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EROSION CONTROL
WATER DEVELOPMENT
DRAINAGE
PERMITTING
GPS/GIS

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Napa, California 94558
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MEMORANDUM

Date: September 2, 2020

To: Daniel Hornett, Napa County Planning, Building, and Environmental Services

From: Cody J. Corsetti, P.E.
             Rachel L. Rosasco, E.I.T.

Cc: John McDowell, Napa County Planning, Building, and Environmental Services

Re: Shafer Blodgett Vineyard Track I ECP, #P20-00117-ECPA
             5096 Silverado Trail
             APNs 039-051-019, 039-051-021, 039-051-023, and 039-051-033
             Revised Hydrologic Analysis

This memo transmits the findings of a revised hydrologic analysis for the above-referenced Track I Erosion Control Plan (ECP). The original analysis submitted in March 2020 was revised to address Napa County Engineering Division review comments. Specifically, all shallow concentrated flow segments have been revised to account for each surface type and corresponding roughness coefficient. Shallow concentrated flow types were segmented and updated according to the procedures outlined in Chapter 15 of the *National Engineering Handbook Part 630*. Additionally, all existing pasture, grassland, and range land use curve numbers were updated to the annual grass curve numbers that are specified in the Natural Resource Conservation Service *Engineering Field Handbook* Chapter 2-Supplement 1 "Estimating Runoff in California" per guidance from Napa County Engineering staff.

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.

Eight (8) watersheds were delineated for the hydrologic modeling. All watersheds, excluding 5 and 6, flow into unnamed swales off the property where they eventually cross the Silverado Trail and thence make their way into the Napa River. Watershed 5 deposits it flows into a reservoir off the property before eventually flowing into the Napa River after crossing the Silverado Trail. Watershed 6 flows into an unnamed swale acting as a tributary of Soda Creek. Please see the attached figures for the location of each watershed.

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

Bale clay loam, 2-5% slopes (Map Unit Symbol 105)
Forward-Kidd complex, 50-75% slopes (Map Unit Symbol 141)
Haire loam, 2-9% slopes (Map Unit Symbol 146)
Hambright-Rock outcrop complex, 2-30% slopes (Map Unit Symbol 151)
Hambright rock-Outcrop complex, 30-75% slopes (Map Unit Symbol 152)
Perkins gravelly loam, 5-9% slopes (Map Unit Symbol 169)
Rock outcrop-Hambright complex, 50-75% slopes (Map Unit Symbol 176)
Sobrante loam, 5-30% slopes (Map Unit Symbol 178)
Sobrante loam, 30-50% slopes (Map Unit Symbol 179)

Please see the attached figures for soil type delineations within the vicinity of each watershed.

Land use areas were initially delineated based on Napa County orthophotos and both American Aerial, Inc. and Napa County contours. Site visits were conducted on January 18, 2019 and November 20, 2019 by Cody Corsetti and Samuel Moose of PPI Engineering to ground truth the orthophotos and determine the existing land use conditions. An additional site visit was conducted on May 14, 2020 with Daniel Hornett and Don Barella of Napa County Planning, Building, & Environmental Services (PBES), David Ilsley of Shafer Vineyards, and Cody Corsetti and Annalee Sanborn of PPI Engineering to verify 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. Please see the attached figures for existing and proposed land use delineations.

The Time of Concentration (Tc) flow paths within the watersheds were determined using both American Aerial, Inc. two-foot and Napa County five-foot contours. The flow path was drafted from the hydrologically most distant point (longest travel time) in the watershed to the watershed outlet per NRCS standards. The Tc flow paths for Watersheds 2, 5, 6, and 7 did not change from pre-project to post-project. In Watersheds 1, 3, 4, and 8 the Tc flow paths changed in post-project conditions due to the addition of the proposed stormwater infrastructure and/or proposed changes in land use. Please see the attached figures for both the pre- and post-project Tc flow paths by watershed.

Pre- and post-project runoff calculations from the HydroCAD models for each watershed are summarized in Table 1. Runoff was calculated for the 2-, 10-, 50-, and 100-year storms respectively for each watershed.

