PPI ENGINEERING
VINEYARD DESIGN
EROSION CONTROL
WATER DEVELOPMENT
DRAINAGE
PERMITTING
GPS/GIS

2800 Jefferson Street
Napa, California 94558
707-253-1806
www.ppiengineering.com

MEMORANDUM

Date: January 29, 2025

To: Alexei Belov, Napa County Planning, Building, and Environmental Services

From: James R. Bushey, P.E.
Rachel L. Rosasco, E.I.T.

James R. Bushey Digitally signed by James R. Bushey Date: 2025.01.29 15:53:33 -08'00'

Re: B & F Farms Track I ECP
APNs 034-030-029 & -030
Hydrologic Analysis

This memo transmits the findings of a hydrologic analysis for the above-referenced Track I Erosion Control Plan (ECP). HydroCAD software was used to estimate pre- and post-project runoff from watersheds containing the proposed development areas. The software uses the Natural Resource Conservation Service (NRCS) TR-20 method to calculate runoff. The analysis uses the Type IA 24-hr storm distribution and includes site-specific National Oceanic and Atmospheric Administration (NOAA) point precipitation data for the ranch.

Two (2) watersheds and four (4) subareas were delineated for the hydrologic modeling using 2-foot contours from NOAA Lidar data. Watershed 1 encompasses approximately 14.2 acres and eventually drains to Hopper Creek. Watershed 2 is approximately 37.5 acres and outlets to an unnamed stream before reaching Dry Creek. Subareas 1-4, all less than 5 acres, were analyzed using a curve number analysis given their relatively small acreage. Please see the attached figures for the location of each watershed and subarea.

Soils within the watersheds were obtained from the NRCS Web Soil Survey and are classified as the following:

Felton gravelly loam, 30-50% Slopes (Map Unit Symbol 136)
Lodo-Maymen-Felton association, 30-75% Slopes (Map Unit Symbol 157)

The Felton gravelly loam (136) is classified as Hydrologic Soil Group (HSG) C. The Lodo-Maymen-Felton association (157) is classified as HSG D. Please see the attached figures for soil type delineations within the vicinity of each watershed.

Land use areas were delineated based on a combination of Napa County and PPI orthophotos and site visits. A site visit was conducted on June 6, 2024 by Jim Bushey and Rachel Rosasco of PPI Engineering to ground truth the orthophotos and determine the existing land use conditions. The land use hydrologic conditions were classified based on the respective covers as poor (less than 50% cover), fair (50%-75% cover), or good (greater than or equal to 75% cover). The HydroCAD software analyzes the land use data along with the corresponding soil HSGs to determine a weighted Curve Number (CN) for runoff calculations. The pre-project condition of the grassed areas that are proposed to be converted to vineyard were classified as Annual Grass in good condition. The land use classification of Annual Grass is based upon the NRCS Engineering Field Manual Chapter 2, Supplement 1 definition. The wooded areas were classified as Woods in good condition. The post-project condition within the proposed vineyard will be classified as good (based on the proposed cover in the ECP). Please see the attached figures for existing and proposed land use delineations.

The Time of Concentration (Tc) flow paths within each watershed were determined using NOAA Lidar contours. The flow paths were drafted from the hydrologically most distant point (longest travel time) in the watershed to the outlet point per NRCS standards. In order to analyze all proposed infrastructure, an additional model run was performed within Watershed 2 and is titled "Alternate Path". Please see the attached figures for both the pre- and post-project Tc flow paths for the watersheds.

Subareas 1-4 were evaluated by comparing pre-project to post-project Curve Numbers. The subareas are each located on a ridge top at or near the watershed break. A change in curve number is directly correlated to a change in runoff at this small scale. A higher post-project curve number indicates a higher runoff potential. As a result, these four subareas were not modeled as a complete watershed and do not have a Tc flow path or runoff predictions.

Pre- and post-project runoff estimates for Watersheds 1 and 2 are summarized in Table 1. Runoff was calculated for the 2-, 10-, 50- and 100-year storms respectively for each watershed. In Table 2, the Curve Number analysis for Subareas 1-4 is summarized.

Table 1. Individual Watershed Summary

	Runoff (cfs)								
	Watershed 1			Watershed 2			Watershed 2 Alternate		
	Pre-Project	Post-Project	Increase/Decrease	Pre-Project	Post-Project	Increase/Decrease	Pre-Project	Post-Project	Increase/Decrease
2-Year Storm	4.36	4.10	0.26	13.05	12.81	0.24	13.26	12.98	0.28
10-Year Storm	10.15	9.70	0.45	28.97	28.58	0.39	29.27	28.88	0.39
50-Year Storm	16.88	16.23	0.65	47.12	46.58	0.54	47.55	46.97	0.58
100-Year Storm	19.88	19.15	0.73	55.17	54.54	0.63	55.65	54.99	0.66

Table 2. Curve Number Analysis Summary

	Runoff (cfs)					
	Subarea 1			Subarea 2		
	Pre-Project	Post-Project	Increase/Decrease	Pre-Project	Post-Project	Increase/Decrease
Curve Number	71	71	0	72	72	0

	Runoff (cfs)					
	Subarea 3			Subarea 4		
	Pre-Project	Post-Project	Increase/Decrease	Pre-Project	Post-Project	Increase/Decrease
Curve Number	73	73	0	71	71	0

Watersheds 1 and 2 had no changes in CN but saw increases in Tc from pre- to post-project as a result of the proposed infrastructure and therefore saw a decrease in net runoff. Additionally, the "Alternate Path" model for Watershed 2 had an increase in Tc and as a result, with no change in CN, also saw a decrease in net runoff.

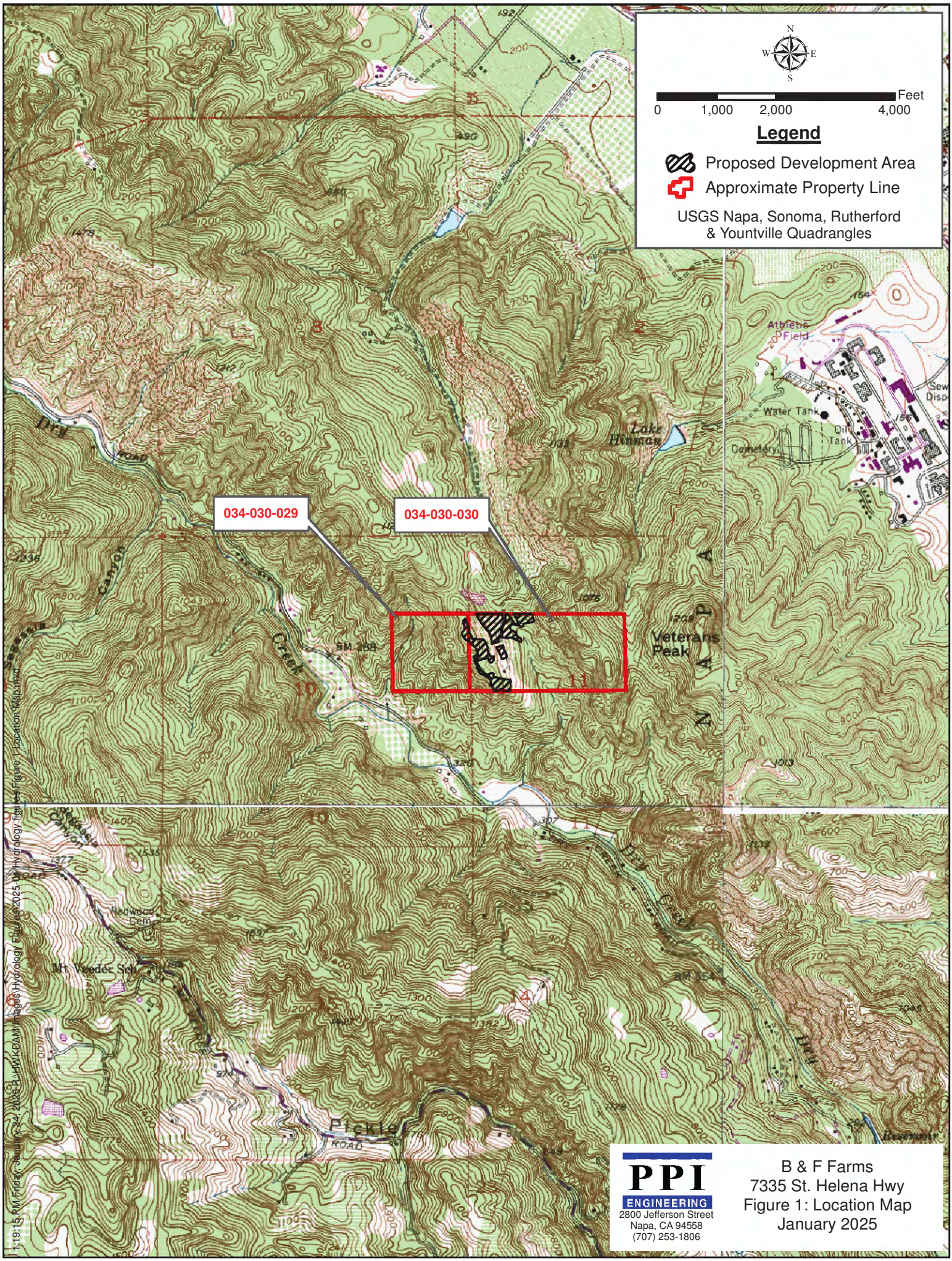
Subareas 1-4 saw no change in CN as a part of the Curve Number Analysis and therefore no net changes in runoff are anticipated.

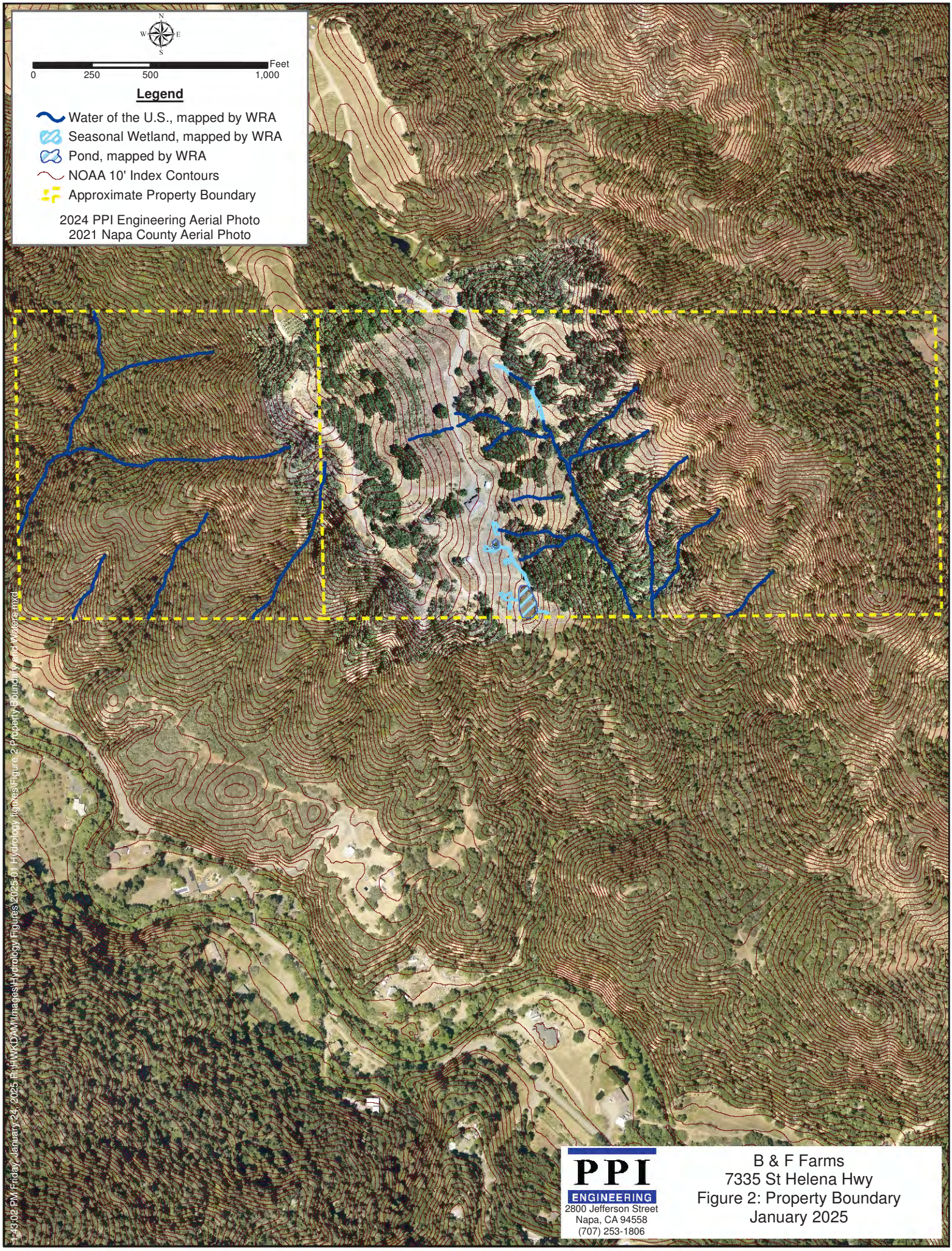
Please see the attached HydroCAD analyses for inputs, details, and summaries of the hydrologic modeling. Based on our analysis, there are no predicted overall net runoff increases, and no negative hydrologic impacts are expected as a result of this project. The project as proposed is in compliance with Napa County's General Plan policy requiring no-net-increase in runoff.



ATTACHMENT A

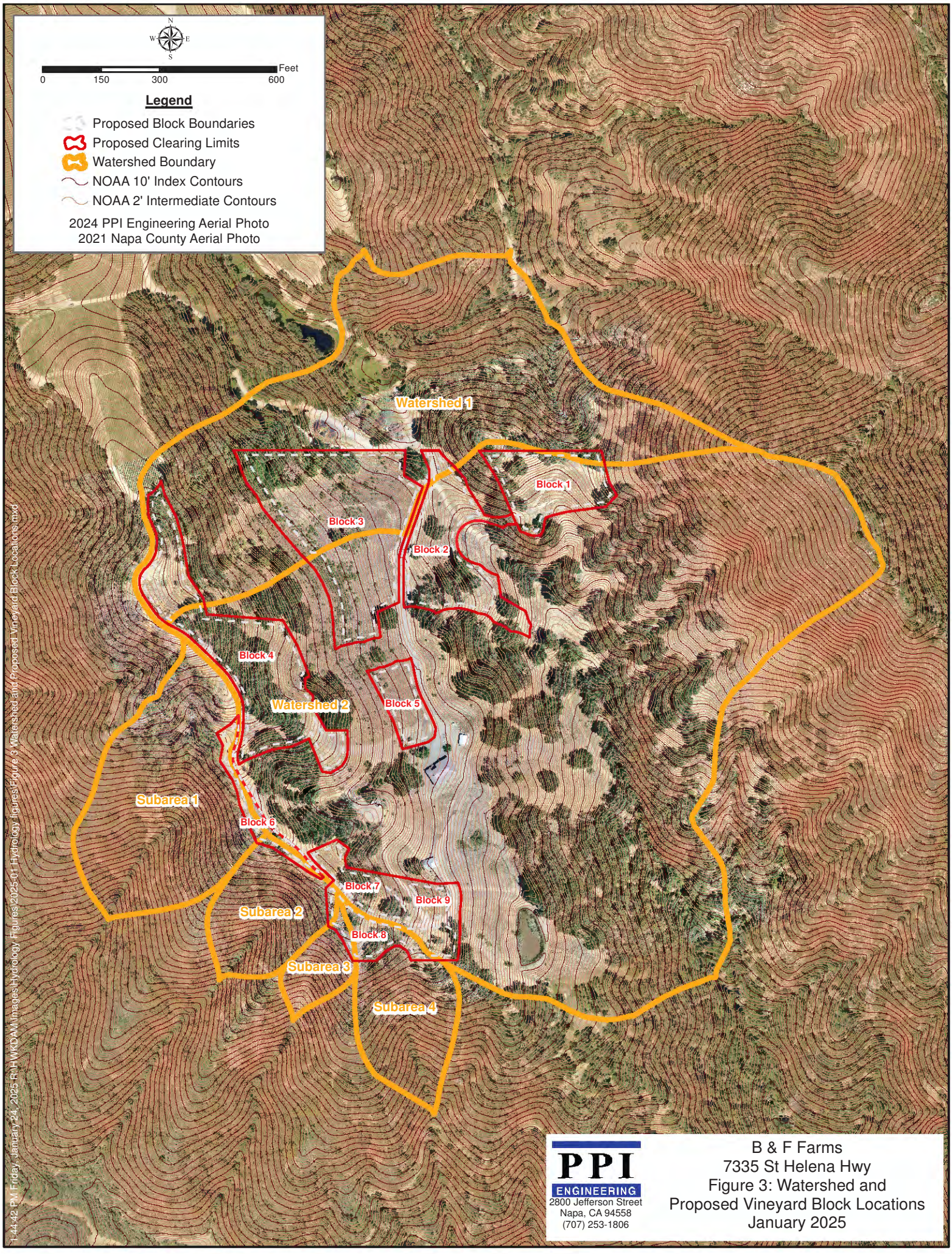
SUPPORTING FIGURES

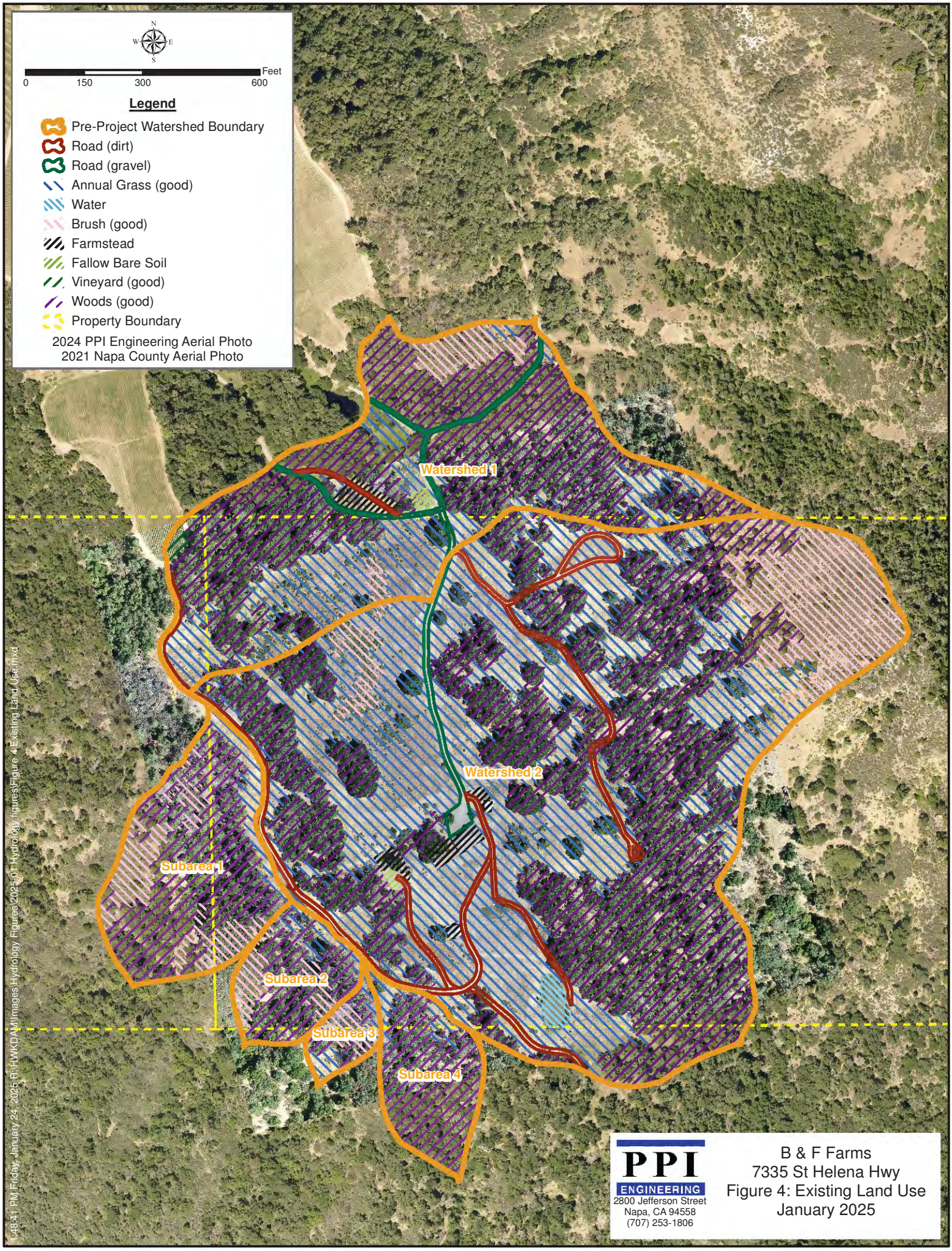

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Proposed Development Area
Approximate Property Line
USGS Napa, Sonoma, Rutherford
& Yountville Quadrangles
034-030-029
034-030-030
Veterans Peak
Lake Hennessey
Dry Creek
Canyon
Athletic Field
Water Tank
Oil Tank
Cemetery
Redwood Cem
Mt Veeder Sch
Pickle
ROAD
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(707) 253-1806
B & F Farms
7335 St. Helena Hwy
Figure 1: Location Map
January 2025
1:19:13 PM Friday, January 24, 2025 J:\HWK\DAM\Images\Hydrology Figures\2025 01 Hydrology figures\Figure 1 Location Map.mxd



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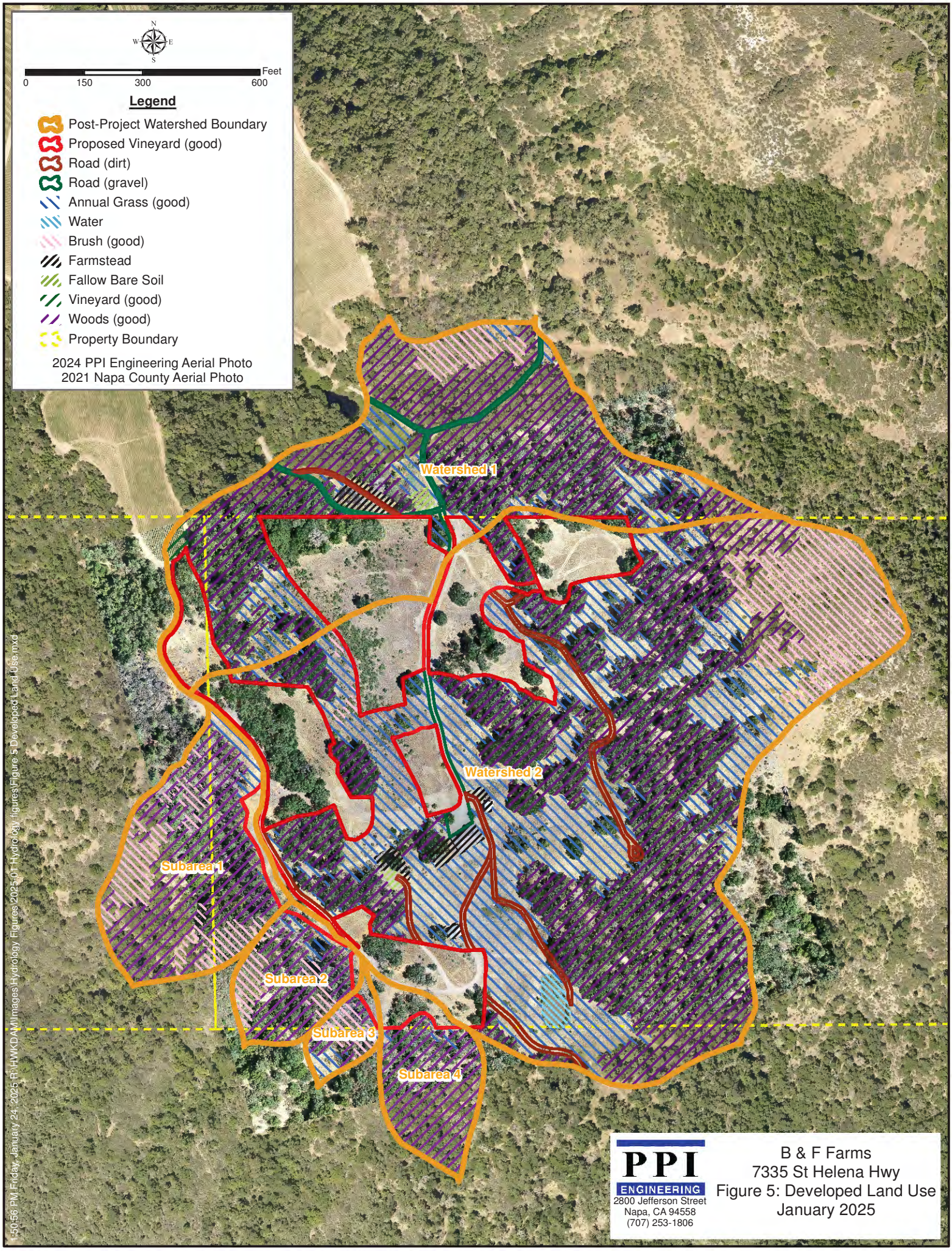
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7335 St Helena Hwy
Figure 2: Property Boundary
January 2025

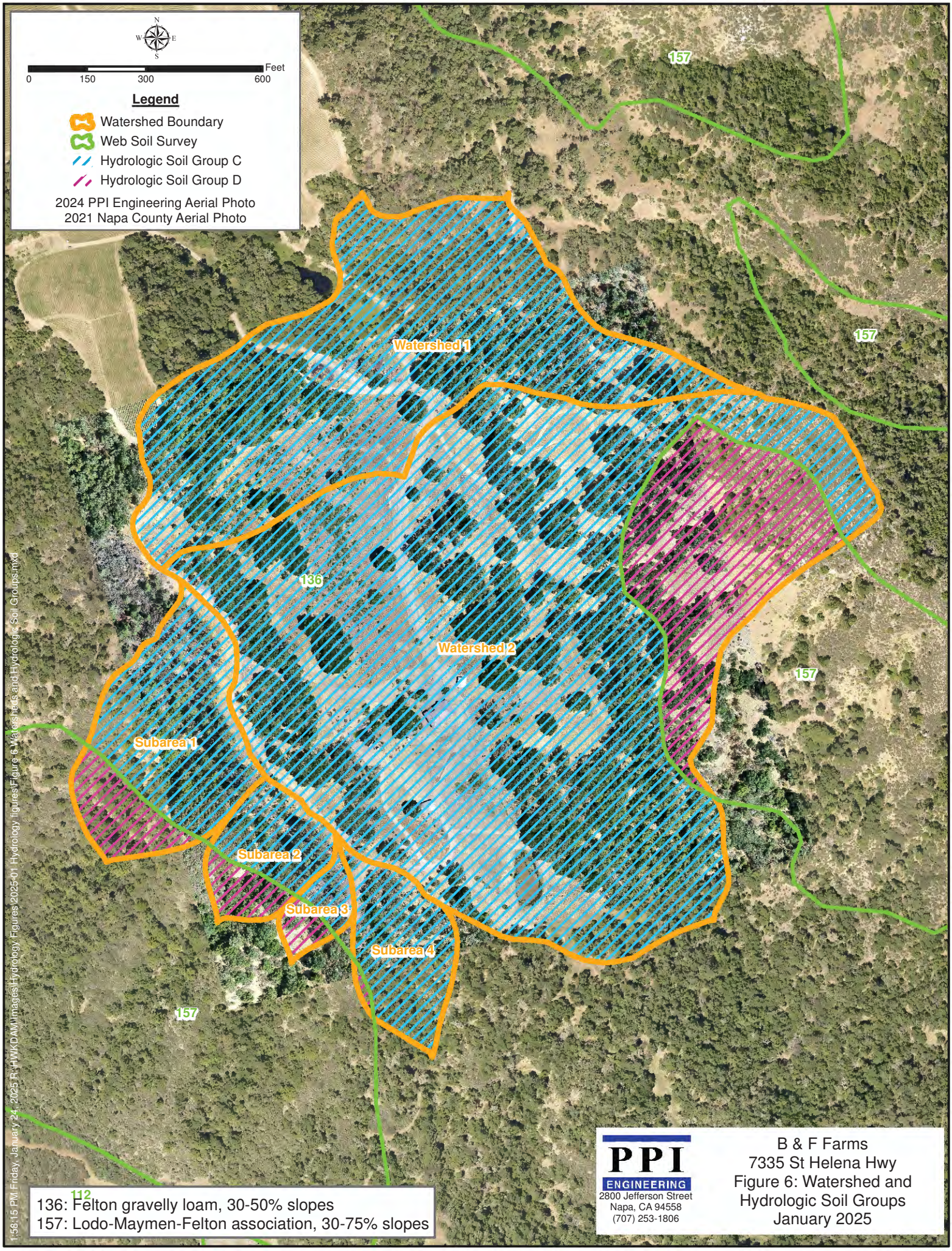

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Proposed Block Boundaries
Proposed Clearing Limits
Watershed Boundary
NOAA 10' Index Contours
NOAA 2' Intermediate Contours
2024 PPI Engineering Aerial Photo
2021 Napa County Aerial Photo
Watershed 1
Block 1
Block 2
Block 3
Block 4
Block 5
Block 6
Block 7
Block 8
Block 9
Watershed 2
Subarea 1
Subarea 2
Subarea 3
Subarea 4
1:4442 PM Friday, January 24, 2025 R:\HWKDA\Images\Hydrology_Figures\2025-01_Hydrology_figures\Figure 3 Watershed and Proposed Vineyard Block Locations.mxd
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Figure 3: Watershed and
Proposed Vineyard Block Locations
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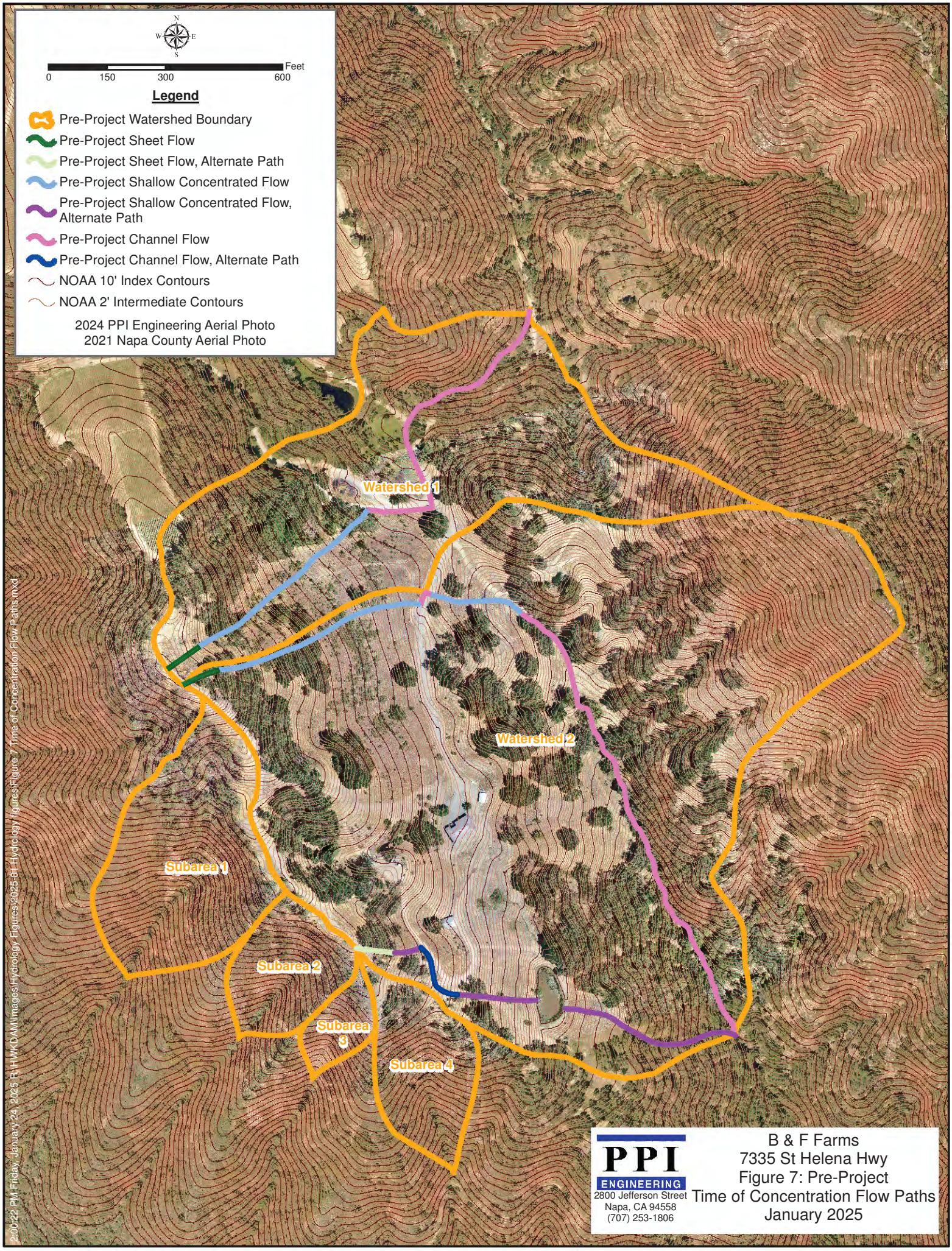
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Figure 4: Existing Land Use
January 2025


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Feet
Legend
Post-Project Watershed Boundary
Proposed Vineyard (good)
Road (dirt)
Road (gravel)
Annual Grass (good)
Water
Brush (good)
Farmstead
Fallow Bare Soil
Vineyard (good)
Woods (good)
Property Boundary
2024 PPI Engineering Aerial Photo
2021 Napa County Aerial Photo
Watershed 1
Watershed 2
Subarea 1
Subarea 2
Subarea 3
Subarea 4
1:50:56 PM, Friday, January 24, 2025 R:\HWK\DATA\Images\Hydrology Figures\2025-01 Hydrology figures\Figure 5 Developed Land Use.mxd
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Figure 5: Developed Land Use
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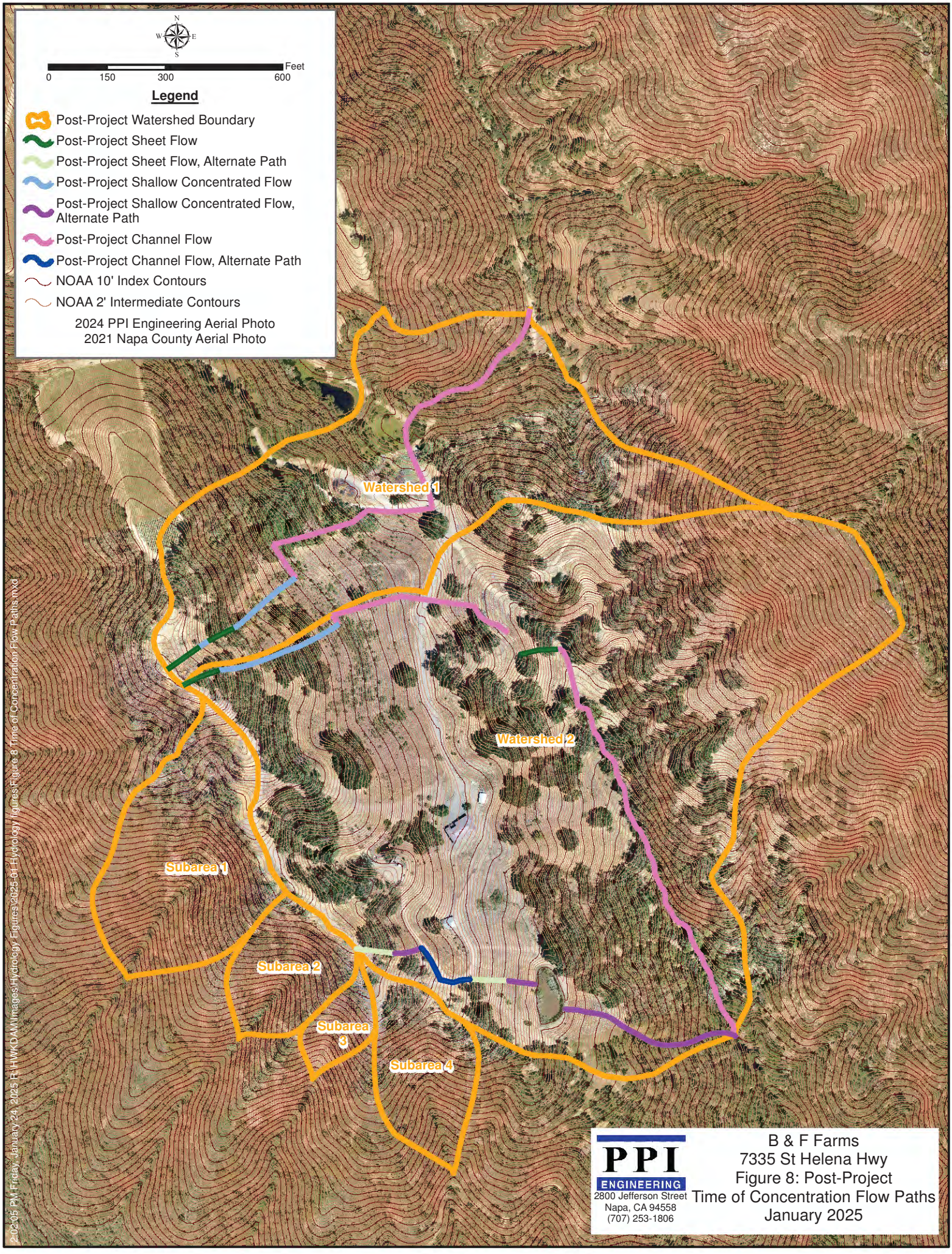
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Figure 6: Watershed and Hydrologic Soil Groups
January 2025



