Oakwoods Cluster Subdivision

Town of Chester
Orange County, New York

Drainage Report

Narrative

PIETRZAK & PFAU ENGINEERING & SURVEYING, PLLC
262 GREENWICH AVENUE
GOSHEN, NEW YORK 10924

P&P No. 19140.01
December 2021

TABLE OF CONTENTS

APPENDICES

I. Executive Summary

This report shall serve as the Drainage Report for the Oakwoods Cluster Subdivision. The proposed project is located on the southern side of Camp Monroe Road. The project is currently identified as Section 15, Block 1, Lots 27.41 on the Town of Chester Tax Map. The total site area is approximately 26.9± acres. A total of 6 lots are proposed for this project.

The parcel is primarily woods with an elevation change of roughly 88' from the roadside property line to the highest point within the site. The proposed lots will be accessed via driveways connected to Camp Monroe Road.

The drainage design for this project has been incorporated to ensure that there are no adverse impacts to areas downstream of the project site. To do this, the drainage design provides a zero net increase in peak flow runoff from the project site. This runoff has been calculated for the 1, 10, 25, 100 year storm events. The proposed design provides a decrease in net peak flow runoff from the site for all of the design storms studied.

II. Design Point Designation

Four (4) separate design points were defined to analyze the stormwater peak flow runoff of the project.

The first design point, Design Point 1, is identified in the Hydro-Cad model as Design Point 1 (Southern Property Line) and is defined as the southern edge of the property line. The stormwater from this design point ultimately flows offsite.

The second design point, Design Point 2, is identified in the Hydro-Cad model as Design Point 2 (Western Property Line) and is defined as the western edge of the property line. The stormwater from this design point ultimately flows offsite.

The third design point, Design Point 3, is identified in the Hydro-Cad model as Design Point 3 (Stream) and is defined as the north-western edge of the property line. The stormwater from this design point ultimately flows offsite.

The fourth design point, Design Point 4, is identified in the Hydro-Cad model as Design Point 4 (Ditch) and is defined as the northern edge of the property line. The stormwater from this design point ultimately flows into a 24" C.M.P. that crosses Camp Monroe Road.

III. Existing Conditions

The soils located within the drainage basin studied on the project site have been identified in accordance with the Orange County Soils Survey. The site consists of soils from Hydrologic Soil D. The soils located in this area are primarily Erie and Mardin soils. (See Appendix 5 for further information on these particular soils).

Coverage in this area consists mainly of woods ranging in elevation of 88' from the roadside property line to the highest point within the property.

Topography on this site consists of slopes in the 0% to 10% range (72.3% of site), 10% to 15% (18.5% of site) and 15% or greater range (9.2% of site).

In modeling the existing site for the drainage analysis, the drainage area was taken to consist of four (4) separate drainage basins.

The first existing drainage basin, identified in the Hydro-Cad Output as Subcatchment 1S, includes approximately 27,500± sq.ft. of on-site land encompassing the southern corner of the project site (See Appendix 2 for Drainage Basin Mapping). This area is made up entirely of woods in fair condition. This area is tributary to the previously defined Design Point 1.

The second existing drainage basin, identified in the Hydro-Cad Output as Subcatchment 2S, includes approximately 180,441± sq.ft. of on-site and off-site land located western of Subcatchment 1S (See Appendix 2 for Drainage Basin Mapping). This drainage area is made up entirely of woods in fair condition. This area is tributary to the previously defined Design Point 2.

The third existing drainage basin, identified in the Hydro-Cad Output as Subcatchment 3S, includes approximately 453,810± sq.ft. of on-site and off-site land located norhtern of Subcatchment 1S (See Appendix 2 for Drainage Basin Mapping). This drainage area is made up entirely of woods in fair condition. This area is tributary to the previously defined Design Point 3.

The fourth existing drainage basin, identified in the Hydro-Cad Output as Subcatchment 4S, includes approximately 510,213± sq.ft. of on-site and off-site land located northern of Subcatchment 3S (See Appendix 2 for Drainage Basin Mapping). This drainage area is made up entirely of woods in fair condition. This area is tributary to the previously defined Design Point 4.

IV. Proposed Conditions

In modeling the project site for the proposed condition, the site was taken to consist of ten (10) separate drainage basins.

The first drainage basin, still identified in the Hydro-Cad Output as Subcatchment 1S, increased to contain approximately 27,500± sq.ft. This area has not been reduced and is the same as the Existing Conditions. This area is tributary to the previously defined Design Point 1.

The second drainage basin, still identified in the Hydro-Cad Output as Subcatchment 2S, increased to contain approximately 180,441± sq.ft. This area has not been reduced and is the same as the Existing Conditions. This area is tributary to the previously defined Design Point 2.

The third drainage basin, still identified in the Hydro-Cad Output as Subcatchment 3S, increased to contain approximately 453,810± sq.ft. This area has not been reduced and is the same as the Existing Conditions. This area is tributary to the previously defined Design Point 3.

The fourth drainage basin, still identified in the Hydro-Cad Output as Subcatchment 4S, has been reduced to contain approximately 48,777± sq.ft. This area now consists of approximately 47,199 sq.ft. of woods in fair condition, and 1,578 sq.ft. proposed impervious area. Stormwater from this area is collected along driveway swales and are directed into rain gardens. This area continues to flow to the previously defined Design Point 4.

Due to the proposed project improvements, drainage infrastructure and site grading, six (6) additional drainage basins have been delineated for the proposed conditions of the analysis.

The fifth drainage basin, identified in the Hydro-Cad Output as Subcatchment 5S, has contains approximately 43,949± sq.ft. This area now consists of approximately 39,620 sq.ft. of woods in fair condition, and 4,329 sq.ft. proposed impervious area. Stormwater from this area is collected along driveway swales and are directed into rain gardens. This area continues to flow to the previously defined Design Point 4.

The sixth drainage basin, identified in the Hydro-Cad Output as Subcatchment 6S, has contains approximately 58,597± sq.ft. This area now consists of approximately 52,377 sq.ft. of woods in fair condition, and 6,220 sq.ft. proposed impervious area. Stormwater from this area is collected along driveway swales and are directed into rain gardens. This area continues to flow to the previously defined Design Point 4.

The seventh drainage basin, identified in the Hydro-Cad Output as Subcatchment 7S, has contains approximately 57,071± sq.ft. This area now consists of approximately 49,698 sq.ft. of woods in fair condition, and 7,373 sq.ft. proposed impervious area. Stormwater from this area is collected along driveway swales and are directed into rain gardens. This area continues to flow to the previously defined Design Point 4.

The eighth drainage basin, identified in the Hydro-Cad Output as Subcatchment 8S, has contains approximately 231,694± sq.ft. This area now consists of approximately 231,694 sq.ft. of woods in fair condition. Stormwater from this area is flows into the existing onsite wetlands. This area continues to flow to the previously defined Design Point 4.

The ninth drainage basin, identified in the Hydro-Cad Output as Subcatchment 9S, has contains approximately 48,419± sq.ft. This area now consists of approximately 45,079 sq.ft. of woods in fair condition, and 3,340 sq.ft. proposed impervious area. Stormwater from this area is collected along driveway swales and are directed into rain gardens. This area continues to flow to the previously defined Design Point 4.

The tenth drainage basin, identified in the Hydro-Cad Output as Subcatchment 10S, has contains approximately 21,833± sq.ft. This area now consists of approximately 18,639 sq.ft. of woods in fair condition, and 3,194 sq.ft. proposed impervious area. Stormwater from this area is

collected along driveway swales and are directed into rain gardens. This area continues to flow to the previously defined Design Point 4.

V. Stormwater Management

As previously stated, one of the goals of the drainage design for this project is to ensure that there are no adverse impacts to downstream areas. To meet this goal, rain gardens have been chosen for the best management practice for peak flow attenuation of the stormwater runoff for this project site. A Hydro-Cad TR-20 analysis was performed for both the existing and proposed conditions for the 1, 10, 25 and 100 year storm events to ensure that this pond provides the necessary detention time to provide a zero net increase in the peak flow of stormwater runoff from the project site for the design storms studied.

The proposed rain gardens have been designed with 300 sq.ft. of area. This is the maximum area that rain gardens are allowed as per the NYS DEC Stormwater Management Design Manual. These rain gardens are to provide a zero net increase in the peak flow stormwater runoff.

As can be seen in the following tables, the proposed peak flow runoff from the project site has been decreased in comparison to the existing conditions studied for all of the defined design points (See Appendix 3 and 4 for Hydro-CAD output).

Design Point 1 (Southern PL)				
Storm Event	Pre-Developed Peak Flow (cfs) Q out	Post-Developed Peak Flow (cfs) Q out	Change (cfs)	Change (%)
1 Year	0.53	0.53	0.00	0.00
10 Year	1.56	1.56	0.00	0.00
25 Year	2.20	2.20	0.00	0.00
100 Year	3.53	3.53	0.00	0.00

Design Point 2 (Westen PL)				
Storm Event	Pre-Developed Peak Flow (cfs) Q out	Post-Developed Peak Flow (cfs) Q out	Change (cfs)	Change (%)
1 Year	2.91	2.91	0.00	0.00
10 Year	8.52	8.52	0.00	0.00
25 Year	12.03	12.03	0.00	0.00
100 Year	19.28	19.28	0.00	0.00

Design Point 3 (Stream)				
Storm Event	Pre-Developed Peak Flow (cfs) Q out	Post-Developed Peak Flow (cfs) Q out	Change (cfs)	Change (%)
1 Year	5.89	5.89	0.00	0.00
10 Year	17.13	17.13	0.00	0.00
25 Year	24.19	24.19	0.00	0.00
100 Year	38.80	38.80	0.00	0.00

Design Point 4 (Ditch)				
Storm Event	Pre-Developed Peak Flow (cfs) Q out	Post-Developed Peak Flow (cfs) Q out	Change (cfs)	Change (%)
1 Year	8.21	3.16	-5.05	-61.51
10 Year	24.04	9.22	-14.82	-61.65
25 Year	33.93	13.67	-20.26	-59.71
100 Year	54.37	39.20	-15.17	-27.90

JJR
19140.01 Drainage Analysis
12-2021

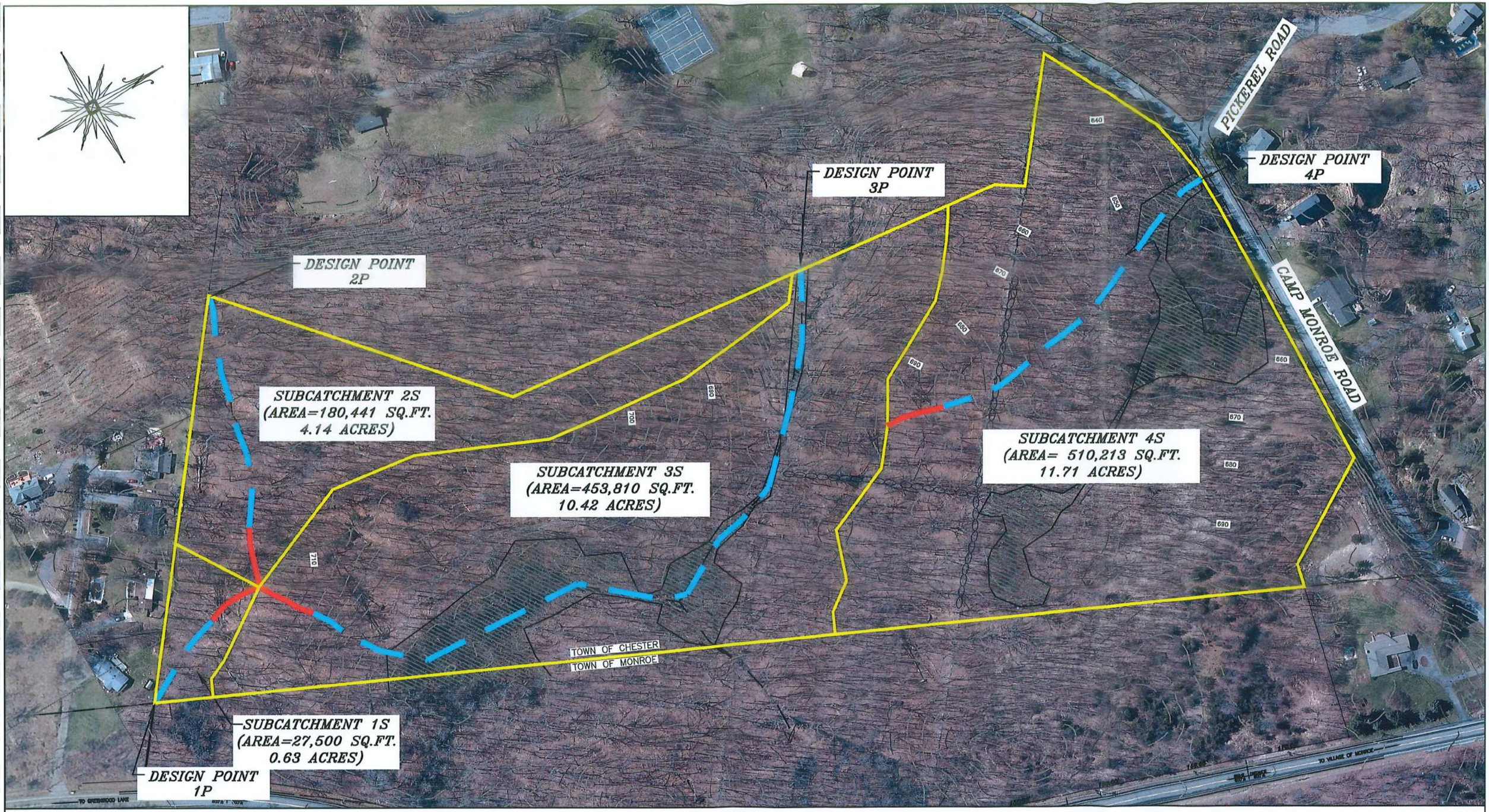
APPENDIX

LOCATION MAP

SCALE: 1" =2,000'

APPENDIX 2

Drainage Basin Maps



PIETRZAK & PFAU
ENGINEERING & SURVEYING, PLLC

262 GREENWICH AVENUE, SUITE A
GOSHEN, NEW YORK 10924
TEL: (845) 294-0606

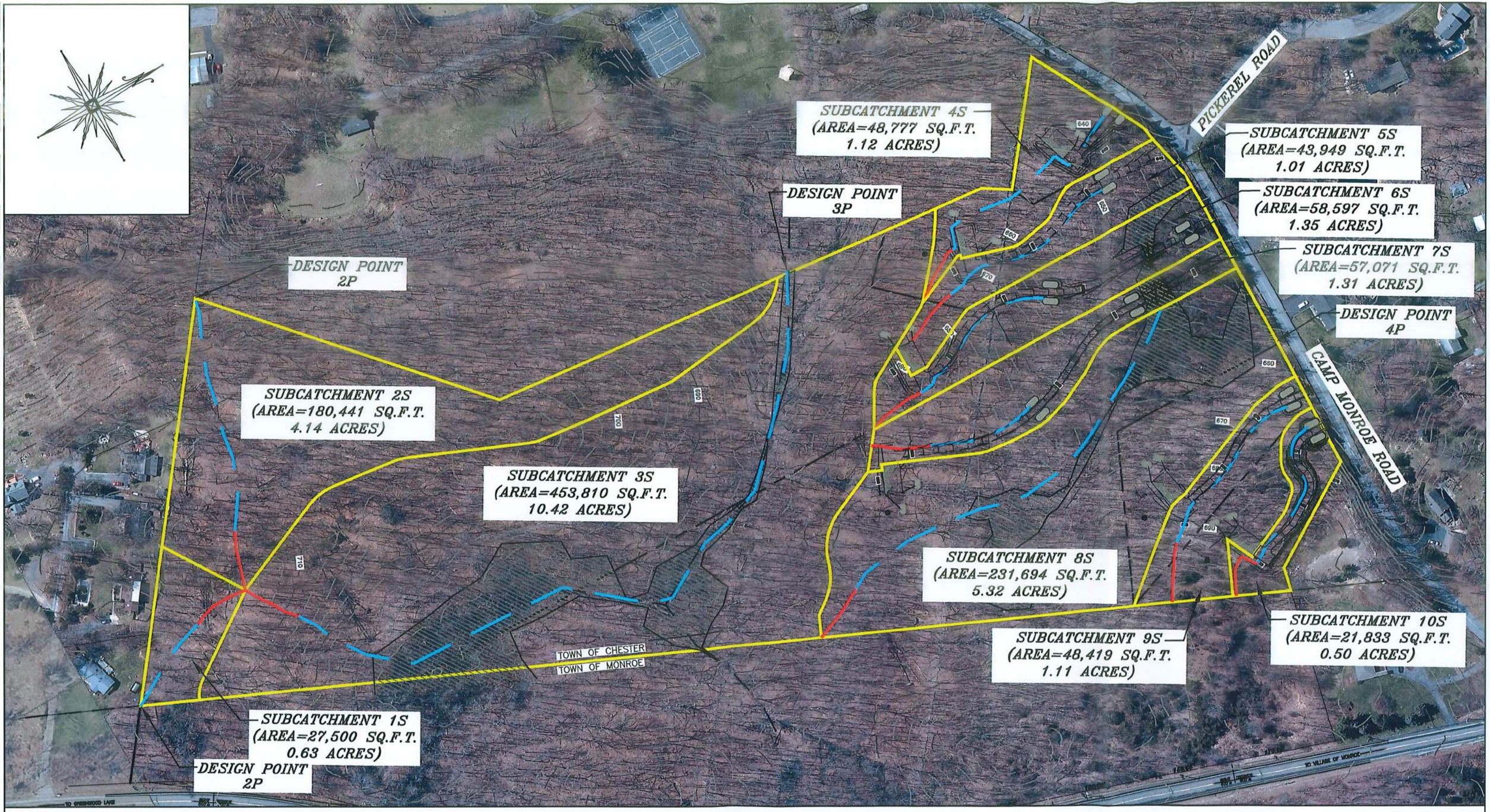
EXISTING CONDITIONS

TOWN OF CHESTER
COUNTY OF ORANGE, NEW YORK
SECTION 15 BLOCK 1 LOT 27.41

SCALE: 1"=150'

LEGEND

- SHEET FLOW
- SHALLOW CONCENTRATED FLOW
- DRAINAGE BASIN BOUNDARY



PIETRZAK & PFAU
ENGINEERING & SURVEYING, PLLC

262 GREENWICH AVENUE, SUITE A
GOSHEN, NEW YORK 10924
TEL: (845) 294-0606

PROPOSED CONDITIONS

TOWN OF CHESTER
COUNTY OF ORANGE, NEW YORK
SECTION 15 BLOCK 1 LOT 27.41

SCALE: 1"=150'

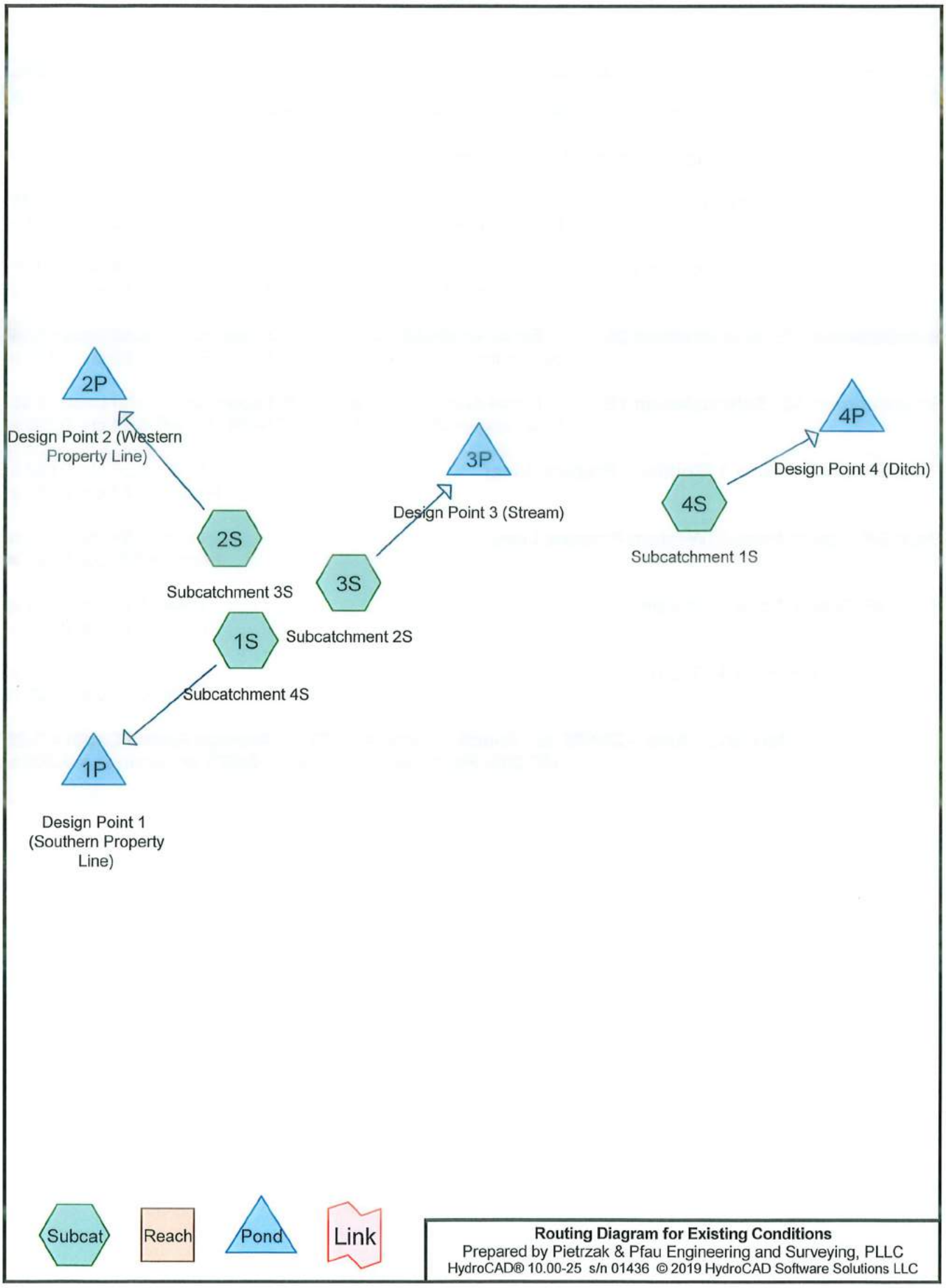
LEGEND

- SHEET FLOW
- SHALLOW CONCENTRATED FLOW
- DRAINAGE BASIN BOUNDARY

APPENDIX 3

TR-20 Hydro-CAD Calculations

Existing Conditions


2P
Design Point 2 (Western Property Line)
3P
Design Point 3 (Stream)
4P
Design Point 4 (Ditch)
2S
Subcatchment 3S
3S
4S
Subcatchment 1S
1S
Subcatchment 2S
Subcatchment 4S
1P
Design Point 1 (Southern Property Line)
Subcat
Reach
Pond
Link
Routing Diagram for Existing Conditions
Prepared by Pietrzak & Pfau Engineering and Surveying, PLLC
HydroCAD® 10.00-25 s/n 01436 © 2019 HydroCAD Software Solutions LLC

Time span=0.00-24.00 hrs, dt=0.01 hrs, 2401 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Subcatchment 1S: Subcatchment 4S Runoff Area=27,500 sf 0.00% Impervious Runoff Depth>0.95"
Flow Length=267' Tc=13.4 min CN=79 Runoff=0.53 cfs 0.050 af

Subcatchment 2S: Subcatchment 3S Runoff Area=180,441 sf 0.00% Impervious Runoff Depth>0.95"
Flow Length=494' Tc=21.4 min CN=79 Runoff=2.91 cfs 0.327 af

Subcatchment 3S: Subcatchment 2S Runoff Area=453,810 sf 0.00% Impervious Runoff Depth>0.94"
Flow Length=1,375' Tc=35.1 min CN=79 Runoff=5.89 cfs 0.820 af

Subcatchment 4S: Subcatchment 1S Runoff Area=510,213 sf 0.00% Impervious Runoff Depth>0.95"
Flow Length=687' Tc=21.5 min CN=79 Runoff=8.21 cfs 0.925 af

Pond 1P: Design Point 1 (Southern Property Line) Inflow=0.53 cfs 0.050 af
Primary=0.53 cfs 0.050 af

Pond 2P: Design Point 2 (Western Property Line) Inflow=2.91 cfs 0.327 af
Primary=2.91 cfs 0.327 af

Pond 3P: Design Point 3 (Stream) Inflow=5.89 cfs 0.820 af
Primary=5.89 cfs 0.820 af

Pond 4P: Design Point 4 (Ditch) Inflow=8.21 cfs 0.925 af
Primary=8.21 cfs 0.925 af

Total Runoff Area = 26.905 ac Runoff Volume = 2.123 af Average Runoff Depth = 0.95"
100.00% Pervious = 26.905 ac 0.00% Impervious = 0.000 ac

Summary for Subcatchment 1S: Subcatchment 4S

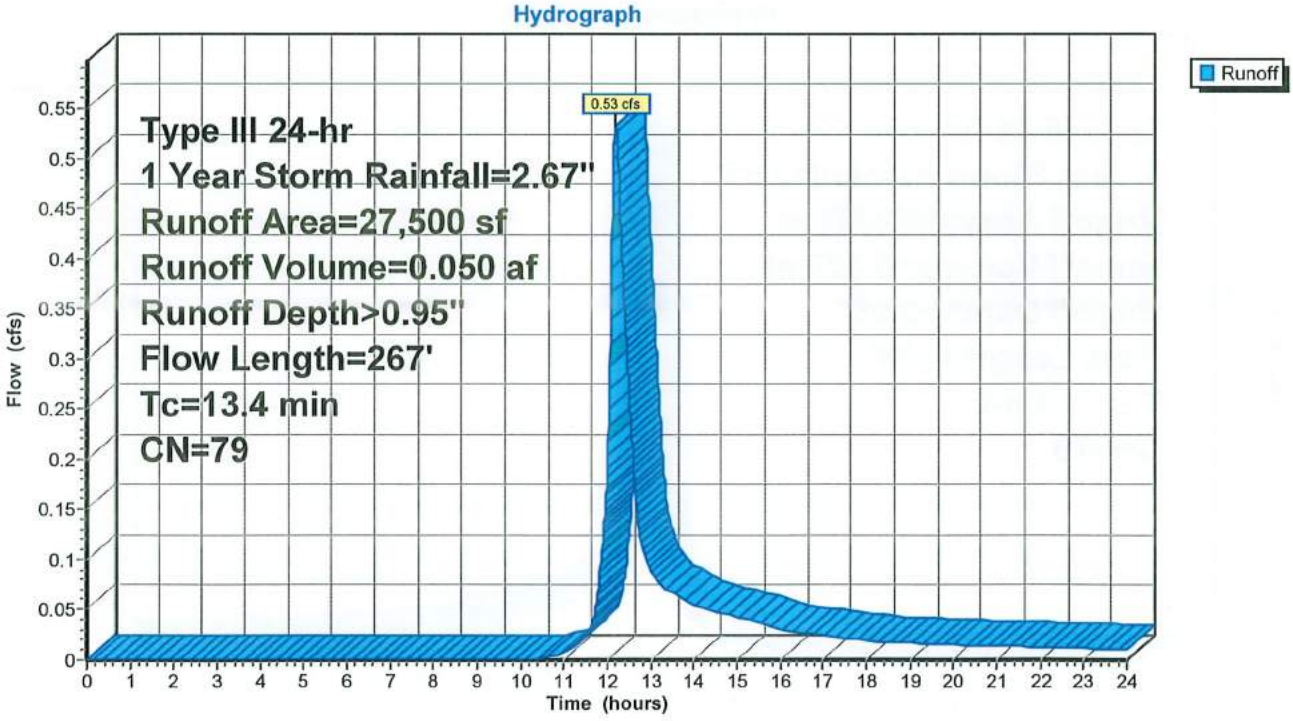
Runoff = 0.53 cfs @ 12.19 hrs, Volume= 0.050 af, Depth> 0.95"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Type III 24-hr 1 Year Storm Rainfall=2.67"

Area (sf)	CN	Description
27,500	79	Woods, Fair, HSG D
27,500		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
11.0	100	0.1069	0.15		**Sheet Flow, Sheet Flow** Woods: Light underbrush n= 0.400 P2= 3.17"
2.4	167	0.0531	1.15		**Shallow Concentrated Flow, Shallow C flow** Woodland Kv= 5.0 fps
13.4	267	Total			

Subcatchment 1S: Subcatchment 4S



Summary for Subcatchment 2S: Subcatchment 3S

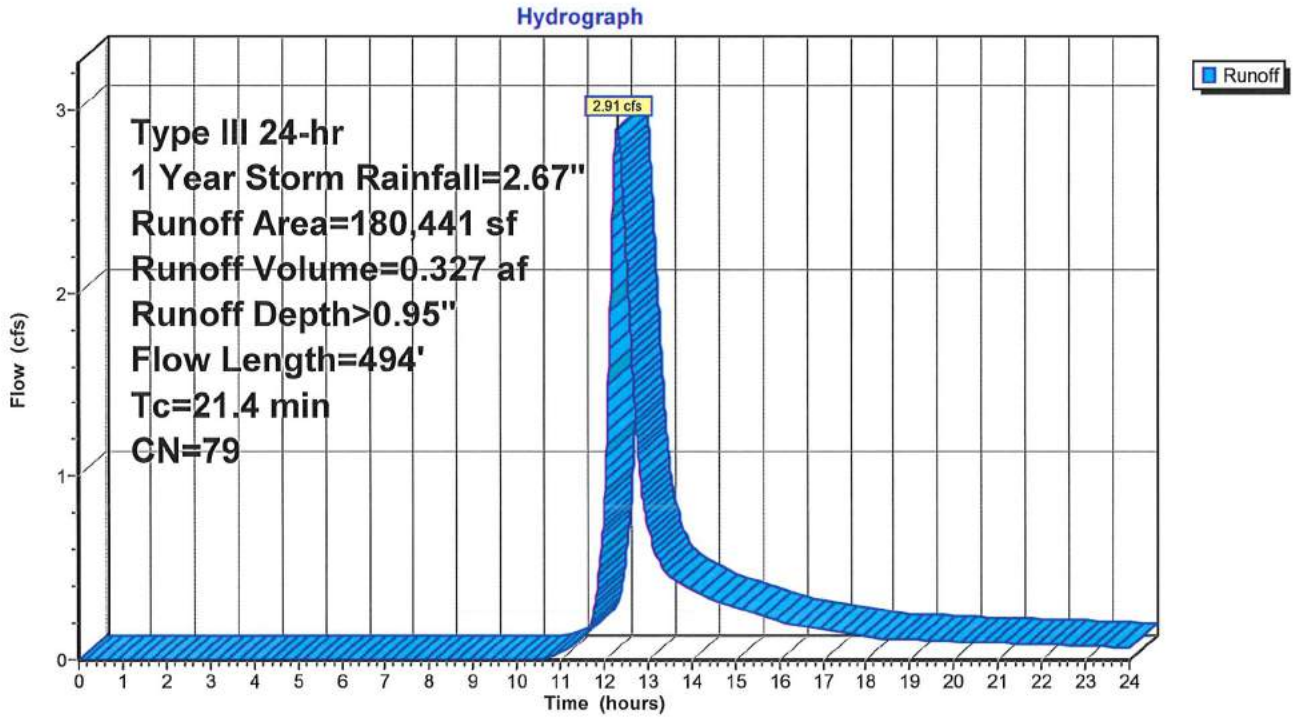
Runoff = 2.91 cfs @ 12.32 hrs, Volume= 0.327 af, Depth> 0.95"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Type III 24-hr 1 Year Storm Rainfall=2.67"

Area (sf)	CN	Description
180,441	79	Woods, Fair, HSG D
180,441		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
17.0	100	0.0361	0.10		**Sheet Flow, Sheet Flow** Woods: Light underbrush n= 0.400 P2= 3.17"
4.4	394	0.0890	1.49		**Shallow Concentrated Flow, Shallow C Flow** Woodland Kv= 5.0 fps
21.4	494	Total			

Subcatchment 2S: Subcatchment 3S



Summary for Subcatchment 3S: Subcatchment 2S

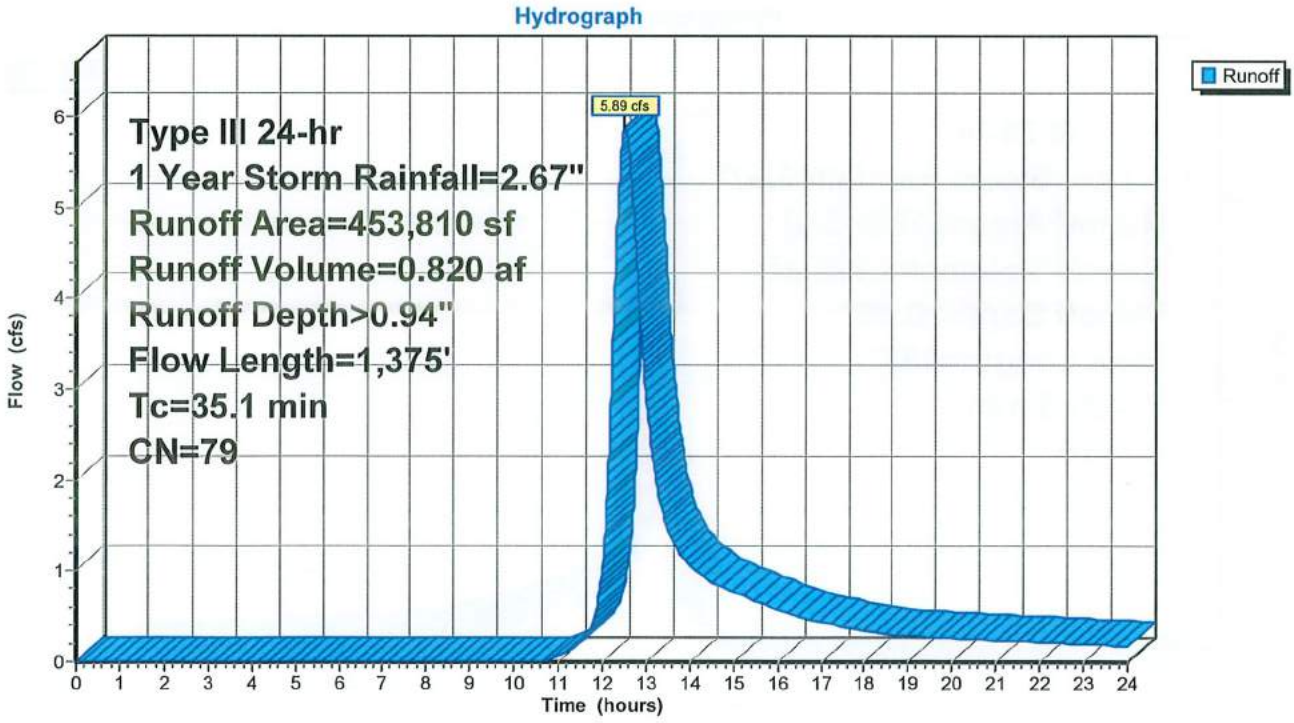
Runoff = 5.89 cfs @ 12.52 hrs, Volume= 0.820 af, Depth> 0.94"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Type III 24-hr 1 Year Storm Rainfall=2.67"

Area (sf)	CN	Description
453,810	79	Woods, Fair, HSG D
453,810		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
14.1	100	0.0575	0.12		**Sheet Flow, Sheet Flow** Woods: Light underbrush n= 0.400 P2= 3.17"
21.0	1,275	0.0410	1.01		**Shallow Concentrated Flow, Shallow C Flow** Woodland Kv= 5.0 fps
35.1	1,375	Total			

Subcatchment 3S: Subcatchment 2S



Summary for Subcatchment 4S: Subcatchment 1S

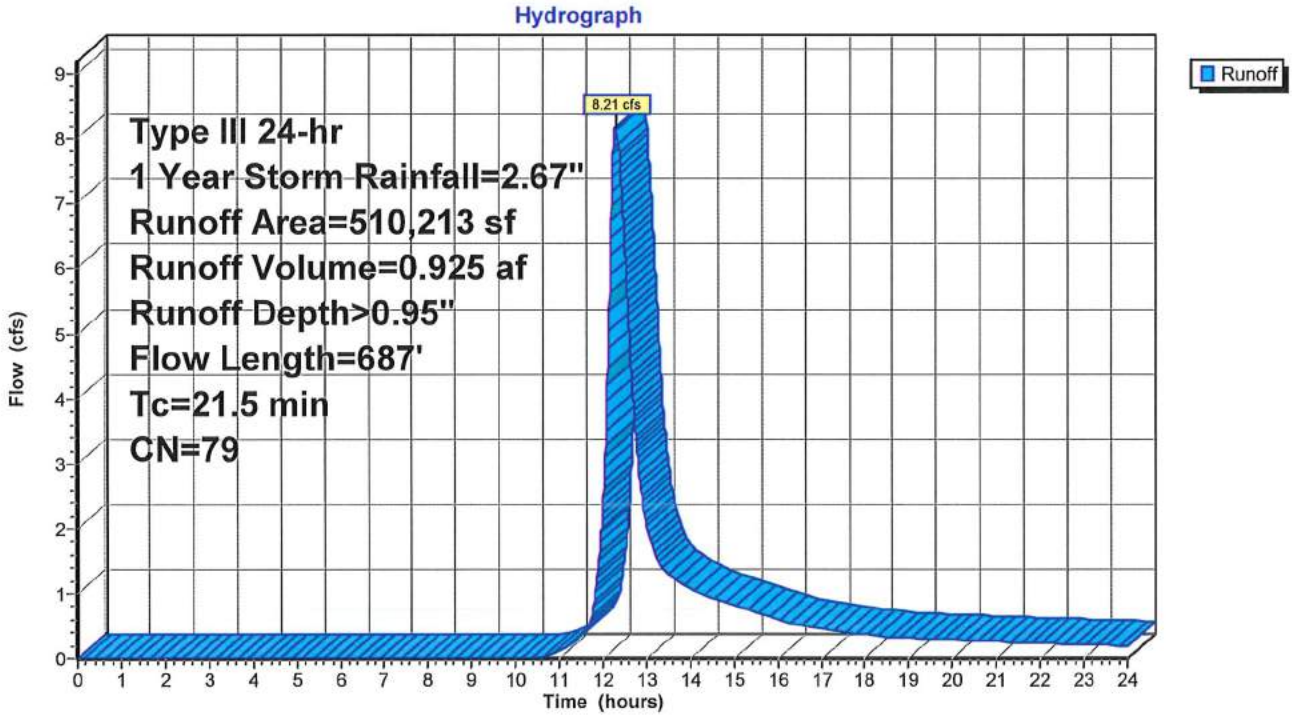
Runoff = 8.21 cfs @ 12.31 hrs, Volume= 0.925 af, Depth> 0.95"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Type III 24-hr 1 Year Storm Rainfall=2.67"

Area (sf)	CN	Description
510,213	79	Woods, Fair, HSG D
510,213		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
14.5	100	0.0537	0.11		**Sheet Flow, Sheet Flow** Woods: Light underbrush n= 0.400 P2= 3.17"
7.0	587	0.0782	1.40		**Shallow Concentrated Flow, Shallow C flow** Woodland Kv= 5.0 fps
21.5	687	Total			

Subcatchment 4S: Subcatchment 1S

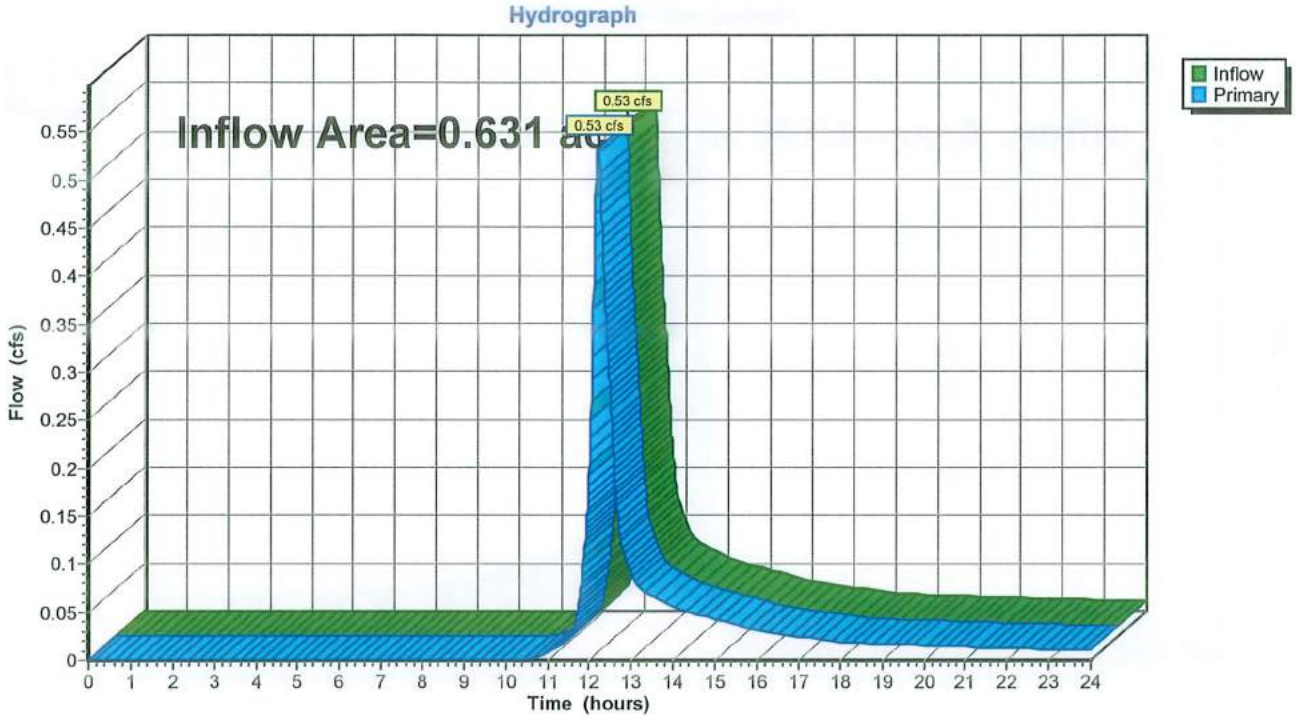


Summary for Pond 1P: Design Point 1 (Southern Property Line)

Inflow Area = 0.631 ac, 0.00% Impervious, Inflow Depth > 0.95" for 1 Year Storm event
Inflow = 0.53 cfs @ 12.19 hrs, Volume= 0.050 af
Primary = 0.53 cfs @ 12.19 hrs, Volume= 0.050 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs

Pond 1P: Design Point 1 (Southern Property Line)

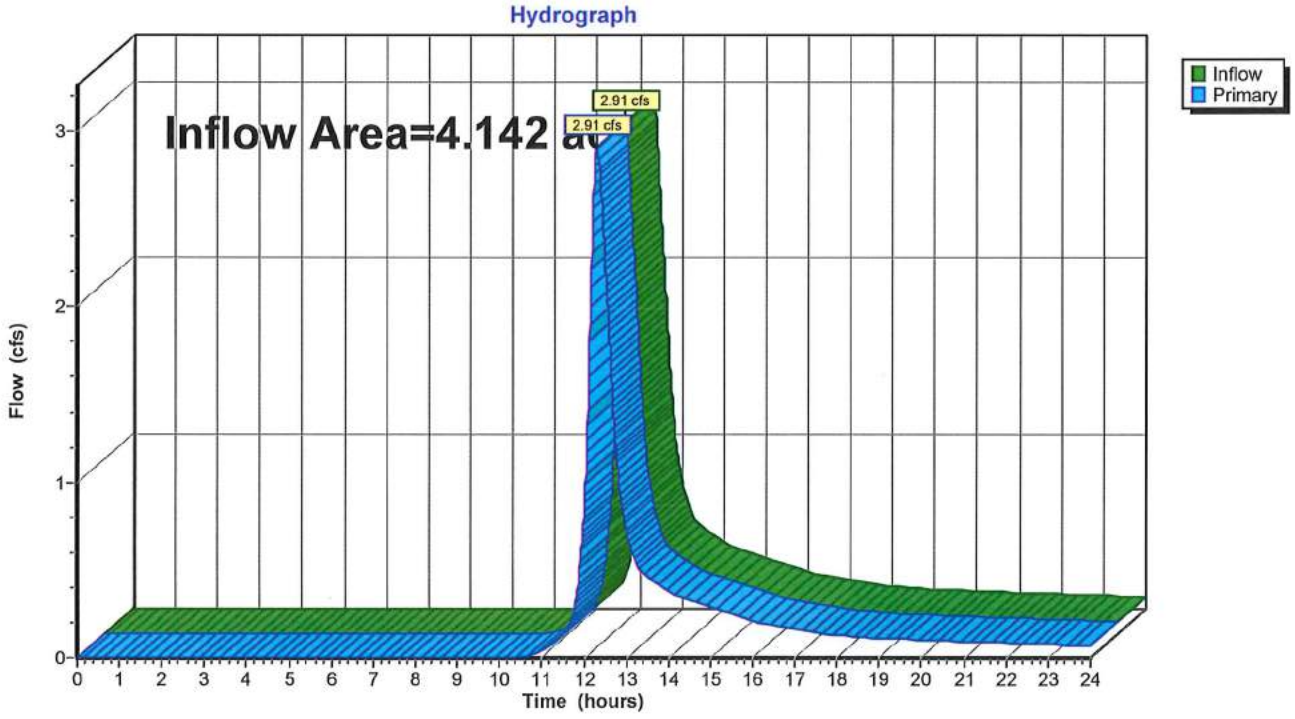


Summary for Pond 2P: Design Point 2 (Western Property Line)

Inflow Area = 4.142 ac, 0.00% Impervious, Inflow Depth > 0.95" for 1 Year Storm event
Inflow = 2.91 cfs @ 12.32 hrs, Volume= 0.327 af
Primary = 2.91 cfs @ 12.32 hrs, Volume= 0.327 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs

Pond 2P: Design Point 2 (Western Property Line)

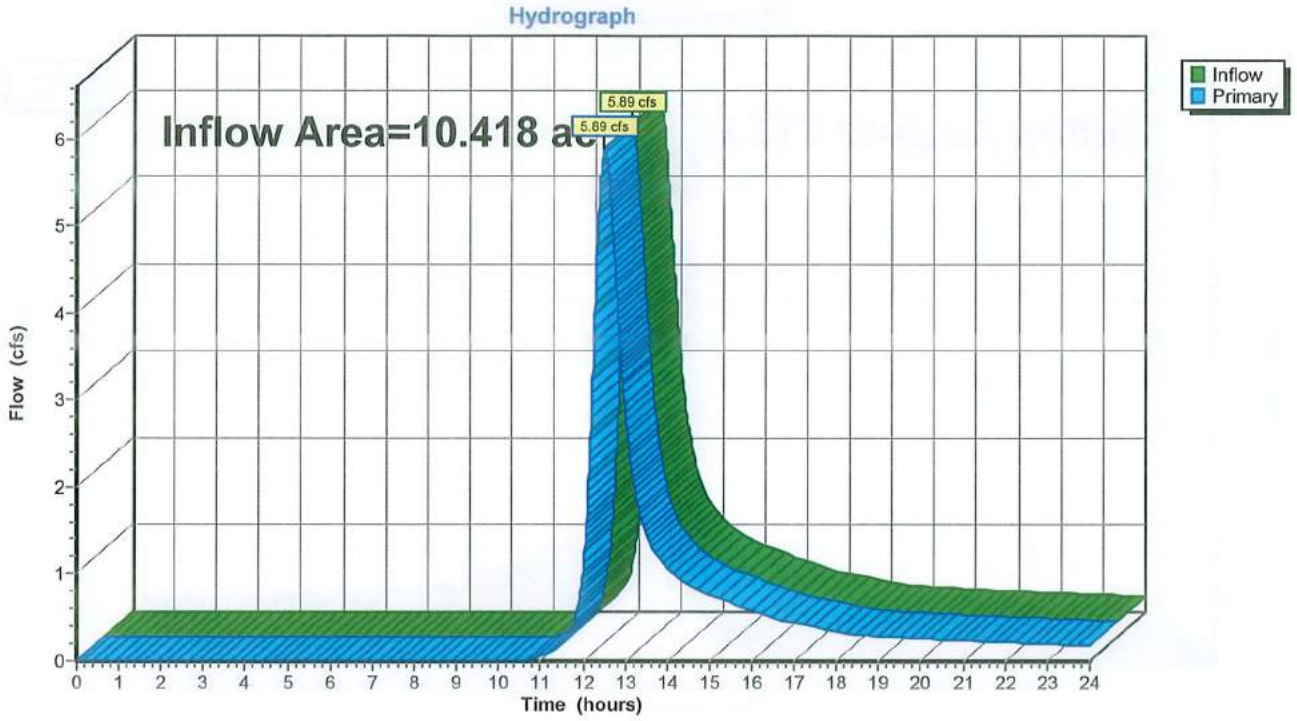


Summary for Pond 3P: Design Point 3 (Stream)

Inflow Area = 10.418 ac, 0.00% Impervious, Inflow Depth > 0.94" for 1 Year Storm event
Inflow = 5.89 cfs @ 12.52 hrs, Volume= 0.820 af
Primary = 5.89 cfs @ 12.52 hrs, Volume= 0.820 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs

Pond 3P: Design Point 3 (Stream)

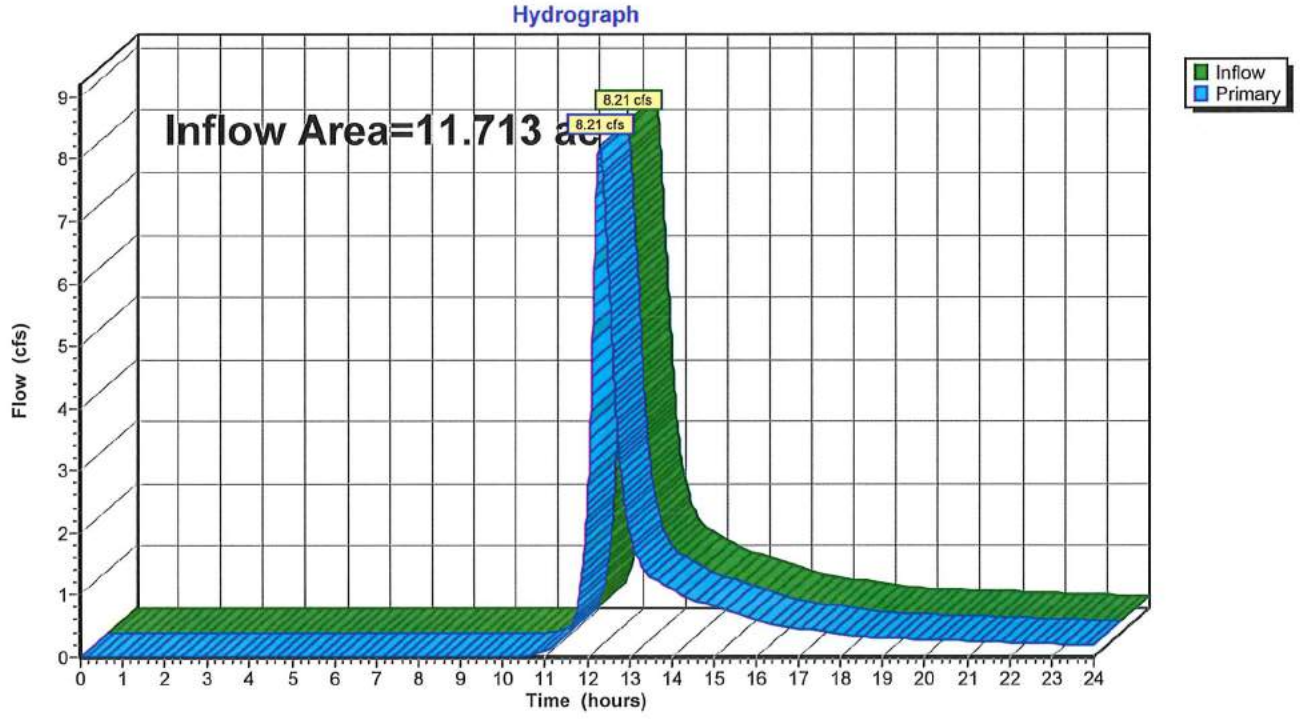


Summary for Pond 4P: Design Point 4 (Ditch)

Inflow Area = 11.713 ac, 0.00% Impervious, Inflow Depth > 0.95" for 1 Year Storm event
Inflow = 8.21 cfs @ 12.31 hrs, Volume= 0.925 af
Primary = 8.21 cfs @ 12.31 hrs, Volume= 0.925 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs

Pond 4P: Design Point 4 (Ditch)



Time span=0.00-24.00 hrs, dt=0.01 hrs, 2401 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Subcatchment 1S: Subcatchment 4S Runoff Area=27,500 sf 0.00% Impervious Runoff Depth>1.37"
Flow Length=267' Tc=13.4 min CN=79 Runoff=0.79 cfs 0.072 af

Subcatchment 2S: Subcatchment 3S Runoff Area=180,441 sf 0.00% Impervious Runoff Depth>1.37"
Flow Length=494' Tc=21.4 min CN=79 Runoff=4.30 cfs 0.472 af

Subcatchment 3S: Subcatchment 2S Runoff Area=453,810 sf 0.00% Impervious Runoff Depth>1.36"
Flow Length=1,375' Tc=35.1 min CN=79 Runoff=8.68 cfs 1.183 af

Subcatchment 4S: Subcatchment 1S Runoff Area=510,213 sf 0.00% Impervious Runoff Depth>1.37"
Flow Length=687' Tc=21.5 min CN=79 Runoff=12.14 cfs 1.335 af

Pond 1P: Design Point 1 (Southern Property Line) Inflow=0.79 cfs 0.072 af
Primary=0.79 cfs 0.072 af

Pond 2P: Design Point 2 (Western Property Line) Inflow=4.30 cfs 0.472 af
Primary=4.30 cfs 0.472 af

Pond 3P: Design Point 3 (Stream) Inflow=8.68 cfs 1.183 af
Primary=8.68 cfs 1.183 af

Pond 4P: Design Point 4 (Ditch) Inflow=12.14 cfs 1.335 af
Primary=12.14 cfs 1.335 af

Total Runoff Area = 26.905 ac Runoff Volume = 3.062 af Average Runoff Depth = 1.37"
100.00% Pervious = 26.905 ac 0.00% Impervious = 0.000 ac

Summary for Subcatchment 1S: Subcatchment 4S

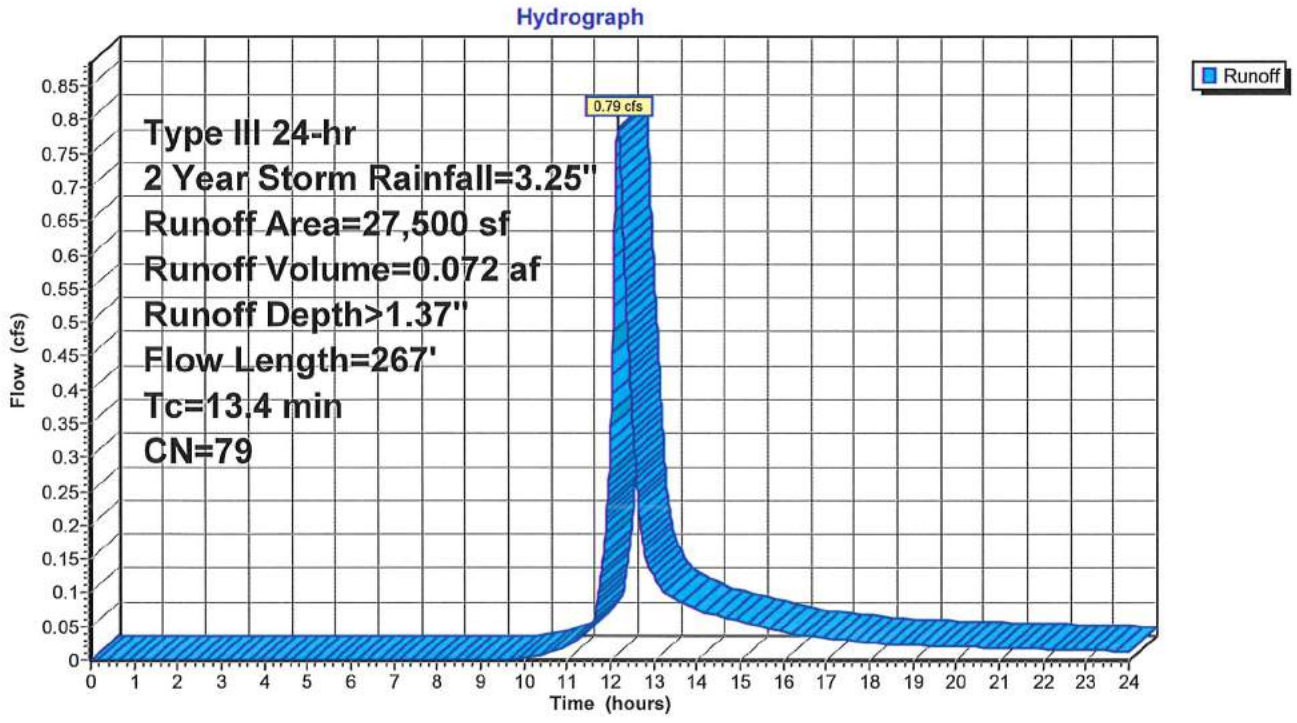
Runoff = 0.79 cfs @ 12.19 hrs, Volume= 0.072 af, Depth> 1.37"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Type III 24-hr 2 Year Storm Rainfall=3.25"

Area (sf)	CN	Description
27,500	79	Woods, Fair, HSG D
27,500		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
11.0	100	0.1069	0.15		**Sheet Flow, Sheet Flow** Woods: Light underbrush n= 0.400 P2= 3.17"
2.4	167	0.0531	1.15		**Shallow Concentrated Flow, Shallow C flow** Woodland Kv= 5.0 fps
13.4	267	Total			

Subcatchment 1S: Subcatchment 4S



Summary for Subcatchment 2S: Subcatchment 3S

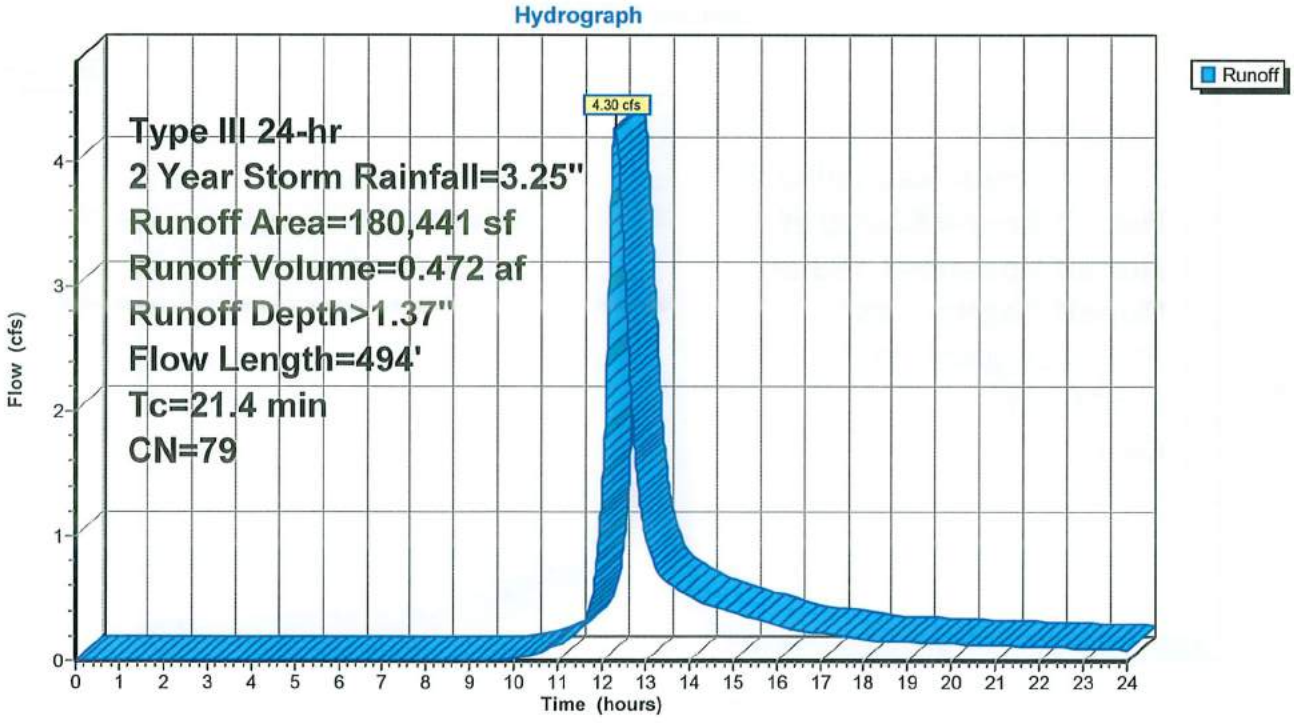
Runoff = 4.30 cfs @ 12.30 hrs, Volume= 0.472 af, Depth> 1.37"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Type III 24-hr 2 Year Storm Rainfall=3.25"

Area (sf)	CN	Description
180,441	79	Woods, Fair, HSG D
180,441		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
17.0	100	0.0361	0.10		**Sheet Flow, Sheet Flow** Woods: Light underbrush n= 0.400 P2= 3.17"
4.4	394	0.0890	1.49		**Shallow Concentrated Flow, Shallow C Flow** Woodland Kv= 5.0 fps
21.4	494	Total			

Subcatchment 2S: Subcatchment 3S



Summary for Subcatchment 3S: Subcatchment 2S

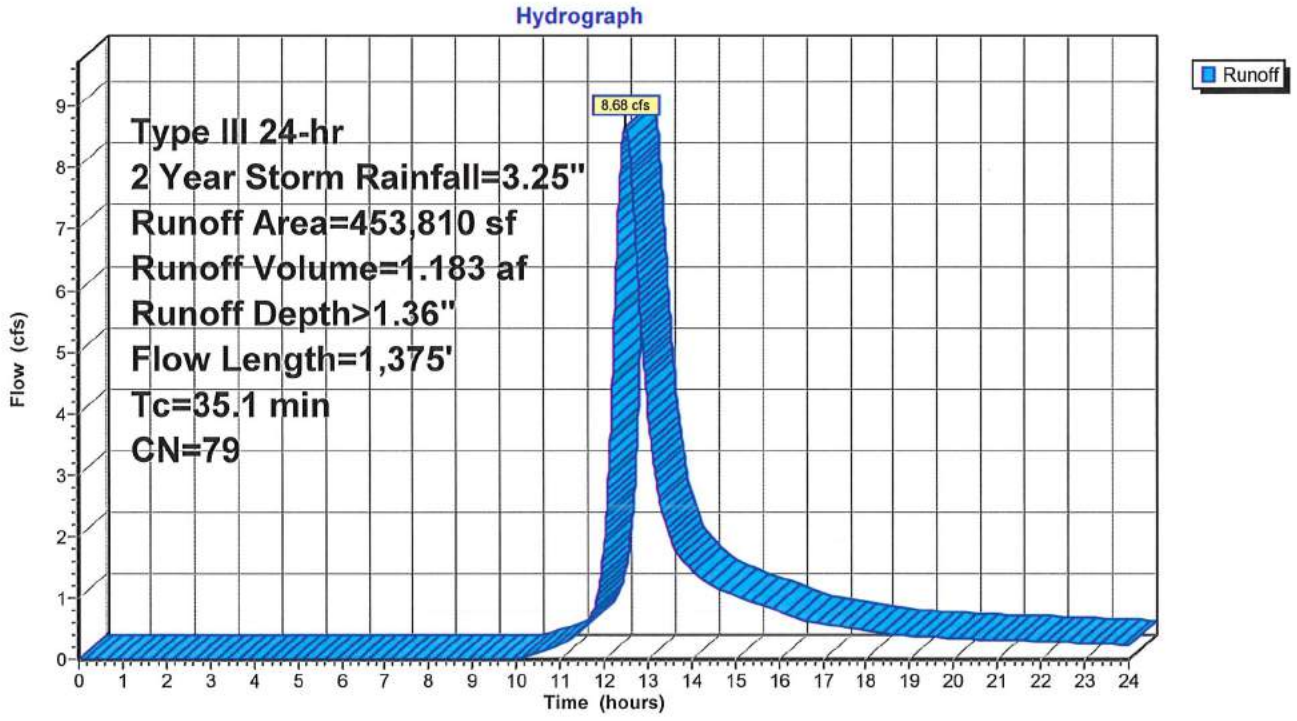
Runoff = 8.68 cfs @ 12.52 hrs, Volume= 1.183 af, Depth> 1.36"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Type III 24-hr 2 Year Storm Rainfall=3.25"

Area (sf)	CN	Description
453,810	79	Woods, Fair, HSG D
453,810		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
14.1	100	0.0575	0.12		**Sheet Flow, Sheet Flow** Woods: Light underbrush n= 0.400 P2= 3.17"
21.0	1,275	0.0410	1.01		**Shallow Concentrated Flow, Shallow C Flow** Woodland Kv= 5.0 fps
35.1	1,375	Total			

Subcatchment 3S: Subcatchment 2S



Summary for Subcatchment 4S: Subcatchment 1S

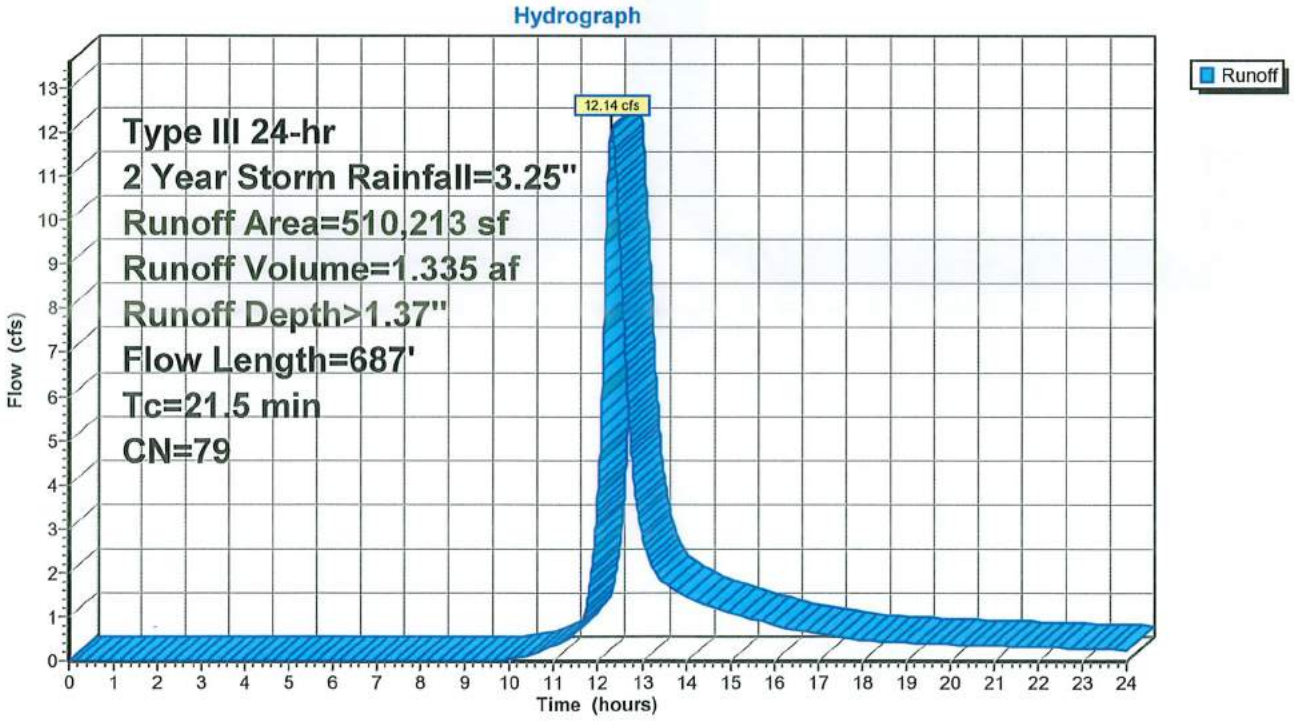
Runoff = 12.14 cfs @ 12.30 hrs, Volume= 1.335 af, Depth> 1.37"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Type III 24-hr 2 Year Storm Rainfall=3.25"

Area (sf)	CN	Description
510,213	79	Woods, Fair, HSG D
510,213		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
14.5	100	0.0537	0.11		**Sheet Flow, Sheet Flow** Woods: Light underbrush n= 0.400 P2= 3.17"
7.0	587	0.0782	1.40		**Shallow Concentrated Flow, Shallow C flow** Woodland Kv= 5.0 fps
21.5	687	Total			

Subcatchment 4S: Subcatchment 1S

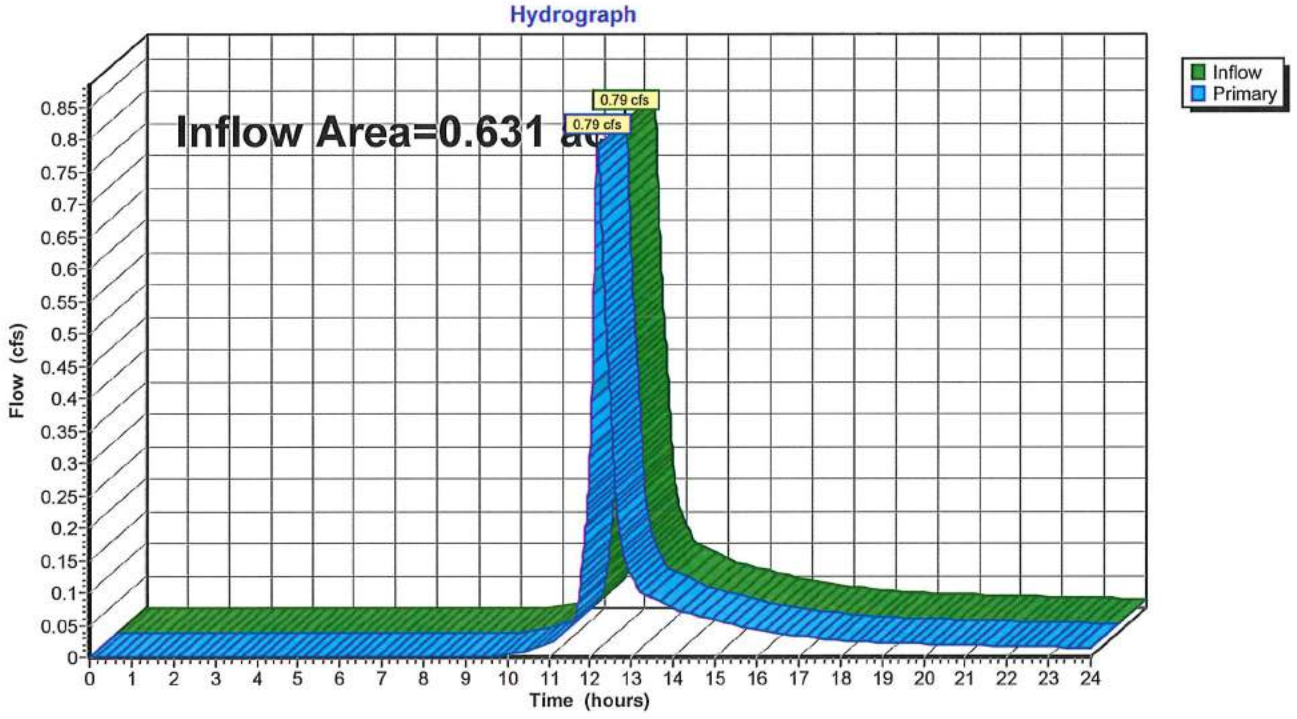


Summary for Pond 1P: Design Point 1 (Southern Property Line)

Inflow Area = 0.631 ac, 0.00% Impervious, Inflow Depth > 1.37" for 2 Year Storm event
Inflow = 0.79 cfs @ 12.19 hrs, Volume= 0.072 af
Primary = 0.79 cfs @ 12.19 hrs, Volume= 0.072 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs

Pond 1P: Design Point 1 (Southern Property Line)

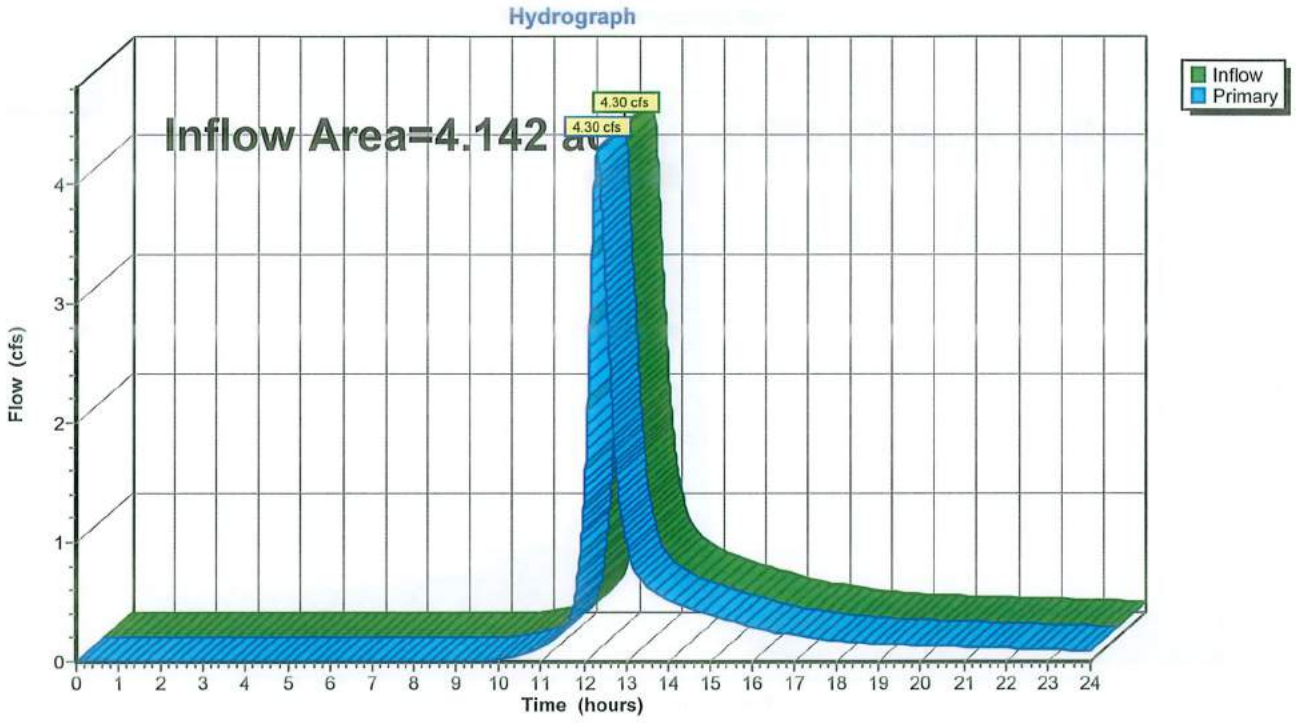


Summary for Pond 2P: Design Point 2 (Western Property Line)

