
STORMWATER MANAGEMENT REPORT
FOR
PROPOSED SOLAR ENERGY FACILITY

**235 VALLEY STREET
PEMBROKE, MA 02359**

PREPARED FOR:

**SWCA ENVIRONMENTAL CONSULTANTS
15 RESEARCH DRIVE
AMHERST, MA 01002**

PREPARED BY:

CIVIL DESIGN GROUP, LLC

**21 HIGH STREET, SUITE 207
NORTH ANDOVER, MA 01845**

DATE: APRIL 16, 2019

Rev. 06/17/2019



A handwritten signature in blue ink, appearing to read "P. R. Henry", located below the professional seal.

TABLE OF CONTENTS**PAGE**

I. STORMWATER MANAGEMENT NARRATIVE	
1.0 SITE LOCATION AND DESCRIPTION.....	1
2.0 METHODOLOGY.....	1
3.0 SOILS.....	1
4.0 POINTS OF ANALYSIS.....	2
5.0 EXISTING DRAINAGE WATERSHEDS.....	2
6.0 PROPOSED DRAINAGE WATERSHEDS.....	2
7.0 PEAK FLOW RATE	3
8.0 WATER QUALITY.....	3
9.0 GROUNDWATER RECHARGE	5
10.0 DRAINAGE CONVEYANCE SYSTEM.....	5
11.0 COMPLIANCE WITH THE MA DEP STORMWATER HANDBOOK.....	5
12.0 SUMMARY.....	7
II. LIST OF FIGURES	
• FIGURE 1: USGS PLAN	
• FIGURE 2: SOIL MAP	
• FIGURE 3: PRE-DEVELOPMENT WATERSHEDS	
• FIGURE 4: POST-DEVELOPMENT WATERSHEDS	
• NATIONAL FLOOD HAZARD LAYER FIRMETTE	
III. HYDROLOGICAL CALCULATIONS	
• PRE-DEVELOPMENT HYDROCAD CALCULATIONS	
• POST-DEVELOPMENT HYDROCAD CALCULATIONS	
IV. APPENDIX	
• MASSACHUSETTS DEP STORMWATER REPORT CHECKLIST	
• OPERATION AND MAINTENANCE PLAN (O&M) (WITH LONG-TERM POLLUTION PREVENTION PLAN)	

1.0 SITE LOCATION AND DESCRIPTION

Civil Design Group, LLC (CDG) has been retained by SWCA Environmental Consultants to prepare this Stormwater Management Report for the construction of a proposed solar energy facility located at 235 Valley Street, Pembroke, Massachusetts (refer to Figure 1). The project includes the construction of a new solar array farm, a 400± lineal foot gravel driveway with electrical infrastructure within a 20± acre limit of work area. The site perimeter is wooded and is bounded by wetlands and residential properties on all sides of the property.

According to FEMA flood insurance rate maps community panel number 25023C0217J, effective date July 17, 2012, the area of the site to be redeveloped lies within Zone X, which is defined as areas determined to be outside the 0.2% (500-year) annual chance floodplain. Based on available MassGIS information, the site does lie within a resource/buffer area, however, the site is not located within an area mapped for rare and endangered species or certified vernal pools as mapped by the State of Massachusetts' Natural Heritage and Endangered Species Program (NHESP) or within an Area of Critical Environmental Concern (ACEC) or within an aquifer protection zone.

This study presents a comparative analysis of the pre-development and post-development hydrologic characteristics of the site, and outlines measures to mitigate flow and maintain water quality from the site in accordance with the municipality and the Massachusetts Department of Environmental Protection (DEP's) requirements.

2.0 METHODOLOGY

Northeast Regional Climate Center (Cornell Rates) was utilized to source the precipitation values and Technical Release 55 (TR-55) methodology was utilized to determine weighted curve numbers (CNs) for each pre and post-development subcatchment area. Weighted CNs are based on ground cover type and hydrologic soil groups (HSGs). The times of concentration (Tc's) for each of the existing and proposed watersheds have been calculated. The areas that do not show a Tc travel path resulted in travel times of less than 6 minutes. CN and Tc values were then utilized to generate hydrographs using HydroCad 10.0, an industry standard software package that develops a hydrologic model based on the SCS method and computes peak discharges from rainfall runoff for urban and rural watersheds.

3.0 SOILS

According to the Natural Resources Conservation Service Web Soil Survey (Figure 2), underlying soils within the vicinity of the site are classified as follows:

1 Water
6A Scarboro muck – HSG A
55A Freetown coarse sand – HSG B/D
253B Hinckley loamy sand – HSG A
253C Hinckley loamy sand – HSG A
256B Deerfield loamy find sand – HSG A
320B Birchwood sand – HSG B/D
665B Udipsamments – HSG A

As indicated above, the site is comprised of HSG A and HSG B soils with the exception of the ‘water’ classification which no longer is applicable as the existing pond has apparently been drained. The proximate land surrounding the former pond appears to be predominately HSG A soils, therefore the limit of work area has been divided up into HSG A and HSG B for both the existing and proposed conditions for the purposes of generating peak flow rates.

4.0 POINTS OF ANALYSIS

Points of Analysis (POAs) are discharge points or lines that convey runoff from the study area via overland flow or through drain pipes. The pre-development and post-development areas of disturbance drain to four (4) POA’s listed and described below and shown on Figures 3 and 4.

TABLE-1: POINTS OF ANALYSIS

POINT OF ANALYSIS	DESCRIPTION
POA-1	Two (2) existing culverts that outlet to the adjacent pond to the east
POA-2	A comparison line along a portion of the site’s westerly property line
POA-3	A comparison line along a portion of the site’s southerly property line
POA-4	A comparison line along the a portion of the sites easterly property.

5.0 EXISTING DRAINAGE WATERSHEDS

The existing watersheds are delineated based on topography, physical characteristics and drainage networks within the site limits and collect and direct stormwater towards the POAs. The total study area for the site is 19.9± acres and is divided into eight (8) pre-development watersheds as described below:

Subcatchment EX-1: The 10.9-acre watershed is comprised of Bog, woods, meadow, and dirt road areas. Runoff travels via overland flow in a northerly direction through a series of existing drainage culverts and stormwater basins towards POA-1.

Subcatchment EX-2: The 3.5-acre watershed is comprised of Bog, meadow, and dirt road areas. Runoff travels via overland flow in an easterly direction towards POA-1.

Subcatchment EX-3: The 0.4-acre watershed is comprised of water and dirt road areas. Runoff travels via overland flow in an easterly direction through an existing stormwater basin and drainage culvert towards POA-1.

Subcatchment EX-4: The 0.5-acre watershed is comprised of woods and dirt road areas. Runoff travels via overland flow in an easterly direction towards POA-1.

Subcatchment EX-5: The 0.3-acre watershed is comprised of water and dirt road areas. Runoff does not appear to have an outlet from the basin within this watershed, however, any overflow runoff would discharge towards POA-1.

Subcatchment EX-6: The 1.2-acre watershed is comprised of wooded areas. Runoff travels via overland flow in a southwesterly direction towards POA-2.

Subcatchment EX-7: The 1.3-acre watershed is comprised of wooded areas. Runoff travels via overland flow in a southerly direction towards POA-3.

Subcatchment EX-8: The 1.5-acre watershed is comprised of wooded and dirt road areas. Runoff travels via overland flow in an easterly direction towards POA-4.

6.0 PROPOSED DRAINAGE WATERSHEDS

Similar to the existing watersheds, the proposed watersheds are delineated based on topography, physical characteristics and drainage networks within the site limits and collect and direct stormwater towards the POAs. This area is divided into eight (8) post-development watersheds described below:

Subcatchment PR-1: The 12.1-acre watershed is comprised of meadow, and dirt/gravel road areas. Runoff travels via overland flow in a northerly direction through a series of existing drainage culverts and stormwater basins towards POA-1.

Subcatchment PR-2: The 3.5-acre watershed is comprised of meadow, and dirt road areas. Runoff travels via overland flow in an easterly direction towards POA-1.

Subcatchment PR-3: The 0.7-acre watershed is comprised of meadow, water and dirt road areas. Runoff travels via overland flow in an easterly direction through an existing stormwater basin and drainage culvert towards POA-1.

Subcatchment PR-4: The 0.4-acre watershed is comprised of meadow and dirt road areas. Runoff travels via overland flow in an easterly direction towards POA-1.

Subcatchment PR-5: The 0.3-acre watershed is comprised of water and dirt road areas. Runoff does not appear to have an outlet from the basin within this watershed, however, any overflow runoff would discharge towards POA-1.

Subcatchment PR-6: The 0.5-acre watershed is comprised of meadow areas. Runoff travels via overland flow in a southwesterly direction towards POA-2.

Subcatchment PR-7: The 1.1-acre watershed is comprised of meadow areas. Runoff travels via overland flow in a southerly direction towards POA-3.

Subcatchment PR-8: The 1.3-acre watershed is comprised of meadow areas. Runoff travels via overland flow in an easterly direction towards POA-4.

7.0 PEAK FLOW RATE MITIGATION

The stormwater management system is designed so that post-development peak discharge rates do not exceed pre-development peak discharge rates for the 2-year, 10-year, and 100-year, 24-hour Type III storm events. Peak flow rates for the pre-development and post-development conditions are illustrated below:

TABLE 2: PEAK FLOW RATE COMPARISON

POINT OF ANALYSIS	2-YEAR STORM EVENT (3.35"/24-HR)		10-YEAR STORM EVENT (4.95"/24-HR)		100-YEAR STORM EVENT (8.68"/24-HR)	
	PRE (CFS)	POST (CFS)	PRE (CFS)	POST (CFS)	PRE (CFS)	POST (CFS)
POA-1	1.43	0.92	3.71	2.98	12.73	8.16
POA-2	0.11	0.11	0.64	0.50	2.66	1.80
POA-3	0.03	0.03	0.53	0.53	3.50	3.17
POA-4	0.00	0.00	0.01	0.00	0.47	0.19

8.0 COMPLIANCE WITH THE MASSACHUSETTS DEP STORMWATER HANDBOOK

This study presents a comparative analysis of the pre-development and post-development hydrologic characteristics of the site, and outlines the proposed measures to mitigate flow, provide groundwater recharge, and improve water quality from the site. The best management practices (BMPs) outlined in this report include measures to meet the municipal and the Massachusetts Department of Environmental Protection (DEP) requirements. Below is a summary of how the design complies with each applicable DEP standard.

Standard 1: No new stormwater conveyances may discharge untreated directly to or cause erosion in wetlands or waters of the Commonwealth.

The proposed stormwater conveyance system does not include any new *untreated* discharges. The overland and subsurface drainage connection points will remain consistent with the existing condition.

Standard 2: Stormwater management systems shall be designed so that post-development peak discharge rates do not exceed pre-development peak discharge rates.

As indicated above and within the supporting HydroCad calculations, the stormwater management system is designed so that post-development peak discharge rates do not exceed pre-development peak discharge rates.

Standard 3: Loss of annual recharge to groundwater shall be eliminated or minimized through the use of infiltration measures including environmentally sensitive site design, low impact development techniques, stormwater best management practices, and good operation and maintenance. At a minimum, the annual recharge from the post-development site shall approximate the annual recharge from pre-development conditions based on soil type. This standard is met when the stormwater management system is designed to infiltrate the required recharge volume as determine in accordance with the Massachusetts Stormwater Handbook.

The proposed equipment pad and gravel access driveway will be directed towards qualified pervious areas, which in part are defined as having maximum curve numbers of 39 and 61 for soil groups A and B, respectively. As indicated in the Hydrocad modelling, both areas sheet drain to lands that are below the curve numbers noted above. Therefore, this standard is assumed to be met under Low Impact Development Site Design Credits 2 and 3.

Standard 4: Stormwater management systems shall be designed to remove 80% of the average annual post-construction load of Total Suspended Solids (TSS).

The proposed equipment pad and gravel access driveway will be directed towards qualified pervious areas, which in part are defined as having maximum curve numbers of 39 and 61 for soil groups A and B, respectively. As indicated in the Hydrocad modelling, both areas sheet drain to lands that are below the curve numbers noted above. Therefore, this standard is assumed to be met under Low Impact Development Site Design Credits 2 and 3.

Standard 5: For land uses with higher potential pollutant loads, source control and pollution prevention shall be implemented in accordance with the Massachusetts Stormwater Handbook to eliminate or reduce the discharge of stormwater runoff from such land uses to the maximum extent practicable.

Not applicable.

Standard 6: Stormwater discharges within the Zone II or Interim Wellhead Protection Area of a public water supply, and stormwater discharges near or to any other critical area, require the use of the specific source control and pollution prevention measures and the specific structural stormwater best management practices determined by the Department to be suitable for managing discharges to such areas, as provided in the Massachusetts Stormwater Handbook.

Not applicable.

Standard 7: A redevelopment project is required to meet the following Stormwater Management Standards only to the maximum extent practicable: Standard 2, Standard 3, and the pretreatment and structural best management practice requirements of Standards 4, 5, and 6. Existing stormwater discharges shall comply with Standard 1 only to the maximum extent practicable. A redevelopment project shall also comply with all other requirements of the Stormwater Management Standards and improve existing conditions.

Not applicable.

Standard 8: A plan to control construction-related impacts including erosion, sedimentation and other pollutant sources during construction and land disturbance activities (construction period erosion, sedimentations, and pollution prevention plan) shall be developed and implemented.

The submitted plans outline and depict measures to control construction related impacts including erosion, sedimentation and other pollutant sources during construction and land disturbance activities.

Standard 9: A long-term operation and maintenance plan shall be developed and implemented to ensure that stormwater management systems function as designed.

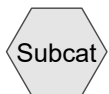
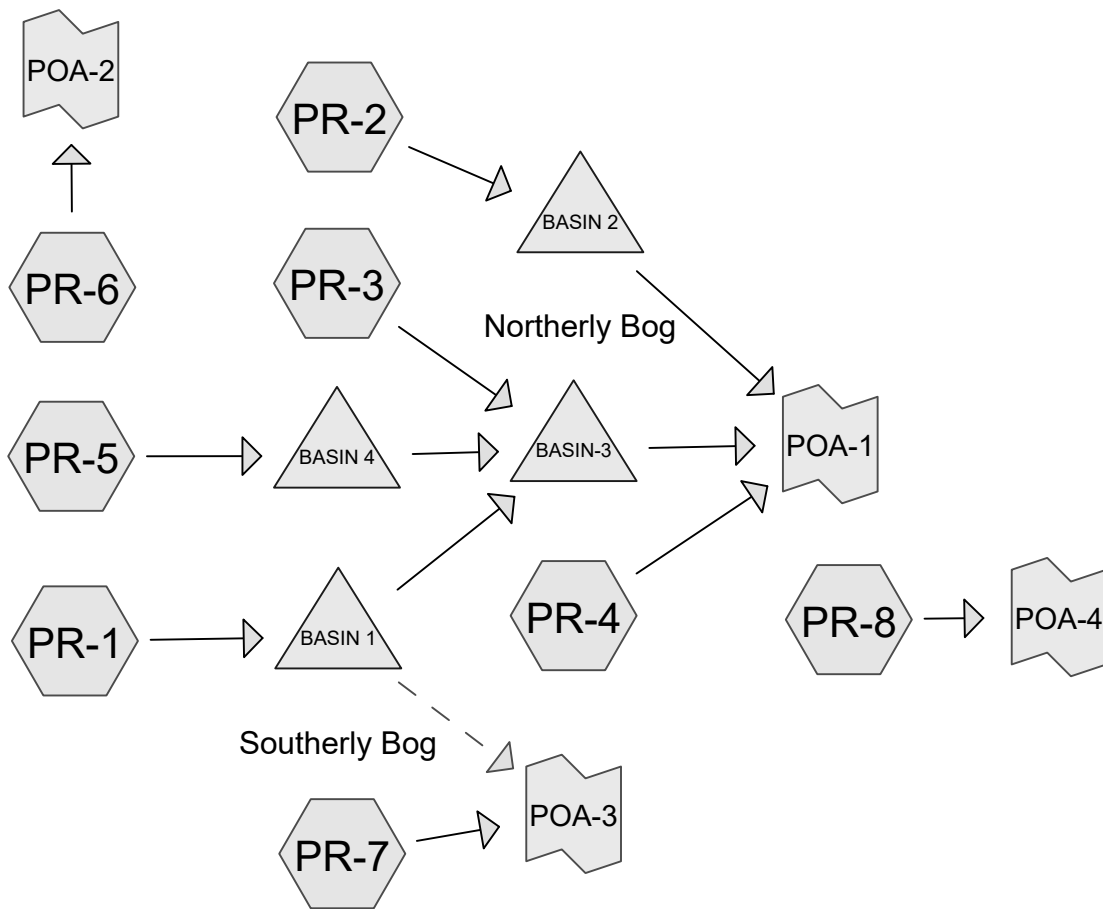
An Operation and Maintenance Plan (O&M) has been developed that outlines maintenance requirements to ensure longevity of BMP's. See Appendix A.

Standard 10: All illicit discharges to the stormwater management system are prohibited.

The proposed stormwater management system does not include any illicit discharges.

9.0 SUMMARY

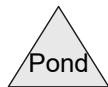
The stormwater management system for the proposed redevelopment includes measures for collecting, conveying, treating and controlling stormwater runoff from the site. Post-development peak runoff rates have been attenuated for the 2, 10 and 100-year storm events. Comprehensive computations and calculations with supporting figures and plans are attached.



Subcat



Reach



Pond



Link

Routing Diagram for Proposed Conditions

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Page 2

Area Listing (all nodes)

Area (acres)	CN	Description (subcatchment-numbers)
0.678	72	Dirt roads, HSG A (PR-1, PR-2, PR-3, PR-4, PR-5)
0.269	82	Dirt roads, HSG B (PR-1, PR-3, PR-5)
5.677	30	Meadow, non-grazed, HSG A (PR-1, PR-2, PR-3, PR-4, PR-7, PR-8)
13.022	58	Meadow, non-grazed, HSG B (PR-1, PR-2, PR-6, PR-7)
0.155	98	Water Surface, 0% imp, HSG A (PR-3, PR-5)
0.101	98	Water Surface, 0% imp, HSG B (PR-3, PR-5)
19.902	51	TOTAL AREA

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Soil Listing (all nodes)

Area (acres)	Soil Group	Subcatchment Numbers
6.510	HSG A	PR-1, PR-2, PR-3, PR-4, PR-5, PR-7, PR-8
13.392	HSG B	PR-1, PR-2, PR-3, PR-5, PR-6, PR-7
0.000	HSG C	
0.000	HSG D	
0.000	Other	
19.902		TOTAL AREA

Proposed Conditions

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Page 4

Time span=0.00-24.00 hrs, dt=0.10 hrs, 241 points
Runoff by SCS TR-20 method, UH=SCS, Split Pervious/Imperv. UI as Pervious
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Subcatchment PR-1: Runoff Area=526,067 sf 0.00% Impervious Runoff Depth>0.29"
Flow Length=979' Tc=45.5 min CN=55/0 Runoff=0.87 cfs 0.291 af

Subcatchment PR-2: Runoff Area=152,619 sf 0.00% Impervious Runoff Depth>0.01"
Flow Length=751' Tc=16.4 min CN=41/0 Runoff=0.01 cfs 0.004 af

Subcatchment PR-3: Runoff Area=29,839 sf 0.00% Impervious Runoff Depth>1.26"
Tc=6.0 min CN=76/0 Runoff=0.94 cfs 0.072 af

Subcatchment PR-4: Runoff Area=17,129 sf 0.00% Impervious Runoff Depth=0.00"
Tc=6.0 min CN=36/0 Runoff=0.00 cfs 0.000 af

Subcatchment PR-5: Runoff Area=10,964 sf 0.00% Impervious Runoff Depth>1.81"
Tc=6.0 min CN=84/0 Runoff=0.51 cfs 0.038 af

Subcatchment PR-6: Runoff Area=23,951 sf 0.00% Impervious Runoff Depth>0.39"
Flow Length=195' Tc=13.7 min CN=58/0 Runoff=0.11 cfs 0.018 af

Subcatchment PR-7: Runoff Area=49,157 sf 0.00% Impervious Runoff Depth>0.16"
Tc=6.0 min CN=50/0 Runoff=0.03 cfs 0.015 af

Subcatchment PR-8: Runoff Area=57,206 sf 0.00% Impervious Runoff Depth=0.00"
Flow Length=236' Tc=14.7 min CN=30/0 Runoff=0.00 cfs 0.000 af

Pond BASIN 1: Southerly Bog Peak Elev=103.75' Storage=885 cf Inflow=0.87 cfs 0.291 af
Discarded=0.13 cfs 0.073 af Primary=0.61 cfs 0.214 af Secondary=0.00 cfs 0.000 af Outflow=0.74 cfs 0.287 af

Pond BASIN 2: Northerly Bog Peak Elev=103.00' Storage=3 cf Inflow=0.01 cfs 0.004 af
Discarded=0.01 cfs 0.004 af Primary=0.00 cfs 0.000 af Outflow=0.01 cfs 0.004 af

Pond BASIN 4: Peak Elev=105.40' Storage=867 cf Inflow=0.51 cfs 0.038 af
Discarded=0.03 cfs 0.028 af Primary=0.00 cfs 0.000 af Outflow=0.03 cfs 0.028 af

Pond BASIN-3: Peak Elev=97.00' Storage=12 cf Inflow=0.94 cfs 0.286 af
Discarded=0.00 cfs 0.001 af Primary=0.92 cfs 0.285 af Outflow=0.92 cfs 0.286 af

Link POA-1: Inflow=0.92 cfs 0.285 af
Primary=0.92 cfs 0.285 af

Link POA-2: Inflow=0.11 cfs 0.018 af
Primary=0.11 cfs 0.018 af

Link POA-3: Inflow=0.03 cfs 0.015 af
Primary=0.03 cfs 0.015 af

Link POA-4: Inflow=0.00 cfs 0.000 af
Primary=0.00 cfs 0.000 af

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Page 5

Total Runoff Area = 19.902 ac Runoff Volume = 0.438 af Average Runoff Depth = 0.26"
100.00% Pervious = 19.902 ac 0.00% Impervious = 0.000 ac

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Page 6

Summary for Subcatchment PR-1:

Runoff = 0.87 cfs @ 12.94 hrs, Volume= 0.291 af, Depth> 0.29"

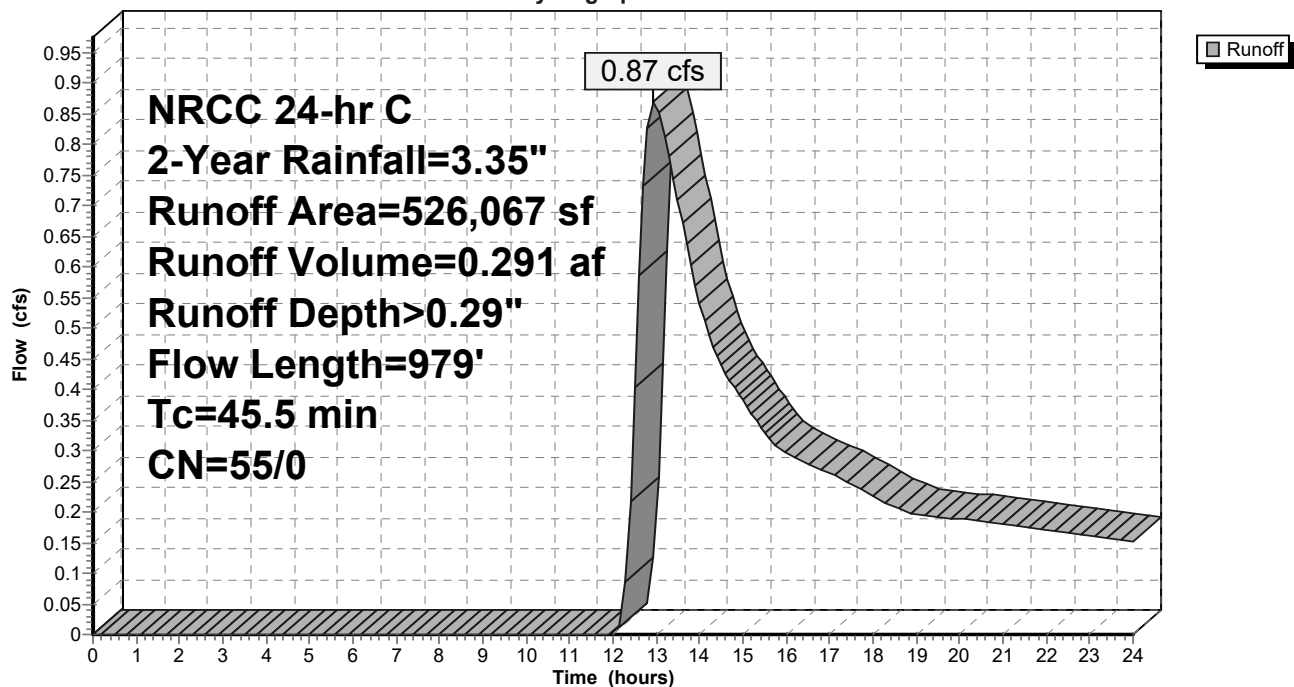
Runoff by SCS TR-20 method, UH=SCS, Split Pervious/Imperv. UI as Pervious, Time Span= 0.00-24.00 hrs, dt= 0.10
NRCC 24-hr C 2-Year Rainfall=3.35"

Area (sf)	CN	Description
63,573	30	Meadow, non-grazed, HSG A
4,170	72	Dirt roads, HSG A
457,715	58	Meadow, non-grazed, HSG B
609	82	Dirt roads, HSG B
526,067	55	Weighted Average
526,067	55	100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
11.6	50	0.0080	0.07		Sheet Flow, Grass: Dense n= 0.240 P2= 3.35"
5.6	335	0.0200	0.99		Shallow Concentrated Flow, Short Grass Pasture Kv= 7.0 fps
28.3	594	0.0025	0.35		Shallow Concentrated Flow, Short Grass Pasture Kv= 7.0 fps
45.5	979	Total			

Subcatchment PR-1:

Hydrograph



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Page 7

Summary for Subcatchment PR-2:

Runoff = 0.01 cfs @ 23.18 hrs, Volume= 0.004 af, Depth> 0.01"

