

STORMWATER MANAGEMENT REPORT

7th Avenue and Douglas Street
Block 143 Lot 1
Elk Township
Gloucester County, New Jersey

Prepared by





JOSEPH A. MANCINI
N.J. Professional Engineer #24GE04579300

Assisted By: Joseph Rynkiewicz, E.I.T.

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P .O. Box 1304 · Blackwood, New Jersey 08012
Telephone (856) 677-8742 · Fax (856) 879-2024

I. SUMMARY

SITE DESCRIPTION

The subject parcel is a ±2.97 acre site located at the intersection of 7th Avenue and Douglas Street in Elk Township, known as Block 143 Lot 1. The existing subject site is a fully wooded area. The proposed development consists of clearing a portion of the wooded area to build 4 single family dwellings and associated infrastructure. Because the parcel does not front any paved roads, the project also proposes to develop a portion of the rights-of-way of both 7th Avenue and Douglas Street to allow for access to the proposed single-family dwellings. This new construction is considered a "Major development" as defined by the New Jersey Stormwater Management Rules (N.J.A.C. 7:8), and thus the Stormwater Management Rules apply to this project.

To accommodate the proposed single family dwellings and roads with respect to the Stormwater Management Rules for major developments, this project proposes a stormwater management system that consists of four rain gardens and two infiltration areas. Rain Gardens #1-4 are proposed to capture and treat the runoff from the four proposed single family dwellings and a portion of proposed roads.

Infiltration Areas #5-6 are proposed to meet the water quality requirement, by capturing and treating stormwater runoff from the northerly half of 7th avenue generated from the paving of the road.

Per the stormwater runoff quality standards for a major development (§ 86-4Q), the stormwater management system has been designed to capture and treat runoff from regulated, impervious motor vehicle surfaces in a way that provides 80% total suspended solid (TSS) removal.

The stormwater management system has also been designed in accordance to the stormwater runoff quantity standards for a major development (§ 86-4R) to limit post-developed peak discharge rates in compliance with at the following rates: 2-year storm at 50% of the pre-development peak, 10-year storm at 75% of the pre-development peak, and 100-year storm at 80% of the pre-development peak.

Pre-development peak discharges at the point of interest, pre- and post-development curve numbers and time of concentration were calculated using the U.S.D.A. Natural Resource Conservation Service (NRCS) Technical Release No. 55 (TR-55). Existing and proposed hydrographs were calculated using the Delmarva Unit Hydrograph method as included in the *HydroCAD (version 10.00-14)* computer software. Post-development times of concentration to the basin assume a minimum of 10 minutes.

Stormwater storage volumes within the stormwater facility were calculated using storage calculations within in the *HydroCAD* computer software.

DESIGN DATA

The pre-developed conditions of the site reflect four defined points where stormwater runoff is leaving the site. Pre-developed drainage area #1 is nearest to the intersection of 7th Avenue and Douglas Street, where all stormwater runoff flows to the intersection of Douglas Street with the vacated right-of-way of Eighth Avenue, as denoted as Analysis Point #1. Pre-Developed Drainage Area #2 does not directly flow out of the site but instead is partially detained and overflows into Pre-Developed Drainage Area #3 as a result of the site's topography. Runoff from Drainage Area #3 leaves the site at Analysis Point #3, at a low point along the northerly right-of-way line of Seventh Avenue. Runoff from Pre-Developed Drainage Area #4 generally flows in a southwesterly direction, to a low point along the easterly right-of-way line of Reed Street (vacated).

The 2-, 10-, and 100-year pre- and post-developed watershed peak discharges and inflow hydrographs were generated using the following data:

Pre-Development Conditions

Drainage Area #1

D.A.: 79,749 sf
CN: 37
T_c: 53.6 min.

Drainage Area #2

D.A.: 29,412 sf
CN: 32
T_c: 28.7 min.

Drainage Area #3

D.A.: 33,644 sf
CN: 55
T_c: 25.9 min.

Drainage Area #4

D.A.: 26,915 sf
CN: 55
T_c: 43.7 min.

Post-Development Conditions

Rain Garden #1

D.A.: 21,057 sf
CN: 72
T_c: 10.0 min.

Rain Garden #2

D.A.: 41,267 sf
CN: 61
T_c: 10.0 min.

Rain Garden #3

D.A.: 36,781 sf
CN: 48
T_c: 10.0 min.

Rain Garden #4

D.A.: 22,387 sf
CN: 56
T_c: 10.0 min.

Infiltration Area #5

D.A.: 15,811 sf
CN: 71
T_c: 10.0 min.

Infiltration Area #6

D.A.: 3,707 sf
CN: 66
T_c: 10.0 min.

Post-Developed Drainage Area #1 (Undetained)

D.A.: 19,178 sf
CN: 40
T_c: 42.7 min.

Post-Developed Drainage Area #4 (Undetained)

D.A.: 9,822 sf
CN: 56
T_c: 26.7 min.

BASIN CALCULATIONS

Rain Gardens #1 - #3 overflow towards the roadside swale and continue east along 7th Avenue, towards Douglas Street. Rain Garden #4 is designed to detain and infiltrate the entirety of the 100-year storm, but also has a 3 foot wide emergency overflow spillway at elevation 136.90 for storms greater than the 100-year storm. Overflow leaving this device would discharge into Douglas Street and flow to Analysis Point #1. Similarly, Infiltration Area #5 was designed to detain and infiltrate the entirety of the 100-year

storm and also has a 20 foot wide emergency overflow spillway at elevation 136.80, which discharges water towards Analysis Point #3. Infiltration Area #6 can retain and infiltrate the entirety of the stormwater runoff up to the 100-year storm on its own. All outlet devices in the overall system (overflow spillways on Rain Garden #4 and Infiltration Area #5) were placed at an elevation above the peak elevation for the NJDEP 2-hour, 1.25" Water Quality storm, allowing for the rain garden to contain and treat the entirety of the runoff generated from this event, and also at an elevation that allows for the analyzed site to meet the water quantity rate reduction requirements for the 2-, 10- and 100- year storms.

The overflow spillway for Rain Garden #4 and Infiltration Area #5 have been designed so that the 100-year peak outflow will pass through the spillway with a non-erosive velocity of less than 2.5 feet/second.

Flows through the outlets were calculated using *HydroCAD (version 10.00-25)* computer software.

Stormwater Runoff Quantity

The stormwater management system consisting of four (4) rain gardens and two (2) infiltration areas was designed to comply with the NJDEP Stormwater Management Rules (N.J.A.C. 7:8-5.6) requirements for peak design outflow. More specifically, the section in the NJDEP Stormwater Management Rules (N.J.A.C. 7:8-5.6(b)3) on runoff quantity impacts which states that the design engineer shall "...Design stormwater measures so that the post-construction peak runoff rates for the 2-, 10-, and 100- year storm events are 50, 75, and 80 percent, respectively, of the preconstruction peak runoff rates. The percentages apply only to the post-construction stormwater runoff that is attributable to the portion of the site on which the proposed development or project is to be constructed..."

The stormwater management system being proposed reduces the peak flow rate of stormwater runoff leaving at the four defined pre-developed analysis points by at least 50, 75 and 80 percent for the 2-, 10- and 100- year storms respectively, as shown in the tables below:

	Drainage Area #1		
Storm	Pre-Developed Peak Runoff Rate (cfs)	Maximum Rate Permitted (cfs)	Post-Developed Peak Runoff Rate (cfs)
2-year	0.00	0.00	0.00
10-year	0.03	0.02	0.02
100-year	0.76	0.60	0.29

Drainage Area #2			
Storm	Pre-Developed Peak Runoff Rate (cfs)	Maximum Rate Permitted (cfs)	Post-Developed Peak Runoff Rate (cfs)
2-year	0.00	0.00	0.00
10-year	0.00	0.00	0.00
100-year	0.16	0.12	0.00

Drainage Area #3			
Storm	Pre-Developed Peak Runoff Rate (cfs)	Maximum Rate Permitted (cfs)	Post-Developed Peak Runoff Rate (cfs)
2-year	0.07	0.03	0.00
10-year	0.46	0.35	0.00
100-year	1.74	1.40	0.00

Drainage Area #4			
Storm	Pre-Developed Peak Runoff Rate (cfs)	Maximum Rate Permitted (cfs)	Post-Developed Peak Runoff Rate (cfs)
2-year	0.05	0.02	0.02
10-year	0.28	0.21	0.15
100-year	1.06	0.85	0.53

The post-developed peak discharge for each storm is reduced as required, therefore this requirement is met.

Stormwater Runoff Quality

The project was also designed in accordance with the NJDEP Stormwater Management Rules (N.J.A.C. 7:8) for water quality. The Stormwater Management Rules require that major development sites include stormwater management measures which reduce the average total suspended solids (TSS) load in the post-development runoff by 80 percent. More specifically, the section in the Stormwater Management Rules (N.J.A.C. 7:8-5.5(b)1) on runoff quality states that.... “Eighty percent TSS removal of the anticipated load.... Shall be achieved for the stormwater runoff from the net increase of motor vehicle surface.” To satisfy the water quality standards in Section 5.5, green infrastructure BMP’s identified in Table 5-1 at N.J.A.C. 7:8-502(f) shall be used. The 80% average TSS-removal, as well as nutrient load reduction, is accomplished on this

site using four (4) rain gardens and two (2) infiltration areas (80% TSS removal) to treat the entirety of the proposed impervious coverage that will serve vehicular traffic. The proposed system complies with the maximum contributory drainage area limitation of 2.5 acres contained in section 5.3(b)4 of the Rules.

The design meets the recommendations in the Stormwater Best Management Practices Manual (SWBMP) Section 9.8 including the requirements for the maximum design storm drain time, permeability rate factor of safety, minimum/maximum subsoil design permeability rate, and criteria for the sand layer.

The proposed stormwater management system provides greater than 80% TSS removal for the proposed impervious coverage serving vehicular by directing runoff into rain gardens and treating it (through retention and infiltration), therefore these requirements are met.

Groundwater Recharge

The rules also require that the pre-developed average annual groundwater recharge volume is maintained in the post-developed conditions.

The required annual recharge volume was calculated using the New Jersey Groundwater Recharge Spreadsheet (version 2.0) – see “Post-Development Annual Recharge Deficit” from the spreadsheet printouts in this report.

Recharge is accomplished on this site by the infiltration facilities. The annual recharge volume provided is calculated using the “BMP Calculations” worksheet in the Groundwater Recharge Spreadsheet. The effective depth is based upon the depth of the rain garden below the lowest orifice or outlet and upper and lower surfaces of the BMP are determined by the elevations of the basin. The annual recharge volume provided by each is calculated using the area of impervious surfaces that drain to that facility. A printout from the spreadsheets for each rain garden is included at the end of this section.

Rain Garden #1:

Pre-Developed Annual Recharge Volume = 5,265 cu-ft

Post-Developed Recharge Volume Provided = 5,737 cu-ft

Rain Garden #2:

Pre-Developed Annual Recharge Volume = 4,390 cu-ft

Post-Developed Recharge Volume Provided = 9,250 cu-ft

Rain Garden #3:

Pre-Developed Annual Recharge Volume = 2,789 cu-ft

Post-Developed Recharge Volume Provided = 9,725 cu-ft

Rain Garden #4:

Pre-Developed Annual Recharge Volume = 5,351 cu-ft

Post-Developed Recharge Volume Provided = 5,810 cu-ft

Infiltration Area #5:

Pre-Developed Annual Recharge Volume = 6,718 cu-ft

Post-Developed Recharge Volume Provided = 10,682 cu-ft

Infiltration Area #6:

Pre-Developed Annual Recharge Volume = 1,577 cu-ft

Post-Developed Recharge Volume Provided = 3,025 cu-ft

INFILTRATION REQUIREMENTS

The NJDEP Stormwater Management Rules, (as reflected in the SWBMP Section 9.8 on Small-Scale Infiltration Systems) require that the permeability rate of the soil must be sufficient to fully drain the infiltration basin's maximum design storm runoff volume within 72 hours.

The infiltration rates used are based on field soil tests performed on October 13, 2023. The Infiltration rates used for all design purposes were calculated by averaging the tested infiltration rate at each corresponding test pit and dividing by two as a factor of safety. Copies of the soil logs are included in this report.

For Rain Garden #1, The maximum design volume is the volume below the top of the basin and overflow to elevation 137.34 (4,976 ft³). Permeability tests shall be completed in accordance with Chapter 12 of the Manual to demonstrate that the soils are capable of meeting the minimum required permeability rate. The BMP Manual requires a minimum of 0.5 in/hour tested rate.

The drain time was calculated using the design permeability rate to demonstrate that the entire water quality volume will be infiltrated within the 72 hours as required. The drain

time was calculated by expressing the runoff volume as an equivalent depth across only the basin bottom area.

Volume below top of basin = 4,976 ft³

Bottom Surface Area = 591 ft²

Equivalent Depth of Water in Basin (ft) = 4,976 ft³ / 591 ft² = 8.420 ft / (1.76 in / hr x 1/12)
= **57.41 hours**

Rain Garden #1 fully drains the required volume within 57.41 hours, which is faster than the 72 hour maximum, therefore this requirement is met.

For Rain Garden #2, The maximum design volume is the volume below the top of the basin and overflow to elevation 138.45 (6,227 ft³) Permeability tests shall be completed in accordance with Chapter 12 of the Manual to demonstrate that the soils are capable of meeting the minimum required permeability rate. The BMP Manual requires a minimum of 0.5 in/hour tested rate. Copies of the soil logs are included in this report.

The drain time was calculated using the design permeability rate to demonstrate that the entire water quality volume will be infiltrated within the 72 hours as required. The drain time was calculated by expressing the runoff volume as an equivalent depth across only the basin bottom area.

Volume below top of basin = 6,227 ft³

Bottom Surface Area = 550 ft²

Equivalent Depth of Water in Basin (ft) = 6,227 ft³ / 550 ft² = 11.32 ft / (4.47 in / hr x 1/12)
= **30.39 hours**

Rain Garden #2 fully drains the required volume within 30.39 hours, which is faster than the 72 hour maximum, therefore this requirement is met.

For Rain Garden #3, The maximum design volume is the volume below the top of the basin and overflow to elevation 137.23 (2,662 ft³). Permeability tests shall be completed in accordance with Chapter 12 of the Manual to demonstrate that the soils are capable of meeting the minimum required permeability rate. The BMP Manual requires a minimum of 0.5 in/hour tested rate. Copies of the soil logs are included in this report.

The drain time was calculated using the design permeability rate to demonstrate that the entire water quality volume will be infiltrated within the 72 hours as required. The drain time was calculated by expressing the runoff volume as an equivalent depth across only the basin bottom area.

Volume below top of basin = 2,662 ft³

Bottom Surface Area = 554 ft²

Equivalent Depth of Water in Basin (ft) = $2,662 \text{ ft}^3 / 554 \text{ ft}^2 = 4.81 \text{ ft} / (6.13 \text{ in} / \text{hr} \times 1/12)$
= **9.41 hours**

Rain Garden #3 fully drains the required volume within 9.41 hours, which is faster than the 72 hour maximum, therefore this requirement is met.

For Rain Garden #4, The maximum design volume is the volume of storage for the 100-year storm at elevation 135.57 (1,755 ft³). Permeability tests shall be completed in accordance with Chapter 12 of the Manual to demonstrate that the soils are capable of meeting the minimum required permeability rate. The BMP Manual requires a minimum of 0.5 in/hour tested rate. Copies of the soil logs are included in this report.

The drain time was calculated using the design permeability rate to demonstrate that the entire water quality volume will be infiltrated within the 72 hours as required. The drain time was calculated by expressing the runoff volume as an equivalent depth across only the basin bottom area.

Volume below lowest outlet = 1,755 ft³

Bottom Surface Area = 1,253 ft²

Equivalent Depth of Water in Basin (ft) = $1,755 \text{ ft}^3 / 1,253 \text{ ft}^2 = 1.40 \text{ ft} / (4.53 \text{ in} / \text{hr} \times 1/12)$
= **3.71 hours**

Rain Garden #4 fully drains the required volume within 3.64 hours, which is faster than the 72 hour maximum, therefore this requirement is met.

For Infiltration Area #5, The maximum design volume is the volume of storage for the 100-year storm at elevation 137.58 (2,616 ft³). Permeability tests shall be completed in accordance with Chapter 12 of the Manual to demonstrate that the soils are capable of meeting the minimum required permeability rate. The BMP Manual requires a minimum of 0.5 in/hour tested rate. Copies of the soil logs are included in this report.

The drain time was calculated using the design permeability rate to demonstrate that the entire water quality volume will be infiltrated within the 72 hours as required. The drain time was calculated by expressing the runoff volume as an equivalent depth across only the basin bottom area.

Volume below lowest outlet = 2,616 ft³

Bottom Surface Area = 500 ft²

Equivalent Depth of Water in Basin (ft) = $2,616 \text{ ft}^3 / 500 \text{ ft}^2 = 5.232 \text{ ft} / (4.224 \text{ in} / \text{hr} \times 1/12)$
= **14.86 hours**

Infiltration Area #5 fully drains the required volume within 14.86 hours, which is faster than the 72 hour maximum, therefore this requirement is met.

For Infiltration Area #6, The maximum design volume is the volume of storage for the 100-year storm at elevation 135.75 (432 ft³). Permeability tests shall be completed in accordance with Chapter 12 of the Manual to demonstrate that the soils are capable of meeting the minimum required permeability rate. The BMP Manual requires a minimum of 0.5 in/hour tested rate.

The drain time was calculated using the design permeability rate to demonstrate that the entire water quality volume will be infiltrated within the 72 hours as required. The drain time was calculated by expressing the runoff volume as an equivalent depth across only the basin bottom area.

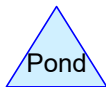
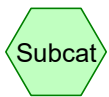
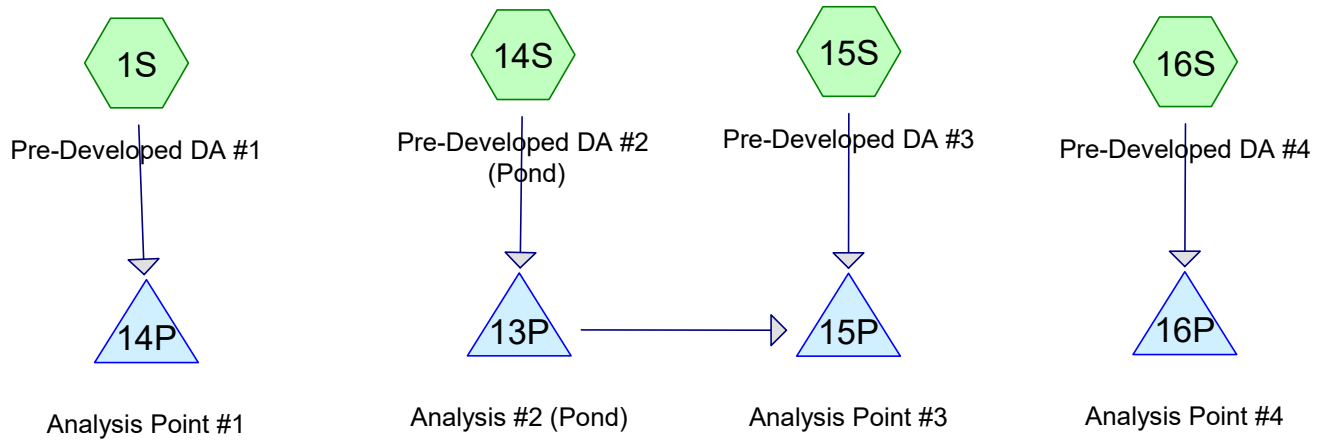
Volume below top of basin = 432 ft³

Bottom Surface Area = 352 ft²

Equivalent Depth of Water in Basin (ft) = $432 \text{ ft}^3 / 352 \text{ ft}^2 = 1.23 \text{ ft} / (4.53 \text{ in} / \text{hr} \times 1/12)$
= **3.25 hours**

Infiltration Area #6 fully drains the required volume within 3.25 hours, which is faster than the 72 hour maximum, therefore this requirement is met.

II. STORMWATER ROUTING CALCULATIONS



Routing Diagram for 23-105 Stormwater PRE
 Prepared by Tri-State Engineering & Survey, Printed 1/24/2024
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23-105 Stormwater PRE

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Area Listing (all nodes)

Area (acres)	CN	Description (subcatchment-numbers)
0.055	72	Dirt roads, HSG A (1S)
1.994	30	Woods, Good, HSG A (1S, 14S)
1.838	55	Woods, Good, HSG B (1S, 14S, 15S, 16S)

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Soil Listing (all nodes)

Area (acres)	Soil Group	Subcatchment Numbers
2.049	HSG A	1S, 14S
1.838	HSG B	1S, 14S, 15S, 16S
0.000	HSG C	
0.000	HSG D	
0.000	Other	

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Ground Covers (all nodes)

HSG-A (acres)	HSG-B (acres)	HSG-C (acres)	HSG-D (acres)	Other (acres)	Total (acres)	Ground Cover	Subcatchment Numbers
0.055	0.000	0.000	0.000	0.000	0.055	Dirt roads	1S
1.994	1.838	0.000	0.000	0.000	3.832	Woods, Good	1S, 14S, 15S, 16S

23-105 Stormwater PRE

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NOAA 24-hr C 2-Year Rainfall=3.29"

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Summary for Subcatchment 1S: Pre-Developed DA #1

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

Routed to Pond 14P : Analysis Point #1

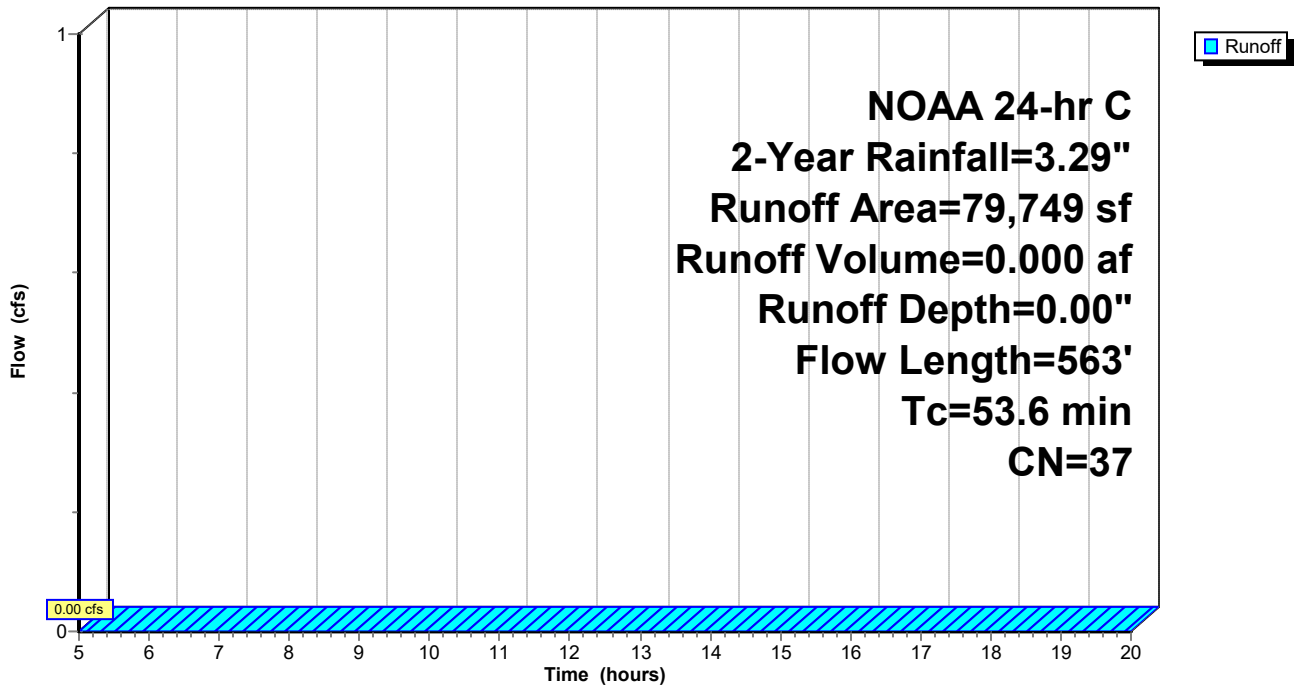
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
 NOAA 24-hr C 2-Year Rainfall=3.29"

Area (sf)	CN	Description
60,061	30	Woods, Good, HSG A
2,415	72	Dirt roads, HSG A
17,273	55	Woods, Good, HSG B
79,749	37	Weighted Average
79,749		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
27.9	100	0.0100	0.06		Sheet Flow, Woods: Light underbrush n= 0.400 P2= 3.29"
25.7	463	0.0036	0.30		Shallow Concentrated Flow, Woodland Kv= 5.0 fps
53.6	563	Total			

Subcatchment 1S: Pre-Developed DA #1

Hydrograph



23-105 Stormwater PRE

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NOAA 24-hr C 2-Year Rainfall=3.29"

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Summary for Subcatchment 14S: Pre-Developed DA #2 (Pond)

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

Routed to Pond 13P : Analysis #2 (Pond)

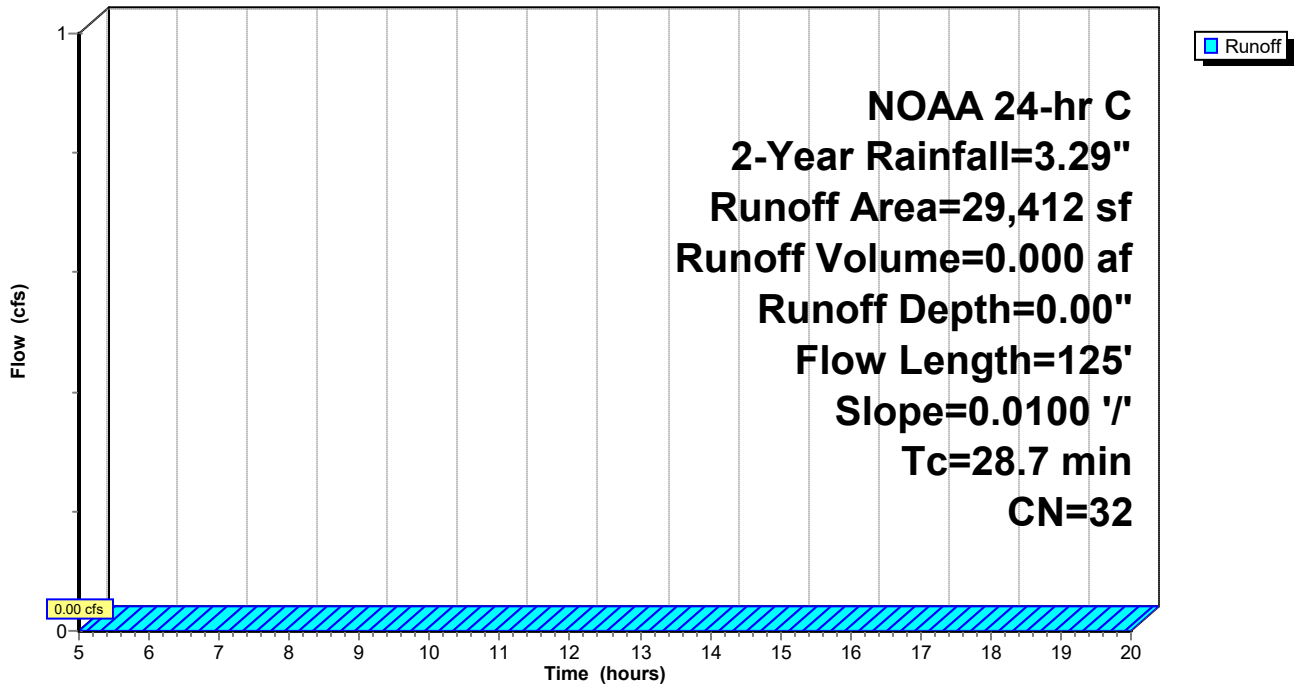
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
 NOAA 24-hr C 2-Year Rainfall=3.29"

Area (sf)	CN	Description
26,781	30	Woods, Good, HSG A
2,631	55	Woods, Good, HSG B
29,412	32	Weighted Average
29,412		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
27.9	100	0.0100	0.06		Sheet Flow, Woods: Light underbrush n= 0.400 P2= 3.29"
0.8	25	0.0100	0.50		Shallow Concentrated Flow, Woodland Kv= 5.0 fps
28.7	125	Total			

Subcatchment 14S: Pre-Developed DA #2 (Pond)

Hydrograph



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NOAA 24-hr C 2-Year Rainfall=3.29"

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Summary for Subcatchment 15S: Pre-Developed DA #3

Runoff = 0.07 cfs @ 12.62 hrs, Volume= 0.014 af, Depth> 0.23"

Routed to Pond 15P : Analysis Point #3

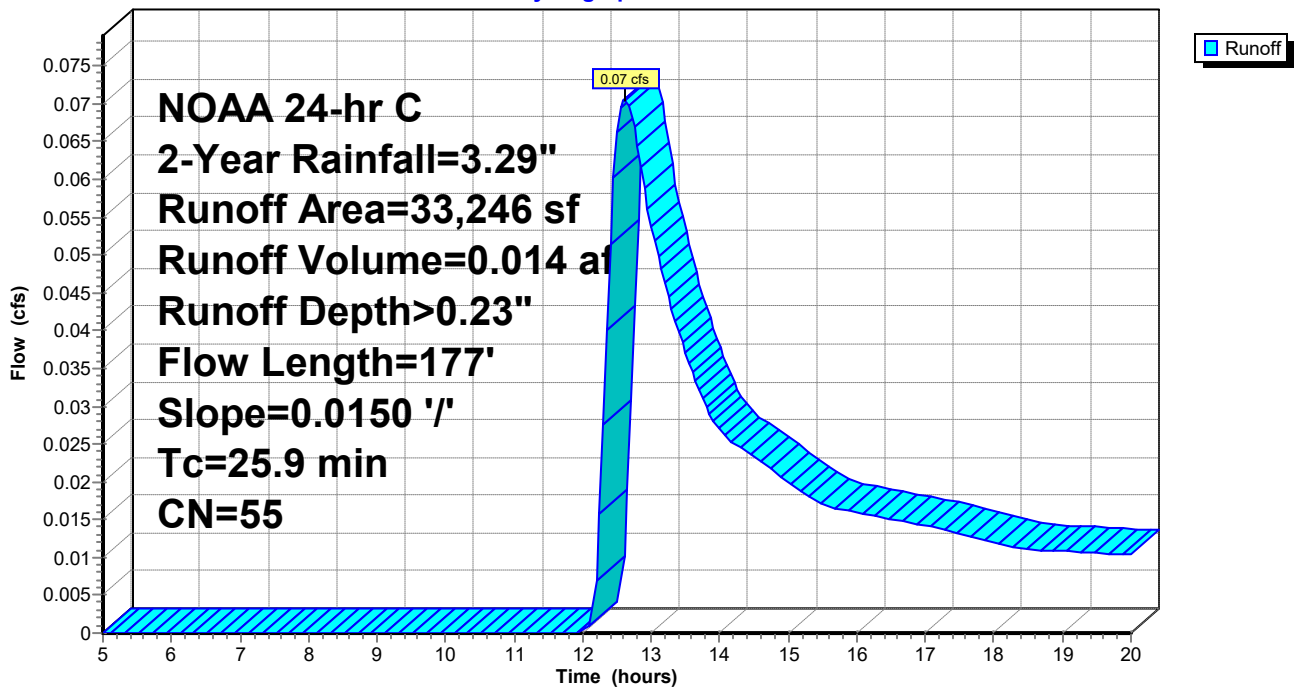
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
NOAA 24-hr C 2-Year Rainfall=3.29"

Area (sf)	CN	Description
33,246	55	Woods, Good, HSG B
33,246		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
23.8	100	0.0150	0.07		Sheet Flow, Woods: Light underbrush n= 0.400 P2= 3.29"
2.1	77	0.0150	0.61		Shallow Concentrated Flow, Woodland Kv= 5.0 fps
25.9	177	Total			

Subcatchment 15S: Pre-Developed DA #3

Hydrograph



23-105 Stormwater PRE

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NOAA 24-hr C 2-Year Rainfall=3.29"

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Summary for Subcatchment 16S: Pre-Developed DA #4

Runoff = 0.05 cfs @ 12.91 hrs, Volume= 0.011 af, Depth> 0.22"

Routed to Pond 16P : Analysis Point #4

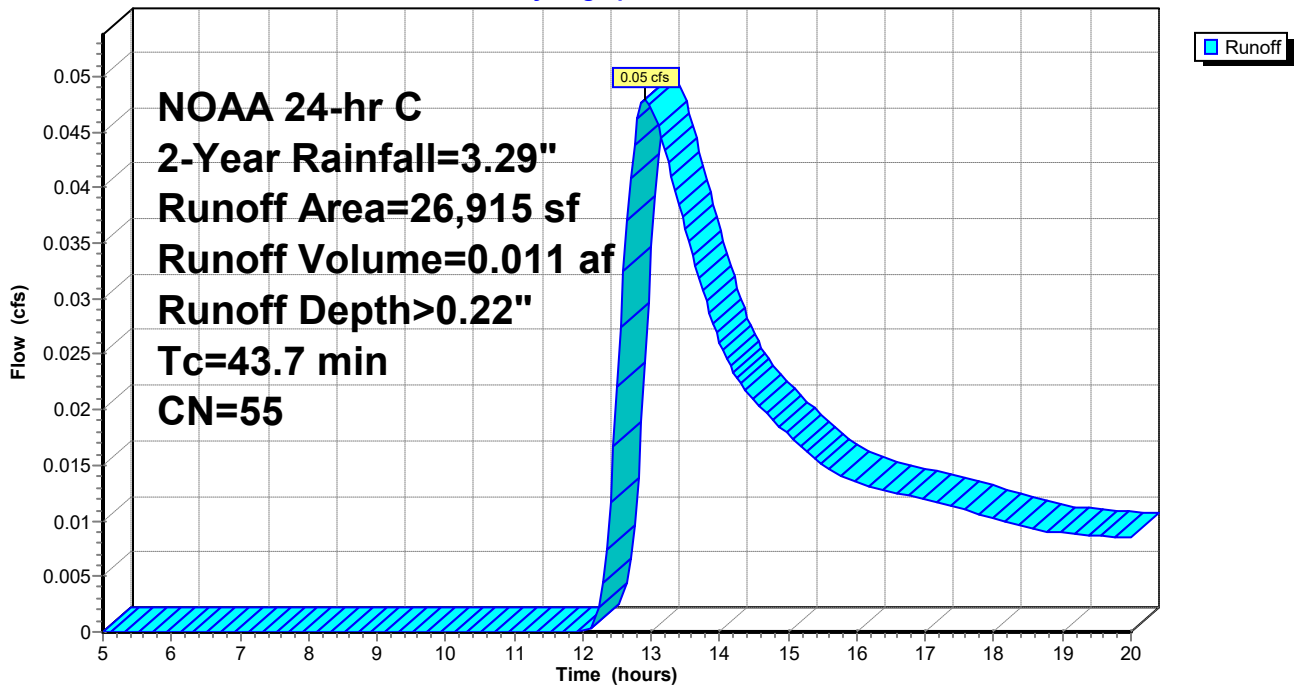
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
NOAA 24-hr C 2-Year Rainfall=3.29"

Area (sf)	CN	Description
26,915	55	Woods, Good, HSG B
26,915		100.00% Pervious Area

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

Subcatchment 16S: Pre-Developed DA #4

Hydrograph



23-105 Stormwater PRE

NOAA 24-hr C 2-Year Rainfall=3.29"

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Summary for Pond 13P: Analysis #2 (Pond)

Inflow Area = 0.675 ac, 0.00% Impervious, Inflow Depth = 0.00" for 2-Year event
 Inflow = 0.00 cfs @ 5.00 hrs, Volume= 0.000 af
 Outflow = 0.00 cfs @ 5.00 hrs, Volume= 0.000 af, Atten= 0%, Lag= 0.0 min
 Discarded = 0.00 cfs @ 5.00 hrs, Volume= 0.000 af
 Primary = 0.00 cfs @ 5.00 hrs, Volume= 0.000 af
 Routed to Pond 15P : Analysis Point #3

Routing by Stor-Ind method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
 Peak Elev= 38.00' @ 5.00 hrs Surf.Area= 2,857 sf Storage= 0 cf

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

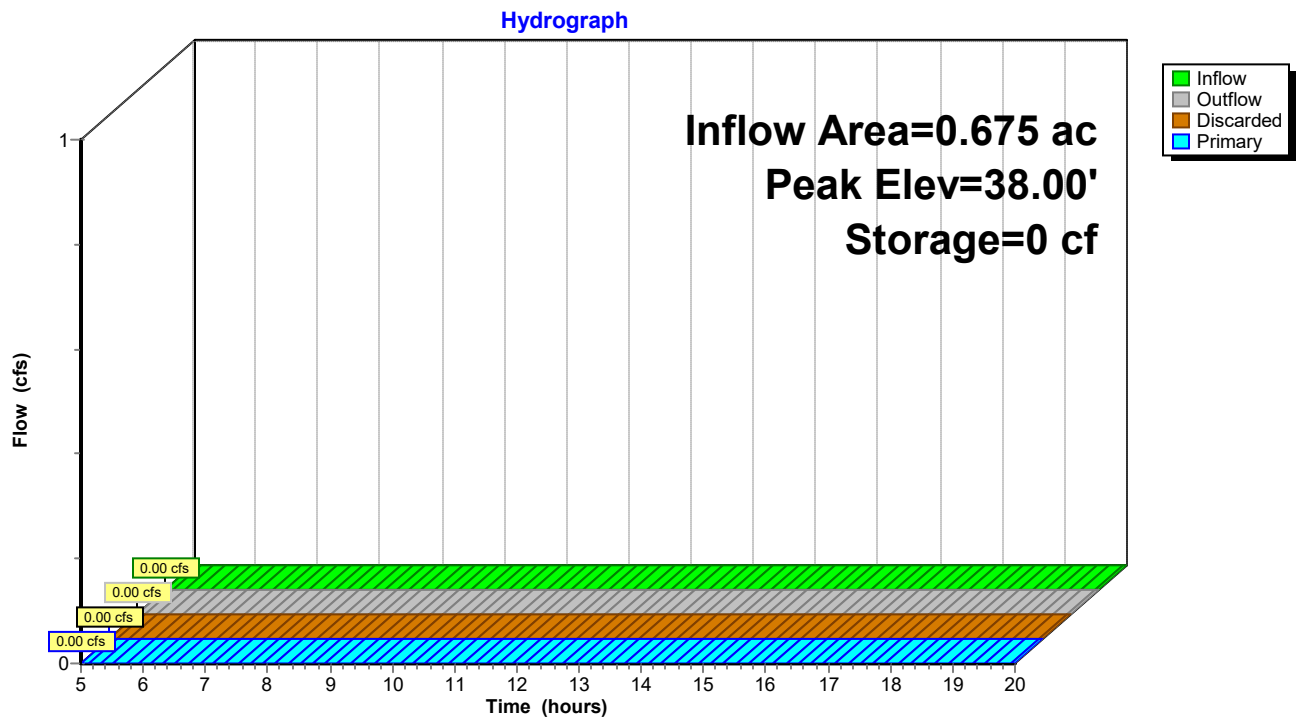
Volume	Invert	Avail.Storage	Storage Description
#1	38.00'	3,614 cf	Custom Stage Data (Prismatic) Listed below (Recalc)
Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
38.00	2,857	0	0
38.50	11,600	3,614	3,614

Device	Routing	Invert	Outlet Devices
#1	Discarded	38.00'	3.00 cfs Exfiltration at all elevations
#2	Primary	38.40'	46.0' long Sharp-Crested Rectangular Weir 2 End Contraction(s)

Discarded OutFlow Max=0.00 cfs @ 5.00 hrs HW=38.00' (Free Discharge)
 ↑1=Exfiltration (Passes 0.00 cfs of 3.00 cfs potential flow)

Primary OutFlow Max=0.00 cfs @ 5.00 hrs HW=38.00' (Free Discharge)
 ↑2=Sharp-Crested Rectangular Weir (Controls 0.00 cfs)

Pond 13P: Analysis #2 (Pond)



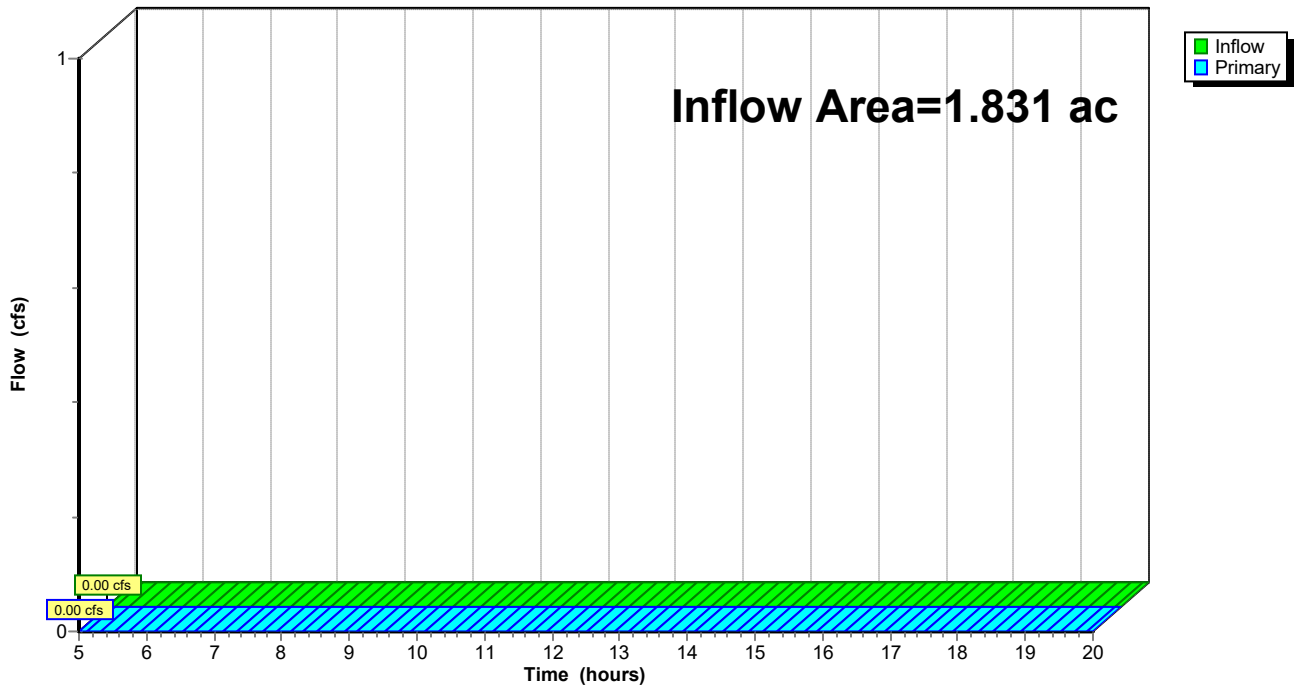
Summary for Pond 14P: Analysis Point #1

Inflow Area = 1.831 ac, 0.00% Impervious, Inflow Depth = 0.00" for 2-Year event
Inflow = 0.00 cfs @ 5.00 hrs, Volume= 0.000 af
Primary = 0.00 cfs @ 5.00 hrs, Volume= 0.000 af, Atten= 0%, Lag= 0.0 min

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

Pond 14P: Analysis Point #1

Hydrograph



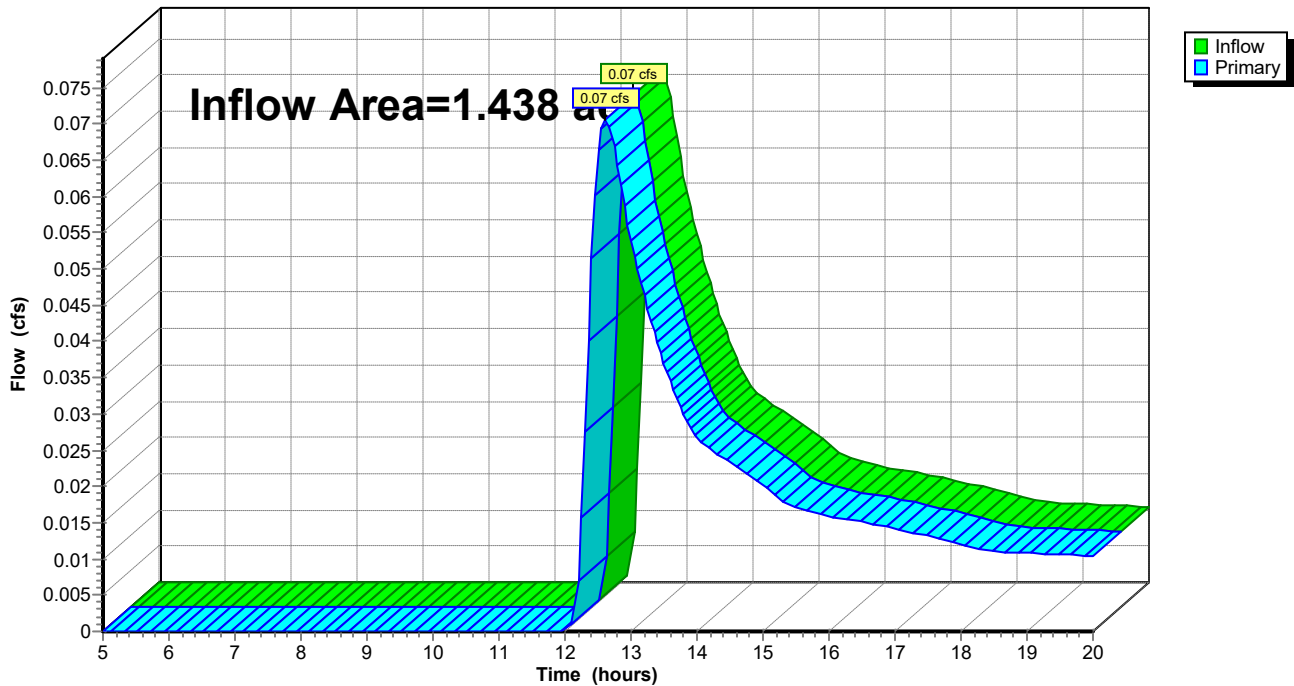
Summary for Pond 15P: Analysis Point #3

Inflow Area = 1.438 ac, 0.00% Impervious, Inflow Depth > 0.12" for 2-Year event
Inflow = 0.07 cfs @ 12.62 hrs, Volume= 0.014 af
Primary = 0.07 cfs @ 12.62 hrs, Volume= 0.014 af, Atten= 0%, Lag= 0.0 min

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

Pond 15P: Analysis Point #3

Hydrograph



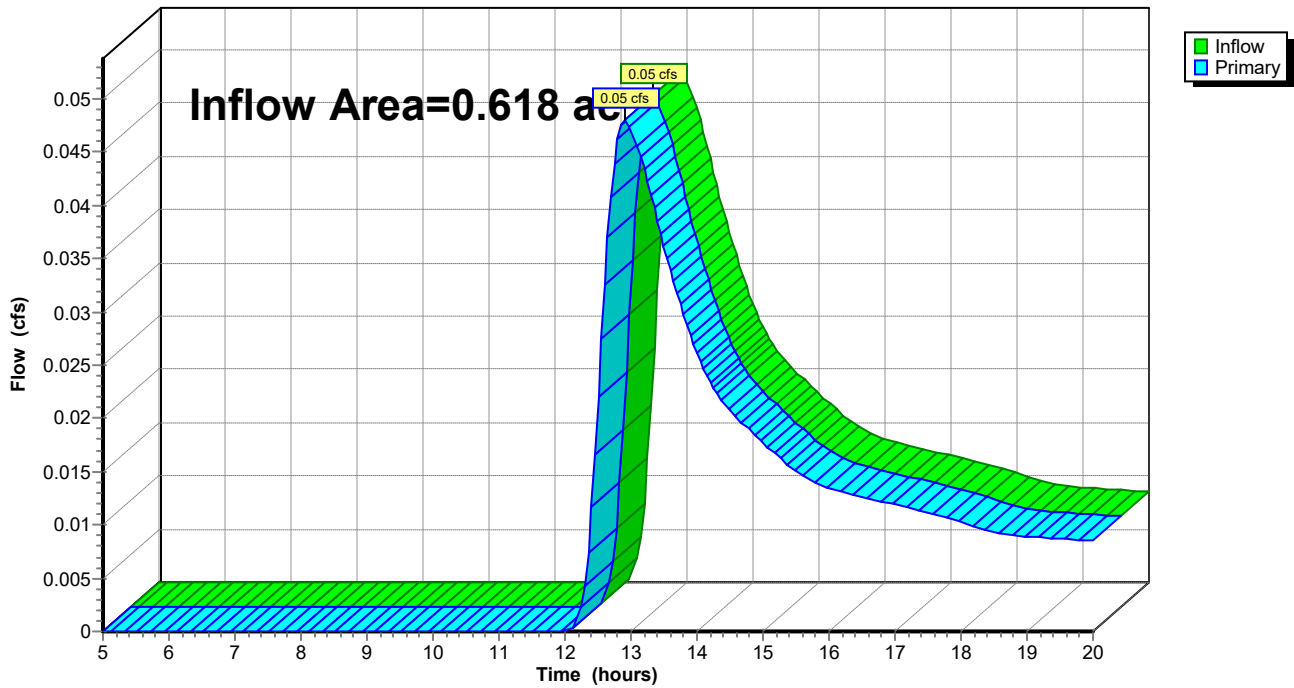
Summary for Pond 16P: Analysis Point #4

Inflow Area = 0.618 ac, 0.00% Impervious, Inflow Depth > 0.22" for 2-Year event
Inflow = 0.05 cfs @ 12.91 hrs, Volume= 0.011 af
Primary = 0.05 cfs @ 12.91 hrs, Volume= 0.011 af, Atten= 0%, Lag= 0.0 min

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

Pond 16P: Analysis Point #4

Hydrograph



23-105 Stormwater PRE

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NOAA 24-hr C 10-Year Rainfall=5.05"

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Summary for Subcatchment 1S: Pre-Developed DA #1

Runoff = 0.03 cfs @ 14.01 hrs, Volume= 0.015 af, Depth> 0.10"