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Figure 7: Pre-Project
Time of Concentration Flow Paths
January 2025

2-0022 PM Friday, January 24, 2025 R:\HWK\DAM\Images\Hydrology\Figures\2025-01-Hydrology\Figures\Figure 7 Time of Concentration Flow Paths.mxd



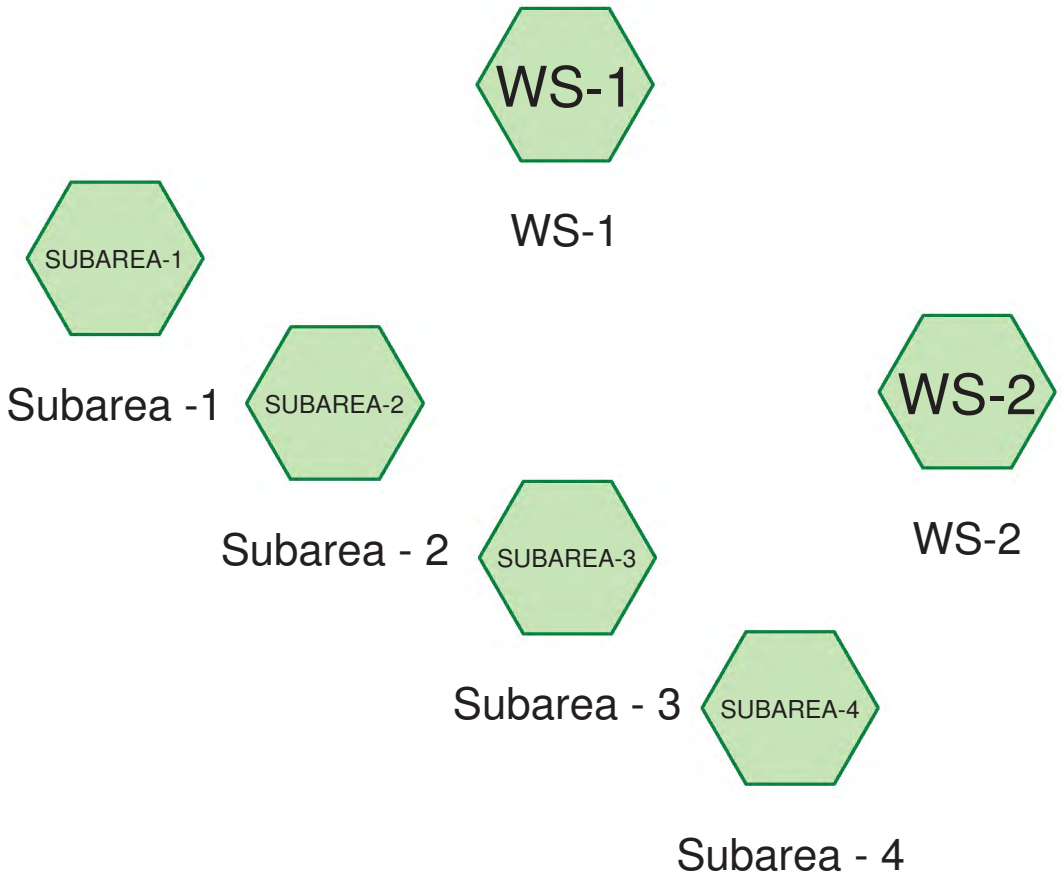
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Figure 8: Post-Project
Time of Concentration Flow Paths
January 2025

P:\02205 PM Friday, January 24, 2025 R:\HWR\DAM\Images\Hydrology\Figures\2025-01-Hydrology\Figures\Figure 8 Time of Concentration Flow Paths.mxd

ATTACHMENT B

HYDROCAD ANALYSES



Subcat Reach Pond Link

Routing Diagram for Pre-Project
Prepared by PPI Engineering, Printed 1/29/2025
HydroCAD® 10.20-5c s/n 09429 © 2023 HydroCAD Software Solutions LLC

Summary for Subcatchment SUBAREA-1: Subarea -1

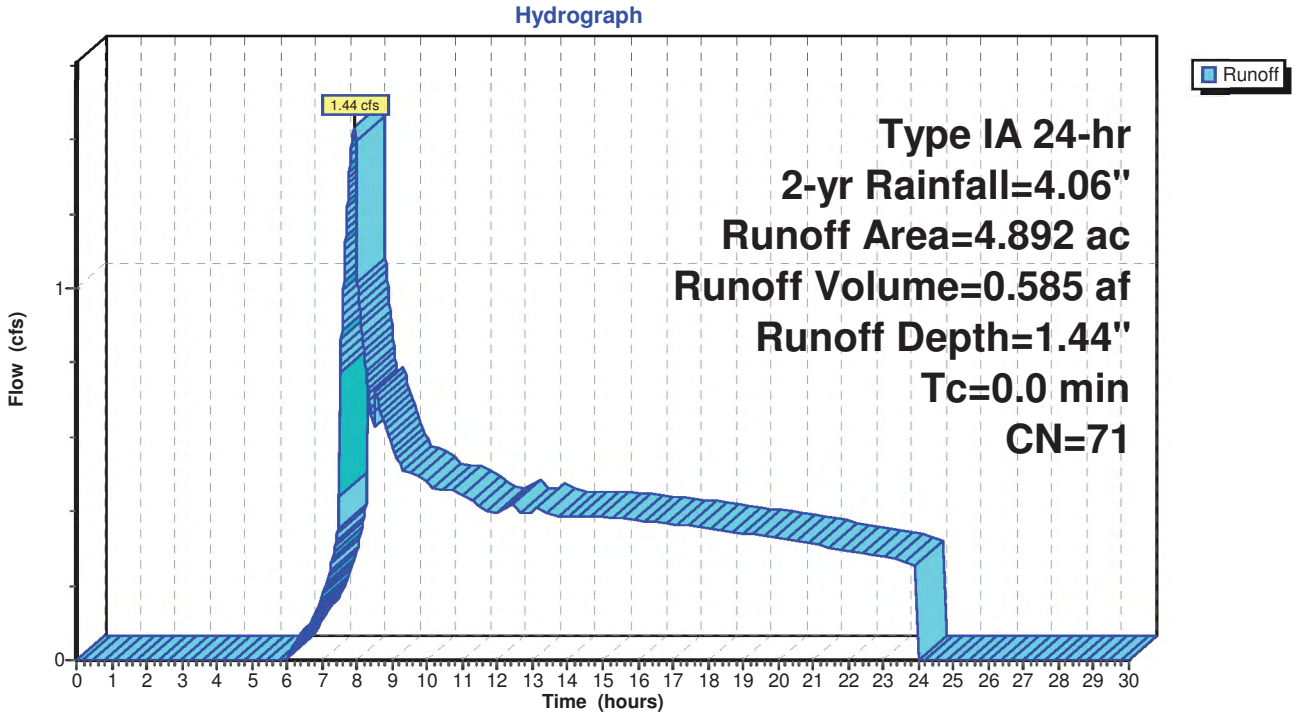
[46] Hint: Tc=0 (Instant runoff peak depends on dt)

Runoff = 1.44 cfs @ 7.94 hrs, Volume= 0.585 af, Depth= 1.44"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.01 hrs
Type IA 24-hr 2-yr Rainfall=4.06"

Area (ac)	CN	Description
0.450	75	Annual Grass, Good, HSG C
0.827	65	Brush, Good, HSG C
0.288	73	Brush, Good, HSG D
2.522	70	Woods, Good, HSG C
0.804	77	Woods, Good, HSG D
4.892	71	Weighted Average
4.892		100.00% Pervious Area

Subcatchment SUBAREA-1: Subarea -1



Summary for Subcatchment SUBAREA-2: Subarea - 2

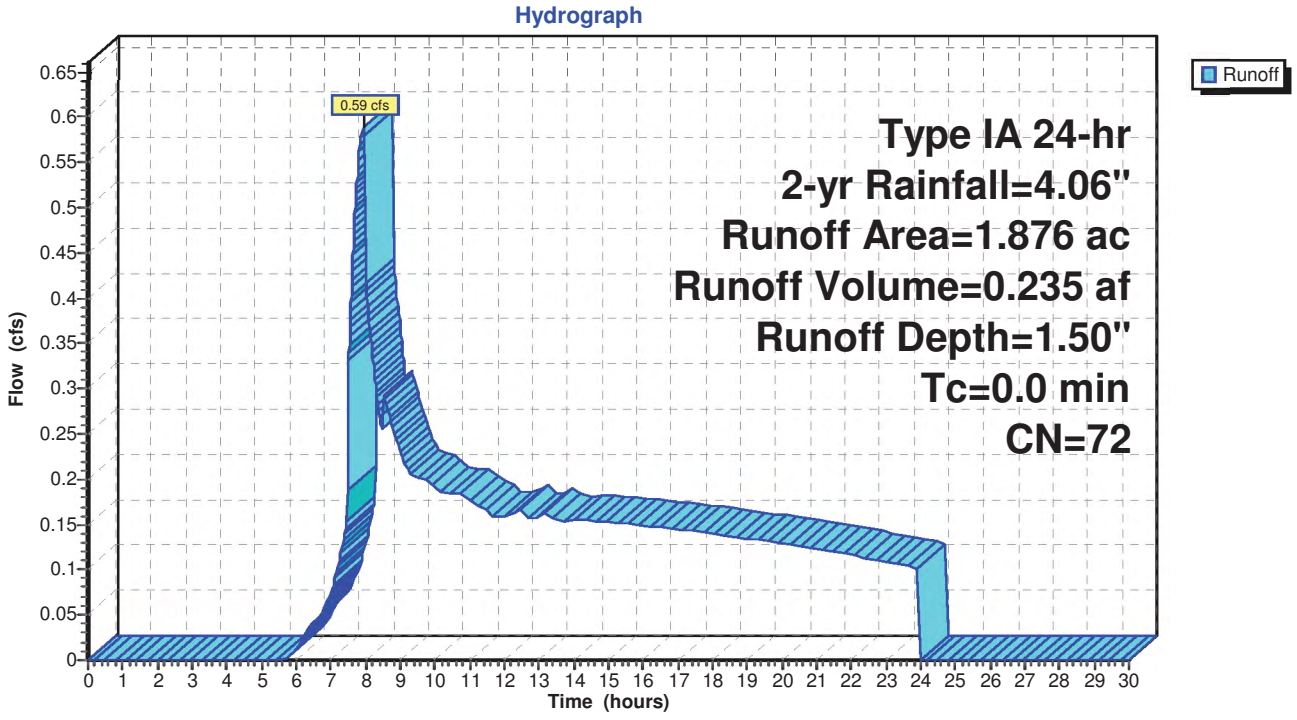
[46] Hint: Tc=0 (Instant runoff peak depends on dt)

Runoff = 0.59 cfs @ 7.94 hrs, Volume= 0.235 af, Depth= 1.50"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.01 hrs
Type IA 24-hr 2-yr Rainfall=4.06"

Area (ac)	CN	Description
0.239	75	Annual Grass, Good, HSG C
0.289	65	Brush, Good, HSG C
0.175	73	Brush, Good, HSG D
0.761	70	Woods, Good, HSG C
0.412	77	Woods, Good, HSG D
1.876	72	Weighted Average
1.876		100.00% Pervious Area

Subcatchment SUBAREA-2: Subarea - 2



Summary for Subcatchment SUBAREA-3: Subarea - 3

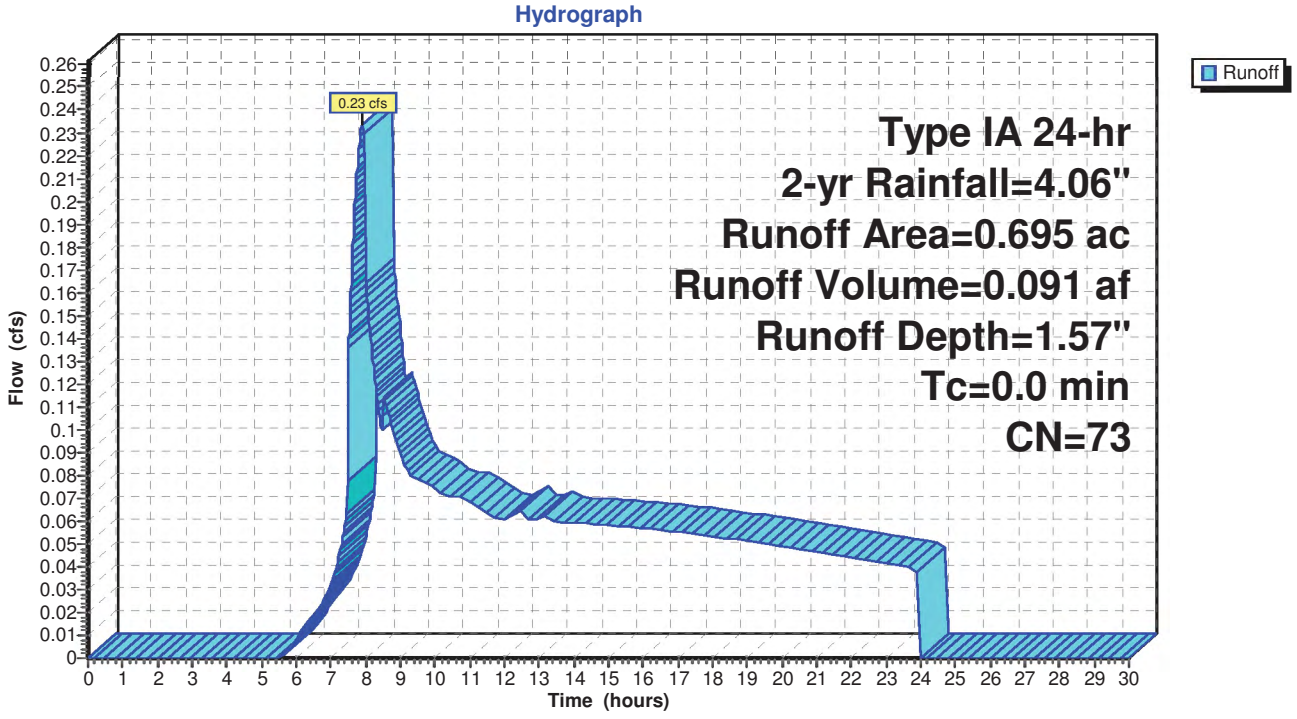
[46] Hint: Tc=0 (Instant runoff peak depends on dt)

Runoff = 0.23 cfs @ 7.93 hrs, Volume= 0.091 af, Depth= 1.57"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.01 hrs
Type IA 24-hr 2-yr Rainfall=4.06"

Area (ac)	CN	Description
0.103	75	Annual Grass, Good, HSG C
0.130	81	Annual Grass, Good, HSG D
0.212	65	Brush, Good, HSG C
0.077	73	Brush, Good, HSG D
0.072	70	Woods, Good, HSG C
0.101	77	Woods, Good, HSG D
0.695	73	Weighted Average
0.695		100.00% Pervious Area

Subcatchment SUBAREA-3: Subarea - 3



Summary for Subcatchment SUBAREA-4: Subarea - 4

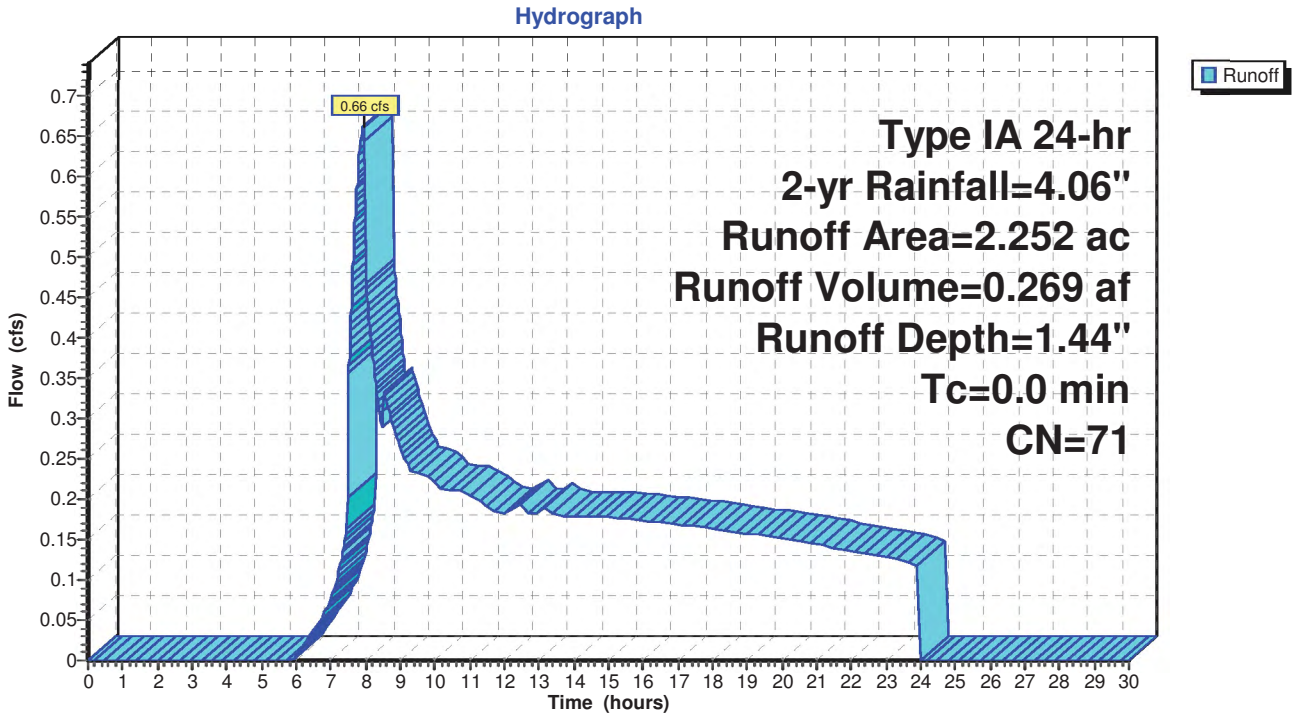
[46] Hint: Tc=0 (Instant runoff peak depends on dt)

Runoff = 0.66 cfs @ 7.94 hrs, Volume= 0.269 af, Depth= 1.44"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.01 hrs
Type IA 24-hr 2-yr Rainfall=4.06"

Area (ac)	CN	Description
0.311	75	Annual Grass, Good, HSG C
1.878	70	Woods, Good, HSG C
0.063	77	Woods, Good, HSG D
2.252	71	Weighted Average
2.252		100.00% Pervious Area

Subcatchment SUBAREA-4: Subarea - 4



Summary for Subcatchment WS-1: WS-1

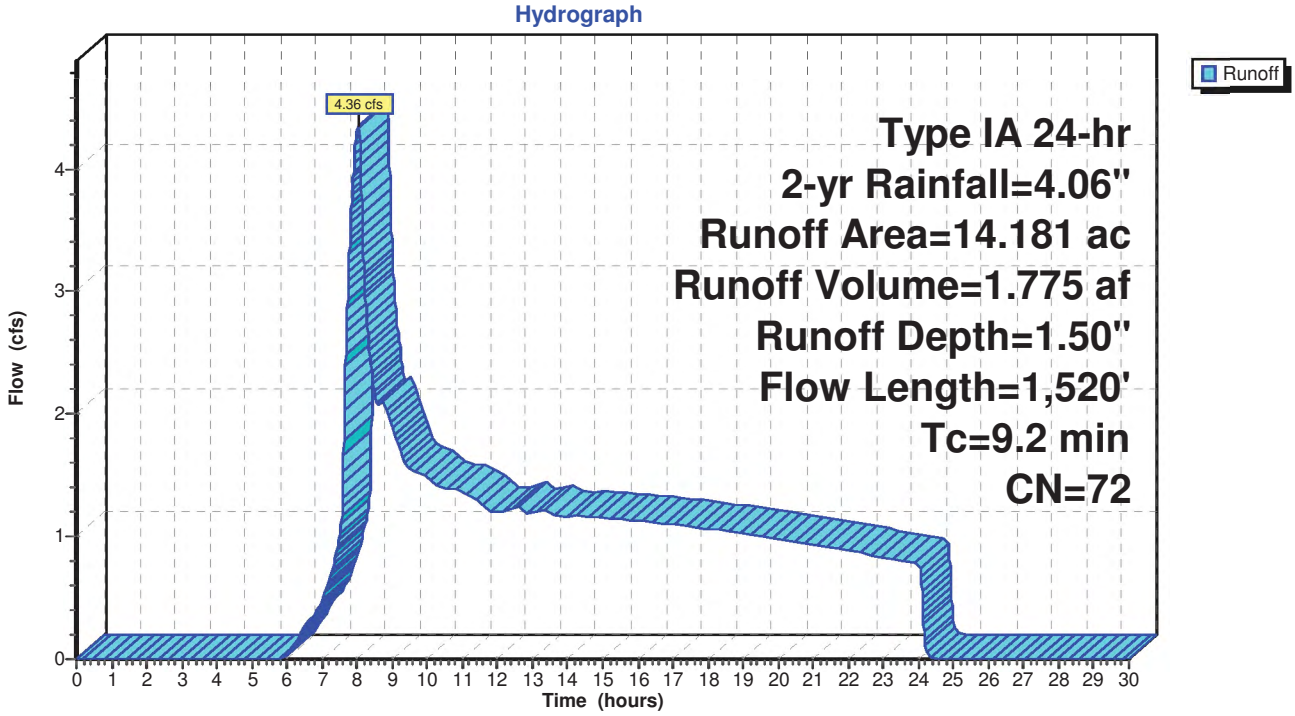
Runoff = 4.36 cfs @ 8.03 hrs, Volume= 1.775 af, Depth= 1.50"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.01 hrs
Type IA 24-hr 2-yr Rainfall=4.06"

Area (ac)	CN	Description
3.789	75	Annual Grass, Good, HSG C
0.671	65	Brush, Good, HSG C
0.149	87	Dirt roads, HSG C
0.069	91	Fallow, bare soil, HSG C
0.202	82	Farmsteads, HSG C
0.277	89	Gravel Roads, HSG C
0.095	75	Vineyard, Good, HSG C
8.929	70	Woods, Good, HSG C
14.181	72	Weighted Average
14.181		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.0	100	0.2000	0.33		**Sheet Flow, Sheet** Grass: Dense n= 0.240 P2= 4.06"
0.1	28	0.2800	3.70		**Shallow Concentrated Flow, Sheet - Short Grass** Short Grass Pasture Kv= 7.0 fps
1.0	178	0.3800	3.08		**Shallow Concentrated Flow, Shallow - Woodland** Woodland Kv= 5.0 fps
1.2	267	0.3000	3.83		**Shallow Concentrated Flow, Shallow - Short Grass** Short Grass Pasture Kv= 7.0 fps
0.6	88	0.2800	2.65		**Shallow Concentrated Flow, Shallow - Woodland** Woodland Kv= 5.0 fps
0.1	44	0.0700	6.57	13.14	**Trap/Vee/Rect Channel Flow, Ditch** Bot.W=0.00' D=1.00' Z= 2.0 '/' Top.W=4.00' n= 0.035
0.1	124	0.1000	18.65	14.65	**Pipe Channel, 12" DW Pipe** 12.0" Round Area= 0.8 sf Perim= 3.1' r= 0.25' n= 0.010 PPI Dual Walled CPP
0.0	37	0.1100	19.56	15.36	**Pipe Channel, 12" DW Pipe** 12.0" Round Area= 0.8 sf Perim= 3.1' r= 0.25' n= 0.010 PPI Dual Walled CPP
0.3	183	0.1300	8.95	17.90	**Trap/Vee/Rect Channel Flow, Ditch** Bot.W=0.00' D=1.00' Z= 2.0 '/' Top.W=4.00' n= 0.035
0.8	471	0.1200	9.85	29.56	**Trap/Vee/Rect Channel Flow, Stream** Bot.W=1.00' D=1.00' Z= 2.0 '/' Top.W=5.00' n= 0.035
9.2	1,520	Total			

Subcatchment WS-1: WS-1



Summary for Subcatchment WS-2: WS-2

[47] Hint: Peak is 107% of capacity of segment #5

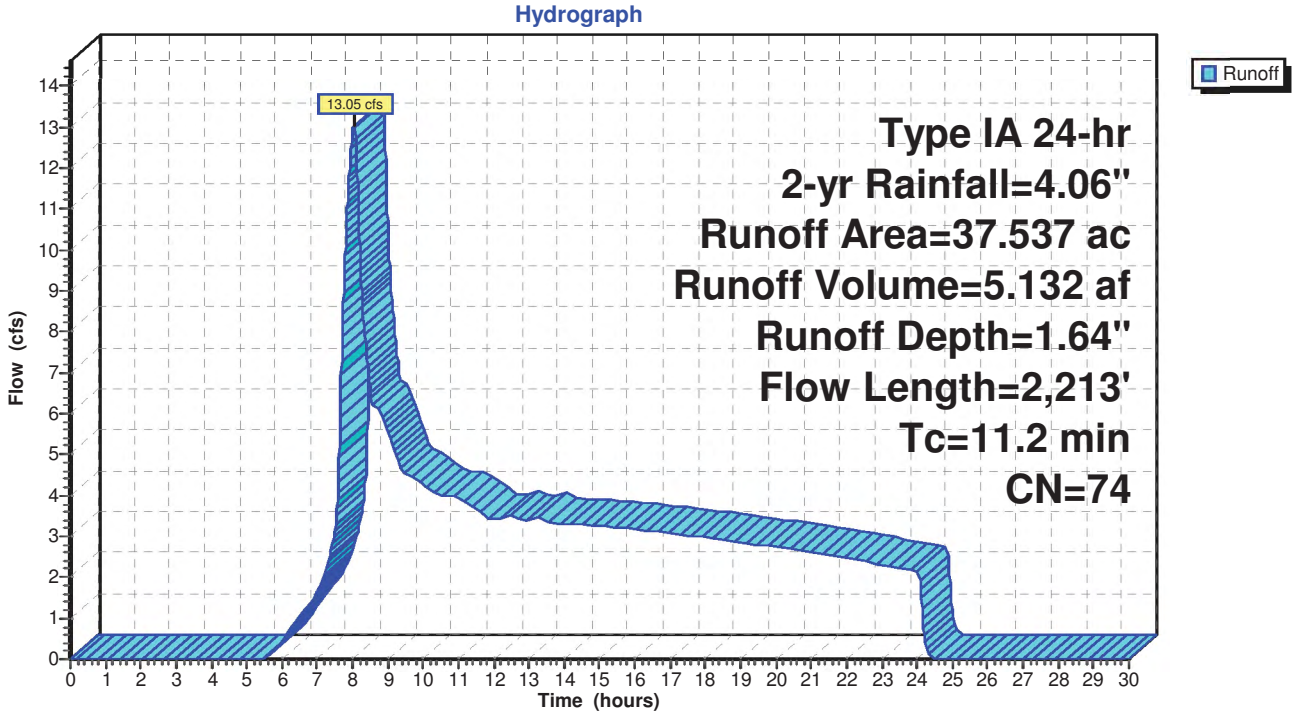
Runoff = 13.05 cfs @ 8.05 hrs, Volume= 5.132 af, Depth= 1.64"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.01 hrs
Type IA 24-hr 2-yr Rainfall=4.06"

Area (ac)	CN	Description
13.802	75	Annual Grass, Good, HSG C
1.871	81	Annual Grass, Good, HSG D
1.679	65	Brush, Good, HSG C
1.478	73	Brush, Good, HSG D
1.118	87	Dirt roads, HSG C
0.039	91	Fallow, bare soil, HSG C
0.369	82	Farmsteads, HSG C
0.270	89	Gravel Roads, HSG C
0.196	98	Water Surface, HSG C
14.267	70	Woods, Good, HSG C
2.448	77	Woods, Good, HSG D
37.537	74	Weighted Average
37.341		99.48% Pervious Area
0.196		0.52% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.3	100	0.1800	0.32		**Sheet Flow, Sheet** Grass: Dense n= 0.240 P2= 4.06"
0.4	104	0.3200	3.96		**Shallow Concentrated Flow, Shallow - Short Grass** Short Grass Pasture Kv= 7.0 fps
0.8	155	0.3700	3.04		**Shallow Concentrated Flow, Shallow - Woodland** Woodland Kv= 5.0 fps
1.3	292	0.2800	3.70		**Shallow Concentrated Flow, Shallow - Short Grass** Short Grass Pasture Kv= 7.0 fps
0.1	34	0.0600	6.08	12.16	**Trap/Vee/Rect Channel Flow, Ditch** Bot.W=0.00' D=1.00' Z= 2.0 '/' Top.W=4.00' n= 0.035
0.0	19	0.1600	23.59	18.53	**Pipe Channel, 12" DW Culvert** 12.0" Round Area= 0.8 sf Perim= 3.1' r= 0.25' n= 0.010
1.3	243	0.2000	3.13		**Shallow Concentrated Flow, Shallow - Short Grass** Short Grass Pasture Kv= 7.0 fps
0.5	333	0.1100	10.27	71.86	**Trap/Vee/Rect Channel Flow, Swale (assumed)** Bot.W=3.00' D=1.00' Z= 4.0 '/' Top.W=11.00' n= 0.035
1.5	933	0.1400	10.64	31.92	**Trap/Vee/Rect Channel Flow, Stream (assumed)** Bot.W=1.00' D=1.00' Z= 2.0 '/' Top.W=5.00' n= 0.035
11.2	2,213	Total			

Subcatchment WS-2: WS-2



Summary for Subcatchment SUBAREA-1: Subarea -1

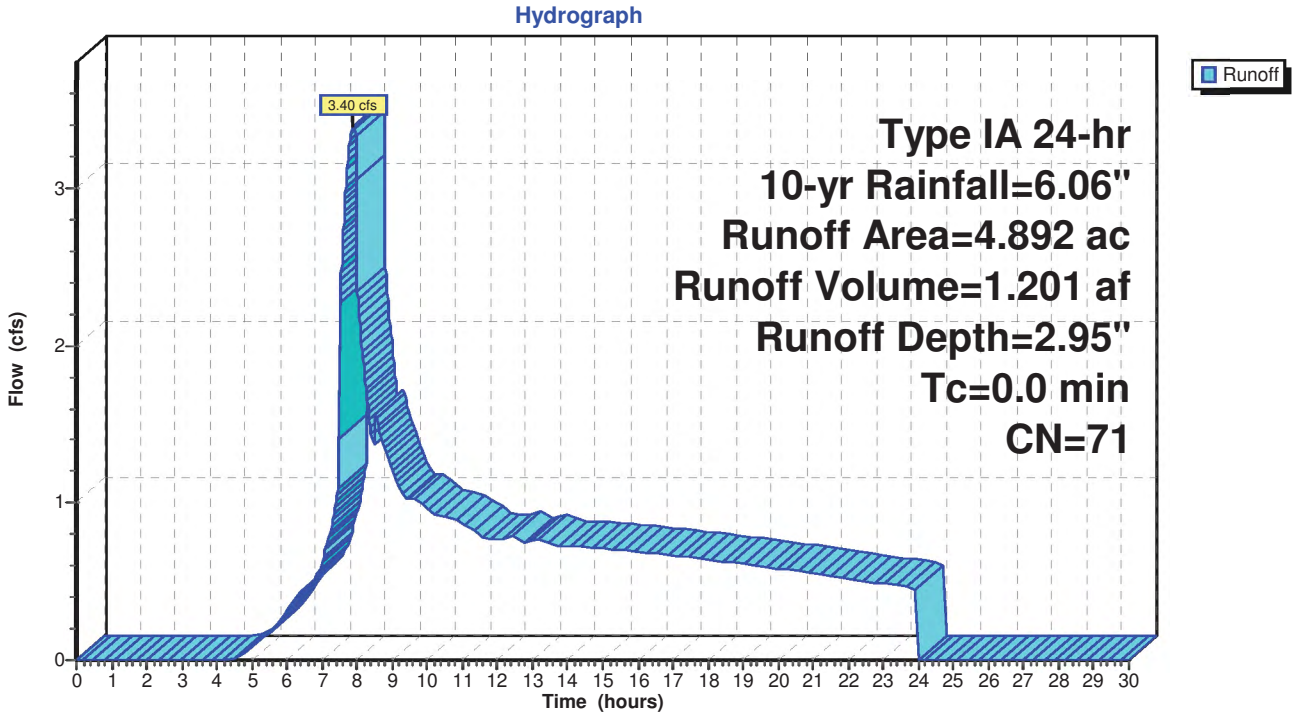
[46] Hint: Tc=0 (Instant runoff peak depends on dt)

Runoff = 3.40 cfs @ 7.89 hrs, Volume= 1.201 af, Depth= 2.95"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.01 hrs
Type IA 24-hr 10-yr Rainfall=6.06"

Area (ac)	CN	Description
0.450	75	Annual Grass, Good, HSG C
0.827	65	Brush, Good, HSG C
0.288	73	Brush, Good, HSG D
2.522	70	Woods, Good, HSG C
0.804	77	Woods, Good, HSG D
4.892	71	Weighted Average
4.892		100.00% Pervious Area

Subcatchment SUBAREA-1: Subarea -1



Summary for Subcatchment SUBAREA-2: Subarea - 2

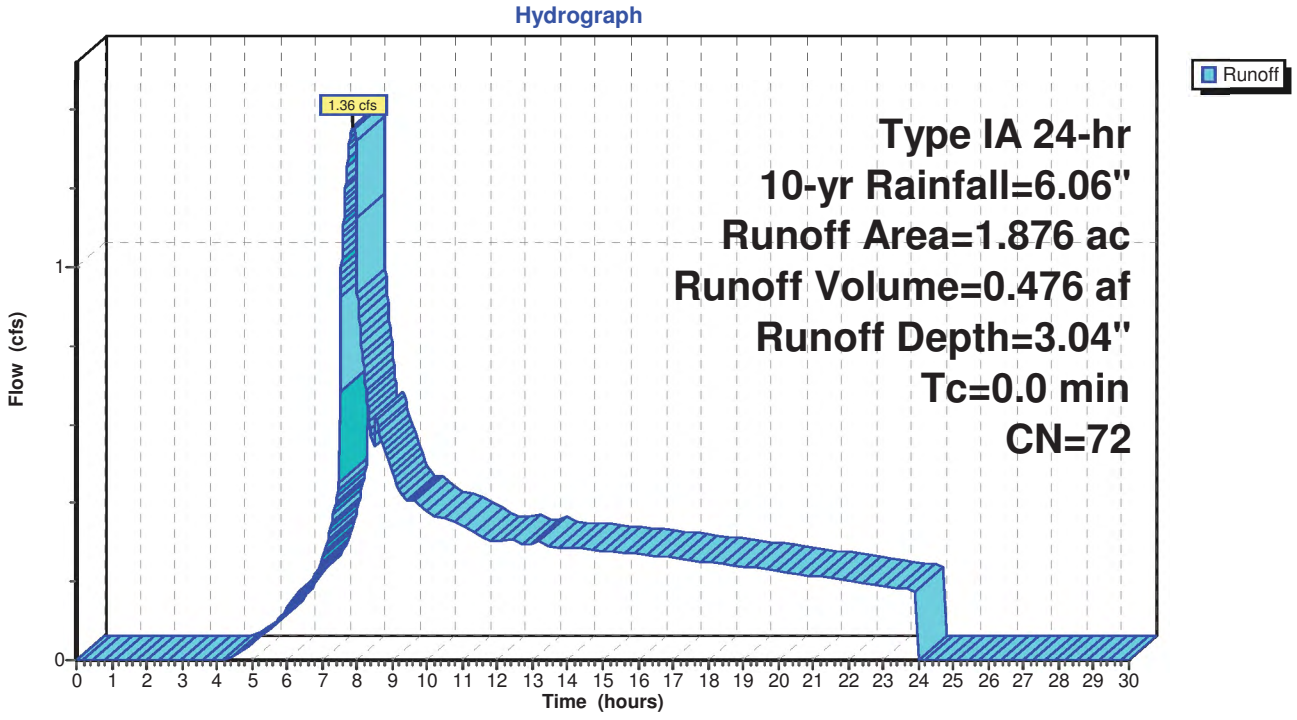
[46] Hint: Tc=0 (Instant runoff peak depends on dt)