Inflow Area = 4.142 ac, 0.00% Impervious, Inflow Depth > 1.37" for 2 Year Storm event
Inflow = 4.30 cfs @ 12.30 hrs, Volume= 0.472 af
Primary = 4.30 cfs @ 12.30 hrs, Volume= 0.472 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs

Pond 2P: Design Point 2 (Western Property Line)

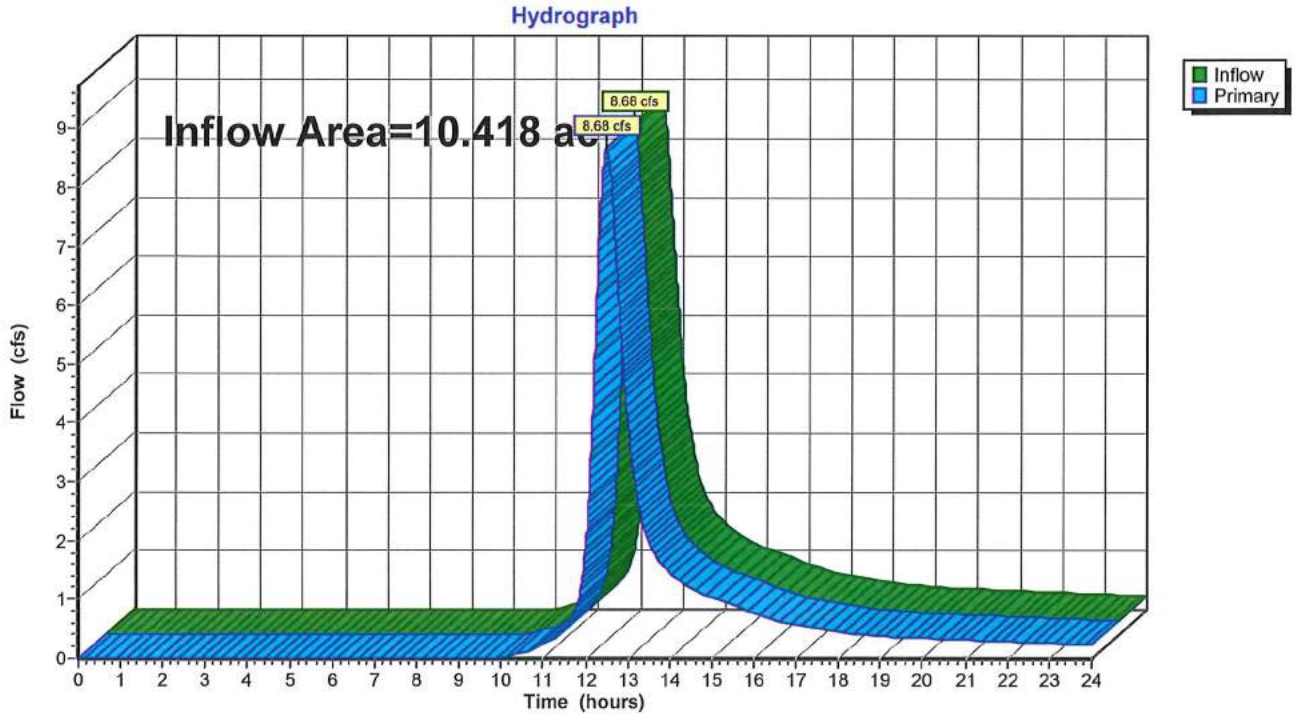


Summary for Pond 3P: Design Point 3 (Stream)

Inflow Area = 10.418 ac, 0.00% Impervious, Inflow Depth > 1.36" for 2 Year Storm event
Inflow = 8.68 cfs @ 12.52 hrs, Volume= 1.183 af
Primary = 8.68 cfs @ 12.52 hrs, Volume= 1.183 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs

Pond 3P: Design Point 3 (Stream)

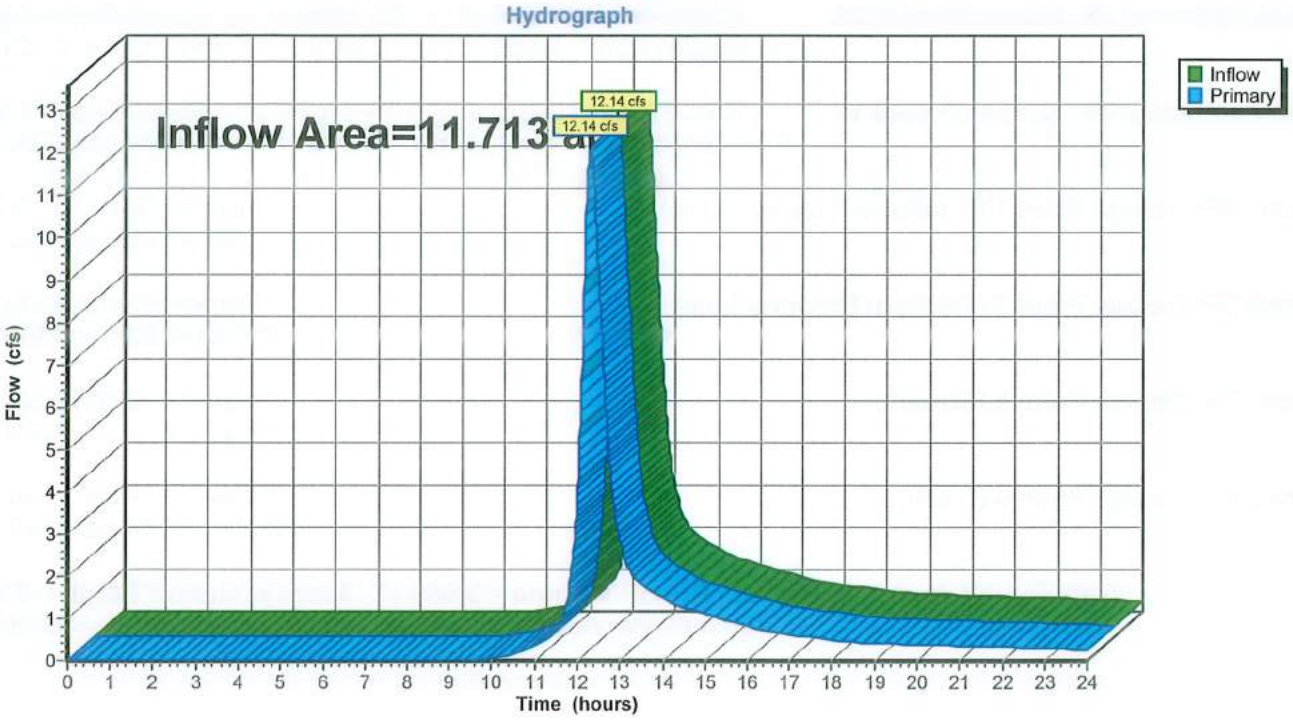


Summary for Pond 4P: Design Point 4 (Ditch)

Inflow Area = 11.713 ac, 0.00% Impervious, Inflow Depth > 1.37" for 2 Year Storm event
Inflow = 12.14 cfs @ 12.30 hrs, Volume= 1.335 af
Primary = 12.14 cfs @ 12.30 hrs, Volume= 1.335 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs

Pond 4P: Design Point 4 (Ditch)



Time span=0.00-24.00 hrs, dt=0.01 hrs, 2401 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Subcatchment 1S: Subcatchment 4S Runoff Area=27,500 sf 0.00% Impervious Runoff Depth>2.67"
Flow Length=267' Tc=13.4 min CN=79 Runoff=1.56 cfs 0.140 af

Subcatchment 2S: Subcatchment 3S Runoff Area=180,441 sf 0.00% Impervious Runoff Depth>2.66"
Flow Length=494' Tc=21.4 min CN=79 Runoff=8.52 cfs 0.919 af

Subcatchment 3S: Subcatchment 2S Runoff Area=453,810 sf 0.00% Impervious Runoff Depth>2.65"
Flow Length=1,375' Tc=35.1 min CN=79 Runoff=17.13 cfs 2.303 af

Subcatchment 4S: Subcatchment 1S Runoff Area=510,213 sf 0.00% Impervious Runoff Depth>2.66"
Flow Length=687' Tc=21.5 min CN=79 Runoff=24.04 cfs 2.597 af

Pond 1P: Design Point 1 (Southern Property Line) Inflow=1.56 cfs 0.140 af
Primary=1.56 cfs 0.140 af

Pond 2P: Design Point 2 (Western Property Line) Inflow=8.52 cfs 0.919 af
Primary=8.52 cfs 0.919 af

Pond 3P: Design Point 3 (Stream) Inflow=17.13 cfs 2.303 af
Primary=17.13 cfs 2.303 af

Pond 4P: Design Point 4 (Ditch) Inflow=24.04 cfs 2.597 af
Primary=24.04 cfs 2.597 af

Total Runoff Area = 26.905 ac Runoff Volume = 5.960 af Average Runoff Depth = 2.66"
100.00% Pervious = 26.905 ac 0.00% Impervious = 0.000 ac

Summary for Subcatchment 1S: Subcatchment 4S

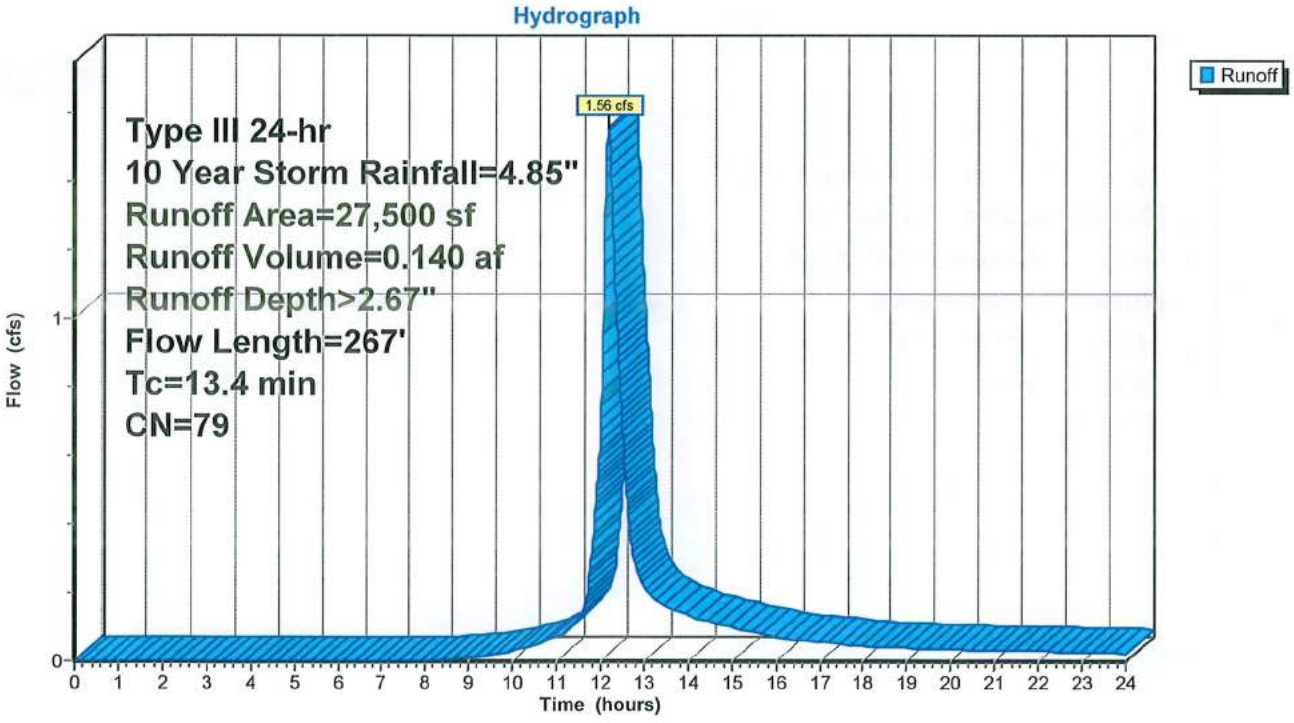
Runoff = 1.56 cfs @ 12.19 hrs, Volume= 0.140 af, Depth> 2.67"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Type III 24-hr 10 Year Storm Rainfall=4.85"

Area (sf)	CN	Description
27,500	79	Woods, Fair, HSG D
27,500		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
11.0	100	0.1069	0.15		**Sheet Flow, Sheet Flow** Woods: Light underbrush n= 0.400 P2= 3.17"
2.4	167	0.0531	1.15		**Shallow Concentrated Flow, Shallow C flow** Woodland Kv= 5.0 fps
13.4	267	Total			

Subcatchment 1S: Subcatchment 4S



Summary for Subcatchment 2S: Subcatchment 3S

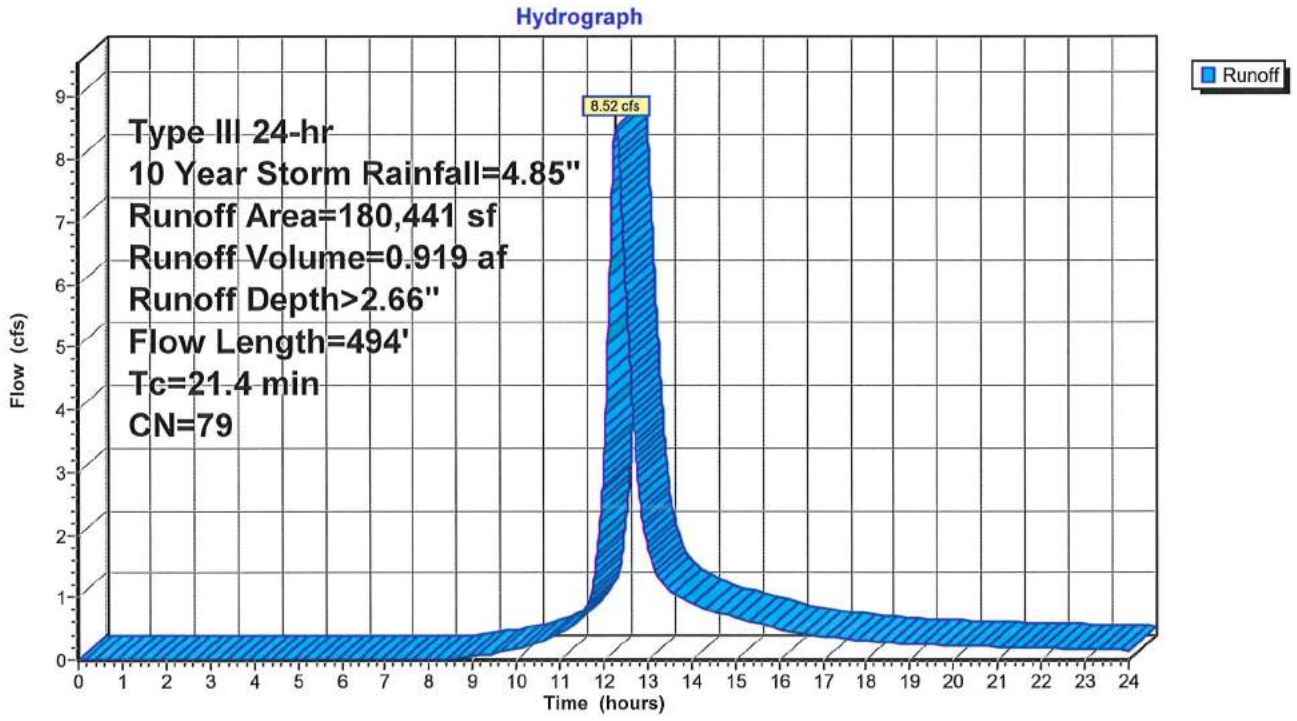
Runoff = 8.52 cfs @ 12.29 hrs, Volume= 0.919 af, Depth> 2.66"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Type III 24-hr 10 Year Storm Rainfall=4.85"

Area (sf)	CN	Description
180,441	79	Woods, Fair, HSG D
180,441		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
17.0	100	0.0361	0.10		**Sheet Flow, Sheet Flow** Woods: Light underbrush n= 0.400 P2= 3.17"
4.4	394	0.0890	1.49		**Shallow Concentrated Flow, Shallow C Flow** Woodland Kv= 5.0 fps
21.4	494	Total			

Subcatchment 2S: Subcatchment 3S



Summary for Subcatchment 3S: Subcatchment 2S

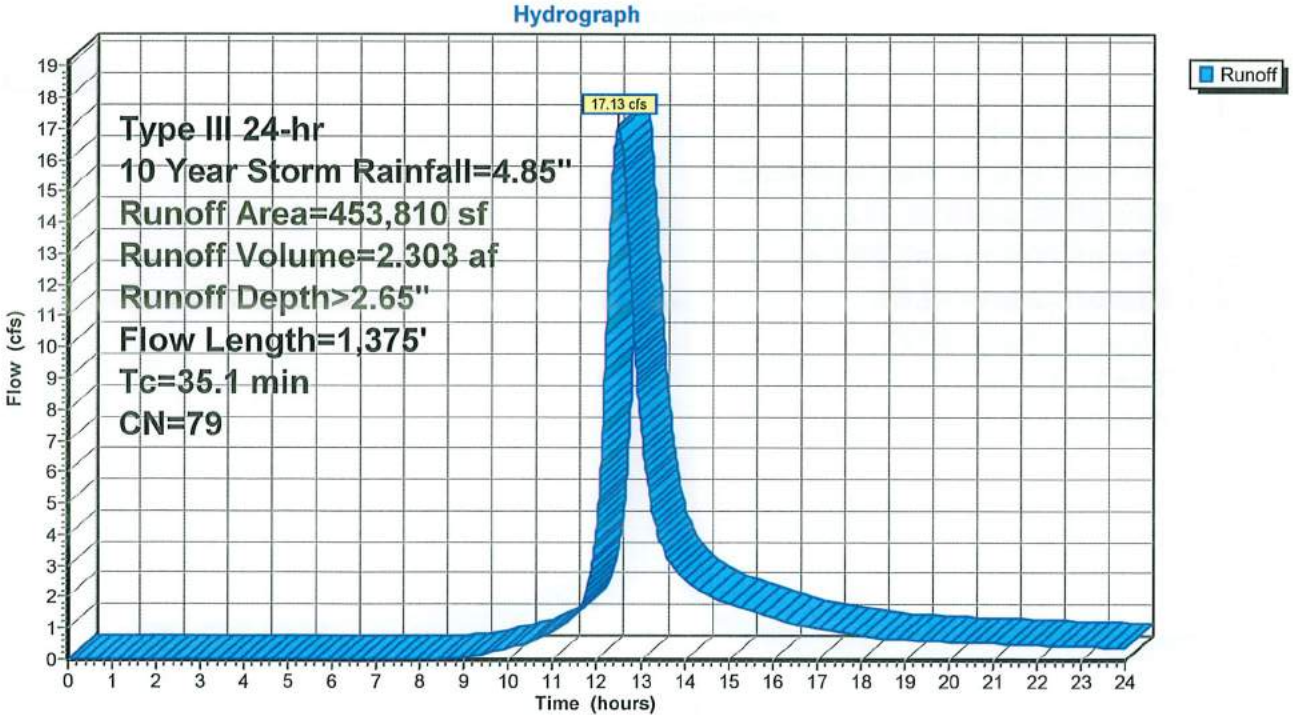
Runoff = 17.13 cfs @ 12.48 hrs, Volume= 2.303 af, Depth> 2.65"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Type III 24-hr 10 Year Storm Rainfall=4.85"

Area (sf)	CN	Description
453,810	79	Woods, Fair, HSG D
453,810		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
14.1	100	0.0575	0.12		**Sheet Flow, Sheet Flow** Woods: Light underbrush n= 0.400 P2= 3.17"
21.0	1,275	0.0410	1.01		**Shallow Concentrated Flow, Shallow C Flow** Woodland Kv= 5.0 fps
35.1	1,375	Total			

Subcatchment 3S: Subcatchment 2S



Summary for Subcatchment 4S: Subcatchment 1S

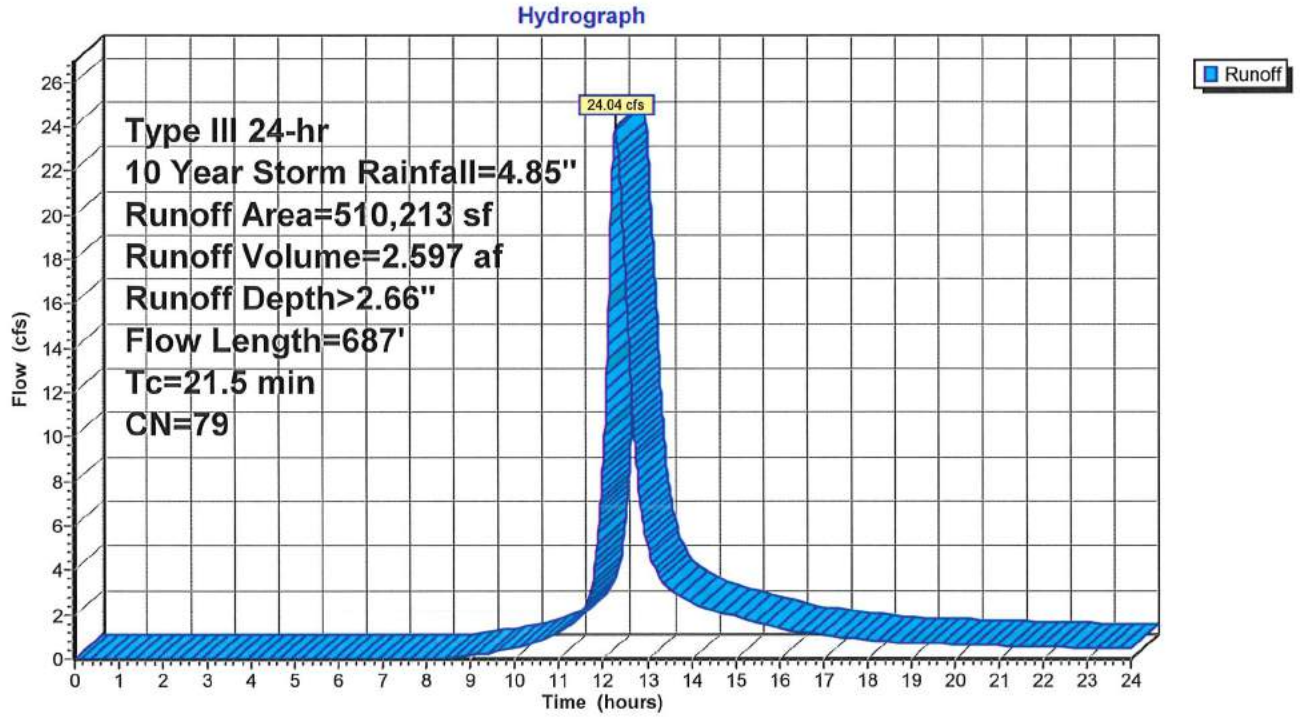
Runoff = 24.04 cfs @ 12.30 hrs, Volume= 2.597 af, Depth> 2.66"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Type III 24-hr 10 Year Storm Rainfall=4.85"

Area (sf)	CN	Description
510,213	79	Woods, Fair, HSG D
510,213		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
14.5	100	0.0537	0.11		**Sheet Flow, Sheet Flow** Woods: Light underbrush n= 0.400 P2= 3.17"
7.0	587	0.0782	1.40		**Shallow Concentrated Flow, Shallow C flow** Woodland Kv= 5.0 fps
21.5	687	Total			

Subcatchment 4S: Subcatchment 1S

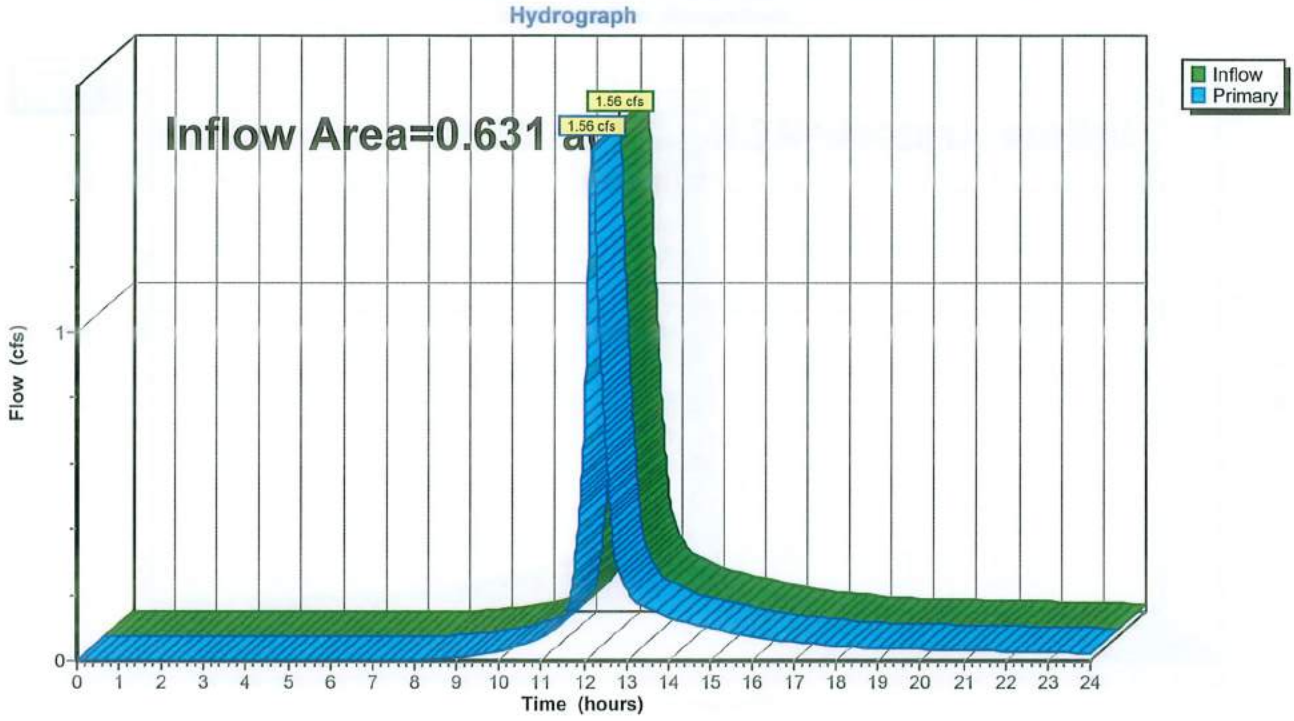


Summary for Pond 1P: Design Point 1 (Southern Property Line)

Inflow Area = 0.631 ac, 0.00% Impervious, Inflow Depth > 2.67" for 10 Year Storm event
Inflow = 1.56 cfs @ 12.19 hrs, Volume= 0.140 af
Primary = 1.56 cfs @ 12.19 hrs, Volume= 0.140 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs

Pond 1P: Design Point 1 (Southern Property Line)

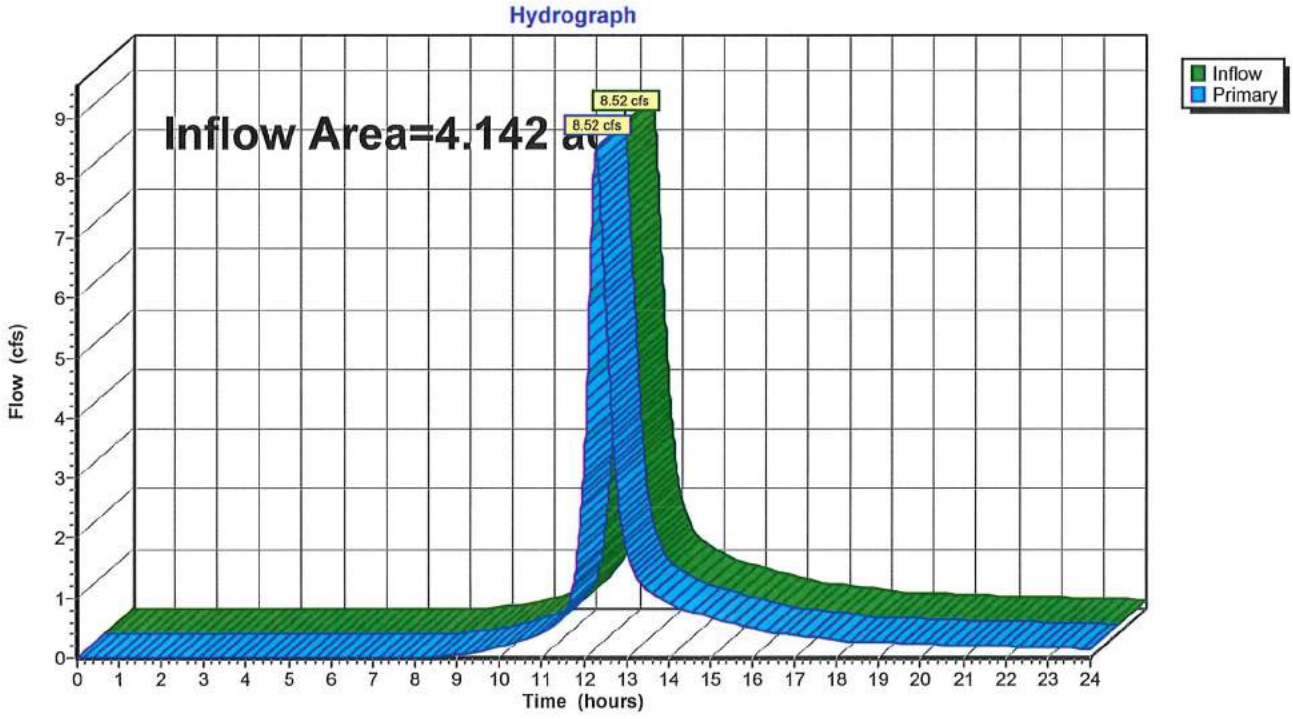


Summary for Pond 2P: Design Point 2 (Western Property Line)

Inflow Area = 4.142 ac, 0.00% Impervious, Inflow Depth > 2.66" for 10 Year Storm event
Inflow = 8.52 cfs @ 12.29 hrs, Volume= 0.919 af
Primary = 8.52 cfs @ 12.29 hrs, Volume= 0.919 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs

Pond 2P: Design Point 2 (Western Property Line)

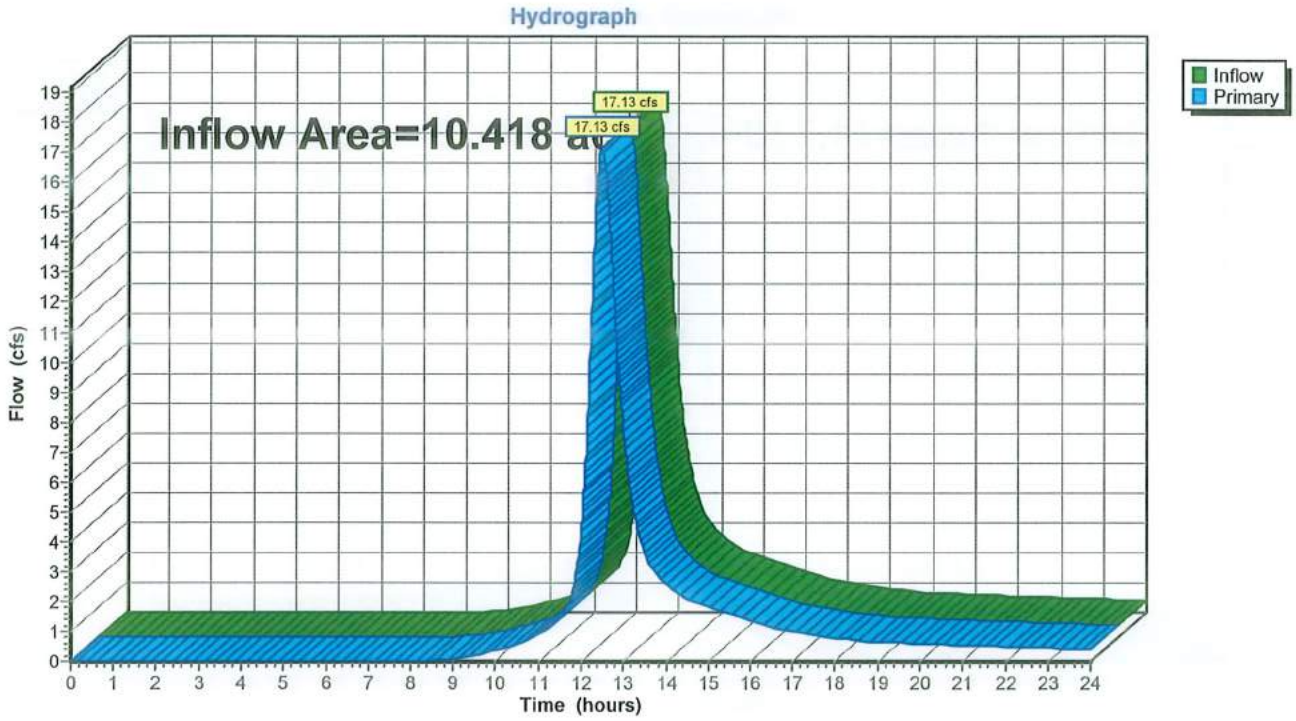


Summary for Pond 3P: Design Point 3 (Stream)

Inflow Area = 10.418 ac, 0.00% Impervious, Inflow Depth > 2.65" for 10 Year Storm event
Inflow = 17.13 cfs @ 12.48 hrs, Volume= 2.303 af
Primary = 17.13 cfs @ 12.48 hrs, Volume= 2.303 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs

Pond 3P: Design Point 3 (Stream)

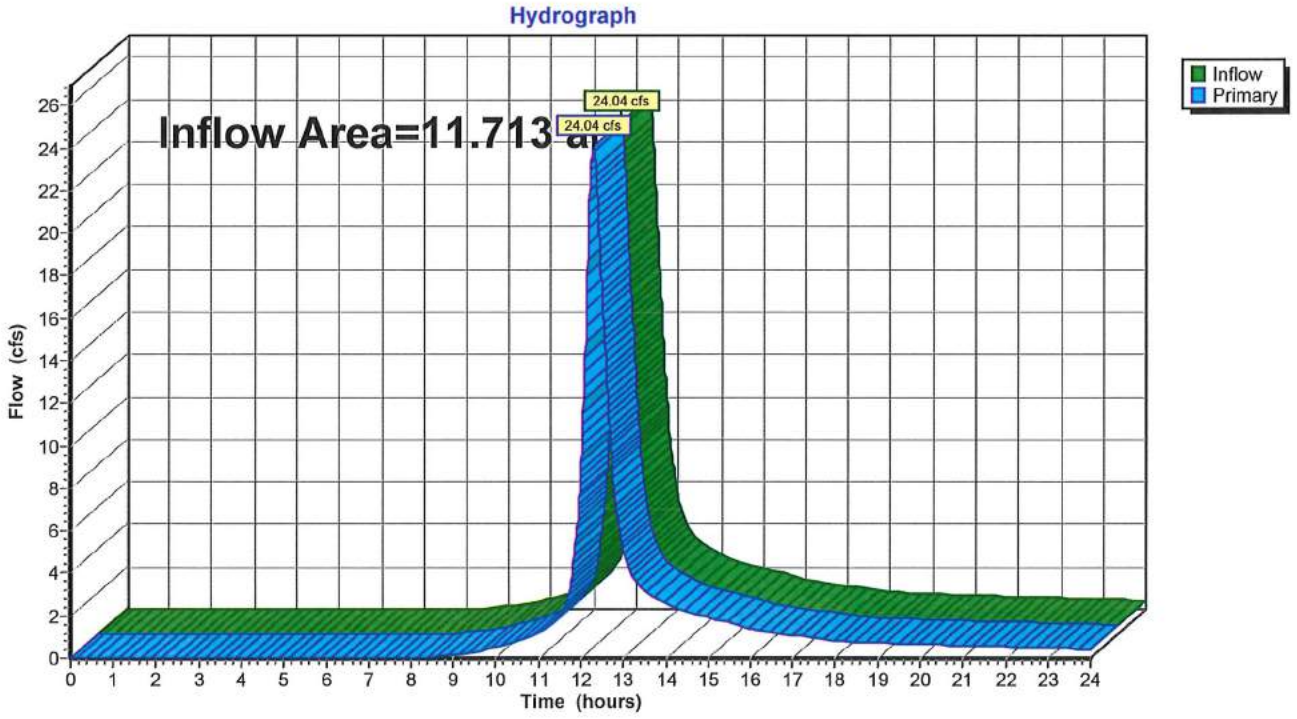


Summary for Pond 4P: Design Point 4 (Ditch)

Inflow Area = 11.713 ac, 0.00% Impervious, Inflow Depth > 2.66" for 10 Year Storm event
Inflow = 24.04 cfs @ 12.30 hrs, Volume= 2.597 af
Primary = 24.04 cfs @ 12.30 hrs, Volume= 2.597 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs

Pond 4P: Design Point 4 (Ditch)



Time span=0.00-24.00 hrs, dt=0.01 hrs, 2401 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Subcatchment 1S: Subcatchment 4S Runoff Area=27,500 sf 0.00% Impervious Runoff Depth>3.77"
Flow Length=267' Tc=13.4 min CN=79 Runoff=2.20 cfs 0.198 af

Subcatchment 2S: Subcatchment 3S Runoff Area=180,441 sf 0.00% Impervious Runoff Depth>3.76"
Flow Length=494' Tc=21.4 min CN=79 Runoff=12.03 cfs 1.299 af

Subcatchment 3S: Subcatchment 2S Runoff Area=453,810 sf 0.00% Impervious Runoff Depth>3.75"
Flow Length=1,375' Tc=35.1 min CN=79 Runoff=24.19 cfs 3.257 af

Subcatchment 4S: Subcatchment 1S Runoff Area=510,213 sf 0.00% Impervious Runoff Depth>3.76"
Flow Length=687' Tc=21.5 min CN=79 Runoff=33.93 cfs 3.672 af

Pond 1P: Design Point 1 (Southern Property Line) Inflow=2.20 cfs 0.198 af
Primary=2.20 cfs 0.198 af

Pond 2P: Design Point 2 (Western Property Line) Inflow=12.03 cfs 1.299 af
Primary=12.03 cfs 1.299 af

Pond 3P: Design Point 3 (Stream) Inflow=24.19 cfs 3.257 af
Primary=24.19 cfs 3.257 af

Pond 4P: Design Point 4 (Ditch) Inflow=33.93 cfs 3.672 af
Primary=33.93 cfs 3.672 af

Total Runoff Area = 26.905 ac Runoff Volume = 8.427 af Average Runoff Depth = 3.76"
100.00% Pervious = 26.905 ac 0.00% Impervious = 0.000 ac

Summary for Subcatchment 1S: Subcatchment 4S

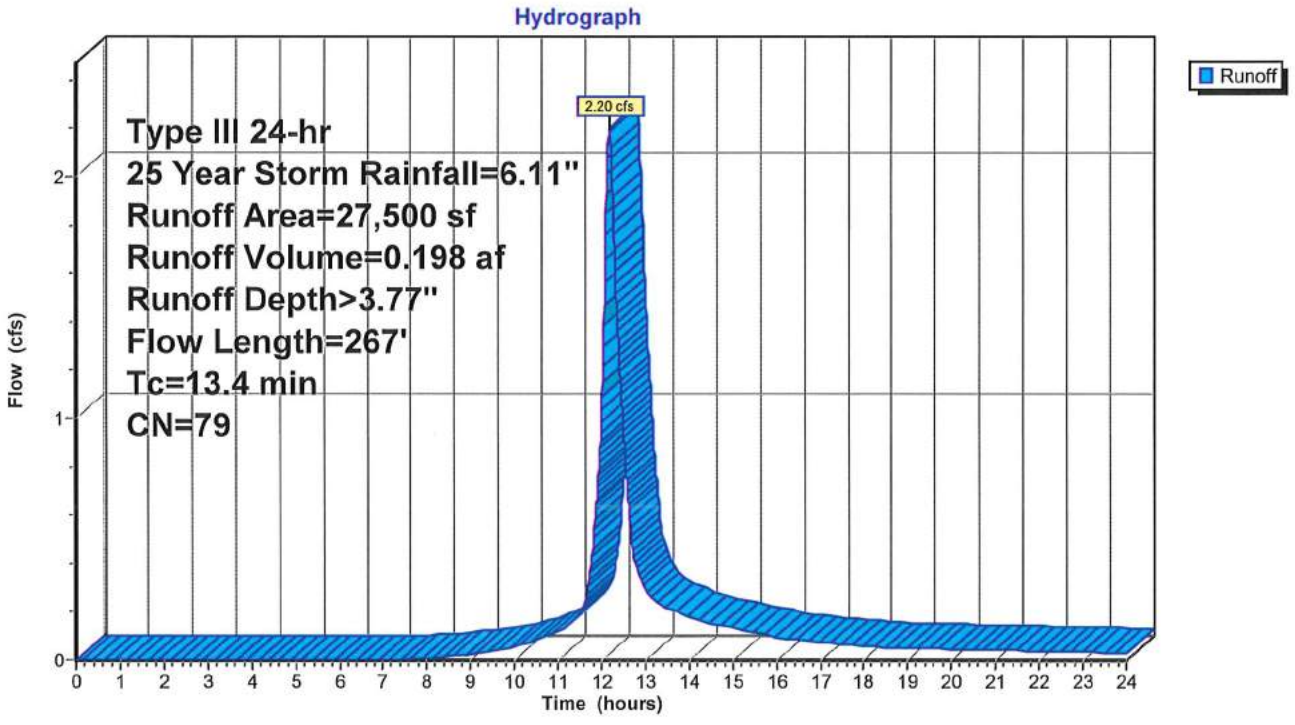
Runoff = 2.20 cfs @ 12.18 hrs, Volume= 0.198 af, Depth> 3.77"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Type III 24-hr 25 Year Storm Rainfall=6.11"

Area (sf)	CN	Description
27,500	79	Woods, Fair, HSG D
27,500		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
11.0	100	0.1069	0.15		**Sheet Flow, Sheet Flow** Woods: Light underbrush n= 0.400 P2= 3.17"
2.4	167	0.0531	1.15		**Shallow Concentrated Flow, Shallow C flow** Woodland Kv= 5.0 fps
13.4	267	Total			

Subcatchment 1S: Subcatchment 4S



Summary for Subcatchment 2S: Subcatchment 3S

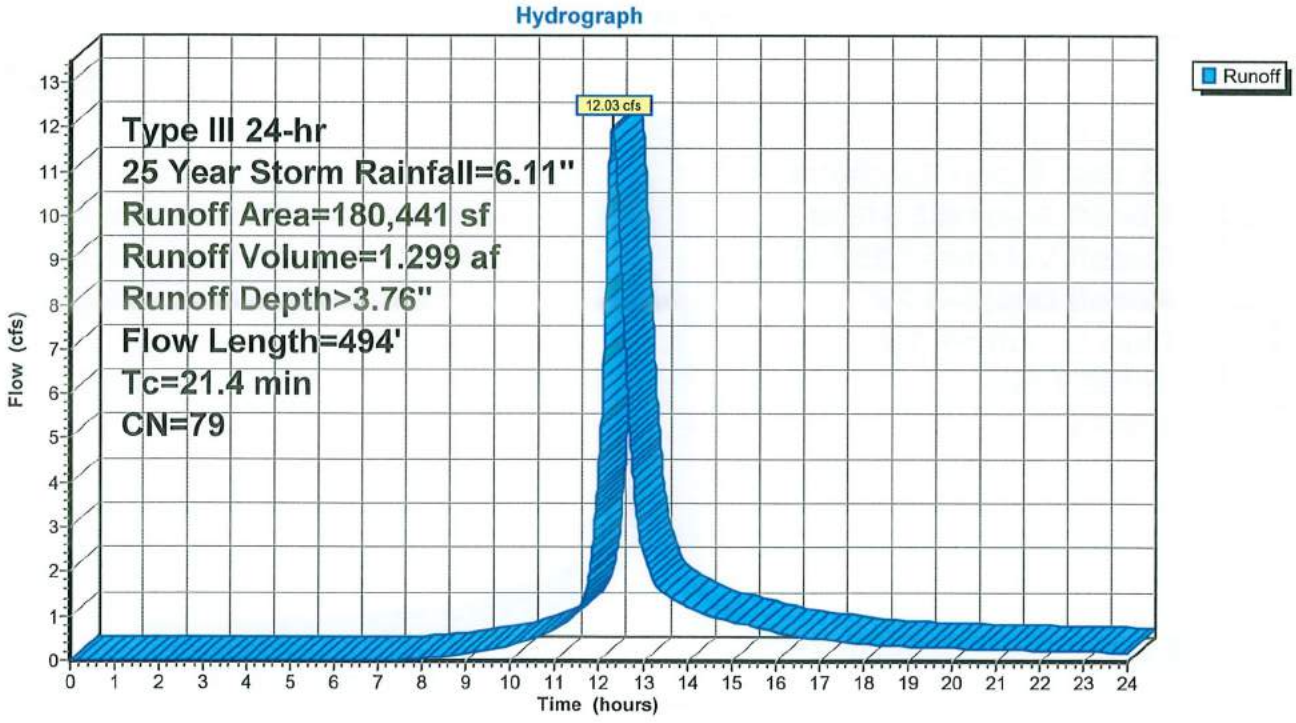
Runoff = 12.03 cfs @ 12.29 hrs, Volume= 1.299 af, Depth> 3.76"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Type III 24-hr 25 Year Storm Rainfall=6.11"

Area (sf)	CN	Description
180,441	79	Woods, Fair, HSG D
180,441		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
17.0	100	0.0361	0.10		**Sheet Flow, Sheet Flow** Woods: Light underbrush n= 0.400 P2= 3.17"
4.4	394	0.0890	1.49		**Shallow Concentrated Flow, Shallow C Flow** Woodland Kv= 5.0 fps
21.4	494	Total			

Subcatchment 2S: Subcatchment 3S



Summary for Subcatchment 3S: Subcatchment 2S

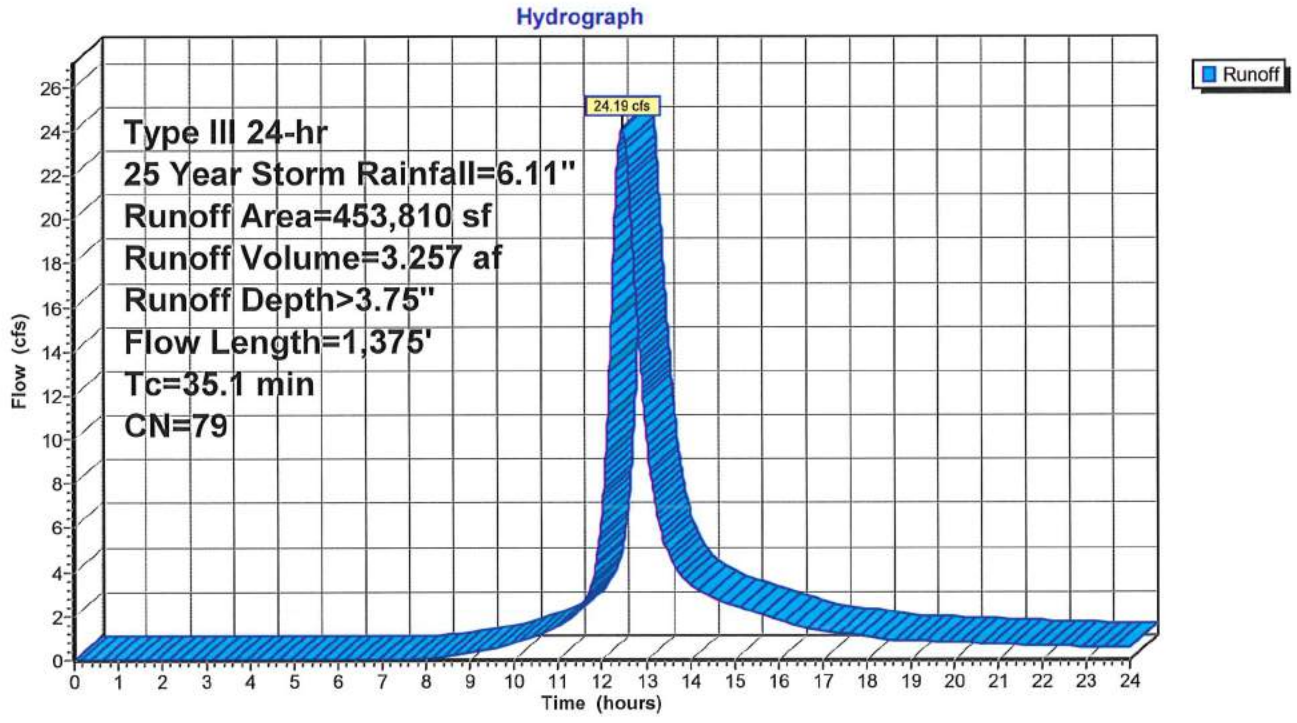
Runoff = 24.19 cfs @ 12.48 hrs, Volume= 3.257 af, Depth> 3.75"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Type III 24-hr 25 Year Storm Rainfall=6.11"

Area (sf)	CN	Description
453,810	79	Woods, Fair, HSG D
453,810		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
14.1	100	0.0575	0.12		**Sheet Flow, Sheet Flow** Woods: Light underbrush n= 0.400 P2= 3.17"
21.0	1,275	0.0410	1.01		**Shallow Concentrated Flow, Shallow C Flow** Woodland Kv= 5.0 fps
35.1	1,375	Total			

Subcatchment 3S: Subcatchment 2S



Summary for Subcatchment 4S: Subcatchment 1S

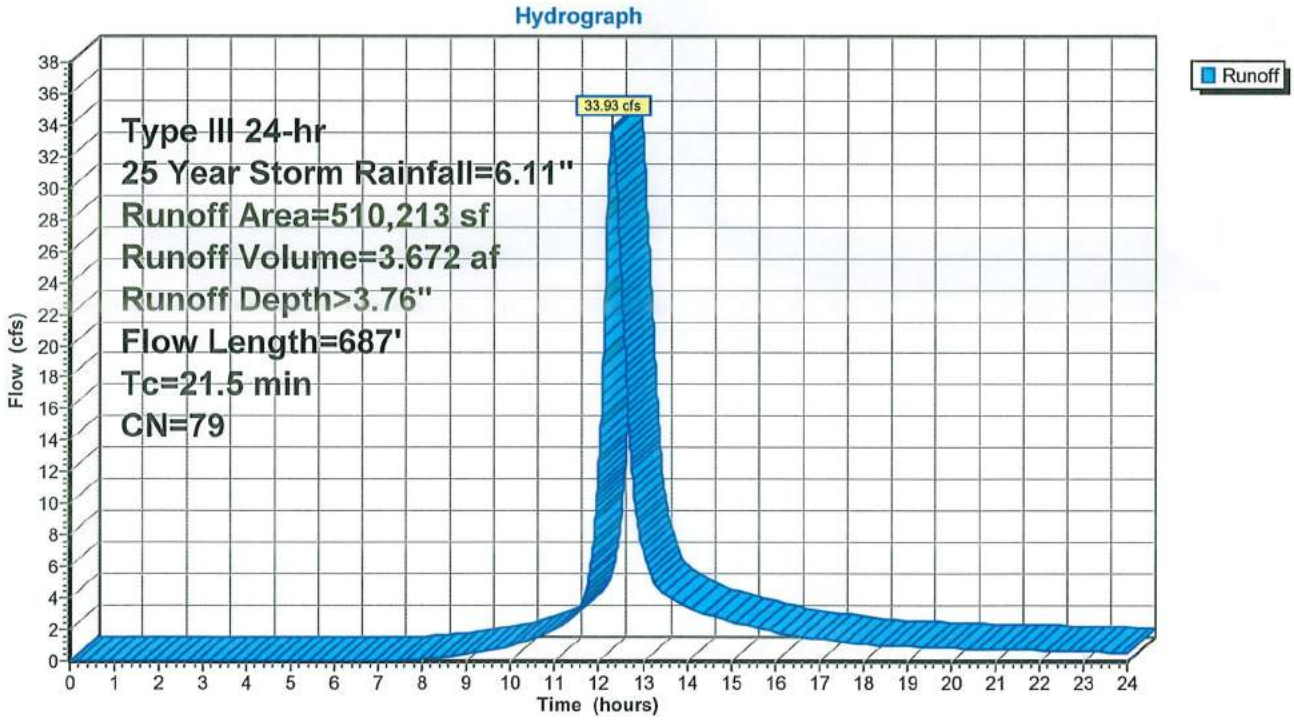
Runoff = 33.93 cfs @ 12.30 hrs, Volume= 3.672 af, Depth> 3.76"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Type III 24-hr 25 Year Storm Rainfall=6.11"

Area (sf)	CN	Description
510,213	79	Woods, Fair, HSG D
510,213		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
14.5	100	0.0537	0.11		**Sheet Flow, Sheet Flow** Woods: Light underbrush n= 0.400 P2= 3.17"
7.0	587	0.0782	1.40		**Shallow Concentrated Flow, Shallow C flow** Woodland Kv= 5.0 fps
21.5	687	Total			

Subcatchment 4S: Subcatchment 1S

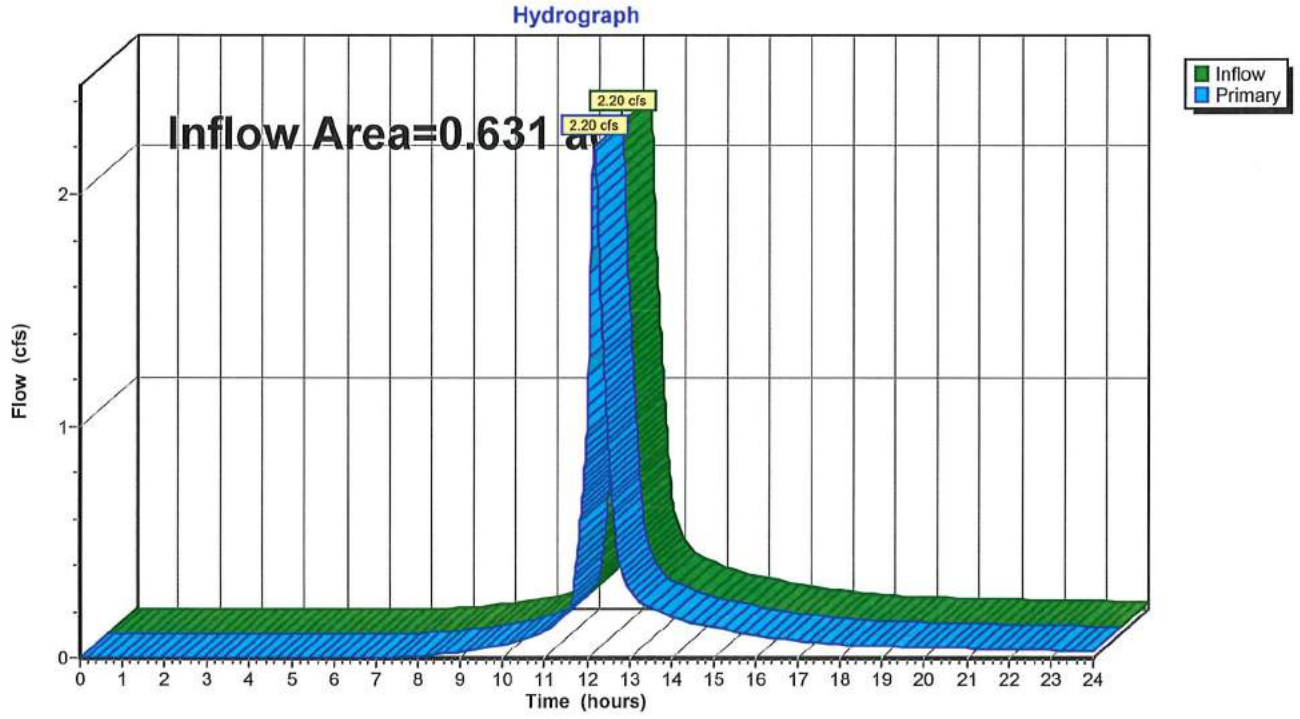


Summary for Pond 1P: Design Point 1 (Southern Property Line)

Inflow Area = 0.631 ac, 0.00% Impervious, Inflow Depth > 3.77" for 25 Year Storm event
Inflow = 2.20 cfs @ 12.18 hrs, Volume= 0.198 af
Primary = 2.20 cfs @ 12.18 hrs, Volume= 0.198 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs

Pond 1P: Design Point 1 (Southern Property Line)

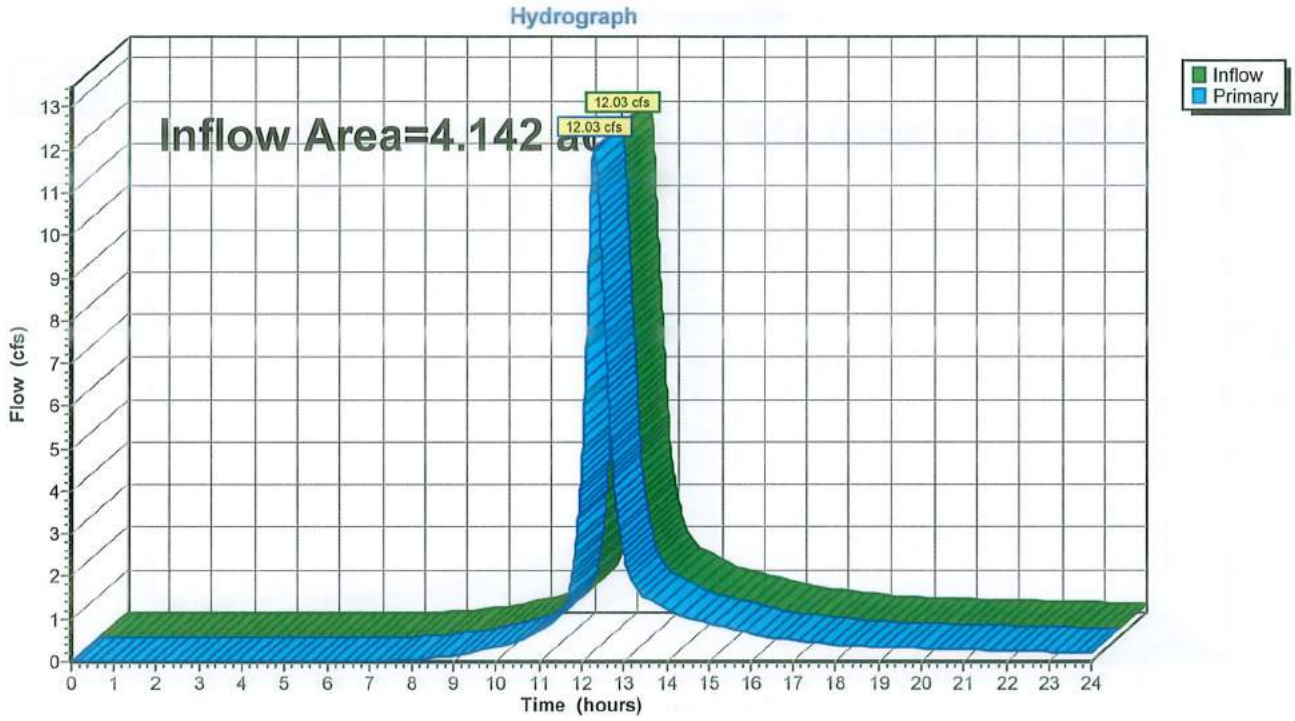


Summary for Pond 2P: Design Point 2 (Western Property Line)

Inflow Area = 4.142 ac, 0.00% Impervious, Inflow Depth > 3.76" for 25 Year Storm event
Inflow = 12.03 cfs @ 12.29 hrs, Volume= 1.299 af
Primary = 12.03 cfs @ 12.29 hrs, Volume= 1.299 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs

Pond 2P: Design Point 2 (Western Property Line)

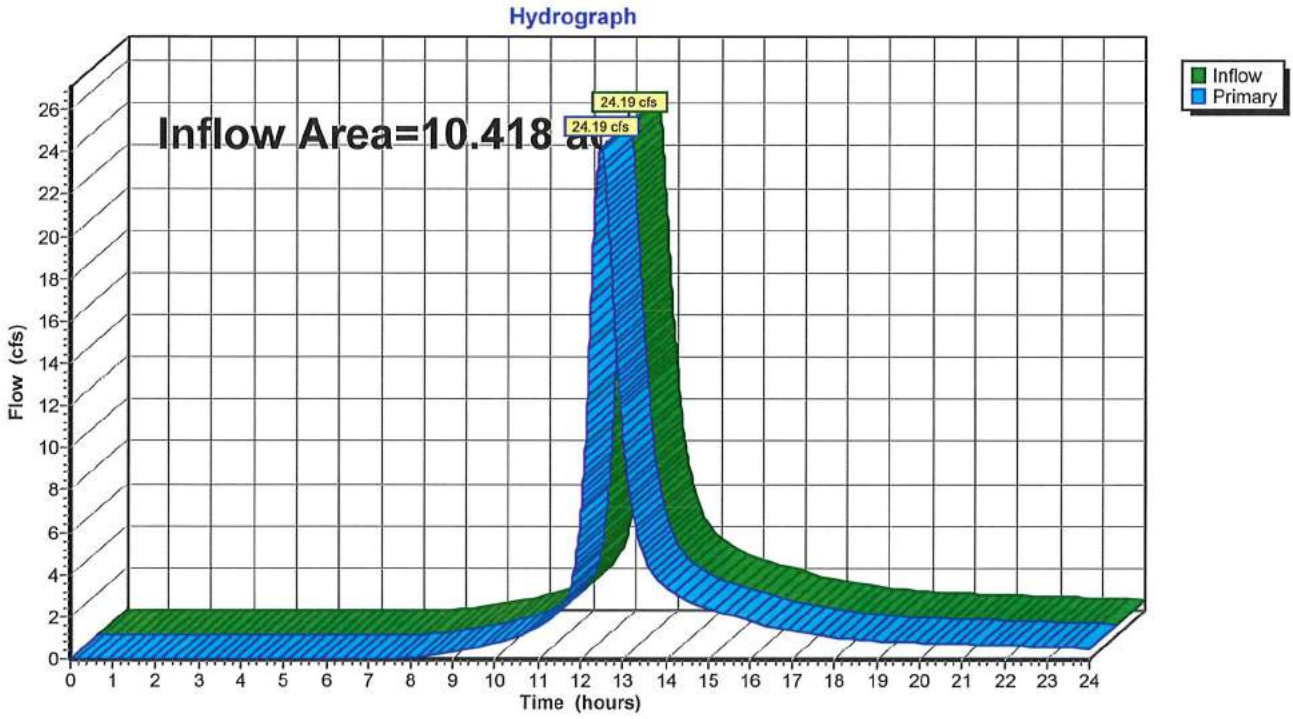


Summary for Pond 3P: Design Point 3 (Stream)

Inflow Area = 10.418 ac, 0.00% Impervious, Inflow Depth > 3.75" for 25 Year Storm event
Inflow = 24.19 cfs @ 12.48 hrs, Volume= 3.257 af
Primary = 24.19 cfs @ 12.48 hrs, Volume= 3.257 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs

Pond 3P: Design Point 3 (Stream)

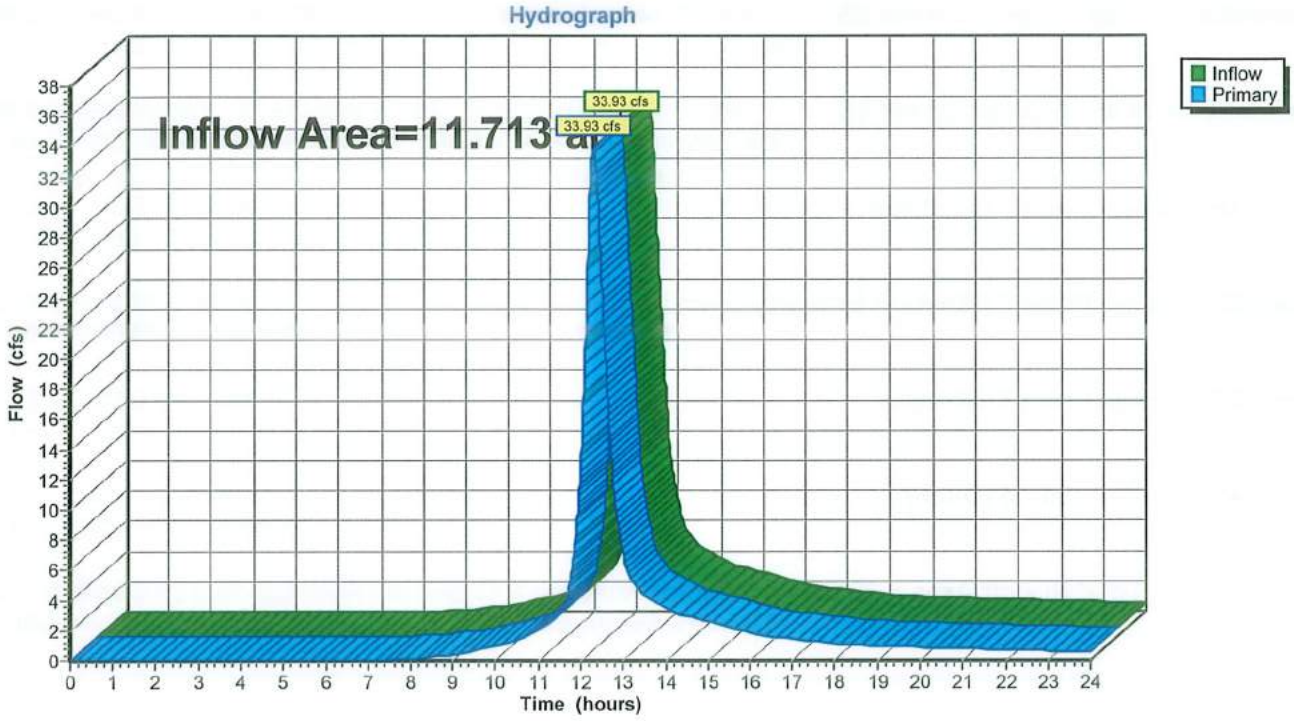


Summary for Pond 4P: Design Point 4 (Ditch)

Inflow Area = 11.713 ac, 0.00% Impervious, Inflow Depth > 3.76" for 25 Year Storm event
Inflow = 33.93 cfs @ 12.30 hrs, Volume= 3.672 af
Primary = 33.93 cfs @ 12.30 hrs, Volume= 3.672 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs

Pond 4P: Design Point 4 (Ditch)



Time span=0.00-24.00 hrs, dt=0.01 hrs, 2401 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Subcatchment 1S: Subcatchment 4S Runoff Area=27,500 sf 0.00% Impervious Runoff Depth>6.11"
Flow Length=267' Tc=13.4 min CN=79 Runoff=3.53 cfs 0.321 af

Subcatchment 2S: Subcatchment 3S Runoff Area=180,441 sf 0.00% Impervious Runoff Depth>6.10"
Flow Length=494' Tc=21.4 min CN=79 Runoff=19.28 cfs 2.106 af

Subcatchment 3S: Subcatchment 2S Runoff Area=453,810 sf 0.00% Impervious Runoff Depth>6.09"
Flow Length=1,375' Tc=35.1 min CN=79 Runoff=38.80 cfs 5.284 af

Subcatchment 4S: Subcatchment 1S Runoff Area=510,213 sf 0.00% Impervious Runoff Depth>6.10"
Flow Length=687' Tc=21.5 min CN=79 Runoff=54.37 cfs 5.956 af

Pond 1P: Design Point 1 (Southern Property Line) Inflow=3.53 cfs 0.321 af
Primary=3.53 cfs 0.321 af

Pond 2P: Design Point 2 (Western Property Line) Inflow=19.28 cfs 2.106 af
Primary=19.28 cfs 2.106 af

Pond 3P: Design Point 3 (Stream) Inflow=38.80 cfs 5.284 af
Primary=38.80 cfs 5.284 af

Pond 4P: Design Point 4 (Ditch) Inflow=54.37 cfs 5.956 af
Primary=54.37 cfs 5.956 af

Total Runoff Area = 26.905 ac Runoff Volume = 13.668 af Average Runoff Depth = 6.10"
100.00% Pervious = 26.905 ac 0.00% Impervious = 0.000 ac

Summary for Subcatchment 1S: Subcatchment 4S

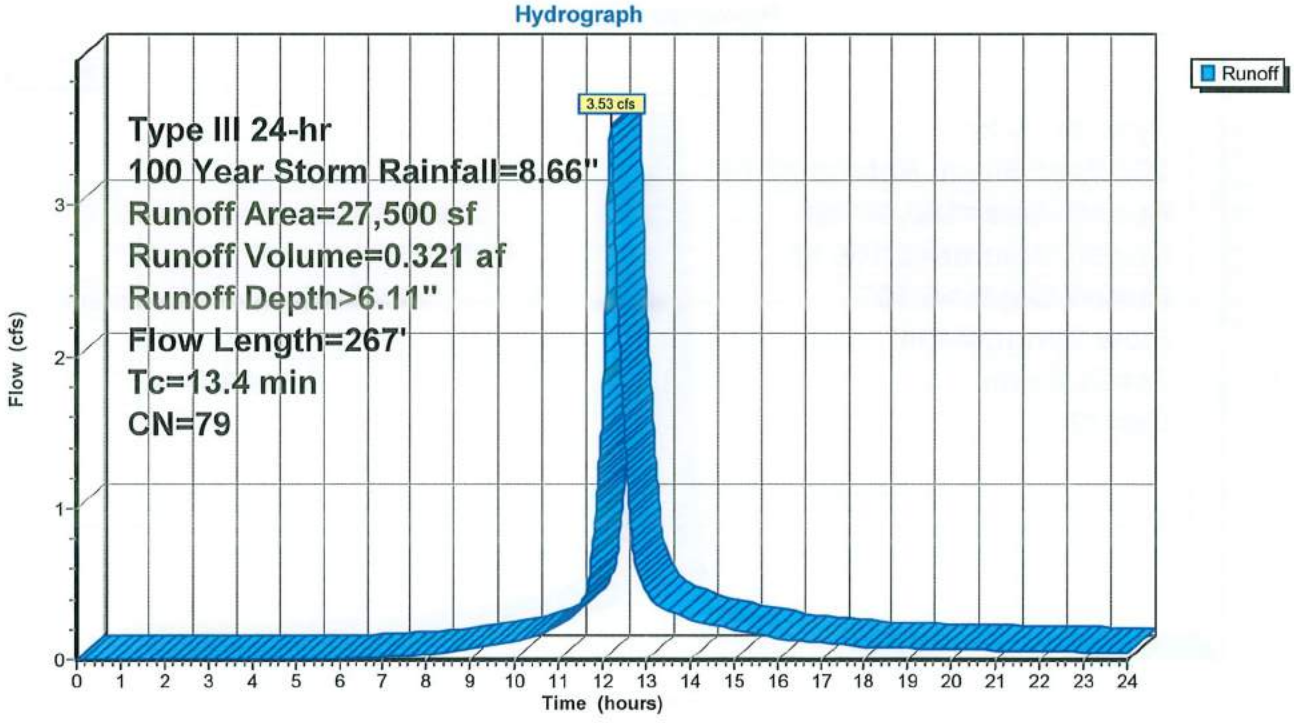
Runoff = 3.53 cfs @ 12.18 hrs, Volume= 0.321 af, Depth> 6.11"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Type III 24-hr 100 Year Storm Rainfall=8.66"

Area (sf)	CN	Description
27,500	79	Woods, Fair, HSG D
27,500		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
11.0	100	0.1069	0.15		**Sheet Flow, Sheet Flow** Woods: Light underbrush n= 0.400 P2= 3.17"
2.4	167	0.0531	1.15		**Shallow Concentrated Flow, Shallow C flow** Woodland Kv= 5.0 fps
13.4	267	Total			

Subcatchment 1S: Subcatchment 4S



Summary for Subcatchment 2S: Subcatchment 3S

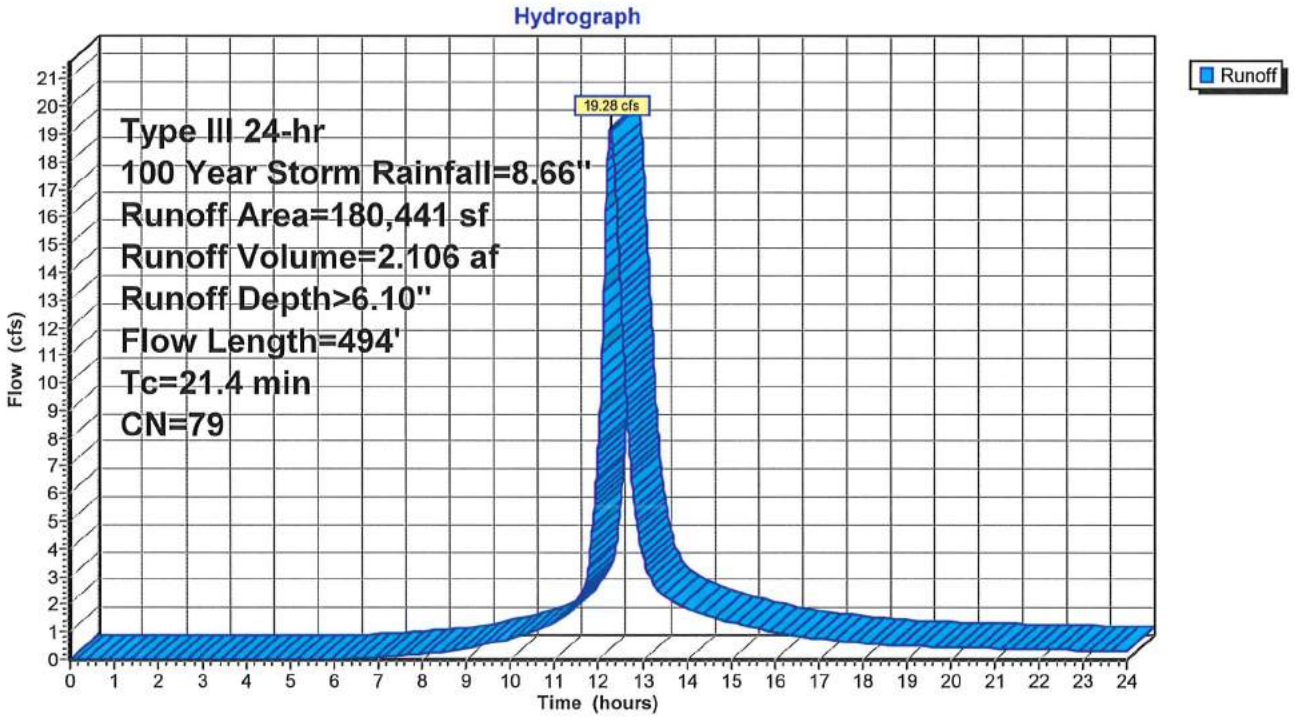
Runoff = 19.28 cfs @ 12.29 hrs, Volume= 2.106 af, Depth> 6.10"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Type III 24-hr 100 Year Storm Rainfall=8.66"