Routed to Pond 14P : Analysis Point #1

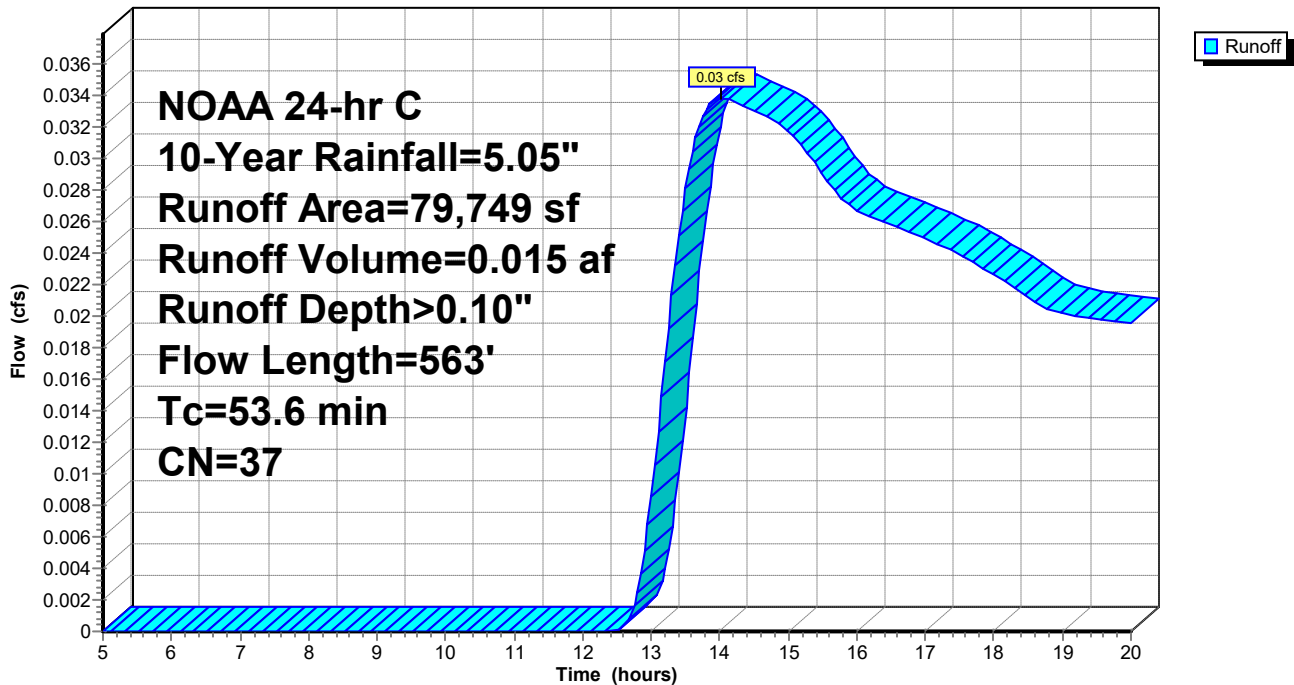
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
 NOAA 24-hr C 10-Year Rainfall=5.05"

Area (sf)	CN	Description
60,061	30	Woods, Good, HSG A
2,415	72	Dirt roads, HSG A
17,273	55	Woods, Good, HSG B
79,749	37	Weighted Average
79,749		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
27.9	100	0.0100	0.06		Sheet Flow, Woods: Light underbrush n= 0.400 P2= 3.29"
25.7	463	0.0036	0.30		Shallow Concentrated Flow, Woodland Kv= 5.0 fps
53.6	563	Total			

Subcatchment 1S: Pre-Developed DA #1

Hydrograph



23-105 Stormwater PRE

NOAA 24-hr C 10-Year Rainfall=5.05"

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Summary for Subcatchment 14S: Pre-Developed DA #2 (Pond)

Runoff = 0.00 cfs @ 20.00 hrs, Volume= 0.001 af, Depth> 0.01"

Routed to Pond 13P : Analysis #2 (Pond)

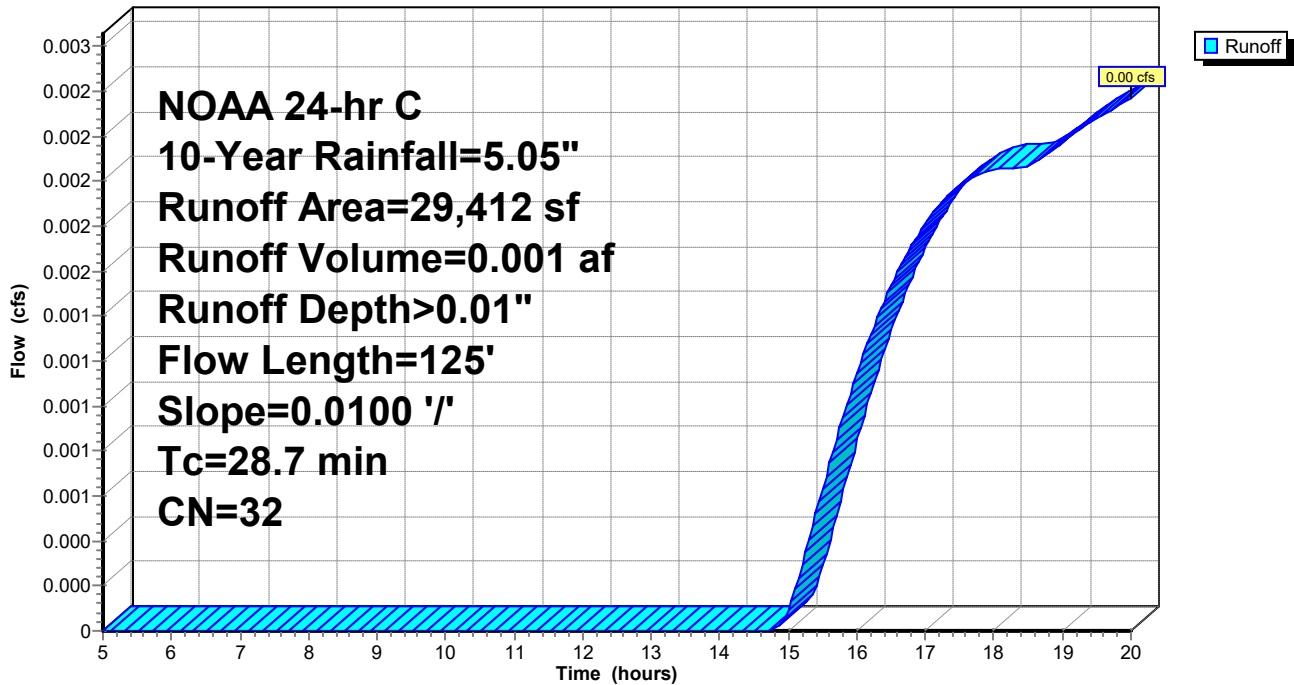
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
 NOAA 24-hr C 10-Year Rainfall=5.05"

Area (sf)	CN	Description
26,781	30	Woods, Good, HSG A
2,631	55	Woods, Good, HSG B
29,412	32	Weighted Average
29,412		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
27.9	100	0.0100	0.06		Sheet Flow, Woods: Light underbrush n= 0.400 P2= 3.29"
0.8	25	0.0100	0.50		Shallow Concentrated Flow, Woodland Kv= 5.0 fps
28.7	125	Total			

Subcatchment 14S: Pre-Developed DA #2 (Pond)

Hydrograph



23-105 Stormwater PRE

NOAA 24-hr C 10-Year Rainfall=5.05"

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Summary for Subcatchment 15S: Pre-Developed DA #3

Runoff = 0.46 cfs @ 12.43 hrs, Volume= 0.055 af, Depth> 0.87"
 Routed to Pond 15P : Analysis Point #3

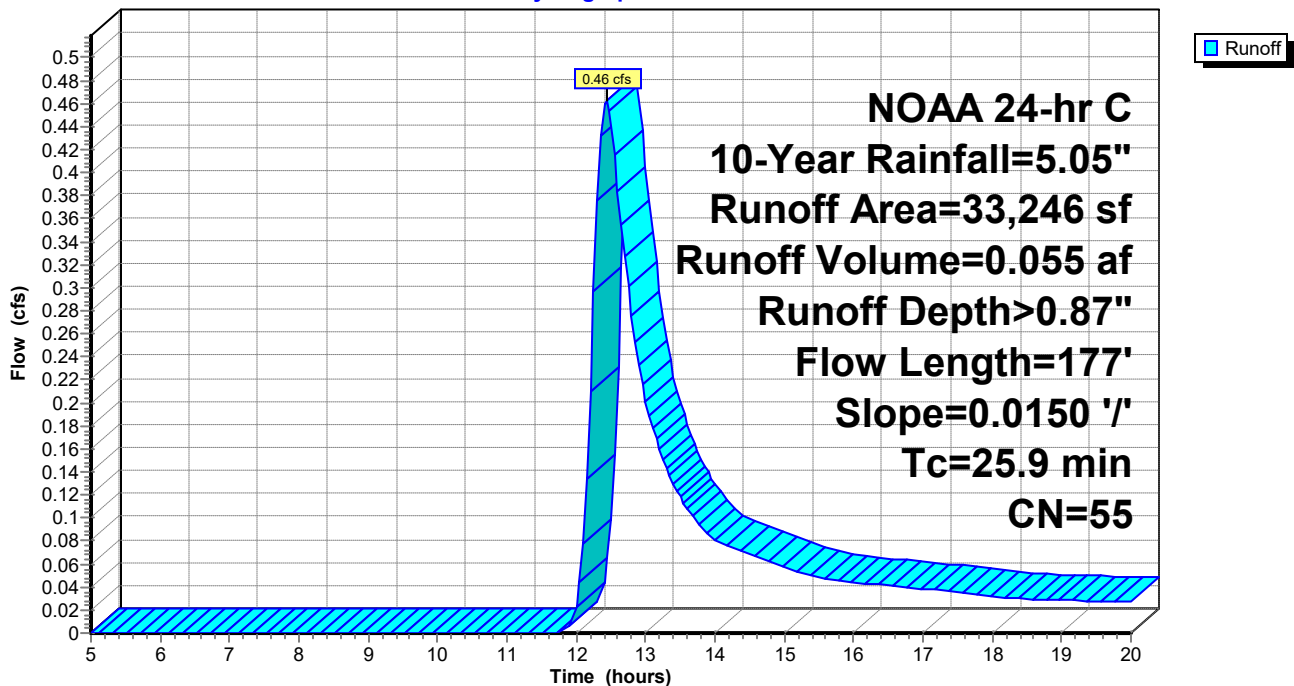
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
 NOAA 24-hr C 10-Year Rainfall=5.05"

Area (sf)	CN	Description
33,246	55	Woods, Good, HSG B
33,246		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
23.8	100	0.0150	0.07		Sheet Flow, Woods: Light underbrush n= 0.400 P2= 3.29"
2.1	77	0.0150	0.61		Shallow Concentrated Flow, Woodland Kv= 5.0 fps
25.9	177	Total			

Subcatchment 15S: Pre-Developed DA #3

Hydrograph



23-105 Stormwater PRE

NOAA 24-hr C 10-Year Rainfall=5.05"

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Summary for Subcatchment 16S: Pre-Developed DA #4

Runoff = 0.28 cfs @ 12.71 hrs, Volume= 0.044 af, Depth> 0.86"

Routed to Pond 16P : Analysis Point #4

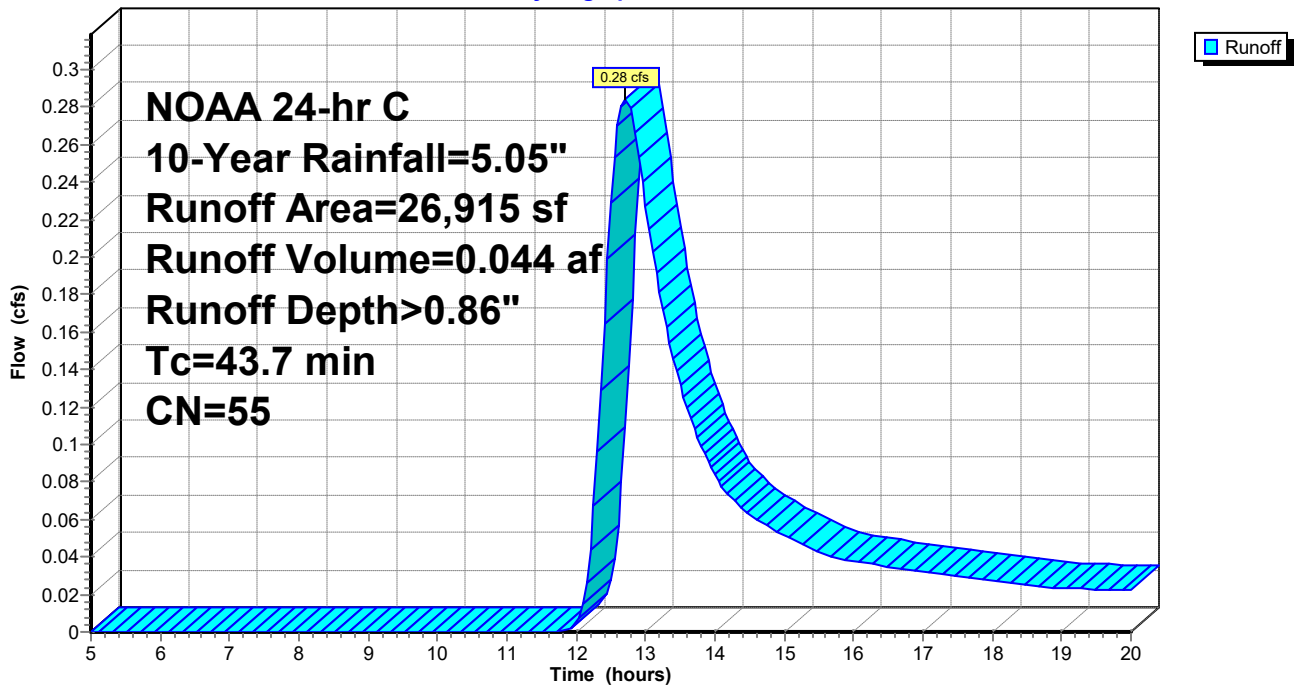
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
 NOAA 24-hr C 10-Year Rainfall=5.05"

Area (sf)	CN	Description
26,915	55	Woods, Good, HSG B
26,915		100.00% Pervious Area

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

Subcatchment 16S: Pre-Developed DA #4

Hydrograph



23-105 Stormwater PRE

NOAA 24-hr C 10-Year Rainfall=5.05"

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Summary for Pond 13P: Analysis #2 (Pond)

Inflow Area = 0.675 ac, 0.00% Impervious, Inflow Depth > 0.01" for 10-Year event
 Inflow = 0.00 cfs @ 20.00 hrs, Volume= 0.001 af
 Outflow = 0.00 cfs @ 20.00 hrs, Volume= 0.001 af, Atten= 0%, Lag= 0.0 min
 Discarded = 0.00 cfs @ 20.00 hrs, Volume= 0.001 af
 Primary = 0.00 cfs @ 5.00 hrs, Volume= 0.000 af
 Routed to Pond 15P : Analysis Point #3

Routing by Stor-Ind method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
 Peak Elev= 38.00' @ 20.00 hrs Surf.Area= 2,857 sf Storage= 0 cf

Plug-Flow detention time= 0.1 min calculated for 0.001 af (100% of inflow)
 Center-of-Mass det. time= 0.0 min (1,079.5 - 1,079.5)

Volume	Invert	Avail.Storage	Storage Description
#1	38.00'	3,614 cf	Custom Stage Data (Prismatic) Listed below (Recalc)
Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
38.00	2,857	0	0
38.50	11,600	3,614	3,614

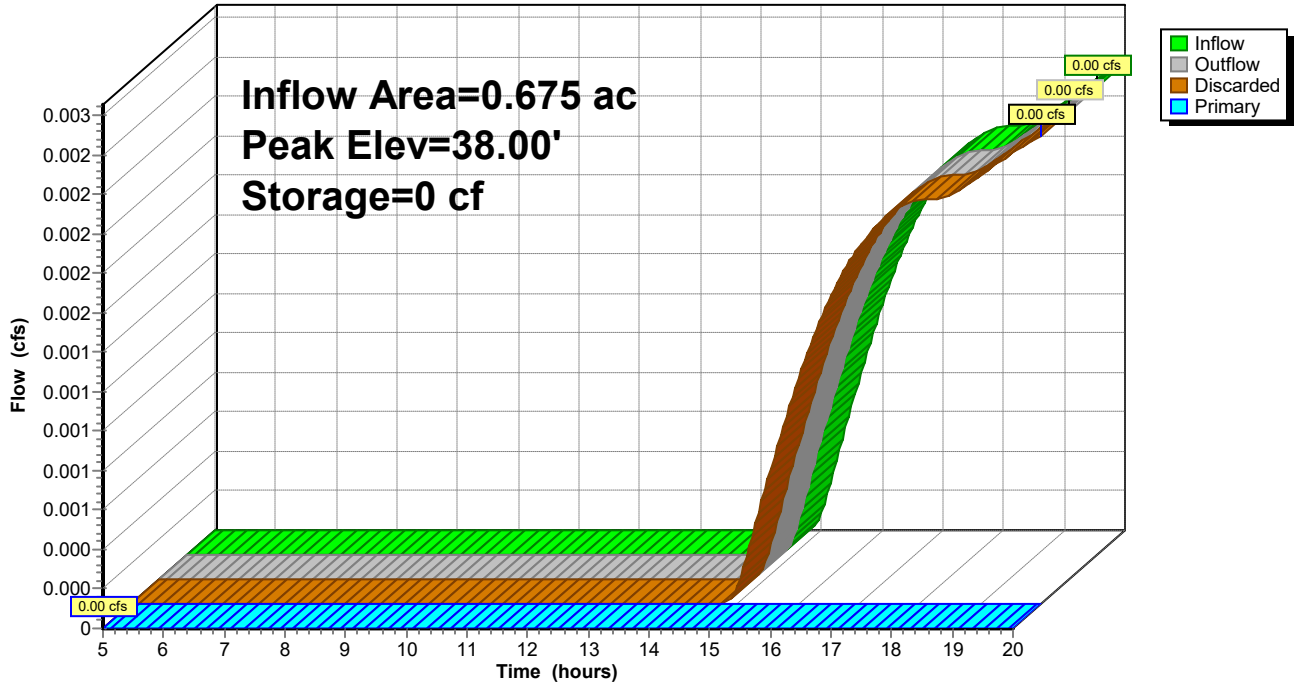
Device	Routing	Invert	Outlet Devices
#1	Discarded	38.00'	3.00 cfs Exfiltration at all elevations
#2	Primary	38.40'	46.0' long Sharp-Crested Rectangular Weir 2 End Contraction(s)

Discarded OutFlow Max=3.00 cfs @ 20.00 hrs HW=38.00' (Free Discharge)
 ↑1=Exfiltration (Exfiltration Controls 3.00 cfs)

Primary OutFlow Max=0.00 cfs @ 5.00 hrs HW=38.00' (Free Discharge)
 ↑2=Sharp-Crested Rectangular Weir (Controls 0.00 cfs)

Pond 13P: Analysis #2 (Pond)

Hydrograph



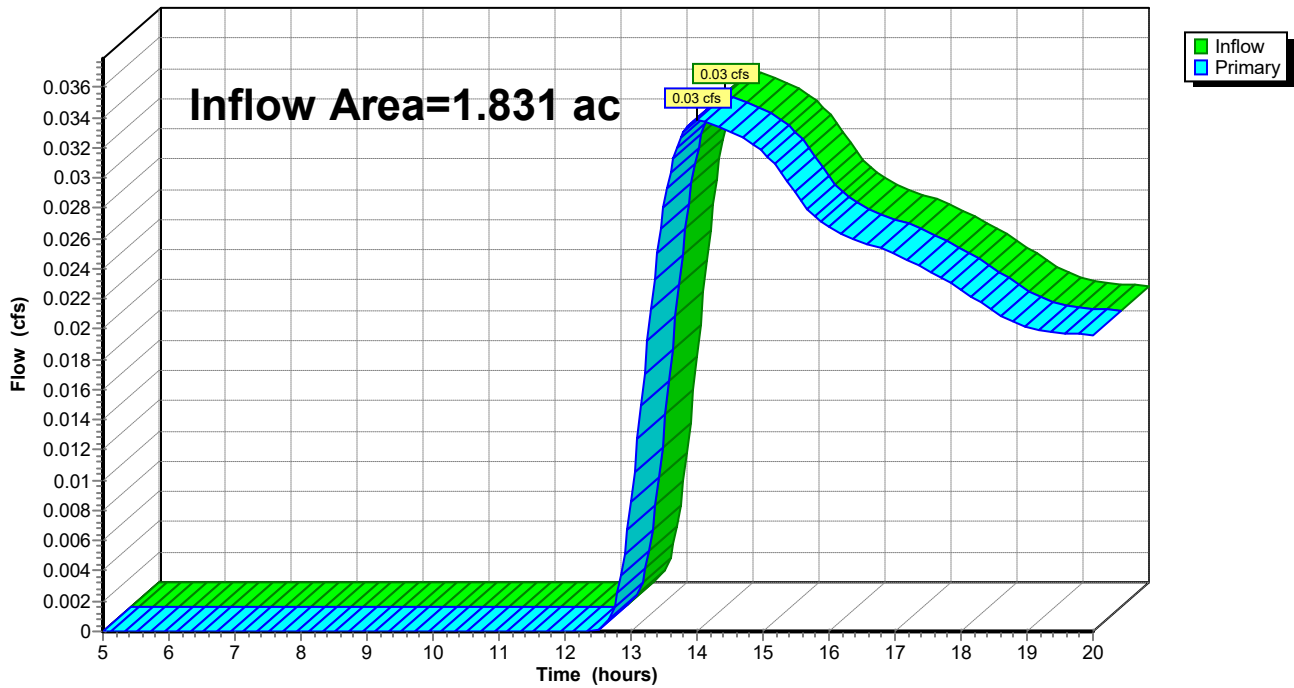
Summary for Pond 14P: Analysis Point #1

Inflow Area = 1.831 ac, 0.00% Impervious, Inflow Depth > 0.10" for 10-Year event
Inflow = 0.03 cfs @ 14.01 hrs, Volume= 0.015 af
Primary = 0.03 cfs @ 14.01 hrs, Volume= 0.015 af, Atten= 0%, Lag= 0.0 min

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

Pond 14P: Analysis Point #1

Hydrograph



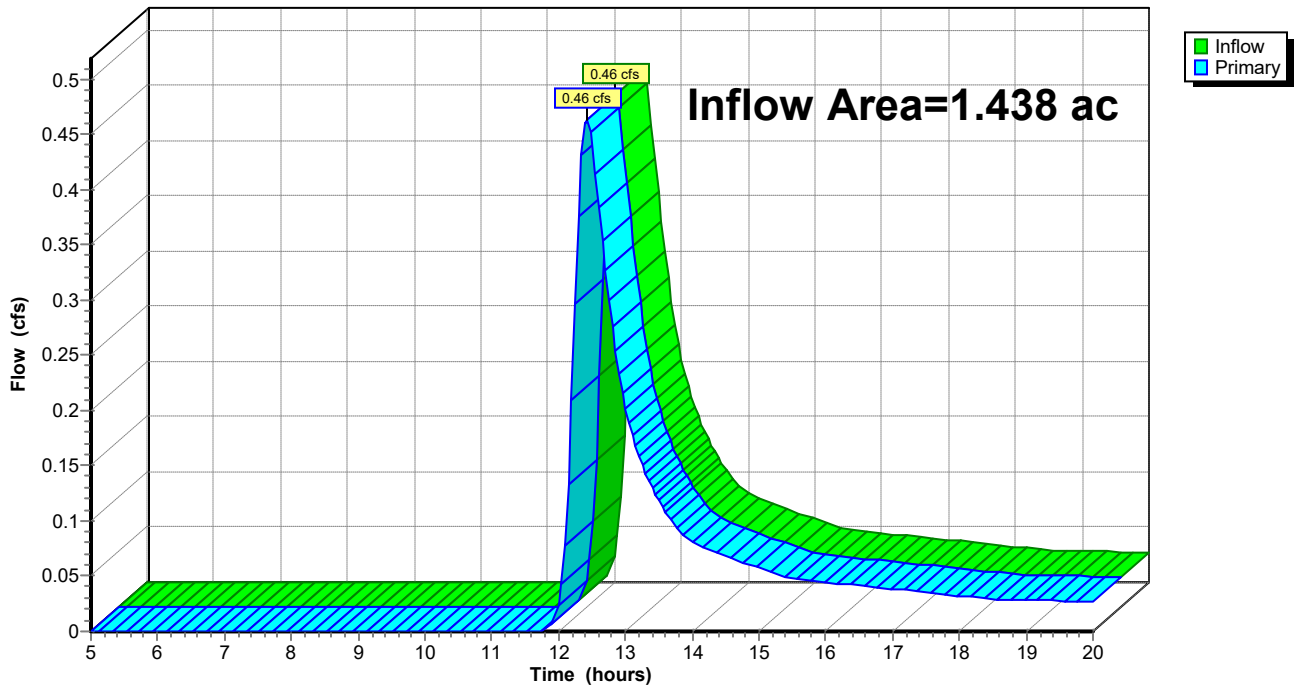
Summary for Pond 15P: Analysis Point #3

Inflow Area = 1.438 ac, 0.00% Impervious, Inflow Depth > 0.46" for 10-Year event
Inflow = 0.46 cfs @ 12.43 hrs, Volume= 0.055 af
Primary = 0.46 cfs @ 12.43 hrs, Volume= 0.055 af, Atten= 0%, Lag= 0.0 min

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

Pond 15P: Analysis Point #3

Hydrograph



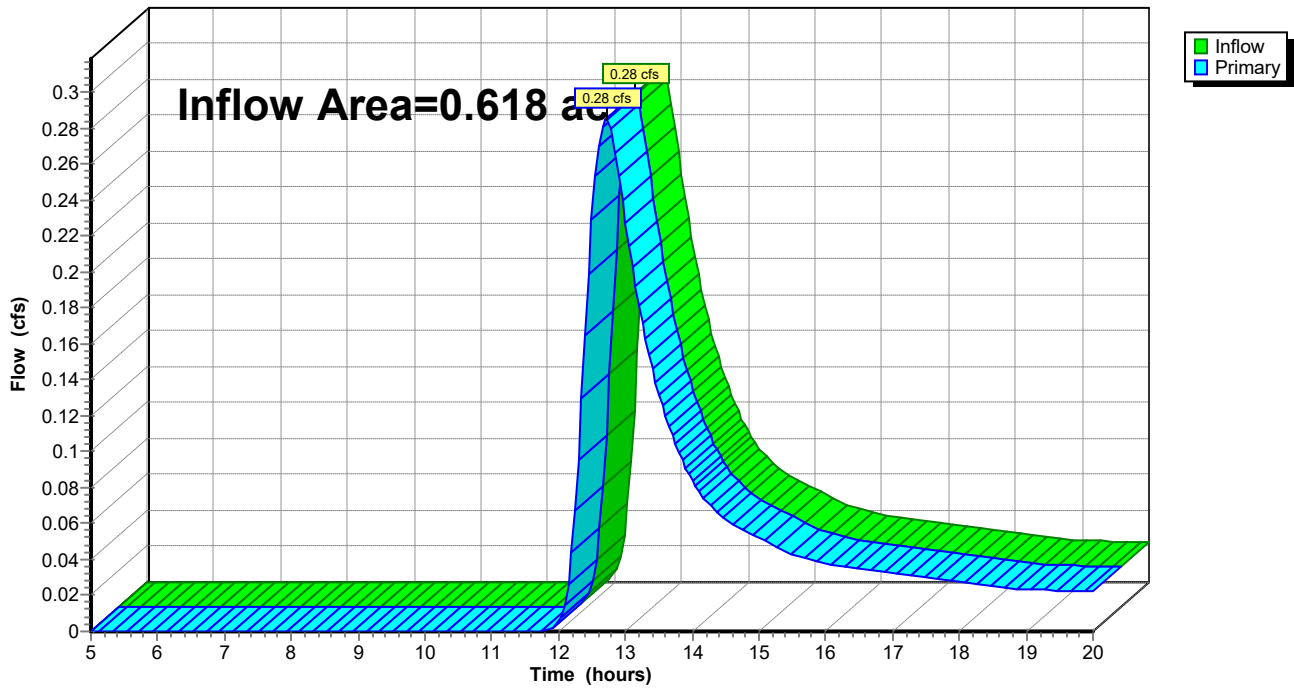
Summary for Pond 16P: Analysis Point #4

Inflow Area = 0.618 ac, 0.00% Impervious, Inflow Depth > 0.86" for 10-Year event
Inflow = 0.28 cfs @ 12.71 hrs, Volume= 0.044 af
Primary = 0.28 cfs @ 12.71 hrs, Volume= 0.044 af, Atten= 0%, Lag= 0.0 min

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

Pond 16P: Analysis Point #4

Hydrograph



23-105 Stormwater PRE

NOAA 24-hr C 100-Year Rainfall=8.55"

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Summary for Subcatchment 1S: Pre-Developed DA #1

Runoff = 0.76 cfs @ 12.94 hrs, Volume= 0.151 af, Depth> 0.99"
 Routed to Pond 14P : Analysis Point #1

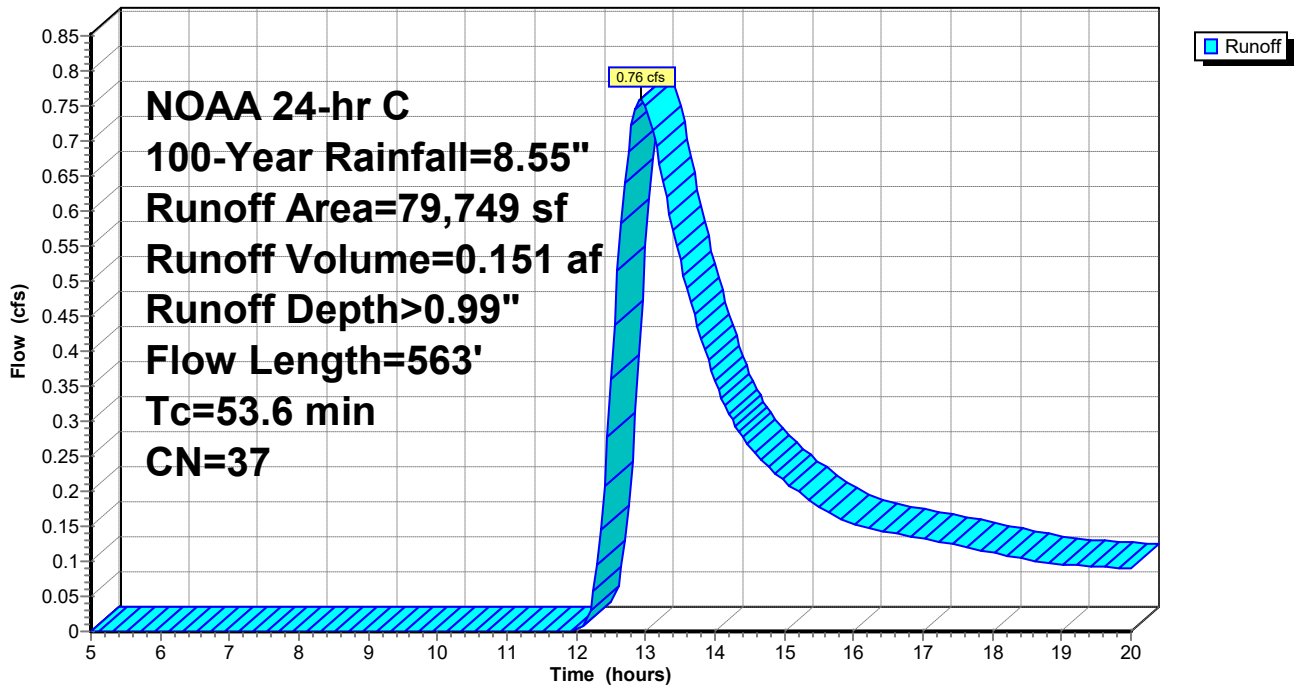
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
 NOAA 24-hr C 100-Year Rainfall=8.55"

Area (sf)	CN	Description
60,061	30	Woods, Good, HSG A
2,415	72	Dirt roads, HSG A
17,273	55	Woods, Good, HSG B
79,749	37	Weighted Average
79,749		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
27.9	100	0.0100	0.06		Sheet Flow, Woods: Light underbrush n= 0.400 P2= 3.29"
25.7	463	0.0036	0.30		Shallow Concentrated Flow, Woodland Kv= 5.0 fps
53.6	563	Total			

Subcatchment 1S: Pre-Developed DA #1

Hydrograph



23-105 Stormwater PRE

NOAA 24-hr C 100-Year Rainfall=8.55"

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Summary for Subcatchment 14S: Pre-Developed DA #2 (Pond)

Runoff = 0.16 cfs @ 12.66 hrs, Volume= 0.033 af, Depth> 0.58"
 Routed to Pond 13P : Analysis #2 (Pond)

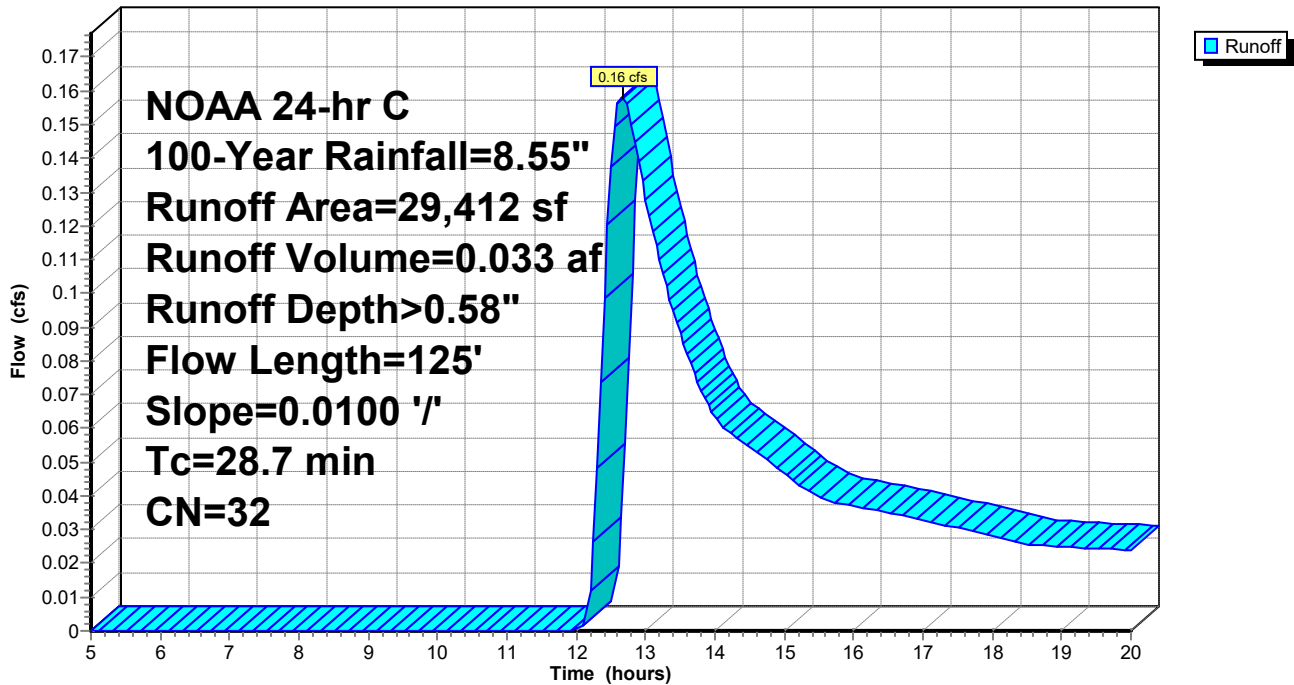
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
 NOAA 24-hr C 100-Year Rainfall=8.55"

Area (sf)	CN	Description
26,781	30	Woods, Good, HSG A
2,631	55	Woods, Good, HSG B
29,412	32	Weighted Average
29,412		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
27.9	100	0.0100	0.06		Sheet Flow, Woods: Light underbrush n= 0.400 P2= 3.29"
0.8	25	0.0100	0.50		Shallow Concentrated Flow, Woodland Kv= 5.0 fps
28.7	125	Total			

Subcatchment 14S: Pre-Developed DA #2 (Pond)

Hydrograph



23-105 Stormwater PRE

NOAA 24-hr C 100-Year Rainfall=8.55"

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Summary for Subcatchment 15S: Pre-Developed DA #3

Runoff = 1.74 cfs @ 12.39 hrs, Volume= 0.181 af, Depth> 2.84"

Routed to Pond 15P : Analysis Point #3

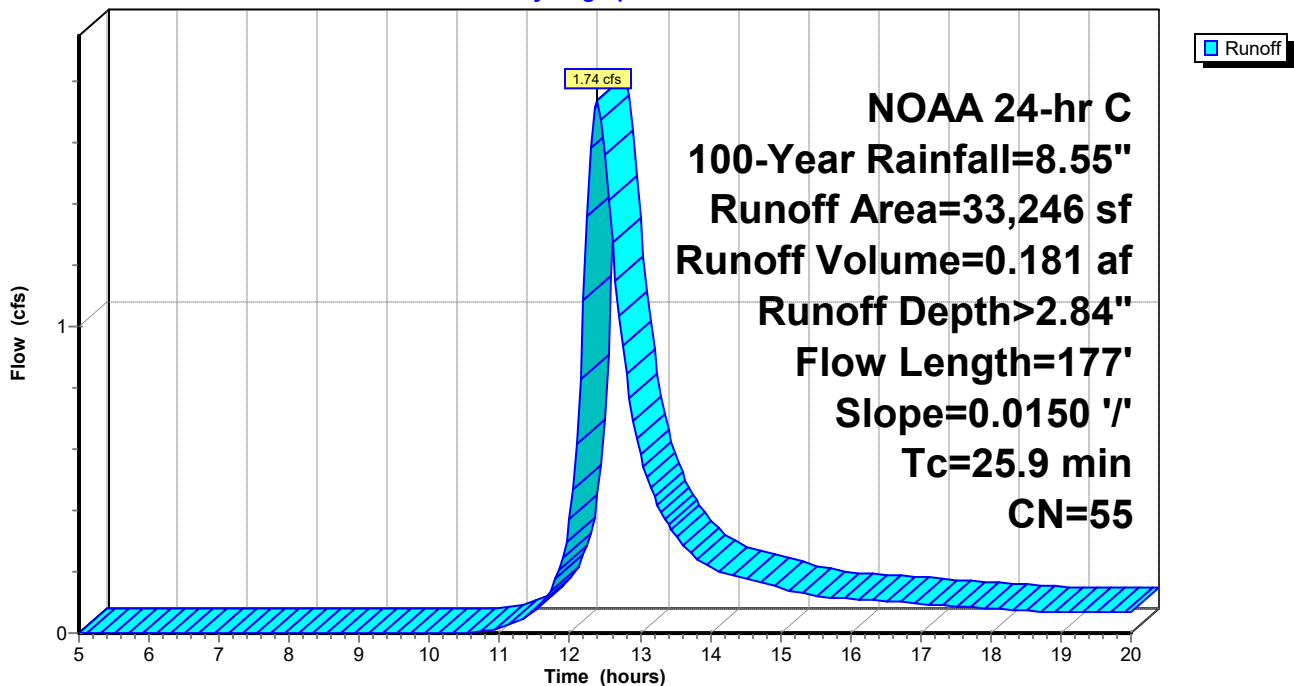
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
 NOAA 24-hr C 100-Year Rainfall=8.55"

Area (sf)	CN	Description
33,246	55	Woods, Good, HSG B
33,246		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
23.8	100	0.0150	0.07		Sheet Flow, Woods: Light underbrush n= 0.400 P2= 3.29"
2.1	77	0.0150	0.61		Shallow Concentrated Flow, Woodland Kv= 5.0 fps
25.9	177	Total			

Subcatchment 15S: Pre-Developed DA #3

Hydrograph



23-105 Stormwater PRE

NOAA 24-hr C 100-Year Rainfall=8.55"

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Summary for Subcatchment 16S: Pre-Developed DA #4

Runoff = 1.06 cfs @ 12.64 hrs, Volume= 0.145 af, Depth> 2.82"

Routed to Pond 16P : Analysis Point #4

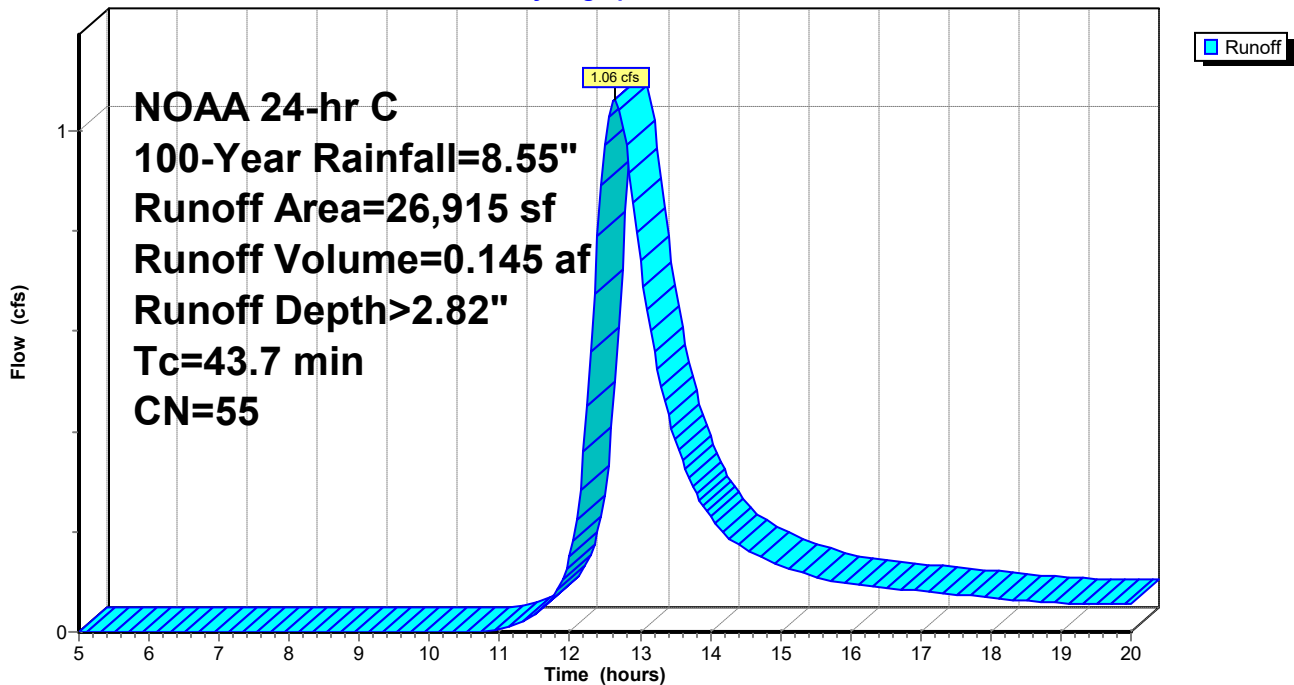
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
NOAA 24-hr C 100-Year Rainfall=8.55"

Area (sf)	CN	Description
26,915	55	Woods, Good, HSG B
26,915		100.00% Pervious Area

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

Subcatchment 16S: Pre-Developed DA #4

Hydrograph



23-105 Stormwater PRE

NOAA 24-hr C 100-Year Rainfall=8.55"

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Summary for Pond 13P: Analysis #2 (Pond)

Inflow Area = 0.675 ac, 0.00% Impervious, Inflow Depth > 0.58" for 100-Year event
 Inflow = 0.16 cfs @ 12.66 hrs, Volume= 0.033 af
 Outflow = 0.16 cfs @ 12.67 hrs, Volume= 0.033 af, Atten= 0%, Lag= 0.1 min
 Discarded = 0.16 cfs @ 12.67 hrs, Volume= 0.033 af
 Primary = 0.00 cfs @ 5.00 hrs, Volume= 0.000 af
 Routed to Pond 15P : Analysis Point #3

Routing by Stor-Ind method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
 Peak Elev= 38.00' @ 12.67 hrs Surf.Area= 2,862 sf Storage= 1 cf

Plug-Flow detention time= 0.1 min calculated for 0.033 af (100% of inflow)
 Center-of-Mass det. time= 0.1 min (893.4 - 893.4)

Volume	Invert	Avail.Storage	Storage Description
#1	38.00'	3,614 cf	Custom Stage Data (Prismatic) Listed below (Recalc)
Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
38.00	2,857	0	0
38.50	11,600	3,614	3,614

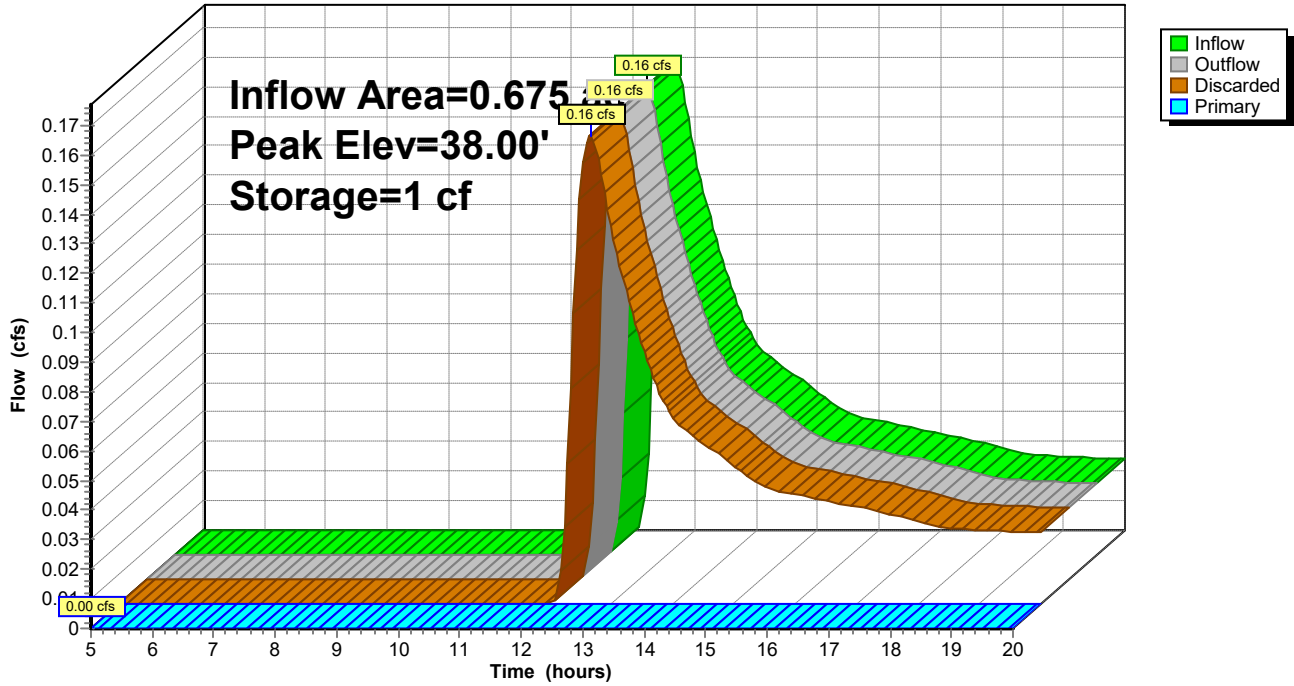
Device	Routing	Invert	Outlet Devices
#1	Discarded	38.00'	3.00 cfs Exfiltration at all elevations
#2	Primary	38.40'	46.0' long Sharp-Crested Rectangular Weir 2 End Contraction(s)

Discarded OutFlow Max=3.00 cfs @ 12.67 hrs HW=38.00' (Free Discharge)
 ↑1=Exfiltration (Exfiltration Controls 3.00 cfs)

Primary OutFlow Max=0.00 cfs @ 5.00 hrs HW=38.00' (Free Discharge)
 ↑2=Sharp-Crested Rectangular Weir (Controls 0.00 cfs)

Pond 13P: Analysis #2 (Pond)

Hydrograph



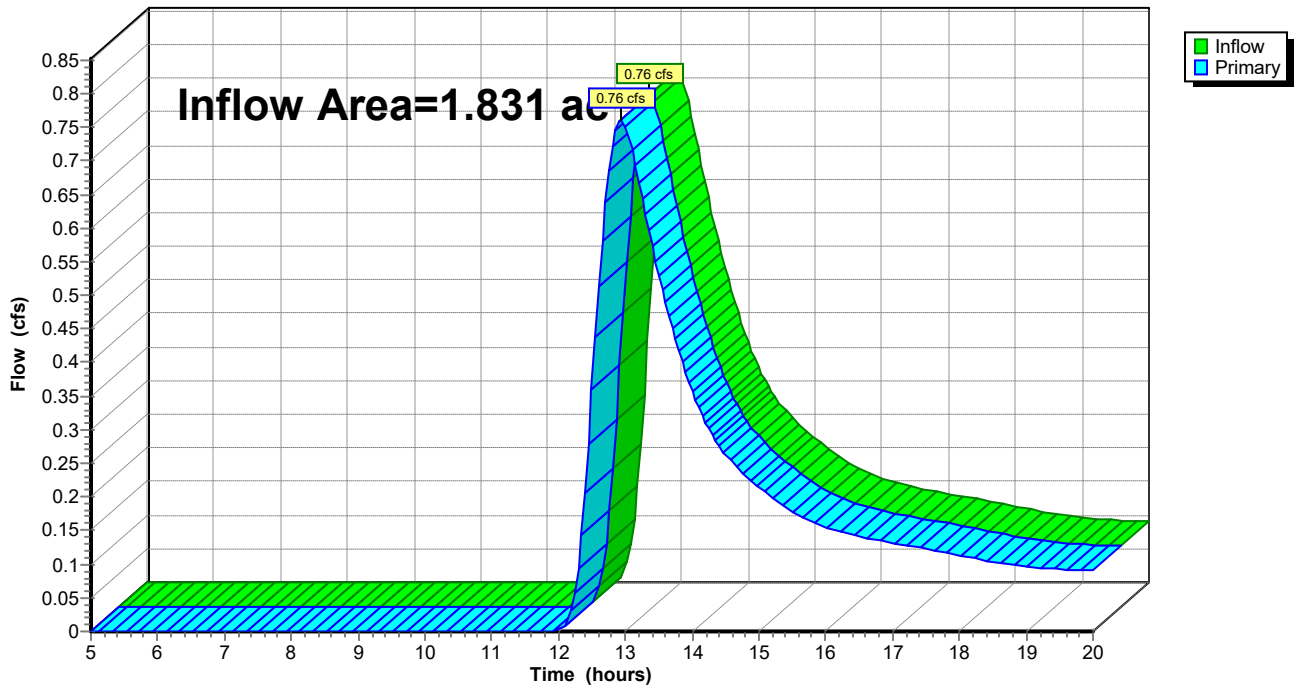
Summary for Pond 14P: Analysis Point #1

Inflow Area = 1.831 ac, 0.00% Impervious, Inflow Depth > 0.99" for 100-Year event
Inflow = 0.76 cfs @ 12.94 hrs, Volume= 0.151 af
Primary = 0.76 cfs @ 12.94 hrs, Volume= 0.151 af, Atten= 0%, Lag= 0.0 min