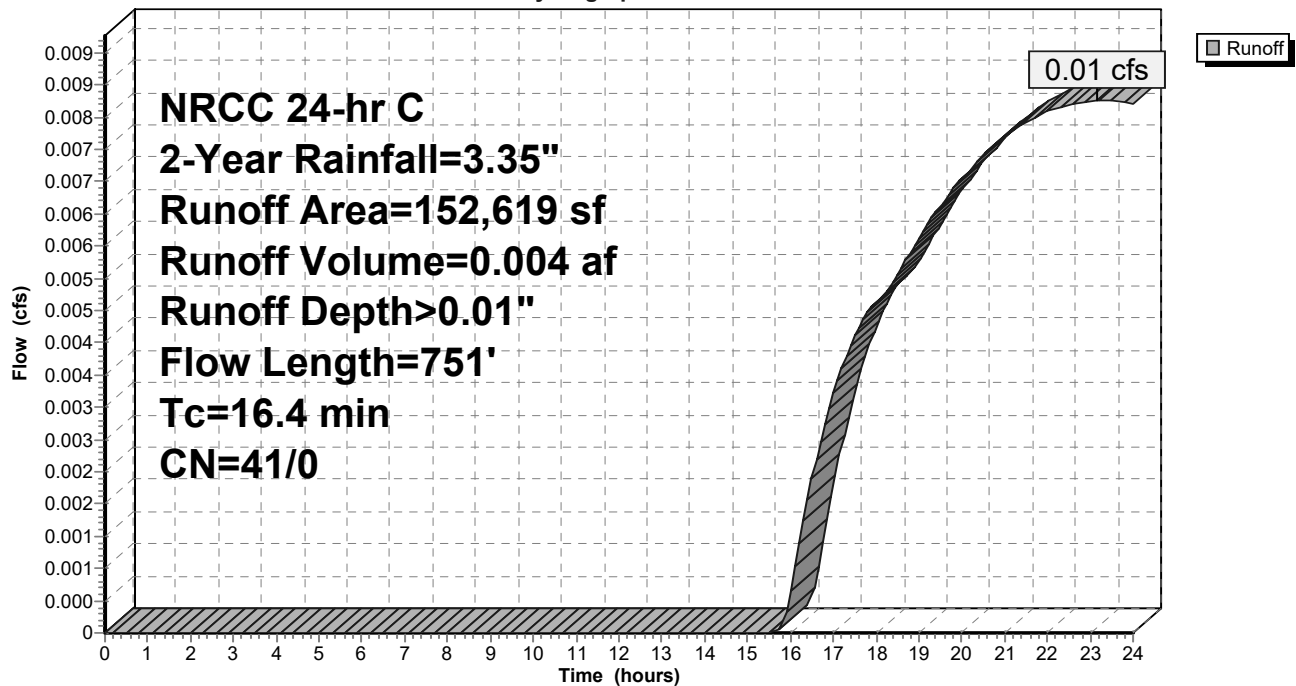
Runoff by SCS TR-20 method, UH=SCS, Split Pervious/Imperv. UI as Pervious, Time Span= 0.00-24.00 hrs, dt= 0.10
NRCC 24-hr C 2-Year Rainfall=3.35"

Area (sf)	CN	Description
94,623	30	Meadow, non-grazed, HSG A
7,838	72	Dirt roads, HSG A
50,158	58	Meadow, non-grazed, HSG B
152,619	41	Weighted Average
152,619	41	100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
1.8	50	0.0340	0.45		Sheet Flow, Fallow n= 0.050 P2= 3.35"
14.6	701	0.0130	0.80		Shallow Concentrated Flow, Short Grass Pasture Kv= 7.0 fps
16.4	751	Total			

Subcatchment PR-2:

Hydrograph



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Page 8

Summary for Subcatchment PR-3:

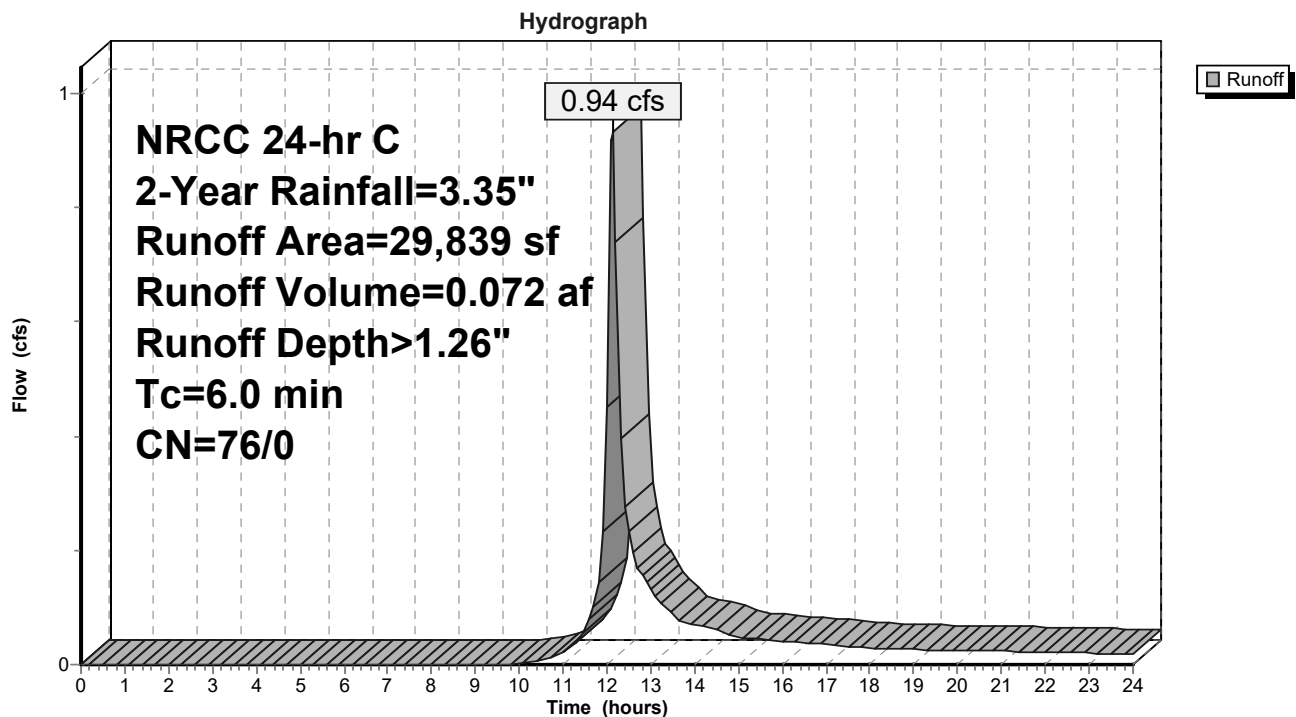
Runoff = 0.94 cfs @ 12.12 hrs, Volume= 0.072 af, Depth> 1.26"

Runoff by SCS TR-20 method, UH=SCS, Split Pervious/Imperv. UI as Pervious, Time Span= 0.00-24.00 hrs, dt= 0.10
NRCC 24-hr C 2-Year Rainfall=3.35"

Area (sf)	CN	Description
12,670	72	Dirt roads, HSG A
6,021	98	Water Surface, 0% imp, HSG A
3,556	30	Meadow, non-grazed, HSG A
5,480	82	Dirt roads, HSG B
2,112	98	Water Surface, 0% imp, HSG B
29,839	76	Weighted Average
29,839	76	100.00% Pervious Area

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

Subcatchment PR-3:



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Page 9

Summary for Subcatchment PR-4:

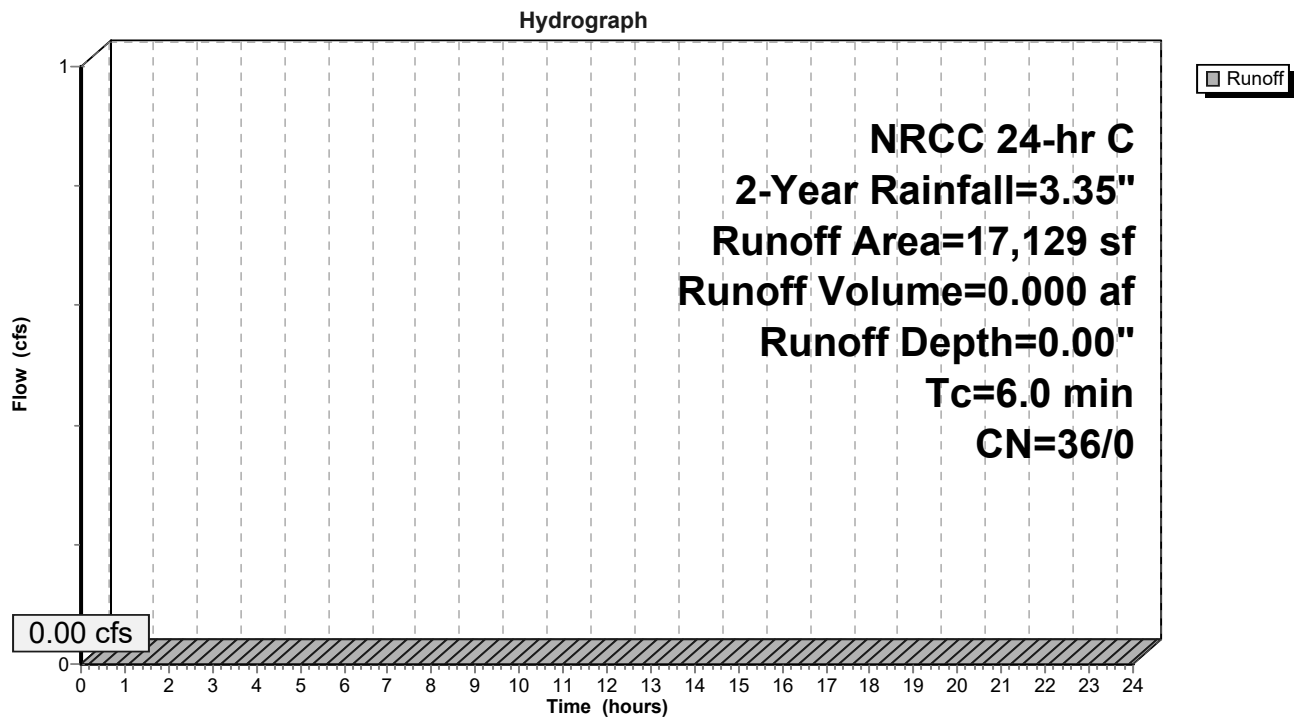
Runoff = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af, Depth= 0.00"

Runoff by SCS TR-20 method, UH=SCS, Split Pervious/Imperv. UI as Pervious, Time Span= 0.00-24.00 hrs, dt= 0.10
NRCC 24-hr C 2-Year Rainfall=3.35"

Area (sf)	CN	Description
2,539	72	Dirt roads, HSG A
14,590	30	Meadow, non-grazed, HSG A
17,129	36	Weighted Average
17,129	36	100.00% Pervious Area

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

Subcatchment PR-4:



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Page 10

Summary for Subcatchment PR-5:

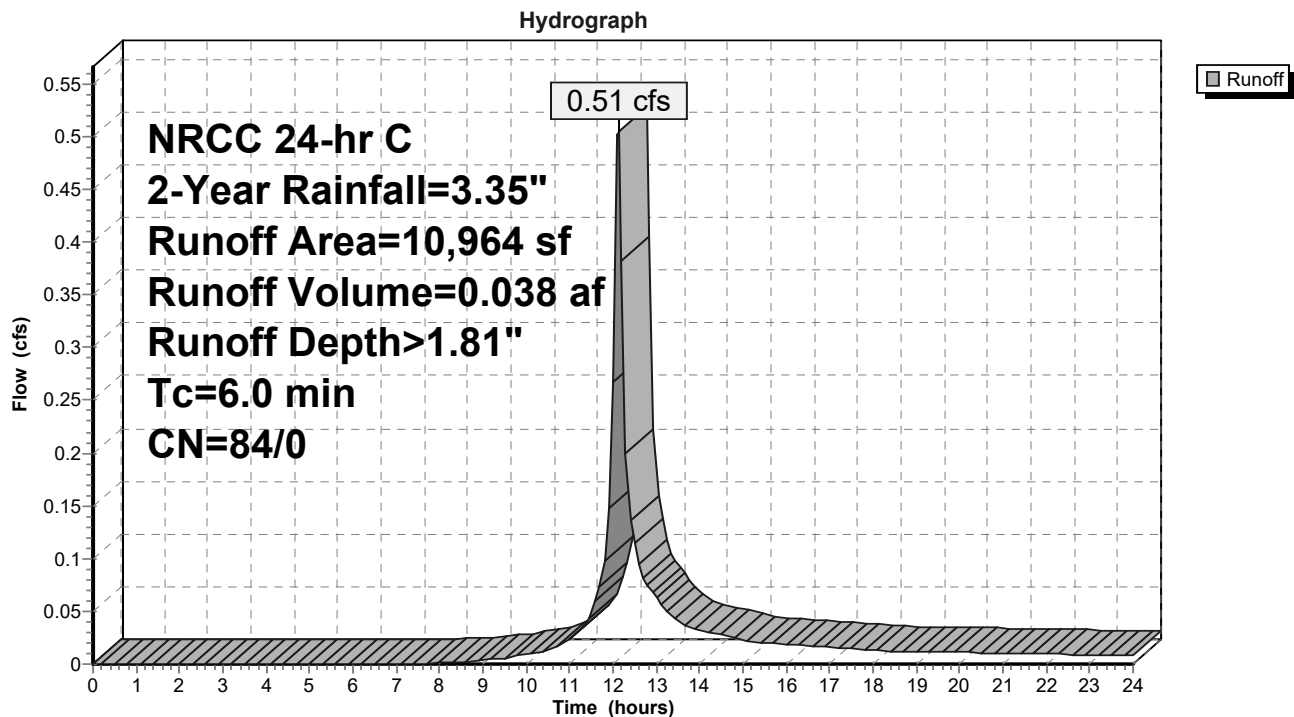
Runoff = 0.51 cfs @ 12.12 hrs, Volume= 0.038 af, Depth> 1.81"

Runoff by SCS TR-20 method, UH=SCS, Split Pervious/Imperv. UI as Pervious, Time Span= 0.00-24.00 hrs, dt= 0.10
NRCC 24-hr C 2-Year Rainfall=3.35"

Area (sf)	CN	Description
2,303	72	Dirt roads, HSG A
747	98	Water Surface, 0% imp, HSG A
5,627	82	Dirt roads, HSG B
2,287	98	Water Surface, 0% imp, HSG B
10,964	84	Weighted Average
10,964	84	100.00% Pervious Area

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

Subcatchment PR-5:



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NRCC 24-hr C 2-Year Rainfall=3.35"

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Page 11

Summary for Subcatchment PR-6:

Runoff = 0.11 cfs @ 12.31 hrs, Volume= 0.018 af, Depth> 0.39"

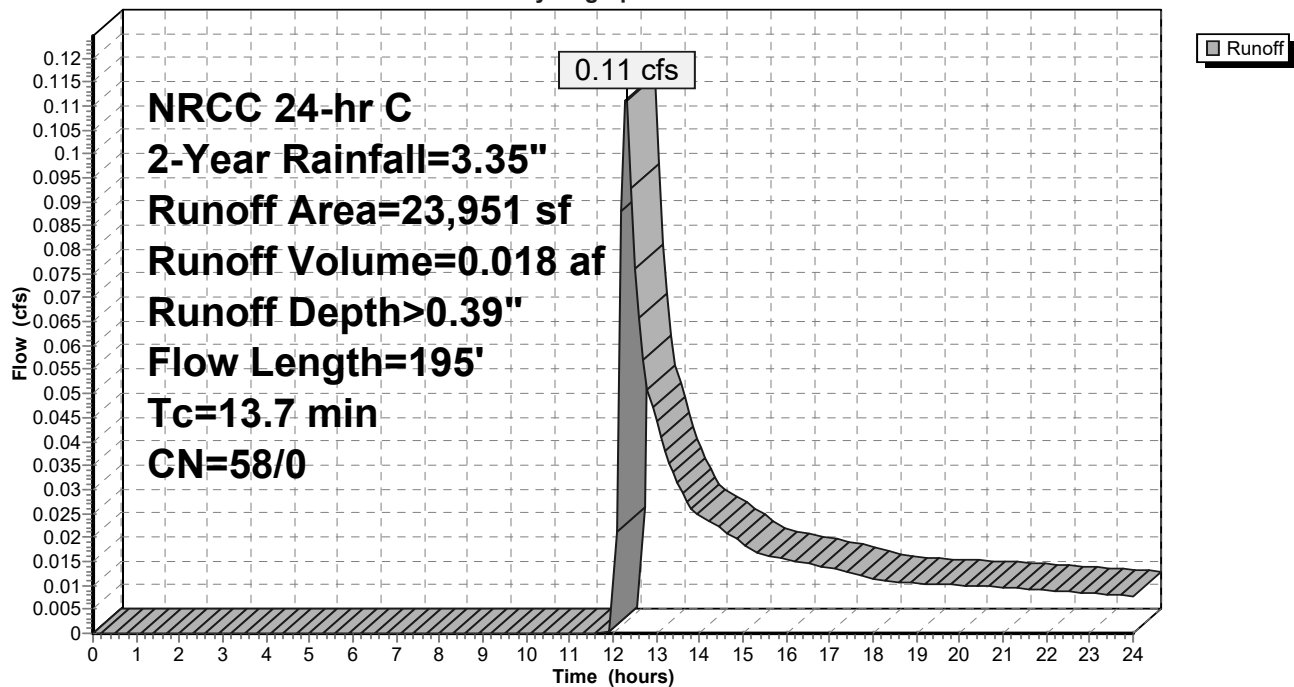
Runoff by SCS TR-20 method, UH=SCS, Split Pervious/Imperv. UI as Pervious, Time Span= 0.00-24.00 hrs, dt= 0.10
NRCC 24-hr C 2-Year Rainfall=3.35"

Area (sf)	CN	Description
23,951	58	Meadow, non-grazed, HSG B
23,951	58	100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
11.6	50	0.0080	0.07		Sheet Flow, Grass: Dense n= 0.240 P2= 3.35"
2.1	145	0.0270	1.15		Shallow Concentrated Flow, Short Grass Pasture Kv= 7.0 fps
13.7	195	Total			

Subcatchment PR-6:

Hydrograph



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Page 12

Summary for Subcatchment PR-7:

Runoff = 0.03 cfs @ 12.55 hrs, Volume= 0.015 af, Depth> 0.16"

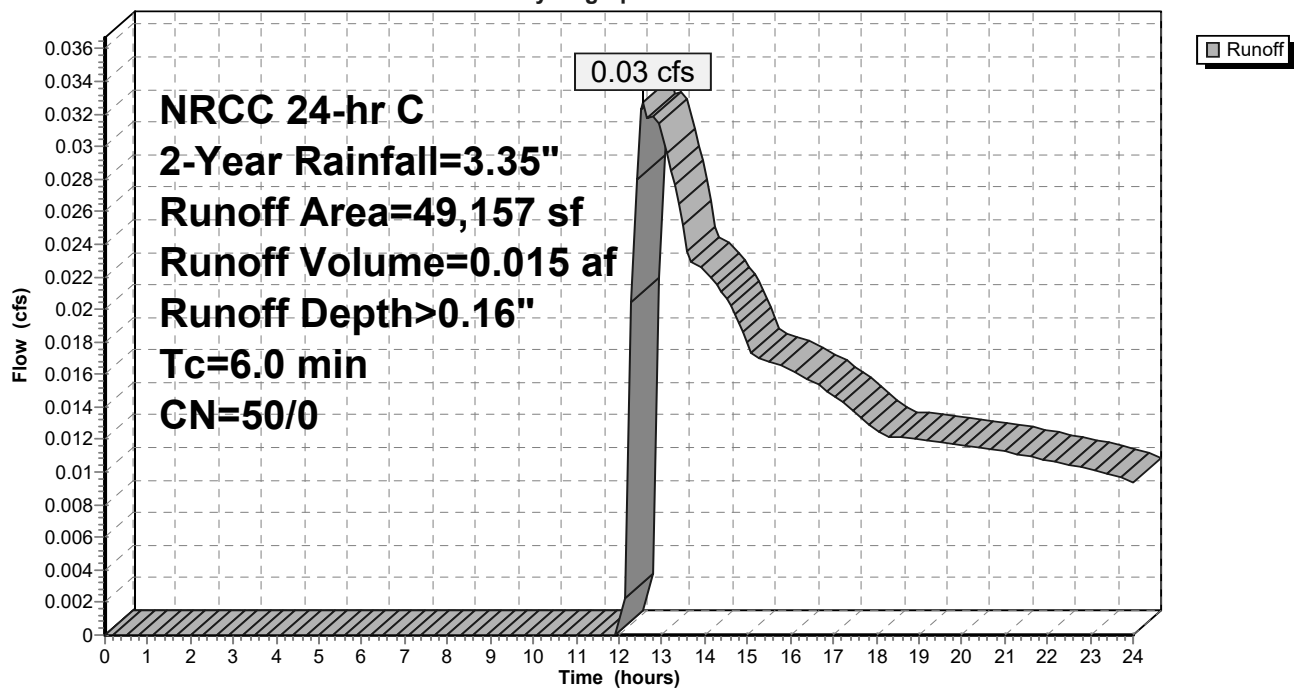
Runoff by SCS TR-20 method, UH=SCS, Split Pervious/Imperv. UI as Pervious, Time Span= 0.00-24.00 hrs, dt= 0.10
NRCC 24-hr C 2-Year Rainfall=3.35"

Area (sf)	CN	Description
13,721	30	Meadow, non-grazed, HSG A
35,436	58	Meadow, non-grazed, HSG B
49,157	50	Weighted Average
49,157	50	100.00% Pervious Area

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

Subcatchment PR-7:

Hydrograph



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Page 13

Summary for Subcatchment PR-8:

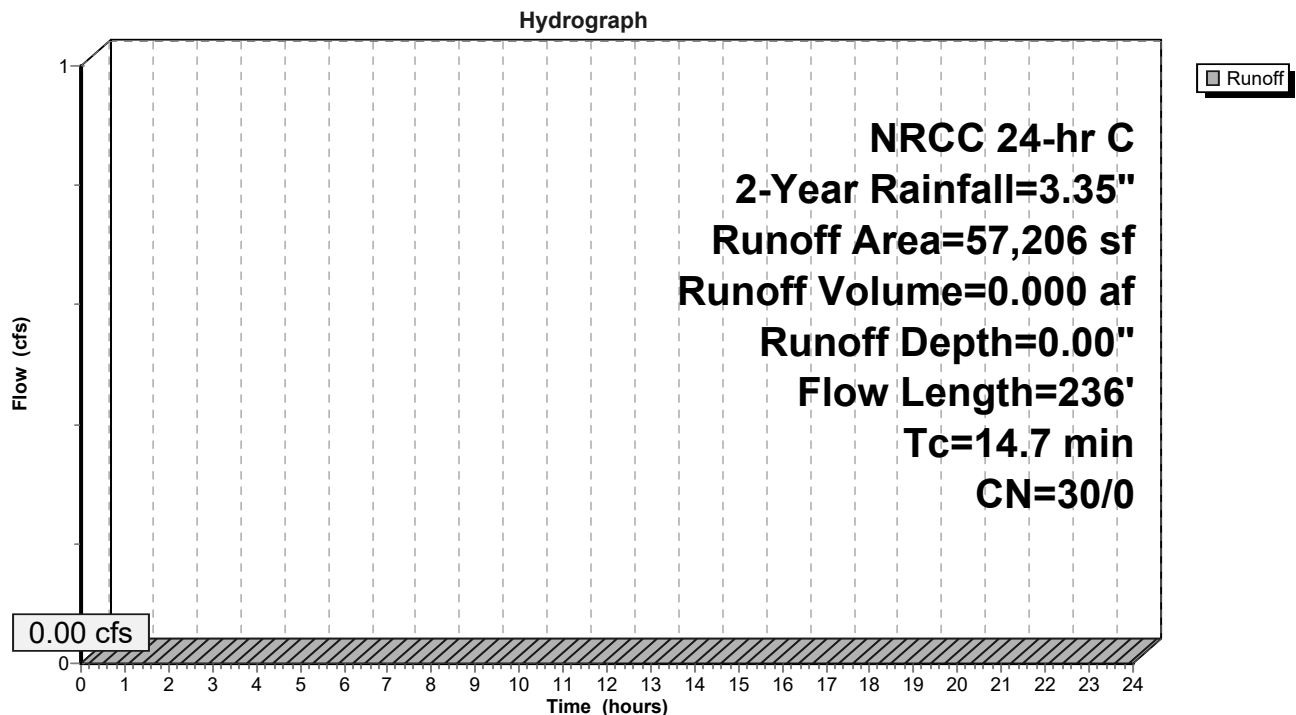
Runoff = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af, Depth= 0.00"

Runoff by SCS TR-20 method, UH=SCS, Split Pervious/Imperv. UI as Pervious, Time Span= 0.00-24.00 hrs, dt= 0.10
NRCC 24-hr C 2-Year Rainfall=3.35"

Area (sf)	CN	Description
57,206	30	Meadow, non-grazed, HSG A
57,206	30	100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
11.6	50	0.0080	0.07		Sheet Flow, Grass: Dense n= 0.240 P2= 3.35"
3.1	186	0.0210	1.01		Shallow Concentrated Flow, Short Grass Pasture Kv= 7.0 fps
14.7	236	Total			

Subcatchment PR-8:



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NRCC 24-hr C 2-Year Rainfall=3.35"

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Page 14

Summary for Pond BASIN 1: Southerly Bog

Inflow Area = 12.077 ac, 0.00% Impervious, Inflow Depth > 0.29" for 2-Year event
Inflow = 0.87 cfs @ 12.94 hrs, Volume= 0.291 af
Outflow = 0.74 cfs @ 13.42 hrs, Volume= 0.287 af, Atten= 15%, Lag= 28.7 min
Discarded = 0.13 cfs @ 13.42 hrs, Volume= 0.073 af
Primary = 0.61 cfs @ 13.42 hrs, Volume= 0.214 af
Secondary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.10 hrs
Peak Elev= 103.75' @ 13.42 hrs Surf.Area= 5,611 sf Storage= 885 cf

Plug-Flow detention time= 17.7 min calculated for 0.286 af (98% of inflow)
Center-of-Mass det. time= 12.7 min (1,003.1 - 990.4)

Volume	Invert	Avail.Storage	Storage Description
#1	103.43'	567,739 cf	Custom Stage Data (Prismatic) Listed below (Recalc)
Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
103.43	0	0	0
104.00	10,143	2,891	2,891
105.00	114,071	62,107	64,998
106.00	274,635	194,353	259,351
107.00	342,142	308,389	567,739

Device	Routing	Invert	Outlet Devices
#1	Primary	103.43'	24.0" Round Culvert L= 25.0' RCP, sq.cut end projecting, Ke= 0.500 Inlet / Outlet Invert= 103.43' / 102.84' S= 0.0236 '/' Cc= 0.900 n= 0.012 Concrete pipe, finished, Flow Area= 3.14 sf
#2	Secondary	106.80'	120.0' long x 20.0' breadth Broad-Crested Rectangular Weir Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 Coef. (English) 2.68 2.70 2.70 2.64 2.63 2.64 2.64 2.63
#3	Discarded	103.43'	1.020 in/hr Exfiltration over Surface area

Discarded OutFlow Max=0.13 cfs @ 13.42 hrs HW=103.75' (Free Discharge)
↑**3=Exfiltration** (Exfiltration Controls 0.13 cfs)

Primary OutFlow Max=0.61 cfs @ 13.42 hrs HW=103.75' (Free Discharge)
↑**1=Culvert** (Inlet Controls 0.61 cfs @ 1.91 fps)

Secondary OutFlow Max=0.00 cfs @ 0.00 hrs HW=103.43' (Free Discharge)
↑**2=Broad-Crested Rectangular Weir** (Controls 0.00 cfs)

