Controls 0.00 cfs) -2=Orifice/Grate (Controls 0.00 cfs)

TIME TO DRAIN CALCULATIONS

Exfiltration Area

: Bottom area Exfiltration rate at 3 in/hour = 0.00007 ft/sec

Basin #	Bottom Area	Basin Volume	Rate	Time (hours)
1	2,200	7,400	0.15	14
2	3,900	13,500	0.28	13
3	8,700	24,300	0.60	11
4&5	3,500	18,000	0.25	20
6	6,500	9,800	0.45	7

APPENDIX C

SOIL EROSION CALCULATIONS

- Conduit Outlet Protection
 - SCD Flood Routing

CONDUIT OUTLET DESIGN

Use 25 Year storm, Q (cfs)

Level Apron

Tw(ft) calculated from:

- (1) 2 Year flood routing for outlets into stormwater management basins
- (2) outlets from basins use 0.2 * D

q = Q/Wo

Calculate length & width of rip rap apron: For $Tw < \frac{1}{2}$ Pipe Size

- Length = (1.8 q/Do1/2) + 7Do
- Width = 3 Wo + L

For $Tw > \frac{1}{2}$ Pipe Size

- Length = 3 q/Do1/2
- Width = 3 Do + 0.4 L

Calculate D50 stone size (in):

= <u>0.02</u> (q) ^{1.33}

Tw

Scour Hole

Depth = 0.5(Do)Width = 2 Wo

Length = 3 Do

 $D50 = \frac{0.0125}{TW} q^{1.33}$

Outlet #	<u>Do</u>	<u>Wo</u>	Q	<u>Tw</u>	<u>a</u>	$\underline{\mathbf{L}}$	W	<u>D50</u>
1-3	18	18	10	0.3 (2)	7.7	22	24	3"
4-7	15	15	7	0.2 (2)	5.6	21	24	3"

OFF-SITE STABILTY

The basins have been designed to comply with the off-site stability standard. The direct discharge must not be more than 10 cfs for a 25 year storm event and the discharge must be less than 2 fps for a ten year storm in the discharge pipe. The flood routing must assume the basin is full to the lowest positive outlet at the start of the storm and cannot utilize infiltration as an outflow. The flood routings eliminating exfiltration outflow and placing the basin bottom at the lowest outlet elevation are enclosed.

<u>Basin #</u>	25 Yr Peak Outflow	<u>10 yr storm pipe velocity</u>
6	0.7	0.2

APPENDIX D

STORM DRAINAGE COLLECTION SYSTEM CALCULATIONS

PROFESSIONAL DESIGN SERVICES, L.L.C.

1245 AIRPORT ROAD, SUITE 1 LAKEWOOD, NJ 08701 (732) 363-0060 COMPUTED BY: SDC DATE: June 3, 2021

DESIGN STORM FREQUENCY: 25 YEAR

INTENSITY CURVE: RSIS

PDS # 321644

LO	CATION					RUNOFF	DATA				SEWER DESIGN DATA					
STRU	JCTURE #				TIME					PIPE MATERIAL			MANNINGS AN@			
UPSTREAM	DOWNSTREAM	AREA	WEIGHT OF RUNOFF COEFFICIENT		TOTAL	OVERLAN D THROUGH AREA (^T _A)	THROUG H AREA (T _P)	ACCUMULATED	RAINFALL INTENSITY	PEAK RUNOFF	DIAMETER	LENGTH	SLOPE	CAPACITY AT FULL FLOW	VELOCITY AT FULL FLOW	VELOCITY ACTUAL
		(AC)	С	AxC	(3A x C)	(MIN)	(MIN)	(MIN)	(IN/HR)	(CFS)	(INCHES)	(FT)	(%)	(CFS)	(FPS)	
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)	(15)	(16)	
1	2	1.12	0.55	0.63	0.63	10		10	6.7	4.22	15		0.50			
2	RG-1	0.64	0.55	0.37	1.00	10		10	6.7	6.70	18		0.50			
3	4	0.23	0.55	0.13	0.13	10		10	6.7	0.81	15		0.30	3.8		
4	MH-5	0.23	0.55	0.13	0.26	10		10	6.7	1.74	15		0.30	3.8		
MH-5	6	0	0.55	0	0.26	10		10	6.7	1.74	15		0.30	3.8		
5	6	1.03	0.55	0.57	0.57	10		10	6.7	3.82	15		0.50	5.9		
6	RG-4	0.13	0.55	0.07	0.90	10		10	6.7	6.03	18		0.50	9.7		
RG-4	8	-	-	-						1.00*						
7	8	0.78	0.55	0.43	0.43	10		10	6.7	2.88	15		0.30			
8	MH-2	0.67	0.55	0.37	0.80	10		10	6.7	6.36	18		0.50			
9	MH-2	0.32	0.55	0.18	0.18	10		10	6.7	1.21	15		0.30			

PROFESSIONAL DESIGN SERVICES, L.L.C.