Area (sf)	CN	Description
180,441	79	Woods, Fair, HSG D
180,441		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
17.0	100	0.0361	0.10		**Sheet Flow, Sheet Flow** Woods: Light underbrush n= 0.400 P2= 3.17"
4.4	394	0.0890	1.49		**Shallow Concentrated Flow, Shallow C Flow** Woodland Kv= 5.0 fps
21.4	494	Total			

Subcatchment 2S: Subcatchment 3S



Summary for Subcatchment 3S: Subcatchment 2S

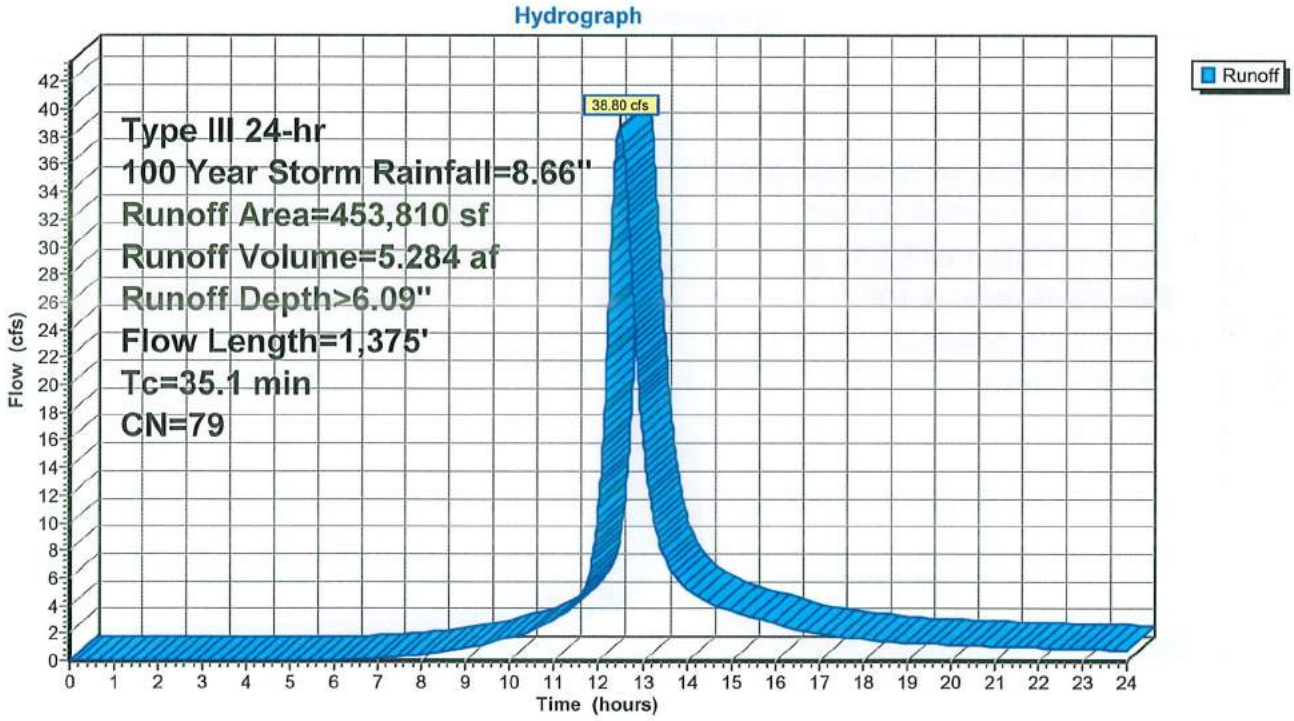
Runoff = 38.80 cfs @ 12.48 hrs, Volume= 5.284 af, Depth> 6.09"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Type III 24-hr 100 Year Storm Rainfall=8.66"

Area (sf)	CN	Description
453,810	79	Woods, Fair, HSG D
453,810		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
14.1	100	0.0575	0.12		**Sheet Flow, Sheet Flow** Woods: Light underbrush n= 0.400 P2= 3.17"
21.0	1,275	0.0410	1.01		**Shallow Concentrated Flow, Shallow C Flow** Woodland Kv= 5.0 fps
35.1	1,375	Total			

Subcatchment 3S: Subcatchment 2S



Summary for Subcatchment 4S: Subcatchment 1S

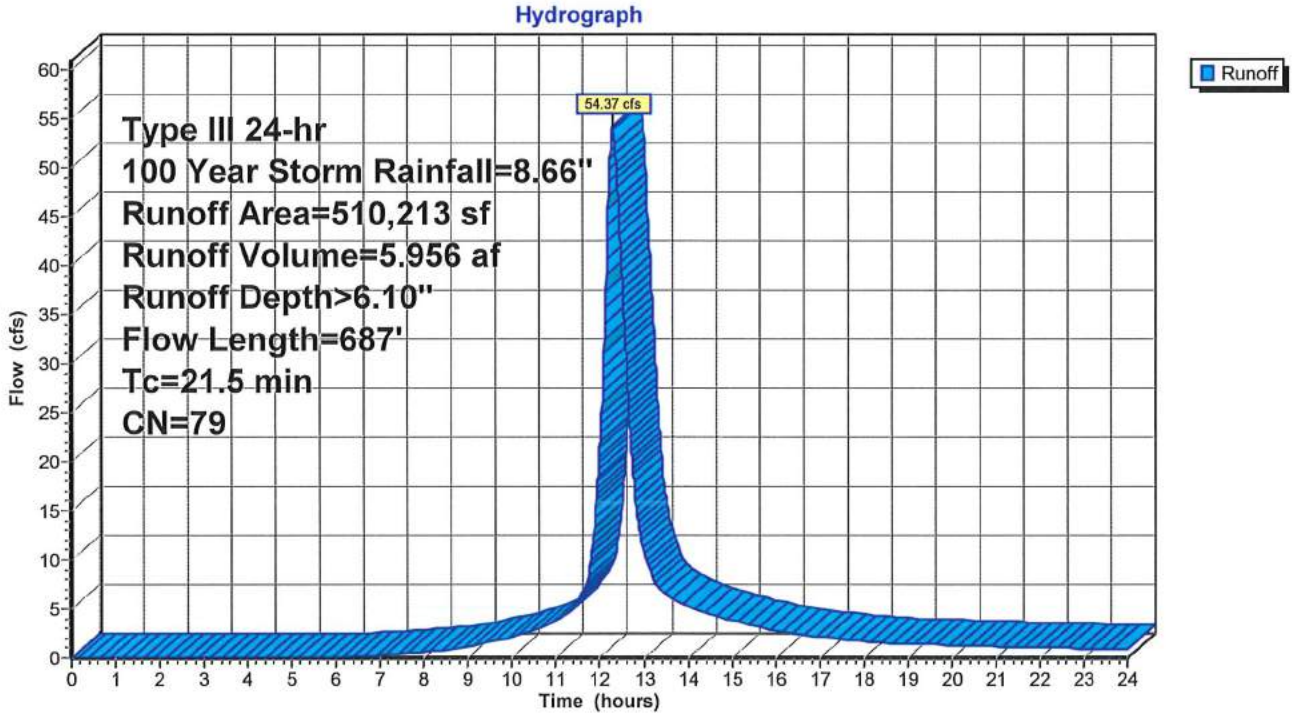
Runoff = 54.37 cfs @ 12.30 hrs, Volume= 5.956 af, Depth> 6.10"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Type III 24-hr 100 Year Storm Rainfall=8.66"

Area (sf)	CN	Description
510,213	79	Woods, Fair, HSG D
510,213		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
14.5	100	0.0537	0.11		**Sheet Flow, Sheet Flow** Woods: Light underbrush n= 0.400 P2= 3.17"
7.0	587	0.0782	1.40		**Shallow Concentrated Flow, Shallow C flow** Woodland Kv= 5.0 fps
21.5	687	Total			

Subcatchment 4S: Subcatchment 1S

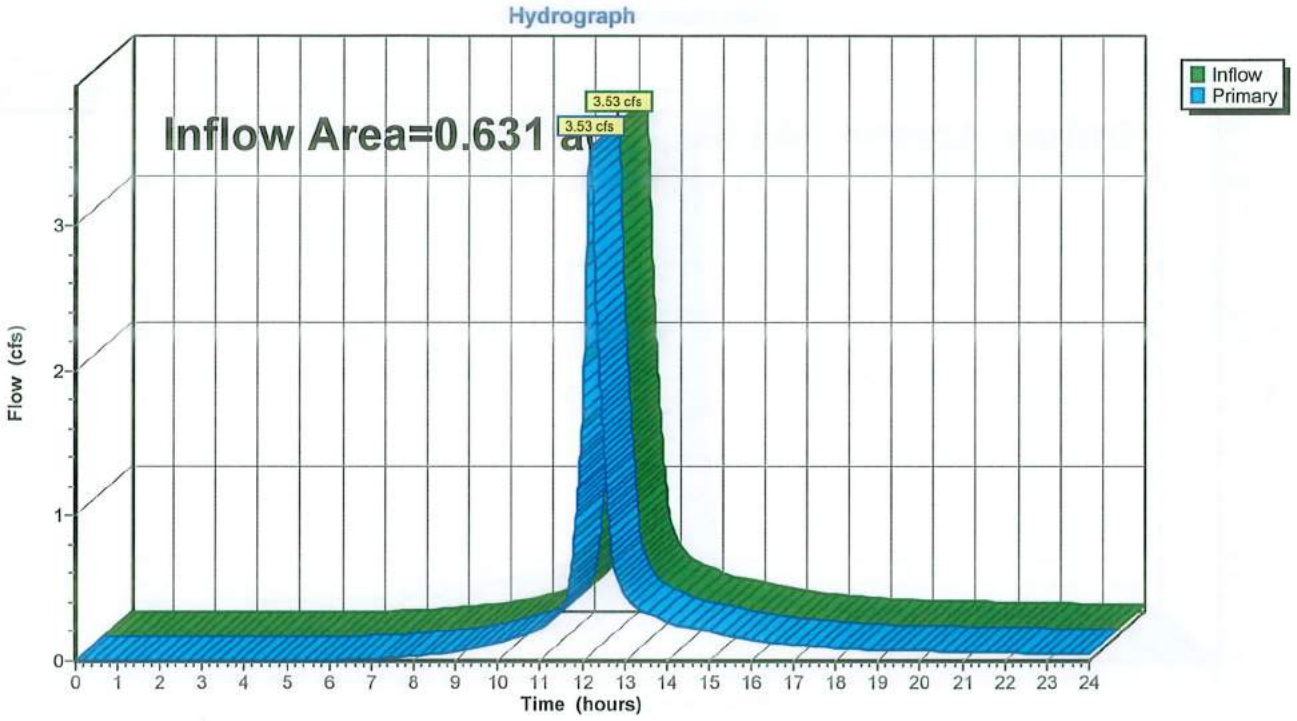


Summary for Pond 1P: Design Point 1 (Southern Property Line)

Inflow Area = 0.631 ac, 0.00% Impervious, Inflow Depth > 6.11" for 100 Year Storm event
Inflow = 3.53 cfs @ 12.18 hrs, Volume= 0.321 af
Primary = 3.53 cfs @ 12.18 hrs, Volume= 0.321 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs

Pond 1P: Design Point 1 (Southern Property Line)

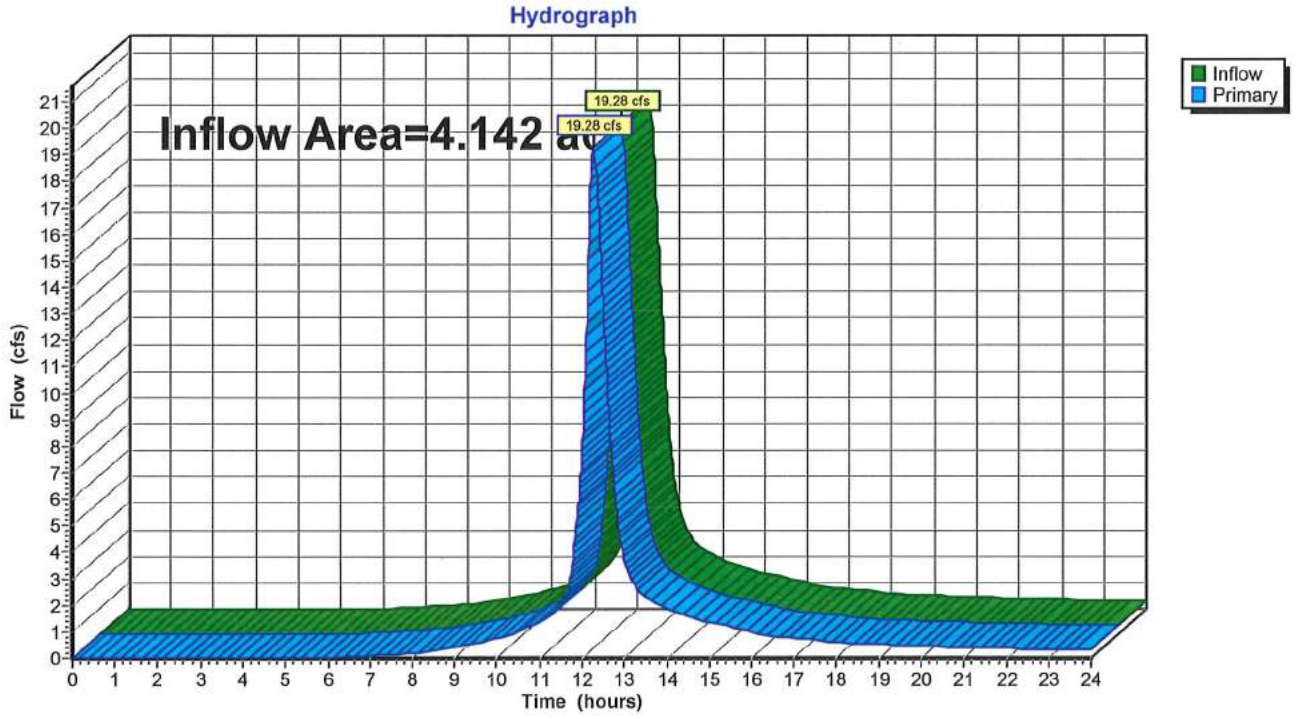


Summary for Pond 2P: Design Point 2 (Western Property Line)

Inflow Area = 4.142 ac, 0.00% Impervious, Inflow Depth > 6.10" for 100 Year Storm event
Inflow = 19.28 cfs @ 12.29 hrs, Volume= 2.106 af
Primary = 19.28 cfs @ 12.29 hrs, Volume= 2.106 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs

Pond 2P: Design Point 2 (Western Property Line)

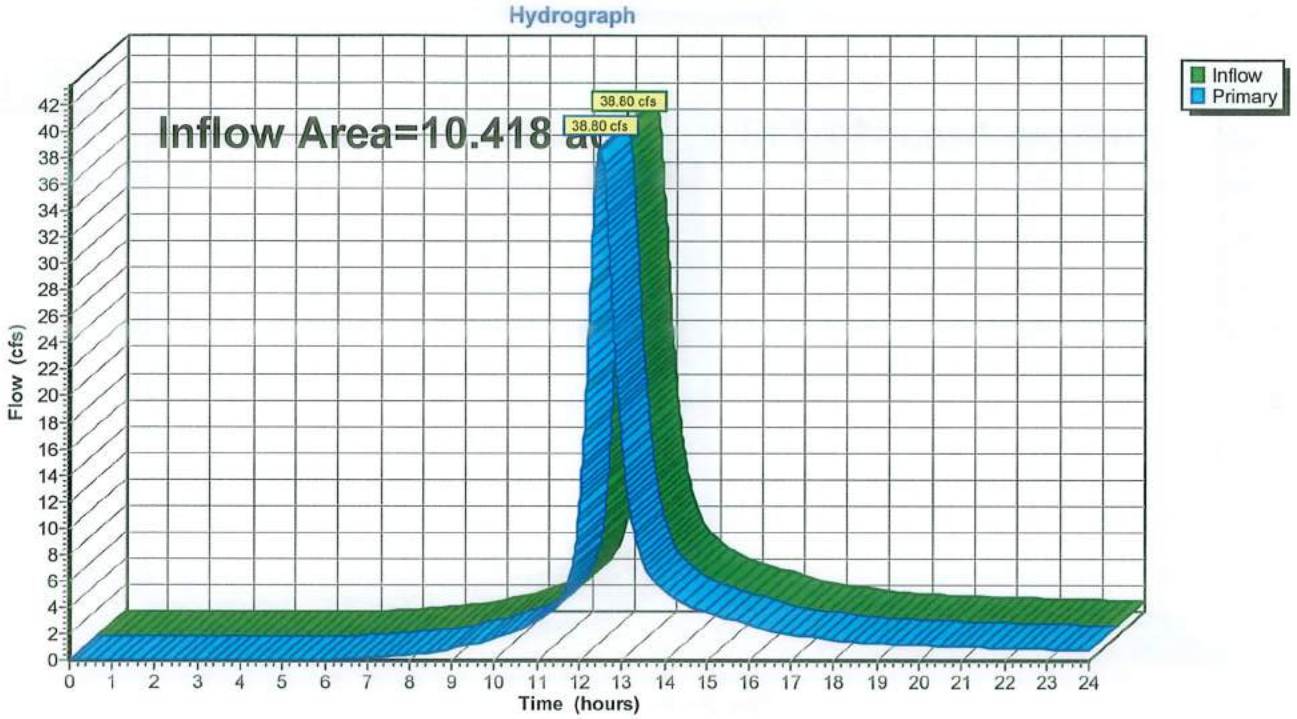


Summary for Pond 3P: Design Point 3 (Stream)

Inflow Area = 10.418 ac, 0.00% Impervious, Inflow Depth > 6.09" for 100 Year Storm event
Inflow = 38.80 cfs @ 12.48 hrs, Volume= 5.284 af
Primary = 38.80 cfs @ 12.48 hrs, Volume= 5.284 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs

Pond 3P: Design Point 3 (Stream)

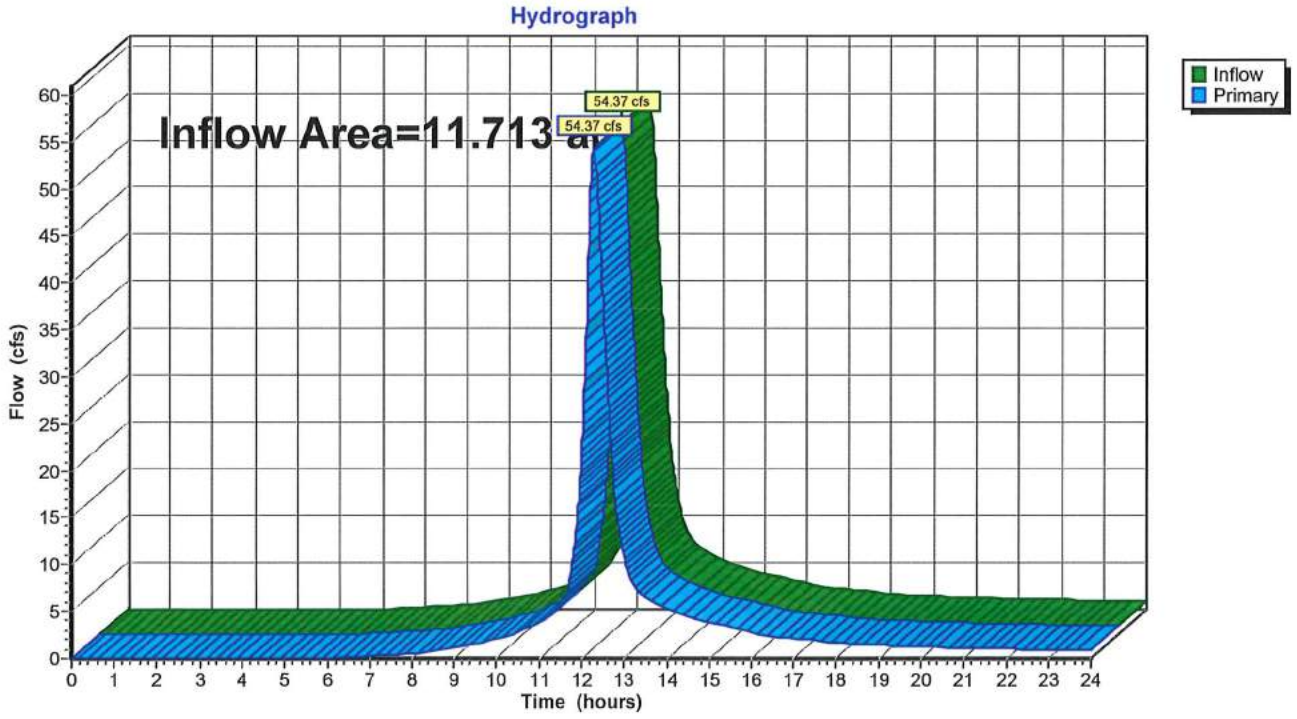


Summary for Pond 4P: Design Point 4 (Ditch)

Inflow Area = 11.713 ac, 0.00% Impervious, Inflow Depth > 6.10" for 100 Year Storm event
Inflow = 54.37 cfs @ 12.30 hrs, Volume= 5.956 af
Primary = 54.37 cfs @ 12.30 hrs, Volume= 5.956 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs

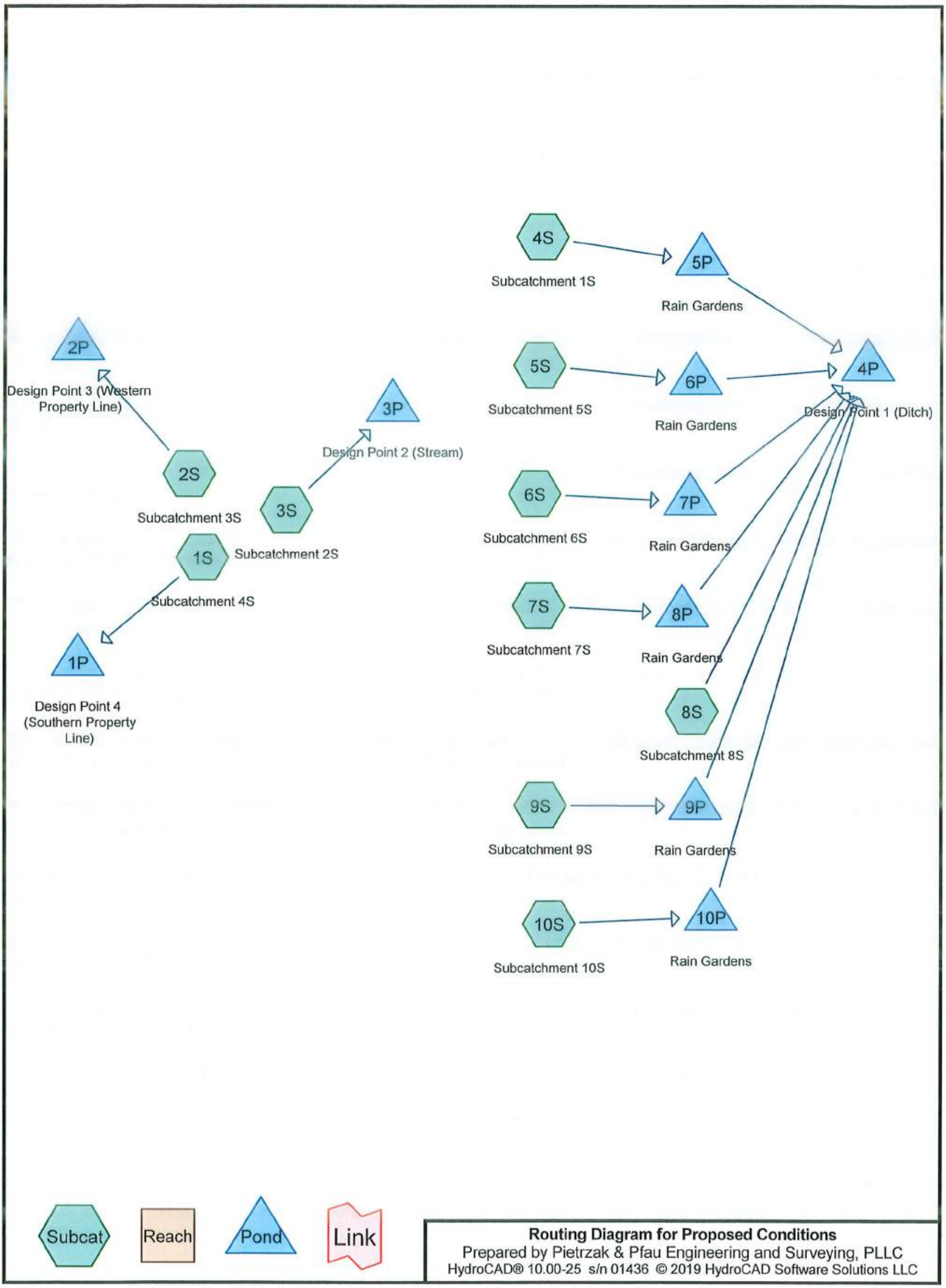
Pond 4P: Design Point 4 (Ditch)



APPENDIX 4

TR-20 Hydro-CAD Calculations

Proposed Conditions



Routing Diagram for Proposed Conditions
Prepared by Pietrzak & Pfau Engineering and Surveying, PLLC

Time span=0.00-24.00 hrs, dt=0.01 hrs, 2401 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Subcatchment 1S: Subcatchment 4S Runoff Area=27,500 sf 0.00% Impervious Runoff Depth>0.95"
Flow Length=267' Tc=13.4 min CN=79 Runoff=0.53 cfs 0.050 af

Subcatchment 2S: Subcatchment 3S Runoff Area=180,441 sf 0.00% Impervious Runoff Depth>0.95"
Flow Length=494' Tc=21.4 min CN=79 Runoff=2.91 cfs 0.327 af

Subcatchment 3S: Subcatchment 2S Runoff Area=453,810 sf 0.00% Impervious Runoff Depth>0.94"
Flow Length=1,375' Tc=35.1 min CN=79 Runoff=5.89 cfs 0.820 af

Subcatchment 4S: Subcatchment 1S Runoff Area=48,777 sf 3.24% Impervious Runoff Depth>1.01"
Flow Length=483' Tc=6.3 min CN=80 Runoff=1.27 cfs 0.094 af

Subcatchment 5S: Subcatchment 5S Runoff Area=43,949 sf 9.85% Impervious Runoff Depth>1.06"
Flow Length=417' Tc=8.8 min CN=81 Runoff=1.12 cfs 0.089 af

Subcatchment 6S: Subcatchment 6S Runoff Area=58,597 sf 10.61% Impervious Runoff Depth>1.06"
Flow Length=357' Tc=16.8 min CN=81 Runoff=1.18 cfs 0.119 af

Subcatchment 7S: Subcatchment 7S Runoff Area=57,071 sf 12.92% Impervious Runoff Depth>1.06"
Flow Length=282' Tc=18.5 min CN=81 Runoff=1.11 cfs 0.116 af

Subcatchment 8S: Subcatchment 8S Runoff Area=231,694 sf 0.00% Impervious Runoff Depth>0.95"
Flow Length=818' Tc=31.5 min CN=79 Runoff=3.16 cfs 0.419 af

Subcatchment 9S: Subcatchment 9S Runoff Area=48,419 sf 6.90% Impervious Runoff Depth>1.00"
Flow Length=400' Tc=16.3 min CN=80 Runoff=0.93 cfs 0.093 af

Subcatchment 10S: Subcatchment 10S Runoff Area=21,833 sf 14.63% Impervious Runoff Depth>1.12"
Flow Length=367' Tc=17.4 min CN=82 Runoff=0.46 cfs 0.047 af

Pond 1P: Design Point 4 (Southern Property Line) Inflow=0.53 cfs 0.050 af
Primary=0.53 cfs 0.050 af

Pond 2P: Design Point 3 (Western Property Line) Inflow=2.91 cfs 0.327 af
Primary=2.91 cfs 0.327 af

Pond 3P: Design Point 2 (Stream) Inflow=5.89 cfs 0.820 af
Primary=5.89 cfs 0.820 af

Pond 4P: Design Point 1 (Ditch) Inflow=3.16 cfs 0.419 af
Primary=3.16 cfs 0.419 af

Pond 5P: Rain Gardens Peak Elev=635.73' Storage=4,092 cf Inflow=1.27 cfs 0.094 af
Outflow=0.00 cfs 0.000 af

Pond 6P: Rain Gardens Peak Elev=647.72' Storage=3,893 cf Inflow=1.12 cfs 0.089 af
Outflow=0.00 cfs 0.000 af

Pond 7P: Rain Gardens Peak Elev=661.64' Storage=5,181 cf Inflow=1.18 cfs 0.119 af
Outflow=0.00 cfs 0.000 af

Pond 8P: Rain Gardens Peak Elev=672.64' Storage=5,044 cf Inflow=1.11 cfs 0.116 af
Outflow=0.00 cfs 0.000 af

Pond 9P: Rain Gardens Peak Elev=663.73' Storage=4,052 cf Inflow=0.93 cfs 0.093 af
Outflow=0.00 cfs 0.000 af

Pond 10P: Rain Gardens Peak Elev=665.61' Storage=2,037 cf Inflow=0.46 cfs 0.047 af
Outflow=0.00 cfs 0.000 af

Total Runoff Area = 26.908 ac Runoff Volume = 2.174 af Average Runoff Depth = 0.97"
97.78% Pervious = 26.310 ac 2.22% Impervious = 0.598 ac

Summary for Subcatchment 1S: Subcatchment 4S

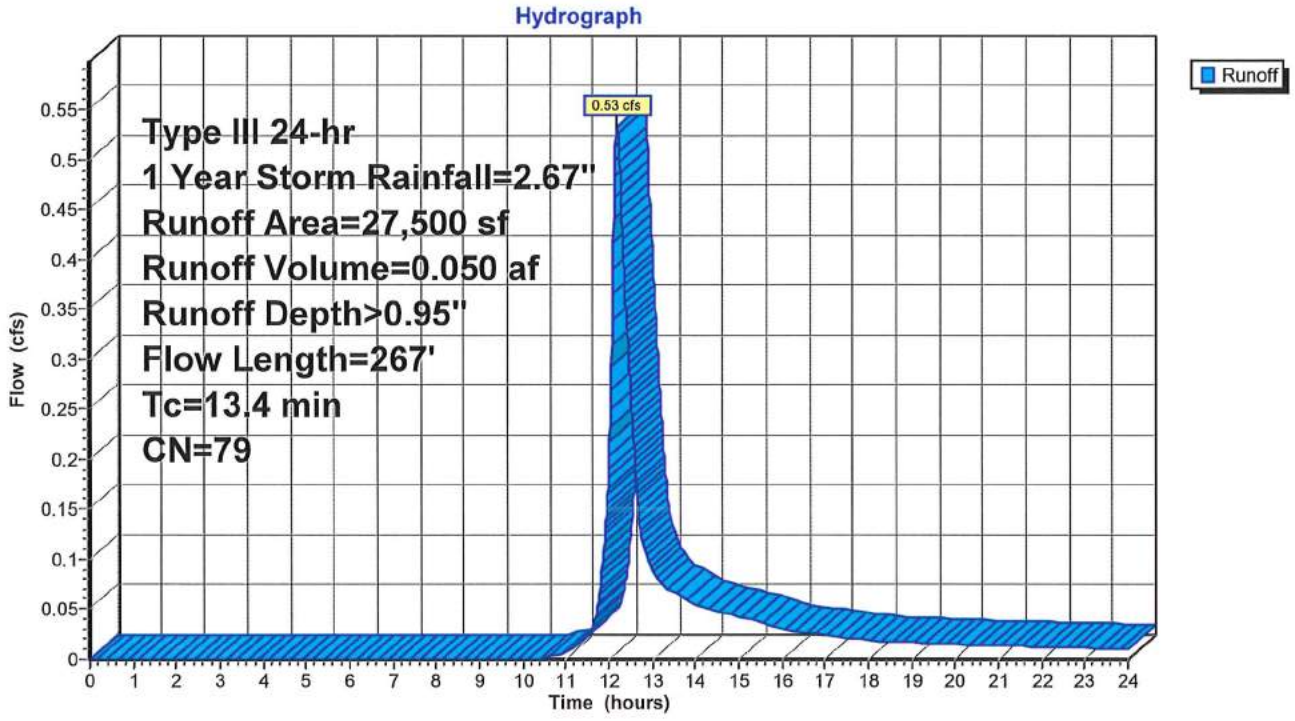
Runoff = 0.53 cfs @ 12.19 hrs, Volume= 0.050 af, Depth> 0.95"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Type III 24-hr 1 Year Storm Rainfall=2.67"

Area (sf)	CN	Description
27,500	79	Woods, Fair, HSG D
27,500		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
11.0	100	0.1069	0.15		**Sheet Flow, Sheet Flow** Woods: Light underbrush n= 0.400 P2= 3.17"
2.4	167	0.0531	1.15		**Shallow Concentrated Flow, Shallow C flow** Woodland Kv= 5.0 fps
13.4	267	Total			

Subcatchment 1S: Subcatchment 4S



Summary for Subcatchment 2S: Subcatchment 3S

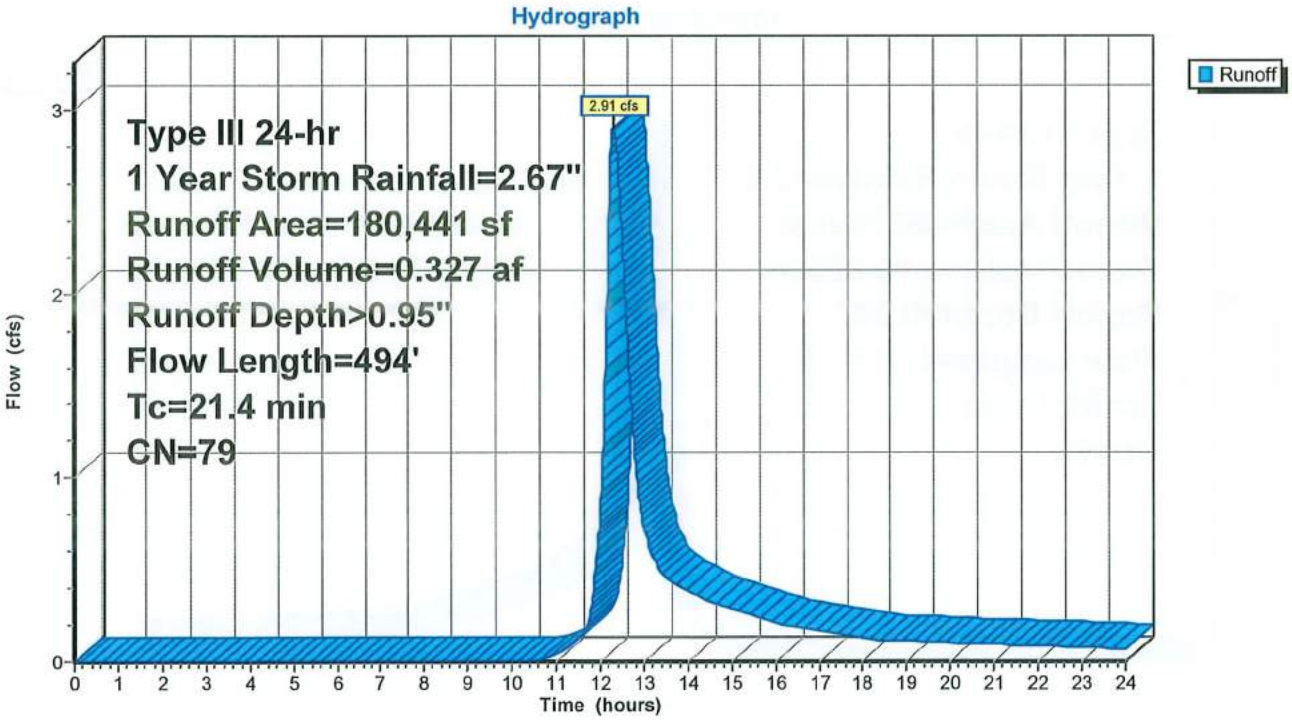
Runoff = 2.91 cfs @ 12.32 hrs, Volume= 0.327 af, Depth> 0.95"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Type III 24-hr 1 Year Storm Rainfall=2.67"

Area (sf)	CN	Description
180,441	79	Woods, Fair, HSG D
180,441		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
17.0	100	0.0361	0.10		**Sheet Flow, Sheet Flow** Woods: Light underbrush n= 0.400 P2= 3.17"
4.4	394	0.0890	1.49		**Shallow Concentrated Flow, Shallow C Flow** Woodland Kv= 5.0 fps
21.4	494	Total			

Subcatchment 2S: Subcatchment 3S



Summary for Subcatchment 3S: Subcatchment 2S

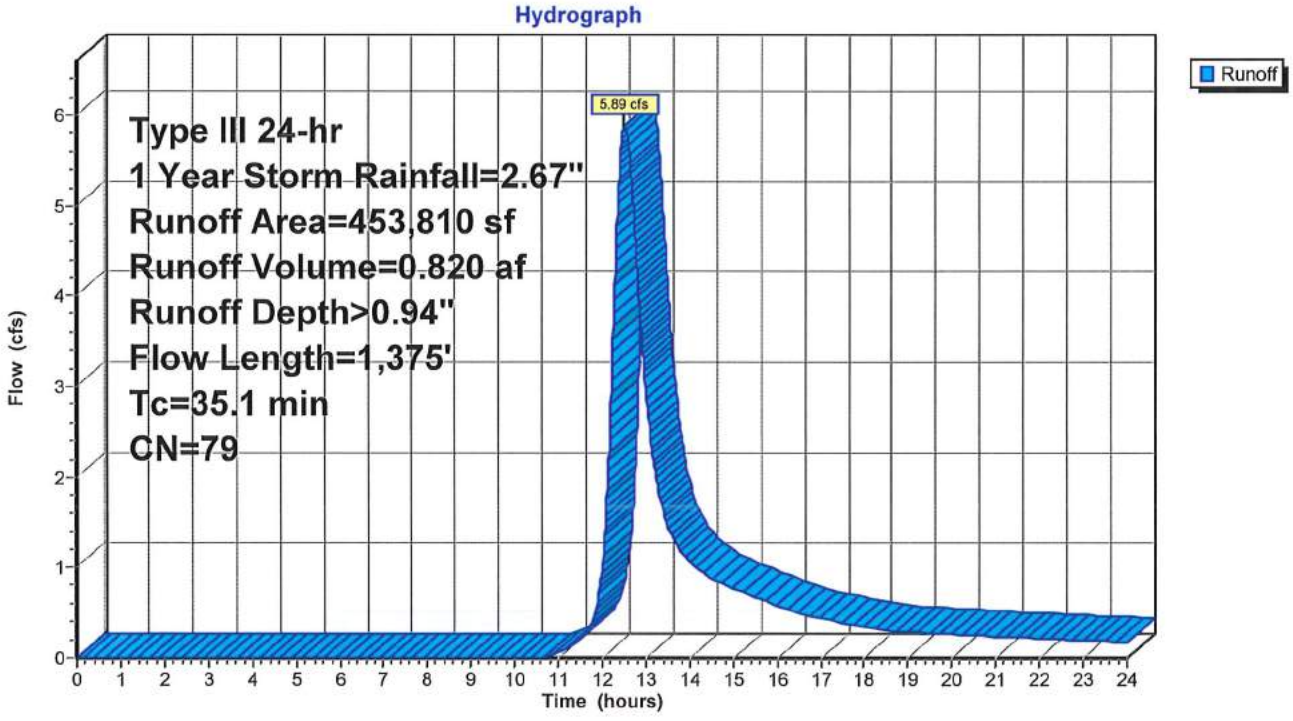
Runoff = 5.89 cfs @ 12.52 hrs, Volume= 0.820 af, Depth> 0.94"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Type III 24-hr 1 Year Storm Rainfall=2.67"

Area (sf)	CN	Description
453,810	79	Woods, Fair, HSG D
453,810		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
14.1	100	0.0575	0.12		**Sheet Flow, Sheet Flow** Woods: Light underbrush n= 0.400 P2= 3.17"
21.0	1,275	0.0410	1.01		**Shallow Concentrated Flow, Shallow C Flow** Woodland Kv= 5.0 fps
35.1	1,375	Total			

Subcatchment 3S: Subcatchment 2S



Summary for Subcatchment 4S: Subcatchment 1S

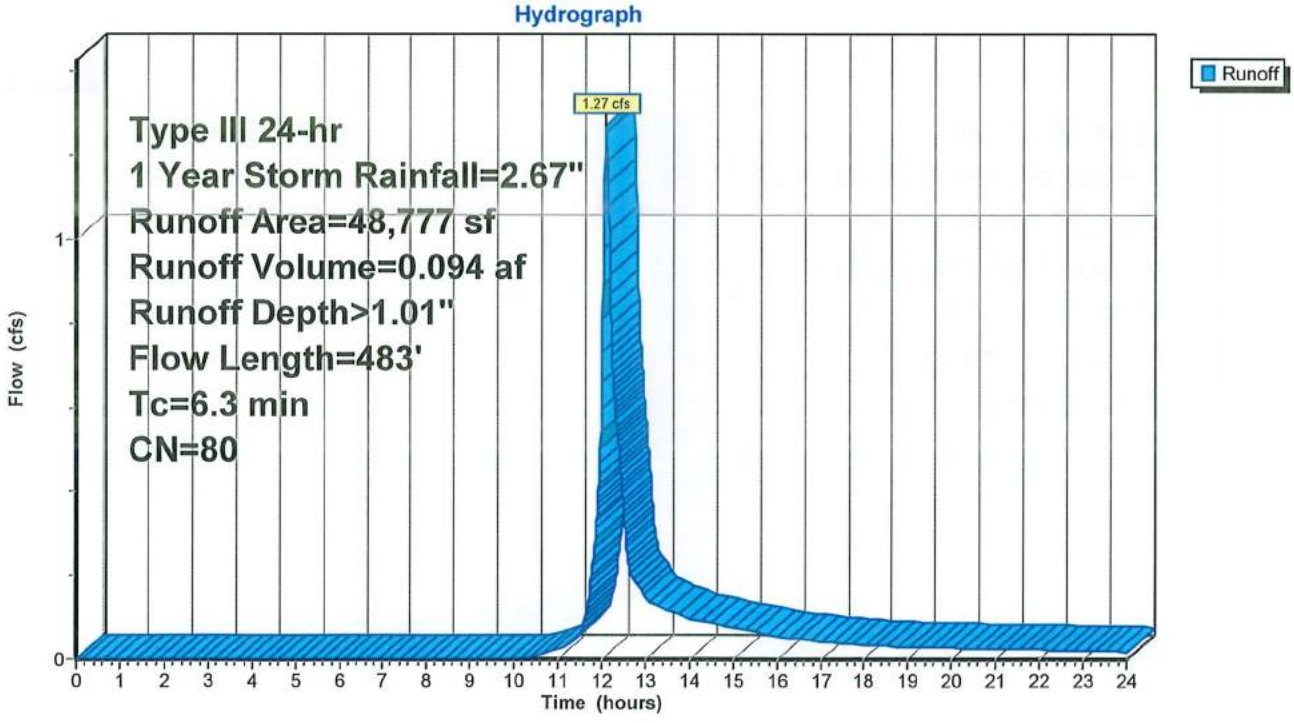
Runoff = 1.27 cfs @ 12.10 hrs, Volume= 0.094 af, Depth> 1.01"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Type III 24-hr 1 Year Storm Rainfall=2.67"

	Area (sf)	CN	Description
	47,199	79	Woods, Fair, HSG D
*	1,578	98	Driveways, HSG A
	48,777	80	Weighted Average
	47,199		96.76% Pervious Area
	1,578		3.24% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
4.8	100	0.1200	0.35		**Sheet Flow, Sheet Flow** Grass: Short n= 0.150 P2= 3.17"
1.5	383	0.0783	4.20		**Shallow Concentrated Flow, Shallow C flow** Grassed Waterway Kv= 15.0 fps
6.3	483	Total			

Subcatchment 4S: Subcatchment 1S



Summary for Subcatchment 5S: Subcatchment 5S

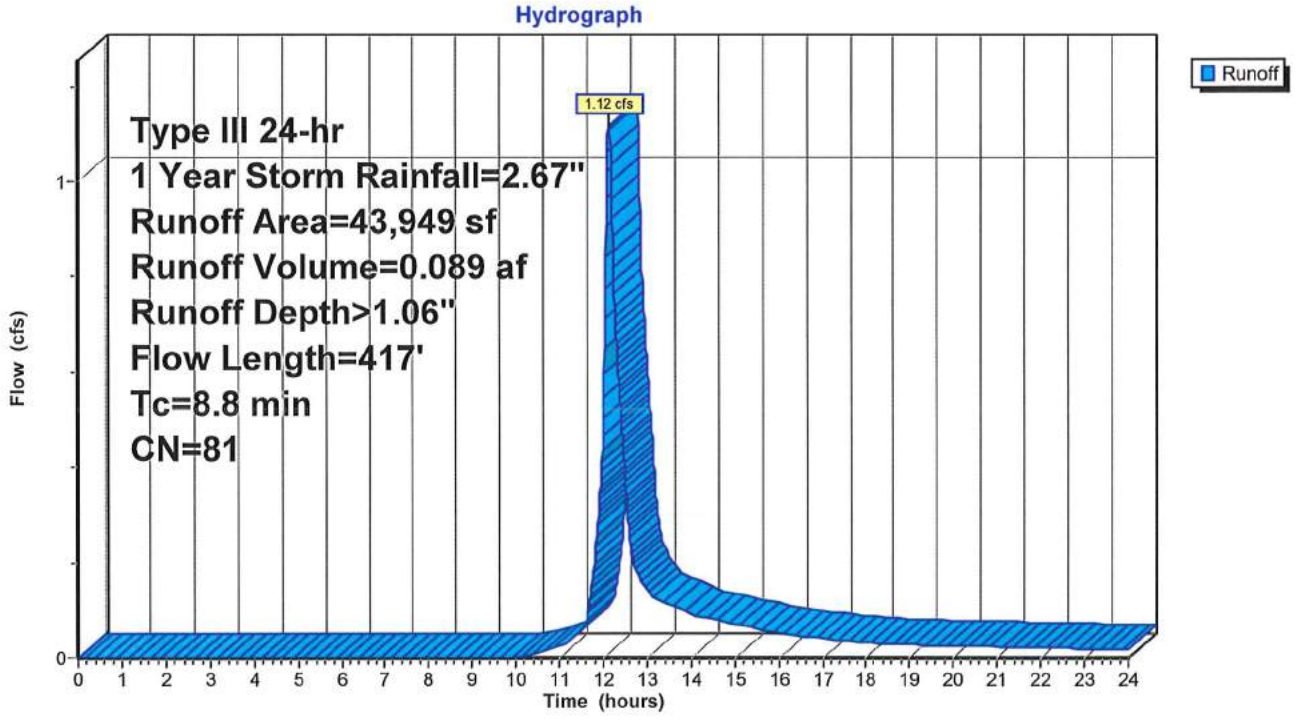
Runoff = 1.12 cfs @ 12.13 hrs, Volume= 0.089 af, Depth> 1.06"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Type III 24-hr 1 Year Storm Rainfall=2.67"

	Area (sf)	CN	Description
	39,620	79	Woods, Fair, HSG D
*	4,329	98	Driveway
	43,949	81	Weighted Average
	39,620		90.15% Pervious Area
	4,329		9.85% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.2	100	0.0972	0.32		**Sheet Flow, Sheet Flow** Grass: Short n= 0.150 P2= 3.17"
3.6	317	0.0861	1.47		**Shallow Concentrated Flow, Shallow C. Flow** Woodland Kv= 5.0 fps
8.8	417	Total			

Subcatchment 5S: Subcatchment 5S



Summary for Subcatchment 6S: Subcatchment 6S

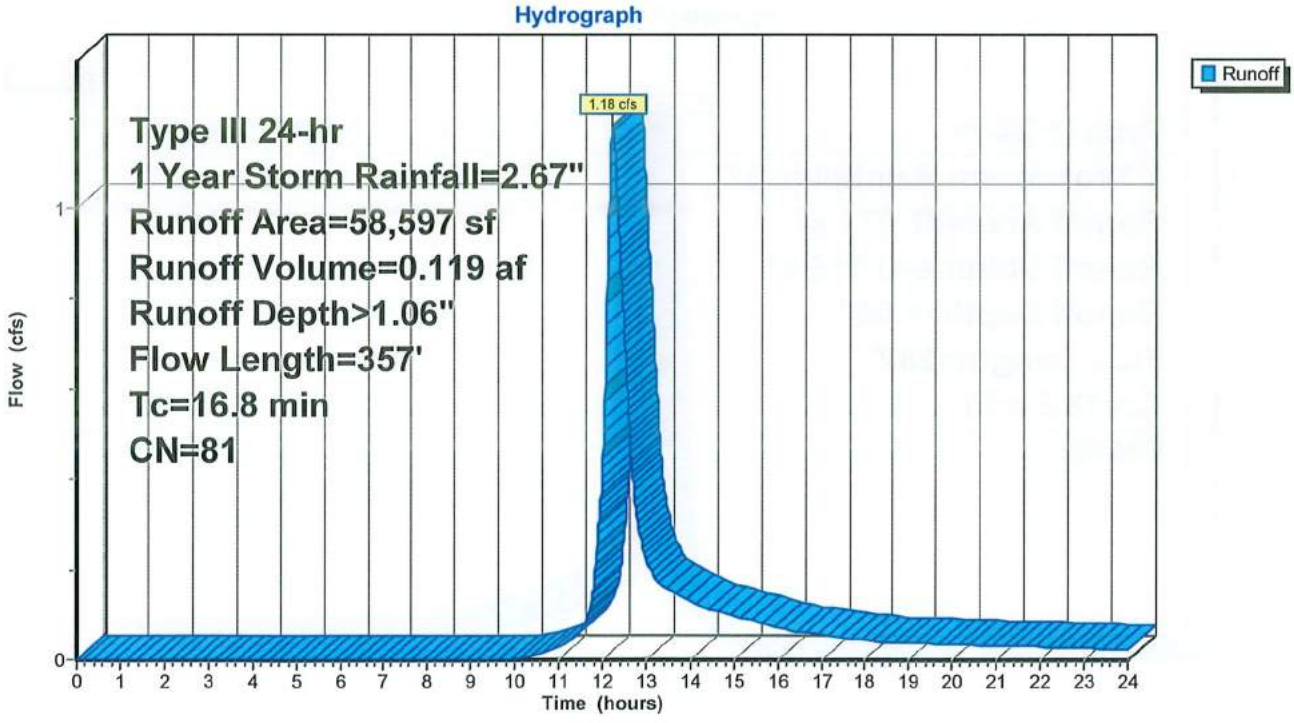
Runoff = 1.18 cfs @ 12.24 hrs, Volume= 0.119 af, Depth> 1.06"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Type III 24-hr 1 Year Storm Rainfall=2.67"

	Area (sf)	CN	Description
	52,377	79	Woods, Fair, HSG D
*	6,220	98	Driveway
	58,597	81	Weighted Average
	52,377		89.39% Pervious Area
	6,220		10.61% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
13.9	100	0.0600	0.12		**Sheet Flow, Sheet Flow** Woods: Light underbrush n= 0.400 P2= 3.17"
2.9	257	0.0856	1.46		**Shallow Concentrated Flow, Shallow C. Flow** Woodland Kv= 5.0 fps
16.8	357	Total			

Subcatchment 6S: Subcatchment 6S



Summary for Subcatchment 7S: Subcatchment 7S

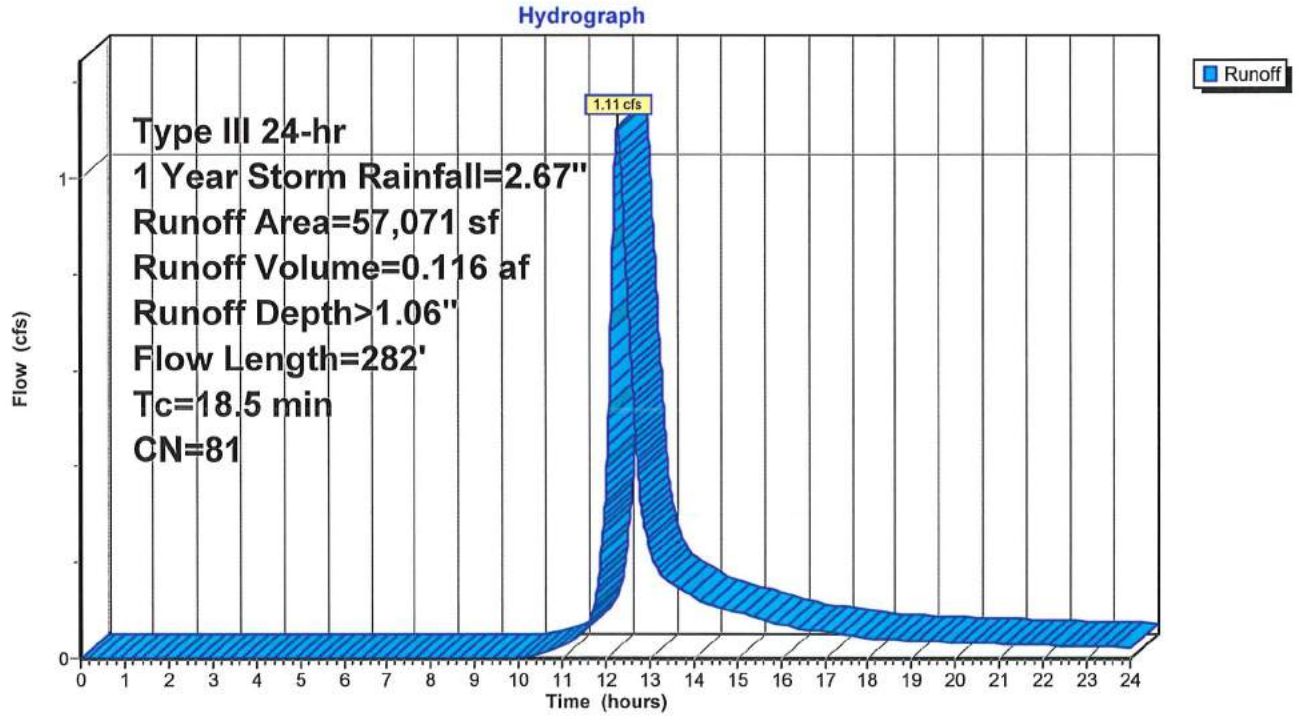
Runoff = 1.11 cfs @ 12.27 hrs, Volume= 0.116 af, Depth> 1.06"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Type III 24-hr 1 Year Storm Rainfall=2.67"

	Area (sf)	CN	Description
	49,698	79	Woods, Fair, HSG D
*	7,373	98	Driveway
	57,071	81	Weighted Average
	49,698		87.08% Pervious Area
	7,373		12.92% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
16.4	100	0.0400	0.10		**Sheet Flow, Sheet Flow** Woods: Light underbrush n= 0.400 P2= 3.17"
2.1	182	0.0824	1.44		**Shallow Concentrated Flow, Shallow C. Flow** Woodland Kv= 5.0 fps
18.5	282	Total			

Subcatchment 7S: Subcatchment 7S



Summary for Subcatchment 8S: Subcatchment 8S

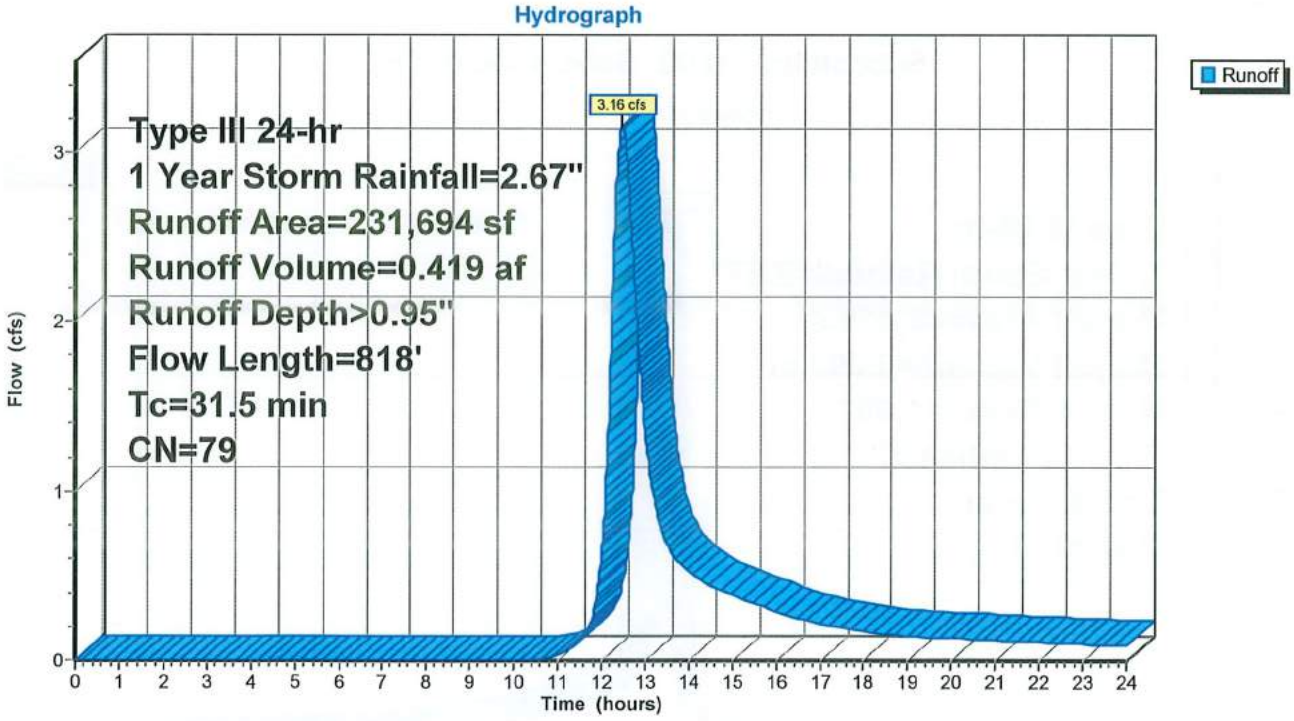
Runoff = 3.16 cfs @ 12.46 hrs, Volume= 0.419 af, Depth> 0.95"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Type III 24-hr 1 Year Storm Rainfall=2.67"

Area (sf)	CN	Description
231,694	79	Woods, Fair, HSG D
231,694		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
20.7	100	0.0222	0.08		**Sheet Flow, Sheet Flow** Woods: Light underbrush n= 0.400 P2= 3.17"
10.8	718	0.0488	1.10		**Shallow Concentrated Flow, Shallow C. Flow** Woodland Kv= 5.0 fps
31.5	818	Total			

Subcatchment 8S: Subcatchment 8S



Summary for Subcatchment 9S: Subcatchment 9S

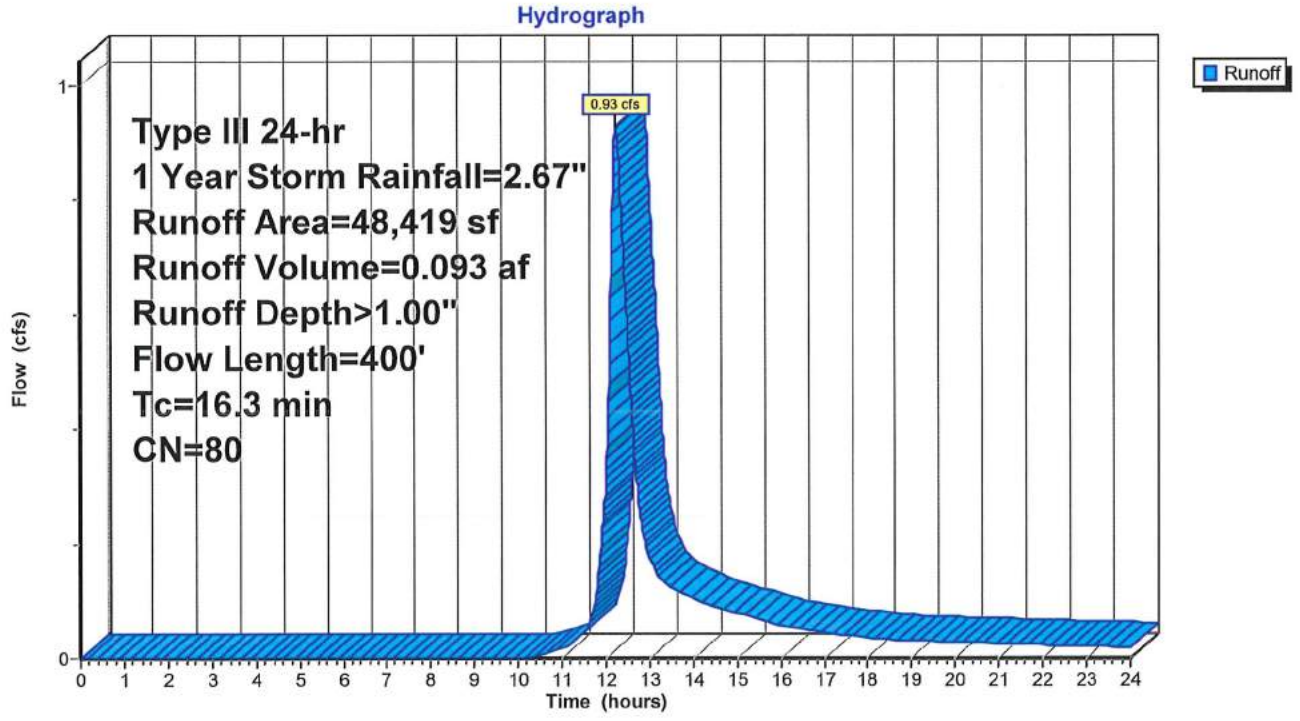
Runoff = 0.93 cfs @ 12.23 hrs, Volume= 0.093 af, Depth> 1.00"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Type III 24-hr 1 Year Storm Rainfall=2.67"

	Area (sf)	CN	Description
	45,079	79	Woods, Fair, HSG D
*	3,340	98	Driveway
	48,419	80	Weighted Average
	45,079		93.10% Pervious Area
	3,340		6.90% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
12.9	100	0.0722	0.13		**Sheet Flow, Sheet Flow** Woods: Light underbrush n= 0.400 P2= 3.17"
3.4	300	0.0884	1.49		**Shallow Concentrated Flow, Shallow C. Flow** Woodland Kv= 5.0 fps
16.3	400	Total			

Subcatchment 9S: Subcatchment 9S



Summary for Subcatchment 10S: Subcatchment 10S

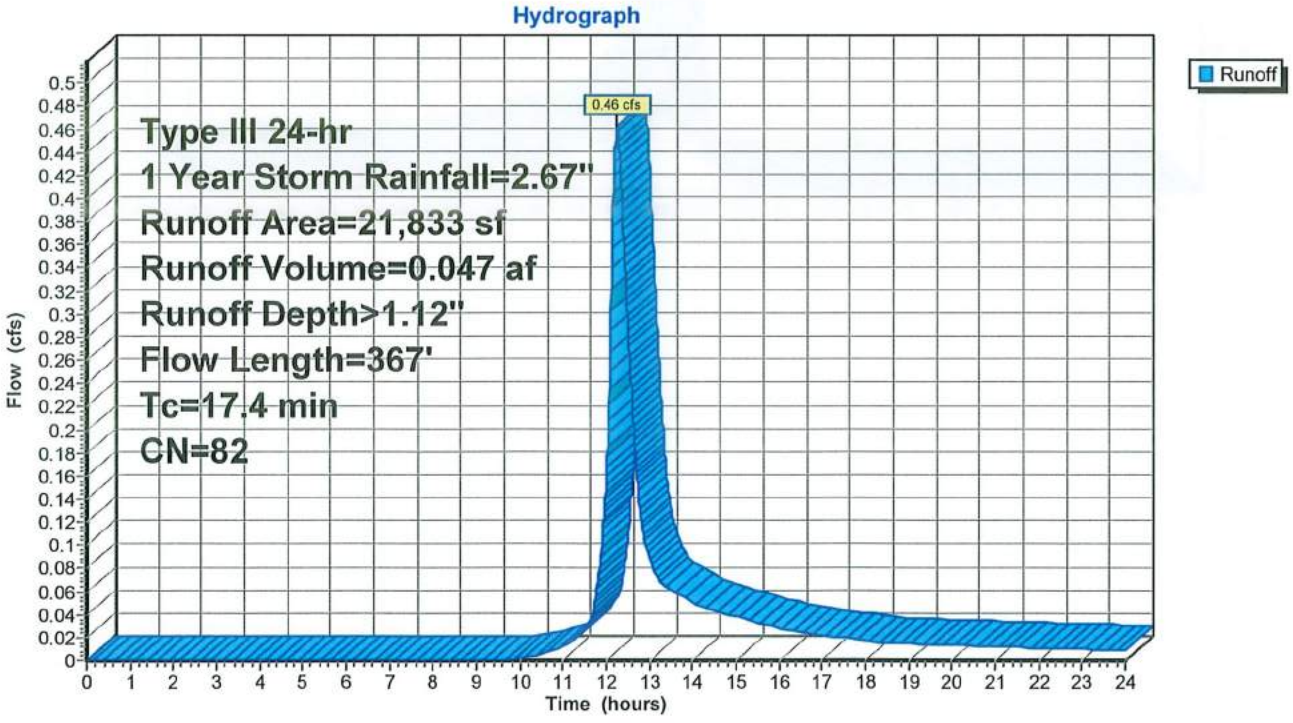
Runoff = 0.46 cfs @ 12.24 hrs, Volume= 0.047 af, Depth> 1.12"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Type III 24-hr 1 Year Storm Rainfall=2.67"

	Area (sf)	CN	Description
	18,639	79	Woods, Fair, HSG D
*	3,194	98	Driveway
	21,833	82	Weighted Average
	18,639		85.37% Pervious Area
	3,194		14.63% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
14.5	100	0.0541	0.12		**Sheet Flow, Sheet Flow** Woods: Light underbrush n= 0.400 P2= 3.17"
2.9	267	0.0974	1.56		**Shallow Concentrated Flow, Shallow C. Flow** Woodland Kv= 5.0 fps
17.4	367	Total			

Subcatchment 10S: Subcatchment 10S

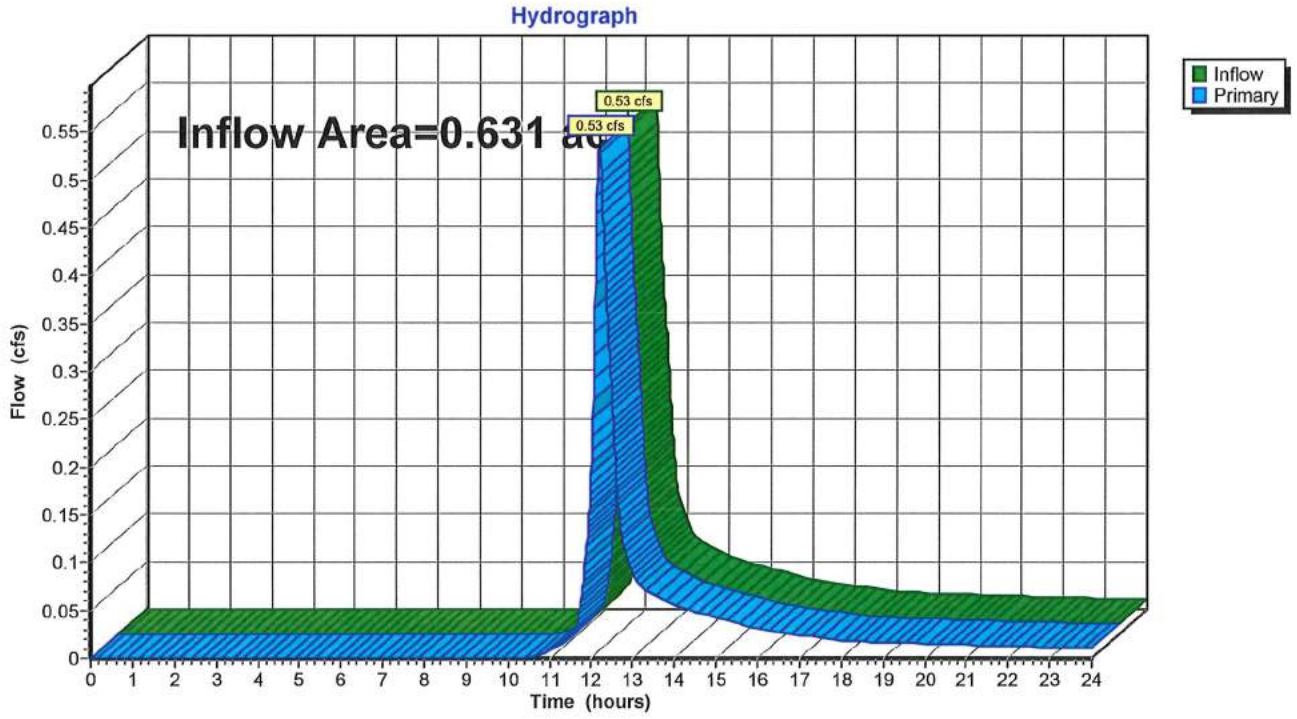


Summary for Pond 1P: Design Point 4 (Southern Property Line)

Inflow Area = 0.631 ac, 0.00% Impervious, Inflow Depth > 0.95" for 1 Year Storm event
Inflow = 0.53 cfs @ 12.19 hrs, Volume= 0.050 af
Primary = 0.53 cfs @ 12.19 hrs, Volume= 0.050 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs

Pond 1P: Design Point 4 (Southern Property Line)

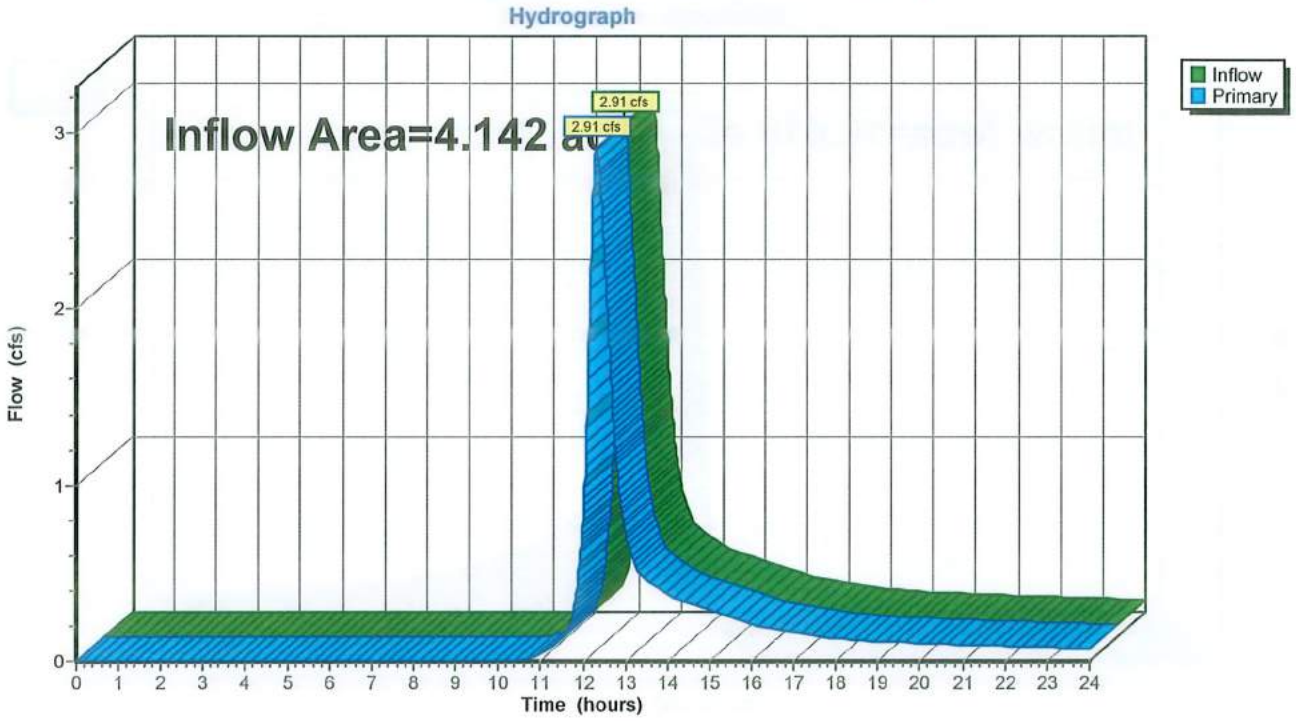


Summary for Pond 2P: Design Point 3 (Western Property Line)

Inflow Area = 4.142 ac, 0.00% Impervious, Inflow Depth > 0.95" for 1 Year Storm event
Inflow = 2.91 cfs @ 12.32 hrs, Volume= 0.327 af
Primary = 2.91 cfs @ 12.32 hrs, Volume= 0.327 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs

Pond 2P: Design Point 3 (Western Property Line)