Table 1. Hydrologic Analysis Summary

	Runoff (cfs)											
	Watershed 1			Watershed 2			Watershed 3			Watershed 4		
	Pre-Project	Post-Project	Increase/Decrease	Pre-Project	Post-Project	Increase/Decrease	Pre-Project	Post-Project	Increase/Decrease	Pre-Project	Post-Project	Increase/Decrease
2-Year Storm	21.36	20.38	0.98	11.01	11.01	0.00	15.32	14.35	0.97	13.06	13.00	0.06
10-Year Storm	46.99	44.99	2.00	26.34	26.34	0.00	33.72	31.69	2.03	29.41	28.65	0.76
50-Year Storm	75.65	72.52	3.13	44.00	44.00	0.00	54.36	51.16	3.20	47.82	46.16	1.66
100-Year Storm	88.04	84.44	3.60	51.74	51.74	0.00	63.28	59.59	3.69	55.82	53.74	2.08

Table 1 (continued). Hydrologic Analysis Summary

	Runoff (cfs)											
	Watershed 5			Watershed 6			Watershed 7			Watershed 8		
	Pre-Project	Post-Project	Increase/Decrease	Pre-Project	Post-Project	Increase/Decrease	Pre-Project	Post-Project	Increase/Decrease	Pre-Project	Post-Project	Increase/Decrease
2-Year Storm	13.67	13.67	0.00	10.02	10.02	0.00	3.52	3.52	0.00	4.97	4.89	0.08
10-Year Storm	31.58	31.58	0.00	25.75	25.75	0.00	7.52	7.52	0.00	9.79	9.67	0.12
50-Year Storm	51.98	51.98	0.00	44.30	44.30	0.00	11.94	11.94	0.00	14.99	14.79	0.20
100-Year Storm	60.86	60.86	0.00	52.52	52.52	0.00	13.84	13.84	0.00	17.20	16.97	0.23

For Watersheds 2, 5, 6, and 7 the HydroCAD model predicts no net change in runoff from pre- to post-project conditions for all storm events. This is due to the fact that neither the CN nor the Tc changed for the post-project conditions within these watersheds. Watersheds 1, 3, and 4 predict a net decrease in runoff for all modeled storm events. These decreases were a result of changes in the Tc flow paths due to the addition of stormwater infrastructure included in the design. The increase in Tc for Watershed 4 mitigated the change in CN from pre- to post-project. The decrease in runoff found in Watershed 8 was also a result of increases in the Tc. The increase in Tc for Watershed 8 was a result of the change in land use from pre-project to post project.