Runoff = 1.36 cfs @ 7.89 hrs, Volume= 0.476 af, Depth= 3.04"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.01 hrs
Type IA 24-hr 10-yr Rainfall=6.06"

Area (ac)	CN	Description
0.239	75	Annual Grass, Good, HSG C
0.289	65	Brush, Good, HSG C
0.175	73	Brush, Good, HSG D
0.761	70	Woods, Good, HSG C
0.412	77	Woods, Good, HSG D
1.876	72	Weighted Average
1.876		100.00% Pervious Area

Subcatchment SUBAREA-2: Subarea - 2



Summary for Subcatchment SUBAREA-3: Subarea - 3

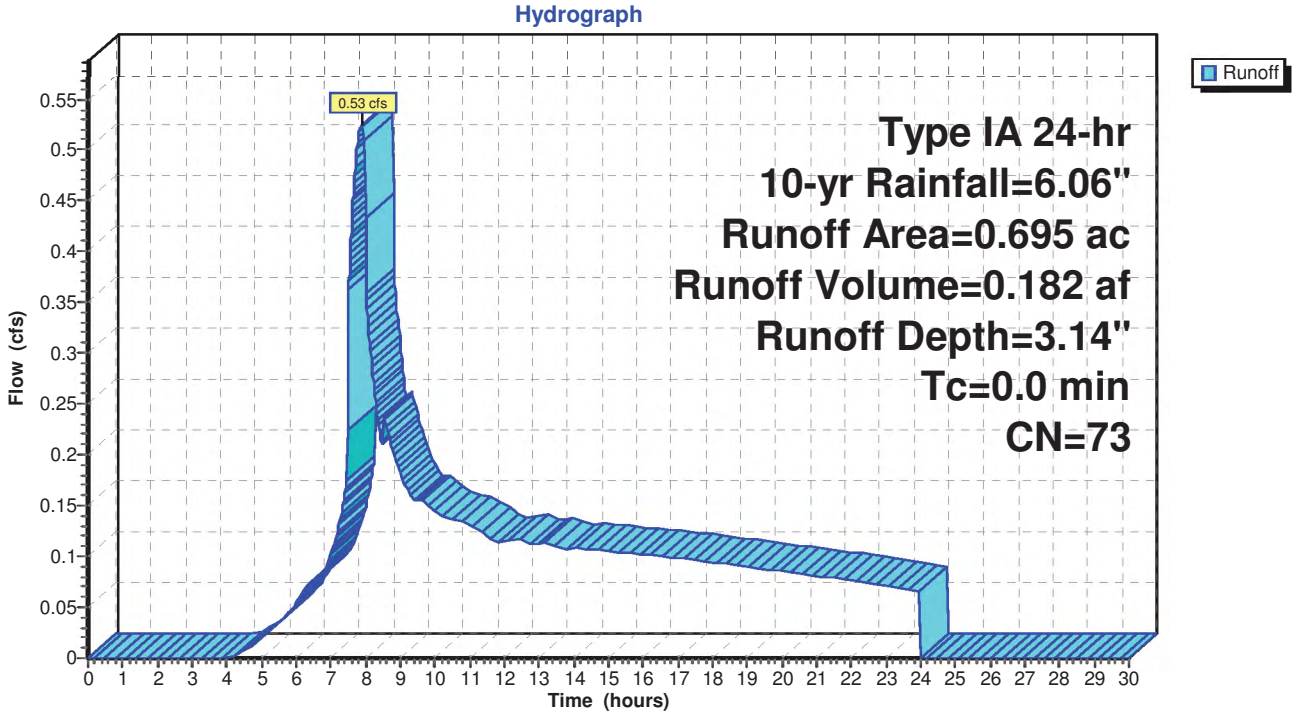
[46] Hint: Tc=0 (Instant runoff peak depends on dt)

Runoff = 0.53 cfs @ 7.88 hrs, Volume= 0.182 af, Depth= 3.14"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.01 hrs
Type IA 24-hr 10-yr Rainfall=6.06"

Area (ac)	CN	Description
0.103	75	Annual Grass, Good, HSG C
0.130	81	Annual Grass, Good, HSG D
0.212	65	Brush, Good, HSG C
0.077	73	Brush, Good, HSG D
0.072	70	Woods, Good, HSG C
0.101	77	Woods, Good, HSG D
0.695	73	Weighted Average
0.695		100.00% Pervious Area

Subcatchment SUBAREA-3: Subarea - 3



Summary for Subcatchment SUBAREA-4: Subarea - 4

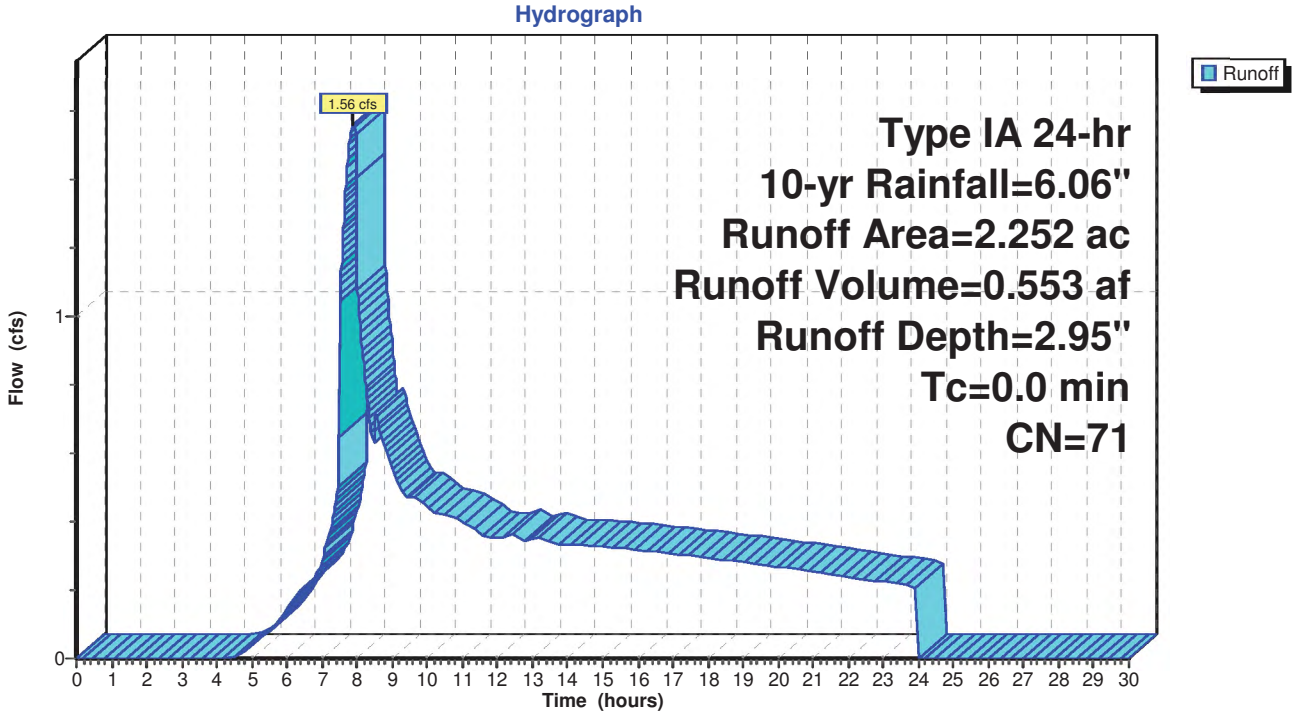
[46] Hint: Tc=0 (Instant runoff peak depends on dt)

Runoff = 1.56 cfs @ 7.89 hrs, Volume= 0.553 af, Depth= 2.95"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.01 hrs
Type IA 24-hr 10-yr Rainfall=6.06"

Area (ac)	CN	Description
0.311	75	Annual Grass, Good, HSG C
1.878	70	Woods, Good, HSG C
0.063	77	Woods, Good, HSG D
2.252	71	Weighted Average
2.252		100.00% Pervious Area

Subcatchment SUBAREA-4: Subarea - 4



Summary for Subcatchment WS-1: WS-1

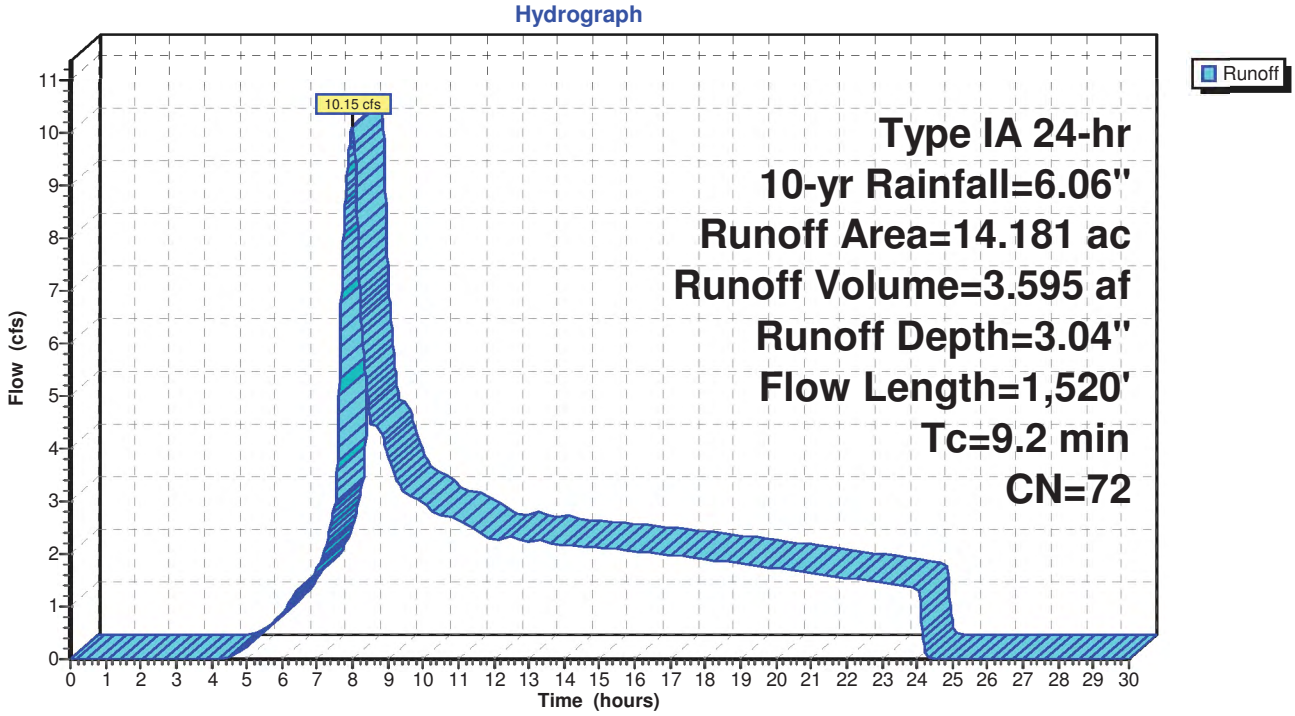
Runoff = 10.15 cfs @ 8.02 hrs, Volume= 3.595 af, Depth= 3.04"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.01 hrs
Type IA 24-hr 10-yr Rainfall=6.06"

Area (ac)	CN	Description
3.789	75	Annual Grass, Good, HSG C
0.671	65	Brush, Good, HSG C
0.149	87	Dirt roads, HSG C
0.069	91	Fallow, bare soil, HSG C
0.202	82	Farmsteads, HSG C
0.277	89	Gravel Roads, HSG C
0.095	75	Vineyard, Good, HSG C
8.929	70	Woods, Good, HSG C
14.181	72	Weighted Average
14.181		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.0	100	0.2000	0.33		**Sheet Flow, Sheet** Grass: Dense n= 0.240 P2= 4.06"
0.1	28	0.2800	3.70		**Shallow Concentrated Flow, Sheet - Short Grass** Short Grass Pasture Kv= 7.0 fps
1.0	178	0.3800	3.08		**Shallow Concentrated Flow, Shallow - Woodland** Woodland Kv= 5.0 fps
1.2	267	0.3000	3.83		**Shallow Concentrated Flow, Shallow - Short Grass** Short Grass Pasture Kv= 7.0 fps
0.6	88	0.2800	2.65		**Shallow Concentrated Flow, Shallow - Woodland** Woodland Kv= 5.0 fps
0.1	44	0.0700	6.57	13.14	**Trap/Vee/Rect Channel Flow, Ditch** Bot.W=0.00' D=1.00' Z= 2.0 '/' Top.W=4.00' n= 0.035
0.1	124	0.1000	18.65	14.65	**Pipe Channel, 12" DW Pipe** 12.0" Round Area= 0.8 sf Perim= 3.1' r= 0.25' n= 0.010 PPI Dual Walled CPP
0.0	37	0.1100	19.56	15.36	**Pipe Channel, 12" DW Pipe** 12.0" Round Area= 0.8 sf Perim= 3.1' r= 0.25' n= 0.010 PPI Dual Walled CPP
0.3	183	0.1300	8.95	17.90	**Trap/Vee/Rect Channel Flow, Ditch** Bot.W=0.00' D=1.00' Z= 2.0 '/' Top.W=4.00' n= 0.035
0.8	471	0.1200	9.85	29.56	**Trap/Vee/Rect Channel Flow, Stream** Bot.W=1.00' D=1.00' Z= 2.0 '/' Top.W=5.00' n= 0.035
9.2	1,520	Total			

Subcatchment WS-1: WS-1



Summary for Subcatchment WS-2: WS-2

[47] Hint: Peak is 238% of capacity of segment #5
[47] Hint: Peak is 156% of capacity of segment #6

Runoff = 28.97 cfs @ 8.03 hrs, Volume= 10.121 af, Depth= 3.24"

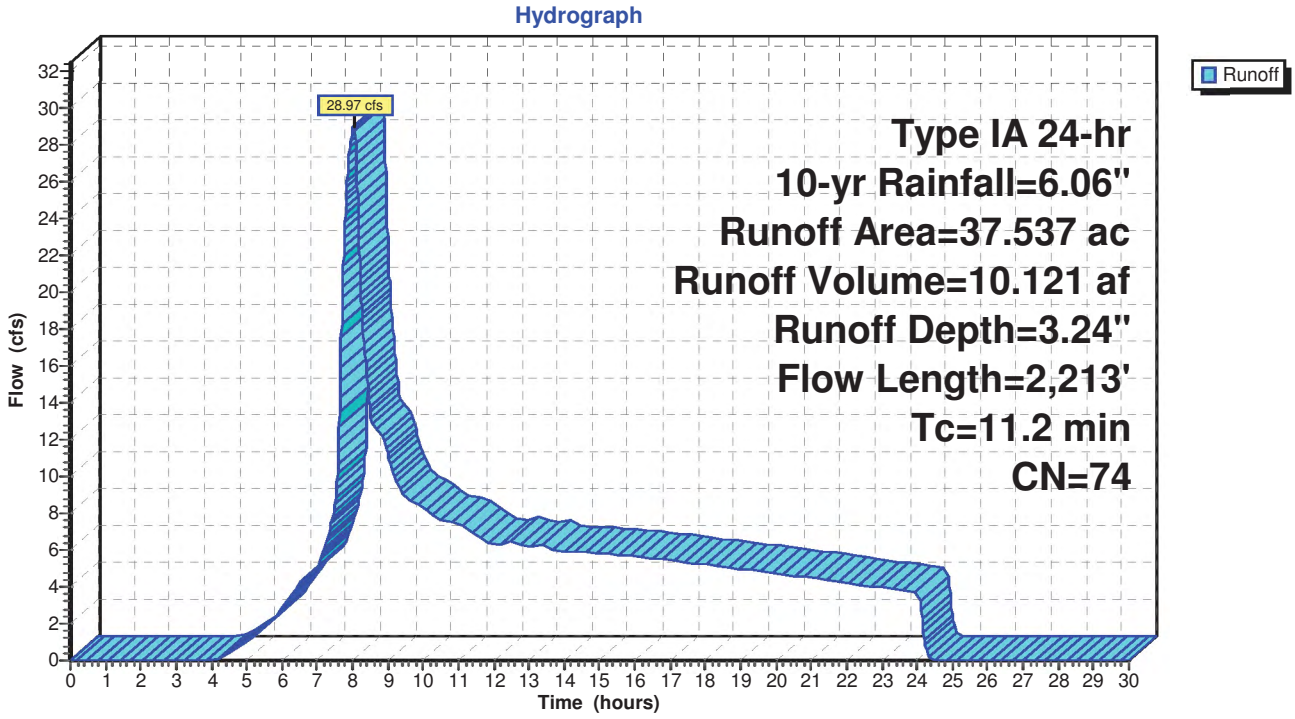
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.01 hrs
Type IA 24-hr 10-yr Rainfall=6.06"

Area (ac)	CN	Description
13.802	75	Annual Grass, Good, HSG C
1.871	81	Annual Grass, Good, HSG D
1.679	65	Brush, Good, HSG C
1.478	73	Brush, Good, HSG D
1.118	87	Dirt roads, HSG C
0.039	91	Fallow, bare soil, HSG C
0.369	82	Farmsteads, HSG C
0.270	89	Gravel Roads, HSG C
0.196	98	Water Surface, HSG C
14.267	70	Woods, Good, HSG C
2.448	77	Woods, Good, HSG D
37.537	74	Weighted Average
37.341		99.48% Pervious Area
0.196		0.52% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.3	100	0.1800	0.32		**Sheet Flow, Sheet** Grass: Dense n= 0.240 P2= 4.06"
0.4	104	0.3200	3.96		**Shallow Concentrated Flow, Shallow - Short Grass** Short Grass Pasture Kv= 7.0 fps
0.8	155	0.3700	3.04		**Shallow Concentrated Flow, Shallow - Woodland** Woodland Kv= 5.0 fps
1.3	292	0.2800	3.70		**Shallow Concentrated Flow, Shallow - Short Grass** Short Grass Pasture Kv= 7.0 fps
0.1	34	0.0600	6.08	12.16	**Trap/Vee/Rect Channel Flow, Ditch** Bot.W=0.00' D=1.00' Z= 2.0 '/' Top.W=4.00' n= 0.035
0.0	19	0.1600	23.59	18.53	**Pipe Channel, 12" DW Culvert** 12.0" Round Area= 0.8 sf Perim= 3.1' r= 0.25' n= 0.010
1.3	243	0.2000	3.13		**Shallow Concentrated Flow, Shallow - Short Grass** Short Grass Pasture Kv= 7.0 fps
0.5	333	0.1100	10.27	71.86	**Trap/Vee/Rect Channel Flow, Swale (assumed)** Bot.W=3.00' D=1.00' Z= 4.0 '/' Top.W=11.00' n= 0.035
1.5	933	0.1400	10.64	31.92	**Trap/Vee/Rect Channel Flow, Stream (assumed)** Bot.W=1.00' D=1.00' Z= 2.0 '/' Top.W=5.00' n= 0.035

11.2	2,213	Total

Subcatchment WS-2: WS-2



Summary for Subcatchment SUBAREA-1: Subarea -1

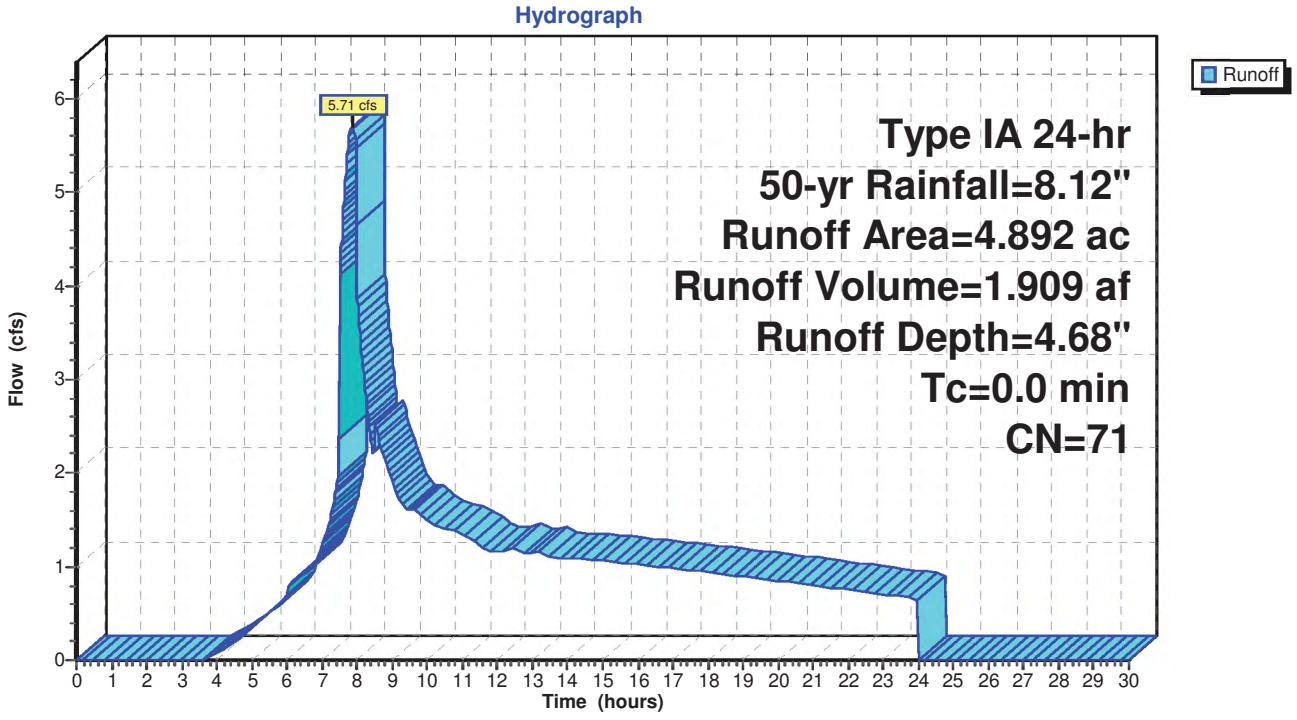
[46] Hint: Tc=0 (Instant runoff peak depends on dt)

Runoff = 5.71 cfs @ 7.86 hrs, Volume= 1.909 af, Depth= 4.68"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.01 hrs
Type IA 24-hr 50-yr Rainfall=8.12"

Area (ac)	CN	Description
0.450	75	Annual Grass, Good, HSG C
0.827	65	Brush, Good, HSG C
0.288	73	Brush, Good, HSG D
2.522	70	Woods, Good, HSG C
0.804	77	Woods, Good, HSG D
4.892	71	Weighted Average
4.892		100.00% Pervious Area

Subcatchment SUBAREA-1: Subarea -1



Summary for Subcatchment SUBAREA-2: Subarea - 2

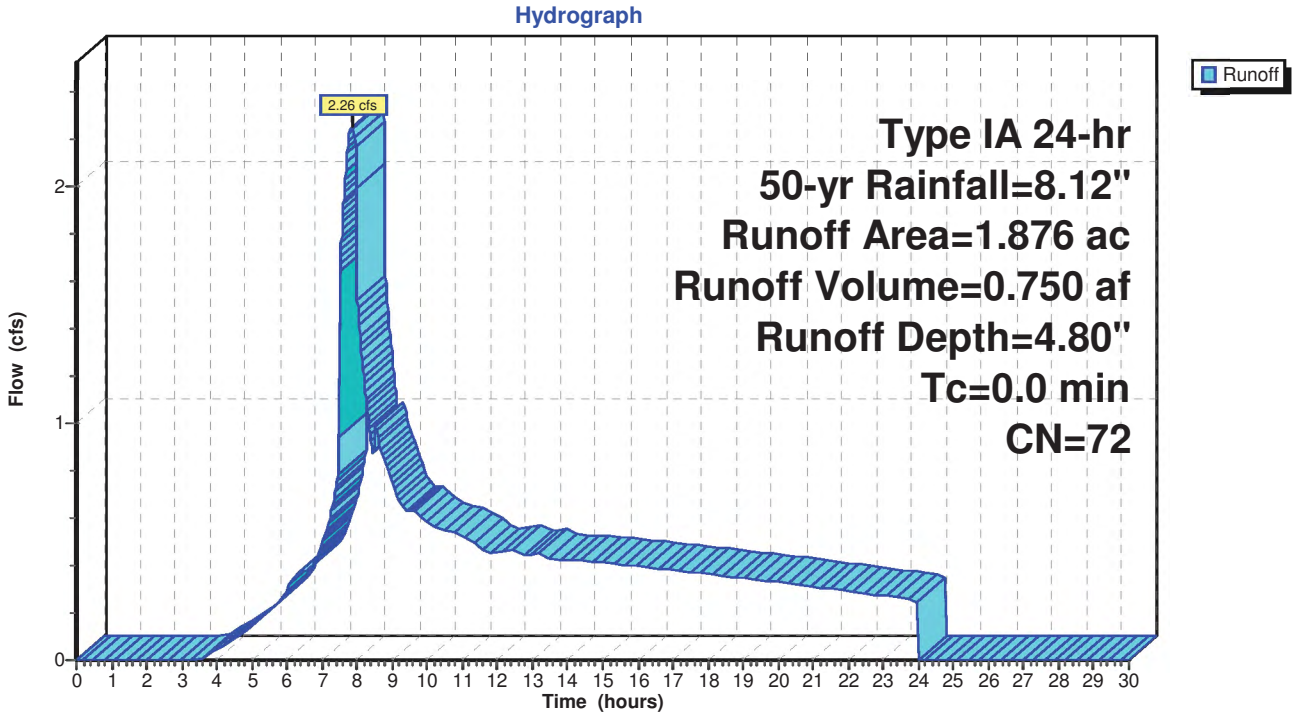
[46] Hint: Tc=0 (Instant runoff peak depends on dt)

Runoff = 2.26 cfs @ 7.86 hrs, Volume= 0.750 af, Depth= 4.80"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.01 hrs
Type IA 24-hr 50-yr Rainfall=8.12"

Area (ac)	CN	Description
0.239	75	Annual Grass, Good, HSG C
0.289	65	Brush, Good, HSG C
0.175	73	Brush, Good, HSG D
0.761	70	Woods, Good, HSG C
0.412	77	Woods, Good, HSG D
1.876	72	Weighted Average
1.876		100.00% Pervious Area

Subcatchment SUBAREA-2: Subarea - 2



Summary for Subcatchment SUBAREA-3: Subarea - 3

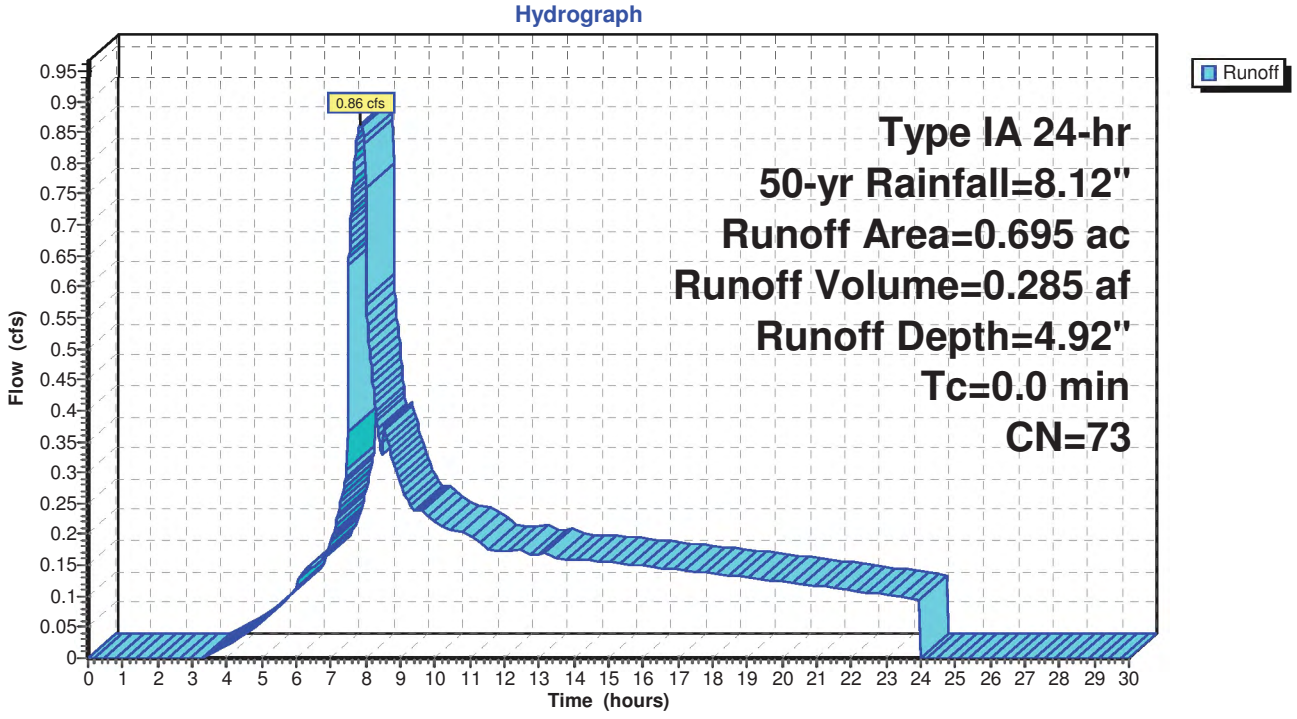
[46] Hint: Tc=0 (Instant runoff peak depends on dt)

Runoff = 0.86 cfs @ 7.85 hrs, Volume= 0.285 af, Depth= 4.92"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.01 hrs
Type IA 24-hr 50-yr Rainfall=8.12"

Area (ac)	CN	Description
0.103	75	Annual Grass, Good, HSG C
0.130	81	Annual Grass, Good, HSG D
0.212	65	Brush, Good, HSG C
0.077	73	Brush, Good, HSG D
0.072	70	Woods, Good, HSG C
0.101	77	Woods, Good, HSG D
0.695	73	Weighted Average
0.695		100.00% Pervious Area

Subcatchment SUBAREA-3: Subarea - 3



Summary for Subcatchment SUBAREA-4: Subarea - 4

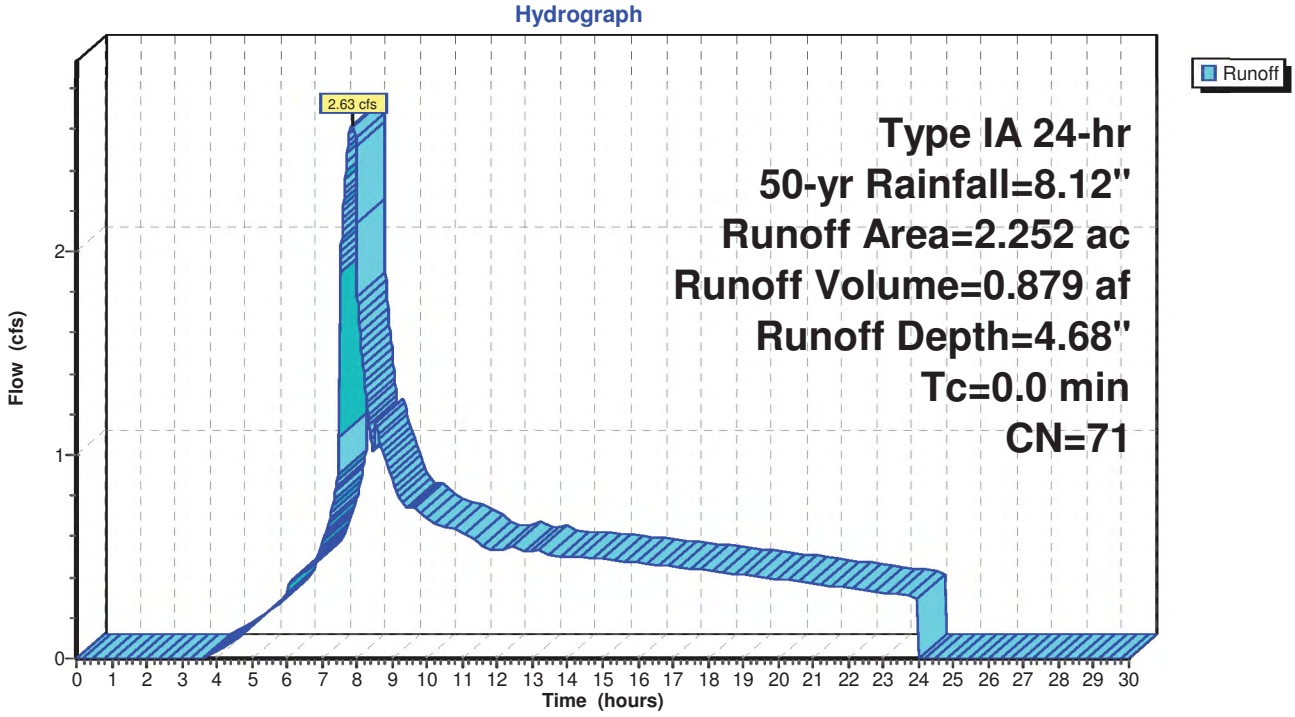
[46] Hint: Tc=0 (Instant runoff peak depends on dt)

Runoff = 2.63 cfs @ 7.86 hrs, Volume= 0.879 af, Depth= 4.68"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.01 hrs
Type IA 24-hr 50-yr Rainfall=8.12"

Area (ac)	CN	Description
0.311	75	Annual Grass, Good, HSG C
1.878	70	Woods, Good, HSG C
0.063	77	Woods, Good, HSG D
2.252	71	Weighted Average
2.252		100.00% Pervious Area

Subcatchment SUBAREA-4: Subarea - 4



Summary for Subcatchment WS-1: WS-1

[47] Hint: Peak is 128% of capacity of segment #6
[47] Hint: Peak is 115% of capacity of segment #7
[47] Hint: Peak is 110% of capacity of segment #8

Runoff = 16.88 cfs @ 8.00 hrs, Volume= 5.672 af, Depth= 4.80"