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

Pond 14P: Analysis Point #1

Hydrograph



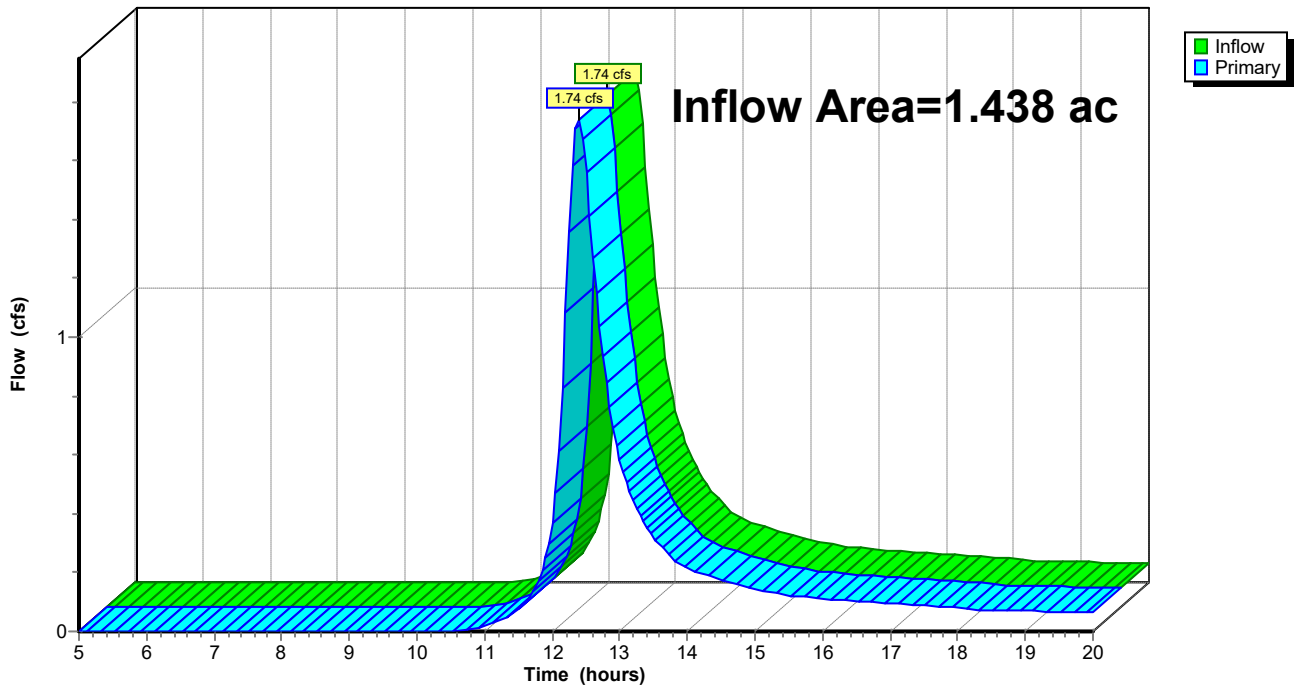
Summary for Pond 15P: Analysis Point #3

Inflow Area = 1.438 ac, 0.00% Impervious, Inflow Depth > 1.51" for 100-Year event
Inflow = 1.74 cfs @ 12.39 hrs, Volume= 0.181 af
Primary = 1.74 cfs @ 12.39 hrs, Volume= 0.181 af, Atten= 0%, Lag= 0.0 min

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

Pond 15P: Analysis Point #3

Hydrograph



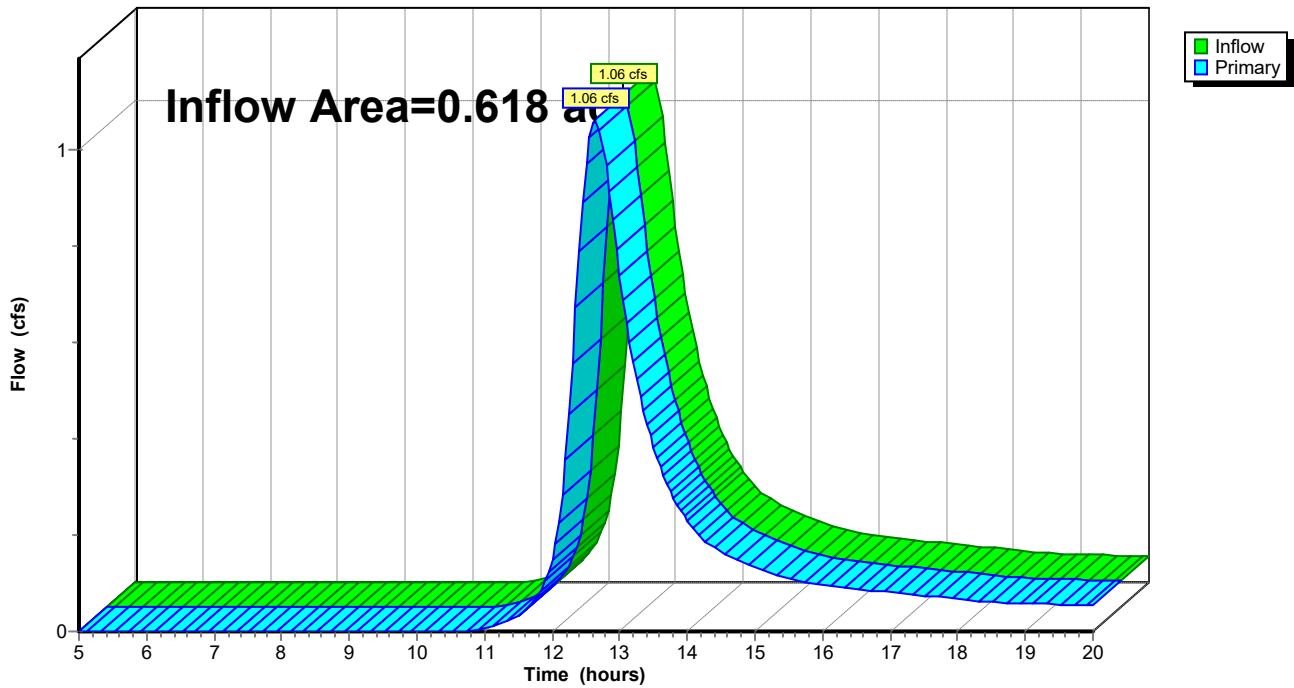
Summary for Pond 16P: Analysis Point #4

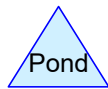
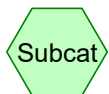
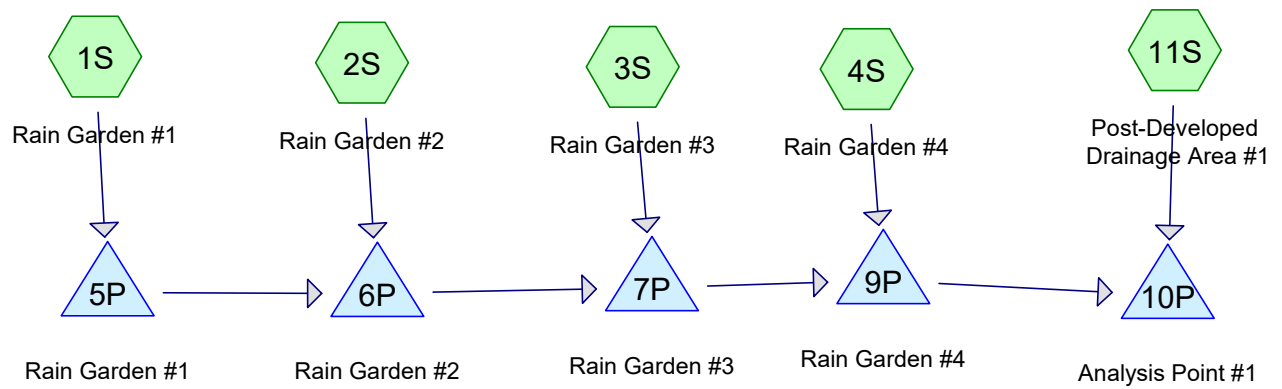
Inflow Area = 0.618 ac, 0.00% Impervious, Inflow Depth > 2.82" for 100-Year event
Inflow = 1.06 cfs @ 12.64 hrs, Volume= 0.145 af
Primary = 1.06 cfs @ 12.64 hrs, Volume= 0.145 af, Atten= 0%, Lag= 0.0 min

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

Pond 16P: Analysis Point #4

Hydrograph





Routing Diagram for 23-105 Stormwater POST RG 1-4
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23-105 Stormwater POST RG 1-4

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Page 2

Area Listing (all nodes)

Area (acres)	CN	Description (subcatchment-numbers)
0.508	98	(1S, 2S, 3S, 4S, 11S)
0.509	61	(2S, 11S)
1.485	39	(2S, 3S, 4S, 11S)
0.013	98	Driveway (1S)
0.321	61	Grass B (1S)
0.062	98	Roof (1S)
0.238	30	Woods, Good, HSG A (11S)
0.038	55	Woods, Good, HSG B (11S)
0.048	85	gravel B (1S)

23-105 Stormwater POST RG 1-4

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Page 3

Soil Listing (all nodes)

Area (acres)	Soil Group	Subcatchment Numbers
0.238	HSG A	11S
0.038	HSG B	11S
0.000	HSG C	
0.000	HSG D	
2.946	Other	1S, 2S, 3S, 4S, 11S

23-105 Stormwater POST RG 1-4

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Ground Covers (all nodes)

HSG-A (acres)	HSG-B (acres)	HSG-C (acres)	HSG-D (acres)	Other (acres)	Total (acres)	Ground Cover	Subcatchment Numbers
0.000	0.000	0.000	0.000	2.501	2.501		1S, 2S, 3S, 4S, 11S
0.000	0.000	0.000	0.000	0.013	0.013	Driveway	1S
0.000	0.000	0.000	0.000	0.321	0.321	Grass B	1S
0.000	0.000	0.000	0.000	0.062	0.062	Roof	1S
0.238	0.038	0.000	0.000	0.000	0.276	Woods, Good	11S
0.000	0.000	0.000	0.000	0.048	0.048	gravel B	1S

23-105 Stormwater POST RG 1-4

NOAA 24-hr C 2-Year Rainfall=3.29"

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Summary for Subcatchment 1S: Rain Garden #1

Runoff = 0.50 cfs @ 12.19 hrs, Volume= 0.039 af, Depth> 0.98"
 Routed to Pond 5P : Rain Garden #1

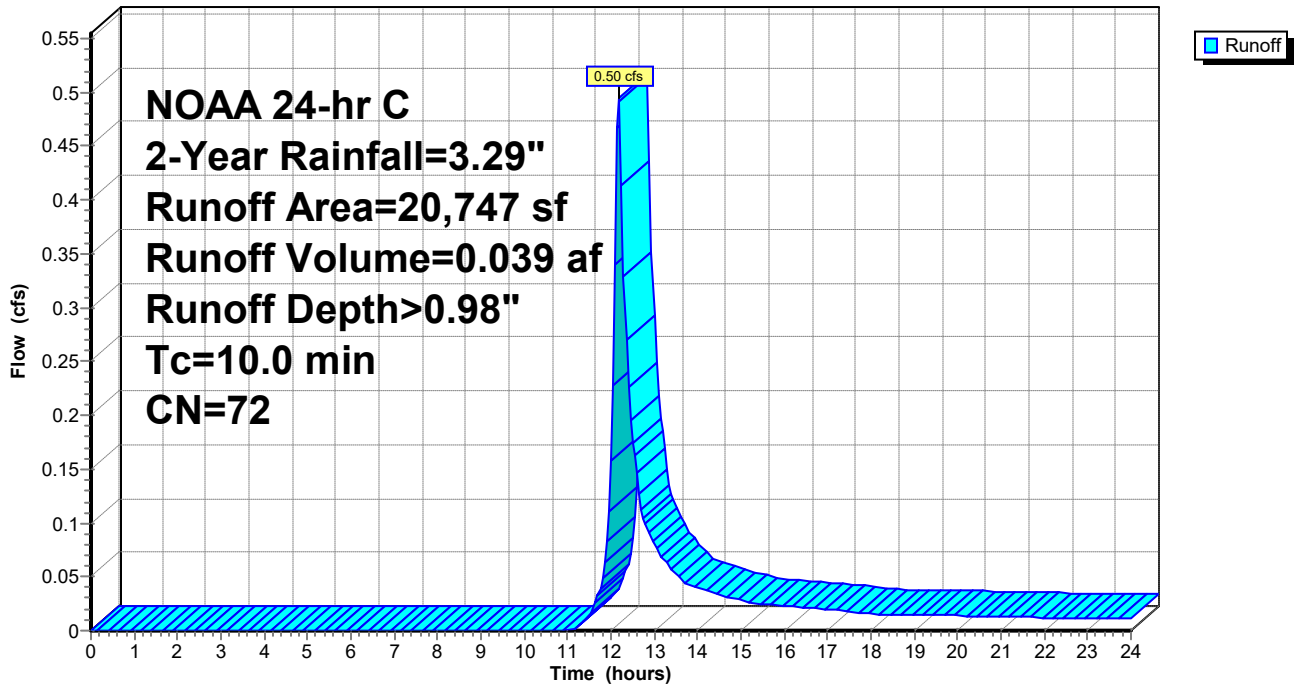
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
 NOAA 24-hr C 2-Year Rainfall=3.29"

	Area (sf)	CN	Description
*	2,700	98	Roof
*	577	98	Driveway
*	13,980	61	Grass B
*	1,392	98	
*	2,098	85	gravel B
	20,747	72	Weighted Average
	16,078		77.50% Pervious Area
	4,669		22.50% Impervious Area

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

Subcatchment 1S: Rain Garden #1

Hydrograph



23-105 Stormwater POST RG 1-4

NOAA 24-hr C 2-Year Rainfall=3.29"

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Summary for Subcatchment 2S: Rain Garden #2

Runoff = 0.36 cfs @ 12.21 hrs, Volume= 0.038 af, Depth> 0.48"
 Routed to Pond 6P : Rain Garden #2

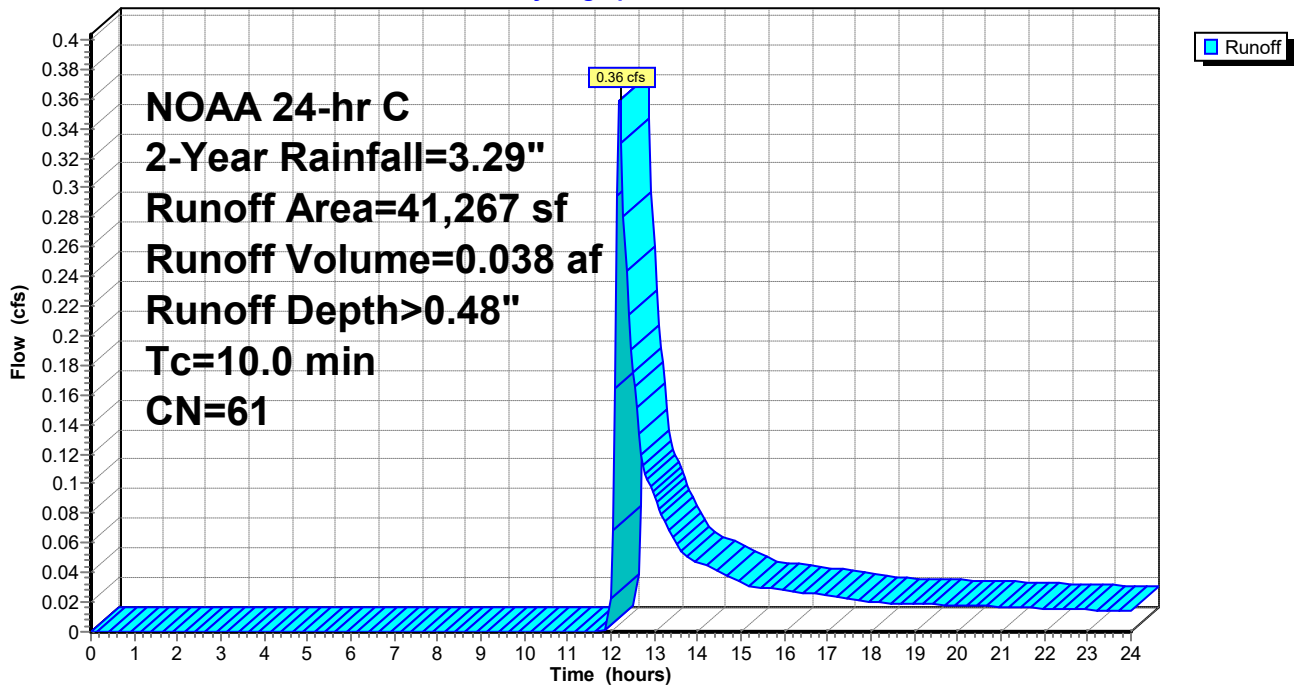
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
 NOAA 24-hr C 2-Year Rainfall=3.29"

	Area (sf)	CN	Description
*	7,646	98	
*	21,463	61	
*	12,158	39	
	41,267	61	Weighted Average
	33,621		81.47% Pervious Area
	7,646		18.53% Impervious Area

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

Subcatchment 2S: Rain Garden #2

Hydrograph



Summary for Subcatchment 3S: Rain Garden #3

Runoff = 0.01 cfs @ 13.02 hrs, Volume= 0.007 af, Depth> 0.10"
 Routed to Pond 7P : Rain Garden #3

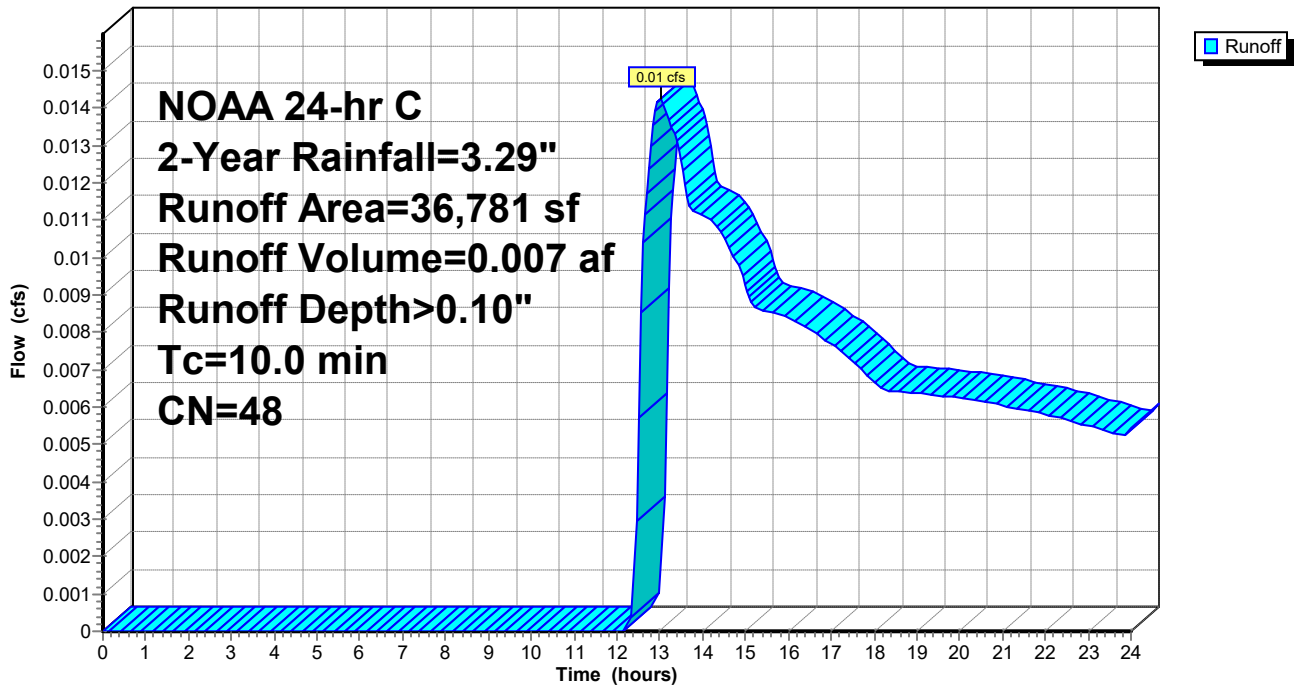
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
 NOAA 24-hr C 2-Year Rainfall=3.29"

	Area (sf)	CN	Description
*	5,527	98	
*	31,254	39	
	36,781	48	Weighted Average
	31,254		84.97% Pervious Area
	5,527		15.03% Impervious Area

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

Subcatchment 3S: Rain Garden #3

Hydrograph



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NOAA 24-hr C 2-Year Rainfall=3.29"

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Summary for Subcatchment 4S: Rain Garden #4

Runoff = 0.08 cfs @ 12.26 hrs, Volume= 0.013 af, Depth> 0.31"
 Routed to Pond 9P : Rain Garden #4

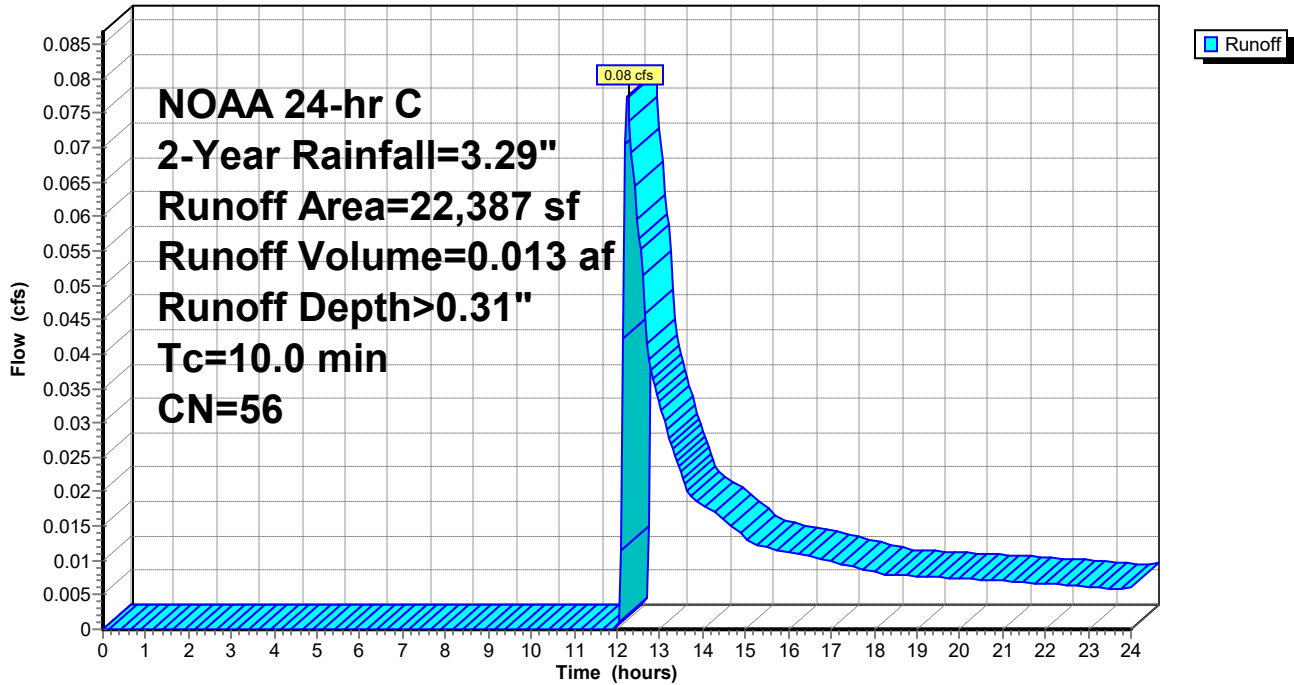
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
 NOAA 24-hr C 2-Year Rainfall=3.29"

	Area (sf)	CN	Description
*	6,345	98	
*	16,042	39	
	22,387	56	Weighted Average
	16,042		71.66% Pervious Area
	6,345		28.34% Impervious Area

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

Subcatchment 4S: Rain Garden #4

Hydrograph



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NOAA 24-hr C 2-Year Rainfall=3.29"

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Summary for Subcatchment 11S: Post-Developed Drainage Area #1

Runoff = 0.00 cfs @ 24.00 hrs, Volume= 0.000 af, Depth> 0.00"

Routed to Pond 10P : Analysis Point #1

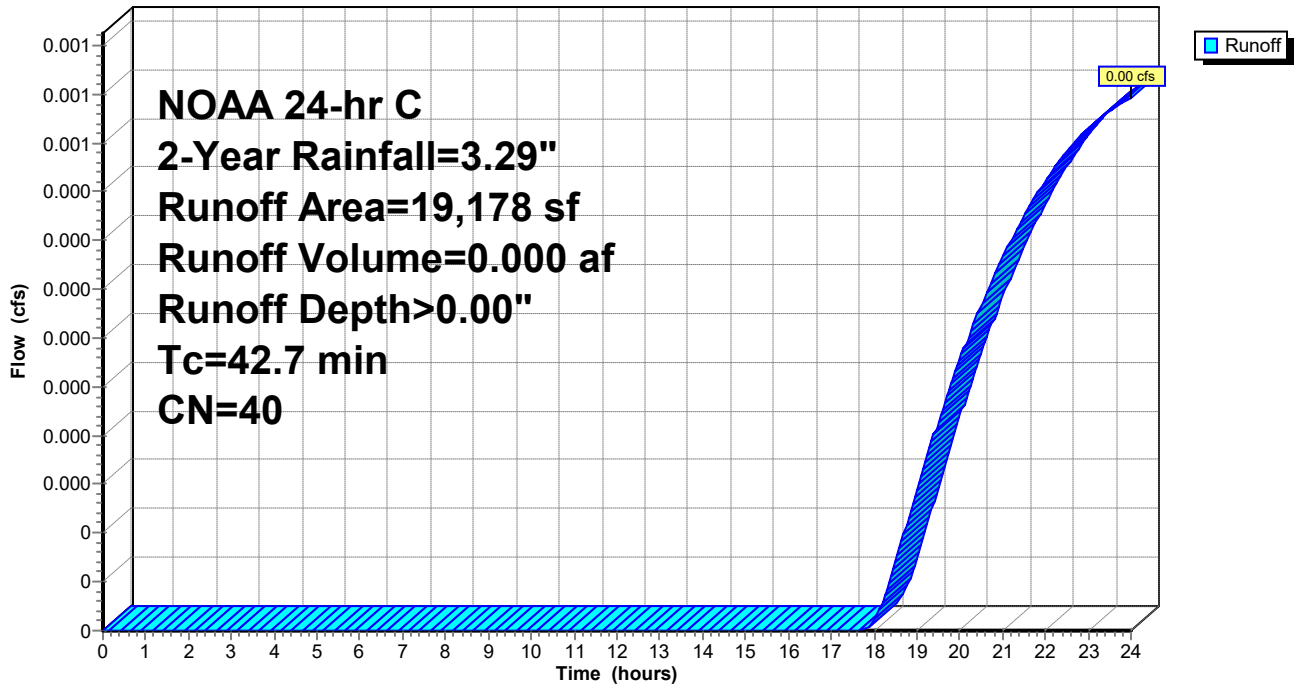
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
 NOAA 24-hr C 2-Year Rainfall=3.29"

	Area (sf)	CN	Description
*	1,201	98	
*	5,225	39	
*	709	61	
	10,382	30	Woods, Good, HSG A
	1,661	55	Woods, Good, HSG B
	19,178	40	Weighted Average
	17,977		93.74% Pervious Area
	1,201		6.26% Impervious Area

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

Subcatchment 11S: Post-Developed Drainage Area #1

Hydrograph



Summary for Pond 5P: Rain Garden #1

Inflow Area = 0.476 ac, 22.50% Impervious, Inflow Depth > 0.98" for 2-Year event
 Inflow = 0.50 cfs @ 12.19 hrs, Volume= 0.039 af
 Outflow = 0.04 cfs @ 13.70 hrs, Volume= 0.038 af, Atten= 91%, Lag= 90.8 min
 Discarded = 0.04 cfs @ 13.70 hrs, Volume= 0.038 af

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
 Peak Elev= 135.39' @ 13.70 hrs Surf.Area= 1,087 sf Storage= 738 cf

Plug-Flow detention time= 193.7 min calculated for 0.038 af (96% of inflow)
 Center-of-Mass det. time= 173.0 min (1,045.5 - 872.4)

Volume	Invert	Avail.Storage	Storage Description
#1	134.50'	6,784 cf	Custom Stage Data (Prismatic) Listed below (Recalc)

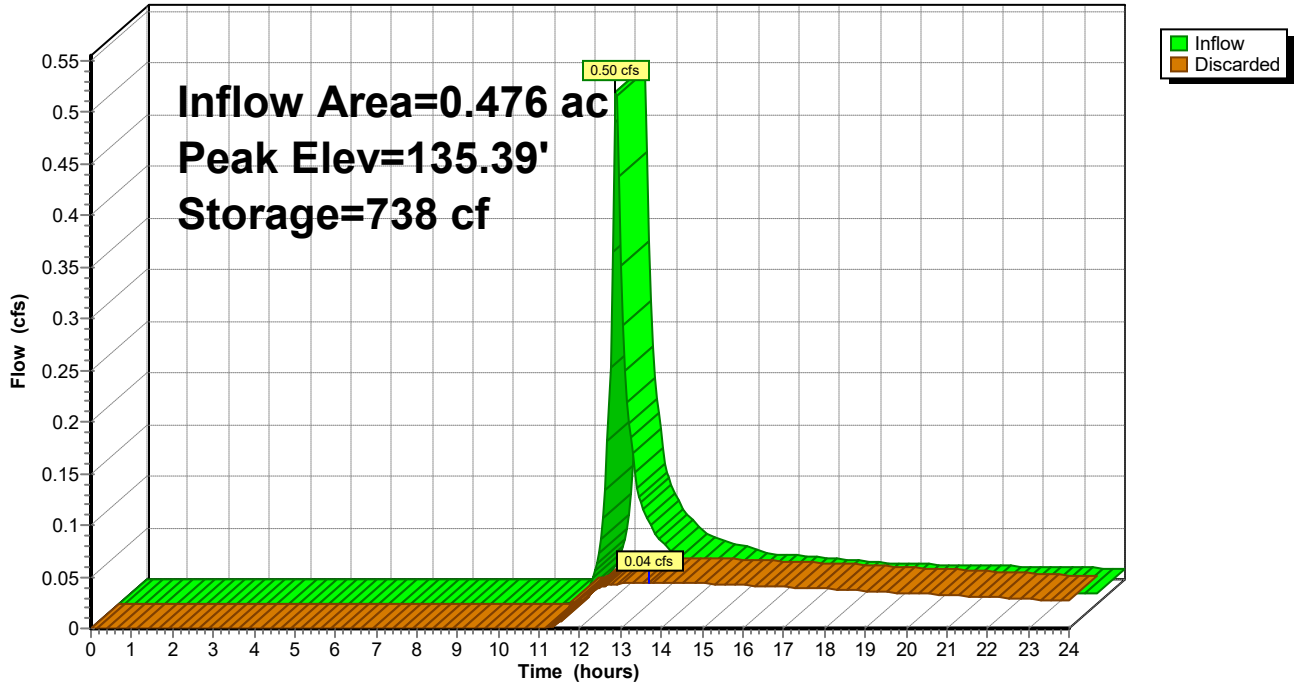
Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
134.50	591	0	0
135.00	862	363	363
136.00	1,446	1,154	1,517
136.50	1,774	805	2,322
137.70	5,662	4,462	6,784

Device	Routing	Invert	Outlet Devices
#1	Discarded	134.50'	1.760 in/hr Exfiltration over Surface area

Discarded OutFlow Max=0.04 cfs @ 13.70 hrs HW=135.39' (Free Discharge)
 ↑**1=Exfiltration** (Exfiltration Controls 0.04 cfs)

Pond 5P: Rain Garden #1

Hydrograph



23-105 Stormwater POST RG 1-4

NOAA 24-hr C 2-Year Rainfall=3.29"

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Summary for Pond 6P: Rain Garden #2

Inflow Area = 1.424 ac, 19.86% Impervious, Inflow Depth > 0.32" for 2-Year event
 Inflow = 0.36 cfs @ 12.21 hrs, Volume= 0.038 af
 Outflow = 0.09 cfs @ 13.07 hrs, Volume= 0.038 af, Atten= 76%, Lag= 51.5 min
 Discarded = 0.09 cfs @ 13.07 hrs, Volume= 0.038 af

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
 Peak Elev= 135.53' @ 13.07 hrs Surf.Area= 827 sf Storage= 363 cf

Plug-Flow detention time= 35.7 min calculated for 0.038 af (99% of inflow)
 Center-of-Mass det. time= 33.5 min (951.1 - 917.6)

Volume	Invert	Avail.Storage	Storage Description
#1	135.00'	8,564 cf	Custom Stage Data (Prismatic) Listed below (Recalc)
#2	139.00'	1,504 cf	Custom Stage Data (Prismatic) Listed below (Recalc)
		10,068 cf	Total Available Storage

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
135.00	550	0	0
136.00	1,075	813	813
137.00	1,670	1,373	2,185
138.00	3,230	2,450	4,635
139.00	4,627	3,929	8,564

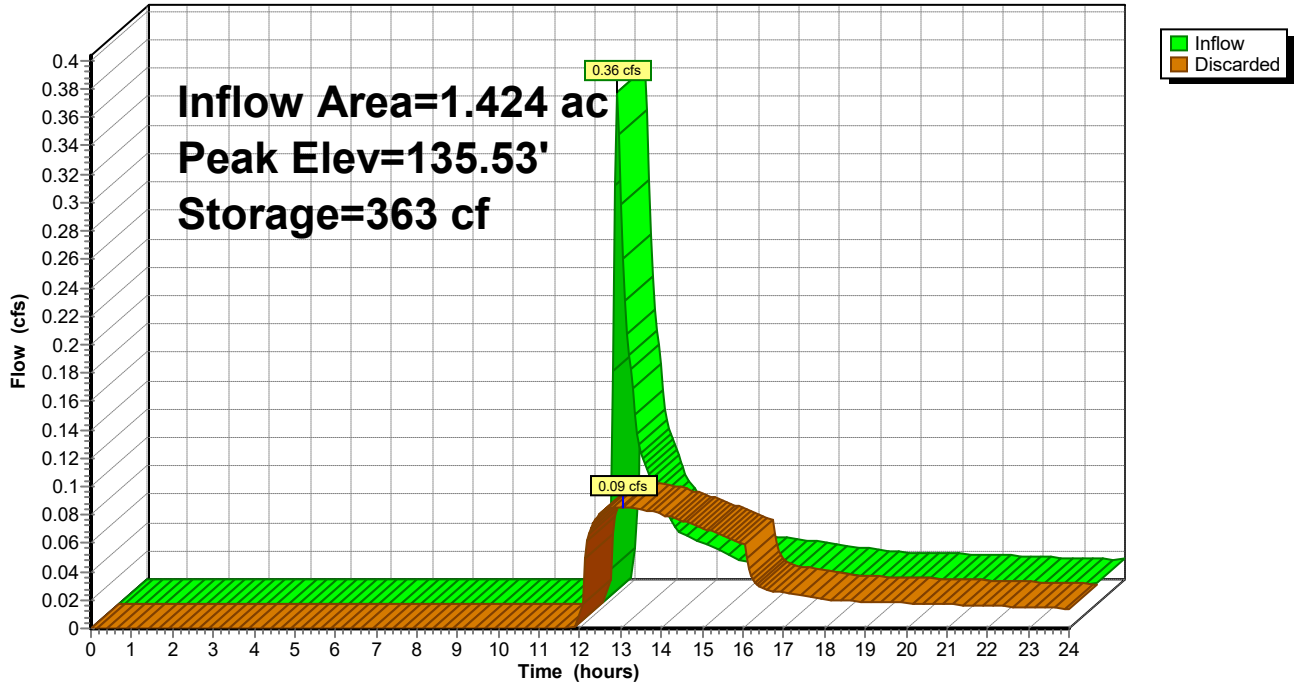
Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
139.00	580	0	0
140.00	2,428	1,504	1,504

Device	Routing	Invert	Outlet Devices
#1	Discarded	135.00'	4.470 in/hr Exfiltration over Surface area

Discarded OutFlow Max=0.09 cfs @ 13.07 hrs HW=135.53' (Free Discharge)
 ↳ **1=Exfiltration** (Exfiltration Controls 0.09 cfs)

Pond 6P: Rain Garden #2

Hydrograph



23-105 Stormwater POST RG 1-4

NOAA 24-hr C 2-Year Rainfall=3.29"

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Summary for Pond 7P: Rain Garden #3

Inflow Area = 2.268 ac, 18.06% Impervious, Inflow Depth > 0.04" for 2-Year event
 Inflow = 0.01 cfs @ 13.02 hrs, Volume= 0.007 af
 Outflow = 0.01 cfs @ 13.09 hrs, Volume= 0.007 af, Atten= 1%, Lag= 4.0 min
 Discarded = 0.01 cfs @ 13.09 hrs, Volume= 0.007 af

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
 Peak Elev= 135.01' @ 13.09 hrs Surf.Area= 557 sf Storage= 3 cf

Plug-Flow detention time= 4.1 min calculated for 0.007 af (99% of inflow)
 Center-of-Mass det. time= 2.5 min (1,042.4 - 1,039.9)

Volume	Invert	Avail.Storage	Storage Description
#1	135.00'	7,794 cf	Custom Stage Data (Prismatic) Listed below (Recalc)

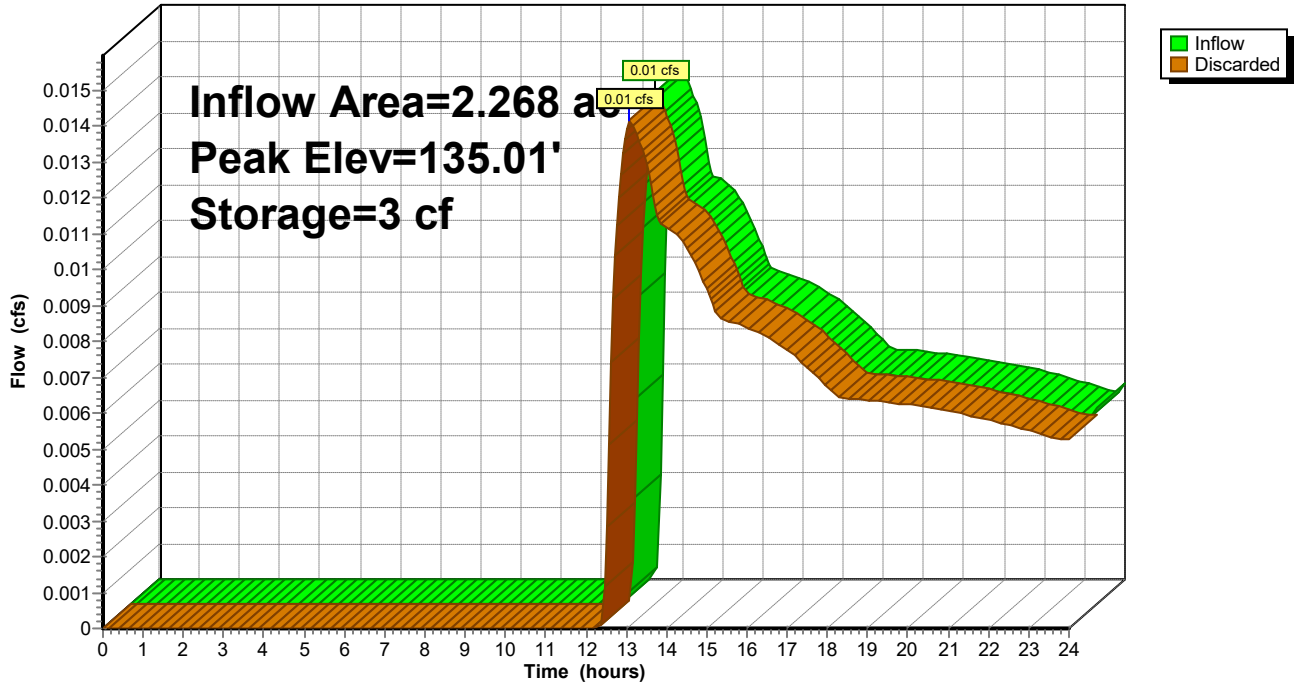
Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
135.00	554	0	0
136.00	1,097	826	826
137.00	1,700	1,399	2,224
138.00	3,243	2,472	4,696
138.60	7,084	3,098	7,794

Device	Routing	Invert	Outlet Devices
#1	Discarded	135.00'	6.130 in/hr Exfiltration over Surface area

Discarded OutFlow Max=0.08 cfs @ 13.09 hrs HW=135.01' (Free Discharge)
 ↑**1=Exfiltration** (Exfiltration Controls 0.08 cfs)

Pond 7P: Rain Garden #3

Hydrograph



Summary for Pond 9P: Rain Garden #4

Inflow Area = 2.782 ac, 19.96% Impervious, Inflow Depth > 0.06" for 2-Year event
 Inflow = 0.08 cfs @ 12.26 hrs, Volume= 0.013 af
 Outflow = 0.07 cfs @ 12.33 hrs, Volume= 0.013 af, Atten= 8%, Lag= 4.4 min
 Discarded = 0.07 cfs @ 12.33 hrs, Volume= 0.013 af
 Primary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af
 Routed to Pond 10P : Analysis Point #1

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
 Peak Elev= 135.00' @ 12.33 hrs Surf.Area= 2,809 sf Storage= 14 cf

Plug-Flow detention time= 3.2 min calculated for 0.013 af (100% of inflow)
 Center-of-Mass det. time= 2.2 min (951.3 - 949.1)

Volume	Invert	Avail.Storage	Storage Description
#1	135.00'	7,370 cf	Custom Stage Data (Prismatic) Listed below (Recalc)
Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
135.00	2,805	0	0
136.00	3,669	3,237	3,237
137.00	4,597	4,133	7,370

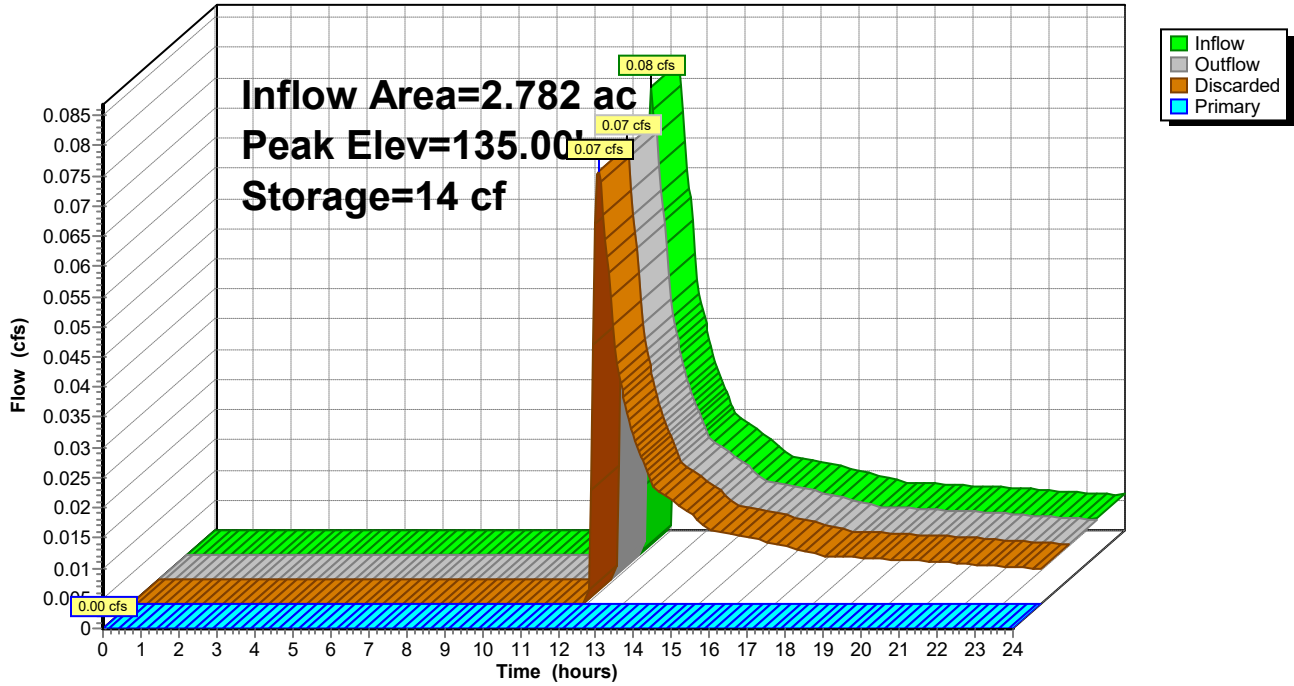
Device	Routing	Invert	Outlet Devices
#1	Primary	136.90'	3.0' long Sharp-Crested Rectangular Weir 2 End Contraction(s)
#2	Discarded	135.00'	4.530 in/hr Exfiltration over Surface area

Discarded OutFlow Max=0.29 cfs @ 12.33 hrs HW=135.00' (Free Discharge)
 ↑**2=Exfiltration** (Exfiltration Controls 0.29 cfs)

Primary OutFlow Max=0.00 cfs @ 0.00 hrs HW=135.00' (Free Discharge)
 ↑**1=Sharp-Crested Rectangular Weir** (Controls 0.00 cfs)

Pond 9P: Rain Garden #4

Hydrograph



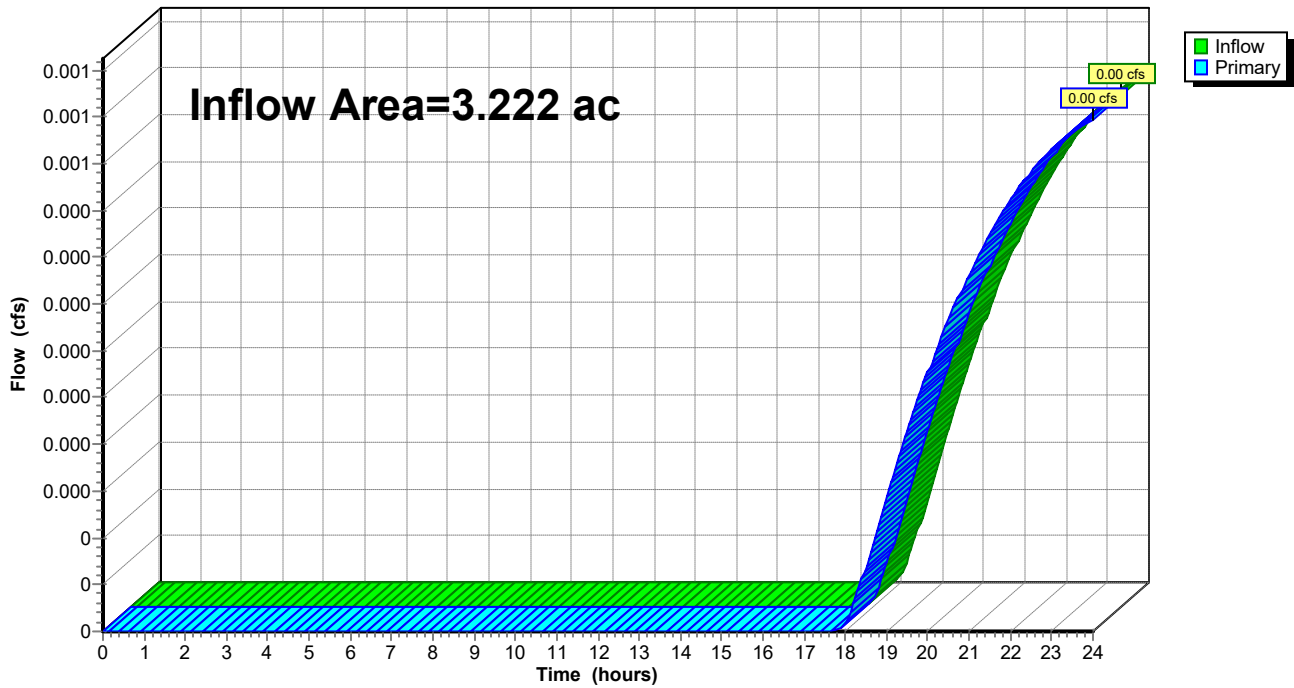
Summary for Pond 10P: Analysis Point #1

Inflow Area = 3.222 ac, 18.09% Impervious, Inflow Depth > 0.00" for 2-Year event
Inflow = 0.00 cfs @ 24.00 hrs, Volume= 0.000 af
Primary = 0.00 cfs @ 24.00 hrs, Volume= 0.000 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs

Pond 10P: Analysis Point #1

Hydrograph



23-105 Stormwater POST RG 1-4

NOAA 24-hr C 10-Year Rainfall=5.05"

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Summary for Subcatchment 1S: Rain Garden #1

Runoff = 1.17 cfs @ 12.18 hrs, Volume= 0.089 af, Depth> 2.23"
 Routed to Pond 5P : Rain Garden #1

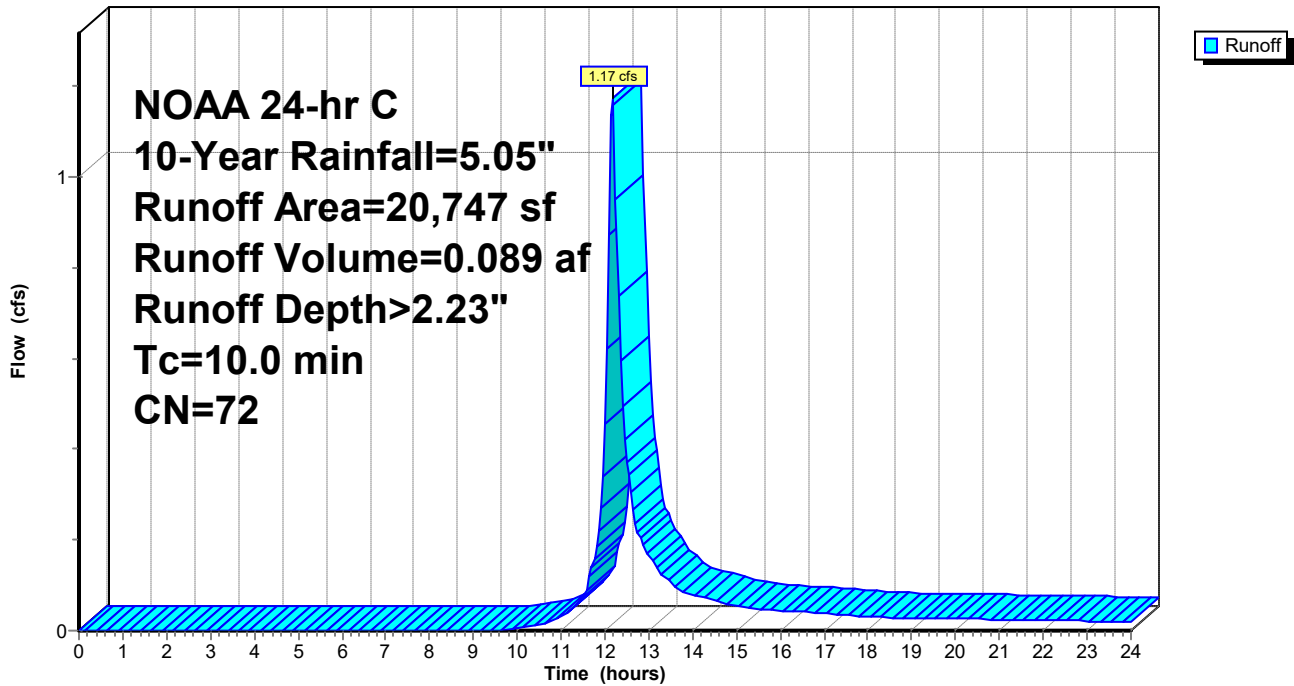
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
 NOAA 24-hr C 10-Year Rainfall=5.05"