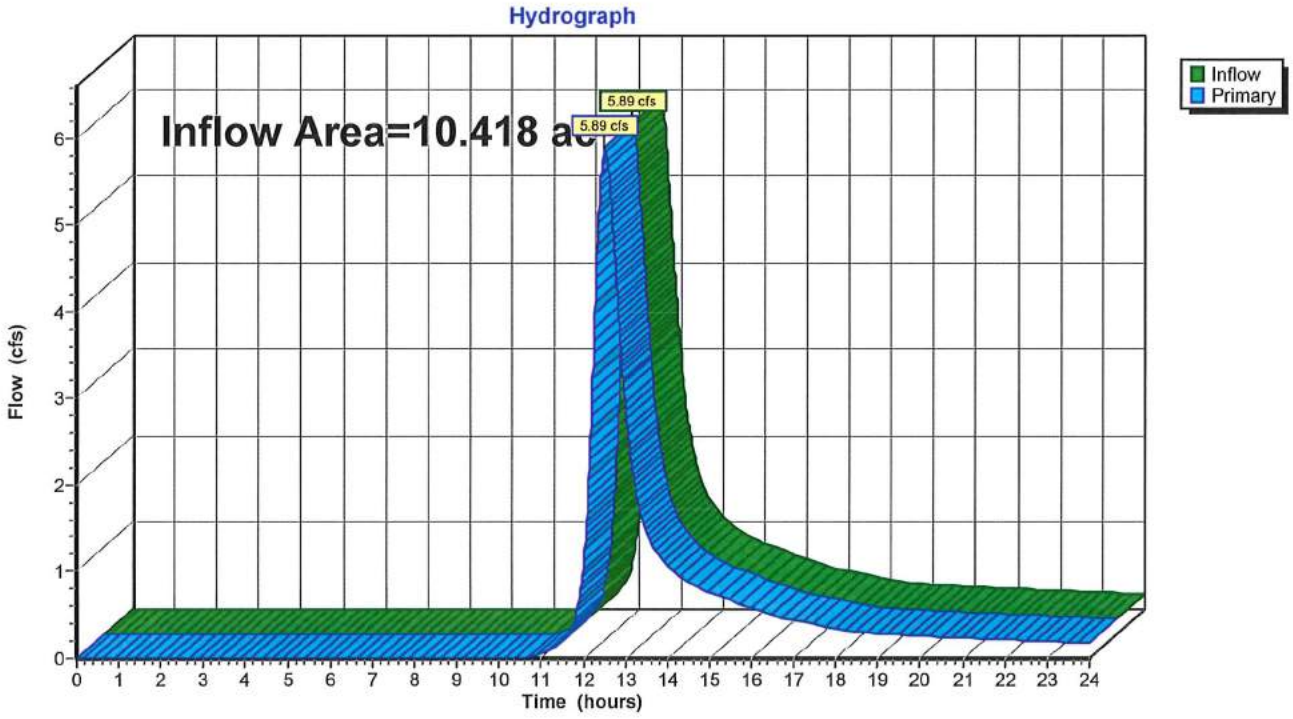


Summary for Pond 3P: Design Point 2 (Stream)

Inflow Area = 10.418 ac, 0.00% Impervious, Inflow Depth > 0.94" for 1 Year Storm event
Inflow = 5.89 cfs @ 12.52 hrs, Volume= 0.820 af
Primary = 5.89 cfs @ 12.52 hrs, Volume= 0.820 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs

Pond 3P: Design Point 2 (Stream)

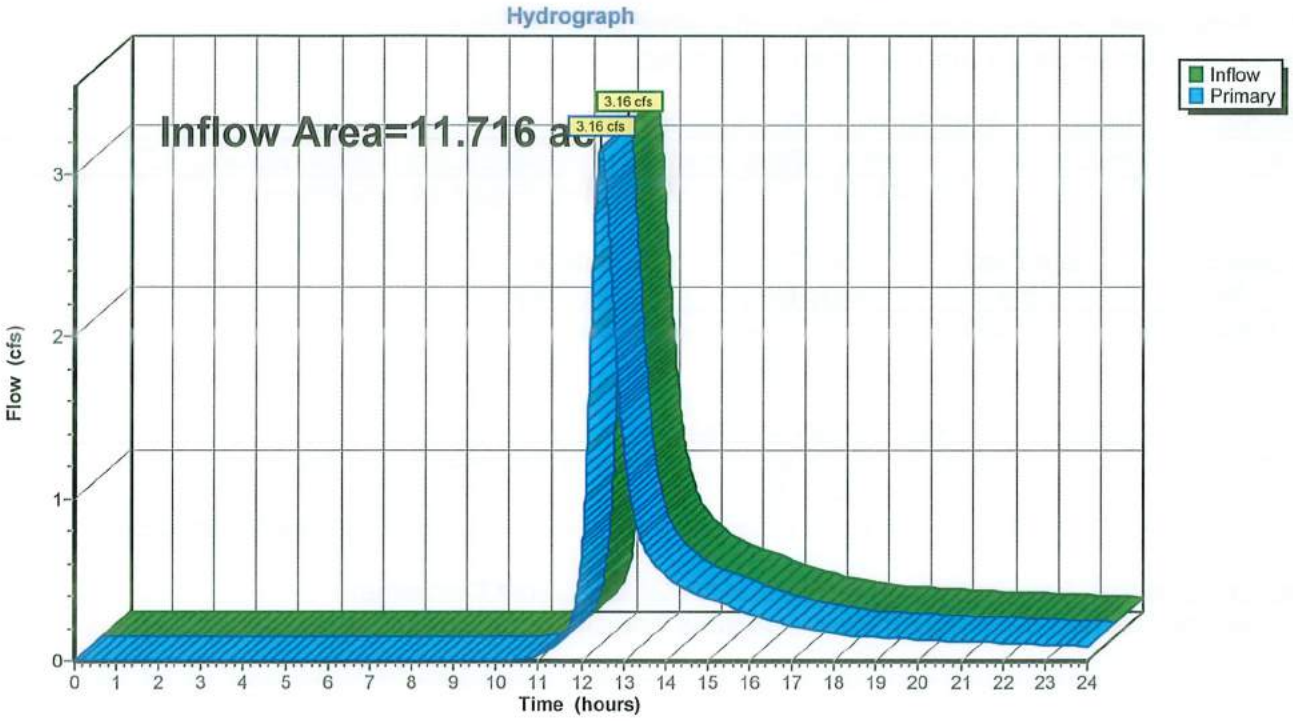


Summary for Pond 4P: Design Point 1 (Ditch)

Inflow Area = 11.716 ac, 5.10% Impervious, Inflow Depth > 0.43" for 1 Year Storm event
Inflow = 3.16 cfs @ 12.46 hrs, Volume= 0.419 af
Primary = 3.16 cfs @ 12.46 hrs, Volume= 0.419 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs

Pond 4P: Design Point 1 (Ditch)



Summary for Pond 5P: Rain Gardens

Inflow Area = 1.120 ac, 3.24% Impervious, Inflow Depth > 1.01" for 1 Year Storm event
Inflow = 1.27 cfs @ 12.10 hrs, Volume= 0.094 af
Outflow = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af, Atten= 100%, Lag= 0.0 min
Primary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Peak Elev= 635.73' @ 24.00 hrs Surf.Area= 18,000 sf Storage= 4,092 cf

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

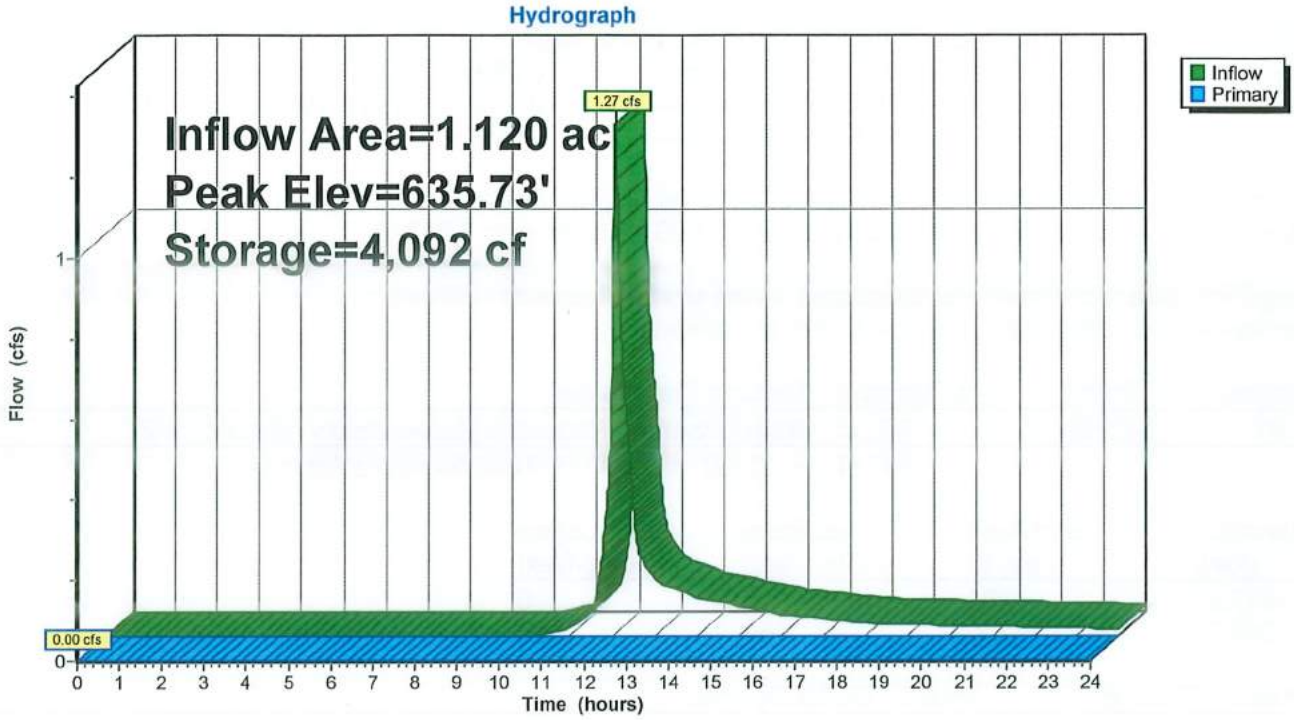
Volume	Invert	Avail.Storage	Storage Description
#1	635.50'	300 cf	**Rain Gradens (Prismatic)** Listed below (Recalc) x 2
		300 cf	x 30.00 = 9,000 cf Total Available Storage

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
635.50	300	0	0
636.00	300	150	150

Device	Routing	Invert	Outlet Devices
#1	Primary	635.90'	**1.0' long x 12.0' 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) 2.57 2.62 2.70 2.67 2.66 2.67 2.66 2.64

Primary OutFlow Max=0.00 cfs @ 0.00 hrs HW=635.50' (Free Discharge)
↑—**1=Broad-Crested Rectangular Weir** (Controls 0.00 cfs)

Pond 5P: Rain Gardens



Summary for Pond 6P: Rain Gardens

Inflow Area = 1.009 ac, 9.85% Impervious, Inflow Depth > 1.06" for 1 Year Storm event
Inflow = 1.12 cfs @ 12.13 hrs, Volume= 0.089 af
Outflow = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af, Atten= 100%, Lag= 0.0 min
Primary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Peak Elev= 647.72' @ 24.00 hrs Surf.Area= 18,000 sf Storage= 3,893 cf

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

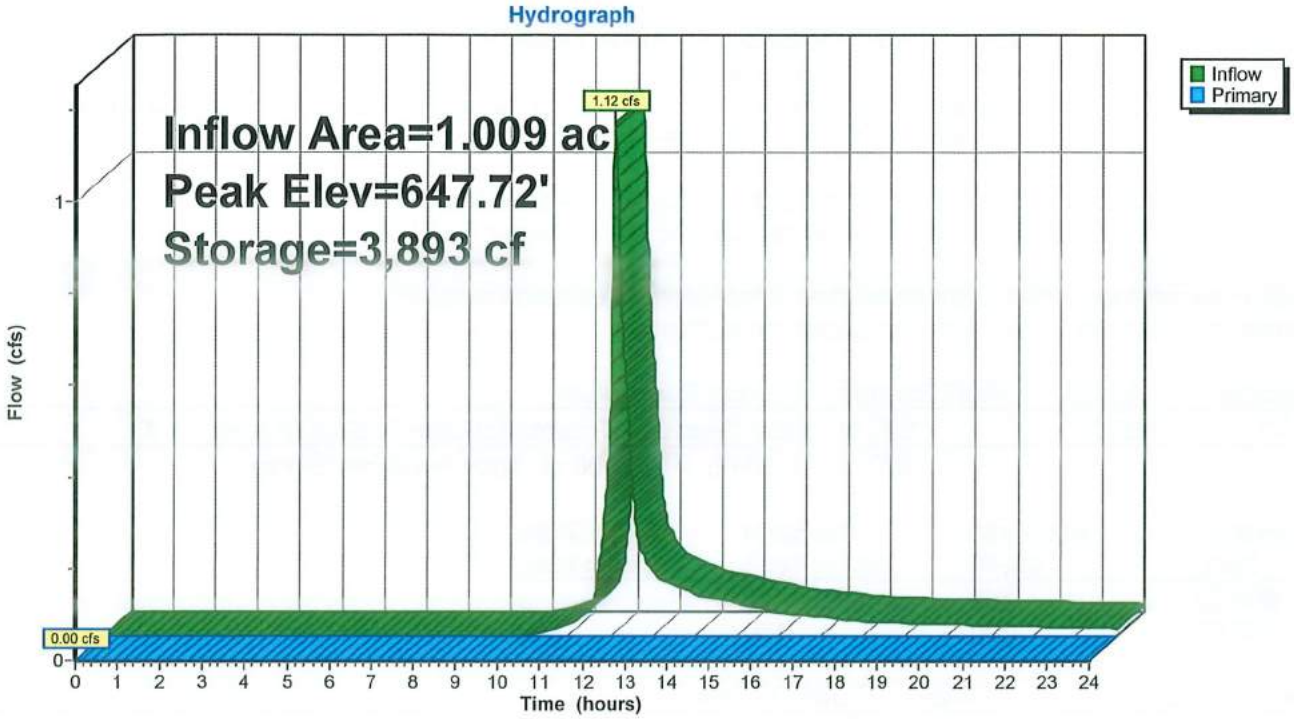
Volume	Invert	Avail.Storage	Storage Description
#1	647.50'	300 cf	**Rain Gradens (Prismatic)** Listed below (Recalc) x 2
		300 cf	x 30.00 = 9,000 cf Total Available Storage

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
647.50	300	0	0
648.00	300	150	150

Device	Routing	Invert	Outlet Devices
#1	Primary	647.90'	**1.0' long x 12.0' 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) 2.57 2.62 2.70 2.67 2.66 2.67 2.66 2.64

Primary OutFlow Max=0.00 cfs @ 0.00 hrs HW=647.50' (Free Discharge)
↑—**1=Broad-Crested Rectangular Weir** (Controls 0.00 cfs)

Pond 6P: Rain Gardens



Summary for Pond 7P: Rain Gardens

Inflow Area = 1.345 ac, 10.61% Impervious, Inflow Depth > 1.06" for 1 Year Storm event
Inflow = 1.18 cfs @ 12.24 hrs, Volume= 0.119 af
Outflow = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af, Atten= 100%, Lag= 0.0 min
Primary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Peak Elev= 661.64' @ 24.00 hrs Surf.Area= 36,000 sf Storage= 5,181 cf

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

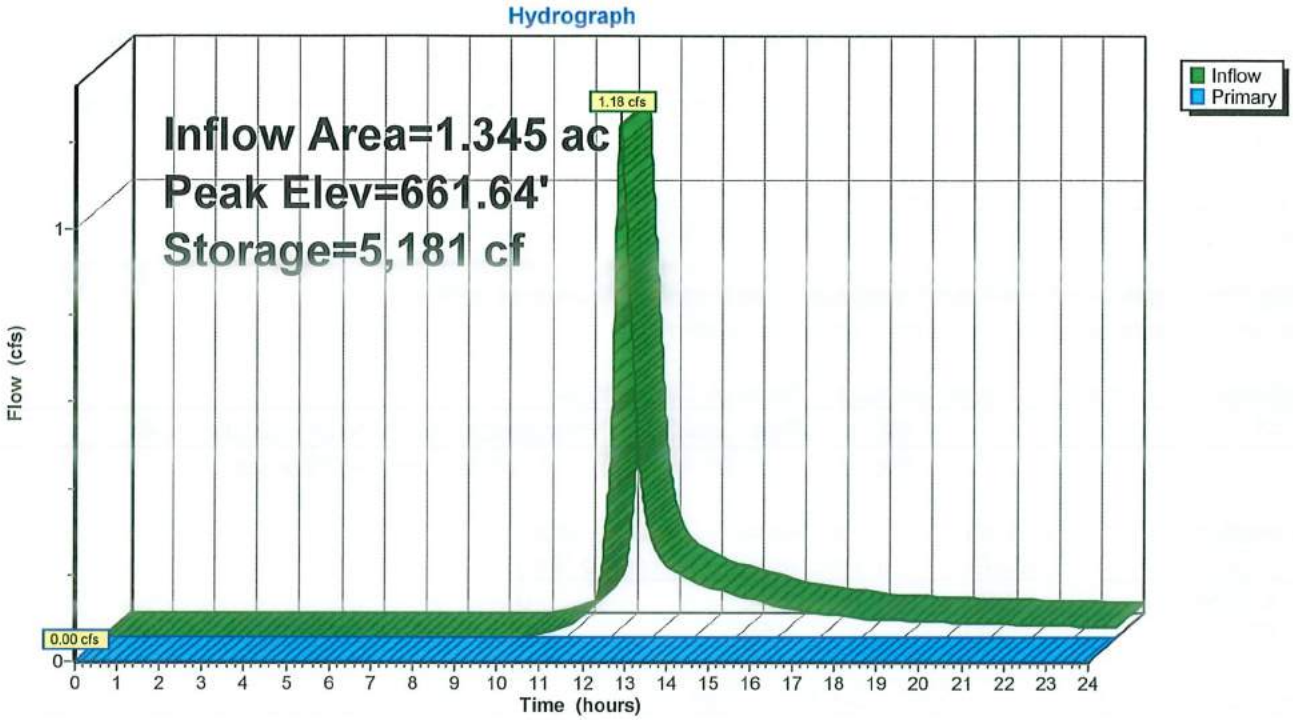
Volume	Invert	Avail.Storage	Storage Description
#1	661.50'	600 cf	**Rain Gradens (Prismatic)** Listed below (Recalc) x 4
		600 cf	x 30.00 = 18,000 cf Total Available Storage

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
661.50	300	0	0
662.00	300	150	150

Device	Routing	Invert	Outlet Devices
#1	Primary	661.90'	**1.0' long x 12.0' 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) 2.57 2.62 2.70 2.67 2.66 2.67 2.66 2.64

Primary OutFlow Max=0.00 cfs @ 0.00 hrs HW=661.50' (Free Discharge)
↑—**1=Broad-Crested Rectangular Weir** (Controls 0.00 cfs)

Pond 7P: Rain Gardens



Summary for Pond 8P: Rain Gardens

Inflow Area = 1.310 ac, 12.92% Impervious, Inflow Depth > 1.06" for 1 Year Storm event
Inflow = 1.11 cfs @ 12.27 hrs, Volume= 0.116 af
Outflow = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af, Atten= 100%, Lag= 0.0 min
Primary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Peak Elev= 672.64' @ 24.00 hrs Surf.Area= 36,000 sf Storage= 5,044 cf

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

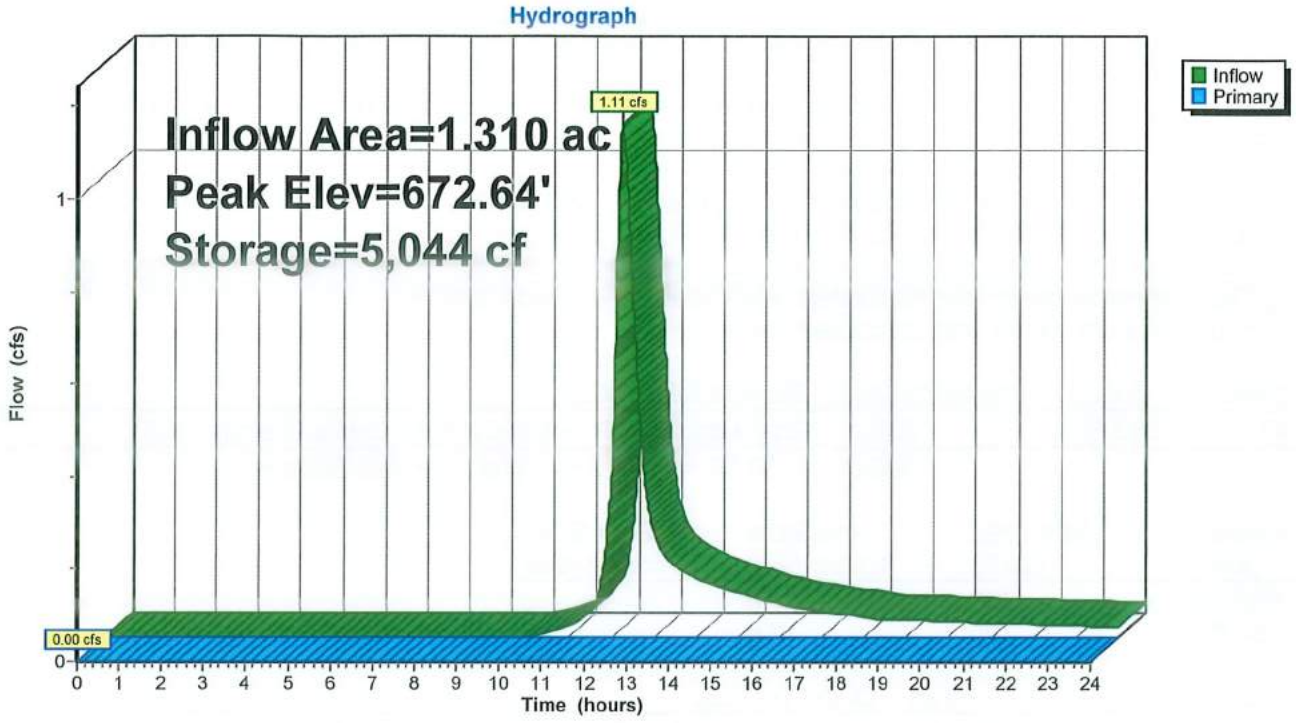
Volume	Invert	Avail.Storage	Storage Description
#1	672.50'	600 cf	**Rain Gradens (Prismatic)** Listed below (Recalc) x 4
		600 cf	x 30.00 = 18,000 cf Total Available Storage

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
672.50	300	0	0
673.00	300	150	150

Device	Routing	Invert	Outlet Devices
#1	Primary	672.90'	**1.0' long x 12.0' 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) 2.57 2.62 2.70 2.67 2.66 2.67 2.66 2.64

Primary OutFlow Max=0.00 cfs @ 0.00 hrs HW=672.50' (Free Discharge)
↑**1=Broad-Crested Rectangular Weir** (Controls 0.00 cfs)

Pond 8P: Rain Gardens



Summary for Pond 9P: Rain Gardens

Inflow Area = 1.112 ac, 6.90% Impervious, Inflow Depth > 1.00" for 1 Year Storm event
Inflow = 0.93 cfs @ 12.23 hrs, Volume= 0.093 af
Outflow = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af, Atten= 100%, Lag= 0.0 min
Primary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Peak Elev= 663.73' @ 24.00 hrs Surf.Area= 18,000 sf Storage= 4,052 cf

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

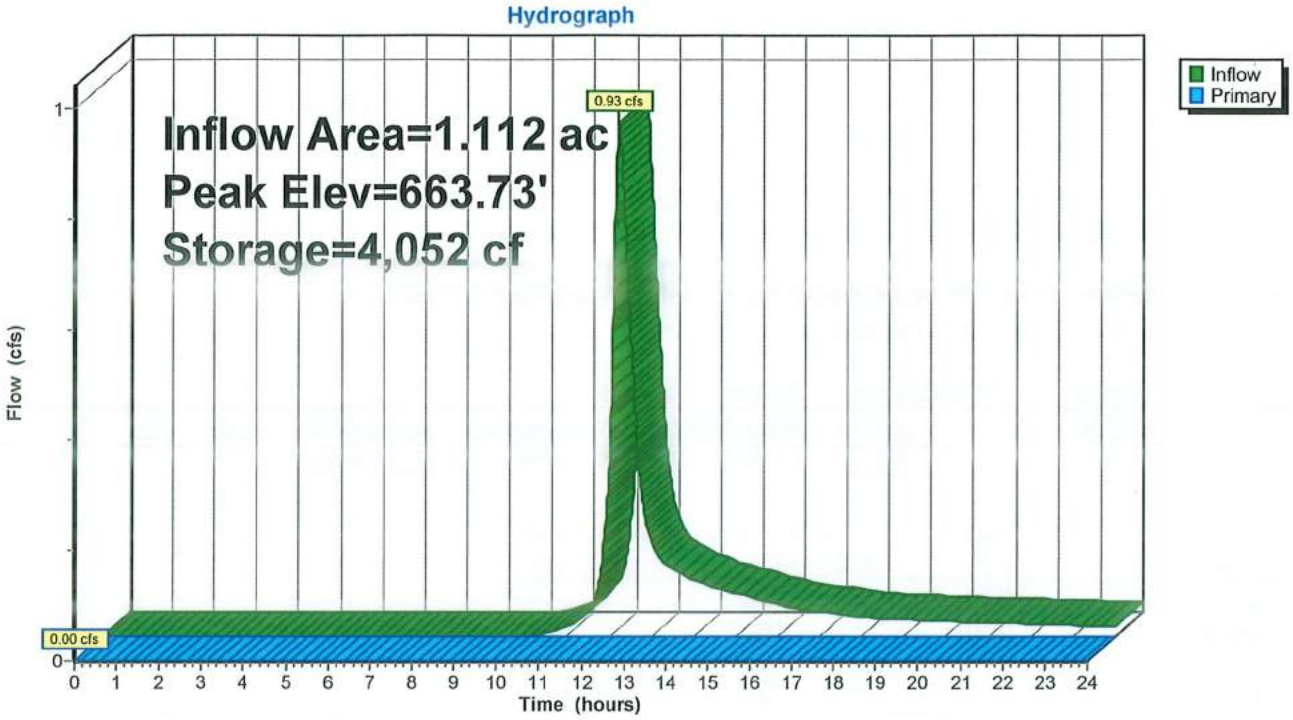
Volume	Invert	Avail.Storage	Storage Description
#1	663.50'	300 cf	**Rain Gradens (Prismatic)** Listed below (Recalc) x 2
		300 cf	x 30.00 = 9,000 cf Total Available Storage

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
663.50	300	0	0
664.00	300	150	150

Device	Routing	Invert	Outlet Devices
#1	Primary	663.90'	**1.0' long x 12.0' 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) 2.57 2.62 2.70 2.67 2.66 2.67 2.66 2.64

Primary OutFlow Max=0.00 cfs @ 0.00 hrs HW=663.50' (Free Discharge)
↑**1=Broad-Crested Rectangular Weir** (Controls 0.00 cfs)

Pond 9P: Rain Gardens



Summary for Pond 10P: Rain Gardens

Inflow Area = 0.501 ac, 14.63% Impervious, Inflow Depth > 1.12" for 1 Year Storm event
Inflow = 0.46 cfs @ 12.24 hrs, Volume= 0.047 af
Outflow = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af, Atten= 100%, Lag= 0.0 min
Primary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Peak Elev= 665.61' @ 24.00 hrs Surf.Area= 18,000 sf Storage= 2,037 cf

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

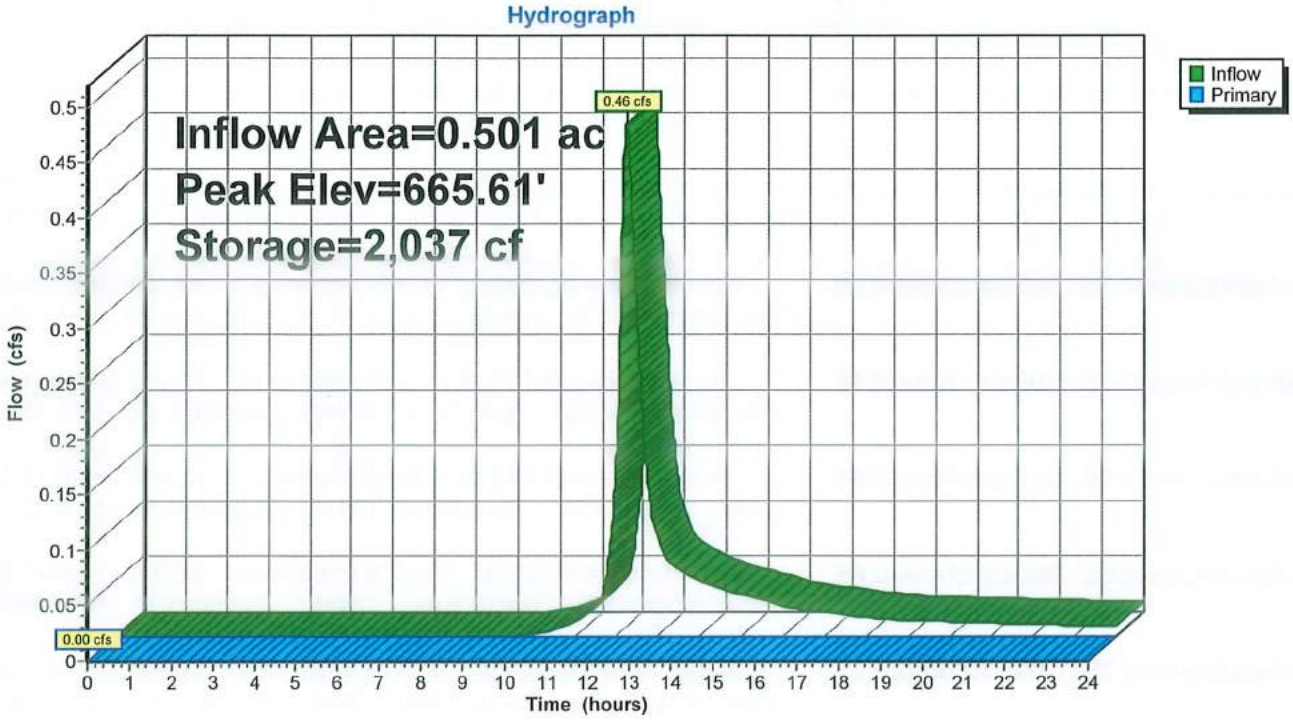
Volume	Invert	Avail.Storage	Storage Description
#1	665.50'	300 cf	**Rain Gradens (Prismatic)** Listed below (Recalc) x 2
		300 cf	x 30.00 = 9,000 cf Total Available Storage

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
665.50	300	0	0
666.00	300	150	150

Device	Routing	Invert	Outlet Devices
#1	Primary	665.90'	**1.0' long x 12.0' 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) 2.57 2.62 2.70 2.67 2.66 2.67 2.66 2.64

Primary OutFlow Max=0.00 cfs @ 0.00 hrs HW=665.50' (Free Discharge)
↑—**1=Broad-Crested Rectangular Weir** (Controls 0.00 cfs)

Pond 10P: Rain Gardens



Time span=0.00-24.00 hrs, dt=0.01 hrs, 2401 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Subcatchment 1S: Subcatchment 4S Runoff Area=27,500 sf 0.00% Impervious Runoff Depth>1.37"
Flow Length=267' Tc=13.4 min CN=79 Runoff=0.79 cfs 0.072 af

Subcatchment 2S: Subcatchment 3S Runoff Area=180,441 sf 0.00% Impervious Runoff Depth>1.37"
Flow Length=494' Tc=21.4 min CN=79 Runoff=4.30 cfs 0.472 af

Subcatchment 3S: Subcatchment 2S Runoff Area=453,810 sf 0.00% Impervious Runoff Depth>1.36"
Flow Length=1,375' Tc=35.1 min CN=79 Runoff=8.68 cfs 1.183 af

Subcatchment 4S: Subcatchment 1S Runoff Area=48,777 sf 3.24% Impervious Runoff Depth>1.44"
Flow Length=483' Tc=6.3 min CN=80 Runoff=1.85 cfs 0.134 af

Subcatchment 5S: Subcatchment 5S Runoff Area=43,949 sf 9.85% Impervious Runoff Depth>1.51"
Flow Length=417' Tc=8.8 min CN=81 Runoff=1.61 cfs 0.127 af

Subcatchment 6S: Subcatchment 6S Runoff Area=58,597 sf 10.61% Impervious Runoff Depth>1.50"
Flow Length=357' Tc=16.8 min CN=81 Runoff=1.71 cfs 0.168 af

Subcatchment 7S: Subcatchment 7S Runoff Area=57,071 sf 12.92% Impervious Runoff Depth>1.50"
Flow Length=282' Tc=18.5 min CN=81 Runoff=1.60 cfs 0.164 af

Subcatchment 8S: Subcatchment 8S Runoff Area=231,694 sf 0.00% Impervious Runoff Depth>1.36"
Flow Length=818' Tc=31.5 min CN=79 Runoff=4.66 cfs 0.605 af

Subcatchment 9S: Subcatchment 9S Runoff Area=48,419 sf 6.90% Impervious Runoff Depth>1.44"
Flow Length=400' Tc=16.3 min CN=80 Runoff=1.36 cfs 0.133 af

Subcatchment 10S: Subcatchment 10S Runoff Area=21,833 sf 14.63% Impervious Runoff Depth>1.57"
Flow Length=367' Tc=17.4 min CN=82 Runoff=0.66 cfs 0.066 af

Pond 1P: Design Point 4 (Southern Property Line) Inflow=0.79 cfs 0.072 af
Primary=0.79 cfs 0.072 af

Pond 2P: Design Point 3 (Western Property Line) Inflow=4.30 cfs 0.472 af
Primary=4.30 cfs 0.472 af

Pond 3P: Design Point 2 (Stream) Inflow=8.68 cfs 1.183 af
Primary=8.68 cfs 1.183 af

Pond 4P: Design Point 1 (Ditch) Inflow=4.66 cfs 0.605 af
Primary=4.66 cfs 0.605 af

Pond 5P: Rain Gardens Peak Elev=635.82' Storage=5,847 cf Inflow=1.85 cfs 0.134 af
Outflow=0.00 cfs 0.000 af

Pond 6P: Rain Gardens Peak Elev=647.81' Storage=5,514 cf Inflow=1.61 cfs 0.127 af
Outflow=0.00 cfs 0.000 af

Pond 7P: Rain Gardens Peak Elev=661.70' Storage=7,338 cf Inflow=1.71 cfs 0.168 af
Outflow=0.00 cfs 0.000 af

Pond 8P: Rain Gardens Peak Elev=672.70' Storage=7,144 cf Inflow=1.60 cfs 0.164 af
Outflow=0.00 cfs 0.000 af

Pond 9P: Rain Gardens Peak Elev=663.82' Storage=5,790 cf Inflow=1.36 cfs 0.133 af
Outflow=0.00 cfs 0.000 af

Pond 10P: Rain Gardens Peak Elev=665.66' Storage=2,861 cf Inflow=0.66 cfs 0.066 af
Outflow=0.00 cfs 0.000 af

Total Runoff Area = 26.908 ac Runoff Volume = 3.124 af Average Runoff Depth = 1.39"
97.78% Pervious = 26.310 ac 2.22% Impervious = 0.598 ac

Summary for Subcatchment 1S: Subcatchment 4S

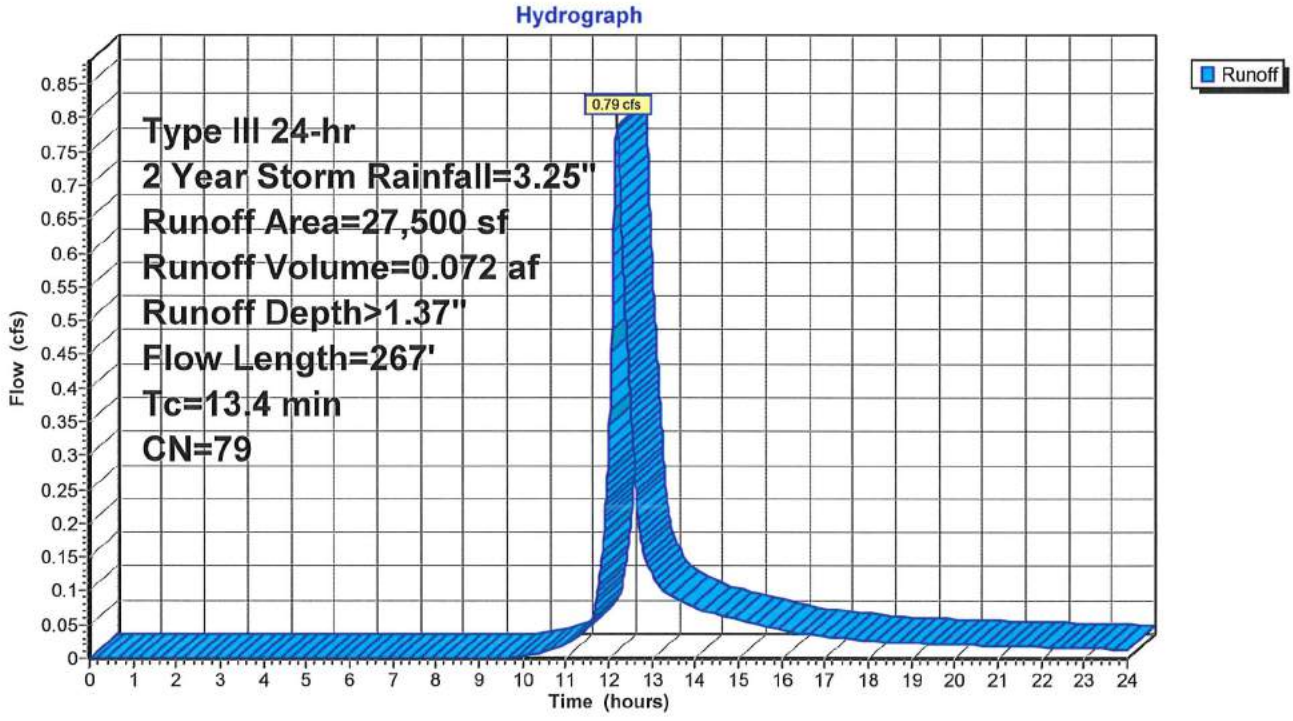
Runoff = 0.79 cfs @ 12.19 hrs, Volume= 0.072 af, Depth> 1.37"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Type III 24-hr 2 Year Storm Rainfall=3.25"

Area (sf)	CN	Description
27,500	79	Woods, Fair, HSG D
27,500		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
11.0	100	0.1069	0.15		**Sheet Flow, Sheet Flow** Woods: Light underbrush n= 0.400 P2= 3.17"
2.4	167	0.0531	1.15		**Shallow Concentrated Flow, Shallow C flow** Woodland Kv= 5.0 fps
13.4	267	Total			

Subcatchment 1S: Subcatchment 4S



Summary for Subcatchment 2S: Subcatchment 3S

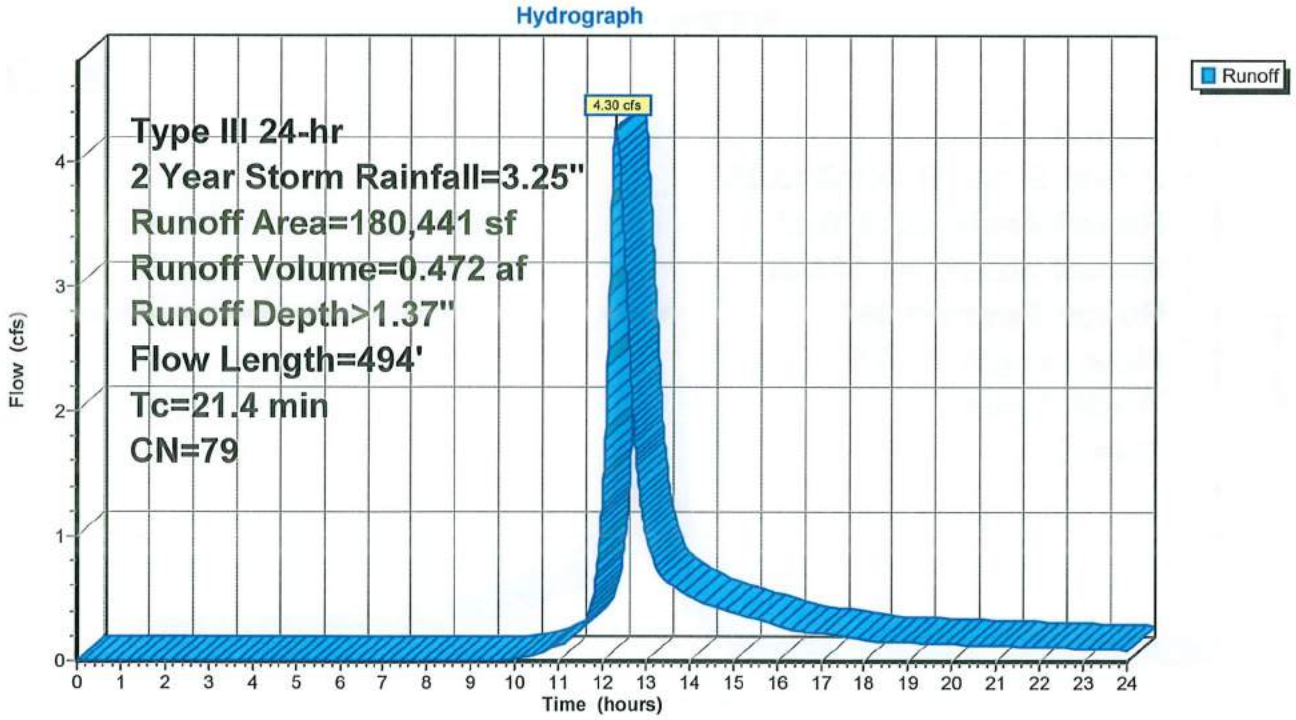
Runoff = 4.30 cfs @ 12.30 hrs, Volume= 0.472 af, Depth> 1.37"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Type III 24-hr 2 Year Storm Rainfall=3.25"

Area (sf)	CN	Description
180,441	79	Woods, Fair, HSG D
180,441		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
17.0	100	0.0361	0.10		**Sheet Flow, Sheet Flow** Woods: Light underbrush n= 0.400 P2= 3.17"
4.4	394	0.0890	1.49		**Shallow Concentrated Flow, Shallow C Flow** Woodland Kv= 5.0 fps
21.4	494	Total			

Subcatchment 2S: Subcatchment 3S



Summary for Subcatchment 3S: Subcatchment 2S

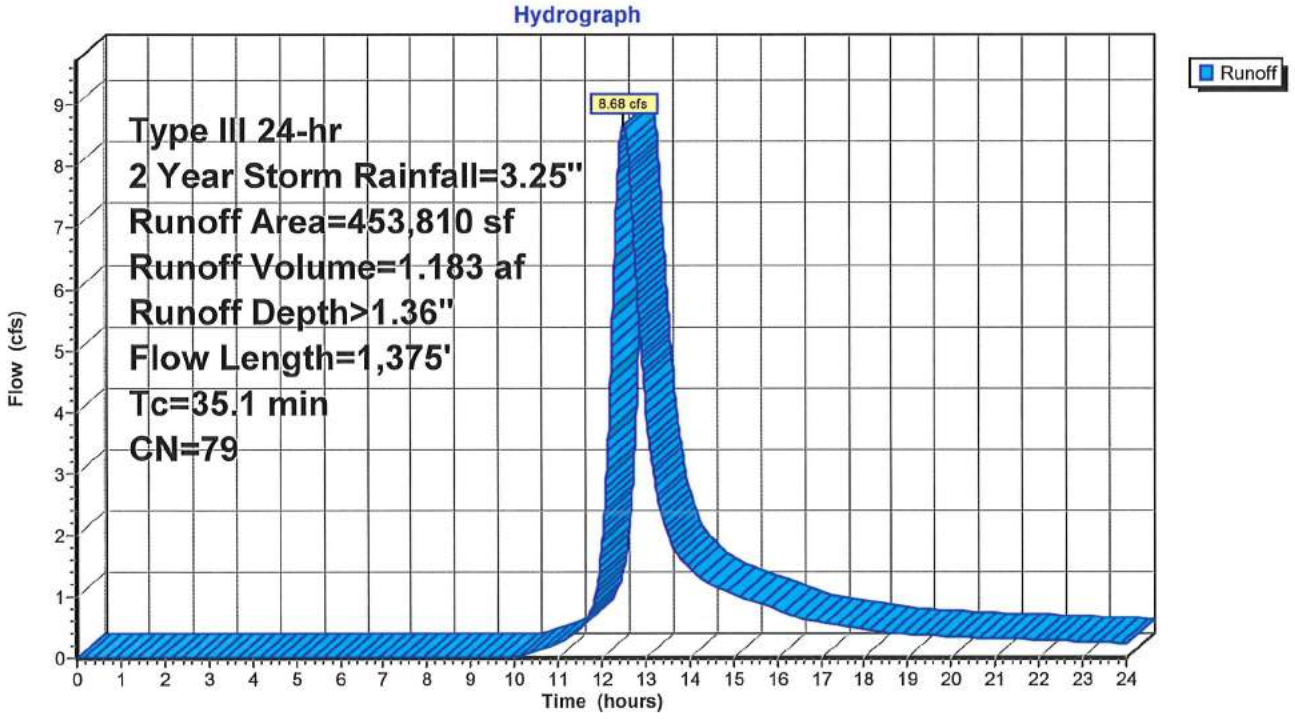
Runoff = 8.68 cfs @ 12.52 hrs, Volume= 1.183 af, Depth> 1.36"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Type III 24-hr 2 Year Storm Rainfall=3.25"

Area (sf)	CN	Description
453,810	79	Woods, Fair, HSG D
453,810		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
14.1	100	0.0575	0.12		**Sheet Flow, Sheet Flow** Woods: Light underbrush n= 0.400 P2= 3.17"
21.0	1,275	0.0410	1.01		**Shallow Concentrated Flow, Shallow C Flow** Woodland Kv= 5.0 fps
35.1	1,375	Total			

Subcatchment 3S: Subcatchment 2S



Summary for Subcatchment 4S: Subcatchment 1S

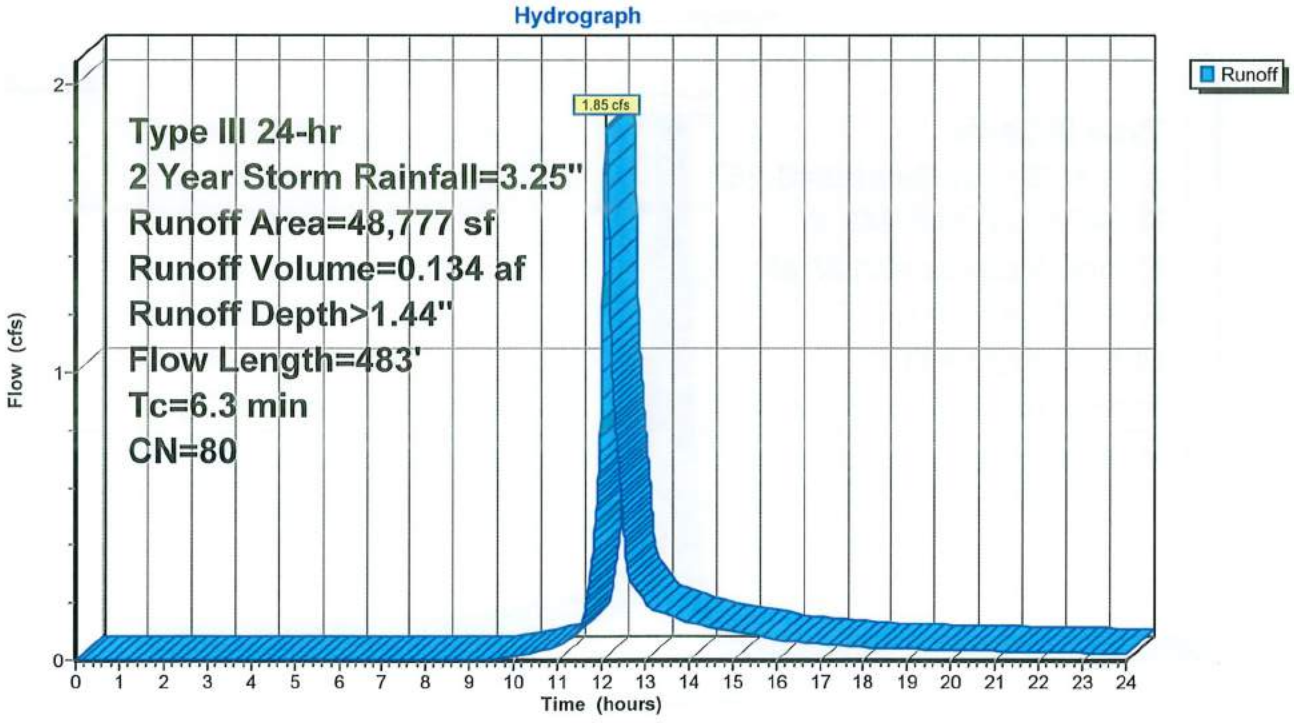
Runoff = 1.85 cfs @ 12.10 hrs, Volume= 0.134 af, Depth> 1.44"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Type III 24-hr 2 Year Storm Rainfall=3.25"

	Area (sf)	CN	Description
	47,199	79	Woods, Fair, HSG D
*	1,578	98	Driveways, HSG A
	48,777	80	Weighted Average
	47,199		96.76% Pervious Area
	1,578		3.24% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
4.8	100	0.1200	0.35		**Sheet Flow, Sheet Flow** Grass: Short n= 0.150 P2= 3.17"
1.5	383	0.0783	4.20		**Shallow Concentrated Flow, Shallow C flow** Grassed Waterway Kv= 15.0 fps
6.3	483	Total			

Subcatchment 4S: Subcatchment 1S



Summary for Subcatchment 5S: Subcatchment 5S

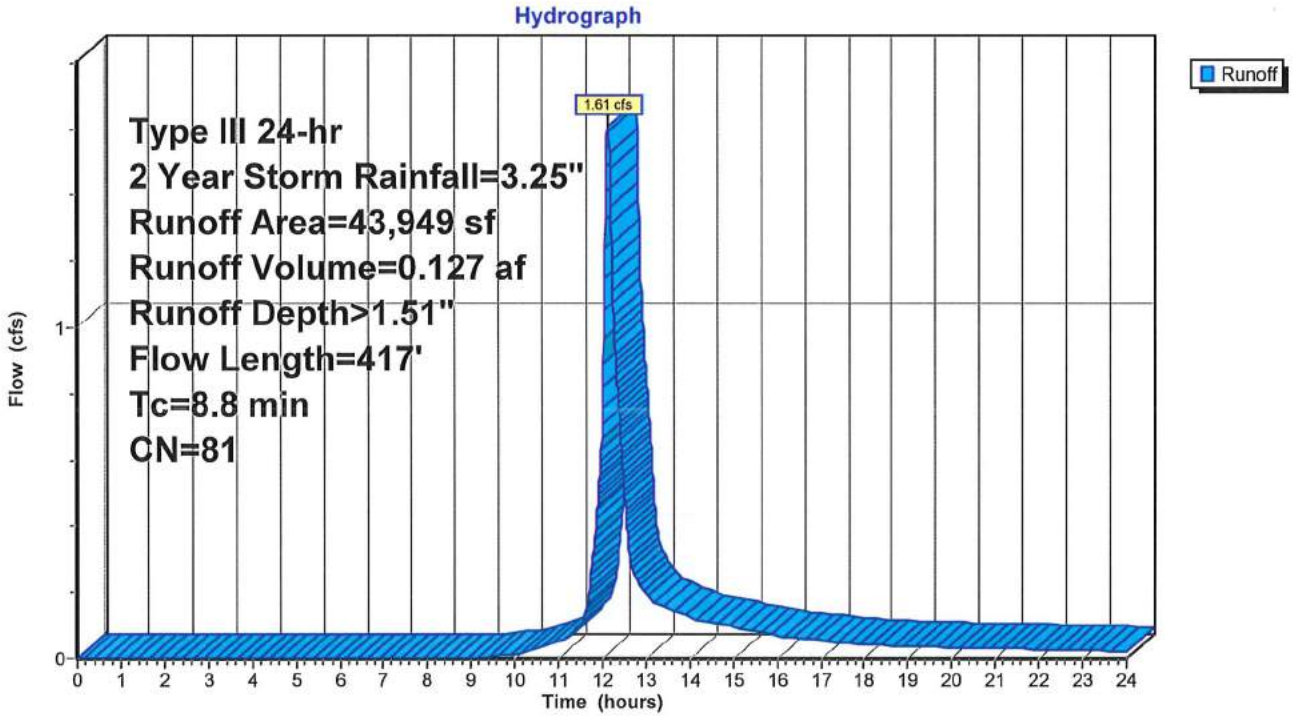
Runoff = 1.61 cfs @ 12.13 hrs, Volume= 0.127 af, Depth> 1.51"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Type III 24-hr 2 Year Storm Rainfall=3.25"

	Area (sf)	CN	Description
	39,620	79	Woods, Fair, HSG D
*	4,329	98	Driveway
	43,949	81	Weighted Average
	39,620		90.15% Pervious Area
	4,329		9.85% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.2	100	0.0972	0.32		**Sheet Flow, Sheet Flow** Grass: Short n= 0.150 P2= 3.17"
3.6	317	0.0861	1.47		**Shallow Concentrated Flow, Shallow C. Flow** Woodland Kv= 5.0 fps
8.8	417	Total			

Subcatchment 5S: Subcatchment 5S



Summary for Subcatchment 6S: Subcatchment 6S

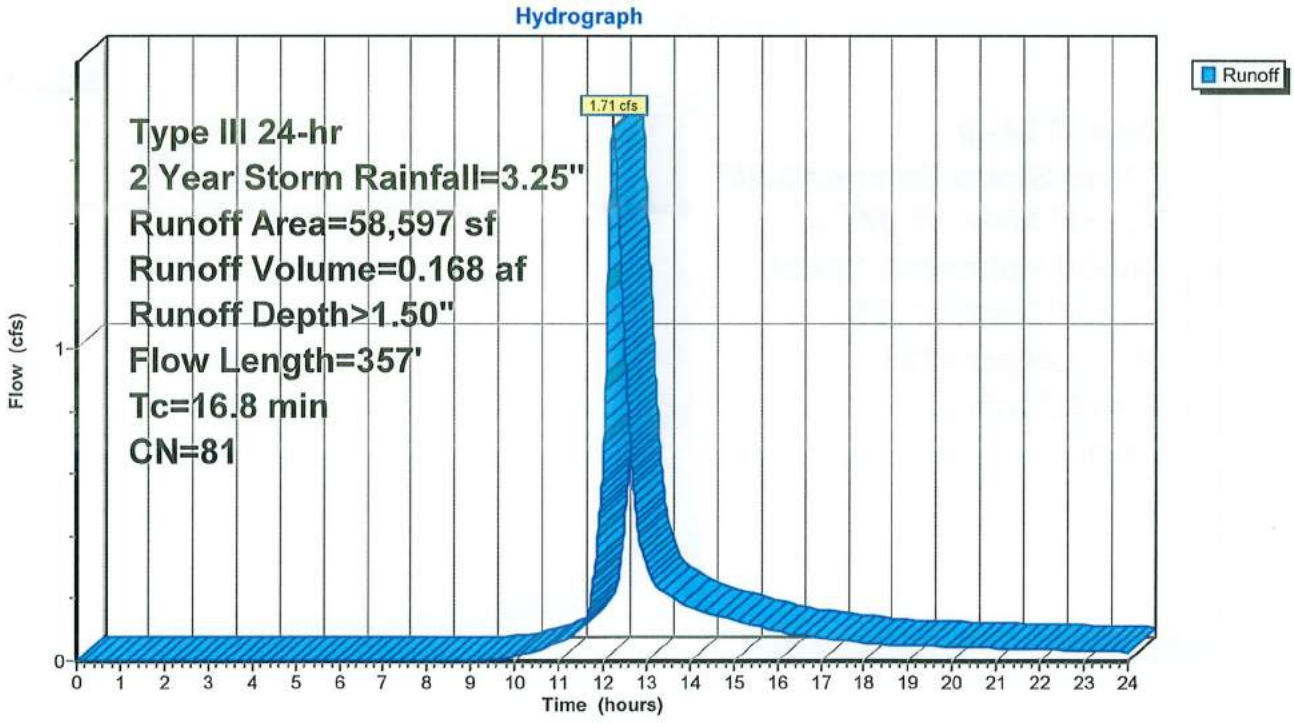
Runoff = 1.71 cfs @ 12.23 hrs, Volume= 0.168 af, Depth> 1.50"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Type III 24-hr 2 Year Storm Rainfall=3.25"

	Area (sf)	CN	Description
	52,377	79	Woods, Fair, HSG D
*	6,220	98	Driveway
	58,597	81	Weighted Average
	52,377		89.39% Pervious Area
	6,220		10.61% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
13.9	100	0.0600	0.12		**Sheet Flow, Sheet Flow** Woods: Light underbrush n= 0.400 P2= 3.17"
2.9	257	0.0856	1.46		**Shallow Concentrated Flow, Shallow C. Flow** Woodland Kv= 5.0 fps
16.8	357	Total			

Subcatchment 6S: Subcatchment 6S



Summary for Subcatchment 7S: Subcatchment 7S

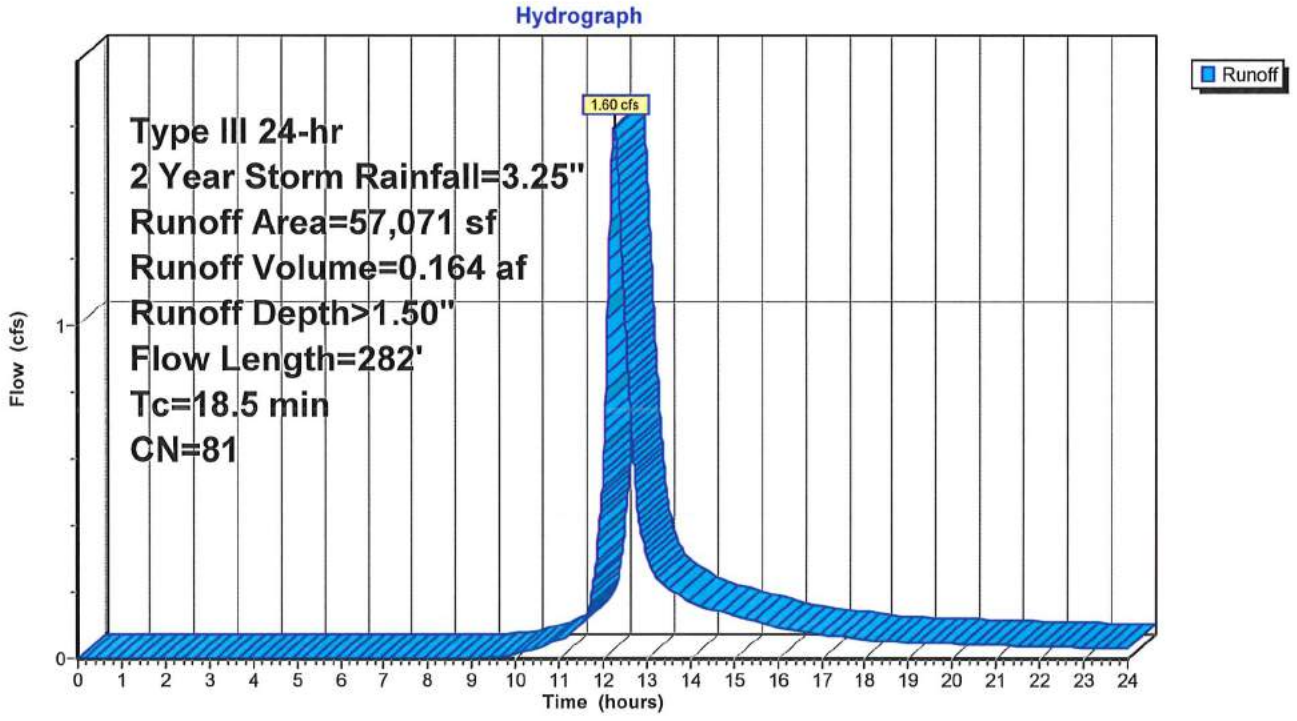
Runoff = 1.60 cfs @ 12.27 hrs, Volume= 0.164 af, Depth> 1.50"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Type III 24-hr 2 Year Storm Rainfall=3.25"

	Area (sf)	CN	Description
	49,698	79	Woods, Fair, HSG D
*	7,373	98	Driveway
	57,071	81	Weighted Average
	49,698		87.08% Pervious Area
	7,373		12.92% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
16.4	100	0.0400	0.10		**Sheet Flow, Sheet Flow** Woods: Light underbrush n= 0.400 P2= 3.17"
2.1	182	0.0824	1.44		**Shallow Concentrated Flow, Shallow C. Flow** Woodland Kv= 5.0 fps
18.5	282	Total			

Subcatchment 7S: Subcatchment 7S



Summary for Subcatchment 8S: Subcatchment 8S

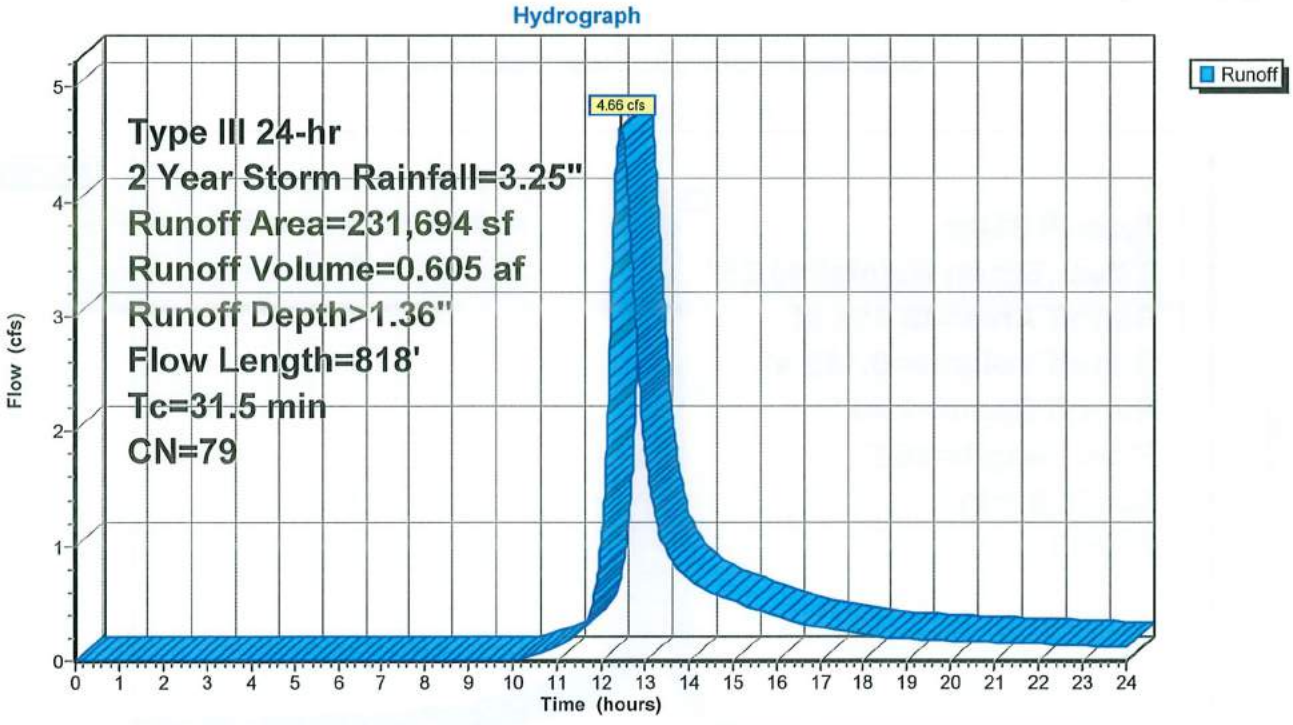
Runoff = 4.66 cfs @ 12.46 hrs, Volume= 0.605 af, Depth> 1.36"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Type III 24-hr 2 Year Storm Rainfall=3.25"

Area (sf)	CN	Description
231,694	79	Woods, Fair, HSG D
231,694		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
20.7	100	0.0222	0.08		**Sheet Flow, Sheet Flow** Woods: Light underbrush n= 0.400 P2= 3.17"
10.8	718	0.0488	1.10		**Shallow Concentrated Flow, Shallow C. Flow** Woodland Kv= 5.0 fps
31.5	818	Total			

Subcatchment 8S: Subcatchment 8S



Summary for Subcatchment 9S: Subcatchment 9S

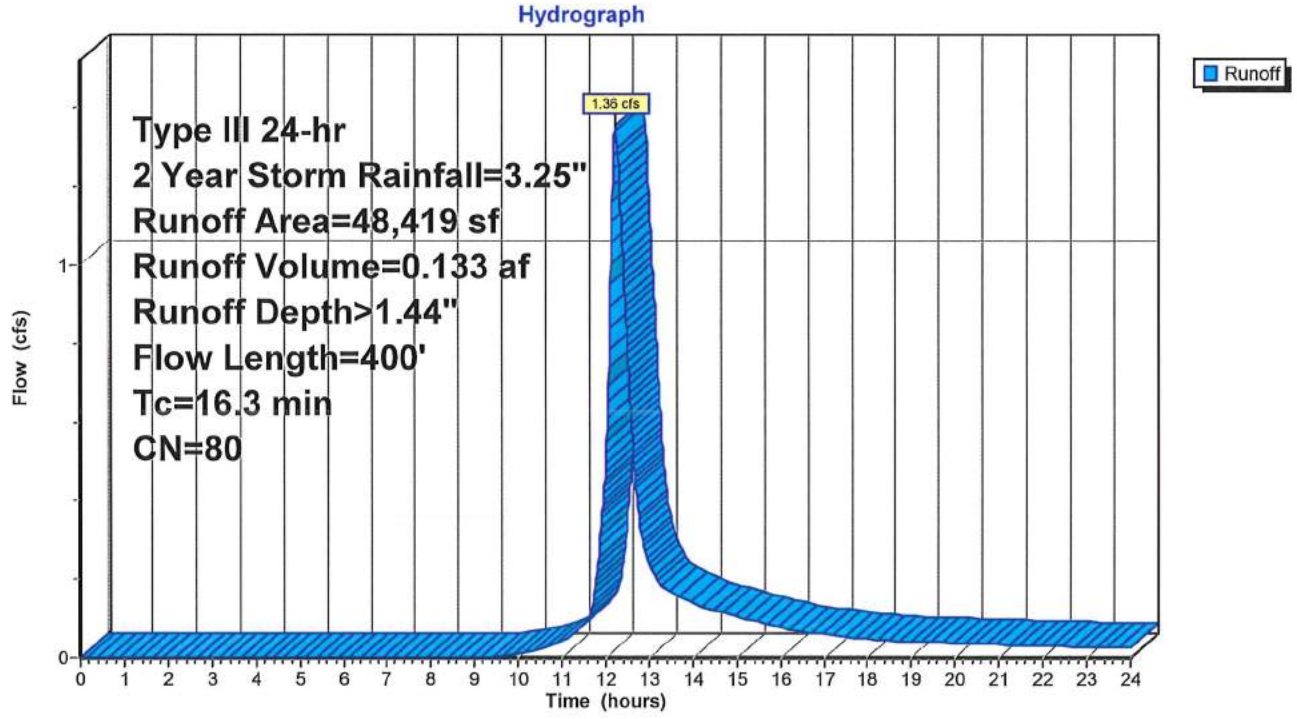
Runoff = 1.36 cfs @ 12.23 hrs, Volume= 0.133 af, Depth> 1.44"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Type III 24-hr 2 Year Storm Rainfall=3.25"

	Area (sf)	CN	Description
	45,079	79	Woods, Fair, HSG D
*	3,340	98	Driveway
	48,419	80	Weighted Average
	45,079		93.10% Pervious Area
	3,340		6.90% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
12.9	100	0.0722	0.13		**Sheet Flow, Sheet Flow** Woods: Light underbrush n= 0.400 P2= 3.17"
3.4	300	0.0884	1.49		**Shallow Concentrated Flow, Shallow C. Flow** Woodland Kv= 5.0 fps
16.3	400	Total			

Subcatchment 9S: Subcatchment 9S



Summary for Subcatchment 10S: Subcatchment 10S

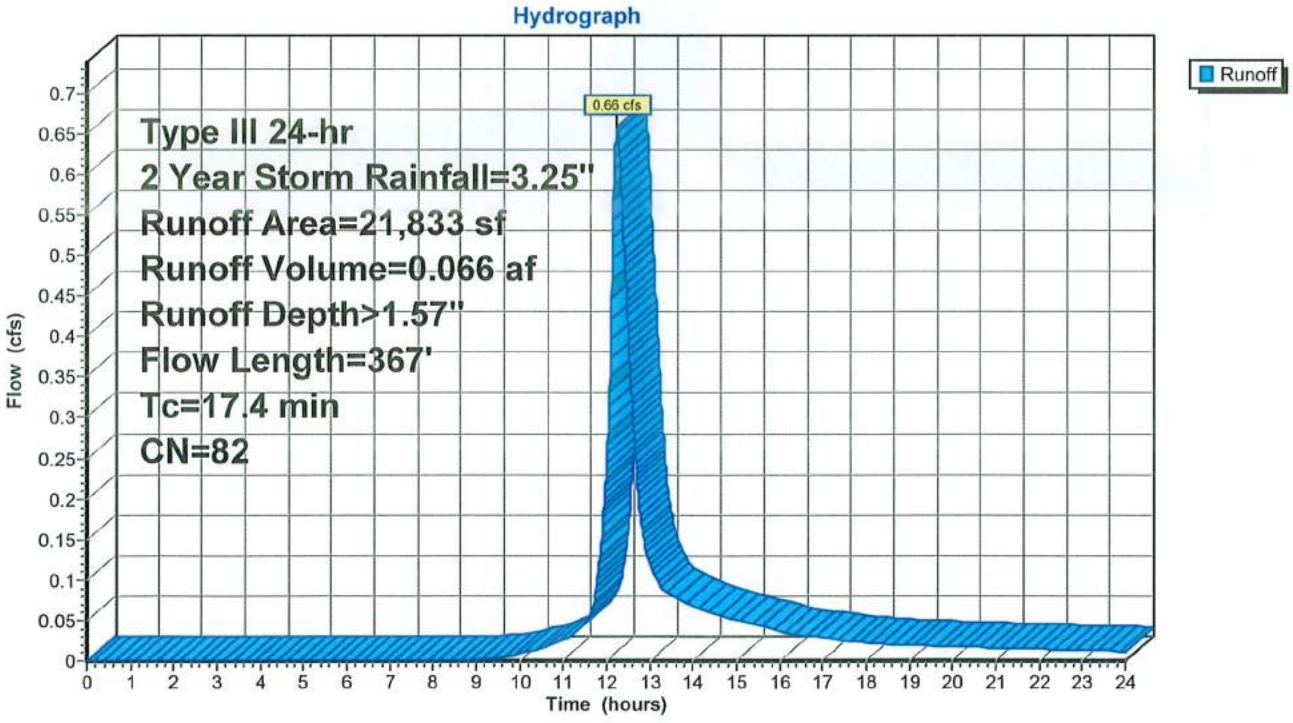
Runoff = 0.66 cfs @ 12.24 hrs, Volume= 0.066 af, Depth> 1.57"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Type III 24-hr 2 Year Storm Rainfall=3.25"

	Area (sf)	CN	Description
	18,639	79	Woods, Fair, HSG D
*	3,194	98	Driveway
	21,833	82	Weighted Average
	18,639		85.37% Pervious Area
	3,194		14.63% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
14.5	100	0.0541	0.12		**Sheet Flow, Sheet Flow** Woods: Light underbrush n= 0.400 P2= 3.17"
2.9	267	0.0974	1.56		**Shallow Concentrated Flow, Shallow C. Flow** Woodland Kv= 5.0 fps
17.4	367	Total			

Subcatchment 10S: Subcatchment 10S

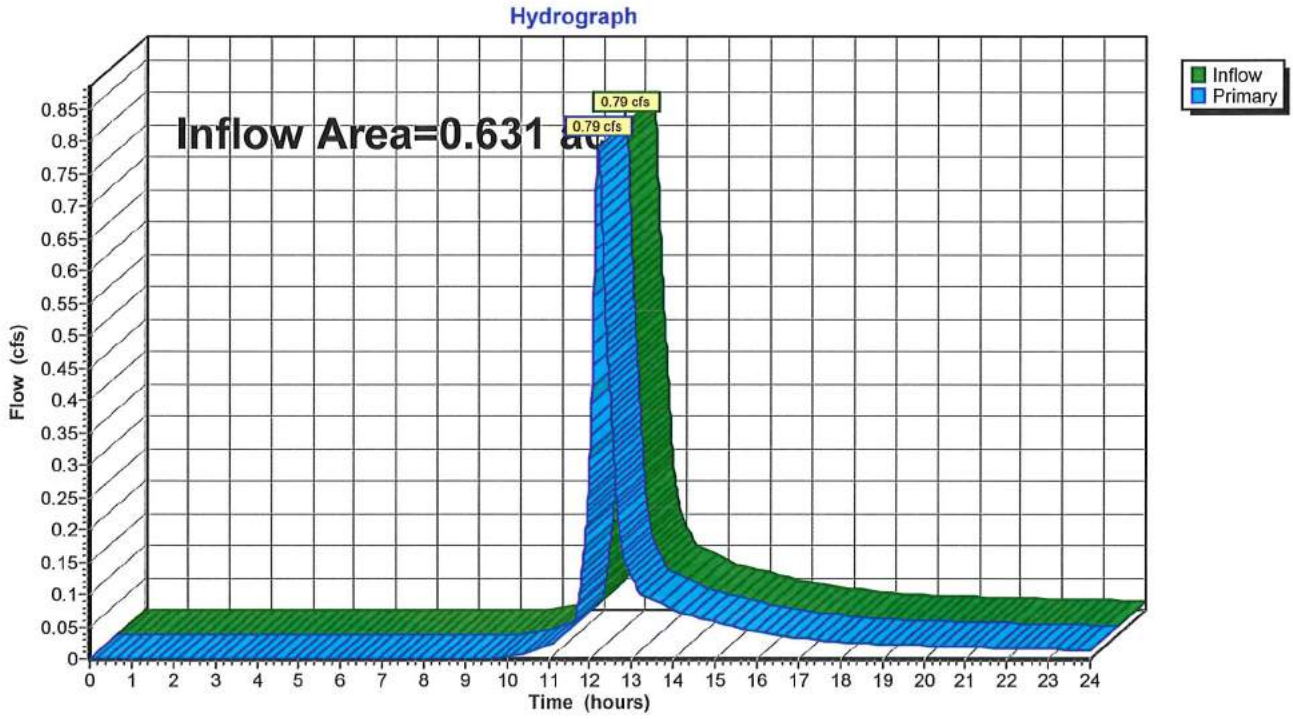


Summary for Pond 1P: Design Point 4 (Southern Property Line)