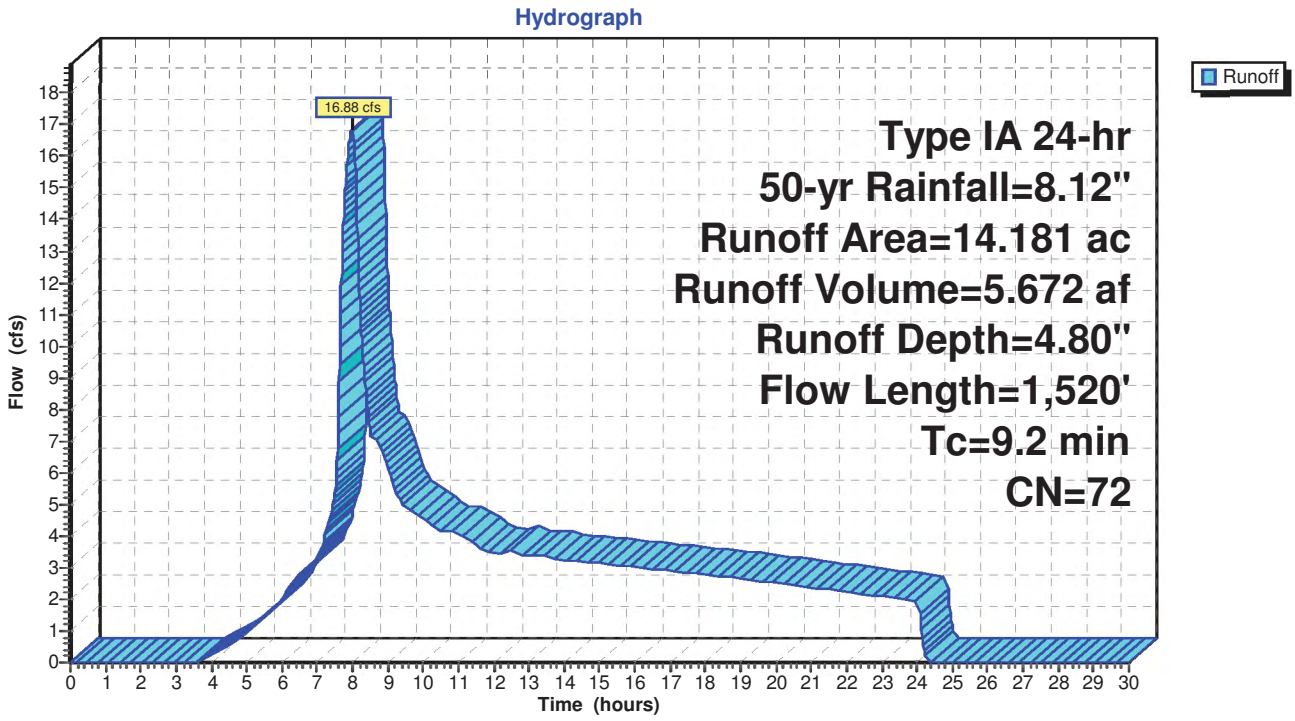
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.01 hrs
Type IA 24-hr 50-yr Rainfall=8.12"

Area (ac)	CN	Description
3.789	75	Annual Grass, Good, HSG C
0.671	65	Brush, Good, HSG C
0.149	87	Dirt roads, HSG C
0.069	91	Fallow, bare soil, HSG C
0.202	82	Farmsteads, HSG C
0.277	89	Gravel Roads, HSG C
0.095	75	Vineyard, Good, HSG C
8.929	70	Woods, Good, HSG C
14.181	72	Weighted Average
14.181		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.0	100	0.2000	0.33		**Sheet Flow, Sheet** Grass: Dense n= 0.240 P2= 4.06"
0.1	28	0.2800	3.70		**Shallow Concentrated Flow, Sheet - Short Grass** Short Grass Pasture Kv= 7.0 fps
1.0	178	0.3800	3.08		**Shallow Concentrated Flow, Shallow - Woodland** Woodland Kv= 5.0 fps
1.2	267	0.3000	3.83		**Shallow Concentrated Flow, Shallow - Short Grass** Short Grass Pasture Kv= 7.0 fps
0.6	88	0.2800	2.65		**Shallow Concentrated Flow, Shallow - Woodland** Woodland Kv= 5.0 fps
0.1	44	0.0700	6.57	13.14	**Trap/Vee/Rect Channel Flow, Ditch** Bot.W=0.00' D=1.00' Z= 2.0 '/' Top.W=4.00' n= 0.035
0.1	124	0.1000	18.65	14.65	**Pipe Channel, 12" DW Pipe** 12.0" Round Area= 0.8 sf Perim= 3.1' r= 0.25' n= 0.010 PPI Dual Walled CPP
0.0	37	0.1100	19.56	15.36	**Pipe Channel, 12" DW Pipe** 12.0" Round Area= 0.8 sf Perim= 3.1' r= 0.25' n= 0.010 PPI Dual Walled CPP
0.3	183	0.1300	8.95	17.90	**Trap/Vee/Rect Channel Flow, Ditch** Bot.W=0.00' D=1.00' Z= 2.0 '/' Top.W=4.00' n= 0.035
0.8	471	0.1200	9.85	29.56	**Trap/Vee/Rect Channel Flow, Stream** Bot.W=1.00' D=1.00' Z= 2.0 '/' Top.W=5.00' n= 0.035

9.2	1,520	Total

Subcatchment WS-1: WS-1



Summary for Subcatchment WS-2: WS-2

[47] Hint: Peak is 387% of capacity of segment #5
[47] Hint: Peak is 254% of capacity of segment #6
[47] Hint: Peak is 148% of capacity of segment #9

Runoff = 47.12 cfs @ 8.02 hrs, Volume= 15.744 af, Depth= 5.03"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.01 hrs
Type IA 24-hr 50-yr Rainfall=8.12"

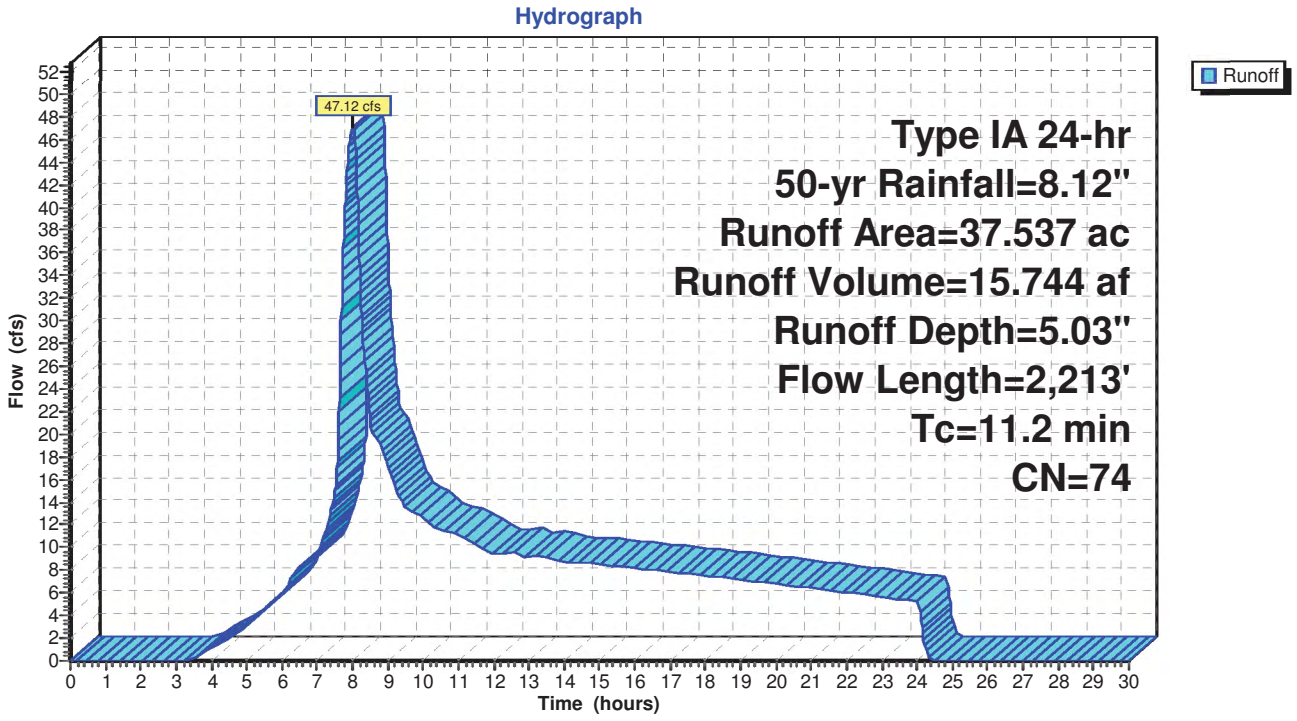
Area (ac)	CN	Description
13.802	75	Annual Grass, Good, HSG C
1.871	81	Annual Grass, Good, HSG D
1.679	65	Brush, Good, HSG C
1.478	73	Brush, Good, HSG D
1.118	87	Dirt roads, HSG C
0.039	91	Fallow, bare soil, HSG C
0.369	82	Farmsteads, HSG C
0.270	89	Gravel Roads, HSG C
0.196	98	Water Surface, HSG C
14.267	70	Woods, Good, HSG C
2.448	77	Woods, Good, HSG D
37.537	74	Weighted Average
37.341		99.48% Pervious Area
0.196		0.52% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.3	100	0.1800	0.32		**Sheet Flow, Sheet** Grass: Dense n= 0.240 P2= 4.06"
0.4	104	0.3200	3.96		**Shallow Concentrated Flow, Shallow - Short Grass** Short Grass Pasture Kv= 7.0 fps
0.8	155	0.3700	3.04		**Shallow Concentrated Flow, Shallow - Woodland** Woodland Kv= 5.0 fps
1.3	292	0.2800	3.70		**Shallow Concentrated Flow, Shallow - Short Grass** Short Grass Pasture Kv= 7.0 fps
0.1	34	0.0600	6.08	12.16	**Trap/Vee/Rect Channel Flow, Ditch** Bot.W=0.00' D=1.00' Z= 2.0 '/' Top.W=4.00' n= 0.035
0.0	19	0.1600	23.59	18.53	**Pipe Channel, 12" DW Culvert** 12.0" Round Area= 0.8 sf Perim= 3.1' r= 0.25' n= 0.010
1.3	243	0.2000	3.13		**Shallow Concentrated Flow, Shallow - Short Grass** Short Grass Pasture Kv= 7.0 fps
0.5	333	0.1100	10.27	71.86	**Trap/Vee/Rect Channel Flow, Swale (assumed)** Bot.W=3.00' D=1.00' Z= 4.0 '/' Top.W=11.00' n= 0.035
1.5	933	0.1400	10.64	31.92	**Trap/Vee/Rect Channel Flow, Stream (assumed)** Bot.W=1.00' D=1.00' Z= 2.0 '/' Top.W=5.00'

n= 0.035

11.2	2,213	Total

Subcatchment WS-2: WS-2



Summary for Subcatchment SUBAREA-1: Subarea -1

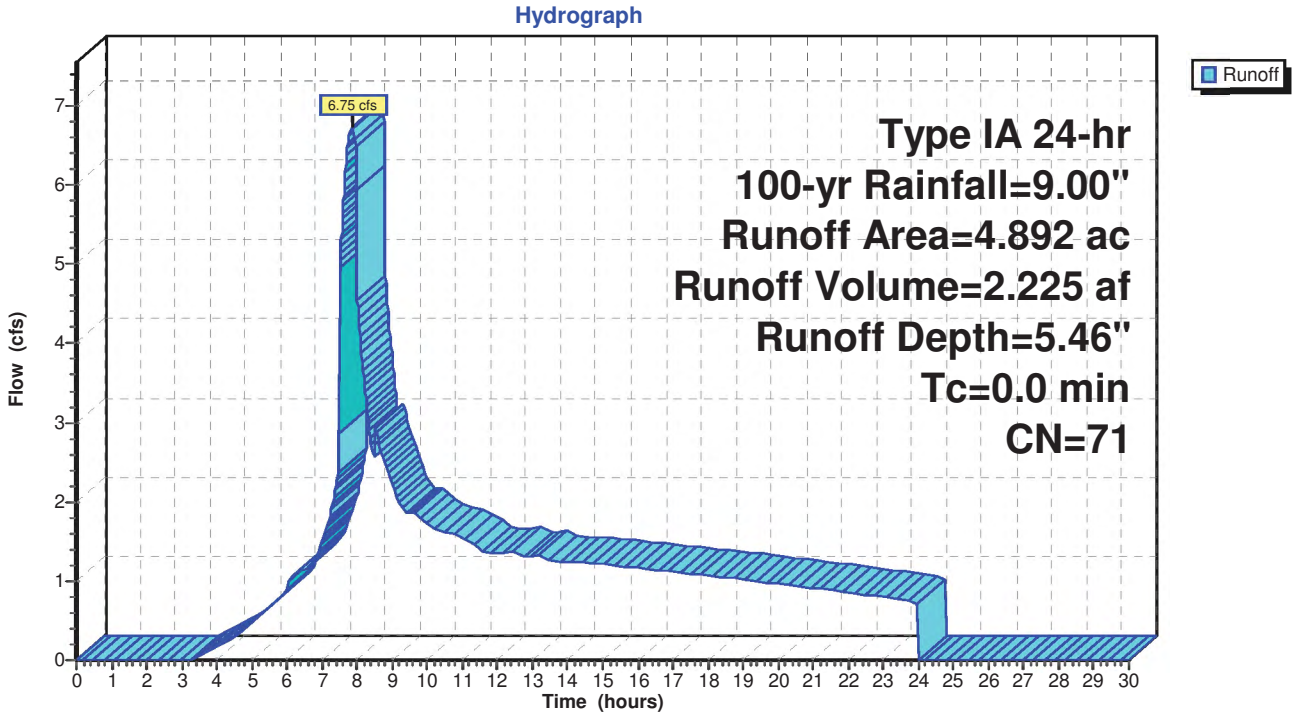
[46] Hint: Tc=0 (Instant runoff peak depends on dt)

Runoff = 6.75 cfs @ 7.85 hrs, Volume= 2.225 af, Depth= 5.46"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.01 hrs
Type IA 24-hr 100-yr Rainfall=9.00"

Area (ac)	CN	Description
0.450	75	Annual Grass, Good, HSG C
0.827	65	Brush, Good, HSG C
0.288	73	Brush, Good, HSG D
2.522	70	Woods, Good, HSG C
0.804	77	Woods, Good, HSG D
4.892	71	Weighted Average
4.892		100.00% Pervious Area

Subcatchment SUBAREA-1: Subarea -1



Summary for Subcatchment SUBAREA-2: Subarea - 2

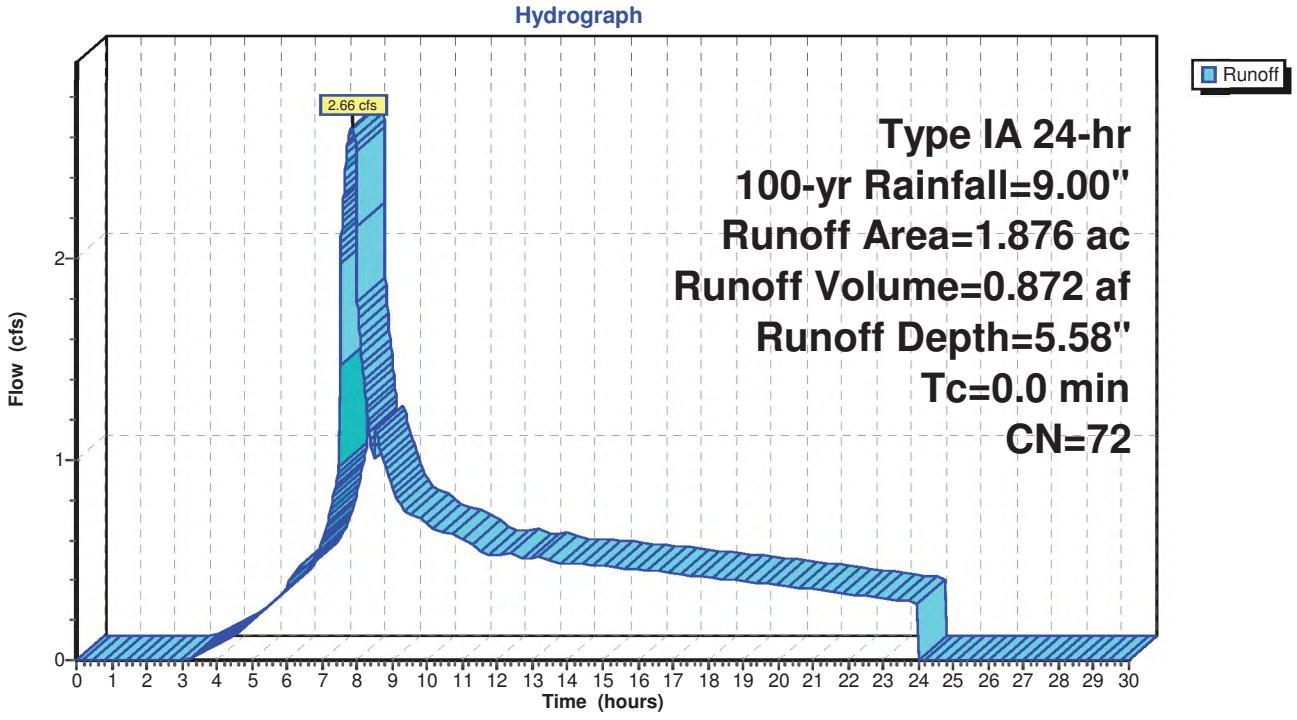
[46] Hint: Tc=0 (Instant runoff peak depends on dt)

Runoff = 2.66 cfs @ 7.85 hrs, Volume= 0.872 af, Depth= 5.58"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.01 hrs
Type IA 24-hr 100-yr Rainfall=9.00"

Area (ac)	CN	Description
0.239	75	Annual Grass, Good, HSG C
0.289	65	Brush, Good, HSG C
0.175	73	Brush, Good, HSG D
0.761	70	Woods, Good, HSG C
0.412	77	Woods, Good, HSG D
1.876	72	Weighted Average
1.876		100.00% Pervious Area

Subcatchment SUBAREA-2: Subarea - 2



Summary for Subcatchment SUBAREA-3: Subarea - 3

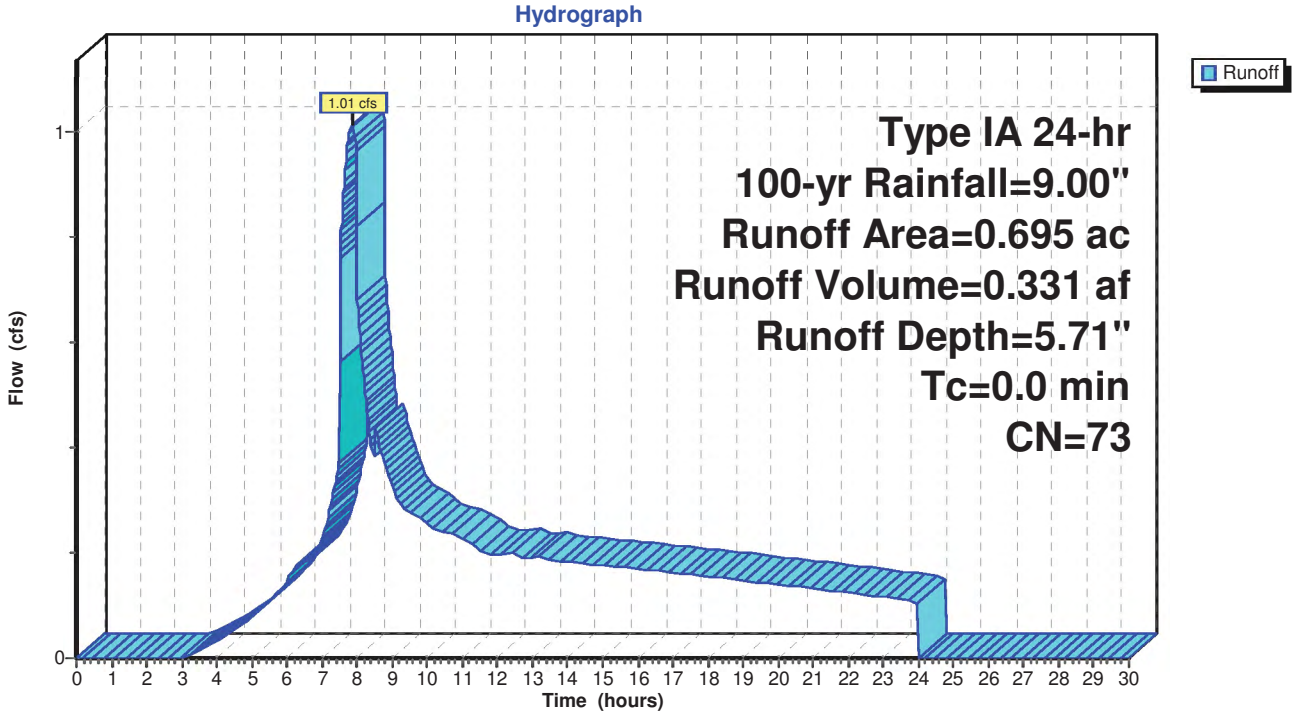
[46] Hint: Tc=0 (Instant runoff peak depends on dt)

Runoff = 1.01 cfs @ 7.85 hrs, Volume= 0.331 af, Depth= 5.71"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.01 hrs
Type IA 24-hr 100-yr Rainfall=9.00"

Area (ac)	CN	Description
0.103	75	Annual Grass, Good, HSG C
0.130	81	Annual Grass, Good, HSG D
0.212	65	Brush, Good, HSG C
0.077	73	Brush, Good, HSG D
0.072	70	Woods, Good, HSG C
0.101	77	Woods, Good, HSG D
0.695	73	Weighted Average
0.695		100.00% Pervious Area

Subcatchment SUBAREA-3: Subarea - 3



Summary for Subcatchment SUBAREA-4: Subarea - 4

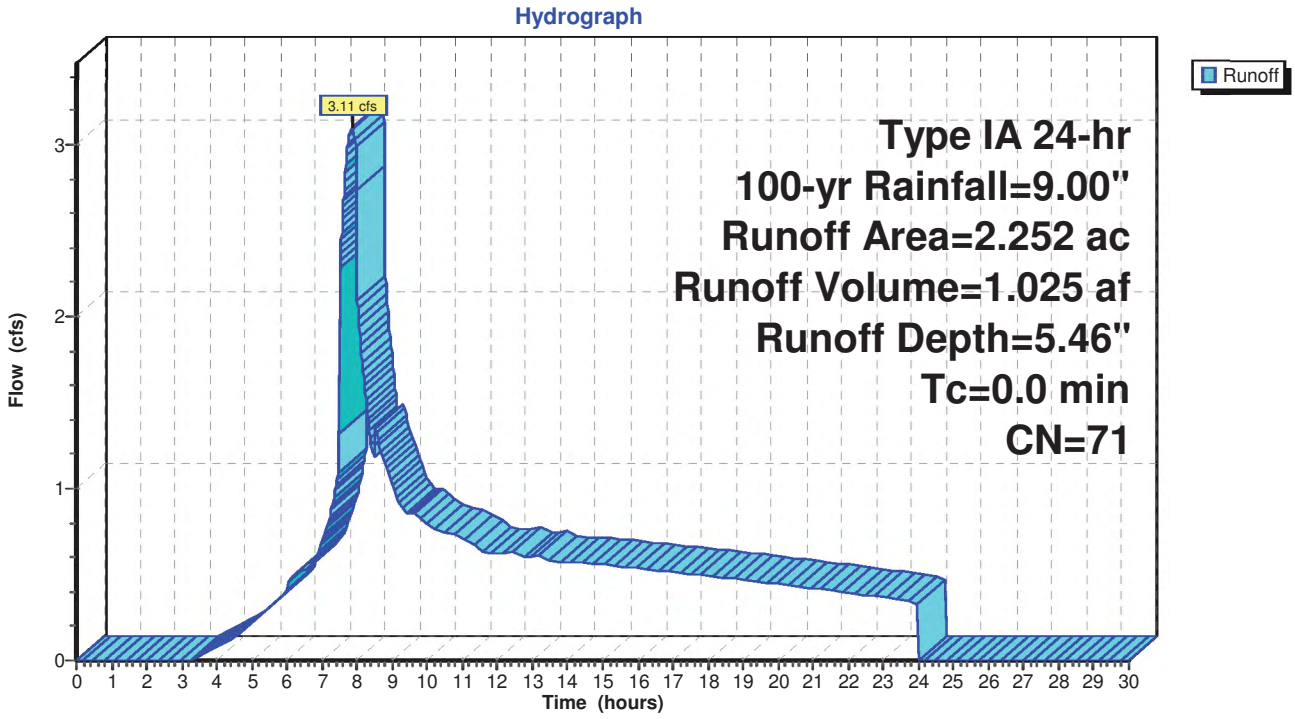
[46] Hint: Tc=0 (Instant runoff peak depends on dt)

Runoff = 3.11 cfs @ 7.85 hrs, Volume= 1.025 af, Depth= 5.46"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.01 hrs
Type IA 24-hr 100-yr Rainfall=9.00"

Area (ac)	CN	Description
0.311	75	Annual Grass, Good, HSG C
1.878	70	Woods, Good, HSG C
0.063	77	Woods, Good, HSG D
2.252	71	Weighted Average
2.252		100.00% Pervious Area

Subcatchment SUBAREA-4: Subarea - 4



Summary for Subcatchment WS-1: WS-1

[47] Hint: Peak is 151% of capacity of segment #6
[47] Hint: Peak is 136% of capacity of segment #7
[47] Hint: Peak is 129% of capacity of segment #8
[47] Hint: Peak is 111% of capacity of segment #9

Runoff = 19.88 cfs @ 8.00 hrs, Volume= 6.597 af, Depth= 5.58"

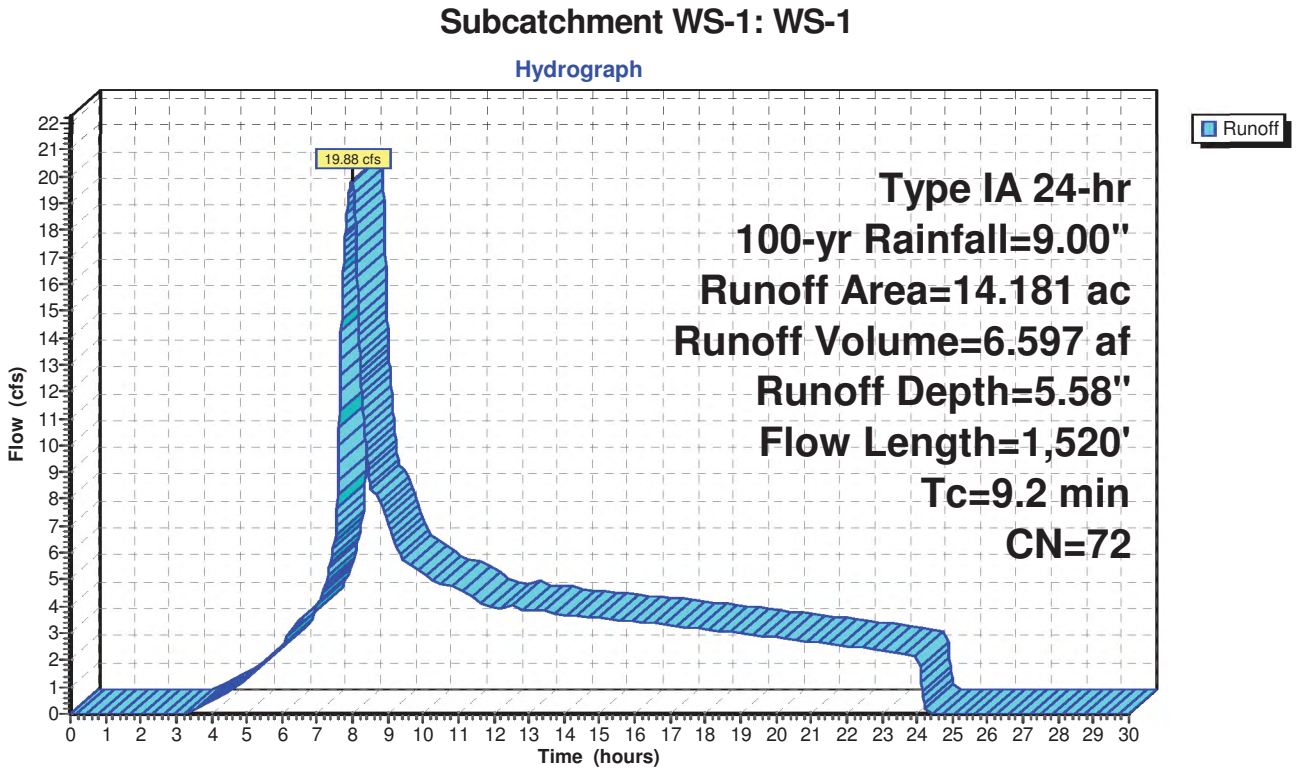
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.01 hrs
Type IA 24-hr 100-yr Rainfall=9.00"

Area (ac)	CN	Description
3.789	75	Annual Grass, Good, HSG C
0.671	65	Brush, Good, HSG C
0.149	87	Dirt roads, HSG C
0.069	91	Fallow, bare soil, HSG C
0.202	82	Farmsteads, HSG C
0.277	89	Gravel Roads, HSG C
0.095	75	Vineyard, Good, HSG C
8.929	70	Woods, Good, HSG C
14.181	72	Weighted Average
14.181		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.0	100	0.2000	0.33		**Sheet Flow, Sheet** Grass: Dense n= 0.240 P2= 4.06"
0.1	28	0.2800	3.70		**Shallow Concentrated Flow, Sheet - Short Grass** Short Grass Pasture Kv= 7.0 fps
1.0	178	0.3800	3.08		**Shallow Concentrated Flow, Shallow - Woodland** Woodland Kv= 5.0 fps
1.2	267	0.3000	3.83		**Shallow Concentrated Flow, Shallow - Short Grass** Short Grass Pasture Kv= 7.0 fps
0.6	88	0.2800	2.65		**Shallow Concentrated Flow, Shallow - Woodland** Woodland Kv= 5.0 fps
0.1	44	0.0700	6.57	13.14	**Trap/Vee/Rect Channel Flow, Ditch** Bot.W=0.00' D=1.00' Z= 2.0 '/' Top.W=4.00' n= 0.035
0.1	124	0.1000	18.65	14.65	**Pipe Channel, 12" DW Pipe** 12.0" Round Area= 0.8 sf Perim= 3.1' r= 0.25' n= 0.010 PPI Dual Walled CPP
0.0	37	0.1100	19.56	15.36	**Pipe Channel, 12" DW Pipe** 12.0" Round Area= 0.8 sf Perim= 3.1' r= 0.25' n= 0.010 PPI Dual Walled CPP
0.3	183	0.1300	8.95	17.90	**Trap/Vee/Rect Channel Flow, Ditch** Bot.W=0.00' D=1.00' Z= 2.0 '/' Top.W=4.00' n= 0.035
0.8	471	0.1200	9.85	29.56	**Trap/Vee/Rect Channel Flow, Stream** Bot.W=1.00' D=1.00' Z= 2.0 '/' Top.W=5.00'

n= 0.035

9.2	1,520	Total



Summary for Subcatchment WS-2: WS-2

[47] Hint: Peak is 454% of capacity of segment #5
[47] Hint: Peak is 298% of capacity of segment #6
[47] Hint: Peak is 173% of capacity of segment #9

Runoff = 55.17 cfs @ 8.00 hrs, Volume= 18.233 af, Depth= 5.83"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.01 hrs
Type IA 24-hr 100-yr Rainfall=9.00"

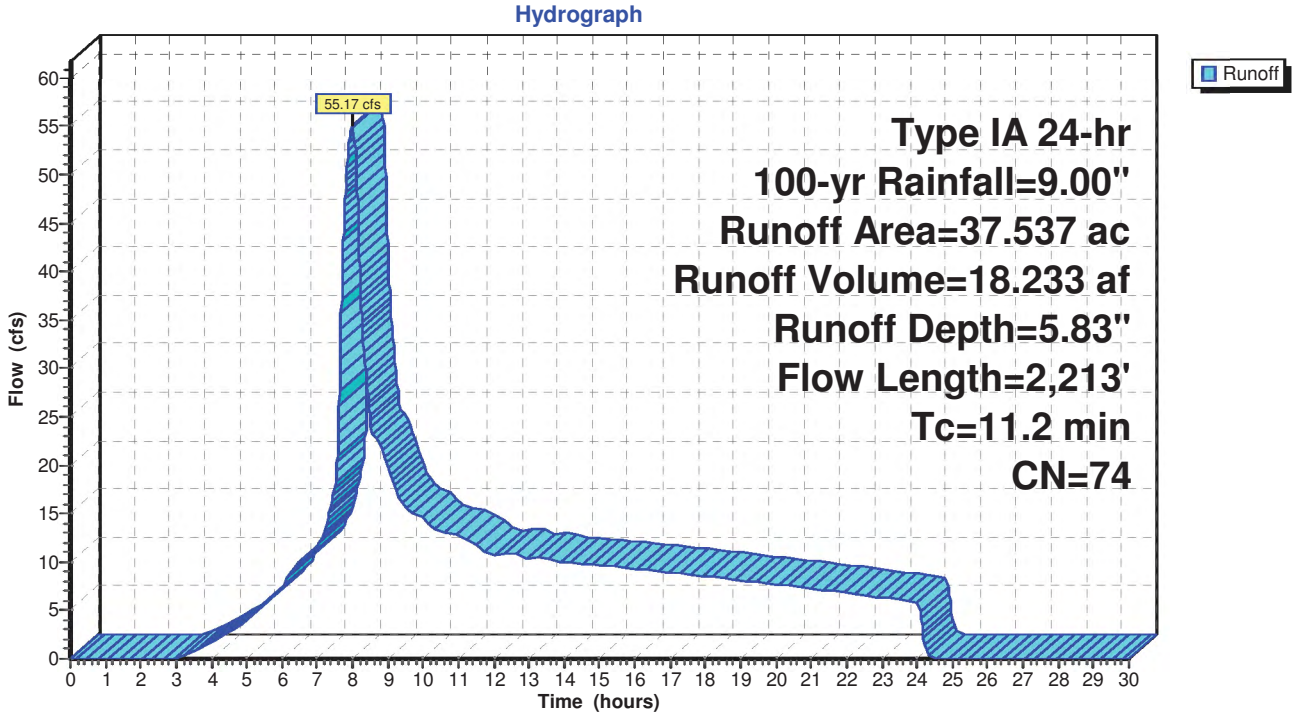
Area (ac)	CN	Description
13.802	75	Annual Grass, Good, HSG C
1.871	81	Annual Grass, Good, HSG D
1.679	65	Brush, Good, HSG C
1.478	73	Brush, Good, HSG D
1.118	87	Dirt roads, HSG C
0.039	91	Fallow, bare soil, HSG C
0.369	82	Farmsteads, HSG C
0.270	89	Gravel Roads, HSG C
0.196	98	Water Surface, HSG C
14.267	70	Woods, Good, HSG C
2.448	77	Woods, Good, HSG D
37.537	74	Weighted Average
37.341		99.48% Pervious Area
0.196		0.52% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.3	100	0.1800	0.32		**Sheet Flow, Sheet** Grass: Dense n= 0.240 P2= 4.06"
0.4	104	0.3200	3.96		**Shallow Concentrated Flow, Shallow - Short Grass** Short Grass Pasture Kv= 7.0 fps
0.8	155	0.3700	3.04		**Shallow Concentrated Flow, Shallow - Woodland** Woodland Kv= 5.0 fps
1.3	292	0.2800	3.70		**Shallow Concentrated Flow, Shallow - Short Grass** Short Grass Pasture Kv= 7.0 fps
0.1	34	0.0600	6.08	12.16	**Trap/Vee/Rect Channel Flow, Ditch** Bot.W=0.00' D=1.00' Z= 2.0 '/' Top.W=4.00' n= 0.035
0.0	19	0.1600	23.59	18.53	**Pipe Channel, 12" DW Culvert** 12.0" Round Area= 0.8 sf Perim= 3.1' r= 0.25' n= 0.010
1.3	243	0.2000	3.13		**Shallow Concentrated Flow, Shallow - Short Grass** Short Grass Pasture Kv= 7.0 fps
0.5	333	0.1100	10.27	71.86	**Trap/Vee/Rect Channel Flow, Swale (assumed)** Bot.W=3.00' D=1.00' Z= 4.0 '/' Top.W=11.00' n= 0.035
1.5	933	0.1400	10.64	31.92	**Trap/Vee/Rect Channel Flow, Stream (assumed)** Bot.W=1.00' D=1.00' Z= 2.0 '/' Top.W=5.00'

n= 0.035

11.2	2,213	Total

Subcatchment WS-2: WS-2





WS-2

Subcat Reach Pond Link

Routing Diagram for Pre-Project Alternate Path
Prepared by PPI Engineering, Printed 1/29/2025
HydroCAD® 10.20-5c s/n 09429 © 2023 HydroCAD Software Solutions LLC