	Area (sf)	CN	Description
*	2,700	98	Roof
*	577	98	Driveway
*	13,980	61	Grass B
*	1,392	98	
*	2,098	85	gravel B
	20,747	72	Weighted Average
	16,078		77.50% Pervious Area
	4,669		22.50% Impervious Area

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

Subcatchment 1S: Rain Garden #1

Hydrograph



23-105 Stormwater POST RG 1-4

NOAA 24-hr C 10-Year Rainfall=5.05"

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Summary for Subcatchment 2S: Rain Garden #2

Runoff = 1.38 cfs @ 12.19 hrs, Volume= 0.110 af, Depth> 1.39"
 Routed to Pond 6P : Rain Garden #2

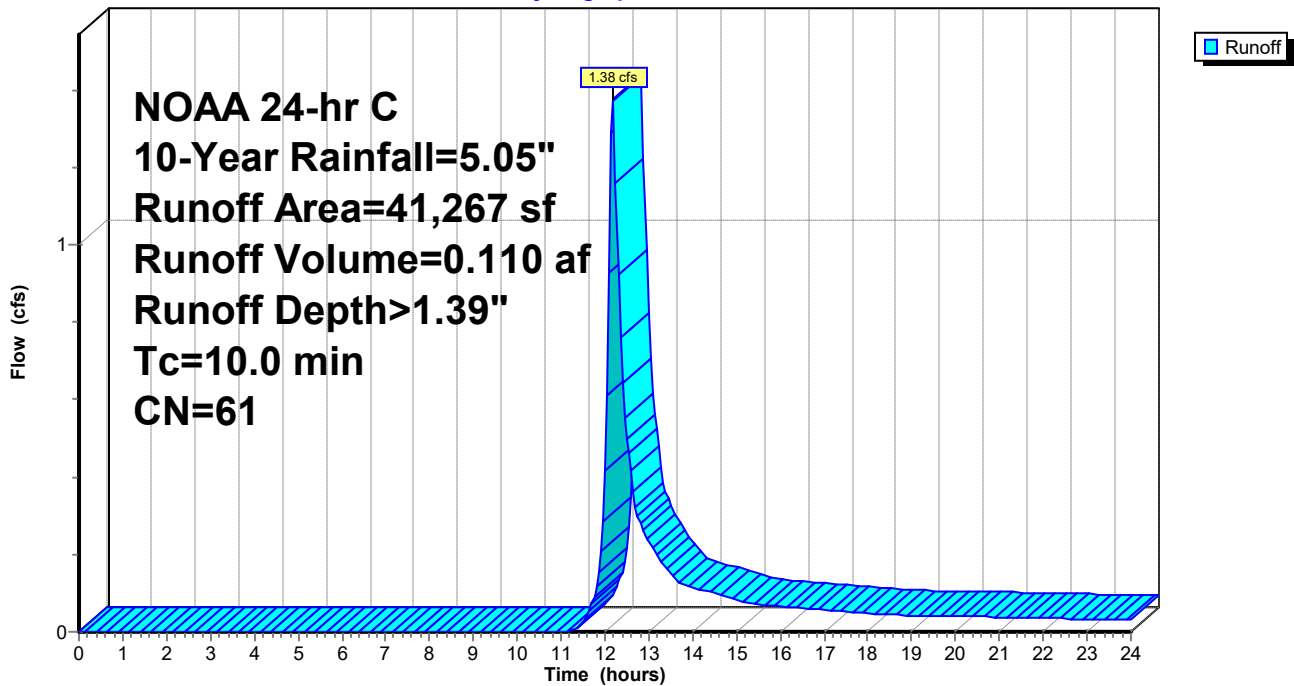
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
 NOAA 24-hr C 10-Year Rainfall=5.05"

	Area (sf)	CN	Description
*	7,646	98	
*	21,463	61	
*	12,158	39	
	41,267	61	Weighted Average
	33,621		81.47% Pervious Area
	7,646		18.53% Impervious Area

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

Subcatchment 2S: Rain Garden #2

Hydrograph



Summary for Subcatchment 3S: Rain Garden #3

Runoff = 0.34 cfs @ 12.22 hrs, Volume= 0.042 af, Depth> 0.60"
 Routed to Pond 7P : Rain Garden #3

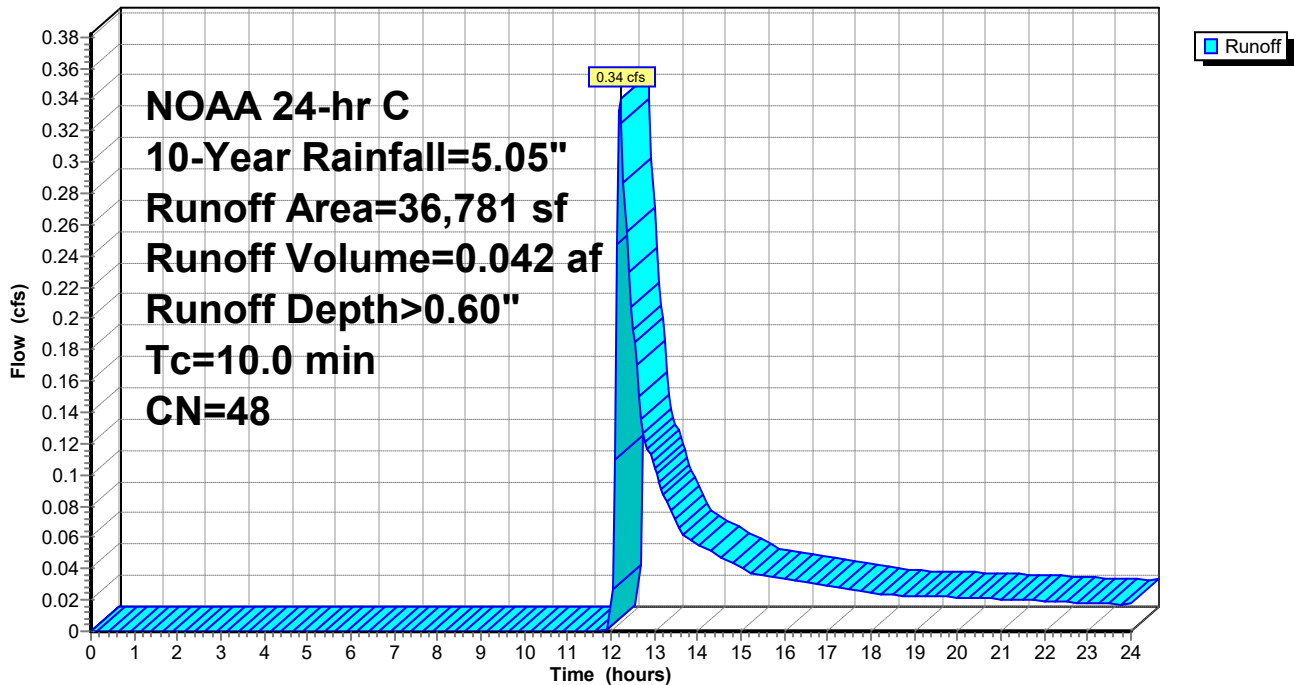
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
 NOAA 24-hr C 10-Year Rainfall=5.05"

	Area (sf)	CN	Description
*	5,527	98	
*	31,254	39	
	36,781	48	Weighted Average
	31,254		84.97% Pervious Area
	5,527		15.03% Impervious Area

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

Subcatchment 3S: Rain Garden #3

Hydrograph



Summary for Subcatchment 4S: Rain Garden #4

Runoff = 0.53 cfs @ 12.20 hrs, Volume= 0.046 af, Depth> 1.06"
 Routed to Pond 9P : Rain Garden #4

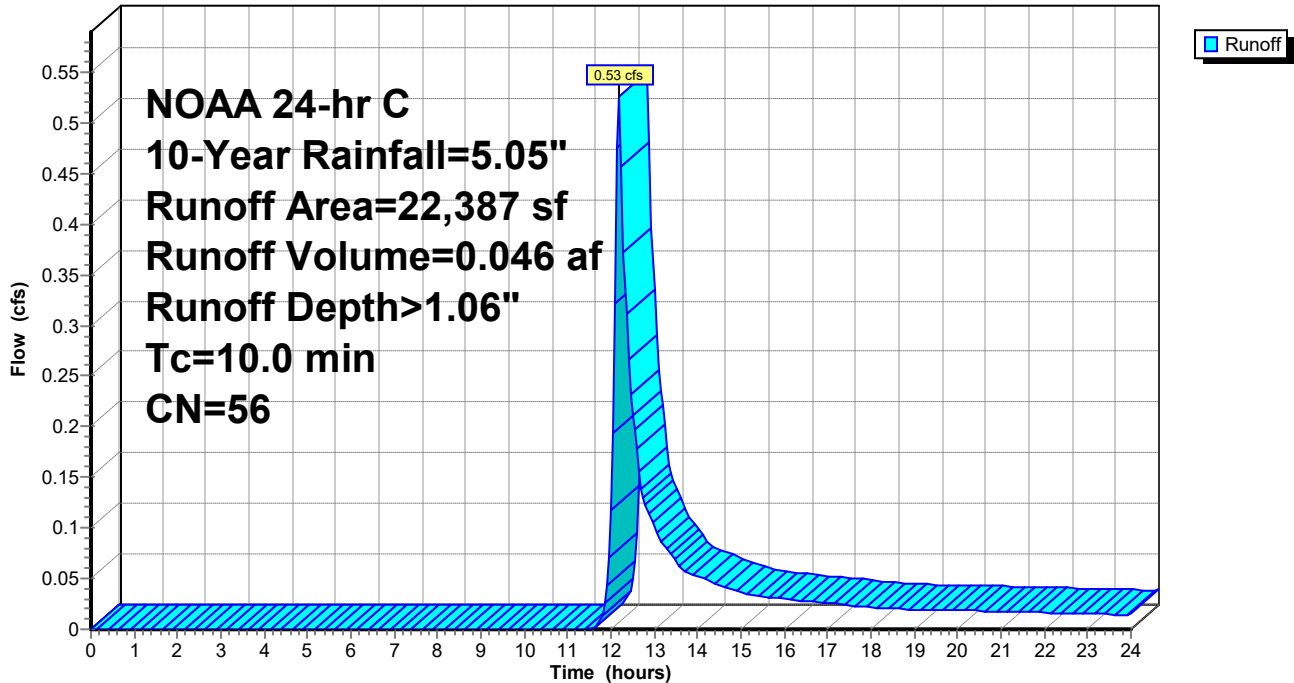
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
 NOAA 24-hr C 10-Year Rainfall=5.05"

	Area (sf)	CN	Description
*	6,345	98	
*	16,042	39	
	22,387	56	Weighted Average
	16,042		71.66% Pervious Area
	6,345		28.34% Impervious Area

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

Subcatchment 4S: Rain Garden #4

Hydrograph



23-105 Stormwater POST RG 1-4

NOAA 24-hr C 10-Year Rainfall=5.05"

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Summary for Subcatchment 11S: Post-Developed Drainage Area #1

Runoff = 0.02 cfs @ 13.26 hrs, Volume= 0.009 af, Depth> 0.24"

Routed to Pond 10P : Analysis Point #1

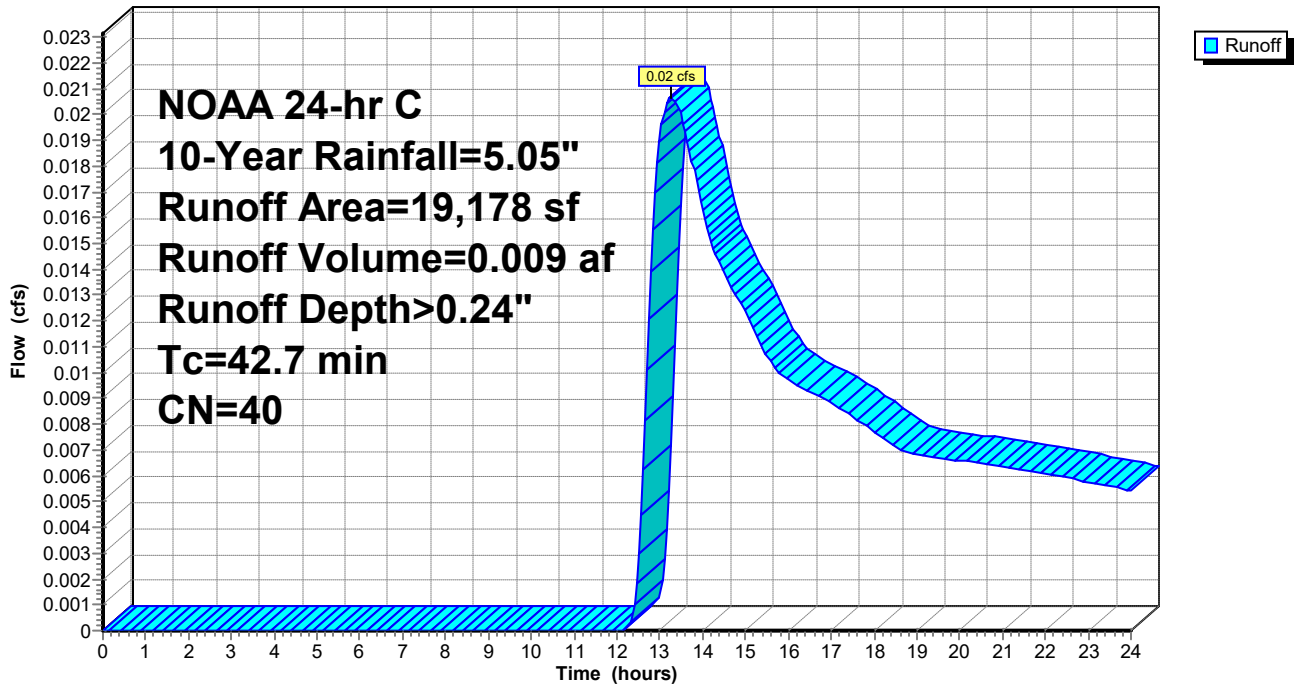
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
 NOAA 24-hr C 10-Year Rainfall=5.05"

	Area (sf)	CN	Description
*	1,201	98	
*	5,225	39	
*	709	61	
	10,382	30	Woods, Good, HSG A
	1,661	55	Woods, Good, HSG B
	19,178	40	Weighted Average
	17,977		93.74% Pervious Area
	1,201		6.26% Impervious Area

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

Subcatchment 11S: Post-Developed Drainage Area #1

Hydrograph



Summary for Pond 5P: Rain Garden #1

Inflow Area = 0.476 ac, 22.50% Impervious, Inflow Depth > 2.23" for 10-Year event
 Inflow = 1.17 cfs @ 12.18 hrs, Volume= 0.089 af
 Outflow = 0.07 cfs @ 14.45 hrs, Volume= 0.064 af, Atten= 94%, Lag= 136.4 min
 Discarded = 0.07 cfs @ 14.45 hrs, Volume= 0.064 af

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
 Peak Elev= 136.35' @ 14.45 hrs Surf.Area= 1,676 sf Storage= 2,064 cf

Plug-Flow detention time= 299.8 min calculated for 0.064 af (72% of inflow)
 Center-of-Mass det. time= 200.9 min (1,048.4 - 847.5)

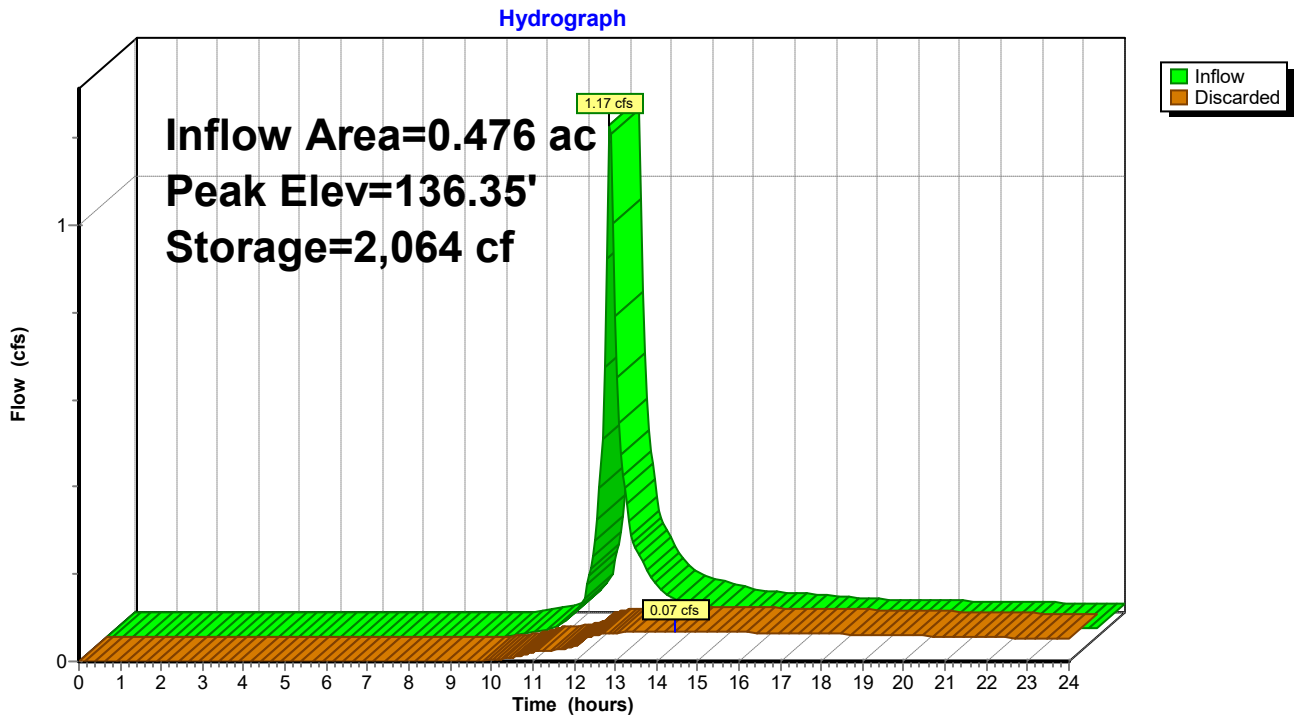
Volume	Invert	Avail.Storage	Storage Description
#1	134.50'	6,784 cf	Custom Stage Data (Prismatic) Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
134.50	591	0	0
135.00	862	363	363
136.00	1,446	1,154	1,517
136.50	1,774	805	2,322
137.70	5,662	4,462	6,784

Device	Routing	Invert	Outlet Devices
#1	Discarded	134.50'	1.760 in/hr Exfiltration over Surface area

Discarded OutFlow Max=0.07 cfs @ 14.45 hrs HW=136.35' (Free Discharge)
 ↑**1=Exfiltration** (Exfiltration Controls 0.07 cfs)

Pond 5P: Rain Garden #1



23-105 Stormwater POST RG 1-4

NOAA 24-hr C 10-Year Rainfall=5.05"

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Summary for Pond 6P: Rain Garden #2

Inflow Area = 1.424 ac, 19.86% Impervious, Inflow Depth > 0.93" for 10-Year event
 Inflow = 1.38 cfs @ 12.19 hrs, Volume= 0.110 af
 Outflow = 0.16 cfs @ 13.43 hrs, Volume= 0.110 af, Atten= 88%, Lag= 74.2 min
 Discarded = 0.16 cfs @ 13.43 hrs, Volume= 0.110 af

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
 Peak Elev= 136.81' @ 13.43 hrs Surf.Area= 1,556 sf Storage= 1,875 cf

Plug-Flow detention time= 131.4 min calculated for 0.110 af (99% of inflow)
 Center-of-Mass det. time= 129.4 min (1,006.6 - 877.2)

Volume	Invert	Avail.Storage	Storage Description
#1	135.00'	8,564 cf	Custom Stage Data (Prismatic) Listed below (Recalc)
#2	139.00'	1,504 cf	Custom Stage Data (Prismatic) Listed below (Recalc)
		10,068 cf	Total Available Storage

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
135.00	550	0	0
136.00	1,075	813	813
137.00	1,670	1,373	2,185
138.00	3,230	2,450	4,635
139.00	4,627	3,929	8,564

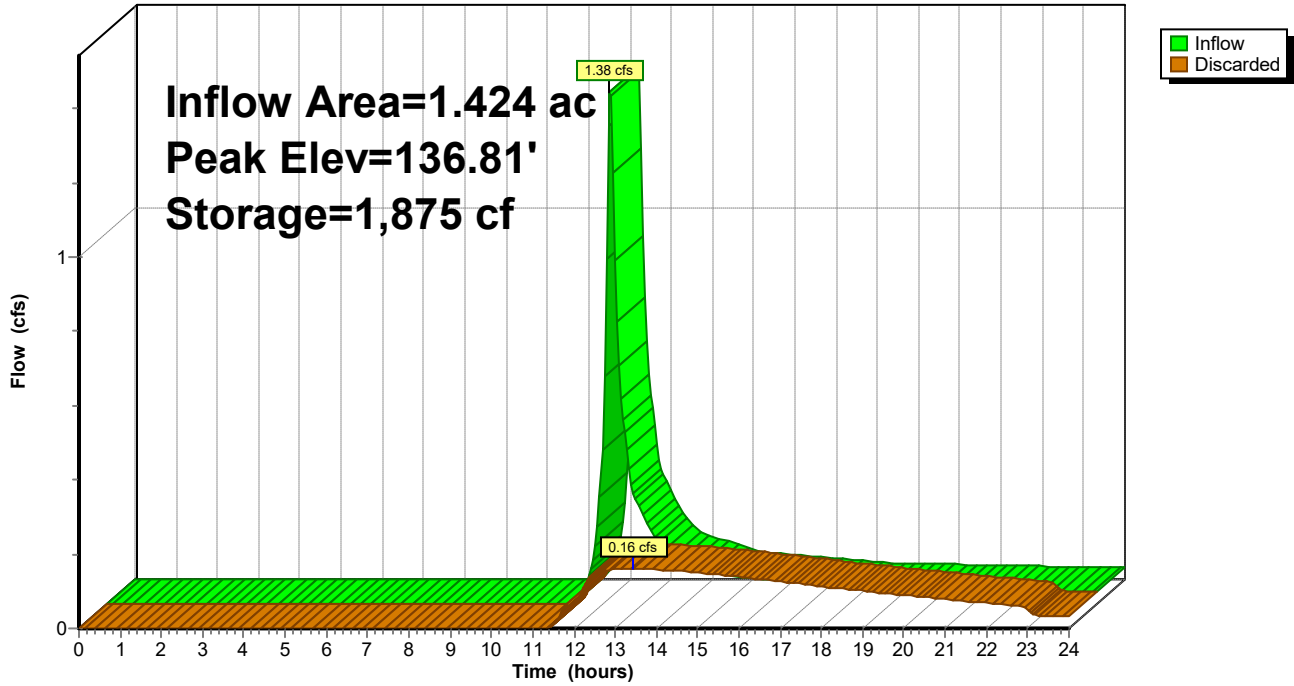
Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
139.00	580	0	0
140.00	2,428	1,504	1,504

Device	Routing	Invert	Outlet Devices
#1	Discarded	135.00'	4.470 in/hr Exfiltration over Surface area

Discarded OutFlow Max=0.16 cfs @ 13.43 hrs HW=136.81' (Free Discharge)
 ↳ **1=Exfiltration** (Exfiltration Controls 0.16 cfs)

Pond 6P: Rain Garden #2

Hydrograph



23-105 Stormwater POST RG 1-4

NOAA 24-hr C 10-Year Rainfall=5.05"

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Summary for Pond 7P: Rain Garden #3

Inflow Area = 2.268 ac, 18.06% Impervious, Inflow Depth > 0.22" for 10-Year event
 Inflow = 0.34 cfs @ 12.22 hrs, Volume= 0.042 af
 Outflow = 0.11 cfs @ 12.91 hrs, Volume= 0.042 af, Atten= 67%, Lag= 41.4 min
 Discarded = 0.11 cfs @ 12.91 hrs, Volume= 0.042 af

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
 Peak Elev= 135.43' @ 12.91 hrs Surf.Area= 790 sf Storage= 292 cf

Plug-Flow detention time= 19.0 min calculated for 0.042 af (100% of inflow)
 Center-of-Mass det. time= 17.8 min (948.9 - 931.2)

Volume	Invert	Avail.Storage	Storage Description
#1	135.00'	7,794 cf	Custom Stage Data (Prismatic) Listed below (Recalc)

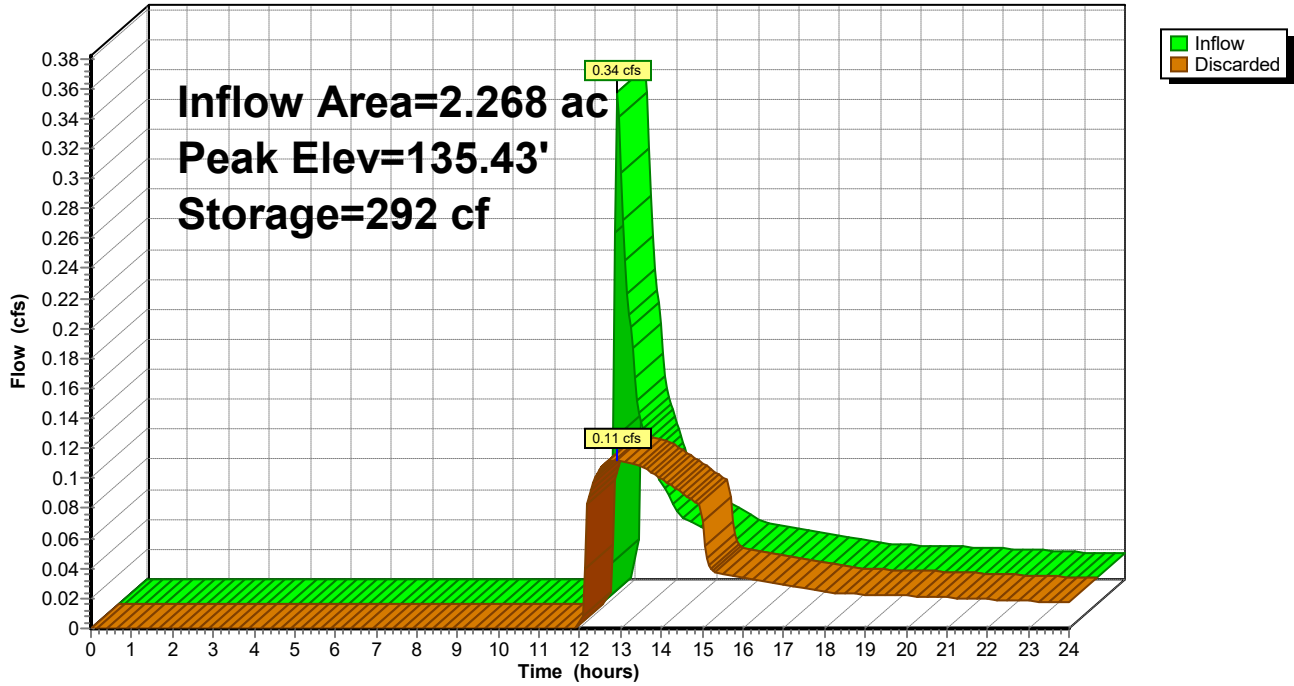
Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
135.00	554	0	0
136.00	1,097	826	826
137.00	1,700	1,399	2,224
138.00	3,243	2,472	4,696
138.60	7,084	3,098	7,794

Device	Routing	Invert	Outlet Devices
#1	Discarded	135.00'	6.130 in/hr Exfiltration over Surface area

Discarded OutFlow Max=0.11 cfs @ 12.91 hrs HW=135.43' (Free Discharge)
 ↑**1=Exfiltration** (Exfiltration Controls 0.11 cfs)

Pond 7P: Rain Garden #3

Hydrograph



Summary for Pond 9P: Rain Garden #4

Inflow Area = 2.782 ac, 19.96% Impervious, Inflow Depth > 0.20" for 10-Year event
 Inflow = 0.53 cfs @ 12.20 hrs, Volume= 0.046 af
 Outflow = 0.30 cfs @ 12.36 hrs, Volume= 0.045 af, Atten= 43%, Lag= 10.1 min
 Discarded = 0.30 cfs @ 12.36 hrs, Volume= 0.045 af
 Primary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af
 Routed to Pond 10P : Analysis Point #1

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
 Peak Elev= 135.06' @ 12.36 hrs Surf.Area= 2,856 sf Storage= 167 cf

Plug-Flow detention time= 4.3 min calculated for 0.045 af (100% of inflow)
 Center-of-Mass det. time= 3.6 min (897.5 - 893.9)

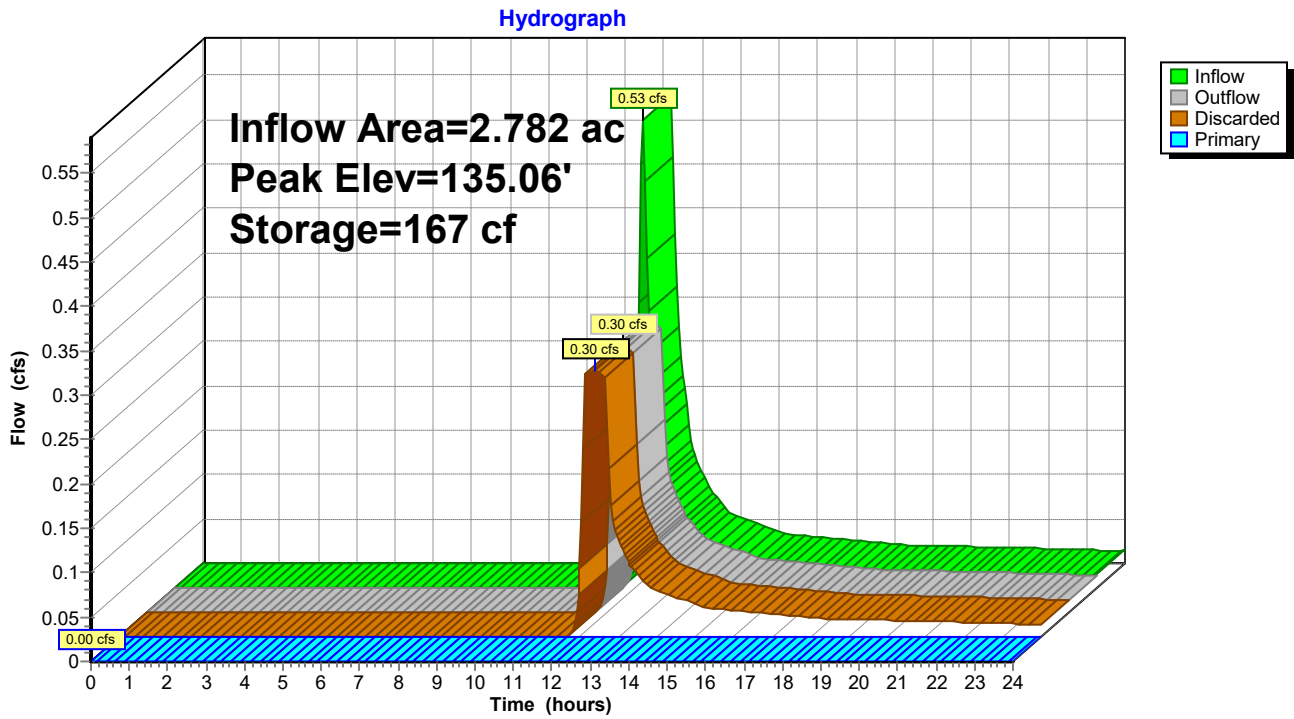
Volume	Invert	Avail.Storage	Storage Description
#1	135.00'	7,370 cf	Custom Stage Data (Prismatic) Listed below (Recalc)
Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
135.00	2,805	0	0
136.00	3,669	3,237	3,237
137.00	4,597	4,133	7,370

Device	Routing	Invert	Outlet Devices
#1	Primary	136.90'	3.0' long Sharp-Crested Rectangular Weir 2 End Contraction(s)
#2	Discarded	135.00'	4.530 in/hr Exfiltration over Surface area

Discarded OutFlow Max=0.30 cfs @ 12.36 hrs HW=135.06' (Free Discharge)
 ↑**2=Exfiltration** (Exfiltration Controls 0.30 cfs)

Primary OutFlow Max=0.00 cfs @ 0.00 hrs HW=135.00' (Free Discharge)
 ↑**1=Sharp-Crested Rectangular Weir** (Controls 0.00 cfs)

Pond 9P: Rain Garden #4



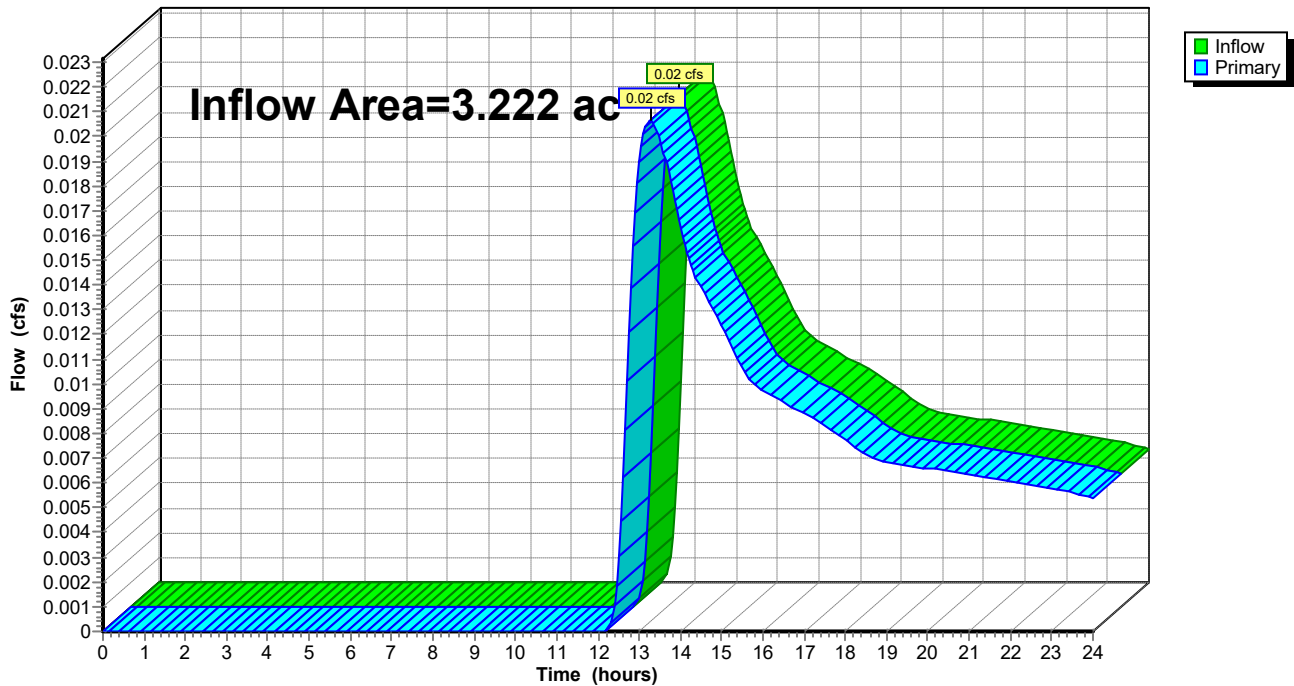
Summary for Pond 10P: Analysis Point #1

Inflow Area = 3.222 ac, 18.09% Impervious, Inflow Depth > 0.03" for 10-Year event
Inflow = 0.02 cfs @ 13.26 hrs, Volume= 0.009 af
Primary = 0.02 cfs @ 13.26 hrs, Volume= 0.009 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs

Pond 10P: Analysis Point #1

Hydrograph



23-105 Stormwater POST RG 1-4

NOAA 24-hr C 100-Year Rainfall=8.55"

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Summary for Subcatchment 1S: Rain Garden #1

Runoff = 2.72 cfs @ 12.17 hrs, Volume= 0.205 af, Depth> 5.17"
 Routed to Pond 5P : Rain Garden #1

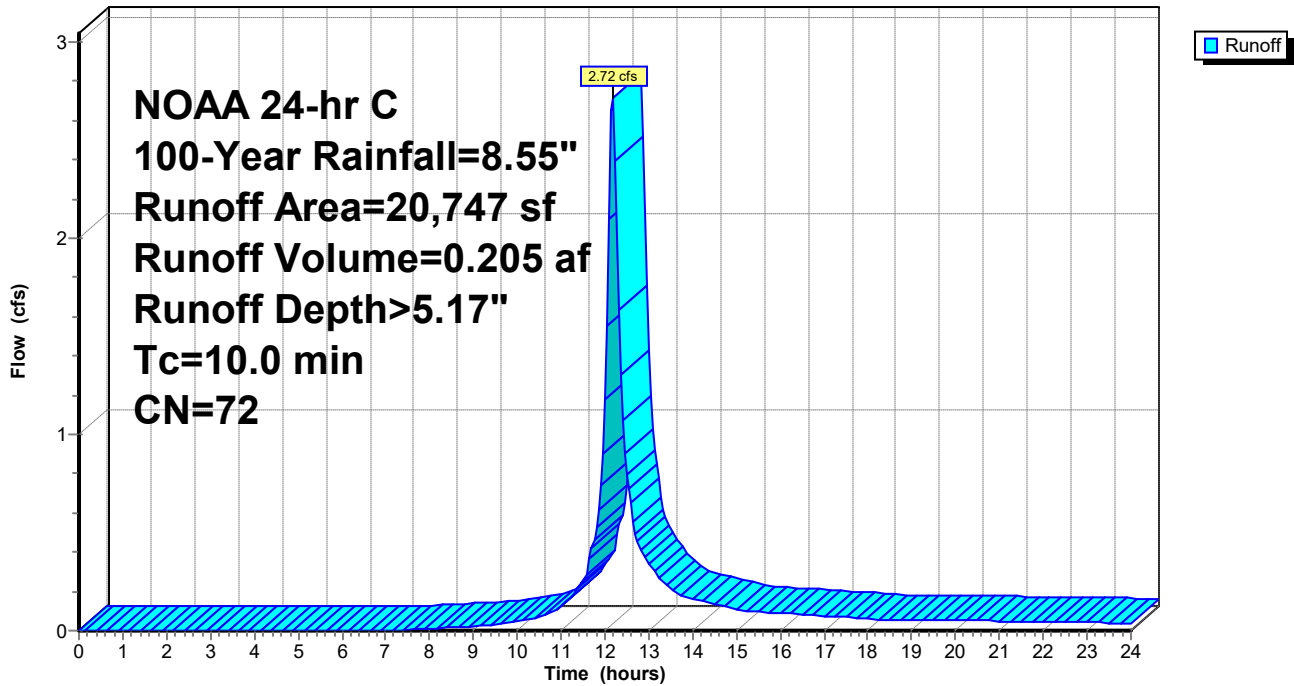
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
 NOAA 24-hr C 100-Year Rainfall=8.55"

	Area (sf)	CN	Description
*	2,700	98	Roof
*	577	98	Driveway
*	13,980	61	Grass B
*	1,392	98	
*	2,098	85	gravel B
	20,747	72	Weighted Average
	16,078		77.50% Pervious Area
	4,669		22.50% Impervious Area

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

Subcatchment 1S: Rain Garden #1

Hydrograph



23-105 Stormwater POST RG 1-4

NOAA 24-hr C 100-Year Rainfall=8.55"

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Summary for Subcatchment 2S: Rain Garden #2

Runoff = 4.04 cfs @ 12.18 hrs, Volume= 0.305 af, Depth> 3.86"
 Routed to Pond 6P : Rain Garden #2

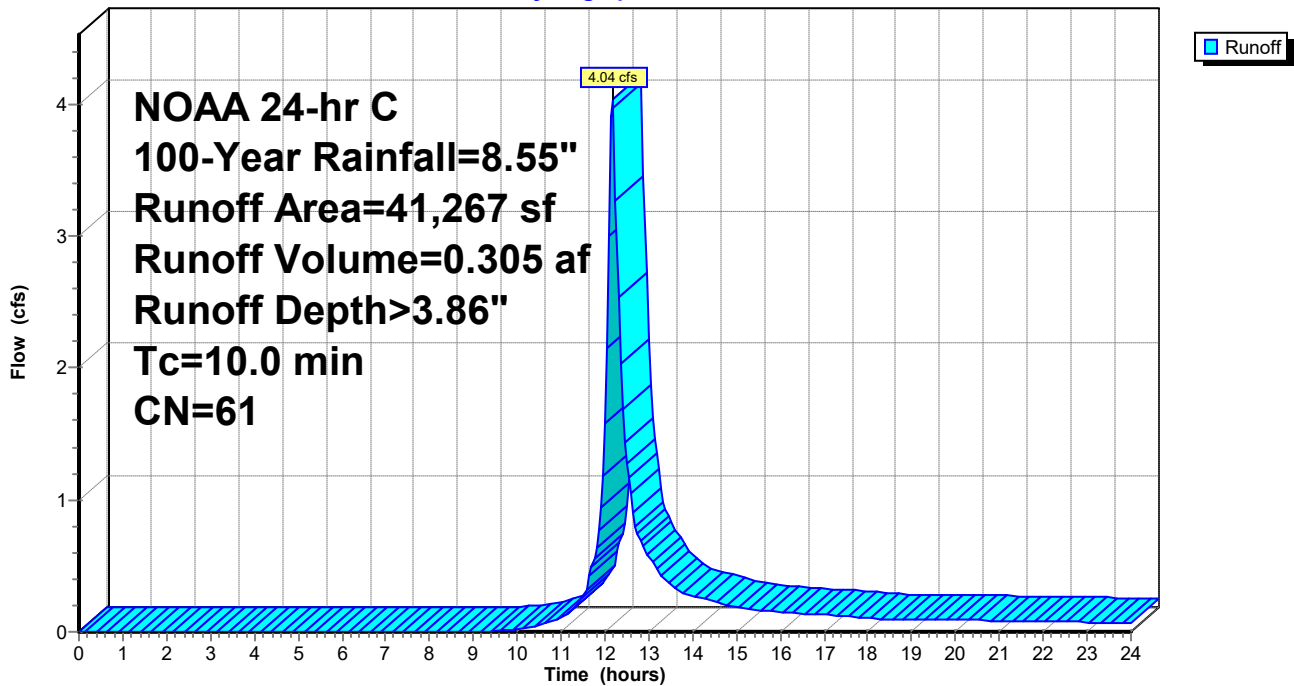
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
 NOAA 24-hr C 100-Year Rainfall=8.55"

	Area (sf)	CN	Description
*	7,646	98	
*	21,463	61	
*	12,158	39	
	41,267	61	Weighted Average
	33,621		81.47% Pervious Area
	7,646		18.53% Impervious Area

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

Subcatchment 2S: Rain Garden #2

Hydrograph



23-105 Stormwater POST RG 1-4

NOAA 24-hr C 100-Year Rainfall=8.55"

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Summary for Subcatchment 3S: Rain Garden #3

Runoff = 2.07 cfs @ 12.19 hrs, Volume= 0.166 af, Depth> 2.36"
 Routed to Pond 7P : Rain Garden #3

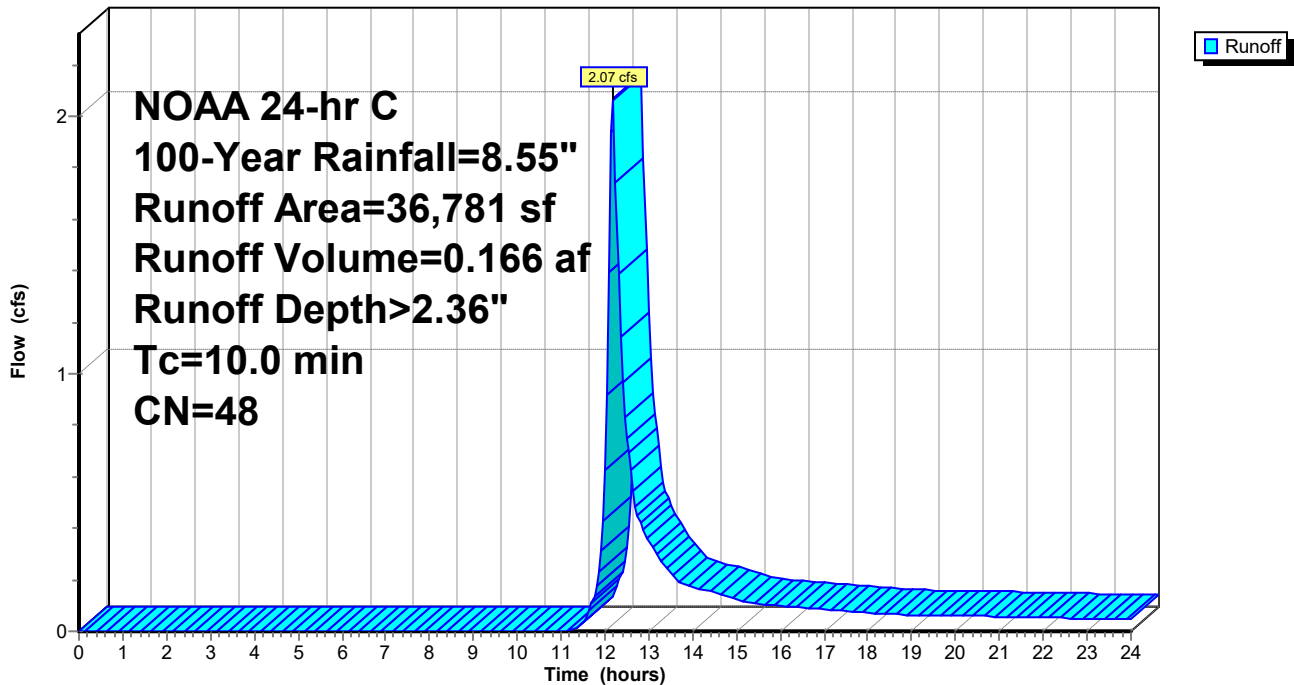
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
 NOAA 24-hr C 100-Year Rainfall=8.55"

	Area (sf)	CN	Description
*	5,527	98	
*	31,254	39	
	36,781	48	Weighted Average
	31,254		84.97% Pervious Area
	5,527		15.03% Impervious Area

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

Subcatchment 3S: Rain Garden #3

Hydrograph



23-105 Stormwater POST RG 1-4

NOAA 24-hr C 100-Year Rainfall=8.55"

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Summary for Subcatchment 4S: Rain Garden #4

Runoff = 1.84 cfs @ 12.18 hrs, Volume= 0.140 af, Depth> 3.27"
 Routed to Pond 9P : Rain Garden #4

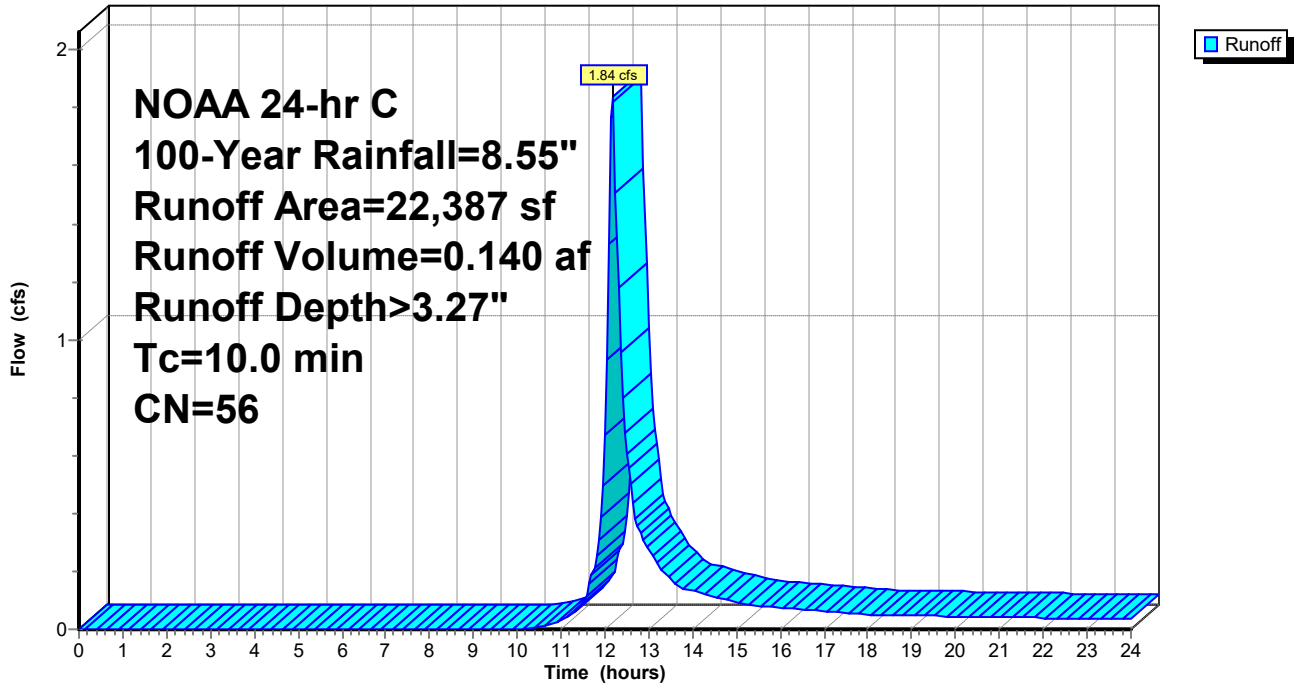
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
 NOAA 24-hr C 100-Year Rainfall=8.55"

	Area (sf)	CN	Description
*	6,345	98	
*	16,042	39	
	22,387	56	Weighted Average
	16,042		71.66% Pervious Area
	6,345		28.34% Impervious Area

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

Subcatchment 4S: Rain Garden #4

Hydrograph



23-105 Stormwater POST RG 1-4

NOAA 24-hr C 100-Year Rainfall=8.55"

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Summary for Subcatchment 11S: Post-Developed Drainage Area #1

Runoff = 0.29 cfs @ 12.72 hrs, Volume= 0.054 af, Depth> 1.47"
 Routed to Pond 10P : Analysis Point #1