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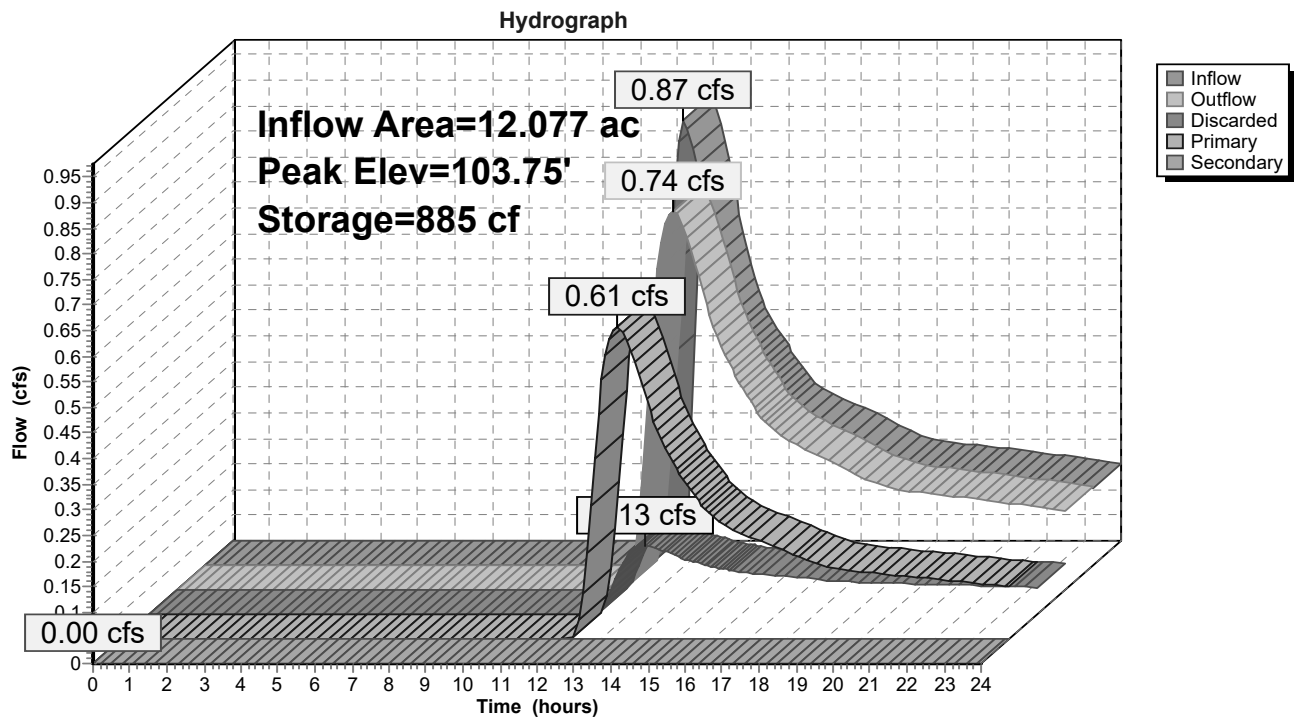
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Page 15

Pond BASIN 1: Southerly Bog



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Page 16

Summary for Pond BASIN 2: Northerly Bog

Inflow Area = 3.504 ac, 0.00% Impervious, Inflow Depth > 0.01" for 2-Year event
Inflow = 0.01 cfs @ 23.18 hrs, Volume= 0.004 af
Outflow = 0.01 cfs @ 23.28 hrs, Volume= 0.004 af, Atten= 0%, Lag= 6.1 min
Discarded = 0.01 cfs @ 23.28 hrs, Volume= 0.004 af
Primary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.10 hrs
Peak Elev= 103.00' @ 23.28 hrs Surf.Area= 65,000 sf Storage= 3 cf

Plug-Flow detention time= 7.0 min calculated for 0.004 af (98% of inflow)
Center-of-Mass det. time= 3.2 min (1,245.0 - 1,241.8)

Volume	Invert	Avail.Storage	Storage Description
#1	103.00'	66,417 cf	Custom Stage Data (Prismatic) Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
103.00	65,000	0	0
104.00	67,834	66,417	66,417

Device	Routing	Invert	Outlet Devices
#1	Primary	103.50'	15.0' long x 5.0' breadth Broad-Crested Rectangular Weir Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50 3.00 3.50 4.00 4.50 5.00 5.50 Coef. (English) 2.34 2.50 2.70 2.68 2.68 2.66 2.65 2.65 2.65 2.65 2.67 2.66 2.68 2.70 2.74 2.79 2.88
#2	Discarded	103.00'	1.020 in/hr Exfiltration over Surface area

Discarded OutFlow Max=1.53 cfs @ 23.28 hrs HW=103.00' (Free Discharge)
↑**2=Exfiltration** (Exfiltration Controls 1.53 cfs)

Primary OutFlow Max=0.00 cfs @ 0.00 hrs HW=103.00' (Free Discharge)
↑**1=Broad-Crested Rectangular Weir** (Controls 0.00 cfs)

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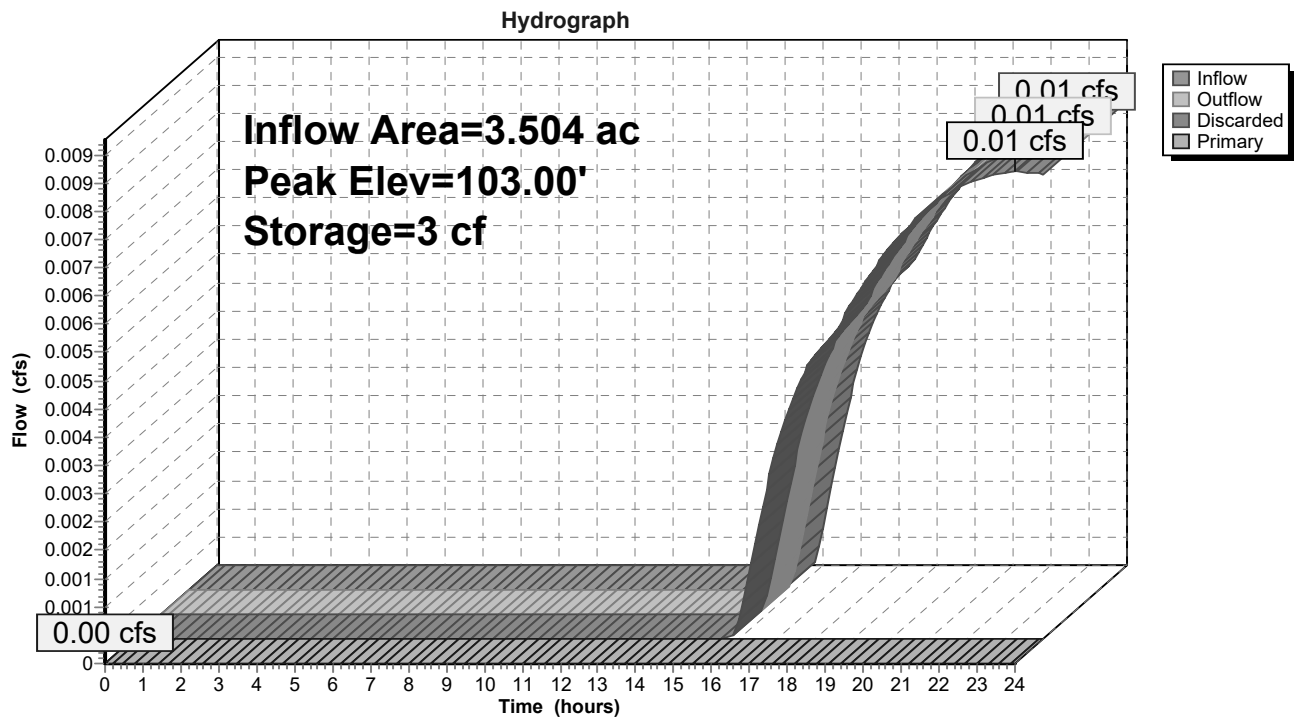
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Page 17

Pond BASIN 2: Northerly Bog



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Page 18

Summary for Pond BASIN 4:

Inflow Area = 0.252 ac, 0.00% Impervious, Inflow Depth > 1.81" for 2-Year event
Inflow = 0.51 cfs @ 12.12 hrs, Volume= 0.038 af
Outflow = 0.03 cfs @ 14.06 hrs, Volume= 0.028 af, Atten= 94%, Lag= 116.7 min
Discarded = 0.03 cfs @ 14.06 hrs, Volume= 0.028 af
Primary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.10 hrs
Peak Elev= 105.40' @ 14.06 hrs Surf.Area= 1,348 sf Storage= 867 cf

Plug-Flow detention time= 293.1 min calculated for 0.028 af (74% of inflow)
Center-of-Mass det. time= 194.9 min (1,031.5 - 836.7)

Volume	Invert	Avail.Storage	Storage Description
#1	104.00'	4,520 cf	Custom Stage Data (Prismatic) Listed below (Recalc)
Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
104.00	75	0	0
105.00	797	436	436
106.00	2,168	1,483	1,919
107.00	3,035	2,602	4,520

Device	Routing	Invert	Outlet Devices
#1	Primary	107.20'	30.0' long x 30.0' breadth Broad-Crested Rectangular Weir Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 Coef. (English) 2.68 2.70 2.70 2.64 2.63 2.64 2.64 2.63
#2	Discarded	104.00'	1.020 in/hr Exfiltration over Surface area

Discarded OutFlow Max=0.03 cfs @ 14.06 hrs HW=105.40' (Free Discharge)
↑**2=Exfiltration** (Exfiltration Controls 0.03 cfs)

Primary OutFlow Max=0.00 cfs @ 0.00 hrs HW=104.00' (Free Discharge)
↑**1=Broad-Crested Rectangular Weir** (Controls 0.00 cfs)

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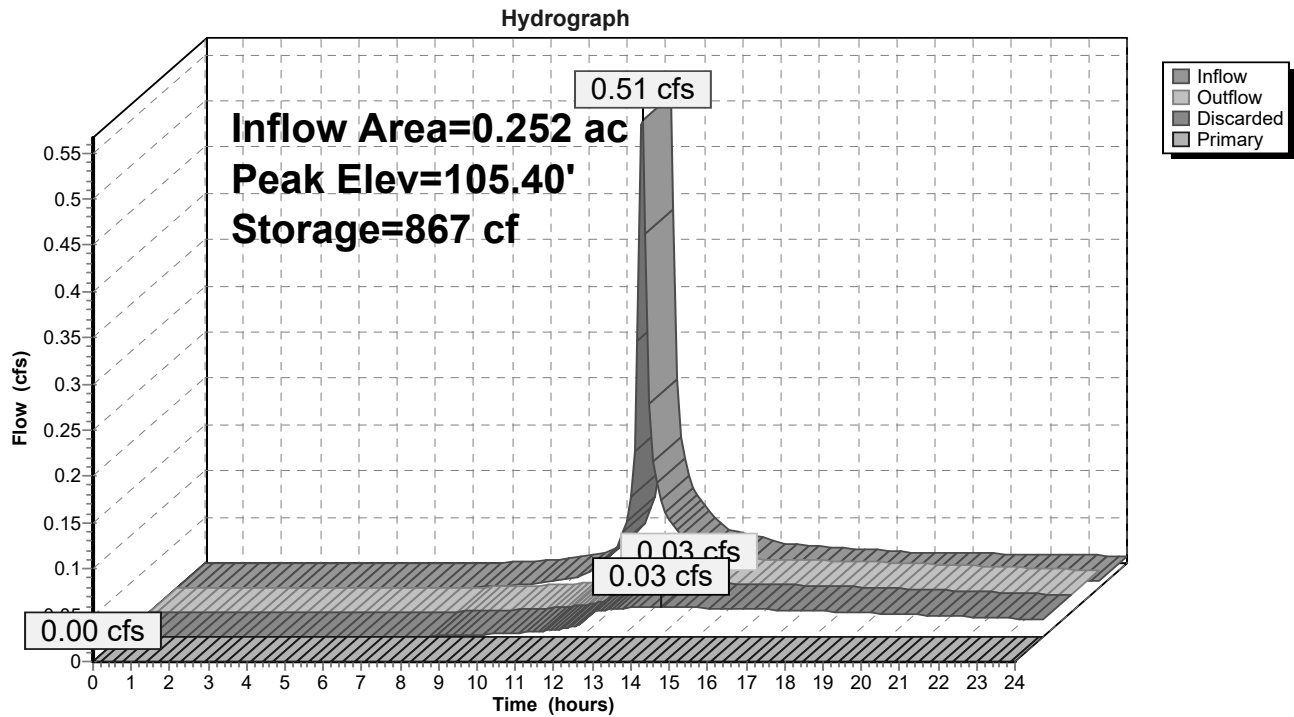
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Page 19

Pond BASIN 4:



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Page 20

Summary for Pond BASIN-3:

Inflow Area = 13.014 ac, 0.00% Impervious, Inflow Depth > 0.26" for 2-Year event
 Inflow = 0.94 cfs @ 12.12 hrs, Volume= 0.286 af
 Outflow = 0.92 cfs @ 12.13 hrs, Volume= 0.286 af, Atten= 1%, Lag= 0.3 min
 Discarded = 0.00 cfs @ 12.13 hrs, Volume= 0.001 af
 Primary = 0.92 cfs @ 12.13 hrs, Volume= 0.285 af

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.10 hrs
 Peak Elev= 97.00' @ 12.13 hrs Surf.Area= 35 sf Storage= 12 cf

Plug-Flow detention time= 0.3 min calculated for 0.286 af (100% of inflow)
 Center-of-Mass det. time= 0.2 min (958.8 - 958.6)

Volume	Invert	Avail.Storage	Storage Description
#1	96.30'	25,553 cf	Custom Stage Data (Prismatic) Listed below (Recalc)
Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
96.30	0	0	0
97.00	35	12	12
98.00	183	109	121
99.00	412	298	419
100.00	807	610	1,028
101.00	2,661	1,734	2,762
102.00	4,620	3,641	6,403
103.00	5,817	5,219	11,621
104.00	6,957	6,387	18,008
105.00	8,132	7,545	25,553

Device	Routing	Invert	Outlet Devices
#1	Primary	96.31'	36.0" Round Culvert L= 81.0' CPP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 96.31' / 96.30' S= 0.0001 '/' Cc= 0.900 n= 0.025 Corrugated metal, Flow Area= 7.07 sf
#2	Primary	105.50'	35.0' long x 10.0' breadth Broad-Crested Rectangular Weir Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 Coef. (English) 2.49 2.56 2.70 2.69 2.68 2.69 2.67 2.64
#3	Discarded	96.30'	1.020 in/hr Exfiltration over Surface area

Discarded OutFlow Max=0.00 cfs @ 12.13 hrs HW=96.97' (Free Discharge)
 ↳ **3=Exfiltration** (Exfiltration Controls 0.00 cfs)

Primary OutFlow Max=0.86 cfs @ 12.13 hrs HW=96.97' (Free Discharge)
 ↳ **1=Culvert** (Barrel Controls 0.86 cfs @ 1.12 fps)
 ↳ **2=Broad-Crested Rectangular Weir** (Controls 0.00 cfs)

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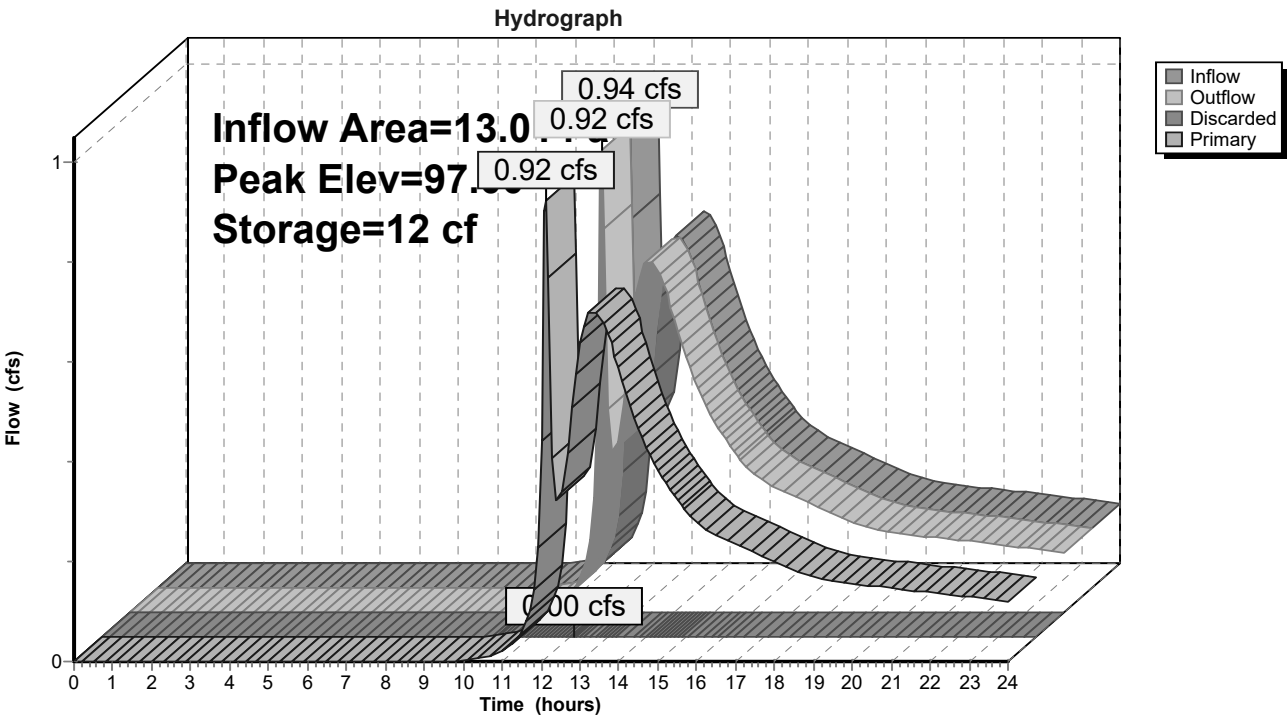
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Page 21

Pond BASIN-3:



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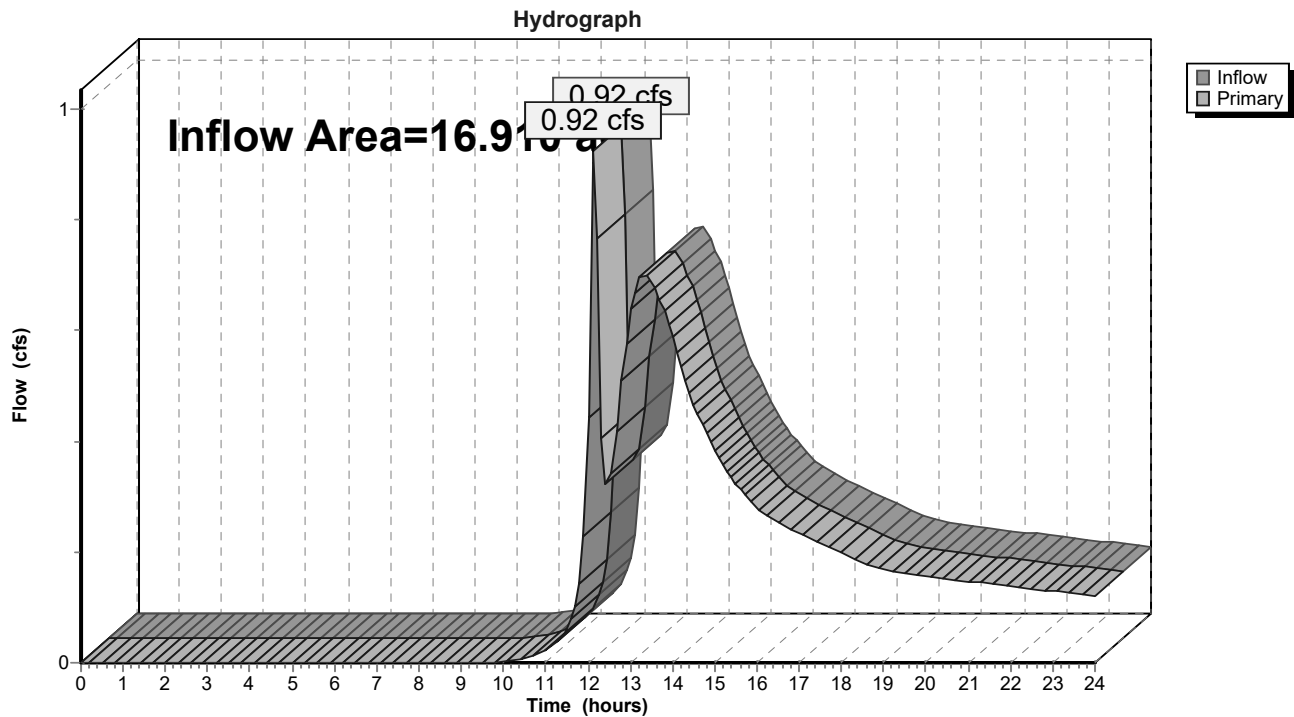
Page 22

Summary for Link POA-1:

Inflow Area = 16.910 ac, 0.00% Impervious, Inflow Depth > 0.20" for 2-Year event
Inflow = 0.92 cfs @ 12.13 hrs, Volume= 0.285 af
Primary = 0.92 cfs @ 12.13 hrs, Volume= 0.285 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-24.00 hrs, dt= 0.10 hrs

Link POA-1:



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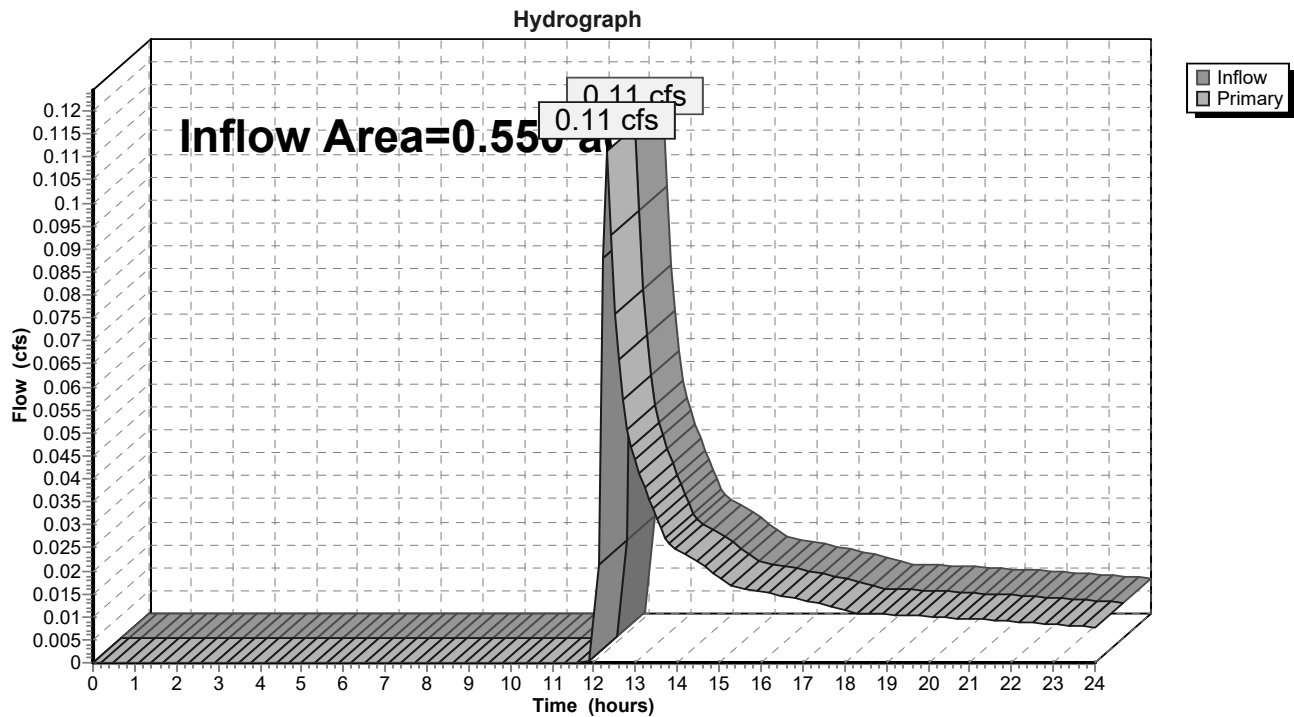
Page 23

Summary for Link POA-2:

Inflow Area = 0.550 ac, 0.00% Impervious, Inflow Depth > 0.39" for 2-Year event
Inflow = 0.11 cfs @ 12.31 hrs, Volume= 0.018 af
Primary = 0.11 cfs @ 12.31 hrs, Volume= 0.018 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-24.00 hrs, dt= 0.10 hrs

Link POA-2:



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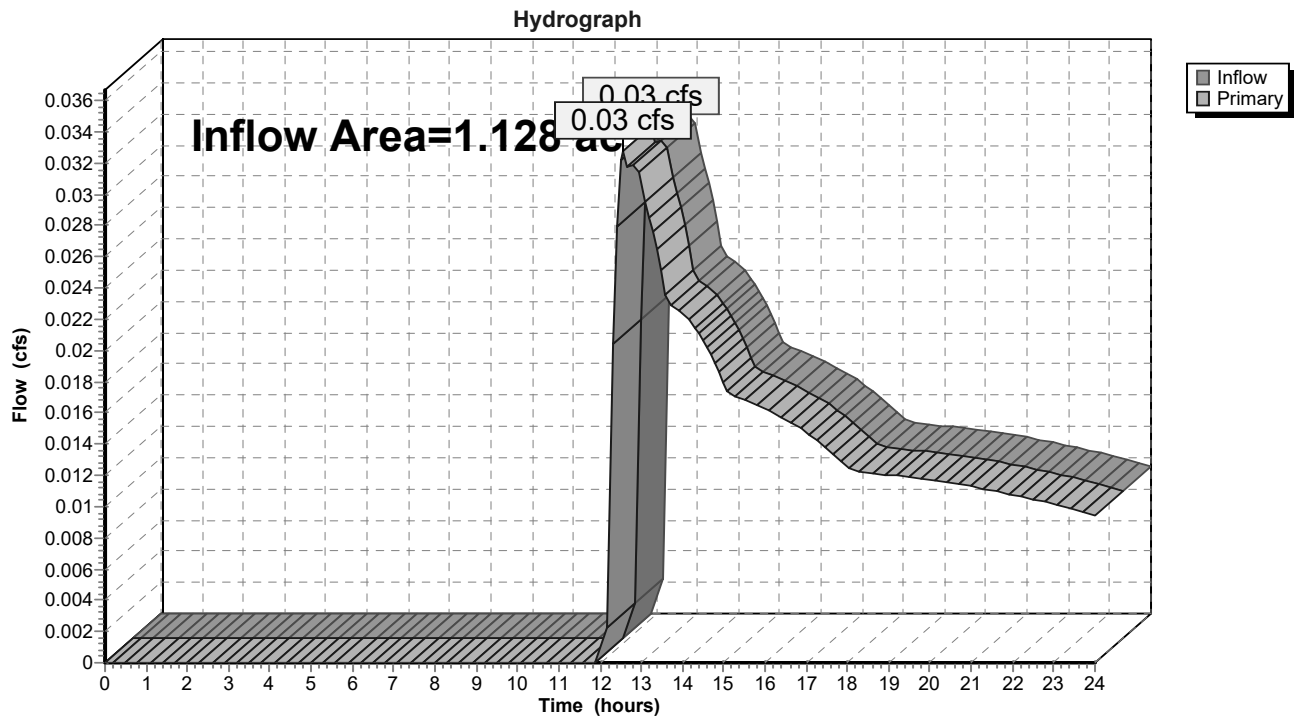
Page 24