Please see the attached HydroCAD analyses for inputs, details, and summaries of the hydrologic modeling. Based on our analysis, there are no predicted 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
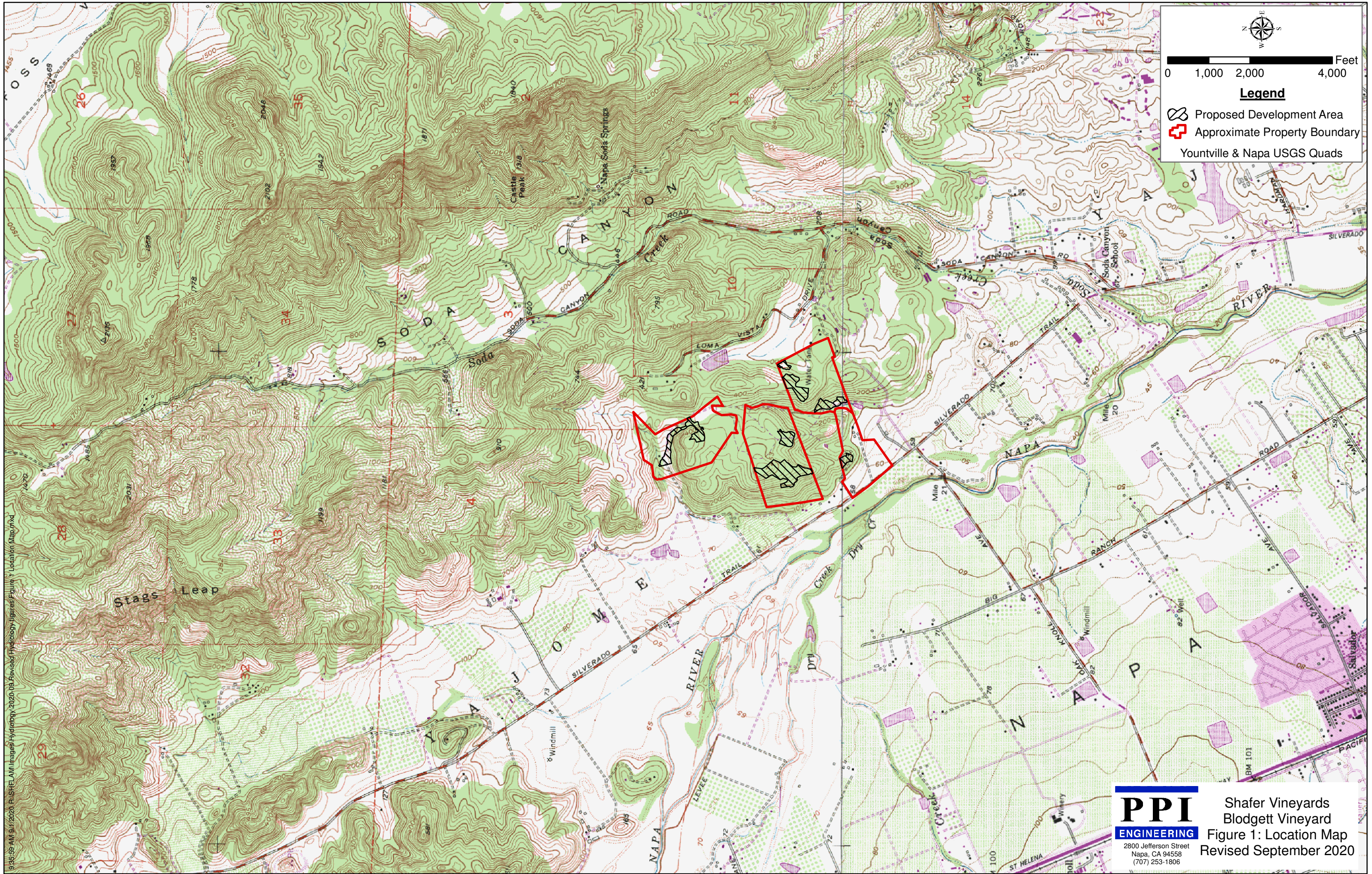
Shafer Vineyards
Blodgett Vineyard
Figure 1: Location Map
Revised September 2020

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Legend

~ U.S.G.S. Blue Line Stream, Mapped by WRA
~ U.S.G.S. Blue Line Stream, Approximate Location
~ Ephemeral Stream, Mapped by WRA
~ Ephemeral Stream, Assumed Location
~ Seasonal Wetland Swale, Mapped by WRA
▨ Existing Reservoir
⬚ Approximate Property Boundary
~ American Aerial 10' Index Contours
~ Napa County 25' Index Contours