Summary for Subcatchment WS-2: WS-2

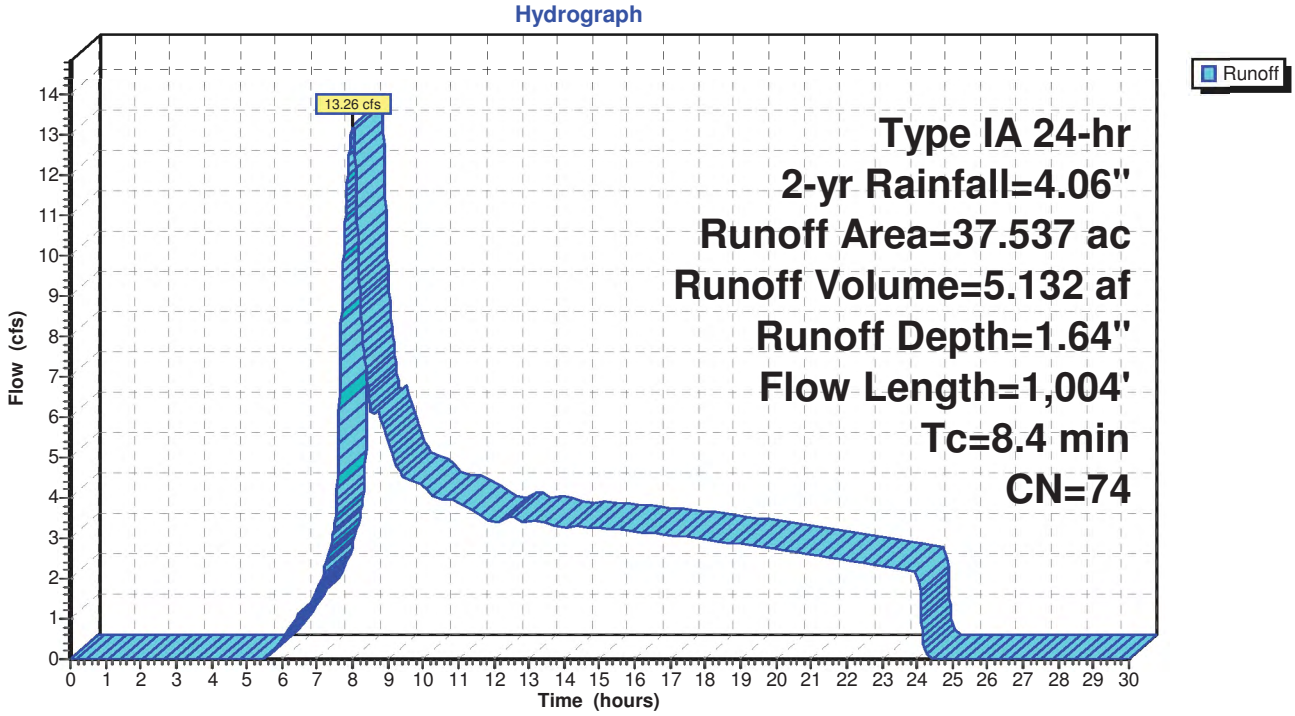
Runoff = 13.26 cfs @ 8.02 hrs, Volume= 5.132 af, Depth= 1.64"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.01 hrs
Type IA 24-hr 2-yr Rainfall=4.06"

Area (ac)	CN	Description
13.802	75	Annual Grass, Good, HSG C
1.871	81	Annual Grass, Good, HSG D
1.679	65	Brush, Good, HSG C
1.478	73	Brush, Good, HSG D
1.118	87	Dirt roads, HSG C
0.039	91	Fallow, bare soil, HSG C
0.369	82	Farmsteads, HSG C
0.270	89	Gravel Roads, HSG C
0.196	98	Water Surface, HSG C
14.267	70	Woods, Good, HSG C
2.448	77	Woods, Good, HSG D
37.537	74	Weighted Average
37.341		99.48% Pervious Area
0.196		0.52% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
4.7	100	0.2400	0.36		**Sheet Flow, Sheet** Grass: Dense n= 0.240 P2= 4.06"
0.3	69	0.2900	3.77		**Shallow Concentrated Flow, Shallow - Short Grass** Short Grass Pasture Kv= 7.0 fps
0.3	169	0.1300	8.95	17.90	**Trap/Vee/Rect Channel Flow, Ditch** Bot.W=0.00' D=1.00' Z= 2.0 '/' Top.W=4.00' n= 0.035
0.9	202	0.3200	3.96		**Shallow Concentrated Flow, Shallow - Short Grass** Short Grass Pasture Kv= 7.0 fps
0.9	208	0.3100	3.90		**Shallow Concentrated Flow, Shallow - Short Grass** Short Grass Pasture Kv= 7.0 fps
1.3	256	0.4000	3.16		**Shallow Concentrated Flow, Shallow - Woodland** Woodland Kv= 5.0 fps
8.4	1,004	Total			

Subcatchment WS-2: WS-2



Summary for Subcatchment WS-2: WS-2

[47] Hint: Peak is 163% of capacity of segment #3

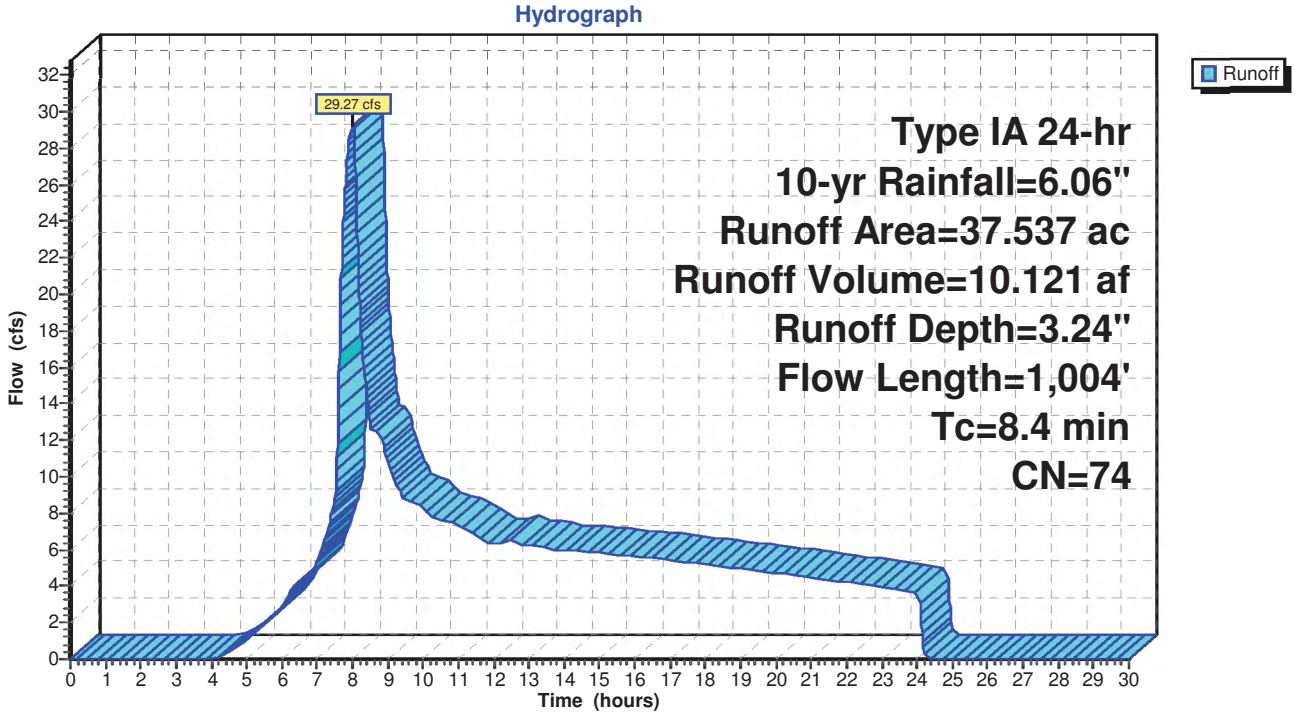
Runoff = 29.27 cfs @ 8.00 hrs, Volume= 10.121 af, Depth= 3.24"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.01 hrs
Type IA 24-hr 10-yr Rainfall=6.06"

Area (ac)	CN	Description
13.802	75	Annual Grass, Good, HSG C
1.871	81	Annual Grass, Good, HSG D
1.679	65	Brush, Good, HSG C
1.478	73	Brush, Good, HSG D
1.118	87	Dirt roads, HSG C
0.039	91	Fallow, bare soil, HSG C
0.369	82	Farmsteads, HSG C
0.270	89	Gravel Roads, HSG C
0.196	98	Water Surface, HSG C
14.267	70	Woods, Good, HSG C
2.448	77	Woods, Good, HSG D
37.537	74	Weighted Average
37.341		99.48% Pervious Area
0.196		0.52% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
4.7	100	0.2400	0.36		**Sheet Flow, Sheet** Grass: Dense n= 0.240 P2= 4.06"
0.3	69	0.2900	3.77		**Shallow Concentrated Flow, Shallow - Short Grass** Short Grass Pasture Kv= 7.0 fps
0.3	169	0.1300	8.95	17.90	**Trap/Vee/Rect Channel Flow, Ditch** Bot.W=0.00' D=1.00' Z= 2.0 '/' Top.W=4.00' n= 0.035
0.9	202	0.3200	3.96		**Shallow Concentrated Flow, Shallow - Short Grass** Short Grass Pasture Kv= 7.0 fps
0.9	208	0.3100	3.90		**Shallow Concentrated Flow, Shallow - Short Grass** Short Grass Pasture Kv= 7.0 fps
1.3	256	0.4000	3.16		**Shallow Concentrated Flow, Shallow - Woodland** Woodland Kv= 5.0 fps
8.4	1,004	Total			

Subcatchment WS-2: WS-2



Summary for Subcatchment WS-2: WS-2

[47] Hint: Peak is 266% of capacity of segment #3

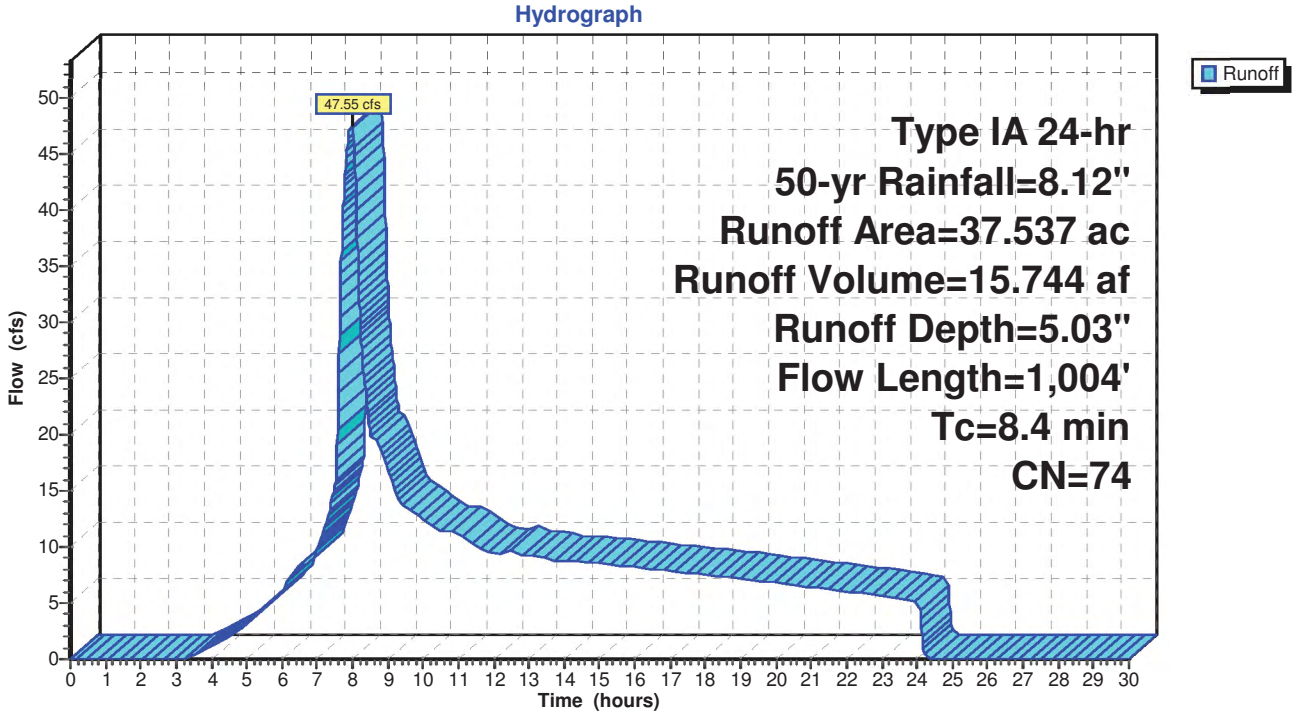
Runoff = 47.55 cfs @ 7.98 hrs, Volume= 15.744 af, Depth= 5.03"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.01 hrs
Type IA 24-hr 50-yr Rainfall=8.12"

Area (ac)	CN	Description
13.802	75	Annual Grass, Good, HSG C
1.871	81	Annual Grass, Good, HSG D
1.679	65	Brush, Good, HSG C
1.478	73	Brush, Good, HSG D
1.118	87	Dirt roads, HSG C
0.039	91	Fallow, bare soil, HSG C
0.369	82	Farmsteads, HSG C
0.270	89	Gravel Roads, HSG C
0.196	98	Water Surface, HSG C
14.267	70	Woods, Good, HSG C
2.448	77	Woods, Good, HSG D
37.537	74	Weighted Average
37.341		99.48% Pervious Area
0.196		0.52% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
4.7	100	0.2400	0.36		**Sheet Flow, Sheet** Grass: Dense n= 0.240 P2= 4.06"
0.3	69	0.2900	3.77		**Shallow Concentrated Flow, Shallow - Short Grass** Short Grass Pasture Kv= 7.0 fps
0.3	169	0.1300	8.95	17.90	**Trap/Vee/Rect Channel Flow, Ditch** Bot.W=0.00' D=1.00' Z= 2.0 '/' Top.W=4.00' n= 0.035
0.9	202	0.3200	3.96		**Shallow Concentrated Flow, Shallow - Short Grass** Short Grass Pasture Kv= 7.0 fps
0.9	208	0.3100	3.90		**Shallow Concentrated Flow, Shallow - Short Grass** Short Grass Pasture Kv= 7.0 fps
1.3	256	0.4000	3.16		**Shallow Concentrated Flow, Shallow - Woodland** Woodland Kv= 5.0 fps
8.4	1,004	Total			

Subcatchment WS-2: WS-2



Summary for Subcatchment WS-2: WS-2

[47] Hint: Peak is 311% of capacity of segment #3

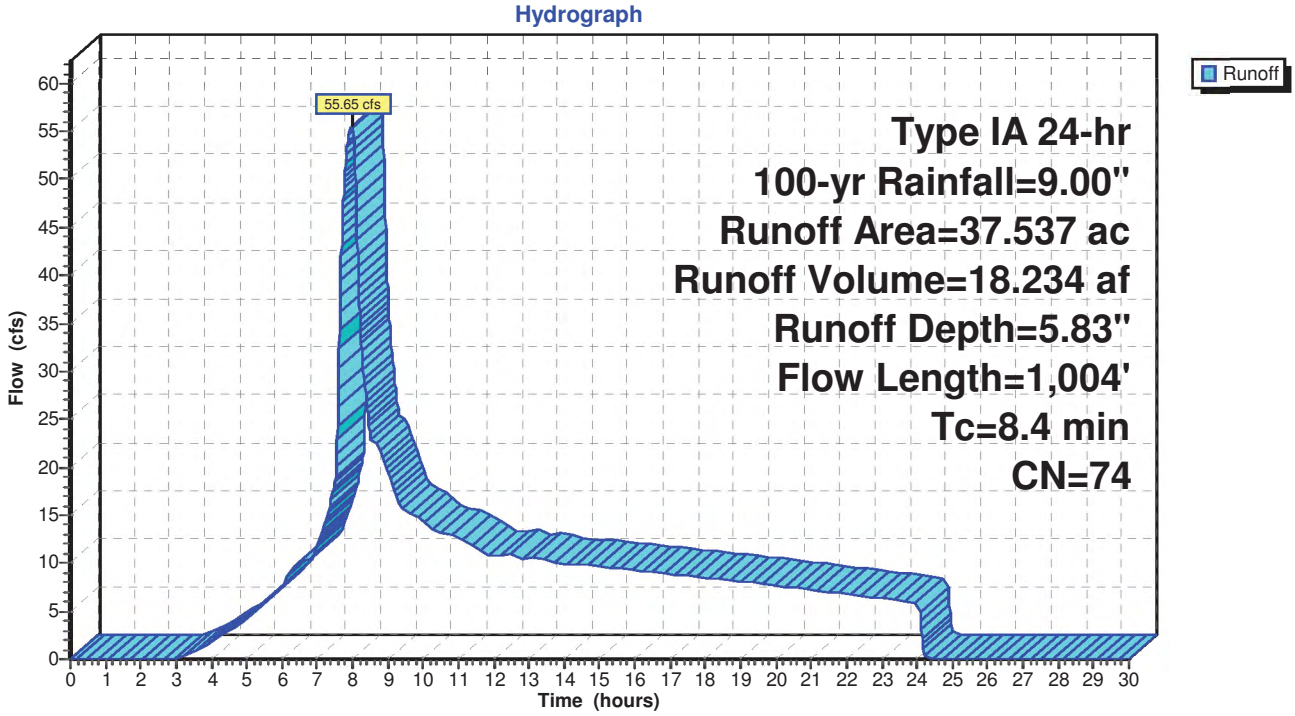
Runoff = 55.65 cfs @ 7.98 hrs, Volume= 18.234 af, Depth= 5.83"

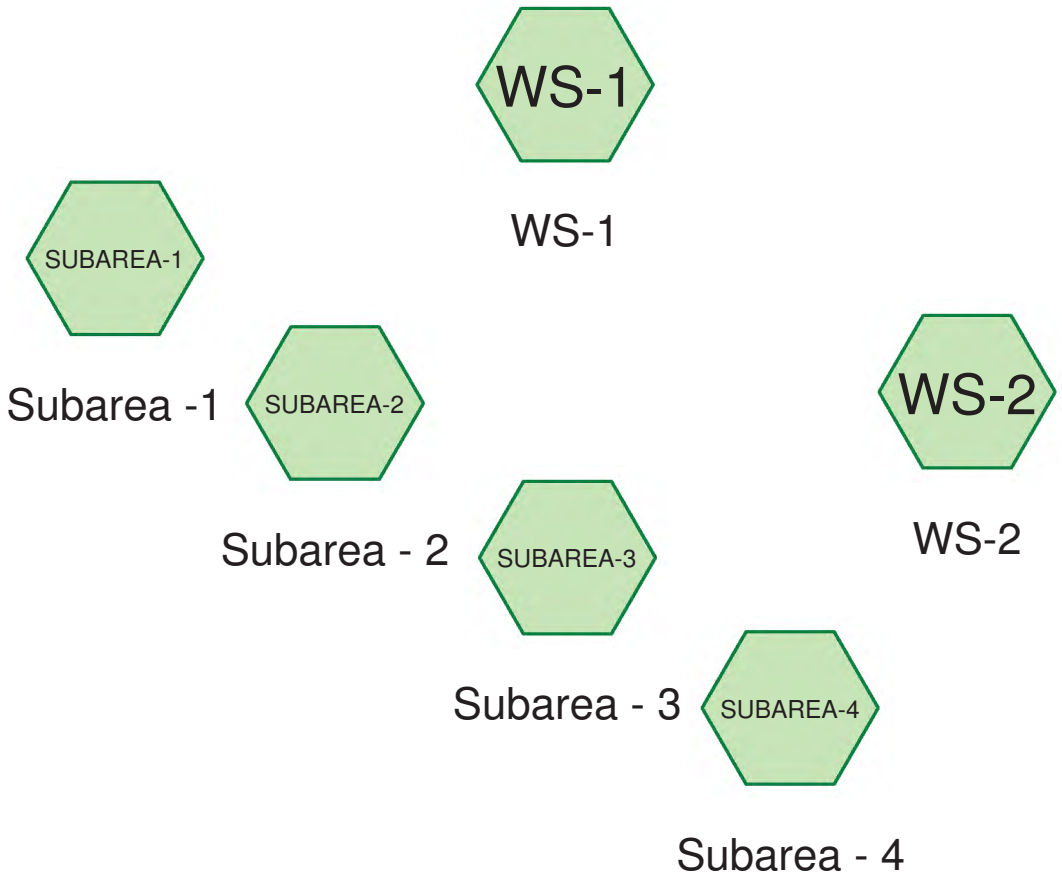
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.01 hrs
Type IA 24-hr 100-yr Rainfall=9.00"

Area (ac)	CN	Description
13.802	75	Annual Grass, Good, HSG C
1.871	81	Annual Grass, Good, HSG D
1.679	65	Brush, Good, HSG C
1.478	73	Brush, Good, HSG D
1.118	87	Dirt roads, HSG C
0.039	91	Fallow, bare soil, HSG C
0.369	82	Farmsteads, HSG C
0.270	89	Gravel Roads, HSG C
0.196	98	Water Surface, HSG C
14.267	70	Woods, Good, HSG C
2.448	77	Woods, Good, HSG D
37.537	74	Weighted Average
37.341		99.48% Pervious Area
0.196		0.52% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
4.7	100	0.2400	0.36		**Sheet Flow, Sheet** Grass: Dense n= 0.240 P2= 4.06"
0.3	69	0.2900	3.77		**Shallow Concentrated Flow, Shallow - Short Grass** Short Grass Pasture Kv= 7.0 fps
0.3	169	0.1300	8.95	17.90	**Trap/Vee/Rect Channel Flow, Ditch** Bot.W=0.00' D=1.00' Z= 2.0 '/' Top.W=4.00' n= 0.035
0.9	202	0.3200	3.96		**Shallow Concentrated Flow, Shallow - Short Grass** Short Grass Pasture Kv= 7.0 fps
0.9	208	0.3100	3.90		**Shallow Concentrated Flow, Shallow - Short Grass** Short Grass Pasture Kv= 7.0 fps
1.3	256	0.4000	3.16		**Shallow Concentrated Flow, Shallow - Woodland** Woodland Kv= 5.0 fps
8.4	1,004	Total			

Subcatchment WS-2: WS-2





Subcat Reach Pond Link

Routing Diagram for Post-Project
Prepared by PPI Engineering, Printed 1/29/2025
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Summary for Subcatchment SUBAREA-1: Subarea -1

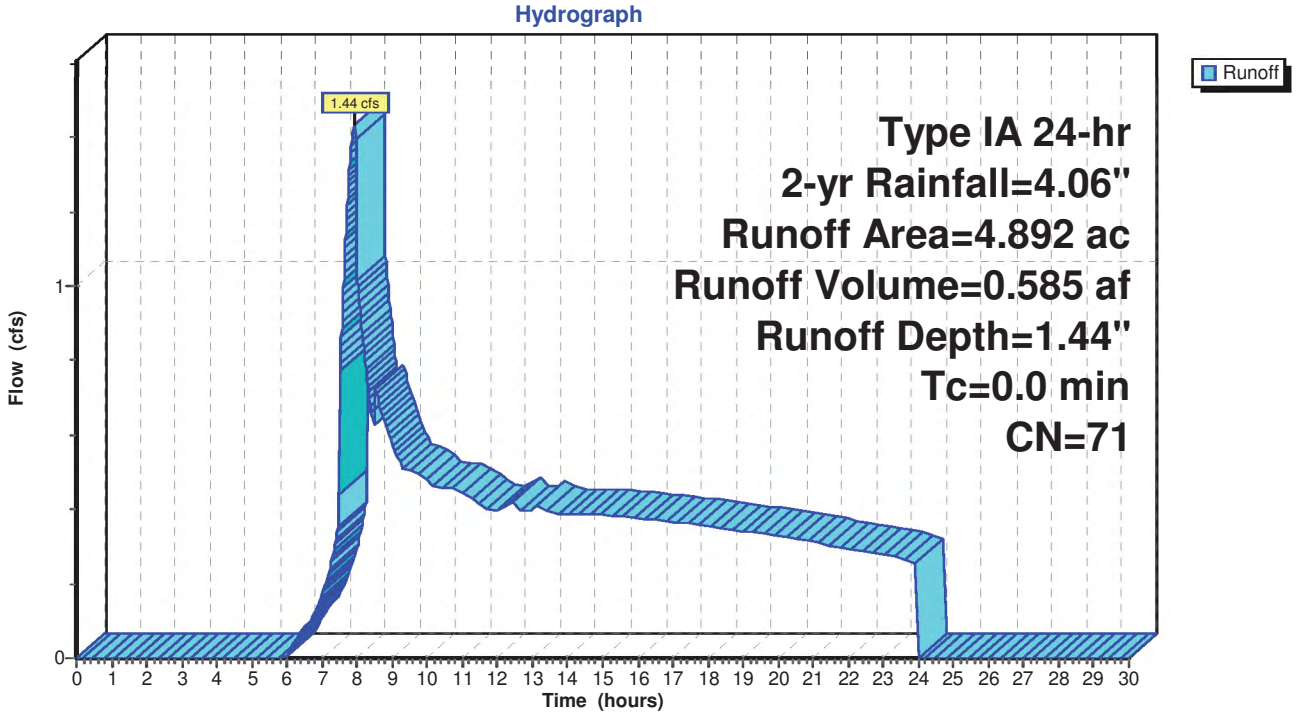
[46] Hint: Tc=0 (Instant runoff peak depends on dt)

Runoff = 1.44 cfs @ 7.94 hrs, Volume= 0.585 af, Depth= 1.44"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.01 hrs
Type IA 24-hr 2-yr Rainfall=4.06"

Area (ac)	CN	Description
0.267	75	Annual Grass, Good, HSG C
0.827	65	Brush, Good, HSG C
0.288	73	Brush, Good, HSG D
0.203	75	Vineyard, Good, HSG C
2.503	70	Woods, Good, HSG C
0.804	77	Woods, Good, HSG D
4.892	71	Weighted Average
4.892		100.00% Pervious Area

Subcatchment SUBAREA-1: Subarea -1



Summary for Subcatchment SUBAREA-2: Subarea - 2

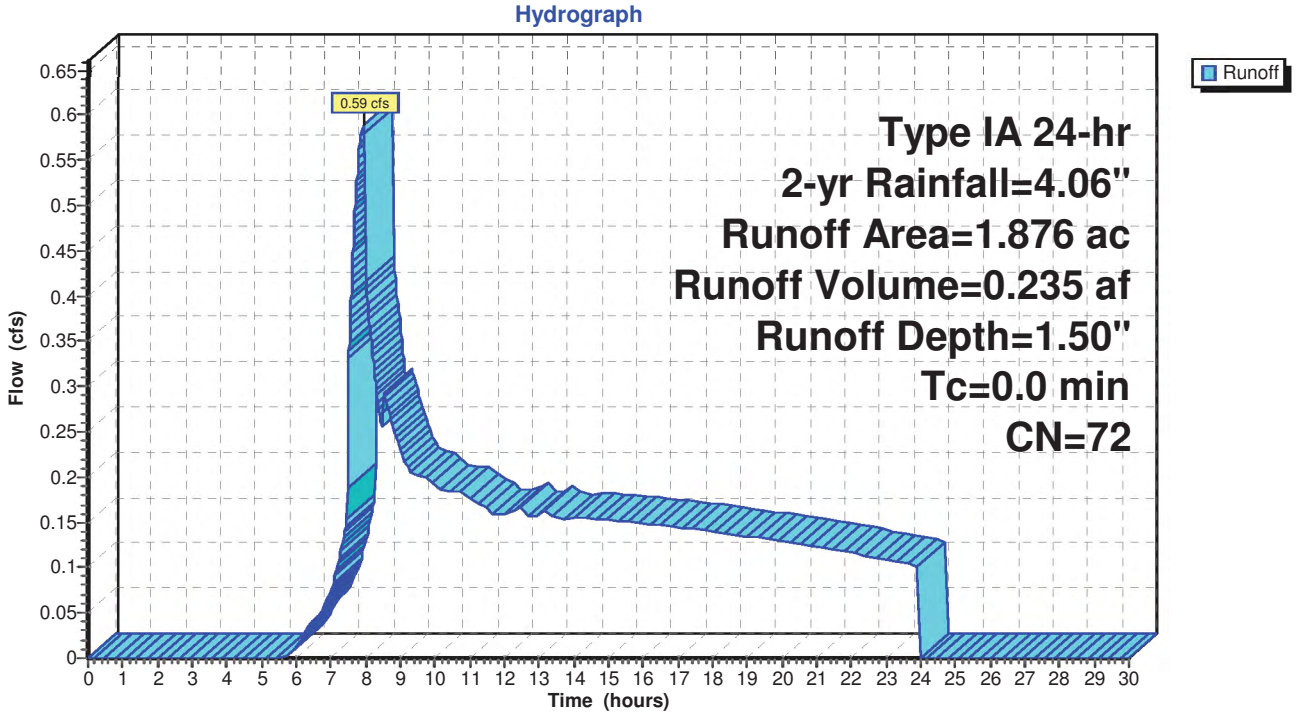
[46] Hint: Tc=0 (Instant runoff peak depends on dt)

Runoff = 0.59 cfs @ 7.94 hrs, Volume= 0.235 af, Depth= 1.50"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.01 hrs
Type IA 24-hr 2-yr Rainfall=4.06"

Area (ac)	CN	Description
0.140	75	Annual Grass, Good, HSG C
0.289	65	Brush, Good, HSG C
0.175	73	Brush, Good, HSG D
0.134	75	Vineyard, Good, HSG C
0.727	70	Woods, Good, HSG C
0.412	77	Woods, Good, HSG D
1.876	72	Weighted Average
1.876		100.00% Pervious Area

Subcatchment SUBAREA-2: Subarea - 2



Summary for Subcatchment SUBAREA-3: Subarea - 3

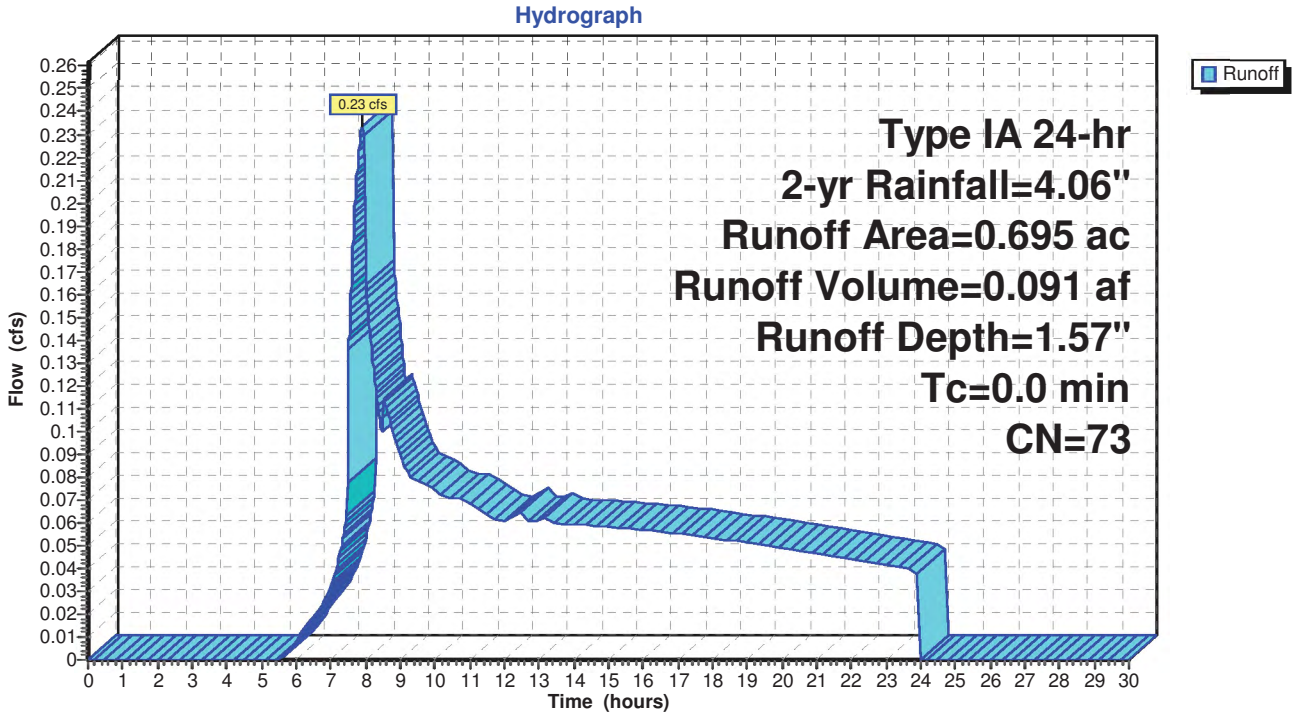
[46] Hint: Tc=0 (Instant runoff peak depends on dt)

Runoff = 0.23 cfs @ 7.93 hrs, Volume= 0.091 af, Depth= 1.57"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.01 hrs
Type IA 24-hr 2-yr Rainfall=4.06"

Area (ac)	CN	Description
0.025	75	Annual Grass, Good, HSG C
0.130	81	Annual Grass, Good, HSG D
0.212	65	Brush, Good, HSG C
0.077	73	Brush, Good, HSG D
0.093	75	Vineyard, Good, HSG C
0.057	70	Woods, Good, HSG C
0.101	77	Woods, Good, HSG D
0.695	73	Weighted Average
0.695		100.00% Pervious Area

Subcatchment SUBAREA-3: Subarea - 3



Summary for Subcatchment SUBAREA-4: Subarea - 4

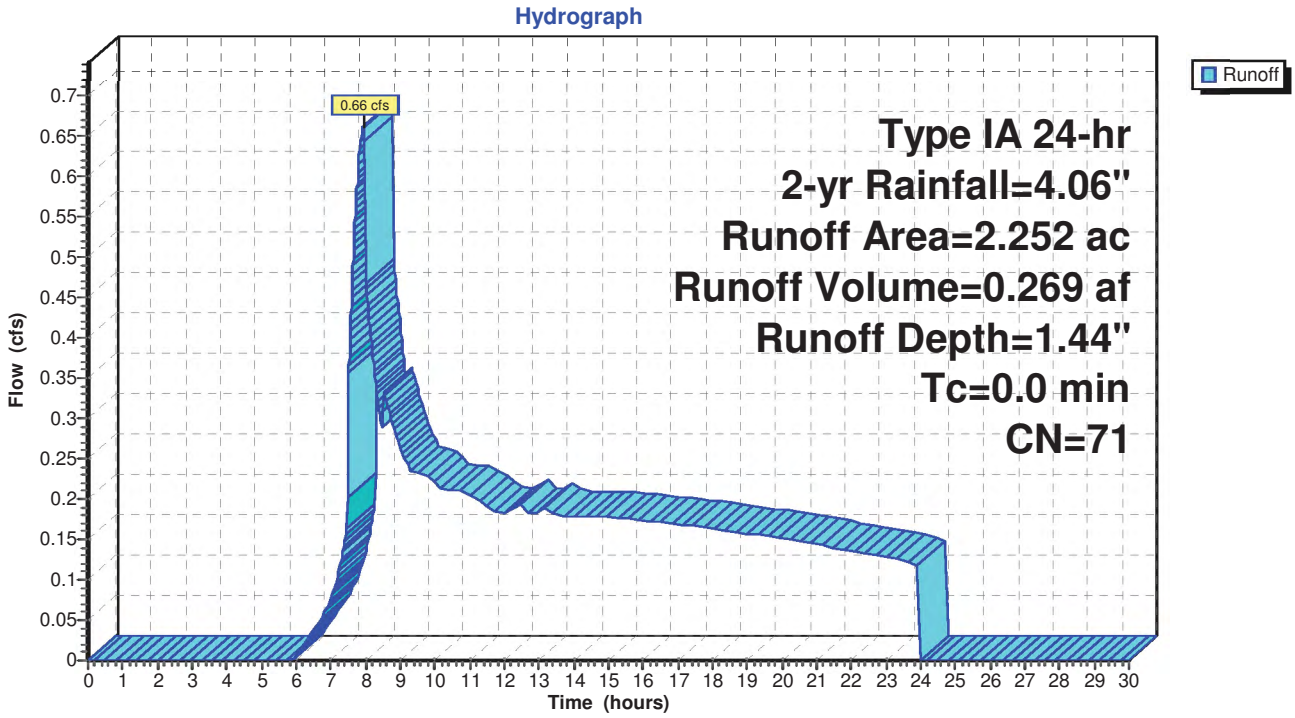
[46] Hint: Tc=0 (Instant runoff peak depends on dt)

Runoff = 0.66 cfs @ 7.94 hrs, Volume= 0.269 af, Depth= 1.44"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.01 hrs
Type IA 24-hr 2-yr Rainfall=4.06"