Summary for Link POA-3:

Inflow Area = 1.128 ac, 0.00% Impervious, Inflow Depth > 0.16" for 2-Year event
Inflow = 0.03 cfs @ 12.55 hrs, Volume= 0.015 af
Primary = 0.03 cfs @ 12.55 hrs, Volume= 0.015 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-24.00 hrs, dt= 0.10 hrs

Link POA-3:



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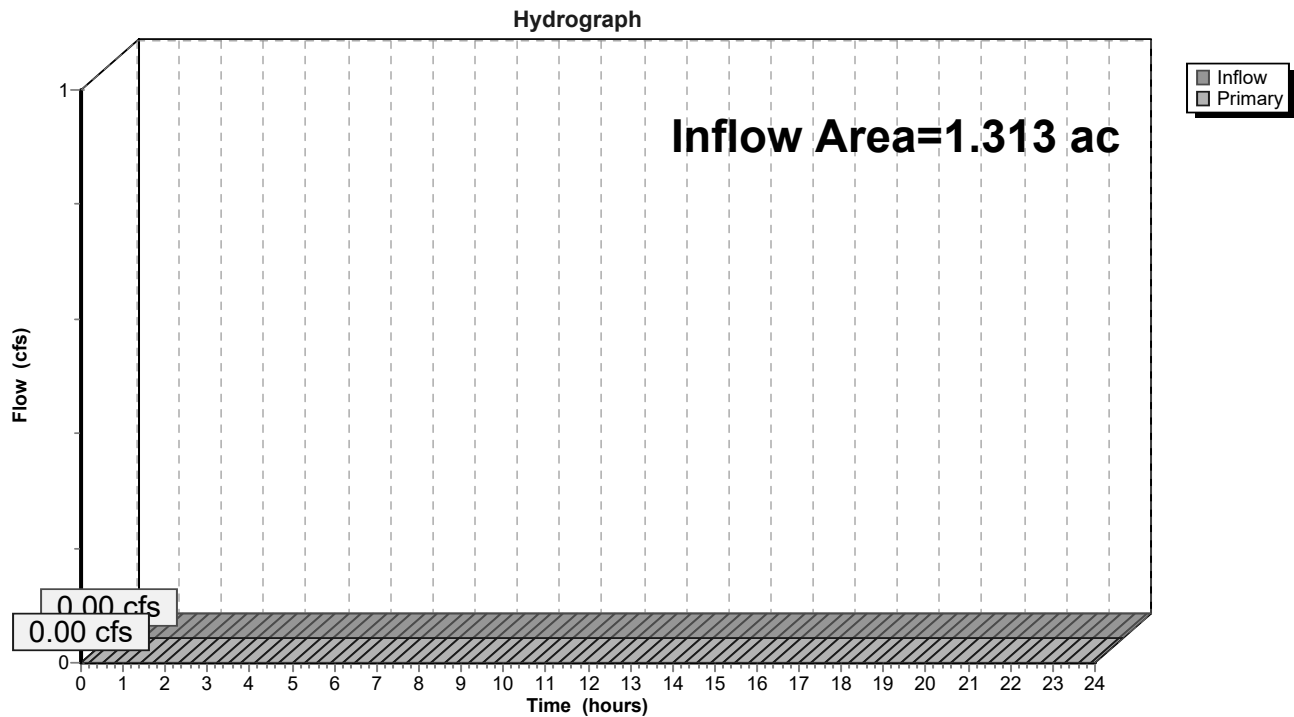
Page 25

Summary for Link POA-4:

Inflow Area = 1.313 ac, 0.00% 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

Primary outflow = Inflow, Time Span= 0.00-24.00 hrs, dt= 0.10 hrs

Link POA-4:



Proposed Conditions

NRCC 24-hr C 10-Year Rainfall=4.95"

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Page 26

Time span=0.00-24.00 hrs, dt=0.10 hrs, 241 points
Runoff by SCS TR-20 method, UH=SCS, Split Pervious/Imperv. UI as Pervious
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Subcatchment PR-1: Runoff Area=526,067 sf 0.00% Impervious Runoff Depth>0.94"
Flow Length=979' Tc=45.5 min CN=55/0 Runoff=4.67 cfs 0.943 af

Subcatchment PR-2: Runoff Area=152,619 sf 0.00% Impervious Runoff Depth>0.26"
Flow Length=751' Tc=16.4 min CN=41/0 Runoff=0.17 cfs 0.075 af

Subcatchment PR-3: Runoff Area=29,839 sf 0.00% Impervious Runoff Depth>2.49"
Tc=6.0 min CN=76/0 Runoff=1.90 cfs 0.142 af

Subcatchment PR-4: Runoff Area=17,129 sf 0.00% Impervious Runoff Depth>0.10"
Tc=6.0 min CN=36/0 Runoff=0.00 cfs 0.003 af

Subcatchment PR-5: Runoff Area=10,964 sf 0.00% Impervious Runoff Depth>3.22"
Tc=6.0 min CN=84/0 Runoff=0.89 cfs 0.068 af

Subcatchment PR-6: Runoff Area=23,951 sf 0.00% Impervious Runoff Depth>1.14"
Flow Length=195' Tc=13.7 min CN=58/0 Runoff=0.50 cfs 0.052 af

Subcatchment PR-7: Runoff Area=49,157 sf 0.00% Impervious Runoff Depth>0.67"
Tc=6.0 min CN=50/0 Runoff=0.53 cfs 0.063 af

Subcatchment PR-8: Runoff Area=57,206 sf 0.00% Impervious Runoff Depth>0.00"
Flow Length=236' Tc=14.7 min CN=30/0 Runoff=0.00 cfs 0.000 af

Pond BASIN 1: Southerly Bog Peak Elev=104.13' Storage=5,035 cf Inflow=4.67 cfs 0.943 af
Discarded=0.55 cfs 0.159 af Primary=2.78 cfs 0.775 af Secondary=0.00 cfs 0.000 af Outflow=3.33 cfs 0.934 af

Pond BASIN 2: Northerly Bog Peak Elev=103.00' Storage=71 cf Inflow=0.17 cfs 0.075 af
Discarded=0.17 cfs 0.075 af Primary=0.00 cfs 0.000 af Outflow=0.17 cfs 0.075 af

Pond BASIN 4: Peak Elev=105.88' Storage=1,672 cf Inflow=0.89 cfs 0.068 af
Discarded=0.05 cfs 0.045 af Primary=0.00 cfs 0.000 af Outflow=0.05 cfs 0.045 af

Pond BASIN-3: Peak Elev=97.44' Storage=42 cf Inflow=2.99 cfs 0.917 af
Discarded=0.00 cfs 0.001 af Primary=2.98 cfs 0.916 af Outflow=2.98 cfs 0.917 af

Link POA-1: Inflow=2.98 cfs 0.919 af
Primary=2.98 cfs 0.919 af

Link POA-2: Inflow=0.50 cfs 0.052 af
Primary=0.50 cfs 0.052 af

Link POA-3: Inflow=0.53 cfs 0.063 af
Primary=0.53 cfs 0.063 af

Link POA-4: Inflow=0.00 cfs 0.000 af
Primary=0.00 cfs 0.000 af

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NRCC 24-hr C 10-Year Rainfall=4.95"

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Page 27

Total Runoff Area = 19.902 ac Runoff Volume = 1.347 af Average Runoff Depth = 0.81"
100.00% Pervious = 19.902 ac 0.00% Impervious = 0.000 ac

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Page 28

Summary for Subcatchment PR-1:

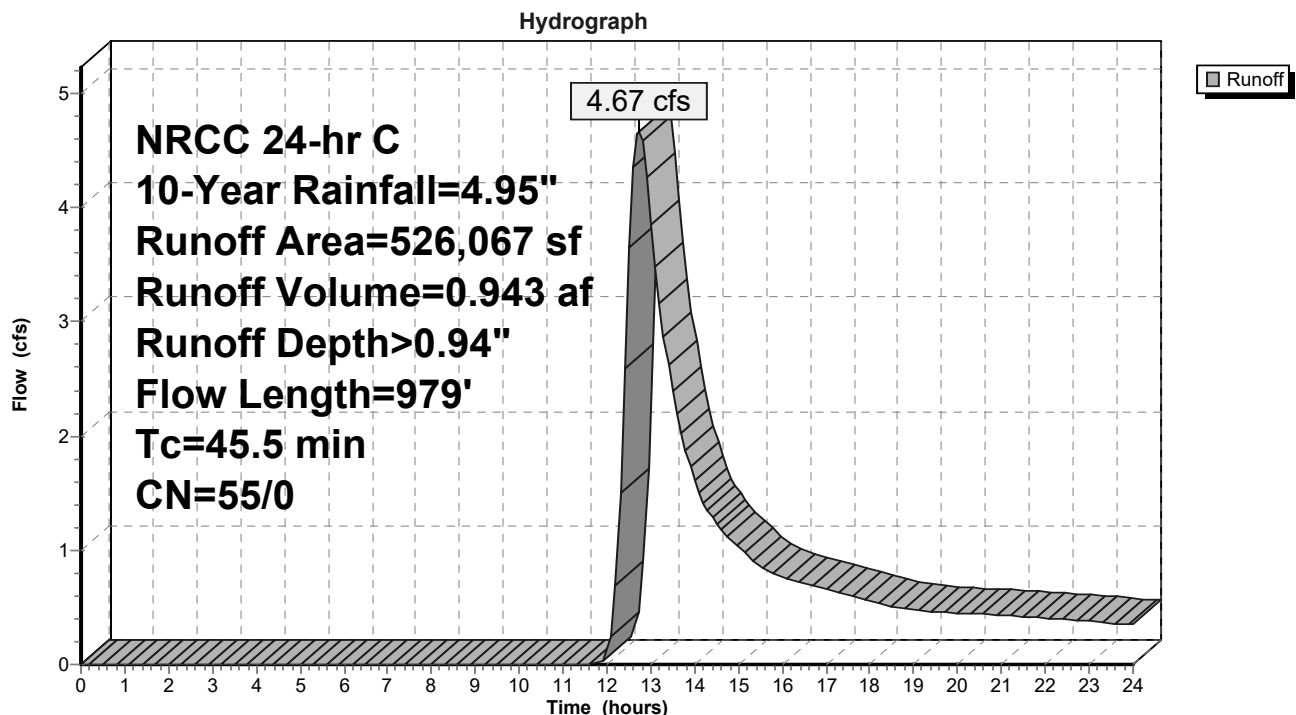
Runoff = 4.67 cfs @ 12.73 hrs, Volume= 0.943 af, Depth> 0.94"

Runoff by SCS TR-20 method, UH=SCS, Split Pervious/Imperv. UI as Pervious, Time Span= 0.00-24.00 hrs, dt= 0.10
NRCC 24-hr C 10-Year Rainfall=4.95"

Area (sf)	CN	Description
63,573	30	Meadow, non-grazed, HSG A
4,170	72	Dirt roads, HSG A
457,715	58	Meadow, non-grazed, HSG B
609	82	Dirt roads, HSG B
526,067	55	Weighted Average
526,067	55	100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
11.6	50	0.0080	0.07		Sheet Flow, Grass: Dense n= 0.240 P2= 3.35"
5.6	335	0.0200	0.99		Shallow Concentrated Flow, Short Grass Pasture Kv= 7.0 fps
28.3	594	0.0025	0.35		Shallow Concentrated Flow, Short Grass Pasture Kv= 7.0 fps
45.5	979	Total			

Subcatchment PR-1:



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Page 29

Summary for Subcatchment PR-2:

Runoff = 0.17 cfs @ 12.73 hrs, Volume= 0.075 af, Depth> 0.26"

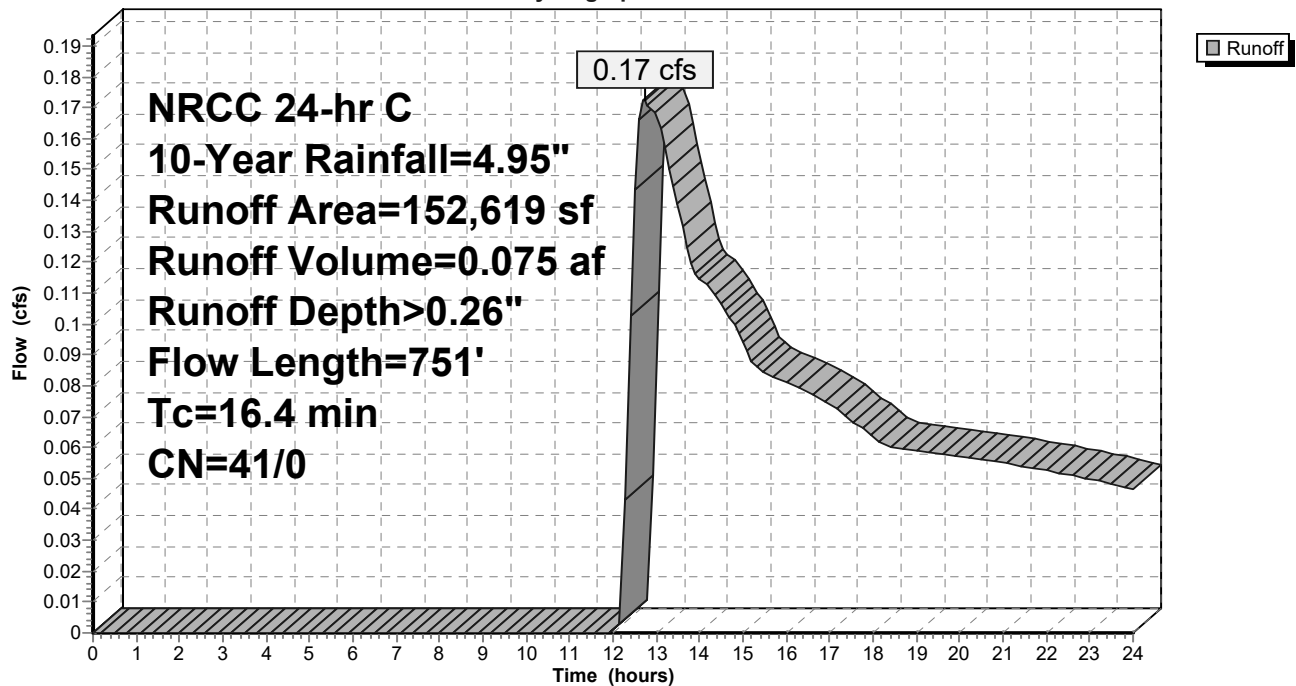
Runoff by SCS TR-20 method, UH=SCS, Split Pervious/Imperv. UI as Pervious, Time Span= 0.00-24.00 hrs, dt= 0.10
NRCC 24-hr C 10-Year Rainfall=4.95"

Area (sf)	CN	Description
94,623	30	Meadow, non-grazed, HSG A
7,838	72	Dirt roads, HSG A
50,158	58	Meadow, non-grazed, HSG B
152,619	41	Weighted Average
152,619	41	100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
1.8	50	0.0340	0.45		Sheet Flow, Fallow n= 0.050 P2= 3.35"
14.6	701	0.0130	0.80		Shallow Concentrated Flow, Short Grass Pasture Kv= 7.0 fps
16.4	751	Total			

Subcatchment PR-2:

Hydrograph



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Page 30

Summary for Subcatchment PR-3:

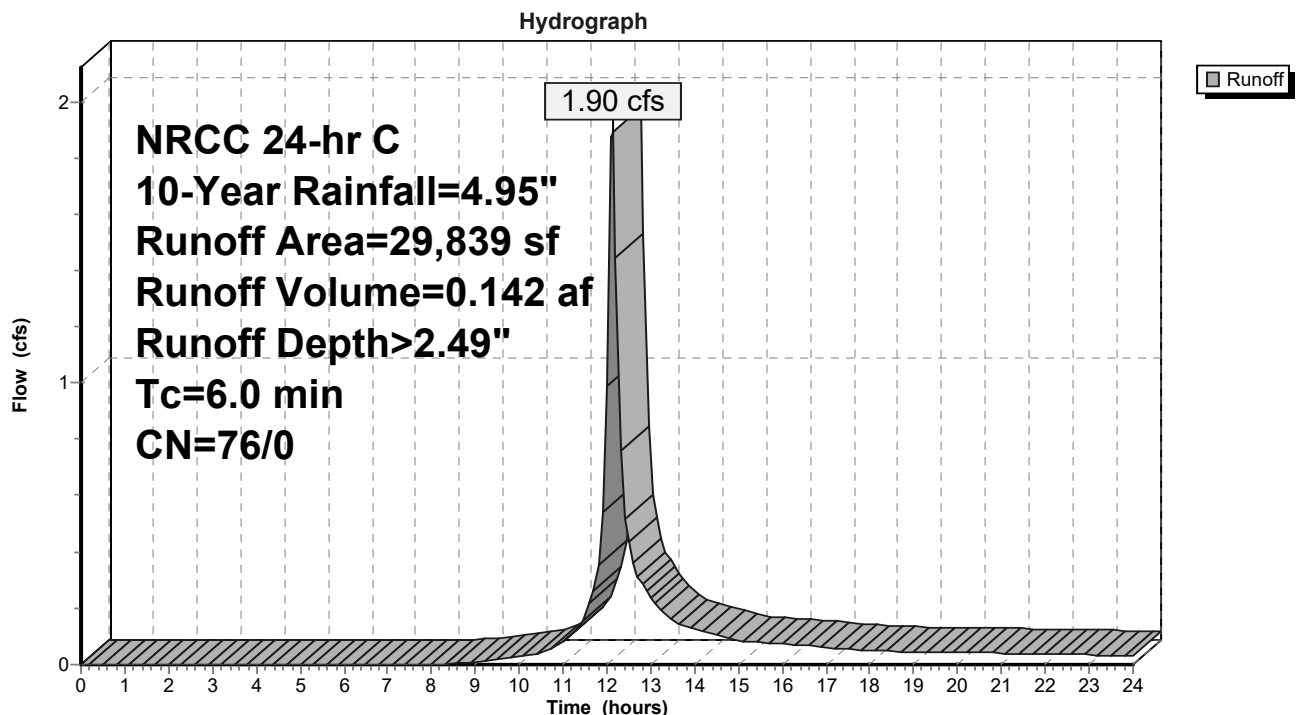
Runoff = 1.90 cfs @ 12.12 hrs, Volume= 0.142 af, Depth> 2.49"

Runoff by SCS TR-20 method, UH=SCS, Split Pervious/Imperv. UI as Pervious, Time Span= 0.00-24.00 hrs, dt= 0.10
NRCC 24-hr C 10-Year Rainfall=4.95"

Area (sf)	CN	Description
12,670	72	Dirt roads, HSG A
6,021	98	Water Surface, 0% imp, HSG A
3,556	30	Meadow, non-grazed, HSG A
5,480	82	Dirt roads, HSG B
2,112	98	Water Surface, 0% imp, HSG B
29,839	76	Weighted Average
29,839	76	100.00% Pervious Area

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

Subcatchment PR-3:



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Page 31

Summary for Subcatchment PR-4:

Runoff = 0.00 cfs @ 14.49 hrs, Volume= 0.003 af, Depth> 0.10"

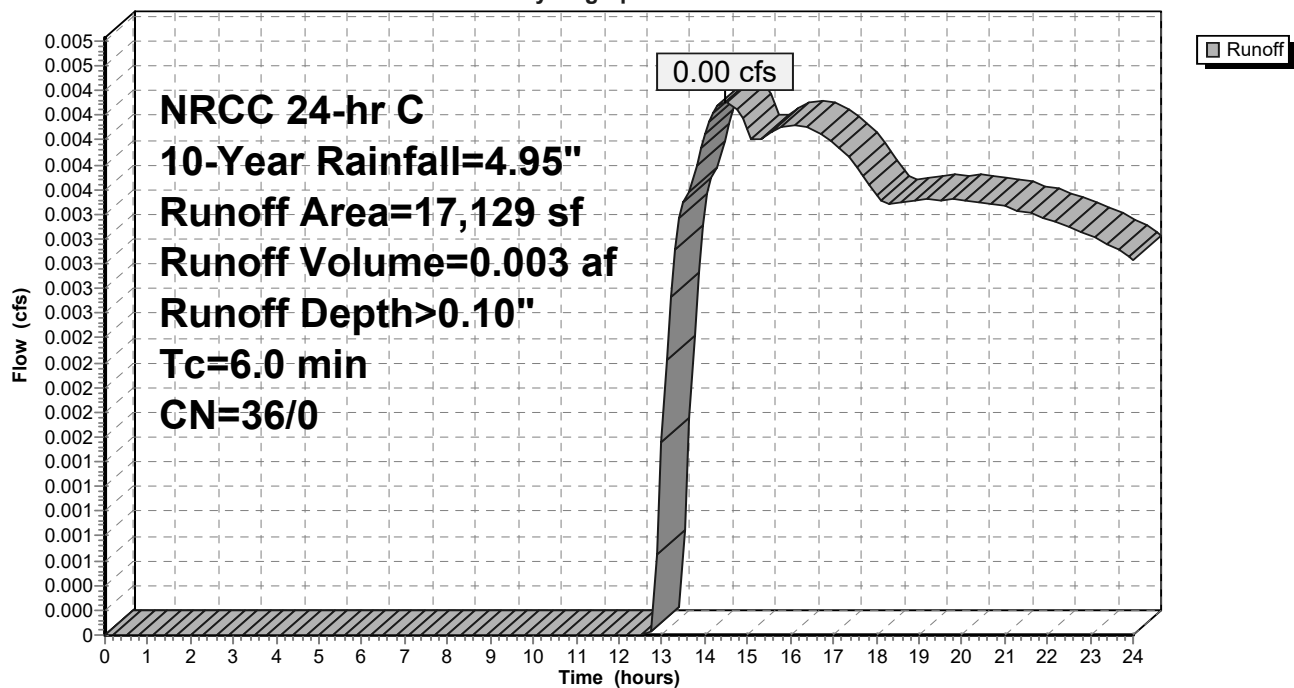
Runoff by SCS TR-20 method, UH=SCS, Split Pervious/Imperv. UI as Pervious, Time Span= 0.00-24.00 hrs, dt= 0.10
NRCC 24-hr C 10-Year Rainfall=4.95"

Area (sf)	CN	Description
2,539	72	Dirt roads, HSG A
14,590	30	Meadow, non-grazed, HSG A
17,129	36	Weighted Average
17,129	36	100.00% Pervious Area

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

Subcatchment PR-4:

Hydrograph



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Page 32

Summary for Subcatchment PR-5:

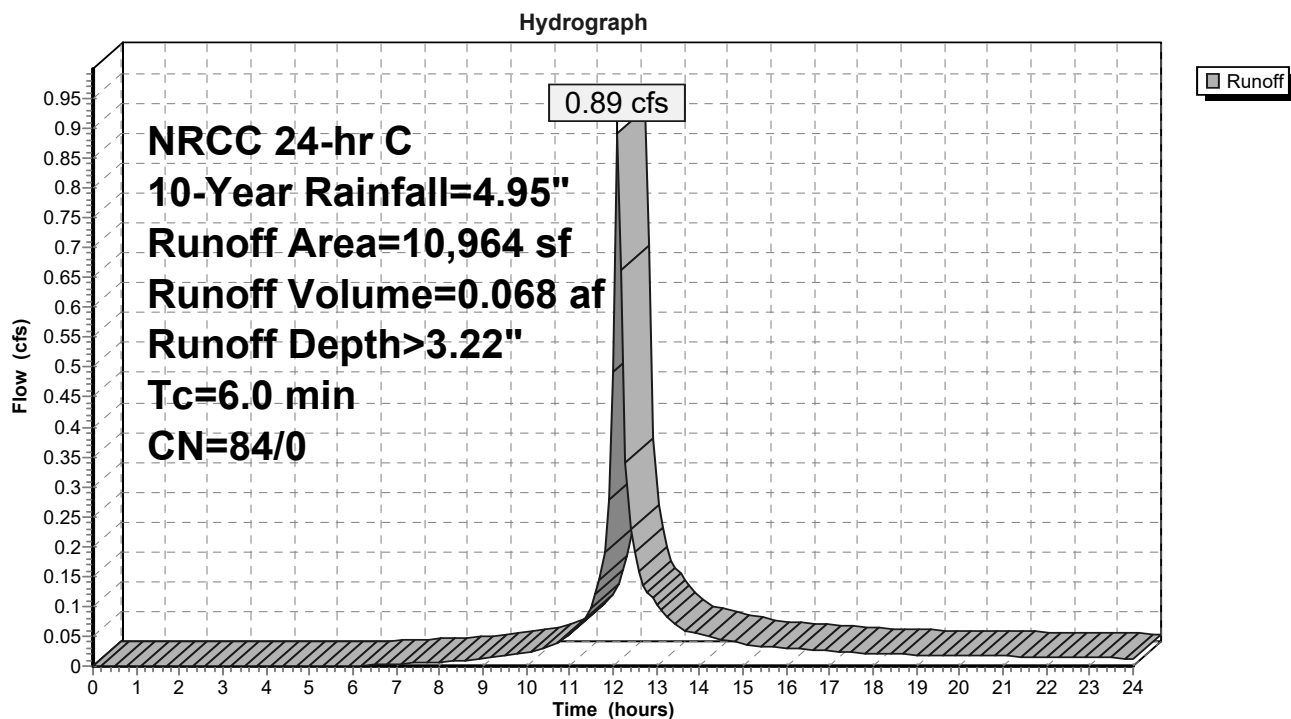
Runoff = 0.89 cfs @ 12.11 hrs, Volume= 0.068 af, Depth> 3.22"

Runoff by SCS TR-20 method, UH=SCS, Split Pervious/Imperv. UI as Pervious, Time Span= 0.00-24.00 hrs, dt= 0.10
NRCC 24-hr C 10-Year Rainfall=4.95"

Area (sf)	CN	Description
2,303	72	Dirt roads, HSG A
747	98	Water Surface, 0% imp, HSG A
5,627	82	Dirt roads, HSG B
2,287	98	Water Surface, 0% imp, HSG B
10,964	84	Weighted Average
10,964	84	100.00% Pervious Area

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

Subcatchment PR-5:



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Page 33

Summary for Subcatchment PR-6:

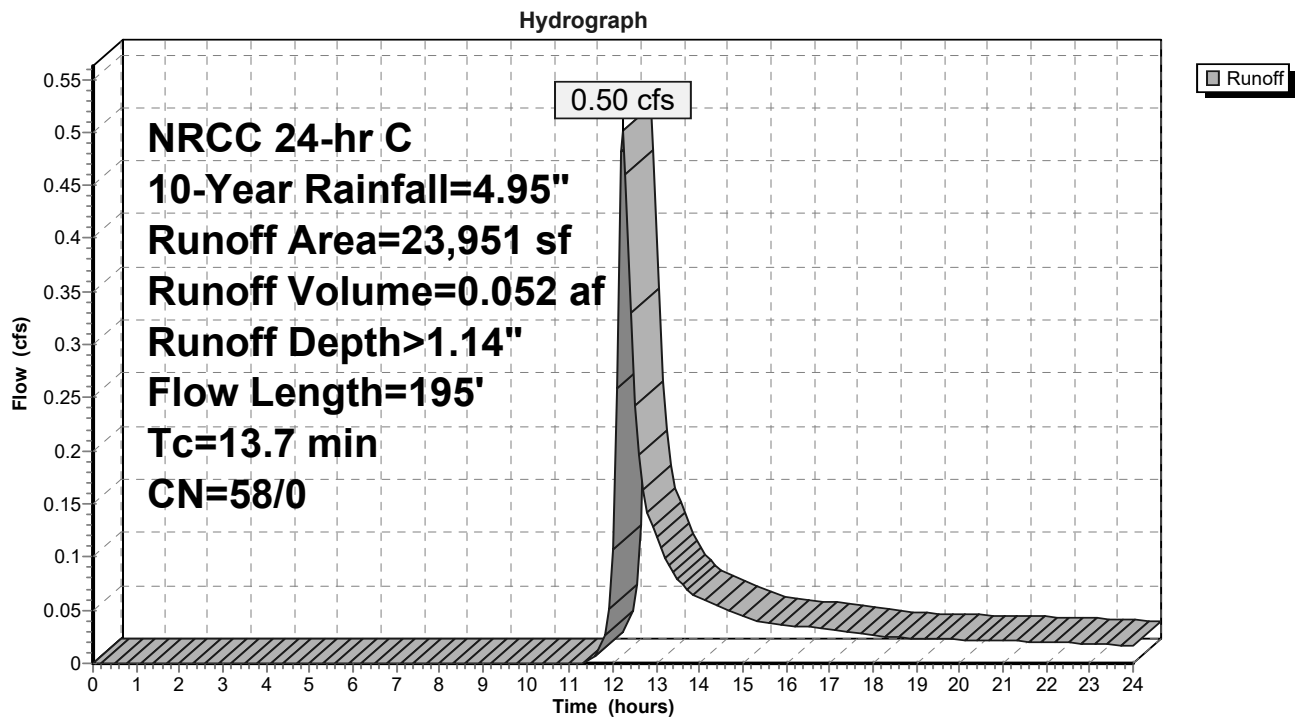
Runoff = 0.50 cfs @ 12.24 hrs, Volume= 0.052 af, Depth> 1.14"

Runoff by SCS TR-20 method, UH=SCS, Split Pervious/Imperv. UI as Pervious, Time Span= 0.00-24.00 hrs, dt= 0.10
NRCC 24-hr C 10-Year Rainfall=4.95"

Area (sf)	CN	Description
23,951	58	Meadow, non-grazed, HSG B
23,951	58	100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
11.6	50	0.0080	0.07		Sheet Flow, Grass: Dense n= 0.240 P2= 3.35"
2.1	145	0.0270	1.15		Shallow Concentrated Flow, Short Grass Pasture Kv= 7.0 fps
13.7	195	Total			

Subcatchment PR-6:



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Page 34

Summary for Subcatchment PR-7:

Runoff = 0.53 cfs @ 12.17 hrs, Volume= 0.063 af, Depth> 0.67"

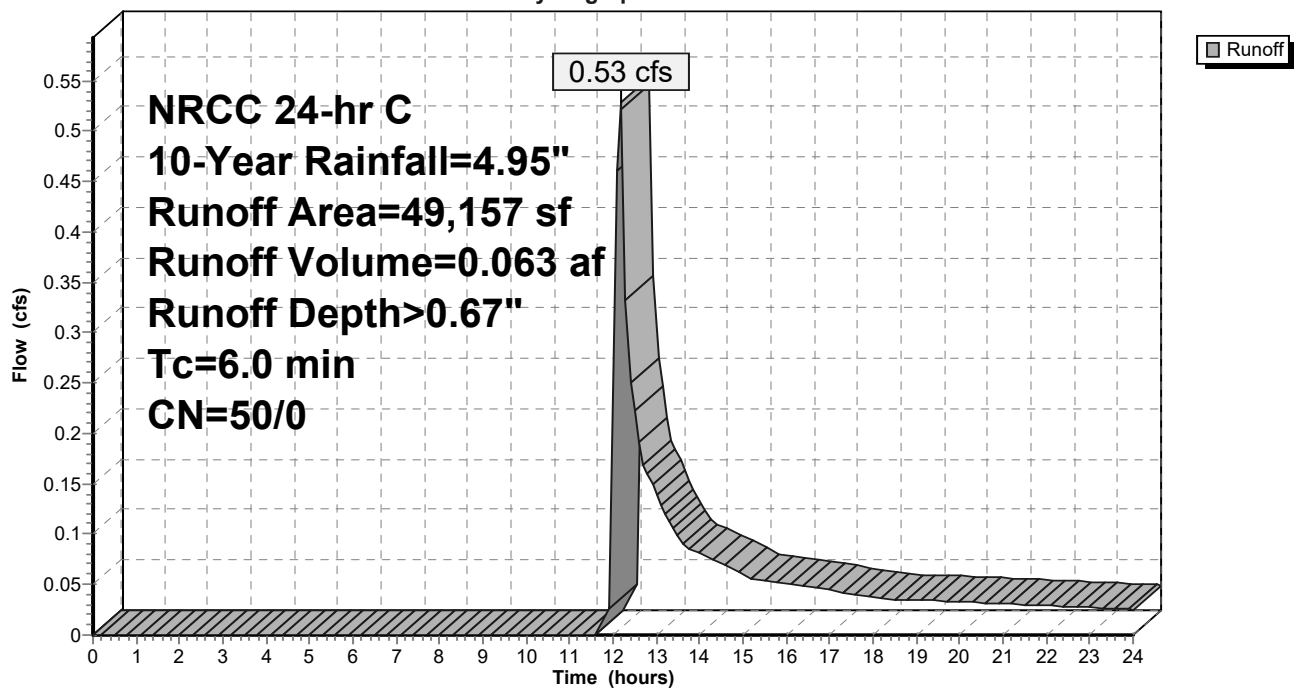
Runoff by SCS TR-20 method, UH=SCS, Split Pervious/Imperv. UI as Pervious, Time Span= 0.00-24.00 hrs, dt= 0.10
NRCC 24-hr C 10-Year Rainfall=4.95"

Area (sf)	CN	Description
13,721	30	Meadow, non-grazed, HSG A
35,436	58	Meadow, non-grazed, HSG B
49,157	50	Weighted Average
49,157	50	100.00% Pervious Area

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

Subcatchment PR-7:

Hydrograph



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Page 35

Summary for Subcatchment PR-8:

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

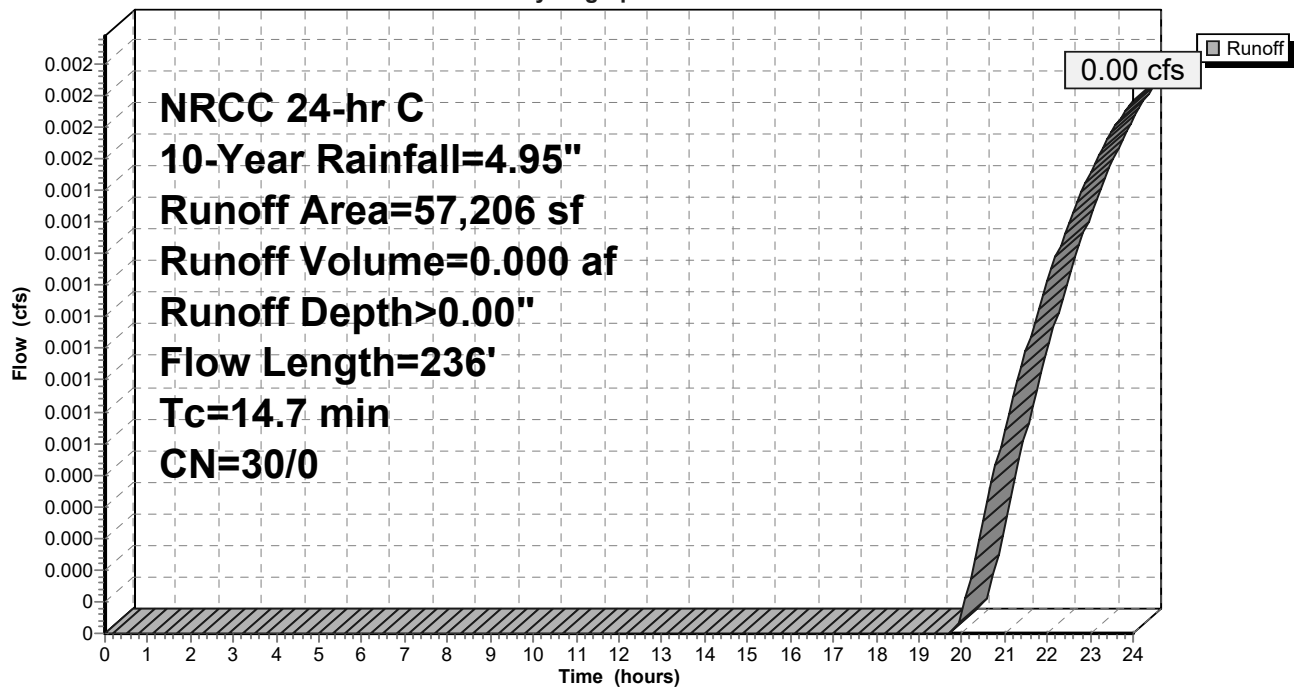
Runoff by SCS TR-20 method, UH=SCS, Split Pervious/Imperv. UI as Pervious, Time Span= 0.00-24.00 hrs, dt= 0.10
NRCC 24-hr C 10-Year Rainfall=4.95"

Area (sf)	CN	Description
57,206	30	Meadow, non-grazed, HSG A
57,206	30	100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
11.6	50	0.0080	0.07		Sheet Flow, Grass: Dense n= 0.240 P2= 3.35"
3.1	186	0.0210	1.01		Shallow Concentrated Flow, Short Grass Pasture Kv= 7.0 fps
14.7	236	Total			

Subcatchment PR-8:

Hydrograph



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NRCC 24-hr C 10-Year Rainfall=4.95"

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Summary for Pond BASIN 1: Southerly Bog

Inflow Area = 12.077 ac, 0.00% Impervious, Inflow Depth > 0.94" for 10-Year event
 Inflow = 4.67 cfs @ 12.73 hrs, Volume= 0.943 af
 Outflow = 3.33 cfs @ 13.15 hrs, Volume= 0.934 af, Atten= 29%, Lag= 25.1 min
 Discarded = 0.55 cfs @ 13.15 hrs, Volume= 0.159 af
 Primary = 2.78 cfs @ 13.15 hrs, Volume= 0.775 af
 Secondary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.10 hrs
 Peak Elev= 104.13' @ 13.15 hrs Surf.Area= 23,420 sf Storage= 5,035 cf

Plug-Flow detention time= 21.4 min calculated for 0.930 af (99% of inflow)
 Center-of-Mass det. time= 16.7 min (952.6 - 935.9)

Volume	Invert	Avail.Storage	Storage Description
#1	103.43'	567,739 cf	Custom Stage Data (Prismatic) Listed below (Recalc)
Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
103.43	0	0	0
104.00	10,143	2,891	2,891
105.00	114,071	62,107	64,998
106.00	274,635	194,353	259,351
107.00	342,142	308,389	567,739

Device	Routing	Invert	Outlet Devices
#1	Primary	103.43'	24.0" Round Culvert L= 25.0' RCP, sq.cut end projecting, Ke= 0.500 Inlet / Outlet Invert= 103.43' / 102.84' S= 0.0236 ' / Cc= 0.900 n= 0.012 Concrete pipe, finished, Flow Area= 3.14 sf
#2	Secondary	106.80'	120.0' long x 20.0' breadth Broad-Crested Rectangular Weir Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 Coef. (English) 2.68 2.70 2.70 2.64 2.63 2.64 2.64 2.63
#3	Discarded	103.43'	1.020 in/hr Exfiltration over Surface area

Discarded OutFlow Max=0.55 cfs @ 13.15 hrs HW=104.13' (Free Discharge)
 ↑**3=Exfiltration** (Exfiltration Controls 0.55 cfs)

Primary OutFlow Max=2.77 cfs @ 13.15 hrs HW=104.13' (Free Discharge)
 ↑**1=Culvert** (Inlet Controls 2.77 cfs @ 2.84 fps)

Secondary OutFlow Max=0.00 cfs @ 0.00 hrs HW=103.43' (Free Discharge)
 ↑**2=Broad-Crested Rectangular Weir** (Controls 0.00 cfs)

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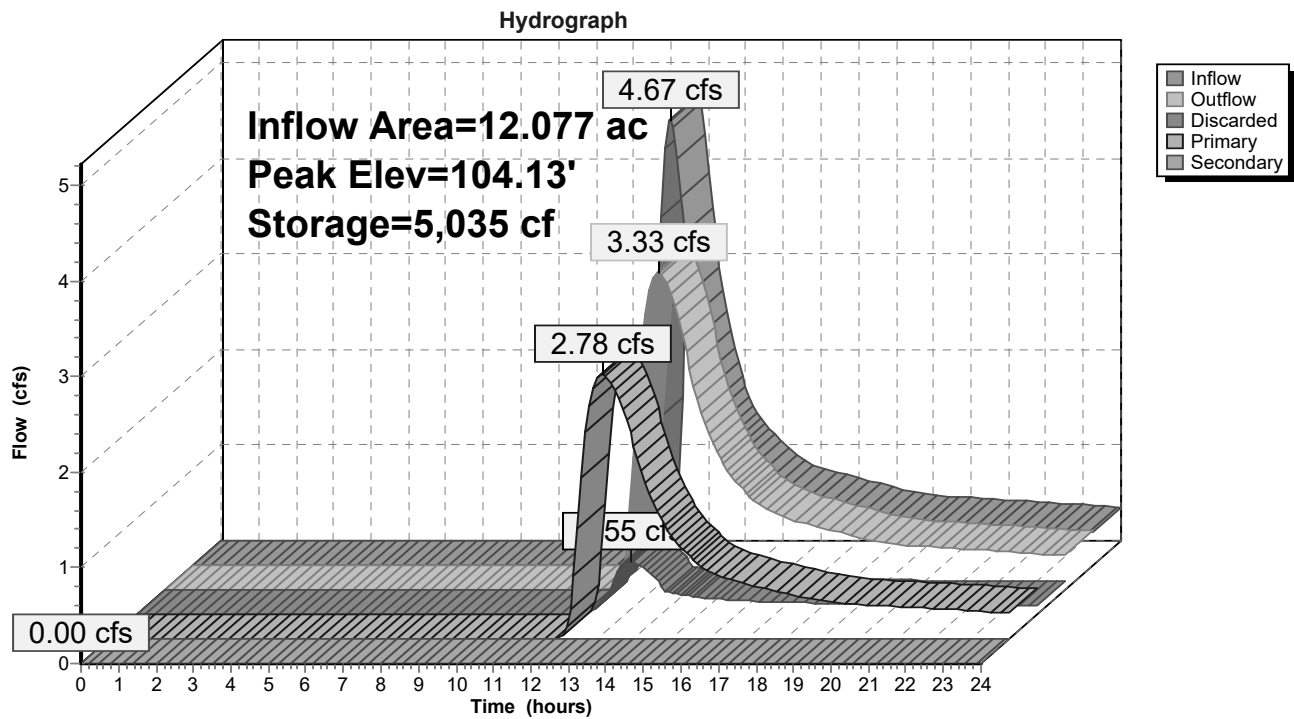
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Page 37

Pond BASIN 1: Southerly Bog



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Summary for Pond BASIN 2: Northerly Bog

Inflow Area = 3.504 ac, 0.00% Impervious, Inflow Depth > 0.26" for 10-Year event
Inflow = 0.17 cfs @ 12.73 hrs, Volume= 0.075 af
Outflow = 0.17 cfs @ 12.98 hrs, Volume= 0.075 af, Atten= 3%, Lag= 14.9 min
Discarded = 0.17 cfs @ 12.98 hrs, Volume= 0.075 af
Primary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.10 hrs
Peak Elev= 103.00' @ 12.98 hrs Surf.Area= 65,003 sf Storage= 71 cf

Plug-Flow detention time= 7.0 min calculated for 0.075 af (99% of inflow)
Center-of-Mass det. time= 4.5 min (1,020.2 - 1,015.8)

Volume	Invert	Avail.Storage	Storage Description
#1	103.00'	66,417 cf	Custom Stage Data (Prismatic) Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
103.00	65,000	0	0
104.00	67,834	66,417	66,417

Device	Routing	Invert	Outlet Devices
#1	Primary	103.50'	15.0' long x 5.0' breadth Broad-Crested Rectangular Weir Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50 3.00 3.50 4.00 4.50 5.00 5.50 Coef. (English) 2.34 2.50 2.70 2.68 2.68 2.66 2.65 2.65 2.65 2.65 2.67 2.66 2.68 2.70 2.74 2.79 2.88
#2	Discarded	103.00'	1.020 in/hr Exfiltration over Surface area

Discarded OutFlow Max=1.53 cfs @ 12.98 hrs HW=103.00' (Free Discharge)
↑**2=Exfiltration** (Exfiltration Controls 1.53 cfs)

Primary OutFlow Max=0.00 cfs @ 0.00 hrs HW=103.00' (Free Discharge)
↑**1=Broad-Crested Rectangular Weir** (Controls 0.00 cfs)

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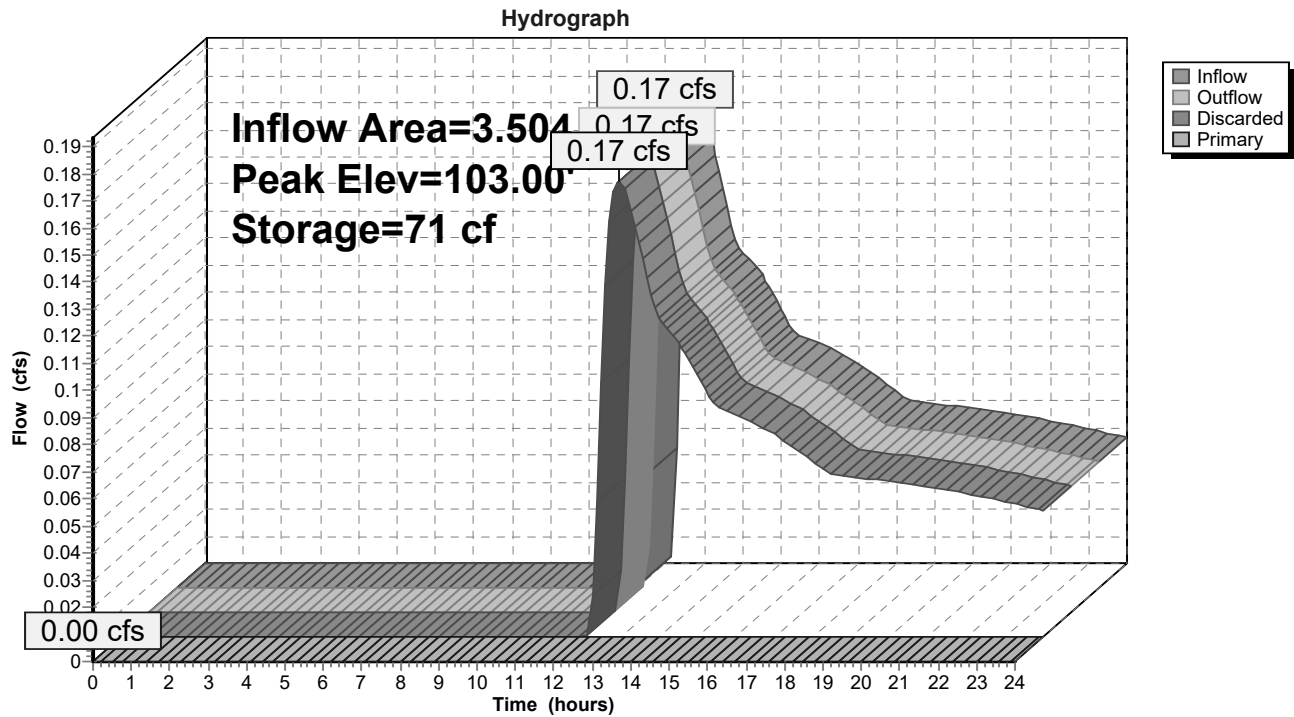
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Page 39

Pond BASIN 2: Northerly Bog



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Page 40

Summary for Pond BASIN 4:

Inflow Area = 0.252 ac, 0.00% Impervious, Inflow Depth > 3.22" for 10-Year event
Inflow = 0.89 cfs @ 12.11 hrs, Volume= 0.068 af
Outflow = 0.05 cfs @ 14.35 hrs, Volume= 0.045 af, Atten= 95%, Lag= 134.0 min
Discarded = 0.05 cfs @ 14.35 hrs, Volume= 0.045 af
Primary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.10 hrs
Peak Elev= 105.88' @ 14.35 hrs Surf.Area= 2,006 sf Storage= 1,672 cf

Plug-Flow detention time= 321.1 min calculated for 0.045 af (67% of inflow)
Center-of-Mass det. time= 214.6 min (1,033.0 - 818.4)

Volume	Invert	Avail.Storage	Storage Description
#1	104.00'	4,520 cf	Custom Stage Data (Prismatic) Listed below (Recalc)
Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
104.00	75	0	0
105.00	797	436	436
106.00	2,168	1,483	1,919
107.00	3,035	2,602	4,520

Device	Routing	Invert	Outlet Devices
#1	Primary	107.20'	30.0' long x 30.0' breadth Broad-Crested Rectangular Weir Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 Coef. (English) 2.68 2.70 2.70 2.64 2.63 2.64 2.64 2.63
#2	Discarded	104.00'	1.020 in/hr Exfiltration over Surface area

Discarded OutFlow Max=0.05 cfs @ 14.35 hrs HW=105.88' (Free Discharge)
↑**2=Exfiltration** (Exfiltration Controls 0.05 cfs)

Primary OutFlow Max=0.00 cfs @ 0.00 hrs HW=104.00' (Free Discharge)
↑**1=Broad-Crested Rectangular Weir** (Controls 0.00 cfs)

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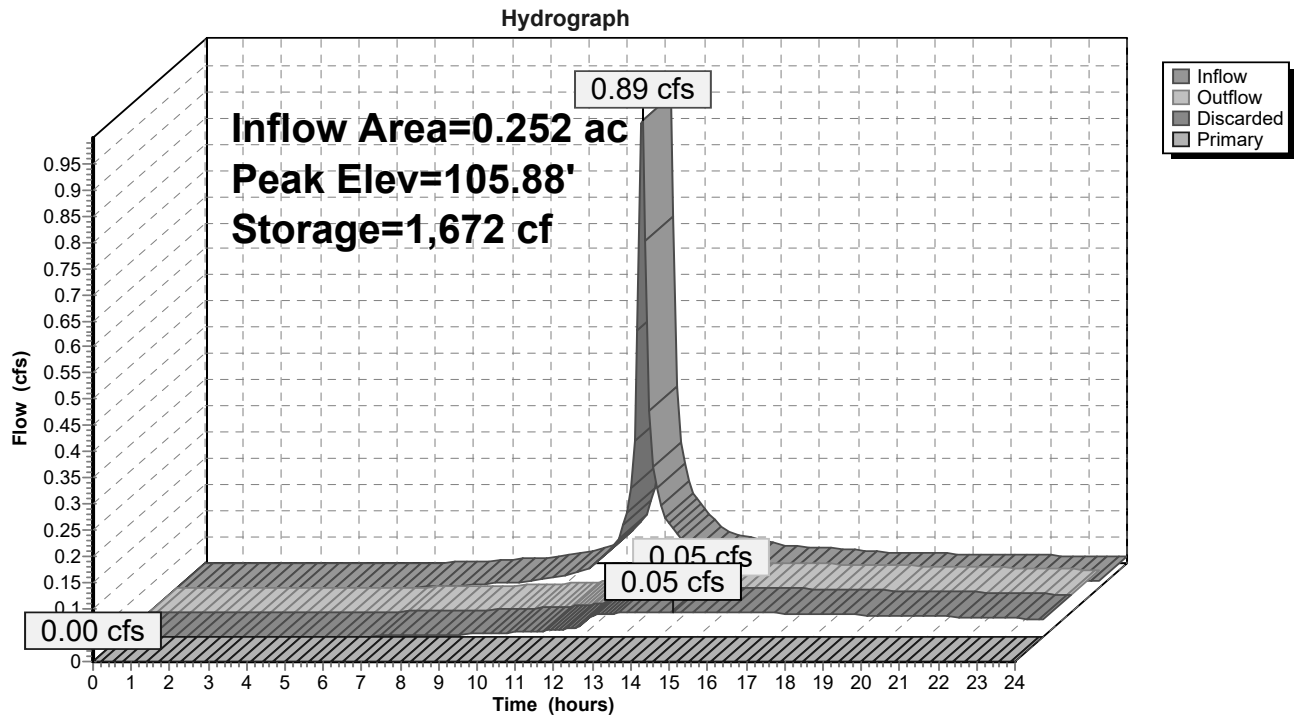
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Page 41

Pond BASIN 4:



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Summary for Pond BASIN-3:

Inflow Area = 13.014 ac, 0.00% Impervious, Inflow Depth > 0.85" for 10-Year event
 Inflow = 2.99 cfs @ 13.10 hrs, Volume= 0.917 af
 Outflow = 2.98 cfs @ 13.12 hrs, Volume= 0.917 af, Atten= 0%, Lag= 0.9 min
 Discarded = 0.00 cfs @ 13.12 hrs, Volume= 0.001 af
 Primary = 2.98 cfs @ 13.12 hrs, Volume= 0.916 af

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.10 hrs
 Peak Elev= 97.44' @ 13.12 hrs Surf.Area= 100 sf Storage= 42 cf

Plug-Flow detention time= 0.2 min calculated for 0.913 af (100% of inflow)
 Center-of-Mass det. time= 0.2 min (930.0 - 929.9)

Volume	Invert	Avail.Storage	Storage Description
#1	96.30'	25,553 cf	Custom Stage Data (Prismatic) Listed below (Recalc)
Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
96.30	0	0	0
97.00	35	12	12
98.00	183	109	121
99.00	412	298	419
100.00	807	610	1,028
101.00	2,661	1,734	2,762
102.00	4,620	3,641	6,403
103.00	5,817	5,219	11,621
104.00	6,957	6,387	18,008
105.00	8,132	7,545	25,553

Device	Routing	Invert	Outlet Devices
#1	Primary	96.31'	36.0" Round Culvert L= 81.0' CPP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 96.31' / 96.30' S= 0.0001 '/' Cc= 0.900 n= 0.025 Corrugated metal, Flow Area= 7.07 sf
#2	Primary	105.50'	35.0' long x 10.0' breadth Broad-Crested Rectangular Weir Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 Coef. (English) 2.49 2.56 2.70 2.69 2.68 2.69 2.67 2.64
#3	Discarded	96.30'	1.020 in/hr Exfiltration over Surface area