Inflow Area = 0.631 ac, 0.00% Impervious, Inflow Depth > 1.37" for 2 Year Storm event
Inflow = 0.79 cfs @ 12.19 hrs, Volume= 0.072 af
Primary = 0.79 cfs @ 12.19 hrs, Volume= 0.072 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs

Pond 1P: Design Point 4 (Southern Property Line)

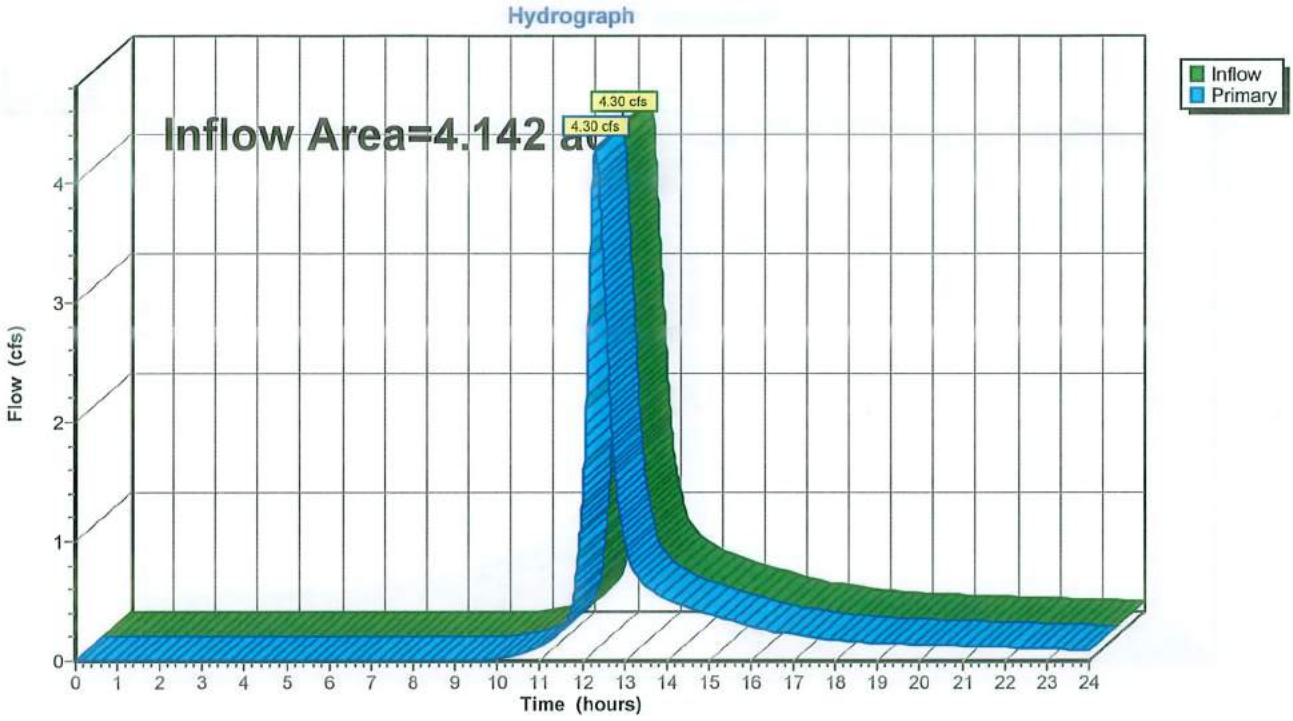


Summary for Pond 2P: Design Point 3 (Western Property Line)

Inflow Area = 4.142 ac, 0.00% Impervious, Inflow Depth > 1.37" for 2 Year Storm event
Inflow = 4.30 cfs @ 12.30 hrs, Volume= 0.472 af
Primary = 4.30 cfs @ 12.30 hrs, Volume= 0.472 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs

Pond 2P: Design Point 3 (Western Property Line)

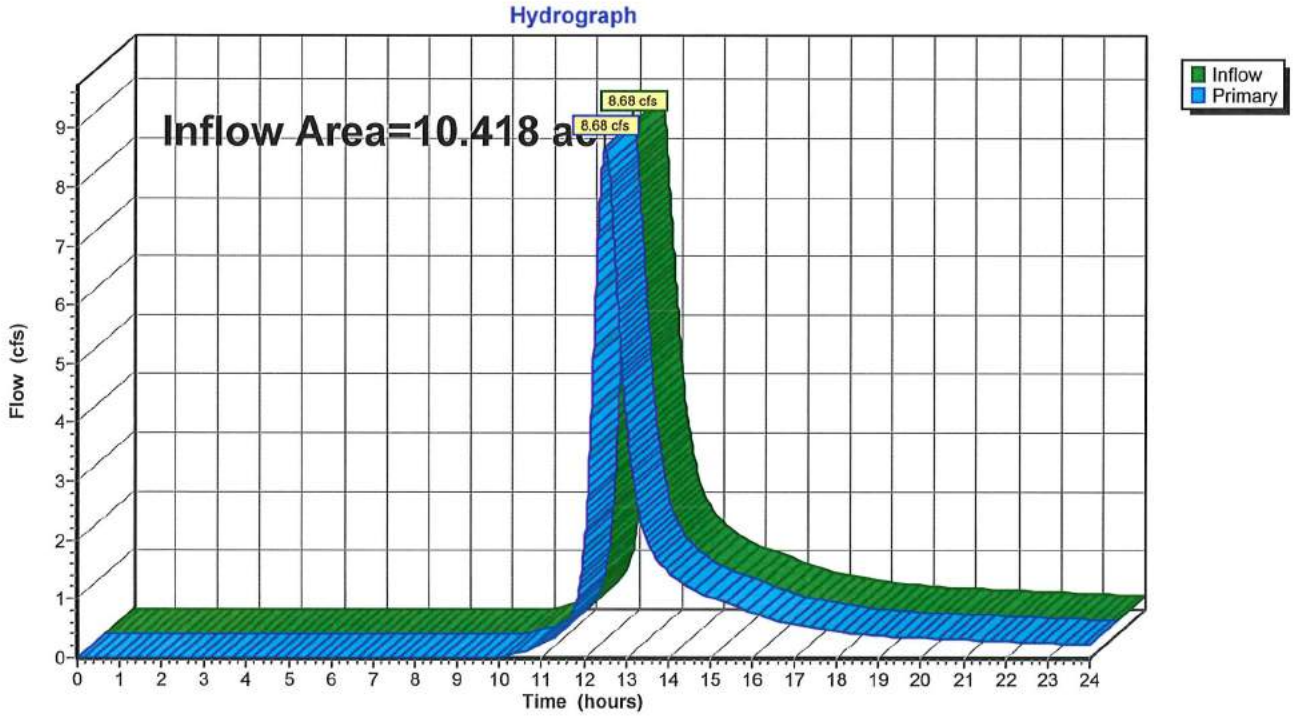


Summary for Pond 3P: Design Point 2 (Stream)

Inflow Area = 10.418 ac, 0.00% Impervious, Inflow Depth > 1.36" for 2 Year Storm event
Inflow = 8.68 cfs @ 12.52 hrs, Volume= 1.183 af
Primary = 8.68 cfs @ 12.52 hrs, Volume= 1.183 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs

Pond 3P: Design Point 2 (Stream)

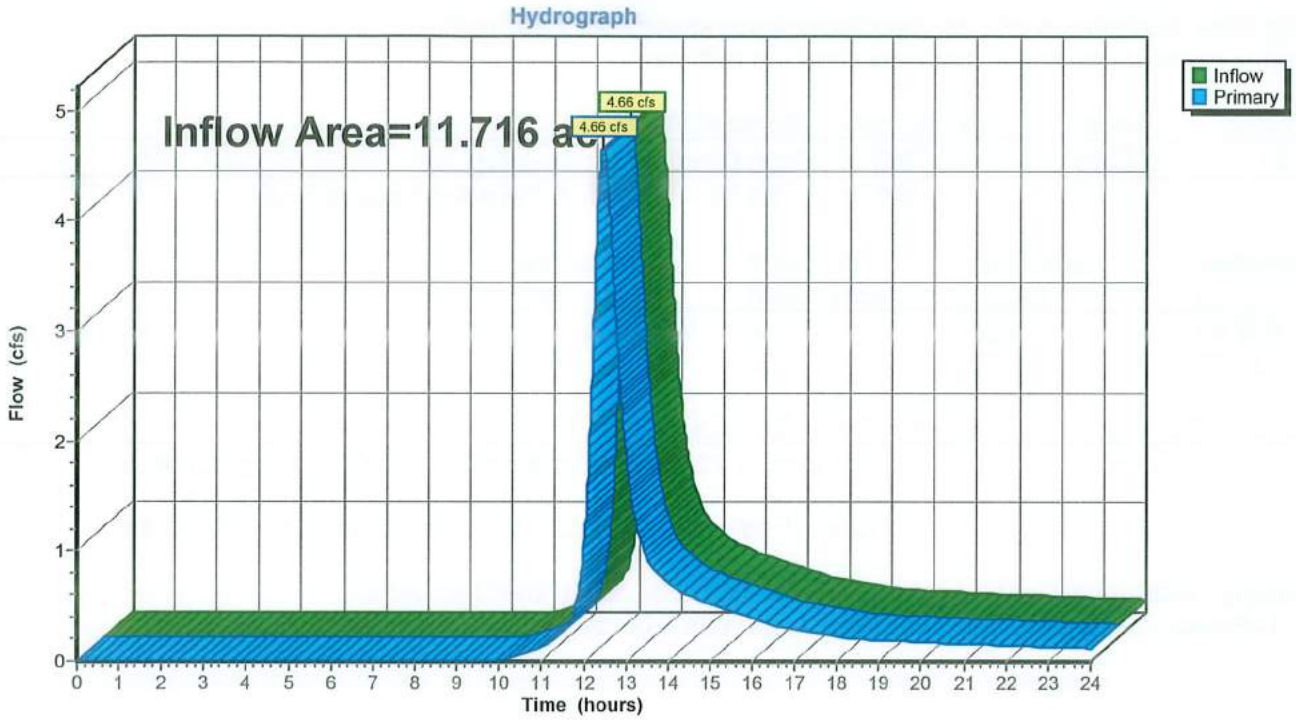


Summary for Pond 4P: Design Point 1 (Ditch)

Inflow Area = 11.716 ac, 5.10% Impervious, Inflow Depth > 0.62" for 2 Year Storm event
Inflow = 4.66 cfs @ 12.46 hrs, Volume= 0.605 af
Primary = 4.66 cfs @ 12.46 hrs, Volume= 0.605 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs

Pond 4P: Design Point 1 (Ditch)



Summary for Pond 5P: Rain Gardens

Inflow Area = 1.120 ac, 3.24% Impervious, Inflow Depth > 1.44" for 2 Year Storm event
Inflow = 1.85 cfs @ 12.10 hrs, Volume= 0.134 af
Outflow = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af, Atten= 100%, Lag= 0.0 min
Primary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Peak Elev= 635.82' @ 24.00 hrs Surf.Area= 18,000 sf Storage= 5,847 cf

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

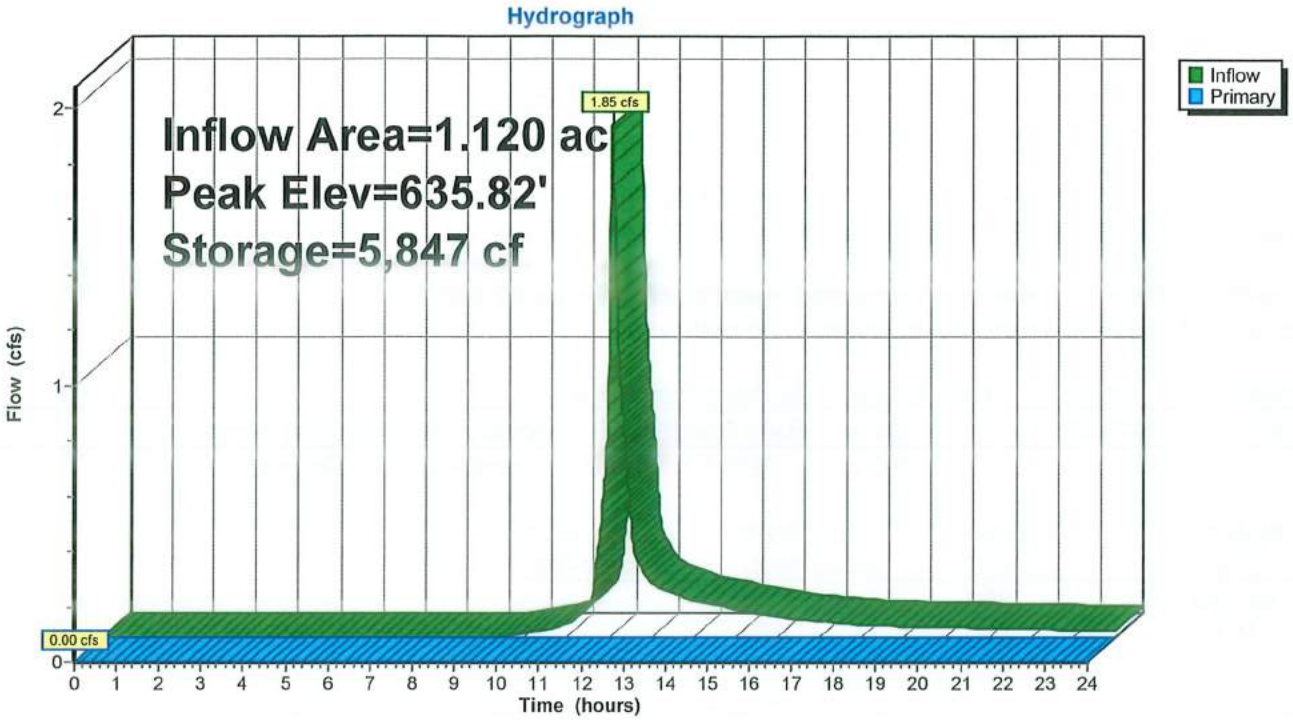
Volume	Invert	Avail.Storage	Storage Description
#1	635.50'	300 cf	**Rain Gradens (Prismatic)** Listed below (Recalc) x 2
		300 cf	x 30.00 = 9,000 cf Total Available Storage

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
635.50	300	0	0
636.00	300	150	150

Device	Routing	Invert	Outlet Devices
#1	Primary	635.90'	**1.0' long x 12.0' 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) 2.57 2.62 2.70 2.67 2.66 2.67 2.66 2.64

Primary OutFlow Max=0.00 cfs @ 0.00 hrs HW=635.50' (Free Discharge)
↑—**1=Broad-Crested Rectangular Weir** (Controls 0.00 cfs)

Pond 5P: Rain Gardens



Summary for Pond 6P: Rain Gardens

Inflow Area = 1.009 ac, 9.85% Impervious, Inflow Depth > 1.51" for 2 Year Storm event
Inflow = 1.61 cfs @ 12.13 hrs, Volume= 0.127 af
Outflow = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af, Atten= 100%, Lag= 0.0 min
Primary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Peak Elev= 647.81' @ 24.00 hrs Surf.Area= 18,000 sf Storage= 5,514 cf

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

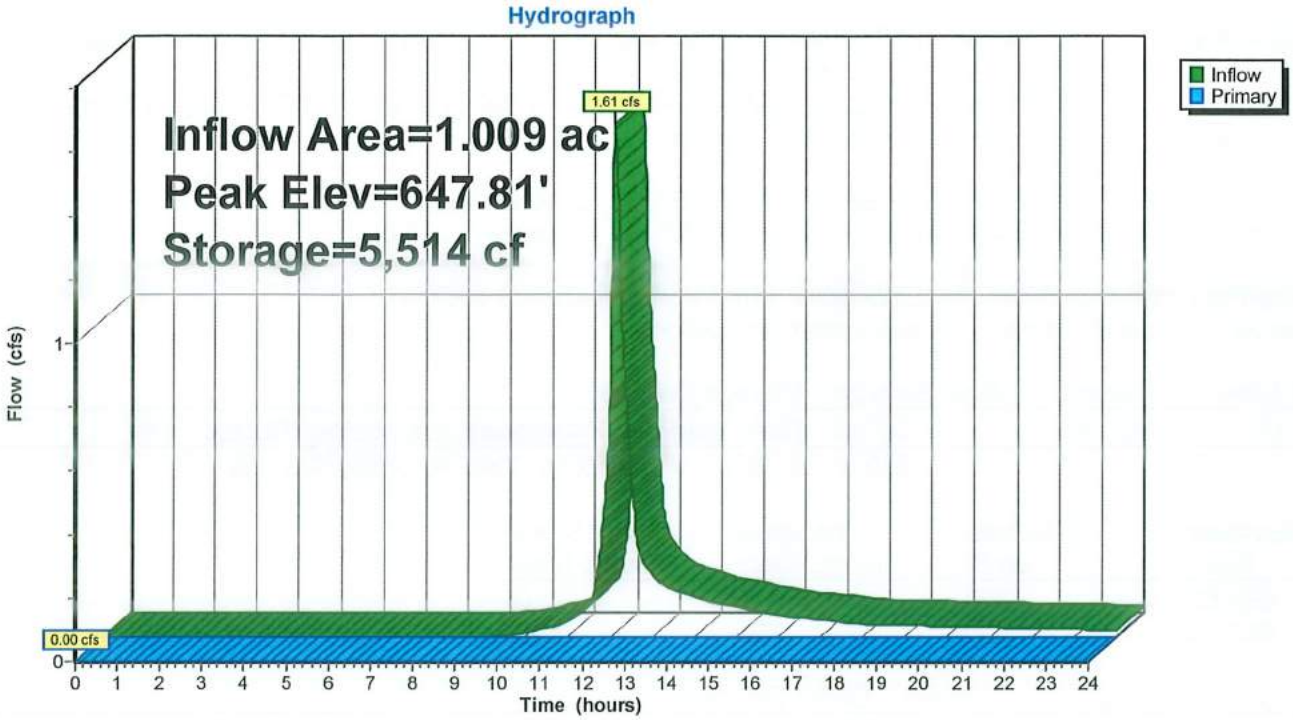
Volume	Invert	Avail.Storage	Storage Description
#1	647.50'	300 cf	**Rain Gradens (Prismatic)** Listed below (Recalc) x 2
		300 cf	x 30.00 = 9,000 cf Total Available Storage

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
647.50	300	0	0
648.00	300	150	150

Device	Routing	Invert	Outlet Devices
#1	Primary	647.90'	**1.0' long x 12.0' 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) 2.57 2.62 2.70 2.67 2.66 2.67 2.66 2.64

Primary OutFlow Max=0.00 cfs @ 0.00 hrs HW=647.50' (Free Discharge)
1=Broad-Crested Rectangular Weir (Controls 0.00 cfs)

Pond 6P: Rain Gardens



Summary for Pond 7P: Rain Gardens

Inflow Area = 1.345 ac, 10.61% Impervious, Inflow Depth > 1.50" for 2 Year Storm event
Inflow = 1.71 cfs @ 12.23 hrs, Volume= 0.168 af
Outflow = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af, Atten= 100%, Lag= 0.0 min
Primary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Peak Elev= 661.70' @ 24.00 hrs Surf.Area= 36,000 sf Storage= 7,338 cf

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

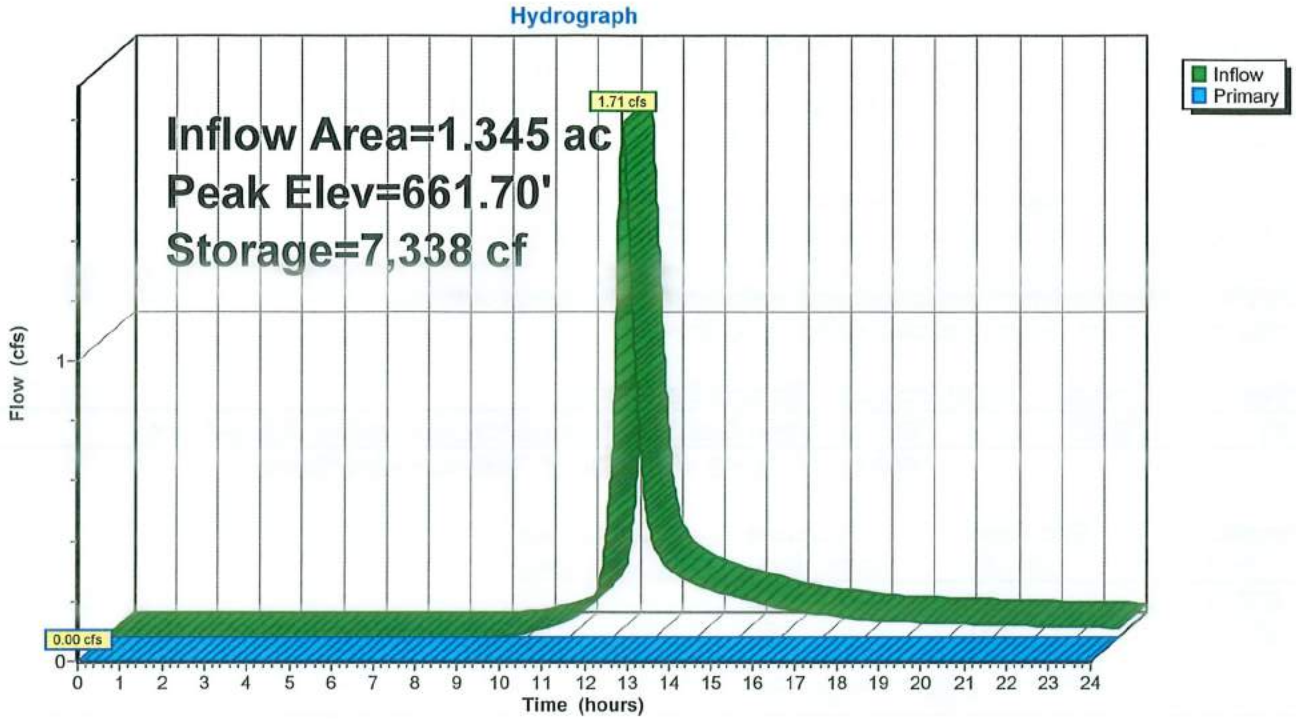
Volume	Invert	Avail.Storage	Storage Description
#1	661.50'	600 cf	**Rain Gradens (Prismatic)** Listed below (Recalc) x 4
		600 cf	x 30.00 = 18,000 cf Total Available Storage

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
661.50	300	0	0
662.00	300	150	150

Device	Routing	Invert	Outlet Devices
#1	Primary	661.90'	**1.0' long x 12.0' 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) 2.57 2.62 2.70 2.67 2.66 2.67 2.66 2.64

Primary OutFlow Max=0.00 cfs @ 0.00 hrs HW=661.50' (Free Discharge)
↑**1=Broad-Crested Rectangular Weir** (Controls 0.00 cfs)

Pond 7P: Rain Gardens



Summary for Pond 8P: Rain Gardens

Inflow Area = 1.310 ac, 12.92% Impervious, Inflow Depth > 1.50" for 2 Year Storm event
Inflow = 1.60 cfs @ 12.27 hrs, Volume= 0.164 af
Outflow = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af, Atten= 100%, Lag= 0.0 min
Primary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Peak Elev= 672.70' @ 24.00 hrs Surf.Area= 36,000 sf Storage= 7,144 cf

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

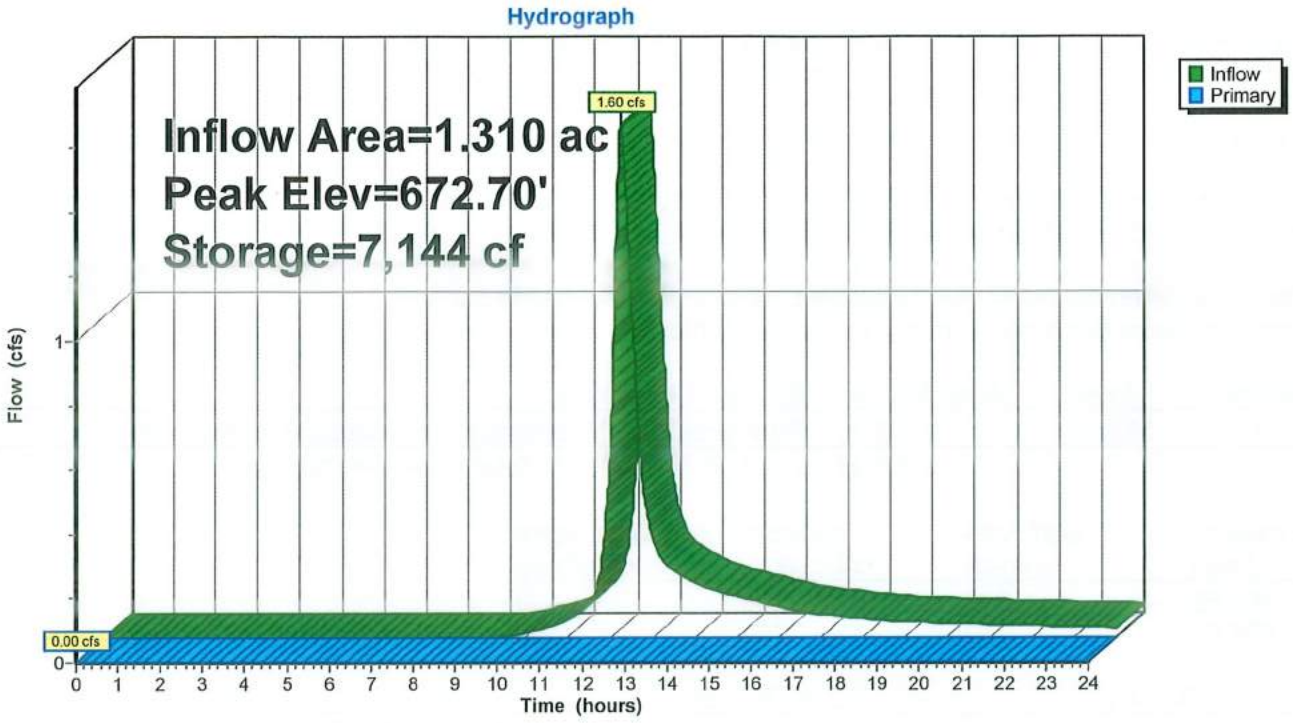
Volume	Invert	Avail.Storage	Storage Description
#1	672.50'	600 cf	**Rain Gradens (Prismatic)** Listed below (Recalc) x 4
		600 cf	x 30.00 = 18,000 cf Total Available Storage

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
672.50	300	0	0
673.00	300	150	150

Device	Routing	Invert	Outlet Devices
#1	Primary	672.90'	**1.0' long x 12.0' 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) 2.57 2.62 2.70 2.67 2.66 2.67 2.66 2.64

Primary OutFlow Max=0.00 cfs @ 0.00 hrs HW=672.50' (Free Discharge)
↑—**1=Broad-Crested Rectangular Weir** (Controls 0.00 cfs)

Pond 8P: Rain Gardens



Summary for Pond 9P: Rain Gardens

Inflow Area = 1.112 ac, 6.90% Impervious, Inflow Depth > 1.44" for 2 Year Storm event
Inflow = 1.36 cfs @ 12.23 hrs, Volume= 0.133 af
Outflow = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af, Atten= 100%, Lag= 0.0 min
Primary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Peak Elev= 663.82' @ 24.00 hrs Surf.Area= 18,000 sf Storage= 5,790 cf

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

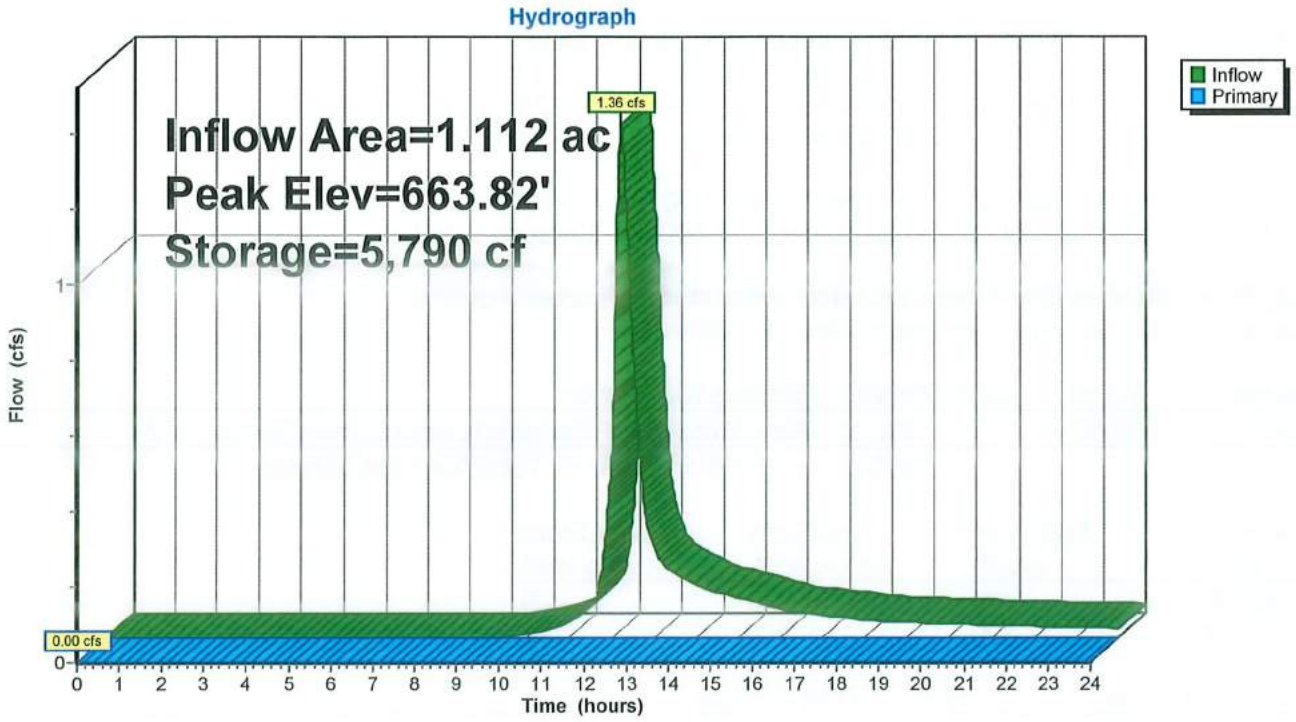
Volume	Invert	Avail.Storage	Storage Description
#1	663.50'	300 cf	**Rain Gradens (Prismatic)** Listed below (Recalc) x 2
		300 cf	x 30.00 = 9,000 cf Total Available Storage

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
663.50	300	0	0
664.00	300	150	150

Device	Routing	Invert	Outlet Devices
#1	Primary	663.90'	**1.0' long x 12.0' 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) 2.57 2.62 2.70 2.67 2.66 2.67 2.66 2.64

Primary OutFlow Max=0.00 cfs @ 0.00 hrs HW=663.50' (Free Discharge)
↑—**1=Broad-Crested Rectangular Weir** (Controls 0.00 cfs)

Pond 9P: Rain Gardens



Summary for Pond 10P: Rain Gardens

Inflow Area = 0.501 ac, 14.63% Impervious, Inflow Depth > 1.57" for 2 Year Storm event
Inflow = 0.66 cfs @ 12.24 hrs, Volume= 0.066 af
Outflow = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af, Atten= 100%, Lag= 0.0 min
Primary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Peak Elev= 665.66' @ 24.00 hrs Surf.Area= 18,000 sf Storage= 2,861 cf

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

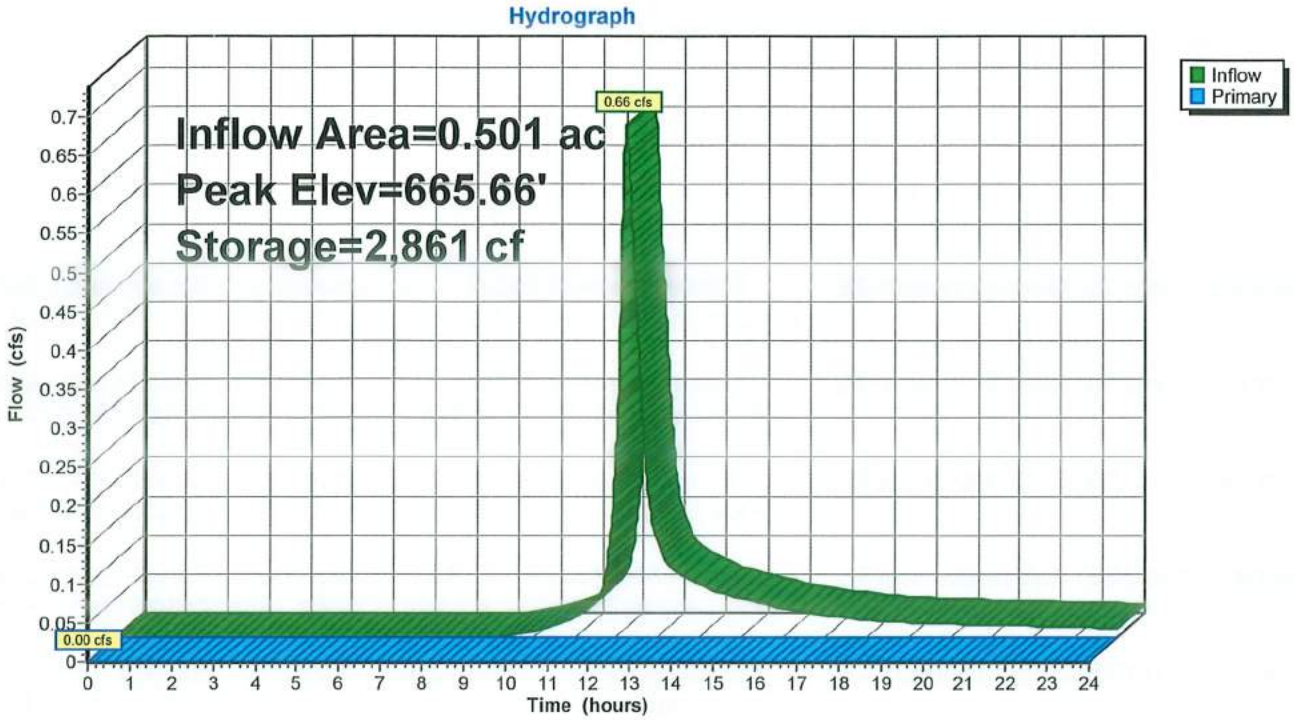
Volume	Invert	Avail.Storage	Storage Description
#1	665.50'	300 cf	**Rain Gradens (Prismatic)** Listed below (Recalc) x 2
		300 cf	x 30.00 = 9,000 cf Total Available Storage

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
665.50	300	0	0
666.00	300	150	150

Device	Routing	Invert	Outlet Devices
#1	Primary	665.90'	**1.0' long x 12.0' 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) 2.57 2.62 2.70 2.67 2.66 2.67 2.66 2.64

Primary OutFlow Max=0.00 cfs @ 0.00 hrs HW=665.50' (Free Discharge)
1=Broad-Crested Rectangular Weir (Controls 0.00 cfs)

Pond 10P: Rain Gardens



Time span=0.00-24.00 hrs, dt=0.01 hrs, 2401 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Subcatchment 1S: Subcatchment 4S Runoff Area=27,500 sf 0.00% Impervious Runoff Depth>2.67"
Flow Length=267' Tc=13.4 min CN=79 Runoff=1.56 cfs 0.140 af

Subcatchment 2S: Subcatchment 3S Runoff Area=180,441 sf 0.00% Impervious Runoff Depth>2.66"
Flow Length=494' Tc=21.4 min CN=79 Runoff=8.52 cfs 0.919 af

Subcatchment 3S: Subcatchment 2S Runoff Area=453,810 sf 0.00% Impervious Runoff Depth>2.65"
Flow Length=1,375' Tc=35.1 min CN=79 Runoff=17.13 cfs 2.303 af

Subcatchment 4S: Subcatchment 1S Runoff Area=48,777 sf 3.24% Impervious Runoff Depth>2.76"
Flow Length=483' Tc=6.3 min CN=80 Runoff=3.59 cfs 0.257 af

Subcatchment 5S: Subcatchment 5S Runoff Area=43,949 sf 9.85% Impervious Runoff Depth>2.85"
Flow Length=417' Tc=8.8 min CN=81 Runoff=3.06 cfs 0.239 af

Subcatchment 6S: Subcatchment 6S Runoff Area=58,597 sf 10.61% Impervious Runoff Depth>2.84"
Flow Length=357' Tc=16.8 min CN=81 Runoff=3.26 cfs 0.319 af

Subcatchment 7S: Subcatchment 7S Runoff Area=57,071 sf 12.92% Impervious Runoff Depth>2.84"
Flow Length=282' Tc=18.5 min CN=81 Runoff=3.05 cfs 0.310 af

Subcatchment 8S: Subcatchment 8S Runoff Area=231,694 sf 0.00% Impervious Runoff Depth>2.66"
Flow Length=818' Tc=31.5 min CN=79 Runoff=9.22 cfs 1.177 af

Subcatchment 9S: Subcatchment 9S Runoff Area=48,419 sf 6.90% Impervious Runoff Depth>2.75"
Flow Length=400' Tc=16.3 min CN=80 Runoff=2.64 cfs 0.255 af

Subcatchment 10S: Subcatchment 10S Runoff Area=21,833 sf 14.63% Impervious Runoff Depth>2.94"
Flow Length=367' Tc=17.4 min CN=82 Runoff=1.24 cfs 0.123 af

Pond 1P: Design Point 4 (Southern Property Line) Inflow=1.56 cfs 0.140 af
Primary=1.56 cfs 0.140 af

Pond 2P: Design Point 3 (Western Property Line) Inflow=8.52 cfs 0.919 af
Primary=8.52 cfs 0.919 af

Pond 3P: Design Point 2 (Stream) Inflow=17.13 cfs 2.303 af
Primary=17.13 cfs 2.303 af

Pond 4P: Design Point 1 (Ditch) Inflow=9.22 cfs 1.334 af
Primary=9.22 cfs 1.334 af

Pond 5P: Rain Gardens Peak Elev=636.02' Storage=9,000 cf Inflow=3.59 cfs 0.257 af
Outflow=0.11 cfs 0.058 af

Pond 6P: Rain Gardens Peak Elev=647.98' Storage=8,714 cf Inflow=3.06 cfs 0.239 af
Outflow=0.06 cfs 0.043 af

Pond 7P: Rain Gardens Peak Elev=661.89' Storage=13,885 cf Inflow=3.26 cfs 0.319 af
Outflow=0.00 cfs 0.000 af

Pond 8P: Rain Gardens Peak Elev=672.88' Storage=13,519 cf Inflow=3.05 cfs 0.310 af
Outflow=0.00 cfs 0.000 af

Pond 9P: Rain Gardens Peak Elev=664.00' Storage=8,983 cf Inflow=2.64 cfs 0.255 af
Outflow=0.08 cfs 0.056 af

Pond 10P: Rain Gardens Peak Elev=665.80' Storage=5,340 cf Inflow=1.24 cfs 0.123 af
Outflow=0.00 cfs 0.000 af

Total Runoff Area = 26.908 ac Runoff Volume = 6.043 af Average Runoff Depth = 2.70"
97.78% Pervious = 26.310 ac 2.22% Impervious = 0.598 ac

Summary for Subcatchment 1S: Subcatchment 4S

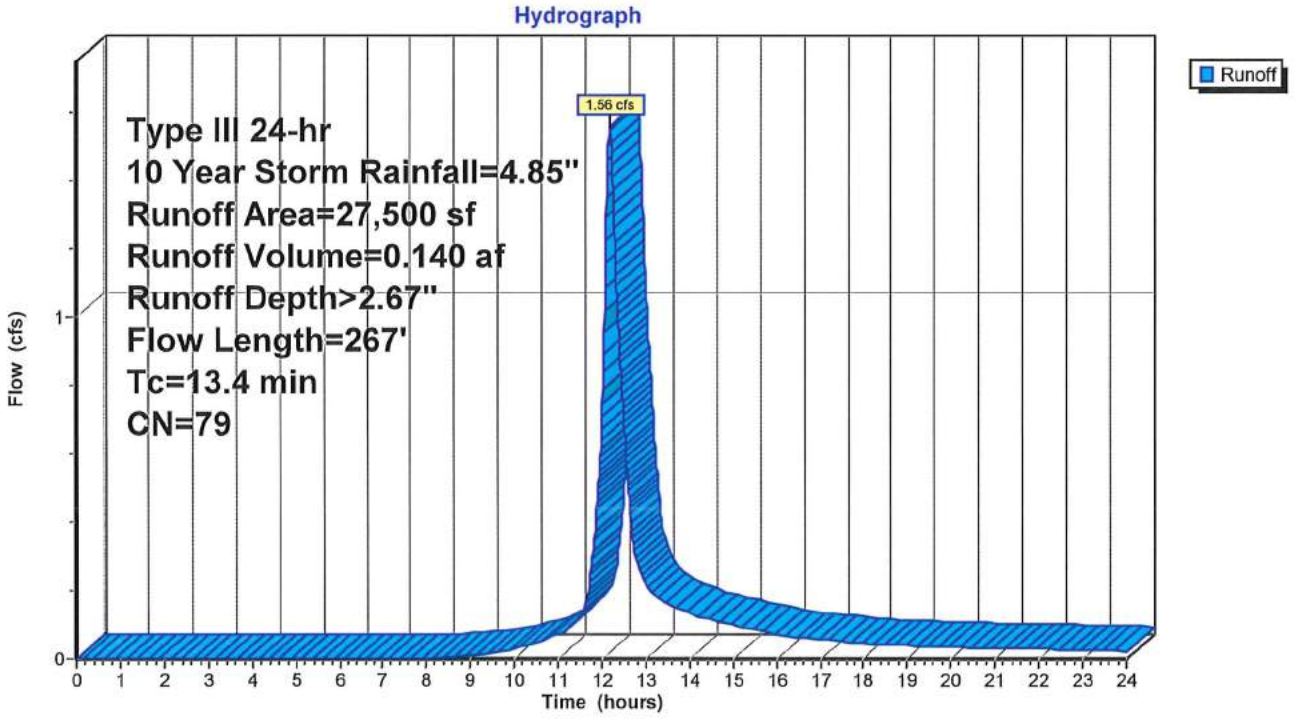
Runoff = 1.56 cfs @ 12.19 hrs, Volume= 0.140 af, Depth> 2.67"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Type III 24-hr 10 Year Storm Rainfall=4.85"

Area (sf)	CN	Description
27,500	79	Woods, Fair, HSG D
27,500		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
11.0	100	0.1069	0.15		**Sheet Flow, Sheet Flow** Woods: Light underbrush n= 0.400 P2= 3.17"
2.4	167	0.0531	1.15		**Shallow Concentrated Flow, Shallow C flow** Woodland Kv= 5.0 fps
13.4	267	Total			

Subcatchment 1S: Subcatchment 4S



Summary for Subcatchment 2S: Subcatchment 3S

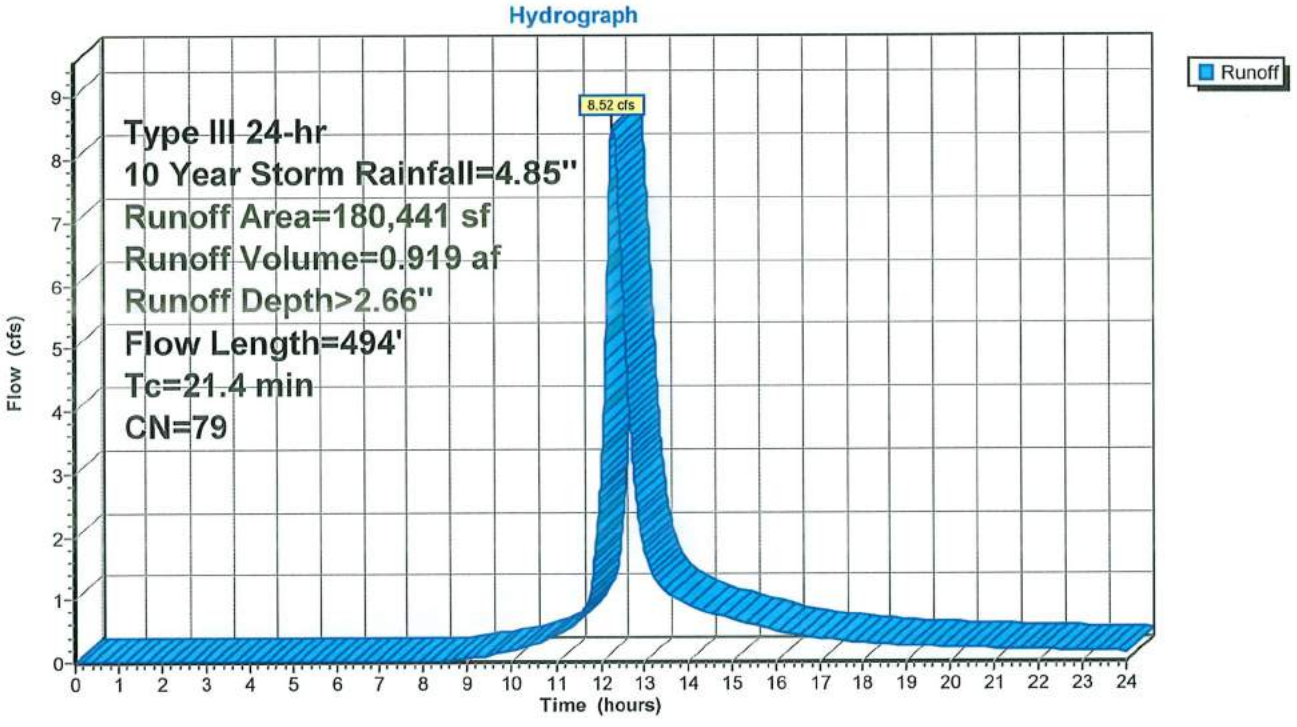
Runoff = 8.52 cfs @ 12.29 hrs, Volume= 0.919 af, Depth> 2.66"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Type III 24-hr 10 Year Storm Rainfall=4.85"

Area (sf)	CN	Description
180,441	79	Woods, Fair, HSG D
180,441		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
17.0	100	0.0361	0.10		**Sheet Flow, Sheet Flow** Woods: Light underbrush n= 0.400 P2= 3.17"
4.4	394	0.0890	1.49		**Shallow Concentrated Flow, Shallow C Flow** Woodland Kv= 5.0 fps
21.4	494	Total			

Subcatchment 2S: Subcatchment 3S



Summary for Subcatchment 9S: Subcatchment 9S

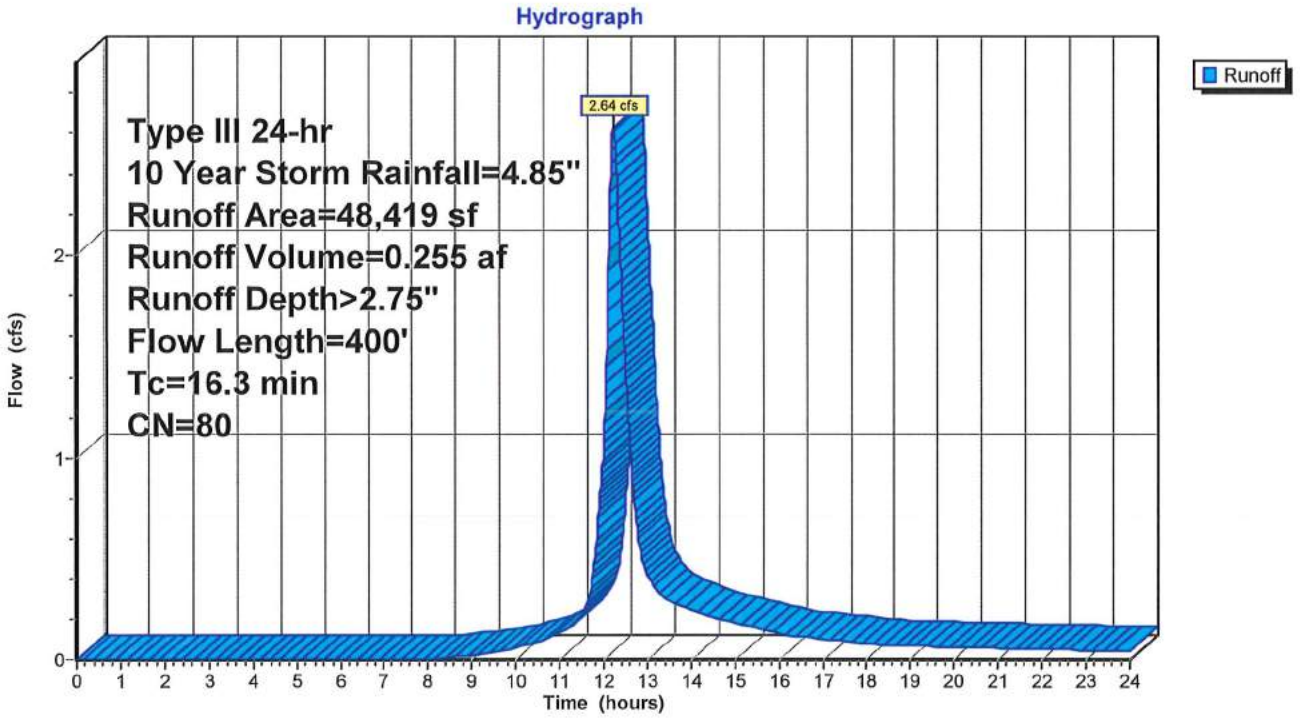
Runoff = 2.64 cfs @ 12.22 hrs, Volume= 0.255 af, Depth> 2.75"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Type III 24-hr 10 Year Storm Rainfall=4.85"

	Area (sf)	CN	Description
	45,079	79	Woods, Fair, HSG D
*	3,340	98	Driveway
	48,419	80	Weighted Average
	45,079		93.10% Pervious Area
	3,340		6.90% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
12.9	100	0.0722	0.13		**Sheet Flow, Sheet Flow** Woods: Light underbrush n= 0.400 P2= 3.17"
3.4	300	0.0884	1.49		**Shallow Concentrated Flow, Shallow C. Flow** Woodland Kv= 5.0 fps
16.3	400	Total			

Subcatchment 9S: Subcatchment 9S



Summary for Subcatchment 10S: Subcatchment 10S

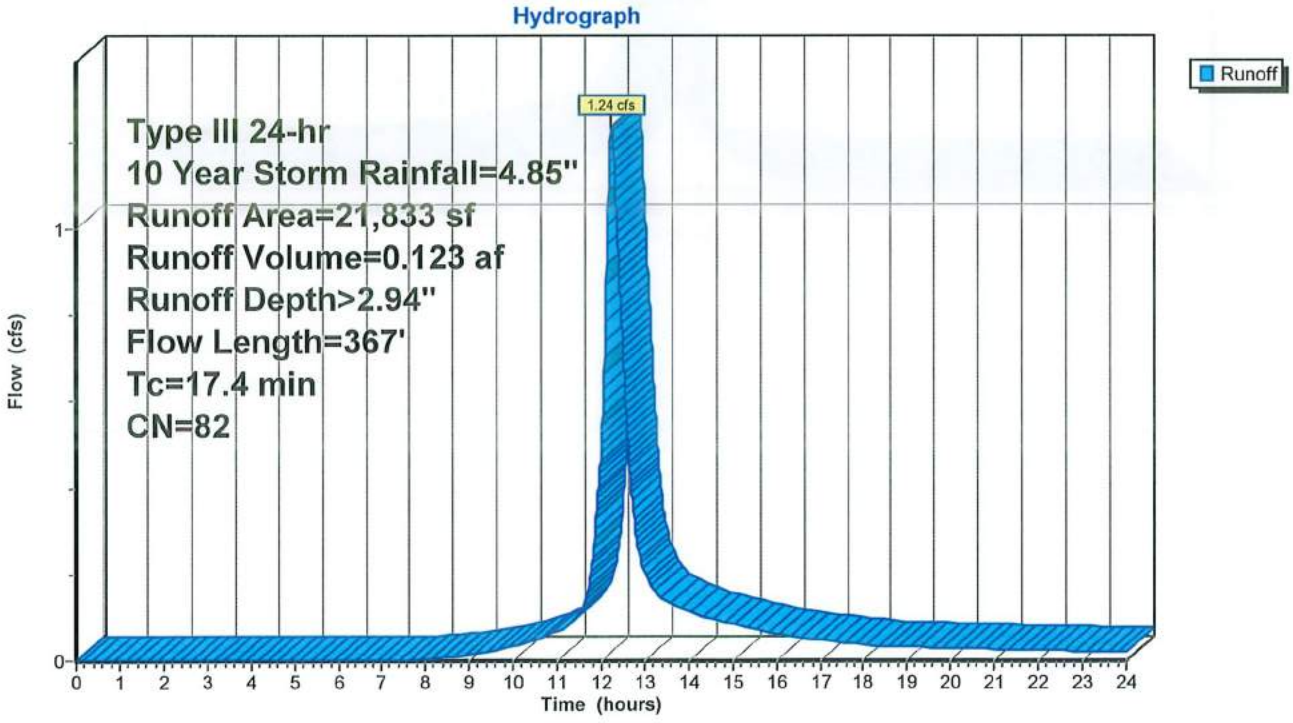
Runoff = 1.24 cfs @ 12.24 hrs, Volume= 0.123 af, Depth> 2.94"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Type III 24-hr 10 Year Storm Rainfall=4.85"

	Area (sf)	CN	Description
	18,639	79	Woods, Fair, HSG D
*	3,194	98	Driveway
	21,833	82	Weighted Average
	18,639		85.37% Pervious Area
	3,194		14.63% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
14.5	100	0.0541	0.12		**Sheet Flow, Sheet Flow** Woods: Light underbrush n= 0.400 P2= 3.17"
2.9	267	0.0974	1.56		**Shallow Concentrated Flow, Shallow C. Flow** Woodland Kv= 5.0 fps
17.4	367	Total			

Subcatchment 10S: Subcatchment 10S

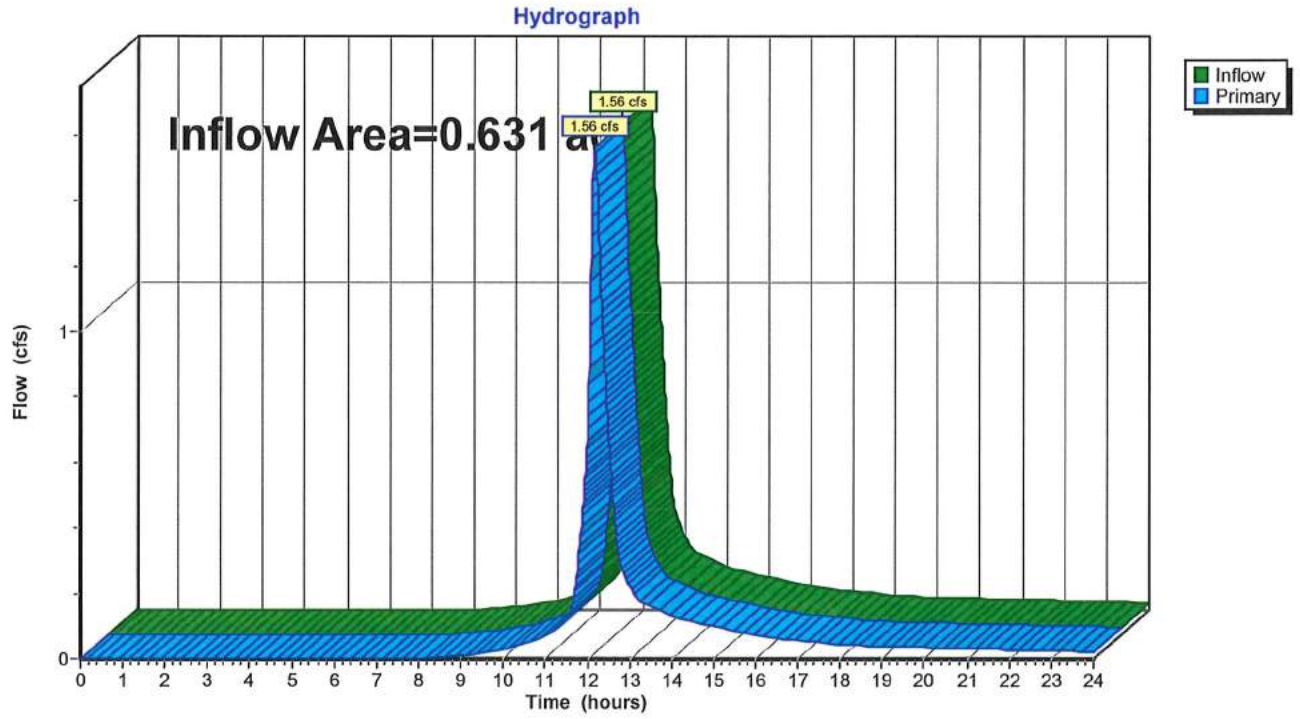


Summary for Pond 1P: Design Point 4 (Southern Property Line)

Inflow Area = 0.631 ac, 0.00% Impervious, Inflow Depth > 2.67" for 10 Year Storm event
Inflow = 1.56 cfs @ 12.19 hrs, Volume= 0.140 af
Primary = 1.56 cfs @ 12.19 hrs, Volume= 0.140 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs

Pond 1P: Design Point 4 (Southern Property Line)

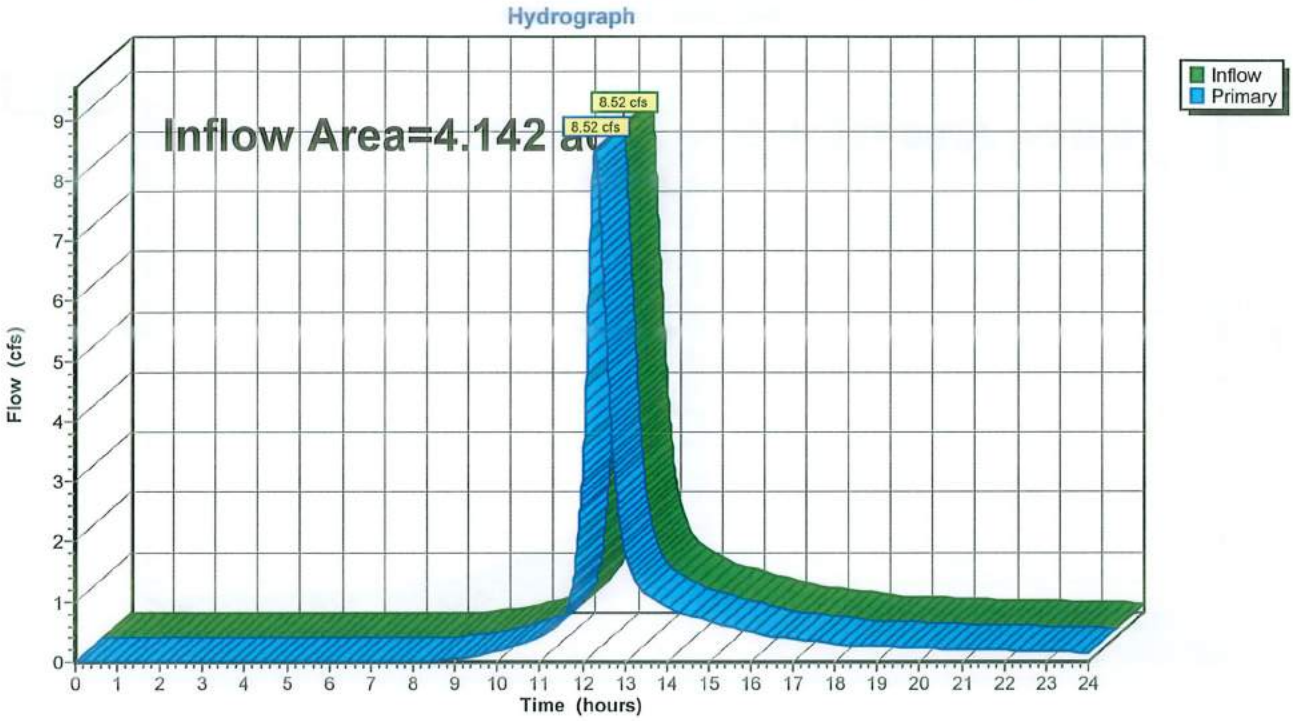


Summary for Pond 2P: Design Point 3 (Western Property Line)

Inflow Area = 4.142 ac, 0.00% Impervious, Inflow Depth > 2.66" for 10 Year Storm event
Inflow = 8.52 cfs @ 12.29 hrs, Volume= 0.919 af
Primary = 8.52 cfs @ 12.29 hrs, Volume= 0.919 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs

Pond 2P: Design Point 3 (Western Property Line)

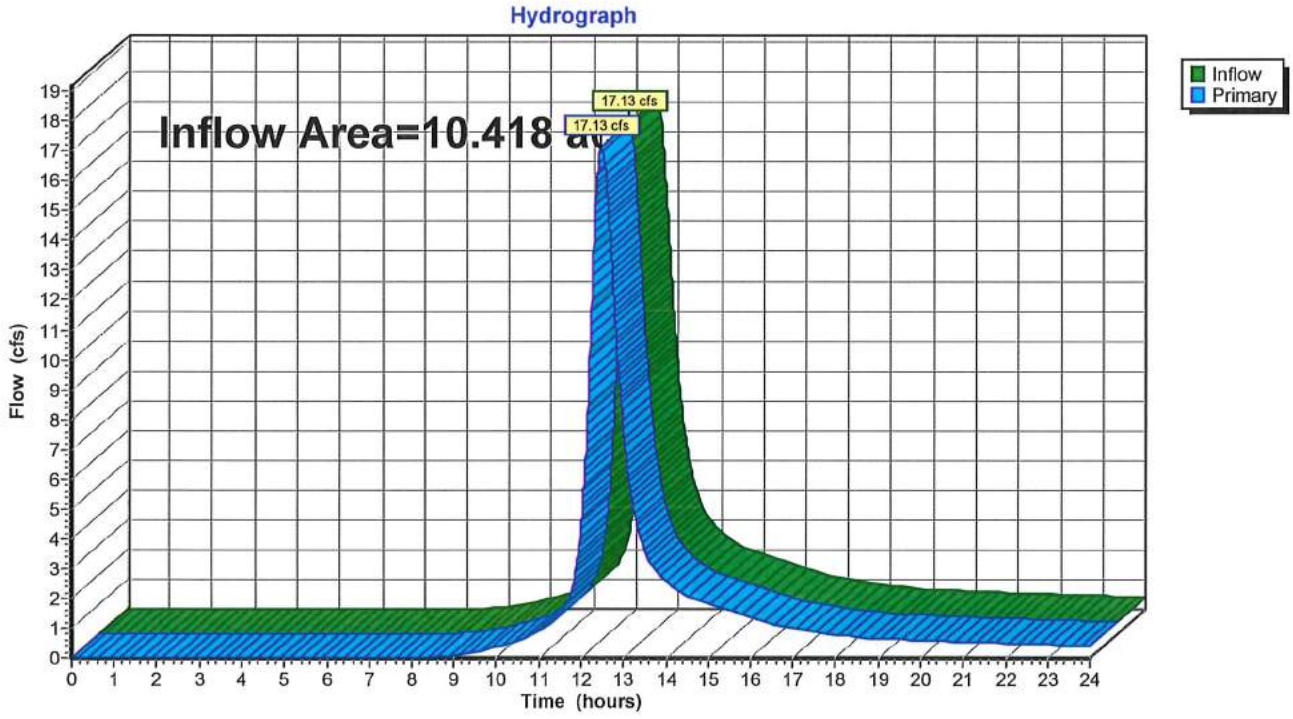


Summary for Pond 3P: Design Point 2 (Stream)

Inflow Area = 10.418 ac, 0.00% Impervious, Inflow Depth > 2.65" for 10 Year Storm event
Inflow = 17.13 cfs @ 12.48 hrs, Volume= 2.303 af
Primary = 17.13 cfs @ 12.48 hrs, Volume= 2.303 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs

Pond 3P: Design Point 2 (Stream)

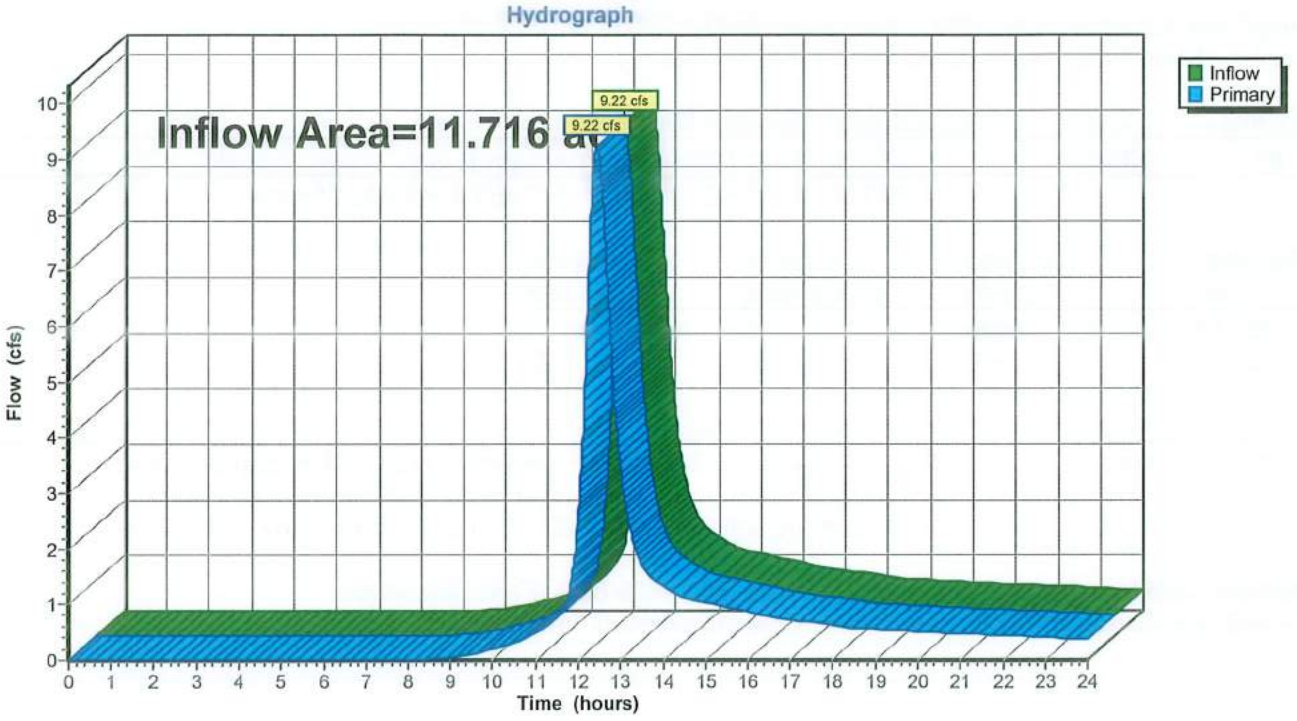


Summary for Pond 4P: Design Point 1 (Ditch)

Inflow Area = 11.716 ac, 5.10% Impervious, Inflow Depth > 1.37" for 10 Year Storm event
Inflow = 9.22 cfs @ 12.43 hrs, Volume= 1.334 af
Primary = 9.22 cfs @ 12.43 hrs, Volume= 1.334 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs

Pond 4P: Design Point 1 (Ditch)



Summary for Pond 5P: Rain Gardens

Inflow Area = 1.120 ac, 3.24% Impervious, Inflow Depth > 2.76" for 10 Year Storm event
Inflow = 3.59 cfs @ 12.09 hrs, Volume= 0.257 af
Outflow = 0.11 cfs @ 17.19 hrs, Volume= 0.058 af, Atten= 97%, Lag= 305.9 min
Primary = 0.11 cfs @ 17.19 hrs, Volume= 0.058 af

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Peak Elev= 636.02' @ 17.19 hrs Surf.Area= 18,000 sf Storage= 9,000 cf

Plug-Flow detention time= 462.1 min calculated for 0.058 af (23% of inflow)
Center-of-Mass det. time= 321.2 min (1,143.9 - 822.6)

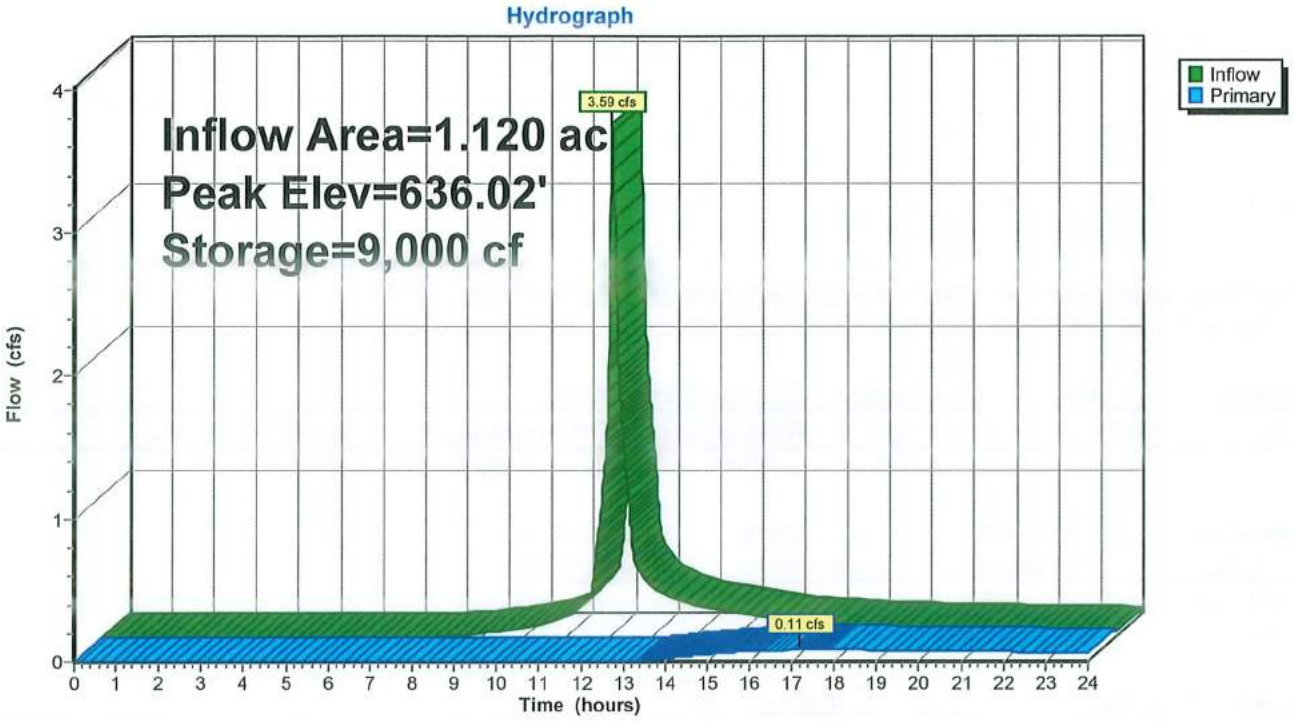
Volume	Invert	Avail.Storage	Storage Description
#1	635.50'	300 cf	**Rain Gradens (Prismatic)** Listed below (Recalc) x 2
		300 cf	x 30.00 = 9,000 cf Total Available Storage

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
635.50	300	0	0
636.00	300	150	150

Device	Routing	Invert	Outlet Devices
#1	Primary	635.90'	**1.0' long x 12.0' 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) 2.57 2.62 2.70 2.67 2.66 2.67 2.66 2.64

Primary OutFlow Max=0.11 cfs @ 17.19 hrs HW=636.02' (Free Discharge)
↑—**1=Broad-Crested Rectangular Weir** (Weir Controls 0.11 cfs @ 0.89 fps)

Pond 5P: Rain Gardens



Summary for Pond 6P: Rain Gardens

Inflow Area = 1.009 ac, 9.85% Impervious, Inflow Depth > 2.85" for 10 Year Storm event
Inflow = 3.06 cfs @ 12.12 hrs, Volume= 0.239 af
Outflow = 0.06 cfs @ 19.03 hrs, Volume= 0.043 af, Atten= 98%, Lag= 414.6 min
Primary = 0.06 cfs @ 19.03 hrs, Volume= 0.043 af

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Peak Elev= 647.98' @ 19.03 hrs Surf.Area= 18,000 sf Storage= 8,714 cf

Plug-Flow detention time= 500.3 min calculated for 0.043 af (18% of inflow)
Center-of-Mass det. time= 348.1 min (1,170.0 - 821.9)

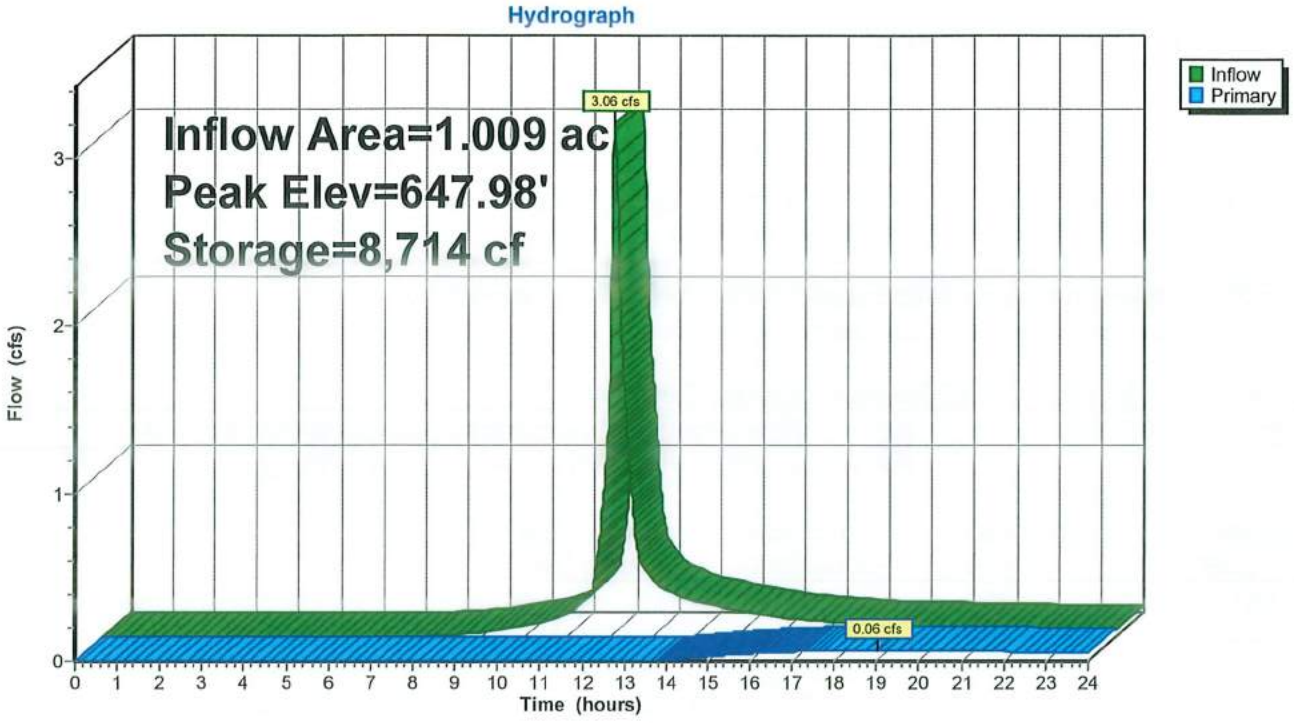
Volume	Invert	Avail.Storage	Storage Description
#1	647.50'	300 cf	**Rain Gradens (Prismatic)** Listed below (Recalc) x 2
		300 cf	x 30.00 = 9,000 cf Total Available Storage

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
647.50	300	0	0
648.00	300	150	150

Device	Routing	Invert	Outlet Devices
#1	Primary	647.90'	**1.0' long x 12.0' 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) 2.57 2.62 2.70 2.67 2.66 2.67 2.66 2.64

Primary OutFlow Max=0.06 cfs @ 19.03 hrs HW=647.98' (Free Discharge)
1=Broad-Crested Rectangular Weir (Weir Controls 0.06 cfs @ 0.75 fps)

Pond 6P: Rain Gardens



Summary for Pond 7P: Rain Gardens

Inflow Area = 1.345 ac, 10.61% Impervious, Inflow Depth > 2.84" for 10 Year Storm event
Inflow = 3.26 cfs @ 12.23 hrs, Volume= 0.319 af
Outflow = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af, Atten= 100%, Lag= 0.0 min
Primary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Peak Elev= 661.89' @ 24.00 hrs Surf.Area= 36,000 sf Storage= 13,885 cf

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

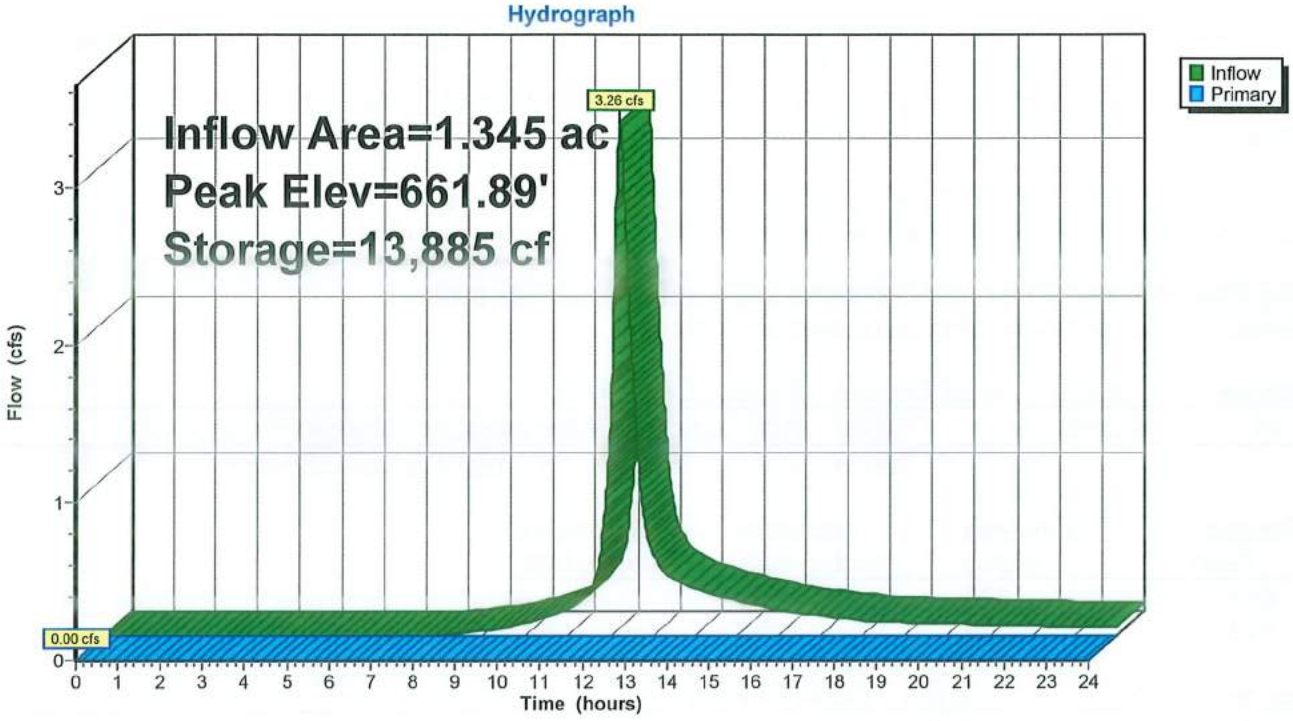
Volume	Invert	Avail.Storage	Storage Description
#1	661.50'	600 cf	**Rain Gradens (Prismatic)** Listed below (Recalc) x 4
		600 cf	x 30.00 = 18,000 cf Total Available Storage

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
661.50	300	0	0
662.00	300	150	150

Device	Routing	Invert	Outlet Devices
#1	Primary	661.90'	**1.0' long x 12.0' 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) 2.57 2.62 2.70 2.67 2.66 2.67 2.66 2.64

Primary OutFlow Max=0.00 cfs @ 0.00 hrs HW=661.50' (Free Discharge)
1=Broad-Crested Rectangular Weir (Controls 0.00 cfs)

Pond 7P: Rain Gardens



Summary for Pond 8P: Rain Gardens

Inflow Area = 1.310 ac, 12.92% Impervious, Inflow Depth > 2.84" for 10 Year Storm event
Inflow = 3.05 cfs @ 12.25 hrs, Volume= 0.310 af
Outflow = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af, Atten= 100%, Lag= 0.0 min
Primary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Peak Elev= 672.88' @ 24.00 hrs Surf.Area= 36,000 sf Storage= 13,519 cf

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

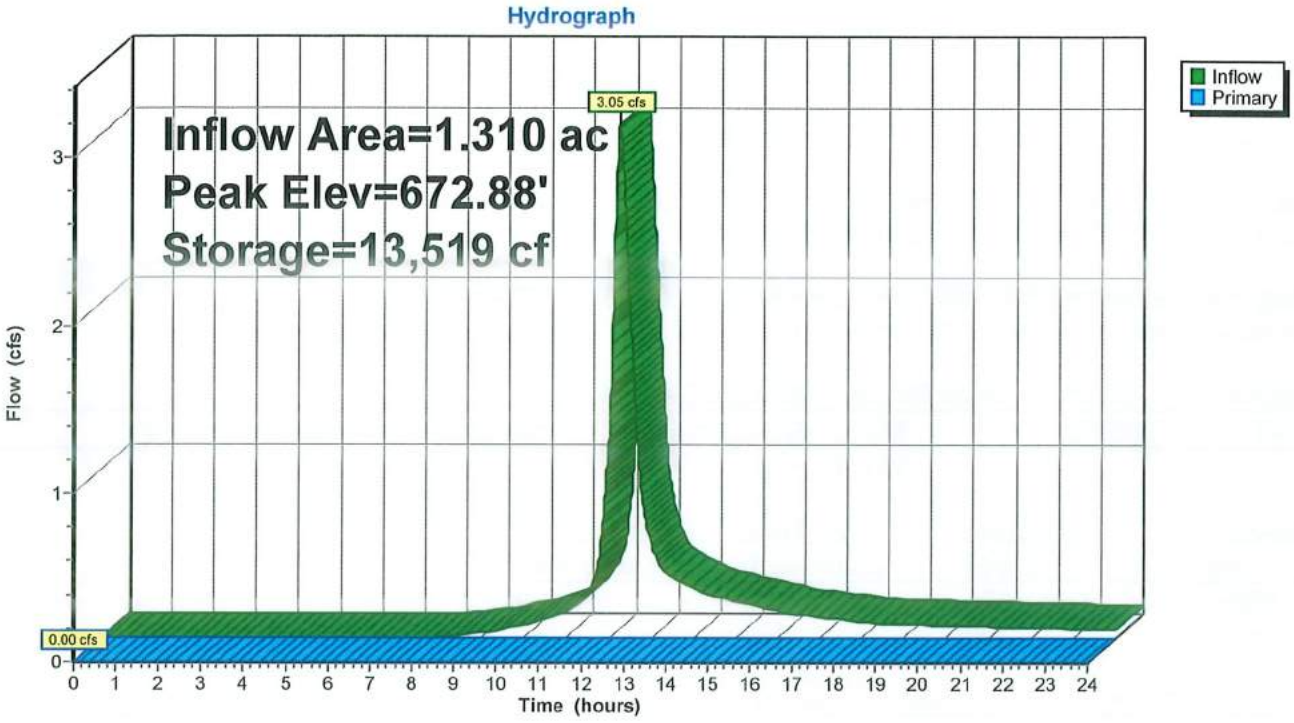
Volume	Invert	Avail.Storage	Storage Description
#1	672.50'	600 cf	**Rain Gradens (Prismatic)** Listed below (Recalc) x 4
		600 cf	x 30.00 = 18,000 cf Total Available Storage

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
672.50	300	0	0
673.00	300	150	150

Device	Routing	Invert	Outlet Devices
#1	Primary	672.90'	**1.0' long x 12.0' 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) 2.57 2.62 2.70 2.67 2.66 2.67 2.66 2.64

Primary OutFlow Max=0.00 cfs @ 0.00 hrs HW=672.50' (Free Discharge)
↑—**1=Broad-Crested Rectangular Weir** (Controls 0.00 cfs)

Pond 8P: Rain Gardens



Summary for Pond 9P: Rain Gardens

Inflow Area = 1.112 ac, 6.90% Impervious, Inflow Depth > 2.75" for 10 Year Storm event
Inflow = 2.64 cfs @ 12.22 hrs, Volume= 0.255 af
Outflow = 0.08 cfs @ 17.99 hrs, Volume= 0.056 af, Atten= 97%, Lag= 345.9 min
Primary = 0.08 cfs @ 17.99 hrs, Volume= 0.056 af

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Peak Elev= 664.00' @ 17.99 hrs Surf.Area= 18,000 sf Storage= 8,983 cf

Plug-Flow detention time= 464.1 min calculated for 0.056 af (22% of inflow)
Center-of-Mass det. time= 322.0 min (1,152.7 - 830.6)

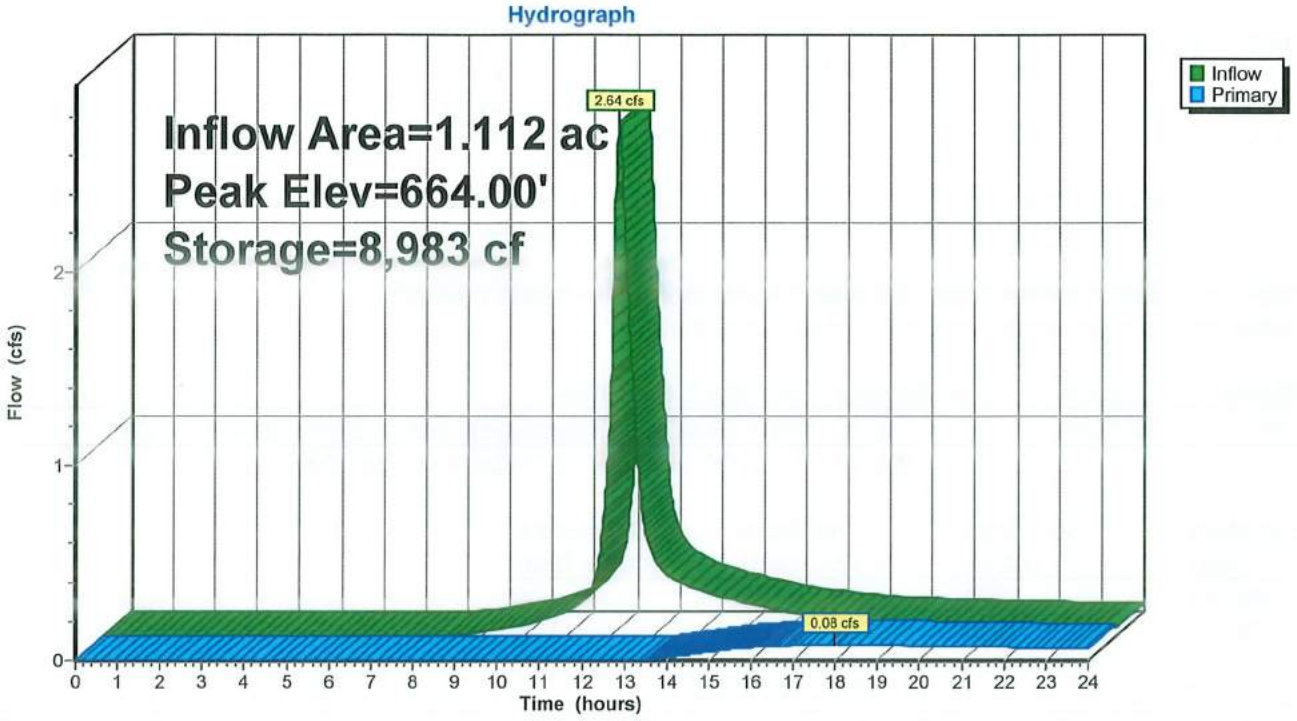
Volume	Invert	Avail.Storage	Storage Description
#1	663.50'	300 cf	**Rain Gradens (Prismatic)** Listed below (Recalc) x 2
		300 cf	x 30.00 = 9,000 cf Total Available Storage

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
663.50	300	0	0
664.00	300	150	150

Device	Routing	Invert	Outlet Devices
#1	Primary	663.90'	**1.0' long x 12.0' 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) 2.57 2.62 2.70 2.67 2.66 2.67 2.66 2.64

Primary OutFlow Max=0.08 cfs @ 17.99 hrs HW=664.00' (Free Discharge)
1=Broad-Crested Rectangular Weir (Weir Controls 0.08 cfs @ 0.81 fps)

Pond 9P: Rain Gardens



Summary for Pond 10P: Rain Gardens

Inflow Area = 0.501 ac, 14.63% Impervious, Inflow Depth > 2.94" for 10 Year Storm event
Inflow = 1.24 cfs @ 12.24 hrs, Volume= 0.123 af
Outflow = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af, Atten= 100%, Lag= 0.0 min
Primary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Peak Elev= 665.80' @ 24.00 hrs Surf.Area= 18,000 sf Storage= 5,340 cf

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

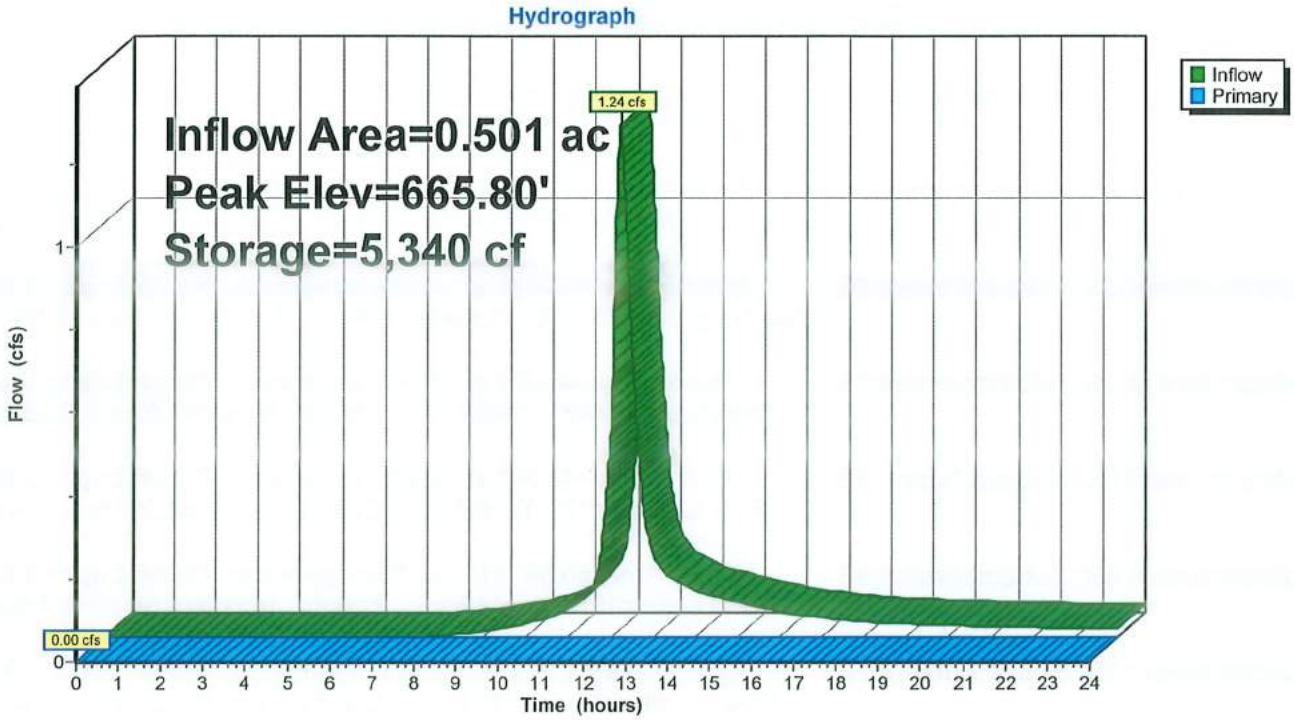
Volume	Invert	Avail.Storage	Storage Description
#1	665.50'	300 cf	**Rain Gradens (Prismatic)** Listed below (Recalc) x 2
		300 cf	x 30.00 = 9,000 cf Total Available Storage

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
665.50	300	0	0
666.00	300	150	150

Device	Routing	Invert	Outlet Devices
#1	Primary	665.90'	**1.0' long x 12.0' 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) 2.57 2.62 2.70 2.67 2.66 2.67 2.66 2.64

Primary OutFlow Max=0.00 cfs @ 0.00 hrs HW=665.50' (Free Discharge)
1=Broad-Crested Rectangular Weir (Controls 0.00 cfs)

Pond 10P: Rain Gardens



Time span=0.00-24.00 hrs, dt=0.01 hrs, 2401 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Subcatchment 1S: Subcatchment 4S Runoff Area=27,500 sf 0.00% Impervious Runoff Depth>3.77"
Flow Length=267' Tc=13.4 min CN=79 Runoff=2.20 cfs 0.198 af

Subcatchment 2S: Subcatchment 3S Runoff Area=180,441 sf 0.00% Impervious Runoff Depth>3.76"
Flow Length=494' Tc=21.4 min CN=79 Runoff=12.03 cfs 1.299 af

Subcatchment 3S: Subcatchment 2S Runoff Area=453,810 sf 0.00% Impervious Runoff Depth>3.75"
Flow Length=1,375' Tc=35.1 min CN=79 Runoff=24.19 cfs 3.257 af

Subcatchment 4S: Subcatchment 1S Runoff Area=48,777 sf 3.24% Impervious Runoff Depth>3.88"
Flow Length=483' Tc=6.3 min CN=80 Runoff=5.02 cfs 0.362 af

Subcatchment 5S: Subcatchment 5S Runoff Area=43,949 sf 9.85% Impervious Runoff Depth>3.98"
Flow Length=417' Tc=8.8 min CN=81 Runoff=4.26 cfs 0.334 af

Subcatchment 6S: Subcatchment 6S Runoff Area=58,597 sf 10.61% Impervious Runoff Depth>3.97"
Flow Length=357' Tc=16.8 min CN=81 Runoff=4.54 cfs 0.445 af

Subcatchment 7S: Subcatchment 7S Runoff Area=57,071 sf 12.92% Impervious Runoff Depth>3.97"
Flow Length=282' Tc=18.5 min CN=81 Runoff=4.24 cfs 0.434 af

Subcatchment 8S: Subcatchment 8S Runoff Area=231,694 sf 0.00% Impervious Runoff Depth>3.75"
Flow Length=818' Tc=31.5 min CN=79 Runoff=13.03 cfs 1.664 af

Subcatchment 9S: Subcatchment 9S Runoff Area=48,419 sf 6.90% Impervious Runoff Depth>3.87"
Flow Length=400' Tc=16.3 min CN=80 Runoff=3.70 cfs 0.358 af

Subcatchment 10S: Subcatchment 10S Runoff Area=21,833 sf 14.63% Impervious Runoff Depth>4.08"
Flow Length=367' Tc=17.4 min CN=82 Runoff=1.71 cfs 0.170 af

Pond 1P: Design Point 4 (Southern Property Line) Inflow=2.20 cfs 0.198 af
Primary=2.20 cfs 0.198 af

Pond 2P: Design Point 3 (Western Property Line) Inflow=12.03 cfs 1.299 af
Primary=12.03 cfs 1.299 af

Pond 3P: Design Point 2 (Stream) Inflow=24.19 cfs 3.257 af
Primary=24.19 cfs 3.257 af

Pond 4P: Design Point 1 (Ditch) Inflow=13.67 cfs 2.184 af
Primary=13.67 cfs 2.184 af

Pond 5P: Rain Gardens Peak Elev=636.55' Storage=9,000 cf Inflow=5.02 cfs 0.362 af
Outflow=1.41 cfs 0.158 af

Pond 6P: Rain Gardens Peak Elev=648.33' Storage=9,000 cf Inflow=4.26 cfs 0.334 af
Outflow=0.75 cfs 0.133 af

Pond 7P: Rain Gardens Peak Elev=661.99' Storage=17,650 cf Inflow=4.54 cfs 0.445 af
Outflow=0.07 cfs 0.040 af

Pond 8P: Rain Gardens Peak Elev=672.98' Storage=17,429 cf Inflow=4.24 cfs 0.434 af
Outflow=0.06 cfs 0.033 af

Pond 9P: Rain Gardens Peak Elev=664.67' Storage=9,000 cf Inflow=3.70 cfs 0.358 af
Outflow=1.79 cfs 0.155 af

Pond 10P: Rain Gardens Peak Elev=665.91' Storage=7,404 cf Inflow=1.71 cfs 0.170 af
Outflow=0.00 cfs 0.000 af

Total Runoff Area = 26.908 ac Runoff Volume = 8.522 af Average Runoff Depth = 3.80"
97.78% Pervious = 26.310 ac 2.22% Impervious = 0.598 ac

Summary for Subcatchment 1S: Subcatchment 4S

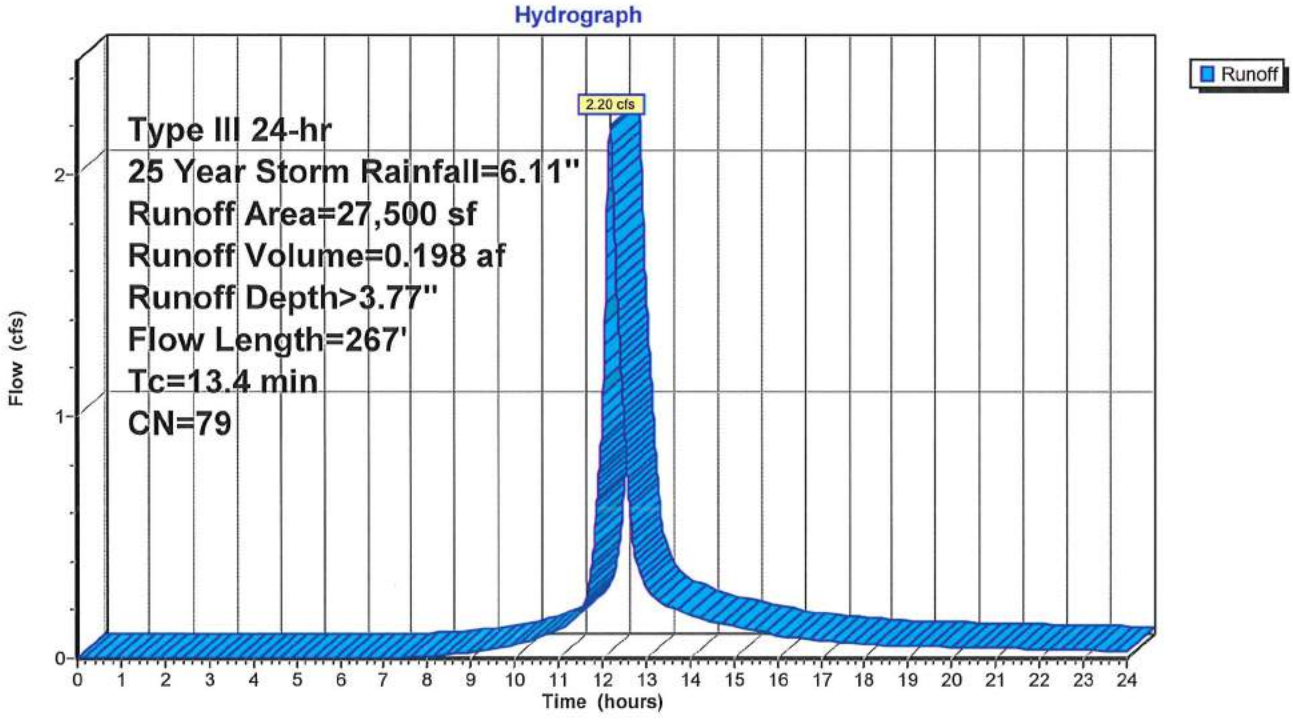
Runoff = 2.20 cfs @ 12.18 hrs, Volume= 0.198 af, Depth> 3.77"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Type III 24-hr 25 Year Storm Rainfall=6.11"

Area (sf)	CN	Description
27,500	79	Woods, Fair, HSG D
27,500		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
11.0	100	0.1069	0.15		**Sheet Flow, Sheet Flow** Woods: Light underbrush n= 0.400 P2= 3.17"
2.4	167	0.0531	1.15		**Shallow Concentrated Flow, Shallow C flow** Woodland Kv= 5.0 fps
13.4	267	Total			

Subcatchment 1S: Subcatchment 4S



Summary for Subcatchment 2S: Subcatchment 3S

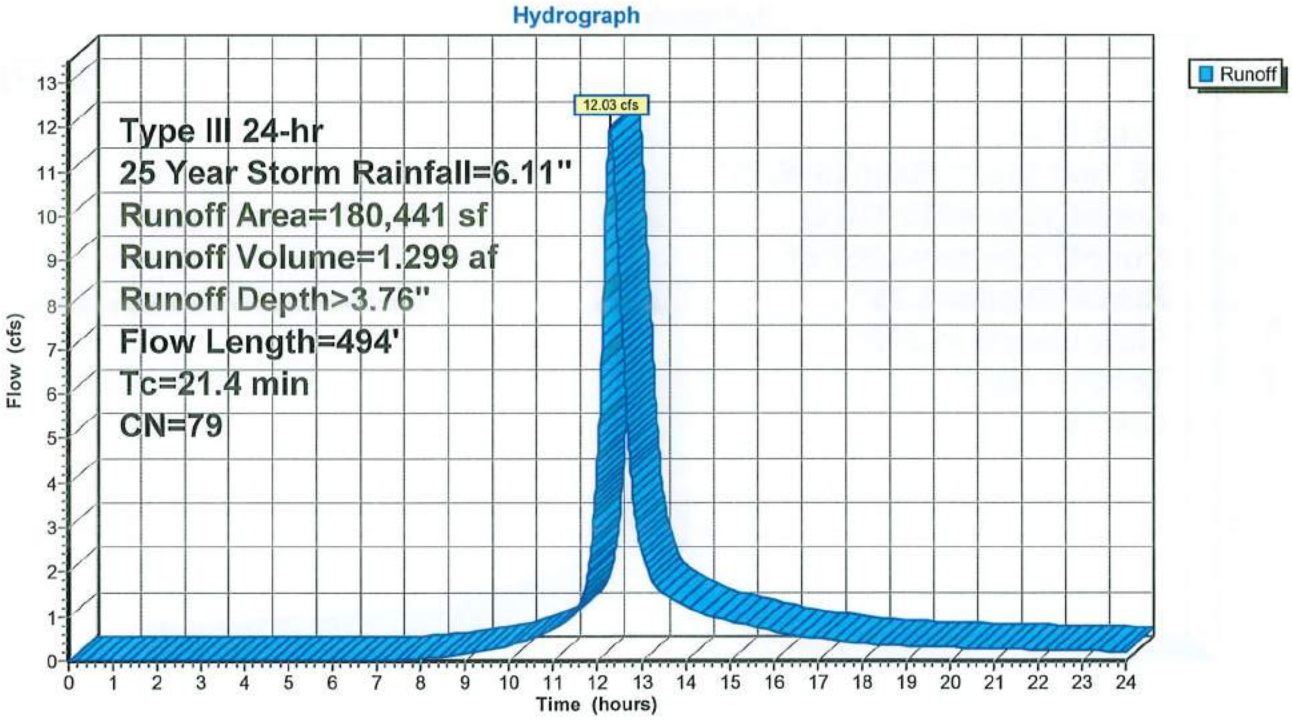
Runoff = 12.03 cfs @ 12.29 hrs, Volume= 1.299 af, Depth> 3.76"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Type III 24-hr 25 Year Storm Rainfall=6.11"

Area (sf)	CN	Description
180,441	79	Woods, Fair, HSG D
180,441		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
17.0	100	0.0361	0.10		**Sheet Flow, Sheet Flow** Woods: Light underbrush n= 0.400 P2= 3.17"
4.4	394	0.0890	1.49		**Shallow Concentrated Flow, Shallow C Flow** Woodland Kv= 5.0 fps
21.4	494	Total			

Subcatchment 2S: Subcatchment 3S



Summary for Subcatchment 3S: Subcatchment 2S

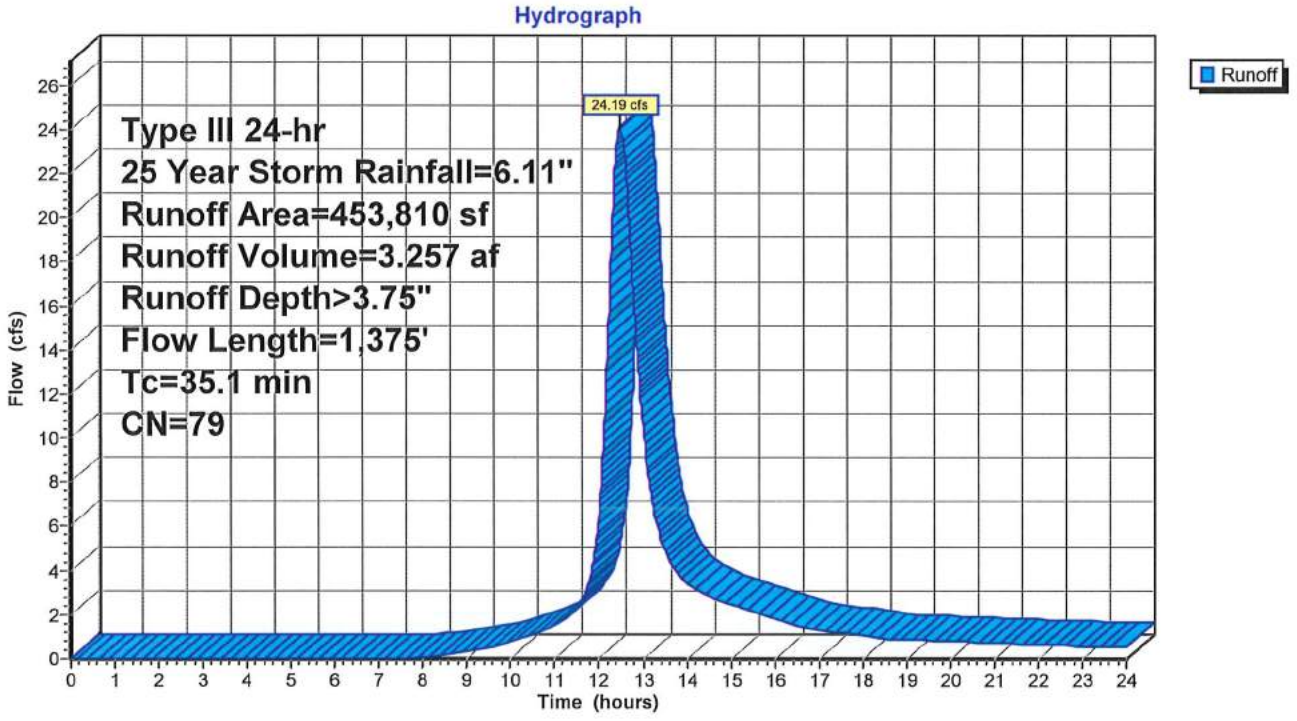
Runoff = 24.19 cfs @ 12.48 hrs, Volume= 3.257 af, Depth> 3.75"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Type III 24-hr 25 Year Storm Rainfall=6.11"

Area (sf)	CN	Description
453,810	79	Woods, Fair, HSG D
453,810		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
14.1	100	0.0575	0.12		**Sheet Flow, Sheet Flow** Woods: Light underbrush n= 0.400 P2= 3.17"
21.0	1,275	0.0410	1.01		**Shallow Concentrated Flow, Shallow C Flow** Woodland Kv= 5.0 fps
35.1	1,375	Total			

Subcatchment 3S: Subcatchment 2S



Summary for Subcatchment 4S: Subcatchment 1S

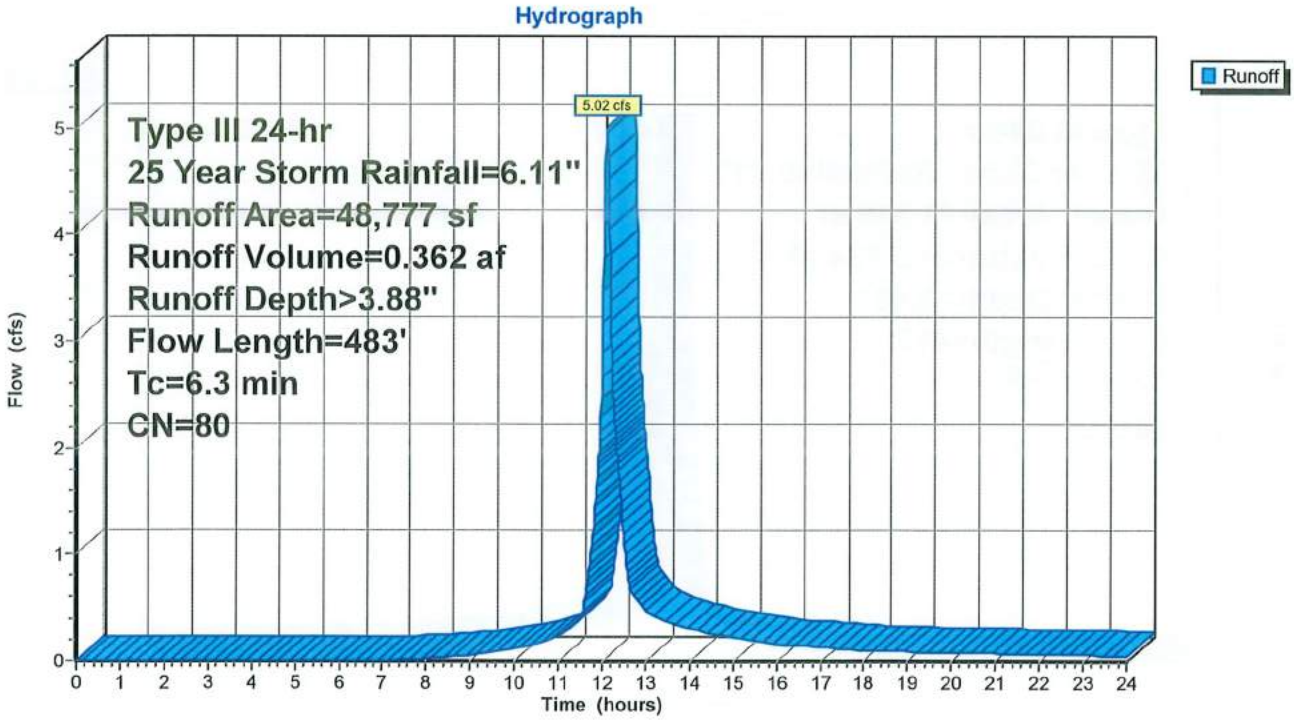
Runoff = 5.02 cfs @ 12.09 hrs, Volume= 0.362 af, Depth> 3.88"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Type III 24-hr 25 Year Storm Rainfall=6.11"

	Area (sf)	CN	Description
	47,199	79	Woods, Fair, HSG D
*	1,578	98	Driveways, HSG A
	48,777	80	Weighted Average
	47,199		96.76% Pervious Area
	1,578		3.24% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
4.8	100	0.1200	0.35		**Sheet Flow, Sheet Flow** Grass: Short n= 0.150 P2= 3.17"
1.5	383	0.0783	4.20		**Shallow Concentrated Flow, Shallow C flow** Grassed Waterway Kv= 15.0 fps
6.3	483	Total			

Subcatchment 4S: Subcatchment 1S



Summary for Subcatchment 5S: Subcatchment 5S

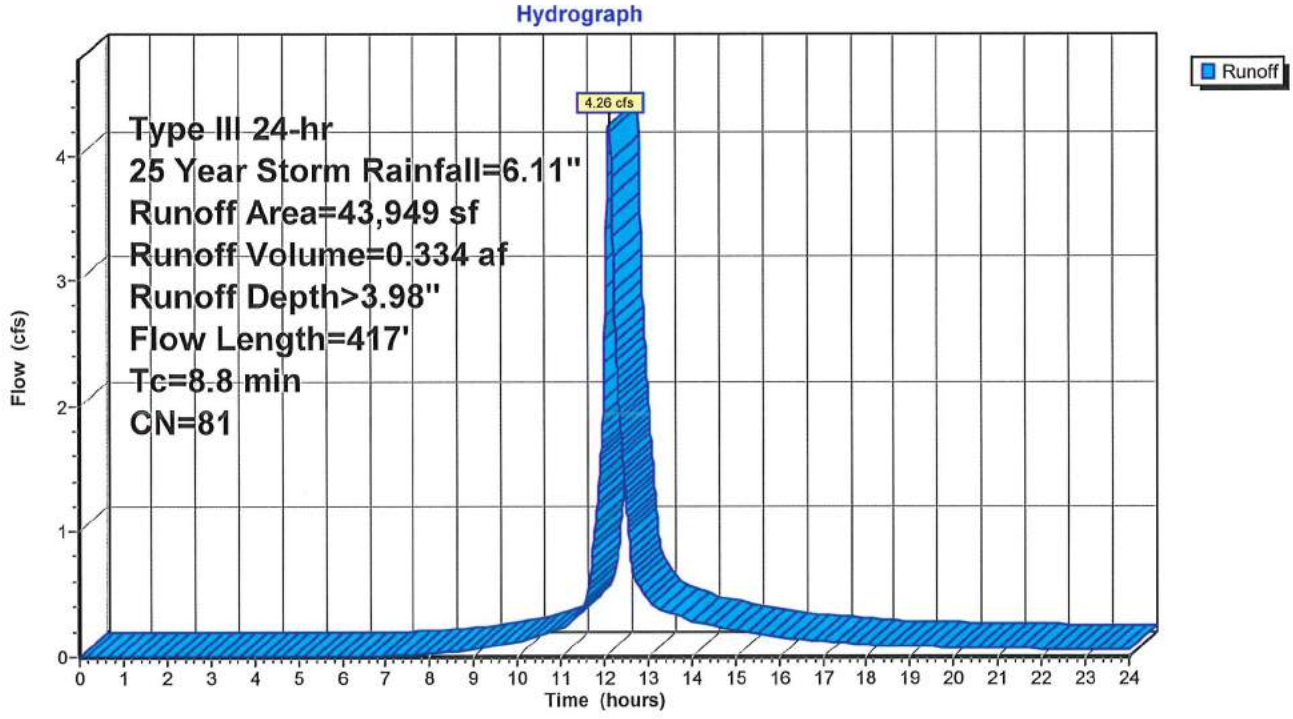
Runoff = 4.26 cfs @ 12.12 hrs, Volume= 0.334 af, Depth> 3.98"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Type III 24-hr 25 Year Storm Rainfall=6.11"

	Area (sf)	CN	Description
	39,620	79	Woods, Fair, HSG D
*	4,329	98	Driveway
	43,949	81	Weighted Average
	39,620		90.15% Pervious Area
	4,329		9.85% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.2	100	0.0972	0.32		**Sheet Flow, Sheet Flow** Grass: Short n= 0.150 P2= 3.17"
3.6	317	0.0861	1.47		**Shallow Concentrated Flow, Shallow C. Flow** Woodland Kv= 5.0 fps
8.8	417	Total			

Subcatchment 5S: Subcatchment 5S



Summary for Subcatchment 6S: Subcatchment 6S

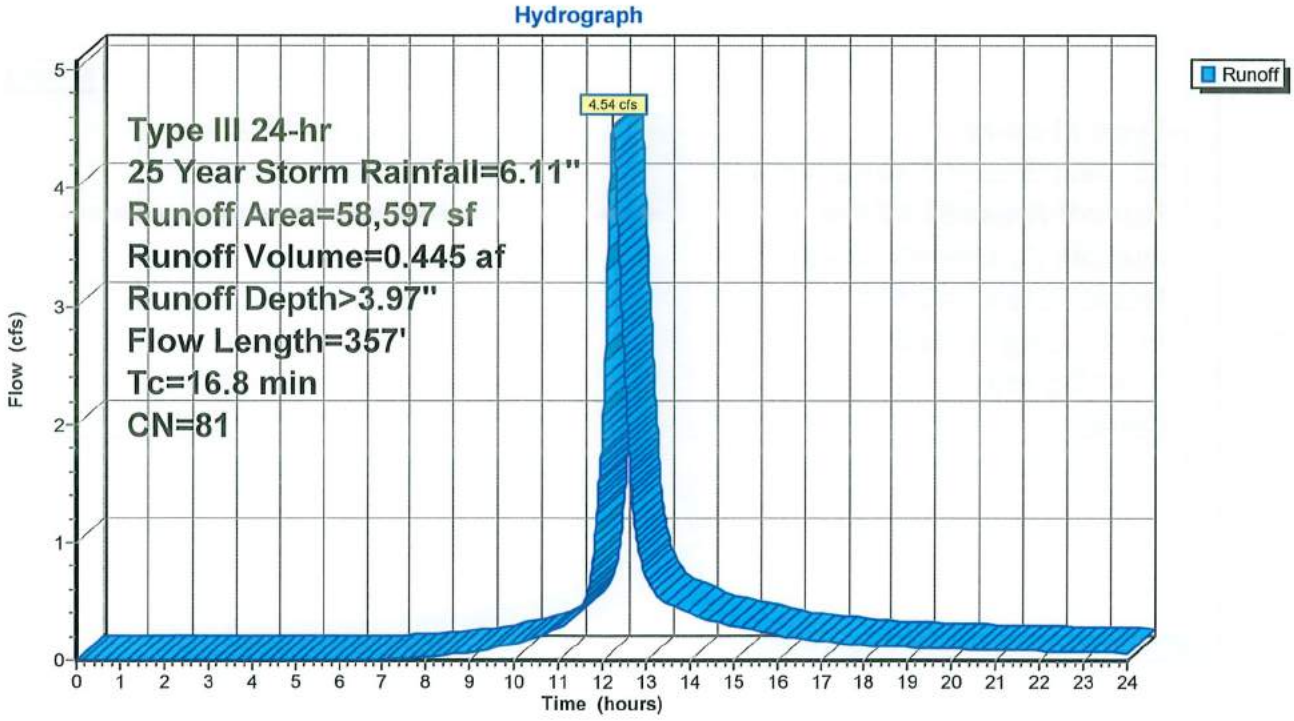
Runoff = 4.54 cfs @ 12.23 hrs, Volume= 0.445 af, Depth> 3.97"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Type III 24-hr 25 Year Storm Rainfall=6.11"

	Area (sf)	CN	Description
	52,377	79	Woods, Fair, HSG D
*	6,220	98	Driveway
	58,597	81	Weighted Average
	52,377		89.39% Pervious Area
	6,220		10.61% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
13.9	100	0.0600	0.12		**Sheet Flow, Sheet Flow** Woods: Light underbrush n= 0.400 P2= 3.17"
2.9	257	0.0856	1.46		**Shallow Concentrated Flow, Shallow C. Flow** Woodland Kv= 5.0 fps
16.8	357	Total			

Subcatchment 6S: Subcatchment 6S



Summary for Subcatchment 7S: Subcatchment 7S

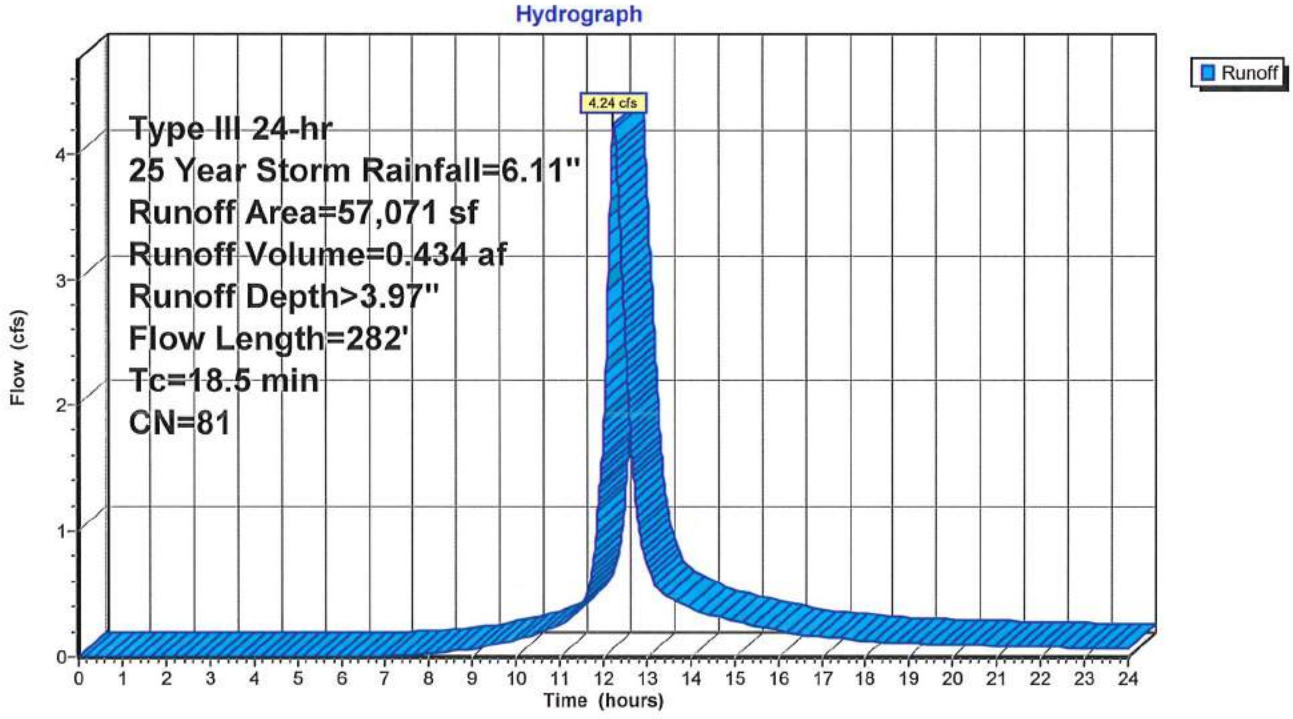
Runoff = 4.24 cfs @ 12.25 hrs, Volume= 0.434 af, Depth> 3.97"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Type III 24-hr 25 Year Storm Rainfall=6.11"

	Area (sf)	CN	Description
	49,698	79	Woods, Fair, HSG D
*	7,373	98	Driveway
	57,071	81	Weighted Average
	49,698		87.08% Pervious Area
	7,373		12.92% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
16.4	100	0.0400	0.10		**Sheet Flow, Sheet Flow** Woods: Light underbrush n= 0.400 P2= 3.17"
2.1	182	0.0824	1.44		**Shallow Concentrated Flow, Shallow C. Flow** Woodland Kv= 5.0 fps
18.5	282	Total			

Subcatchment 7S: Subcatchment 7S



Summary for Subcatchment 8S: Subcatchment 8S

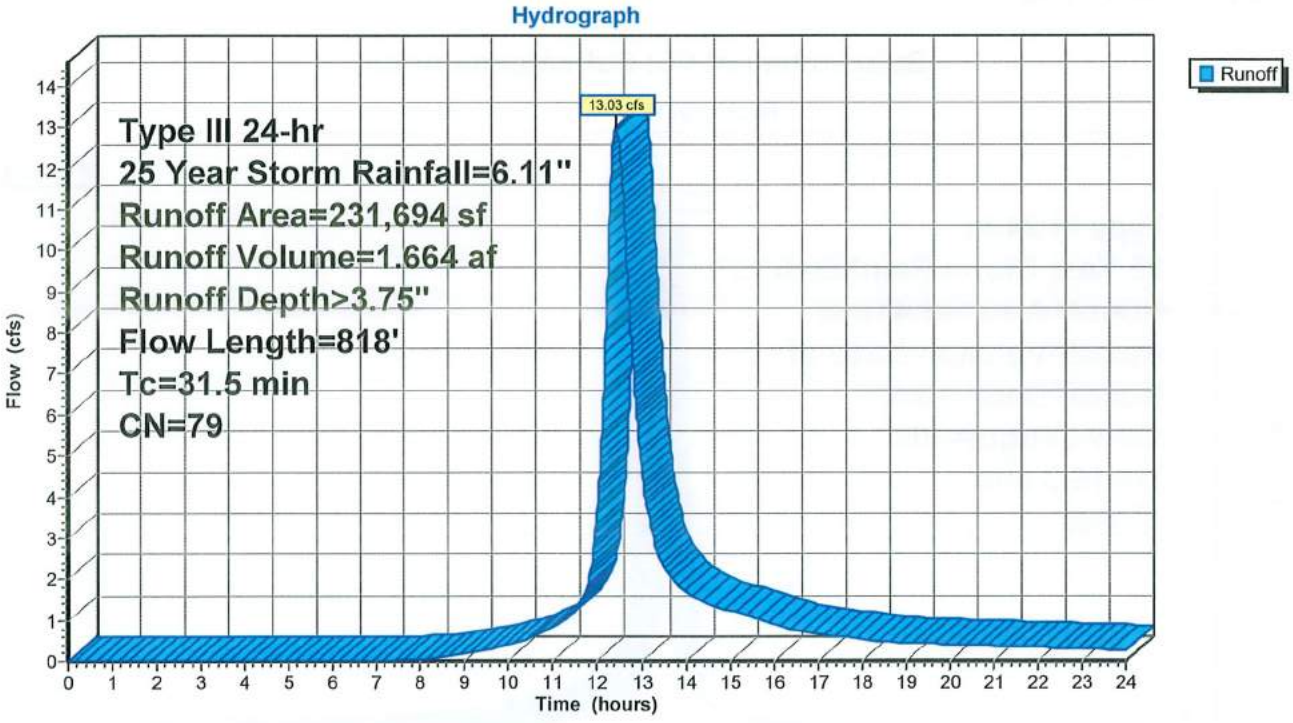
Runoff = 13.03 cfs @ 12.43 hrs, Volume= 1.664 af, Depth> 3.75"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Type III 24-hr 25 Year Storm Rainfall=6.11"

Area (sf)	CN	Description
231,694	79	Woods, Fair, HSG D
231,694		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
20.7	100	0.0222	0.08		**Sheet Flow, Sheet Flow** Woods: Light underbrush n= 0.400 P2= 3.17"
10.8	718	0.0488	1.10		**Shallow Concentrated Flow, Shallow C. Flow** Woodland Kv= 5.0 fps
31.5	818	Total			

Subcatchment 8S: Subcatchment 8S



Summary for Subcatchment 9S: Subcatchment 9S

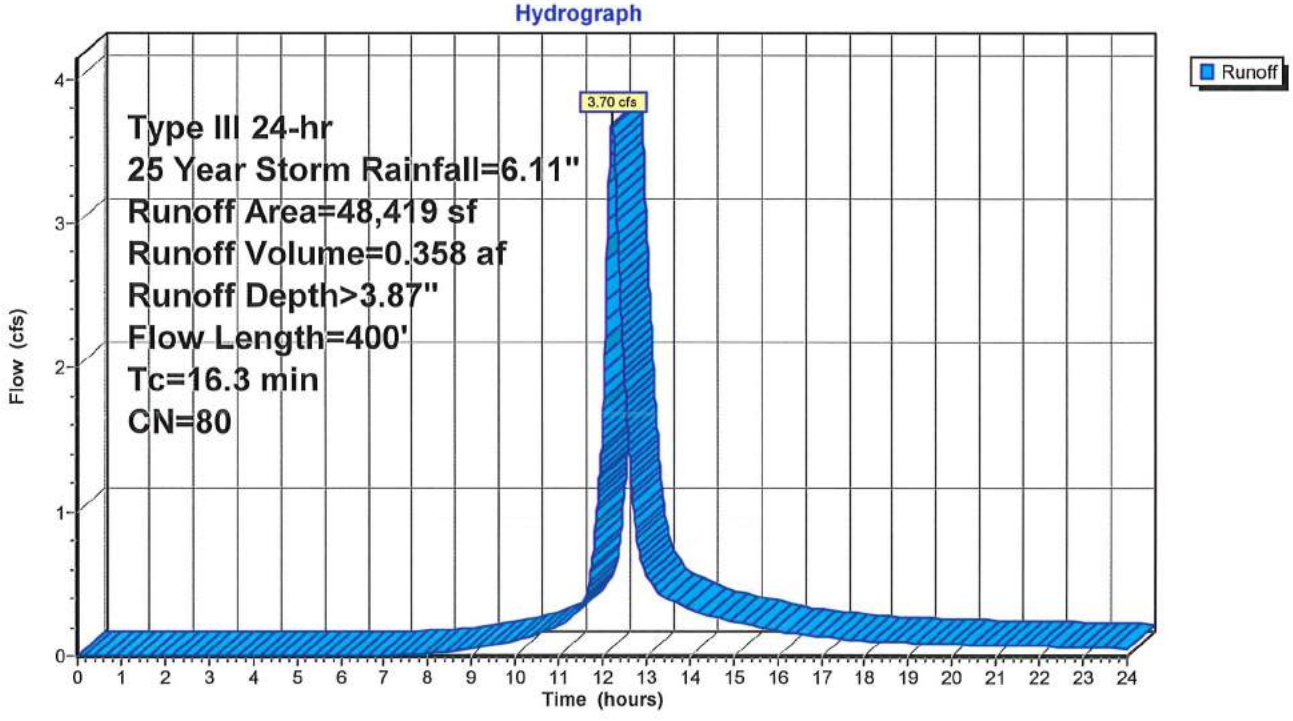
Runoff = 3.70 cfs @ 12.22 hrs, Volume= 0.358 af, Depth> 3.87"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Type III 24-hr 25 Year Storm Rainfall=6.11"

	Area (sf)	CN	Description
	45,079	79	Woods, Fair, HSG D
*	3,340	98	Driveway
	48,419	80	Weighted Average
	45,079		93.10% Pervious Area
	3,340		6.90% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
12.9	100	0.0722	0.13		**Sheet Flow, Sheet Flow** Woods: Light underbrush n= 0.400 P2= 3.17"
3.4	300	0.0884	1.49		**Shallow Concentrated Flow, Shallow C. Flow** Woodland Kv= 5.0 fps
16.3	400	Total			

Subcatchment 9S: Subcatchment 9S



Summary for Subcatchment 10S: Subcatchment 10S

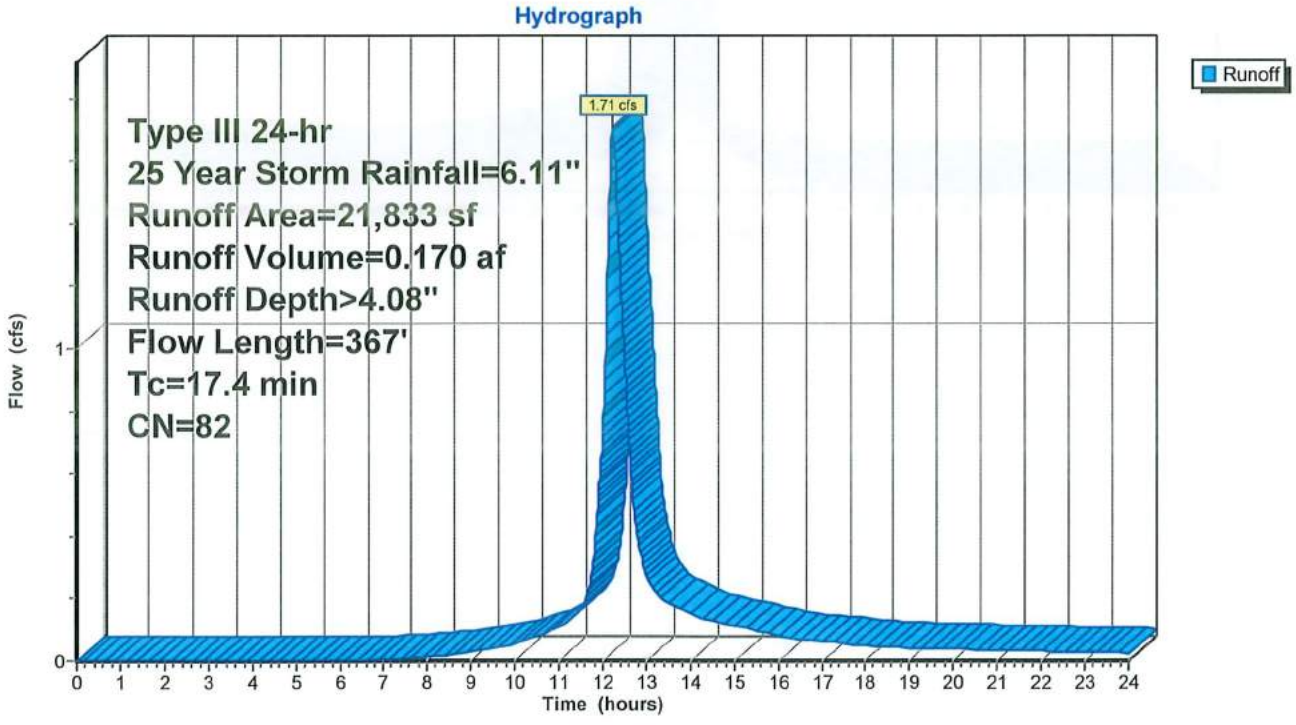
Runoff = 1.71 cfs @ 12.24 hrs, Volume= 0.170 af, Depth> 4.08"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Type III 24-hr 25 Year Storm Rainfall=6.11"

	Area (sf)	CN	Description
	18,639	79	Woods, Fair, HSG D
*	3,194	98	Driveway
	21,833	82	Weighted Average
	18,639		85.37% Pervious Area
	3,194		14.63% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
14.5	100	0.0541	0.12		**Sheet Flow, Sheet Flow** Woods: Light underbrush n= 0.400 P2= 3.17"
2.9	267	0.0974	1.56		**Shallow Concentrated Flow, Shallow C. Flow** Woodland Kv= 5.0 fps
17.4	367	Total			

Subcatchment 10S: Subcatchment 10S

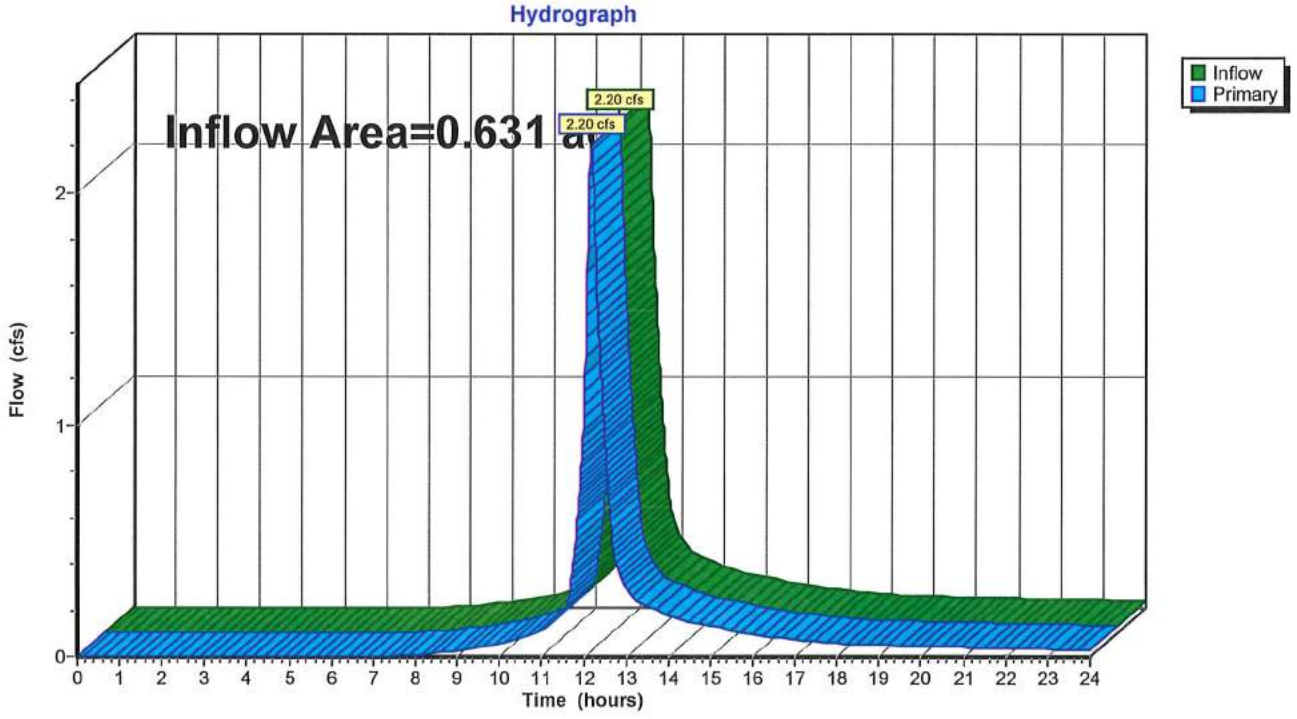


Summary for Pond 1P: Design Point 4 (Southern Property Line)

Inflow Area = 0.631 ac, 0.00% Impervious, Inflow Depth > 3.77" for 25 Year Storm event
Inflow = 2.20 cfs @ 12.18 hrs, Volume= 0.198 af
Primary = 2.20 cfs @ 12.18 hrs, Volume= 0.198 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs

Pond 1P: Design Point 4 (Southern Property Line)

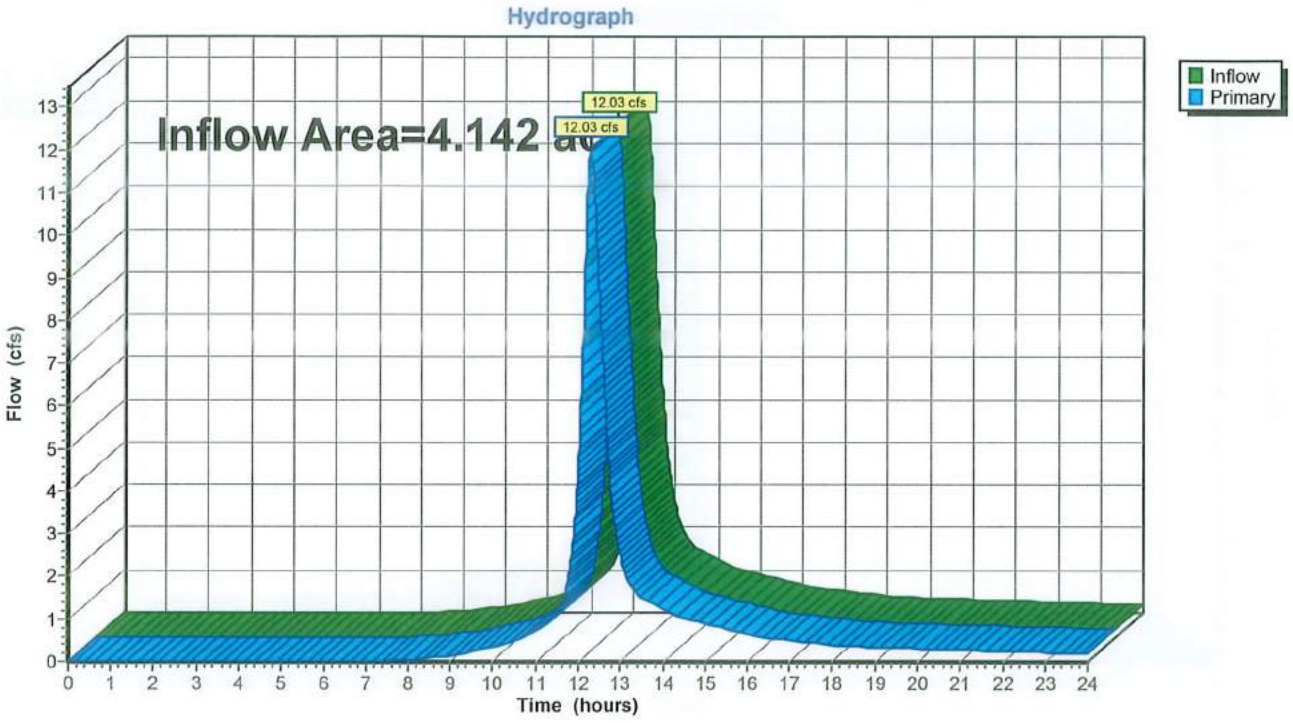


Summary for Pond 2P: Design Point 3 (Western Property Line)

Inflow Area = 4.142 ac, 0.00% Impervious, Inflow Depth > 3.76" for 25 Year Storm event
Inflow = 12.03 cfs @ 12.29 hrs, Volume= 1.299 af
Primary = 12.03 cfs @ 12.29 hrs, Volume= 1.299 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs

Pond 2P: Design Point 3 (Western Property Line)

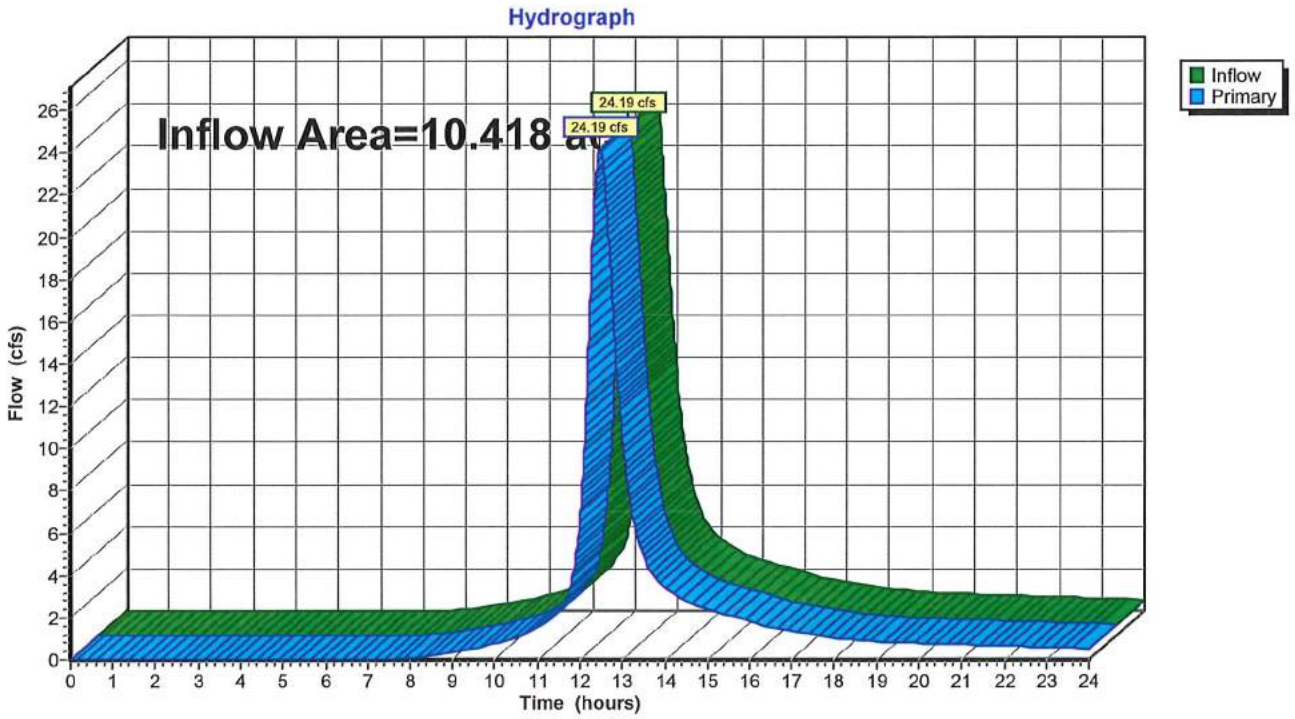


Summary for Pond 3P: Design Point 2 (Stream)

Inflow Area = 10.418 ac, 0.00% Impervious, Inflow Depth > 3.75" for 25 Year Storm event
Inflow = 24.19 cfs @ 12.48 hrs, Volume= 3.257 af
Primary = 24.19 cfs @ 12.48 hrs, Volume= 3.257 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs

Pond 3P: Design Point 2 (Stream)

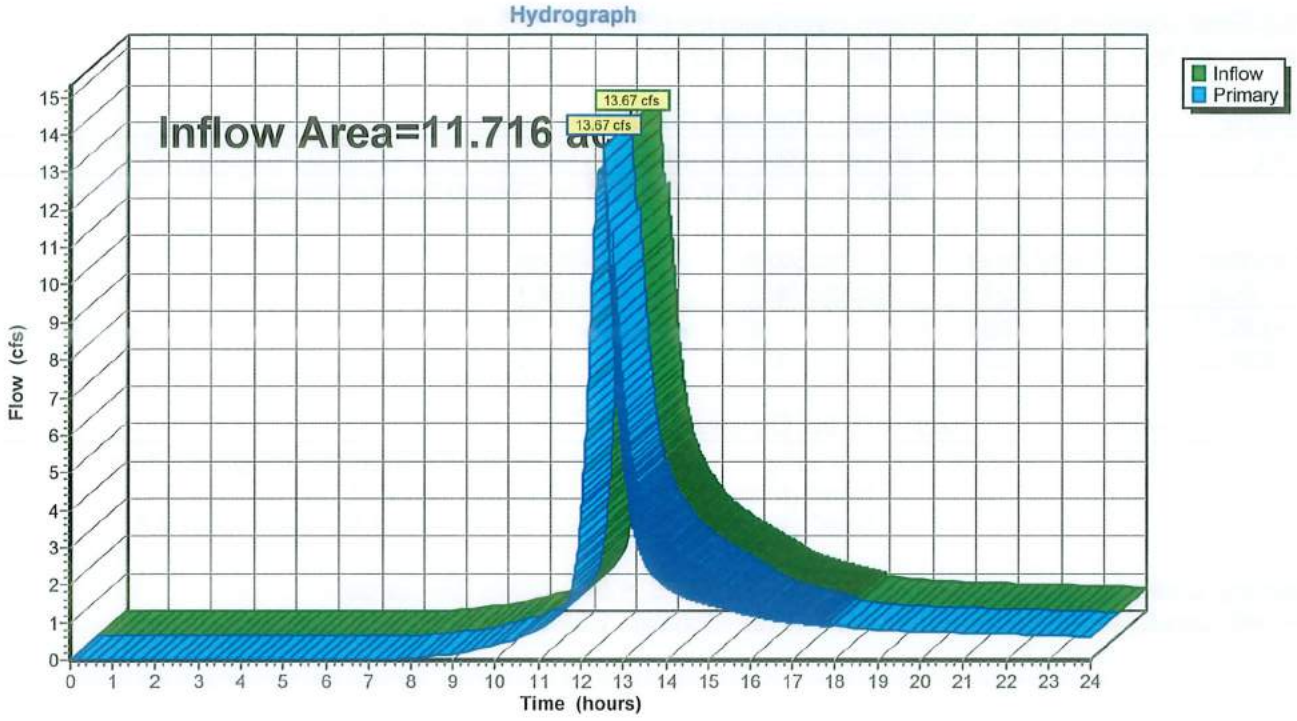


Summary for Pond 4P: Design Point 1 (Ditch)

Inflow Area = 11.716 ac, 5.10% Impervious, Inflow Depth > 2.24" for 25 Year Storm event
Inflow = 13.67 cfs @ 12.54 hrs, Volume= 2.184 af
Primary = 13.67 cfs @ 12.54 hrs, Volume= 2.184 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs

Pond 4P: Design Point 1 (Ditch)



Summary for Pond 5P: Rain Gardens

Inflow Area = 1.120 ac, 3.24% Impervious, Inflow Depth > 3.88" for 25 Year Storm event
Inflow = 5.02 cfs @ 12.09 hrs, Volume= 0.362 af
Outflow = 1.41 cfs @ 12.54 hrs, Volume= 0.158 af, Atten= 72%, Lag= 26.9 min
Primary = 1.41 cfs @ 12.54 hrs, Volume= 0.158 af

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Peak Elev= 636.55' @ 12.54 hrs Surf.Area= 18,000 sf Storage= 9,000 cf

Plug-Flow detention time= 268.8 min calculated for 0.158 af (44% of inflow)
Center-of-Mass det. time= 151.3 min (964.3 - 813.0)

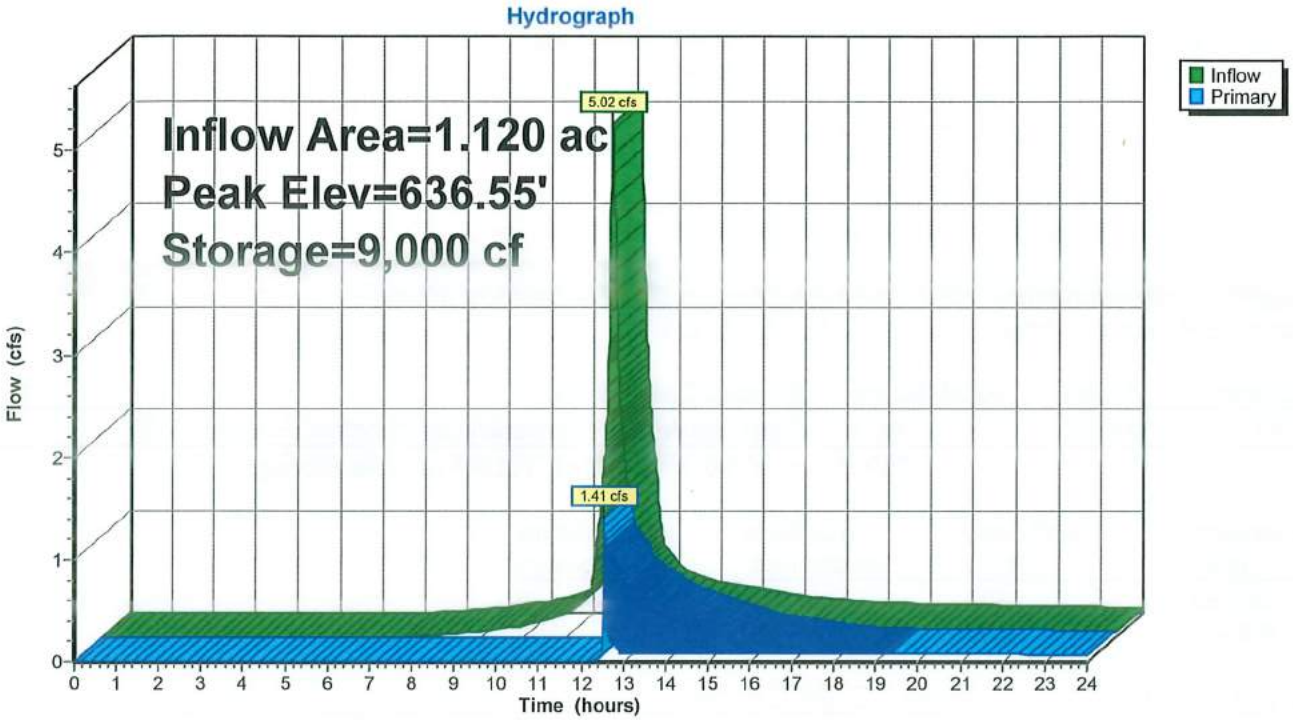
Volume	Invert	Avail.Storage	Storage Description
#1	635.50'	300 cf	**Rain Gradens (Prismatic)** Listed below (Recalc) x 2
		300 cf	x 30.00 = 9,000 cf Total Available Storage

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
635.50	300	0	0
636.00	300	150	150

Device	Routing	Invert	Outlet Devices
#1	Primary	635.90'	**1.0' long x 12.0' 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) 2.57 2.62 2.70 2.67 2.66 2.67 2.66 2.64

Primary OutFlow Max=1.39 cfs @ 12.54 hrs HW=636.54' (Free Discharge)
↑—**1=Broad-Crested Rectangular Weir** (Weir Controls 1.39 cfs @ 2.16 fps)

Pond 5P: Rain Gardens



Summary for Pond 6P: Rain Gardens

Inflow Area = 1.009 ac, 9.85% Impervious, Inflow Depth > 3.98" for 25 Year Storm event
Inflow = 4.26 cfs @ 12.12 hrs, Volume= 0.334 af
Outflow = 0.75 cfs @ 12.84 hrs, Volume= 0.133 af, Atten= 82%, Lag= 43.0 min
Primary = 0.75 cfs @ 12.84 hrs, Volume= 0.133 af

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Peak Elev= 648.33' @ 12.84 hrs Surf.Area= 18,000 sf Storage= 9,000 cf

Plug-Flow detention time= 299.3 min calculated for 0.132 af (40% of inflow)
Center-of-Mass det. time= 178.0 min (990.5 - 812.4)

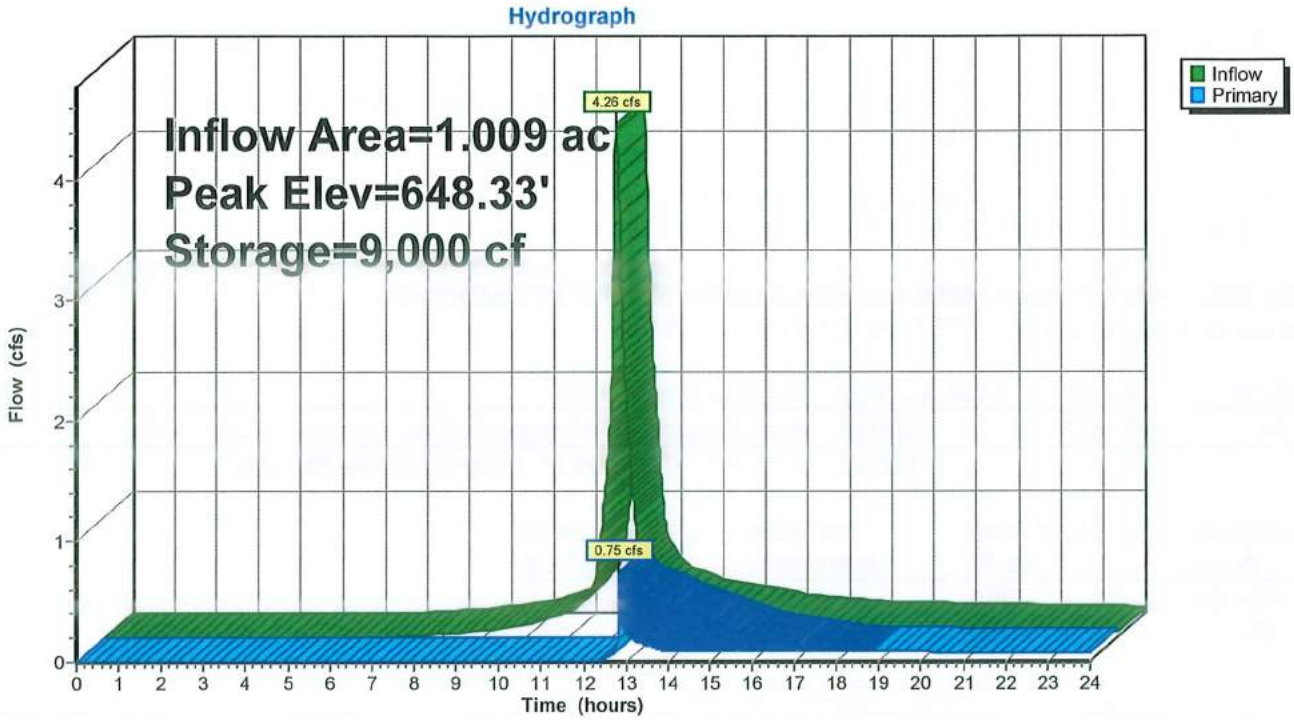
Volume	Invert	Avail.Storage	Storage Description
#1	647.50'	300 cf	**Rain Gradens (Prismatic)** Listed below (Recalc) x 2
		300 cf	x 30.00 = 9,000 cf Total Available Storage

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
647.50	300	0	0
648.00	300	150	150

Device	Routing	Invert	Outlet Devices
#1	Primary	647.90'	**1.0' long x 12.0' 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) 2.57 2.62 2.70 2.67 2.66 2.67 2.66 2.64

Primary OutFlow Max=0.75 cfs @ 12.84 hrs HW=648.33' (Free Discharge)
↑—**1=Broad-Crested Rectangular Weir** (Weir Controls 0.75 cfs @ 1.73 fps)

Pond 6P: Rain Gardens



Summary for Pond 7P: Rain Gardens

Inflow Area = 1.345 ac, 10.61% Impervious, Inflow Depth > 3.97" for 25 Year Storm event
Inflow = 4.54 cfs @ 12.23 hrs, Volume= 0.445 af
Outflow = 0.07 cfs @ 23.63 hrs, Volume= 0.040 af, Atten= 98%, Lag= 683.9 min
Primary = 0.07 cfs @ 23.63 hrs, Volume= 0.040 af

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Peak Elev= 661.99' @ 23.63 hrs Surf.Area= 36,000 sf Storage= 17,650 cf

Plug-Flow detention time= 603.6 min calculated for 0.040 af (9% of inflow)
Center-of-Mass det. time= 395.4 min (1,214.3 - 818.9)

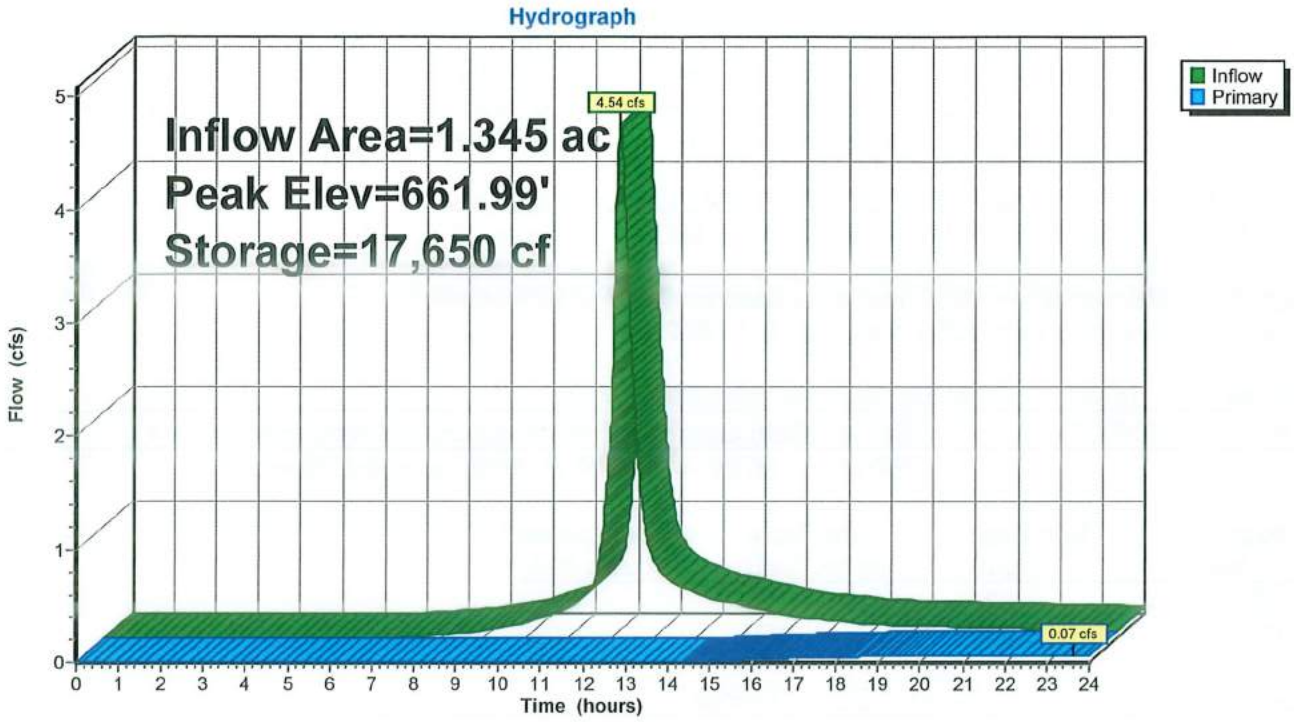
Volume	Invert	Avail.Storage	Storage Description
#1	661.50'	600 cf	**Rain Gradens (Prismatic)** Listed below (Recalc) x 4
		600 cf	x 30.00 = 18,000 cf Total Available Storage

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
661.50	300	0	0
662.00	300	150	150

Device	Routing	Invert	Outlet Devices
#1	Primary	661.90'	**1.0' long x 12.0' 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) 2.57 2.62 2.70 2.67 2.66 2.67 2.66 2.64

Primary OutFlow Max=0.07 cfs @ 23.63 hrs HW=661.99' (Free Discharge)
↑**1=Broad-Crested Rectangular Weir** (Weir Controls 0.07 cfs @ 0.77 fps)

Pond 7P: Rain Gardens



Summary for Pond 8P: Rain Gardens

Inflow Area = 1.310 ac, 12.92% Impervious, Inflow Depth > 3.97" for 25 Year Storm event
Inflow = 4.24 cfs @ 12.25 hrs, Volume= 0.434 af
Outflow = 0.06 cfs @ 24.00 hrs, Volume= 0.033 af, Atten= 99%, Lag= 705.0 min
Primary = 0.06 cfs @ 24.00 hrs, Volume= 0.033 af

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Peak Elev= 672.98' @ 24.00 hrs Surf.Area= 36,000 sf Storage= 17,429 cf

Plug-Flow detention time= 625.2 min calculated for 0.033 af (8% of inflow)
Center-of-Mass det. time= 406.2 min (1,226.4 - 820.3)

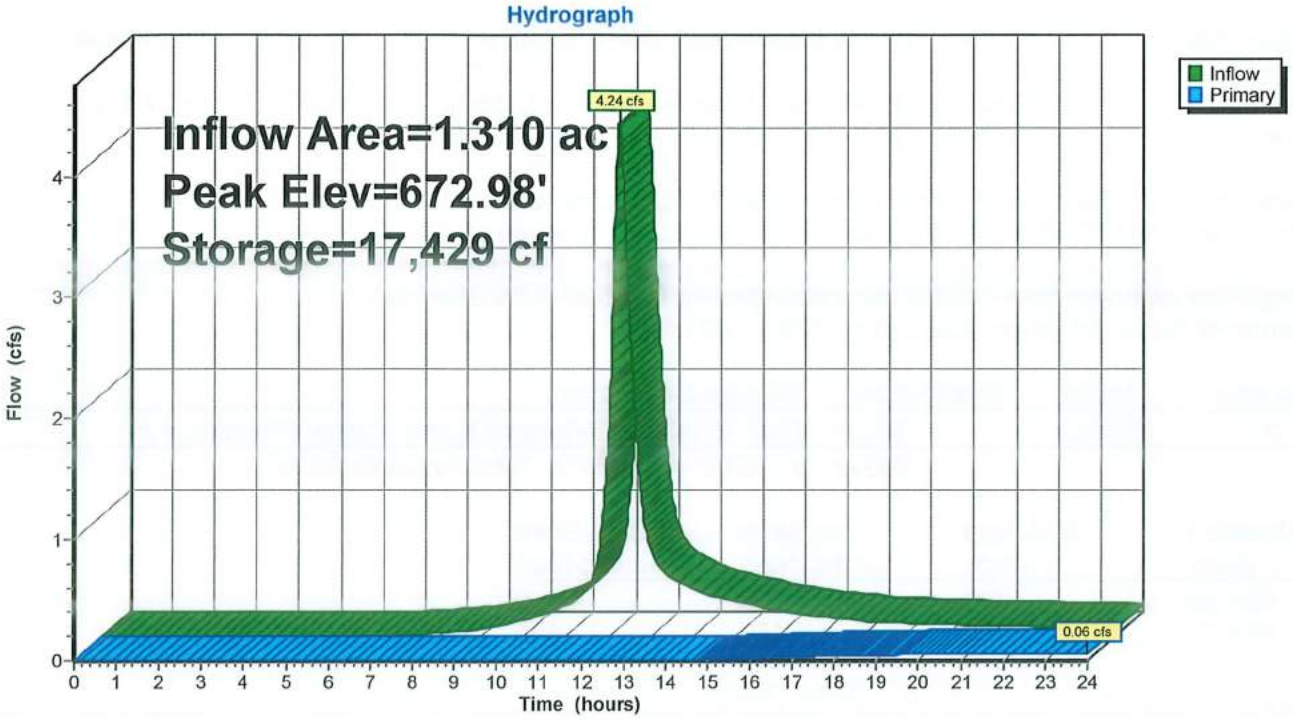
Volume	Invert	Avail.Storage	Storage Description
#1	672.50'	600 cf	**Rain Gradens (Prismatic)** Listed below (Recalc) x 4
		600 cf	x 30.00 = 18,000 cf Total Available Storage

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
672.50	300	0	0
673.00	300	150	150

Device	Routing	Invert	Outlet Devices
#1	Primary	672.90'	**1.0' long x 12.0' 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) 2.57 2.62 2.70 2.67 2.66 2.67 2.66 2.64

Primary OutFlow Max=0.06 cfs @ 24.00 hrs HW=672.98' (Free Discharge)
↑—**1=Broad-Crested Rectangular Weir** (Weir Controls 0.06 cfs @ 0.75 fps)

Pond 8P: Rain Gardens



Summary for Pond 9P: Rain Gardens

Inflow Area = 1.112 ac, 6.90% Impervious, Inflow Depth > 3.87" for 25 Year Storm event
Inflow = 3.70 cfs @ 12.22 hrs, Volume= 0.358 af
Outflow = 1.79 cfs @ 12.74 hrs, Volume= 0.155 af, Atten= 51%, Lag= 31.1 min
Primary = 1.79 cfs @ 12.74 hrs, Volume= 0.155 af

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Peak Elev= 664.67' @ 12.74 hrs Surf.Area= 18,000 sf Storage= 9,000 cf

Plug-Flow detention time= 270.0 min calculated for 0.155 af (43% of inflow)
Center-of-Mass det. time= 152.3 min (973.4 - 821.0)

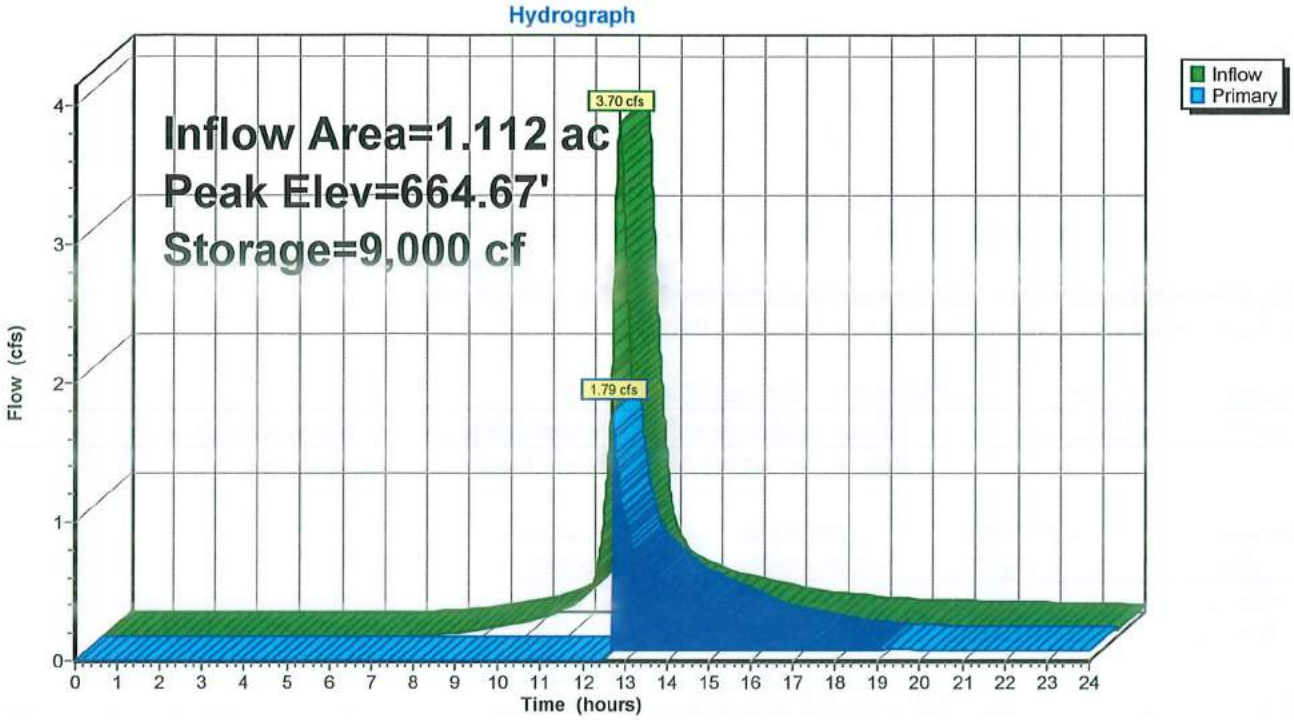
Volume	Invert	Avail.Storage	Storage Description
#1	663.50'	300 cf	**Rain Gradens (Prismatic)** Listed below (Recalc) x 2
		300 cf	x 30.00 = 9,000 cf Total Available Storage

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
663.50	300	0	0
664.00	300	150	150

Device	Routing	Invert	Outlet Devices
#1	Primary	663.90'	**1.0' long x 12.0' 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) 2.57 2.62 2.70 2.67 2.66 2.67 2.66 2.64

Primary OutFlow Max=1.79 cfs @ 12.74 hrs HW=664.67' (Free Discharge)
↑—**1=Broad-Crested Rectangular Weir** (Weir Controls 1.79 cfs @ 2.34 fps)

Pond 9P: Rain Gardens



Summary for Pond 10P: Rain Gardens

Inflow Area = 0.501 ac, 14.63% Impervious, Inflow Depth > 4.08" for 25 Year Storm event
Inflow = 1.71 cfs @ 12.24 hrs, Volume= 0.170 af
Outflow = 0.00 cfs @ 24.00 hrs, Volume= 0.000 af, Atten= 100%, Lag= 705.8 min
Primary = 0.00 cfs @ 24.00 hrs, Volume= 0.000 af

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Peak Elev= 665.91' @ 24.00 hrs Surf.Area= 18,000 sf Storage= 7,404 cf

Plug-Flow detention time= 984.0 min calculated for 0.000 af (0% of inflow)
Center-of-Mass det. time= 584.2 min (1,401.0 - 816.8)

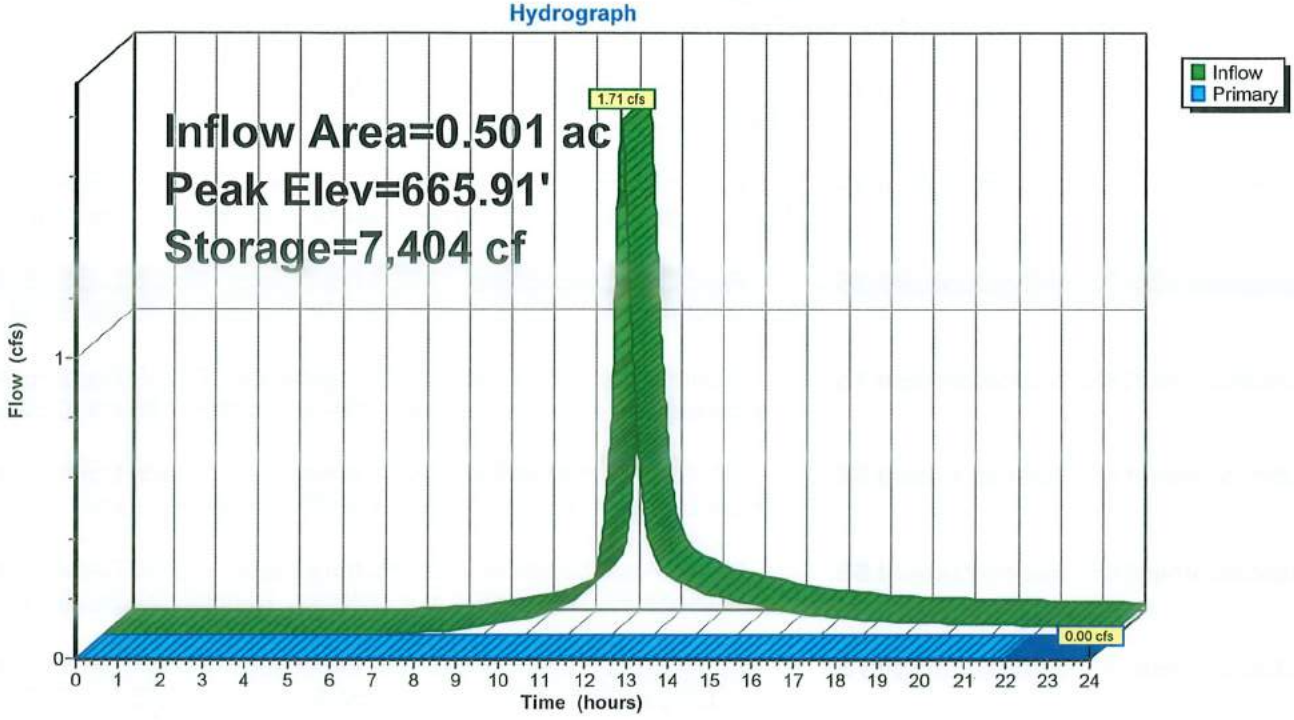
Volume	Invert	Avail.Storage	Storage Description
#1	665.50'	300 cf	**Rain Gradens (Prismatic)** Listed below (Recalc) x 2
		300 cf	x 30.00 = 9,000 cf Total Available Storage

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
665.50	300	0	0
666.00	300	150	150

Device	Routing	Invert	Outlet Devices
#1	Primary	665.90'	**1.0' long x 12.0' 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) 2.57 2.62 2.70 2.67 2.66 2.67 2.66 2.64

Primary OutFlow Max=0.00 cfs @ 24.00 hrs HW=665.91' (Free Discharge)
↑**1=Broad-Crested Rectangular Weir** (Weir Controls 0.00 cfs @ 0.27 fps)

Pond 10P: Rain Gardens



Time span=0.00-24.00 hrs, dt=0.01 hrs, 2401 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Subcatchment 1S: Subcatchment 4S Runoff Area=27,500 sf 0.00% Impervious Runoff Depth>6.11"
Flow Length=267' Tc=13.4 min CN=79 Runoff=3.53 cfs 0.321 af

Subcatchment 2S: Subcatchment 3S Runoff Area=180,441 sf 0.00% Impervious Runoff Depth>6.10"
Flow Length=494' Tc=21.4 min CN=79 Runoff=19.28 cfs 2.106 af

Subcatchment 3S: Subcatchment 2S Runoff Area=453,810 sf 0.00% Impervious Runoff Depth>6.09"
Flow Length=1,375' Tc=35.1 min CN=79 Runoff=38.80 cfs 5.284 af

Subcatchment 4S: Subcatchment 1S Runoff Area=48,777 sf 3.24% Impervious Runoff Depth>6.24"
Flow Length=483' Tc=6.3 min CN=80 Runoff=7.96 cfs 0.582 af

Subcatchment 5S: Subcatchment 5S Runoff Area=43,949 sf 9.85% Impervious Runoff Depth>6.36"
Flow Length=417' Tc=8.8 min CN=81 Runoff=6.69 cfs 0.535 af

Subcatchment 6S: Subcatchment 6S Runoff Area=58,597 sf 10.61% Impervious Runoff Depth>6.35"
Flow Length=357' Tc=16.8 min CN=81 Runoff=7.14 cfs 0.712 af

Subcatchment 7S: Subcatchment 7S Runoff Area=57,071 sf 12.92% Impervious Runoff Depth>6.35"
Flow Length=282' Tc=18.5 min CN=81 Runoff=6.68 cfs 0.693 af

Subcatchment 8S: Subcatchment 8S Runoff Area=231,694 sf 0.00% Impervious Runoff Depth>6.09"
Flow Length=818' Tc=31.5 min CN=79 Runoff=20.90 cfs 2.700 af

Subcatchment 9S: Subcatchment 9S Runoff Area=48,419 sf 6.90% Impervious Runoff Depth>6.23"
Flow Length=400' Tc=16.3 min CN=80 Runoff=5.88 cfs 0.577 af

Subcatchment 10S: Subcatchment 10S Runoff Area=21,833 sf 14.63% Impervious Runoff Depth>6.47"
Flow Length=367' Tc=17.4 min CN=82 Runoff=2.66 cfs 0.270 af

Pond 1P: Design Point 4 (Southern Property Line) Inflow=3.53 cfs 0.321 af
Primary=3.53 cfs 0.321 af

Pond 2P: Design Point 3 (Western Property Line) Inflow=19.28 cfs 2.106 af
Primary=19.28 cfs 2.106 af

Pond 3P: Design Point 2 (Stream) Inflow=38.80 cfs 5.284 af
Primary=38.80 cfs 5.284 af

Pond 4P: Design Point 1 (Ditch) Inflow=39.20 cfs 4.425 af
Primary=39.20 cfs 4.425 af

Pond 5P: Rain Gardens Peak Elev=639.15' Storage=9,000 cf Inflow=7.96 cfs 0.582 af
Outflow=15.45 cfs 0.376 af

Pond 6P: Rain Gardens Peak Elev=650.74' Storage=9,000 cf Inflow=6.69 cfs 0.535 af
Outflow=12.64 cfs 0.328 af

Pond 7P: Rain Gardens Peak Elev=663.14' Storage=18,000 cf Inflow=7.14 cfs 0.712 af
Outflow=3.68 cfs 0.299 af

Pond 8P: Rain Gardens Peak Elev=673.81' Storage=18,000 cf Inflow=6.68 cfs 0.693 af
Outflow=2.33 cfs 0.280 af

Pond 9P: Rain Gardens Peak Elev=665.77' Storage=9,000 cf Inflow=5.88 cfs 0.577 af
Outflow=6.75 cfs 0.370 af

Pond 10P: Rain Gardens Peak Elev=666.10' Storage=9,000 cf Inflow=2.66 cfs 0.270 af
Outflow=0.23 cfs 0.073 af

Total Runoff Area = 26.908 ac Runoff Volume = 13.780 af Average Runoff Depth = 6.15"
97.78% Pervious = 26.310 ac 2.22% Impervious = 0.598 ac

Summary for Subcatchment 1S: Subcatchment 4S

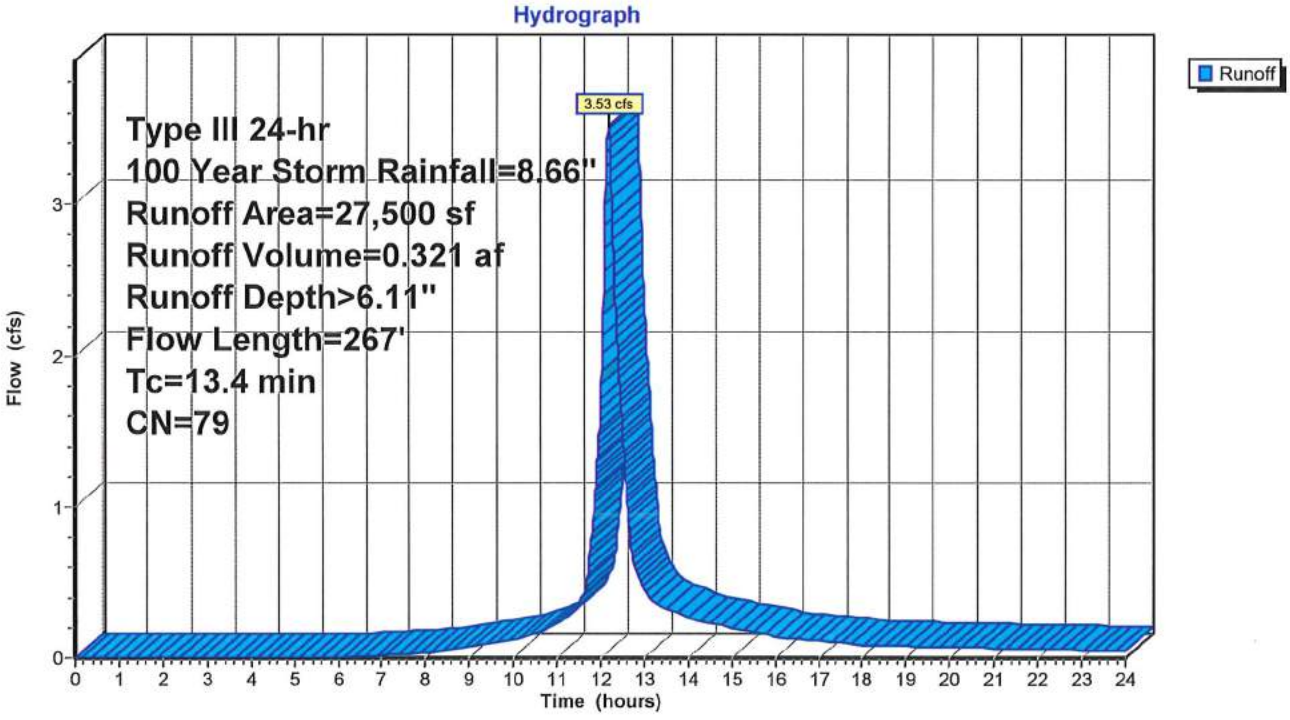
Runoff = 3.53 cfs @ 12.18 hrs, Volume= 0.321 af, Depth> 6.11"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Type III 24-hr 100 Year Storm Rainfall=8.66"

Area (sf)	CN	Description
27,500	79	Woods, Fair, HSG D
27,500		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
11.0	100	0.1069	0.15		**Sheet Flow, Sheet Flow** Woods: Light underbrush n= 0.400 P2= 3.17"
2.4	167	0.0531	1.15		**Shallow Concentrated Flow, Shallow C flow** Woodland Kv= 5.0 fps
13.4	267	Total			

Subcatchment 1S: Subcatchment 4S



Summary for Subcatchment 2S: Subcatchment 3S

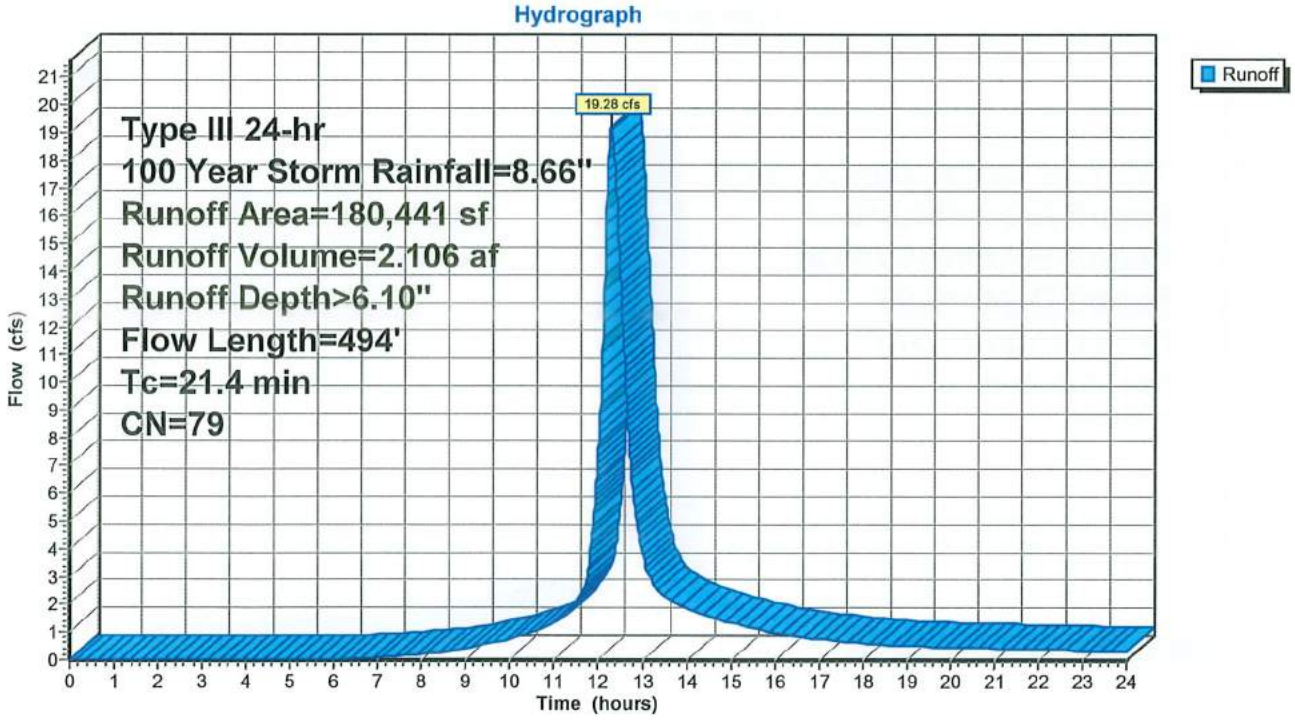
Runoff = 19.28 cfs @ 12.29 hrs, Volume= 2.106 af, Depth> 6.10"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Type III 24-hr 100 Year Storm Rainfall=8.66"

Area (sf)	CN	Description
180,441	79	Woods, Fair, HSG D
180,441		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
17.0	100	0.0361	0.10		**Sheet Flow, Sheet Flow** Woods: Light underbrush n= 0.400 P2= 3.17"
4.4	394	0.0890	1.49		**Shallow Concentrated Flow, Shallow C Flow** Woodland Kv= 5.0 fps
21.4	494	Total			

Subcatchment 2S: Subcatchment 3S



Summary for Subcatchment 3S: Subcatchment 2S

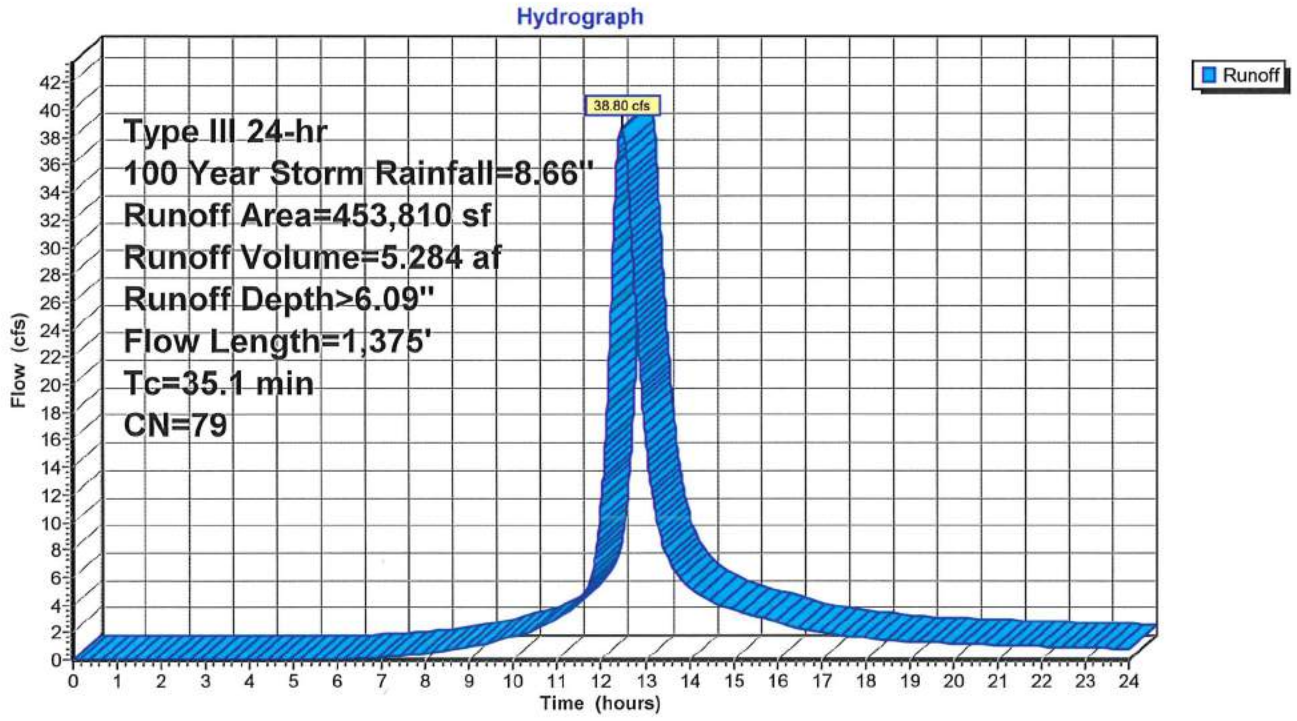
Runoff = 38.80 cfs @ 12.48 hrs, Volume= 5.284 af, Depth> 6.09"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Type III 24-hr 100 Year Storm Rainfall=8.66"

Area (sf)	CN	Description
453,810	79	Woods, Fair, HSG D
453,810		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
14.1	100	0.0575	0.12		**Sheet Flow, Sheet Flow** Woods: Light underbrush n= 0.400 P2= 3.17"
21.0	1,275	0.0410	1.01		**Shallow Concentrated Flow, Shallow C Flow** Woodland Kv= 5.0 fps
35.1	1,375	Total			

Subcatchment 3S: Subcatchment 2S



Summary for Subcatchment 4S: Subcatchment 1S

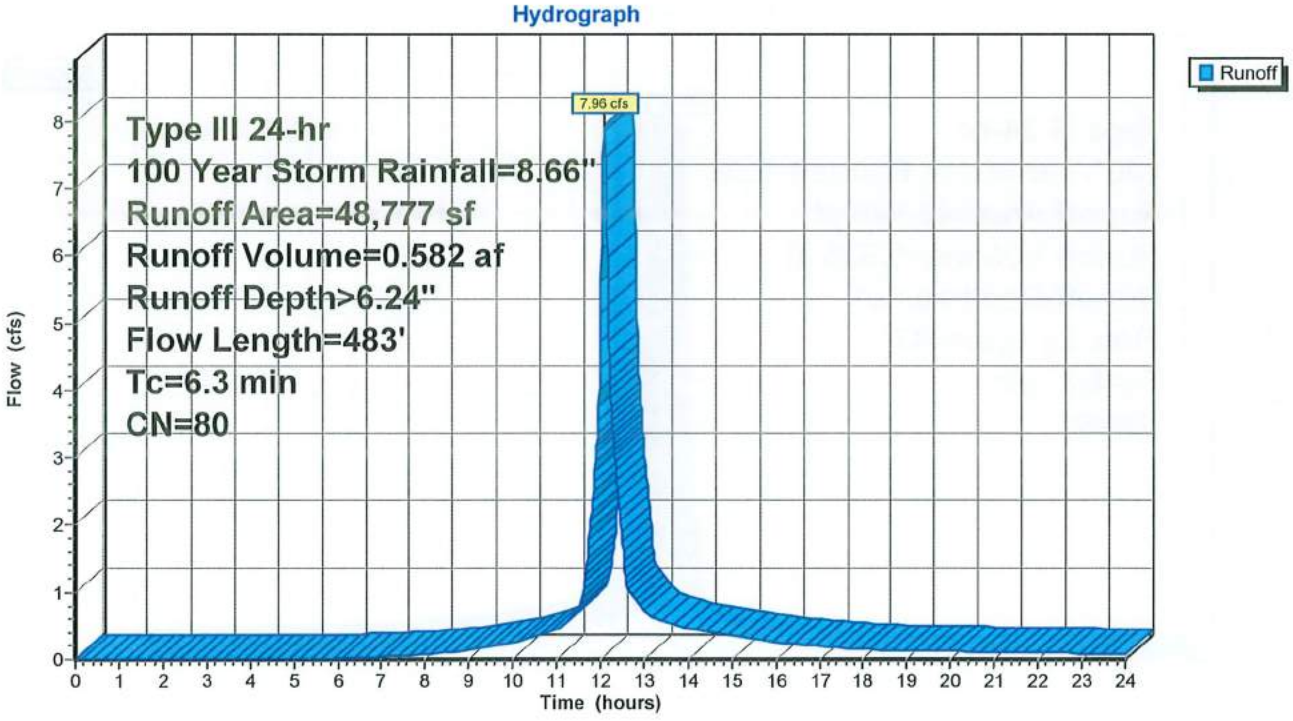
Runoff = 7.96 cfs @ 12.09 hrs, Volume= 0.582 af, Depth> 6.24"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Type III 24-hr 100 Year Storm Rainfall=8.66"

	Area (sf)	CN	Description
	47,199	79	Woods, Fair, HSG D
*	1,578	98	Driveways, HSG A
	48,777	80	Weighted Average
	47,199		96.76% Pervious Area
	1,578		3.24% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
4.8	100	0.1200	0.35		**Sheet Flow, Sheet Flow** Grass: Short n= 0.150 P2= 3.17"
1.5	383	0.0783	4.20		**Shallow Concentrated Flow, Shallow C flow** Grassed Waterway Kv= 15.0 fps
6.3	483	Total			

Subcatchment 4S: Subcatchment 1S



Summary for Subcatchment 5S: Subcatchment 5S

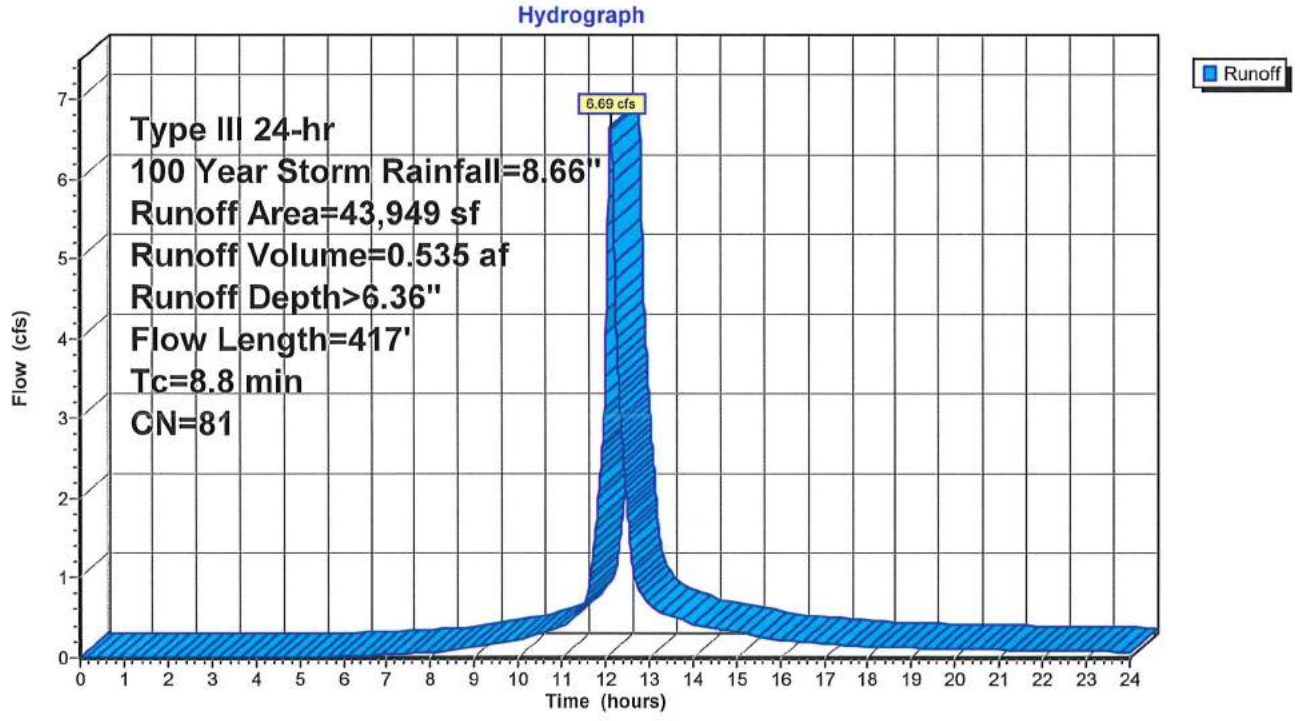
Runoff = 6.69 cfs @ 12.12 hrs, Volume= 0.535 af, Depth> 6.36"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Type III 24-hr 100 Year Storm Rainfall=8.66"

	Area (sf)	CN	Description
	39,620	79	Woods, Fair, HSG D
*	4,329	98	Driveway
	43,949	81	Weighted Average
	39,620		90.15% Pervious Area
	4,329		9.85% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.2	100	0.0972	0.32		**Sheet Flow, Sheet Flow** Grass: Short n= 0.150 P2= 3.17"
3.6	317	0.0861	1.47		**Shallow Concentrated Flow, Shallow C. Flow** Woodland Kv= 5.0 fps
8.8	417	Total			

Subcatchment 5S: Subcatchment 5S



Summary for Subcatchment 6S: Subcatchment 6S

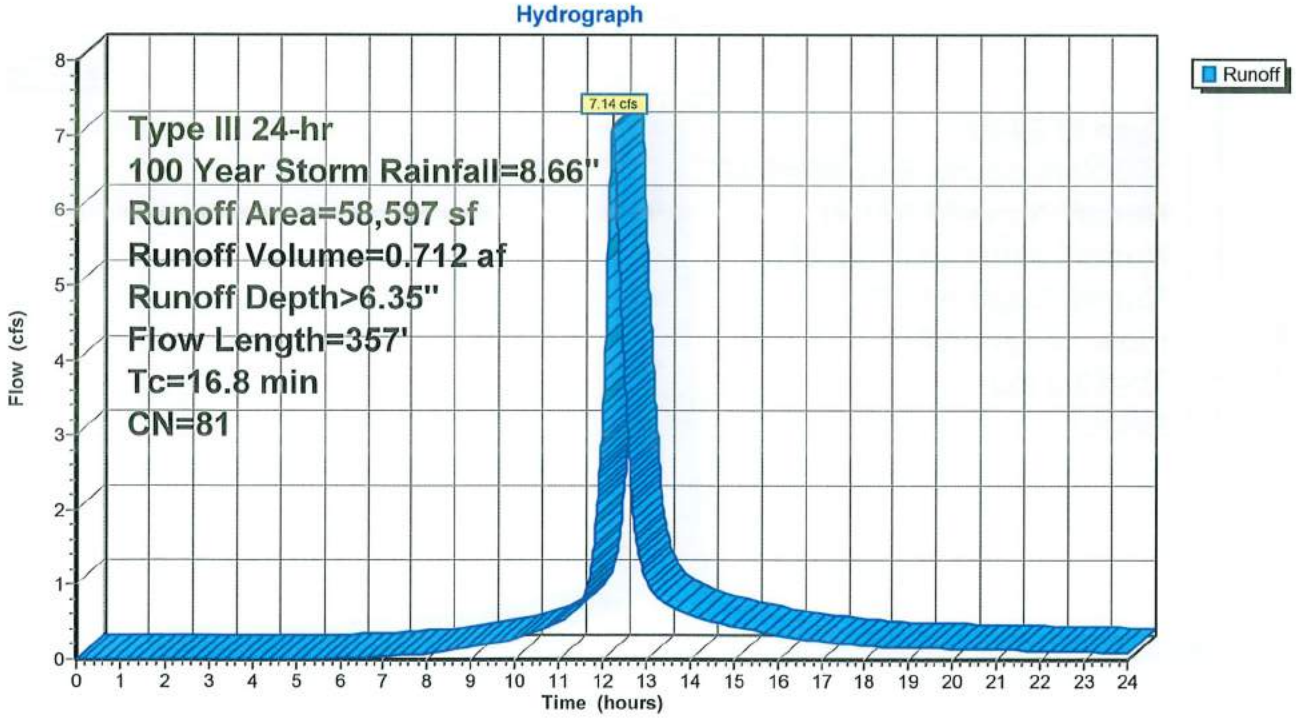
Runoff = 7.14 cfs @ 12.23 hrs, Volume= 0.712 af, Depth> 6.35"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Type III 24-hr 100 Year Storm Rainfall=8.66"

	Area (sf)	CN	Description
	52,377	79	Woods, Fair, HSG D
*	6,220	98	Driveway
	58,597	81	Weighted Average
	52,377		89.39% Pervious Area
	6,220		10.61% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
13.9	100	0.0600	0.12		**Sheet Flow, Sheet Flow** Woods: Light underbrush n= 0.400 P2= 3.17"
2.9	257	0.0856	1.46		**Shallow Concentrated Flow, Shallow C. Flow** Woodland Kv= 5.0 fps
16.8	357	Total			

Subcatchment 6S: Subcatchment 6S



Summary for Subcatchment 7S: Subcatchment 7S

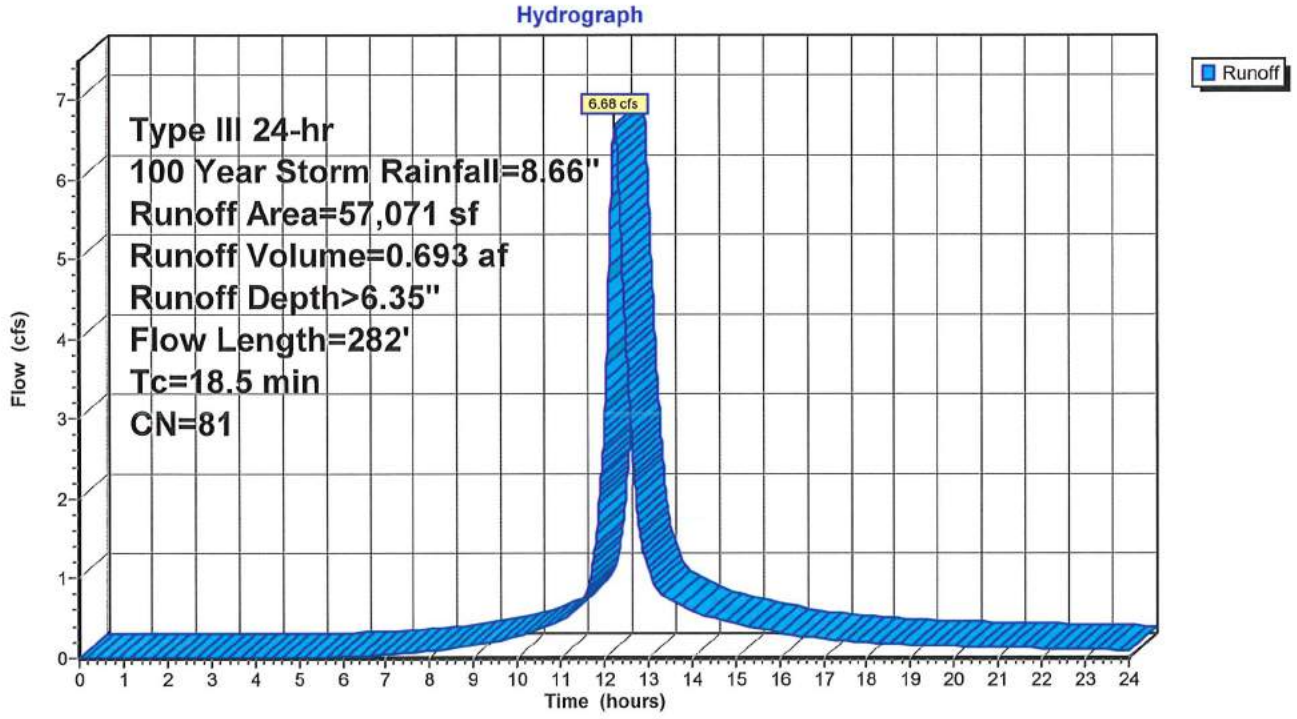
Runoff = 6.68 cfs @ 12.25 hrs, Volume= 0.693 af, Depth> 6.35"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Type III 24-hr 100 Year Storm Rainfall=8.66"

	Area (sf)	CN	Description
	49,698	79	Woods, Fair, HSG D
*	7,373	98	Driveway
	57,071	81	Weighted Average
	49,698		87.08% Pervious Area
	7,373		12.92% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
16.4	100	0.0400	0.10		**Sheet Flow, Sheet Flow** Woods: Light underbrush n= 0.400 P2= 3.17"
2.1	182	0.0824	1.44		**Shallow Concentrated Flow, Shallow C. Flow** Woodland Kv= 5.0 fps
18.5	282	Total			

Subcatchment 7S: Subcatchment 7S



Summary for Subcatchment 8S: Subcatchment 8S

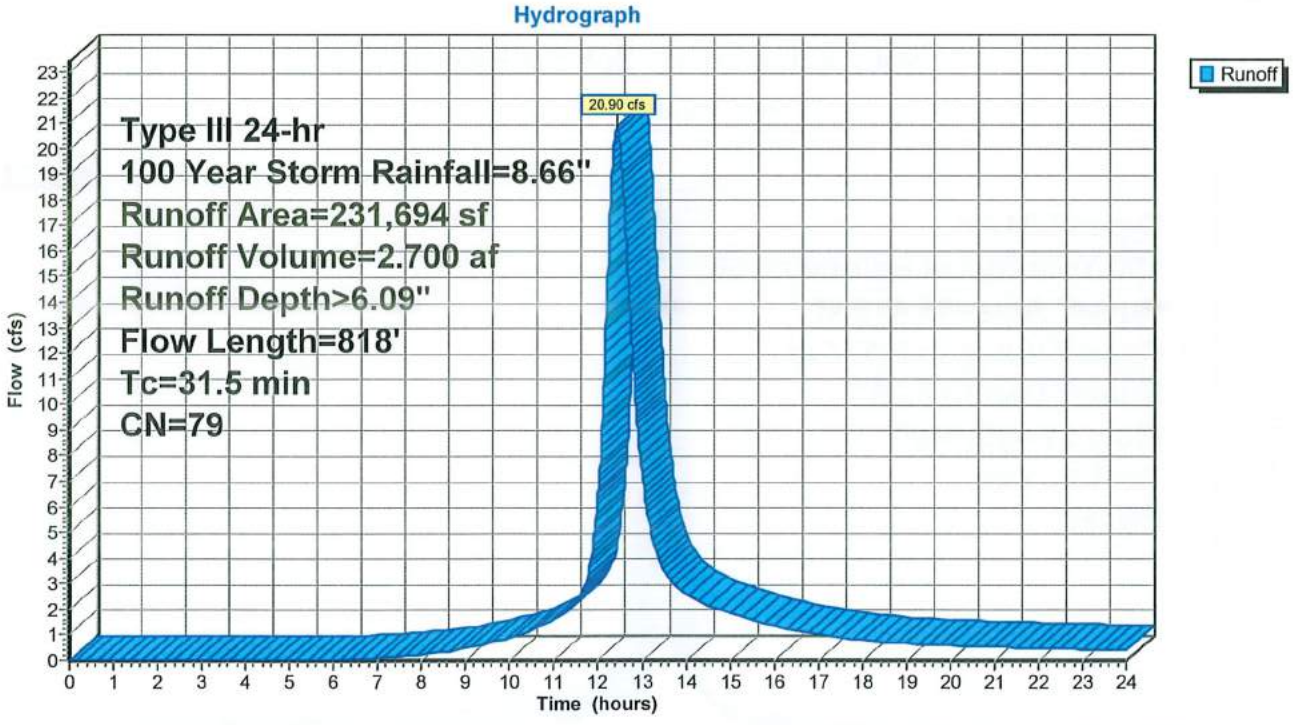
Runoff = 20.90 cfs @ 12.43 hrs, Volume= 2.700 af, Depth> 6.09"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Type III 24-hr 100 Year Storm Rainfall=8.66"

Area (sf)	CN	Description
231,694	79	Woods, Fair, HSG D
231,694		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
20.7	100	0.0222	0.08		**Sheet Flow, Sheet Flow** Woods: Light underbrush n= 0.400 P2= 3.17"
10.8	718	0.0488	1.10		**Shallow Concentrated Flow, Shallow C. Flow** Woodland Kv= 5.0 fps
31.5	818	Total			

Subcatchment 8S: Subcatchment 8S



Summary for Subcatchment 9S: Subcatchment 9S

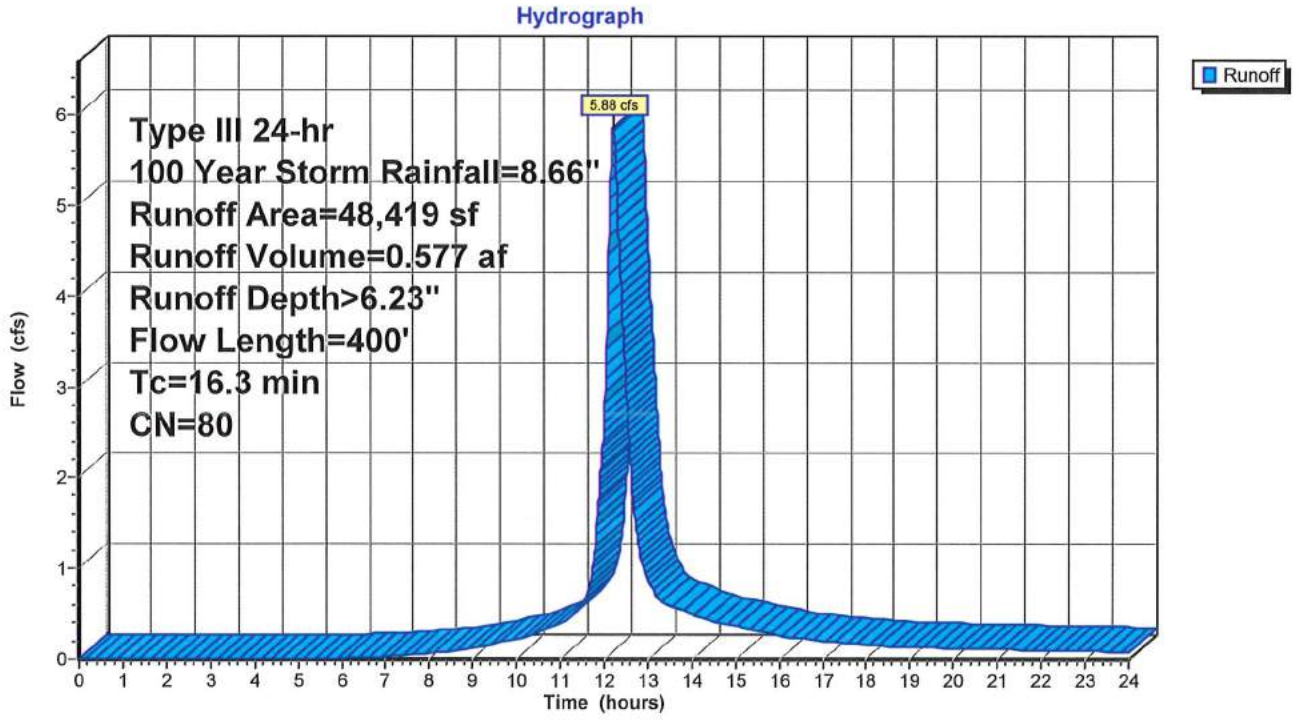
Runoff = 5.88 cfs @ 12.22 hrs, Volume= 0.577 af, Depth> 6.23"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Type III 24-hr 100 Year Storm Rainfall=8.66"

	Area (sf)	CN	Description
	45,079	79	Woods, Fair, HSG D
*	3,340	98	Driveway
	48,419	80	Weighted Average
	45,079		93.10% Pervious Area
	3,340		6.90% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
12.9	100	0.0722	0.13		**Sheet Flow, Sheet Flow** Woods: Light underbrush n= 0.400 P2= 3.17"
3.4	300	0.0884	1.49		**Shallow Concentrated Flow, Shallow C. Flow** Woodland Kv= 5.0 fps
16.3	400	Total			

Subcatchment 9S: Subcatchment 9S



Summary for Subcatchment 10S: Subcatchment 10S

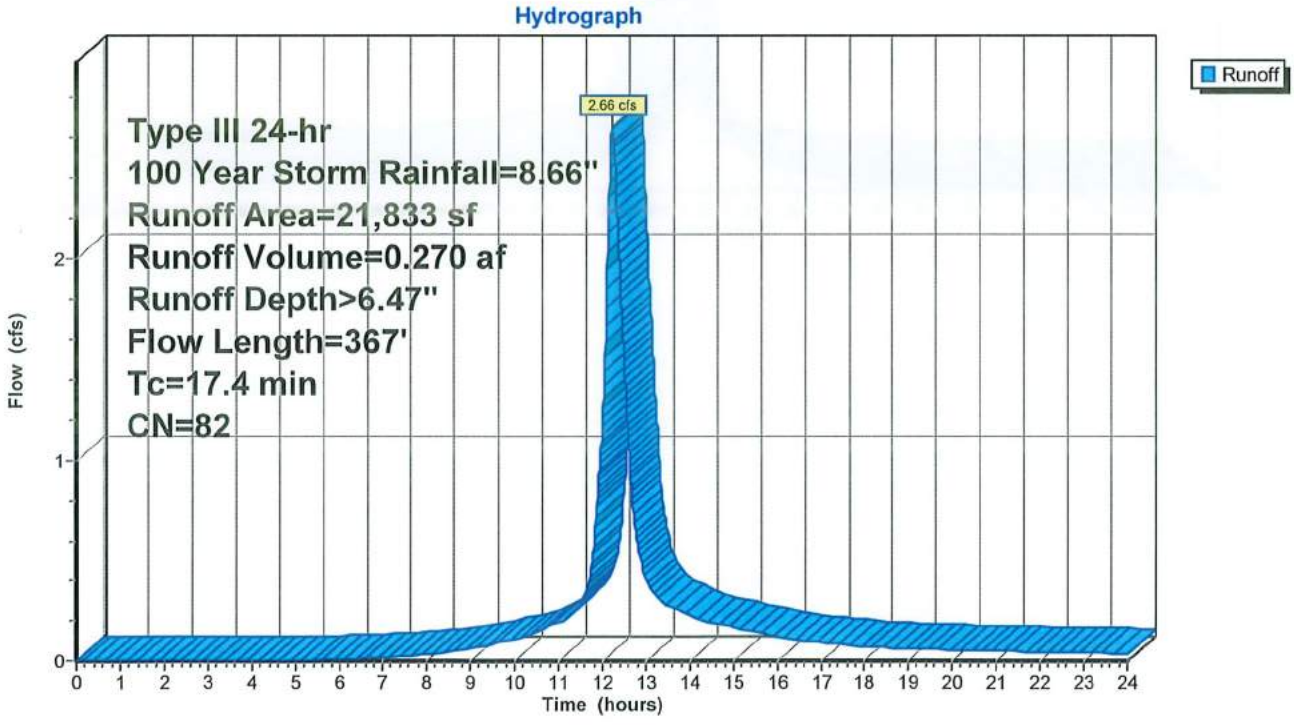
Runoff = 2.66 cfs @ 12.23 hrs, Volume= 0.270 af, Depth> 6.47"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Type III 24-hr 100 Year Storm Rainfall=8.66"

	Area (sf)	CN	Description
	18,639	79	Woods, Fair, HSG D
*	3,194	98	Driveway
	21,833	82	Weighted Average
	18,639		85.37% Pervious Area
	3,194		14.63% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
14.5	100	0.0541	0.12		**Sheet Flow, Sheet Flow** Woods: Light underbrush n= 0.400 P2= 3.17"
2.9	267	0.0974	1.56		**Shallow Concentrated Flow, Shallow C. Flow** Woodland Kv= 5.0 fps
17.4	367	Total			

Subcatchment 10S: Subcatchment 10S

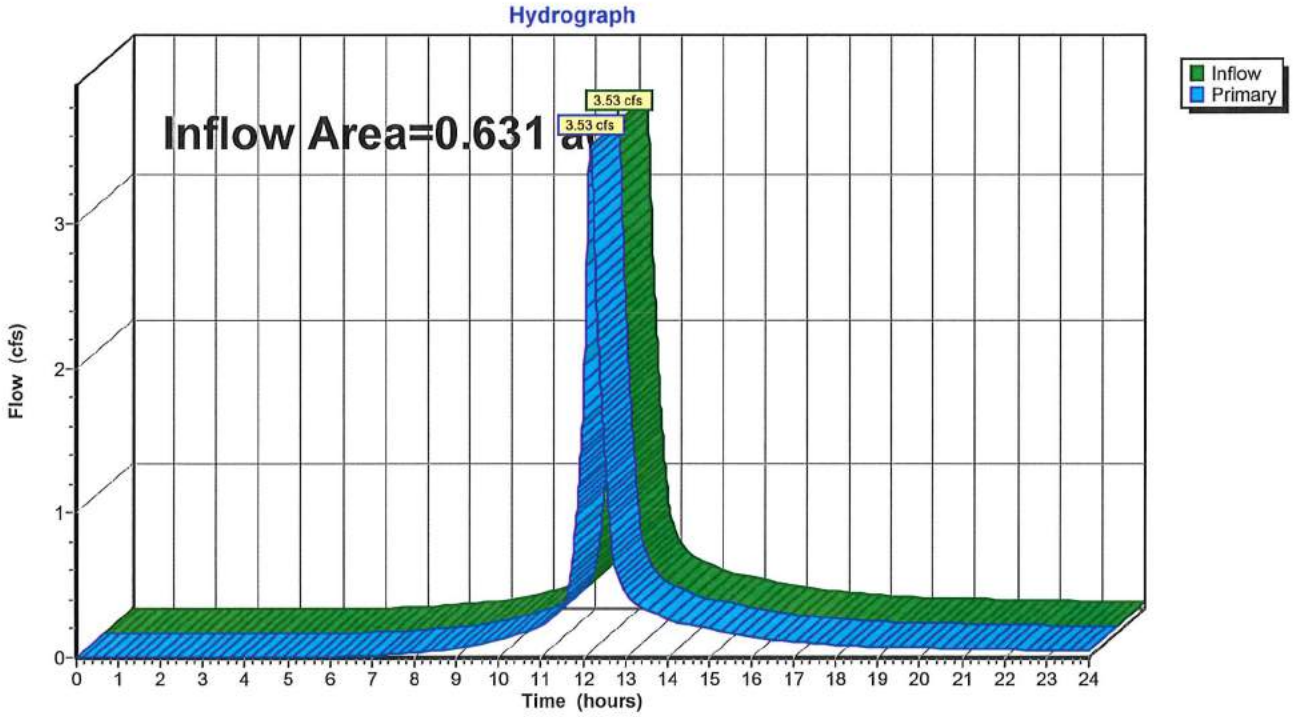


Summary for Pond 1P: Design Point 4 (Southern Property Line)

Inflow Area = 0.631 ac, 0.00% Impervious, Inflow Depth > 6.11" for 100 Year Storm event
Inflow = 3.53 cfs @ 12.18 hrs, Volume= 0.321 af
Primary = 3.53 cfs @ 12.18 hrs, Volume= 0.321 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs

Pond 1P: Design Point 4 (Southern Property Line)

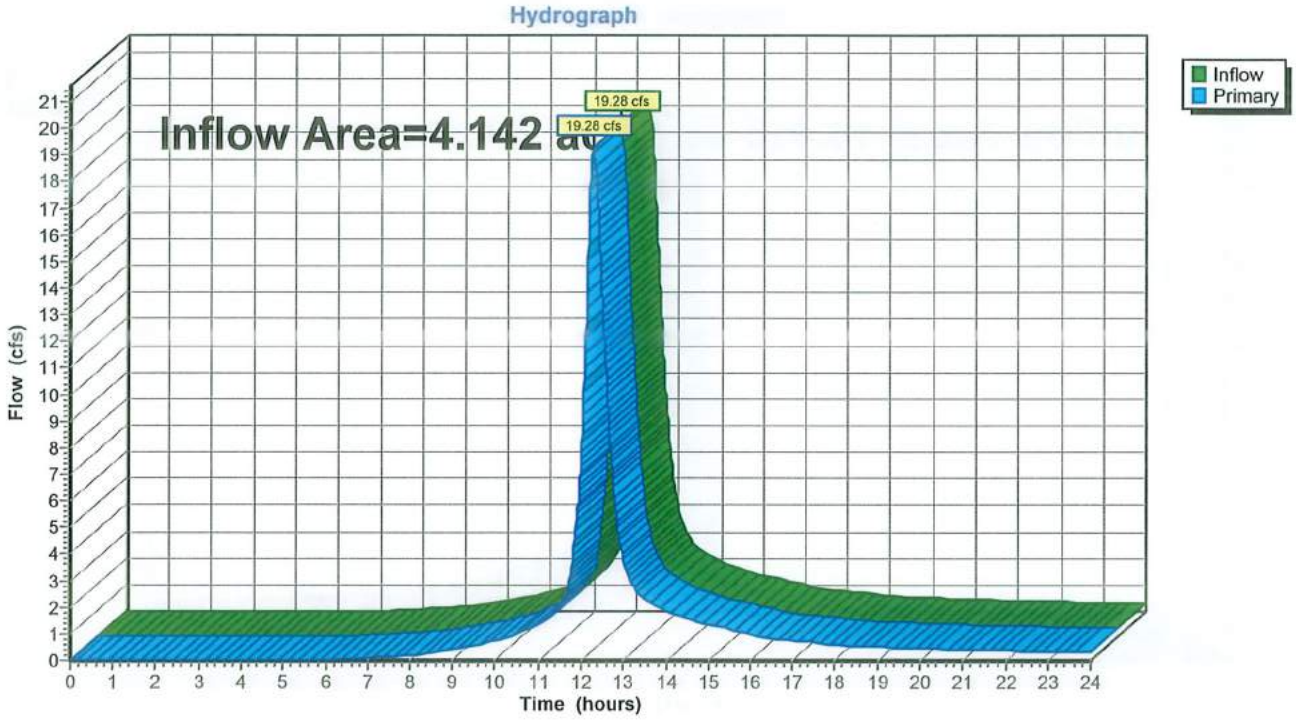


Summary for Pond 2P: Design Point 3 (Western Property Line)

Inflow Area = 4.142 ac, 0.00% Impervious, Inflow Depth > 6.10" for 100 Year Storm event
Inflow = 19.28 cfs @ 12.29 hrs, Volume= 2.106 af
Primary = 19.28 cfs @ 12.29 hrs, Volume= 2.106 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs

Pond 2P: Design Point 3 (Western Property Line)