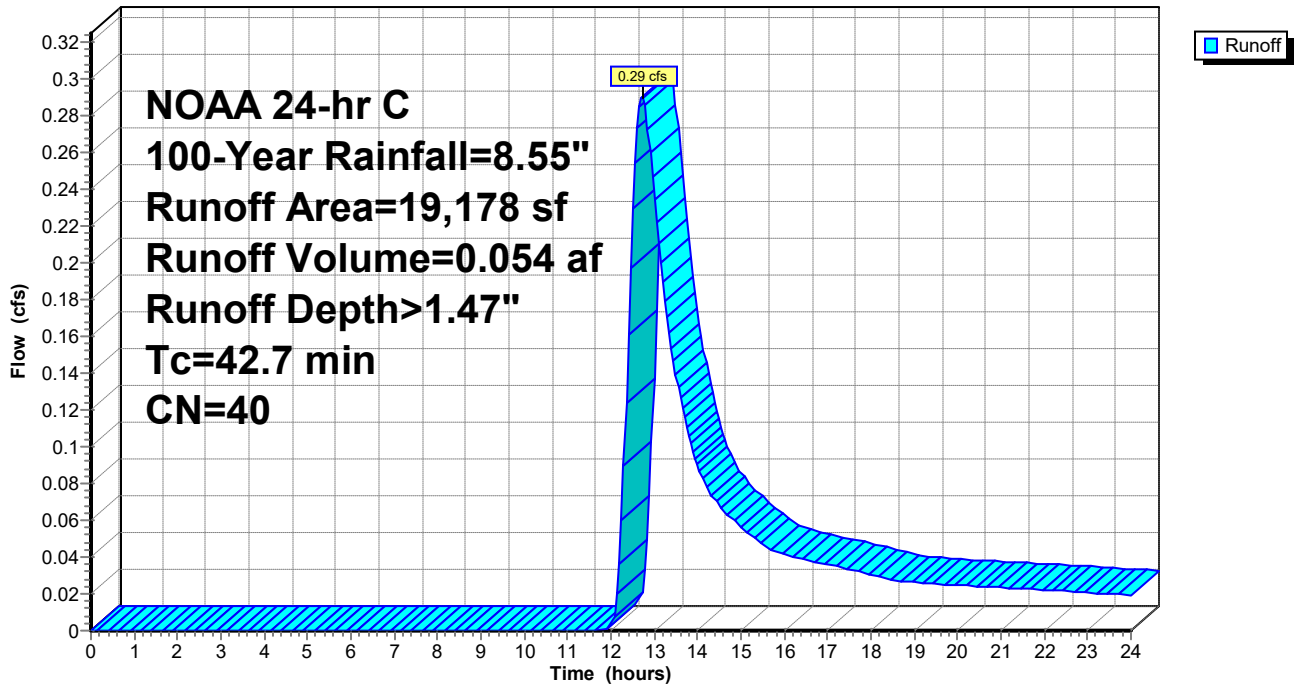
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
 NOAA 24-hr C 100-Year Rainfall=8.55"

	Area (sf)	CN	Description
*	1,201	98	
*	5,225	39	
*	709	61	
	10,382	30	Woods, Good, HSG A
	1,661	55	Woods, Good, HSG B
	19,178	40	Weighted Average
	17,977		93.74% Pervious Area
	1,201		6.26% Impervious Area

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

Subcatchment 11S: Post-Developed Drainage Area #1

Hydrograph



Summary for Pond 5P: Rain Garden #1

Inflow Area = 0.476 ac, 22.50% Impervious, Inflow Depth > 5.17" for 100-Year event
 Inflow = 2.72 cfs @ 12.17 hrs, Volume= 0.205 af
 Outflow = 0.18 cfs @ 13.67 hrs, Volume= 0.149 af, Atten= 93%, Lag= 90.0 min
 Discarded = 0.18 cfs @ 13.67 hrs, Volume= 0.149 af

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
 Peak Elev= 137.34' @ 13.67 hrs Surf.Area= 4,511 sf Storage= 4,976 cf

Plug-Flow detention time= 285.8 min calculated for 0.149 af (72% of inflow)
 Center-of-Mass det. time= 192.1 min (1,015.3 - 823.2)

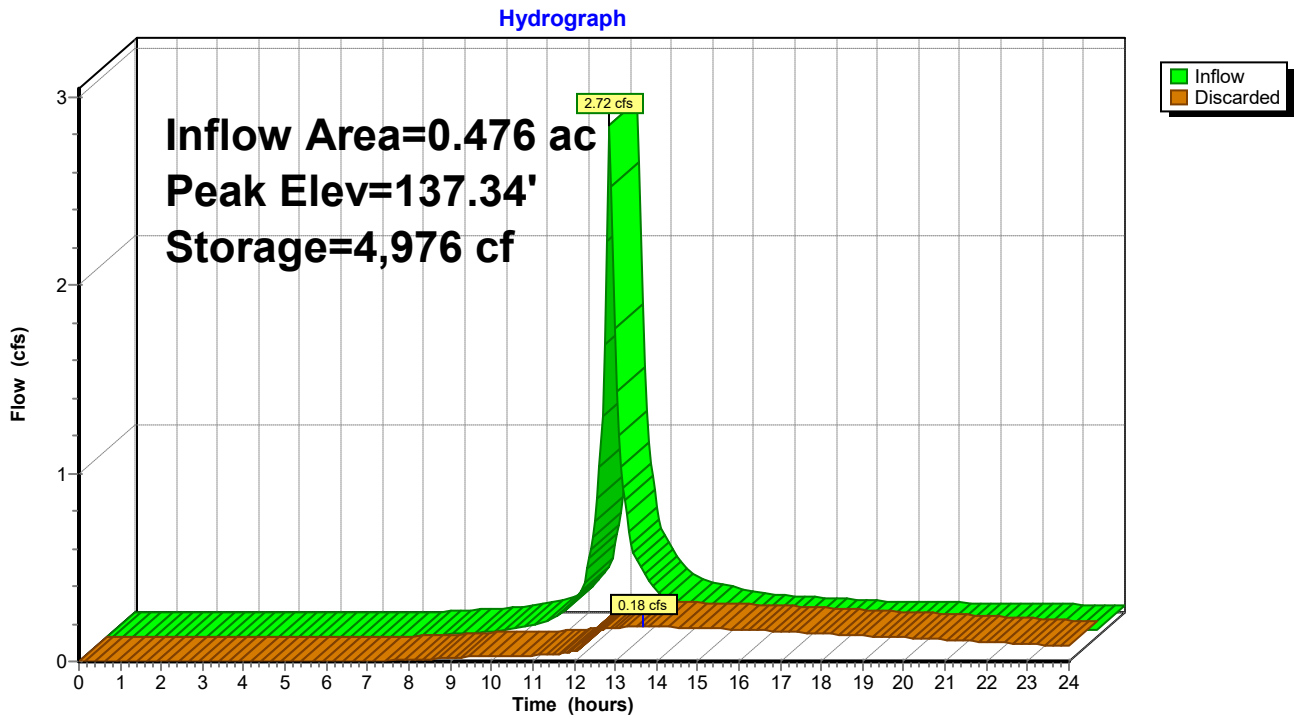
Volume	Invert	Avail.Storage	Storage Description
#1	134.50'	6,784 cf	Custom Stage Data (Prismatic) Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
134.50	591	0	0
135.00	862	363	363
136.00	1,446	1,154	1,517
136.50	1,774	805	2,322
137.70	5,662	4,462	6,784

Device	Routing	Invert	Outlet Devices
#1	Discarded	134.50'	1.760 in/hr Exfiltration over Surface area

Discarded OutFlow Max=0.18 cfs @ 13.67 hrs HW=137.34' (Free Discharge)
 ↑ **1=Exfiltration** (Exfiltration Controls 0.18 cfs)

Pond 5P: Rain Garden #1



Summary for Pond 6P: Rain Garden #2

Inflow Area = 1.424 ac, 19.86% Impervious, Inflow Depth > 2.57" for 100-Year event
 Inflow = 4.04 cfs @ 12.18 hrs, Volume= 0.305 af
 Outflow = 0.40 cfs @ 13.38 hrs, Volume= 0.275 af, Atten= 90%, Lag= 71.9 min
 Discarded = 0.40 cfs @ 13.38 hrs, Volume= 0.275 af

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
 Peak Elev= 138.45' @ 13.38 hrs Surf.Area= 3,858 sf Storage= 6,227 cf

Plug-Flow detention time= 204.2 min calculated for 0.274 af (90% of inflow)
 Center-of-Mass det. time= 155.7 min (1,001.7 - 846.0)

Volume	Invert	Avail.Storage	Storage Description
#1	135.00'	8,564 cf	Custom Stage Data (Prismatic) Listed below (Recalc)
#2	139.00'	1,504 cf	Custom Stage Data (Prismatic) Listed below (Recalc)
		10,068 cf	Total Available Storage

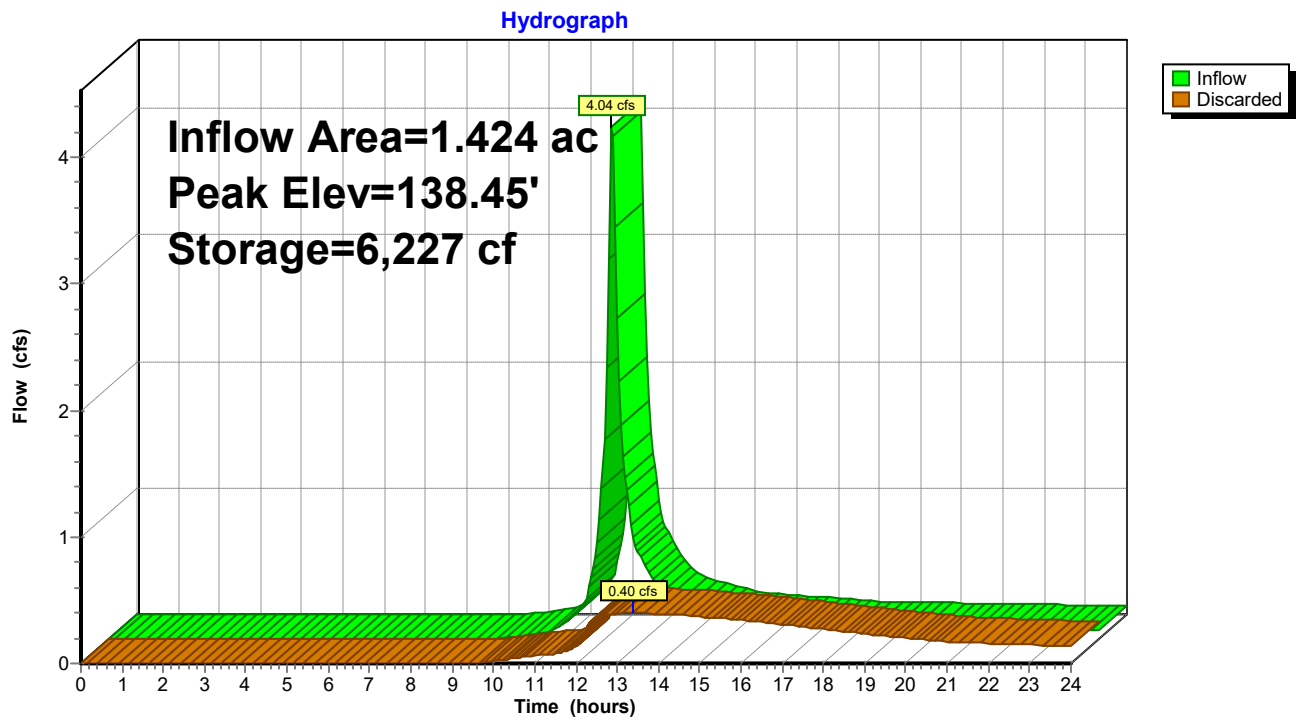
Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
135.00	550	0	0
136.00	1,075	813	813
137.00	1,670	1,373	2,185
138.00	3,230	2,450	4,635
139.00	4,627	3,929	8,564

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
139.00	580	0	0
140.00	2,428	1,504	1,504

Device	Routing	Invert	Outlet Devices
#1	Discarded	135.00'	4.470 in/hr Exfiltration over Surface area

Discarded OutFlow Max=0.40 cfs @ 13.38 hrs HW=138.45' (Free Discharge)
 ↳ **1=Exfiltration** (Exfiltration Controls 0.40 cfs)

Pond 6P: Rain Garden #2



Summary for Pond 7P: Rain Garden #3

Inflow Area = 2.268 ac, 18.06% Impervious, Inflow Depth > 0.88" for 100-Year event
 Inflow = 2.07 cfs @ 12.19 hrs, Volume= 0.166 af
 Outflow = 0.29 cfs @ 13.19 hrs, Volume= 0.166 af, Atten= 86%, Lag= 60.2 min
 Discarded = 0.29 cfs @ 13.19 hrs, Volume= 0.166 af

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
 Peak Elev= 137.23' @ 13.19 hrs Surf.Area= 2,059 sf Storage= 2,662 cf

Plug-Flow detention time= 108.6 min calculated for 0.165 af (100% of inflow)
 Center-of-Mass det. time= 107.4 min (984.7 - 877.3)

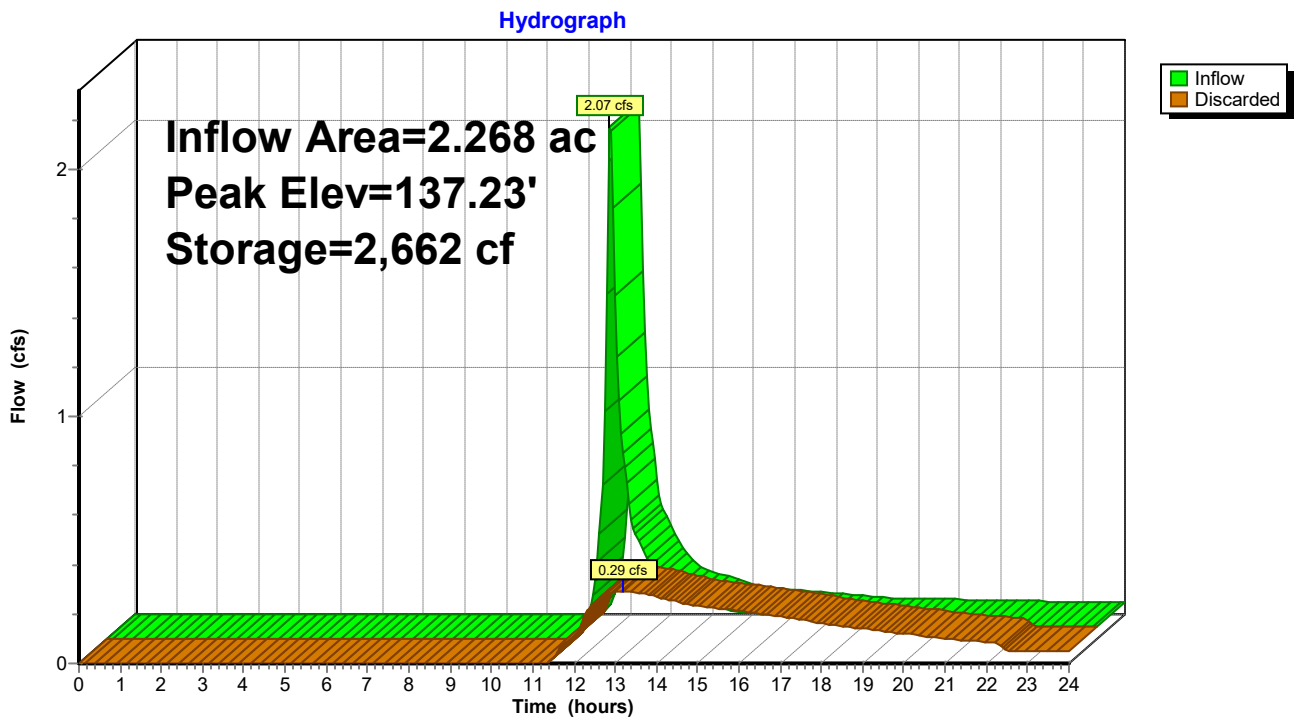
Volume	Invert	Avail.Storage	Storage Description
#1	135.00'	7,794 cf	Custom Stage Data (Prismatic) Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
135.00	554	0	0
136.00	1,097	826	826
137.00	1,700	1,399	2,224
138.00	3,243	2,472	4,696
138.60	7,084	3,098	7,794

Device	Routing	Invert	Outlet Devices
#1	Discarded	135.00'	6.130 in/hr Exfiltration over Surface area

Discarded OutFlow Max=0.29 cfs @ 13.19 hrs HW=137.23' (Free Discharge)
 ↑**1=Exfiltration** (Exfiltration Controls 0.29 cfs)

Pond 7P: Rain Garden #3



Summary for Pond 9P: Rain Garden #4

Inflow Area = 2.782 ac, 19.96% Impervious, Inflow Depth > 0.60" for 100-Year event
 Inflow = 1.84 cfs @ 12.18 hrs, Volume= 0.140 af
 Outflow = 0.35 cfs @ 12.77 hrs, Volume= 0.140 af, Atten= 81%, Lag= 35.3 min
 Discarded = 0.35 cfs @ 12.77 hrs, Volume= 0.140 af
 Primary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af
 Routed to Pond 10P : Analysis Point #1

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
 Peak Elev= 135.57' @ 12.77 hrs Surf.Area= 3,302 sf Storage= 1,755 cf

Plug-Flow detention time= 38.0 min calculated for 0.140 af (100% of inflow)
 Center-of-Mass det. time= 37.3 min (894.3 - 857.0)

Volume	Invert	Avail.Storage	Storage Description
#1	135.00'	7,370 cf	Custom Stage Data (Prismatic) Listed below (Recalc)
Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
135.00	2,805	0	0
136.00	3,669	3,237	3,237
137.00	4,597	4,133	7,370

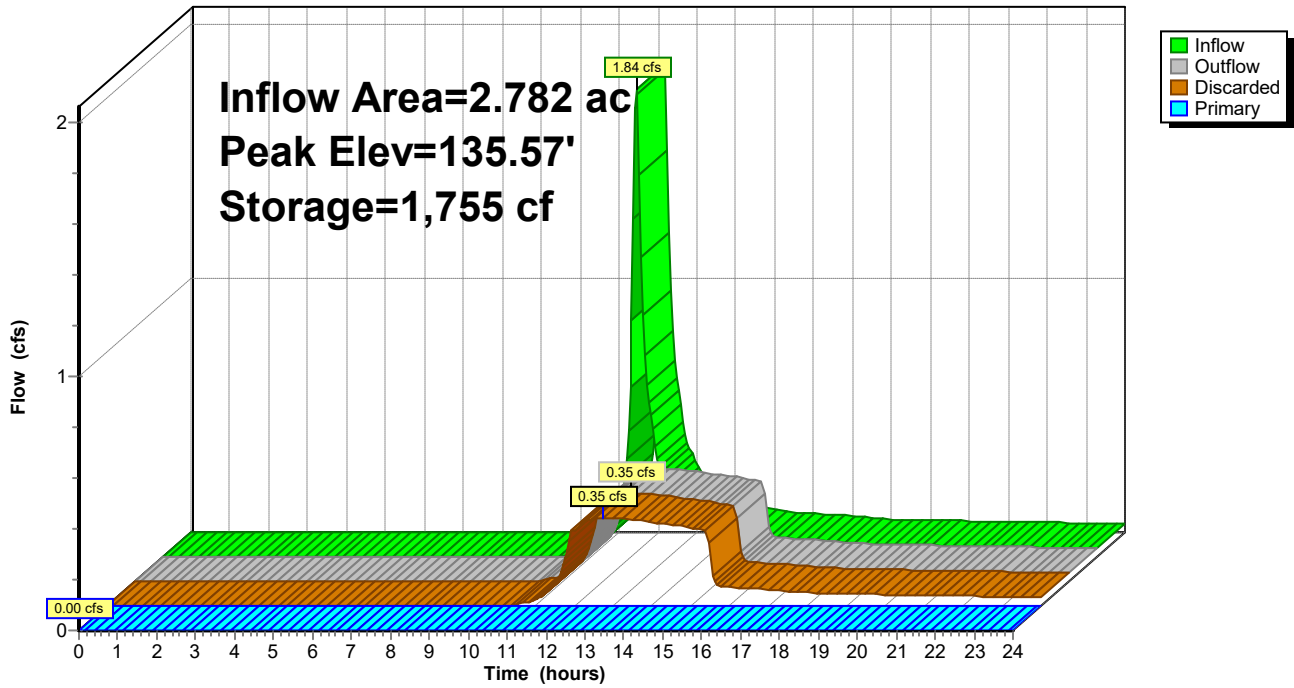
Device	Routing	Invert	Outlet Devices
#1	Primary	136.90'	3.0' long Sharp-Crested Rectangular Weir 2 End Contraction(s)
#2	Discarded	135.00'	4.530 in/hr Exfiltration over Surface area

Discarded OutFlow Max=0.35 cfs @ 12.77 hrs HW=135.57' (Free Discharge)
 ↑**2=Exfiltration** (Exfiltration Controls 0.35 cfs)

Primary OutFlow Max=0.00 cfs @ 0.00 hrs HW=135.00' (Free Discharge)
 ↑**1=Sharp-Crested Rectangular Weir** (Controls 0.00 cfs)

Pond 9P: Rain Garden #4

Hydrograph



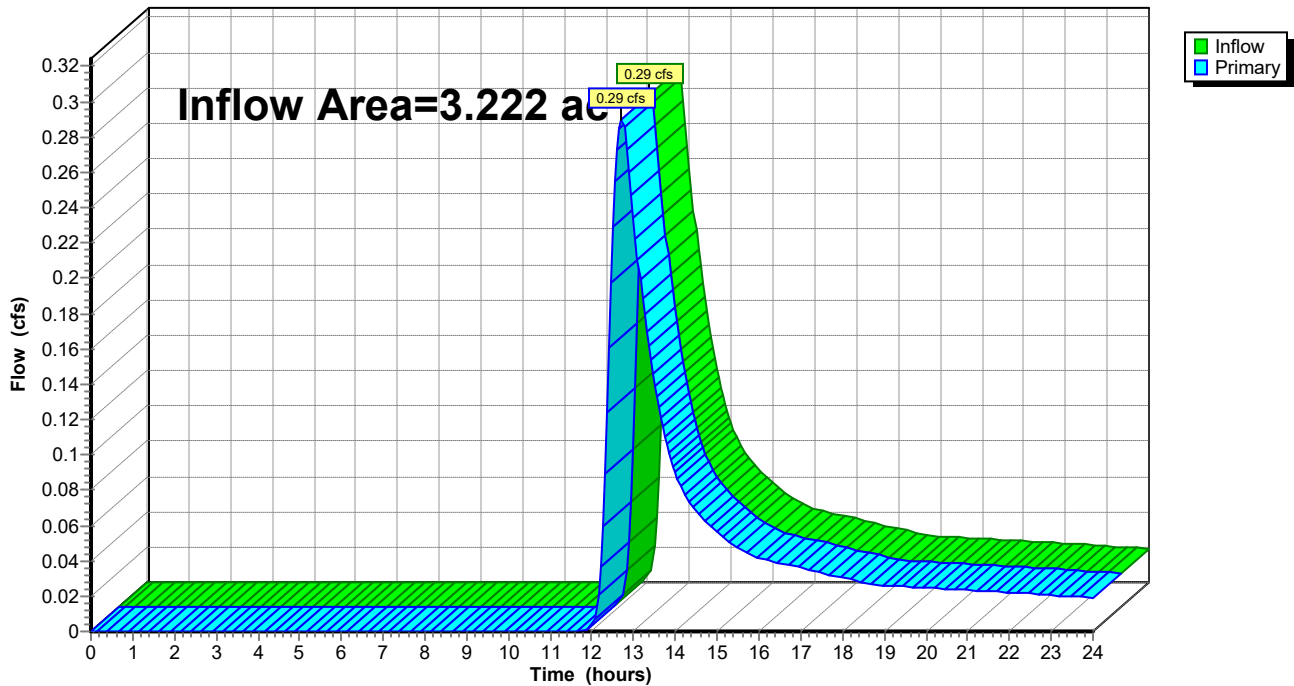
Summary for Pond 10P: Analysis Point #1

Inflow Area = 3.222 ac, 18.09% Impervious, Inflow Depth > 0.20" for 100-Year event
Inflow = 0.29 cfs @ 12.72 hrs, Volume= 0.054 af
Primary = 0.29 cfs @ 12.72 hrs, Volume= 0.054 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs

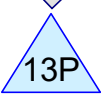
Pond 10P: Analysis Point #1

Hydrograph





Infiltration Area #5



Infiltration Area #5



Analysis Point #3



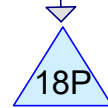
Infiltration Area #6



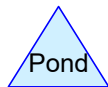
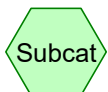
Infiltration Area #6



Post-Developed
Drainage Area #4



Analysis Point #4



Routing Diagram for 23-105 Stormwater POST INF 5-6
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23-105 Stormwater POST INF 5-6

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Page 2

Area Listing (all nodes)

Area (acres)	CN	Description (subcatchment-numbers)
0.152	98	(12S, 15S)
0.107	61	(12S)
0.131	39	>75% Grass cover, Good, HSG A (12S, 15S)
0.046	61	>75% Grass cover, Good, HSG B (17S)
0.058	85	Gravel roads, HSG B (12S)
0.180	55	Woods, Good, HSG B (17S)

23-105 Stormwater POST INF 5-6

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Soil Listing (all nodes)

Area (acres)	Soil Group	Subcatchment Numbers
0.131	HSG A	12S, 15S
0.283	HSG B	12S, 17S
0.000	HSG C	
0.000	HSG D	
0.259	Other	12S, 15S

23-105 Stormwater POST INF 5-6

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Ground Covers (all nodes)

HSG-A (acres)	HSG-B (acres)	HSG-C (acres)	HSG-D (acres)	Other (acres)	Total (acres)	Ground Cover	Subcatchment Numbers
0.000	0.000	0.000	0.000	0.259	0.259		12S, 15S
0.131	0.046	0.000	0.000	0.000	0.177	>75% Grass cover, Good	12S, 15S, 17S
0.000	0.058	0.000	0.000	0.000	0.058	Gravel roads	12S
0.000	0.180	0.000	0.000	0.000	0.180	Woods, Good	17S

Summary for Subcatchment 12S: Infiltration Area #5

Runoff = 0.35 cfs @ 12.19 hrs, Volume= 0.028 af, Depth> 0.93"
 Routed to Pond 13P : Infiltration Area #5

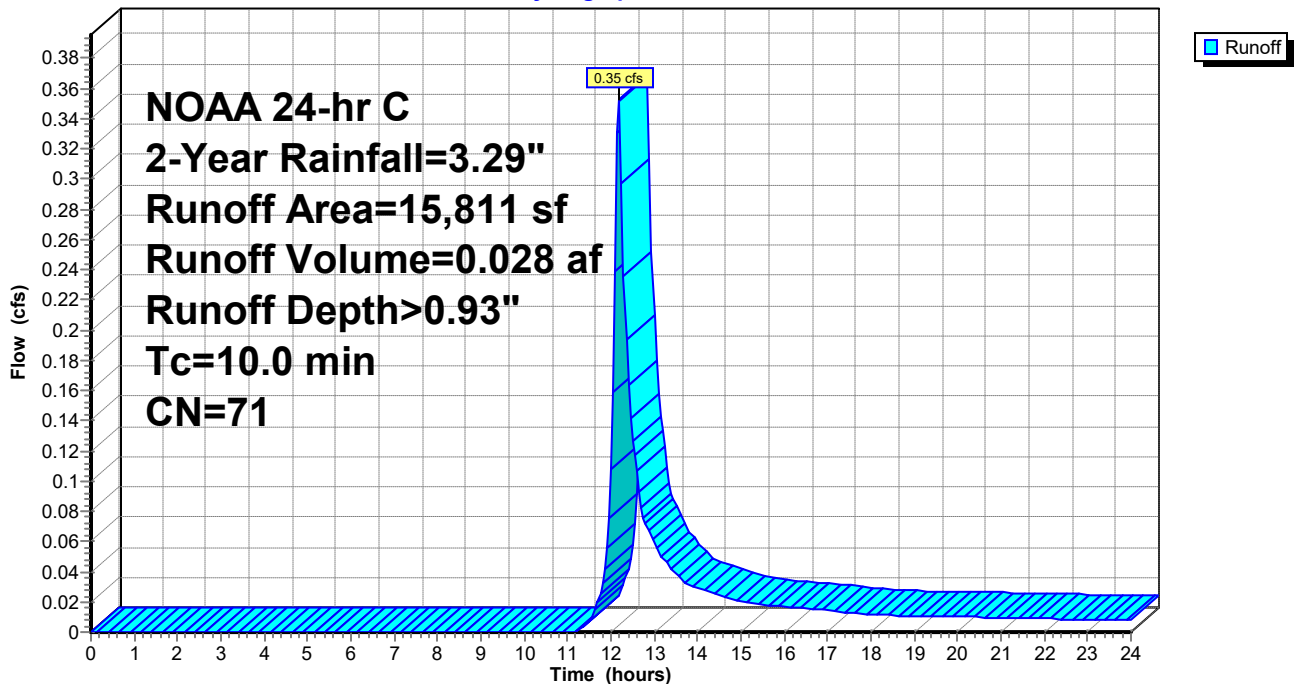
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
 NOAA 24-hr C 2-Year Rainfall=3.29"

	Area (sf)	CN	Description
*	4,951	98	
	3,698	39	>75% Grass cover, Good, HSG A
*	4,655	61	
	2,507	85	Gravel roads, HSG B
	15,811	71	Weighted Average
	10,860		68.69% Pervious Area
	4,951		31.31% Impervious Area

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

Subcatchment 12S: Infiltration Area #5

Hydrograph



23-105 Stormwater POST INF 5-6

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NOAA 24-hr C 2-Year Rainfall=3.29"

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Summary for Subcatchment 15S: Infiltration Area #6

Runoff = 0.06 cfs @ 12.20 hrs, Volume= 0.005 af, Depth> 0.69"
 Routed to Pond 16P : Infiltration Area #6

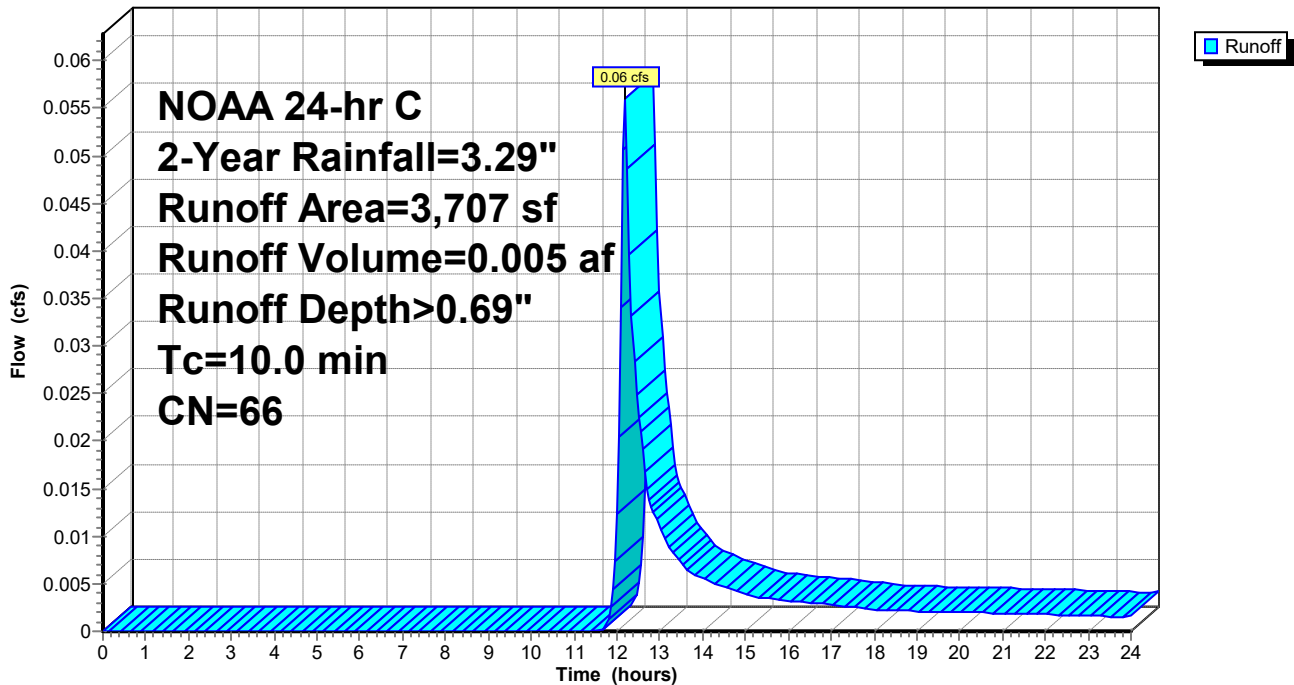
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
 NOAA 24-hr C 2-Year Rainfall=3.29"

Area (sf)	CN	Description
* 1,683	98	
2,024	39	>75% Grass cover, Good, HSG A
3,707	66	Weighted Average
2,024		54.60% Pervious Area
1,683		45.40% Impervious Area

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

Subcatchment 15S: Infiltration Area #6

Hydrograph



23-105 Stormwater POST INF 5-6

NOAA 24-hr C 2-Year Rainfall=3.29"

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Summary for Subcatchment 17S: Post-Developed Drainage Area #4

Runoff = 0.02 cfs @ 12.58 hrs, Volume= 0.006 af, Depth> 0.30"

Routed to Pond 18P : Analysis Point #4

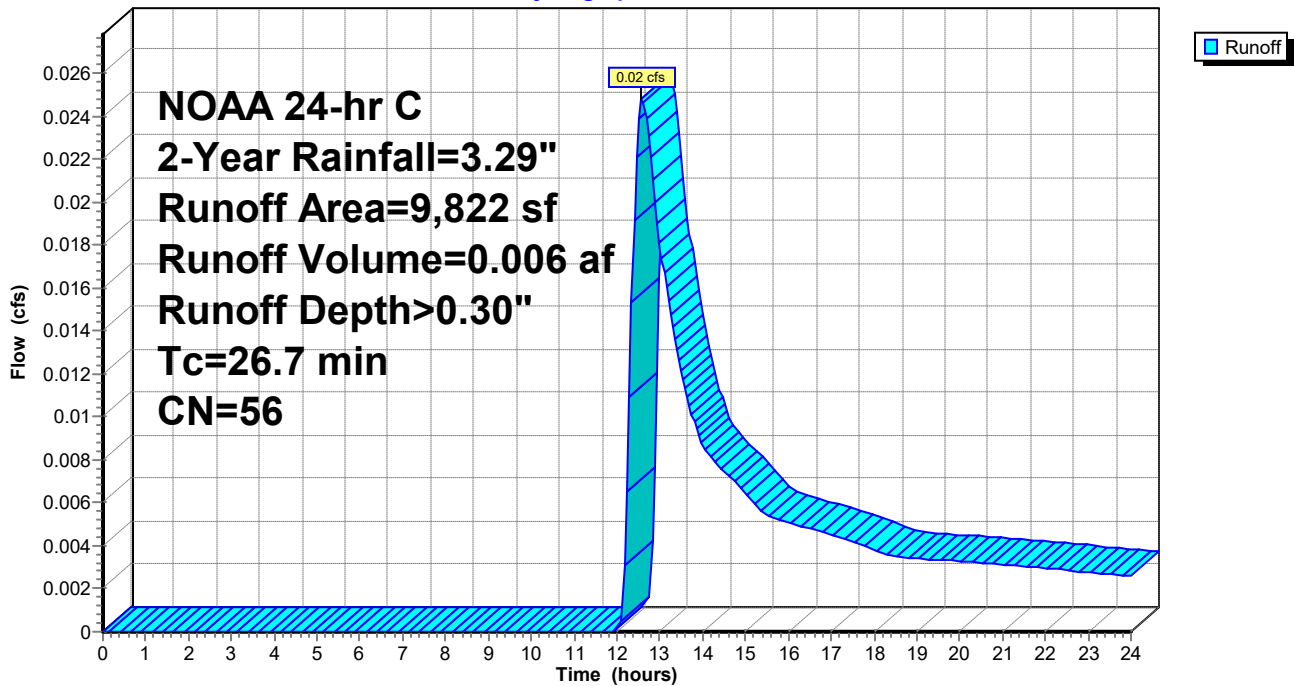
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
 NOAA 24-hr C 2-Year Rainfall=3.29"

Area (sf)	CN	Description
7,839	55	Woods, Good, HSG B
1,983	61	>75% Grass cover, Good, HSG B
9,822	56	Weighted Average
9,822		100.00% Pervious Area

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

Subcatchment 17S: Post-Developed Drainage Area #4

Hydrograph



Summary for Pond 13P: Infiltration Area #5

Inflow Area = 0.363 ac, 31.31% Impervious, Inflow Depth > 0.93" for 2-Year event
 Inflow = 0.35 cfs @ 12.19 hrs, Volume= 0.028 af
 Outflow = 0.10 cfs @ 12.64 hrs, Volume= 0.028 af, Atten= 73%, Lag= 27.1 min
 Discarded = 0.10 cfs @ 12.64 hrs, Volume= 0.028 af
 Primary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af
 Routed to Pond 14P : Analysis Point #3

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
 Peak Elev= 136.39' @ 12.64 hrs Surf.Area= 979 sf Storage= 287 cf

Plug-Flow detention time= 23.4 min calculated for 0.028 af (100% of inflow)
 Center-of-Mass det. time= 22.7 min (898.5 - 875.8)

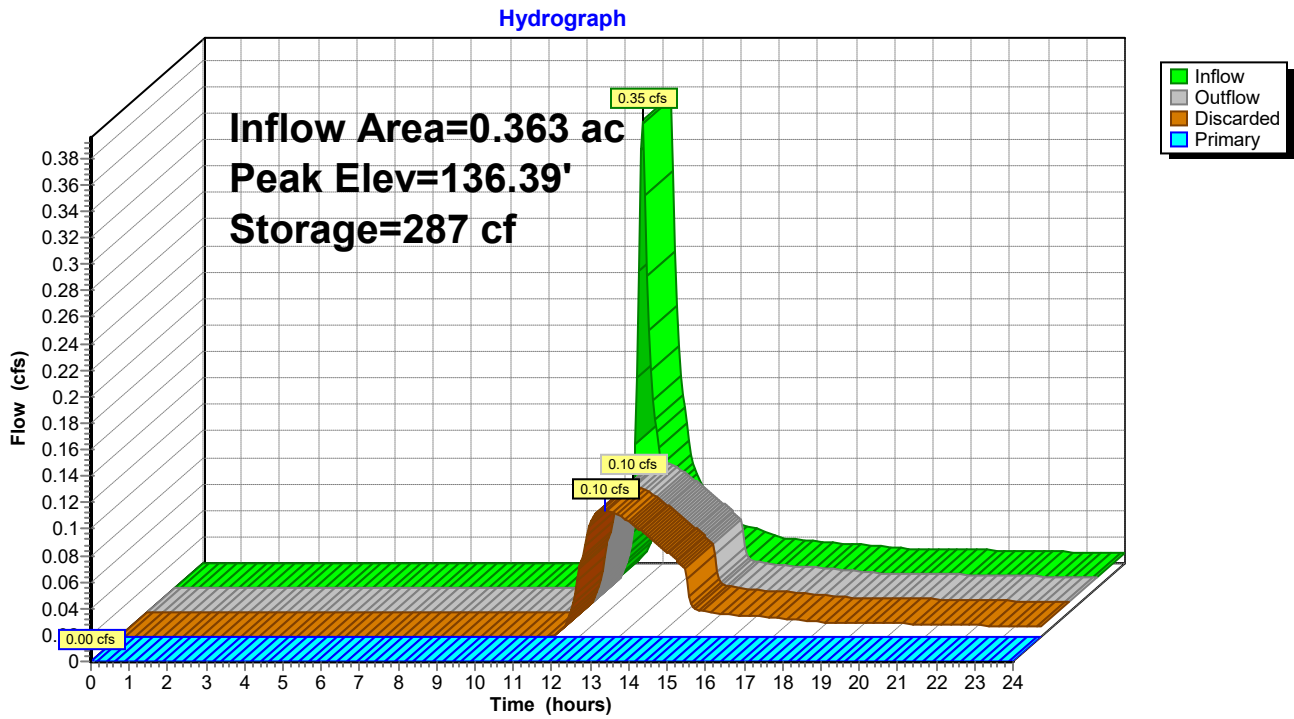
Volume	Invert	Avail.Storage	Storage Description
#1	136.00'	4,310 cf	Custom Stage Data (Prismatic) Listed below (Recalc)
Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
136.00	500	0	0
137.00	1,734	1,117	1,117
138.00	4,651	3,193	4,310

Device	Routing	Invert	Outlet Devices
#1	Primary	137.80'	20.0' long Sharp-Crested Rectangular Weir 2 End Contraction(s)
#2	Discarded	136.00'	4.224 in/hr Exfiltration over Surface area

Discarded OutFlow Max=0.10 cfs @ 12.64 hrs HW=136.39' (Free Discharge)
 ↑**2=Exfiltration** (Exfiltration Controls 0.10 cfs)

Primary OutFlow Max=0.00 cfs @ 0.00 hrs HW=136.00' (Free Discharge)
 ↑**1=Sharp-Crested Rectangular Weir** (Controls 0.00 cfs)

Pond 13P: Infiltration Area #5



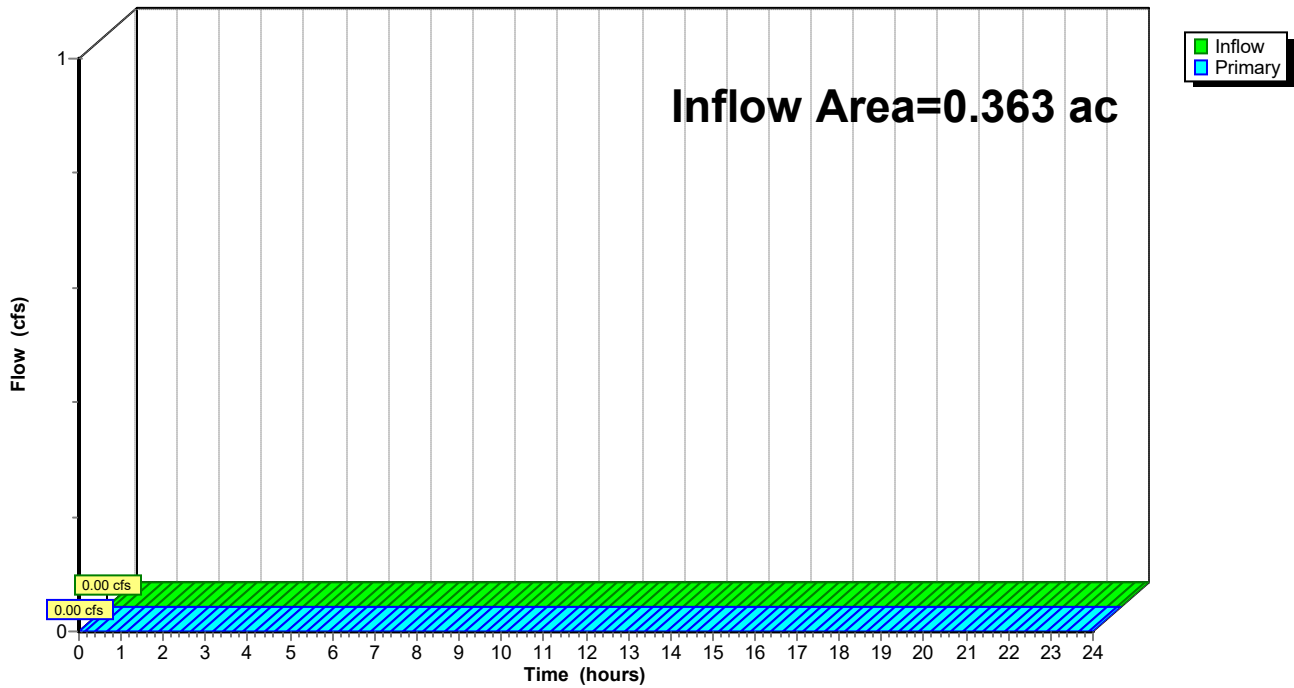
Summary for Pond 14P: Analysis Point #3

Inflow Area = 0.363 ac, 31.31% Impervious, Inflow Depth = 0.00" for 2-Year event
Inflow = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af
Primary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs

Pond 14P: Analysis Point #3

Hydrograph



23-105 Stormwater POST INF 5-6

NOAA 24-hr C 2-Year Rainfall=3.29"

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Summary for Pond 16P: Infiltration Area #6

Inflow Area = 0.085 ac, 45.40% Impervious, Inflow Depth > 0.69" for 2-Year event
 Inflow = 0.06 cfs @ 12.20 hrs, Volume= 0.005 af
 Outflow = 0.04 cfs @ 12.31 hrs, Volume= 0.005 af, Atten= 31%, Lag= 6.9 min
 Discarded = 0.04 cfs @ 12.31 hrs, Volume= 0.005 af

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
 Peak Elev= 135.03' @ 12.31 hrs Surf.Area= 369 sf Storage= 11 cf

Plug-Flow detention time= 2.0 min calculated for 0.005 af (100% of inflow)
 Center-of-Mass det. time= 1.7 min (896.1 - 894.5)

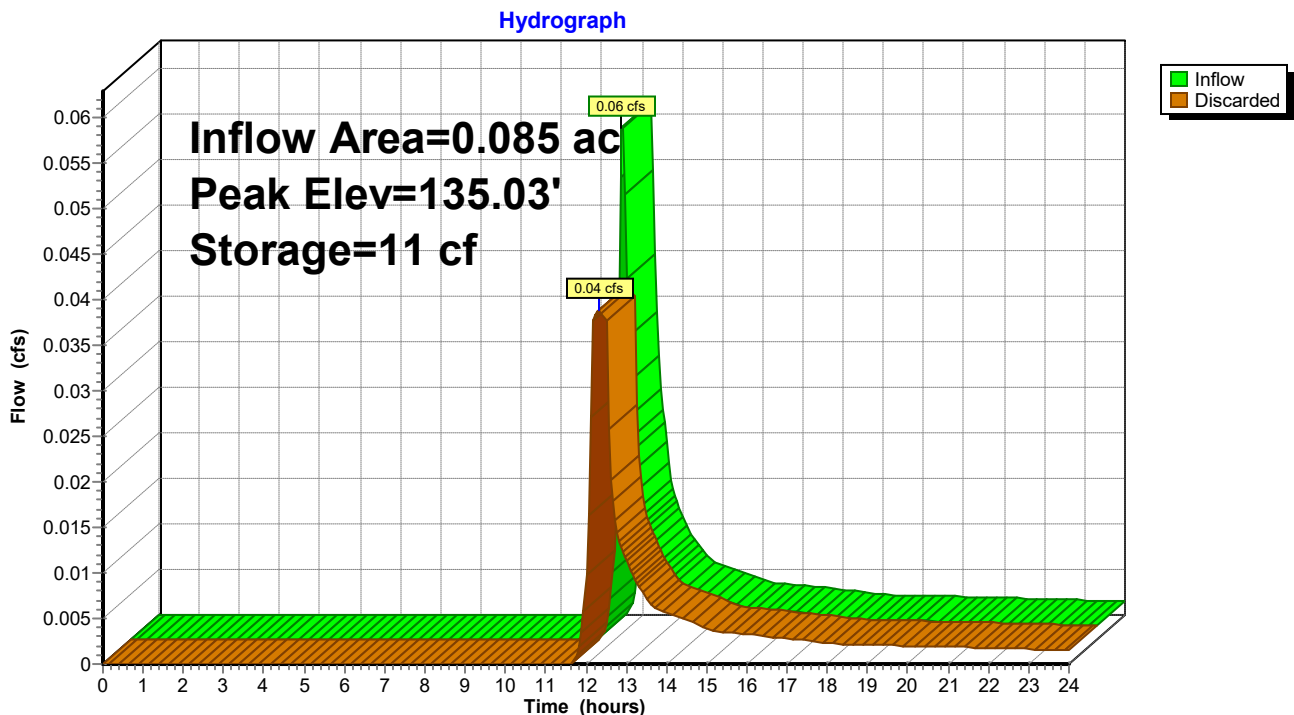
Volume	Invert	Avail.Storage	Storage Description
#1	135.00'	645 cf	Custom Stage Data (Prismatic) Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
135.00	352	0	0
136.00	938	645	645

Device	Routing	Invert	Outlet Devices
#1	Discarded	135.00'	4.530 in/hr Exfiltration over Surface area

Discarded OutFlow Max=0.04 cfs @ 12.31 hrs HW=135.03' (Free Discharge)
 ↑1=Exfiltration (Exfiltration Controls 0.04 cfs)

Pond 16P: Infiltration Area #6



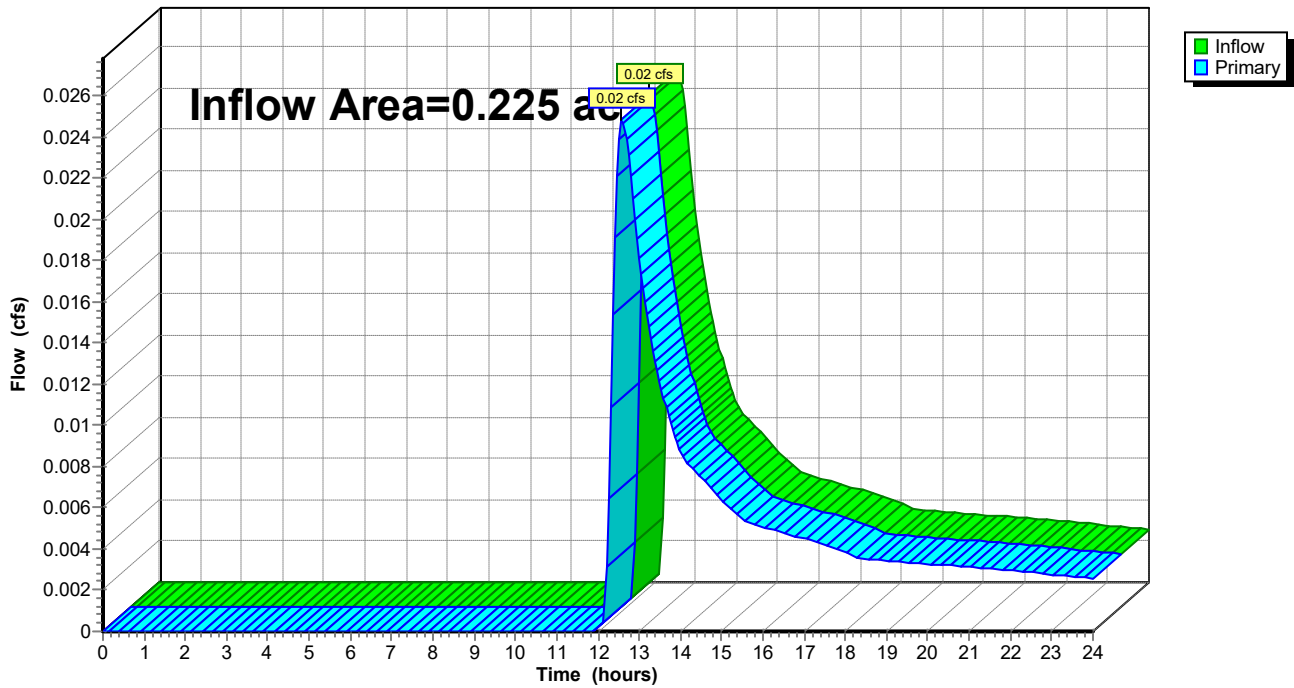
Summary for Pond 18P: Analysis Point #4

Inflow Area = 0.225 ac, 0.00% Impervious, Inflow Depth > 0.30" for 2-Year event
Inflow = 0.02 cfs @ 12.58 hrs, Volume= 0.006 af
Primary = 0.02 cfs @ 12.58 hrs, Volume= 0.006 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs

Pond 18P: Analysis Point #4

Hydrograph



Summary for Subcatchment 12S: Infiltration Area #5

Runoff = 0.86 cfs @ 12.18 hrs, Volume= 0.065 af, Depth> 2.15"
 Routed to Pond 13P : Infiltration Area #5

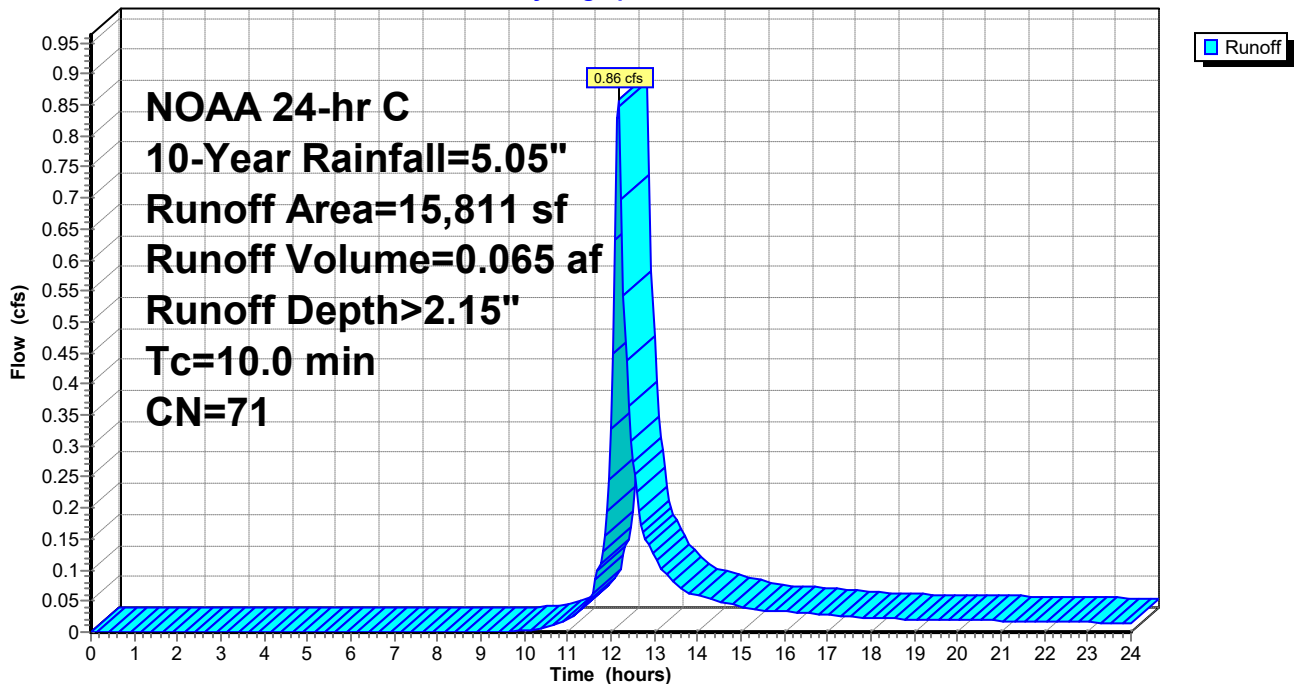
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
 NOAA 24-hr C 10-Year Rainfall=5.05"

	Area (sf)	CN	Description
*	4,951	98	
	3,698	39	>75% Grass cover, Good, HSG A
*	4,655	61	
	2,507	85	Gravel roads, HSG B
	15,811	71	Weighted Average
	10,860		68.69% Pervious Area
	4,951		31.31% Impervious Area

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

Subcatchment 12S: Infiltration Area #5

Hydrograph



Summary for Subcatchment 15S: Infiltration Area #6

Runoff = 0.16 cfs @ 12.18 hrs, Volume= 0.012 af, Depth> 1.76"
 Routed to Pond 16P : Infiltration Area #6

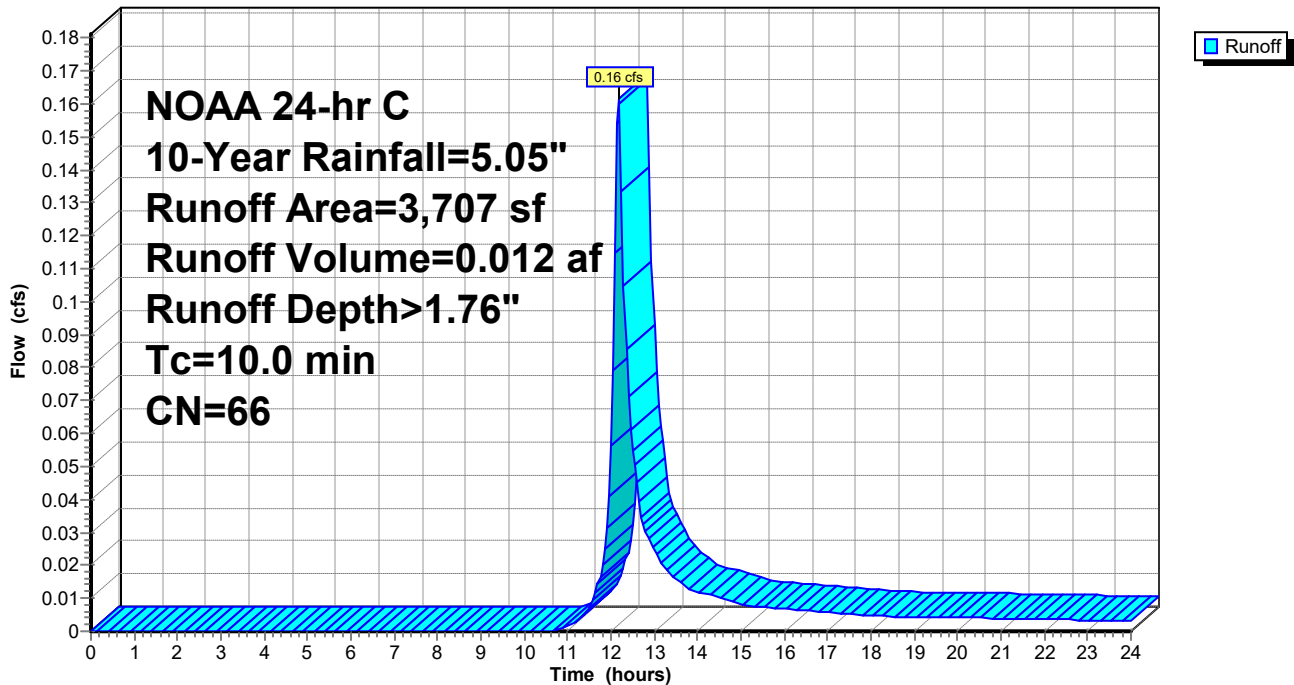
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
 NOAA 24-hr C 10-Year Rainfall=5.05"

	Area (sf)	CN	Description
*	1,683	98	
	2,024	39	>75% Grass cover, Good, HSG A
	3,707	66	Weighted Average
	2,024		54.60% Pervious Area
	1,683		45.40% Impervious Area

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

Subcatchment 15S: Infiltration Area #6

Hydrograph



Summary for Subcatchment 17S: Post-Developed Drainage Area #4

Runoff = 0.15 cfs @ 12.44 hrs, Volume= 0.020 af, Depth> 1.06"
 Routed to Pond 18P : Analysis Point #4

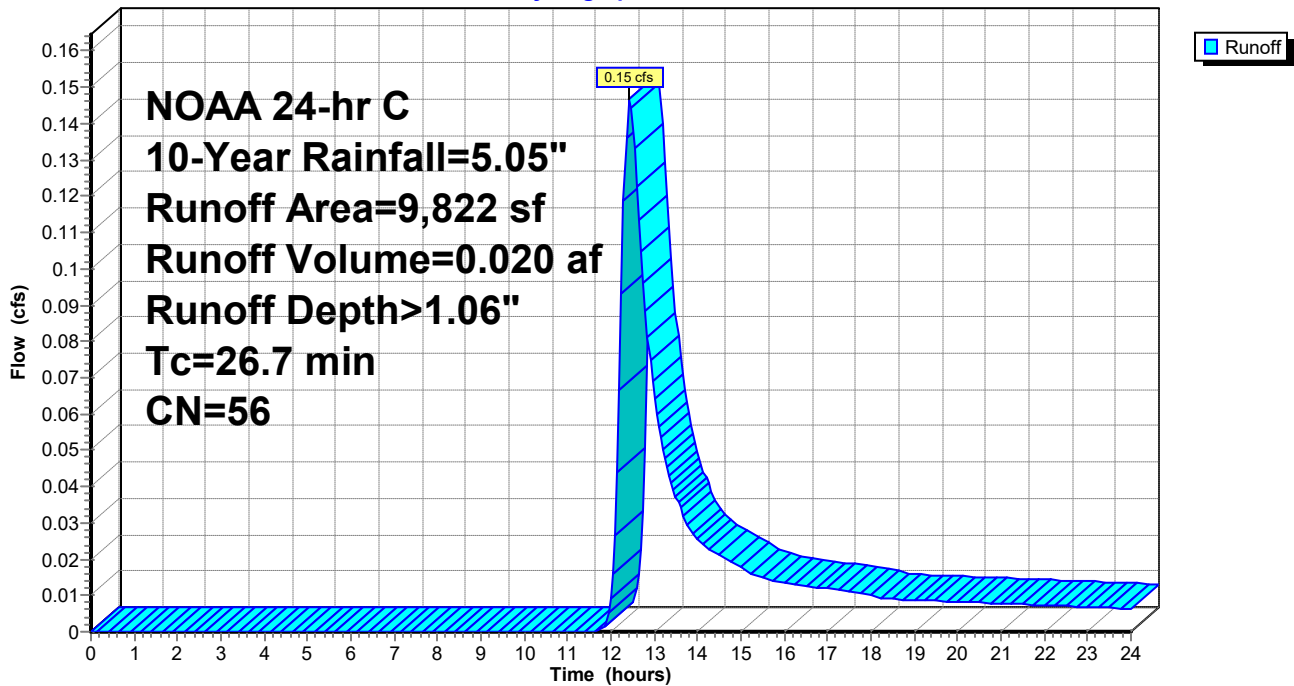
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
 NOAA 24-hr C 10-Year Rainfall=5.05"

Area (sf)	CN	Description
7,839	55	Woods, Good, HSG B
1,983	61	>75% Grass cover, Good, HSG B
9,822	56	Weighted Average
9,822		100.00% Pervious Area

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

Subcatchment 17S: Post-Developed Drainage Area #4

Hydrograph



23-105 Stormwater POST INF 5-6

NOAA 24-hr C 10-Year Rainfall=5.05"

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Summary for Pond 13P: Infiltration Area #5

Inflow Area = 0.363 ac, 31.31% Impervious, Inflow Depth > 2.15" for 10-Year event
 Inflow = 0.86 cfs @ 12.18 hrs, Volume= 0.065 af
 Outflow = 0.16 cfs @ 12.77 hrs, Volume= 0.065 af, Atten= 82%, Lag= 35.1 min
 Discarded = 0.16 cfs @ 12.77 hrs, Volume= 0.065 af
 Primary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af
 Routed to Pond 14P : Analysis Point #3

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
 Peak Elev= 136.90' @ 12.77 hrs Surf.Area= 1,608 sf Storage= 947 cf

Plug-Flow detention time= 56.0 min calculated for 0.065 af (100% of inflow)
 Center-of-Mass det. time= 55.3 min (905.4 - 850.0)

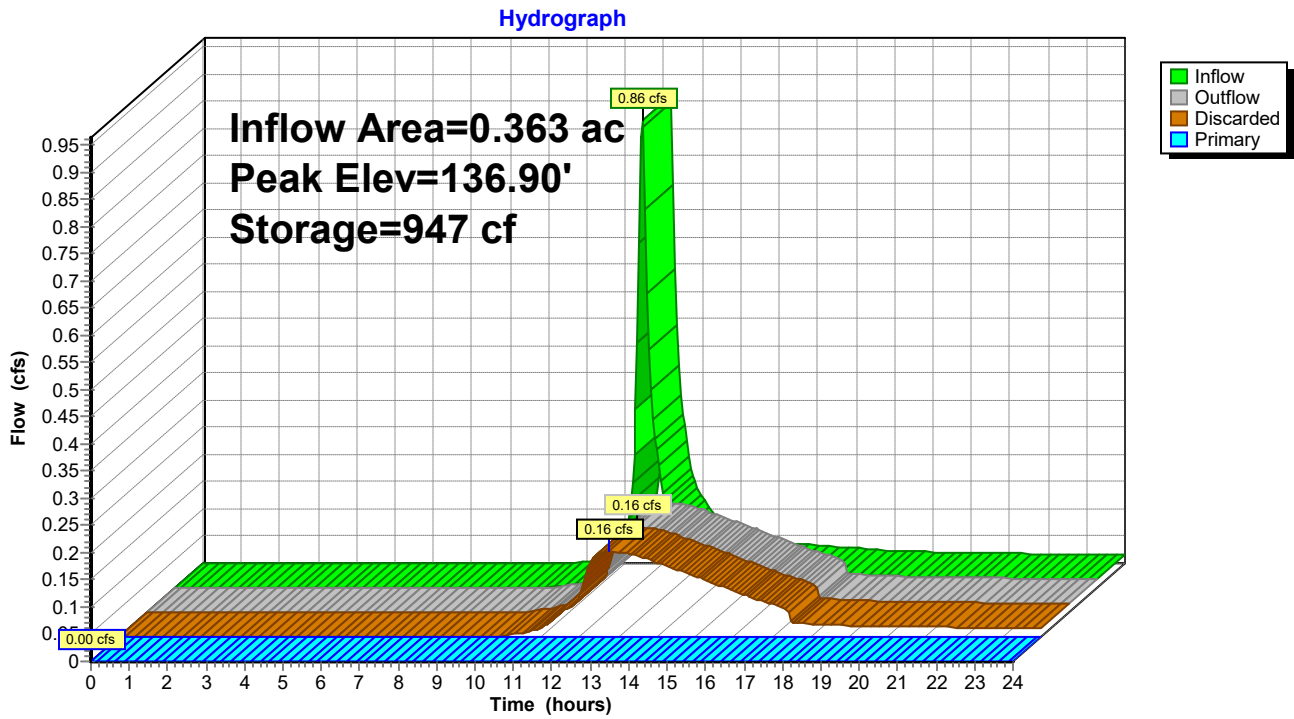
Volume	Invert	Avail.Storage	Storage Description
#1	136.00'	4,310 cf	Custom Stage Data (Prismatic) Listed below (Recalc)
Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
136.00	500	0	0
137.00	1,734	1,117	1,117
138.00	4,651	3,193	4,310

Device	Routing	Invert	Outlet Devices
#1	Primary	137.80'	20.0' long Sharp-Crested Rectangular Weir 2 End Contraction(s)
#2	Discarded	136.00'	4.224 in/hr Exfiltration over Surface area

Discarded OutFlow Max=0.16 cfs @ 12.77 hrs HW=136.90' (Free Discharge)
 ↑**2=Exfiltration** (Exfiltration Controls 0.16 cfs)

Primary OutFlow Max=0.00 cfs @ 0.00 hrs HW=136.00' (Free Discharge)
 ↑**1=Sharp-Crested Rectangular Weir** (Controls 0.00 cfs)

Pond 13P: Infiltration Area #5



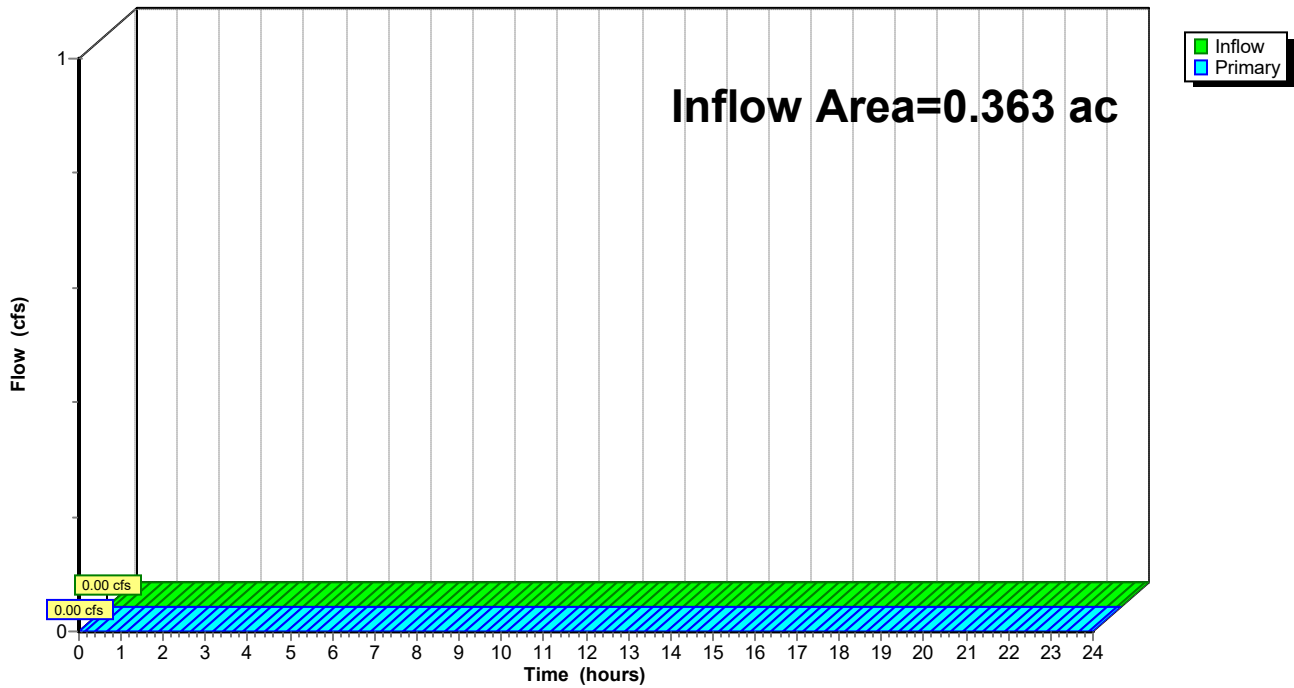
Summary for Pond 14P: Analysis Point #3

Inflow Area = 0.363 ac, 31.31% Impervious, Inflow Depth = 0.00" for 10-Year event
Inflow = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af
Primary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs

Pond 14P: Analysis Point #3

Hydrograph



Summary for Pond 16P: Infiltration Area #6

Inflow Area = 0.085 ac, 45.40% Impervious, Inflow Depth > 1.76" for 10-Year event
 Inflow = 0.16 cfs @ 12.18 hrs, Volume= 0.012 af
 Outflow = 0.05 cfs @ 12.53 hrs, Volume= 0.012 af, Atten= 68%, Lag= 20.7 min
 Discarded = 0.05 cfs @ 12.53 hrs, Volume= 0.012 af

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
 Peak Elev= 135.25' @ 12.53 hrs Surf.Area= 497 sf Storage= 105 cf

Plug-Flow detention time= 13.2 min calculated for 0.012 af (100% of inflow)
 Center-of-Mass det. time= 12.9 min (875.9 - 863.0)

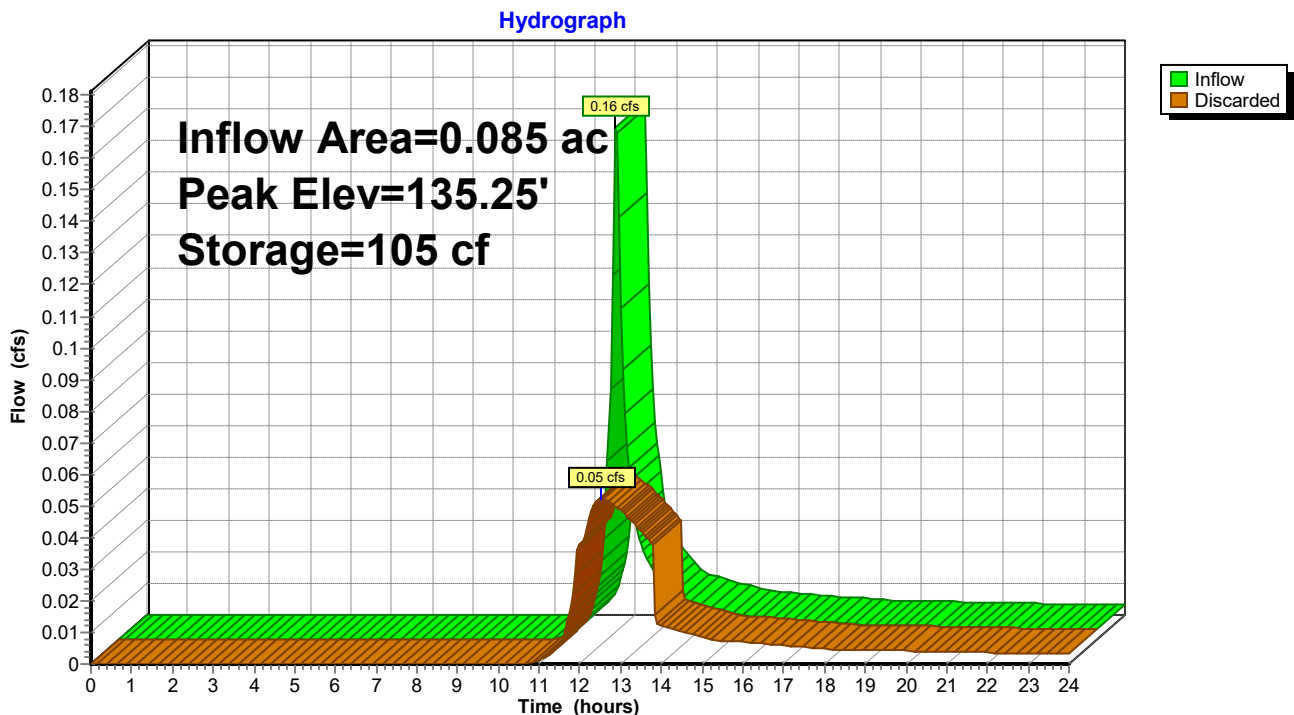
Volume	Invert	Avail.Storage	Storage Description
#1	135.00'	645 cf	Custom Stage Data (Prismatic) Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
135.00	352	0	0
136.00	938	645	645

Device	Routing	Invert	Outlet Devices
#1	Discarded	135.00'	4.530 in/hr Exfiltration over Surface area

Discarded OutFlow Max=0.05 cfs @ 12.53 hrs HW=135.25' (Free Discharge)
 ↑1=Exfiltration (Exfiltration Controls 0.05 cfs)

Pond 16P: Infiltration Area #6



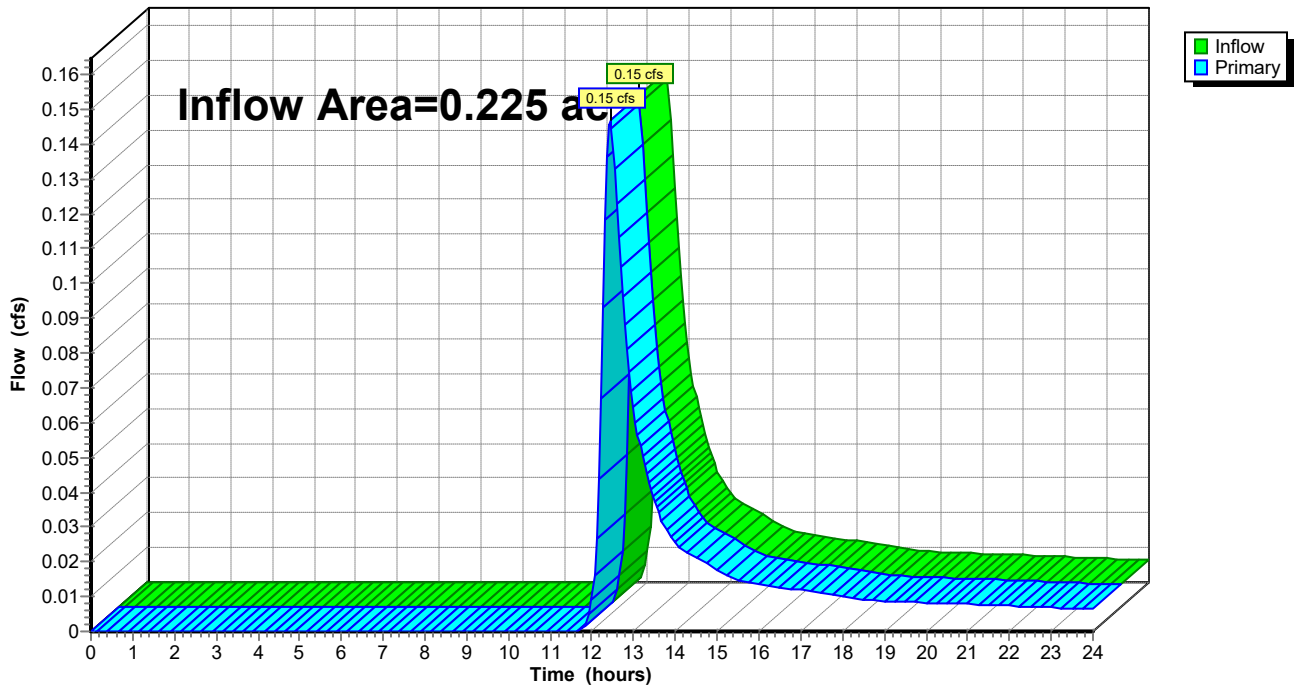
Summary for Pond 18P: Analysis Point #4

Inflow Area = 0.225 ac, 0.00% Impervious, Inflow Depth > 1.06" for 10-Year event
Inflow = 0.15 cfs @ 12.44 hrs, Volume= 0.020 af
Primary = 0.15 cfs @ 12.44 hrs, Volume= 0.020 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs

Pond 18P: Analysis Point #4

Hydrograph



23-105 Stormwater POST INF 5-6

NOAA 24-hr C 100-Year Rainfall=8.55"

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Summary for Subcatchment 12S: Infiltration Area #5

Runoff = 2.03 cfs @ 12.17 hrs, Volume= 0.153 af, Depth> 5.05"
 Routed to Pond 13P : Infiltration Area #5

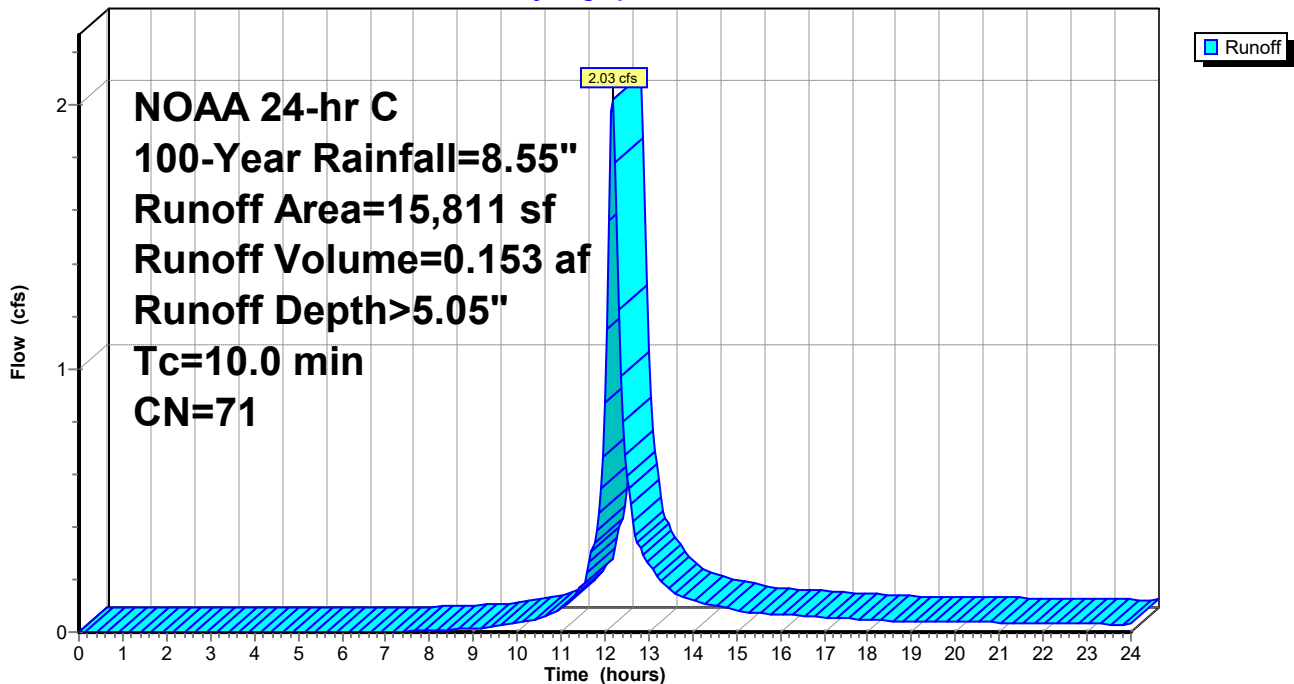
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
 NOAA 24-hr C 100-Year Rainfall=8.55"

	Area (sf)	CN	Description
*	4,951	98	
	3,698	39	>75% Grass cover, Good, HSG A
*	4,655	61	
	2,507	85	Gravel roads, HSG B
	15,811	71	Weighted Average
	10,860		68.69% Pervious Area
	4,951		31.31% Impervious Area

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

Subcatchment 12S: Infiltration Area #5

Hydrograph



23-105 Stormwater POST INF 5-6

NOAA 24-hr C 100-Year Rainfall=8.55"

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Summary for Subcatchment 15S: Infiltration Area #6

Runoff = 0.42 cfs @ 12.18 hrs, Volume= 0.032 af, Depth> 4.45"
Routed to Pond 16P : Infiltration Area #6

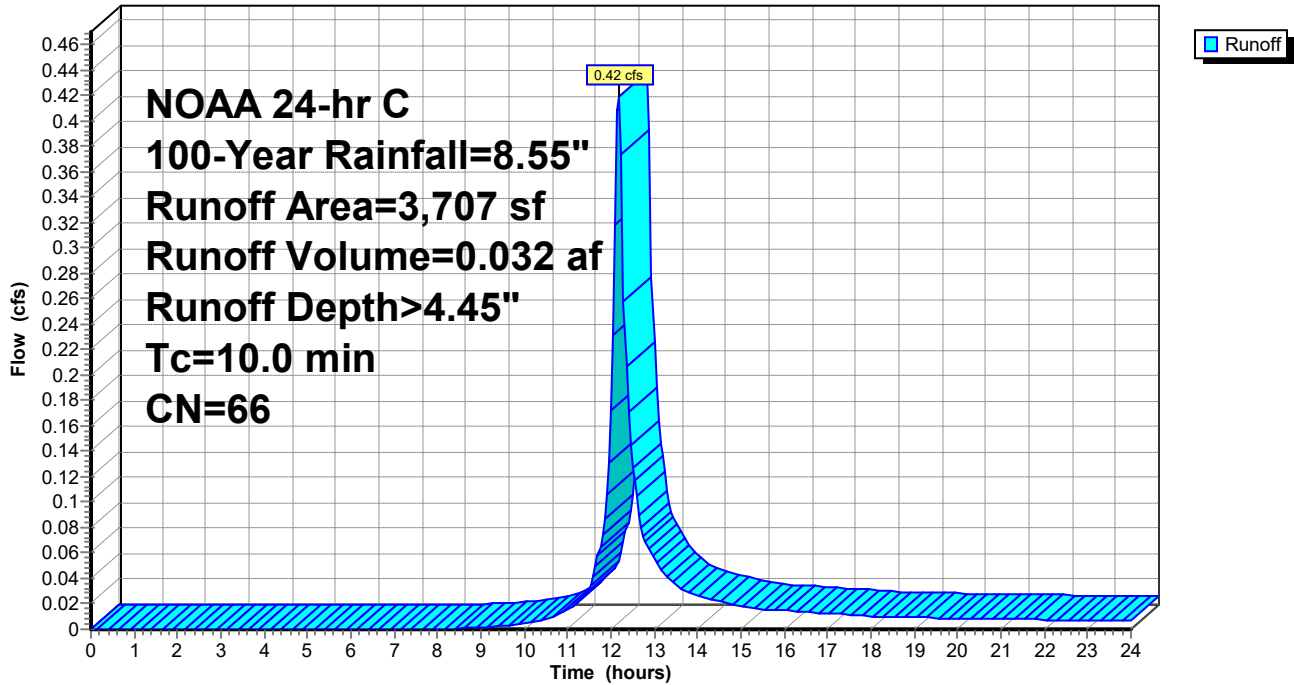
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
NOAA 24-hr C 100-Year Rainfall=8.55"

	Area (sf)	CN	Description
*	1,683	98	
	2,024	39	>75% Grass cover, Good, HSG A
	3,707	66	Weighted Average
	2,024		54.60% Pervious Area
	1,683		45.40% Impervious Area

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

Subcatchment 15S: Infiltration Area #6

Hydrograph



Summary for Subcatchment 17S: Post-Developed Drainage Area #4

Runoff = 0.53 cfs @ 12.40 hrs, Volume= 0.061 af, Depth> 3.26"
 Routed to Pond 18P : Analysis Point #4

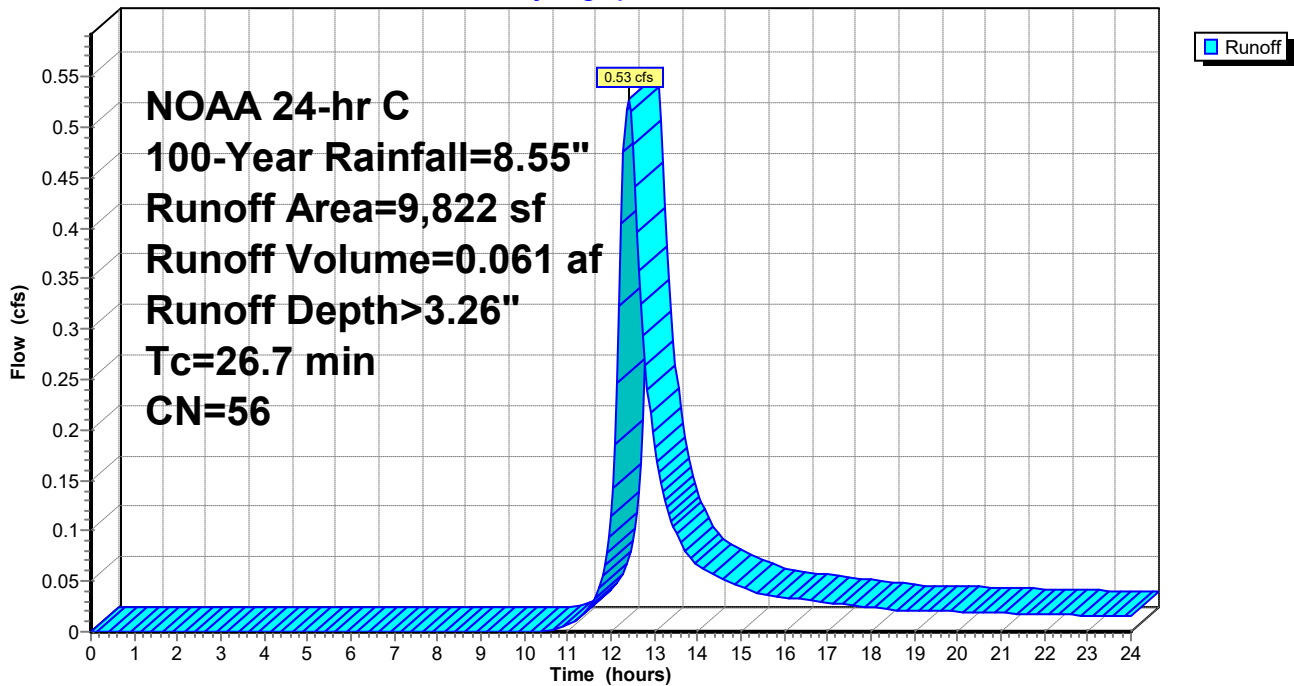
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
 NOAA 24-hr C 100-Year Rainfall=8.55"

Area (sf)	CN	Description
7,839	55	Woods, Good, HSG B
1,983	61	>75% Grass cover, Good, HSG B
9,822	56	Weighted Average
9,822		100.00% Pervious Area

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

Subcatchment 17S: Post-Developed Drainage Area #4

Hydrograph



Summary for Pond 13P: Infiltration Area #5

Inflow Area = 0.363 ac, 31.31% Impervious, Inflow Depth > 5.05" for 100-Year event
 Inflow = 2.03 cfs @ 12.17 hrs, Volume= 0.153 af
 Outflow = 0.34 cfs @ 12.76 hrs, Volume= 0.153 af, Atten= 83%, Lag= 35.2 min
 Discarded = 0.34 cfs @ 12.76 hrs, Volume= 0.153 af
 Primary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af
 Routed to Pond 14P : Analysis Point #3

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
 Peak Elev= 137.58' @ 12.76 hrs Surf.Area= 3,428 sf Storage= 2,616 cf

Plug-Flow detention time= 89.6 min calculated for 0.153 af (100% of inflow)
 Center-of-Mass det. time= 89.1 min (914.4 - 825.3)

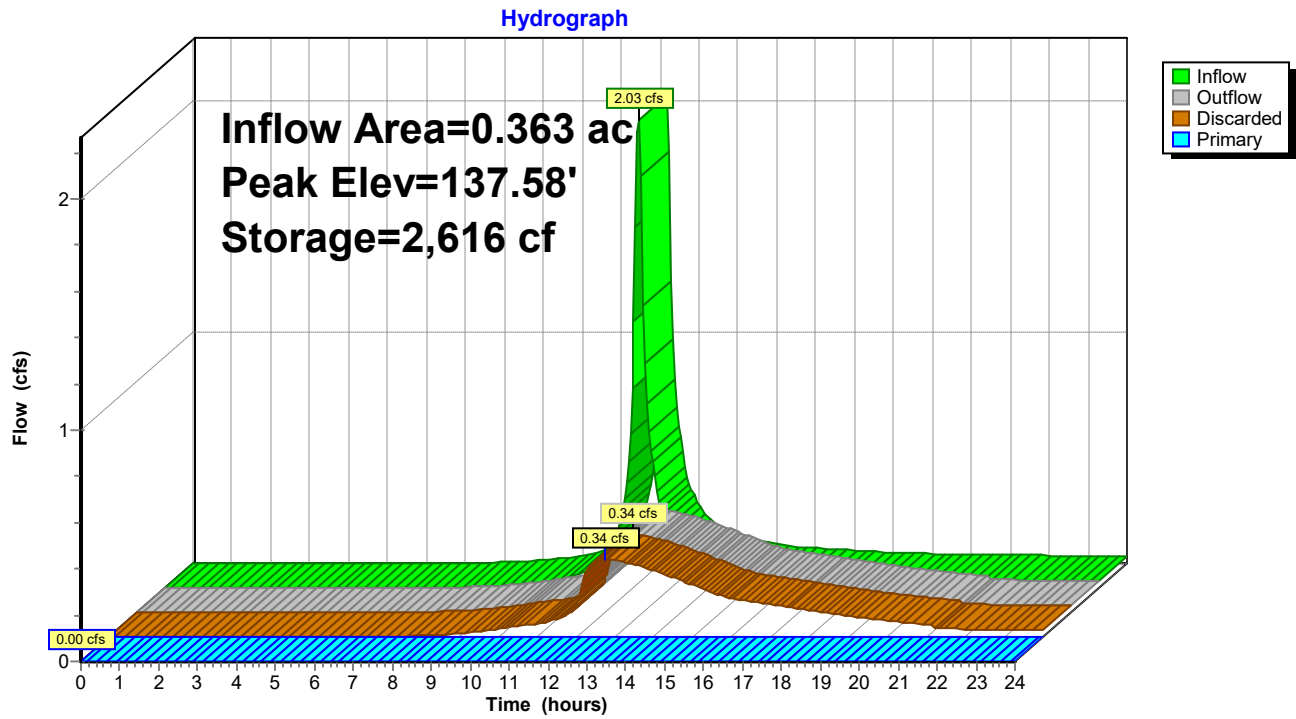
Volume	Invert	Avail.Storage	Storage Description
#1	136.00'	4,310 cf	Custom Stage Data (Prismatic) Listed below (Recalc)
Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
136.00	500	0	0
137.00	1,734	1,117	1,117
138.00	4,651	3,193	4,310

Device	Routing	Invert	Outlet Devices
#1	Primary	137.80'	20.0' long Sharp-Crested Rectangular Weir 2 End Contraction(s)
#2	Discarded	136.00'	4.224 in/hr Exfiltration over Surface area

Discarded OutFlow Max=0.34 cfs @ 12.76 hrs HW=137.58' (Free Discharge)
 ↑**2=Exfiltration** (Exfiltration Controls 0.34 cfs)

Primary OutFlow Max=0.00 cfs @ 0.00 hrs HW=136.00' (Free Discharge)
 ↑**1=Sharp-Crested Rectangular Weir** (Controls 0.00 cfs)

Pond 13P: Infiltration Area #5



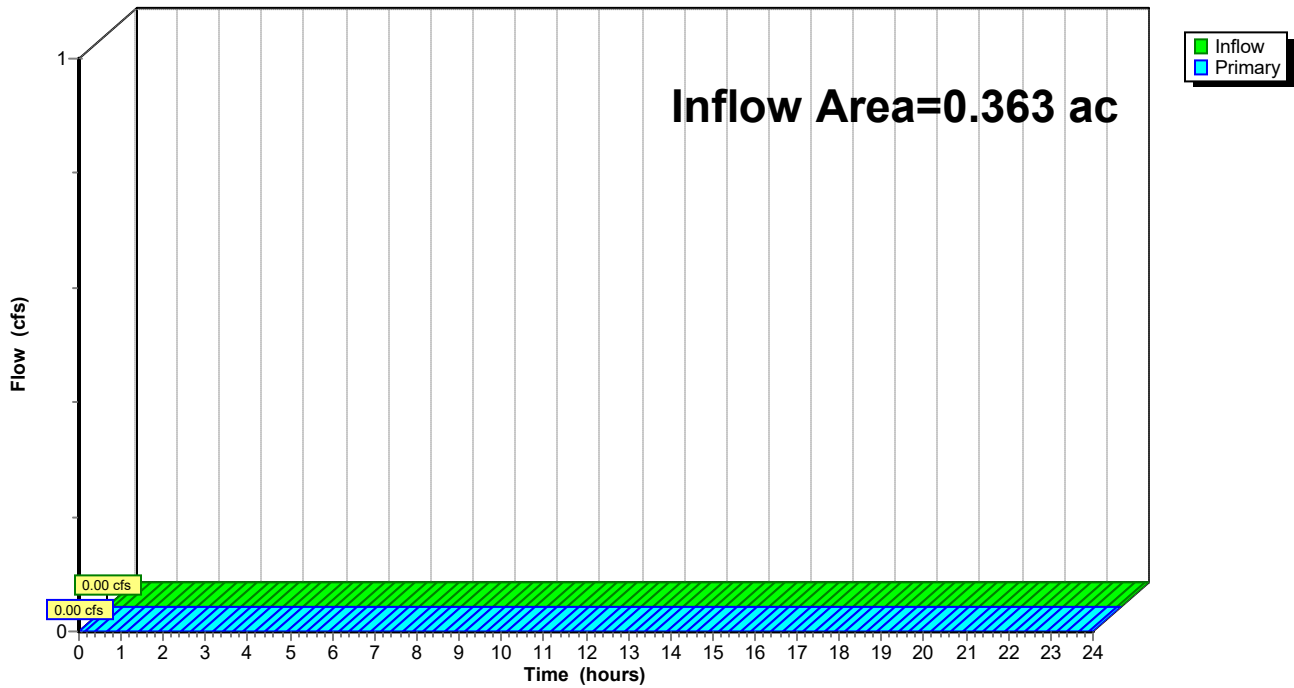
Summary for Pond 14P: Analysis Point #3

Inflow Area = 0.363 ac, 31.31% Impervious, Inflow Depth = 0.00" for 100-Year event
Inflow = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af
Primary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs

Pond 14P: Analysis Point #3

Hydrograph



Summary for Pond 16P: Infiltration Area #6

Inflow Area = 0.085 ac, 45.40% Impervious, Inflow Depth > 4.45" for 100-Year event
 Inflow = 0.42 cfs @ 12.18 hrs, Volume= 0.032 af
 Outflow = 0.08 cfs @ 12.68 hrs, Volume= 0.032 af, Atten= 80%, Lag= 30.4 min
 Discarded = 0.08 cfs @ 12.68 hrs, Volume= 0.032 af

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
 Peak Elev= 135.75' @ 12.68 hrs Surf.Area= 794 sf Storage= 432 cf

Plug-Flow detention time= 43.0 min calculated for 0.032 af (100% of inflow)
 Center-of-Mass det. time= 42.7 min (878.3 - 835.6)

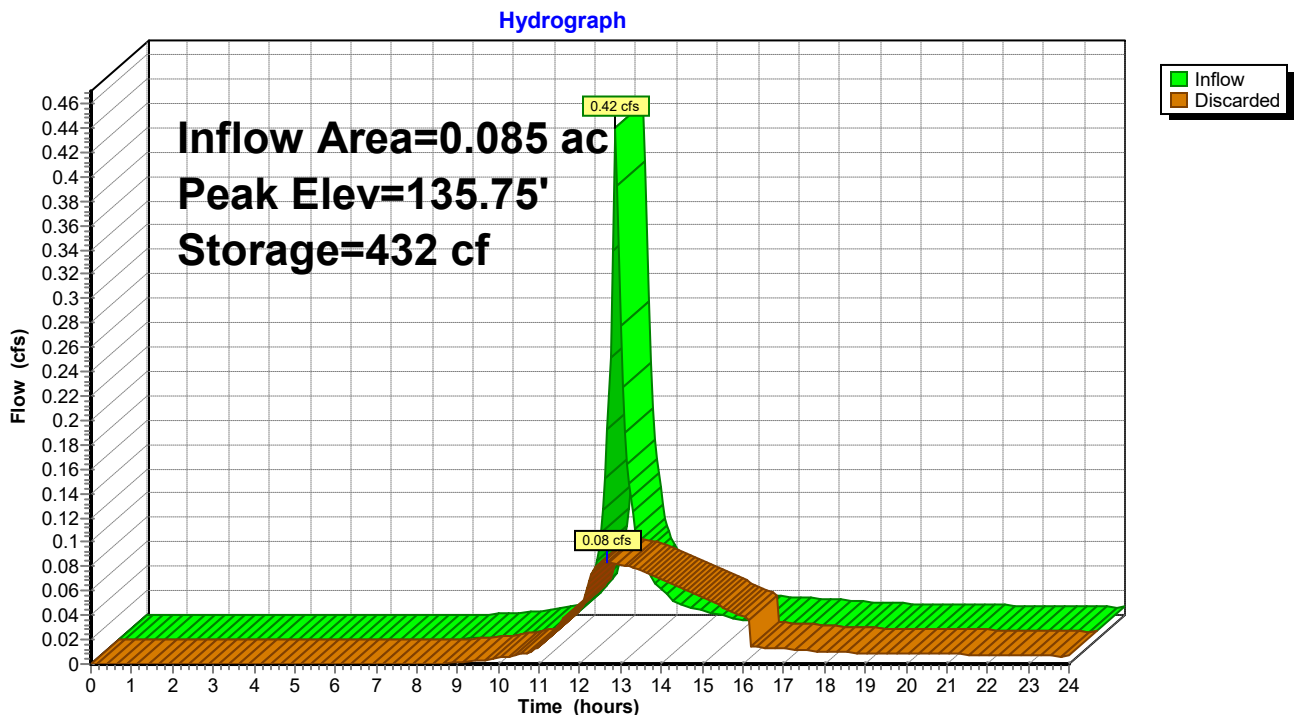
Volume	Invert	Avail.Storage	Storage Description
#1	135.00'	645 cf	Custom Stage Data (Prismatic) Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
135.00	352	0	0
136.00	938	645	645

Device	Routing	Invert	Outlet Devices
#1	Discarded	135.00'	4.530 in/hr Exfiltration over Surface area

Discarded OutFlow Max=0.08 cfs @ 12.68 hrs HW=135.75' (Free Discharge)
 ↑1=Exfiltration (Exfiltration Controls 0.08 cfs)

Pond 16P: Infiltration Area #6



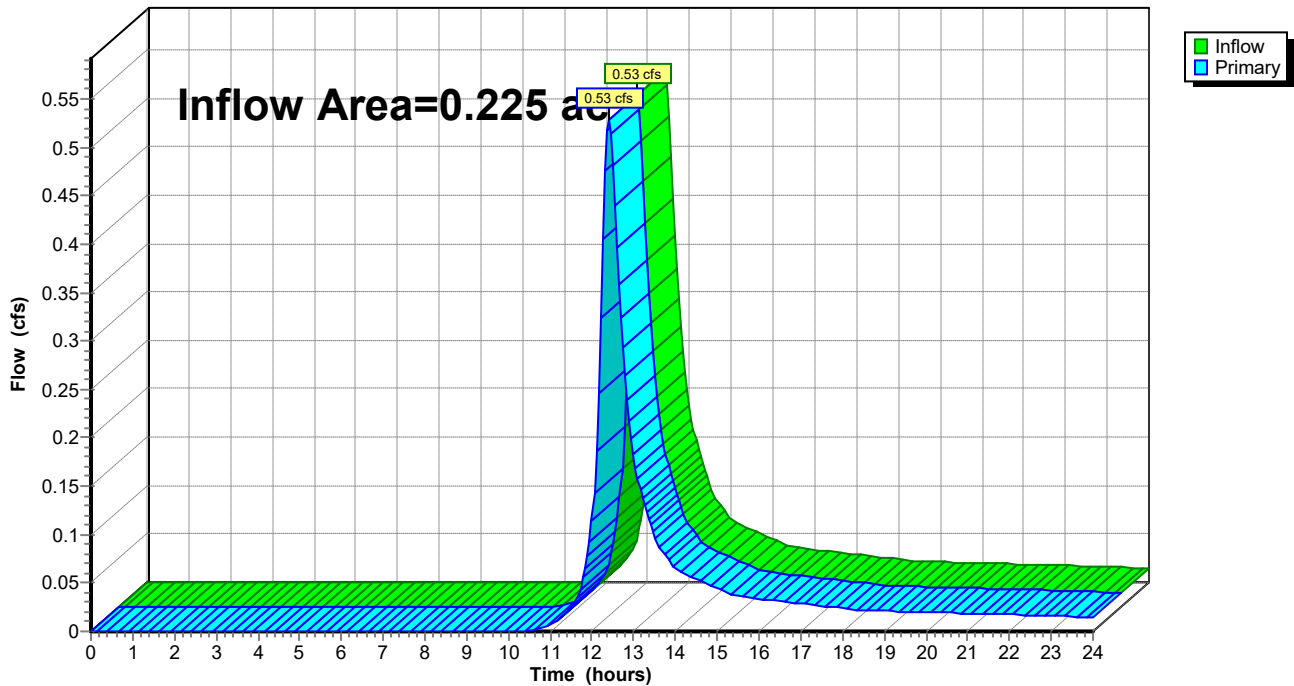
Summary for Pond 18P: Analysis Point #4

Inflow Area = 0.225 ac, 0.00% Impervious, Inflow Depth > 3.26" for 100-Year event
Inflow = 0.53 cfs @ 12.40 hrs, Volume= 0.061 af
Primary = 0.53 cfs @ 12.40 hrs, Volume= 0.061 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs

Pond 18P: Analysis Point #4

Hydrograph



III. SOIL REPORT

**GLOUCESTER COUNTY DEPARTMENT OF HEALTH
APPLICATION FOR PERMIT TO CONSTRUCT/ALTER/REPAIR AN INDIVIDUAL SUBSURFACE SEWAGE
DISPOSAL SYSTEM**

APPLICATION SHALL BE SUBMITTED ELECTRONICALLY TO CME FOR REVIEW BY DESIGN ENGINEER
SepticReviews@cmeusa1.com and jalexander@cmeusa1.com

PAYMENT SHALL BE SUBMITTED TO GCHD (CHECK OR MONEY ORDER ONLY)
ONSITE INSPECTIONS MUST BE SCHEDULED VIA EMAIL: GCHD@CMEUSA1.COM
MUNICIPALITY Elk Twp

Form 2b - Soil Log and Interpretation: Lot 1 Block 143

1. Log Number TP1 Method (Check One): Profile Pit Boring

Existing Grade Elevation: _____

2. Soil Log

Depth _____
Structure: _____
Top-Bottom _____
Munsell Color Name and Symbol; Estimated Textural Class; (inches) Estimated Volume % Coarse Fragment, if Present;
Moist or Dry Consistence; Mottling--Abundance, Size and Contrast, if Present

0" - 12" 10YR 4/3 Sandy loam, Sub-angular blocky, Friable

12" - 31" 7.5YR 6/4 fine Loamy sand, Sub-angular blocky, Friable

31" - 44" 7.5YR 6/6 Sandy clay loam, Sub-angular blocky, slightly Firm

44" - 81" 7.5YR 6/6 Sandy clay loam, Angular blocky, Firm (HR) with 35% gravel

81" - 95" 7.5YR 5/4 Sandy clay loam, Angular blocky, Firm (HR)
with Common, Medium, Distinct 5YR 5/6 mottles @ 86"

95" - 107" 7.5YR 5/4 Sandy clay loam, Angular blocky, slightly Firm, with 10% gravel

107" - 121" 7.5YR 5/4 Sandy loam, Sub-angular blocky, Friable, with 15% gravel

121" - 150" 7.5YR 7/2 fine Loamy sand, Single grain, Loose

3. Ground Water Observations:

Seepage-Indicate _____ Depth _____ N/E _____
Pit /Boring Flooded--Depth after _____ Hours _____

4. Soil Limiting Zones (Check Appropriate Categories):

Fractured Rock Substratum - Depth to Top _____
Massive Rock Substratum - Depth to Top _____
Excessively Coarse Horizon - Depth Top to Bottom _____
Excessively Coarse Substratum - Depth to Top _____
Hydraulically Restrictive Horizon - Depth Top to Bottom 44" - 95"
Hydraulically Restrictive Substratum - Depth to Top _____
Perched Zone of Saturation - Depth Top to Bottom _____
Regional Zone of Saturation - Depth to Top 86"

5. Soil Suitability Classification: IIIHR

6. I hereby certify that the information furnished on Form 2b of this application is true and accurate. I am aware that falsification of data is a violation of the Water Pollution Control Act (N.J.S.A. 58:10A-1 et seq.) and is subject to penalties as prescribed in N.J.A.C. 7:14-8.

Signature of Site Evaluator _____
Date 10/13/2023

Signature of Professional Engineer  License # 6E28106

GLOUCESTER COUNTY DEPARTMENT OF HEALTH
APPLICATION FOR PERMIT TO CONSTRUCT/ALTER/REPAIR AN INDIVIDUAL SUBSURFACE SEWAGE
DISPOSAL SYSTEM
APPLICATION SHALL BE SUBMITTED ELECTRONICALLY TO CME FOR REVIEW BY DESIGN ENGINEER
SepticReviews@cmeusa1.com and jalexander@cmeusa1.com
PAYMENT SHALL BE SUBMITTED TO GCHD (CHECK OR MONEY ORDER ONLY)
ONSITE INSPECTIONS MUST BE SCHEDULED VIA EMAIL: GCHD@CMEUSA1.COM
MUNICIPALITY Eik Twp

Form 2b - Soil Log and Interpretation: Lot 1 Block 143

1. Log Number TP2 Method (Check One): xx Profile Pit Boring

Existing Grade Elevation: _____

2. Soil Log

Depth: _____ Munsel Color Name and Symbol; Estimated Textural Class; (Inches) Estimated Volume % Coarse Fragment, if Present;
Structure: _____
Top-Bottom: _____ Moist or Dry Consistence; Mottling--Abundance, Size and Contrast, if Present

0" - 11" 10YR 4/3 Sandy loam, Sub-angular blocky, Friable

11" - 50" 7.5YR 6/4 Sandy clay loam, Sub-angular blocky, Friable, with 10% gravel

50" - 71" 7.5YR 6/6 Sandy clay loam, Angular blocky, Firm (HR) with 30% gravel

71" - 93" 7.5YR 6/6 Sandy loam, Sub-angular blocky, Friable, with 40% gravel
with Common, Medium, Distinct 5YR 5/6 mottles @ 87"

93" - 144" 7.5YR 7/3 fine Loamy sand, Angular blocky, Friable

3. Ground Water Observations:

Seepage-indicate _____ Depth N/E
Pit /Boring Flooded--Depth after _____ Hours

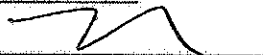
4. Soil Limiting Zones (Check Appropriate Categories):

Fractured Rock Substratum - Depth to Top _____
Massive Rock Substratum - Depth to Top _____
Excessively Coarse Horizon - Depth Top to Bottom _____
Excessively Coarse Substratum - Depth to Top _____
Hydraulically Restrictive Horizon - Depth Top to Bottom 50" - 71"
Hydraulically Restrictive Substratum - Depth to Top _____
Perched Zone of Saturation - Depth Top to Bottom _____
Regional Zone of Saturation - Depth to Top 87"

5. Soil Suitability Classification: IIHR

6. I hereby certify that the information furnished on Form 2b of this application is true and accurate. I am aware that falsification of data is a violation of the Water Pollution Control Act (N.J.S.A. 58:10A-1 et seq.) and is subject to penalties as prescribed in N.J.A.C. 7:14-8.

Signature of Site Evaluator _____
Date 10/13/2023

Signature of Professional Engineer  License # 6E28106

GLOUCESTER COUNTY DEPARTMENT OF HEALTH
APPLICATION FOR PERMIT TO CONSTRUCT/ALTER/REPAIR AN INDIVIDUAL SUBSURFACE SEWAGE
DISPOSAL SYSTEM

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SepticReviews@cmeusa1.com and jalexander@cmeusa1.com

PAYMENT SHALL BE SUBMITTED TO GCHD (CHECK OR MONEY ORDER ONLY)
ONSITE INSPECTIONS MUST BE SCHEDULED VIA EMAIL: GCHD@CMEUSA1.COM

MUNICIPALITY Elk Twp

Form 2b - Soil Log and Interpretation: Lot 1 Block 143

1. Log Number TP3 Method (Check One): xx Profile Pit Boring

Existing Grade Elevation:

2. Soil Log

Depth	Munsell Color Name and Symbol; Estimated Textural Class; (inches) Estimated Volume % Coarse Fragment, if Present;
Structure:	
Top-Bottom	Moist or Dry Consistence; Mottling--Abundance, Size and Contrast, if Present

0" - 14" 10YR 4/3 Sandy loam, Sub-angular blocky, Friable

14" - 59" 7.5YR 6/4 Sandy clay loam, Sub-angular blocky, Friable, with 10% gravel

59" - 68" 7.5YR 7/2 fine Loamy sand, Single grain, Loose, with 15% gravel

68" - 84" 7.5YR 5/4 Sandy loam, Sub-angular blocky, Friable, with 35% gravel

84" - 102" 7.5YR 5/8 Sandy clay loam, Sub-angular blocky, Friable, with 25% gravel
with Common, Medium, Distinct 5YR 5/6 mottles @ 85"

102" - 144" 7.5YR 5/8 Sandy loam, Sub-angular blocky, Friable, with 25% gravel

3. Ground Water Observations:

Seepage-Indicate Depth N/E
Pit /Boring Flooded--Depth after Hours

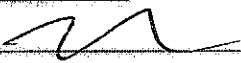
4. Soil Limiting Zones (Check Appropriate Categories):

Fractured Rock Substratum - Depth to Top
Massive Rock Substratum - Depth to Top
Excessively Coarse Horizon - Depth Top to Bottom
Excessively Coarse Substratum - Depth to Top
Hydraulically Restrictive Horizon - Depth Top to Bottom
Hydraulically Restrictive Substratum - Depth to Top
Perched Zone of Saturation - Depth Top to Bottom
Regional Zone of Saturation - Depth to Top 85"

5. Soil Suitability Classification: I

6. I hereby certify that the information furnished on Form 2b of this application is true and accurate. I am aware that falsification of data is a violation of the Water Pollution Control Act (N.J.S.A. 58:10A-1 et seq.) and is subject to penalties as prescribed in N.J.A.C. 7:14-8.

Signature of Site Evaluator
Date 10/13/2023

Signature of Professional Engineer  License # 6E28106

GLOUCESTER COUNTY DEPARTMENT OF HEALTH
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DISPOSAL SYSTEM
APPLICATION SHALL BE SUBMITTED ELECTRONICALLY TO CME FOR REVIEW BY DESIGN ENGINEER
SepticReviews@cmeusa1.com and jalexander@cmeusa1.com
PAYMENT SHALL BE SUBMITTED TO GCHD (CHECK OR MONEY ORDER ONLY)
ONSITE INSPECTIONS MUST BE SCHEDULED VIA EMAIL: GCHD@CMEUSA1.COM
MUNICIPALITY _____ Eik Twp _____

Form 2b - Soil Log and Interpretation: Lot 1 Block 143

1. Log Number TP4 Method (Check One): xx Profile Pit _____ Boring _____

Existing Grade Elevation: _____

2. Soil Log

Depth _____ Munsel Color Name and Symbol; Estimated Textural Class; (inches) Estimated Volume % Coarse Fragment, if Present;
Structure: _____
Top-Bottom _____ Moist or Dry Consistence; Mottling--Abundance, Size and Contrast, if Present

- 0" - 7" 10YR 4/3 Sandy loam, Sub-angular blocky, Friable
- 7" - 29" 7.5YR 6/4 Sandy loam, Sub-angular blocky, Friable
- 29" - 42" 7.5YR 6/4 Sandy clay loam, Sub-angular blocky, Friable
- 42" - 60" 7.5YR 6/6 Loamy sand, Sub-angular blocky, Friable, with 10% gravel
- 60" - 87" 7.5YR 5/4 Sandy loam, Sub-angular blocky, Friable, with 25% gravel
with Common, Medium, Distinct 5YR 5/6 mottles @ 84"
- 87" - 105" 7.5YR 7/3 fine Loamy sand, Angular blocky, Friable, with 25% gravel
- 105" - 125" 7.5YR 7/3 fine Loamy sand, Single grain, Loose
- 125" - 150" 7.5YR 7/1 fine Sand, Single grain, Loose

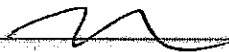
3. Ground Water Observations:
Seepage-indicate _____ Depth _____ N/E _____
Pit /Boring Flooded--Depth after _____ Hours _____

4. Soil Limiting Zones (Check Appropriate Categories):
Fractured Rock Substratum - Depth to Top _____
Massive Rock Substratum - Depth to Top _____
Excessively Coarse Horizon - Depth Top to Bottom _____
Excessively Coarse Substratum - Depth to Top _____
Hydraulically Restrictive Horizon - Depth Top to Bottom _____
Hydraulically Restrictive Substratum - Depth to Top _____
Perched Zone of Saturation - Depth Top to Bottom _____
Regional Zone of Saturation - Depth to Top _____ 84"

5. Soil Suitability Classification: _____

6. I hereby certify that the information furnished on Form 2b of this application is true and accurate. I am aware that falsification of data is a violation of the Water Pollution Control Act (N.J.S.A. 58:10A-1 et seq.) and is subject to penalties as prescribed in N.J.A.C. 7:14-8.

Signature of Site Evaluator _____
Date 10/13/2025

Signature of Professional Engineer  License # GE28106

GLOUCESTER COUNTY DEPARTMENT OF HEALTH
APPLICATION FOR PERMIT TO CONSTRUCT/ALTER/REPAIR AN INDIVIDUAL SUBSURFACE SEWAGE DISPOSAL SYSTEM
APPLICATION SHALL BE SUBMITTED ELECTRONICALLY TO CME FOR REVIEW BY DESIGN ENGINEER
SepticReviews@cmeusa1.com and jallexander@cmeusa1.com
PAYMENT SHALL BE SUBMITTED TO GCHD (CHECK OR MONEY ORDER ONLY)
ONSITE INSPECTIONS MUST BE SCHEDULED VIA EMAIL: GCHD@CMEUSA1.COM
 MUNICIPALITY _____ Elk Twp _____

Form 2b - Soil Log and Interpretation: Lot 1 Block 143

1. Log Number: TP5 Method (Check One): xx Profile Pit _____ Boring _____

Existing Grade Elevation: _____

2. Soil Log

Depth	Munsell Color Name and Symbol; Estimated Textural Class; (inches) Estimated Volume % Coarse Fragment, if Present;
Structure:	
Top-Bottom	Moist or Dry Consistence; Mottling--Abundance, Size and Contrast, if Present

0" – 8" 10YR 4/3 Sandy loam, Sub-angular blocky, Friable

8" – 21" 7.5YR 6/4 Sandy loam, Sub-angular blocky, Friable

21" – 37" 7.5YR 7/2 Loamy sand, Sub-angular blocky, Friable

37" – 77" 7.5YR 5/8 Sandy clay loam, Angular blocky, slightly Firm, with 15% gravel

77" – 97" 7.5YR 5/4 Sandy clay loam, Sub-angular blocky, slightly Firm, with 25% gravel
with Common, Medium, Distinct 5YR 5/6 mottles @ 82"

97" – 117" 7.5YR 6/4 fine Loamy sand, Sub-angular blocky, Friable

117" – 144" 7.5YR 7/1 fine Sand, Single grain, Loose

3. Ground Water Observations:

Seepage-Indicate _____ Depth _____ N/E _____
 Pit /Boring Flooded--Depth after _____ Hours _____

4. Soil Limiting Zones (Check Appropriate Categories):

Fractured Rock Substratum - Depth to Top _____
 Massive Rock Substratum - Depth to Top _____
 Excessively Coarse Horizon - Depth Top to Bottom _____
 Excessively Coarse Substratum - Depth to Top _____
 Hydraulically Restrictive Horizon - Depth Top to Bottom _____
 Hydraulically Restrictive Substratum - Depth to Top _____
 Perched Zone of Saturation - Depth Top to Bottom _____
 Regional Zone of Saturation - Depth to Top _____ 82"

5. Soil Suitability Classification: _____

6. I hereby certify that the information furnished on Form 2b of this application is true and accurate. I am aware that falsification of data is a violation of the Water Pollution Control Act (N.J.S.A. 58:10A-1 et seq.) and is subject to penalties as prescribed in N.J.A.C. 7:14-8.

Signature of Site Evaluator _____

Date 10/13/2023

Signature of Professional Engineer _____

License # GE28106

GLOUCESTER COUNTY DEPARTMENT OF HEALTH
APPLICATION FOR PERMIT TO CONSTRUCT/ALTER/REPAIR AN INDIVIDUAL SUBSURFACE SEWAGE
DISPOSAL SYSTEM

APPLICATION SHALL BE SUBMITTED ELECTRONICALLY TO CME FOR REVIEW BY DESIGN ENGINEER

SepticReviews@cmeusa1.com and jalexander@cmeusa1.com

PAYMENT SHALL BE SUBMITTED TO GCHD (CHECK OR MONEY ORDER ONLY)
ONSITE INSPECTIONS MUST BE SCHEDULED VIA EMAIL: GCHD@CMEUSA1.COM
MUNICIPALITY Elk Twp

Form 2b - Soil Log and Interpretation: Lot 1 Block 143

1. Log Number TP6 Method (Check One): xx Profile Pit Boring

Existing Grade Elevation:

2. Soil Log

Depth Munsel Color Name and Symbol; Estimated Textural Class; (inches) Estimated Volume % Coarse Fragment, If Present;
Structure:
Top-Bottom Moist or Dry Consistence; Mottling--Abundance, Size and Contrast, If Present

0" - 8" 10YR 4/3 Sandy loam, Sub-angular blocky, Friable

8" - 42" 7.5YR 6/6 Sandy clay loam, Angular blocky, Friable, with 10% gravel

42" - 83" 7.5YR 7/3 fine Loamy sand, Single grain, Loose
with Common, Medium, Distinct 5YR 5/6 mottles @ 80"

83" - 130" 7.5YR 7/1 fine Sand, Single grain, Loose

130" - 144" 7.5YR 6/4 Loamy sand, Sub-angular blocky, Friable

3. Ground Water Observations:

Seepage-Indicate Depth N/E
Pit /Boring Flooded--Depth after Hours

4. Soil Limiting Zones (Check Appropriate Categories):

Fractured Rock Substratum - Depth to Top
Massive Rock Substratum - Depth to Top
Excessively Coarse Horizon - Depth Top to Bottom
Excessively Coarse Substratum - Depth to Top
Hydraulically Restrictive Horizon - Depth Top to Bottom
Hydraulically Restrictive Substratum - Depth to Top
Perched Zone of Saturation - Depth Top to Bottom
Regional Zone of Saturation - Depth to Top 80"

5. Soil Suitability Classification: I

6. I hereby certify that the information furnished on Form 2b of this application is true and accurate. I am aware that falsification of data is a violation of the Water Pollution Control Act (N.J.S.A. 58:10A-1 et seq.) and is subject to penalties as prescribed in N.J.A.C. 7:14-8.

Signature of Site Evaluator

Date 10/13/2023

Signature of Professional Engineer

License # 6E28106

**GLOUCESTER COUNTY DEPARTMENT OF HEALTH
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 SepticReviews@cmeusa1.com and jalexander@cmeusa1.com
 PAYMENT SHALL BE SUBMITTED TO GCHD (CHECK OR MONEY ORDER ONLY)
 ONSITE INSPECTIONS MUST BE SCHEDULED VIA EMAIL: GCHD@CMEUSA1.COM
 MUNICIPALITY _____ EIk Twp _____**

Form 2b - Soil Log and Interpretation: Lot 1 Block 143

1. Log Number TP7 Method (Check One): Profile Pit Boring

Existing Grade Elevation: _____

2. Soil Log
 Depth _____ Munsell Color Name and Symbol; Estimated Textural Class; (Inches) Estimated Volume % Coarse Fragment, If Present;
 Structure: _____
 Top-Bottom _____ Moist or Dry Consistence; Mottling--Abundance, Size and Contrast, If Present

0" – 10" 10YR 4/3 Sandy loam, Sub-angular blocky, Friable

10" – 29" 7.5YR 6/6 Sandy clay loam, Sub-angular blocky, Friable

29" – 61" 7.5YR 6/6 fine Loamy sand, Single grain, Loose

61" – 135" 7.5YR 7/1 fine Sand, Single grain, Loose
 with Common, Medium, Distinct 5YR 5/6 mottles @ 82"

Pit discontinued due to collapse / cave-in

3. Ground Water Observations:
 Seepage-Indicate _____ Depth _____ N/E _____
 Pit /Boring Flooded--Depth after _____ Hours _____

4. Soil Limiting Zones (Check Appropriate Categories):
 Fractured Rock Substratum - Depth to Top _____
 Massive Rock Substratum - Depth to Top _____
 Excessively Coarse Horizon - Depth Top to Bottom _____
 Excessively Coarse Substratum - Depth to Top _____
 Hydraulically Restrictive Horizon - Depth Top to Bottom _____
 Hydraulically Restrictive Substratum - Depth to Top _____
 Perched Zone of Saturation - Depth Top to Bottom _____
 Regional Zone of Saturation - Depth to Top _____ 82"

5. Soil Suitability Classification: _____

6. I hereby certify that the information furnished on Form 2b of this application is true and accurate. I am aware that falsification of data is a violation of the Water Pollution Control Act (N.J.S.A. 58:10A-1 et seq.) and is subject to penalties as prescribed in N.J.A.C. 7:14-8.

Signature of Site Evaluator _____
 Date 10/13/2023

Signature of Professional Engineer  License # 6E28106

GLOUCESTER COUNTY DEPARTMENT OF HEALTH
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PAYMENT SHALL BE SUBMITTED TO GCHD (CHECK OR MONEY ORDER ONLY)
ONSITE INSPECTIONS MUST BE SCHEDULED VIA EMAIL: GCHD@CMEUSA1.COM
MUNICIPALITY Elk Twp

Form 2b - Soil Log and Interpretation: Lot 1 Block 143

1. Log Number TP8 Method (Check One): Profile Pit Boring

Existing Grade Elevation: _____

2. Soil Log

Depth: _____ Munsell Color Name and Symbol; Estimated Textural Class; (inches) Estimated Volume % Coarse Fragment, If Present;
Structure: _____
Top-Bottom: _____ Moist or Dry Consistence; Mottling--Abundance, Size and Contrast, If Present

0" - 8" 10YR 4/3 Sandy loam, Sub-angular blocky, Friable

8" - 34" 7.5YR 6/6 Sandy clay loam, Angular blocky, Friable, with 15% gravel

34" - 76" 7.5YR 6/6 Sandy loam, Sub-angular blocky, Friable

76" - 91" 7.5YR 7/3 fine Loamy sand, Single grain, Loose
with Common, Medium, Distinct 5YR 5/6 mottles @ 79"

91" - 135" 7.5YR 7/1 fine Sand, Single grain, Loose

Pit discontinued due to collapse / cave-in

3. Ground Water Observations:

Seepage-Indicate _____ Depth N/E
Pit /Boring Flooded--Depth after _____ Hours

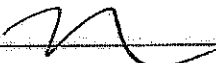
4. Soil Limiting Zones (Check Appropriate Categories):

Fractured Rock Substratum - Depth to Top _____
Massive Rock Substratum - Depth to Top _____
Excessively Coarse Horizon - Depth Top to Bottom _____
Excessively Coarse Substratum - Depth to Top _____
Hydraulically Restrictive Horizon - Depth Top to Bottom _____
Hydraulically Restrictive Substratum - Depth to Top _____
Perched Zone of Saturation - Depth Top to Bottom _____
Regional Zone of Saturation - Depth to Top 79"

5. Soil Suitability Classification: I

6. I hereby certify that the information furnished on Form 2b of this application is true and accurate. I am aware that falsification of data is a violation of the Water Pollution Control Act (N.J.S.A. 58:10A-1 et seq.) and is subject to penalties as prescribed in N.J.A.C. 7:14-8.

Signature of Site Evaluator _____
Date 10/13/2023

Signature of Professional Engineer  License # 6E2B106

South Jersey Engineers LLC

Tristate Engineering

Sample Date: 10/13/23

P.O. Box 1406
Voorhees, NJ 08043

Douglass Street
Elk Township

Stormwater - TP1
Horizon 95"-107"

MUNICIPALITY

Form 3b. Tube Permeameter Test Data

1. Test Number Replicate Letter Date Collected

2. Material Tested Fill Test in Native Soil - Indicate Depth

3. Type of Sample Undisturbed Disturbed

4. Sample Dimensions Inside Radius of Sample Tube, R, in cm
Length of Sample, in inches

5. Bulk Density Determination (Disturbed Samples Only):
Sample Weight (Wt. Tube Containing Sample - Wt. Empty Tube)
Sample Volume (L x 2.54 cm/inch x 3.14R²), cc
Bulk Density (Sample Wt./Sample Volume), grams/cc

6. Standpipe Used: No Yes
Indicate internal Radius, cm _____

7. Height of water Level above Rim of Test Basin in inches:
At the Beginning of Each Test Interval, H1
At the End of Each Test Interval, H2

8. Rate of Water Level Drop (Add additional lines if needed):

Time, Start of Test Interval, T1 (min.sec)	Time, End of Test Interval, T2 (min.sec)	Length of Test Interval, T, (min)
0.00	43.05	43.08
0.00	43.28	43.46
0.00	43.42	43.70

9. Calculation of Permeability:

$$K, (in/hr) = 60 \text{ min/hr} \times r^2/R^2 \times L(in)/T(min) \times \ln(H1/H2)$$

k= 60 min/hr	x	-----/-----	x 3/	43.70	x ln(3/2)
k= 1.67					

10. Defects in the Sample (Check appropriate items):

None Cracks Worm Channels Root Channels
 Soil/Tube Contact Large Gravel Large Roots
 Dry Soil Smearing Compaction
 Other---Specify _____

South Jersey Engineers LLC

Tristate Engineering

Sample Date: 10/13/23

P.O. Box 1406

Douglass Street

Stormwater - TP1

Voorhees, NJ 08043

Elk Township

Horizon 95"-107"

MUNICIPALITY

Form 3b. Tube Permeameter Test Data

1. Test Number Replicate Letter: Date Collected

2. Material Tested Fill Test in Native Soil - Indicate Depth

3. Type of Sample Undisturbed Disturbed

4. Sample Dimensions Inside Radius of Sample Tube, R, in cm
Length of Sample, in inches

5. Bulk Density Determination (Disturbed Samples Only):
Sample Weight (Wt. Tube Containing Sample - Wt. Empty Tube)
Sample Volume (L x 2.54 cm/inch x 3.14R²), cc
Bulk Density (Sample Wt./Sample Volume), grams/cc

6. Standpipe Used: x No Yes
Indicate internal Radius, cm _____

7. Height of water Level above Rim of Test Basin in inches:
At the Beginning of Each Test Interval, H1
At the End of Each Test Interval, H2

8. Rate of Water Level Drop (Add additional lines if needed):

Time, Start of Test Interval, T1 (min.sec)	Time, End of Test Interval, T2 (min.sec)	Length of Test Interval, T, (min)
0.00	45.39	45.65
0.00	45.56	45.94
0.00	46.03	46.04

9. Calculation of Permeability:

$$K, (in/hr) = 60 \text{ min/hr} \times r^2/R^2 \times L(in)/T(\text{min}) \times \ln(H1/H2)$$

$$k = 60 \text{ min/hr} \times \frac{\text{---}}{\text{---}} \times \frac{3}{46.04} \times \ln(3/2)$$

$$k = 1.59$$

10. Defects in the Sample (Check appropriate items):
 None Cracks Worm Channels Root Channels
 Soil/Tube Contact Large Gravel Large Roots
 Dry Soil Smearing Compaction
 Other—Specify _____

South Jersey Engineers LLC

Tristate Engineering

Sample Date: 10/13/23

P.O. Box 1406

Douglass Street

Stormwater - TP2

Voorhees, NJ 08043

Elk Township

Horizon 71"-93"

MUNICIPALITY

Form 3b. Tube Permeameter Test Data

1. Test Number Replicate Letter Date Collected

2. Material Tested Fill Test in Native Soil - Indicate Depth

3. Type of Sample Undisturbed Disturbed

4. Sample Dimensions Inside Radius of Sample Tube, R, in cm
Length of Sample, in inches

5. Bulk Density Determination (Disturbed Samples Only):
Sample Weight (Wt. Tube Containing Sample - Wt. Empty Tube)
Sample Volume (L x 2.54 cm/inch x 3.14R²), cc
Bulk Density (Sample Wt./Sample Volume), grams/cc

6. Standpipe Used: x No Yes
Indicate internal Radius, cm _____

7. Height of water Level above Rim of Test Basin in inches:
At the Beginning of Each Test Interval, H1
At the End of Each Test Interval, H2

8. Rate of Water Level Drop (Add additional lines if needed):

Time, Start of Test Interval, T1 (min.sec)	Time, End of Test Interval, T2 (min.sec)	Length of Test Interval, T, (min)
0.00	13.00	13.01
0.00	13.04	13.06
0.00	13.20	13.34

9. Calculation of Permeability:

$$K, (in/hr) = 60 \text{ min/hr} \times r^2/R^2 \times L(in)/T(min) \times \ln(H1/H2)$$

$$k = 60 \text{ min/hr} \times \frac{\text{---}}{\text{---}} \times \frac{3}{13.34} \times \ln(3/2)$$

$$k = 5.47$$

10. Defects in the Sample (Check appropriate items):
 None Cracks Worm Channels Root Channels
 Soil/Tube Contact Large Gravel Large Roots
 Dry Soil Smearing Compaction
 Other—Specify _____

South Jersey Engineers LLC

Tristate Engineering

Sample Date: 10/13/23

P.O. Box 1406

Douglass Street

Stormwater - TP2

Voorhees, NJ 08043

Elk Township

Horizon 71"-93"

MUNICIPALITY

Form 3b. Tube Permeameter Test Data

1. Test Number Replicate Letter Date Collected

2. Material Tested Fill Test in Native Soil - Indicate Depth

3. Type of Sample Undisturbed Disturbed

4. Sample Dimensions Inside Radius of Sample Tube, R, in cm
Length of Sample, in inches

5. Bulk Density Determination (Disturbed Samples Only):
Sample Weight (Wt. Tube Containing Sample - Wt. Empty Tube)
Sample Volume (L x 2.54 cm/inch x 3.14R²), cc
Bulk Density (Sample Wt./Sample Volume), grams/cc

6. Standpipe Used: No Yes
Indicate internal Radius, cm _____

7. Height of water Level above Rim of Test Basin in inches:
At the Beginning of Each Test Interval, H1
At the End of Each Test Interval, H2

8. Rate of Water Level Drop (Add additional lines if needed):

Time, Start of Test Interval, T1 (min.sec)	Time, End of Test Interval, T2 (min.sec)	Length of Test Interval, T, (min)
0.00	12.48	12.80
0.00	13.15	13.25
0.00	13.42	13.69

9. Calculation of Permeability:

$$K, (in/hr) = 60 \text{ min/hr} \times r^2/R^2 \times L(in)/T(min) \times \ln(H1/H2)$$

$$k = 60 \text{ min/hr} \times \frac{1.905^2}{3^2} \times \frac{3}{13.69} \times \ln(3/2)$$

$$k = 5.33$$

10. Defects in the Sample (Check appropriate items):
 None Cracks Worm Channels Root Channels
 Soil/Tube Contact Large Gravel Large Roots
 Dry Soil Smearing Compaction
 Other—Specify _____

South Jersey Engineers LLC

Tristate Engineering

Sample Date: 10/13/23

P.O. Box 1406

Douglass Street

Stormwater - TP3

Voorhees, NJ 08043

Elk Township

Horizon 102"-144"

MUNICIPALITY

Form 3b. Tube Permeameter Test Data

1. Test Number Replicate Letter Date Collected

2. Material Tested Fill Test in Native Soil - Indicate Depth

3. Type of Sample Undisturbed Disturbed

4. Sample Dimensions Inside Radius of Sample Tube, R, in cm
Length of Sample, in inches

5. Bulk Density Determination (Disturbed Samples Only):
Sample Weight (Wt. Tube Containing Sample - Wt. Empty Tube)
Sample Volume (L x 2.54 cm/inch x 3.14R²), cc
Bulk Density (Sample Wt./Sample Volume), grams/cc

6. Standpipe Used: No Yes
Indicate internal Radius, cm _____

7. Height of water Level above Rim of Test Basin in inches:
At the Beginning of Each Test Interval, H1
At the End of Each Test Interval, H2

8. Rate of Water Level Drop (Add additional lines if needed):

Time, Start of Test Interval, T1 (min.sec)	Time, End of Test Interval, T2 (min.sec)	Length of Test Interval, T, (min)
0.00	12.46	12.77
0.00	12.53	12.88
0.00	13.08	13.14

9. Calculation of Permeability:

$$K, (in/hr) = 60 \text{ min/hr} \times r^2/R^2 \times L(in)/T(min) \times \ln(H1/H2)$$

$$k = 60 \text{ min/hr} \times \frac{1}{3} \times \frac{1}{13.14} \times \ln(3/2)$$

$$k = 5.56$$

10. Defects in the Sample (Check appropriate items):
 None Cracks Worm Channels Root Channels
 Soil/Tube Contact Large Gravel Large Roots
 Dry Soil Smearing Compaction
 Other---Specify _____

South Jersey Engineers LLC

Tristate Engineering

Sample Date: 10/13/23

P.O. Box 1406

Douglass Street

Stormwater - TP3

Voorhees, NJ 08043

Elk Township

Horizon 102"-144"

MUNICIPALITY

Form 3b. Tube Permeameter Test Data

1. Test Number Replicate Letter Date Collected

2. Material Tested Fill Test in Native Soil - Indicate Depth

3. Type of Sample Undisturbed Disturbed

4. Sample Dimensions Inside Radius of Sample Tube, R, in cm
Length of Sample, in inches

5. Bulk Density Determination (Disturbed Samples Only):
Sample Weight (Wt. Tube Containing Sample - Wt. Empty Tube)
Sample Volume (L x 2.54 cm/inch x 3.14R²), cc
Bulk Density (Sample Wt./Sample Volume), grams/cc

6. Standpipe Used: x No Yes
Indicate internal Radius, cm _____

7. Height of water Level above Rim of Test Basin in inches:
At the Beginning of Each Test Interval, H1
At the End of Each Test Interval, H2

8. Rate of Water Level Drop (Add additional lines if needed):

Time, Start of Test Interval, T1 (min.sec)	Time, End of Test Interval, T2 (min.sec)	Length of Test Interval, T, (min)
0.00	12.12	12.20
0.00	12.14	12.23
0.00	12.32	12.53

9. Calculation of Permeability:

$$K, (in/hr) = 60 \text{ min/hr} \times r^2/R^2 \times L(in)/T(min) \times \ln(H1/H2)$$

$k = 60 \text{ min/hr}$	\times	$\frac{r^2}{R^2}$	\times	$\frac{L}{T}$	\times	$\ln(3/2)$
				12.53		
k = 5.82						

10. Defects in the Sample (Check appropriate items):

None Cracks Worm Channels Root Channels
 Soil/Tube Contact Large Gravel Large Roots
 Dry Soil Smearing Compaction
 Other—Specify _____

South Jersey Engineers LLC

Tristate Engineering

Sample Date: 10/13/23

P.O. Box 1406
Voorhees, NJ 08043

Douglass Street
Elk Township

Stormwater - TP4
Horizon 42"-60"

MUNICIPALITY

Form 3b. Tube Permeameter Test Data

1. Test Number Replicate Letter Date Collected

2. Material Tested Fill Test in Native Soil - Indicate Depth

3. Type of Sample Undisturbed Disturbed

4. Sample Dimensions Inside Radius of Sample Tube, R, in cm
Length of Sample, in inches

5. Bulk Density Determination (Disturbed Samples Only):
Sample Weight (Wt. Tube Containing Sample - Wt. Empty Tube)
Sample Volume (L x 2.54 cm/inch x 3.14R²), cc
Bulk Density (Sample Wt./Sample Volume), grams/cc

6. Standpipe Used: No Yes
Indicate internal Radius, cm _____

7. Height of water Level above Rim of Test Basin in inches:
At the Beginning of Each Test Interval, H1
At the End of Each Test Interval, H2

8. Rate of Water Level Drop (Add additional lines if needed):

Time, Start of Test Interval, T1 (min.sec)	Time, End of Test Interval, T2 (min.sec)	Length of Test Interval, T, (min)
0.00	5.59	5.99
0.00	6.01	6.01
0.00	6.01	6.01

9. Calculation of Permeability:

$$K, (in/hr) = 60 \text{ min/hr} \times r^2/R^2 \times L(in)/T(min) \times \ln(H1/H2)$$

k= 60 min/hr	x	-----/-----	x 3/	6.01	x ln(3/2)
k= 12.14					

10. Defects in the Sample (Check appropriate items):
 None Cracks Worm Channels Root Channels
 Soil/Tube Contact Large Gravel Large Roots
 Dry Soil Smearing Compaction
 Other---Specify _____

South Jersey Engineers LLC

Tristate Engineering

Sample Date: 10/13/23

P.O. Box 1406

Douglass Street

Stormwater - TP4

Voorhees, NJ 08043

Elk Township

Horizon 42"-60"

MUNICIPALITY

Form 3b. Tube Permeameter Test Data

1. Test Number Replicate Letter Date Collected

2. Material Tested Fill Test in Native Soil - Indicate Depth

3. Type of Sample Undisturbed Disturbed

4. Sample Dimensions Inside Radius of Sample Tube, R, in cm
Length of Sample, in inches

5. Bulk Density Determination (Disturbed Samples Only):
Sample Weight (Wt. Tube Containing Sample - Wt. Empty Tube)
Sample Volume (L x 2.54 cm/inch x 3.14R²), cc
Bulk Density (Sample Wt./Sample Volume), grams/cc

6. Standpipe Used: x No Yes
Indicate internal Radius, cm _____

7. Height of water Level above Rim of Test Basin in inches:
At the Beginning of Each Test Interval, H1
At the End of Each Test Interval, H2

8. Rate of Water Level Drop (Add additional lines if needed):

Time, Start of Test Interval, T1 (min.sec)	Time, End of Test Interval, T2 (min.sec)	Length of Test Interval, T, (min)
0.00	5.40	5.67
0.00	5.52	5.87
0.00	5.57	5.96

9. Calculation of Permeability:

$$K, (in/hr) = 60 \text{ min/hr} \times r^2/R^2 \times L(in)/T(min) \times \ln(H1/H2)$$

$k = 60 \text{ min/hr}$	\times	$\frac{r^2}{R^2}$	\times	$\frac{L}{T}$	\times	$\ln(3/2)$
$k = 12.25$				5.96		

10. Defects in the Sample (Check appropriate items):

- None Cracks Worm Channels Root Channels
 Soil/Tube Contact Large Gravel Large Roots
 Dry Soil Smearing Compaction
 Other—Specify _____

South Jersey Engineers LLC

Tristate Engineering

Sample Date: 10/13/23

P.O. Box 1406
Voorhees, NJ 08043

Douglass Street
Elk Township

Stormwater - TP5
Horizon 97"-117"

MUNICIPALITY

Form 3b. Tube Permeameter Test Data

1. Test Number Replicate Letter Date Collected

2. Material Tested Fill Test in Native Soil - Indicate Depth

3. Type of Sample Undisturbed Disturbed

4. Sample Dimensions Inside Radius of Sample Tube, R, in cm
Length of Sample, in inches

5. Bulk Density Determination (Disturbed Samples Only):
Sample Weight (Wt. Tube Containing Sample - Wt. Empty Tube)
Sample Volume (L x 2.54 cm/inch x 3.14R²), cc
Bulk Density (Sample Wt./Sample Volume), grams/cc

6. Standpipe Used: x No Yes
Indicate internal Radius, cm _____

7. Height of water Level above Rim of Test Basin in inches:
At the Beginning of Each Test Interval, H1
At the End of Each Test Interval, H2

8. Rate of Water Level Drop (Add additional lines if needed):

Time, Start of Test Interval, T1 (min.sec)	Time, End of Test Interval, T2 (min.sec)	Length of Test Interval, T, (min)
0.00	5.20	5.33
0.00	5.36	5.59
0.00	5.52	5.87

9. Calculation of Permeability:

$$K, (in/hr) = 60 \text{ min/hr} \times r^2/R^2 \times L(in)/T(\text{min}) \times \ln(H1/H2)$$

k= 60 min/hr	x	-----/-----	x 3/	5.87	x ln(3/2)
k= 12.44					

10. Defects in the Sample (Check appropriate items):
 None Cracks Worm Channels Root Channels
 Soil/Tube Contact Large Gravel Large Roots
 Dry Soil Smearing Compaction
 Other---Specify _____

South Jersey Engineers LLC

Tristate Engineering

Sample Date: 10/13/23

P.O. Box 1406
Voorhees, NJ 08043

Douglass Street
Elk Township

Stormwater - TP5
Horizon 97"-117"

MUNICIPALITY

Form 3b. Tube Permeameter Test Data

1. Test Number Replicate Letter Date Collected

2. Material Tested Fill Test in Native Soil - Indicate Depth

3. Type of Sample Undisturbed Disturbed

4. Sample Dimensions Inside Radius of Sample Tube, R, in cm
Length of Sample, in inches

5. Bulk Density Determination (Disturbed Samples Only):
Sample Weight (Wt. Tube Containing Sample - Wt. Empty Tube)
Sample Volume (L x 2.54 cm/inch x 3.14R²), cc
Bulk Density (Sample Wt./Sample Volume), grams/cc

6. Standpipe Used: No Yes
Indicate internal Radius, cm _____

7. Height of water Level above Rim of Test Basin in inches:
At the Beginning of Each Test Interval, H1
At the End of Each Test Interval, H2

8. Rate of Water Level Drop (Add additional lines if needed):

Time, Start of Test Interval, T1 (min.sec)	Time, End of Test Interval, T2 (min.sec)	Length of Test Interval, T, (min)
0.00	5.15	5.26
0.00	5.45	5.74
0.00	5.56	5.93

9. Calculation of Permeability:

$$K, (in/hr) = 60 \text{ min/hr} \times r^2/R^2 \times L(in)/T(min) \times \ln(H1/H2)$$

k= 60 min/hr	x	-----/----- x 3/	5.93	x ln(3/2)
k= 12.31				

10. Defects in the Sample (Check appropriate items):
 None Cracks Worm Channels Root Channels
 Soil/Tube Contact Large Gravel Large Roots
 Dry Soil Smearing Compaction
 Other—Specify _____

South Jersey Engineers LLC

Tristate Engineering

Sample Date: 10/13/23

P.O. Box 1406
Voorhees, NJ 08043

Douglass Street
Elk Township

Stormwater - TP6
Horizon 42"-83"

MUNICIPALITY

Form 3b. Tube Permeameter Test Data

1. Test Number Replicate Letter Date Collected

2. Material Tested Fill Test in Native Soil - Indicate Depth

3. Type of Sample Undisturbed Disturbed

4. Sample Dimensions Inside Radius of Sample Tube, R, in cm
Length of Sample, in inches

5. Bulk Density Determination (Disturbed Samples Only):
Sample Weight (Wt. Tube Containing Sample - Wt. Empty Tube)
Sample Volume (L x 2.54 cm/inch x 3.14R²), cc
Bulk Density (Sample Wt./Sample Volume), grams/cc

6. Standpipe Used: x No Yes
Indicate internal Radius, cm _____

7. Height of water Level above Rim of Test Basin in inches:
At the Beginning of Each Test Interval, H1
At the End of Each Test Interval, H2

8. Rate of Water Level Drop (Add additional lines if needed):

Time, Start of Test Interval, T1 (min.sec)	Time, End of Test Interval, T2 (min.sec)	Length of Test Interval, T, (min)
0.00	5.24	5.39
0.00	5.48	5.81
0.00	6.02	6.04

9. Calculation of Permeability:

$$K, (in/hr) = 60 \text{ min/hr} \times r^2/R^2 \times L(in)/T(min) \times \ln(H1/H2)$$

$$k = 60 \text{ min/hr} \times \frac{1.905^2}{3^2} \times \frac{3}{6.04} \times \ln(3/2)$$

$$k = 12.09$$

10. Defects in the Sample (Check appropriate items):
 None Cracks Worm Channels Root Channels
 Soil/Tube Contact Large Gravel Large Roots
 Dry Soil Smearing Compaction
 Other—Specify _____

South Jersey Engineers LLC

Tristate Engineering

Sample Date: 10/13/23

P.O. Box 1406

Douglass Street

Stormwater - TP6

Voorhees, NJ 08043

Elk Township

Horizon 42"-83"

MUNICIPALITY

Form 3b. Tube Permeameter Test Data

1. Test Number Replicate Letter Date Collected

2. Material Tested Fill Test in Native Soil - Indicate Depth

3. Type of Sample Undisturbed Disturbed

4. Sample Dimensions Inside Radius of Sample Tube, R, in cm
Length of Sample, in inches

5. Bulk Density Determination (Disturbed Samples Only):
Sample Weight (Wt. Tube Containing Sample - Wt. Empty Tube)
Sample Volume (L x 2.54 cm/inch x 3.14R²), cc
Bulk Density (Sample Wt./Sample Volume), grams/cc

6. Standpipe Used: x No Yes
Indicate internal Radius, cm _____

7. Height of water Level above Rim of Test Basin in inches:
At the Beginning of Each Test Interval, H1
At the End of Each Test Interval, H2

8. Rate of Water Level Drop (Add additional lines if needed):

Time, Start of Test Interval, T1 (min.sec)	Time, End of Test Interval, T2 (min.sec)	Length of Test Interval, T, (min)
0.00	5.19	5.31
0.00	5.42	5.69
0.00	5.58	5.97

9. Calculation of Permeability:

$$K, (in/hr) = 60 \text{ min/hr} \times r^2/R^2 \times L(in)/T(min) \times \ln(H1/H2)$$

$$k = 60 \text{ min/hr} \times \frac{1.905^2}{3^2} \times \frac{3}{5.97} \times \ln(3/2)$$

$$k = 12.23$$

10. Defects in the Sample (Check appropriate items):
 None Cracks Worm Channels Root Channels
 Soil/Tube Contact Large Gravel Large Roots
 Dry Soil Smearing Compaction
 Other---Specify _____

South Jersey Engineers LLC

Tristate Engineering

Sample Date: 10/13/23

P.O. Box 1406

Douglass Street

Stormwater - TP7

Voorhees, NJ 08043

Elk Township

Horizon 29"-61"

MUNICIPALITY

Form 3b. Tube Permeameter Test Data

1. Test Number Replicate Letter Date Collected

2. Material Tested Fill Test in Native Soil - Indicate Depth

3. Type of Sample Undisturbed Disturbed

4. Sample Dimensions Inside Radius of Sample Tube, R, in cm
Length of Sample, in inches

5. Bulk Density Determination (Disturbed Samples Only):
Sample Weight (Wt. Tube Containing Sample - Wt. Empty Tube)
Sample Volume (L x 2.54 cm/inch x 3.14R²), cc
Bulk Density (Sample Wt./Sample Volume), grams/cc

6. Standpipe Used: No Yes
Indicate internal Radius, cm _____

7. Height of water Level above Rim of Test Basin in inches:
At the Beginning of Each Test Interval, H1
At the End of Each Test Interval, H2

8. Rate of Water Level Drop (Add additional lines if needed):

Time, Start of Test Interval, T1 (min.sec)	Time, End of Test Interval, T2 (min.sec)	Length of Test Interval, T, (min)
0.00	5.30	5.50
0.00	5.31	5.51
0.00	5.49	5.81

9. Calculation of Permeability:

$$K, (in/hr) = 60 \text{ min/hr} \times r^2/R^2 \times L(in)/T(min) \times \ln(H1/H2)$$

$k = 60 \text{ min/hr}$	\times	$-----/-----$	\times	$3/$	5.81	\times	$\ln(3/2)$
$k = 12.56$							

10. Defects in the Sample (Check appropriate items):
 None Cracks Worm Channels Root Channels
 Soil/Tube Contact Large Gravel Large Roots
 Dry Soil Smearing Compaction
 Other—Specify _____

South Jersey Engineers LLC

Tristate Engineering

Sample Date: 10/13/23

P.O. Box 1406

Douglass Street

Stormwater - TP7

Voorhees, NJ 08043

Elk Township

Horizon 29"-61"

MUNICIPALITY

Form 3b. Tube Permeameter Test Data

1. Test Number Replicate Letter Date Collected

2. Material Tested Fill Test in Native Soil - Indicate Depth

3. Type of Sample Undisturbed Disturbed

4. Sample Dimensions inside Radius of Sample Tube, R, in cm
Length of Sample, in inches

5. Bulk Density Determination (Disturbed Samples Only):
Sample Weight (Wt. Tube Containing Sample - Wt. Empty Tube)
Sample Volume (L x 2.54 cm/inch x 3.14R²), cc
Bulk Density (Sample Wt./Sample Volume), grams/cc

6. Standpipe Used: x No Yes
Indicate internal Radius, cm _____

7. Height of water Level above Rim of Test Basin in inches:
At the Beginning of Each Test Interval, H1
At the End of Each Test Interval, H2

8. Rate of Water Level Drop (Add additional lines if needed):

Time, Start of Test Interval, T1 (min.sec)	Time, End of Test Interval, T2 (min.sec)	Length of Test Interval, T, (min)
0.00	5.27	5.45
0.00	5.30	5.50
0.00	5.52	5.87

9. Calculation of Permeability:

$$K, (in/hr) = 60 \text{ min/hr} \times r^2/R^2 \times L(in)/T(\text{min}) \times \ln(H1/H2)$$

$k = 60 \text{ min/hr}$	\times	r^2/R^2	\times	L	$/$	5.87	\times	$\ln(3/2)$
$k = 12.42$								

10. Defects in the Sample (Check appropriate items):
 None Cracks Worm Channels Root Channels
 Soil/Tube Contact Large Gravel Large Roots
 Dry Soil Smearing Compaction
 Other---Specify _____

South Jersey Engineers LLC

Tristate Engineering

Sample Date: 10/13/23

P.O. Box 1406
Voorhees, NJ 08043

Douglass Street
Elk Township

Stormwater - TP8
Horizon 34"-76"

MUNICIPALITY

Form 3b. Tube Permeameter Test Data

1. Test Number Replicate Letter Date Collected

2. Material Tested Fill Test in Native Soil - Indicate Depth

3. Type of Sample Undisturbed Disturbed

4. Sample Dimensions Inside Radius of Sample Tube, R, in cm
Length of Sample, in inches

5. Bulk Density Determination (Disturbed Samples Only):
Sample Weight (Wt. Tube Containing Sample - Wt. Empty Tube)
Sample Volume (L x 2.54 cm/inch x 3.14R²), cc
Bulk Density (Sample Wt./Sample Volume), grams/cc

6. Standpipe Used: No Yes
Indicate internal Radius, cm _____

7. Height of water Level above Rim of Test Basin in inches:
At the Beginning of Each Test Interval, H1
At the End of Each Test Interval, H2

8. Rate of Water Level Drop (Add additional lines if needed):

Time, Start of Test Interval, T1 (min.sec)	Time, End of Test Interval, T2 (min.sec)	Length of Test Interval, T, (min)
0.00	12.25	12.42
0.00	12.27	12.45
0.00	12.38	12.63

9. Calculation of Permeability:

$$K, (in/hr) = 60 \text{ min/hr} \times r^2/R^2 \times L(in)/T(\text{min}) \times \ln(H1/H2)$$

$$k = 60 \text{ min/hr} \times \frac{1.905^2}{3^2} \times \frac{12.63}{12.63} \times \ln(3/2)$$

$$k = 5.78$$

10. Defects in the Sample (Check appropriate items):
 None Cracks Worm Channels Root Channels
 Soil/Tube Contact Large Gravel Large Roots
 Dry Soil Smearing Compaction
 Other—Specify _____

South Jersey Engineers LLC

Tristate Engineering

Sample Date: 10/13/23

P.O. Box 1406
Voorhees, NJ 08043

Douglass Street
Elk Township

Stormwater - TP8
Horizon 34"-76"

MUNICIPALITY

Form 3b. Tube Permeameter Test Data

1. Test Number Replicate Letter Date Collected

2. Material Tested Fill Test in Native Soil - Indicate Depth

3. Type of Sample Undisturbed Disturbed

4. Sample Dimensions Inside Radius of Sample Tube, R, in cm
Length of Sample, in inches

5. Bulk Density Determination (Disturbed Samples Only):
Sample Weight (Wt. Tube Containing Sample - Wt. Empty Tube)
Sample Volume (L x 2.54 cm/inch x 3.14R²), cc
Bulk Density (Sample Wt./Sample Volume), grams/cc

6. Standpipe Used: No Yes
Indicate internal Radius, cm _____

7. Height of water Level above Rim of Test Basin in inches:
At the Beginning of Each Test Interval, H1
At the End of Each Test Interval, H2

8. Rate of Water Level Drop (Add additional lines if needed):

Time, Start of Test Interval, T1 (min.sec)	Time, End of Test Interval, T2 (min.sec)	Length of Test Interval, T, (min)
0.00	12.26	12.43
0.00	12.49	12.82
0.00	13.15	13.26

9. Calculation of Permeability:

$$K, (in/hr) = 60 \text{ min/hr} \times r^2/R^2 \times L(in)/T(\text{min}) \times \ln(H1/H2)$$

$$k = 60 \text{ min/hr} \times \frac{3^2}{1.905^2} \times \frac{3}{13.26} \times \ln(3/2)$$

$$k = 5.51$$

10. Defects in the Sample (Check appropriate items):
 None Cracks Worm Channels Root Channels
 Soil/Tube Contact Large Gravel Large Roots
 Dry Soil Smearing Compaction
 Other—Specify _____

IV. RECHARGE SPREADSHEETS

New Jersey
Groundwater
Recharge
Spreadsheet
Version 2.0
November 2003

Annual Groundwater Recharge Analysis (based on GSR-32)

Select Township ↓	Average Annual P (in)	Climatic Factor
GLOUCESTER CO., ELK TWP	43.8	1.35

Project Name:	7th Ave and Douglas Street
Description:	Rain Garden #1
Analysis Date:	01/24/24

Pre-Developed Conditions					
Land Segment	Area (acres)	TR-55 Land Cover	Soil	Annual Recharge (in)	Annual Recharge (cu.ft)
1	0.48	Woods	Aura	11.6	20,214
2	0				
3	0				
4	0				
5	0				
6	0				
7	0				
8	0				
9	0				
10	0				
11	0				
12	0				
13	0				
14	0				
15	0				
Total =	0.5			Total Annual Recharge (in) 11.6	Total Annual Recharge (cu-ft) 20,214

Post-Developed Conditions					
Land Segment	Area (acres)	TR-55 Land Cover	Soil	Annual Recharge (in)	Annual Recharge (cu.ft)
1	0.34	Open space	Keyport	10.9	13,482
2	0.05	Gravel, dirt	Aura	8.1	1,468
3	0.09	Impervious areas	Aura	0.0	-
4	0				
5	0				
6	0				
7	0				
8	0				
9	0				
10	0				
11	0				
12	0				
13	0				
14	0				
15	0				
Total =	0.5			Total Annual Recharge (in) 8.6	Total Annual Recharge (cu.ft) 14,950

Annual Recharge Requirements Calculation ↓			
% of Pre-Developed Annual Recharge to Preserve =	100%	Total Impervious Area (sq.ft)	3,920
Post-Development Annual Recharge Deficit=	5,265	(cubic feet)	

Recharge Efficiency Parameters Calculations (area averages)			
RWC=	4.02	(in)	DRWC= 4.02 (in)
ERWC =	1.31	(in)	EDRWC= 1.31 (in)

Procedure to fill the Pre-Development and Post-Development Conditions Tables

For each land segment, first enter the area, then select TR-55 Land Cover, then select Soil. Start from the top of the table and proceed downward. Don't leave blank rows (with A=0) in between your segment entries. Rows with A=0 will not be displayed or used in calculations. For impervious areas outside of standard lots select "Impervious Areas" as the Land Cover. Soil type for impervious areas are only required if an infiltration facility will be built within these areas.