Discarded OutFlow Max=0.00 cfs @ 13.12 hrs HW=97.44' (Free Discharge)
 ↳ **3=Exfiltration** (Exfiltration Controls 0.00 cfs)

Primary OutFlow Max=2.97 cfs @ 13.12 hrs HW=97.44' (Free Discharge)
 ↳ **1=Culvert** (Barrel Controls 2.97 cfs @ 1.81 fps)
 ↳ **2=Broad-Crested Rectangular Weir** (Controls 0.00 cfs)

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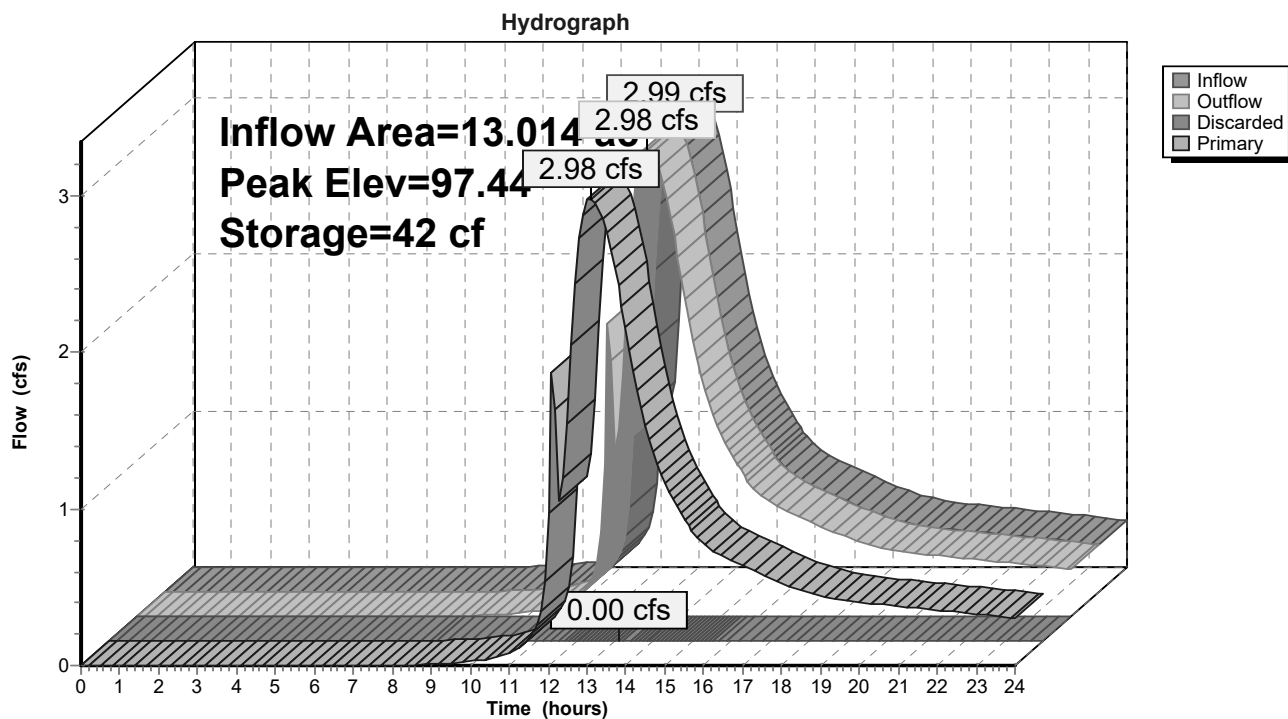
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Page 43

Pond BASIN-3:



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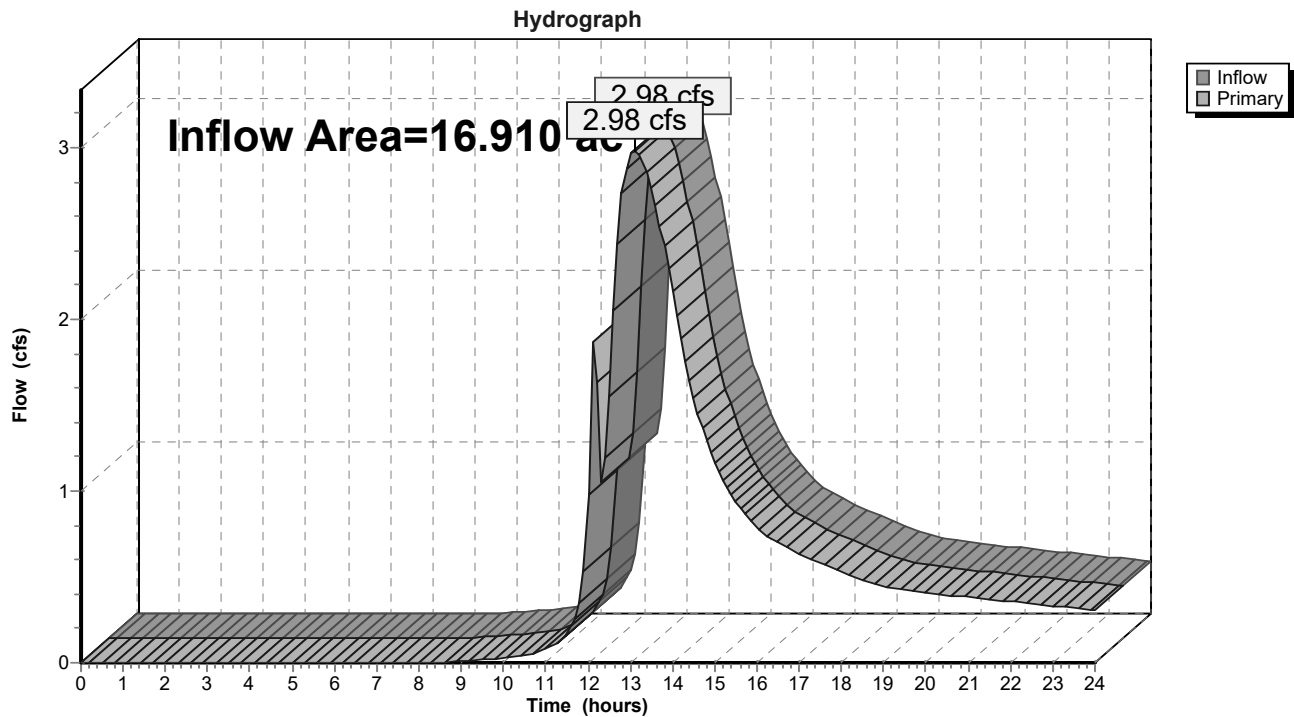
Page 44

Summary for Link POA-1:

Inflow Area = 16.910 ac, 0.00% Impervious, Inflow Depth > 0.65" for 10-Year event
Inflow = 2.98 cfs @ 13.13 hrs, Volume= 0.919 af
Primary = 2.98 cfs @ 13.13 hrs, Volume= 0.919 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-24.00 hrs, dt= 0.10 hrs

Link POA-1:



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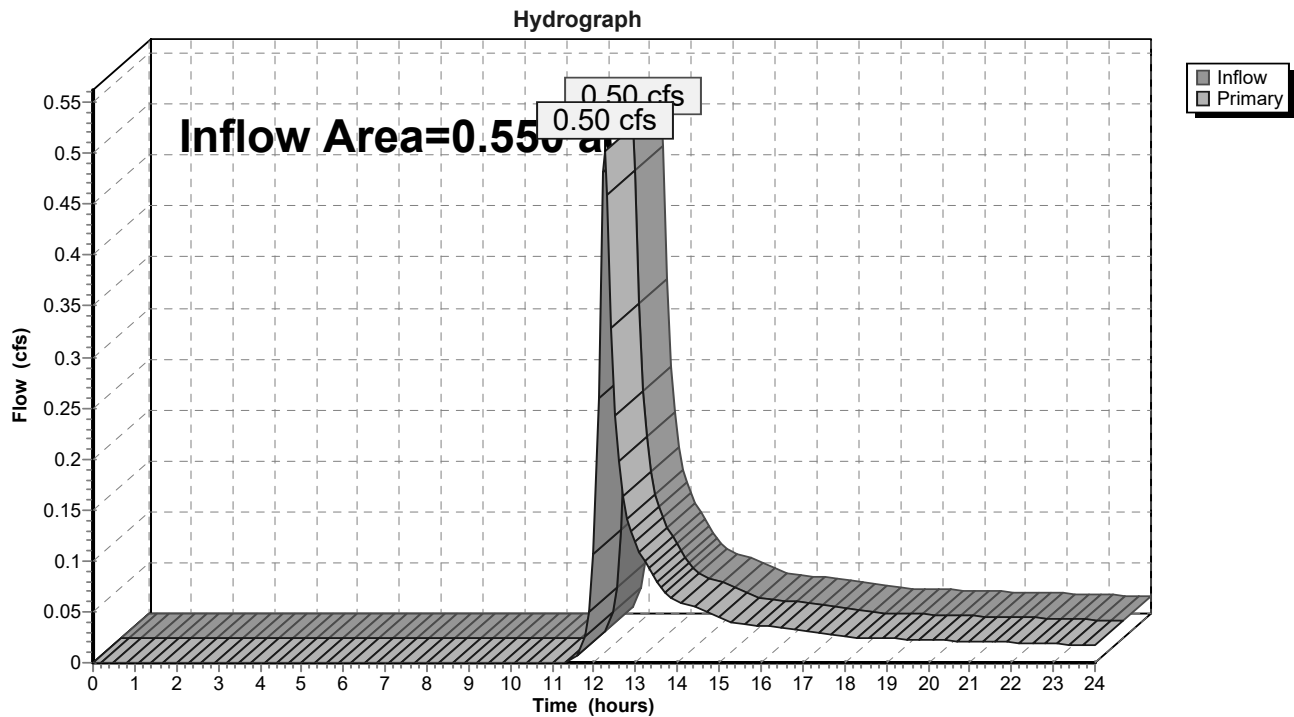
Page 45

Summary for Link POA-2:

Inflow Area = 0.550 ac, 0.00% Impervious, Inflow Depth > 1.14" for 10-Year event
Inflow = 0.50 cfs @ 12.24 hrs, Volume= 0.052 af
Primary = 0.50 cfs @ 12.24 hrs, Volume= 0.052 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-24.00 hrs, dt= 0.10 hrs

Link POA-2:



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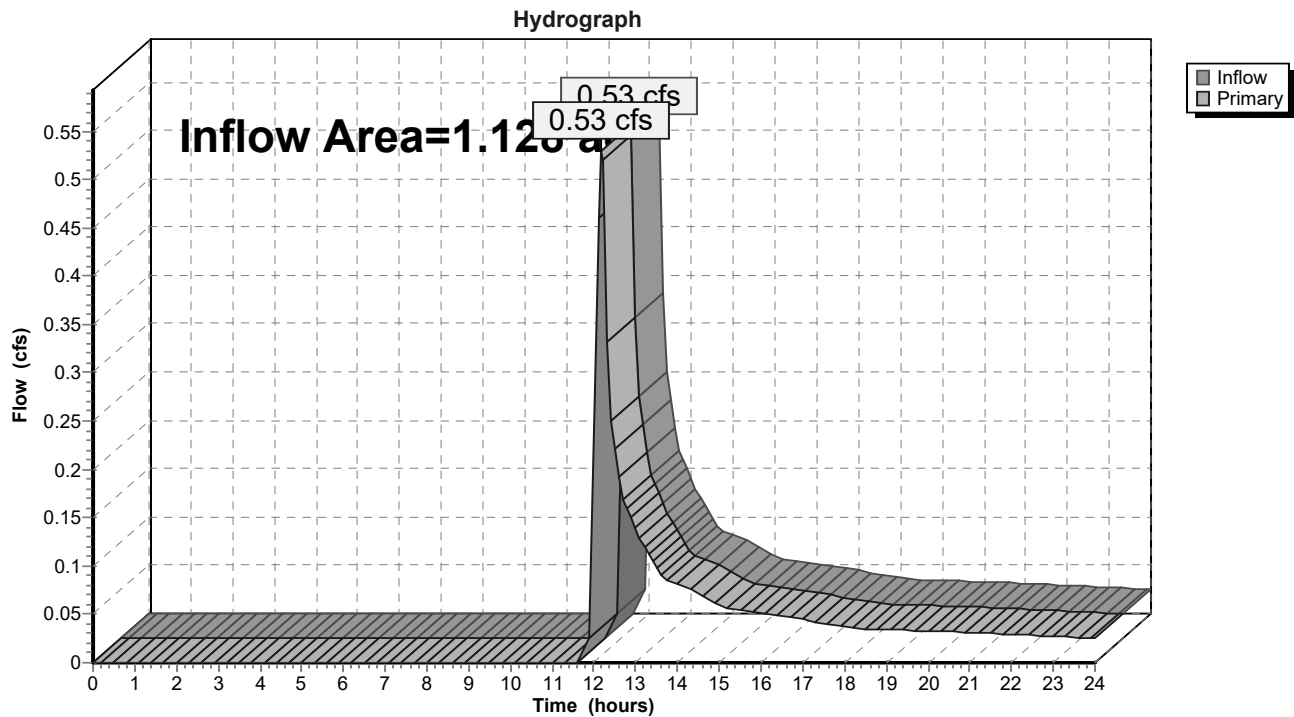
Page 46

Summary for Link POA-3:

Inflow Area = 1.128 ac, 0.00% Impervious, Inflow Depth > 0.67" for 10-Year event
Inflow = 0.53 cfs @ 12.17 hrs, Volume= 0.063 af
Primary = 0.53 cfs @ 12.17 hrs, Volume= 0.063 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-24.00 hrs, dt= 0.10 hrs

Link POA-3:



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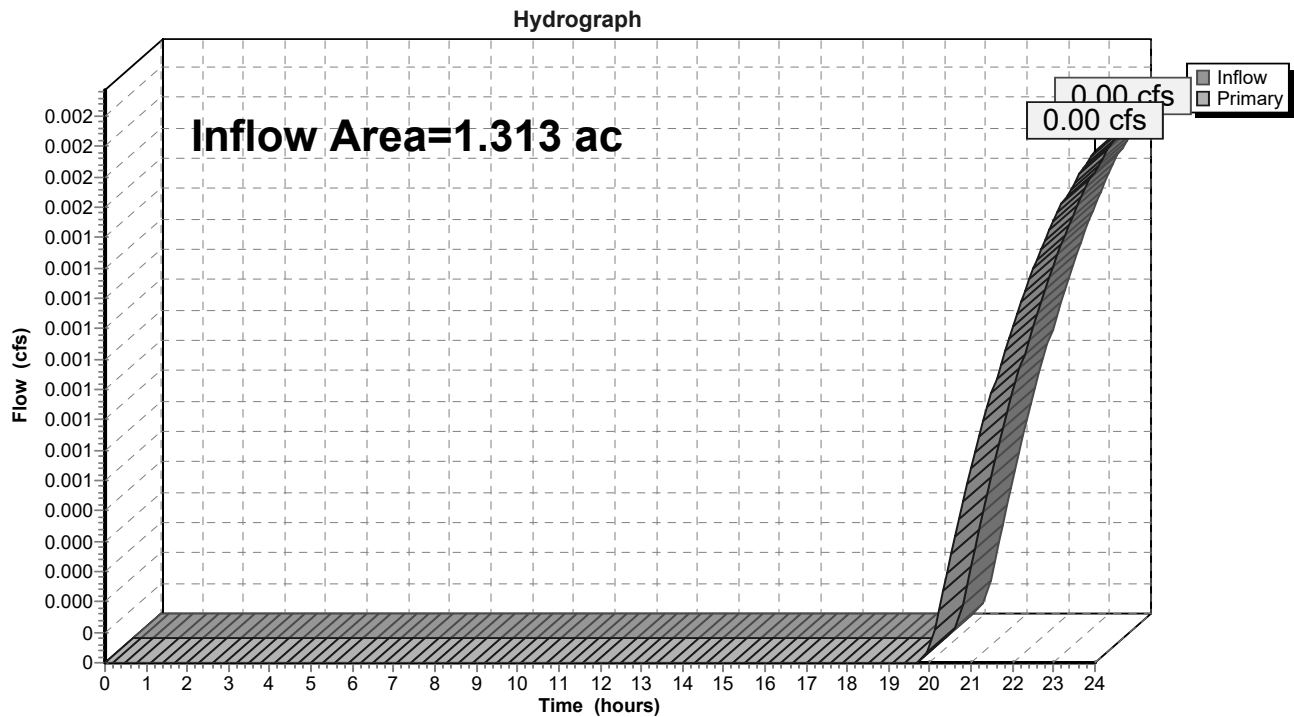
Page 47

Summary for Link POA-4:

Inflow Area = 1.313 ac, 0.00% Impervious, Inflow Depth > 0.00" for 10-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

Primary outflow = Inflow, Time Span= 0.00-24.00 hrs, dt= 0.10 hrs

Link POA-4:



Proposed Conditions

NRCC 24-hr C 100-Year Rainfall=8.68"

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Page 48

Time span=0.00-24.00 hrs, dt=0.10 hrs, 241 points
Runoff by SCS TR-20 method, UH=SCS, Split Pervious/Imperv. UI as Pervious
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Subcatchment PR-1: Runoff Area=526,067 sf 0.00% Impervious Runoff Depth>3.21"
Flow Length=979' Tc=45.5 min CN=55/0 Runoff=19.42 cfs 3.233 af

Subcatchment PR-2: Runoff Area=152,619 sf 0.00% Impervious Runoff Depth>1.66"
Flow Length=751' Tc=16.4 min CN=41/0 Runoff=4.01 cfs 0.484 af

Subcatchment PR-3: Runoff Area=29,839 sf 0.00% Impervious Runoff Depth>5.78"
Tc=6.0 min CN=76/0 Runoff=4.34 cfs 0.330 af

Subcatchment PR-4: Runoff Area=17,129 sf 0.00% Impervious Runoff Depth>1.14"
Tc=6.0 min CN=36/0 Runoff=0.31 cfs 0.038 af

Subcatchment PR-5: Runoff Area=10,964 sf 0.00% Impervious Runoff Depth>6.75"
Tc=6.0 min CN=84/0 Runoff=1.81 cfs 0.141 af

Subcatchment PR-6: Runoff Area=23,951 sf 0.00% Impervious Runoff Depth>3.60"
Flow Length=195' Tc=13.7 min CN=58/0 Runoff=1.80 cfs 0.165 af

Subcatchment PR-7: Runoff Area=49,157 sf 0.00% Impervious Runoff Depth>2.67"
Tc=6.0 min CN=50/0 Runoff=3.17 cfs 0.251 af

Subcatchment PR-8: Runoff Area=57,206 sf 0.00% Impervious Runoff Depth>0.58"
Flow Length=236' Tc=14.7 min CN=30/0 Runoff=0.19 cfs 0.064 af

Pond BASIN 1: Southerly Bog Peak Elev=104.66' Storage=32,585 cf Inflow=19.42 cfs 3.233 af
Discarded=1.87 cfs 0.568 af Primary=7.70 cfs 2.639 af Secondary=0.00 cfs 0.000 af Outflow=9.57 cfs 3.207 af

Pond BASIN 2: Northerly Bog Peak Elev=103.05' Storage=3,137 cf Inflow=4.01 cfs 0.484 af
Discarded=1.54 cfs 0.482 af Primary=0.00 cfs 0.000 af Outflow=1.54 cfs 0.482 af

Pond BASIN 4: Peak Elev=106.79' Storage=3,894 cf Inflow=1.81 cfs 0.141 af
Discarded=0.07 cfs 0.072 af Primary=0.00 cfs 0.000 af Outflow=0.07 cfs 0.072 af

Pond BASIN-3: Peak Elev=98.11' Storage=142 cf Inflow=8.09 cfs 2.969 af
Discarded=0.00 cfs 0.002 af Primary=8.09 cfs 2.966 af Outflow=8.10 cfs 2.969 af

Link POA-1: Inflow=8.16 cfs 3.004 af
Primary=8.16 cfs 3.004 af

Link POA-2: Inflow=1.80 cfs 0.165 af
Primary=1.80 cfs 0.165 af

Link POA-3: Inflow=3.17 cfs 0.251 af
Primary=3.17 cfs 0.251 af

Link POA-4: Inflow=0.19 cfs 0.064 af
Primary=0.19 cfs 0.064 af

Proposed Conditions*NRCC 24-hr C 100-Year Rainfall=8.68"*

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Page 49

Total Runoff Area = 19.902 ac Runoff Volume = 4.706 af Average Runoff Depth = 2.84"
100.00% Pervious = 19.902 ac 0.00% Impervious = 0.000 ac

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Page 50

Summary for Subcatchment PR-1:

Runoff = 19.42 cfs @ 12.65 hrs, Volume= 3.233 af, Depth> 3.21"

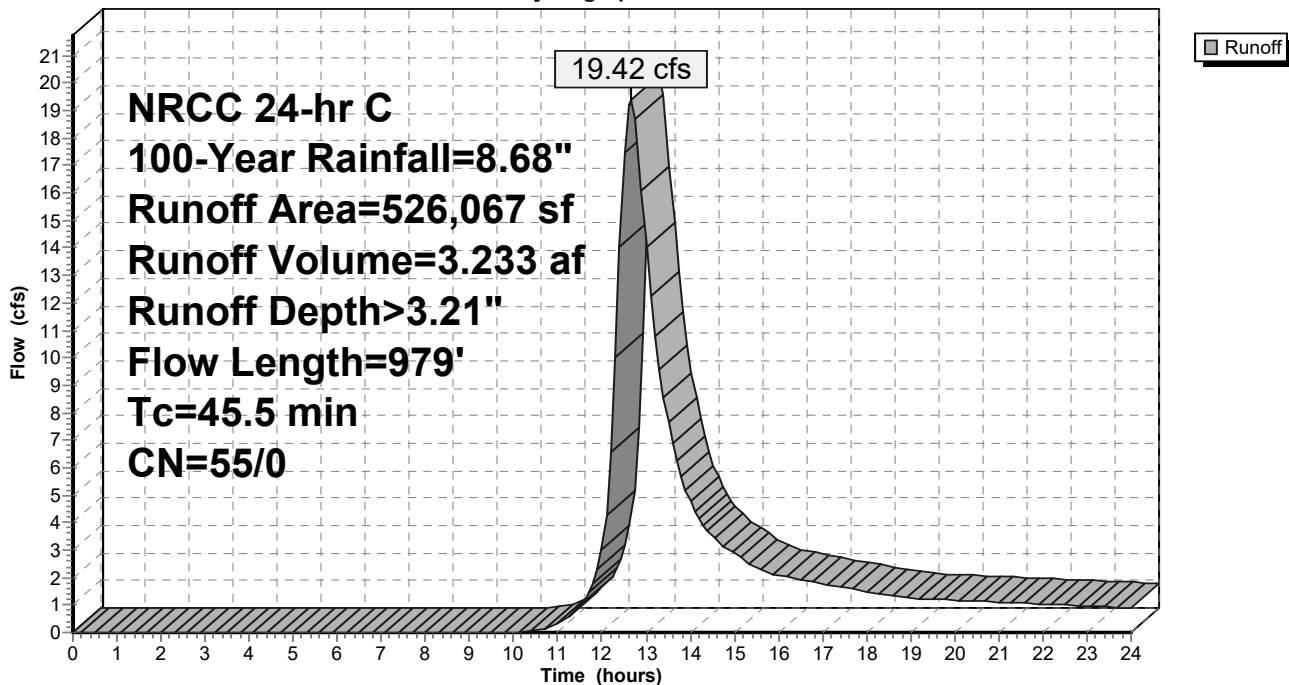
Runoff by SCS TR-20 method, UH=SCS, Split Pervious/Imperv. UI as Pervious, Time Span= 0.00-24.00 hrs, dt= 0.10
NRCC 24-hr C 100-Year Rainfall=8.68"

Area (sf)	CN	Description
63,573	30	Meadow, non-grazed, HSG A
4,170	72	Dirt roads, HSG A
457,715	58	Meadow, non-grazed, HSG B
609	82	Dirt roads, HSG B
526,067	55	Weighted Average
526,067	55	100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
11.6	50	0.0080	0.07		Sheet Flow, Grass: Dense n= 0.240 P2= 3.35"
5.6	335	0.0200	0.99		Shallow Concentrated Flow, Short Grass Pasture Kv= 7.0 fps
28.3	594	0.0025	0.35		Shallow Concentrated Flow, Short Grass Pasture Kv= 7.0 fps
45.5	979	Total			

Subcatchment PR-1:

Hydrograph



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Page 51

Summary for Subcatchment PR-2:

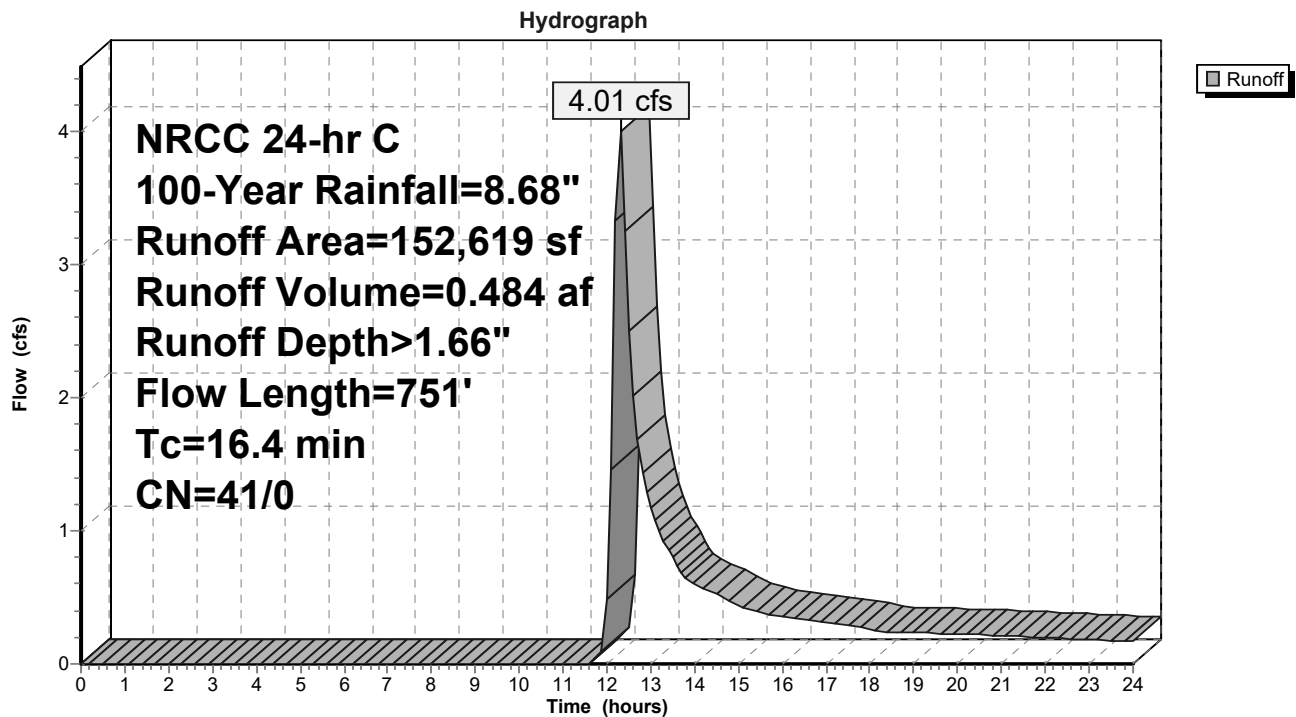
Runoff = 4.01 cfs @ 12.30 hrs, Volume= 0.484 af, Depth> 1.66"