1245 AIRPORT ROAD, SUITE 1 LAKEWOOD, NJ 08701 (732) 363-0060 COMPUTED BY: SDC DATE: June 3, 2021

DESIGN STORM FREQUENCY: 25 YEAR

INTENSITY CURVE: RSIS

PDS # 321644

LO	CATION					RUNOFF	DATA				SEWER DESIGN DATA								
STRU	CTURE #								PIPE MATERIAL MA			MANNINGS AN@							
UPSTREAM	DOWNSTREAM	AREA	WEIGHT OF RUNOFF COEFFICIENT		TOTAL	OVERLAN D THROUGH AREA (^T _A)	THROUG H AREA (T _P)	ACCUMULATED	RAINFALL INTENSITY	PEAK RUNOFF	DIAMETER	LENGTH	SLOPE	CAPACITY AT FULL FLOW	VELOCITY AT FULL FLOW	VELOCITY ACTUAL			
		(AC)	С	AxC	(3A x C)	(MIN)	(MIN)	(MIN)	(IN/HR)	(CFS)	(INCHES)	(FT)	(%)	(CFS)	(FPS)				
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)	(15)	(16)				
10	MH-2	0.37	0.55	0.20	0.20	10		10	6.7	1.34	15		0.50	3.8					
MH-2	11	0	0.55	0	1.18	10		10	6.7	8.91	18		0.50	9.7					
11	RG-2	0.02	0.55	0.02	1.20	10		10	6.7	9.04	18		0.50	9.7					
12	RG-6	0.30	0.55	0.17	0.17	10		10	6.7	1.14	15		0.30	3.8					
13	14	0.17	0.55	0.09	0.09	10		10	6.7	0.60	15		0.30	3.8					
14	15	0.17	0.55	0.09	0.18	10		10	6.7	1.21	15		0.30	3.8					
15	16	0.24	0.55	0.13	0.31	10		10	6.7	2.10	15		0.30	3.8					
16	17	0.26	0.55	0.14	0.45	10		10	6.7	3.02	15		0.30	3.8					
17	RG-5	0.13	0.55	0.07	0.52	10		10	6.7	3.48	15		0.30	3.8					
21	22	0.60	0.55	0.33	0.33	10		10	6.7	2.21	15		0.30	3.8					
22	HH-3	0.67	0.55	0.37	0.70	10		10	6.7	4.69	15		0.50	5.9					
18	HH-3	0.38	0.55	0.21	0.21	10		10	6.7	1.41	15		0.30	3.8					

PROFESSIONAL DESIGN SERVICES, L.L.C.

1245 AIRPORT ROAD, SUITE 1 LAKEWOOD, NJ 08701 (732) 363-0060 COMPUTED BY: SDC DATE: June 3, 2021

DESIGN STORM FREQUENCY: 25 YEAR

INTENSITY CURVE: RSIS

PDS # 321644

LOG	CATION			-		RUNOFF	DATA				SEWER DESIGN DATA					
STRU	JCTURE #										PI	PE MATERIAL		MANNINGS AN@		
UPSTREAM	DOWNSTREAM	AREA	WEIGHT OF RUNOFF COEFFICIENT		TOTAL	OVERLAN D THROUGH AREA (^T A)	THROUG H AREA (T _P)	ACCUMULATED	RAINFALL INTENSITY	PEAK RUNOFF	DIAMETER	LENGTH	SLOPE	CAPACITY AT FULL FLOW	VELOCITY AT FULL FLOW	VELOCITY ACTUAL
		(AC)	С	AxC	(3A x C)	(MIN)	(MIN)	(MIN)	(IN/HR)	(CFS)	(INCHES)	(FT)	(%)	(CFS)	(FPS)	
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)	(15)	(16)	
HH-3	23	0	0.55	0	0	10		10	6.7	-	18		0.50	9.7		
23	24	0.33	0.55	0.18	1.09	10		10	6.7	7.30	18		0.50	9.7		
24	25	0.15	0.55	0.08	1.17	10		10	6.7	7.84	18		0.50	9.7		
25	RG-3	0.25	0.55	0.14	1.31	10		10	6.7	8.78	18		0.50	9.7		