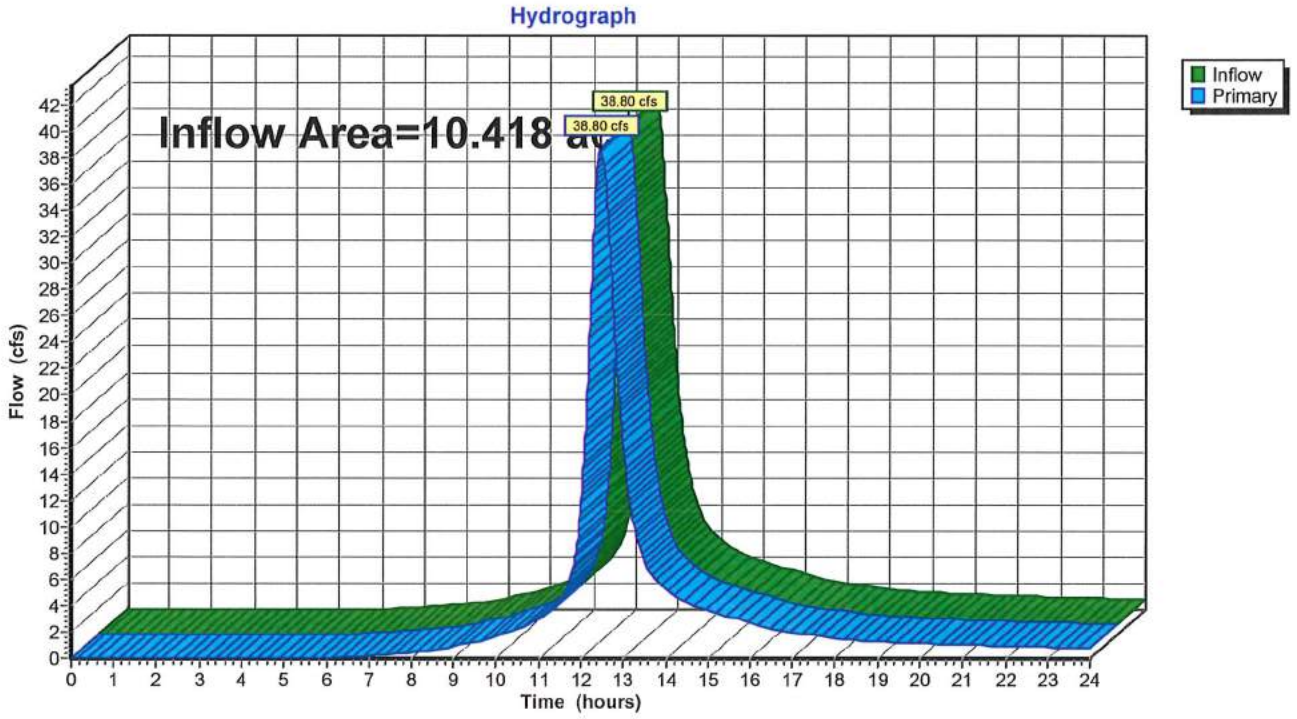


Summary for Pond 3P: Design Point 2 (Stream)

Inflow Area = 10.418 ac, 0.00% Impervious, Inflow Depth > 6.09" for 100 Year Storm event
Inflow = 38.80 cfs @ 12.48 hrs, Volume= 5.284 af
Primary = 38.80 cfs @ 12.48 hrs, Volume= 5.284 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs

Pond 3P: Design Point 2 (Stream)

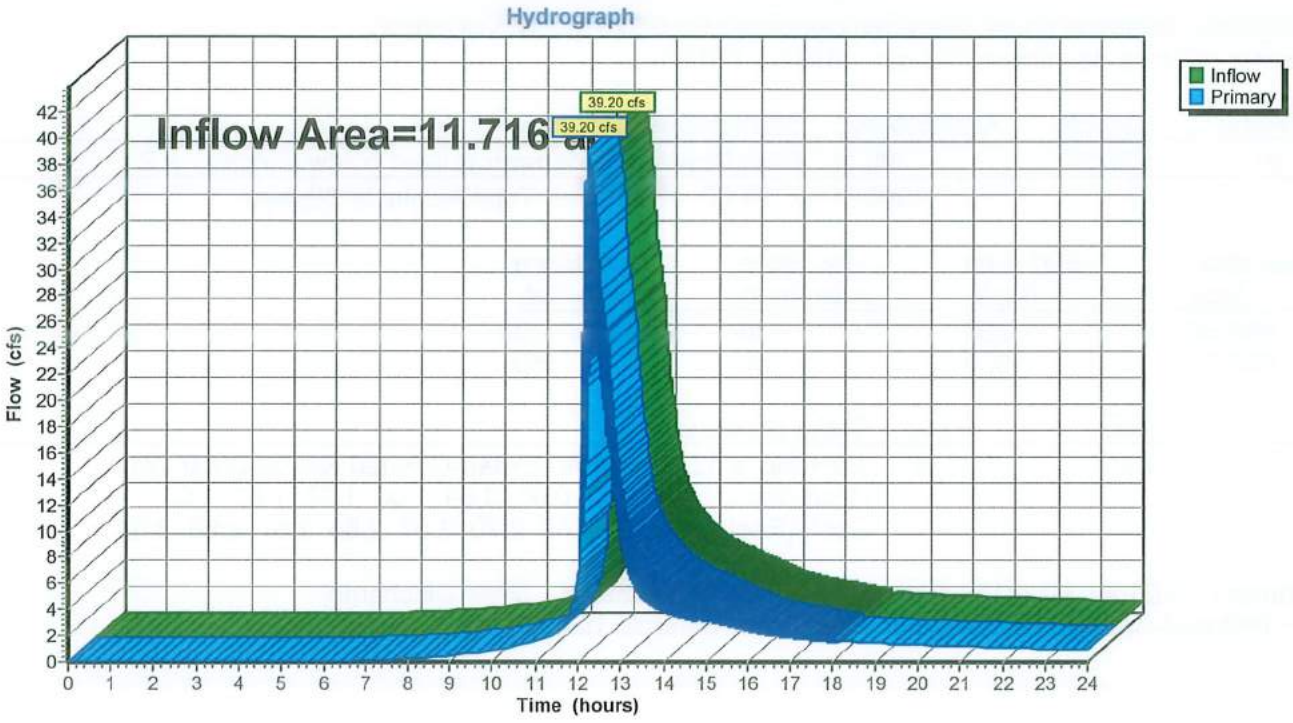


Summary for Pond 4P: Design Point 1 (Ditch)

Inflow Area = 11.716 ac, 5.10% Impervious, Inflow Depth > 4.53" for 100 Year Storm event
Inflow = 39.20 cfs @ 12.25 hrs, Volume= 4.425 af
Primary = 39.20 cfs @ 12.25 hrs, Volume= 4.425 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs

Pond 4P: Design Point 1 (Ditch)



Summary for Pond 5P: Rain Gardens

Inflow Area = 1.120 ac, 3.24% Impervious, Inflow Depth > 6.24" for 100 Year Storm event
Inflow = 7.96 cfs @ 12.09 hrs, Volume= 0.582 af
Outflow = 15.45 cfs @ 12.09 hrs, Volume= 0.376 af, Atten= 0%, Lag= 0.0 min
Primary = 15.45 cfs @ 12.09 hrs, Volume= 0.376 af

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Peak Elev= 639.15' @ 12.09 hrs Surf.Area= 18,000 sf Storage= 9,000 cf

Plug-Flow detention time= 169.4 min calculated for 0.376 af (64% of inflow)
Center-of-Mass det. time= 71.0 min (870.6 - 799.6)

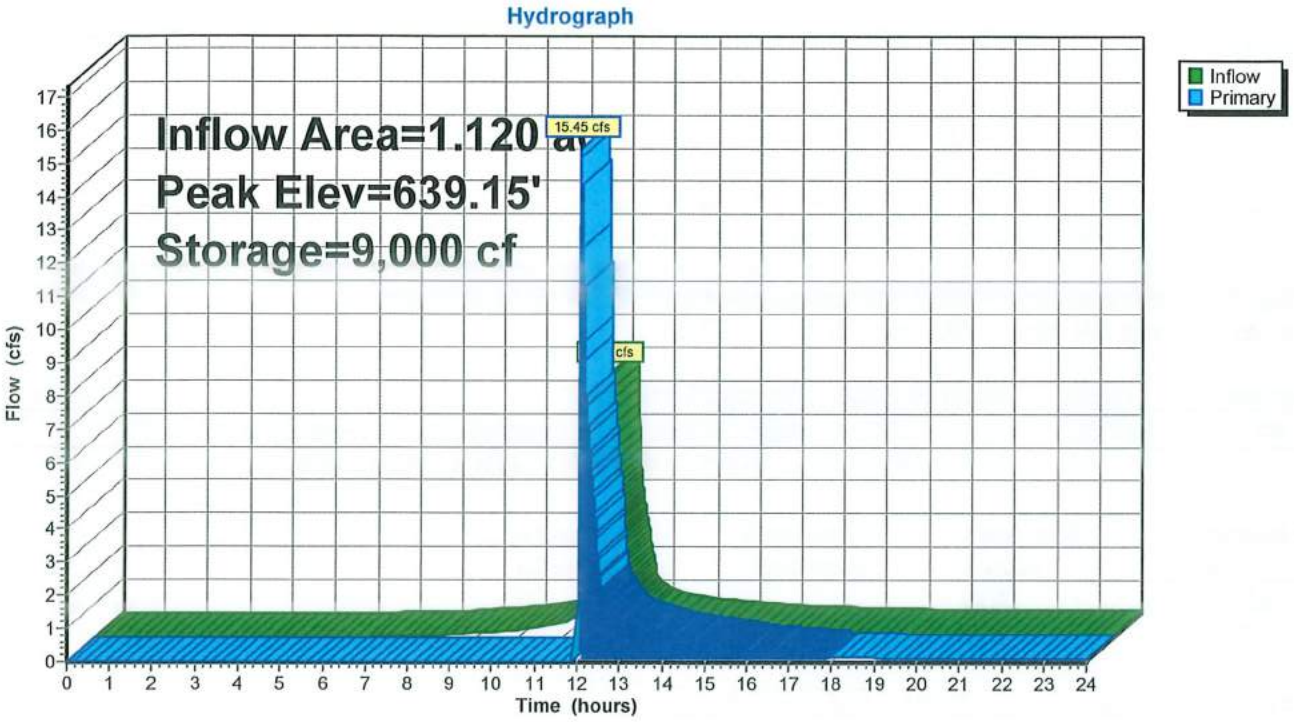
Volume	Invert	Avail.Storage	Storage Description
#1	635.50'	300 cf	**Rain Gradens (Prismatic)** Listed below (Recalc) x 2
		300 cf	x 30.00 = 9,000 cf Total Available Storage

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
635.50	300	0	0
636.00	300	150	150

Device	Routing	Invert	Outlet Devices
#1	Primary	635.90'	**1.0' long x 12.0' 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) 2.57 2.62 2.70 2.67 2.66 2.67 2.66 2.64

Primary OutFlow Max=15.45 cfs @ 12.09 hrs HW=639.15' (Free Discharge)
1=Broad-Crested Rectangular Weir (Weir Controls 15.45 cfs @ 4.76 fps)

Pond 5P: Rain Gardens



Summary for Pond 6P: Rain Gardens

Inflow Area = 1.009 ac, 9.85% Impervious, Inflow Depth > 6.36" for 100 Year Storm event
Inflow = 6.69 cfs @ 12.12 hrs, Volume= 0.535 af
Outflow = 12.64 cfs @ 12.15 hrs, Volume= 0.328 af, Atten= 0%, Lag= 1.7 min
Primary = 12.64 cfs @ 12.15 hrs, Volume= 0.328 af

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Peak Elev= 650.74' @ 12.15 hrs Surf.Area= 18,000 sf Storage= 9,000 cf

Plug-Flow detention time= 180.6 min calculated for 0.328 af (61% of inflow)
Center-of-Mass det. time= 79.4 min (878.7 - 799.3)

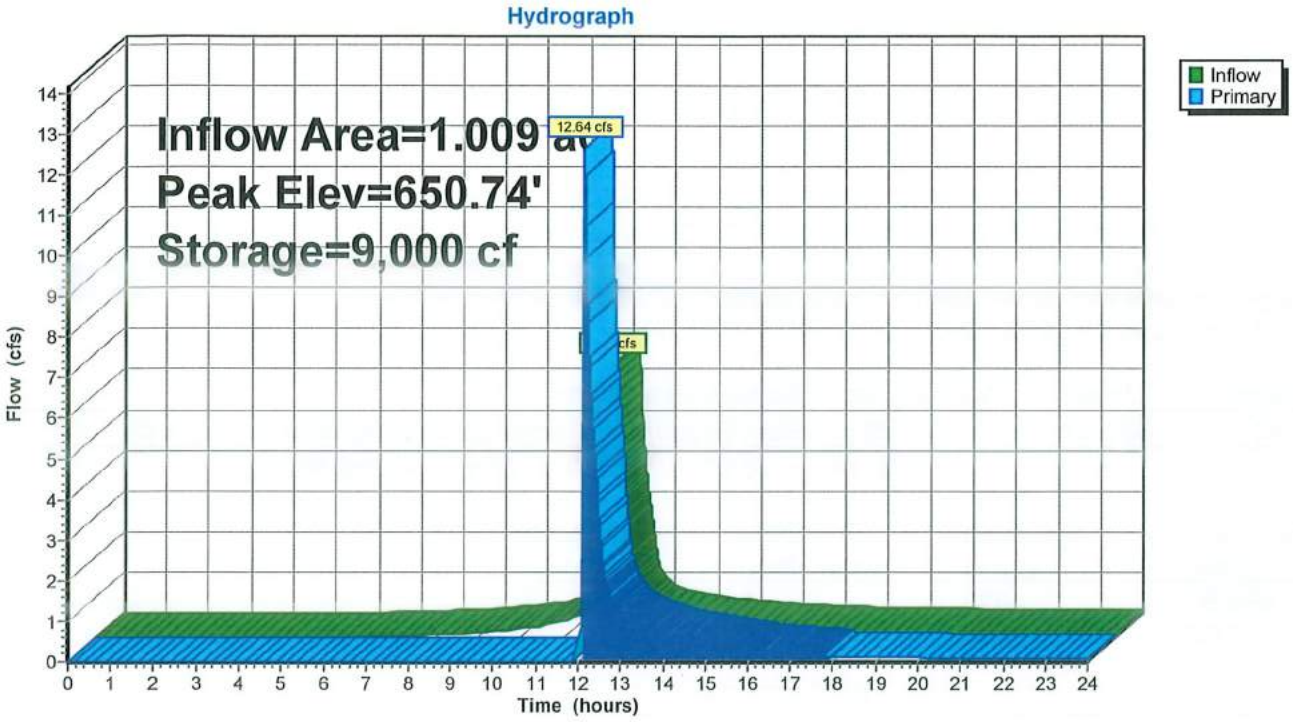
Volume	Invert	Avail.Storage	Storage Description
#1	647.50'	300 cf	**Rain Gradens (Prismatic)** Listed below (Recalc) x 2
		300 cf	x 30.00 = 9,000 cf Total Available Storage

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
647.50	300	0	0
648.00	300	150	150

Device	Routing	Invert	Outlet Devices
#1	Primary	647.90'	**1.0' long x 12.0' 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) 2.57 2.62 2.70 2.67 2.66 2.67 2.66 2.64

Primary OutFlow Max=12.64 cfs @ 12.15 hrs HW=650.74' (Free Discharge)
↑—**1=Broad-Crested Rectangular Weir** (Weir Controls 12.64 cfs @ 4.45 fps)

Pond 6P: Rain Gardens



Summary for Pond 7P: Rain Gardens

Inflow Area = 1.345 ac, 10.61% Impervious, Inflow Depth > 6.35" for 100 Year Storm event
Inflow = 7.14 cfs @ 12.23 hrs, Volume= 0.712 af
Outflow = 3.68 cfs @ 12.63 hrs, Volume= 0.299 af, Atten= 48%, Lag= 24.3 min
Primary = 3.68 cfs @ 12.63 hrs, Volume= 0.299 af

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Peak Elev= 663.14' @ 12.63 hrs Surf.Area= 36,000 sf Storage= 18,000 cf

Plug-Flow detention time= 264.0 min calculated for 0.298 af (42% of inflow)
Center-of-Mass det. time= 143.6 min (949.4 - 805.8)

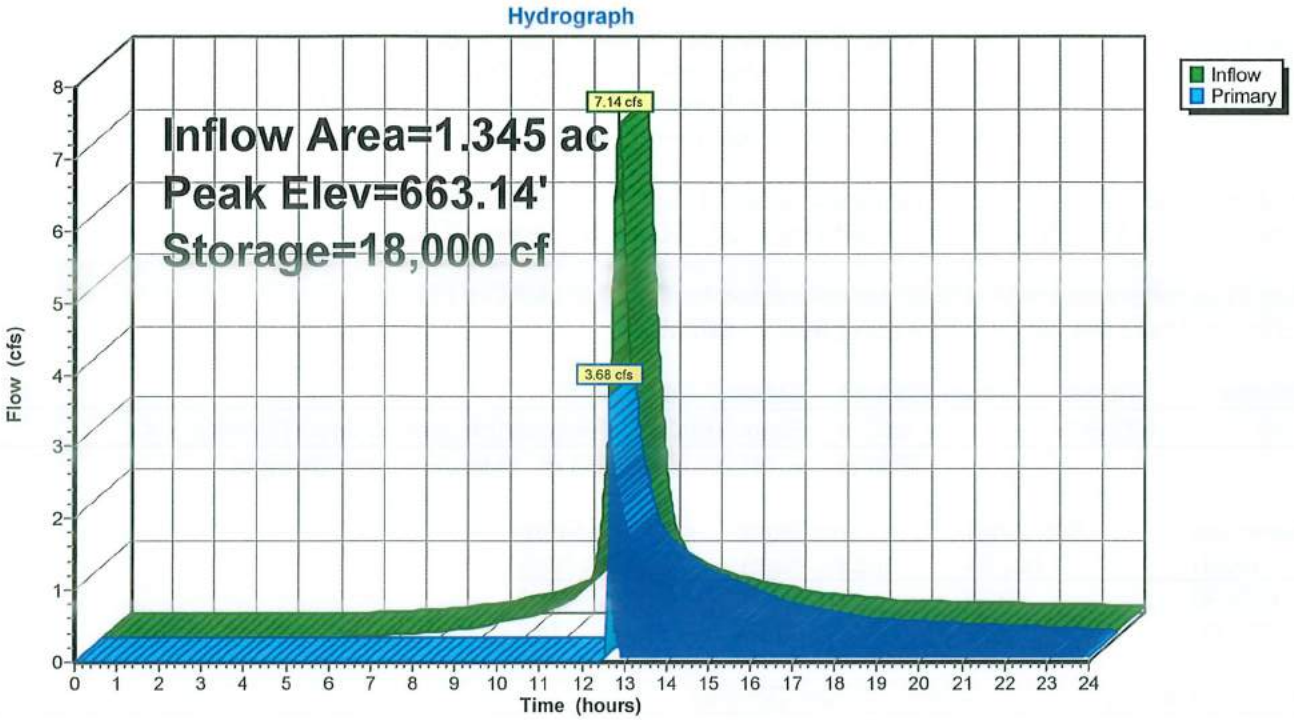
Volume	Invert	Avail.Storage	Storage Description
#1	661.50'	600 cf	**Rain Gradens (Prismatic)** Listed below (Recalc) x 4
		600 cf	x 30.00 = 18,000 cf Total Available Storage

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
661.50	300	0	0
662.00	300	150	150

Device	Routing	Invert	Outlet Devices
#1	Primary	661.90'	**1.0' long x 12.0' 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) 2.57 2.62 2.70 2.67 2.66 2.67 2.66 2.64

Primary OutFlow Max=3.68 cfs @ 12.63 hrs HW=663.14' (Free Discharge)
↑**1=Broad-Crested Rectangular Weir** (Weir Controls 3.68 cfs @ 2.97 fps)

Pond 7P: Rain Gardens



Summary for Pond 8P: Rain Gardens

Inflow Area = 1.310 ac, 12.92% Impervious, Inflow Depth > 6.35" for 100 Year Storm event
Inflow = 6.68 cfs @ 12.25 hrs, Volume= 0.693 af
Outflow = 2.33 cfs @ 12.72 hrs, Volume= 0.280 af, Atten= 65%, Lag= 28.4 min
Primary = 2.33 cfs @ 12.72 hrs, Volume= 0.280 af

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Peak Elev= 673.81' @ 12.72 hrs Surf.Area= 36,000 sf Storage= 18,000 cf

Plug-Flow detention time= 273.5 min calculated for 0.280 af (40% of inflow)
Center-of-Mass det. time= 150.9 min (958.1 - 807.2)

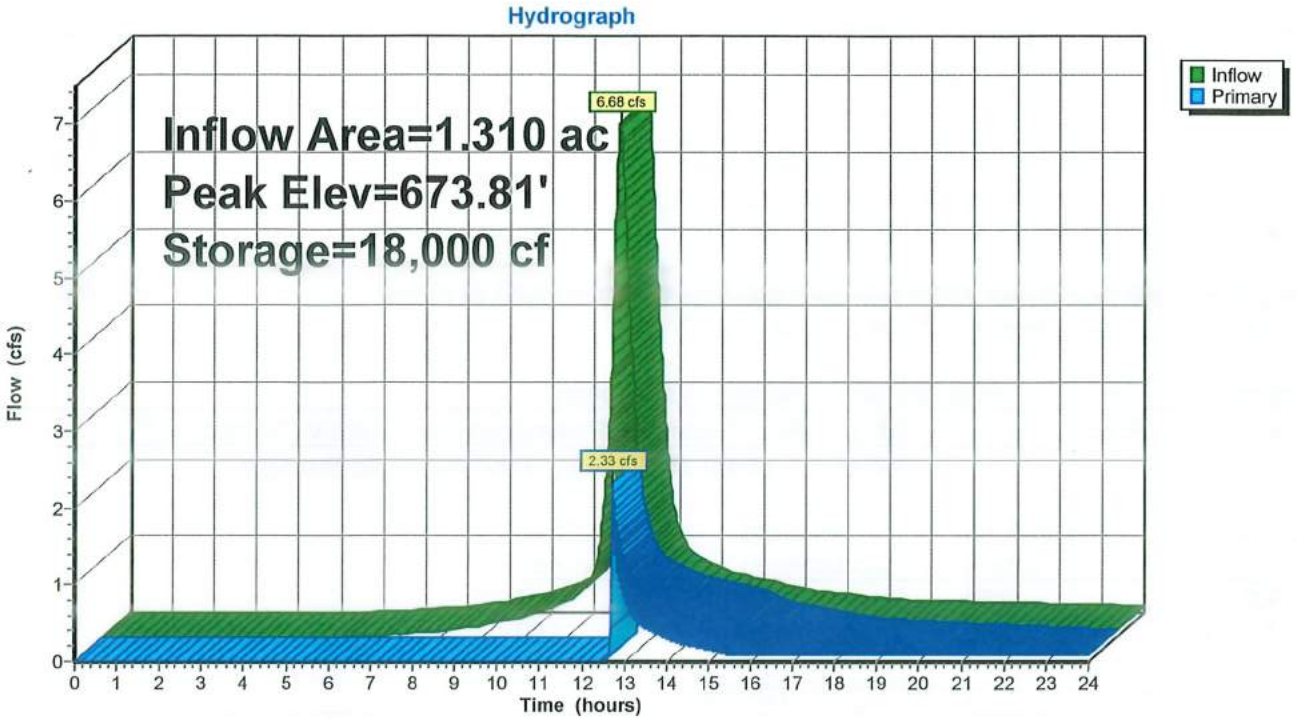
Volume	Invert	Avail.Storage	Storage Description
#1	672.50'	600 cf	**Rain Gradens (Prismatic)** Listed below (Recalc) x 4
		600 cf	x 30.00 = 18,000 cf Total Available Storage

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
672.50	300	0	0
673.00	300	150	150

Device	Routing	Invert	Outlet Devices
#1	Primary	672.90'	**1.0' long x 12.0' 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) 2.57 2.62 2.70 2.67 2.66 2.67 2.66 2.64

Primary OutFlow Max=2.30 cfs @ 12.72 hrs HW=673.81' (Free Discharge)
↑—**1=Broad-Crested Rectangular Weir** (Weir Controls 2.30 cfs @ 2.54 fps)

Pond 8P: Rain Gardens



Summary for Pond 9P: Rain Gardens

Inflow Area = 1.112 ac, 6.90% Impervious, Inflow Depth > 6.23" for 100 Year Storm event
Inflow = 5.88 cfs @ 12.22 hrs, Volume= 0.577 af
Outflow = 6.75 cfs @ 12.23 hrs, Volume= 0.370 af, Atten= 0%, Lag= 0.7 min
Primary = 6.75 cfs @ 12.23 hrs, Volume= 0.370 af

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Peak Elev= 665.77' @ 12.23 hrs Surf.Area= 18,000 sf Storage= 9,000 cf

Plug-Flow detention time= 169.4 min calculated for 0.370 af (64% of inflow)
Center-of-Mass det. time= 71.7 min (879.4 - 807.7)

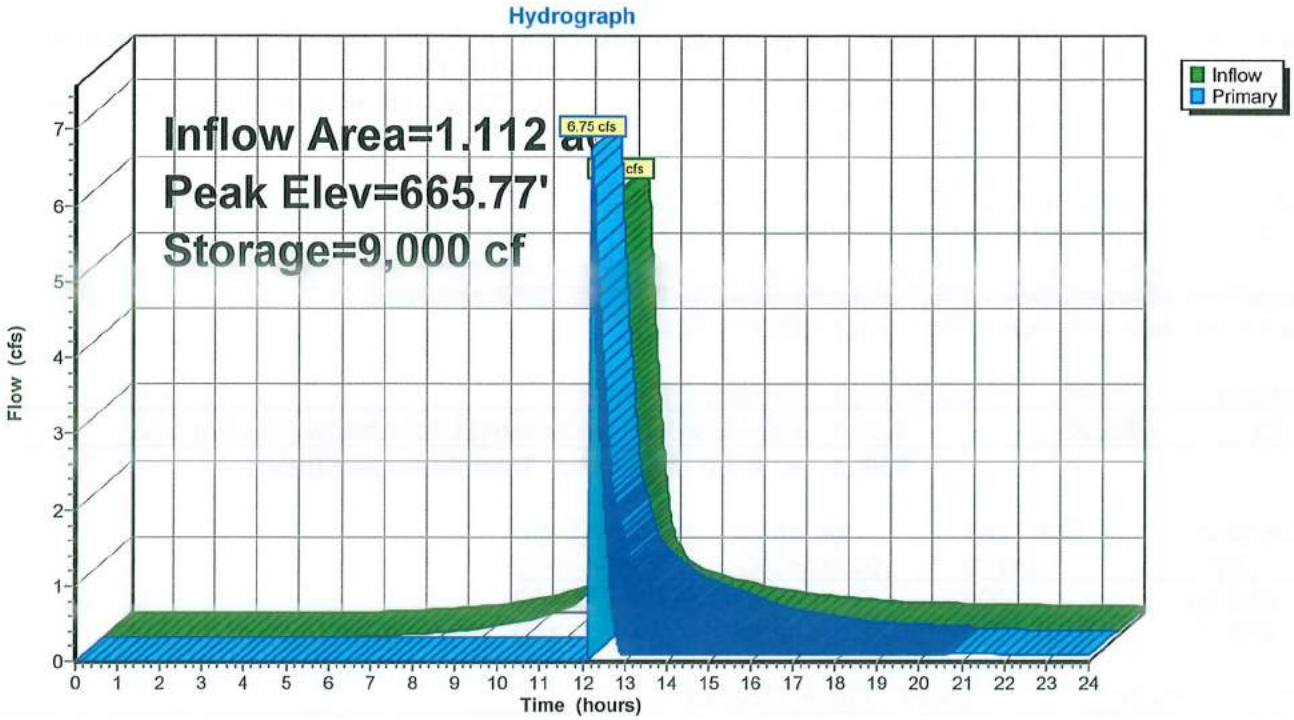
Volume	Invert	Avail.Storage	Storage Description
#1	663.50'	300 cf	**Rain Gradens (Prismatic)** Listed below (Recalc) x 2
		300 cf	x 30.00 = 9,000 cf Total Available Storage

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
663.50	300	0	0
664.00	300	150	150

Device	Routing	Invert	Outlet Devices
#1	Primary	663.90'	**1.0' long x 12.0' 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) 2.57 2.62 2.70 2.67 2.66 2.67 2.66 2.64

Primary OutFlow Max=6.75 cfs @ 12.23 hrs HW=665.77' (Free Discharge)
↑—**1=Broad-Crested Rectangular Weir** (Weir Controls 6.75 cfs @ 3.61 fps)

Pond 9P: Rain Gardens



Summary for Pond 10P: Rain Gardens

Inflow Area = 0.501 ac, 14.63% Impervious, Inflow Depth > 6.47" for 100 Year Storm event
Inflow = 2.66 cfs @ 12.23 hrs, Volume= 0.270 af
Outflow = 0.23 cfs @ 14.80 hrs, Volume= 0.073 af, Atten= 91%, Lag= 153.9 min
Primary = 0.23 cfs @ 14.80 hrs, Volume= 0.073 af

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Peak Elev= 666.10' @ 14.80 hrs Surf.Area= 18,000 sf Storage= 9,000 cf

Plug-Flow detention time= 433.7 min calculated for 0.072 af (27% of inflow)
Center-of-Mass det. time= 284.7 min (1,088.6 - 804.0)

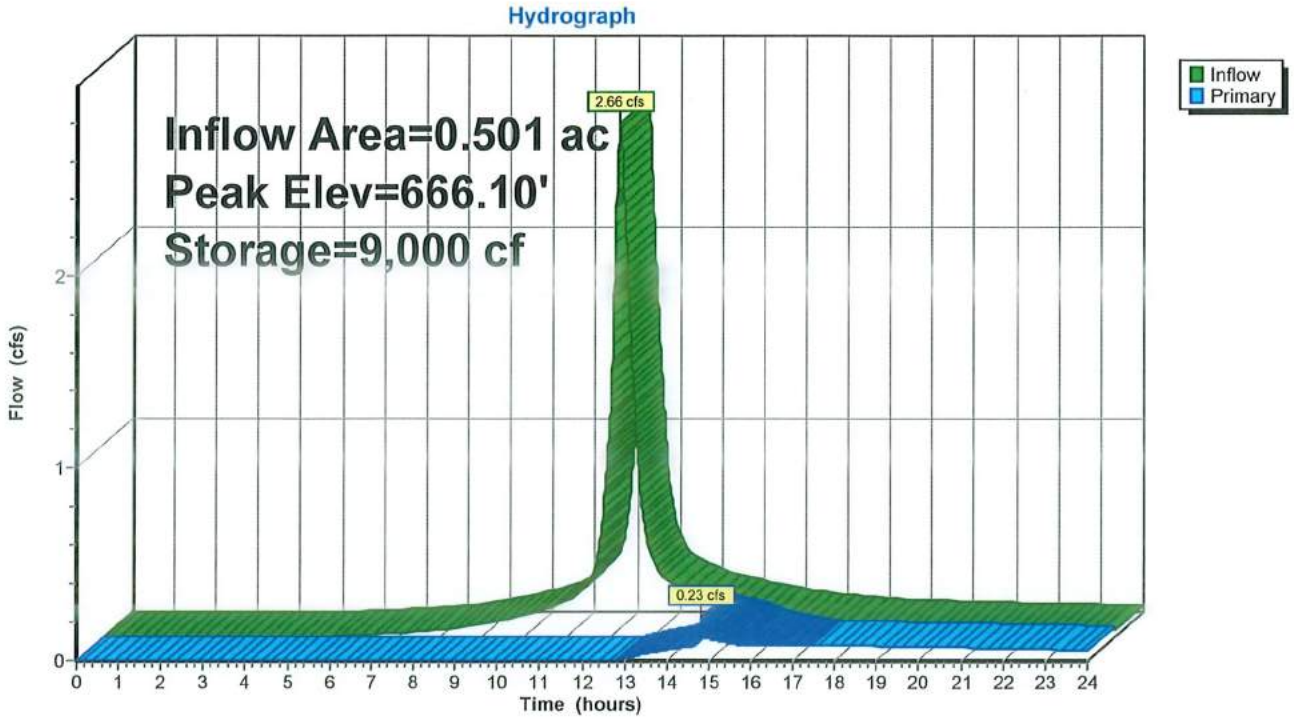
Volume	Invert	Avail.Storage	Storage Description
#1	665.50'	300 cf	**Rain Gradens (Prismatic)** Listed below (Recalc) x 2
		300 cf	x 30.00 = 9,000 cf Total Available Storage

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
665.50	300	0	0
666.00	300	150	150

Device	Routing	Invert	Outlet Devices
#1	Primary	665.90'	**1.0' long x 12.0' 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) 2.57 2.62 2.70 2.67 2.66 2.67 2.66 2.64

Primary OutFlow Max=0.23 cfs @ 14.80 hrs HW=666.10' (Free Discharge)
↑—**1=Broad-Crested Rectangular Weir** (Weir Controls 0.23 cfs @ 1.15 fps)

Pond 10P: Rain Gardens



APPENDIX 5

TR-20 Supporting Data

Extreme Precipitation Tables

Northeast Regional Climate Center

Data represents point estimates calculated from partial duration series. All precipitation amounts are displayed in inches.

Smoothing	Yes
State	New York
Location	
Longitude	74.238 degrees West
Latitude	41.291 degrees North
Elevation	0 feet
Date/Time	Thu, 09 Dec 2021 15:17:01 -0500

Extreme Precipitation Estimates

	5min	10min	15min	30min	60min	120min		1hr	2hr	3hr	6hr	12hr	24hr	48hr		1day	2day	4day	7day	10day	
1yr	0.33	0.51	0.63	0.83	1.03	1.28	1yr	0.89	1.21	1.47	1.80	2.19	2.67	3.08	1yr	2.36	2.96	3.41	4.09	4.74	1yr
2yr	0.40	0.61	0.76	1.00	1.25	1.56	2yr	1.08	1.46	1.79	2.20	2.68	3.25	3.69	2yr	2.88	3.55	4.08	4.80	5.46	2yr
5yr	0.46	0.72	0.90	1.21	1.54	1.94	5yr	1.33	1.80	2.24	2.76	3.36	4.08	4.68	5yr	3.61	4.50	5.14	5.94	6.71	5yr
10yr	0.52	0.81	1.03	1.39	1.81	2.30	10yr	1.56	2.11	2.66	3.28	4.00	4.85	5.59	10yr	4.29	5.38	6.13	6.97	7.85	10yr
25yr	0.60	0.95	1.21	1.68	2.23	2.87	25yr	1.93	2.61	3.33	4.13	5.05	6.11	7.10	25yr	5.40	6.82	7.74	8.64	9.67	25yr
50yr	0.68	1.09	1.39	1.95	2.62	3.40	50yr	2.26	3.07	3.96	4.91	6.01	7.27	8.50	50yr	6.44	8.17	9.24	10.16	11.32	50yr
100yr	0.76	1.24	1.60	2.26	3.09	4.03	100yr	2.66	3.61	4.70	5.86	7.17	8.66	10.18	100yr	7.67	9.79	11.03	11.96	13.28	100yr
200yr	0.86	1.41	1.83	2.63	3.63	4.77	200yr	3.13	4.25	5.59	6.98	8.55	10.33	12.21	200yr	9.14	11.74	13.19	14.07	15.57	200yr
500yr	1.04	1.71	2.23	3.23	4.51	5.96	500yr	3.89	5.27	7.01	8.78	10.78	13.05	15.53	500yr	11.55	14.93	16.70	17.47	19.26	500yr

Lower Confidence Limits

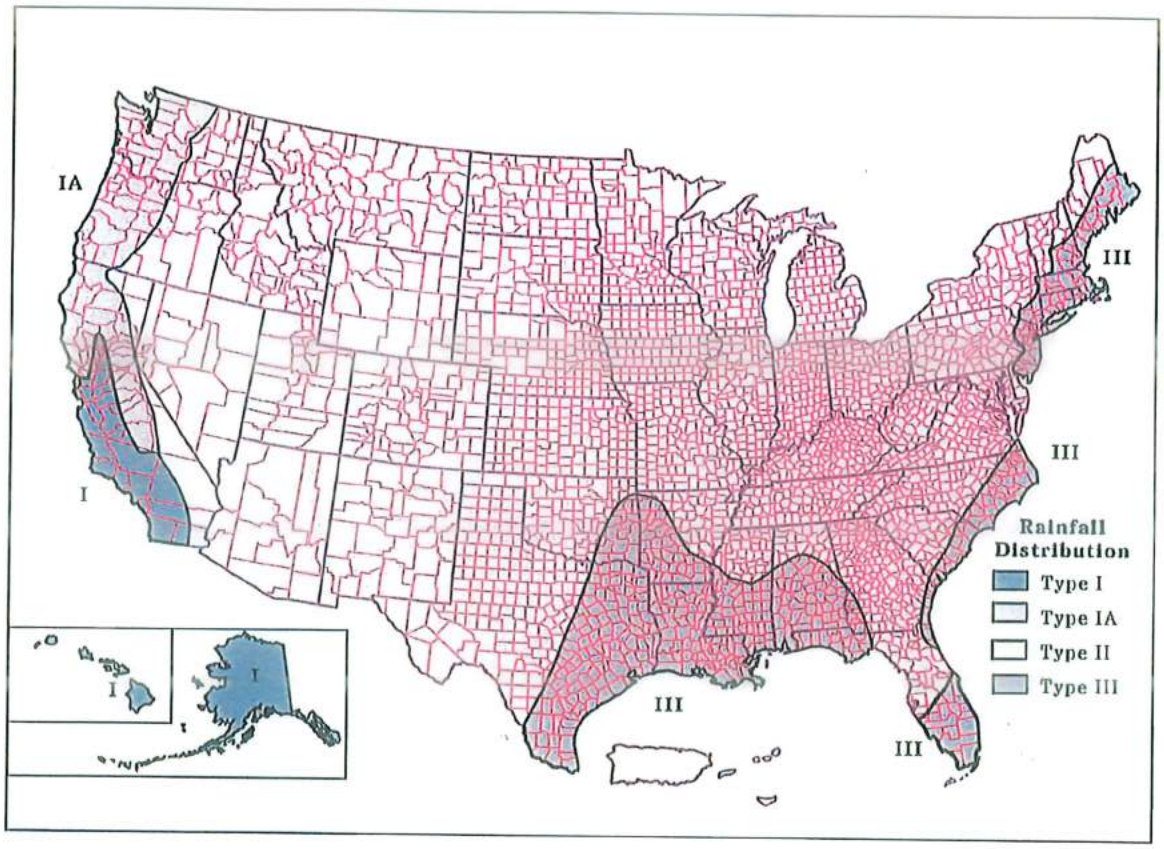
	5min	10min	15min	30min	60min	120min		1hr	2hr	3hr	6hr	12hr	24hr	48hr		1day	2day	4day	7day	10day	
1yr	0.30	0.47	0.57	0.76	0.94	1.11	1yr	0.81	1.09	1.22	1.54	2.04	2.30	2.58	1yr	2.03	2.48	2.87	3.82	4.23	1yr
2yr	0.38	0.59	0.72	0.98	1.21	1.46	2yr	1.04	1.42	1.65	2.12	2.64	3.16	3.57	2yr	2.79	3.43	3.94	4.68	5.32	2yr
5yr	0.43	0.66	0.82	1.12	1.42	1.69	5yr	1.23	1.65	1.93	2.47	3.09	3.80	4.36	5yr	3.36	4.19	4.82	5.57	6.31	5yr
10yr	0.47	0.72	0.89	1.24	1.61	1.89	10yr	1.39	1.85	2.17	2.78	3.51	4.35	4.91	10yr	3.85	4.72	5.57	6.32	7.13	10yr
25yr	0.53	0.81	1.01	1.44	1.90	2.19	25yr	1.64	2.14	2.52	3.23	4.13	5.15	5.86	25yr	4.56	5.64	6.75	7.51	8.33	25yr
50yr	0.59	0.89	1.11	1.60	2.15	2.45	50yr	1.86	2.40	2.84	3.65	4.68	5.84	6.73	50yr	5.17	6.47	7.82	8.57	9.39	50yr
100yr	0.65	0.99	1.24	1.79	2.45	2.74	100yr	2.12	2.68	3.21	4.12	5.33	6.60	7.73	100yr	5.84	7.43	9.07	9.75	10.55	100yr
200yr	0.73	1.10	1.39	2.02	2.81	3.07	200yr	2.43	3.00	3.62	4.68	6.08	7.49	8.88	200yr	6.63	8.54	10.54	11.11	11.85	200yr
500yr	0.85	1.27	1.63	2.37	3.37	3.57	500yr	2.91	3.49	4.27	5.55	7.26	8.85	10.71	500yr	7.84	10.29	12.89	13.24	13.86	500yr

Upper Confidence Limits

	5min	10min	15min	30min	60min	120min		1hr	2hr	3hr	6hr	12hr	24hr	48hr		1day	2day	4day	7day	10day	
1yr	0.36	0.55	0.68	0.91	1.12	1.36	1yr	0.96	1.33	1.57	1.97	2.42	2.86	3.35	1yr	2.53	3.22	3.70	4.32	5.17	1yr
2yr	0.41	0.63	0.78	1.05	1.30	1.55	2yr	1.12	1.52	1.77	2.27	2.81	3.40	3.86	2yr	3.01	3.71	4.26	4.96	5.67	2yr
5yr	0.50	0.78	0.96	1.32	1.68	1.99	5yr	1.45	1.95	2.28	2.92	3.65	4.38	4.98	5yr	3.88	4.79	5.47	6.31	7.10	5yr
10yr	0.59	0.91	1.13	1.58	2.04	2.44	10yr	1.76	2.38	2.77	3.55	4.46	5.39	6.23	10yr	4.77	5.99	6.69	7.59	8.51	10yr
25yr	0.74	1.13	1.41	2.01	2.64	3.17	25yr	2.28	3.10	3.61	4.65	5.80	7.10	8.21	25yr	6.29	7.90	8.73	9.71	10.82	25yr
50yr	0.88	1.34	1.67	2.40	3.23	3.84	50yr	2.79	3.75	4.39	5.67	7.06	8.78	10.13	50yr	7.77	9.74	10.67	11.70	13.01	50yr
100yr	1.04	1.58	1.98	2.86	3.92	4.68	100yr	3.38	4.58	5.35	6.91	8.60	10.86	12.50	100yr	9.61	12.02	13.04	14.11	15.65	100yr
200yr	1.24	1.86	2.36	3.42	4.77	5.72	200yr	4.11	5.59	6.51	8.43	10.48	13.46	15.43	200yr	11.91	14.84	15.95	17.00	18.85	200yr
500yr	1.56	2.32	2.99	4.34	6.17	7.43	500yr	5.32	7.26	8.46	10.96	13.59	17.87	20.34	500yr	15.82	19.56	20.82	21.79	24.14	500yr

Powered by ACIS
Northeast Regional Climate Center

Figure B-2 Approximate geographic boundaries for NRCS (SCS) rainfall distributions



Rainfall data sources

This section lists the most current 24-hour rainfall data published by the National Weather Service (NWS) for various parts of the country. Because NWS Technical Paper 40 (TP-40) is out of print, the 24-hour rainfall maps for areas east of the 105th meridian are included here as figures B-3 through B-8. For the area generally west of the 105th meridian, TP-40 has been superseded by NOAA Atlas 2, the Precipitation-Frequency Atlas of the Western United States, published by the National Ocean and Atmospheric Administration.

East of 105th meridian

Hershfield, D.M. 1961. Rainfall frequency atlas of the United States for durations from 30 minutes to 24 hours and return periods from 1 to 100 years. U.S. Dept. Commerce, Weather Bur. Tech. Pap. No. 40. Washington, DC. 155 p.

West of 105th meridian

Miller, J.F., R.H. Frederick, and R.J. Tracey. 1973. Precipitation-frequency atlas of the Western United States. Vol. I Montana; Vol. II, Wyoming; Vol III, Colorado; Vol. IV, New Mexico; Vol V, Idaho; Vol. VI, Utah; Vol. VII, Nevada; Vol. VIII, Arizona; Vol. IX, Washington; Vol. X, Oregon; Vol. XI, California. U.S. Dept. of Commerce, National Weather Service, NOAA Atlas 2. Silver Spring, MD.

Alaska

Miller, John F. 1963. Probable maximum precipitation and rainfall-frequency data for Alaska for areas to 400 square miles, durations to 24 hours and return periods from 1 to 100 years. U.S. Dept. of Commerce, Weather Bur. Tech. Pap. No. 47. Washington, DC. 69 p.

Hawaii

Weather Bureau. 1962. Rainfall-frequency atlas of the Hawaiian Islands for areas to 200 square miles, durations to 24 hours and return periods from 1 to 100 years. U.S. Dept. Commerce, Weather Bur. Tech. Pap. No. 43. Washington, DC. 60 p.

Puerto Rico and Virgin Islands

Weather Bureau. 1961. Generalized estimates of probable maximum precipitation and rainfall-frequency data for Puerto Rico and Virgin Islands for areas to 400 square miles, durations to 24 hours, and return periods from 1 to 100 years. U.S. Dept. Commerce, Weather Bur. Tech. Pap. No. 42. Washington, DC. 94 P.

United States Department of Agriculture

NRCS

Natural Resources Conservation Service

A product of the National Cooperative Soil Survey, a joint effort of the United States Department of Agriculture and other Federal agencies, State agencies including the Agricultural Experiment Stations, and local participants

Custom Soil Resource Report for Orange County, New York

October 7, 2021

Preface

Soil surveys contain information that affects land use planning in survey areas. They highlight soil limitations that affect various land uses and provide information about the properties of the soils in the survey areas. Soil surveys are designed for many different users, including farmers, ranchers, foresters, agronomists, urban planners, community officials, engineers, developers, builders, and home buyers. Also, conservationists, teachers, students, and specialists in recreation, waste disposal, and pollution control can use the surveys to help them understand, protect, or enhance the environment.

Various land use regulations of Federal, State, and local governments may impose special restrictions on land use or land treatment. Soil surveys identify soil properties that are used in making various land use or land treatment decisions. The information is intended to help the land users identify and reduce the effects of soil limitations on various land uses. The landowner or user is responsible for identifying and complying with existing laws and regulations.

Although soil survey information can be used for general farm, local, and wider area planning, onsite investigation is needed to supplement this information in some cases. Examples include soil quality assessments (http://www.nrcs.usda.gov/wps/portal/nrcs/main/soils/health/) and certain conservation and engineering applications. For more detailed information, contact your local USDA Service Center (https://offices.sc.egov.usda.gov/locator/app?agency=nrcs) or your NRCS State Soil Scientist (http://www.nrcs.usda.gov/wps/portal/nrcs/detail/soils/contactus/?cid=nrcs142p2_053951).

Great differences in soil properties can occur within short distances. Some soils are seasonally wet or subject to flooding. Some are too unstable to be used as a foundation for buildings or roads. Clayey or wet soils are poorly suited to use as septic tank absorption fields. A high water table makes a soil poorly suited to basements or underground installations.

The National Cooperative Soil Survey is a joint effort of the United States Department of Agriculture and other Federal agencies, State agencies including the Agricultural Experiment Stations, and local agencies. The Natural Resources Conservation Service (NRCS) has leadership for the Federal part of the National Cooperative Soil Survey.

Information about soils is updated periodically. Updated information is available through the NRCS Web Soil Survey, the site for official soil survey information.

The U.S. Department of Agriculture (USDA) prohibits discrimination in all its programs and activities on the basis of race, color, national origin, age, disability, and where applicable, sex, marital status, familial status, parental status, religion, sexual orientation, genetic information, political beliefs, reprisal, or because all or a part of an individual's income is derived from any public assistance program. (Not all prohibited bases apply to all programs.) Persons with disabilities who require

alternative means for communication of program information (Braille, large print, audiotape, etc.) should contact USDA's TARGET Center at (202) 720-2600 (voice and TDD). To file a complaint of discrimination, write to USDA, Director, Office of Civil Rights, 1400 Independence Avenue, S.W., Washington, D.C. 20250-9410 or call (800) 795-3272 (voice) or (202) 720-6382 (TDD). USDA is an equal opportunity provider and employer.

Contents

How Soil Surveys Are Made

Soil surveys are made to provide information about the soils and miscellaneous areas in a specific area. They include a description of the soils and miscellaneous areas and their location on the landscape and tables that show soil properties and limitations affecting various uses. Soil scientists observed the steepness, length, and shape of the slopes; the general pattern of drainage; the kinds of crops and native plants; and the kinds of bedrock. They observed and described many soil profiles. A soil profile is the sequence of natural layers, or horizons, in a soil. The profile extends from the surface down into the unconsolidated material in which the soil formed or from the surface down to bedrock. The unconsolidated material is devoid of roots and other living organisms and has not been changed by other biological activity.

Currently, soils are mapped according to the boundaries of major land resource areas (MLRAs). MLRAs are geographically associated land resource units that share common characteristics related to physiography, geology, climate, water resources, soils, biological resources, and land uses (USDA, 2006). Soil survey areas typically consist of parts of one or more MLRA.

The soils and miscellaneous areas in a survey area occur in an orderly pattern that is related to the geology, landforms, relief, climate, and natural vegetation of the area. Each kind of soil and miscellaneous area is associated with a particular kind of landform or with a segment of the landform. By observing the soils and miscellaneous areas in the survey area and relating their position to specific segments of the landform, a soil scientist develops a concept, or model, of how they were formed. Thus, during mapping, this model enables the soil scientist to predict with a considerable degree of accuracy the kind of soil or miscellaneous area at a specific location on the landscape.

Commonly, individual soils on the landscape merge into one another as their characteristics gradually change. To construct an accurate soil map, however, soil scientists must determine the boundaries between the soils. They can observe only a limited number of soil profiles. Nevertheless, these observations, supplemented by an understanding of the soil-vegetation-landscape relationship, are sufficient to verify predictions of the kinds of soil in an area and to determine the boundaries.

Soil scientists recorded the characteristics of the soil profiles that they studied. They noted soil color, texture, size and shape of soil aggregates, kind and amount of rock fragments, distribution of plant roots, reaction, and other features that enable them to identify soils. After describing the soils in the survey area and determining their properties, the soil scientists assigned the soils to taxonomic classes (units). Taxonomic classes are concepts. Each taxonomic class has a set of soil characteristics with precisely defined limits. The classes are used as a basis for comparison to classify soils systematically. Soil taxonomy, the system of taxonomic classification used in the United States, is based mainly on the kind and character of soil properties and the arrangement of horizons within the profile. After the soil

scientists classified and named the soils in the survey area, they compared the individual soils with similar soils in the same taxonomic class in other areas so that they could confirm data and assemble additional data based on experience and research.

The objective of soil mapping is not to delineate pure map unit components; the objective is to separate the landscape into landforms or landform segments that have similar use and management requirements. Each map unit is defined by a unique combination of soil components and/or miscellaneous areas in predictable proportions. Some components may be highly contrasting to the other components of the map unit. The presence of minor components in a map unit in no way diminishes the usefulness or accuracy of the data. The delineation of such landforms and landform segments on the map provides sufficient information for the development of resource plans. If intensive use of small areas is planned, onsite investigation is needed to define and locate the soils and miscellaneous areas.

Soil scientists make many field observations in the process of producing a soil map. The frequency of observation is dependent upon several factors, including scale of mapping, intensity of mapping, design of map units, complexity of the landscape, and experience of the soil scientist. Observations are made to test and refine the soil-landscape model and predictions and to verify the classification of the soils at specific locations. Once the soil-landscape model is refined, a significantly smaller number of measurements of individual soil properties are made and recorded. These measurements may include field measurements, such as those for color, depth to bedrock, and texture, and laboratory measurements, such as those for content of sand, silt, clay, salt, and other components. Properties of each soil typically vary from one point to another across the landscape.

Observations for map unit components are aggregated to develop ranges of characteristics for the components. The aggregated values are presented. Direct measurements do not exist for every property presented for every map unit component. Values for some properties are estimated from combinations of other properties.

While a soil survey is in progress, samples of some of the soils in the area generally are collected for laboratory analyses and for engineering tests. Soil scientists interpret the data from these analyses and tests as well as the field-observed characteristics and the soil properties to determine the expected behavior of the soils under different uses. Interpretations for all of the soils are field tested through observation of the soils in different uses and under different levels of management. Some interpretations are modified to fit local conditions, and some new interpretations are developed to meet local needs. Data are assembled from other sources, such as research information, production records, and field experience of specialists. For example, data on crop yields under defined levels of management are assembled from farm records and from field or plot experiments on the same kinds of soil.

Predictions about soil behavior are based not only on soil properties but also on such variables as climate and biological activity. Soil conditions are predictable over long periods of time, but they are not predictable from year to year. For example, soil scientists can predict with a fairly high degree of accuracy that a given soil will have a high water table within certain depths in most years, but they cannot predict that a high water table will always be at a specific level in the soil on a specific date.

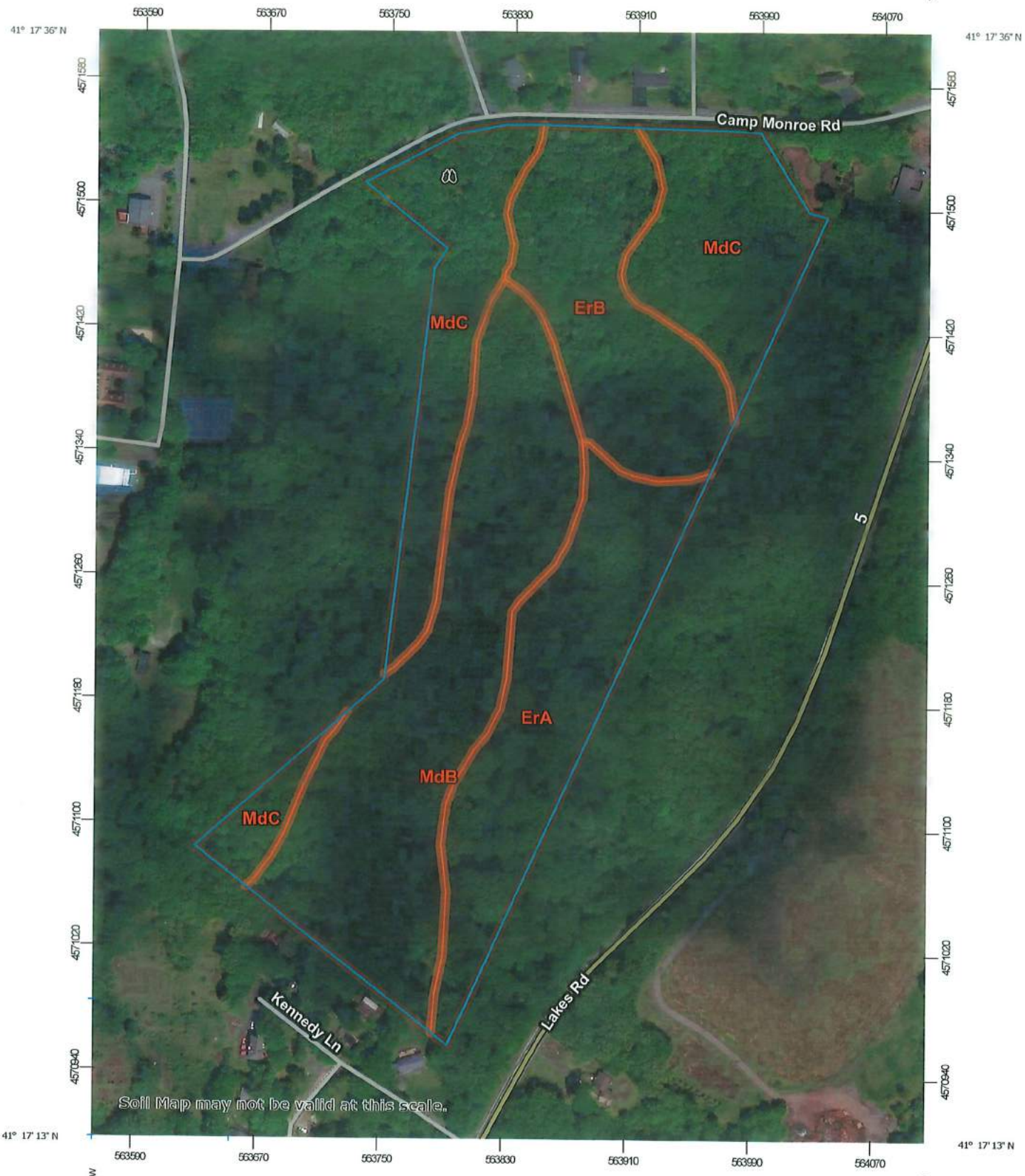
After soil scientists located and identified the significant natural bodies of soil in the survey area, they drew the boundaries of these bodies on aerial photographs and

identified each as a specific map unit. Aerial photographs show trees, buildings, fields, roads, and rivers, all of which help in locating boundaries accurately.

Soil Map

The soil map section includes the soil map for the defined area of interest, a list of soil map units on the map and extent of each map unit, and cartographic symbols displayed on the map. Also presented are various metadata about data used to produce the map, and a description of each soil map unit.

Custom Soil Resource Report
Soil Map



Map Scale: 1:3,480 if printed on A portrait (8.5" x 11") sheet.

N

0 50 100 200 300 Meters

0 150 300 600 900 Feet

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

MAP LEGEND

Area of Interest (AOI)
- Area of Interest (AOI)

Soils
- Soil Map Unit Polygons
- Soil Map Unit Lines
- Soil Map Unit Points

Special Point Features
- Blowout
- Borrow Pit
- Clay Spot
- Closed Depression
- Gravel Pit
- Gravelly Spot
- Landfill
- Lava Flow
- Marsh or swamp
- Mine or Quarry
- Miscellaneous Water
- Perennial Water
- Rock Outcrop
- Saline Spot
- Sandy Spot
- Severely Eroded Spot
- Sinkhole
- Slide or Slip
- Sodic Spot
- Spoil Area
- Stony Spot
- Very Stony Spot
- Wet Spot
- Other
- Special Line Features

Water Features
- Streams and Canals

Transportation
- Rails
- Interstate Highways
- US Routes
- Major Roads
- Local Roads

Background
- Aerial Photography

MAP INFORMATION

The soil surveys that comprise your AOI were mapped at 1:15,800.

Warning: Soil Map may not be valid at this scale.

Enlargement of maps beyond the scale of mapping can cause misunderstanding of the detail of mapping and accuracy of soil line placement. The maps do not show the small areas of contrasting soils that could have been shown at a more detailed scale.

Please rely on the bar scale on each map sheet for map measurements.

Source of Map: Natural Resources Conservation Service
Web Soil Survey URL:
Coordinate System: Web Mercator (EPSG:3857)

Maps from the Web Soil Survey are based on the Web Mercator projection, which preserves direction and shape but distorts distance and area. A projection that preserves area, such as the Albers equal-area conic projection, should be used if more accurate calculations of distance or area are required.

This product is generated from the USDA-NRCS certified data as of the version date(s) listed below.

Soil Survey Area: Orange County, New York
Survey Area Data: Version 22, Aug 29, 2021

Soil map units are labeled (as space allows) for map scales 1:50,000 or larger.

Date(s) aerial images were photographed: Oct 7, 2013—Feb 26, 2017

The orthophoto or other base map on which the soil lines were compiled and digitized probably differs from the background imagery displayed on these maps. As a result, some minor shifting of map unit boundaries may be evident.

Map Unit Legend

Map Unit Symbol	Map Unit Name	Acres in AOI	Percent of AOI
ErA	Erie gravelly silt loam, 0 to 3 percent slopes	5.5	20.5%
ErB	Erie gravelly silt loam, 3 to 8 percent slopes	4.8	17.8%
MdB	Mardin gravelly silt loam, 3 to 8 percent slopes	9.0	33.4%
MdC	Mardin gravelly silt loam, 8 to 15 percent slopes	7.6	28.3%
Totals for Area of Interest		26.9	**100.0%**

Map Unit Descriptions

The map units delineated on the detailed soil maps in a soil survey represent the soils or miscellaneous areas in the survey area. The map unit descriptions, along with the maps, can be used to determine the composition and properties of a unit.

A map unit delineation on a soil map represents an area dominated by one or more major kinds of soil or miscellaneous areas. A map unit is identified and named according to the taxonomic classification of the dominant soils. Within a taxonomic class there are precisely defined limits for the properties of the soils. On the landscape, however, the soils are natural phenomena, and they have the characteristic variability of all natural phenomena. Thus, the range of some observed properties may extend beyond the limits defined for a taxonomic class. Areas of soils of a single taxonomic class rarely, if ever, can be mapped without including areas of other taxonomic classes. Consequently, every map unit is made up of the soils or miscellaneous areas for which it is named and some minor components that belong to taxonomic classes other than those of the major soils.

Most minor soils have properties similar to those of the dominant soil or soils in the map unit, and thus they do not affect use and management. These are called noncontrasting, or similar, components. They may or may not be mentioned in a particular map unit description. Other minor components, however, have properties and behavioral characteristics divergent enough to affect use or to require different management. These are called contrasting, or dissimilar, components. They generally are in small areas and could not be mapped separately because of the scale used. Some small areas of strongly contrasting soils or miscellaneous areas are identified by a special symbol on the maps. If included in the database for a given area, the contrasting minor components are identified in the map unit descriptions along with some characteristics of each. A few areas of minor components may not have been observed, and consequently they are not mentioned in the descriptions, especially where the pattern was so complex that it was impractical to make enough observations to identify all the soils and miscellaneous areas on the landscape.

The presence of minor components in a map unit in no way diminishes the usefulness or accuracy of the data. The objective of mapping is not to delineate pure taxonomic classes but rather to separate the landscape into landforms or landform segments that have similar use and management requirements. The delineation of such segments on the map provides sufficient information for the development of resource plans. If intensive use of small areas is planned, however, onsite investigation is needed to define and locate the soils and miscellaneous areas.

An identifying symbol precedes the map unit name in the map unit descriptions. Each description includes general facts about the unit and gives important soil properties and qualities.

Soils that have profiles that are almost alike make up a *soil series*. Except for differences in texture of the surface layer, all the soils of a series have major horizons that are similar in composition, thickness, and arrangement.

Soils of one series can differ in texture of the surface layer, slope, stoniness, salinity, degree of erosion, and other characteristics that affect their use. On the basis of such differences, a soil series is divided into *soil phases*. Most of the areas shown on the detailed soil maps are phases of soil series. The name of a soil phase commonly indicates a feature that affects use or management. For example, Alpha silt loam, 0 to 2 percent slopes, is a phase of the Alpha series.

Some map units are made up of two or more major soils or miscellaneous areas. These map units are complexes, associations, or undifferentiated groups.

A *complex* consists of two or more soils or miscellaneous areas in such an intricate pattern or in such small areas that they cannot be shown separately on the maps. The pattern and proportion of the soils or miscellaneous areas are somewhat similar in all areas. Alpha-Beta complex, 0 to 6 percent slopes, is an example.

An *association* is made up of two or more geographically associated soils or miscellaneous areas that are shown as one unit on the maps. Because of present or anticipated uses of the map units in the survey area, it was not considered practical or necessary to map the soils or miscellaneous areas separately. The pattern and relative proportion of the soils or miscellaneous areas are somewhat similar. Alpha-Beta association, 0 to 2 percent slopes, is an example.

An *undifferentiated group* is made up of two or more soils or miscellaneous areas that could be mapped individually but are mapped as one unit because similar interpretations can be made for use and management. The pattern and proportion of the soils or miscellaneous areas in a mapped area are not uniform. An area can be made up of only one of the major soils or miscellaneous areas, or it can be made up of all of them. Alpha and Beta soils, 0 to 2 percent slopes, is an example.

Some surveys include *miscellaneous areas*. Such areas have little or no soil material and support little or no vegetation. Rock outcrop is an example.

Orange County, New York

ErA—Erie gravelly silt loam, 0 to 3 percent slopes

Map Unit Setting

National map unit symbol: 9vv8
Elevation: 100 to 1,360 feet
Mean annual precipitation: 42 to 52 inches
Mean annual air temperature: 46 to 52 degrees F
Frost-free period: 135 to 215 days
Farmland classification: Farmland of statewide importance

Map Unit Composition

Erie and similar soils: 75 percent
Minor components: 25 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Erie

Setting

Landform: Drumlinoid ridges, hills, till plains
Landform position (two-dimensional): Summit, footslope
Landform position (three-dimensional): Base slope
Down-slope shape: Concave
Across-slope shape: Linear
Parent material: Loamy till derived from siltstone, sandstone, shale, and limestone

Typical profile

H1 - 0 to 10 inches: gravelly silt loam
H2 - 10 to 18 inches: channery silt loam
H3 - 18 to 56 inches: channery silt loam
H4 - 56 to 70 inches: channery silt loam

Properties and qualities

Slope: 0 to 3 percent
Depth to restrictive feature: 10 to 21 inches to fragipan
Drainage class: Somewhat poorly drained
Capacity of the most limiting layer to transmit water (Ksat): Moderately low to moderately high (0.06 to 0.20 in/hr)
Depth to water table: About 6 to 18 inches
Frequency of flooding: None
Frequency of ponding: None
Calcium carbonate, maximum content: 15 percent
Available water supply, 0 to 60 inches: Very low (about 2.5 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 3w
Hydrologic Soil Group: D
Ecological site: F144AY037MA - Moist Dense Till Uplands
Hydric soil rating: No

Minor Components

Wurtsboro

Percent of map unit: 5 percent

Hydric soil rating: No

Bath

Percent of map unit: 5 percent
Hydric soil rating: No

Mardin

Percent of map unit: 5 percent
Hydric soil rating: No

Alden

Percent of map unit: 5 percent
Landform: Depressions
Hydric soil rating: Yes

Swartswood

Percent of map unit: 5 percent
Landform: Depressions
Hydric soil rating: No

ErB—Erie gravelly silt loam, 3 to 8 percent slopes

Map Unit Setting

National map unit symbol: 9vv9
Elevation: 100 to 1,390 feet
Mean annual precipitation: 42 to 52 inches
Mean annual air temperature: 46 to 52 degrees F
Frost-free period: 135 to 215 days
Farmland classification: Farmland of statewide importance

Map Unit Composition

Erie and similar soils: 80 percent
Minor components: 20 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Erie

Setting

Landform: Drumlinoid ridges, hills, till plains
Landform position (two-dimensional): Summit, footslope
Landform position (three-dimensional): Base slope
Down-slope shape: Concave
Across-slope shape: Linear
Parent material: Loamy till derived from siltstone, sandstone, shale, and limestone

Typical profile

H1 - 0 to 9 inches: gravelly silt loam
H2 - 9 to 18 inches: channery silt loam
H3 - 18 to 54 inches: channery silt loam
H4 - 54 to 70 inches: channery silt loam

Properties and qualities

Slope: 3 to 8 percent
Depth to restrictive feature: 10 to 21 inches to fragipan
Drainage class: Somewhat poorly drained
Capacity of the most limiting layer to transmit water (Ksat): Moderately low to moderately high (0.06 to 0.20 in/hr)
Depth to water table: About 6 to 18 inches
Frequency of flooding: None
Frequency of ponding: None
Calcium carbonate, maximum content: 15 percent
Available water supply, 0 to 60 inches: Very low (about 2.4 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 3w
Hydrologic Soil Group: D
Ecological site: F144AY037MA - Moist Dense Till Uplands
Hydric soil rating: No

Minor Components

Alden

Percent of map unit: 5 percent
Landform: Depressions
Hydric soil rating: Yes

Bath

Percent of map unit: 5 percent
Hydric soil rating: No

Wurtsboro

Percent of map unit: 5 percent
Hydric soil rating: No

Mardin

Percent of map unit: 5 percent
Hydric soil rating: No

MdB—Mardin gravelly silt loam, 3 to 8 percent slopes

Map Unit Setting

National map unit symbol: 2v30j
Elevation: 330 to 2,460 feet
Mean annual precipitation: 31 to 70 inches
Mean annual air temperature: 39 to 52 degrees F
Frost-free period: 105 to 180 days
Farmland classification: Farmland of statewide importance

Map Unit Composition

Mardin and similar soils: 85 percent
Minor components: 15 percent

Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Mardin

Setting

Landform: Hills, mountains
Landform position (two-dimensional): Summit, shoulder
Landform position (three-dimensional): Interfluve, side slope
Down-slope shape: Convex
Across-slope shape: Convex
Parent material: Loamy till

Typical profile

Ap - 0 to 8 inches: gravelly silt loam
Bw - 8 to 15 inches: gravelly silt loam
E - 15 to 20 inches: gravelly silt loam
Bx - 20 to 72 inches: gravelly silt loam

Properties and qualities

Slope: 3 to 8 percent
Surface area covered with cobbles, stones or boulders: 0.0 percent
Depth to restrictive feature: 14 to 26 inches to fragipan
Drainage class: Moderately well drained
Capacity of the most limiting layer to transmit water (Ksat): Very low to moderately low (0.00 to 0.14 in/hr)
Depth to water table: About 13 to 24 inches
Frequency of flooding: None
Frequency of ponding: None
Available water supply, 0 to 60 inches: Low (about 3.6 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 2w
Hydrologic Soil Group: D
Ecological site: F144AY008CT - Moist Till Uplands
Hydric soil rating: No

Minor Components

Volusia

Percent of map unit: 5 percent
Landform: Hills, mountains
Landform position (two-dimensional): Summit, footslope
Landform position (three-dimensional): Interfluve, base slope, side slope
Down-slope shape: Concave
Across-slope shape: Linear
Hydric soil rating: No

Lordstown

Percent of map unit: 5 percent
Landform: Mountains, hills
Landform position (two-dimensional): Summit, shoulder
Landform position (three-dimensional): Mountaintop, interfluve, crest
Down-slope shape: Convex
Across-slope shape: Convex
Hydric soil rating: No

Bath

Percent of map unit: 5 percent
Landform: Hills, mountains
Landform position (two-dimensional): Shoulder, backslope
Landform position (three-dimensional): Interfluve, side slope
Down-slope shape: Concave
Across-slope shape: Linear
Hydric soil rating: No

MdC—Mardin gravelly silt loam, 8 to 15 percent slopes

Map Unit Setting

National map unit symbol: 2v30l
Elevation: 330 to 2,460 feet
Mean annual precipitation: 31 to 70 inches
Mean annual air temperature: 39 to 52 degrees F
Frost-free period: 105 to 180 days
Farmland classification: Farmland of statewide importance

Map Unit Composition

Mardin and similar soils: 85 percent
Minor components: 15 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Mardin

Setting

Landform: Hills, mountains
Landform position (two-dimensional): Shoulder, backslope
Landform position (three-dimensional): Interfluve, side slope
Down-slope shape: Linear
Across-slope shape: Linear
Parent material: Loamy till

Typical profile

Ap - 0 to 8 inches: gravelly silt loam
Bw - 8 to 15 inches: gravelly silt loam
E - 15 to 20 inches: gravelly silt loam
Bx - 20 to 72 inches: gravelly silt loam

Properties and qualities

Slope: 8 to 15 percent
Surface area covered with cobbles, stones or boulders: 0.0 percent
Depth to restrictive feature: 14 to 26 inches to fragipan
Drainage class: Moderately well drained
Capacity of the most limiting layer to transmit water (Ksat): Very low to moderately low (0.00 to 0.14 in/hr)
Depth to water table: About 13 to 24 inches
Frequency of flooding: None
Frequency of ponding: None

Available water supply, 0 to 60 inches: Low (about 3.6 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 3e
Hydrologic Soil Group: D
Ecological site: F144AY008CT - Moist Till Uplands
Hydric soil rating: No

Minor Components

Bath

Percent of map unit: 5 percent
Landform: Hills, mountains
Landform position (two-dimensional): Backslope
Landform position (three-dimensional): Nose slope, side slope
Down-slope shape: Linear
Across-slope shape: Linear
Hydric soil rating: No

Lordstown

Percent of map unit: 5 percent
Landform: Mountains, hills
Landform position (two-dimensional): Backslope
Landform position (three-dimensional): Mountainflank, nose slope, side slope
Down-slope shape: Linear
Across-slope shape: Linear
Hydric soil rating: No

Volusia

Percent of map unit: 5 percent
Landform: Hills, mountains
Landform position (two-dimensional): Summit, footslope
Landform position (three-dimensional): Interfluve, base slope, side slope
Down-slope shape: Concave
Across-slope shape: Linear
Hydric soil rating: No

References

American Association of State Highway and Transportation Officials (AASHTO). 2004. Standard specifications for transportation materials and methods of sampling and testing. 24th edition.

American Society for Testing and Materials (ASTM). 2005. Standard classification of soils for engineering purposes. ASTM Standard D2487-00.

Cowardin, L.M., V. Carter, F.C. Golet, and E.T. LaRoe. 1979. Classification of wetlands and deep-water habitats of the United States. U.S. Fish and Wildlife Service FWS/OBS-79/31.

Federal Register. July 13, 1994. Changes in hydric soils of the United States.

Federal Register. September 18, 2002. Hydric soils of the United States.

Hurt, G.W., and L.M. Vasilas, editors. Version 6.0, 2006. Field indicators of hydric soils in the United States.

National Research Council. 1995. Wetlands: Characteristics and boundaries.

Soil Survey Division Staff. 1993. Soil survey manual. Soil Conservation Service. U.S. Department of Agriculture Handbook 18. http://www.nrcs.usda.gov/wps/portal/nrcs/detail/national/soils/?cid=nrcs142p2_054262

Soil Survey Staff. 1999. Soil taxonomy: A basic system of soil classification for making and interpreting soil surveys. 2nd edition. Natural Resources Conservation Service, U.S. Department of Agriculture Handbook 436. http://www.nrcs.usda.gov/wps/portal/nrcs/detail/national/soils/?cid=nrcs142p2_053577

Soil Survey Staff. 2010. Keys to soil taxonomy. 11th edition. U.S. Department of Agriculture, Natural Resources Conservation Service. http://www.nrcs.usda.gov/wps/portal/nrcs/detail/national/soils/?cid=nrcs142p2_053580

Tiner, R.W., Jr. 1985. Wetlands of Delaware. U.S. Fish and Wildlife Service and Delaware Department of Natural Resources and Environmental Control, Wetlands Section.

United States Army Corps of Engineers, Environmental Laboratory. 1987. Corps of Engineers wetlands delineation manual. Waterways Experiment Station Technical Report Y-87-1.

United States Department of Agriculture, Natural Resources Conservation Service. National forestry manual. http://www.nrcs.usda.gov/wps/portal/nrcs/detail/soils/home/?cid=nrcs142p2_053374

United States Department of Agriculture, Natural Resources Conservation Service. National range and pasture handbook. http://www.nrcs.usda.gov/wps/portal/nrcs/detail/national/landuse/rangepasture/?cid=stelprdb1043084

United States Department of Agriculture, Natural Resources Conservation Service. National soil survey handbook, title 430-VI. http://www.nrcs.usda.gov/wps/portal/nrcs/detail/soils/scientists/?cid=nrcs142p2_054242

United States Department of Agriculture, Natural Resources Conservation Service. 2006. Land resource regions and major land resource areas of the United States, the Caribbean, and the Pacific Basin. U.S. Department of Agriculture Handbook 296. http://www.nrcs.usda.gov/wps/portal/nrcs/detail/national/soils/?cid=nrcs142p2_053624

United States Department of Agriculture, Soil Conservation Service. 1961. Land capability classification. U.S. Department of Agriculture Handbook 210. http://www.nrcs.usda.gov/Internet/FSE_DOCUMENTS/nrcs142p2_052290.pdf