Runoff by SCS TR-20 method, UH=SCS, Split Pervious/Imperv. UI as Pervious, Time Span= 0.00-24.00 hrs, dt= 0.10
NRCC 24-hr C 100-Year Rainfall=8.68"

Area (sf)	CN	Description
94,623	30	Meadow, non-grazed, HSG A
7,838	72	Dirt roads, HSG A
50,158	58	Meadow, non-grazed, HSG B
152,619	41	Weighted Average
152,619	41	100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
1.8	50	0.0340	0.45		Sheet Flow, Fallow n= 0.050 P2= 3.35"
14.6	701	0.0130	0.80		Shallow Concentrated Flow, Short Grass Pasture Kv= 7.0 fps
16.4	751	Total			

Subcatchment PR-2:



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Page 52

Summary for Subcatchment PR-3:

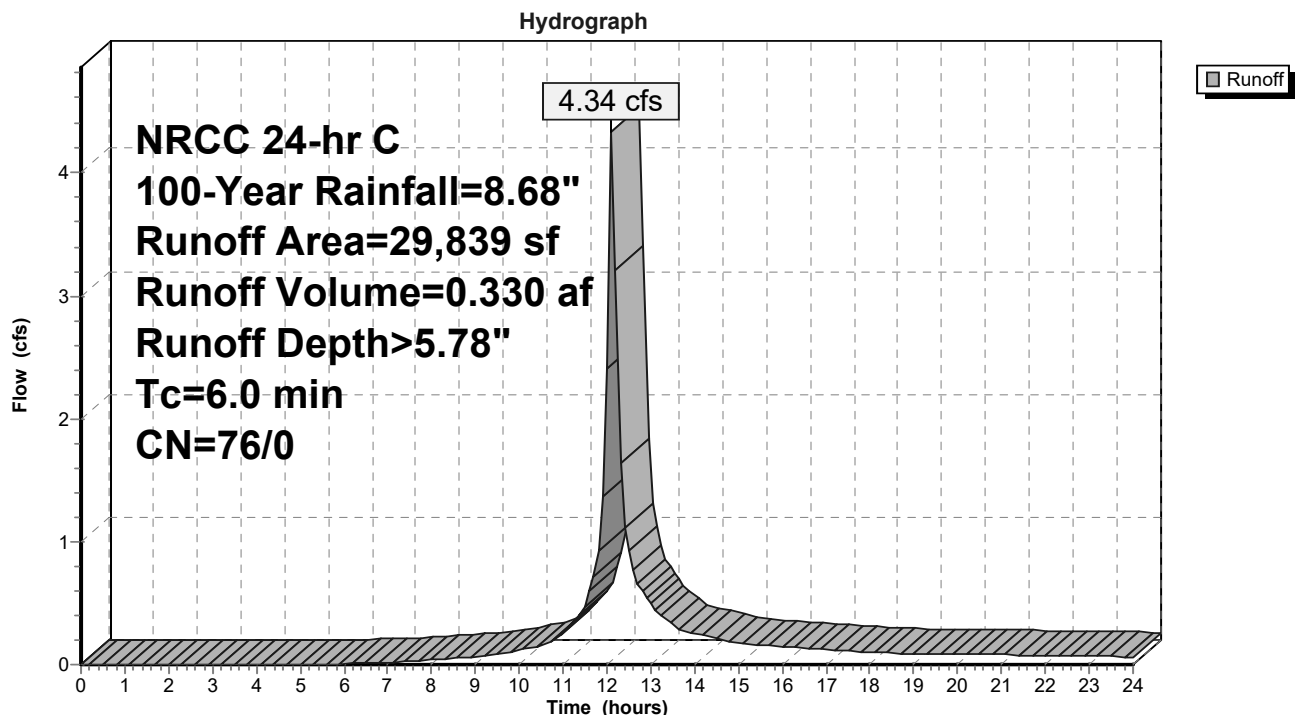
Runoff = 4.34 cfs @ 12.11 hrs, Volume= 0.330 af, Depth> 5.78"

Runoff by SCS TR-20 method, UH=SCS, Split Pervious/Imperv. UI as Pervious, Time Span= 0.00-24.00 hrs, dt= 0.10
NRCC 24-hr C 100-Year Rainfall=8.68"

Area (sf)	CN	Description
12,670	72	Dirt roads, HSG A
6,021	98	Water Surface, 0% imp, HSG A
3,556	30	Meadow, non-grazed, HSG A
5,480	82	Dirt roads, HSG B
2,112	98	Water Surface, 0% imp, HSG B
29,839	76	Weighted Average
29,839	76	100.00% Pervious Area

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

Subcatchment PR-3:



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Page 53

Summary for Subcatchment PR-4:

Runoff = 0.31 cfs @ 12.18 hrs, Volume= 0.038 af, Depth> 1.14"

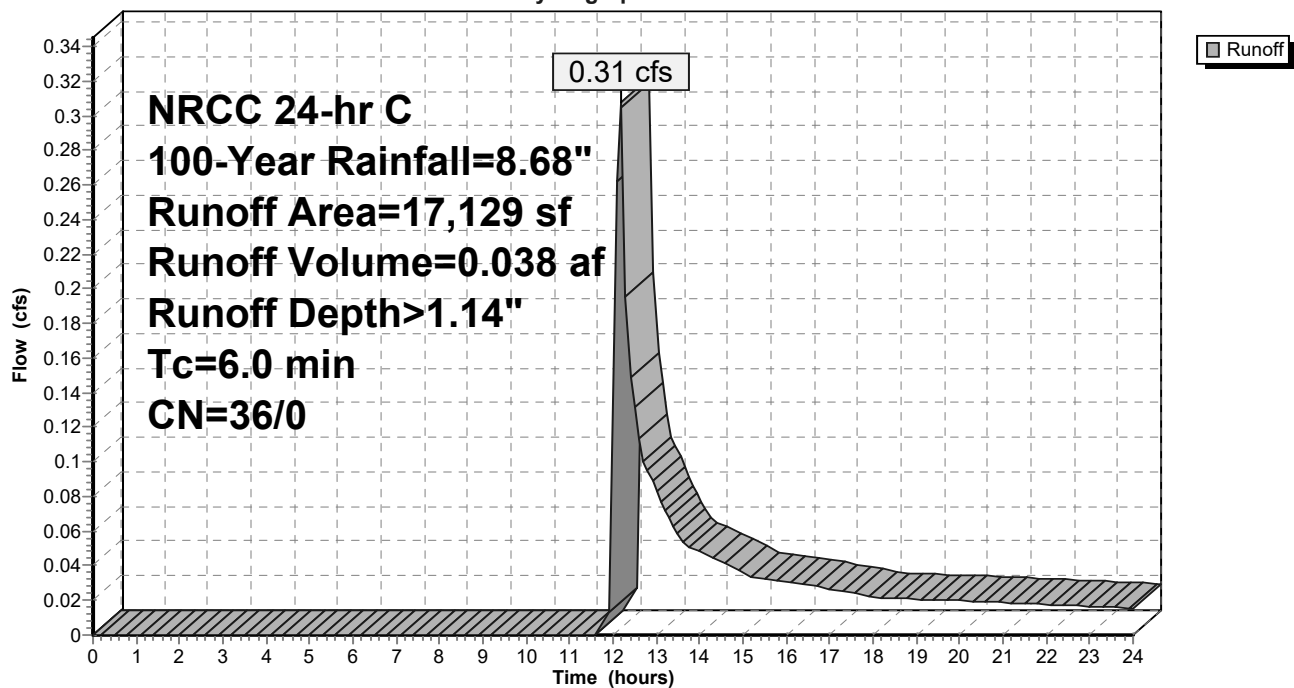
Runoff by SCS TR-20 method, UH=SCS, Split Pervious/Imperv. UI as Pervious, Time Span= 0.00-24.00 hrs, dt= 0.10
NRCC 24-hr C 100-Year Rainfall=8.68"

Area (sf)	CN	Description
2,539	72	Dirt roads, HSG A
14,590	30	Meadow, non-grazed, HSG A
17,129	36	Weighted Average
17,129	36	100.00% Pervious Area

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

Subcatchment PR-4:

Hydrograph



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Page 54

Summary for Subcatchment PR-5:

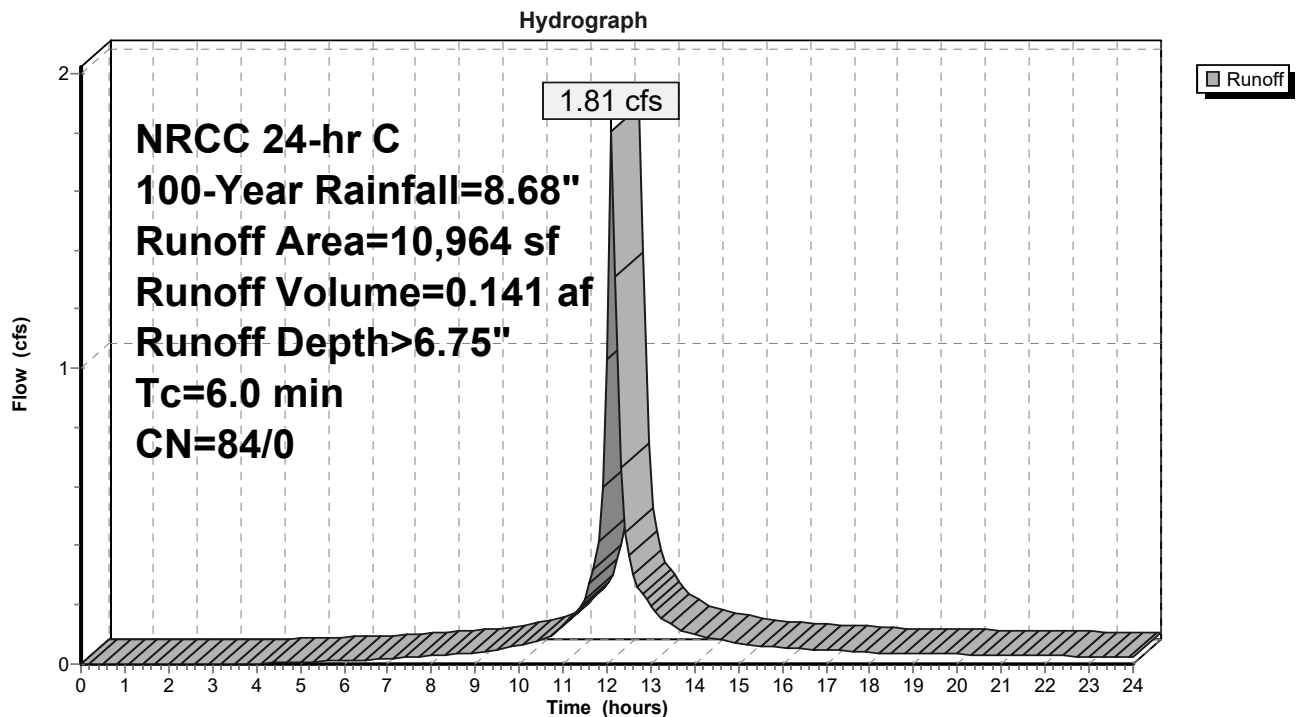
Runoff = 1.81 cfs @ 12.11 hrs, Volume= 0.141 af, Depth> 6.75"

Runoff by SCS TR-20 method, UH=SCS, Split Pervious/Imperv. UI as Pervious, Time Span= 0.00-24.00 hrs, dt= 0.10
NRCC 24-hr C 100-Year Rainfall=8.68"

Area (sf)	CN	Description
2,303	72	Dirt roads, HSG A
747	98	Water Surface, 0% imp, HSG A
5,627	82	Dirt roads, HSG B
2,287	98	Water Surface, 0% imp, HSG B
10,964	84	Weighted Average
10,964	84	100.00% Pervious Area

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

Subcatchment PR-5:



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Page 55

Summary for Subcatchment PR-6:

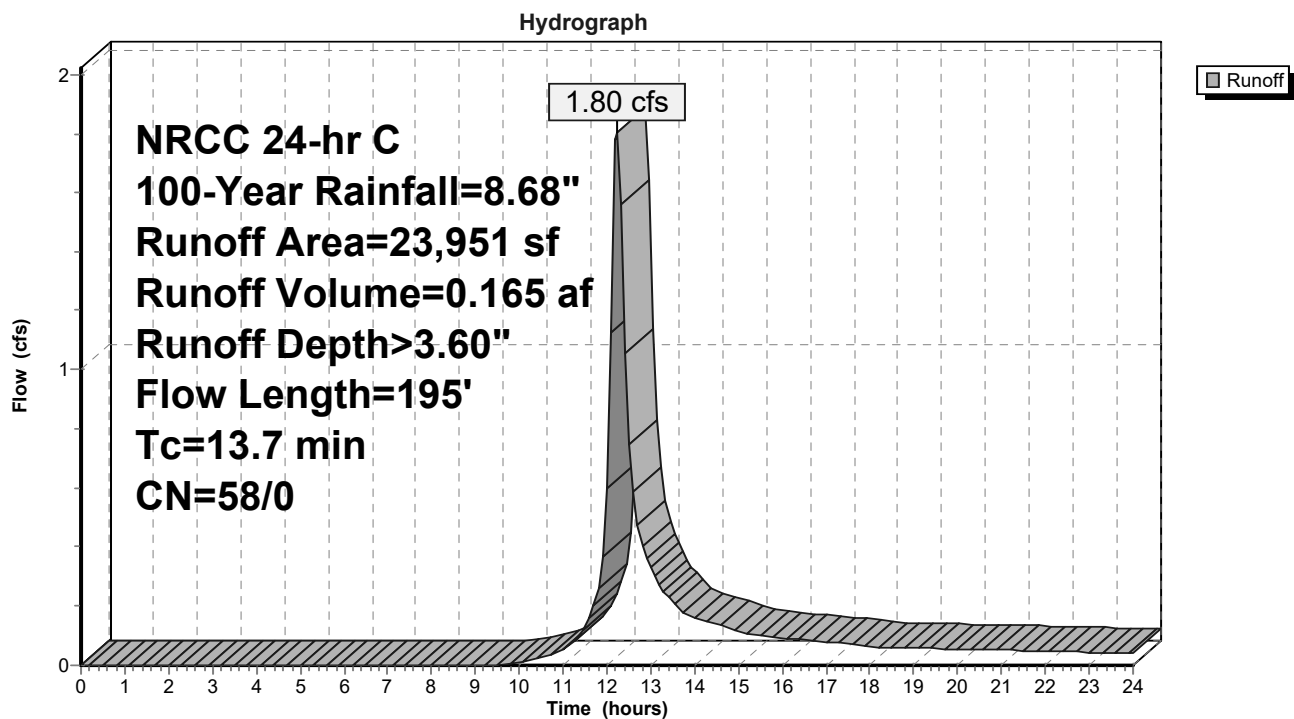
Runoff = 1.80 cfs @ 12.22 hrs, Volume= 0.165 af, Depth> 3.60"

Runoff by SCS TR-20 method, UH=SCS, Split Pervious/Imperv. UI as Pervious, Time Span= 0.00-24.00 hrs, dt= 0.10
NRCC 24-hr C 100-Year Rainfall=8.68"

Area (sf)	CN	Description
23,951	58	Meadow, non-grazed, HSG B
23,951	58	100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
11.6	50	0.0080	0.07		Sheet Flow, Grass: Dense n= 0.240 P2= 3.35"
2.1	145	0.0270	1.15		Shallow Concentrated Flow, Short Grass Pasture Kv= 7.0 fps
13.7	195	Total			

Subcatchment PR-6:



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Page 56

Summary for Subcatchment PR-7:

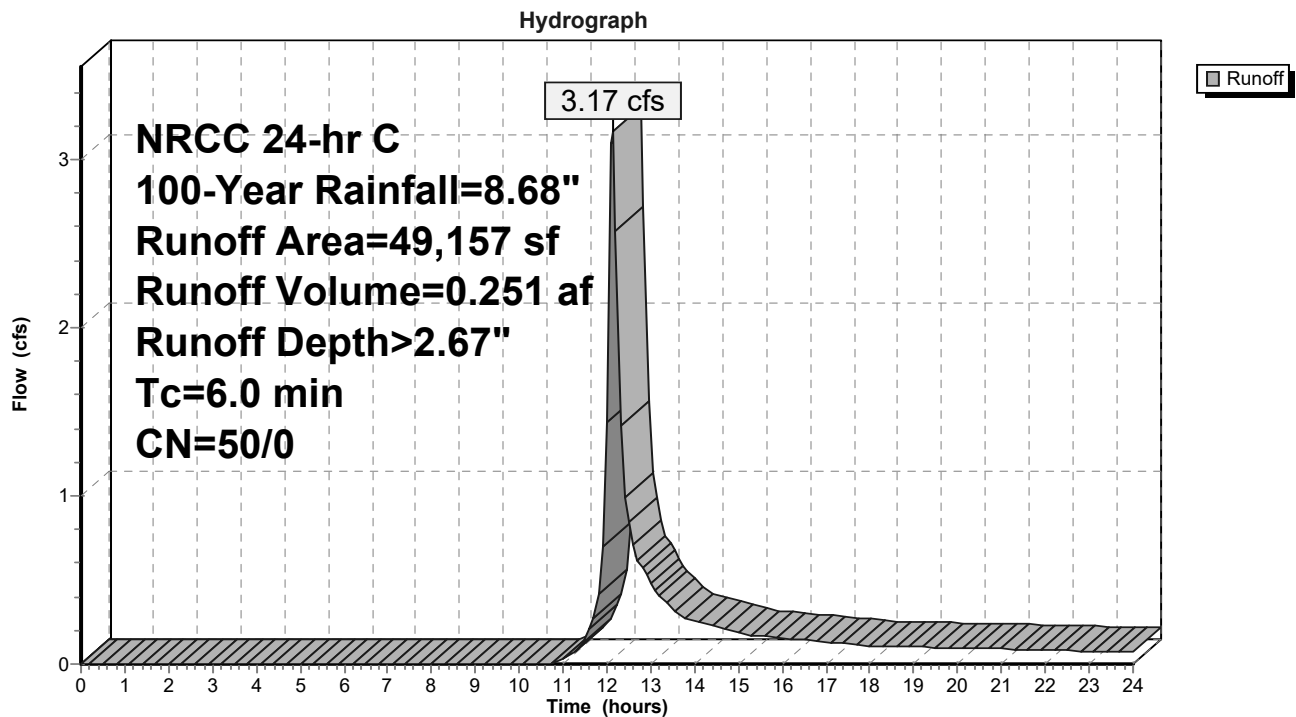
Runoff = 3.17 cfs @ 12.13 hrs, Volume= 0.251 af, Depth> 2.67"

Runoff by SCS TR-20 method, UH=SCS, Split Pervious/Imperv. UI as Pervious, Time Span= 0.00-24.00 hrs, dt= 0.10
NRCC 24-hr C 100-Year Rainfall=8.68"

Area (sf)	CN	Description
13,721	30	Meadow, non-grazed, HSG A
35,436	58	Meadow, non-grazed, HSG B
49,157	50	Weighted Average
49,157	50	100.00% Pervious Area

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

Subcatchment PR-7:



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Page 57

Summary for Subcatchment PR-8:

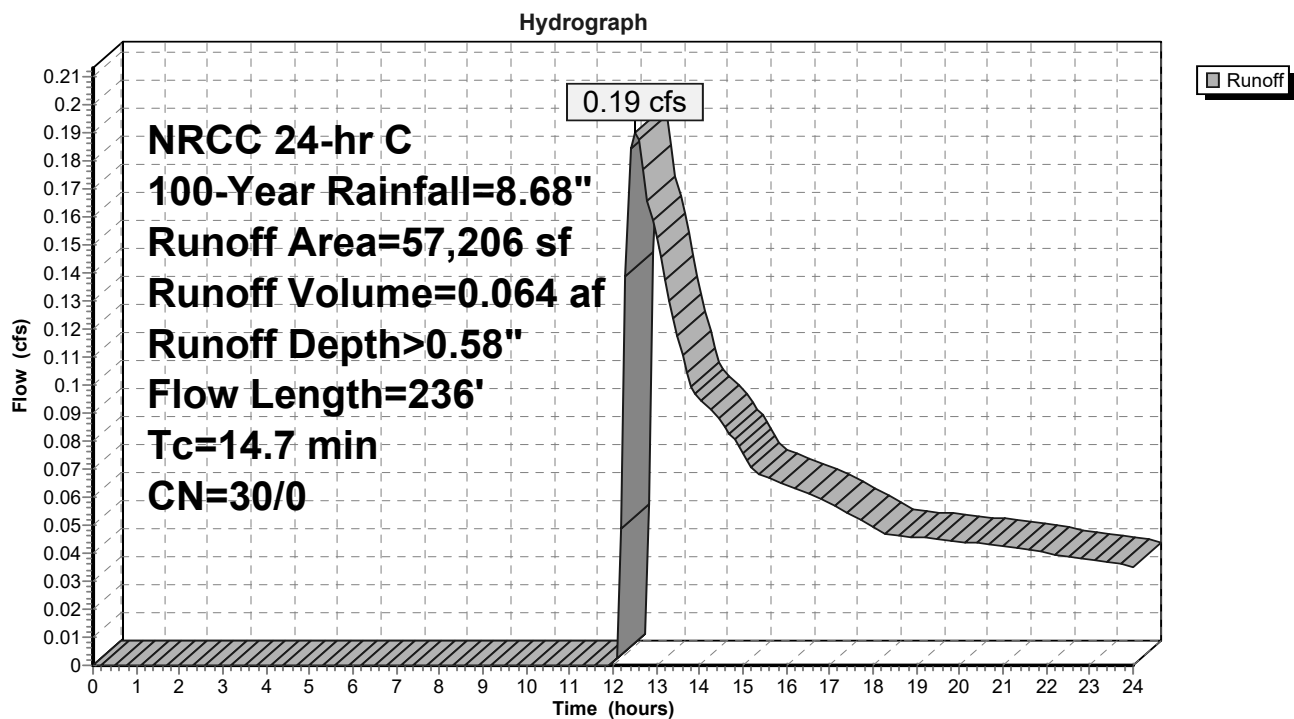
Runoff = 0.19 cfs @ 12.52 hrs, Volume= 0.064 af, Depth> 0.58"

Runoff by SCS TR-20 method, UH=SCS, Split Pervious/Imperv. UI as Pervious, Time Span= 0.00-24.00 hrs, dt= 0.10
NRCC 24-hr C 100-Year Rainfall=8.68"

Area (sf)	CN	Description
57,206	30	Meadow, non-grazed, HSG A
57,206	30	100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
11.6	50	0.0080	0.07		Sheet Flow, Grass: Dense n= 0.240 P2= 3.35"
3.1	186	0.0210	1.01		Shallow Concentrated Flow, Short Grass Pasture Kv= 7.0 fps
14.7	236	Total			

Subcatchment PR-8:



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Page 58

Summary for Pond BASIN 1: Southerly Bog

Inflow Area = 12.077 ac, 0.00% Impervious, Inflow Depth > 3.21" for 100-Year event
Inflow = 19.42 cfs @ 12.65 hrs, Volume= 3.233 af
Outflow = 9.57 cfs @ 13.30 hrs, Volume= 3.207 af, Atten= 51%, Lag= 39.0 min
Discarded = 1.87 cfs @ 13.30 hrs, Volume= 0.568 af
Primary = 7.70 cfs @ 13.30 hrs, Volume= 2.639 af
Secondary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.10 hrs
Peak Elev= 104.66' @ 13.30 hrs Surf.Area= 79,215 sf Storage= 32,585 cf

Plug-Flow detention time= 38.4 min calculated for 3.194 af (99% of inflow)
Center-of-Mass det. time= 34.0 min (927.5 - 893.5)

Volume	Invert	Avail.Storage	Storage Description
#1	103.43'	567,739 cf	Custom Stage Data (Prismatic) Listed below (Recalc)
Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
103.43	0	0	0
104.00	10,143	2,891	2,891
105.00	114,071	62,107	64,998
106.00	274,635	194,353	259,351
107.00	342,142	308,389	567,739

Device	Routing	Invert	Outlet Devices
#1	Primary	103.43'	24.0" Round Culvert L= 25.0' RCP, sq.cut end projecting, Ke= 0.500 Inlet / Outlet Invert= 103.43' / 102.84' S= 0.0236 '/' Cc= 0.900 n= 0.012 Concrete pipe, finished, Flow Area= 3.14 sf
#2	Secondary	106.80'	120.0' long x 20.0' breadth Broad-Crested Rectangular Weir Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 Coef. (English) 2.68 2.70 2.70 2.64 2.63 2.64 2.64 2.63
#3	Discarded	103.43'	1.020 in/hr Exfiltration over Surface area

Discarded OutFlow Max=1.87 cfs @ 13.30 hrs HW=104.66' (Free Discharge)
↑**3=Exfiltration** (Exfiltration Controls 1.87 cfs)

Primary OutFlow Max=7.70 cfs @ 13.30 hrs HW=104.66' (Free Discharge)
↑**1=Culvert** (Inlet Controls 7.70 cfs @ 3.78 fps)

Secondary OutFlow Max=0.00 cfs @ 0.00 hrs HW=103.43' (Free Discharge)
↑**2=Broad-Crested Rectangular Weir** (Controls 0.00 cfs)