Project Name		Description		Analysis Date		BMP or LID Type					
7th Ave and Douglas Street		Rain Garden #1		01/24/24							
Recharge BMP Input Parameters				Root Zone Water capacity Calculated Parameters				Recharge Design Parameters			
Parameter	Symbol	Value	Unit	Parameter	Symbol	Value	Unit	Parameter	Symbol	Value	Unit
BMP Area	ABMP	1774.0	sq.ft	Empty Portion of RWC under Post-D Natural Recharge	ERWC	1.31	in	Inches of Runoff to capture	Qdesign	2.70	in
BMP Effective Depth, this is the design variable	dBMP	24.0	in	ERWC Modified to consider dEXC	EDRWC	0.73	in	Inches of Rainfall to capture	Pdesign	2.93	in
Upper level of the BMP surface (negative if above ground)	dBMPu	-5.2	in	Empty Portion of RWC under Infiltr. BMP	RERWC	0.62	in	Recharge Provided Avg. over Imp. Area		17.6	in
Depth of lower surface of BMP, must be >= dBMPu	dEXC	24.0	in					Runoff Captured Avg. over imp. Area		34.0	in
Post-development Land Segment Location of BMP	SegBMP	0	unitless								
Input Zero if Location is distributed or undetermined											
				BMP Calculated Size Parameters				CALCULATION CHECK MESSAGES			
				ABMP/Aimp	Aratio	0.45	unitless	Volume Balance--> Solve Problem to satisfy Annual Recharge dBMP Check--> OK dEXC Check--> OK			
				BMP Volume	VBMP	3,548	cu.ft				
Parameters from Annual Recharge Worksheet				System Performance Calculated Parameters				OTHER NOTES Pdesign is accurate only after BMP dimensions are updated to make rech volume= deficit volume. The portion of BMP infiltration prior to filling and the area occupied by BMP are ignored in these calculations. Results are sensitive to dBMP, make sure dBMP selected is small enough for BMP to empty in less than 3 days. For land Segment Location of BMP if you select "impervious areas" RWC will be minimal but not zero as determined by the soil type and a shallow root zone for this Land Cover allowing consideration of lateral flow and other losses.			
Post-D Deficit Recharge (or desired recharge volume)	Vdef	5,265	cu.ft	Annual BMP Recharge Volume		5,737	cu.ft				
Post-D Impervious Area (or target Impervious Area)	Aimp	3,920	sq.ft	Avg BMP Recharge Efficiency		51.7%	Represents % Infiltration Recharged				
Root Zone Water Capacity	RWC	4.02	in	%Rainfall became Runoff		77.5%	%				
RWC Modified to consider dEXC	DRWC	2.26	in	%Runoff Infiltrated		100.0%	%				
Climatic Factor	C-factor	1.35	no units	%Runoff Recharged		51.7%	%				
Average Annual P	Pavg	43.8	in	%Rainfall Recharged		40.1%	%				
Recharge Requirement over Imp. Area	dr	16.1	in								
How to solve for different recharge volumes: By default the spreadsheet assigns the values of total deficit recharge volume "Vdef" and total proposed impervious area "Aimp" from the "Annual Recharge" sheet to "Vdef" and "Aimp" on this page. This allows solution for a single BMP to handle the entire recharge requirement assuming the runoff from entire impervious area is available to the BMP. To solve for a smaller BMP or a LID-IMP to recharge only part of the recharge requirement, set Vdef to your target value and Aimp to impervious area directly connected to your infiltration facility and then solve for ABMP or dBMP. To go back to the default configuration click the "Default Vdef & Aimp" button.											

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Annual Groundwater Recharge Analysis (based on GSR-32)

Select Township ↓	Average Annual P (in)	Climatic Factor
GLOUCESTER CO., ELK TWP	43.8	1.35

Project Name:	7th Ave and Douglas Street
Description:	Rain Garden #2
Analysis Date:	01/24/24

Pre-Developed Conditions					
Land Segment	Area (acres)	TR-55 Land Cover	Soil	Annual Recharge (in)	Annual Recharge (cu.ft)
1	0.595	Woods	Aura	11.6	25,057
2	0.375	Woods	Downer	12.1	16,407
3	0				
4	0				
5	0				
6	0				
7	0				
8	0				
9	0				
10	0				
11	0				
12	0				
13	0				
14	0				
15	0				
Total =	1.0			Total Annual Recharge (in)	Total Annual Recharge (cu-ft)
				11.8	41,465

Post-Developed Conditions					
Land Segment	Area (acres)	TR-55 Land Cover	Soil	Annual Recharge (in)	Annual Recharge (cu.ft)
1	0.14	Impervious areas	Aura	0.0	-
2	0.455	Open space	Aura	11.9	19,611
3	0.375	Open space	Downer	12.8	17,464
4	0				
5	0				
6	0				
7	0				
8	0				
9	0				
10	0				
11	0				
12	0				
13	0				
14	0				
15	0				
Total =	1.0			Total Annual Recharge (in)	Total Annual Recharge (cu.ft)
				10.5	37,075

Procedure to fill the Pre-Development and Post-Development Conditions Tables

For each land segment, first enter the area, then select TR-55 Land Cover, then select Soil. Start from the top of the table and proceed downward. Don't leave blank rows (with A=0) in between your segment entries. Rows with A=0 will not be displayed or used in calculations. For impervious areas outside of standard lots select "Impervious Areas" as the Land Cover. Soil type for impervious areas are only required if an infiltration facility will be built within these areas.

Annual Recharge Requirements Calculation ↓		Total Annual Recharge (in)	10.5	Total Annual Recharge (cu.ft)	37,075
% of Pre-Developed Annual Recharge to Preserve =	100%	Total Impervious Area (sq.ft)		6,098	
Post-Development Annual Recharge Deficit=			4,390	(cubic feet)	
Recharge Efficiency Parameters Calculations (area averages)					
RWC=	3.53	(in)	DRWC=	3.53	(in)
ERWC =	1.15	(in)	EDRWC=	1.15	(in)

Project Name		Description		Analysis Date		BMP or LID Type					
7th Ave and Douglas Street		Rain Garden #2		01/24/24							
Recharge BMP Input Parameters				Root Zone Water capacity Calculated Parameters				Recharge Design Parameters			
Parameter	Symbol	Value	Unit	Parameter	Symbol	Value	Unit	Parameter	Symbol	Value	Unit
BMP Area	ABMP	1670.0	sq.ft	Empty Portion of RWC under Post-D Natural Recharge	ERWC	1.15	in	Inches of Runoff to capture	Qdesign	2.70	in
BMP Effective Depth, this is the design variable	dBMP	24.0	in	ERWC Modified to consider dEXC	EDRWC	1.15	in	Inches of Rainfall to capture	Pdesign	2.93	in
Upper level of the BMP surface (negative if above ground)	dBMPu	-5.2	in	Empty Portion of RWC under Infiltr. BMP	RERWC	0.97	in	Recharge Provided Avg. over Imp. Area		18.2	in
Depth of lower surface of BMP, must be >= dBMPu	dEXC	0.0	in					Runoff Captured Avg. over imp. Area		34.0	in
Post-development Land Segment Location of BMP	SegBMP	0	unitless								
Input Zero if Location is distributed or undetermined											
				BMP Calculated Size Parameters				CALCULATION CHECK MESSAGES			
				ABMP/Aimp	Aratio	0.27	unitless	Volume Balance--> Solve Problem to satisfy Annual Recharge dBMP Check--> dBMP must be <= dEXC-dBMPu, adjust parameters dEXC Check--> OK			
				BMP Volume	VBMP	3,340	cu.ft				
Parameters from Annual Recharge Worksheet				System Performance Calculated Parameters				OTHER NOTES			
Post-D Deficit Recharge (or desired recharge volume)	Vdef	4,390	cu.ft	Annual BMP Recharge Volume		9,250	cu.ft				
Post-D Impervious Area (or target Impervious Area)	Aimp	6,098	sq.ft	Avg BMP Recharge Efficiency		53.6%	Represents % Infiltration Recharged				
Root Zone Water Capacity	RWC	3.53	in	%Rainfall became Runoff		77.5%	%				
RWC Modified to consider dEXC	DRWC	3.53	in	%Runoff Infiltrated		100.0%	%				
Climatic Factor	C-factor	1.35	no units	%Runoff Recharged		53.6%	%				
Average Annual P	Pavg	43.8	in	%Rainfall Recharged		41.6%	%				
Recharge Requirement over Imp. Area	dr	8.6	in								
<p>How to solve for different recharge volumes: By default the spreadsheet assigns the values of total deficit recharge volume "Vdef" and total proposed impervious area "Aimp" from the "Annual Recharge" sheet to "Vdef" and "Aimp" on this page. This allows solution for a single BMP to handle the entire recharge requirement assuming the runoff from entire impervious area is available to the BMP. To solve for a smaller BMP or a LID-IMP to recharge only part of the recharge requirement, set Vdef to your target value and Aimp to impervious area directly connected to your infiltration facility and then solve for ABMP or dBMP. To go back to the default configuration click the "Default Vdef & Aimp" button.</p>											

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Annual Groundwater Recharge Analysis (based on GSR-32)

Select Township ↓	Average Annual P (in)	Climatic Factor
GLOUCESTER CO., ELK TWP	43.8	1.35

Project Name:	7th Ave and Douglas Street
Description:	Rain Garden #3
Analysis Date:	01/24/24

Pre-Developed Conditions					
Land Segment	Area (acres)	TR-55 Land Cover	Soil	Annual Recharge (in)	Annual Recharge (cu.ft)
1	0.828	Woods	Downer	12.1	36,227
2	0				
3	0				
4	0				
5	0				
6	0				
7	0				
8	0				
9	0				
10	0				
11	0				
12	0				
13	0				
14	0				
15	0				
Total =	0.8			Total Annual Recharge (in) 12.1	Total Annual Recharge (cu-ft) 36,227

Post-Developed Conditions					
Land Segment	Area (acres)	TR-55 Land Cover	Soil	Annual Recharge (in)	Annual Recharge (cu.ft)
1	0.11	Impervious areas	Downer	0.0	-
2	0.718	Open space	Downer	12.8	33,438
3	0				
4	0				
5	0				
6	0				
7	0				
8	0				
9	0				
10	0				
11	0				
12	0				
13	0				
14	0				
15	0				
Total =	0.8			Total Annual Recharge (in) 11.1	Total Annual Recharge (cu.ft) 33,438

Procedure to fill the Pre-Development and Post-Development Conditions Tables

For each land segment, first enter the area, then select TR-55 Land Cover, then select Soil. Start from the top of the table and proceed downward. Don't leave blank rows (with A=0) in between your segment entries. Rows with A=0 will not be displayed or used in calculations. For impervious areas outside of standard lots select "Impervious Areas" as the Land Cover. Soil type for impervious areas are only required if an infiltration facility will be built within these areas.

Annual Recharge Requirements Calculation ↓		Total Annual Recharge (in)	11.1	Total Annual Recharge (cu.ft)	33,438
% of Pre-Developed Annual Recharge to Preserve =	100%	Total Impervious Area (sq.ft)		4,792	
Post-Development Annual Recharge Deficit=	2,789	(cubic feet)			
Recharge Efficiency Parameters Calculations (area averages)					
RWC=	2.53	(in)	DRWC=	1.47	(in)
ERWC =	0.82	(in)	EDRWC=	0.48	(in)

Project Name		Description		Analysis Date		BMP or LID Type					
7th Ave and Douglas Street		Rain Garden #3		01/24/24							
Recharge BMP Input Parameters				Root Zone Water capacity Calculated Parameters				Recharge Design Parameters			
Parameter	Symbol	Value	Unit	Parameter	Symbol	Value	Unit	Parameter	Symbol	Value	Unit
BMP Area	ABMP	1690.0	sq.ft	Empty Portion of RWC under Post-D Natural Recharge	ERWC	0.82	in	Inches of Runoff to capture	Qdesign	2.70	in
BMP Effective Depth, this is the design variable	dBMP	24.0	in	ERWC Modified to consider dEXC	EDRWC	0.48	in	Inches of Rainfall to capture	Pdesign	2.93	in
Upper level of the BMP surface (negative if above ground)	dBMPu	24.0	in	Empty Portion of RWC under Infiltr. BMP	RERWC	0.39	in	Recharge Provided Avg. over Imp. Area		24.4	in
Depth of lower surface of BMP, must be >= dBMPu	dEXC	0.0	in					Runoff Captured Avg. over imp. Area		34.0	in
Post-development Land Segment Location of BMP	SegBMP	0	unitless								
Input Zero if Location is distributed or undetermined											
				BMP Calculated Size Parameters				CALCULATION CHECK MESSAGES			
				ABMP/Aimp	Aratio	0.35	unitless	Volume Balance--> Solve Problem to satisfy Annual Recharge dBMP Check--> dBMP must be <= dEXC-dBMPu, adjust parameters dEXC Check--> make dEXC larger than dBMPu			
				BMP Volume	VBMP	3,380	cu.ft				
Parameters from Annual Recharge Worksheet				System Performance Calculated Parameters				OTHER NOTES			
Post-D Deficit Recharge (or desired recharge volume)	Vdef	2,789	cu.ft	Annual BMP Recharge Volume		9,725	cu.ft	<p>Pdesign is accurate only after BMP dimensions are updated to make rech volume= deficit volume. The portion of BMP infiltration prior to filling and the area occupied by BMP are ignored in these calculations. Results are sensitive to dBMP, make sure dBMP selected is small enough for BMP to empty in less than 3 days. For land Segment Location of BMP if you select "impervious areas" RWC will be minimal but not zero as determined by the soil type and a shallow root zone for this Land Cover allowing consideration of lateral flow and other losses.</p>			
Post-D Impervious Area (or target Impervious Area)	Aimp	4,792	sq.ft	Avg BMP Recharge Efficiency		71.7%	Represents % Infiltration Recharged				
Root Zone Water Capacity	RWC	2.53	in	%Rainfall became Runoff		77.5%	%				
RWC Modified to consider dEXC	DRWC	1.47	in	%Runoff Infiltrated		100.0%	%				
Climatic Factor	C-factor	1.35	no units	%Runoff Recharged		71.7%	%				
Average Annual P	Pavg	43.8	in	%Rainfall Recharged		55.6%	%				
Recharge Requirement over Imp. Area	dr	7.0	in								
<p>How to solve for different recharge volumes: By default the spreadsheet assigns the values of total deficit recharge volume "Vdef" and total proposed impervious area "Aimp" from the "Annual Recharge" sheet to "Vdef" and "Aimp" on this page. This allows solution for a single BMP to handle the entire recharge requirement assuming the runoff from entire impervious area is available to the BMP. To solve for a smaller BMP or a LID-IMP to recharge only part of the recharge requirement, set Vdef to your target value and Aimp to impervious area directly connected to your infiltration facility and then solve for ABMP or dBMP. To go back to the default configuration click the "Default Vdef & Aimp" button.</p>											

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Annual Groundwater Recharge Analysis (based on GSR-32)

Select Township ↓	Average Annual P (in)	Climatic Factor
GLOUCESTER CO., ELK TWP	43.8	1.35

Project Name:	7th Ave and Douglas Street
Description:	Rain Garden #4
Analysis Date:	01/24/24

Pre-Developed Conditions					
Land Segment	Area (acres)	TR-55 Land Cover	Soil	Annual Recharge (in)	Annual Recharge (cu.ft)
1	0.514	Woods	Downer	12.1	22,489
2	0				
3	0				
4	0				
5	0				
6	0				
7	0				
8	0				
9	0				
10	0				
11	0				
12	0				
13	0				
14	0				
15	0				
Total =	0.5			Total Annual Recharge (in) 12.1	Total Annual Recharge (cu-ft) 22,489

Post-Developed Conditions					
Land Segment	Area (acres)	TR-55 Land Cover	Soil	Annual Recharge (in)	Annual Recharge (cu.ft)
1	0.146	Impervious areas	Downer	0.0	-
2	0.368	Open space	Downer	12.8	17,138
3	0				
4	0				
5	0				
6	0				
7	0				
8	0				
9	0				
10	0				
11	0				
12	0				
13	0				
14	0				
15	0				
Total =	0.5			Total Annual Recharge (in) 9.2	Total Annual Recharge (cu.ft) 17,138

Procedure to fill the Pre-Development and Post-Development Conditions Tables

For each land segment, first enter the area, then select TR-55 Land Cover, then select Soil. Start from the top of the table and proceed downward. Don't leave blank rows (with A=0) in between your segment entries. Rows with A=0 will not be displayed or used in calculations. For impervious areas outside of standard lots select "Impervious Areas" as the Land Cover. Soil type for impervious areas are only required if an infiltration facility will be built within these areas.

Annual Recharge Requirements Calculation ↓		Total Annual Recharge (in)	9.2	Total Annual Recharge (cu.ft)	17,138
% of Pre-Developed Annual Recharge to Preserve =	100%	Total Impervious Area (sq.ft)		6,360	
Post-Development Annual Recharge Deficit=	5,351	(cubic feet)			
Recharge Efficiency Parameters Calculations (area averages)					
RWC= 2.42	(in)	DRWC= 2.42	(in)		
ERWC = 0.79	(in)	EDRWC= 0.79	(in)		

Project Name		Description		Analysis Date		BMP or LID Type					
7th Ave and Douglas Street		Rain Garden #4		01/24/24							
Recharge BMP Input Parameters				Root Zone Water capacity Calculated Parameters				Recharge Design Parameters			
Parameter	Symbol	Value	Unit	Parameter	Symbol	Value	Unit	Parameter	Symbol	Value	Unit
BMP Area	ABMP	4597.0	sq.ft	Empty Portion of RWC under Post-D Natural Recharge	ERWC	0.79	in	Inches of Runoff to capture	Qdesign	2.70	in
BMP Effective Depth, this is the design variable	dBMP	24.0	in	ERWC Modified to consider dEXC	EDRWC	0.79	in	Inches of Rainfall to capture	Pdesign	2.93	in
Upper level of the BMP surface (negative if above ground)	dBMPu	-5.2	in	Empty Portion of RWC under Infiltr. BMP	RERWC	0.70	in	Recharge Provided Avg. over Imp. Area		11.0	in
Depth of lower surface of BMP, must be >= dBMPu	dEXC	0.0	in					Runoff Captured Avg. over imp. Area		34.0	in
Post-development Land Segment Location of BMP	SegBMP	0	unitless								
Input Zero if Location is distributed or undetermined											
				BMP Calculated Size Parameters				CALCULATION CHECK MESSAGES			
				ABMP/Aimp	Aratio	0.72	unitless	Volume Balance--> Solve Problem to satisfy Annual Recharge dBMP Check--> dBMP must be <= dEXC-dBMPu, adjust parameters dEXC Check--> OK			
				BMP Volume	VBMP	9,194	cu.ft				
Parameters from Annual Recharge Worksheet				System Performance Calculated Parameters				OTHER NOTES			
Post-D Deficit Recharge (or desired recharge volume)	Vdef	5,351	cu.ft	Annual BMP Recharge Volume		5,810	cu.ft	<p>Pdesign is accurate only after BMP dimensions are updated to make rech volume= deficit volume. The portion of BMP infiltration prior to filling and the area occupied by BMP are ignored in these calculations. Results are sensitive to dBMP, make sure dBMP selected is small enough for BMP to empty in less than 3 days. For land Segment Location of BMP if you select "impervious areas" RWC will be minimal but not zero as determined by the soil type and a shallow root zone for this Land Cover allowing consideration of lateral flow and other losses.</p>			
Post-D Impervious Area (or target Impervious Area)	Aimp	6,360	sq.ft	Avg BMP Recharge Efficiency		32.3%	Represents % Infiltration Recharged				
Root Zone Water Capacity	RWC	2.42	in	%Rainfall became Runoff		77.5%	%				
RWC Modified to consider dEXC	DRWC	2.42	in	%Runoff Infiltrated		100.0%	%				
Climatic Factor	C-factor	1.35	no units	%Runoff Recharged		32.3%	%				
Average Annual P	Pavg	43.8	in	%Rainfall Recharged		25.0%	%				
Recharge Requirement over Imp. Area	dr	10.1	in								
<p>How to solve for different recharge volumes: By default the spreadsheet assigns the values of total deficit recharge volume "Vdef" and total proposed impervious area "Aimp" from the "Annual Recharge" sheet to "Vdef" and "Aimp" on this page. This allows solution for a single BMP to handle the entire recharge requirement assuming the runoff from entire impervious area is available to the BMP. To solve for a smaller BMP or a LID-IMP to recharge only part of the recharge requirement, set Vdef to your target value and Aimp to impervious area directly connected to your infiltration facility and then solve for ABMP or dBMP. To go back to the default configuration click the "Default Vdef & Aimp" button.</p>											

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Select Township ↓	Average Annual P (in)	Climatic Factor
GLOUCESTER CO., ELK TWP	43.8	1.35

Project Name:	7th Ave and Douglas Street
Description:	Infiltration Area #5
Analysis Date:	01/24/24

Pre-Developed Conditions					
Land Segment	Area (acres)	TR-55 Land Cover	Soil	Annual Recharge (in)	Annual Recharge (cu.ft)
1	0.365	Woods	Aura	11.6	15,371
2					
3	0				
4	0				
5	0				
6	0				
7	0				
8	0				
9	0				
10	0				
11	0				
12	0				
13	0				
14	0				
15	0				
Total =	0.4			Total Annual Recharge (in) 11.6	Total Annual Recharge (cu-ft) 15,371

Post-Developed Conditions					
Land Segment	Area (acres)	TR-55 Land Cover	Soil	Annual Recharge (in)	Annual Recharge (cu.ft)
1	0.171	Impervious areas	Downer	0.0	-
2	0.084	Open space	Downer	12.8	3,912
3	0.11	Open space	Aura	11.9	4,741
4	0				
5	0				
6	0				
7	0				
8	0				
9	0				
10	0				
11	0				
12	0				
13	0				
14	0				
15	0				
Total =	0.4			Total Annual Recharge (in) 6.5	Total Annual Recharge (cu.ft) 8,653

Annual Recharge Requirements Calculation ↓			
% of Pre-Developed Annual Recharge to Preserve =	100%	Total Impervious Area (sq.ft)	7,449
Post-Development Annual Recharge Deficit=	6,718	(cubic feet)	

Recharge Efficiency Parameters Calculations (area averages)			
RWC=	2.88	(in)	DRWC= 1.69 (in)
ERWC =	0.94	(in)	EDRWC= 0.55 (in)

Procedure to fill the Pre-Development and Post-Development Conditions Tables

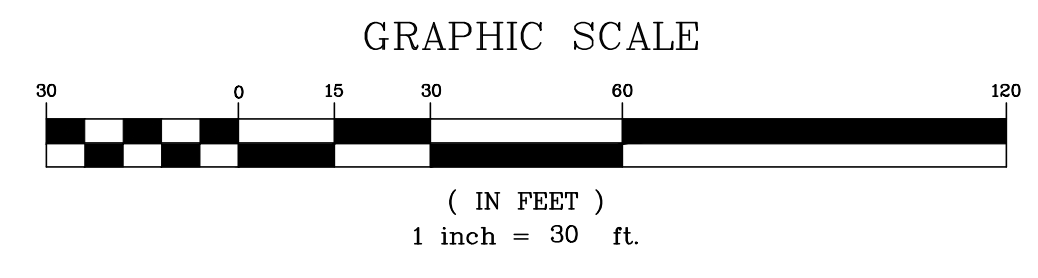
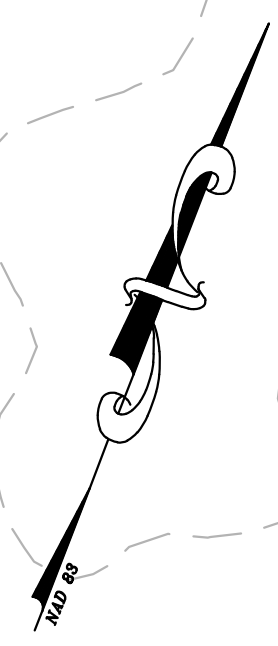
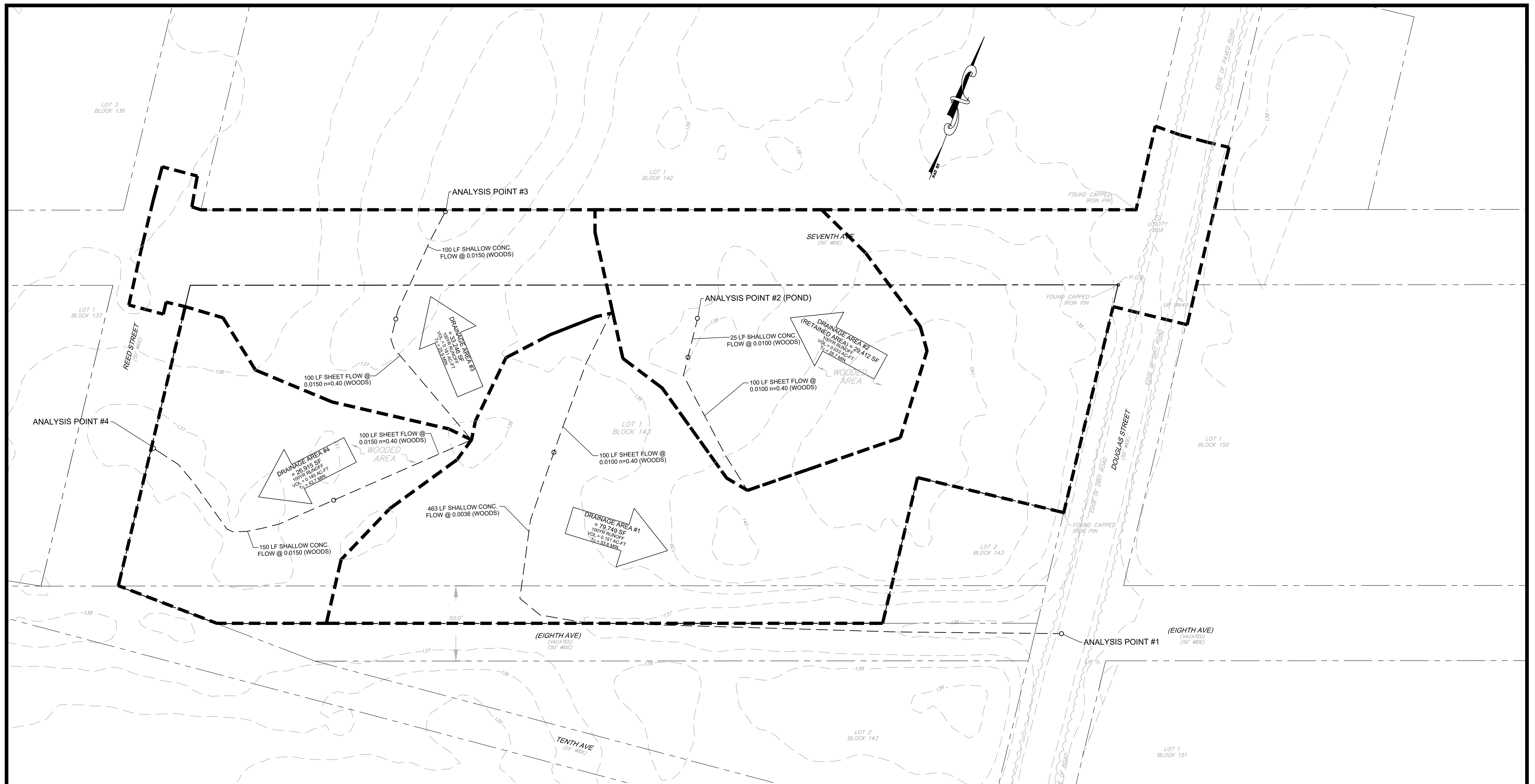
For each land segment, first enter the area, then select TR-55 Land Cover, then select Soil. Start from the top of the table and proceed downward. Don't leave blank rows (with A=0) in between your segment entries. Rows with A=0 will not be displayed or used in calculations. For impervious areas outside of standard lots select "Impervious Areas" as the Land Cover. Soil type for impervious areas are only required if an infiltration facility will be built within these areas.

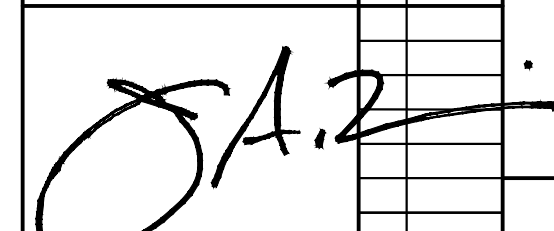

Project Name		Description		Analysis Date		BMP or LID Type					
7th Ave and Douglas Street		Infiltration Area #5		01/24/24							
Recharge BMP Input Parameters				Root Zone Water capacity Calculated Parameters				Recharge Design Parameters			
Parameter	Symbol	Value	Unit	Parameter	Symbol	Value	Unit	Parameter	Symbol	Value	Unit
BMP Area	ABMP	4651.0	sq.ft	Empty Portion of RWC under Post-D Natural Recharge	ERWC	0.94	in	Inches of Runoff to capture	Qdesign	2.70	in
BMP Effective Depth, this is the design variable	dBMP	22.0	in	ERWC Modified to consider dEXC	EDRWC	0.55	in	Inches of Rainfall to capture	Pdesign	2.93	in
Upper level of the BMP surface (negative if above ground)	dBMPu	-5.2	in	Empty Portion of RWC under Infiltr. BMP	RERWC	0.47	in	Recharge Provided Avg. over Imp. Area		17.2	in
Depth of lower surface of BMP, must be >= dBMPu	dEXC	24.0	in					Runoff Captured Avg. over imp. Area		34.0	in
Post-development Land Segment Location of BMP	SegBMP	0	unitless								
Input Zero if Location is distributed or undetermined											
Parameters from Annual Recharge Worksheet				BMP Calculated Size Parameters				CALCULATION CHECK MESSAGES			
Post-D Deficit Recharge (or desired recharge volume)	Vdef	6,718	cu.ft	ABMP/Aimp	Aratio	0.62	unitless	Volume Balance-->	Solve Problem to satisfy Annual Recharge		
Post-D Impervious Area (or target Impervious Area)	Aimp	7,449	sq.ft	BMP Volume	VBMP	8,527	cu.ft	dBMP Check-->	OK		
Root Zone Water Capacity	RWC	2.88	in					dEXC Check-->	OK		
RWC Modified to consider dEXC	DRWC	1.69	in	Annual BMP Recharge Volume		10,682	cu.ft	BMP Location-->	Location is selected as distributed or undetermined		
Climatic Factor	C-factor	1.35	no units	Avg BMP Recharge Efficiency		50.7%	Represents % Infiltration Recharged	OTHER NOTES			
Average Annual P	Pavg	43.8	in	%Rainfall became Runoff		77.5%	%	Pdesign is accurate only after BMP dimensions are updated to make rech volume= deficit volume. The portion of BMP infiltration prior to filling and the area occupied by BMP are ignored in these calculations. Results are sensitive to dBMP, make sure dBMP selected is small enough for BMP to empty in less than 3 days. For land Segment Location of BMP if you select "impervious areas" RWC will be minimal but not zero as determined by the soil type and a shallow root zone for this Land Cover allowing consideration of lateral flow and other losses.			
Recharge Requirement over Imp. Area	dr	10.8	in	%Runoff Infiltrated		100.0%	%				
				%Runoff Recharged		50.7%	%				
				%Rainfall Recharged		39.3%	%				
<p>How to solve for different recharge volumes: By default the spreadsheet assigns the values of total deficit recharge volume "Vdef" and total proposed impervious area "Aimp" from the "Annual Recharge" sheet to "Vdef" and "Aimp" on this page. This allows solution for a single BMP to handle the entire recharge requirement assuming the runoff from entire impervious area is available to the BMP. To solve for a smaller BMP or a LID-IMP to recharge only part of the recharge requirement, set Vdef to your target value and Aimp to impervious area directly connected to your infiltration facility and then solve for ABMP or dBMP. To go back to the default configuration click the "Default Vdef & Aimp" button.</p>											

Project Name		Description		Analysis Date		BMP or LID Type					
7th Ave and Douglas Street		Rain Garden #6		01/24/24							
Recharge BMP Input Parameters				Root Zone Water capacity Calculated Parameters				Recharge Design Parameters			
Parameter	Symbol	Value	Unit	Parameter	Symbol	Value	Unit	Parameter	Symbol	Value	Unit
BMP Area	ABMP	1016.0	sq.ft	Empty Portion of RWC under Post-D Natural Recharge	ERWC	0.75	in	Inches of Runoff to capture	Qdesign	2.70	in
BMP Effective Depth, this is the design variable	dBMP	22.0	in	ERWC Modified to consider dEXC	EDRWC	0.39	in	Inches of Rainfall to capture	Pdesign	2.93	in
Upper level of the BMP surface (negative if above ground)	dBMPu	-5.2	in	Empty Portion of RWC under Infiltr. BMP	RERWC	0.33	in	Recharge Provided Avg. over Imp. Area		21.4	in
Depth of lower surface of BMP, must be >= dBMPu	dEXC	24.0	in					Runoff Captured Avg. over imp. Area		34.0	in
Post-development Land Segment Location of BMP	SegBMP	0	unitless								
Input Zero if Location is distributed or undetermined											
				BMP Calculated Size Parameters				CALCULATION CHECK MESSAGES			
				ABMP/Aimp	Aratio	0.60	unitless	Volume Balance--> Solve Problem to satisfy Annual Recharge			
				BMP Volume	VBMP	1,863	cu.ft	dBMP Check--> OK			
								dEXC Check--> OK			
Parameters from Annual Recharge Worksheet				System Performance Calculated Parameters							
Post-D Deficit Recharge (or desired recharge volume)	Vdef	1,577	cu.ft	Annual BMP Recharge Volume		3,025	cu.ft	BMP Location--> Location is selected as distributed or undetermined			
Post-D Impervious Area (or target Impervious Area)	Aimp	1,699	sq.ft	Avg BMP Recharge Efficiency		62.9%	Represents % Infiltration Recharged	OTHER NOTES			
Root Zone Water Capacity	RWC	2.30	in	%Rainfall became Runoff		77.5%	%	Pdesign is accurate only after BMP dimensions are updated to make rech volume= deficit volume. The portion of BMP infiltration prior to filling and the area occupied by BMP are ignored in these calculations. Results are			
RWC Modified to consider dEXC	DRWC	1.20	in	%Runoff Infiltrated		100.0%	%	sensitive to dBMP, make sure dBMP selected is small enough for BMP to empty in less than 3 days. For land			
Climatic Factor	C-factor	1.35	no units	%Runoff Recharged		62.9%	%	Segment Location of BMP if you select "impervious areas" RWC will be minimal but not zero as determined by			
Average Annual P	Pavg	43.8	in	%Rainfall Recharged		48.8%	%	the soil type and a shallow root zone for this Land Cover allowing consideration of lateral flow and other losses.			
Recharge Requirement over Imp. Area	dr	11.1	in								
<p>How to solve for different recharge volumes: By default the spreadsheet assigns the values of total deficit recharge volume "Vdef" and total proposed impervious area "Aimp" from the "Annual Recharge" sheet to "Vdef" and "Aimp" on this page. This allows solution for a single BMP to handle the entire recharge requirement assuming the runoff from entire impervious area is available to the BMP. To solve for a smaller BMP or a LID-IMP to recharge only part of the recharge requirement, set Vdef to your target value and Aimp to impervious area directly connected to your infiltration facility and then solve for ABMP or dBMP. To go back to the default configuration click the "Default Vdef & Aimp" button.</p>											

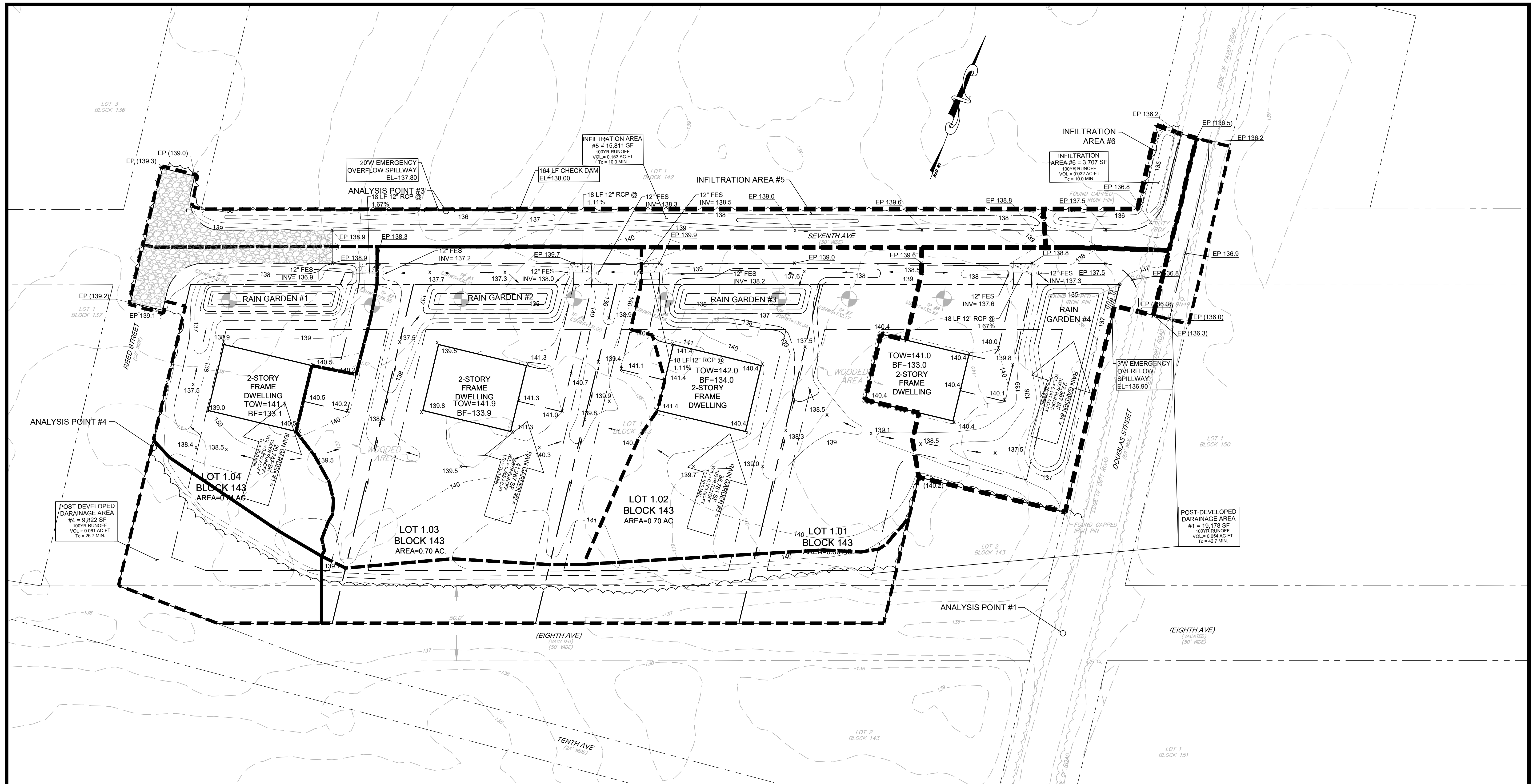
Project Name		Description		Analysis Date		BMP or LID Type					
7th Ave and Douglas Street		Rain Garden #6		01/24/24							
Recharge BMP Input Parameters				Root Zone Water capacity Calculated Parameters				Recharge Design Parameters			
Parameter	Symbol	Value	Unit	Parameter	Symbol	Value	Unit	Parameter	Symbol	Value	Unit
BMP Area	ABMP	1016.0	sq.ft	Empty Portion of RWC under Post-D Natural Recharge	ERWC	0.75	in	Inches of Runoff to capture	Qdesign	2.70	in
BMP Effective Depth, this is the design variable	dBMP	22.0	in	ERWC Modified to consider dEXC	EDRWC	0.39	in	Inches of Rainfall to capture	Pdesign	2.93	in
Upper level of the BMP surface (negative if above ground)	dBMPu	-5.2	in	Empty Portion of RWC under Infiltr. BMP	RERWC	0.33	in	Recharge Provided Avg. over Imp. Area		21.4	in
Depth of lower surface of BMP, must be >= dBMPu	dEXC	24.0	in					Runoff Captured Avg. over imp. Area		34.0	in
Post-development Land Segment Location of BMP Input Zero if Location is distributed or undetermined	SegBMP	0	unitless								
				BMP Calculated Size Parameters				CALCULATION CHECK MESSAGES			
				ABMP/Aimp	Aratio	0.60	unitless	Volume Balance--> Solve Problem to satisfy Annual Recharge dBMP Check--> OK dEXC Check--> OK			
				BMP Volume	VBMP	1,863	cu.ft				
Parameters from Annual Recharge Worksheet				System Performance Calculated Parameters				OTHER NOTES Pdesign is accurate only after BMP dimensions are updated to make rech volume= deficit volume. The portion of BMP infiltration prior to filling and the area occupied by BMP are ignored in these calculations. Results are sensitive to dBMP, make sure dBMP selected is small enough for BMP to empty in less than 3 days. For land Segment Location of BMP if you select "impervious areas" RWC will be minimal but not zero as determined by the soil type and a shallow root zone for this Land Cover allowing consideration of lateral flow and other losses.			
Post-D Deficit Recharge (or desired recharge volume)	Vdef	1,577	cu.ft	Annual BMP Recharge Volume		3,025	cu.ft				
Post-D Impervious Area (or target Impervious Area)	Aimp	1,699	sq.ft	Avg BMP Recharge Efficiency		62.9%	Represents % Infiltration Recharged				
Root Zone Water Capacity	RWC	2.30	in	%Rainfall became Runoff		77.5%	%				
RWC Modified to consider dEXC	DRWC	1.20	in	%Runoff Infiltrated		100.0%	%				
Climatic Factor	C-factor	1.35	no units	%Runoff Recharged		62.9%	%				
Average Annual P	Pavg	43.8	in	%Rainfall Recharged		48.8%	%				
Recharge Requirement over Imp. Area	dr	11.1	in								
How to solve for different recharge volumes: By default the spreadsheet assigns the values of total deficit recharge volume "Vdef" and total proposed impervious area "Aimp" from the "Annual Recharge" sheet to "Vdef" and "Aimp" on this page. This allows solution for a single BMP to handle the entire recharge requirement assuming the runoff from entire impervious area is available to the BMP. To solve for a smaller BMP or a LID-IMP to recharge only part of the recharge requirement, set Vdef to your target value and Aimp to impervious area directly connected to your infiltration facility and then solve for ABMP or dBMP. To go back to the default configuration click the "Default Vdef & Aimp" button.											

V. DRAINAGE MAPS



DESIGNED: JPR	DRAWN: JPR	CHECKED: JAM	PRE-DEVELOPED DRAINAGE AREA MAP
DATE SIGNED:		REVISIONS:	
			7TH & DOUGLAS STREET BLOCK 143, LOT 1 ELK TOWNSHIP GLOUCESTER COUNTY, NEW JERSEY
			TRISTATE ENGINEERING AND SURVEYING, PC
 JOSEPH A. MANCINI New Jersey Professional Engineer Lic. No. 24GE04579300			 P.O. BOX 1304 BLACKWOOD, NJ 08012 OFFICE: (856) 677-8742 FAX: (856) 879-2024 www.tristatecivil.com
SCALE: 1" = 30'	DATE: 1/24/24	PROJECT NO: 23-105	SHEET: 1 of 1

Date: Jun 24, 2024, 2:21 pm



POST-DEVELOPED DRAINAGE AREA #4 = 9,822 SF
 100YR RUNOFF VOL = 0.061 AC-FT
 Tc = 26.7 MIN.

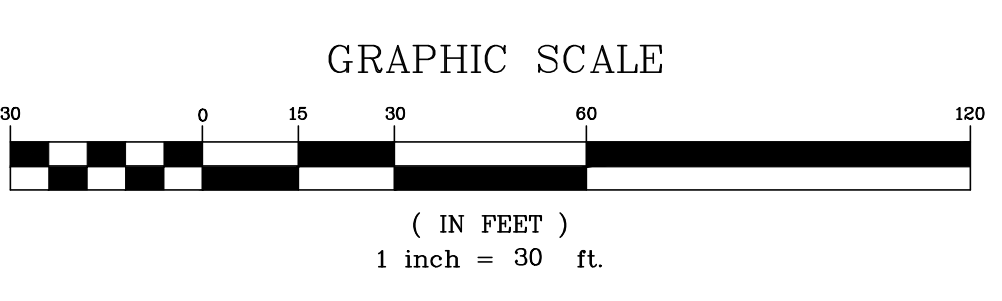
20' W EMERGENCY OVERFLOW SPILLWAY
 EL=137.80
 ANALYSIS POINT #3
 18 LF 12" RCP @ 1.67%

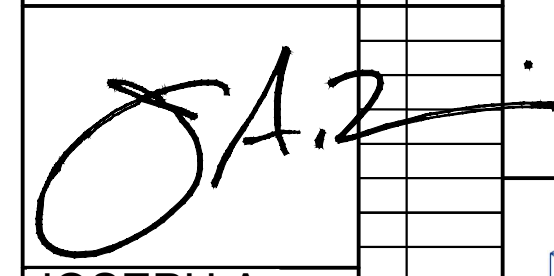

164 LF CHECK DAM
 EL=138.00

INFILTRATION AREA #5 = 15,811 SF
 100YR RUNOFF VOL = 0.153 AC-FT
 Tc = 10.0 MIN.

INFILTRATION AREA #6 = 3,707 SF
 100YR RUNOFF VOL = 0.032 AC-FT
 Tc = 10.0 MIN.

POST-DEVELOPED DRAINAGE AREA #1 = 19,178 SF
 100YR RUNOFF VOL = 0.054 AC-FT
 Tc = 42.7 MIN.



DESIGNED: JPR	DRAWN: JPR	CHECKED: JAM	POST-DEVELOPED DRAINAGE AREA MAP	
DATE SIGNED:		REVISIONS:	7TH & DOUGLAS STREET BLOCK 143, LOT 1 ELK TOWNSHIP GLOUCESTER COUNTY, NEW JERSEY	
 JOSEPH A. MANCINI New Jersey Professional Engineer Lic. No. 24GE04579300			TRISTATE ENGINEERING AND SURVEYING, PC  P.O. BOX 1304 BLACKWOOD, NJ 08012 OFFICE: (856) 677-8742 FAX: (856) 879-2024 www.tristatecivil.com	
			SCALE: 1" = 30'	DATE: 1/24/24

Date: Jun 30, 2024, 1:47pm