Area (ac)	CN	Description
0.067	75	Annual Grass, Good, HSG C
0.378	75	Vineyard, Good, HSG C
1.744	70	Woods, Good, HSG C
0.063	77	Woods, Good, HSG D
2.252	71	Weighted Average
2.252		100.00% Pervious Area

Subcatchment SUBAREA-4: Subarea - 4



Summary for Subcatchment WS-1: WS-1

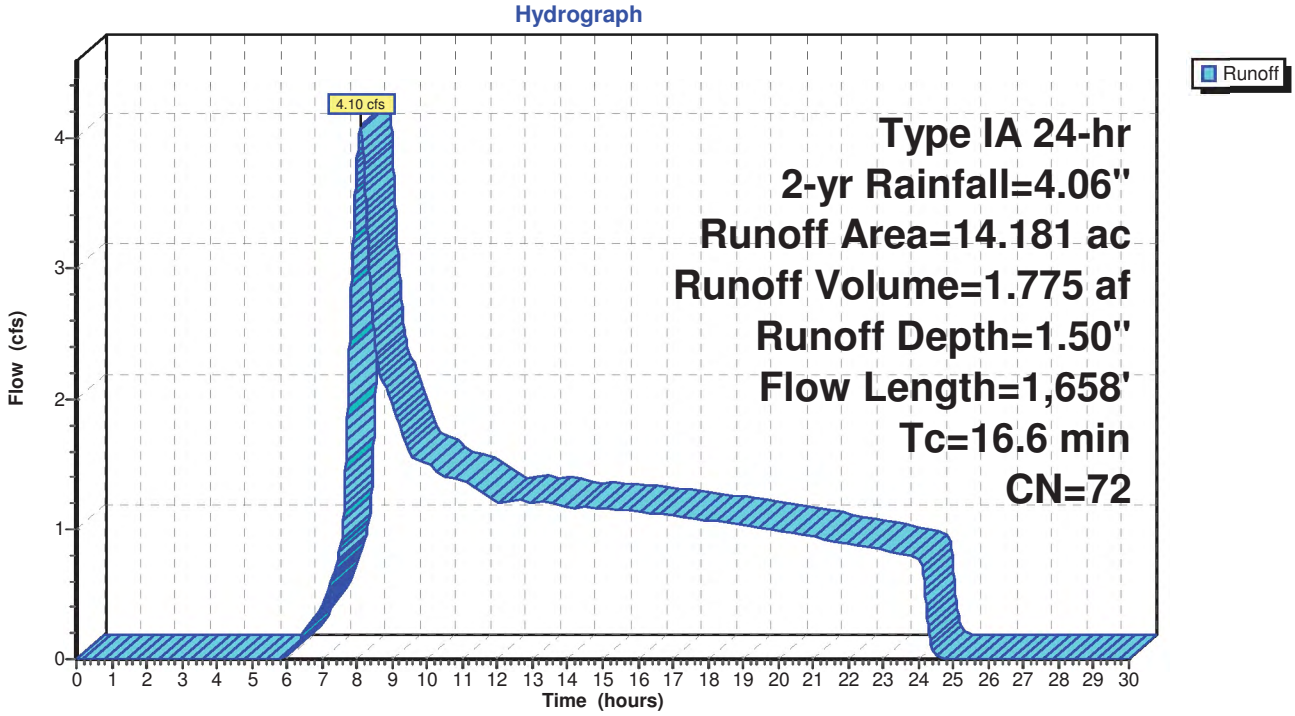
Runoff = 4.10 cfs @ 8.10 hrs, Volume= 1.775 af, Depth= 1.50"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.01 hrs
Type IA 24-hr 2-yr Rainfall=4.06"

Area (ac)	CN	Description
1.871	75	Annual Grass, Good, HSG C
0.545	65	Brush, Good, HSG C
0.149	87	Dirt roads, HSG C
0.069	91	Fallow, bare soil, HSG C
0.202	82	Farmsteads, HSG C
0.271	89	Gravel Roads, HSG C
3.023	75	Vineyard, Good, HSG C
8.051	70	Woods, Good, HSG C
14.181	72	Weighted Average
14.181		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.0	100	0.2000	0.33		**Sheet Flow, Sheet** Grass: Dense n= 0.240 P2= 4.06"
0.1	28	0.2800	3.70		**Shallow Concentrated Flow, Shallow - Short Grass** Short Grass Pasture Kv= 7.0 fps
8.3	73	0.3400	0.15		**Sheet Flow, Sheet - Post LS** Woods: Dense underbrush n= 0.800 P2= 4.06"
0.7	132	0.4400	3.32		**Shallow Concentrated Flow, Shallow - Woodland** Woodland Kv= 5.0 fps
0.4	100	0.3700	4.26		**Shallow Concentrated Flow, Shallow - Short Grass** Short Grass Pasture Kv= 7.0 fps
0.5	104	0.0200	3.51	7.02	**Trap/Vee/Rect Channel Flow, Ditch** Bot.W=0.00' D=1.00' Z= 2.0 '/' Top.W=4.00' n= 0.035
0.3	262	0.2500	13.24	4.62	**Pipe Channel, 10" SW Pipe** 8.0" Round Area= 0.3 sf Perim= 2.1' r= 0.17' n= 0.017 PPI 10in CPP
0.2	168	0.1000	18.65	14.65	**Pipe Channel, 12" DW Pipe** 12.0" Round Area= 0.8 sf Perim= 3.1' r= 0.25' n= 0.010 PPI Dual Walled CPP
0.0	37	0.1100	19.56	15.36	**Pipe Channel, 12" DW Culvert** 12.0" Round Area= 0.8 sf Perim= 3.1' r= 0.25' n= 0.010 PPI Dual Walled CPP
0.3	183	0.1300	8.95	17.90	**Trap/Vee/Rect Channel Flow, Ditch** Bot.W=0.00' D=1.00' Z= 2.0 '/' Top.W=4.00' n= 0.035
0.8	471	0.1200	9.85	29.56	**Trap/Vee/Rect Channel Flow, Stream** Bot.W=1.00' D=1.00' Z= 2.0 '/' Top.W=5.00' n= 0.035
16.6	1,658	Total			

Subcatchment WS-1: WS-1



Summary for Subcatchment WS-2: WS-2

[47] Hint: Peak is 182% of capacity of segment #5
[47] Hint: Peak is 292% of capacity of segment #6

Runoff = 12.81 cfs @ 8.06 hrs, Volume= 5.132 af, Depth= 1.64"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.01 hrs
Type IA 24-hr 2-yr Rainfall=4.06"

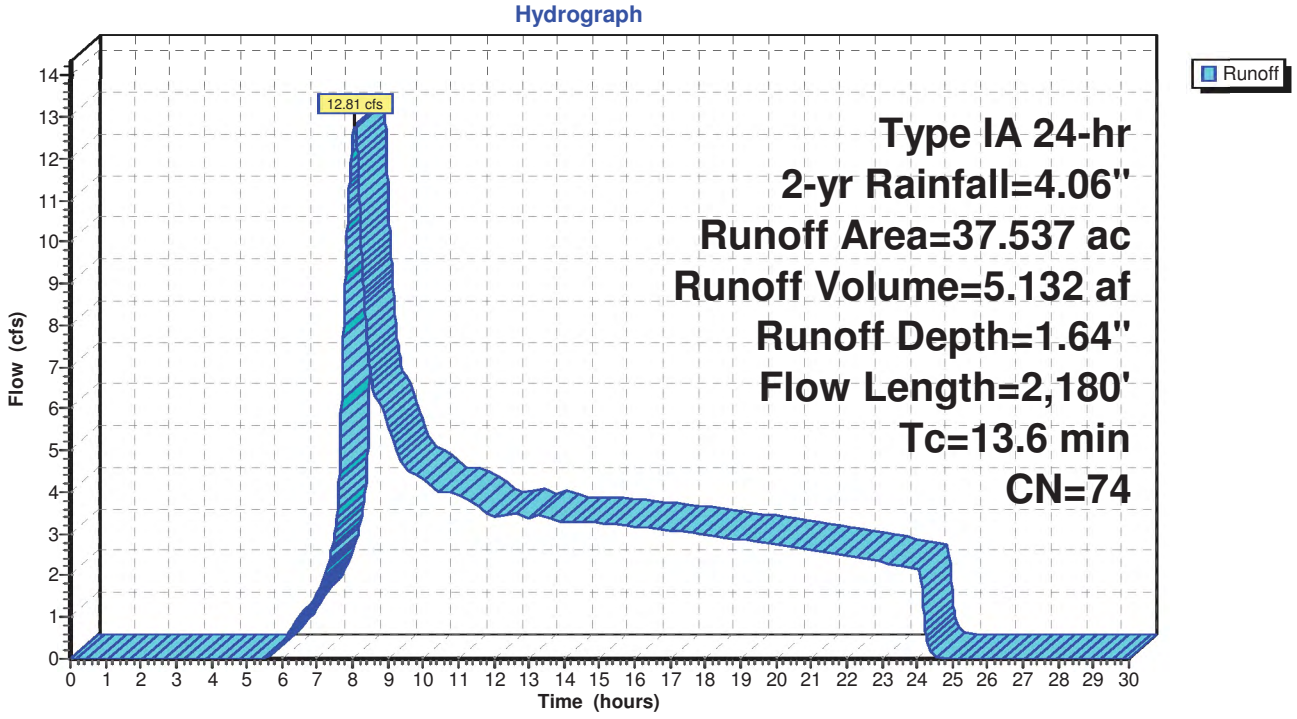
Area (ac)	CN	Description
9.177	75	Annual Grass, Good, HSG C
1.871	81	Annual Grass, Good, HSG D
1.334	65	Brush, Good, HSG C
1.478	73	Brush, Good, HSG D
0.800	87	Dirt roads, HSG C
0.039	91	Fallow, bare soil, HSG C
0.369	82	Farmsteads, HSG C
0.270	89	Gravel Roads, HSG C
7.322	75	Vineyard, Good, HSG C
0.196	98	Water Surface, HSG C
12.233	70	Woods, Good, HSG C
2.448	77	Woods, Good, HSG D
37.537	74	Weighted Average
37.341		99.48% Pervious Area
0.196		0.52% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.3	100	0.1800	0.32		**Sheet Flow, Sheet** Grass: Dense n= 0.240 P2= 4.06"
0.4	104	0.3200	3.96		**Shallow Concentrated Flow, Shallow - Short Grass** Short Grass Pasture Kv= 7.0 fps
0.8	155	0.3700	3.04		**Shallow Concentrated Flow, Shallow - Woodland** Woodland Kv= 5.0 fps
0.3	72	0.3800	4.32		**Shallow Concentrated Flow, Shallow - Short Grass** Short Grass Pasture Kv= 7.0 fps
0.1	28	0.0200	3.51	7.02	**Trap/Vee/Rect Channel Flow, Ditch** Bot.W=0.00' D=1.00' Z= 2.0 '/' Top.W=4.00' n= 0.035
0.6	488	0.2000	12.58	4.39	**Pipe Channel, 8" SW** 8.0" Round Area= 0.3 sf Perim= 2.1' r= 0.17' n= 0.016 PPI 8in CPP
4.2	100	0.3100	0.39		**Sheet Flow, Sheet - Post LS** Grass: Dense n= 0.240 P2= 4.06"
0.4	200	0.0900	9.29	65.00	**Trap/Vee/Rect Channel Flow, Swale (assumed)** Bot.W=3.00' D=1.00' Z= 4.0 '/' Top.W=11.00' n= 0.035
1.5	933	0.1400	10.64	31.92	**Trap/Vee/Rect Channel Flow, Stream (assumed)** Bot.W=1.00' D=1.00' Z= 2.0 '/' Top.W=5.00'

n= 0.035

13.6	2,180	Total

Subcatchment WS-2: WS-2



Summary for Subcatchment SUBAREA-1: Subarea -1

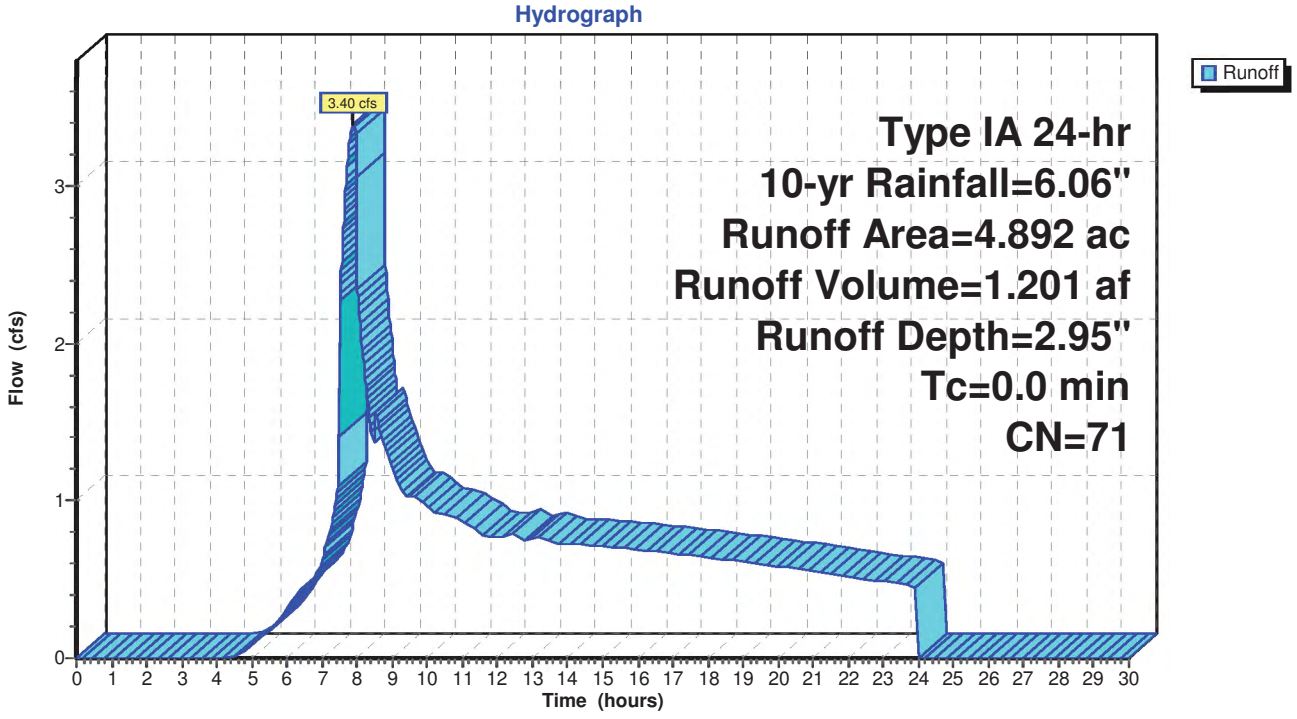
[46] Hint: Tc=0 (Instant runoff peak depends on dt)

Runoff = 3.40 cfs @ 7.89 hrs, Volume= 1.201 af, Depth= 2.95"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.01 hrs
Type IA 24-hr 10-yr Rainfall=6.06"

Area (ac)	CN	Description
0.267	75	Annual Grass, Good, HSG C
0.827	65	Brush, Good, HSG C
0.288	73	Brush, Good, HSG D
0.203	75	Vineyard, Good, HSG C
2.503	70	Woods, Good, HSG C
0.804	77	Woods, Good, HSG D
4.892	71	Weighted Average
4.892		100.00% Pervious Area

Subcatchment SUBAREA-1: Subarea -1



Summary for Subcatchment SUBAREA-2: Subarea - 2

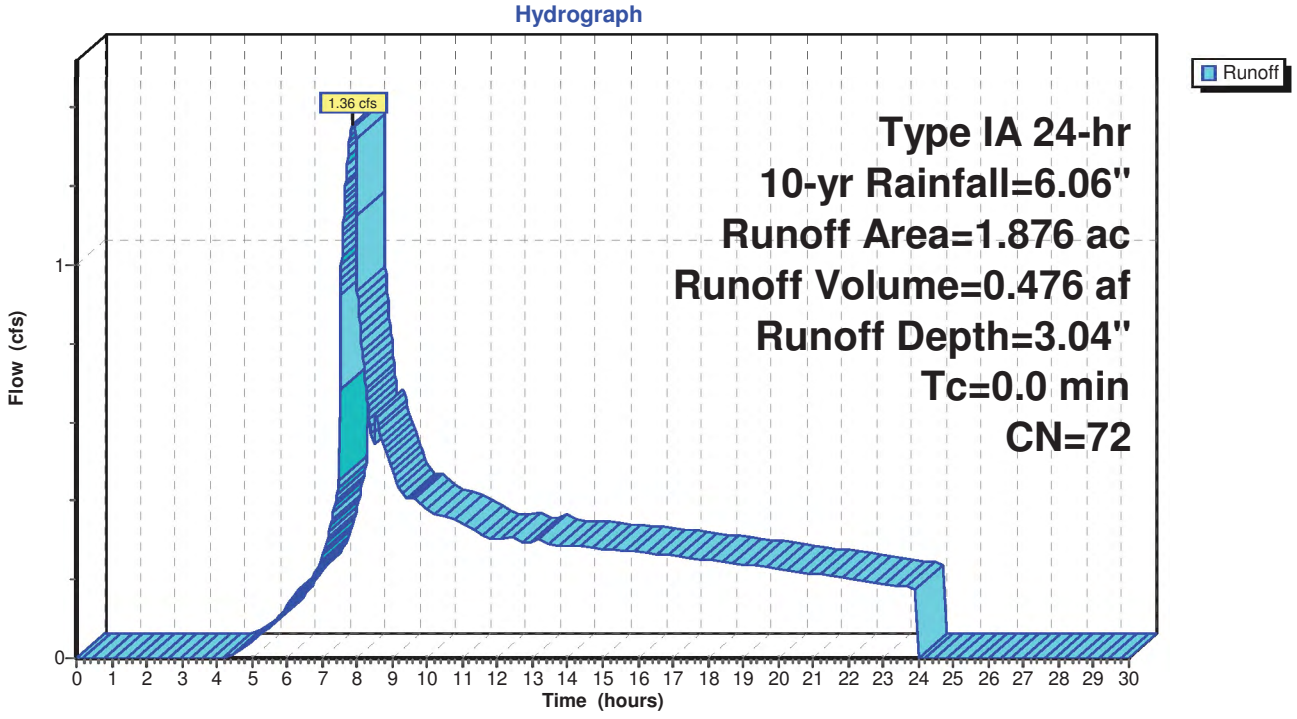
[46] Hint: Tc=0 (Instant runoff peak depends on dt)

Runoff = 1.36 cfs @ 7.89 hrs, Volume= 0.476 af, Depth= 3.04"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.01 hrs
Type IA 24-hr 10-yr Rainfall=6.06"

Area (ac)	CN	Description
0.140	75	Annual Grass, Good, HSG C
0.289	65	Brush, Good, HSG C
0.175	73	Brush, Good, HSG D
0.134	75	Vineyard, Good, HSG C
0.727	70	Woods, Good, HSG C
0.412	77	Woods, Good, HSG D
1.876	72	Weighted Average
1.876		100.00% Pervious Area

Subcatchment SUBAREA-2: Subarea - 2



Summary for Subcatchment SUBAREA-3: Subarea - 3

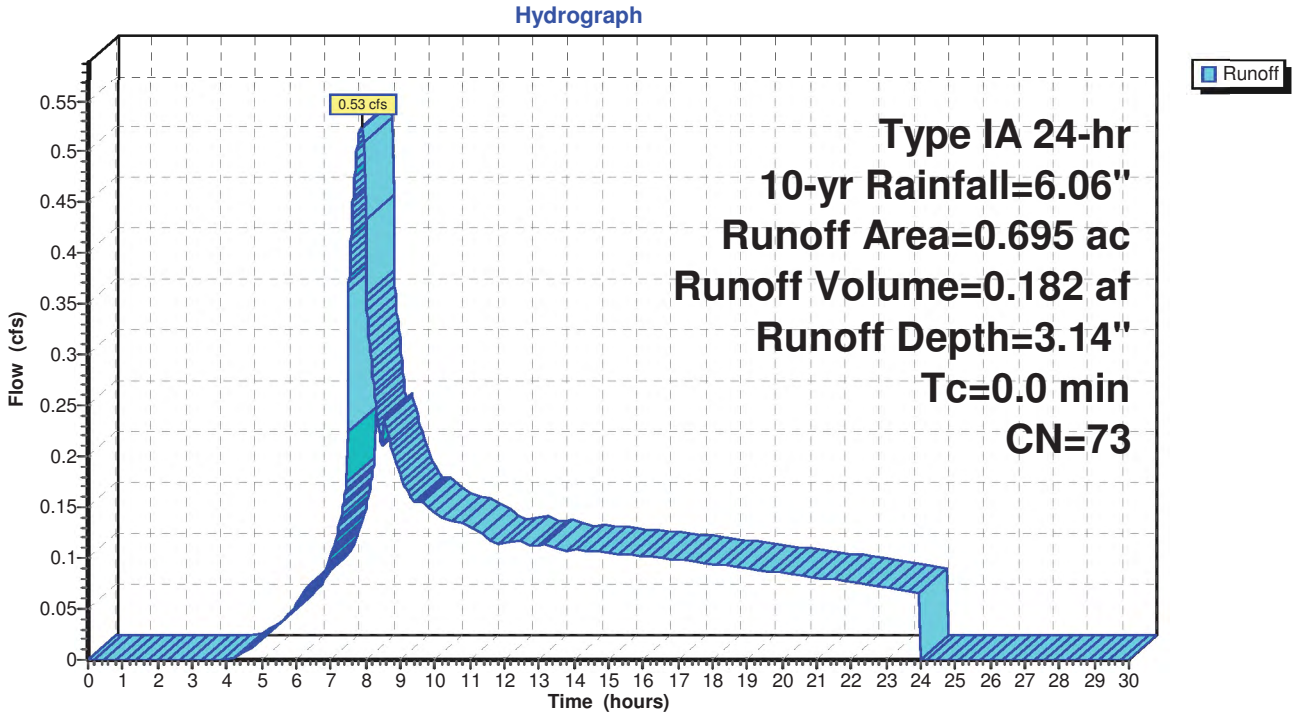
[46] Hint: Tc=0 (Instant runoff peak depends on dt)

Runoff = 0.53 cfs @ 7.88 hrs, Volume= 0.182 af, Depth= 3.14"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.01 hrs
Type IA 24-hr 10-yr Rainfall=6.06"

Area (ac)	CN	Description
0.025	75	Annual Grass, Good, HSG C
0.130	81	Annual Grass, Good, HSG D
0.212	65	Brush, Good, HSG C
0.077	73	Brush, Good, HSG D
0.093	75	Vineyard, Good, HSG C
0.057	70	Woods, Good, HSG C
0.101	77	Woods, Good, HSG D
0.695	73	Weighted Average
0.695		100.00% Pervious Area

Subcatchment SUBAREA-3: Subarea - 3



Summary for Subcatchment SUBAREA-4: Subarea - 4

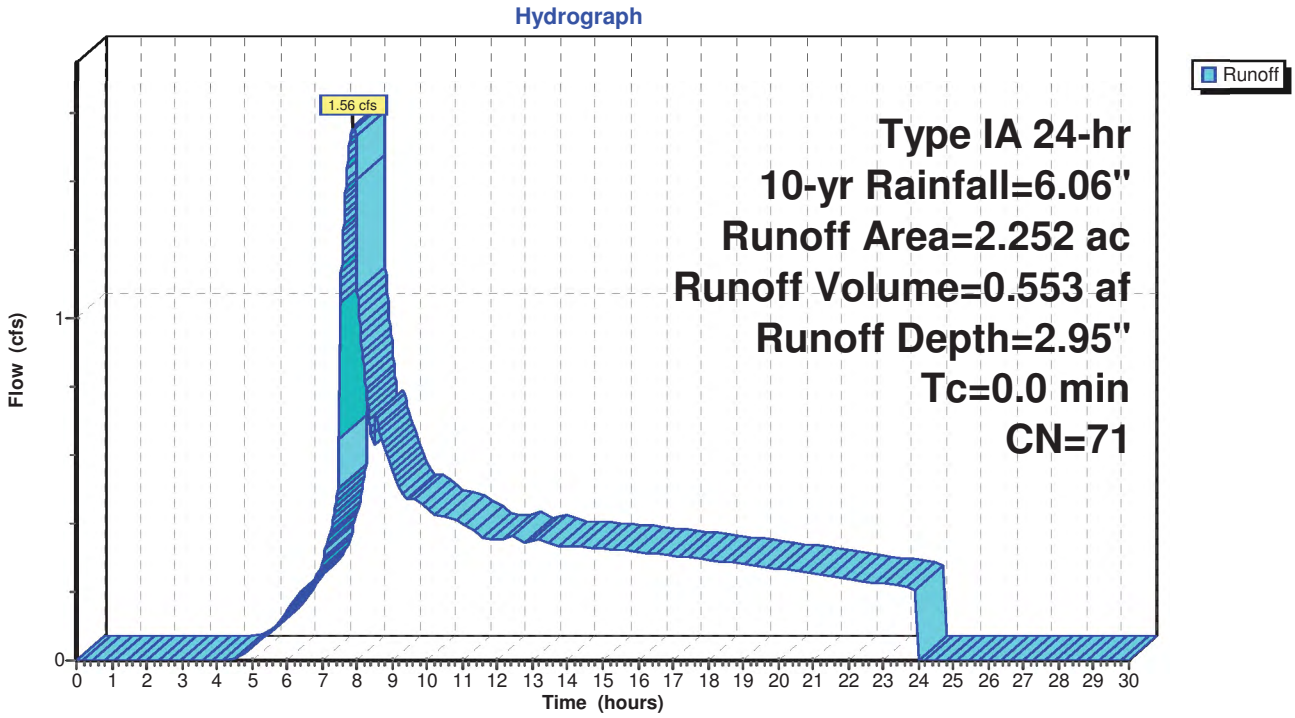
[46] Hint: Tc=0 (Instant runoff peak depends on dt)

Runoff = 1.56 cfs @ 7.89 hrs, Volume= 0.553 af, Depth= 2.95"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.01 hrs
Type IA 24-hr 10-yr Rainfall=6.06"

Area (ac)	CN	Description
0.067	75	Annual Grass, Good, HSG C
0.378	75	Vineyard, Good, HSG C
1.744	70	Woods, Good, HSG C
0.063	77	Woods, Good, HSG D
2.252	71	Weighted Average
2.252		100.00% Pervious Area

Subcatchment SUBAREA-4: Subarea - 4



Summary for Subcatchment WS-1: WS-1

[47] Hint: Peak is 138% of capacity of segment #6
[47] Hint: Peak is 210% of capacity of segment #7

Runoff = 9.70 cfs @ 8.09 hrs, Volume= 3.595 af, Depth= 3.04"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.01 hrs
Type IA 24-hr 10-yr Rainfall=6.06"

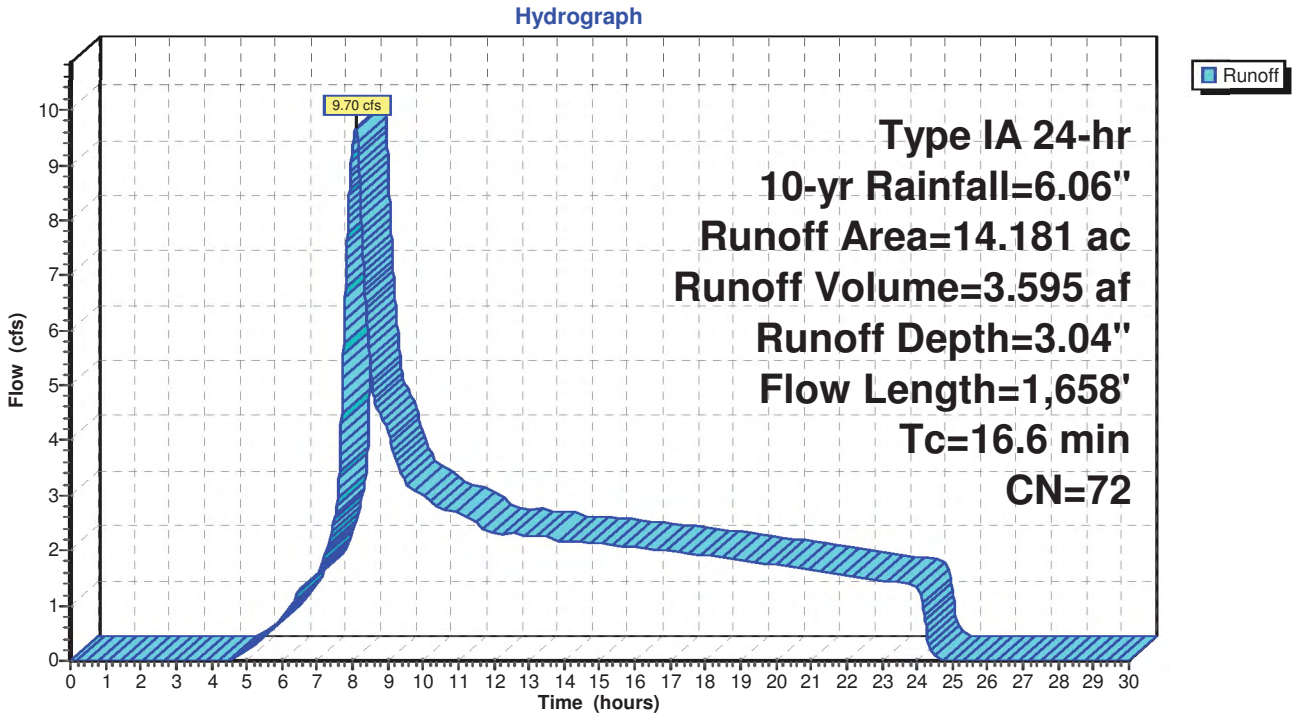
Area (ac)	CN	Description
1.871	75	Annual Grass, Good, HSG C
0.545	65	Brush, Good, HSG C
0.149	87	Dirt roads, HSG C
0.069	91	Fallow, bare soil, HSG C
0.202	82	Farmsteads, HSG C
0.271	89	Gravel Roads, HSG C
3.023	75	Vineyard, Good, HSG C
8.051	70	Woods, Good, HSG C
14.181	72	Weighted Average
14.181		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.0	100	0.2000	0.33		**Sheet Flow, Sheet** Grass: Dense n= 0.240 P2= 4.06"
0.1	28	0.2800	3.70		**Shallow Concentrated Flow, Shallow - Short Grass** Short Grass Pasture Kv= 7.0 fps
8.3	73	0.3400	0.15		**Sheet Flow, Sheet - Post LS** Woods: Dense underbrush n= 0.800 P2= 4.06"
0.7	132	0.4400	3.32		**Shallow Concentrated Flow, Shallow - Woodland** Woodland Kv= 5.0 fps
0.4	100	0.3700	4.26		**Shallow Concentrated Flow, Shallow - Short Grass** Short Grass Pasture Kv= 7.0 fps
0.5	104	0.0200	3.51	7.02	**Trap/Vee/Rect Channel Flow, Ditch** Bot.W=0.00' D=1.00' Z= 2.0 '/' Top.W=4.00' n= 0.035
0.3	262	0.2500	13.24	4.62	**Pipe Channel, 10" SW Pipe** 8.0" Round Area= 0.3 sf Perim= 2.1' r= 0.17' n= 0.017 PPI 10in CPP
0.2	168	0.1000	18.65	14.65	**Pipe Channel, 12" DW Pipe** 12.0" Round Area= 0.8 sf Perim= 3.1' r= 0.25' n= 0.010 PPI Dual Walled CPP
0.0	37	0.1100	19.56	15.36	**Pipe Channel, 12" DW Culvert** 12.0" Round Area= 0.8 sf Perim= 3.1' r= 0.25' n= 0.010 PPI Dual Walled CPP
0.3	183	0.1300	8.95	17.90	**Trap/Vee/Rect Channel Flow, Ditch** Bot.W=0.00' D=1.00' Z= 2.0 '/' Top.W=4.00' n= 0.035
0.8	471	0.1200	9.85	29.56	**Trap/Vee/Rect Channel Flow, Stream**

Bot.W=1.00' D=1.00' Z= 2.0 '/' Top.W=5.00'
n= 0.035

16.6	1,658	Total

Subcatchment WS-1: WS-1



Summary for Subcatchment WS-2: WS-2

[47] Hint: Peak is 407% of capacity of segment #5
[47] Hint: Peak is 651% of capacity of segment #6

Runoff = 28.58 cfs @ 8.05 hrs, Volume= 10.121 af, Depth= 3.24"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.01 hrs
Type IA 24-hr 10-yr Rainfall=6.06"