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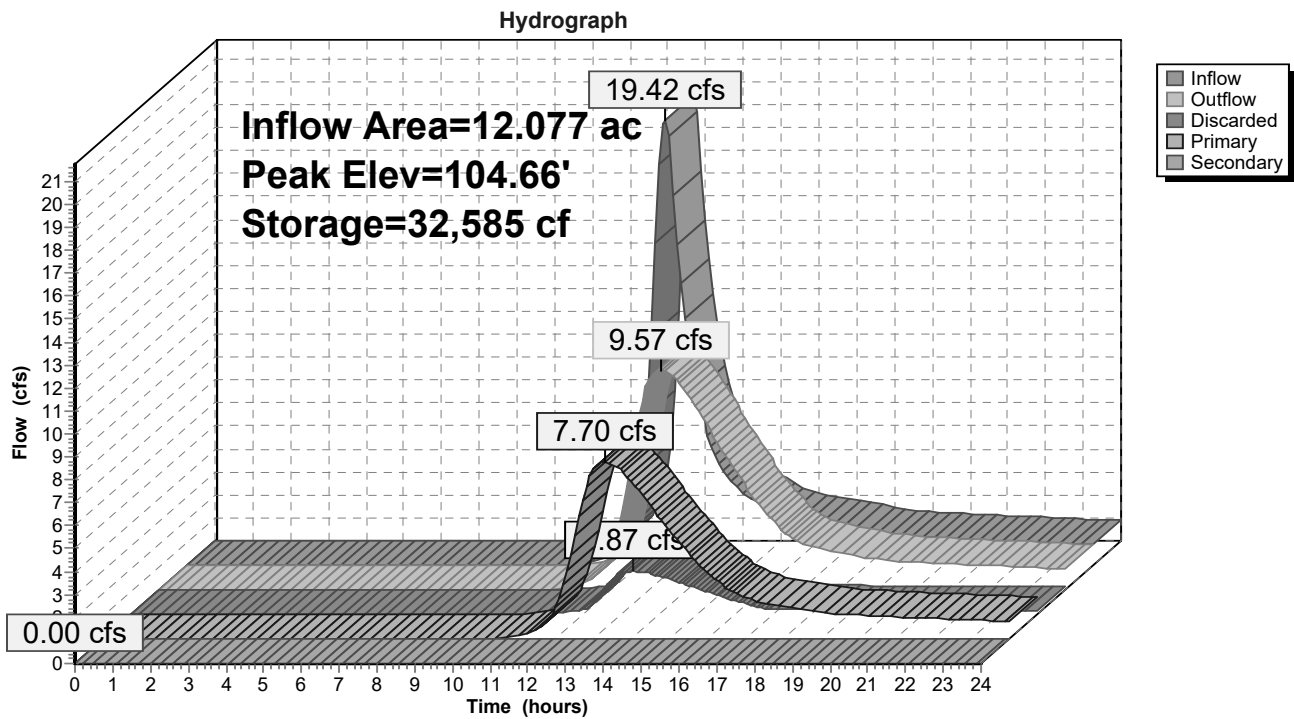
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Page 59

Pond BASIN 1: Southerly Bog



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Page 60

Summary for Pond BASIN 2: Northerly Bog

Inflow Area = 3.504 ac, 0.00% Impervious, Inflow Depth > 1.66" for 100-Year event
Inflow = 4.01 cfs @ 12.30 hrs, Volume= 0.484 af
Outflow = 1.54 cfs @ 12.76 hrs, Volume= 0.482 af, Atten= 62%, Lag= 27.9 min
Discarded = 1.54 cfs @ 12.76 hrs, Volume= 0.482 af
Primary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.10 hrs
Peak Elev= 103.05' @ 12.76 hrs Surf.Area= 65,137 sf Storage= 3,137 cf

Plug-Flow detention time= 14.9 min calculated for 0.482 af (100% of inflow)
Center-of-Mass det. time= 13.1 min (929.4 - 916.3)

Volume	Invert	Avail.Storage	Storage Description
#1	103.00'	66,417 cf	Custom Stage Data (Prismatic) Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
103.00	65,000	0	0
104.00	67,834	66,417	66,417

Device	Routing	Invert	Outlet Devices
#1	Primary	103.50'	15.0' long x 5.0' breadth Broad-Crested Rectangular Weir Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50 3.00 3.50 4.00 4.50 5.00 5.50 Coef. (English) 2.34 2.50 2.70 2.68 2.68 2.66 2.65 2.65 2.65 2.65 2.67 2.66 2.68 2.70 2.74 2.79 2.88
#2	Discarded	103.00'	1.020 in/hr Exfiltration over Surface area

Discarded OutFlow Max=1.54 cfs @ 12.76 hrs HW=103.05' (Free Discharge)
↑**2=Exfiltration** (Exfiltration Controls 1.54 cfs)

Primary OutFlow Max=0.00 cfs @ 0.00 hrs HW=103.00' (Free Discharge)
↑**1=Broad-Crested Rectangular Weir** (Controls 0.00 cfs)

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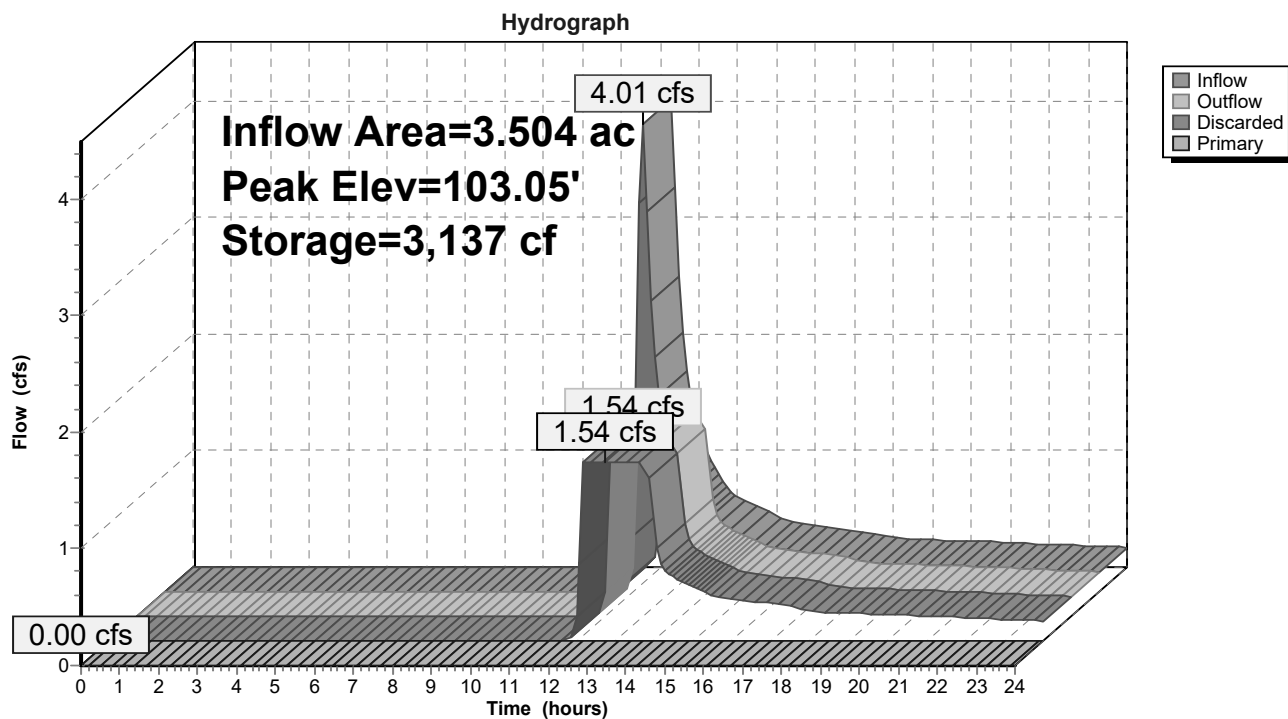
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Page 61

Pond BASIN 2: Northerly Bog



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Page 62

Summary for Pond BASIN 4:

Inflow Area = 0.252 ac, 0.00% Impervious, Inflow Depth > 6.75" for 100-Year event
Inflow = 1.81 cfs @ 12.11 hrs, Volume= 0.141 af
Outflow = 0.07 cfs @ 15.05 hrs, Volume= 0.072 af, Atten= 96%, Lag= 176.0 min
Discarded = 0.07 cfs @ 15.05 hrs, Volume= 0.072 af
Primary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.10 hrs
Peak Elev= 106.79' @ 15.05 hrs Surf.Area= 2,850 sf Storage= 3,894 cf

Plug-Flow detention time= 351.2 min calculated for 0.072 af (51% of inflow)
Center-of-Mass det. time= 227.9 min (1,023.4 - 795.5)

Volume	Invert	Avail.Storage	Storage Description
#1	104.00'	4,520 cf	Custom Stage Data (Prismatic) Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
104.00	75	0	0
105.00	797	436	436
106.00	2,168	1,483	1,919
107.00	3,035	2,602	4,520

Device	Routing	Invert	Outlet Devices
#1	Primary	107.20'	30.0' long x 30.0' breadth Broad-Crested Rectangular Weir Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 Coef. (English) 2.68 2.70 2.70 2.64 2.63 2.64 2.64 2.63
#2	Discarded	104.00'	1.020 in/hr Exfiltration over Surface area

Discarded OutFlow Max=0.07 cfs @ 15.05 hrs HW=106.79' (Free Discharge)
↑**2=Exfiltration** (Exfiltration Controls 0.07 cfs)

Primary OutFlow Max=0.00 cfs @ 0.00 hrs HW=104.00' (Free Discharge)
↑**1=Broad-Crested Rectangular Weir** (Controls 0.00 cfs)

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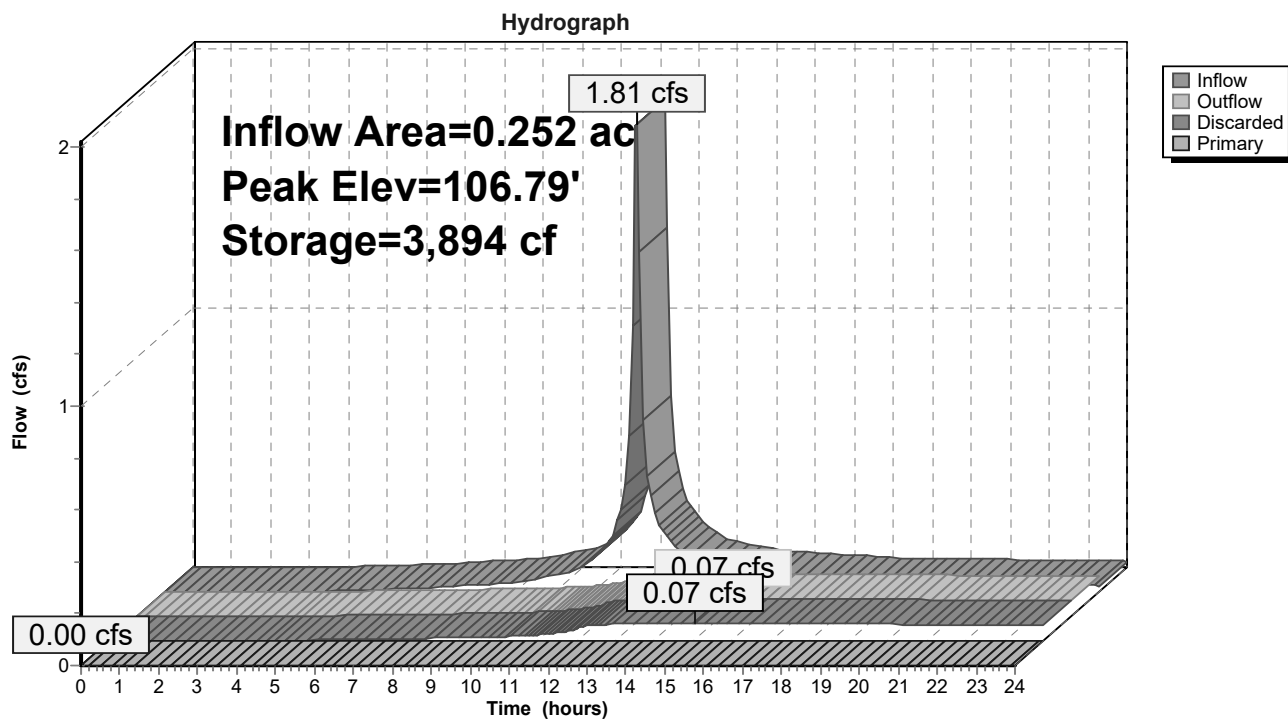
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Page 63

Pond BASIN 4:



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NRCC 24-hr C 100-Year Rainfall=8.68"

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Page 64

Summary for Pond BASIN-3:

Inflow Area = 13.014 ac, 0.00% Impervious, Inflow Depth > 2.74" for 100-Year event
 Inflow = 8.09 cfs @ 13.25 hrs, Volume= 2.969 af
 Outflow = 8.10 cfs @ 13.24 hrs, Volume= 2.969 af, Atten= 0%, Lag= 0.0 min
 Discarded = 0.00 cfs @ 13.24 hrs, Volume= 0.002 af
 Primary = 8.09 cfs @ 13.24 hrs, Volume= 2.966 af

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.10 hrs
 Peak Elev= 98.11' @ 13.24 hrs Surf.Area= 208 sf Storage= 142 cf

Plug-Flow detention time= 0.3 min calculated for 2.969 af (100% of inflow)
 Center-of-Mass det. time= 0.2 min (918.7 - 918.5)

Volume	Invert	Avail.Storage	Storage Description
#1	96.30'	25,553 cf	Custom Stage Data (Prismatic) Listed below (Recalc)
Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
96.30	0	0	0
97.00	35	12	12
98.00	183	109	121
99.00	412	298	419
100.00	807	610	1,028
101.00	2,661	1,734	2,762
102.00	4,620	3,641	6,403
103.00	5,817	5,219	11,621
104.00	6,957	6,387	18,008
105.00	8,132	7,545	25,553

Device	Routing	Invert	Outlet Devices
#1	Primary	96.31'	36.0" Round Culvert L= 81.0' CPP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 96.31' / 96.30' S= 0.0001 '/' Cc= 0.900 n= 0.025 Corrugated metal, Flow Area= 7.07 sf
#2	Primary	105.50'	35.0' long x 10.0' breadth Broad-Crested Rectangular Weir Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 Coef. (English) 2.49 2.56 2.70 2.69 2.68 2.69 2.67 2.64
#3	Discarded	96.30'	1.020 in/hr Exfiltration over Surface area

Discarded OutFlow Max=0.00 cfs @ 13.24 hrs HW=98.11' (Free Discharge)
 ↳ **3=Exfiltration** (Exfiltration Controls 0.00 cfs)

Primary OutFlow Max=8.08 cfs @ 13.24 hrs HW=98.11' (Free Discharge)
 ↳ **1=Culvert** (Barrel Controls 8.08 cfs @ 2.62 fps)
 ↳ **2=Broad-Crested Rectangular Weir** (Controls 0.00 cfs)

Proposed Conditions

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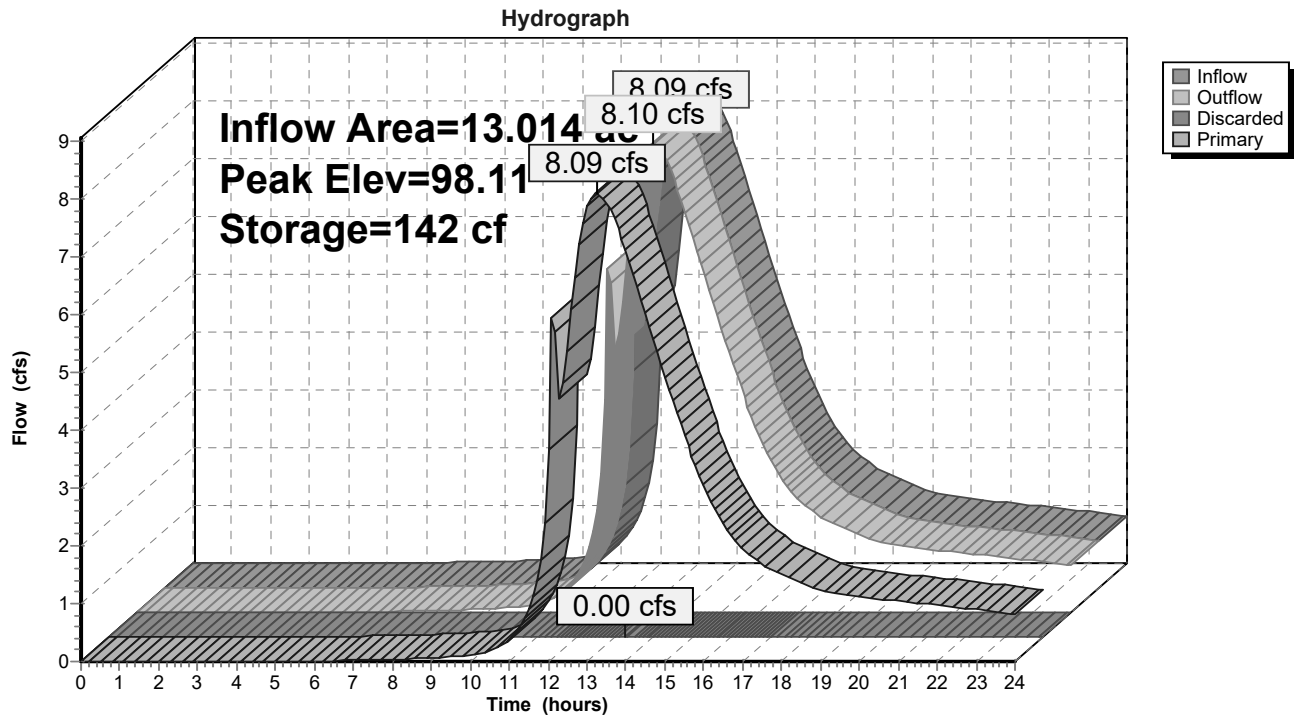
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NRCC 24-hr C 100-Year Rainfall=8.68"

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Page 65

Pond BASIN-3:



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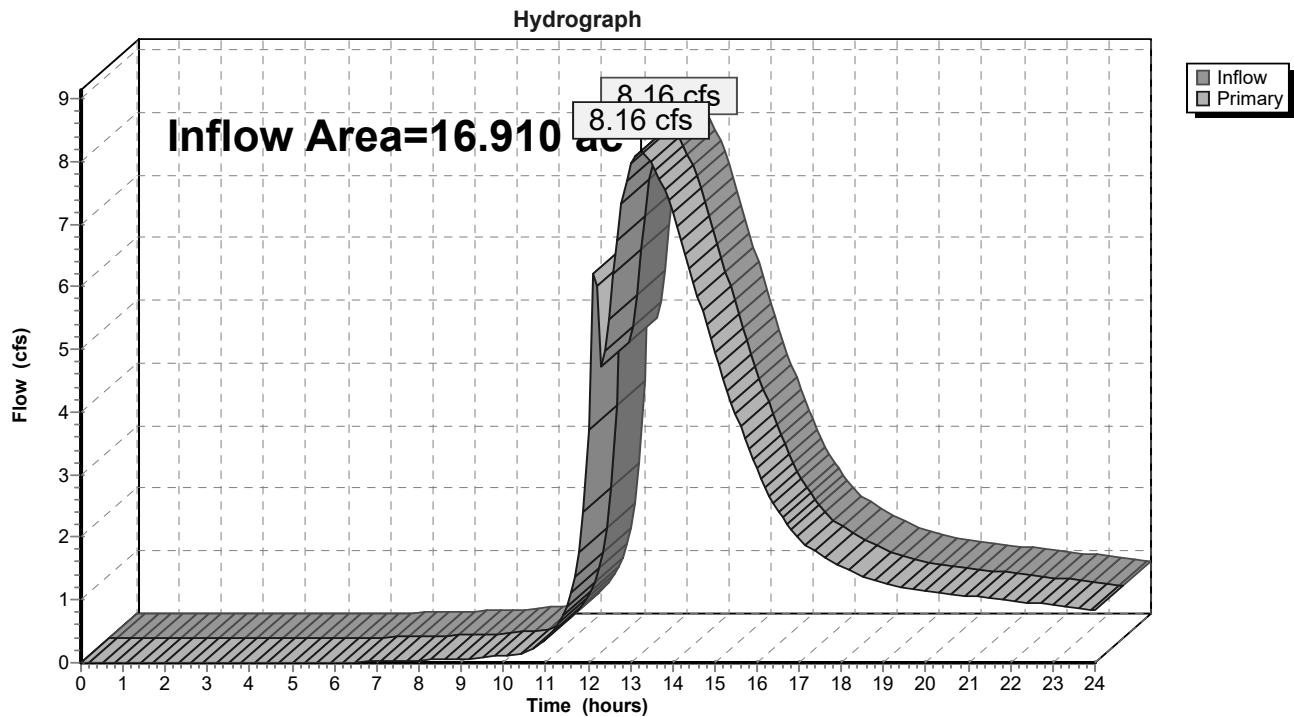
Page 66

Summary for Link POA-1:

Inflow Area = 16.910 ac, 0.00% Impervious, Inflow Depth > 2.13" for 100-Year event
Inflow = 8.16 cfs @ 13.24 hrs, Volume= 3.004 af
Primary = 8.16 cfs @ 13.24 hrs, Volume= 3.004 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-24.00 hrs, dt= 0.10 hrs

Link POA-1:



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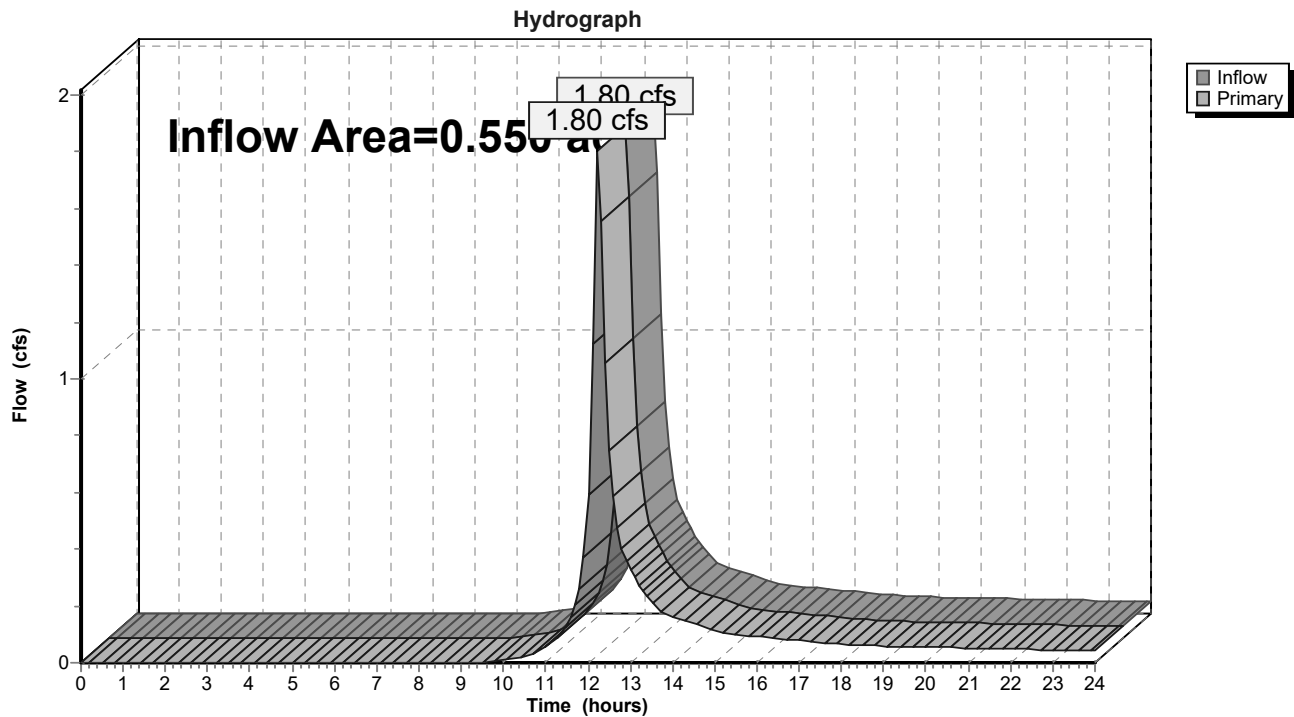
Page 67

Summary for Link POA-2:

Inflow Area = 0.550 ac, 0.00% Impervious, Inflow Depth > 3.60" for 100-Year event
Inflow = 1.80 cfs @ 12.22 hrs, Volume= 0.165 af
Primary = 1.80 cfs @ 12.22 hrs, Volume= 0.165 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-24.00 hrs, dt= 0.10 hrs

Link POA-2:



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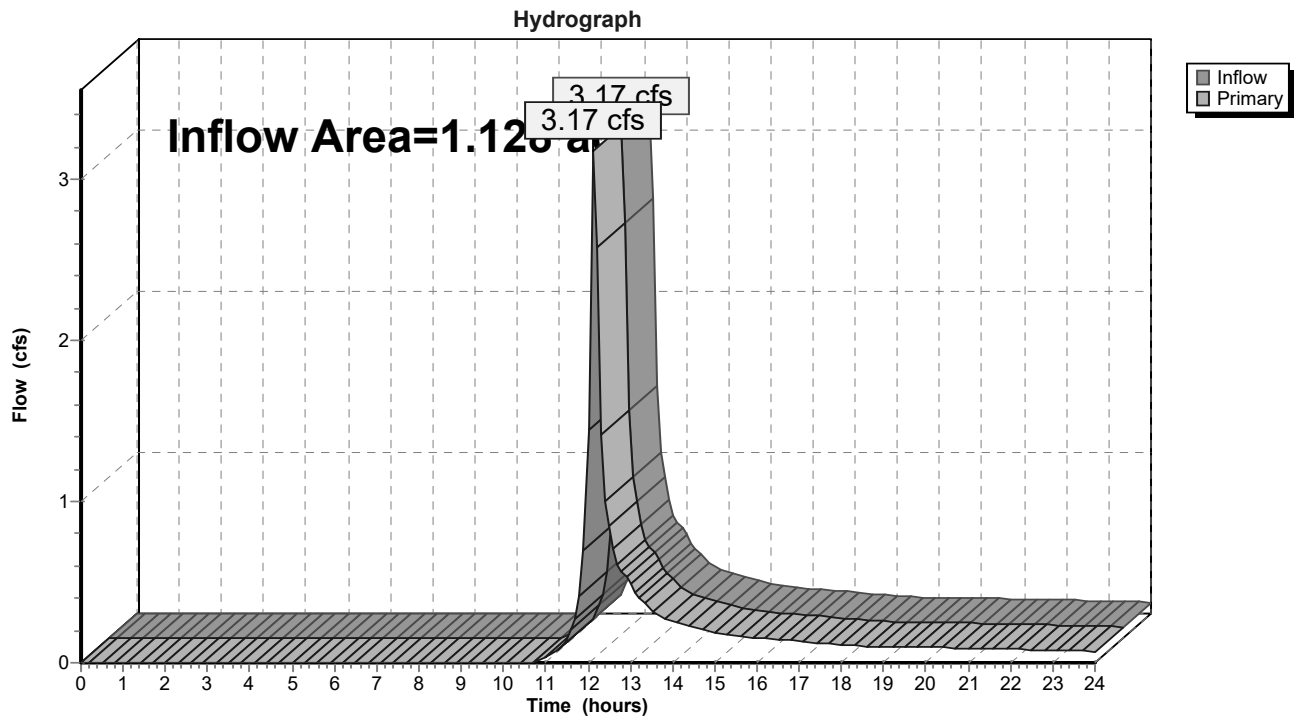
Page 68

Summary for Link POA-3:

Inflow Area = 1.128 ac, 0.00% Impervious, Inflow Depth > 2.67" for 100-Year event
Inflow = 3.17 cfs @ 12.13 hrs, Volume= 0.251 af
Primary = 3.17 cfs @ 12.13 hrs, Volume= 0.251 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-24.00 hrs, dt= 0.10 hrs

Link POA-3:



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Page 69

Summary for Link POA-4:

Inflow Area = 1.313 ac, 0.00% Impervious, Inflow Depth > 0.58" for 100-Year event
Inflow = 0.19 cfs @ 12.52 hrs, Volume= 0.064 af
Primary = 0.19 cfs @ 12.52 hrs, Volume= 0.064 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-24.00 hrs, dt= 0.10 hrs

Link POA-4:

