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Old Hill Farm Solar Farm

STORMWATER MANAGEMENT REPORT

Town of Yorktown
Westchester County, New York
July 28, 2021
Revised: January 14, 2022

PREPARED FOR:

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Section I General Information

A. PROJECT DESCRIPTION

The proposed Old Hill Farm Solar Farm is located within the Town of Yorktown, Westchester County, New York. The project consists of a limited use pervious gravel driveway and solar arrays with appurtenant utilities. The proposed solar project will be constructed on parcel 16.08-1-4. The site is proposed to be developed in a phased approach, with the full development covering a total of 15.0± acres, no more than 5 acres will be disturbed at any given time. The land disturbance will consist mainly of the clearing of former farm area with subsequent tree growth. An existing gravel driveway will be used for preliminary site access. The construction of the limited use pervious gravel driveway will be completed following installation and connection of the solar panels. The proposed project will be constructed in a phased approach as detailed in the project plan set.

B. SOIL CLASSIFICATION

According to the Natural Resources Conservation Service website (NRCS), there are four (4) mapped soil units identified on the project property. Charlton fine sandy loam, 3 to 8 percent slopes is the dominant soil type and is located on approximately 49.1% of the site. These soils have a moderate infiltration rate when thoroughly wet. These consist chiefly of moderately deep or deep, moderately well drained or well drained soils that have moderately fine texture to moderately coarse texture. These soils have a moderate rate of water transmission.

The complete list of soils found on the project site is identified in the table below.

Table I
Soil Summary

Symbol	Soil Name	Hydrologic Soil Group
ChB	Charlton fine sandy loam, 3 to 8 percent slopes	B
ChC	Charlton fine sandy loam, 8 to 15 percent slopes	B
LcB	Leicester loam, 3 to 8 percent slopes, stony	A/D
Sh	Sun loam	C/D

Section II Hydrology

A. METHODOLOGY

Stormwater runoff rates discharged from the site under the existing conditions provide the basis on which to compare the impacts of the proposed site improvements. The areas draining to each analysis point are delineated using topographic survey maps and grading plans. HydroCAD 10.0 by HydroCAD Software Solutions LLC was used to model the existing and proposed condition.

The parameters required to calculate stormwater runoff are area, curve number, and time of concentration. Each drainage area is evaluated using the guidelines described in USDA Soil Conservation Service's TR-55 to determine the curve number and time of concentration.

The runoff curve number (CN) is based on a weighted average of ground cover and soil type. The underlying soil types are described in county soil maps. Site and grading plans and survey maps outline existing and proposed ground cover. CN values for specific locations are determined from the tables presented in TR-55. The CN value for the limited use gravel pavement was calculated manually using the SCS runoff curve number equation provided in TR-55.

Time of concentration (Tc) represents the amount of time it takes for runoff to travel from the hydraulically most distant point of the watershed to the point of analysis. Surface roughness, slope, channel shape and flow patterns are the factors that affect the time of concentration. Stormwater runoff flows through the drainage area as sheet flow, shallow concentrated flow, open channel flow, or concentrated flow (such as in storm sewers). The sum of the travel times over the various surfaces within the assumed flow path for a specific drainage area determines that area's time of concentration. The figures and formulas in TR-55 are employed to compute travel times for sheet flow and shallow concentrated flow. The proposed project will install level spreaders along the contours to mitigate the impact of the proposed construction on the time of concentration.

B. EXISTING CONDITIONS

The drainage areas analyzed has been calculated to be a total of 16.688± acres. This drainage area is further categorized into five sub areas with site runoff conveyed via sheet flow and shallow concentrated flow. The five sub-areas are named DR-A, DR-B, DR-C, DR-D and DR-E. The parcel to be developed consists of grass, wetlands, and wooded areas.

Table II
Existing Conditions Summary

Drainage Area	Description	Size (ac)	Composite Cn	Tc (min)
DR-A	This area consists of meadow, an existing gravel driveway, wooded areas, and a house. This area drains north via sheet flow, shallow concentrated flow and ultimately discharges to an existing 12" CIP cross road culvert designated as Design point #1 (DP-1).	1.859	60	16.1
DR-B	This area consists of meadow, an existing gravel driveway, wooded areas, foundation remains and a house. This area drains north via sheet flow and shallow concentrated flow to a roadside drainage path which ultimately discharges to an existing wetland east of the project site designated as Design point #2 (DP-2)	1.294	60	17.3
DR-C	This area consists of meadow and wooded areas. This area drains east via sheet flow, shallow concentrated flow and ultimately discharges to and existing wetland east of the project site designated as Design point #3 (DP-3).	3.317	60	12.6
DR-D	This area consists of meadow, some woods, a portion of an existing gravel driveway, and a garage. This area drains west via sheet flow, shallow concentrated flow and ultimately discharges towards the western property line. The area where stormwater leaves the site is designated as Design point #4 (DP-4).	4.324	60	15.9
DR-E	This area consists of meadow and former farm area with subsequent tree growth, as well as some woods. This area drains east via sheet flow and shallow concentrated flow and ultimately discharges toward the eastern property line. The area where stormwater leaves the site is designated as Design point #5 (DP-5).	5.894	64	17.0

C. PROPOSED CONDITIONS

The proposed drainage area comprises a total of 16.688± acres. In the proposed (post-development) condition, the site will be comprised of five drainage areas that represents all of the site runoff. The four drainage areas are labeled DR-1, DR-2, DR-3, DR-4, and DR-5. Each area will drain via sheet flow and shallow concentrated flow to their designated design points as it does in the pre-development conditions.

Table III
Proposed Conditions Summary

Drainage Area	Description	Size (ac)	Composite Cn	Tc (min)
DR-1	This area consists of meadow, solar panels, and some woods. This area drains north via sheet flow, shallow concentrated flow and ultimately discharges to an existing 12" CIP cross road culvert designated as Design point #1 (DP-1).	1.787	58	15.2
DR-2	This area consists of meadow, solar panels, a portion of the limited use pervious gravel driveway and a small portion of woods. This area drains north via sheet flow and shallow concentrated flow to a proposed detention pond which ultimately discharges in a controlled manner to an existing wetland east of the project site designated as Design point #2 (DP-2)	1.561	60	17.3
DR-3	This area consists of solar panels and meadow. This area drains east via sheet flow, shallow concentrated flow and ultimately discharges to and existing wetland east of the project site designated as Design point #3 (DP-3).	3.317	58	12.6
DR-4	This area consists of meadow, solar panels, a portion of the limited use pervious gravel driveway and some woods. This area drains west via sheet flow, shallow concentrated flow and ultimately discharges towards the western property line. The area where stormwater leaves the site is designated as Design point #4 (DP-4).	4.130	60	15.9
DR-5	This area consists of meadow, solar panels, a small portion of the limited use pervious gravel driveway and some woods. This area drains east via sheet flow and shallow concentrated flow and ultimately discharges toward the eastern property line. The area where stormwater leaves the site is designated as Design point #5 (DP-5).	5.894	59	17.0

Section III Stormwater Management & SPDES Phase II Requirements

State Pollutant Discharge Elimination System (SPDES)

Since the subject site will have land disturbance of more than 1-acre a State Pollutant Discharge Elimination System (SPDES) permit will be completed as part of the project. A Storm Water Pollution Prevention Plan (SWPPP) will be developed in accordance with the EPA Phase II regulations. The SWPPP will be for the most part modeled on the New York State DEC Guidelines and will meet the following criteria as the principle objectives contained in an approved SWPPP.

1) Reduction or elimination of erosion and sediment loading to water-bodies during construction activities.
2) Control the impact of storm water runoff on the water quality of the receiving waters.
3) Control the increase volume and peak runoff rate of runoff during and after construction.
4) Maintenance of storm water controls during and after completion of construction.

The aforementioned objectives will be accomplished by incorporating the several of the design criteria outlined within the Technical Guidelines provided by New York State Department of Environmental Conservation, Stormwater Management Design Manual and summarized below.

A. WATER QUALITY VOLUME

The New York State Department of Environmental Conservation, Stormwater Management Design Manual was used to determine the water quality criteria. Specifically, the unified storm water sizing criteria was followed for water quality to meet the State of New York pollutant goals. The water quantity volume is intended to improve water quality by capturing and treating 90% of the average annual storm water runoff volume.

The following equation is given within the design manual for calculating the water quality storage volume.

$$WQ_v = \frac{(P)\,(R_v)(A)}{12}$$

where:

WQ_v = water quality volume (acre-ft)
P = 90% Rainfall Event Number (1" was used per ICW Guidelines)
R_v = 0.05 + 0.009 (I) , where I is percent of impervious cover
A = site area (acres)

The proposed project is using a limited use pervious gravel section for the design of the gravel driveway. This driveway section is considered a pervious surface. The proposed project is classified as a redevelopment project with a decrease in impervious area, so water quality treatment is not required.

B. CHANNEL PROTECTION VOLUME

The New York State Department of Environmental Conservation, Stormwater Management Design Manual was used to determine the water quantity criteria. Specifically, mitigating the 10-year and 100-year post-development runoff rates to the predevelopment runoff rates and providing the 24-hour extended detention for the 1-year storm event is required.

The Channel Protection Volume is met by providing the 24 hour extended detention of the post developed 1 year, 24 hour storm event. In addition, since the project is classified as a redevelopment activity with a decrease in impervious area and the hydraulic analysis for the project site shows that the post-construction 1-year 24-hour discharge rate and velocity are less than the pre-construction discharge rate, providing the 24-hour detention of the 1-year storm to meet the channel protection criteria is not required.

C. RUNOFF REDUCTION VOLUME

According to the stormwater management design manual Chapter 9 section 9.2.1.II meeting the Runoff reduction volume (RRv) sizing criteria is not required for the redevelopment activity portion of a project. In addition, most of the drainage areas on site will not alter the hydrology of the site from pre to post development.

D. OVERBANK FLOOD

Overbank Flood protection is provided by controlling the peak discharge from the 10-year storm to 10-year predevelopment rates. This requirement is being satisfied as the proposed development will not impact the hydrology of the site from pre to post development for a majority of the drainage areas on site. However, where the peak flow rate from the 10-year storm shows an increase, a detention pond has been designed to provide adequate detention of the peak discharge flow rates.

E. EXTREME STORM

Extreme Storm protection is provided by controlling the peak discharge from the 100-year storm to 100-year predevelopment rates. This requirement is being satisfied as the proposed development will not impact the hydrology of the site from pre to post development for a majority of the drainage areas on site. However, where the peak flow rate from the 100-year storm shows an increase, a detention pond has been designed to provide adequate detention of the peak discharge flow rates.

Section IV Summary of Findings

A. Summary of Results

The following tables shows a summary of comparison pre-development and post-development flow rates. The values account for the full development of the site in all phases.

Table V – Existing and Proposed Peak Discharge for the 1-year Storm (cfs)

Design/Analysis Point	1-year Design Storm Discharge	
	Existing	Proposed
Design Point 1 (DP-1)	0.27	0.16
Design Point 2 (DP-2)	0.18	0.09
Design Point 3 (DP-2)	0.57	0.34
Design Point 4 (DP-4)	0.63	0.60
Drainage Point 5 (DP-5)	1.72	0.65

Table VI – Existing and Proposed Peak Discharge for the 10-year Storm (cfs)

Design/Analysis Point	10-year Design Storm Discharge	
	Existing	Proposed
Design Point 1 (DP-1)	2.91	2.53
Design Point 2 (DP-2)	1.95	1.83
Design Point 3 (DP-2)	5.92	5.19
Design Point 4 (DP-4)	6.82	6.52
Drainage Point 5 (DP-5)	11.29	8.39

Table VII – Existing and Proposed Peak Discharge for the 100-year Storm (cfs)

Existing Drainage Area Proposed Drainage Area	100-year Design Storm Discharge	
	Existing	Proposed
Design Point 1 (DP-1)	9.42	8.71
Design Point 2 (DP-2)	6.32	6.19
Design Point 3 (DP-2)	18.91	17.73
Design Point 4 (DP-4)	22.03	21.04
Drainage Point 5 (DP-5)	32.69	28.12

As depicted in the above tables, the peak discharge from the site for each of the design storms will decrease after this project is constructed and the stormwater management plan is implemented.

B. Conclusion

Based on the calculations attached in the appendices of this report, the majority of the project site will not impact the hydrology of the site from pre to post development. A proposed detention pond will decrease peak discharge rates from the areas of the site where the peak discharge rate has increased by the proposed development. All in all, the project will not have any adverse impact on the hydrology of the site from pre to post development and will meet all Town of Yorktown and New York State Department of Environmental Conservation (NYSDEC) requirements.

Appendix R-1

Existing Conditions Drainage Map

And HydroCAD Report

ARCH D 24x36

LEGEND

- SOIL TYPE BOUNDARY
- DRAINAGE AREA BOUNDARY
- TIME OF CONCENTRATION FLOW PATH

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OLD HILL FARM SOLAR FARM

571 EAST MAIN STREET
JEFFERSON VALLEY, NY 10535

Date Revised	Description

PRELIMINARY
NOT FOR CONSTRUCTION

Project Manager	Discipline Lead
ECR	ECR
Designer	Reviewer
WD	ECR
Date Issued	Project Number
07/28/2021	14064.11

Sheet Name

EXISTING CONDITIONS DRAINAGE MAP

Drawing Number

DR-EX

of 11

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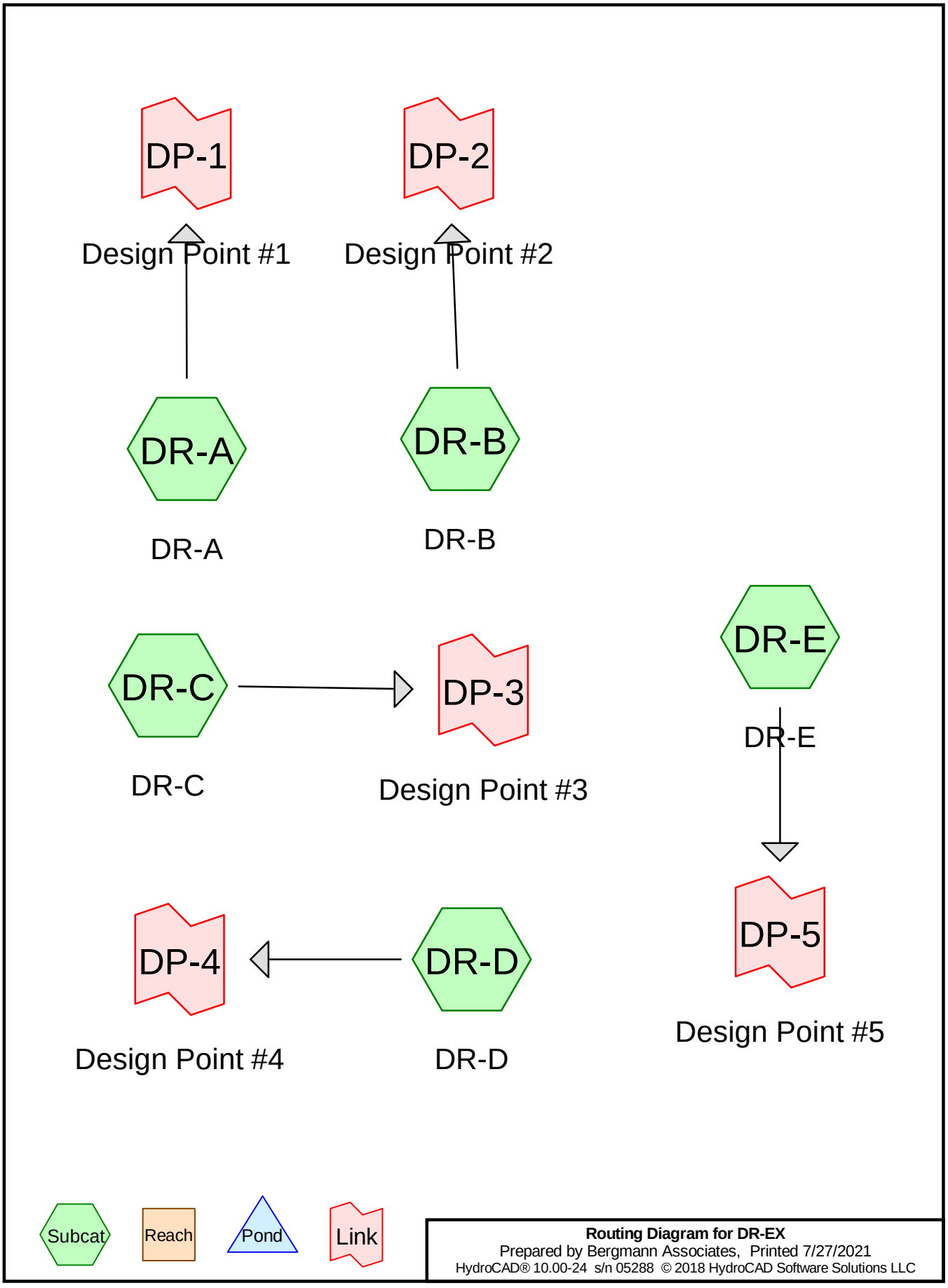

DP-1
DP-2
Design Point #1
Design Point #2
DR-A
DR-B
DR-A
DR-B
DR-C
DP-3
DR-E
DR-C
Design Point #3
DR-E
DP-5
DP-4
DR-D
Design Point #5
Design Point #4
DR-D
Subcat
Reach
Pond
Link
Routing Diagram for DR-EX
Prepared by Bergmann Associates, Printed 7/27/2021
HydroCAD® 10.00-24 s/n 05288 © 2018 HydroCAD Software Solutions LLC

Area Listing (all nodes)

Area (acres)	CN	Description (subcatchment-numbers)
0.092	96	Gravel surface, HSG B (DR-A, DR-D)
9.313	58	Meadow, non-grazed, HSG B (DR-A, DR-B, DR-C, DR-D, DR-E)
0.120	98	Unconnected roofs, HSG B (DR-A, DR-B, DR-D)
7.163	65	Woods/grass comb., Fair, HSG B (DR-A, DR-B, DR-C, DR-D, DR-E)

Soil Listing (all nodes)

Area (acres)	Soil Group	Subcatchment Numbers
0.000	HSG A	
16.688	HSG B	DR-A, DR-B, DR-C, DR-D, DR-E
0.000	HSG C	
0.000	HSG D	
0.000	Other	

Ground Covers (all nodes)

HSG-A (acres)	HSG-B (acres)	HSG-C (acres)	HSG-D (acres)	Other (acres)	Total (acres)	Ground Cover	Subcatchment Numbers
0.000	0.092	0.000	0.000	0.000	0.092	Gravel surface	DR-A, DR-D
0.000	9.313	0.000	0.000	0.000	9.313	Meadow, non-grazed	DR-A, DR-B, DR-C, DR-D, DR-E
0.000	0.120	0.000	0.000	0.000	0.120	Unconnected roofs	DR-A, DR-B, DR-D
0.000	7.163	0.000	0.000	0.000	7.163	Woods/grass comb., Fair	DR-A, DR-B, DR-C, DR-D, DR-E

Summary for Subcatchment DR-A: DR-A

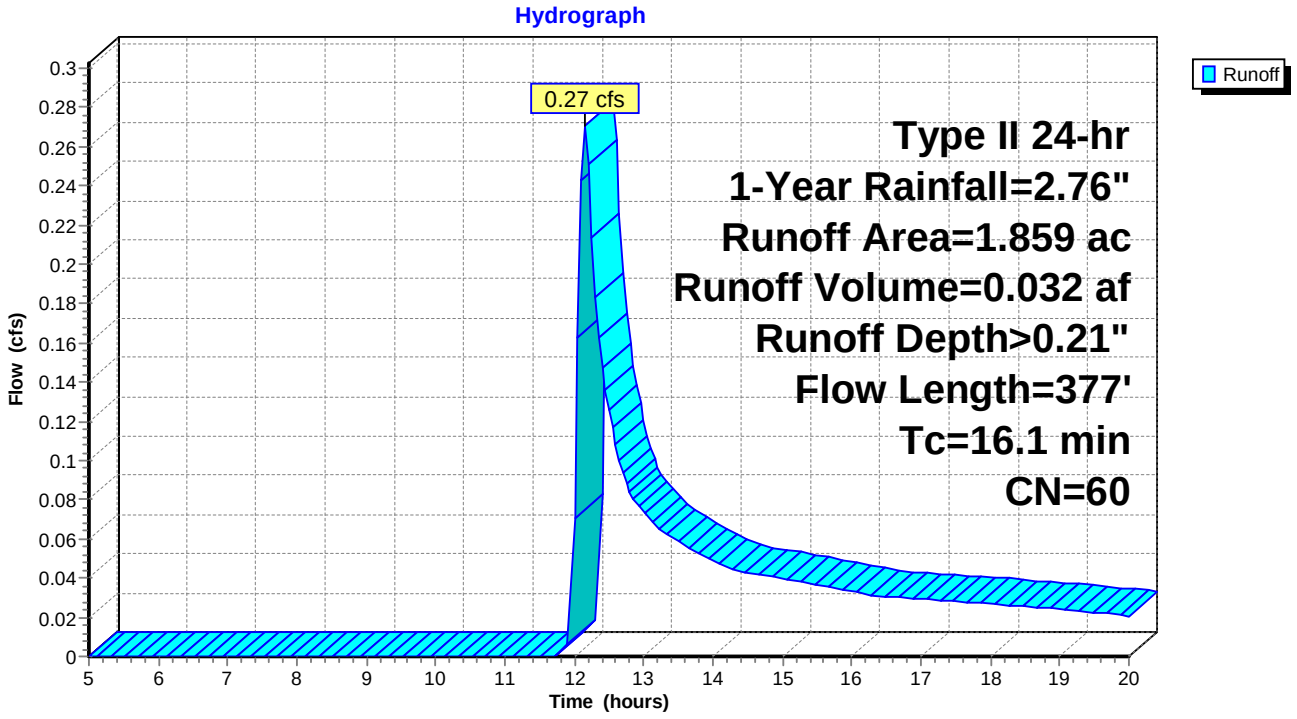
Runoff = 0.27 cfs @ 12.15 hrs, Volume= 0.032 af, Depth> 0.21"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type II 24-hr 1-Year Rainfall=2.76"

Area (ac)	CN	Description
1.548	58	Meadow, non-grazed, HSG B
0.237	65	Woods/grass comb., Fair, HSG B
0.055	96	Gravel surface, HSG B
0.019	98	Unconnected roofs, HSG B
1.859	60	Weighted Average
1.840		98.98% Pervious Area
0.019		1.02% Impervious Area
0.019		100.00% Unconnected

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
12.9	100	0.0295	0.13		**Sheet Flow,** Grass: Dense n= 0.240 P2= 2.87"
3.2	277	0.0437	1.46		**Shallow Concentrated Flow,** Short Grass Pasture Kv= 7.0 fps
16.1	377	Total			

Subcatchment DR-A: DR-A



Summary for Subcatchment DR-B: DR-B

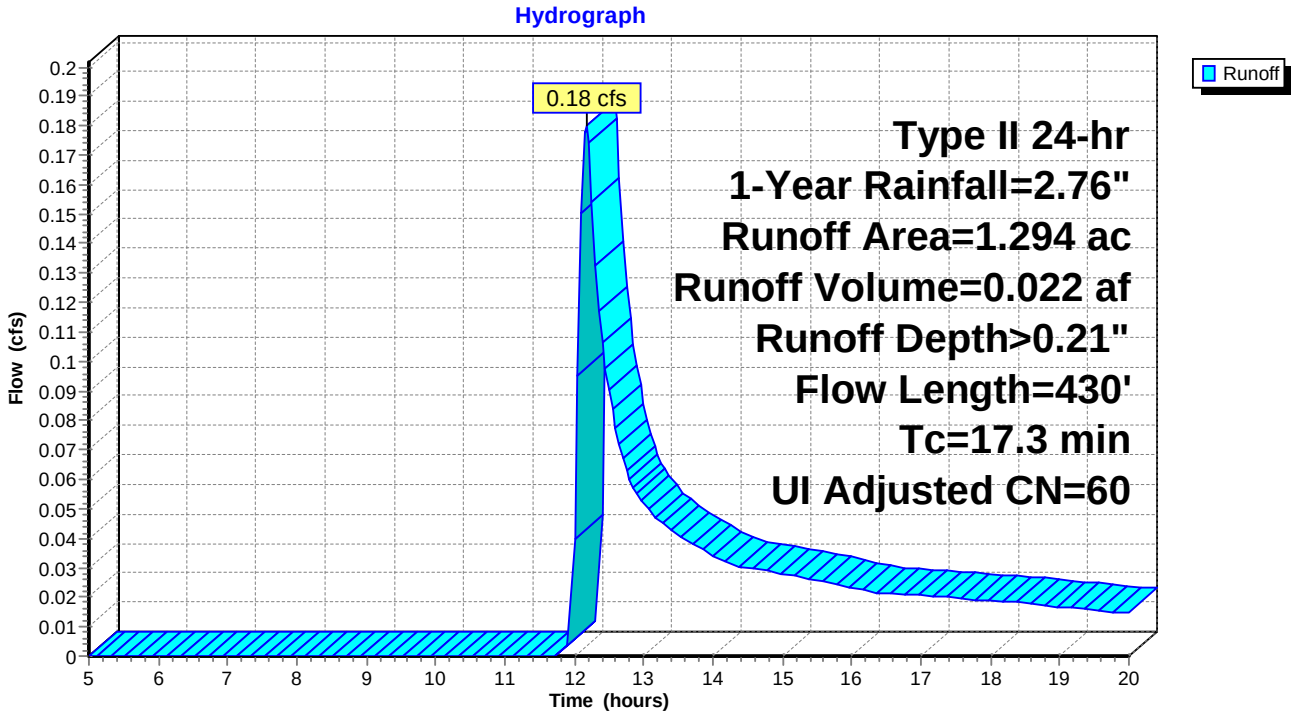
Runoff = 0.18 cfs @ 12.17 hrs, Volume= 0.022 af, Depth> 0.21"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type II 24-hr 1-Year Rainfall=2.76"

Area (ac)	CN	Adj	Description
1.015	58		Meadow, non-grazed, HSG B
0.233	65		Woods/grass comb., Fair, HSG B
0.046	98		Unconnected roofs, HSG B
1.294	61	60	Weighted Average, UI Adjusted
1.248			96.45% Pervious Area
0.046			3.55% Impervious Area
0.046			100.00% Unconnected

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
14.0	100	0.0240	0.12		**Sheet Flow,** Grass: Dense n= 0.240 P2= 2.87"
3.3	330	0.0573	1.68		**Shallow Concentrated Flow,** Short Grass Pasture Kv= 7.0 fps
17.3	430	Total			

Subcatchment DR-B: DR-B



Summary for Subcatchment DR-C: DR-C

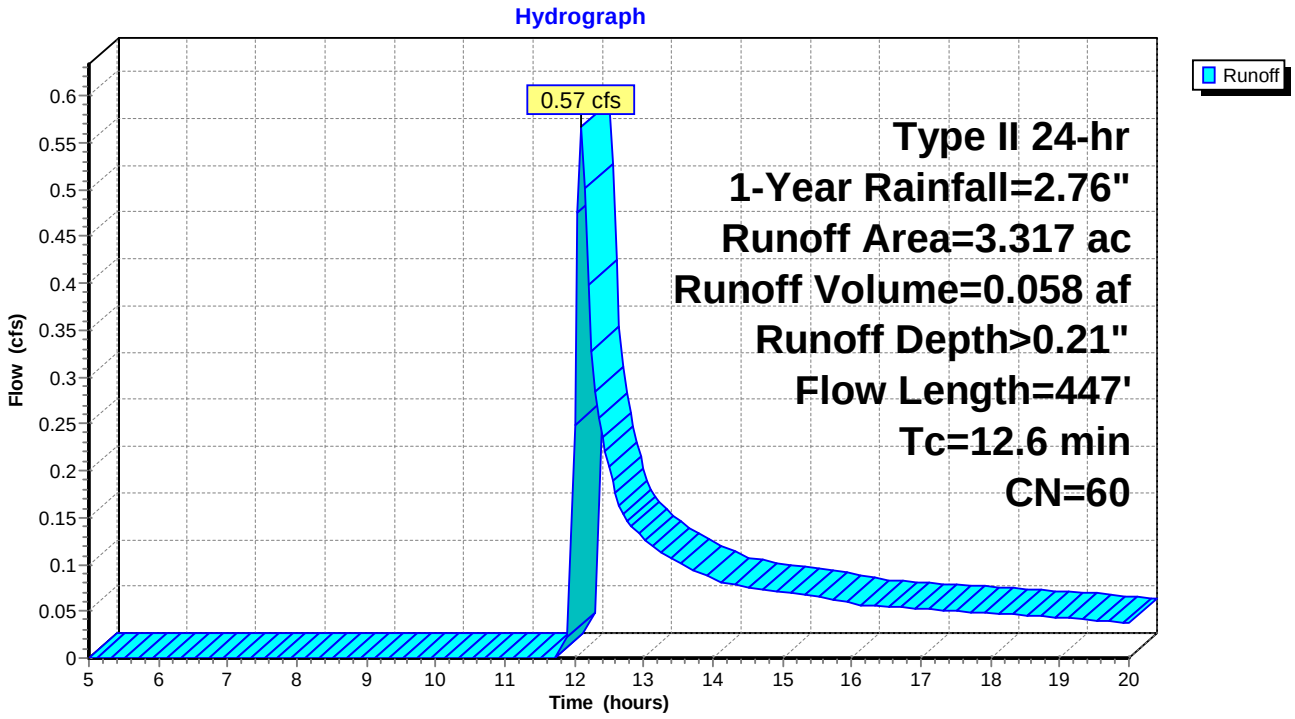
Runoff = 0.57 cfs @ 12.10 hrs, Volume= 0.058 af, Depth> 0.21"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type II 24-hr 1-Year Rainfall=2.76"

Area (ac)	CN	Description
0.948	65	Woods/grass comb., Fair, HSG B
2.369	58	Meadow, non-grazed, HSG B
3.317	60	Weighted Average
3.317		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
9.3	100	0.0670	0.18		**Sheet Flow,** Grass: Dense n= 0.240 P2= 2.87"
3.3	347	0.0630	1.76		**Shallow Concentrated Flow,** Short Grass Pasture Kv= 7.0 fps
12.6	447	Total			

Subcatchment DR-C: DR-C



Summary for Subcatchment DR-D: DR-D

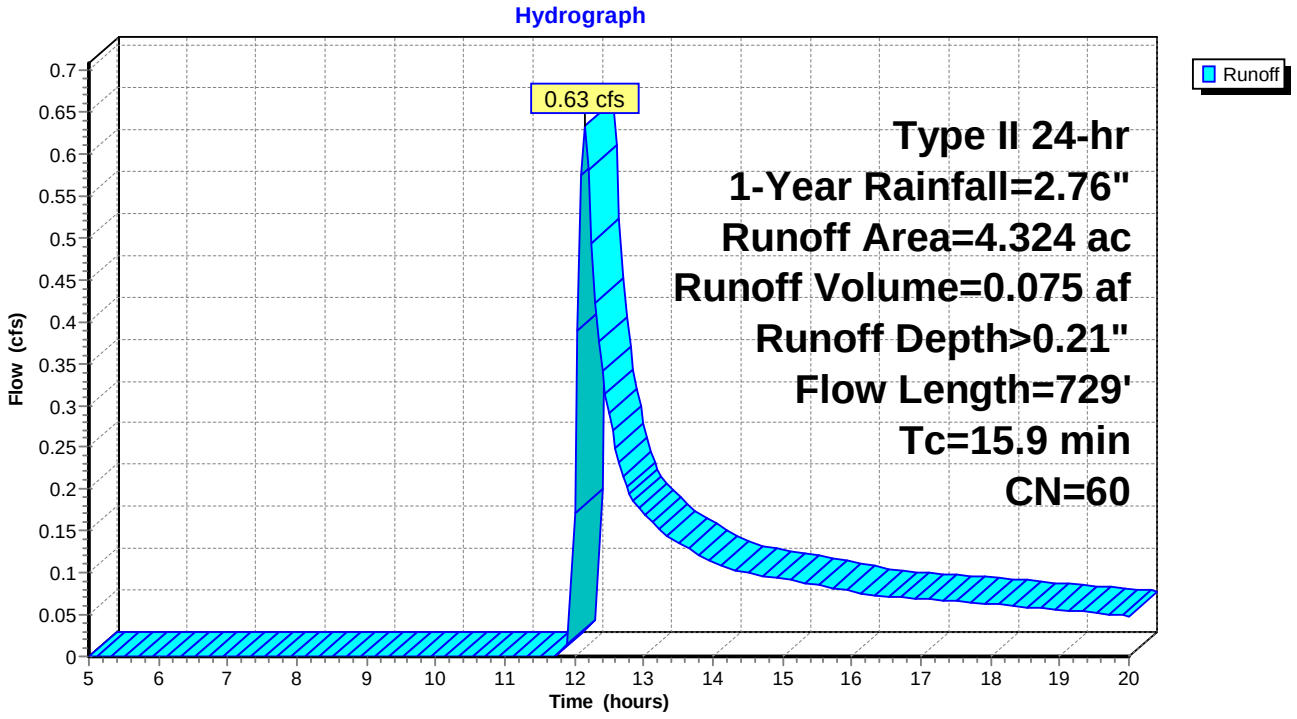
Runoff = 0.63 cfs @ 12.15 hrs, Volume= 0.075 af, Depth> 0.21"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type II 24-hr 1-Year Rainfall=2.76"

Area (ac)	CN	Description
3.221	58	Meadow, non-grazed, HSG B
1.011	65	Woods/grass comb., Fair, HSG B
0.037	96	Gravel surface, HSG B
0.055	98	Unconnected roofs, HSG B
4.324	60	Weighted Average
4.269		98.73% Pervious Area
0.055		1.27% Impervious Area
0.055		100.00% Unconnected

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
9.4	100	0.0659	0.18		**Sheet Flow,** Grass: Dense n= 0.240 P2= 2.87"
6.5	629	0.0528	1.61		**Shallow Concentrated Flow,** Short Grass Pasture Kv= 7.0 fps
15.9	729	Total			

Subcatchment DR-D: DR-D



Summary for Subcatchment DR-E: DR-E

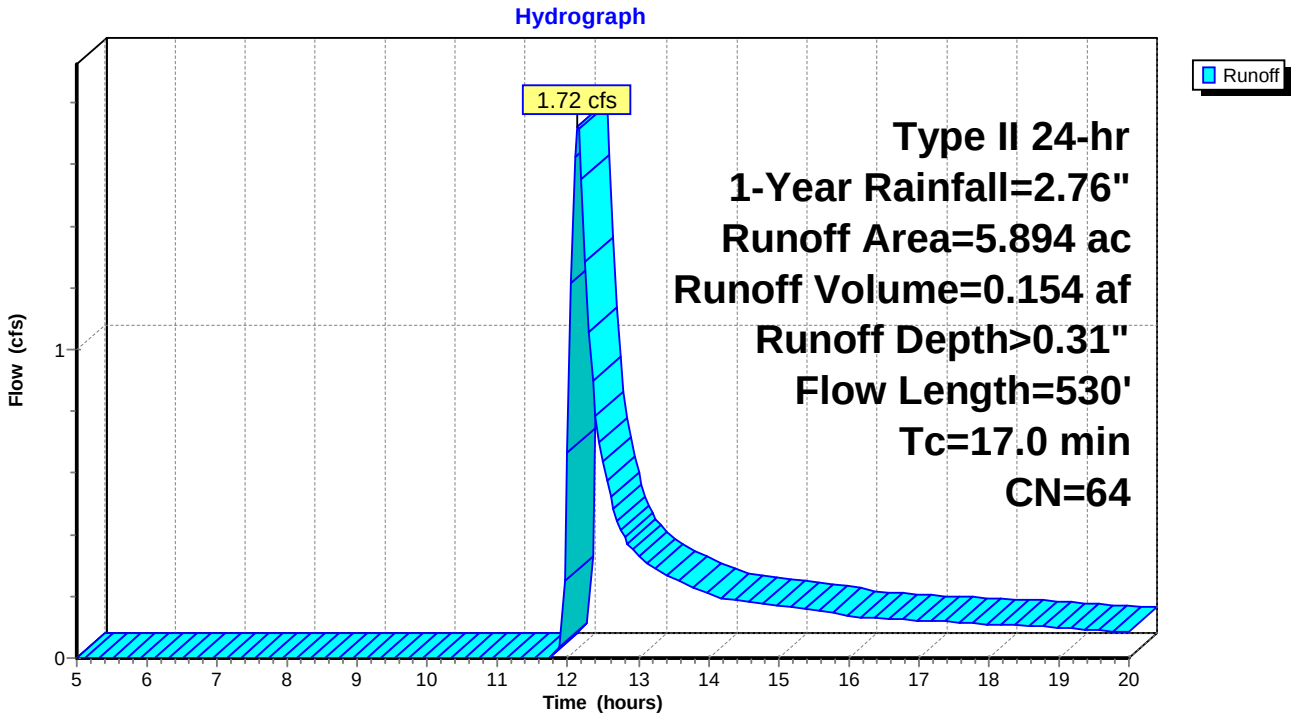
Runoff = 1.72 cfs @ 12.14 hrs, Volume= 0.154 af, Depth> 0.31"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type II 24-hr 1-Year Rainfall=2.76"

Area (ac)	CN	Description
4.734	65	Woods/grass comb., Fair, HSG B
1.160	58	Meadow, non-grazed, HSG B
5.894	64	Weighted Average
5.894		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
13.8	100	0.0247	0.12		**Sheet Flow,** Grass: Dense n= 0.240 P2= 2.87"
3.2	430	0.1006	2.22		**Shallow Concentrated Flow,** Short Grass Pasture Kv= 7.0 fps
17.0	530	Total			

Subcatchment DR-E: DR-E

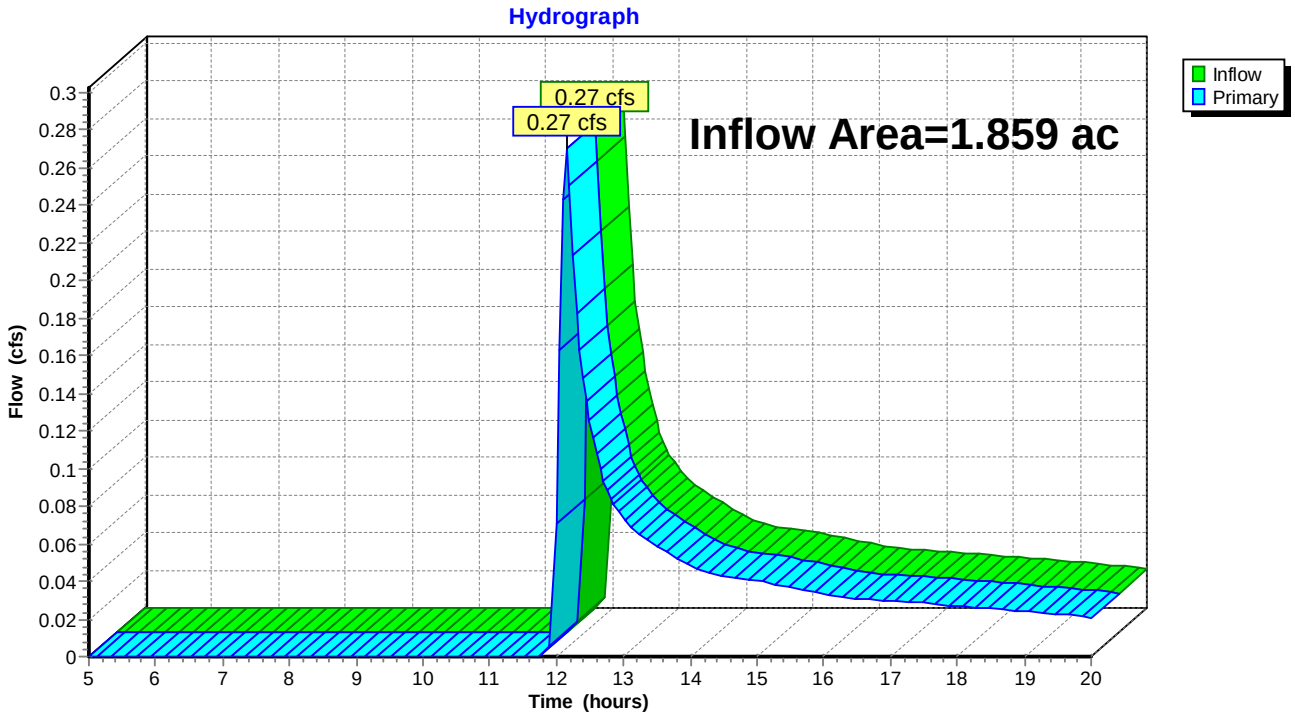


Summary for Link DP-1: Design Point #1

Inflow Area = 1.859 ac, 1.02% Impervious, Inflow Depth > 0.21" for 1-Year event
Inflow = 0.27 cfs @ 12.15 hrs, Volume= 0.032 af
Primary = 0.27 cfs @ 12.15 hrs, Volume= 0.032 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs

Link DP-1: Design Point #1

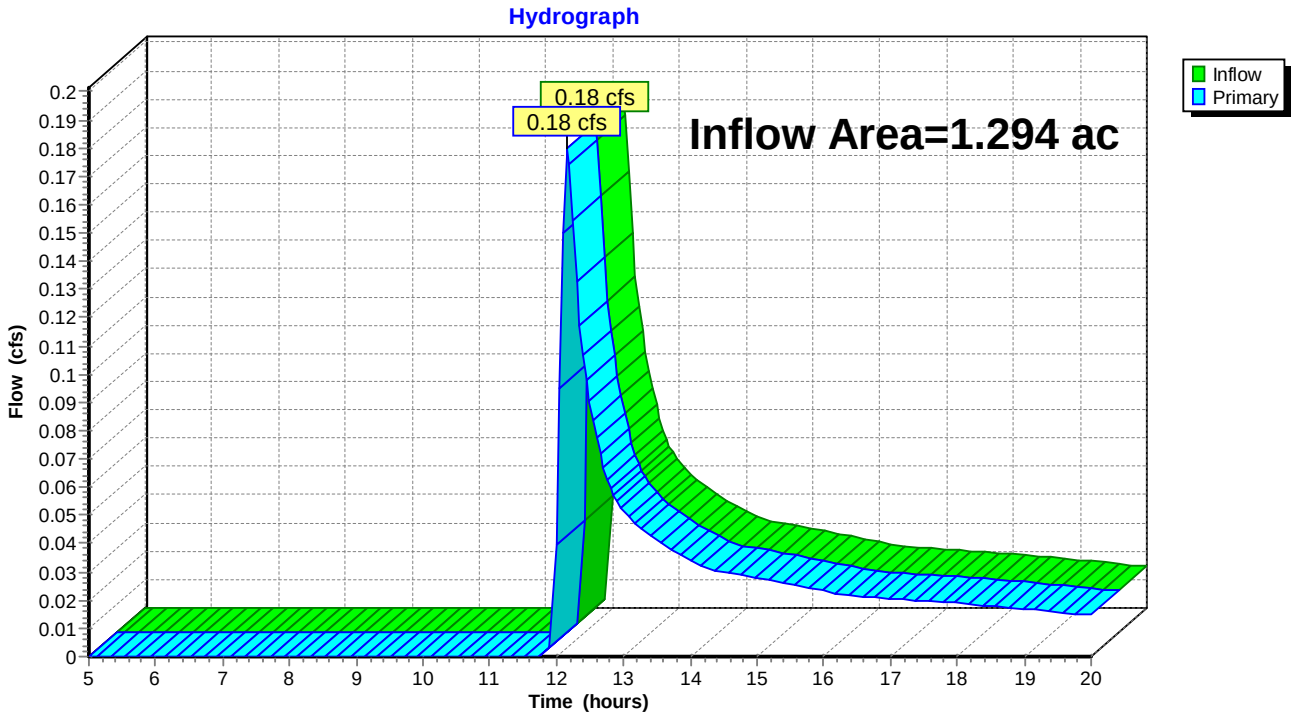


Summary for Link DP-2: Design Point #2

Inflow Area = 1.294 ac, 3.55% Impervious, Inflow Depth > 0.21" for 1-Year event
Inflow = 0.18 cfs @ 12.17 hrs, Volume= 0.022 af
Primary = 0.18 cfs @ 12.17 hrs, Volume= 0.022 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs

Link DP-2: Design Point #2

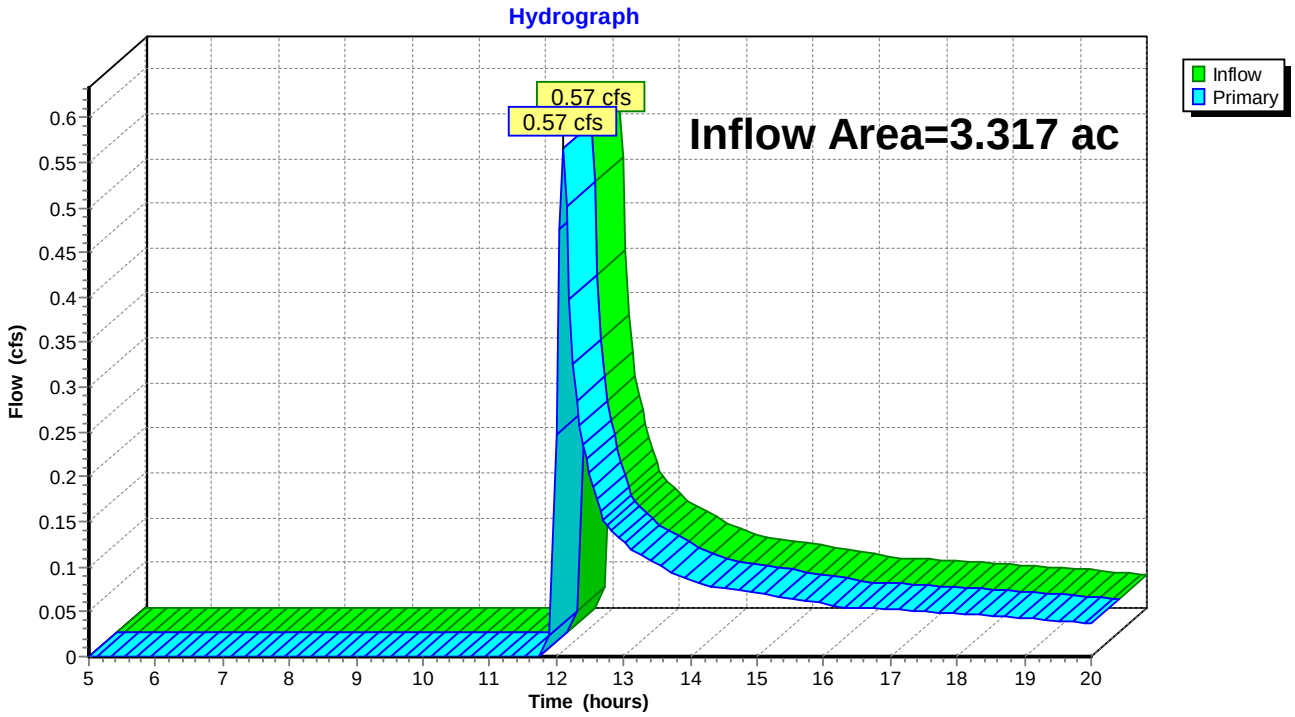


Summary for Link DP-3: Design Point #3

Inflow Area = 3.317 ac, 0.00% Impervious, Inflow Depth > 0.21" for 1-Year event
Inflow = 0.57 cfs @ 12.10 hrs, Volume= 0.058 af
Primary = 0.57 cfs @ 12.10 hrs, Volume= 0.058 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs

Link DP-3: Design Point #3

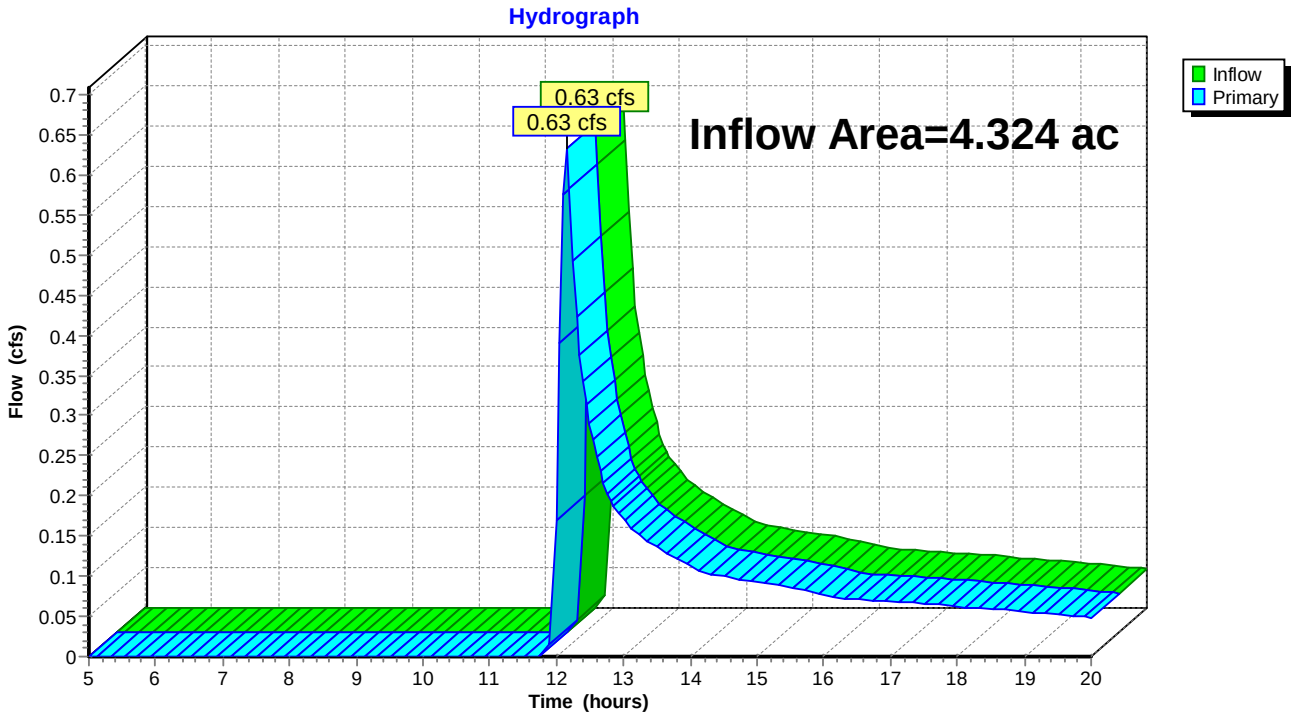


Summary for Link DP-4: Design Point #4

Inflow Area = 4.324 ac, 1.27% Impervious, Inflow Depth > 0.21" for 1-Year event
Inflow = 0.63 cfs @ 12.15 hrs, Volume= 0.075 af
Primary = 0.63 cfs @ 12.15 hrs, Volume= 0.075 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs

Link DP-4: Design Point #4

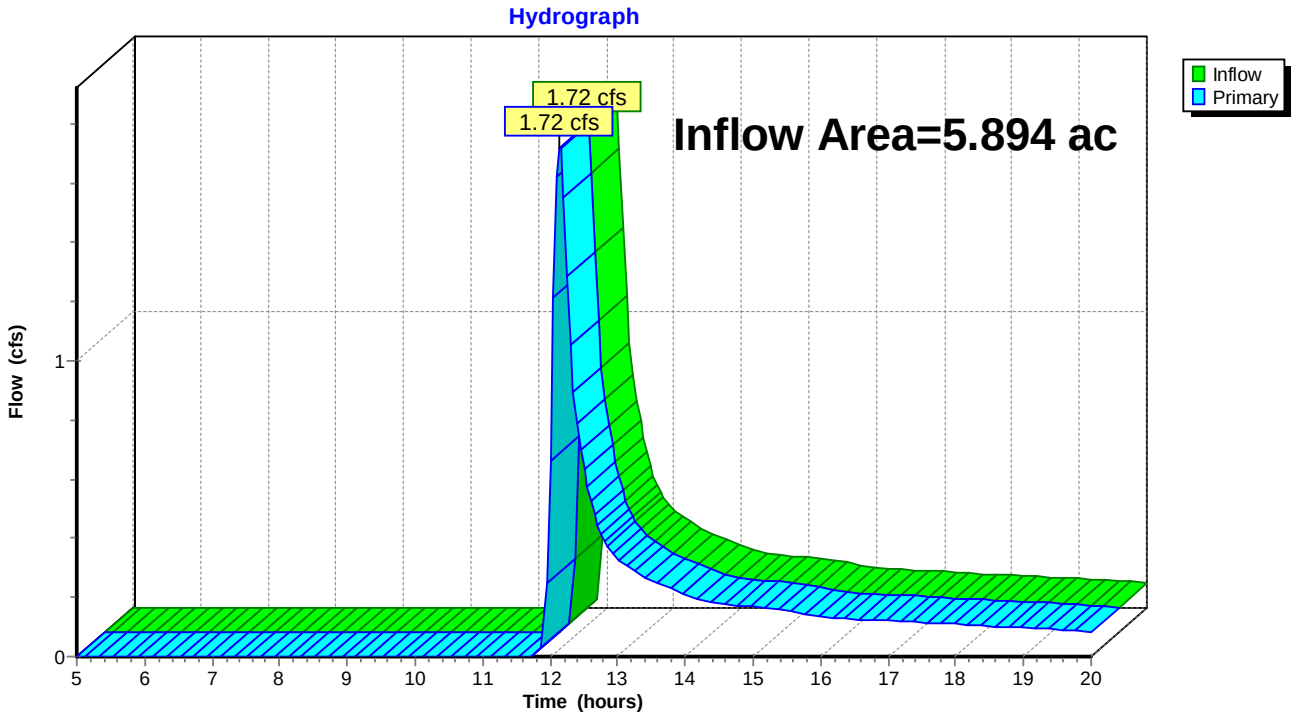


Summary for Link DP-5: Design Point #5

Inflow Area = 5.894 ac, 0.00% Impervious, Inflow Depth > 0.31" for 1-Year event
Inflow = 1.72 cfs @ 12.14 hrs, Volume= 0.154 af
Primary = 1.72 cfs @ 12.14 hrs, Volume= 0.154 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs

Link DP-5: Design Point #5



Summary for Subcatchment DR-A: DR-A

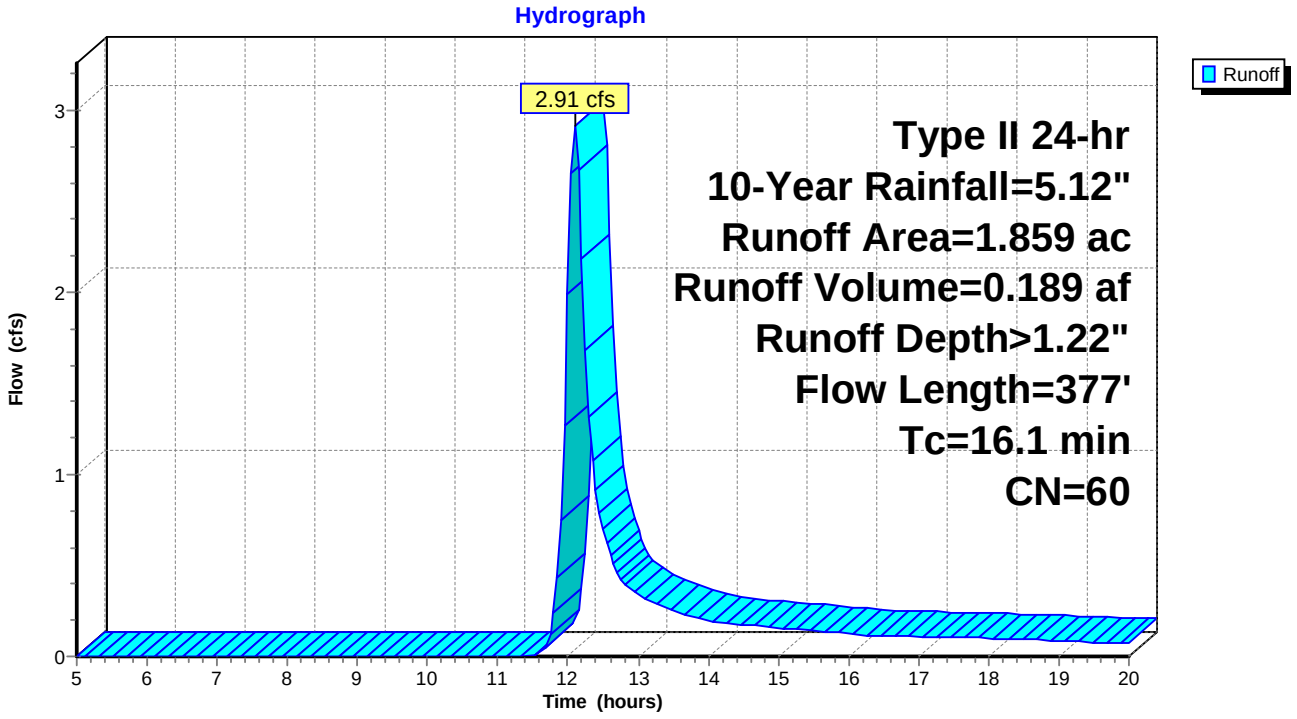
Runoff = 2.91 cfs @ 12.10 hrs, Volume= 0.189 af, Depth> 1.22"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type II 24-hr 10-Year Rainfall=5.12"

Area (ac)	CN	Description
1.548	58	Meadow, non-grazed, HSG B
0.237	65	Woods/grass comb., Fair, HSG B
0.055	96	Gravel surface, HSG B
0.019	98	Unconnected roofs, HSG B
1.859	60	Weighted Average
1.840		98.98% Pervious Area
0.019		1.02% Impervious Area
0.019		100.00% Unconnected

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
12.9	100	0.0295	0.13		**Sheet Flow,** Grass: Dense n= 0.240 P2= 2.87"
3.2	277	0.0437	1.46		**Shallow Concentrated Flow,** Short Grass Pasture Kv= 7.0 fps
16.1	377	Total			

Subcatchment DR-A: DR-A



Summary for Subcatchment DR-B: DR-B

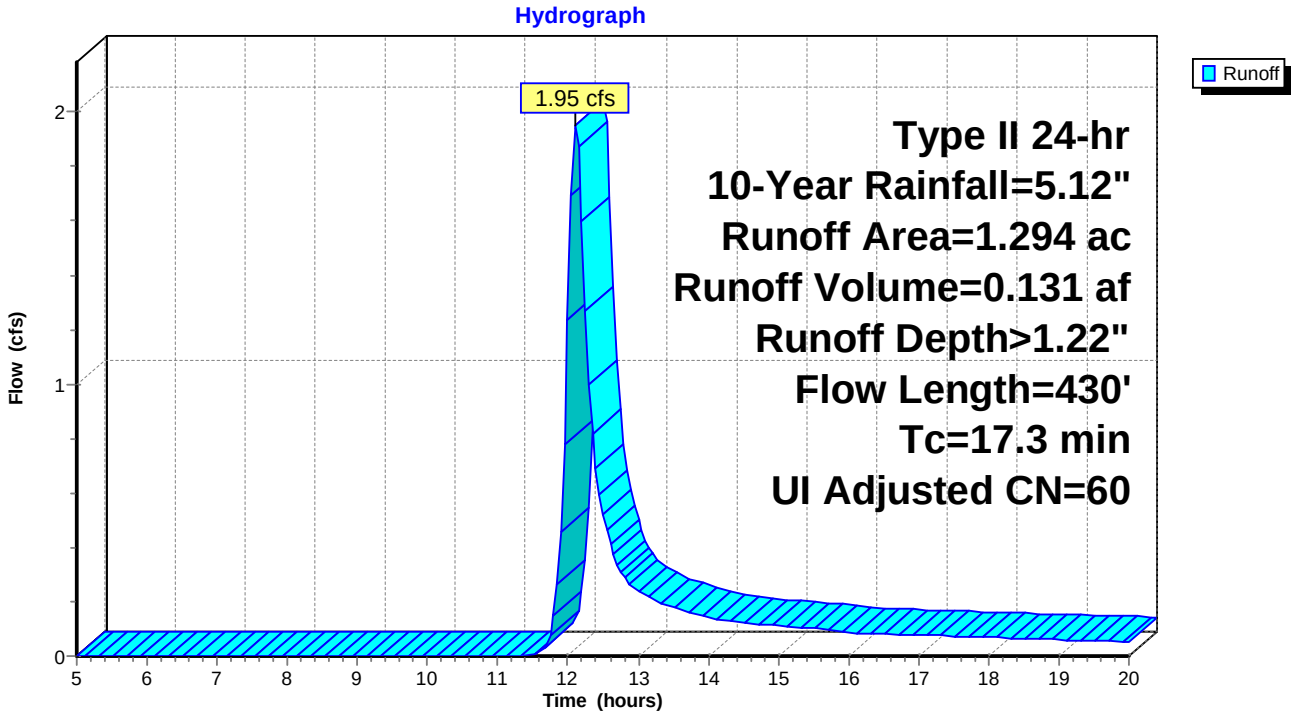
Runoff = 1.95 cfs @ 12.11 hrs, Volume= 0.131 af, Depth> 1.22"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type II 24-hr 10-Year Rainfall=5.12"

Area (ac)	CN	Adj	Description
1.015	58		Meadow, non-grazed, HSG B
0.233	65		Woods/grass comb., Fair, HSG B
0.046	98		Unconnected roofs, HSG B
1.294	61	60	Weighted Average, UI Adjusted
1.248			96.45% Pervious Area
0.046			3.55% Impervious Area
0.046			100.00% Unconnected

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
14.0	100	0.0240	0.12		**Sheet Flow,** Grass: Dense n= 0.240 P2= 2.87"
3.3	330	0.0573	1.68		**Shallow Concentrated Flow,** Short Grass Pasture Kv= 7.0 fps
17.3	430	Total			

Subcatchment DR-B: DR-B



Summary for Subcatchment DR-C: DR-C

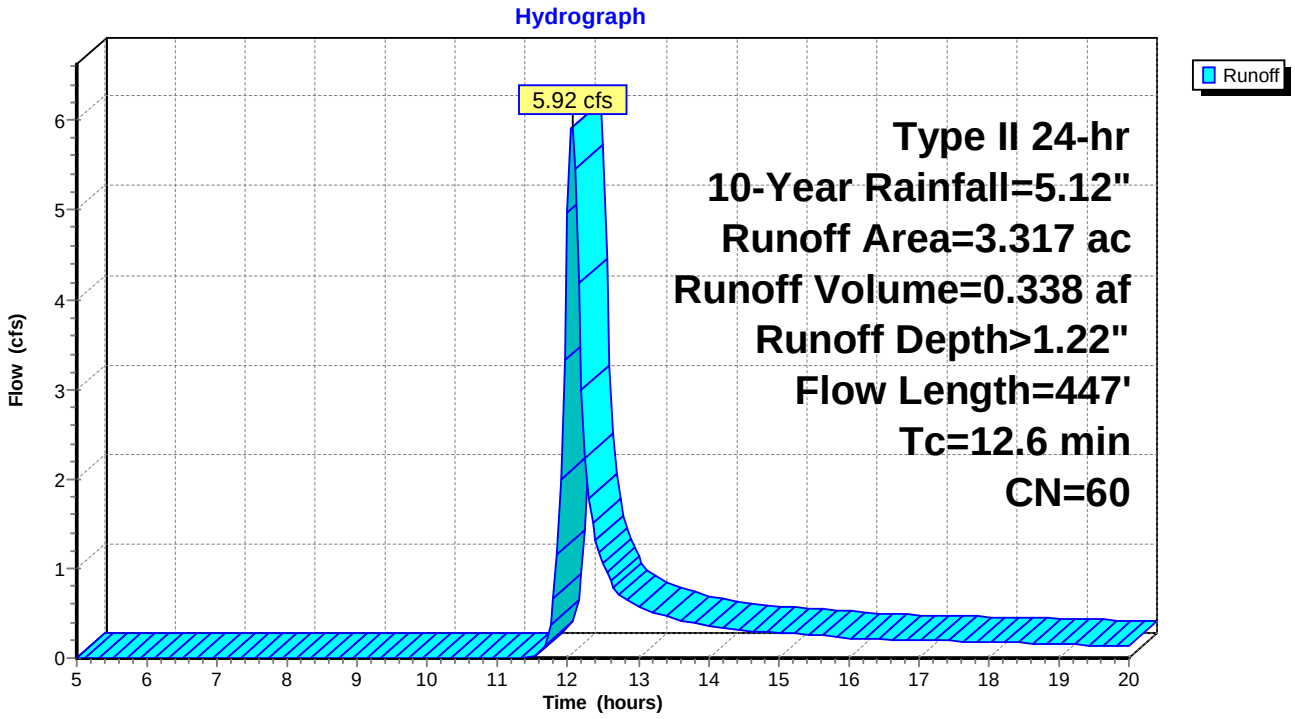
Runoff = 5.92 cfs @ 12.06 hrs, Volume= 0.338 af, Depth> 1.22"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type II 24-hr 10-Year Rainfall=5.12"

Area (ac)	CN	Description
0.948	65	Woods/grass comb., Fair, HSG B
2.369	58	Meadow, non-grazed, HSG B
3.317	60	Weighted Average
3.317		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
9.3	100	0.0670	0.18		**Sheet Flow,** Grass: Dense n= 0.240 P2= 2.87"
3.3	347	0.0630	1.76		**Shallow Concentrated Flow,** Short Grass Pasture Kv= 7.0 fps
12.6	447	Total			

Subcatchment DR-C: DR-C



Summary for Subcatchment DR-D: DR-D

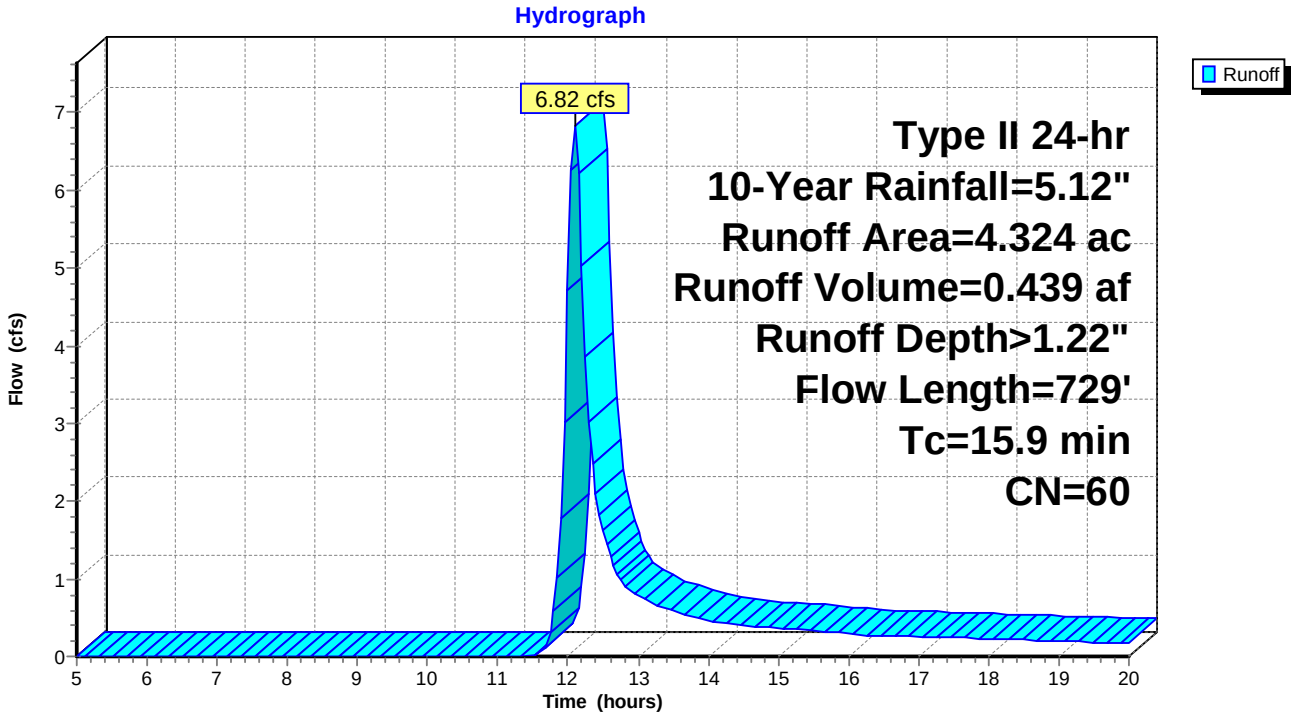
Runoff = 6.82 cfs @ 12.10 hrs, Volume= 0.439 af, Depth> 1.22"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type II 24-hr 10-Year Rainfall=5.12"

Area (ac)	CN	Description
3.221	58	Meadow, non-grazed, HSG B
1.011	65	Woods/grass comb., Fair, HSG B
0.037	96	Gravel surface, HSG B
0.055	98	Unconnected roofs, HSG B
4.324	60	Weighted Average
4.269		98.73% Pervious Area
0.055		1.27% Impervious Area
0.055		100.00% Unconnected

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
9.4	100	0.0659	0.18		**Sheet Flow,** Grass: Dense n= 0.240 P2= 2.87"
6.5	629	0.0528	1.61		**Shallow Concentrated Flow,** Short Grass Pasture Kv= 7.0 fps
15.9	729	Total			

Subcatchment DR-D: DR-D



Summary for Subcatchment DR-E: DR-E

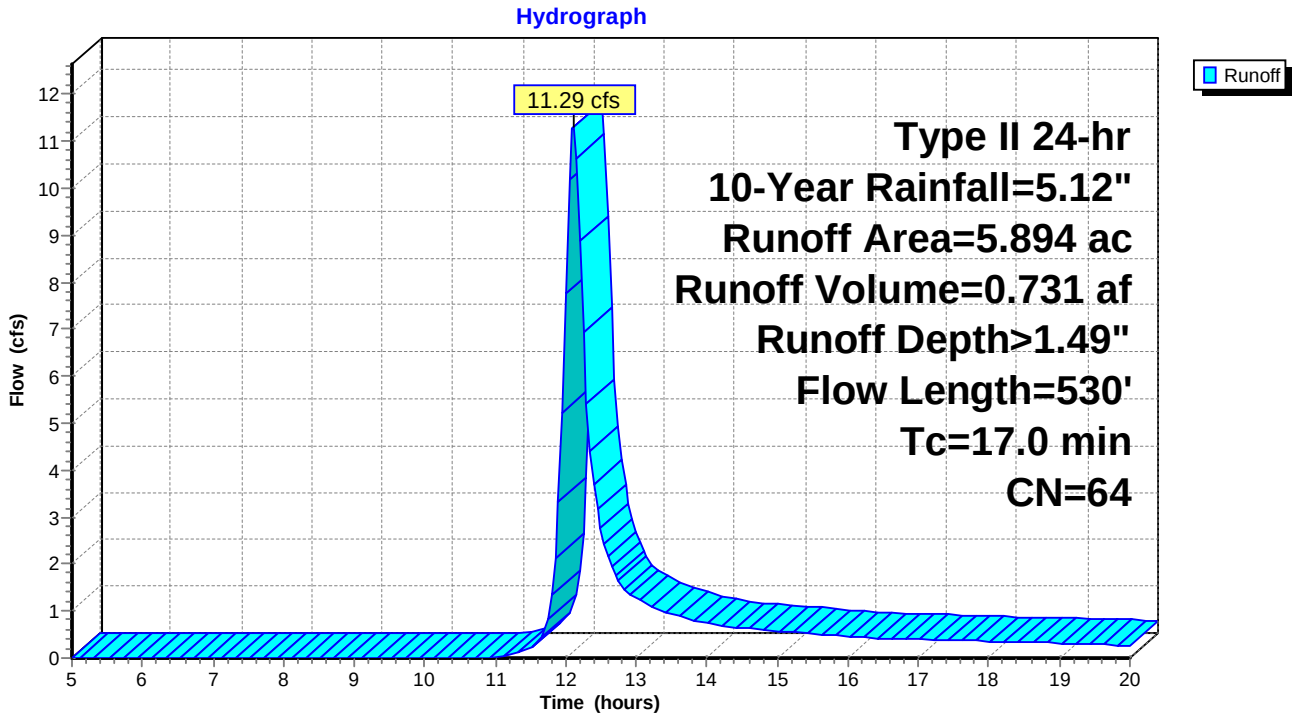
Runoff = 11.29 cfs @ 12.11 hrs, Volume= 0.731 af, Depth> 1.49"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type II 24-hr 10-Year Rainfall=5.12"

Area (ac)	CN	Description
4.734	65	Woods/grass comb., Fair, HSG B
1.160	58	Meadow, non-grazed, HSG B
5.894	64	Weighted Average
5.894		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
13.8	100	0.0247	0.12		**Sheet Flow,** Grass: Dense n= 0.240 P2= 2.87"
3.2	430	0.1006	2.22		**Shallow Concentrated Flow,** Short Grass Pasture Kv= 7.0 fps
17.0	530	Total			

Subcatchment DR-E: DR-E

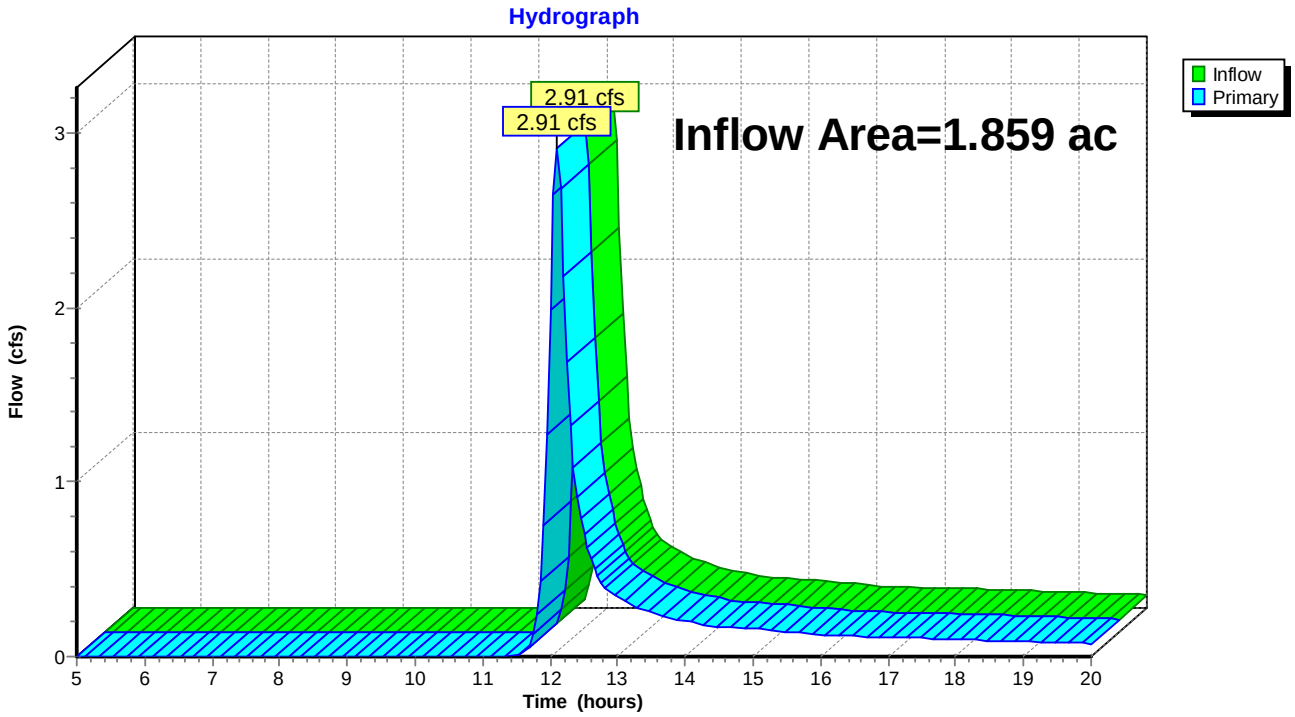


Summary for Link DP-1: Design Point #1

Inflow Area = 1.859 ac, 1.02% Impervious, Inflow Depth > 1.22" for 10-Year event
Inflow = 2.91 cfs @ 12.10 hrs, Volume= 0.189 af
Primary = 2.91 cfs @ 12.10 hrs, Volume= 0.189 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs

Link DP-1: Design Point #1

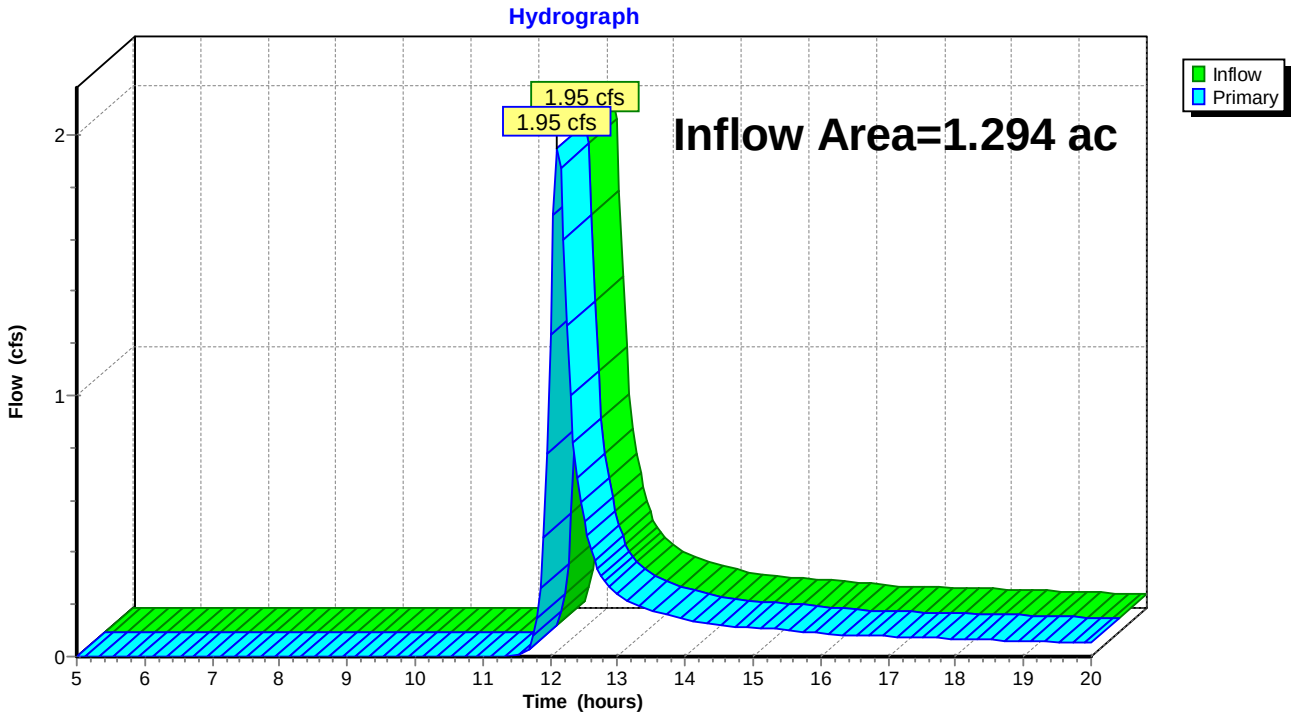


Summary for Link DP-2: Design Point #2

Inflow Area = 1.294 ac, 3.55% Impervious, Inflow Depth > 1.22" for 10-Year event
Inflow = 1.95 cfs @ 12.11 hrs, Volume= 0.131 af
Primary = 1.95 cfs @ 12.11 hrs, Volume= 0.131 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs

Link DP-2: Design Point #2

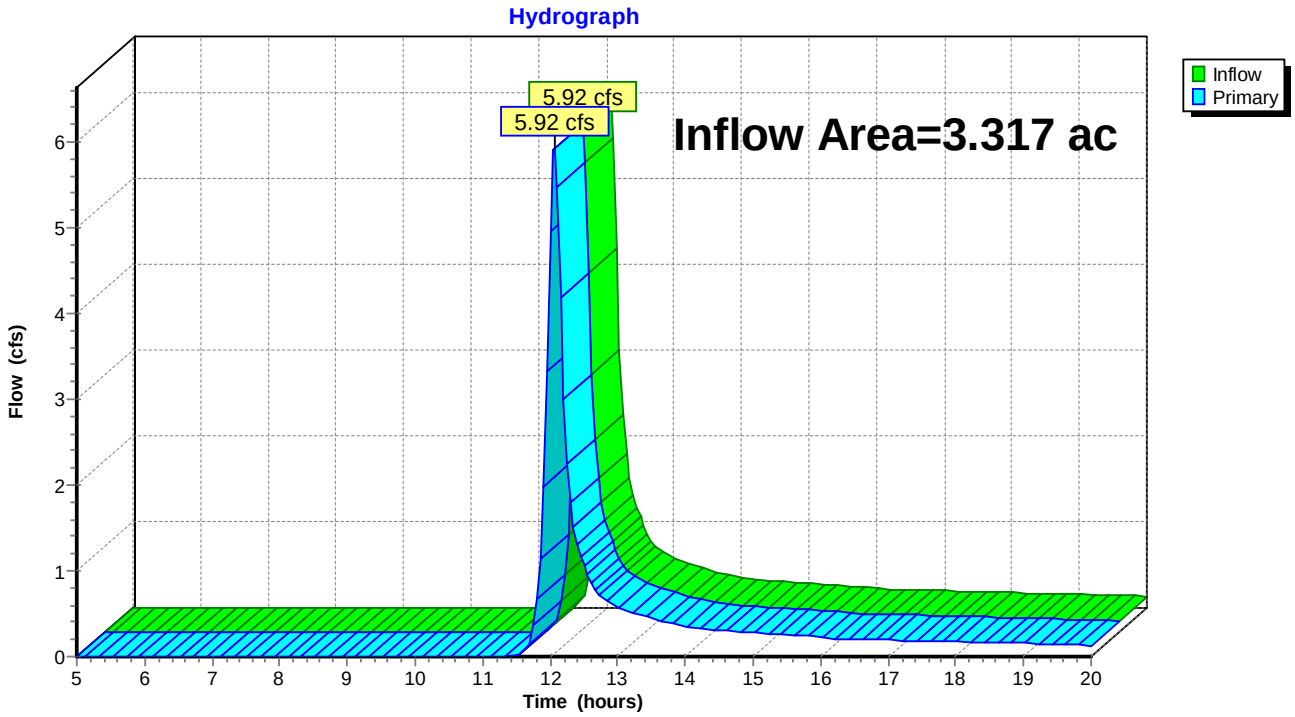


Summary for Link DP-3: Design Point #3

Inflow Area = 3.317 ac, 0.00% Impervious, Inflow Depth > 1.22" for 10-Year event
Inflow = 5.92 cfs @ 12.06 hrs, Volume= 0.338 af
Primary = 5.92 cfs @ 12.06 hrs, Volume= 0.338 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs

Link DP-3: Design Point #3

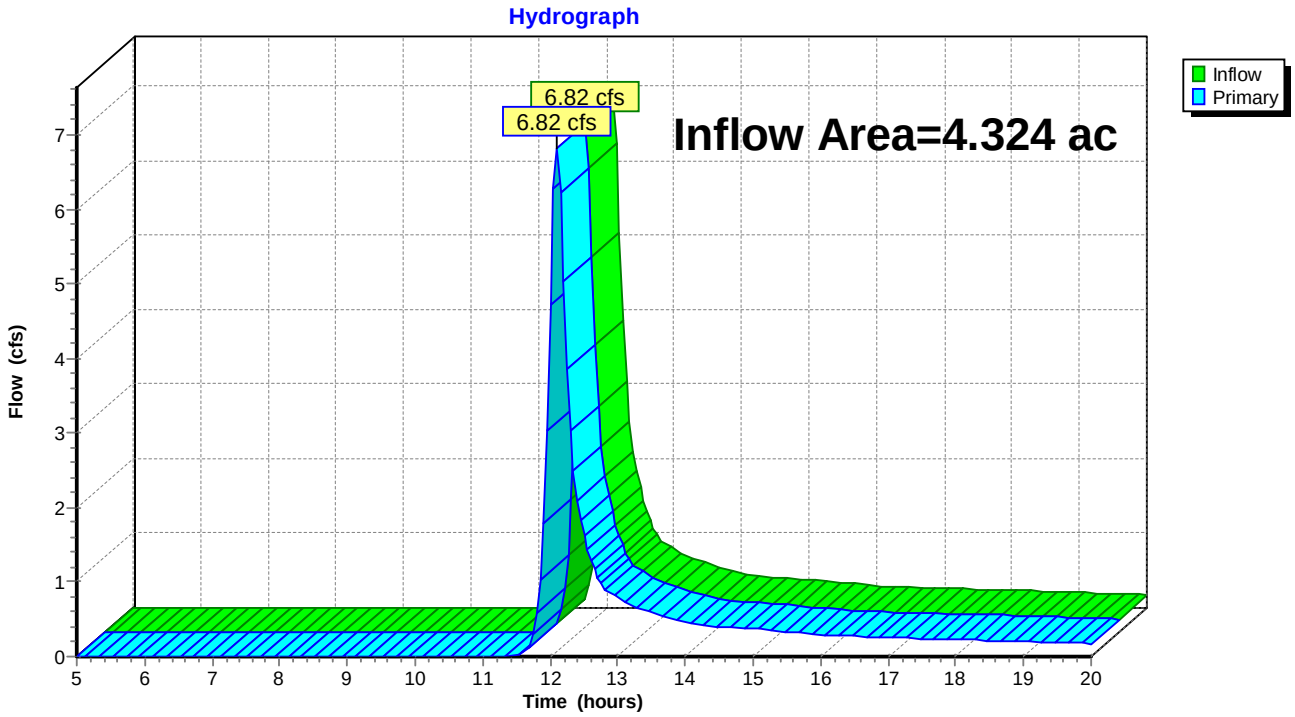


Summary for Link DP-4: Design Point #4

Inflow Area = 4.324 ac, 1.27% Impervious, Inflow Depth > 1.22" for 10-Year event
Inflow = 6.82 cfs @ 12.10 hrs, Volume= 0.439 af
Primary = 6.82 cfs @ 12.10 hrs, Volume= 0.439 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs

Link DP-4: Design Point #4

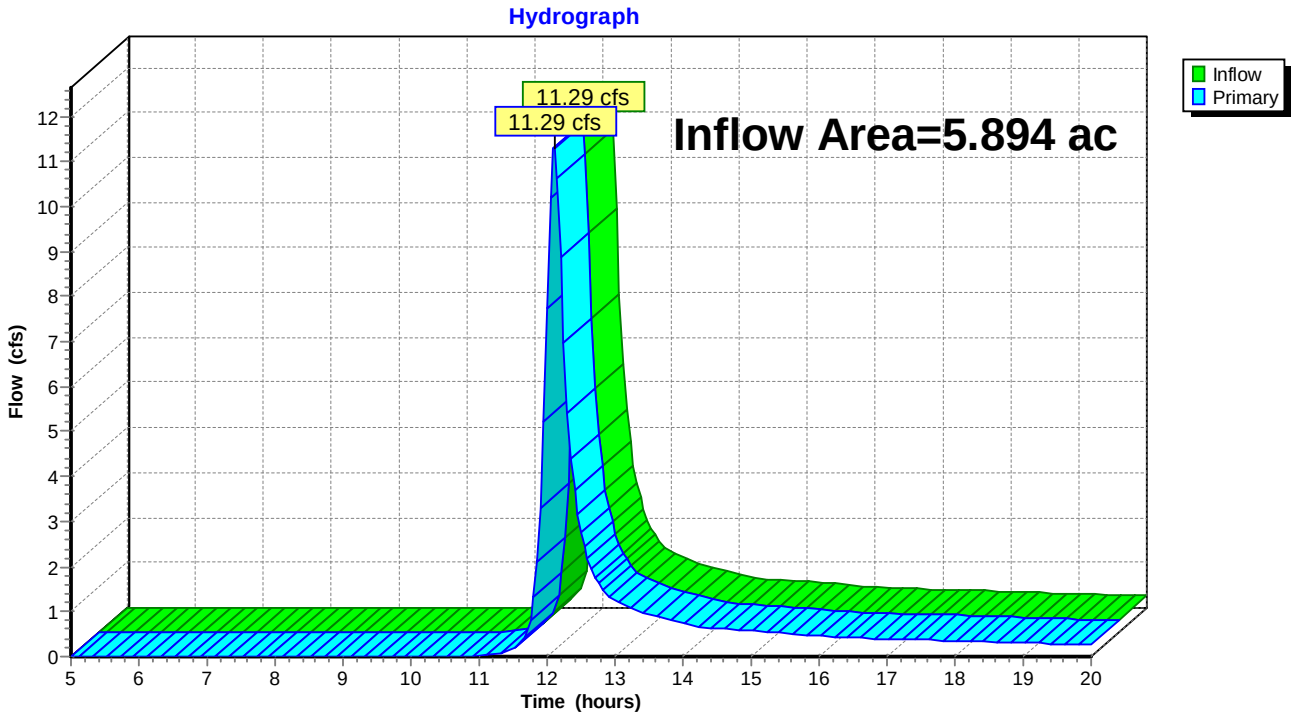


Summary for Link DP-5: Design Point #5

Inflow Area = 5.894 ac, 0.00% Impervious, Inflow Depth > 1.49" for 10-Year event
Inflow = 11.29 cfs @ 12.11 hrs, Volume= 0.731 af
Primary = 11.29 cfs @ 12.11 hrs, Volume= 0.731 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs

Link DP-5: Design Point #5



Summary for Subcatchment DR-A: DR-A

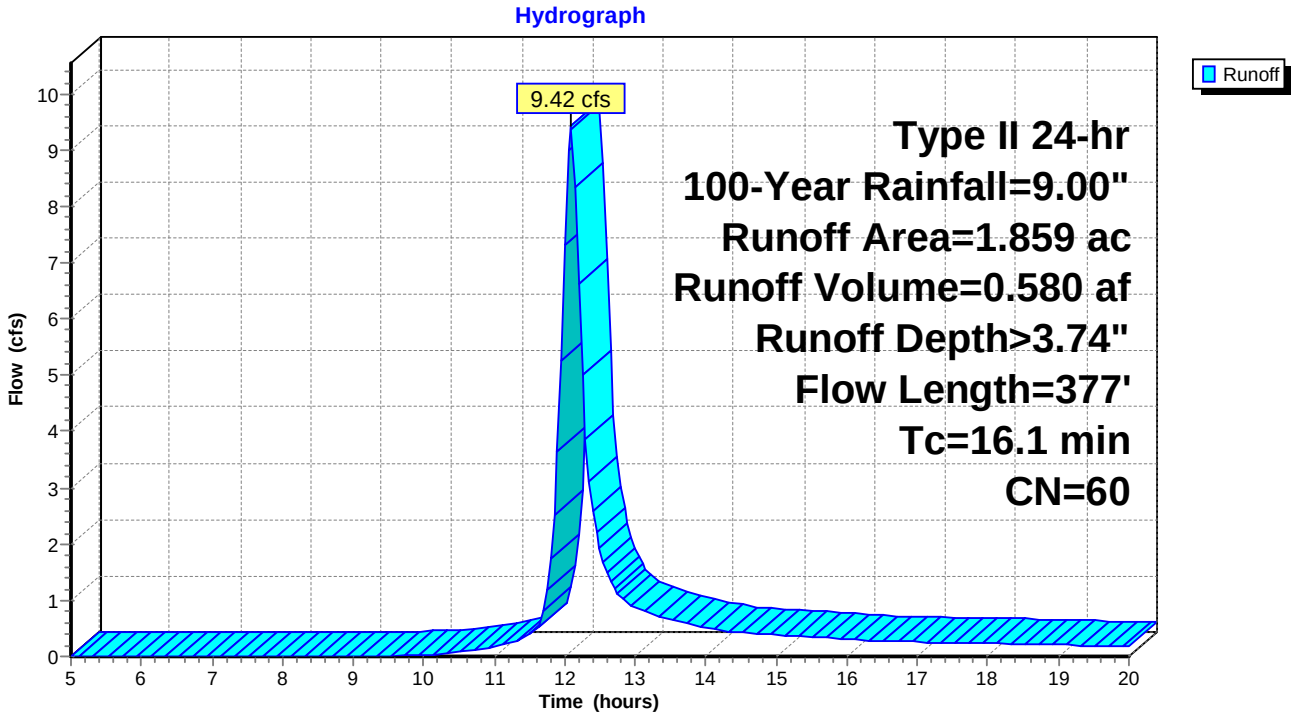
Runoff = 9.42 cfs @ 12.09 hrs, Volume= 0.580 af, Depth> 3.74"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type II 24-hr 100-Year Rainfall=9.00"

Area (ac)	CN	Description
1.548	58	Meadow, non-grazed, HSG B
0.237	65	Woods/grass comb., Fair, HSG B
0.055	96	Gravel surface, HSG B
0.019	98	Unconnected roofs, HSG B
1.859	60	Weighted Average
1.840		98.98% Pervious Area
0.019		1.02% Impervious Area
0.019		100.00% Unconnected

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
12.9	100	0.0295	0.13		**Sheet Flow,** Grass: Dense n= 0.240 P2= 2.87"
3.2	277	0.0437	1.46		**Shallow Concentrated Flow,** Short Grass Pasture Kv= 7.0 fps
16.1	377	Total			

Subcatchment DR-A: DR-A



Summary for Subcatchment DR-B: DR-B

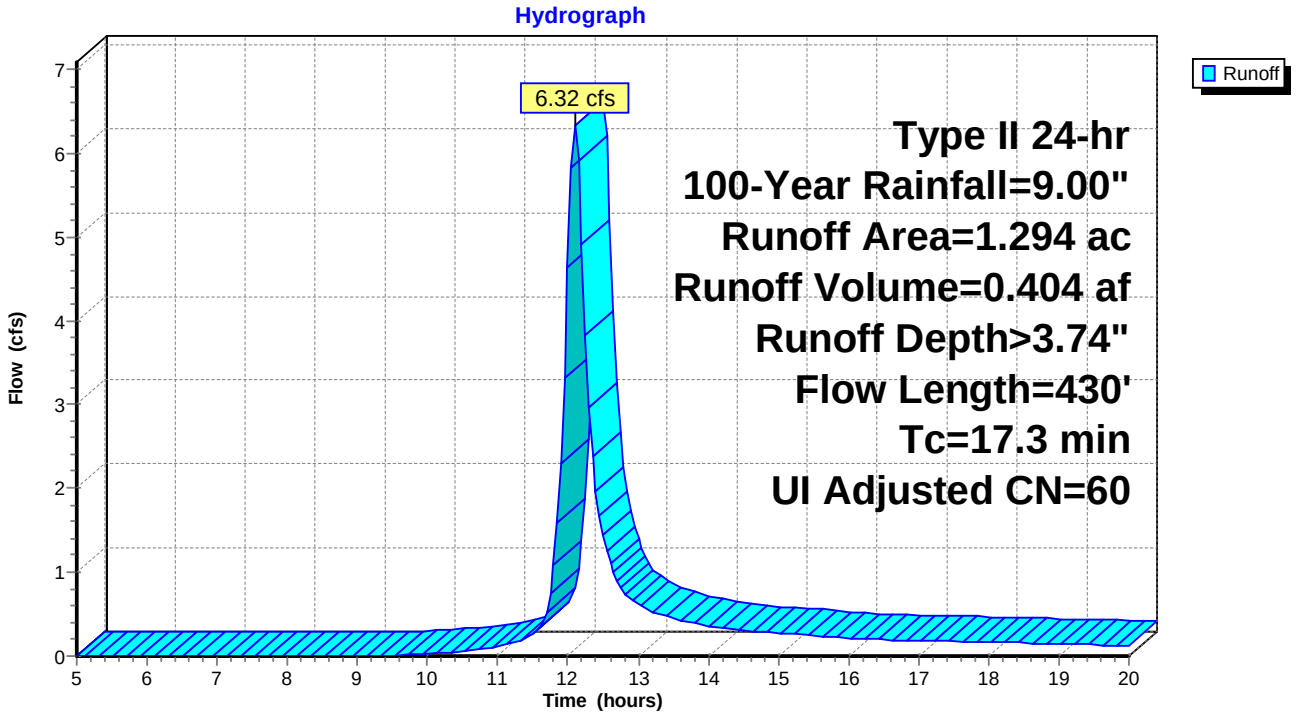
Runoff = 6.32 cfs @ 12.10 hrs, Volume= 0.404 af, Depth> 3.74"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type II 24-hr 100-Year Rainfall=9.00"

Area (ac)	CN	Adj	Description
1.015	58		Meadow, non-grazed, HSG B
0.233	65		Woods/grass comb., Fair, HSG B
0.046	98		Unconnected roofs, HSG B
1.294	61	60	Weighted Average, UI Adjusted
1.248			96.45% Pervious Area
0.046			3.55% Impervious Area
0.046			100.00% Unconnected

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
14.0	100	0.0240	0.12		**Sheet Flow,** Grass: Dense n= 0.240 P2= 2.87"
3.3	330	0.0573	1.68		**Shallow Concentrated Flow,** Short Grass Pasture Kv= 7.0 fps
17.3	430	Total			

Subcatchment DR-B: DR-B



Summary for Subcatchment DR-C: DR-C

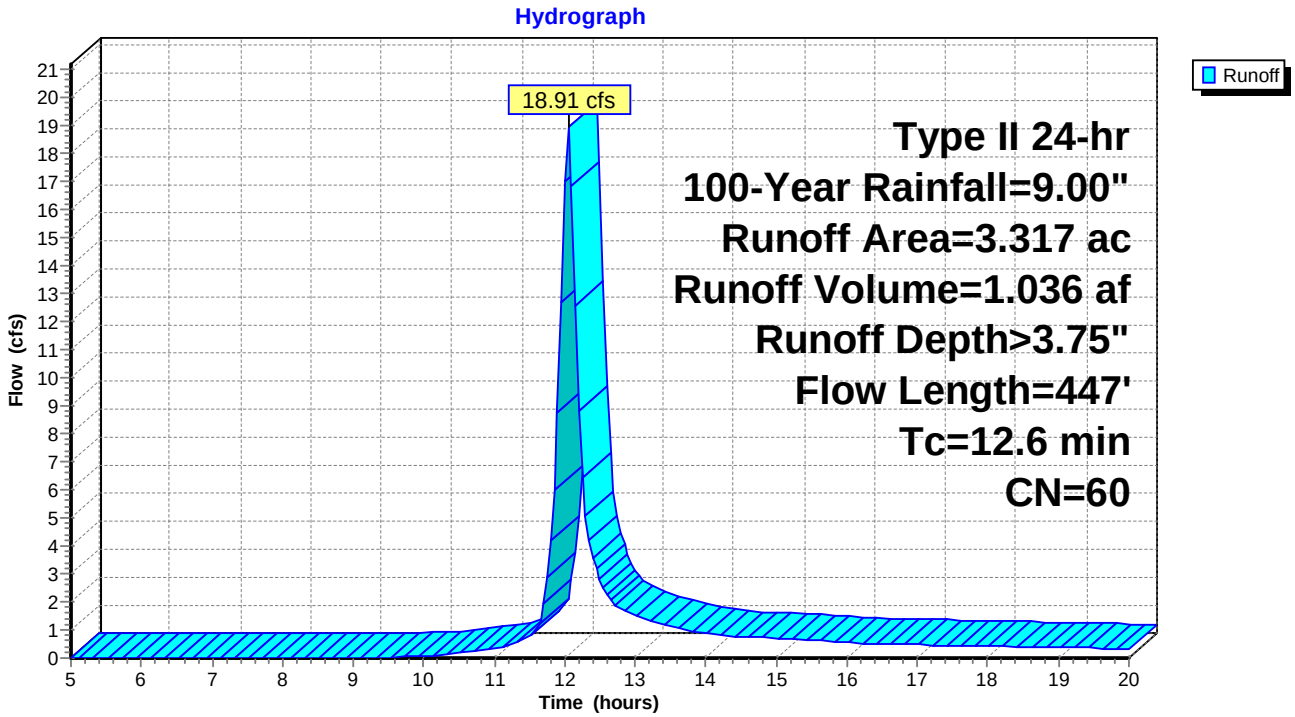
Runoff = 18.91 cfs @ 12.05 hrs, Volume= 1.036 af, Depth> 3.75"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type II 24-hr 100-Year Rainfall=9.00"

Area (ac)	CN	Description
0.948	65	Woods/grass comb., Fair, HSG B
2.369	58	Meadow, non-grazed, HSG B
3.317	60	Weighted Average
3.317		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
9.3	100	0.0670	0.18		**Sheet Flow,** Grass: Dense n= 0.240 P2= 2.87"
3.3	347	0.0630	1.76		**Shallow Concentrated Flow,** Short Grass Pasture Kv= 7.0 fps
12.6	447	Total			

Subcatchment DR-C: DR-C



Summary for Subcatchment DR-D: DR-D

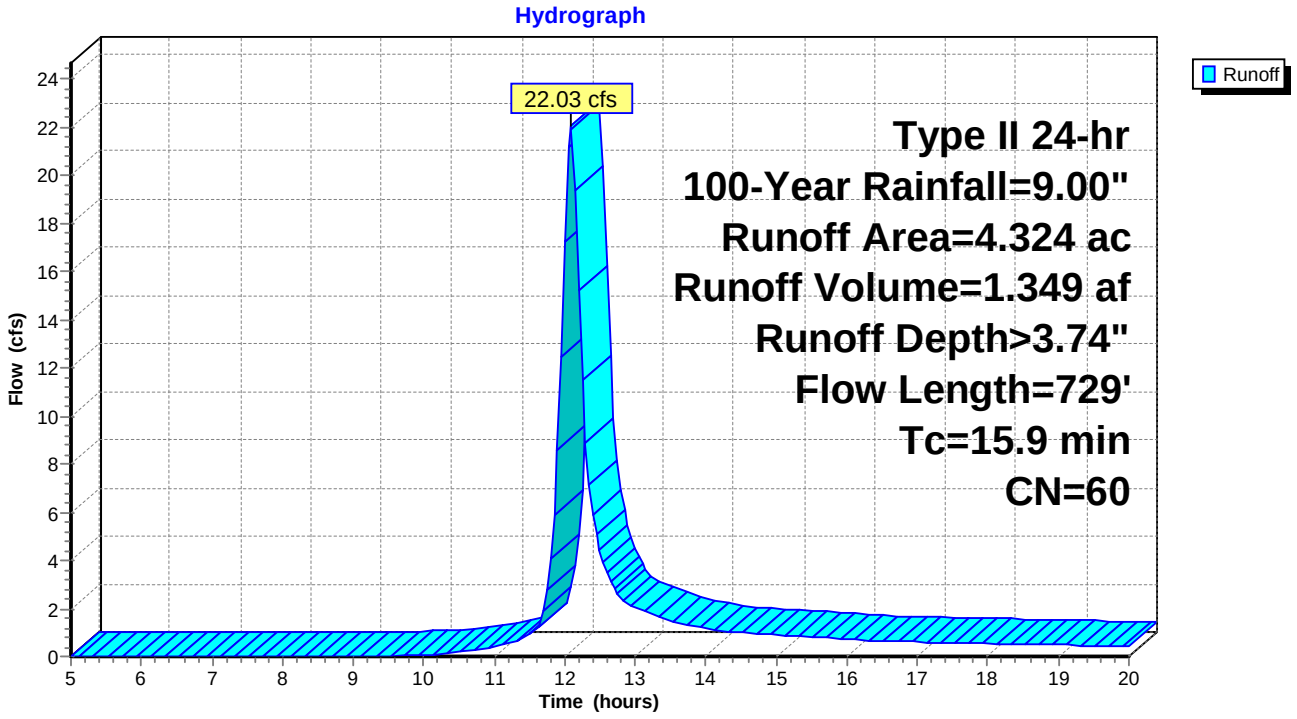
Runoff = 22.03 cfs @ 12.09 hrs, Volume= 1.349 af, Depth> 3.74"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type II 24-hr 100-Year Rainfall=9.00"

Area (ac)	CN	Description
3.221	58	Meadow, non-grazed, HSG B
1.011	65	Woods/grass comb., Fair, HSG B
0.037	96	Gravel surface, HSG B
0.055	98	Unconnected roofs, HSG B
4.324	60	Weighted Average
4.269		98.73% Pervious Area
0.055		1.27% Impervious Area
0.055		100.00% Unconnected

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
9.4	100	0.0659	0.18		**Sheet Flow,** Grass: Dense n= 0.240 P2= 2.87"
6.5	629	0.0528	1.61		**Shallow Concentrated Flow,** Short Grass Pasture Kv= 7.0 fps
15.9	729	Total			

Subcatchment DR-D: DR-D



Summary for Subcatchment DR-E: DR-E

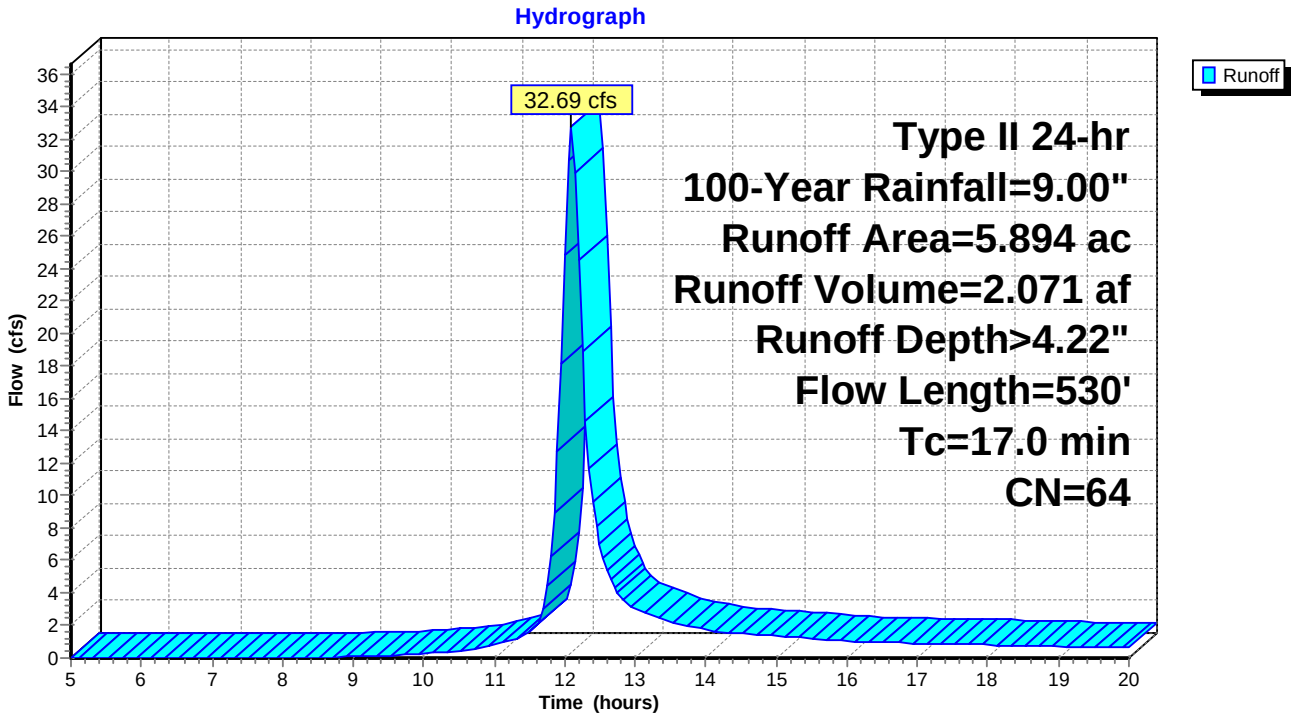
Runoff = 32.69 cfs @ 12.10 hrs, Volume= 2.071 af, Depth> 4.22"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type II 24-hr 100-Year Rainfall=9.00"

Area (ac)	CN	Description
4.734	65	Woods/grass comb., Fair, HSG B
1.160	58	Meadow, non-grazed, HSG B
5.894	64	Weighted Average
5.894		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
13.8	100	0.0247	0.12		**Sheet Flow,** Grass: Dense n= 0.240 P2= 2.87"
3.2	430	0.1006	2.22		**Shallow Concentrated Flow,** Short Grass Pasture Kv= 7.0 fps
17.0	530	Total			

Subcatchment DR-E: DR-E

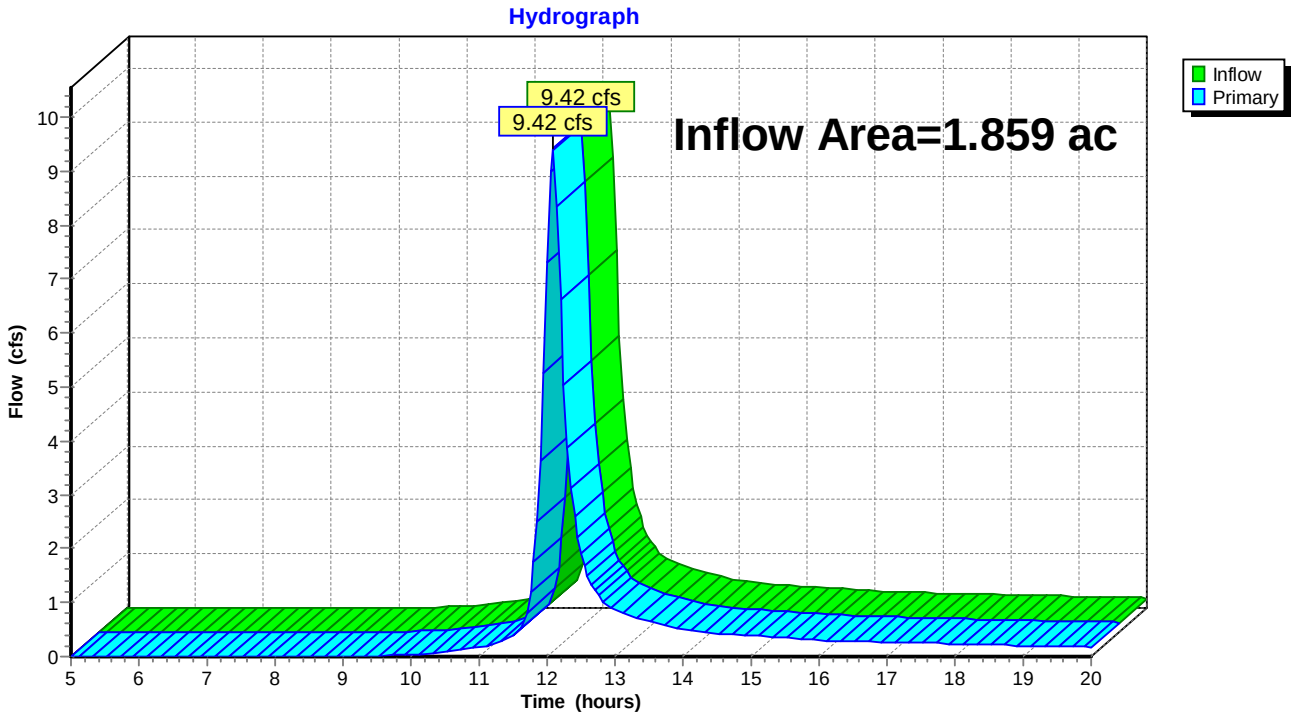


Summary for Link DP-1: Design Point #1

Inflow Area = 1.859 ac, 1.02% Impervious, Inflow Depth > 3.74" for 100-Year event
Inflow = 9.42 cfs @ 12.09 hrs, Volume= 0.580 af
Primary = 9.42 cfs @ 12.09 hrs, Volume= 0.580 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs

Link DP-1: Design Point #1

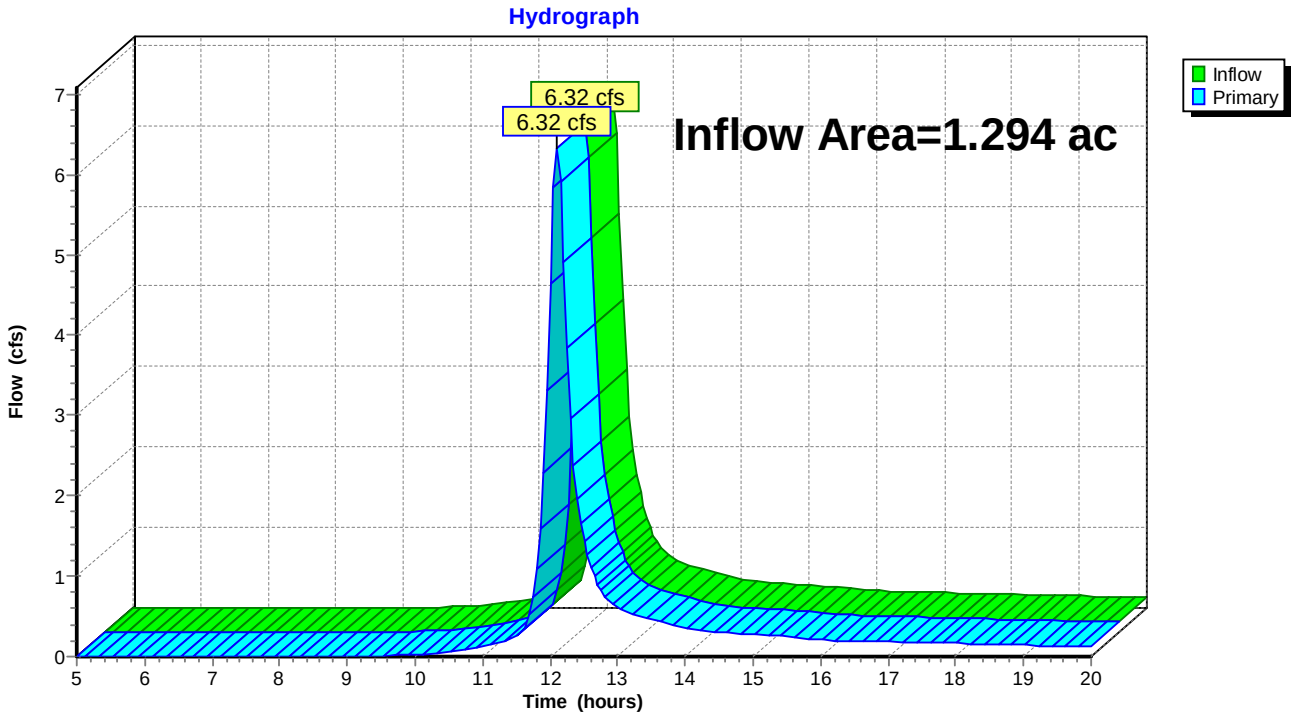


Summary for Link DP-2: Design Point #2

Inflow Area = 1.294 ac, 3.55% Impervious, Inflow Depth > 3.74" for 100-Year event
Inflow = 6.32 cfs @ 12.10 hrs, Volume= 0.404 af
Primary = 6.32 cfs @ 12.10 hrs, Volume= 0.404 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs

Link DP-2: Design Point #2

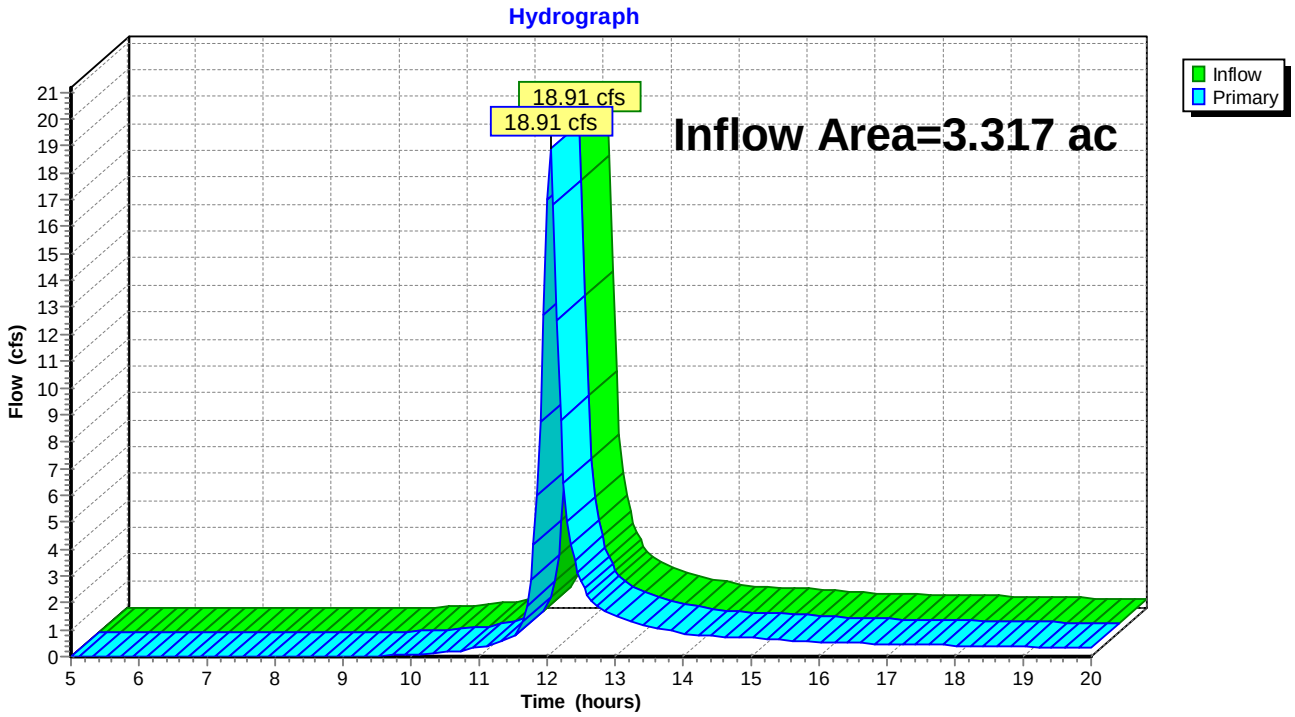


Summary for Link DP-3: Design Point #3

Inflow Area = 3.317 ac, 0.00% Impervious, Inflow Depth > 3.75" for 100-Year event
Inflow = 18.91 cfs @ 12.05 hrs, Volume= 1.036 af
Primary = 18.91 cfs @ 12.05 hrs, Volume= 1.036 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs

Link DP-3: Design Point #3

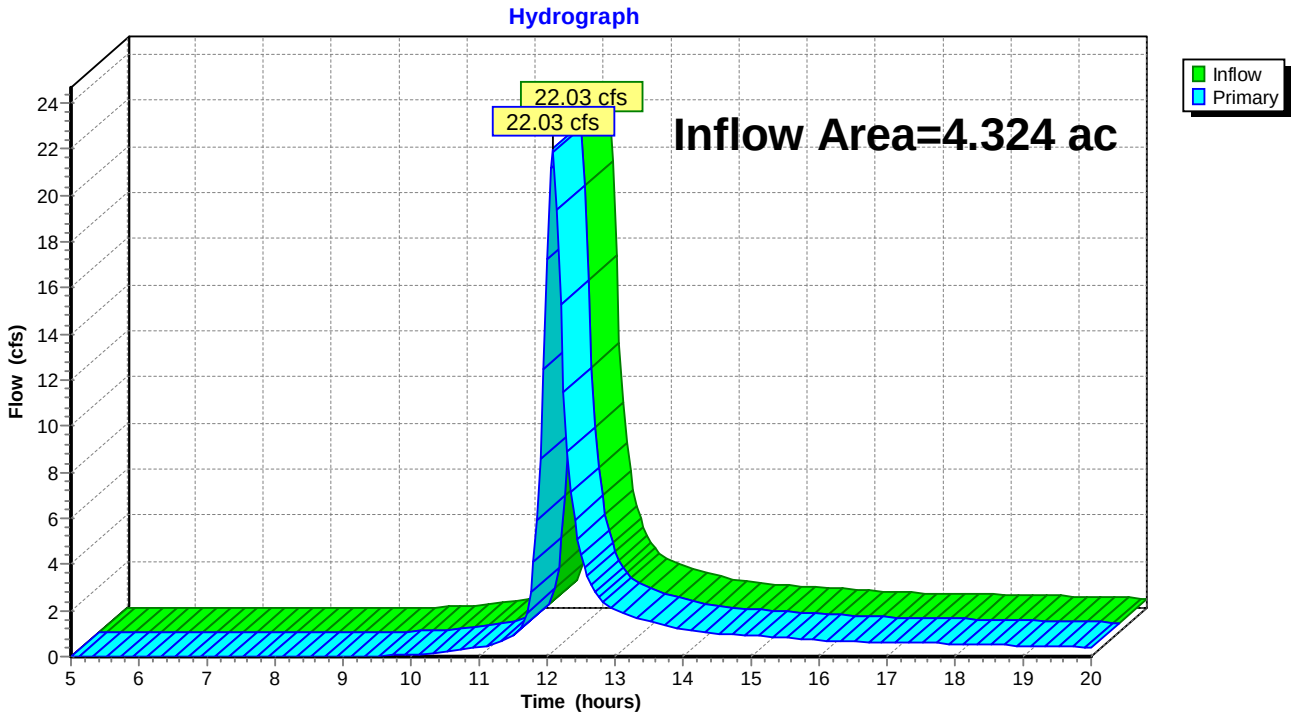


Summary for Link DP-4: Design Point #4

Inflow Area = 4.324 ac, 1.27% Impervious, Inflow Depth > 3.74" for 100-Year event
Inflow = 22.03 cfs @ 12.09 hrs, Volume= 1.349 af
Primary = 22.03 cfs @ 12.09 hrs, Volume= 1.349 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs

Link DP-4: Design Point #4

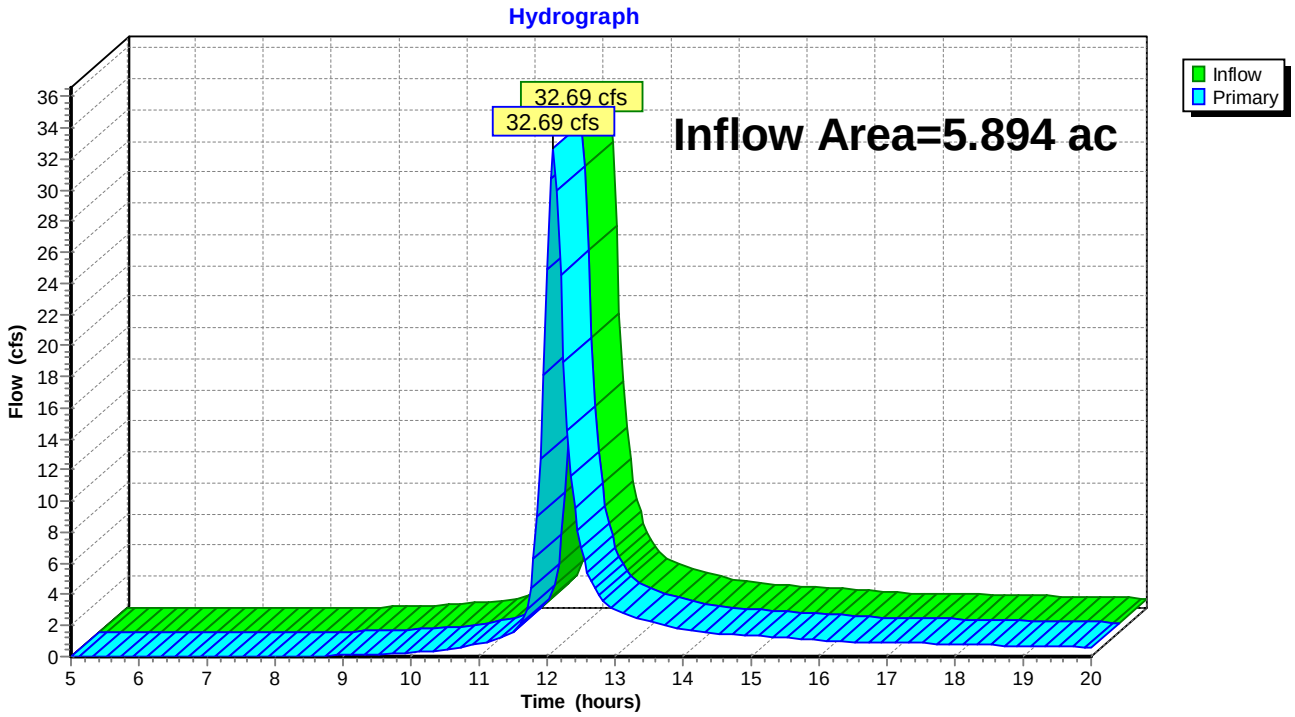


Summary for Link DP-5: Design Point #5

Inflow Area = 5.894 ac, 0.00% Impervious, Inflow Depth > 4.22" for 100-Year event
Inflow = 32.69 cfs @ 12.10 hrs, Volume= 2.071 af
Primary = 32.69 cfs @ 12.10 hrs, Volume= 2.071 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs

Link DP-5: Design Point #5

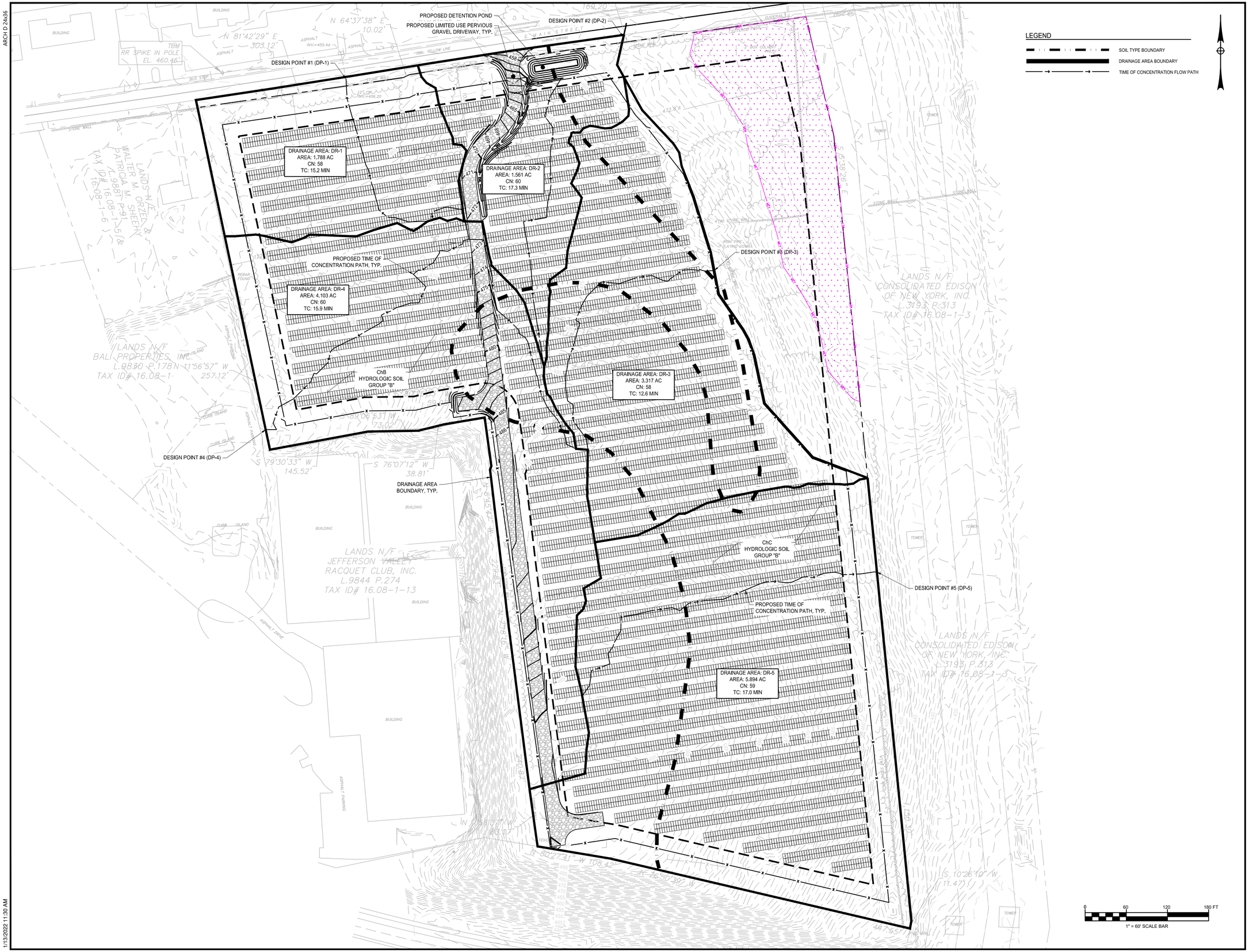


Appendix R-2

Proposed Conditions Drainage Map

And HydroCAD Report

ARCH D 24x36



LEGEND

- SOIL TYPE BOUNDARY
- DRAINAGE AREA BOUNDARY
- TIME OF CONCENTRATION FLOW PATH

0 60 120 180 FT

1" = 60' SCALE BAR

1/13/2022 11:30 AM

BERGMANN
ARCHITECTS ENGINEERS PLANNERS

2 Winners Circle, Suite 102
Albany, NY 12205
www.bergmannpc.com
office: 518.862.0325

HILLSIDE SOLAR LLC

227 GUARD HILL ROAD
BEDFORD CORNERS, NY 10549

OLD HILL FARM SOLAR FARM

571 EAST MAIN STREET
JEFFERSON VALLEY, NY 10535

Date Revised	Description
10/13/2021	REVISED PER CLIENT COMMENTS
12/01/2021	REVISED PER TREE COMMISSION COMMENTS
12/28/2021	REVISED PER FIRE DEPARTMENT COMMENTS
1/07/2022	REVISED PER SITE VISIT WITH FIRE DEPARTMENT
1/13/2022	REVISED PER ENGINEERING DEPARTMENT COMMENTS

PRELIMINARY
NOT FOR CONSTRUCTION

Project Manager	Discipline Lead
###	###
Designer	Reviewer
WD	ECR
Date Issued	Project Number
07/28/2021	14064.11

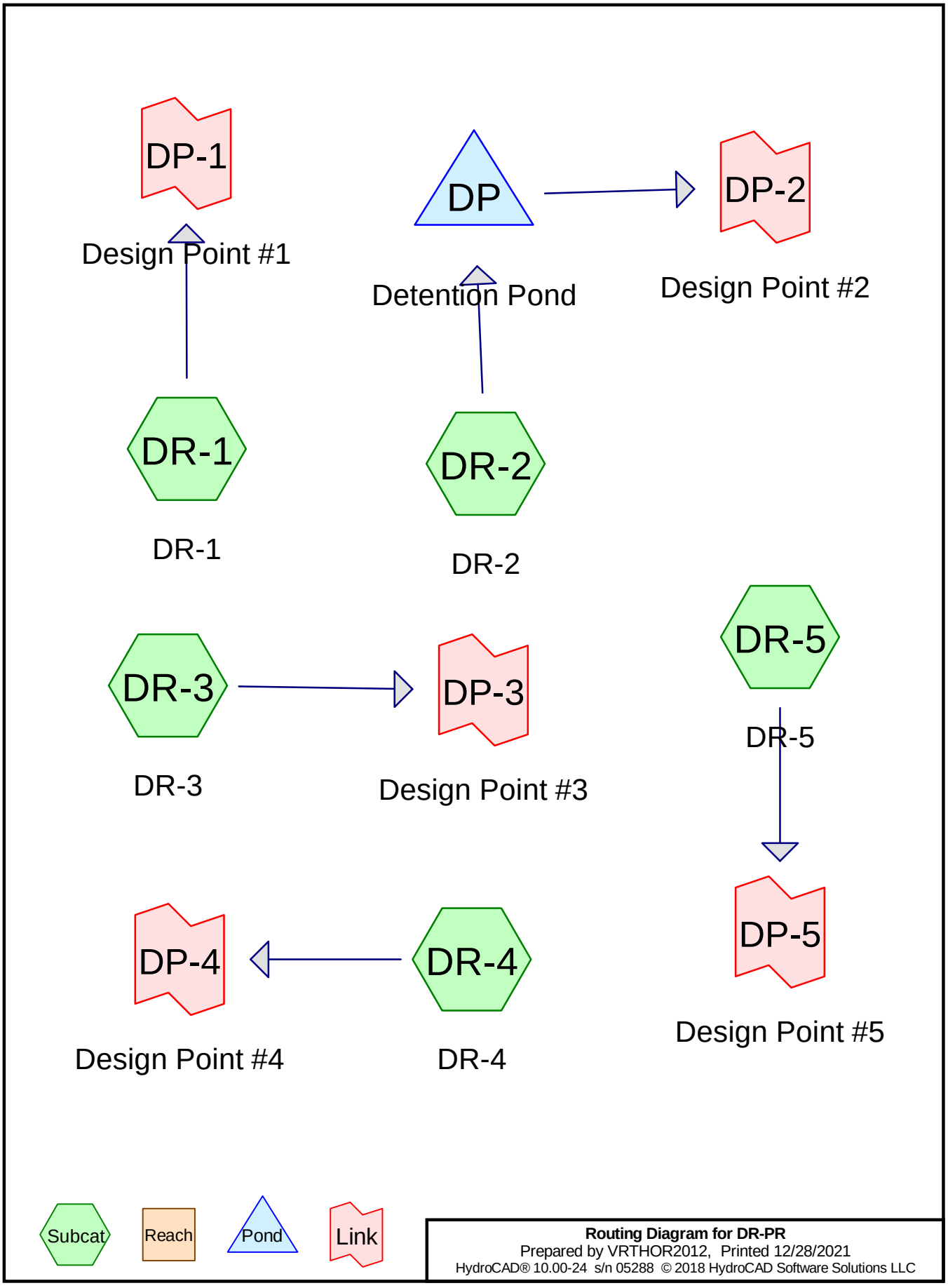
Sheet Name

PROPOSED CONDITIONS DRAINAGE MAP

Drawing Number

DR-PR

of 13



Routing Diagram for DR-PR
Prepared by VRTHOR2012, Printed 12/28/2021

Area Listing (all nodes)

Area (acres)	CN	Description (subcatchment-numbers)
0.004	96	Gravel surface, HSG B (DR-1)
0.623	75	Limited Use Pervious Gravel (DR-2, DR-4, DR-5)
15.171	58	Meadow, non-grazed, HSG B (DR-1, DR-2, DR-3, DR-4, DR-5)
0.891	65	Woods/grass comb., Fair, HSG B (DR-1, DR-4, DR-5)
16.689	**59**	**TOTAL AREA**

Soil Listing (all nodes)

Area (acres)	Soil Group	Subcatchment Numbers
0.000	HSG A	
16.066	HSG B	DR-1, DR-2, DR-3, DR-4, DR-5
0.000	HSG C	
0.000	HSG D	
0.623	Other	DR-2, DR-4, DR-5
16.689		**TOTAL AREA**

Ground Covers (all nodes)

HSG-A (acres)	HSG-B (acres)	HSG-C (acres)	HSG-D (acres)	Other (acres)	Total (acres)	Ground Cover	Subcatchment Numbers
0.000	0.004	0.000	0.000	0.000	0.004	Gravel surface	DR-1
0.000	0.000	0.000	0.000	0.623	0.623	Limited Use Pervious Gravel	DR-2, DR-4, DR-5
0.000	15.171	0.000	0.000	0.000	15.171	Meadow, non-grazed	DR-1, DR-2, DR-3, DR-4, DR-5
0.000	0.891	0.000	0.000	0.000	0.891	Woods/grass comb., Fair	DR-1, DR-4, DR-5
0.000	**16.066**	**0.000**	**0.000**	**0.623**	**16.689**	**TOTAL AREA**	

Pipe Listing (all nodes)

Line#	Node Number	In-Invert (feet)	Out-Invert (feet)	Length (feet)	Slope (ft/ft)	n	Diam/Width (inches)	Height (inches)	Inside-Fill (inches)
1	DP	455.00	454.00	62.0	0.0161	0.013	12.0	0.0	0.0

Time span=5.00-20.00 hrs, dt=0.05 hrs, 301 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Dyn-Stor-Ind method - Pond routing by Dyn-Stor-Ind method

Subcatchment DR-1: DR-1 Runoff Area=1.787 ac 0.00% Impervious Runoff Depth>0.16"
Flow Length=337' Tc=15.2 min CN=58 Runoff=0.16 cfs 0.024 af

Subcatchment DR-2: DR-2 Runoff Area=1.561 ac 0.00% Impervious Runoff Depth>0.21"
Flow Length=435' Tc=17.3 min CN=60 Runoff=0.22 cfs 0.027 af

Subcatchment DR-3: DR-3 Runoff Area=3.317 ac 0.00% Impervious Runoff Depth>0.16"
Flow Length=447' Tc=12.6 min CN=58 Runoff=0.34 cfs 0.045 af

Subcatchment DR-4: DR-4 Runoff Area=4.130 ac 0.00% Impervious Runoff Depth>0.21"
Flow Length=729' Tc=15.9 min CN=60 Runoff=0.60 cfs 0.072 af

Subcatchment DR-5: DR-5 Runoff Area=5.894 ac 0.00% Impervious Runoff Depth>0.18"
Flow Length=530' Tc=17.0 min CN=59 Runoff=0.65 cfs 0.091 af

Pond DP: Detention Pond Peak Elev=455.26' Storage=205 cf Inflow=0.22 cfs 0.027 af
Outflow=0.09 cfs 0.025 af

Link DP-1: Design Point #1 Inflow=0.16 cfs 0.024 af
Primary=0.16 cfs 0.024 af

Link DP-2: Design Point #2 Inflow=0.09 cfs 0.025 af
Primary=0.09 cfs 0.025 af

Link DP-3: Design Point #3 Inflow=0.34 cfs 0.045 af
Primary=0.34 cfs 0.045 af

Link DP-4: Design Point #4 Inflow=0.60 cfs 0.072 af
Primary=0.60 cfs 0.072 af

Link DP-5: Design Point #5 Inflow=0.65 cfs 0.091 af
Primary=0.65 cfs 0.091 af

Total Runoff Area = 16.689 ac Runoff Volume = 0.259 af Average Runoff Depth = 0.19"
100.00% Pervious = 16.689 ac 0.00% Impervious = 0.000 ac

Summary for Subcatchment DR-1: DR-1

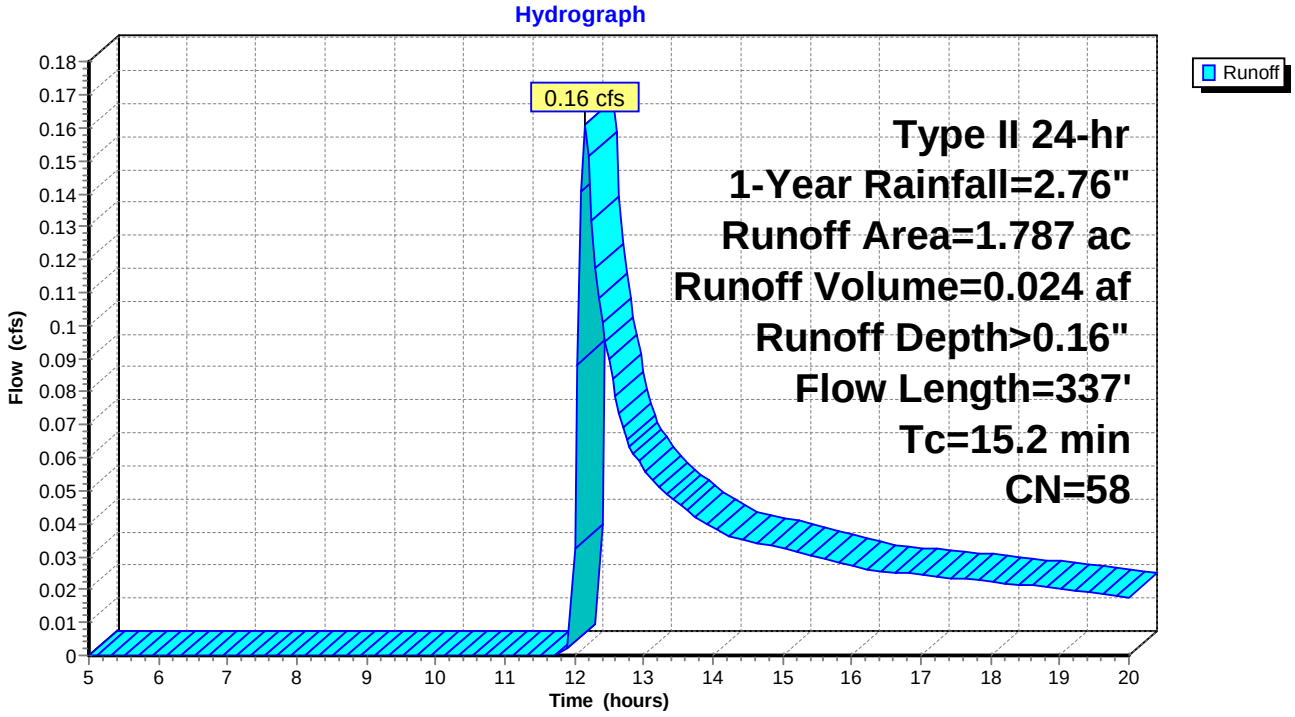
Runoff = 0.16 cfs @ 12.16 hrs, Volume= 0.024 af, Depth> 0.16"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type II 24-hr 1-Year Rainfall=2.76"

Area (ac)	CN	Description
1.716	58	Meadow, non-grazed, HSG B
0.067	65	Woods/grass comb., Fair, HSG B
0.004	96	Gravel surface, HSG B
1.787	58	Weighted Average
1.787		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
12.5	100	0.0319	0.13		**Sheet Flow,** Grass: Dense n= 0.240 P2= 2.87"
2.7	237	0.0437	1.46		**Shallow Concentrated Flow,** Short Grass Pasture Kv= 7.0 fps
15.2	337	Total			

Subcatchment DR-1: DR-1



Summary for Subcatchment DR-2: DR-2

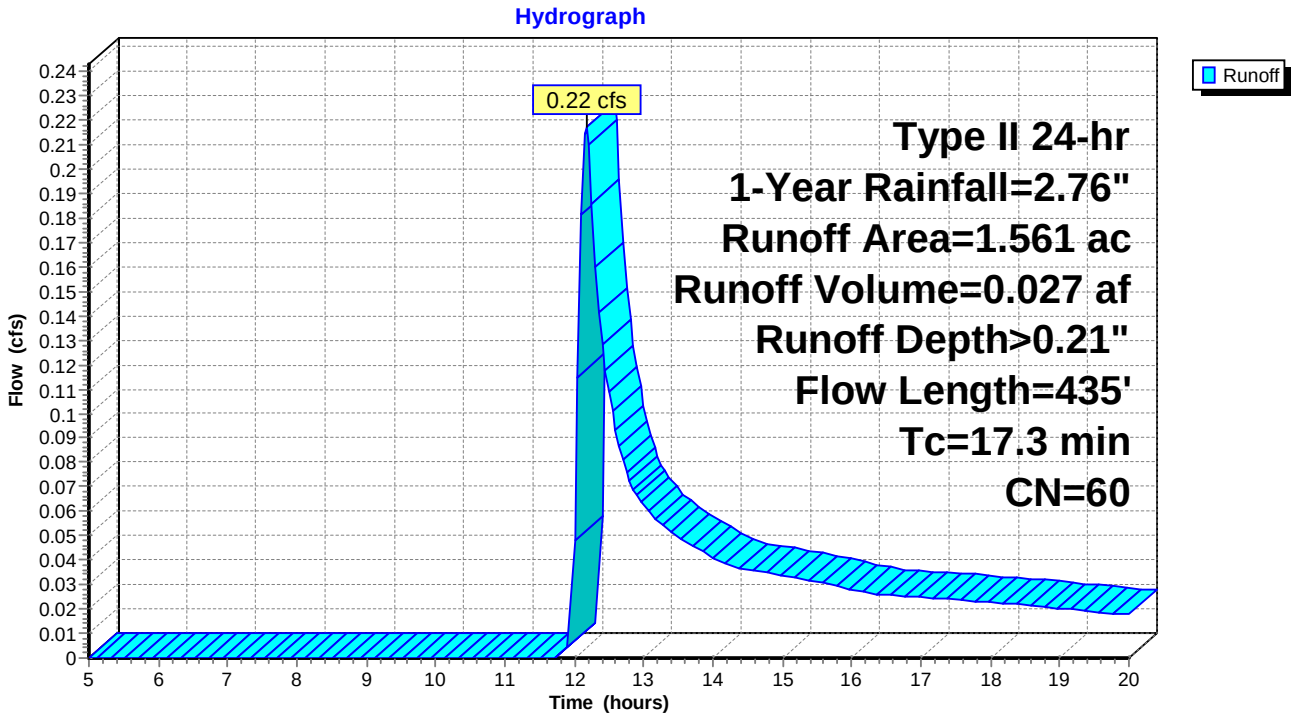
Runoff = 0.22 cfs @ 12.17 hrs, Volume= 0.027 af, Depth> 0.21"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type II 24-hr 1-Year Rainfall=2.76"

	Area (ac)	CN	Description
	1.405	58	Meadow, non-grazed, HSG B
*	0.156	75	Limited Use Pervious Gravel
	1.561	60	Weighted Average
	1.561		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
14.0	100	0.0240	0.12		**Sheet Flow,** Grass: Dense n= 0.240 P2= 2.87"
3.3	335	0.0573	1.68		**Shallow Concentrated Flow,** Short Grass Pasture Kv= 7.0 fps
17.3	435	Total			

Subcatchment DR-2: DR-2



Summary for Subcatchment DR-3: DR-3

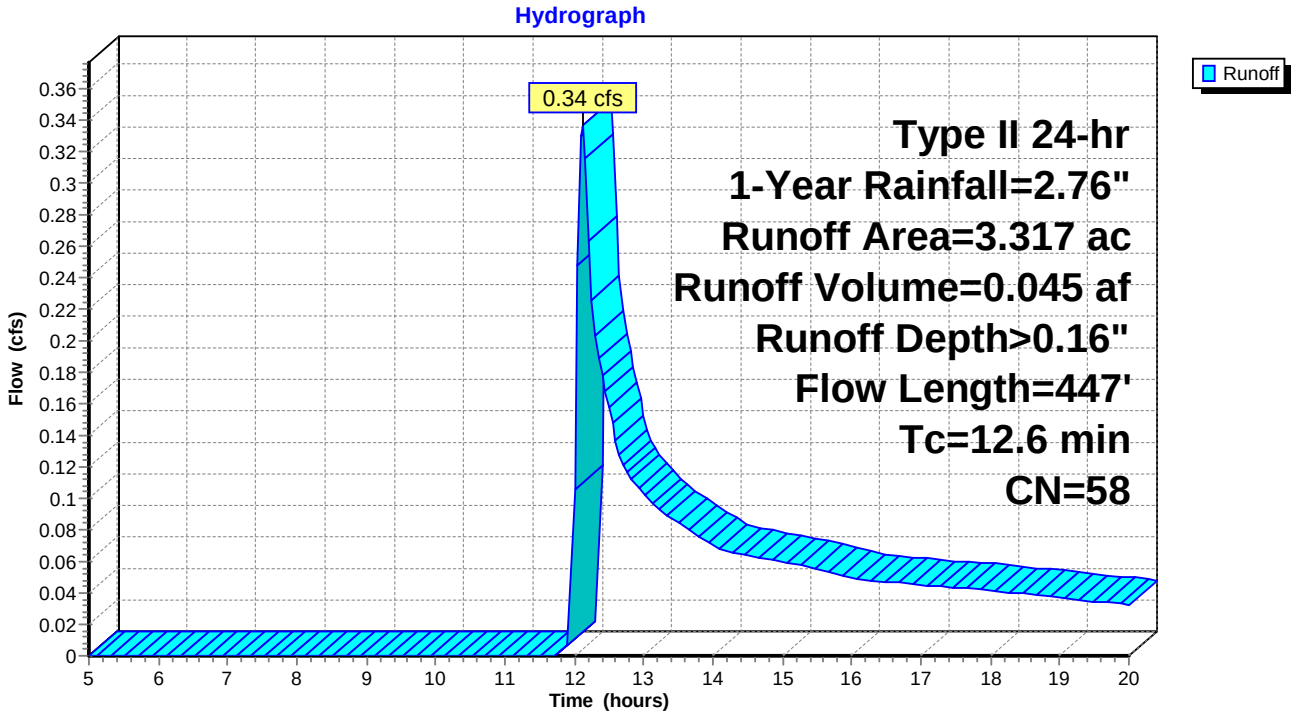
Runoff = 0.34 cfs @ 12.12 hrs, Volume= 0.045 af, Depth> 0.16"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type II 24-hr 1-Year Rainfall=2.76"

Area (ac)	CN	Description
3.317	58	Meadow, non-grazed, HSG B
3.317		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
9.3	100	0.0670	0.18		**Sheet Flow,** Grass: Dense n= 0.240 P2= 2.87"
3.3	347	0.0630	1.76		**Shallow Concentrated Flow,** Short Grass Pasture Kv= 7.0 fps
12.6	447	Total			

Subcatchment DR-3: DR-3



Summary for Subcatchment DR-4: DR-4

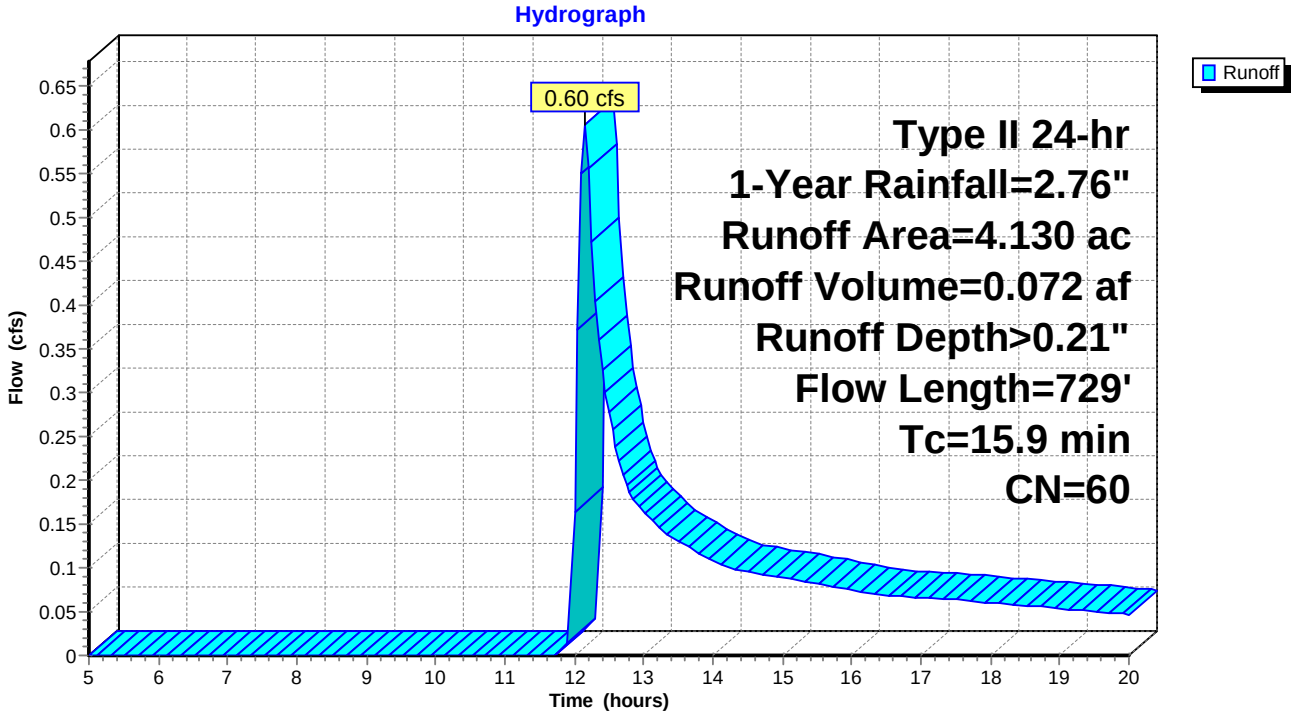
Runoff = 0.60 cfs @ 12.15 hrs, Volume= 0.072 af, Depth> 0.21"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type II 24-hr 1-Year Rainfall=2.76"

	Area (ac)	CN	Description
	3.399	58	Meadow, non-grazed, HSG B
	0.340	65	Woods/grass comb., Fair, HSG B
*	0.391	75	Limited Use Pervious Gravel
	4.130	60	Weighted Average
	4.130		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
9.4	100	0.0659	0.18		**Sheet Flow,** Grass: Dense n= 0.240 P2= 2.87"
6.5	629	0.0528	1.61		**Shallow Concentrated Flow,** Short Grass Pasture Kv= 7.0 fps
15.9	729	Total			

Subcatchment DR-4: DR-4



Summary for Subcatchment DR-5: DR-5

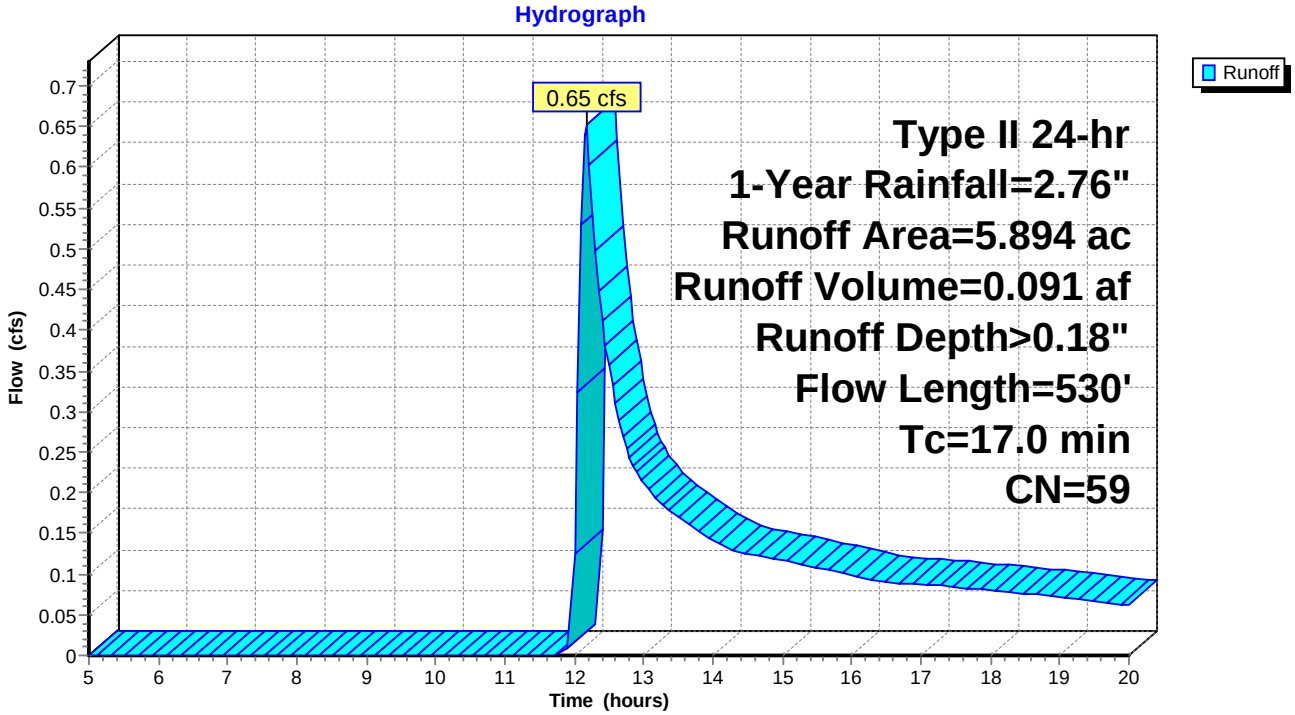
Runoff = 0.65 cfs @ 12.17 hrs, Volume= 0.091 af, Depth> 0.18"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type II 24-hr 1-Year Rainfall=2.76"

	Area (ac)	CN	Description
	0.484	65	Woods/grass comb., Fair, HSG B
	5.334	58	Meadow, non-grazed, HSG B
*	0.076	75	Limited Use Pervious Gravel
	5.894	59	Weighted Average
	5.894		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
13.8	100	0.0247	0.12		**Sheet Flow,** Grass: Dense n= 0.240 P2= 2.87"
3.2	430	0.1006	2.22		**Shallow Concentrated Flow,** Short Grass Pasture Kv= 7.0 fps
17.0	530	Total			

Subcatchment DR-5: DR-5



Summary for Pond DP: Detention Pond

Inflow Area = 1.561 ac, 0.00% Impervious, Inflow Depth > 0.21" for 1-Year event
Inflow = 0.22 cfs @ 12.17 hrs, Volume= 0.027 af
Outflow = 0.09 cfs @ 12.65 hrs, Volume= 0.025 af, Atten= 60%, Lag= 28.9 min
Primary = 0.09 cfs @ 12.65 hrs, Volume= 0.025 af

Routing by Dyn-Stor-Ind method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Peak Elev= 455.26' @ 12.65 hrs Surf.Area= 689 sf Storage= 205 cf

Plug-Flow detention time= 46.8 min calculated for 0.025 af (93% of inflow)
Center-of-Mass det. time= 26.4 min (903.1 - 876.7)

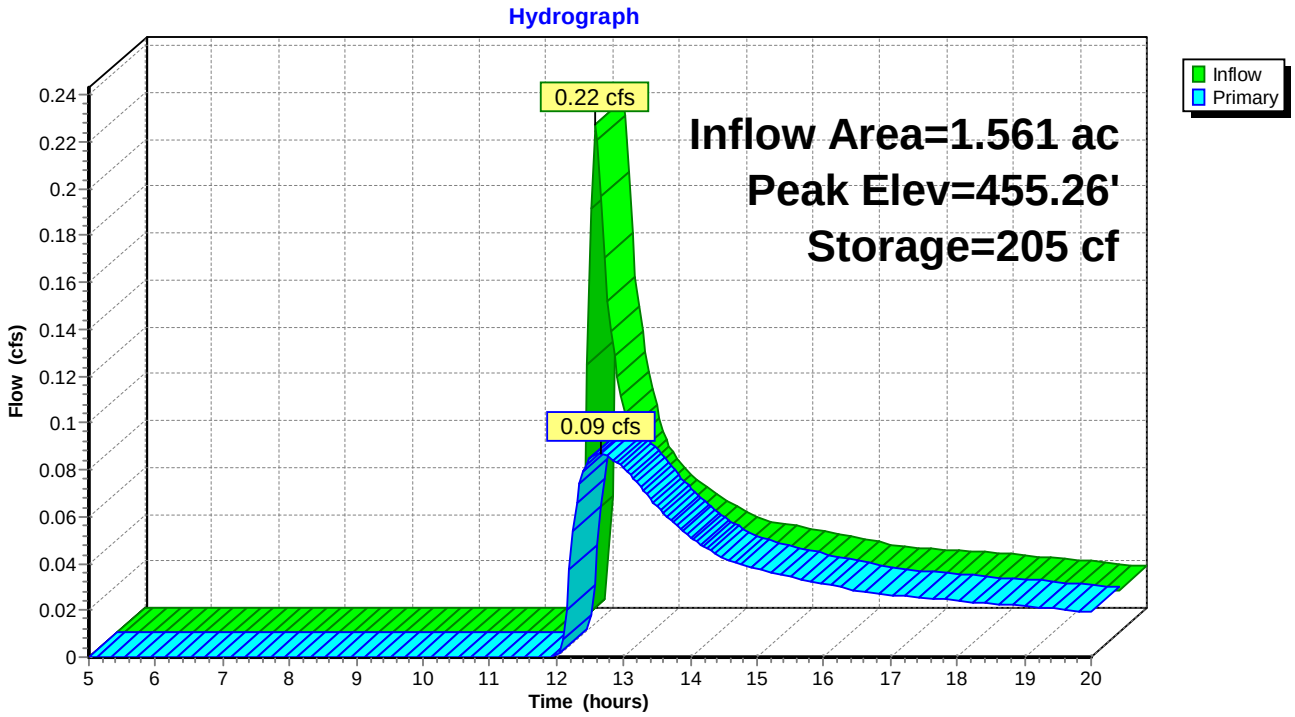
Volume	Invert	Avail.Storage	Storage Description
#1	455.00'	3,884 cf	**Custom Stage Data (Irregular)** Listed below

Elevation (feet)	Surf.Area (sq-ft)	Perim. (feet)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)	Wet.Area (sq-ft)
455.00	570	143.0	0	0	570
456.00	1,028	167.0	788	788	1,182
457.00	1,542	181.0	1,276	2,064	1,607
458.00	2,113	200.0	1,820	3,884	2,214

Device	Routing	Invert	Outlet Devices
#1	Primary	455.00'	**12.0" Round Culvert** L= 62.0' CPP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 455.00' / 454.00' S= 0.0161 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 0.79 sf
#2	Device 1	455.00'	**3.0" Vert. Orifice/Grate** C= 0.600
#3	Device 1	456.00'	**24.0" W x 4.0" H Vert. Orifice/Grate** C= 0.600
#4	Device 1	457.00'	**24.0" W x 5.0" H Vert. Orifice/Grate** C= 0.600
#5	Primary	457.80'	**15.0' long x 5.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50 3.00 3.50 4.00 4.50 5.00 5.50 Coef. (English) 2.34 2.50 2.70 2.68 2.68 2.66 2.65 2.65 2.65 2.65 2.67 2.66 2.68 2.70 2.74 2.79 2.88

Primary OutFlow Max=0.09 cfs @ 12.65 hrs HW=455.26' TW=0.00' (Dynamic Tailwater)
- **1=Culvert** (Passes 0.09 cfs of 0.22 cfs potential flow)
  - **2=Orifice/Grate** (Orifice Controls 0.09 cfs @ 1.77 fps)
  - **3=Orifice/Grate** (Controls 0.00 cfs)
  - **4=Orifice/Grate** (Controls 0.00 cfs)
- **5=Broad-Crested Rectangular Weir** (Controls 0.00 cfs)

Pond DP: Detention Pond

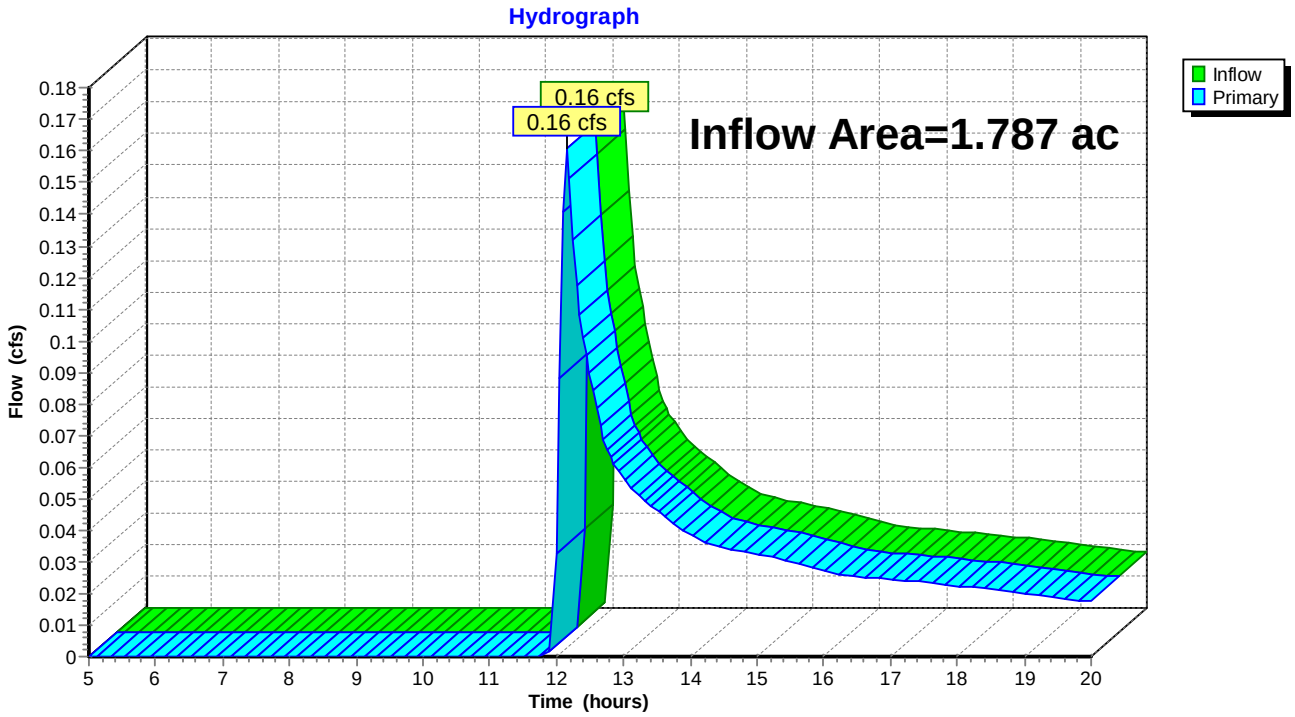


Summary for Link DP-1: Design Point #1

Inflow Area = 1.787 ac, 0.00% Impervious, Inflow Depth > 0.16" for 1-Year event
Inflow = 0.16 cfs @ 12.16 hrs, Volume= 0.024 af
Primary = 0.16 cfs @ 12.16 hrs, Volume= 0.024 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs

Link DP-1: Design Point #1

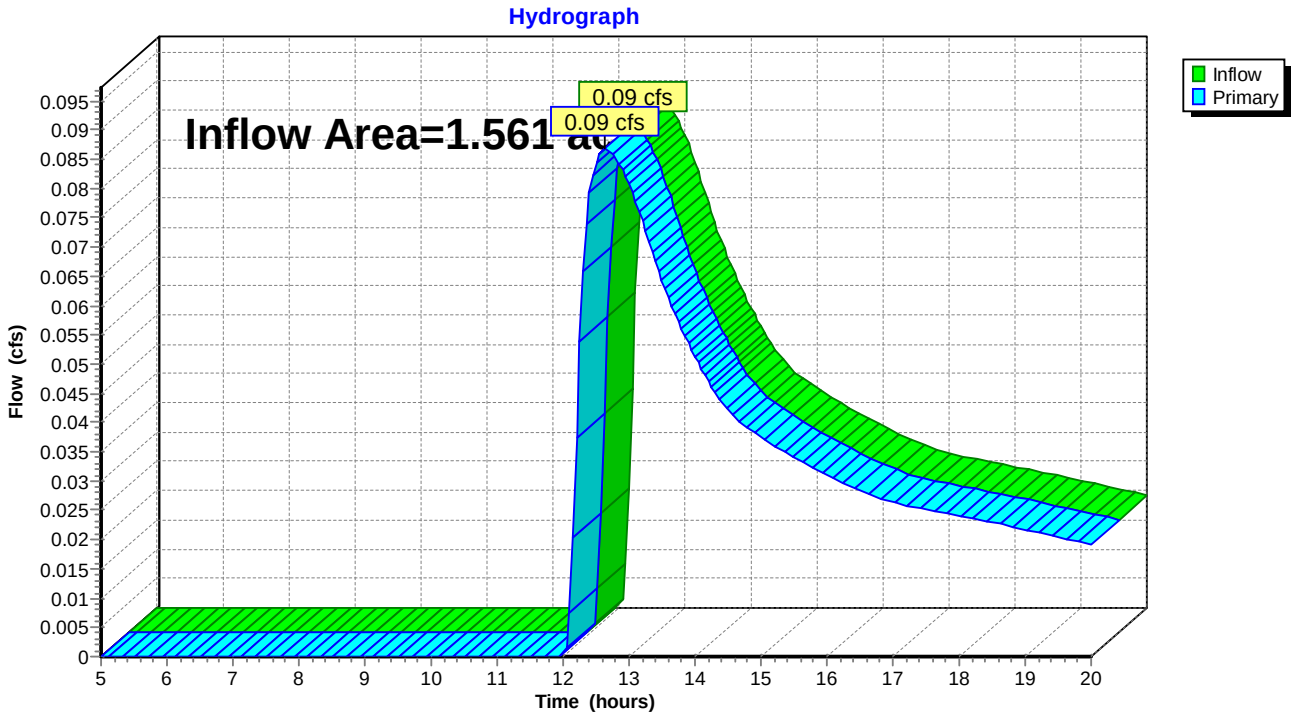


Summary for Link DP-2: Design Point #2

Inflow Area = 1.561 ac, 0.00% Impervious, Inflow Depth > 0.19" for 1-Year event
Inflow = 0.09 cfs @ 12.65 hrs, Volume= 0.025 af
Primary = 0.09 cfs @ 12.65 hrs, Volume= 0.025 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs

Link DP-2: Design Point #2

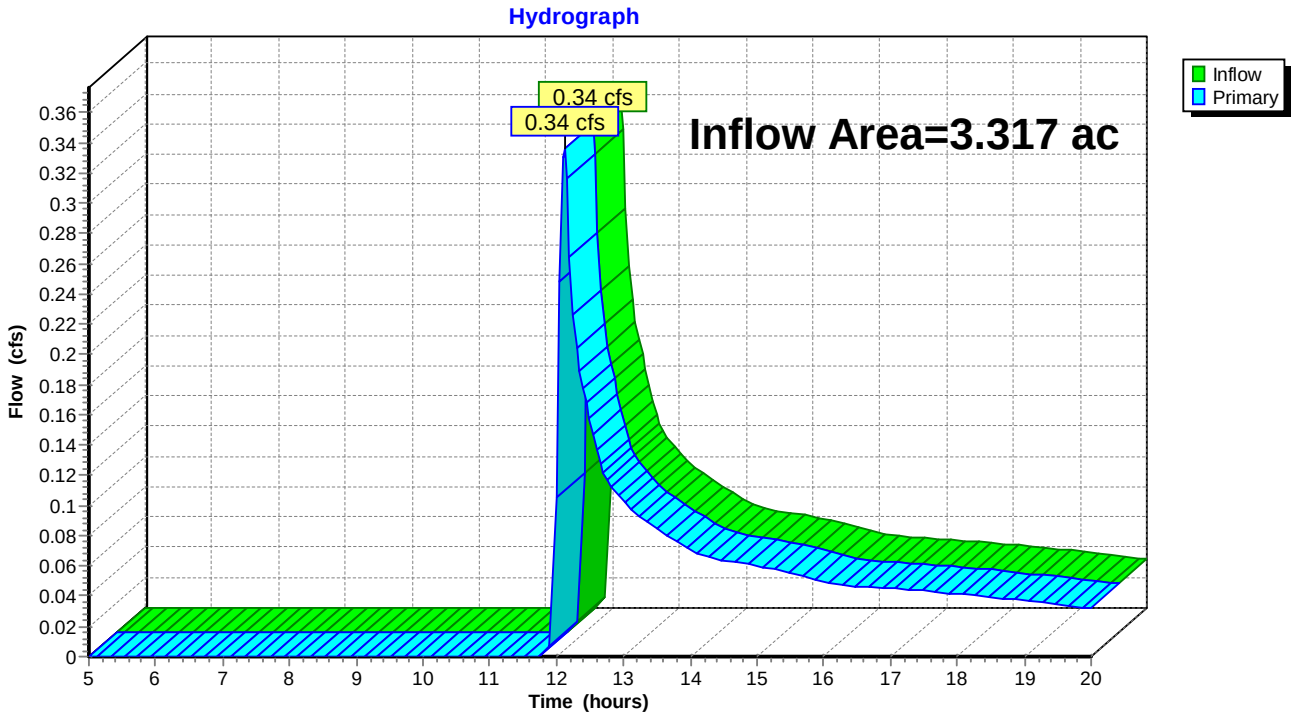


Summary for Link DP-3: Design Point #3

Inflow Area = 3.317 ac, 0.00% Impervious, Inflow Depth > 0.16" for 1-Year event
Inflow = 0.34 cfs @ 12.12 hrs, Volume= 0.045 af
Primary = 0.34 cfs @ 12.12 hrs, Volume= 0.045 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs

Link DP-3: Design Point #3

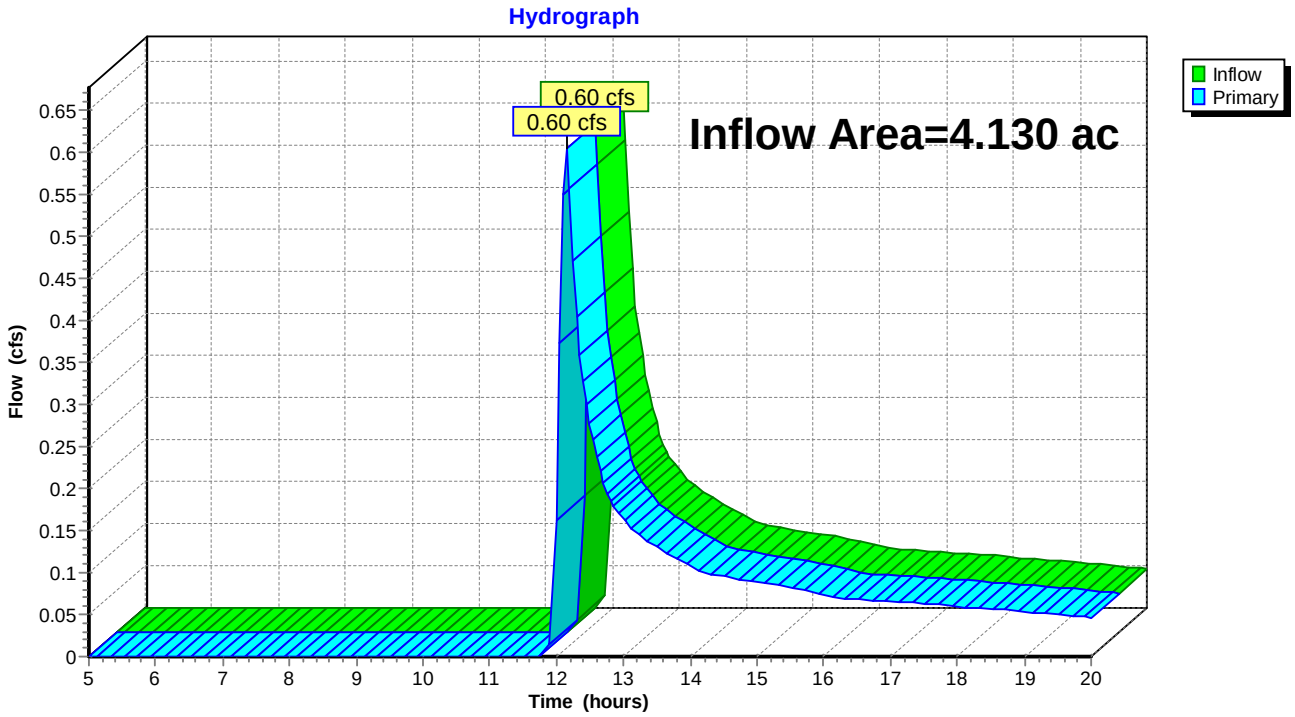


Summary for Link DP-4: Design Point #4

Inflow Area = 4.130 ac, 0.00% Impervious, Inflow Depth > 0.21" for 1-Year event
Inflow = 0.60 cfs @ 12.15 hrs, Volume= 0.072 af
Primary = 0.60 cfs @ 12.15 hrs, Volume= 0.072 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs

Link DP-4: Design Point #4

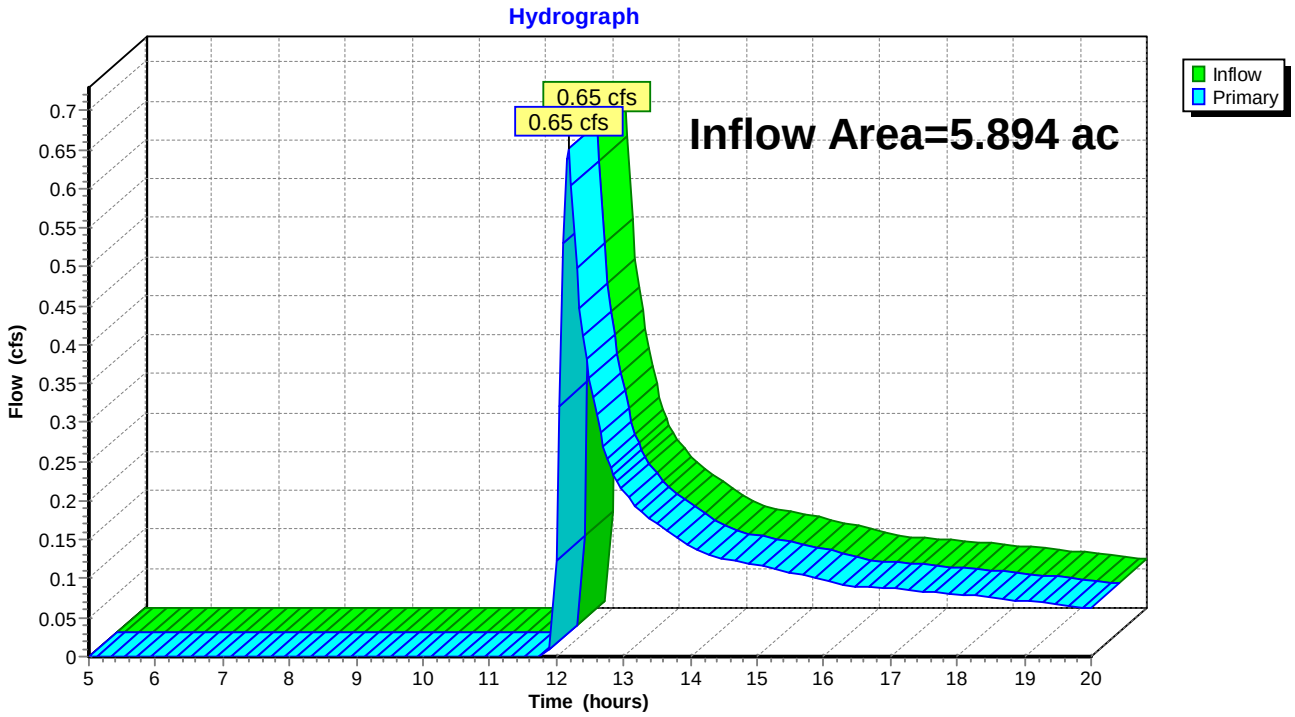


Summary for Link DP-5: Design Point #5

Inflow Area = 5.894 ac, 0.00% Impervious, Inflow Depth > 0.18" for 1-Year event
Inflow = 0.65 cfs @ 12.17 hrs, Volume= 0.091 af
Primary = 0.65 cfs @ 12.17 hrs, Volume= 0.091 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs

Link DP-5: Design Point #5



Time span=5.00-20.00 hrs, dt=0.05 hrs, 301 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Dyn-Stor-Ind method - Pond routing by Dyn-Stor-Ind method

Subcatchment DR-1: DR-1 Runoff Area=1.787 ac 0.00% Impervious Runoff Depth>1.09"
Flow Length=337' Tc=15.2 min CN=58 Runoff=2.53 cfs 0.163 af

Subcatchment DR-2: DR-2 Runoff Area=1.561 ac 0.00% Impervious Runoff Depth>1.22"
Flow Length=435' Tc=17.3 min CN=60 Runoff=2.35 cfs 0.159 af

Subcatchment DR-3: DR-3 Runoff Area=3.317 ac 0.00% Impervious Runoff Depth>1.09"
Flow Length=447' Tc=12.6 min CN=58 Runoff=5.19 cfs 0.302 af

Subcatchment DR-4: DR-4 Runoff Area=4.130 ac 0.00% Impervious Runoff Depth>1.22"
Flow Length=729' Tc=15.9 min CN=60 Runoff=6.52 cfs 0.420 af

Subcatchment DR-5: DR-5 Runoff Area=5.894 ac 0.00% Impervious Runoff Depth>1.15"
Flow Length=530' Tc=17.0 min CN=59 Runoff=8.39 cfs 0.567 af

Pond DP: Detention Pond Peak Elev=456.41' Storage=1,316 cf Inflow=2.35 cfs 0.159 af
Outflow=1.83 cfs 0.155 af

Link DP-1: Design Point #1 Inflow=2.53 cfs 0.163 af
Primary=2.53 cfs 0.163 af

Link DP-2: Design Point #2 Inflow=1.83 cfs 0.155 af
Primary=1.83 cfs 0.155 af

Link DP-3: Design Point #3 Inflow=5.19 cfs 0.302 af
Primary=5.19 cfs 0.302 af

Link DP-4: Design Point #4 Inflow=6.52 cfs 0.420 af
Primary=6.52 cfs 0.420 af

Link DP-5: Design Point #5 Inflow=8.39 cfs 0.567 af
Primary=8.39 cfs 0.567 af

Total Runoff Area = 16.689 ac Runoff Volume = 1.611 af Average Runoff Depth = 1.16"
100.00% Pervious = 16.689 ac 0.00% Impervious = 0.000 ac

Summary for Subcatchment DR-1: DR-1

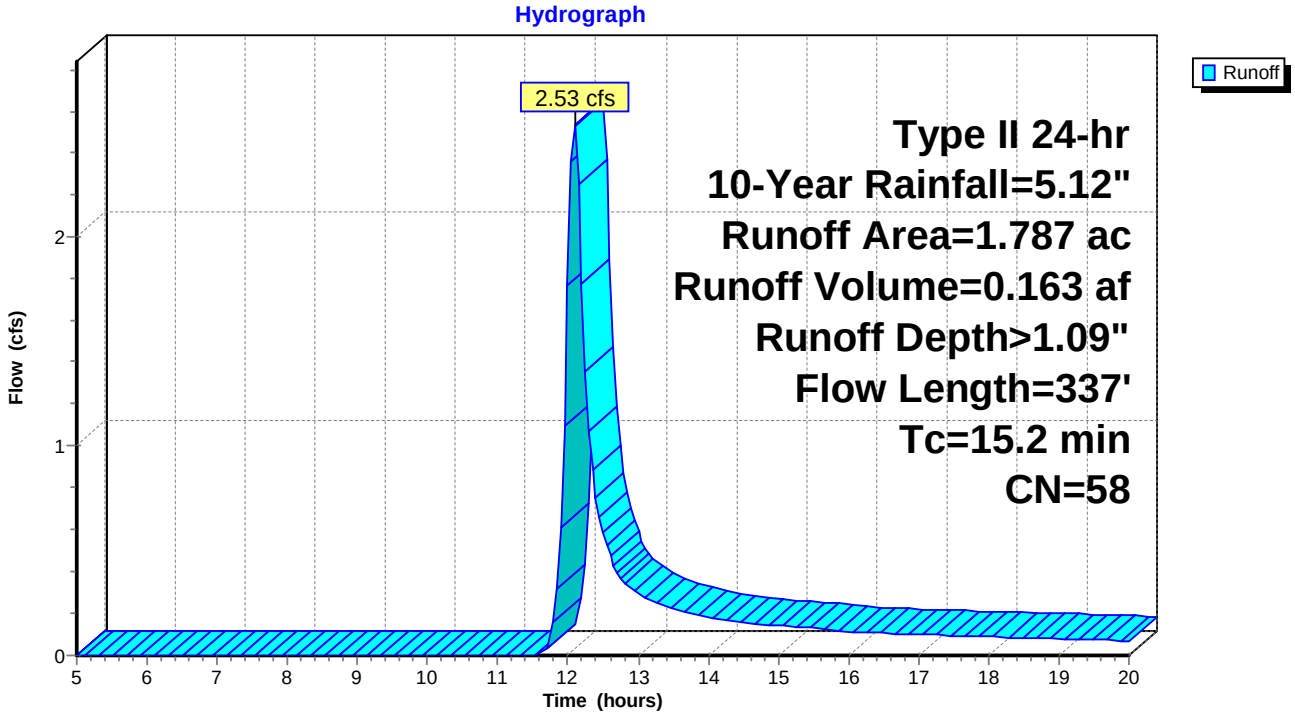
Runoff = 2.53 cfs @ 12.09 hrs, Volume= 0.163 af, Depth> 1.09"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type II 24-hr 10-Year Rainfall=5.12"

Area (ac)	CN	Description
1.716	58	Meadow, non-grazed, HSG B
0.067	65	Woods/grass comb., Fair, HSG B
0.004	96	Gravel surface, HSG B
1.787	58	Weighted Average
1.787		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
12.5	100	0.0319	0.13		**Sheet Flow,** Grass: Dense n= 0.240 P2= 2.87"
2.7	237	0.0437	1.46		**Shallow Concentrated Flow,** Short Grass Pasture Kv= 7.0 fps
15.2	337	Total			

Subcatchment DR-1: DR-1



Summary for Subcatchment DR-2: DR-2

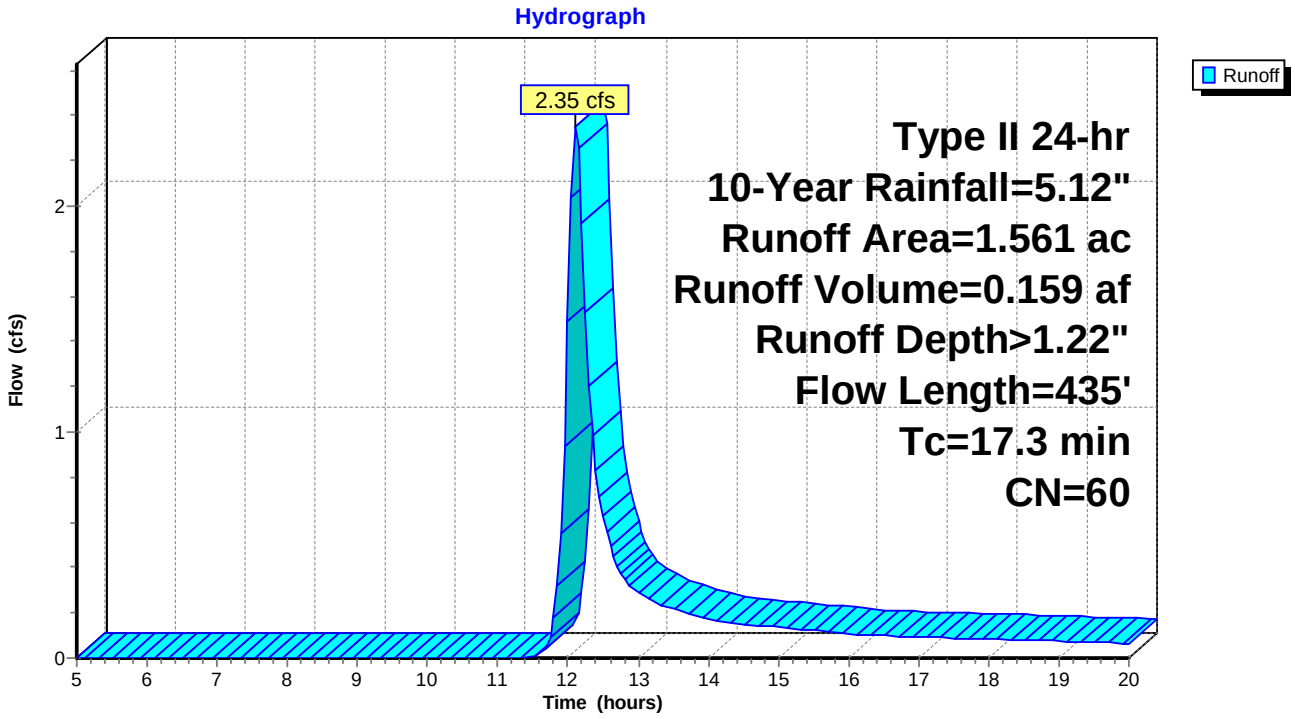
Runoff = 2.35 cfs @ 12.11 hrs, Volume= 0.159 af, Depth> 1.22"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type II 24-hr 10-Year Rainfall=5.12"

	Area (ac)	CN	Description
	1.405	58	Meadow, non-grazed, HSG B
*	0.156	75	Limited Use Pervious Gravel
	1.561	60	Weighted Average
	1.561		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
14.0	100	0.0240	0.12		**Sheet Flow,** Grass: Dense n= 0.240 P2= 2.87"
3.3	335	0.0573	1.68		**Shallow Concentrated Flow,** Short Grass Pasture Kv= 7.0 fps
17.3	435	Total			

Subcatchment DR-2: DR-2



Summary for Subcatchment DR-3: DR-3

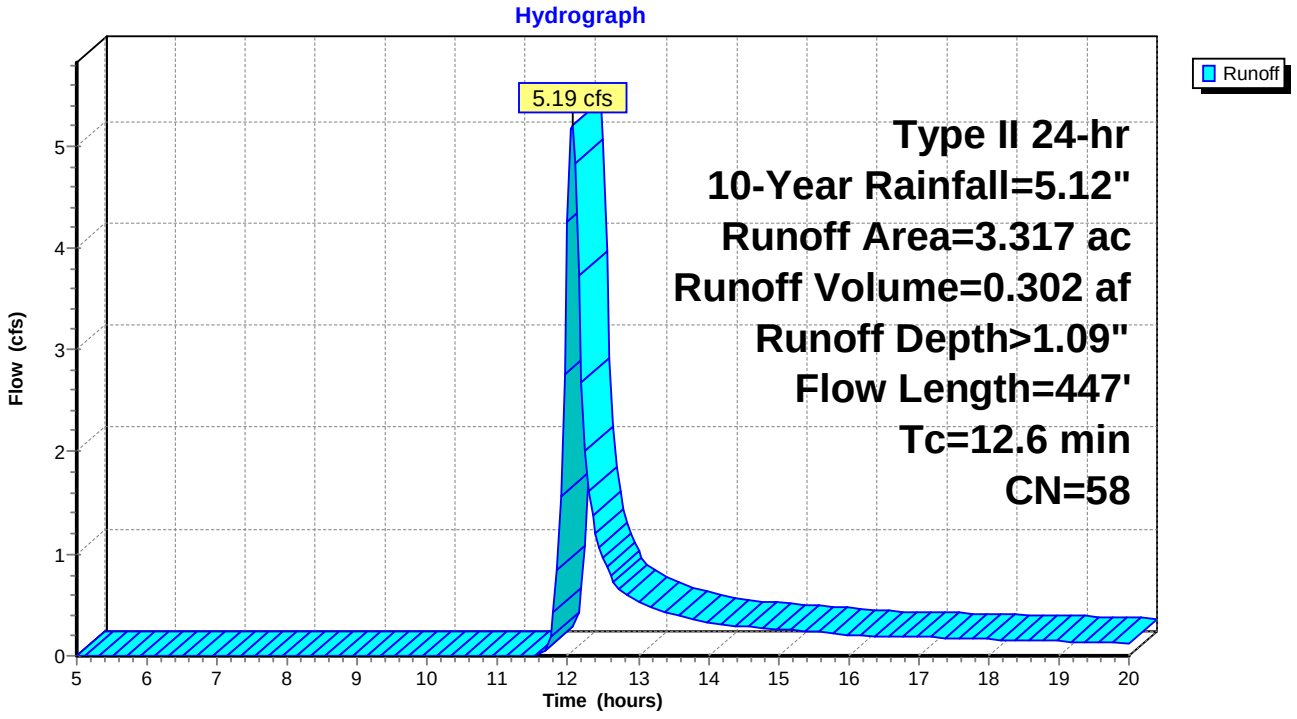
Runoff = 5.19 cfs @ 12.06 hrs, Volume= 0.302 af, Depth> 1.09"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type II 24-hr 10-Year Rainfall=5.12"

Area (ac)	CN	Description
3.317	58	Meadow, non-grazed, HSG B
3.317		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
9.3	100	0.0670	0.18		**Sheet Flow,** Grass: Dense n= 0.240 P2= 2.87"
3.3	347	0.0630	1.76		**Shallow Concentrated Flow,** Short Grass Pasture Kv= 7.0 fps
12.6	447	Total			

Subcatchment DR-3: DR-3



Summary for Subcatchment DR-4: DR-4

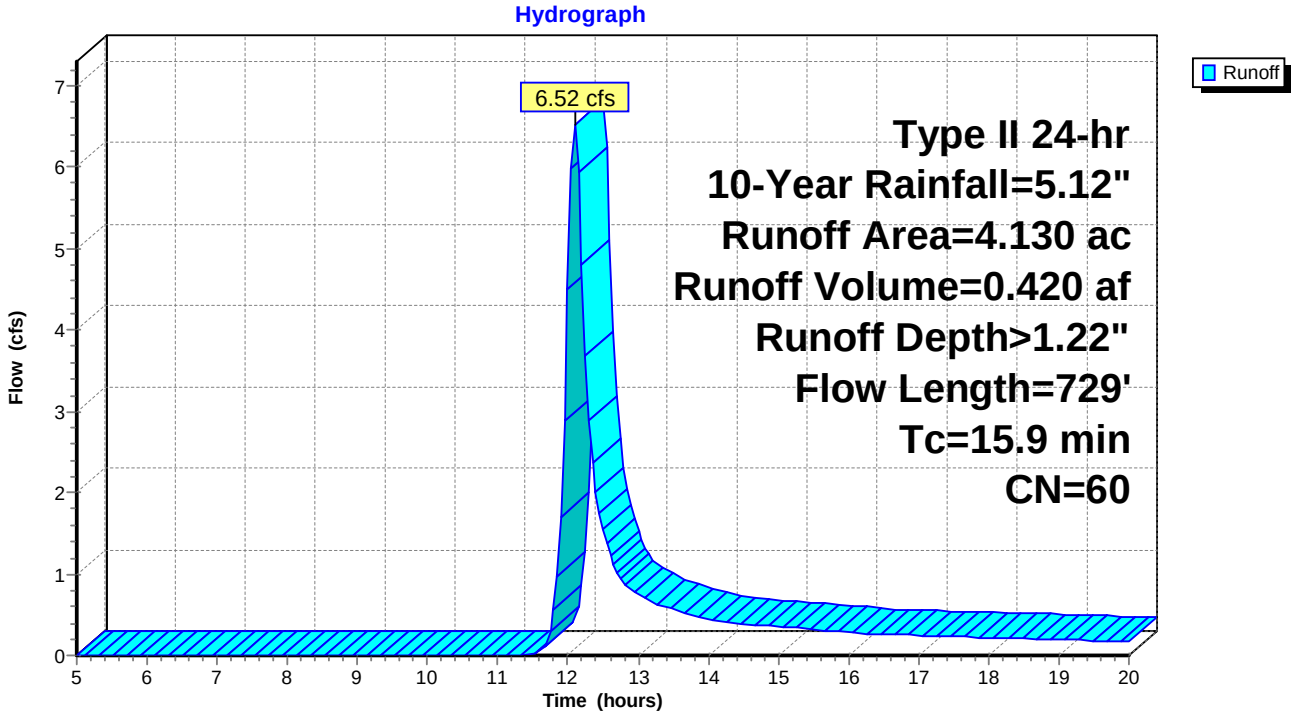
Runoff = 6.52 cfs @ 12.10 hrs, Volume= 0.420 af, Depth> 1.22"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type II 24-hr 10-Year Rainfall=5.12"

	Area (ac)	CN	Description
	3.399	58	Meadow, non-grazed, HSG B
	0.340	65	Woods/grass comb., Fair, HSG B
*	0.391	75	Limited Use Pervious Gravel
	4.130	60	Weighted Average
	4.130		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
9.4	100	0.0659	0.18		**Sheet Flow,** Grass: Dense n= 0.240 P2= 2.87"
6.5	629	0.0528	1.61		**Shallow Concentrated Flow,** Short Grass Pasture Kv= 7.0 fps
15.9	729	Total			

Subcatchment DR-4: DR-4



Summary for Subcatchment DR-5: DR-5

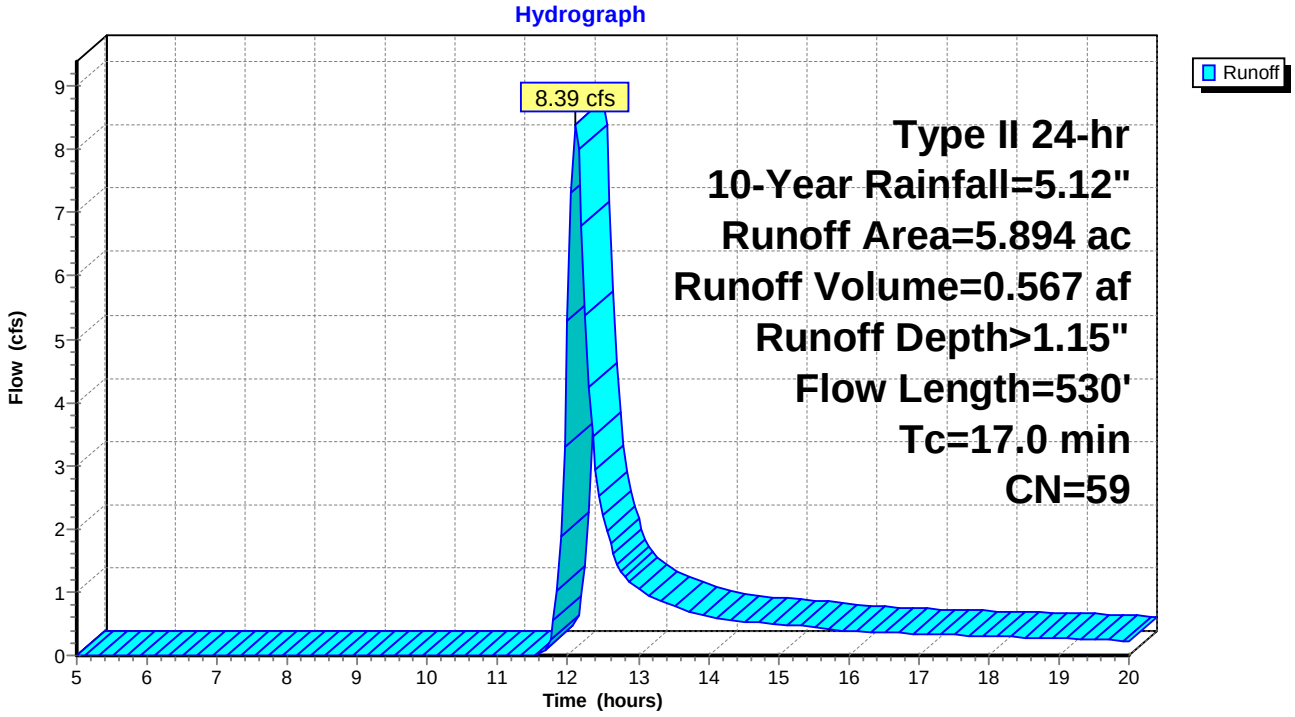
Runoff = 8.39 cfs @ 12.11 hrs, Volume= 0.567 af, Depth> 1.15"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type II 24-hr 10-Year Rainfall=5.12"

	Area (ac)	CN	Description
	0.484	65	Woods/grass comb., Fair, HSG B
	5.334	58	Meadow, non-grazed, HSG B
*	0.076	75	Limited Use Pervious Gravel
	5.894	59	Weighted Average
	5.894		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
13.8	100	0.0247	0.12		**Sheet Flow,** Grass: Dense n= 0.240 P2= 2.87"
3.2	430	0.1006	2.22		**Shallow Concentrated Flow,** Short Grass Pasture Kv= 7.0 fps
17.0	530	Total			

Subcatchment DR-5: DR-5



Summary for Pond DP: Detention Pond

Inflow Area = 1.561 ac, 0.00% Impervious, Inflow Depth > 1.22" for 10-Year event
Inflow = 2.35 cfs @ 12.11 hrs, Volume= 0.159 af
Outflow = 1.83 cfs @ 12.22 hrs, Volume= 0.155 af, Atten= 22%, Lag= 6.2 min
Primary = 1.83 cfs @ 12.22 hrs, Volume= 0.155 af

Routing by Dyn-Stor-Ind method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Peak Elev= 456.41' @ 12.22 hrs Surf.Area= 1,241 sf Storage= 1,316 cf

Plug-Flow detention time= 35.3 min calculated for 0.155 af (98% of inflow)
Center-of-Mass det. time= 26.6 min (851.7 - 825.1)

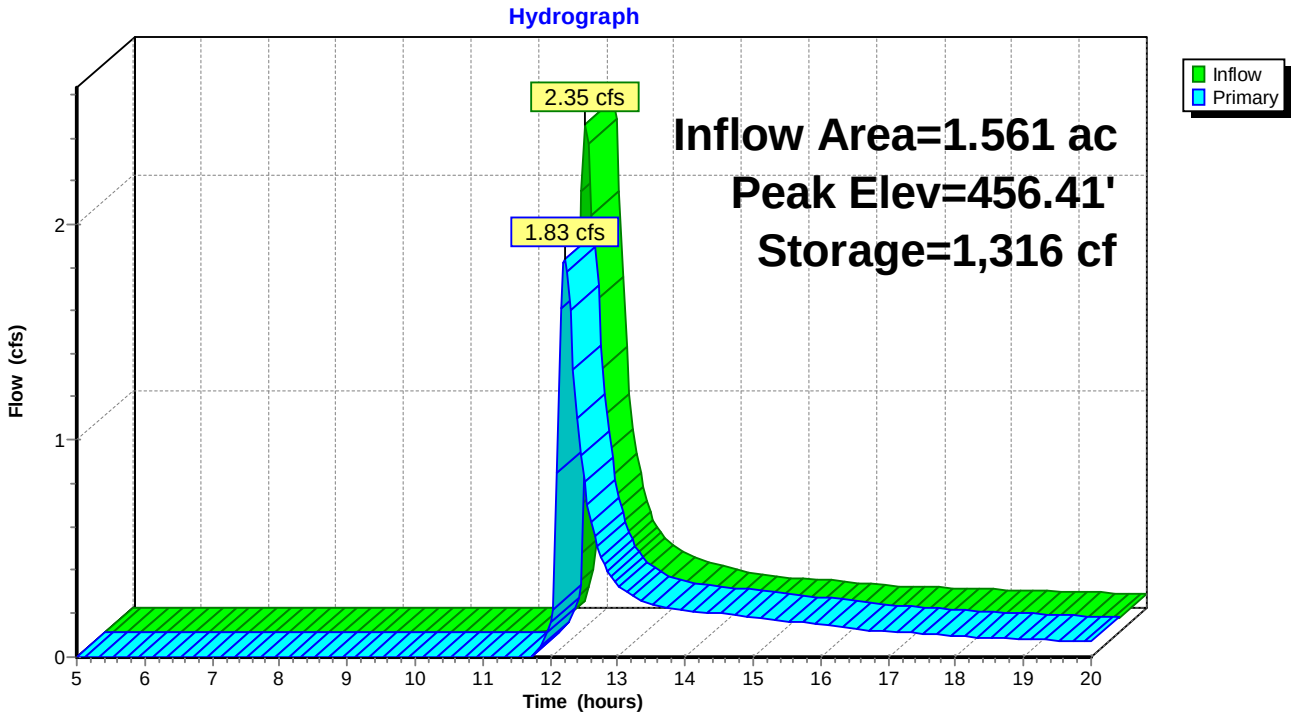
Volume	Invert	Avail.Storage	Storage Description
#1	455.00'	3,884 cf	**Custom Stage Data (Irregular)** Listed below

Elevation (feet)	Surf.Area (sq-ft)	Perim. (feet)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)	Wet.Area (sq-ft)
455.00	570	143.0	0	0	570
456.00	1,028	167.0	788	788	1,182
457.00	1,542	181.0	1,276	2,064	1,607
458.00	2,113	200.0	1,820	3,884	2,214

Device	Routing	Invert	Outlet Devices
#1	Primary	455.00'	**12.0" Round Culvert** L= 62.0' CPP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 455.00' / 454.00' S= 0.0161 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 0.79 sf
#2	Device 1	455.00'	**3.0" Vert. Orifice/Grate** C= 0.600
#3	Device 1	456.00'	**24.0" W x 4.0" H Vert. Orifice/Grate** C= 0.600
#4	Device 1	457.00'	**24.0" W x 5.0" H Vert. Orifice/Grate** C= 0.600
#5	Primary	457.80'	**15.0' long x 5.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50 3.00 3.50 4.00 4.50 5.00 5.50 Coef. (English) 2.34 2.50 2.70 2.68 2.68 2.66 2.65 2.65 2.65 2.65 2.67 2.66 2.68 2.70 2.74 2.79 2.88

Primary OutFlow Max=1.81 cfs @ 12.22 hrs HW=456.41' TW=0.00' (Dynamic Tailwater)
- **1=Culvert** (Passes 1.81 cfs of 2.84 cfs potential flow)
  - **2=Orifice/Grate** (Orifice Controls 0.27 cfs @ 5.45 fps)
  - **3=Orifice/Grate** (Orifice Controls 1.54 cfs @ 2.31 fps)
  - **4=Orifice/Grate** (Controls 0.00 cfs)
- **5=Broad-Crested Rectangular Weir** (Controls 0.00 cfs)

Pond DP: Detention Pond

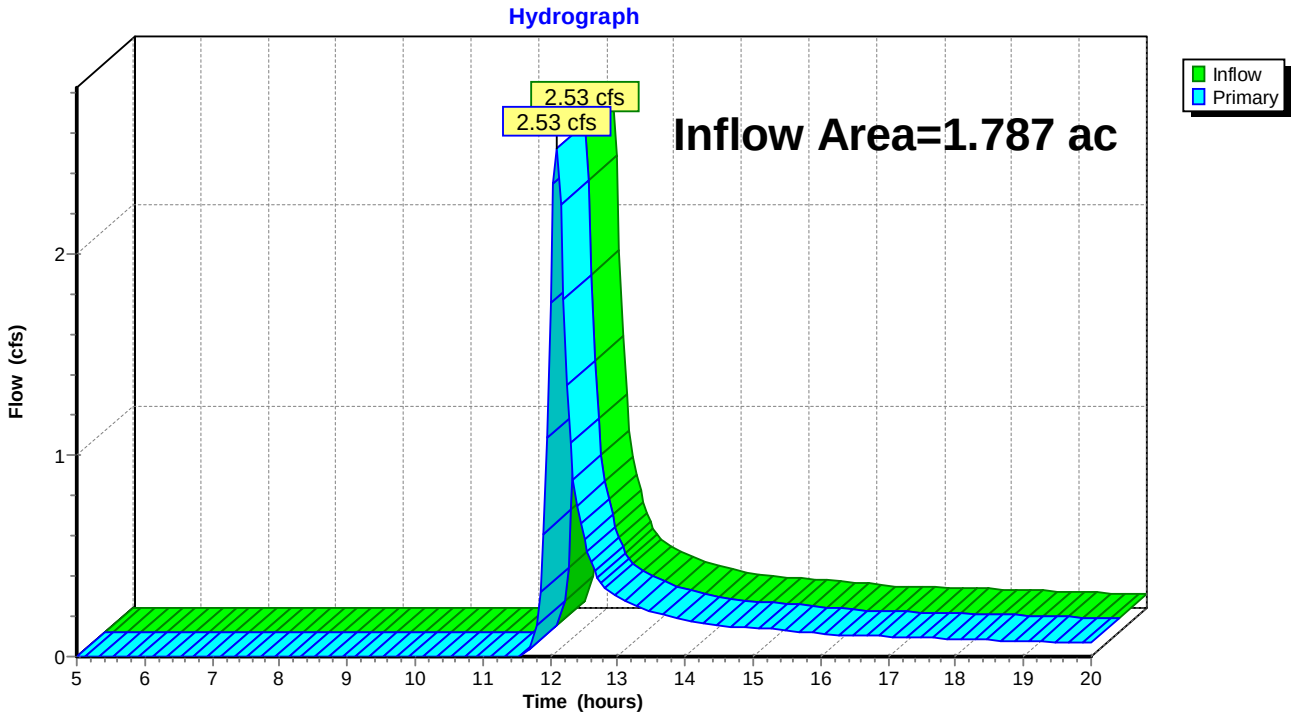


Summary for Link DP-1: Design Point #1

Inflow Area = 1.787 ac, 0.00% Impervious, Inflow Depth > 1.09" for 10-Year event
Inflow = 2.53 cfs @ 12.09 hrs, Volume= 0.163 af
Primary = 2.53 cfs @ 12.09 hrs, Volume= 0.163 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs

Link DP-1: Design Point #1

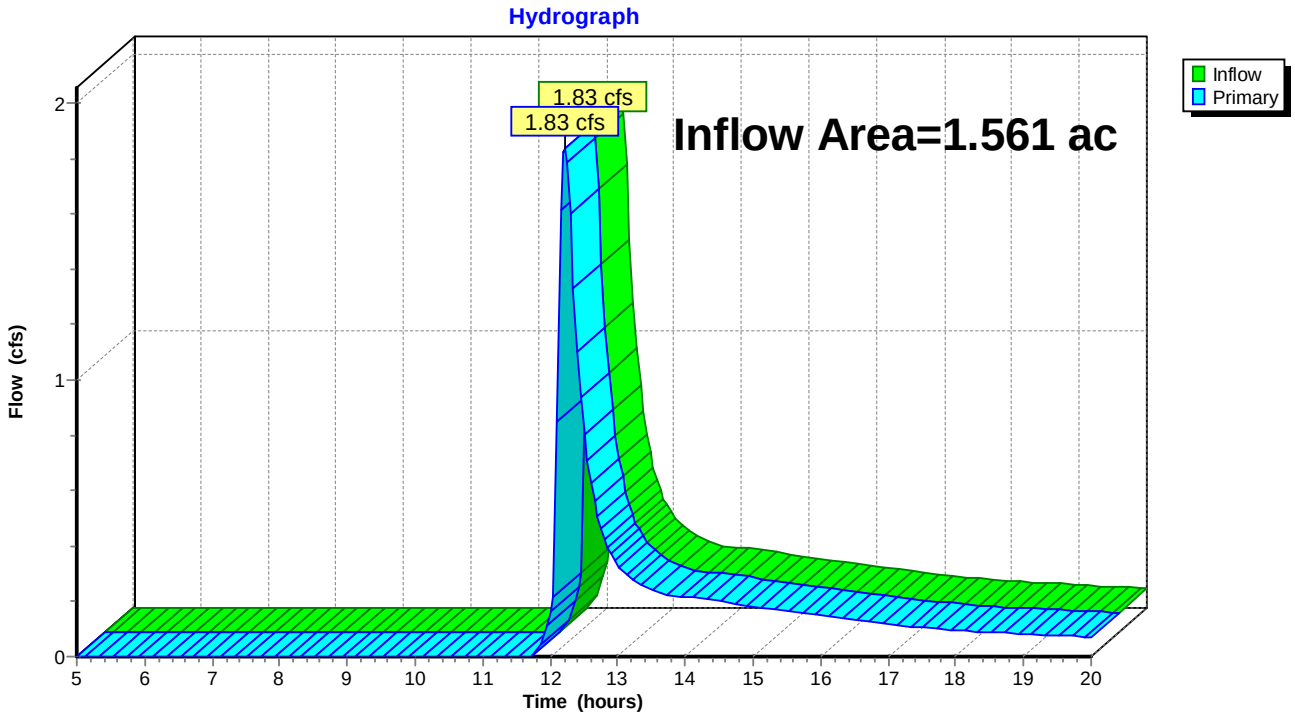


Summary for Link DP-2: Design Point #2

Inflow Area = 1.561 ac, 0.00% Impervious, Inflow Depth > 1.19" for 10-Year event
Inflow = 1.83 cfs @ 12.22 hrs, Volume= 0.155 af
Primary = 1.83 cfs @ 12.22 hrs, Volume= 0.155 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs

Link DP-2: Design Point #2

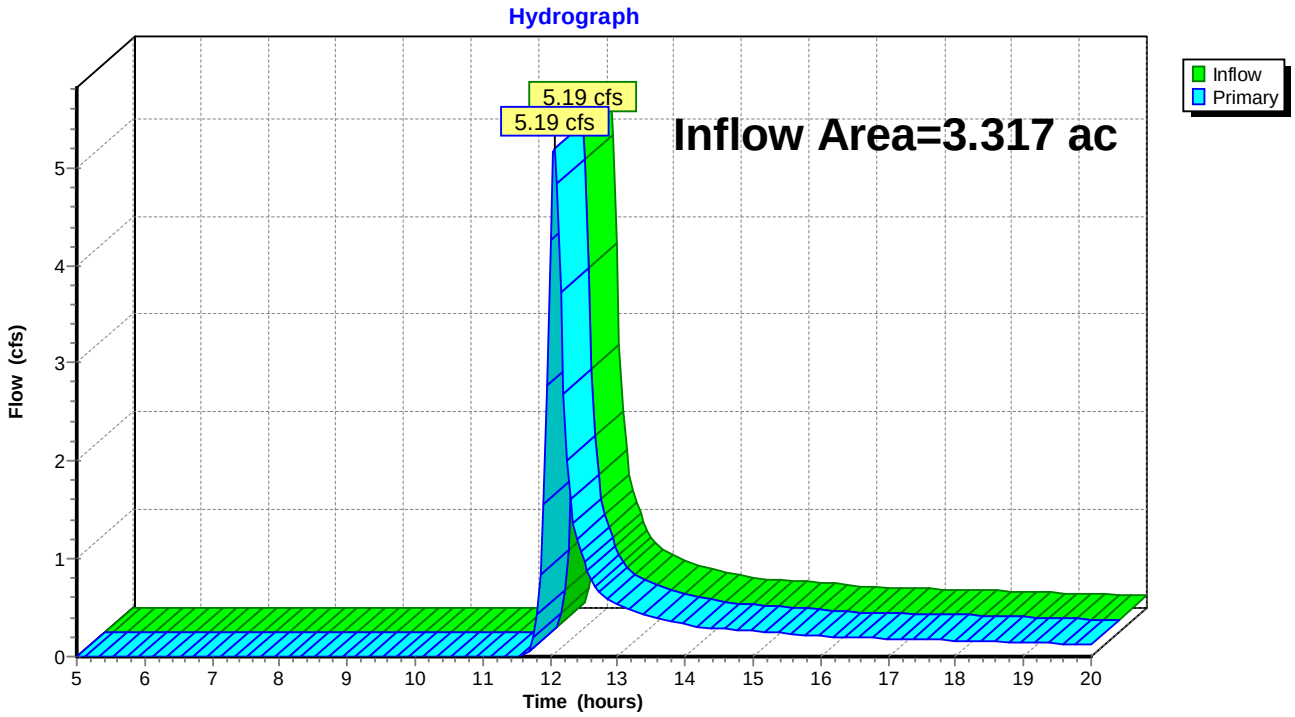


Summary for Link DP-3: Design Point #3

Inflow Area = 3.317 ac, 0.00% Impervious, Inflow Depth > 1.09" for 10-Year event
Inflow = 5.19 cfs @ 12.06 hrs, Volume= 0.302 af
Primary = 5.19 cfs @ 12.06 hrs, Volume= 0.302 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs

Link DP-3: Design Point #3

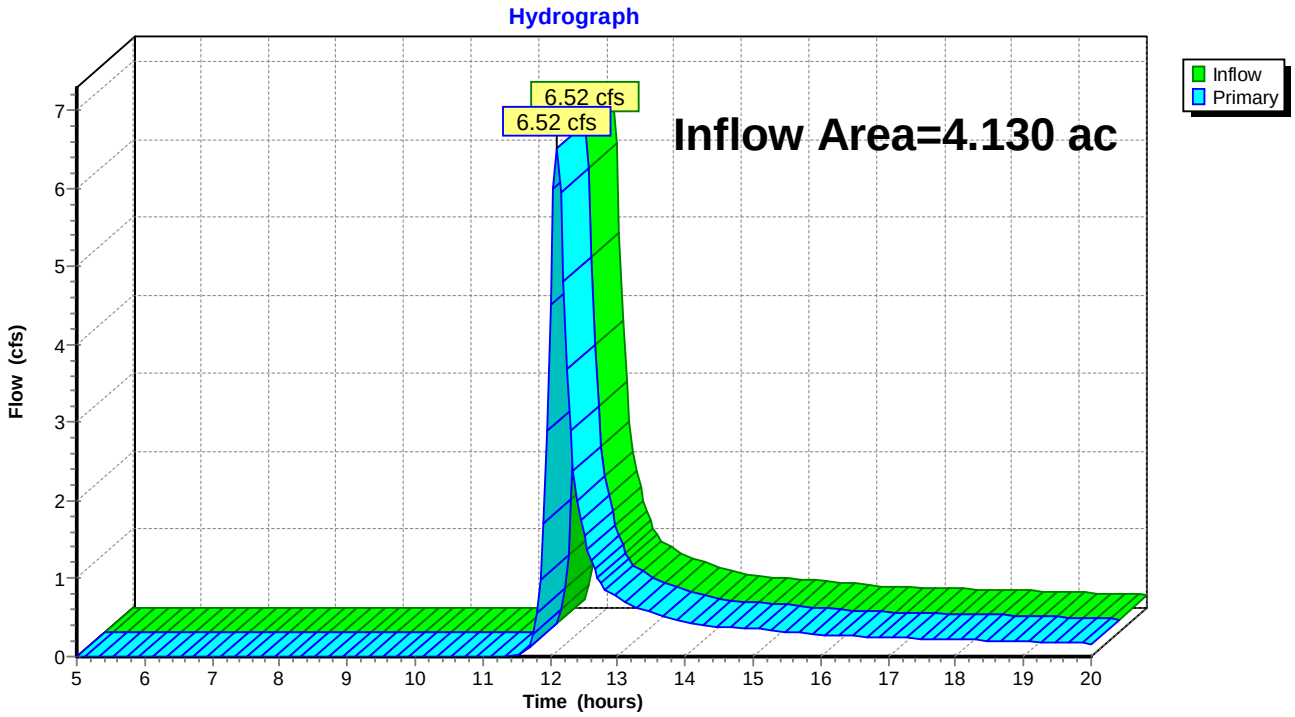


Summary for Link DP-4: Design Point #4

Inflow Area = 4.130 ac, 0.00% Impervious, Inflow Depth > 1.22" for 10-Year event
Inflow = 6.52 cfs @ 12.10 hrs, Volume= 0.420 af
Primary = 6.52 cfs @ 12.10 hrs, Volume= 0.420 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs

Link DP-4: Design Point #4

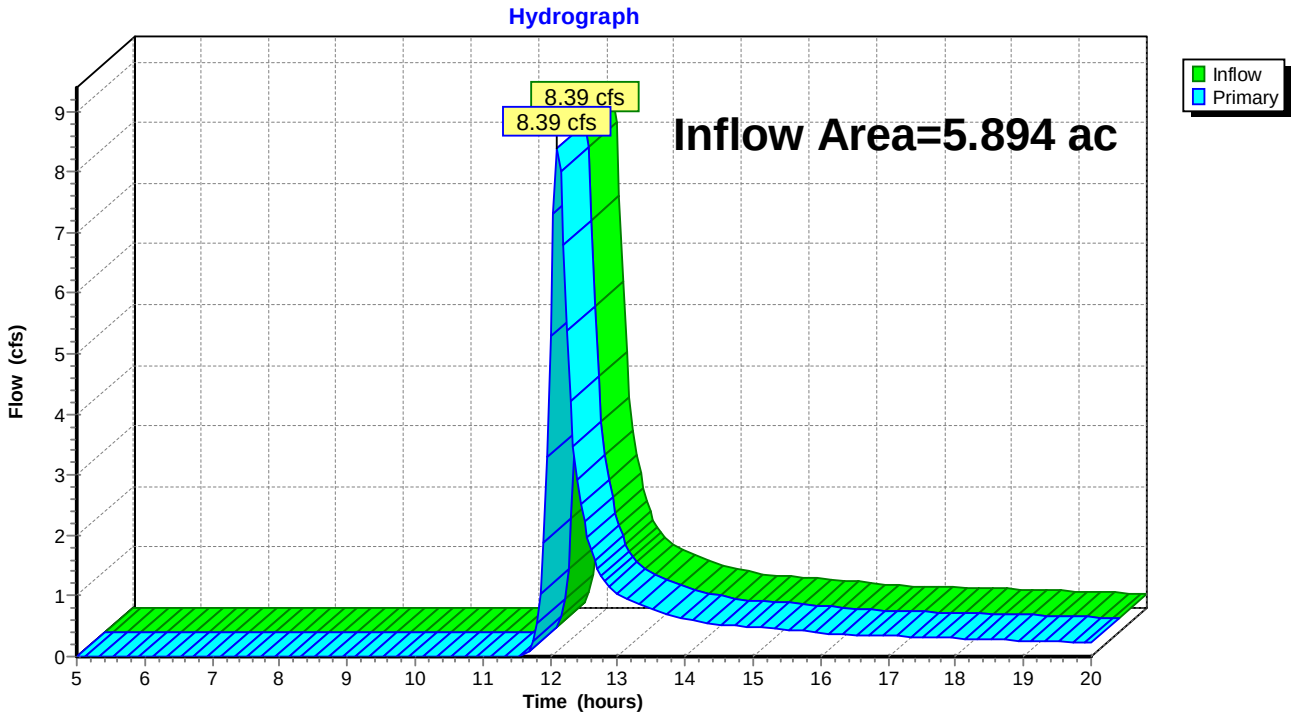


Summary for Link DP-5: Design Point #5

Inflow Area = 5.894 ac, 0.00% Impervious, Inflow Depth > 1.15" for 10-Year event
Inflow = 8.39 cfs @ 12.11 hrs, Volume= 0.567 af
Primary = 8.39 cfs @ 12.11 hrs, Volume= 0.567 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs

Link DP-5: Design Point #5



Time span=5.00-20.00 hrs, dt=0.05 hrs, 301 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Dyn-Stor-Ind method - Pond routing by Dyn-Stor-Ind method

Subcatchment DR-1: DR-1 Runoff Area=1.787 ac 0.00% Impervious Runoff Depth>3.51"
Flow Length=337' Tc=15.2 min CN=58 Runoff=8.71 cfs 0.523 af

Subcatchment DR-2: DR-2 Runoff Area=1.561 ac 0.00% Impervious Runoff Depth>3.74"
Flow Length=435' Tc=17.3 min CN=60 Runoff=7.63 cfs 0.487 af

Subcatchment DR-3: DR-3 Runoff Area=3.317 ac 0.00% Impervious Runoff Depth>3.51"
Flow Length=447' Tc=12.6 min CN=58 Runoff=17.73 cfs 0.971 af

Subcatchment DR-4: DR-4 Runoff Area=4.130 ac 0.00% Impervious Runoff Depth>3.74"
Flow Length=729' Tc=15.9 min CN=60 Runoff=21.04 cfs 1.289 af

Subcatchment DR-5: DR-5 Runoff Area=5.894 ac 0.00% Impervious Runoff Depth>3.63"
Flow Length=530' Tc=17.0 min CN=59 Runoff=28.12 cfs 1.781 af

Pond DP: Detention Pond Peak Elev=457.93' Storage=3,750 cf Inflow=7.63 cfs 0.487 af
Outflow=6.19 cfs 0.474 af

Link DP-1: Design Point #1 Inflow=8.71 cfs 0.523 af
Primary=8.71 cfs 0.523 af

Link DP-2: Design Point #2 Inflow=6.19 cfs 0.474 af
Primary=6.19 cfs 0.474 af

Link DP-3: Design Point #3 Inflow=17.73 cfs 0.971 af
Primary=17.73 cfs 0.971 af

Link DP-4: Design Point #4 Inflow=21.04 cfs 1.289 af
Primary=21.04 cfs 1.289 af

Link DP-5: Design Point #5 Inflow=28.12 cfs 1.781 af
Primary=28.12 cfs 1.781 af

Total Runoff Area = 16.689 ac Runoff Volume = 5.051 af Average Runoff Depth = 3.63"
100.00% Pervious = 16.689 ac 0.00% Impervious = 0.000 ac

Summary for Subcatchment DR-1: DR-1

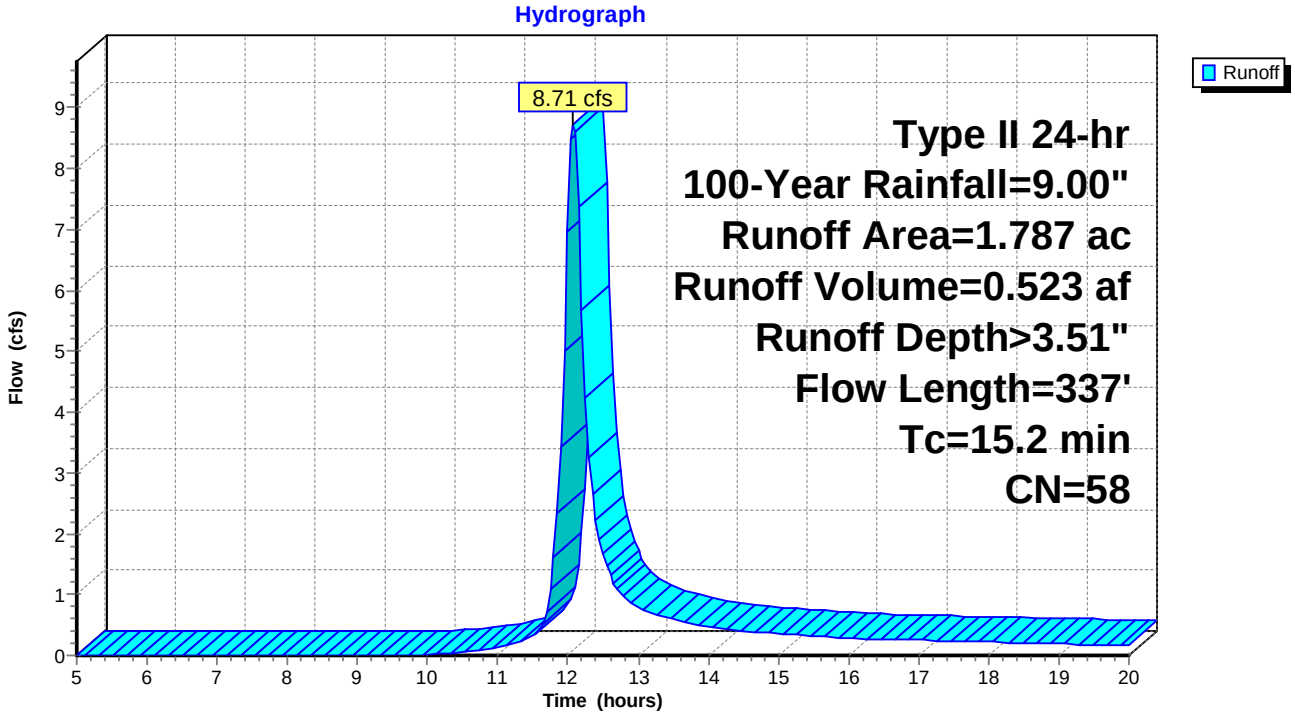
Runoff = 8.71 cfs @ 12.08 hrs, Volume= 0.523 af, Depth> 3.51"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type II 24-hr 100-Year Rainfall=9.00"

Area (ac)	CN	Description
1.716	58	Meadow, non-grazed, HSG B
0.067	65	Woods/grass comb., Fair, HSG B
0.004	96	Gravel surface, HSG B
1.787	58	Weighted Average
1.787		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
12.5	100	0.0319	0.13		**Sheet Flow,** Grass: Dense n= 0.240 P2= 2.87"
2.7	237	0.0437	1.46		**Shallow Concentrated Flow,** Short Grass Pasture Kv= 7.0 fps
15.2	337	Total			

Subcatchment DR-1: DR-1



Summary for Subcatchment DR-2: DR-2

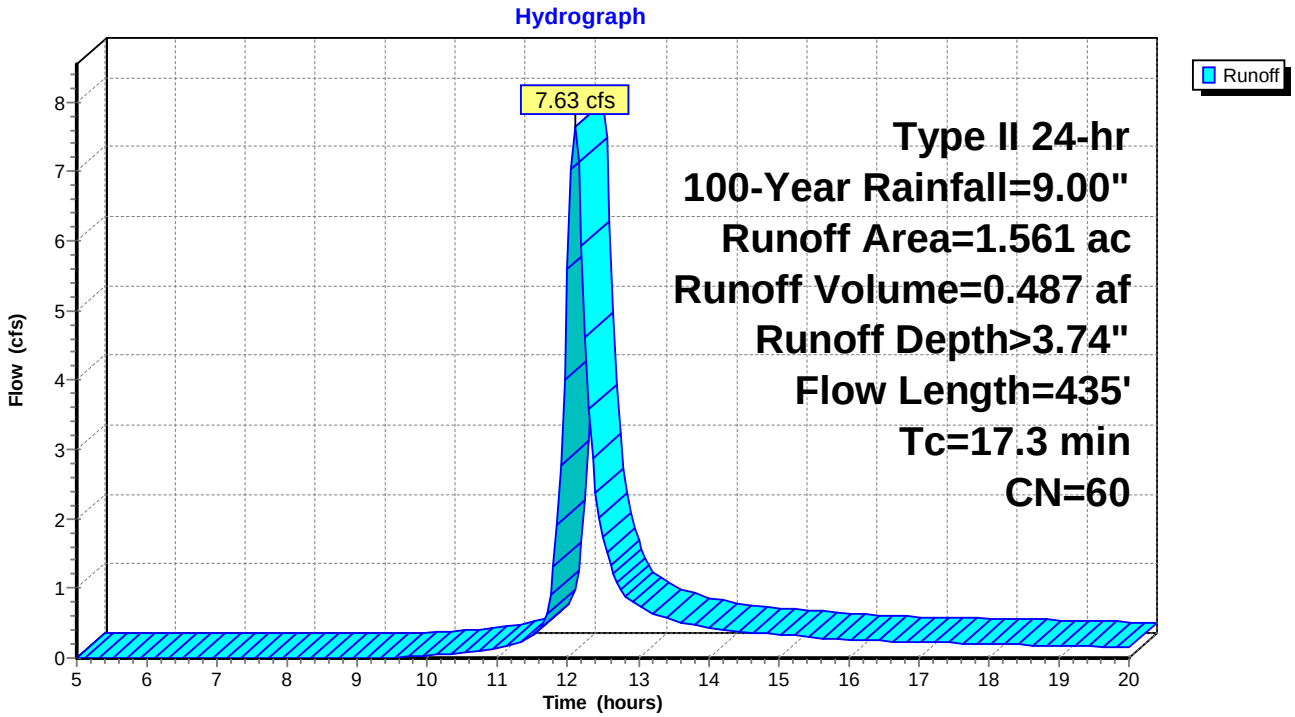
Runoff = 7.63 cfs @ 12.10 hrs, Volume= 0.487 af, Depth> 3.74"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type II 24-hr 100-Year Rainfall=9.00"

	Area (ac)	CN	Description
	1.405	58	Meadow, non-grazed, HSG B
*	0.156	75	Limited Use Pervious Gravel
	1.561	60	Weighted Average
	1.561		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
14.0	100	0.0240	0.12		**Sheet Flow,** Grass: Dense n= 0.240 P2= 2.87"
3.3	335	0.0573	1.68		**Shallow Concentrated Flow,** Short Grass Pasture Kv= 7.0 fps
17.3	435	Total			

Subcatchment DR-2: DR-2



Summary for Subcatchment DR-3: DR-3

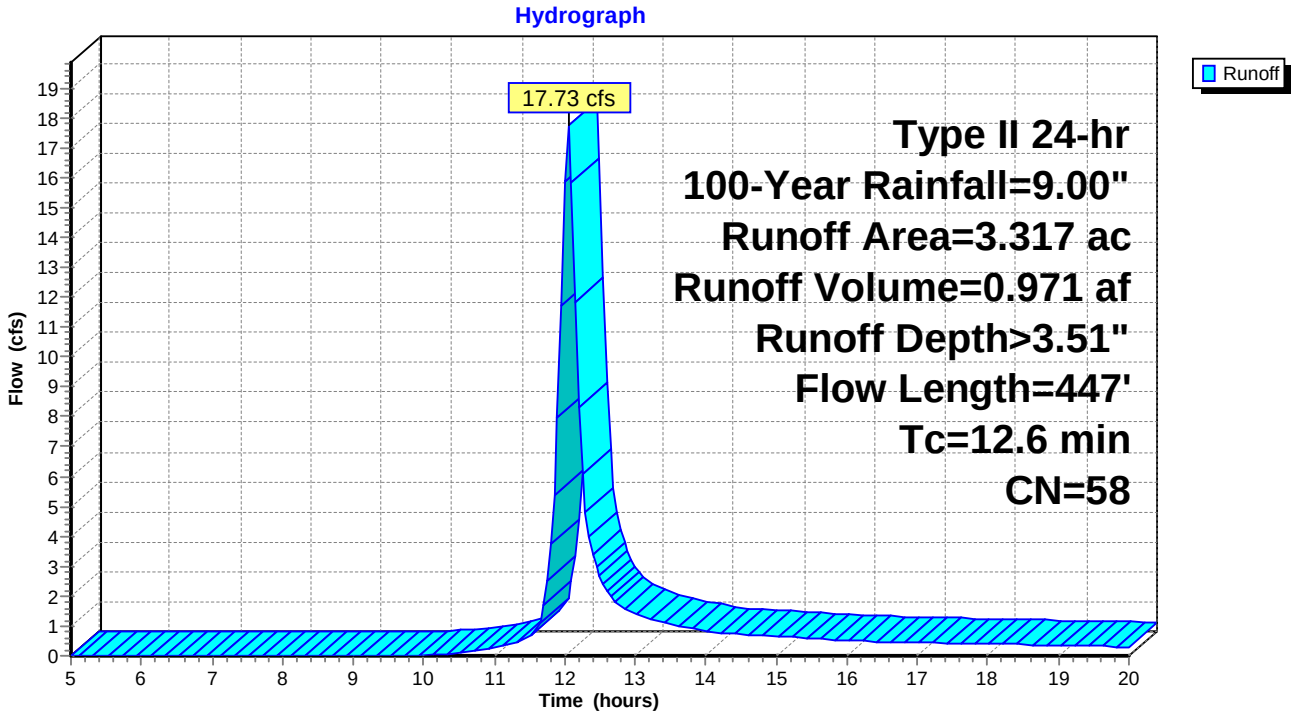
Runoff = 17.73 cfs @ 12.05 hrs, Volume= 0.971 af, Depth> 3.51"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type II 24-hr 100-Year Rainfall=9.00"

Area (ac)	CN	Description
3.317	58	Meadow, non-grazed, HSG B
3.317		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
9.3	100	0.0670	0.18		**Sheet Flow,** Grass: Dense n= 0.240 P2= 2.87"
3.3	347	0.0630	1.76		**Shallow Concentrated Flow,** Short Grass Pasture Kv= 7.0 fps
12.6	447	Total			

Subcatchment DR-3: DR-3



Summary for Subcatchment DR-4: DR-4

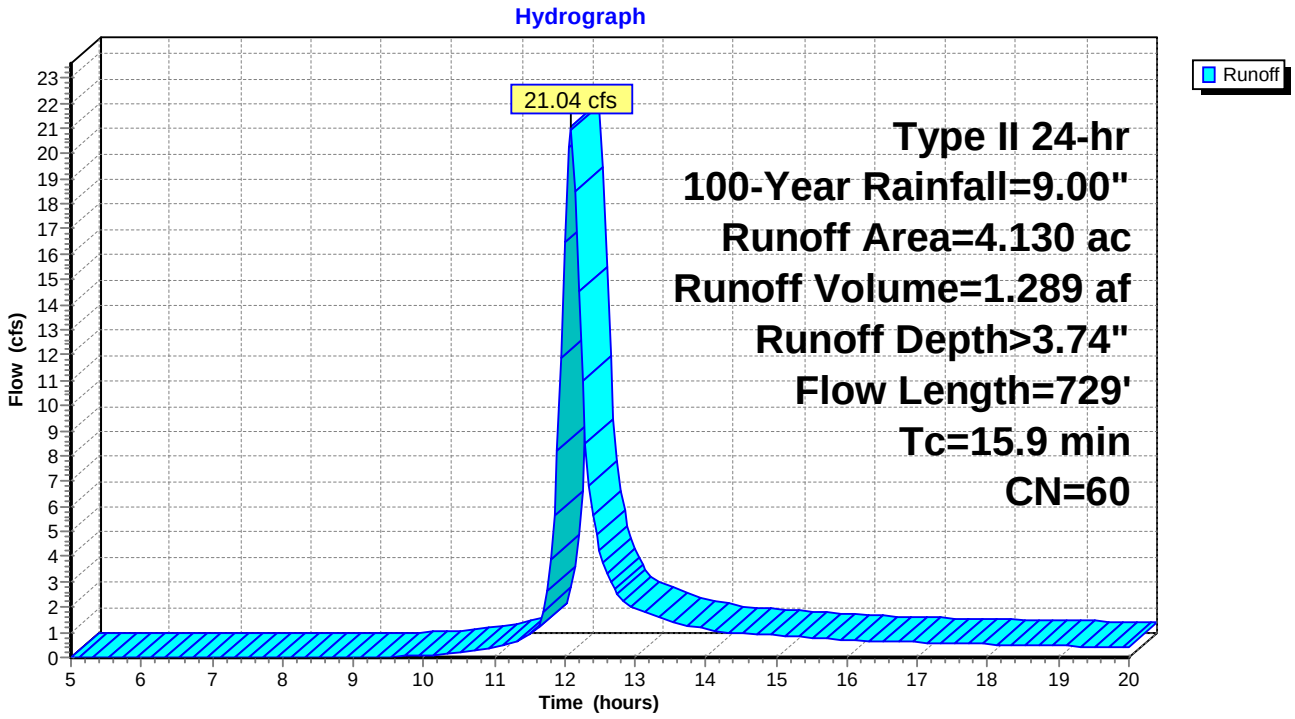
Runoff = 21.04 cfs @ 12.09 hrs, Volume= 1.289 af, Depth> 3.74"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type II 24-hr 100-Year Rainfall=9.00"

	Area (ac)	CN	Description
	3.399	58	Meadow, non-grazed, HSG B
	0.340	65	Woods/grass comb., Fair, HSG B
*	0.391	75	Limited Use Pervious Gravel
	4.130	60	Weighted Average
	4.130		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
9.4	100	0.0659	0.18		**Sheet Flow,** Grass: Dense n= 0.240 P2= 2.87"
6.5	629	0.0528	1.61		**Shallow Concentrated Flow,** Short Grass Pasture Kv= 7.0 fps
15.9	729	Total			

Subcatchment DR-4: DR-4



Summary for Subcatchment DR-5: DR-5

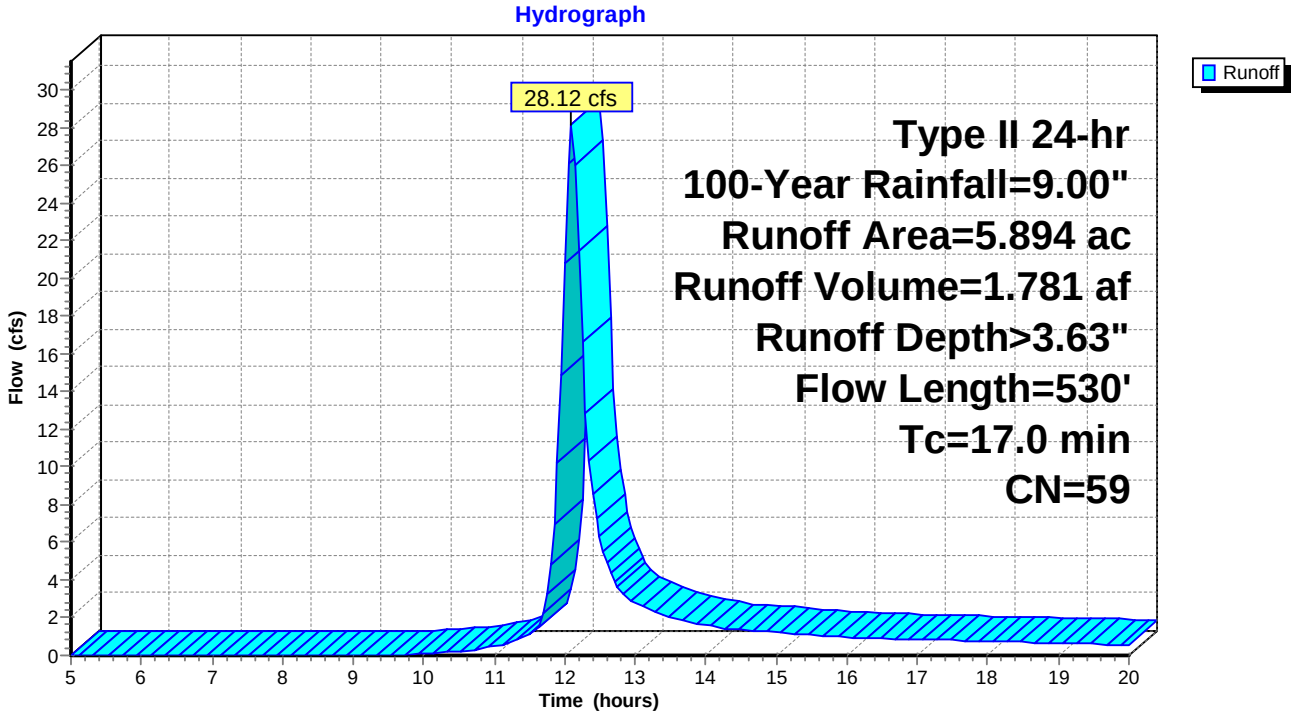
Runoff = 28.12 cfs @ 12.10 hrs, Volume= 1.781 af, Depth> 3.63"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type II 24-hr 100-Year Rainfall=9.00"

	Area (ac)	CN	Description
	0.484	65	Woods/grass comb., Fair, HSG B
	5.334	58	Meadow, non-grazed, HSG B
*	0.076	75	Limited Use Pervious Gravel
	5.894	59	Weighted Average
	5.894		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
13.8	100	0.0247	0.12		**Sheet Flow,** Grass: Dense n= 0.240 P2= 2.87"
3.2	430	0.1006	2.22		**Shallow Concentrated Flow,** Short Grass Pasture Kv= 7.0 fps
17.0	530	Total			

Subcatchment DR-5: DR-5



Summary for Pond DP: Detention Pond

Inflow Area = 1.561 ac, 0.00% Impervious, Inflow Depth > 3.74" for 100-Year event
Inflow = 7.63 cfs @ 12.10 hrs, Volume= 0.487 af
Outflow = 6.19 cfs @ 12.21 hrs, Volume= 0.474 af, Atten= 19%, Lag= 6.4 min
Primary = 6.19 cfs @ 12.21 hrs, Volume= 0.474 af

Routing by Dyn-Stor-Ind method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Peak Elev= 457.93' @ 12.21 hrs Surf.Area= 2,071 sf Storage= 3,750 cf

Plug-Flow detention time= 24.0 min calculated for 0.472 af (97% of inflow)
Center-of-Mass det. time= 14.0 min (815.5 - 801.5)