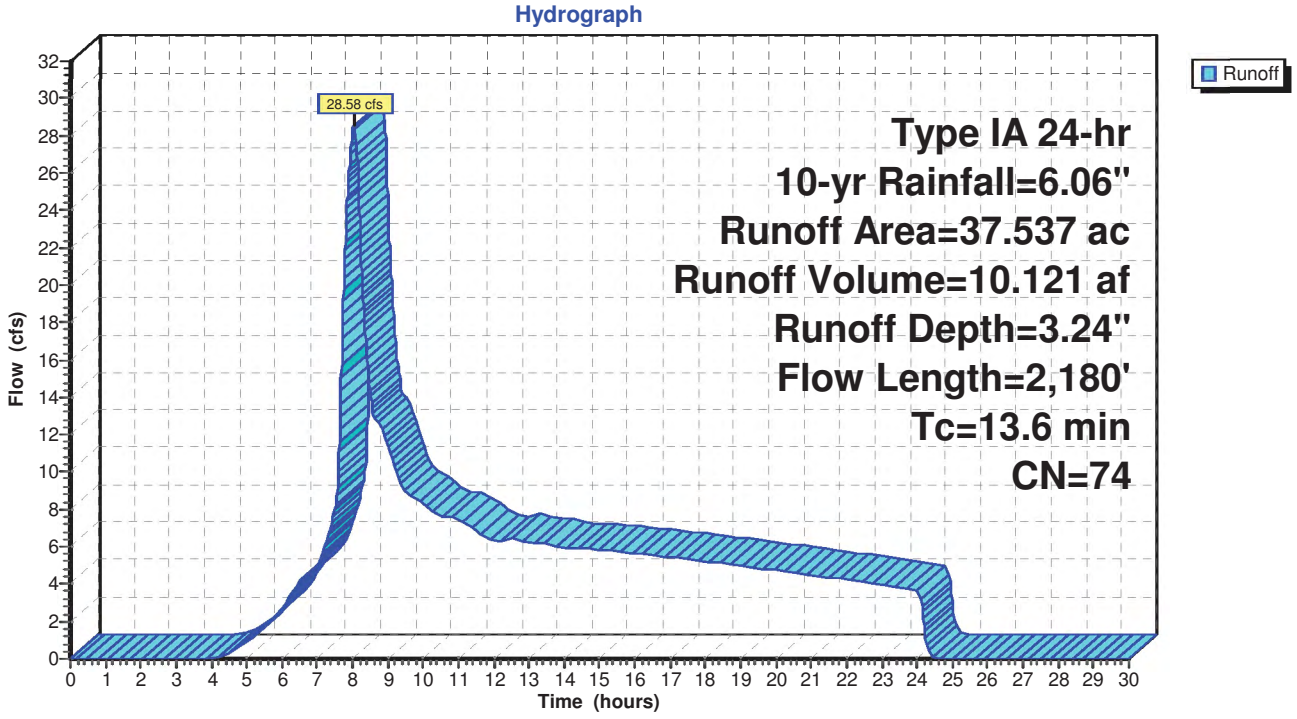
Area (ac)	CN	Description
9.177	75	Annual Grass, Good, HSG C
1.871	81	Annual Grass, Good, HSG D
1.334	65	Brush, Good, HSG C
1.478	73	Brush, Good, HSG D
0.800	87	Dirt roads, HSG C
0.039	91	Fallow, bare soil, HSG C
0.369	82	Farmsteads, HSG C
0.270	89	Gravel Roads, HSG C
7.322	75	Vineyard, Good, HSG C
0.196	98	Water Surface, HSG C
12.233	70	Woods, Good, HSG C
2.448	77	Woods, Good, HSG D
37.537	74	Weighted Average
37.341		99.48% Pervious Area
0.196		0.52% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.3	100	0.1800	0.32		**Sheet Flow, Sheet** Grass: Dense n= 0.240 P2= 4.06"
0.4	104	0.3200	3.96		**Shallow Concentrated Flow, Shallow - Short Grass** Short Grass Pasture Kv= 7.0 fps
0.8	155	0.3700	3.04		**Shallow Concentrated Flow, Shallow - Woodland** Woodland Kv= 5.0 fps
0.3	72	0.3800	4.32		**Shallow Concentrated Flow, Shallow - Short Grass** Short Grass Pasture Kv= 7.0 fps
0.1	28	0.0200	3.51	7.02	**Trap/Vee/Rect Channel Flow, Ditch** Bot.W=0.00' D=1.00' Z= 2.0 '/' Top.W=4.00' n= 0.035
0.6	488	0.2000	12.58	4.39	**Pipe Channel, 8" SW** 8.0" Round Area= 0.3 sf Perim= 2.1' r= 0.17' n= 0.016 PPI 8in CPP
4.2	100	0.3100	0.39		**Sheet Flow, Sheet - Post LS** Grass: Dense n= 0.240 P2= 4.06"
0.4	200	0.0900	9.29	65.00	**Trap/Vee/Rect Channel Flow, Swale (assumed)** Bot.W=3.00' D=1.00' Z= 4.0 '/' Top.W=11.00' n= 0.035
1.5	933	0.1400	10.64	31.92	**Trap/Vee/Rect Channel Flow, Stream (assumed)** Bot.W=1.00' D=1.00' Z= 2.0 '/' Top.W=5.00'

n= 0.035

13.6	2,180	Total

Subcatchment WS-2: WS-2



Summary for Subcatchment SUBAREA-1: Subarea -1

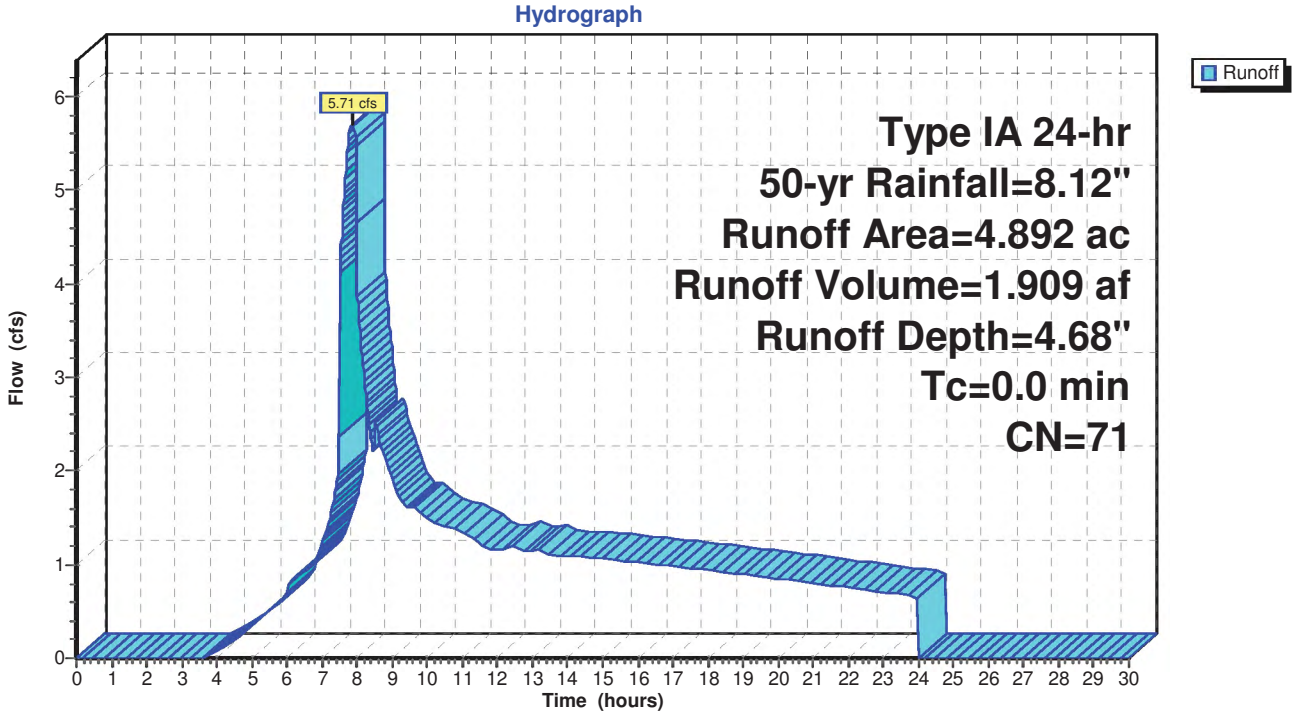
[46] Hint: Tc=0 (Instant runoff peak depends on dt)

Runoff = 5.71 cfs @ 7.86 hrs, Volume= 1.909 af, Depth= 4.68"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.01 hrs
Type IA 24-hr 50-yr Rainfall=8.12"

Area (ac)	CN	Description
0.267	75	Annual Grass, Good, HSG C
0.827	65	Brush, Good, HSG C
0.288	73	Brush, Good, HSG D
0.203	75	Vineyard, Good, HSG C
2.503	70	Woods, Good, HSG C
0.804	77	Woods, Good, HSG D
4.892	71	Weighted Average
4.892		100.00% Pervious Area

Subcatchment SUBAREA-1: Subarea -1



Summary for Subcatchment SUBAREA-2: Subarea - 2

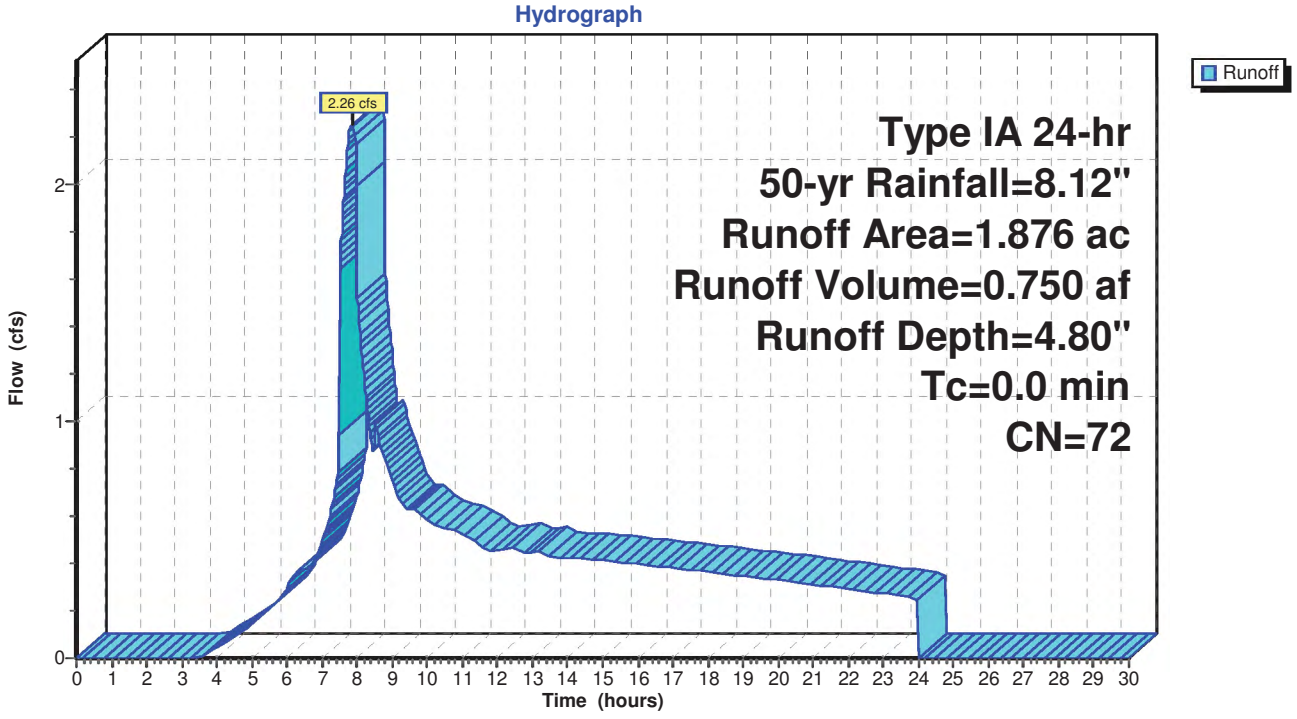
[46] Hint: Tc=0 (Instant runoff peak depends on dt)

Runoff = 2.26 cfs @ 7.86 hrs, Volume= 0.750 af, Depth= 4.80"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.01 hrs
Type IA 24-hr 50-yr Rainfall=8.12"

Area (ac)	CN	Description
0.140	75	Annual Grass, Good, HSG C
0.289	65	Brush, Good, HSG C
0.175	73	Brush, Good, HSG D
0.134	75	Vineyard, Good, HSG C
0.727	70	Woods, Good, HSG C
0.412	77	Woods, Good, HSG D
1.876	72	Weighted Average
1.876		100.00% Pervious Area

Subcatchment SUBAREA-2: Subarea - 2



Summary for Subcatchment SUBAREA-3: Subarea - 3

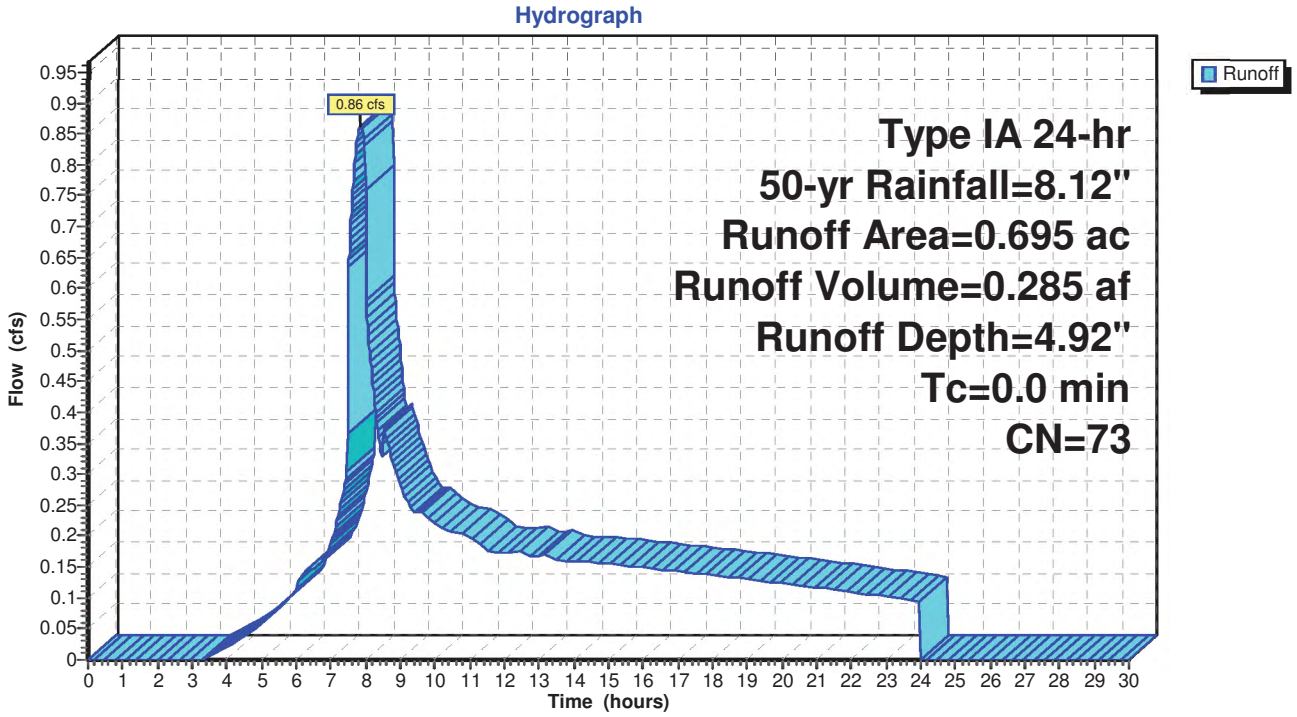
[46] Hint: Tc=0 (Instant runoff peak depends on dt)

Runoff = 0.86 cfs @ 7.85 hrs, Volume= 0.285 af, Depth= 4.92"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.01 hrs
Type IA 24-hr 50-yr Rainfall=8.12"

Area (ac)	CN	Description
0.025	75	Annual Grass, Good, HSG C
0.130	81	Annual Grass, Good, HSG D
0.212	65	Brush, Good, HSG C
0.077	73	Brush, Good, HSG D
0.093	75	Vineyard, Good, HSG C
0.057	70	Woods, Good, HSG C
0.101	77	Woods, Good, HSG D
0.695	73	Weighted Average
0.695		100.00% Pervious Area

Subcatchment SUBAREA-3: Subarea - 3



Summary for Subcatchment SUBAREA-4: Subarea - 4

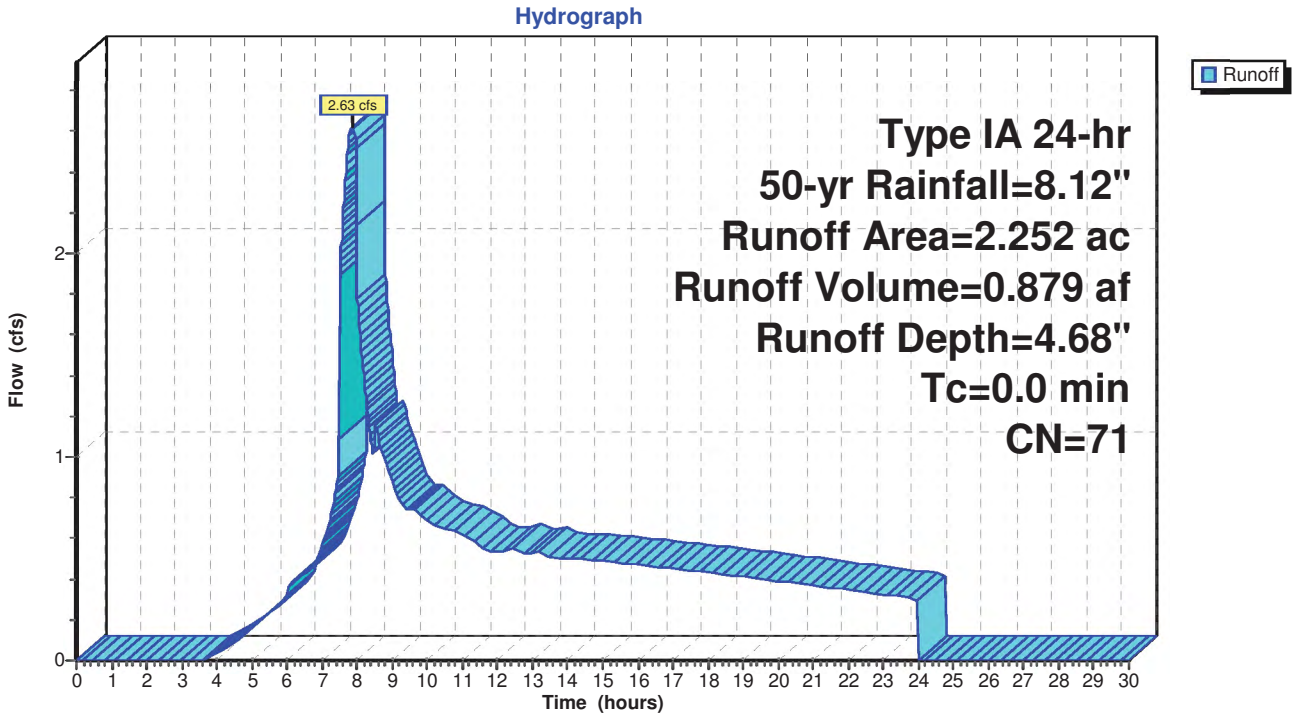
[46] Hint: Tc=0 (Instant runoff peak depends on dt)

Runoff = 2.63 cfs @ 7.86 hrs, Volume= 0.879 af, Depth= 4.68"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.01 hrs
Type IA 24-hr 50-yr Rainfall=8.12"

Area (ac)	CN	Description
0.067	75	Annual Grass, Good, HSG C
0.378	75	Vineyard, Good, HSG C
1.744	70	Woods, Good, HSG C
0.063	77	Woods, Good, HSG D
2.252	71	Weighted Average
2.252		100.00% Pervious Area

Subcatchment SUBAREA-4: Subarea - 4



Summary for Subcatchment WS-1: WS-1

[47] Hint: Peak is 231% of capacity of segment #6
[47] Hint: Peak is 351% of capacity of segment #7
[47] Hint: Peak is 111% of capacity of segment #8
[47] Hint: Peak is 106% of capacity of segment #9

Runoff = 16.23 cfs @ 8.07 hrs, Volume= 5.672 af, Depth= 4.80"

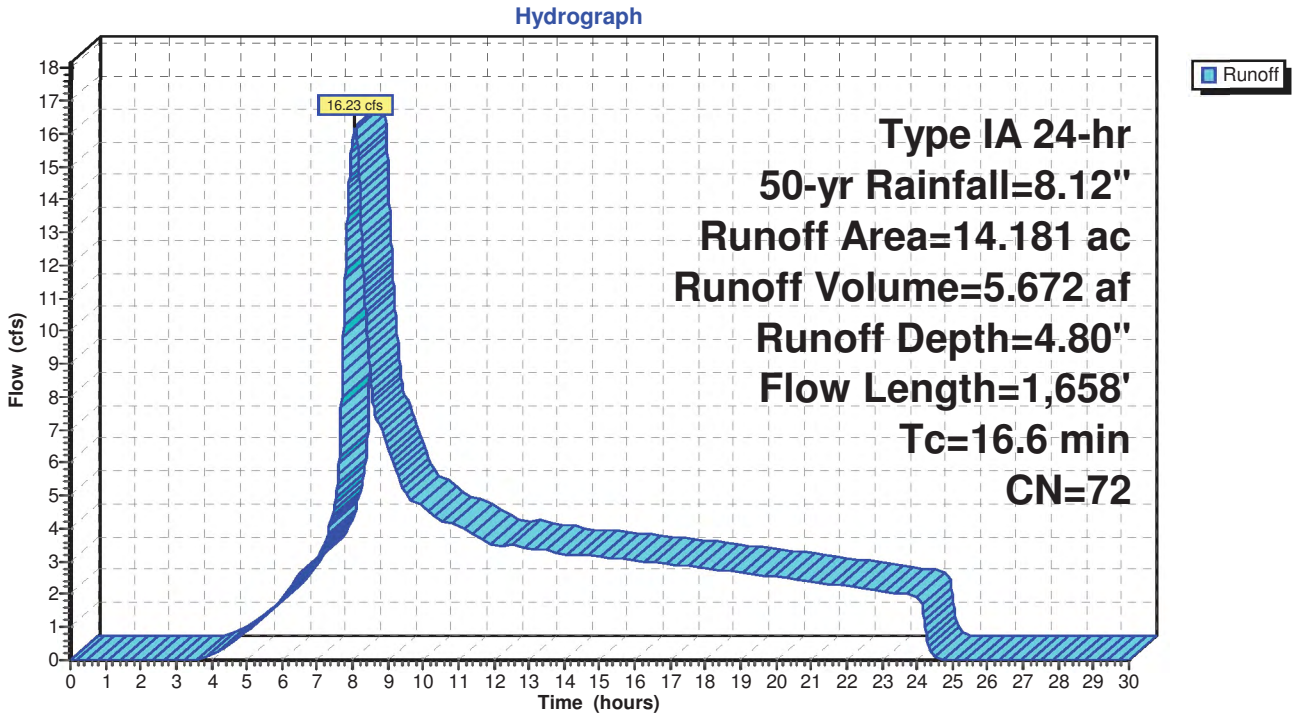
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.01 hrs
Type IA 24-hr 50-yr Rainfall=8.12"

Area (ac)	CN	Description
1.871	75	Annual Grass, Good, HSG C
0.545	65	Brush, Good, HSG C
0.149	87	Dirt roads, HSG C
0.069	91	Fallow, bare soil, HSG C
0.202	82	Farmsteads, HSG C
0.271	89	Gravel Roads, HSG C
3.023	75	Vineyard, Good, HSG C
8.051	70	Woods, Good, HSG C
14.181	72	Weighted Average
14.181		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.0	100	0.2000	0.33		**Sheet Flow, Sheet** Grass: Dense n= 0.240 P2= 4.06"
0.1	28	0.2800	3.70		**Shallow Concentrated Flow, Shallow - Short Grass** Short Grass Pasture Kv= 7.0 fps
8.3	73	0.3400	0.15		**Sheet Flow, Sheet - Post LS** Woods: Dense underbrush n= 0.800 P2= 4.06"
0.7	132	0.4400	3.32		**Shallow Concentrated Flow, Shallow - Woodland** Woodland Kv= 5.0 fps
0.4	100	0.3700	4.26		**Shallow Concentrated Flow, Shallow - Short Grass** Short Grass Pasture Kv= 7.0 fps
0.5	104	0.0200	3.51	7.02	**Trap/Vee/Rect Channel Flow, Ditch** Bot.W=0.00' D=1.00' Z= 2.0 '/' Top.W=4.00' n= 0.035
0.3	262	0.2500	13.24	4.62	**Pipe Channel, 10" SW Pipe** 8.0" Round Area= 0.3 sf Perim= 2.1' r= 0.17' n= 0.017 PPI 10in CPP
0.2	168	0.1000	18.65	14.65	**Pipe Channel, 12" DW Pipe** 12.0" Round Area= 0.8 sf Perim= 3.1' r= 0.25' n= 0.010 PPI Dual Walled CPP
0.0	37	0.1100	19.56	15.36	**Pipe Channel, 12" DW Culvert** 12.0" Round Area= 0.8 sf Perim= 3.1' r= 0.25' n= 0.010 PPI Dual Walled CPP
0.3	183	0.1300	8.95	17.90	**Trap/Vee/Rect Channel Flow, Ditch** Bot.W=0.00' D=1.00' Z= 2.0 '/' Top.W=4.00'

n= 0.035					
0.8	471	0.1200	9.85	29.56	**Trap/Vee/Rect Channel Flow, Stream** Bot.W=1.00' D=1.00' Z= 2.0 '/' Top.W=5.00' n= 0.035
16.6	1,658	Total			

Subcatchment WS-1: WS-1



Summary for Subcatchment WS-2: WS-2

[47] Hint: Peak is 663% of capacity of segment #5
[47] Hint: Peak is 1061% of capacity of segment #6
[47] Hint: Peak is 146% of capacity of segment #9

Runoff = 46.58 cfs @ 8.05 hrs, Volume= 15.744 af, Depth= 5.03"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.01 hrs
Type IA 24-hr 50-yr Rainfall=8.12"

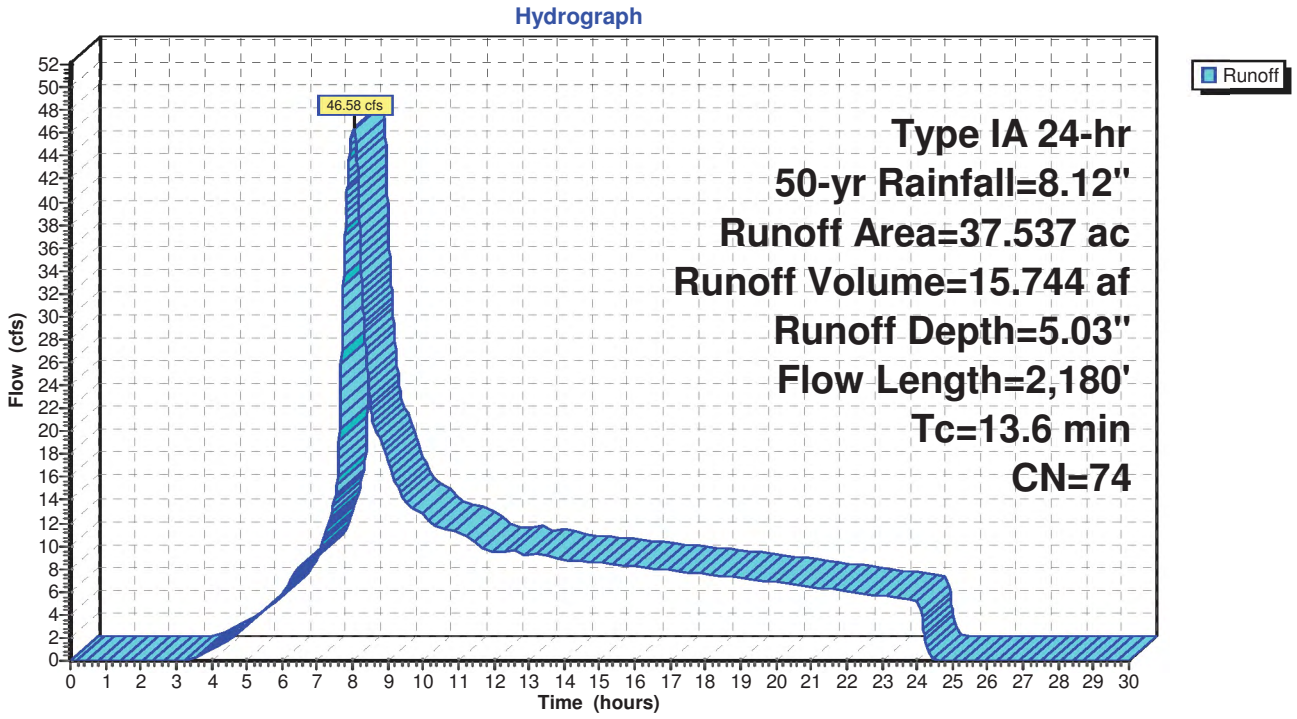
Area (ac)	CN	Description
9.177	75	Annual Grass, Good, HSG C
1.871	81	Annual Grass, Good, HSG D
1.334	65	Brush, Good, HSG C
1.478	73	Brush, Good, HSG D
0.800	87	Dirt roads, HSG C
0.039	91	Fallow, bare soil, HSG C
0.369	82	Farmsteads, HSG C
0.270	89	Gravel Roads, HSG C
7.322	75	Vineyard, Good, HSG C
0.196	98	Water Surface, HSG C
12.233	70	Woods, Good, HSG C
2.448	77	Woods, Good, HSG D
37.537	74	Weighted Average
37.341		99.48% Pervious Area
0.196		0.52% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.3	100	0.1800	0.32		**Sheet Flow, Sheet** Grass: Dense n= 0.240 P2= 4.06"
0.4	104	0.3200	3.96		**Shallow Concentrated Flow, Shallow - Short Grass** Short Grass Pasture Kv= 7.0 fps
0.8	155	0.3700	3.04		**Shallow Concentrated Flow, Shallow - Woodland** Woodland Kv= 5.0 fps
0.3	72	0.3800	4.32		**Shallow Concentrated Flow, Shallow - Short Grass** Short Grass Pasture Kv= 7.0 fps
0.1	28	0.0200	3.51	7.02	**Trap/Vee/Rect Channel Flow, Ditch** Bot.W=0.00' D=1.00' Z= 2.0 '/' Top.W=4.00' n= 0.035
0.6	488	0.2000	12.58	4.39	**Pipe Channel, 8" SW** 8.0" Round Area= 0.3 sf Perim= 2.1' r= 0.17' n= 0.016 PPI 8in CPP
4.2	100	0.3100	0.39		**Sheet Flow, Sheet - Post LS** Grass: Dense n= 0.240 P2= 4.06"
0.4	200	0.0900	9.29	65.00	**Trap/Vee/Rect Channel Flow, Swale (assumed)** Bot.W=3.00' D=1.00' Z= 4.0 '/' Top.W=11.00' n= 0.035
1.5	933	0.1400	10.64	31.92	**Trap/Vee/Rect Channel Flow, Stream (assumed)**

Bot.W=1.00' D=1.00' Z= 2.0 '/' Top.W=5.00'
n= 0.035

13.6	2,180	Total

Subcatchment WS-2: WS-2



Summary for Subcatchment SUBAREA-1: Subarea -1

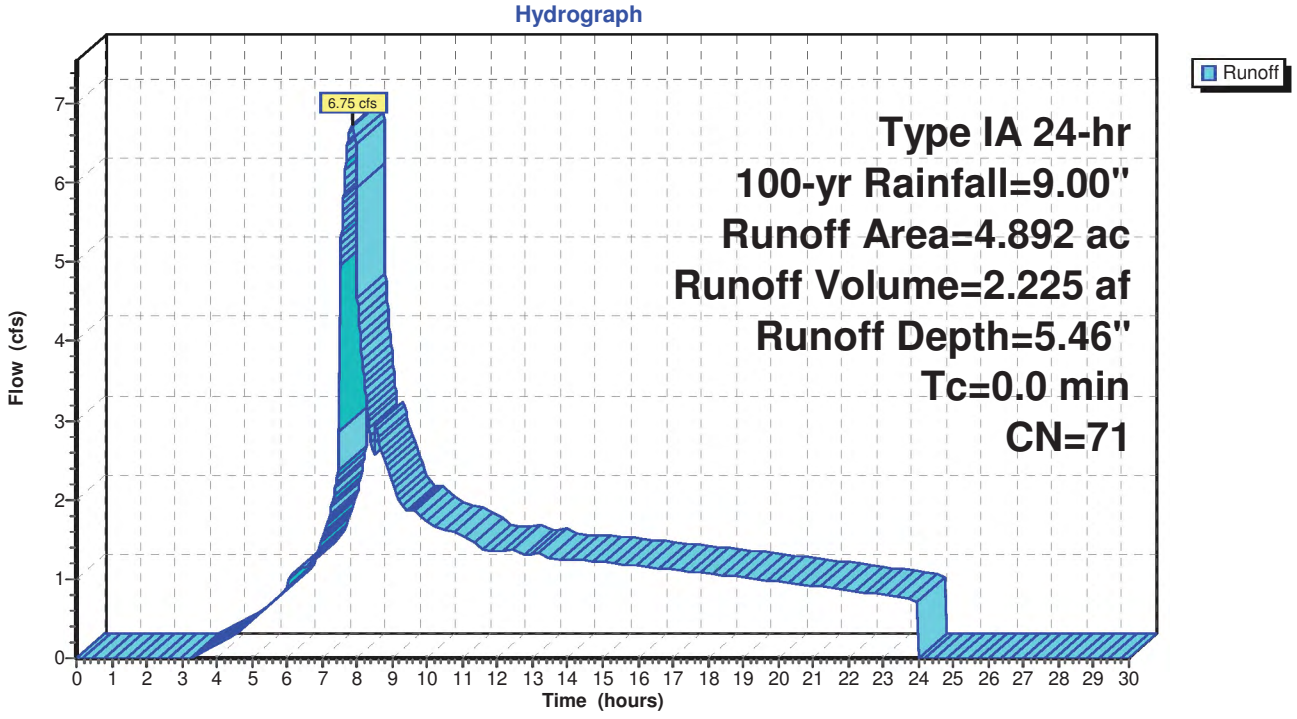
[46] Hint: Tc=0 (Instant runoff peak depends on dt)

Runoff = 6.75 cfs @ 7.85 hrs, Volume= 2.225 af, Depth= 5.46"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.01 hrs
Type IA 24-hr 100-yr Rainfall=9.00"

Area (ac)	CN	Description
0.267	75	Annual Grass, Good, HSG C
0.827	65	Brush, Good, HSG C
0.288	73	Brush, Good, HSG D
0.203	75	Vineyard, Good, HSG C
2.503	70	Woods, Good, HSG C
0.804	77	Woods, Good, HSG D
4.892	71	Weighted Average
4.892		100.00% Pervious Area

Subcatchment SUBAREA-1: Subarea -1



Summary for Subcatchment SUBAREA-2: Subarea - 2

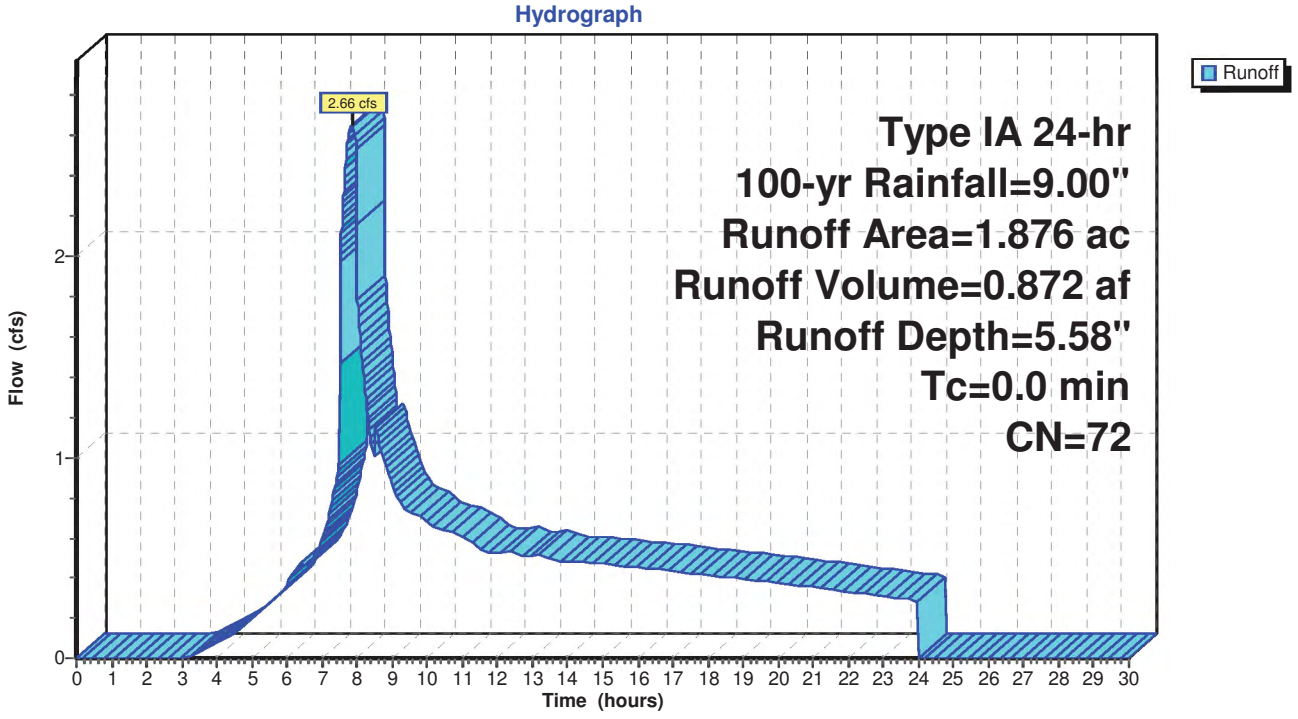
[46] Hint: Tc=0 (Instant runoff peak depends on dt)

Runoff = 2.66 cfs @ 7.85 hrs, Volume= 0.872 af, Depth= 5.58"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.01 hrs
Type IA 24-hr 100-yr Rainfall=9.00"

Area (ac)	CN	Description
0.140	75	Annual Grass, Good, HSG C
0.289	65	Brush, Good, HSG C
0.175	73	Brush, Good, HSG D
0.134	75	Vineyard, Good, HSG C
0.727	70	Woods, Good, HSG C
0.412	77	Woods, Good, HSG D
1.876	72	Weighted Average
1.876		100.00% Pervious Area

Subcatchment SUBAREA-2: Subarea - 2



Summary for Subcatchment SUBAREA-3: Subarea - 3

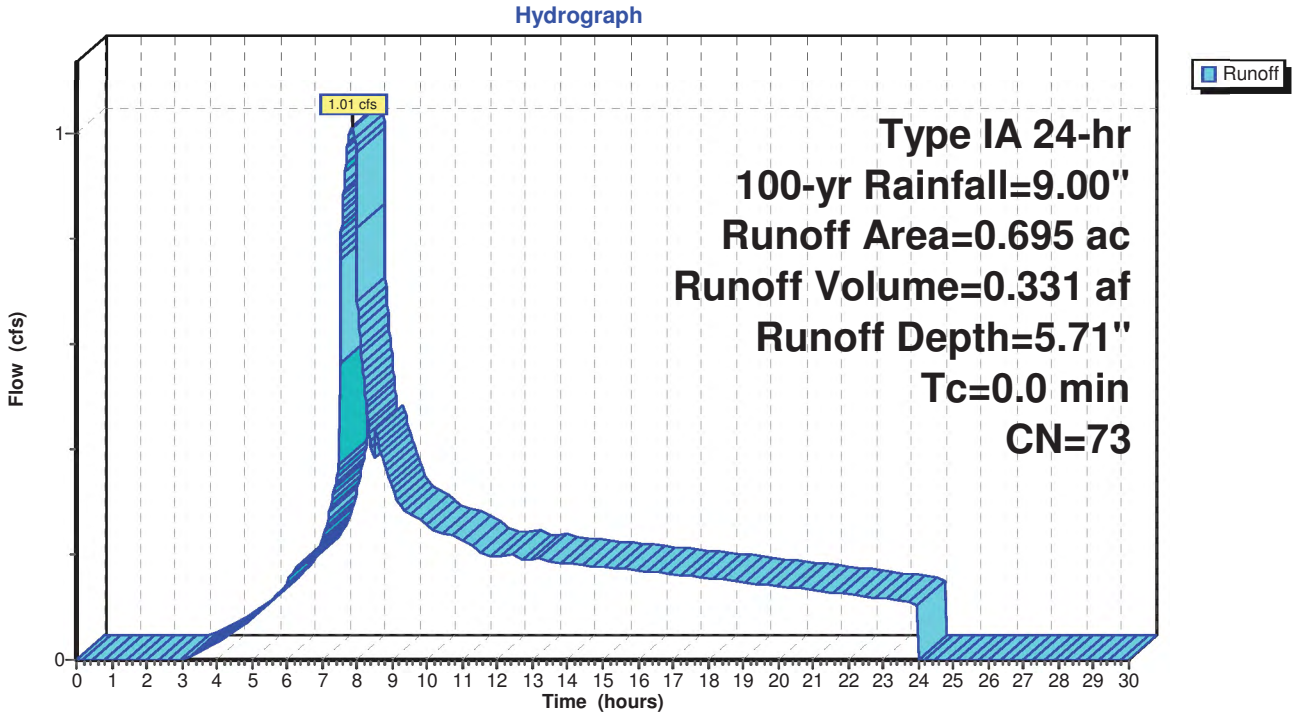
[46] Hint: Tc=0 (Instant runoff peak depends on dt)

Runoff = 1.01 cfs @ 7.85 hrs, Volume= 0.331 af, Depth= 5.71"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.01 hrs
Type IA 24-hr 100-yr Rainfall=9.00"

Area (ac)	CN	Description
0.025	75	Annual Grass, Good, HSG C
0.130	81	Annual Grass, Good, HSG D
0.212	65	Brush, Good, HSG C
0.077	73	Brush, Good, HSG D
0.093	75	Vineyard, Good, HSG C
0.057	70	Woods, Good, HSG C
0.101	77	Woods, Good, HSG D
0.695	73	Weighted Average
0.695		100.00% Pervious Area

Subcatchment SUBAREA-3: Subarea - 3



Summary for Subcatchment SUBAREA-4: Subarea - 4

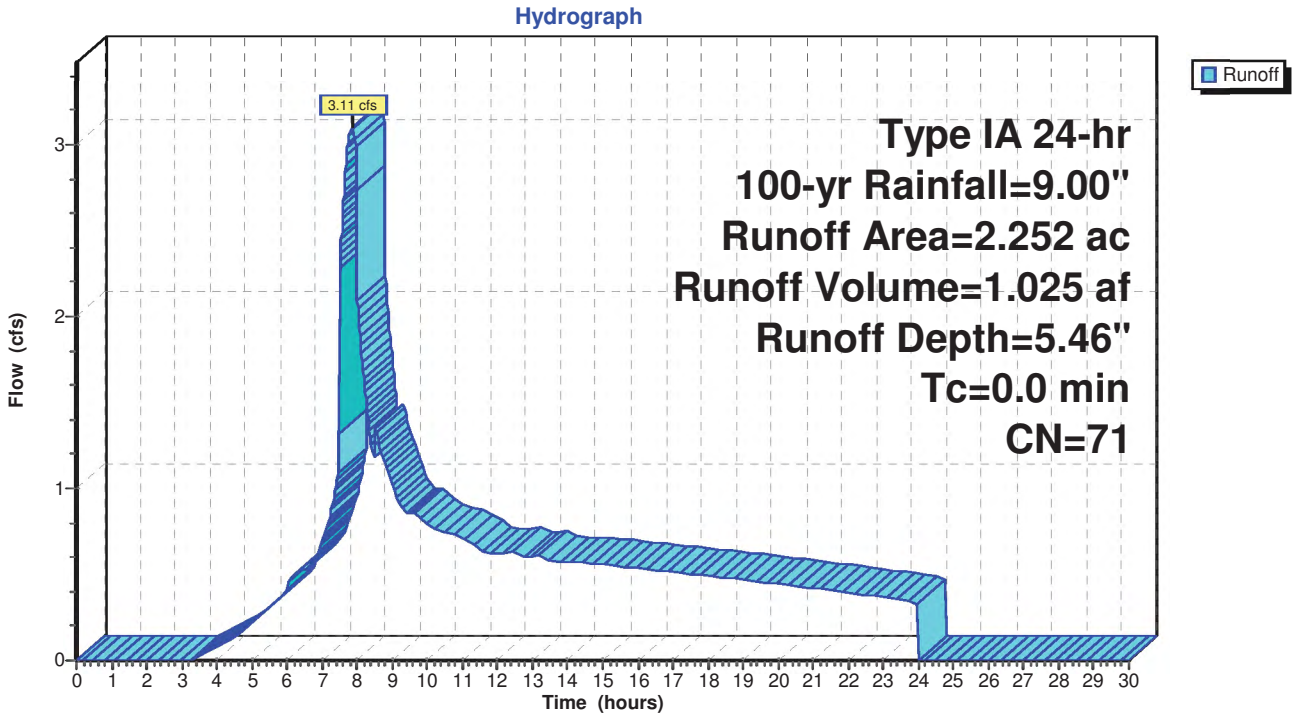
[46] Hint: Tc=0 (Instant runoff peak depends on dt)

Runoff = 3.11 cfs @ 7.85 hrs, Volume= 1.025 af, Depth= 5.46"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.01 hrs
Type IA 24-hr 100-yr Rainfall=9.00"

Area (ac)	CN	Description
0.067	75	Annual Grass, Good, HSG C
0.378	75	Vineyard, Good, HSG C
1.744	70	Woods, Good, HSG C
0.063	77	Woods, Good, HSG D
2.252	71	Weighted Average
2.252		100.00% Pervious Area

Subcatchment SUBAREA-4: Subarea - 4



Summary for Subcatchment WS-1: WS-1

[47] Hint: Peak is 273% of capacity of segment #6
[47] Hint: Peak is 415% of capacity of segment #7
[47] Hint: Peak is 131% of capacity of segment #8
[47] Hint: Peak is 125% of capacity of segment #9
[47] Hint: Peak is 107% of capacity of segment #10

Runoff = 19.15 cfs @ 8.06 hrs, Volume= 6.597 af, Depth= 5.58"

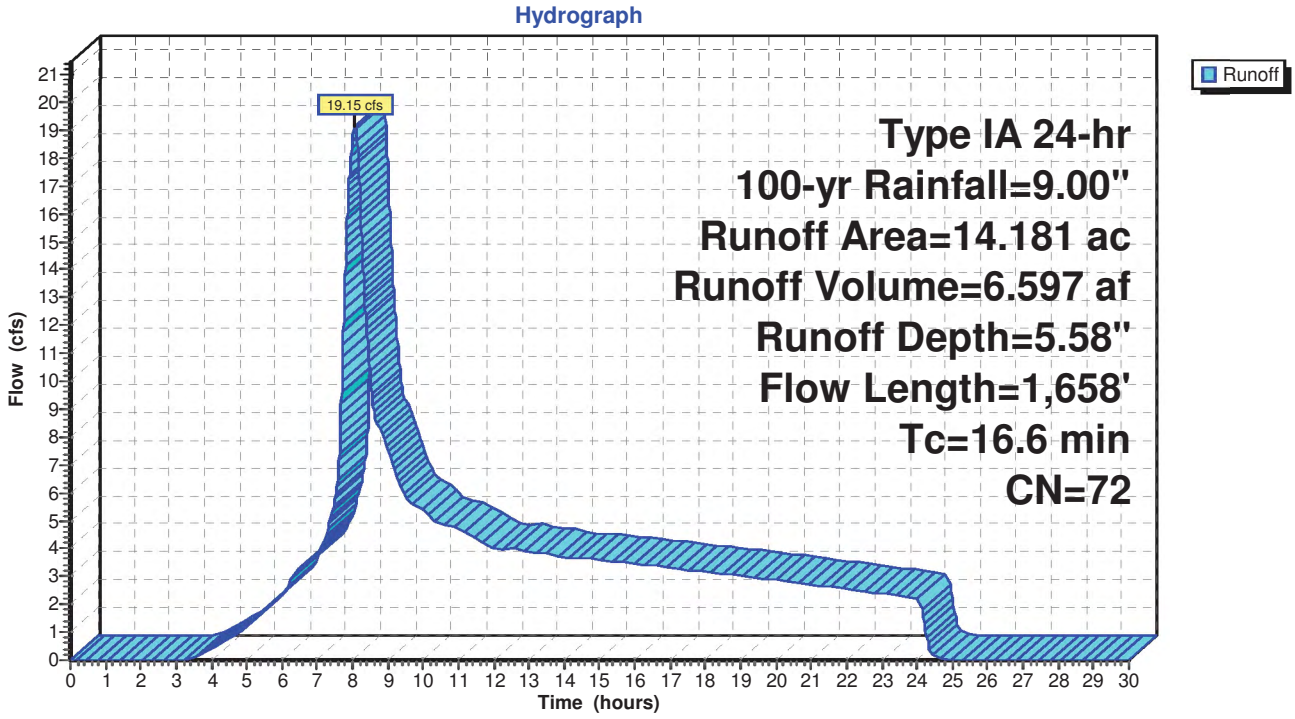
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.01 hrs
Type IA 24-hr 100-yr Rainfall=9.00"

Area (ac)	CN	Description
1.871	75	Annual Grass, Good, HSG C
0.545	65	Brush, Good, HSG C
0.149	87	Dirt roads, HSG C
0.069	91	Fallow, bare soil, HSG C
0.202	82	Farmsteads, HSG C
0.271	89	Gravel Roads, HSG C
3.023	75	Vineyard, Good, HSG C
8.051	70	Woods, Good, HSG C
14.181	72	Weighted Average
14.181		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.0	100	0.2000	0.33		**Sheet Flow, Sheet** Grass: Dense n= 0.240 P2= 4.06"
0.1	28	0.2800	3.70		**Shallow Concentrated Flow, Shallow - Short Grass** Short Grass Pasture Kv= 7.0 fps
8.3	73	0.3400	0.15		**Sheet Flow, Sheet - Post LS** Woods: Dense underbrush n= 0.800 P2= 4.06"
0.7	132	0.4400	3.32		**Shallow Concentrated Flow, Shallow - Woodland** Woodland Kv= 5.0 fps
0.4	100	0.3700	4.26		**Shallow Concentrated Flow, Shallow - Short Grass** Short Grass Pasture Kv= 7.0 fps
0.5	104	0.0200	3.51	7.02	**Trap/Vee/Rect Channel Flow, Ditch** Bot.W=0.00' D=1.00' Z= 2.0 '/' Top.W=4.00' n= 0.035
0.3	262	0.2500	13.24	4.62	**Pipe Channel, 10" SW Pipe** 8.0" Round Area= 0.3 sf Perim= 2.1' r= 0.17' n= 0.017 PPI 10in CPP
0.2	168	0.1000	18.65	14.65	**Pipe Channel, 12" DW Pipe** 12.0" Round Area= 0.8 sf Perim= 3.1' r= 0.25' n= 0.010 PPI Dual Walled CPP
0.0	37	0.1100	19.56	15.36	**Pipe Channel, 12" DW Culvert** 12.0" Round Area= 0.8 sf Perim= 3.1' r= 0.25' n= 0.010 PPI Dual Walled CPP
0.3	183	0.1300	8.95	17.90	**Trap/Vee/Rect Channel Flow, Ditch**

Bot.W=0.00' D=1.00' Z= 2.0 '/' Top.W=4.00'					
					n= 0.035
0.8	471	0.1200	9.85	29.56	**Trap/Vee/Rect Channel Flow, Stream**
					Bot.W=1.00' D=1.00' Z= 2.0 '/' Top.W=5.00'
					n= 0.035
16.6	1,658	Total			

Subcatchment WS-1: WS-1



Summary for Subcatchment WS-2: WS-2

[47] Hint: Peak is 777% of capacity of segment #5
[47] Hint: Peak is 1242% of capacity of segment #6
[47] Hint: Peak is 171% of capacity of segment #9

Runoff = 54.54 cfs @ 8.03 hrs, Volume= 18.233 af, Depth= 5.83"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.01 hrs
Type IA 24-hr 100-yr Rainfall=9.00"

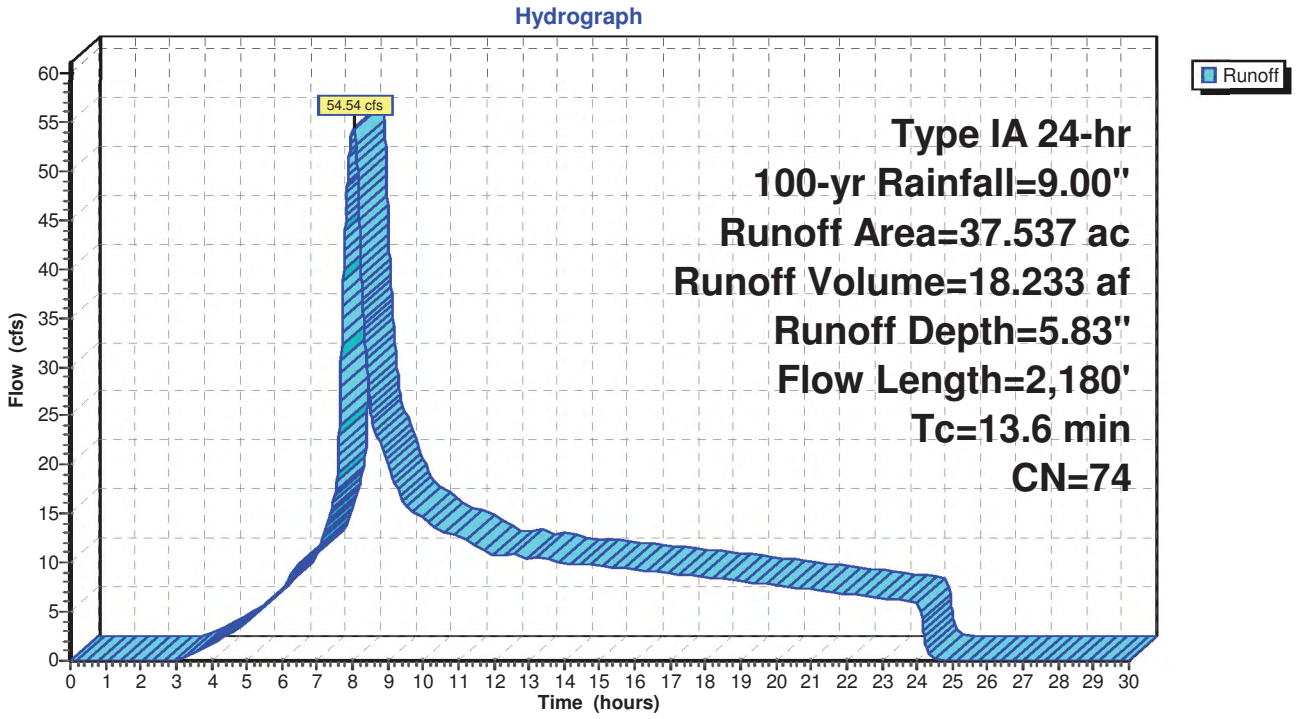
Area (ac)	CN	Description
9.177	75	Annual Grass, Good, HSG C
1.871	81	Annual Grass, Good, HSG D
1.334	65	Brush, Good, HSG C
1.478	73	Brush, Good, HSG D
0.800	87	Dirt roads, HSG C
0.039	91	Fallow, bare soil, HSG C
0.369	82	Farmsteads, HSG C
0.270	89	Gravel Roads, HSG C
7.322	75	Vineyard, Good, HSG C
0.196	98	Water Surface, HSG C
12.233	70	Woods, Good, HSG C
2.448	77	Woods, Good, HSG D
37.537	74	Weighted Average
37.341		99.48% Pervious Area
0.196		0.52% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.3	100	0.1800	0.32		**Sheet Flow, Sheet** Grass: Dense n= 0.240 P2= 4.06"
0.4	104	0.3200	3.96		**Shallow Concentrated Flow, Shallow - Short Grass** Short Grass Pasture Kv= 7.0 fps
0.8	155	0.3700	3.04		**Shallow Concentrated Flow, Shallow - Woodland** Woodland Kv= 5.0 fps
0.3	72	0.3800	4.32		**Shallow Concentrated Flow, Shallow - Short Grass** Short Grass Pasture Kv= 7.0 fps
0.1	28	0.0200	3.51	7.02	**Trap/Vee/Rect Channel Flow, Ditch** Bot.W=0.00' D=1.00' Z= 2.0 '/' Top.W=4.00' n= 0.035
0.6	488	0.2000	12.58	4.39	**Pipe Channel, 8" SW** 8.0" Round Area= 0.3 sf Perim= 2.1' r= 0.17' n= 0.016 PPI 8in CPP
4.2	100	0.3100	0.39		**Sheet Flow, Sheet - Post LS** Grass: Dense n= 0.240 P2= 4.06"
0.4	200	0.0900	9.29	65.00	**Trap/Vee/Rect Channel Flow, Swale (assumed)** Bot.W=3.00' D=1.00' Z= 4.0 '/' Top.W=11.00' n= 0.035
1.5	933	0.1400	10.64	31.92	**Trap/Vee/Rect Channel Flow, Stream (assumed)**

Bot.W=1.00' D=1.00' Z= 2.0 '/' Top.W=5.00'
n= 0.035

13.6	2,180	Total

Subcatchment WS-2: WS-2





WS-2

Subcat Reach Pond Link

Routing Diagram for Post-Project Alternate Path
Prepared by PPI Engineering, Printed 1/29/2025
HydroCAD® 10.20-5c s/n 09429 © 2023 HydroCAD Software Solutions LLC

Summary for Subcatchment WS-2: WS-2

[47] Hint: Peak is 259% of capacity of segment #4

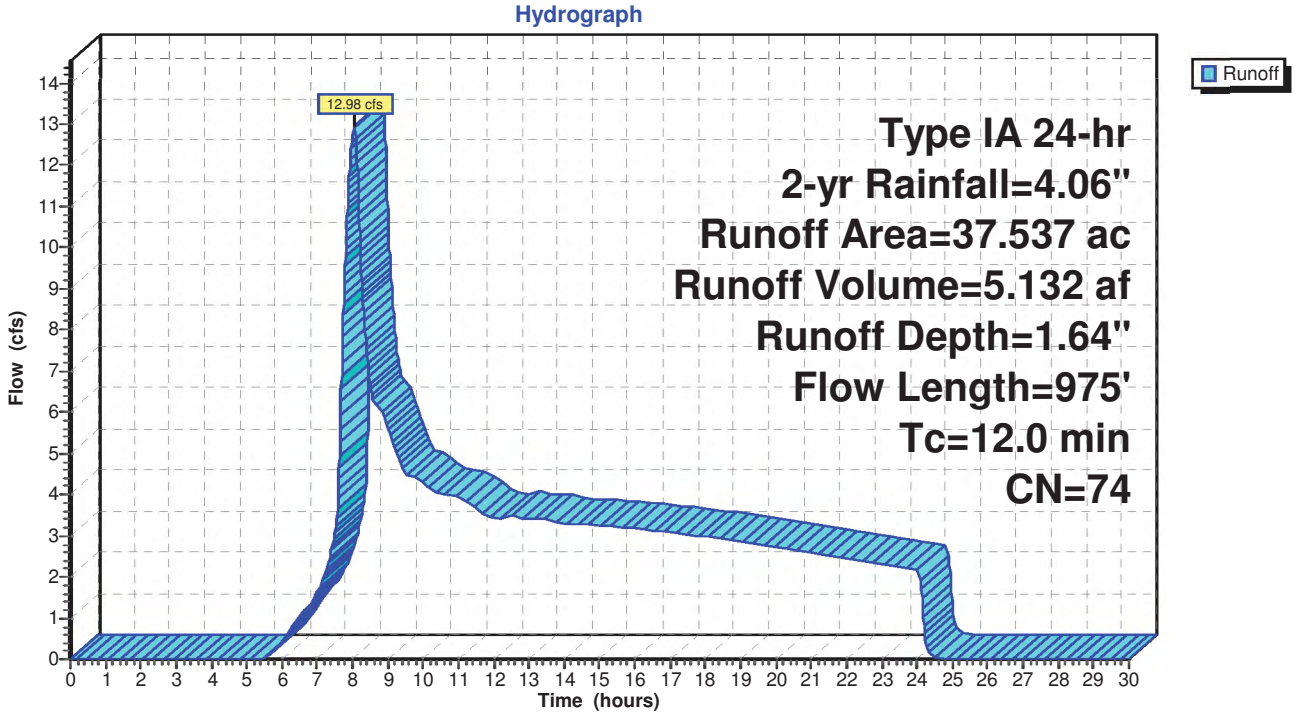
Runoff = 12.98 cfs @ 8.06 hrs, Volume= 5.132 af, Depth= 1.64"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.01 hrs
Type IA 24-hr 2-yr Rainfall=4.06"

Area (ac)	CN	Description
9.177	75	Annual Grass, Good, HSG C
1.871	81	Annual Grass, Good, HSG D
1.334	65	Brush, Good, HSG C
1.478	73	Brush, Good, HSG D
0.800	87	Dirt roads, HSG C
0.039	91	Fallow, bare soil, HSG C
0.369	82	Farmsteads, HSG C
0.270	89	Gravel Roads, HSG C
7.322	75	Vineyard, Good, HSG C
0.196	98	Water Surface, HSG C
12.233	70	Woods, Good, HSG C
2.448	77	Woods, Good, HSG D
37.537	74	Weighted Average
37.341		99.48% Pervious Area
0.196		0.52% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
4.7	100	0.2400	0.36		**Sheet Flow, Sheet** Grass: Dense n= 0.240 P2= 4.06"
0.3	70	0.2900	3.77		**Shallow Concentrated Flow, Shallow - Short Grass** Short Grass Pasture Kv= 7.0 fps
0.2	95	0.1200	8.60	17.20	**Trap/Vee/Rect Channel Flow, Ditch** Bot.W=0.00' D=1.00' Z= 2.0 '/' Top.W=4.00' n= 0.035
0.1	78	0.2600	14.34	5.01	**Pipe Channel, 8" SW** 8.0" Round Area= 0.3 sf Perim= 2.1' r= 0.17' n= 0.016 PPI 8in CPP
4.2	100	0.3200	0.40		**Sheet Flow, Sheet - Post Rock Apron** Grass: Dense n= 0.240 P2= 4.06"
0.3	68	0.3500	4.14		**Shallow Concentrated Flow, Shallow - Short Grass** Short Grass Pasture Kv= 7.0 fps
0.9	208	0.3100	3.90		**Shallow Concentrated Flow, Shallow - Short Grass** Short Grass Pasture Kv= 7.0 fps
1.3	256	0.4000	3.16		**Shallow Concentrated Flow, Shallow - Woodland** Woodland Kv= 5.0 fps
12.0	975	Total			

Subcatchment WS-2: WS-2



Summary for Subcatchment WS-2: WS-2

[47] Hint: Peak is 168% of capacity of segment #3
[47] Hint: Peak is 577% of capacity of segment #4

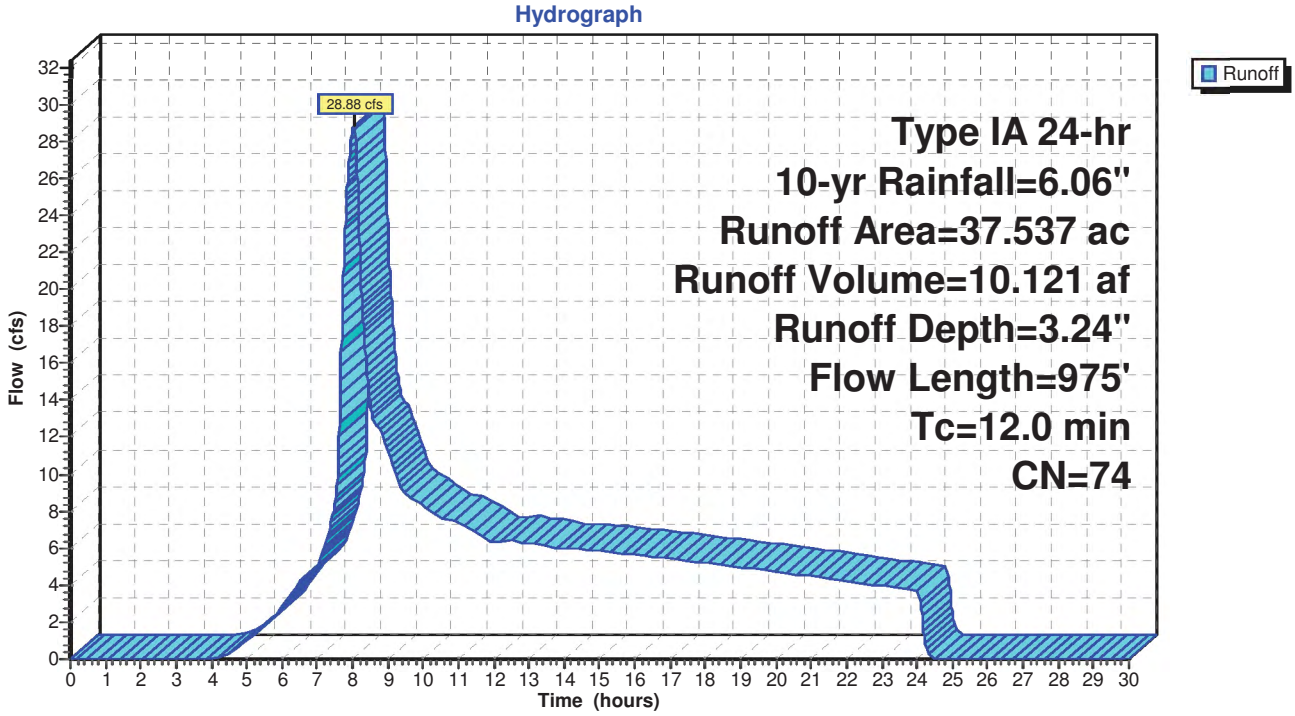
Runoff = 28.88 cfs @ 8.04 hrs, Volume= 10.121 af, Depth= 3.24"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.01 hrs
Type IA 24-hr 10-yr Rainfall=6.06"

Area (ac)	CN	Description
9.177	75	Annual Grass, Good, HSG C
1.871	81	Annual Grass, Good, HSG D
1.334	65	Brush, Good, HSG C
1.478	73	Brush, Good, HSG D
0.800	87	Dirt roads, HSG C
0.039	91	Fallow, bare soil, HSG C
0.369	82	Farmsteads, HSG C
0.270	89	Gravel Roads, HSG C
7.322	75	Vineyard, Good, HSG C
0.196	98	Water Surface, HSG C
12.233	70	Woods, Good, HSG C
2.448	77	Woods, Good, HSG D
37.537	74	Weighted Average
37.341		99.48% Pervious Area
0.196		0.52% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
4.7	100	0.2400	0.36		**Sheet Flow, Sheet** Grass: Dense n= 0.240 P2= 4.06"
0.3	70	0.2900	3.77		**Shallow Concentrated Flow, Shallow - Short Grass** Short Grass Pasture Kv= 7.0 fps
0.2	95	0.1200	8.60	17.20	**Trap/Vee/Rect Channel Flow, Ditch** Bot.W=0.00' D=1.00' Z= 2.0 '/' Top.W=4.00' n= 0.035
0.1	78	0.2600	14.34	5.01	**Pipe Channel, 8" SW** 8.0" Round Area= 0.3 sf Perim= 2.1' r= 0.17' n= 0.016 PPI 8in CPP
4.2	100	0.3200	0.40		**Sheet Flow, Sheet - Post Rock Apron** Grass: Dense n= 0.240 P2= 4.06"
0.3	68	0.3500	4.14		**Shallow Concentrated Flow, Shallow - Short Grass** Short Grass Pasture Kv= 7.0 fps
0.9	208	0.3100	3.90		**Shallow Concentrated Flow, Shallow - Short Grass** Short Grass Pasture Kv= 7.0 fps
1.3	256	0.4000	3.16		**Shallow Concentrated Flow, Shallow - Woodland** Woodland Kv= 5.0 fps
12.0	975	Total			

Subcatchment WS-2: WS-2



Summary for Subcatchment WS-2: WS-2

[47] Hint: Peak is 273% of capacity of segment #3
[47] Hint: Peak is 938% of capacity of segment #4

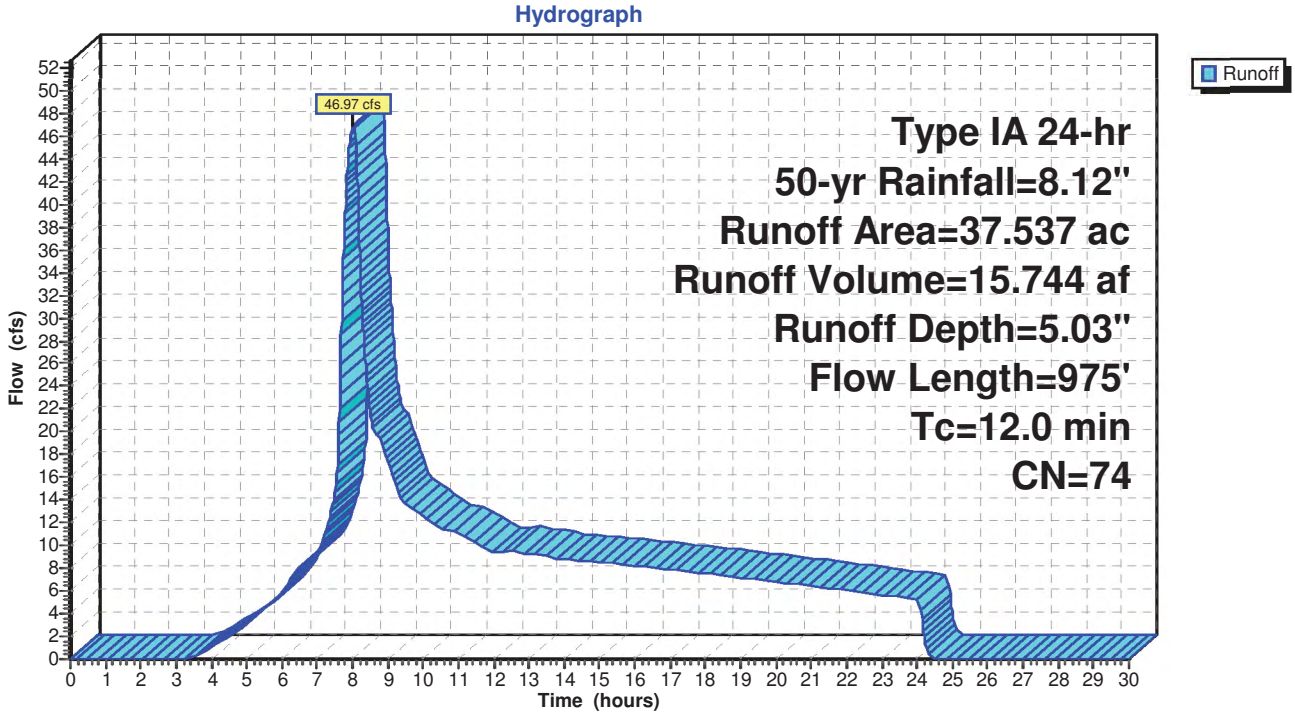
Runoff = 46.97 cfs @ 8.02 hrs, Volume= 15.744 af, Depth= 5.03"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.01 hrs
Type IA 24-hr 50-yr Rainfall=8.12"

Area (ac)	CN	Description
9.177	75	Annual Grass, Good, HSG C
1.871	81	Annual Grass, Good, HSG D
1.334	65	Brush, Good, HSG C
1.478	73	Brush, Good, HSG D
0.800	87	Dirt roads, HSG C
0.039	91	Fallow, bare soil, HSG C
0.369	82	Farmsteads, HSG C
0.270	89	Gravel Roads, HSG C
7.322	75	Vineyard, Good, HSG C
0.196	98	Water Surface, HSG C
12.233	70	Woods, Good, HSG C
2.448	77	Woods, Good, HSG D
37.537	74	Weighted Average
37.341		99.48% Pervious Area
0.196		0.52% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
4.7	100	0.2400	0.36		**Sheet Flow, Sheet** Grass: Dense n= 0.240 P2= 4.06"
0.3	70	0.2900	3.77		**Shallow Concentrated Flow, Shallow - Short Grass** Short Grass Pasture Kv= 7.0 fps
0.2	95	0.1200	8.60	17.20	**Trap/Vee/Rect Channel Flow, Ditch** Bot.W=0.00' D=1.00' Z= 2.0 '/' Top.W=4.00' n= 0.035
0.1	78	0.2600	14.34	5.01	**Pipe Channel, 8" SW** 8.0" Round Area= 0.3 sf Perim= 2.1' r= 0.17' n= 0.016 PPI 8in CPP
4.2	100	0.3200	0.40		**Sheet Flow, Sheet - Post Rock Apron** Grass: Dense n= 0.240 P2= 4.06"
0.3	68	0.3500	4.14		**Shallow Concentrated Flow, Shallow - Short Grass** Short Grass Pasture Kv= 7.0 fps
0.9	208	0.3100	3.90		**Shallow Concentrated Flow, Shallow - Short Grass** Short Grass Pasture Kv= 7.0 fps
1.3	256	0.4000	3.16		**Shallow Concentrated Flow, Shallow - Woodland** Woodland Kv= 5.0 fps
12.0	975	Total			

Subcatchment WS-2: WS-2



Summary for Subcatchment WS-2: WS-2

[47] Hint: Peak is 320% of capacity of segment #3
[47] Hint: Peak is 1098% of capacity of segment #4

Runoff = 54.99 cfs @ 8.02 hrs, Volume= 18.234 af, Depth= 5.83"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.01 hrs
Type IA 24-hr 100-yr Rainfall=9.00"

Area (ac)	CN	Description
9.177	75	Annual Grass, Good, HSG C
1.871	81	Annual Grass, Good, HSG D
1.334	65	Brush, Good, HSG C
1.478	73	Brush, Good, HSG D
0.800	87	Dirt roads, HSG C
0.039	91	Fallow, bare soil, HSG C
0.369	82	Farmsteads, HSG C
0.270	89	Gravel Roads, HSG C
7.322	75	Vineyard, Good, HSG C
0.196	98	Water Surface, HSG C
12.233	70	Woods, Good, HSG C
2.448	77	Woods, Good, HSG D
37.537	74	Weighted Average
37.341		99.48% Pervious Area
0.196		0.52% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
4.7	100	0.2400	0.36		**Sheet Flow, Sheet** Grass: Dense n= 0.240 P2= 4.06"
0.3	70	0.2900	3.77		**Shallow Concentrated Flow, Shallow - Short Grass** Short Grass Pasture Kv= 7.0 fps
0.2	95	0.1200	8.60	17.20	**Trap/Vee/Rect Channel Flow, Ditch** Bot.W=0.00' D=1.00' Z= 2.0 '/' Top.W=4.00' n= 0.035
0.1	78	0.2600	14.34	5.01	**Pipe Channel, 8" SW** 8.0" Round Area= 0.3 sf Perim= 2.1' r= 0.17' n= 0.016 PPI 8in CPP
4.2	100	0.3200	0.40		**Sheet Flow, Sheet - Post Rock Apron** Grass: Dense n= 0.240 P2= 4.06"
0.3	68	0.3500	4.14		**Shallow Concentrated Flow, Shallow - Short Grass** Short Grass Pasture Kv= 7.0 fps
0.9	208	0.3100	3.90		**Shallow Concentrated Flow, Shallow - Short Grass** Short Grass Pasture Kv= 7.0 fps
1.3	256	0.4000	3.16		**Shallow Concentrated Flow, Shallow - Woodland** Woodland Kv= 5.0 fps
12.0	975	Total			

Subcatchment WS-2: WS-2