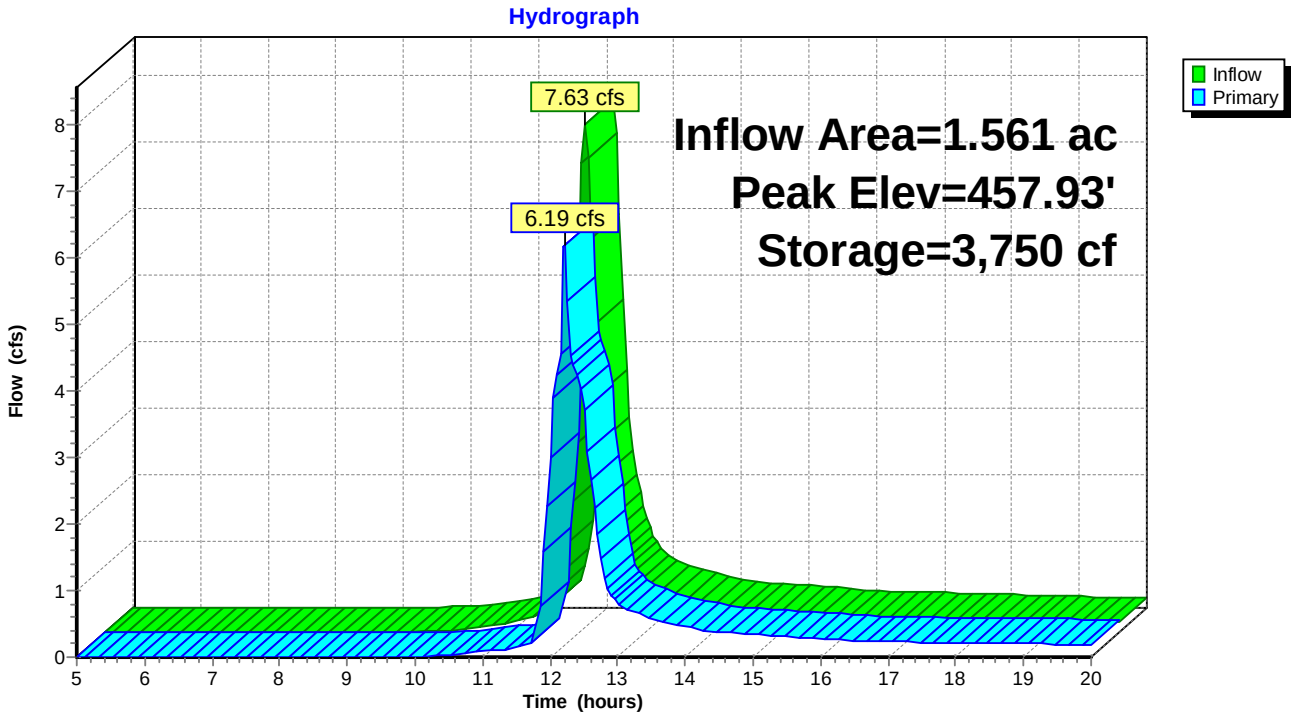
Volume	Invert	Avail.Storage	Storage Description
#1	455.00'	3,884 cf	**Custom Stage Data (Irregular)** Listed below

Elevation (feet)	Surf.Area (sq-ft)	Perim. (feet)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)	Wet.Area (sq-ft)
455.00	570	143.0	0	0	570
456.00	1,028	167.0	788	788	1,182
457.00	1,542	181.0	1,276	2,064	1,607
458.00	2,113	200.0	1,820	3,884	2,214

Device	Routing	Invert	Outlet Devices
#1	Primary	455.00'	**12.0" Round Culvert** L= 62.0' CPP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 455.00' / 454.00' S= 0.0161 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 0.79 sf
#2	Device 1	455.00'	**3.0" Vert. Orifice/Grate** C= 0.600
#3	Device 1	456.00'	**24.0" W x 4.0" H Vert. Orifice/Grate** C= 0.600
#4	Device 1	457.00'	**24.0" W x 5.0" H Vert. Orifice/Grate** C= 0.600
#5	Primary	457.80'	**15.0' long x 5.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50 3.00 3.50 4.00 4.50 5.00 5.50 Coef. (English) 2.34 2.50 2.70 2.68 2.68 2.66 2.65 2.65 2.65 2.65 2.67 2.66 2.68 2.70 2.74 2.79 2.88

Primary OutFlow Max=6.02 cfs @ 12.21 hrs HW=457.92' TW=0.00' (Dynamic Tailwater)
- **1=Culvert** (Inlet Controls 4.64 cfs @ 5.91 fps)
  - **2=Orifice/Grate** (Passes < 0.39 cfs potential flow)
  - **3=Orifice/Grate** (Passes < 4.24 cfs potential flow)
  - **4=Orifice/Grate** (Passes < 3.36 cfs potential flow)
- **5=Broad-Crested Rectangular Weir** (Weir Controls 1.38 cfs @ 0.79 fps)

Pond DP: Detention Pond

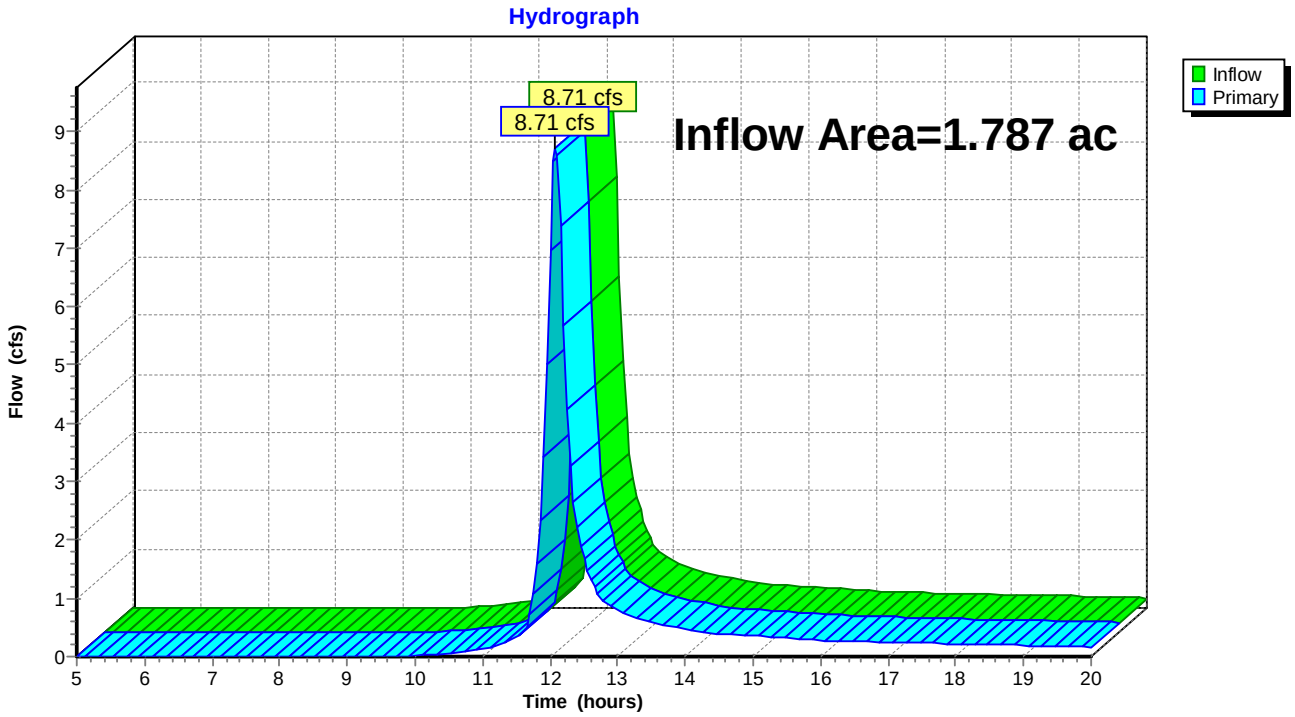


Summary for Link DP-1: Design Point #1

Inflow Area = 1.787 ac, 0.00% Impervious, Inflow Depth > 3.51" for 100-Year event
Inflow = 8.71 cfs @ 12.08 hrs, Volume= 0.523 af
Primary = 8.71 cfs @ 12.08 hrs, Volume= 0.523 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs

Link DP-1: Design Point #1

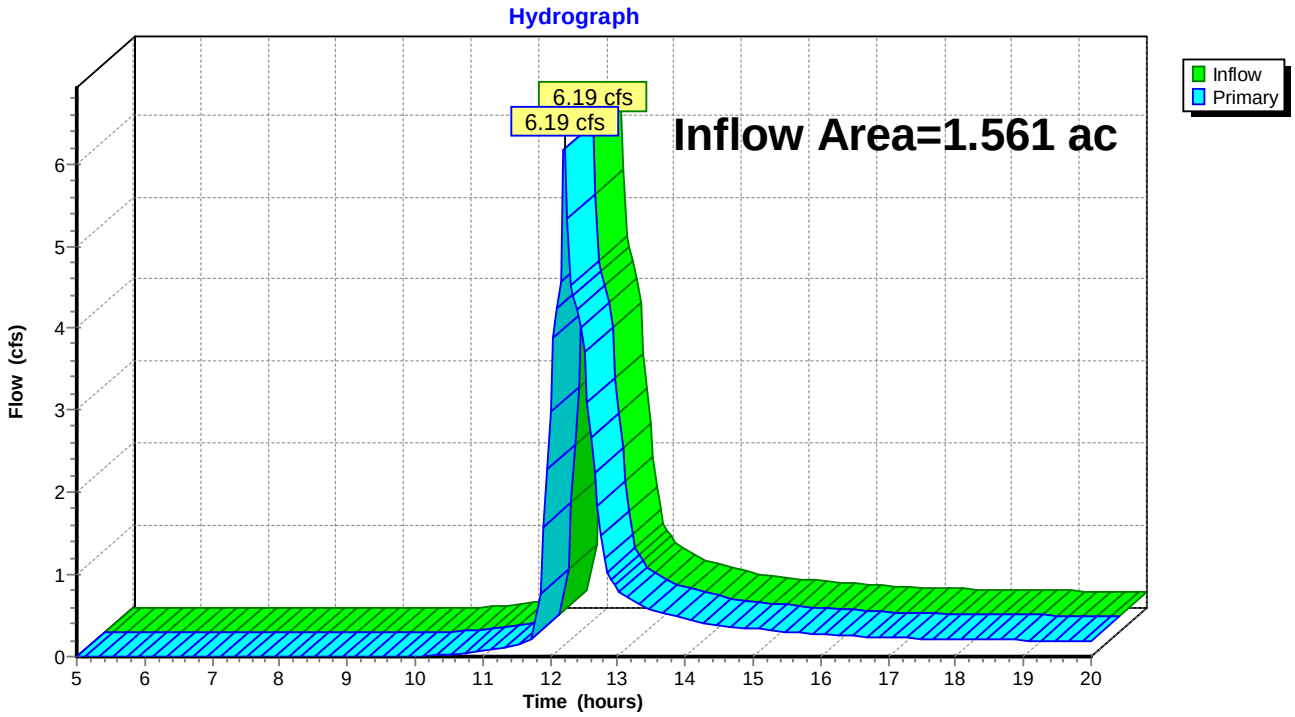


Summary for Link DP-2: Design Point #2

Inflow Area = 1.561 ac, 0.00% Impervious, Inflow Depth > 3.64" for 100-Year event
Inflow = 6.19 cfs @ 12.21 hrs, Volume= 0.474 af
Primary = 6.19 cfs @ 12.21 hrs, Volume= 0.474 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs

Link DP-2: Design Point #2

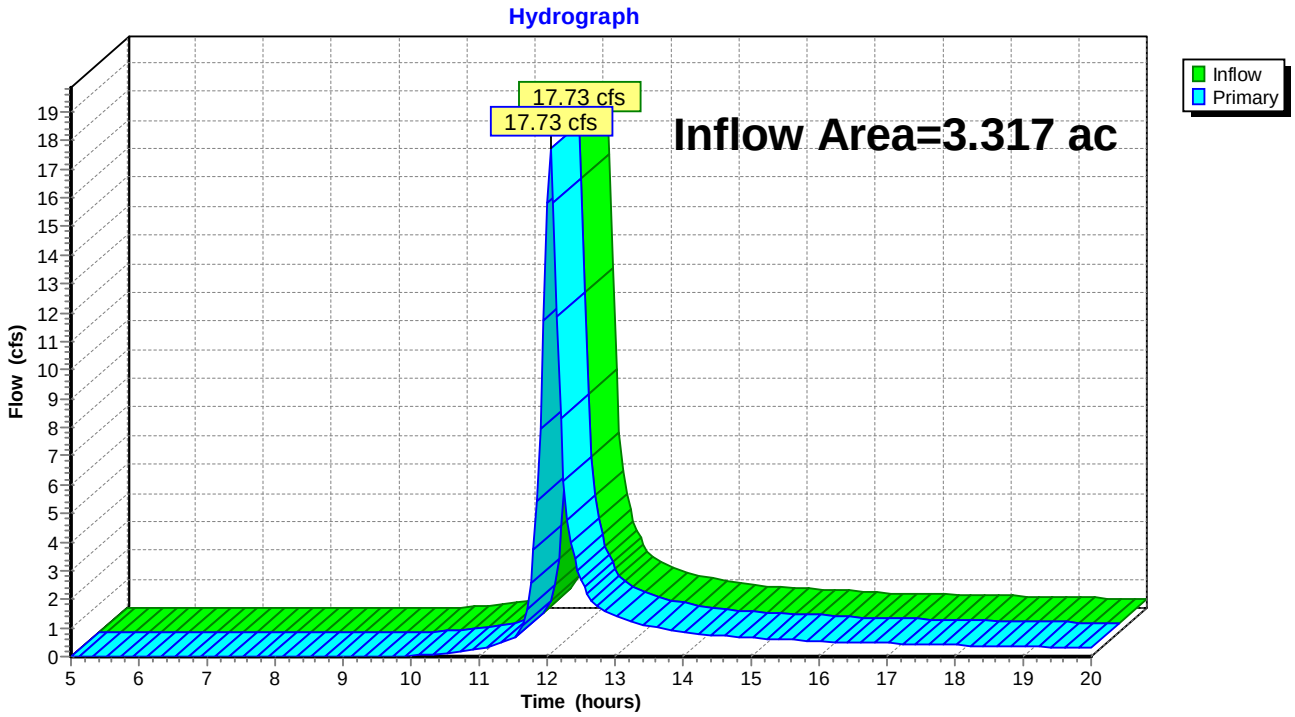


Summary for Link DP-3: Design Point #3

Inflow Area = 3.317 ac, 0.00% Impervious, Inflow Depth > 3.51" for 100-Year event
Inflow = 17.73 cfs @ 12.05 hrs, Volume= 0.971 af
Primary = 17.73 cfs @ 12.05 hrs, Volume= 0.971 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs

Link DP-3: Design Point #3

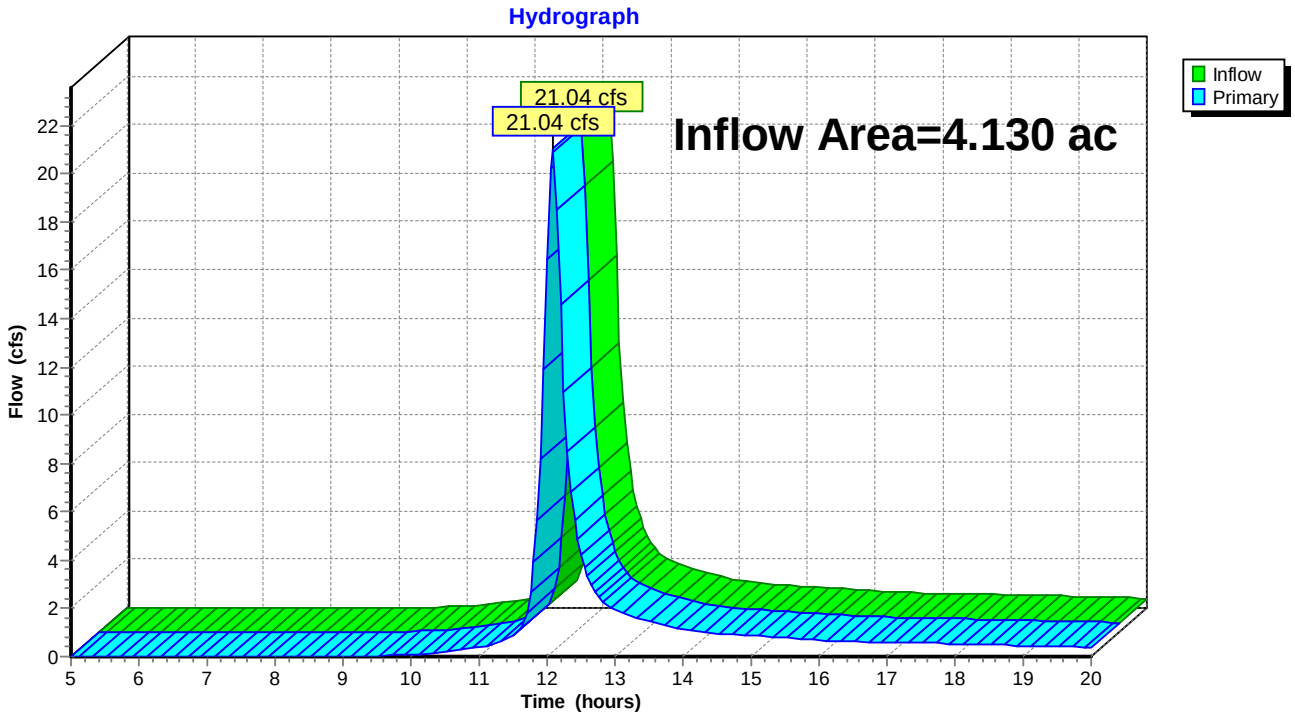


Summary for Link DP-4: Design Point #4

Inflow Area = 4.130 ac, 0.00% Impervious, Inflow Depth > 3.74" for 100-Year event
Inflow = 21.04 cfs @ 12.09 hrs, Volume= 1.289 af
Primary = 21.04 cfs @ 12.09 hrs, Volume= 1.289 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs

Link DP-4: Design Point #4

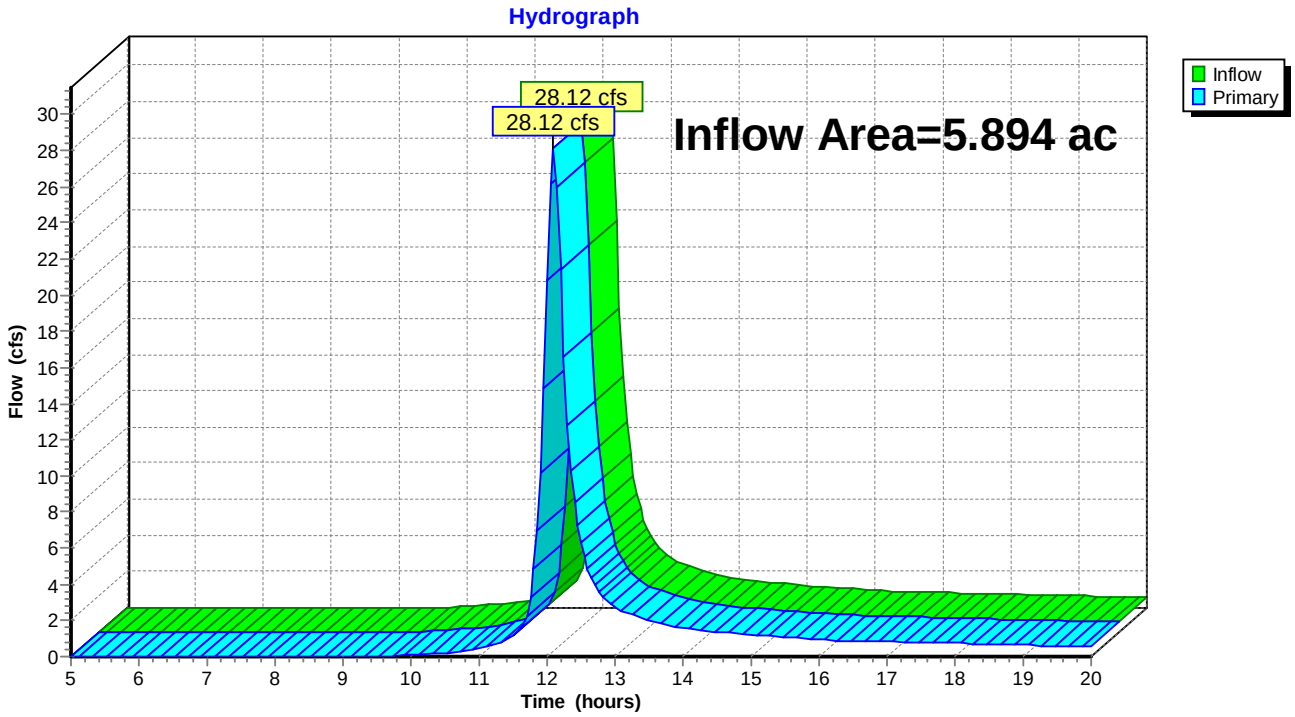


Summary for Link DP-5: Design Point #5

Inflow Area = 5.894 ac, 0.00% Impervious, Inflow Depth > 3.63" for 100-Year event
Inflow = 28.12 cfs @ 12.10 hrs, Volume= 1.781 af
Primary = 28.12 cfs @ 12.10 hrs, Volume= 1.781 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs

Link DP-5: Design Point #5



Appendix R-3
NRCS Soil Report

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 Westchester County, New York

July 27, 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.

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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.

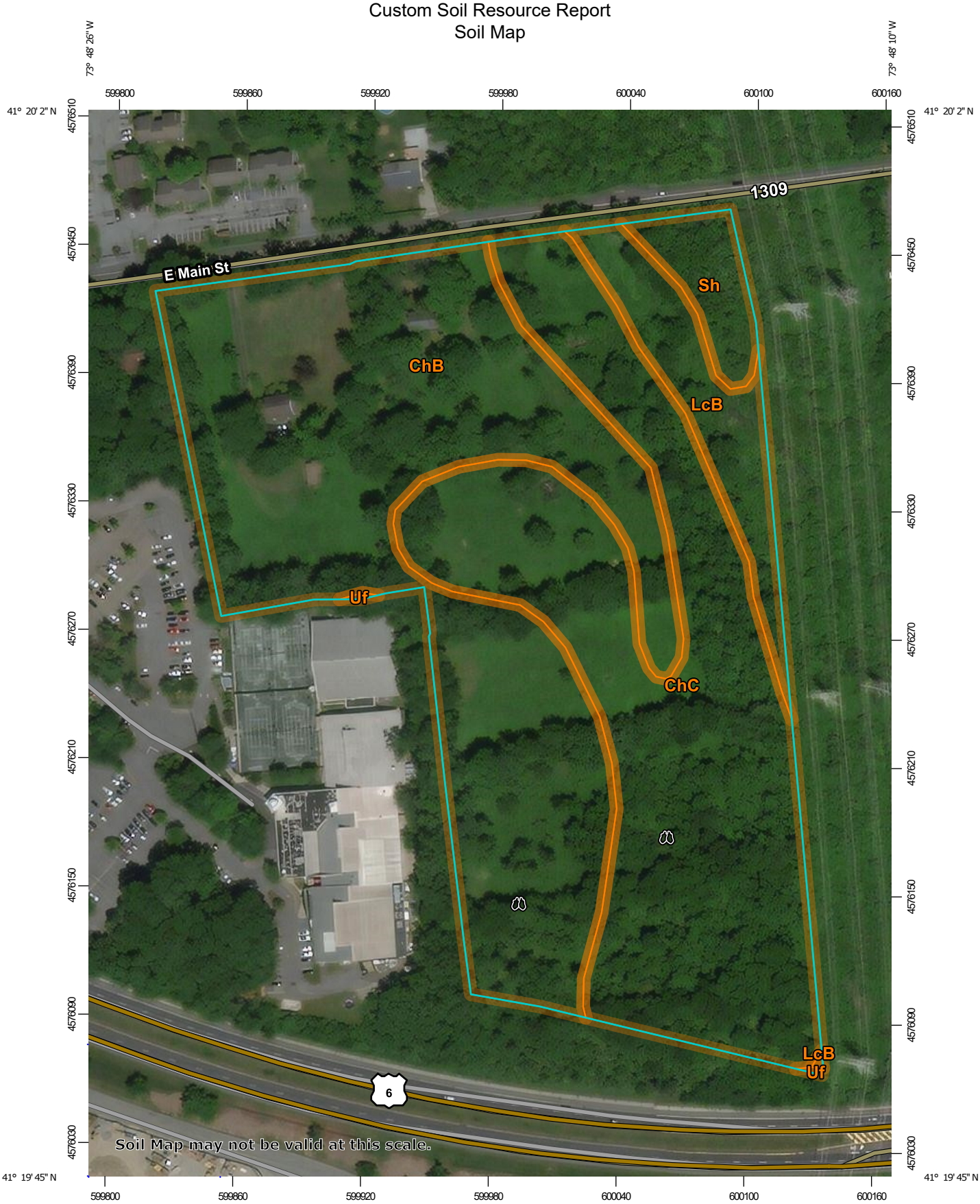
After soil scientists located and identified the significant natural bodies of soil in the survey area, they drew the boundaries of these bodies on aerial photographs and

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: 1:2,430 if printed on A portrait (8.5" x 11") sheet.

N

Meters: 0 35 70 140 210

Feet: 0 100 200 400 600

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 1:12,000.

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: Westchester County, New York
Survey Area Data: Version 16, Jun 11, 2020

Soil map units are labeled (as space allows) for map scales 1:50,000 or larger.

Date(s) aerial images were photographed: Dec 31, 2009—Oct 5, 2016

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
ChB	Charlton fine sandy loam, 3 to 8 percent slopes	9.5	49.1%
ChC	Charlton fine sandy loam, 8 to 15 percent slopes	7.9	40.8%
LcB	Leicester loam, 3 to 8 percent slopes, stony	1.3	6.8%
Sh	Sun loam	0.6	3.2%
Uf	Urban land	0.0	0.1%
Totals for Area of Interest		**19.4**	**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.

Westchester County, New York

ChB—Charlton fine sandy loam, 3 to 8 percent slopes

Map Unit Setting

National map unit symbol: 2wh0n
Elevation: 0 to 1,440 feet
Mean annual precipitation: 36 to 71 inches
Mean annual air temperature: 39 to 55 degrees F
Frost-free period: 140 to 240 days
Farmland classification: All areas are prime farmland

Map Unit Composition

Charlton and similar soils: 85 percent
Minor components: 15 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Charlton

Setting

Landform: Hills, ground moraines, ridges
Landform position (two-dimensional): Backslope, shoulder, summit
Landform position (three-dimensional): Crest, side slope, nose slope
Down-slope shape: Linear, convex
Across-slope shape: Convex
Parent material: Coarse-loamy melt-out till derived from granite, gneiss, and/or schist

Typical profile

Ap - 0 to 7 inches: fine sandy loam
Bw - 7 to 22 inches: gravelly fine sandy loam
C - 22 to 65 inches: gravelly fine sandy loam

Properties and qualities

Slope: 3 to 8 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Well drained
Runoff class: Low
Capacity of the most limiting layer to transmit water (Ksat): Moderately low to high (0.14 to 14.17 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Maximum salinity: Nonsaline (0.0 to 1.9 mmhos/cm)
Available water capacity: Moderate (about 6.9 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 2e
Hydrologic Soil Group: B
Ecological site: F144AY034CT - Well Drained Till Uplands
Hydric soil rating: No

Minor Components

Sutton

Percent of map unit: 8 percent
Landform: Ground moraines, hills
Landform position (two-dimensional): Footslope
Landform position (three-dimensional): Base slope
Down-slope shape: Concave
Across-slope shape: Linear
Hydric soil rating: No

Paxton

Percent of map unit: 5 percent
Landform: Drumlins, hills, ground moraines
Landform position (two-dimensional): Backslope, summit, shoulder
Landform position (three-dimensional): Side slope, crest
Down-slope shape: Linear, convex
Across-slope shape: Convex
Hydric soil rating: No

Leicester

Percent of map unit: 1 percent
Landform: Drainageways, depressions
Down-slope shape: Linear
Across-slope shape: Concave
Hydric soil rating: Yes

Chatfield

Percent of map unit: 1 percent
Landform: Hills, ridges
Landform position (two-dimensional): Backslope, shoulder, summit
Landform position (three-dimensional): Crest, side slope, nose slope
Down-slope shape: Convex
Across-slope shape: Linear, convex
Hydric soil rating: No

ChC—Charlton fine sandy loam, 8 to 15 percent slopes

Map Unit Setting

National map unit symbol: 2wh0q
Elevation: 0 to 1,440 feet
Mean annual precipitation: 36 to 71 inches
Mean annual air temperature: 39 to 55 degrees F
Frost-free period: 140 to 240 days
Farmland classification: Farmland of statewide importance

Map Unit Composition

Charlton and similar soils: 85 percent
Minor components: 15 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Charlton

Setting

Landform: Ground moraines, ridges, hills
Landform position (two-dimensional): Backslope
Landform position (three-dimensional): Side slope
Down-slope shape: Convex, linear
Across-slope shape: Convex
Parent material: Coarse-loamy melt-out till derived from granite, gneiss, and/or schist

Typical profile

Ap - 0 to 7 inches: fine sandy loam
Bw - 7 to 22 inches: gravelly fine sandy loam
C - 22 to 65 inches: gravelly fine sandy loam

Properties and qualities

Slope: 8 to 15 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Well drained
Runoff class: Low
Capacity of the most limiting layer to transmit water (Ksat): Moderately low to high (0.14 to 14.17 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Maximum salinity: Nonsaline (0.0 to 1.9 mmhos/cm)
Available water capacity: Moderate (about 6.9 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 3e
Hydrologic Soil Group: B
Ecological site: F144AY034CT - Well Drained Till Uplands
Hydric soil rating: No

Minor Components

Paxton

Percent of map unit: 5 percent
Landform: Drumlins, hills, ground moraines
Landform position (two-dimensional): Backslope
Landform position (three-dimensional): Side slope
Down-slope shape: Linear, convex
Across-slope shape: Convex
Hydric soil rating: No

Sutton, fine sandy loam

Percent of map unit: 5 percent
Landform: Hills, ridges, ground moraines
Landform position (two-dimensional): Footslope
Landform position (three-dimensional): Base slope
Down-slope shape: Concave
Across-slope shape: Linear
Hydric soil rating: No

Chatfield

Percent of map unit: 3 percent
Landform: Hills, ridges
Landform position (two-dimensional): Backslope, shoulder, summit
Landform position (three-dimensional): Crest, side slope, nose slope
Down-slope shape: Convex
Across-slope shape: Convex, linear
Hydric soil rating: No

Canton

Percent of map unit: 2 percent
Landform: Hills, ground moraines, ridges
Landform position (two-dimensional): Shoulder, backslope, summit
Landform position (three-dimensional): Side slope, nose slope, crest
Down-slope shape: Linear, convex
Across-slope shape: Convex
Hydric soil rating: No

LcB—Leicester loam, 3 to 8 percent slopes, stony

Map Unit Setting

National map unit symbol: bd8w
Elevation: 0 to 1,120 feet
Mean annual precipitation: 46 to 50 inches
Mean annual air temperature: 46 to 52 degrees F
Frost-free period: 115 to 215 days
Farmland classification: Not prime farmland

Map Unit Composition

Leicester, somewhat poorly drained, and similar soils: 50 percent
Leicester, poorly drained, and similar soils: 35 percent
Minor components: 15 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Leicester, Somewhat Poorly Drained

Setting

Landform: Hills, ridges, till plains
Landform position (two-dimensional): Footslope, summit
Landform position (three-dimensional): Base slope
Down-slope shape: Concave
Across-slope shape: Linear
Parent material: Loamy acid till derived mostly from schist and gneiss

Typical profile

H1 - 0 to 8 inches: loam
H2 - 8 to 26 inches: sandy loam
C - 26 to 60 inches: sandy loam

Properties and qualities

Slope: 3 to 8 percent
Surface area covered with cobbles, stones or boulders: 0.1 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Somewhat poorly drained
Capacity of the most limiting layer to transmit water (Ksat): Moderately high to high (0.57 to 5.95 in/hr)
Depth to water table: About 6 to 18 inches
Frequency of flooding: None
Frequency of ponding: None
Available water capacity: Moderate (about 7.7 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 6s
Hydrologic Soil Group: A/D
Ecological site: F144AY009CT - Wet Till Depressions
Hydric soil rating: No

Description of Leicester, Poorly Drained

Setting

Landform: Ridges, till plains, hills
Landform position (two-dimensional): Footslope, summit
Landform position (three-dimensional): Base slope
Down-slope shape: Concave
Across-slope shape: Linear
Parent material: Loamy acid till derived mostly from schist and gneiss

Typical profile

H1 - 0 to 8 inches: loam
H2 - 8 to 26 inches: sandy loam
C - 26 to 60 inches: sandy loam

Properties and qualities

Slope: 3 to 8 percent
Surface area covered with cobbles, stones or boulders: 0.1 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Poorly drained
Capacity of the most limiting layer to transmit water (Ksat): Moderately high to high (0.57 to 5.95 in/hr)
Depth to water table: About 0 to 12 inches
Frequency of flooding: None
Frequency of ponding: None
Available water capacity: Moderate (about 7.7 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 6s
Hydrologic Soil Group: A/D
Ecological site: F144AY009CT - Wet Till Depressions
Hydric soil rating: Yes

Minor Components

Sun

Percent of map unit: 7 percent

Landform: Depressions
Hydric soil rating: Yes

Sutton
Percent of map unit: 5 percent
Hydric soil rating: No

Leicester, very stony
Percent of map unit: 3 percent
Hydric soil rating: No

Sh—Sun loam

Map Unit Setting
National map unit symbol: bd9q
Elevation: 600 to 1,800 feet
Mean annual precipitation: 46 to 50 inches
Mean annual air temperature: 46 to 52 degrees F
Frost-free period: 115 to 215 days
Farmland classification: Farmland of statewide importance

Map Unit Composition
Sun and similar soils: 85 percent
Minor components: 15 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Sun

Setting
Landform: Depressions
Landform position (two-dimensional): Toeslope
Landform position (three-dimensional): Base slope
Down-slope shape: Concave
Across-slope shape: Concave
Parent material: Loamy till derived primarily from limestone and sandstone, with a component of schist, shale, or granitic rocks in some areas

Typical profile
H1 - 0 to 9 inches: loam
H2 - 9 to 27 inches: loam
H3 - 27 to 60 inches: gravelly fine sandy loam

Properties and qualities
Slope: 0 to 3 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Very 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 0 inches
Frequency of flooding: None

Frequency of ponding: Frequent
Calcium carbonate, maximum content: 15 percent
Available water capacity: Moderate (about 6.7 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 4w
Hydrologic Soil Group: C/D
Ecological site: F144AY039NY - Semi-Rich Wet Till Depressions
Hydric soil rating: Yes

Minor Components

Leicester

Percent of map unit: 5 percent
Landform: Depressions
Hydric soil rating: Yes

Ridgebury

Percent of map unit: 5 percent
Landform: Depressions
Hydric soil rating: Yes

Palms

Percent of map unit: 3 percent
Landform: Swamps, marshes
Hydric soil rating: Yes

Sun, stony

Percent of map unit: 2 percent
Landform: Depressions
Hydric soil rating: Yes

Uf—Urban land

Map Unit Setting

National map unit symbol: bd7j
Elevation: 50 to 2,400 feet
Mean annual precipitation: 46 to 50 inches
Mean annual air temperature: 46 to 52 degrees F
Frost-free period: 115 to 215 days
Farmland classification: Not prime farmland

Map Unit Composition

Urban land: 85 percent
Minor components: 15 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Minor Components

Udorthents

Percent of map unit: 5 percent

Hydric soil rating: No

Riverhead

Percent of map unit: 2 percent
Hydric soil rating: No

Chatfield

Percent of map unit: 2 percent
Hydric soil rating: No

Udorthents, wet substratum

Percent of map unit: 2 percent
Hydric soil rating: No

Unadilla

Percent of map unit: 2 percent
Hydric soil rating: No

Sutton

Percent of map unit: 2 percent
Hydric soil rating: No

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