2018 Napa County Aerial Photo
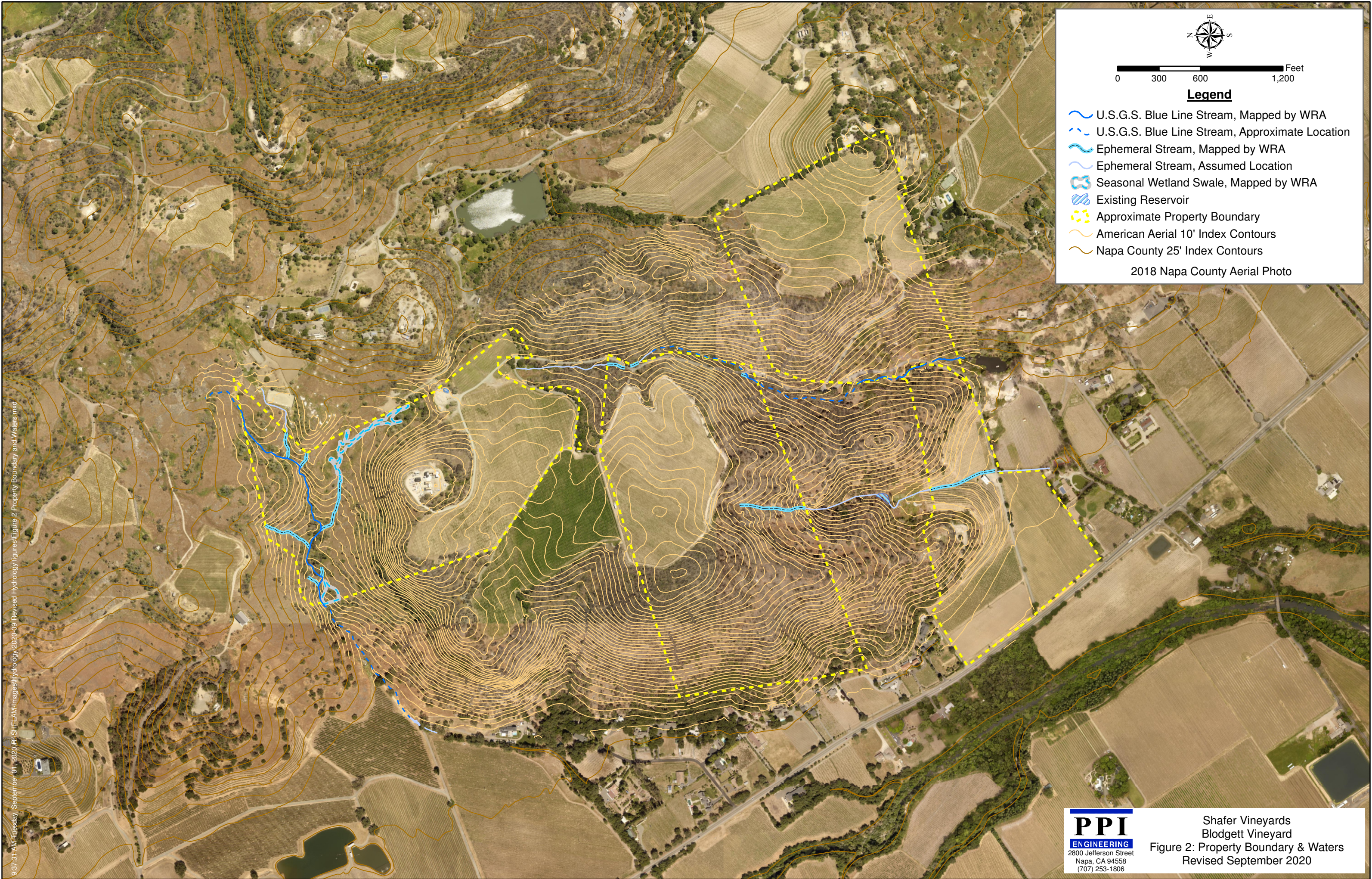
PPI ENGINEERING
2800 Jefferson Street
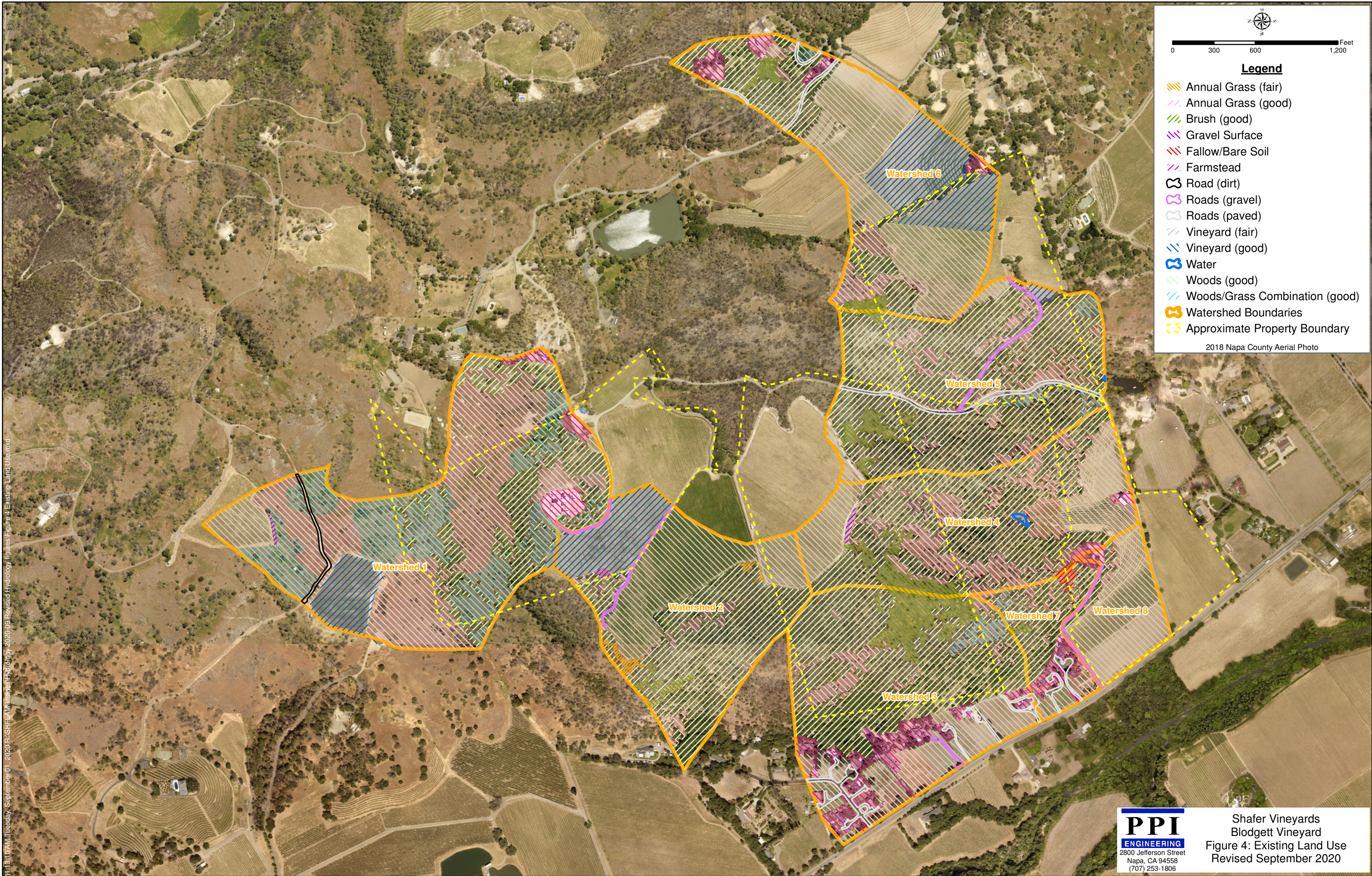Napa, CA 94558
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Shafer Vineyards
Blodgett Vineyard
Figure 2: Property Boundary & Waters
Revised September 2020

Legend

- Proposed Block Boundaries
- Proposed Clearing Limits
- Watershed Boundaries
- American Aerial 10' Index Contours
- American Aerial 2' Intermediate Contours
- Napa County 25' Index Contours
- Napa County 5' Intermediate Contours

2018 Napa County Aerial Photo

Watershed 1
Watershed 2
Watershed 3
Watershed 4
Watershed 5
Watershed 6
Watershed 7
Watershed 8

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Shafer Vineyards
Blodgett Vineyard
Figure 3: Watersheds and
Proposed Vineyard Block Locations
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Legend

- Annual Grass (fair)
- Annual Grass (good)
- Brush (good)
- Gravel Surface
- Fallow/Bare Soil
- Farmstead
- Road (dirt)
- Roads (gravel)
- Roads (paved)
- Vineyard (fair)
- Vineyard (good)
- Water
- Woods (good)
- Woods/Grass Combination (good)
- Watershed Boundaries
- Approximate Property Boundary

2018 Napa County Aerial Photo

Watershed 6
Watershed 5
Watershed 1
Watershed 4
Watershed 2
Watershed 7
Watershed 8
Watershed 3

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Shafer Vineyards
Blodgett Vineyard
Figure 4: Existing Land Use
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Legend

- Proposed Vineyard (good)
- Annual Grass (fair)
- Annual Grass (good)
- Brush (good)
- Gravel Surface
- Fallow/Bare Soil
- Farmstead
- Road (dirt)
- Roads (gravel)
- Roads (paved)
- Vineyard (fair)
- Vineyard (good)
- Water
- Woods (good)
- Woods/Grass Combination (good)
- Watershed Boundaries
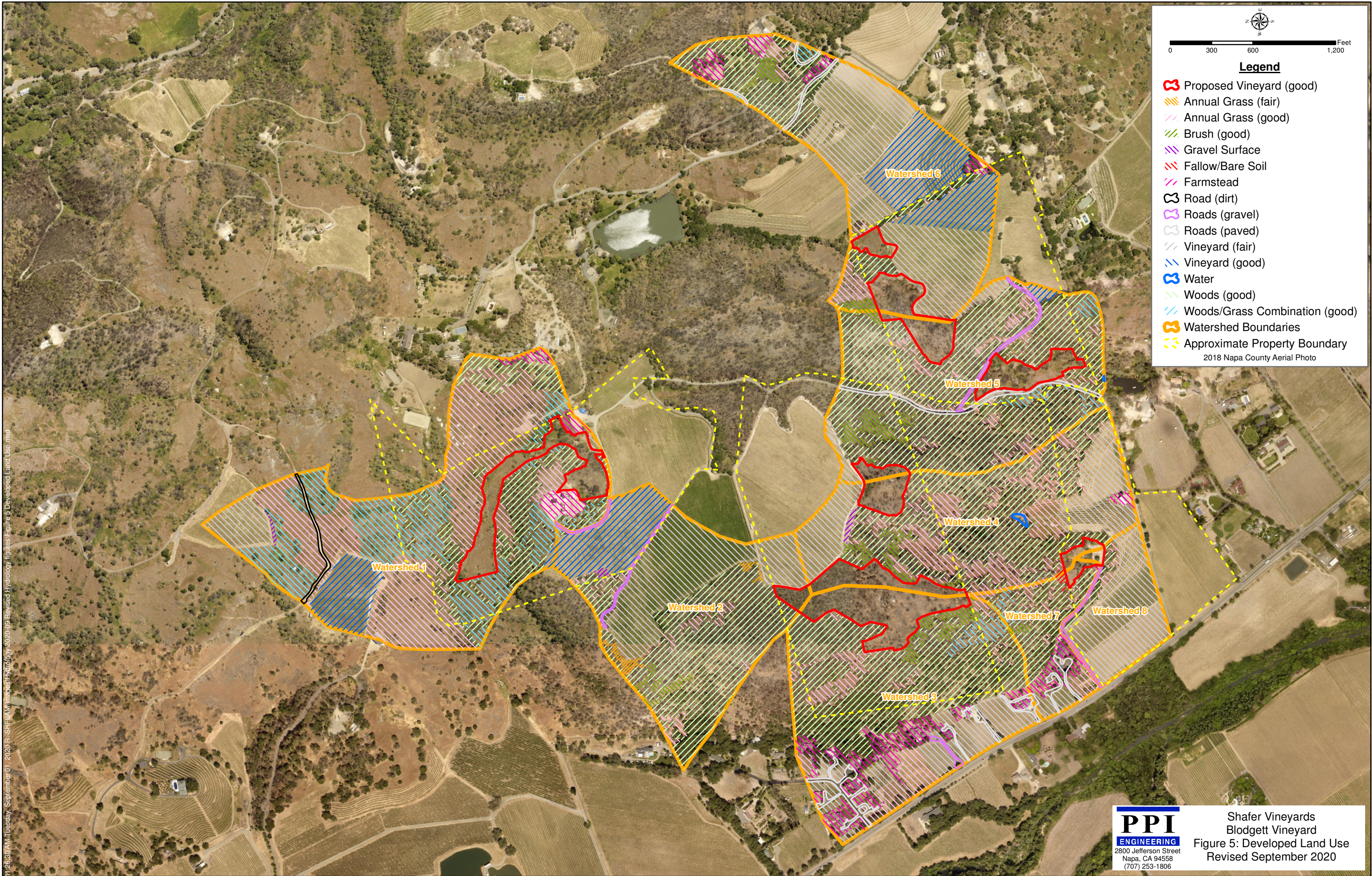- Approximate Property Boundary

2018 Napa County Aerial Photo

Watershed 6
Watershed 5
Watershed 1
Watershed 2
Watershed 4
Watershed 3
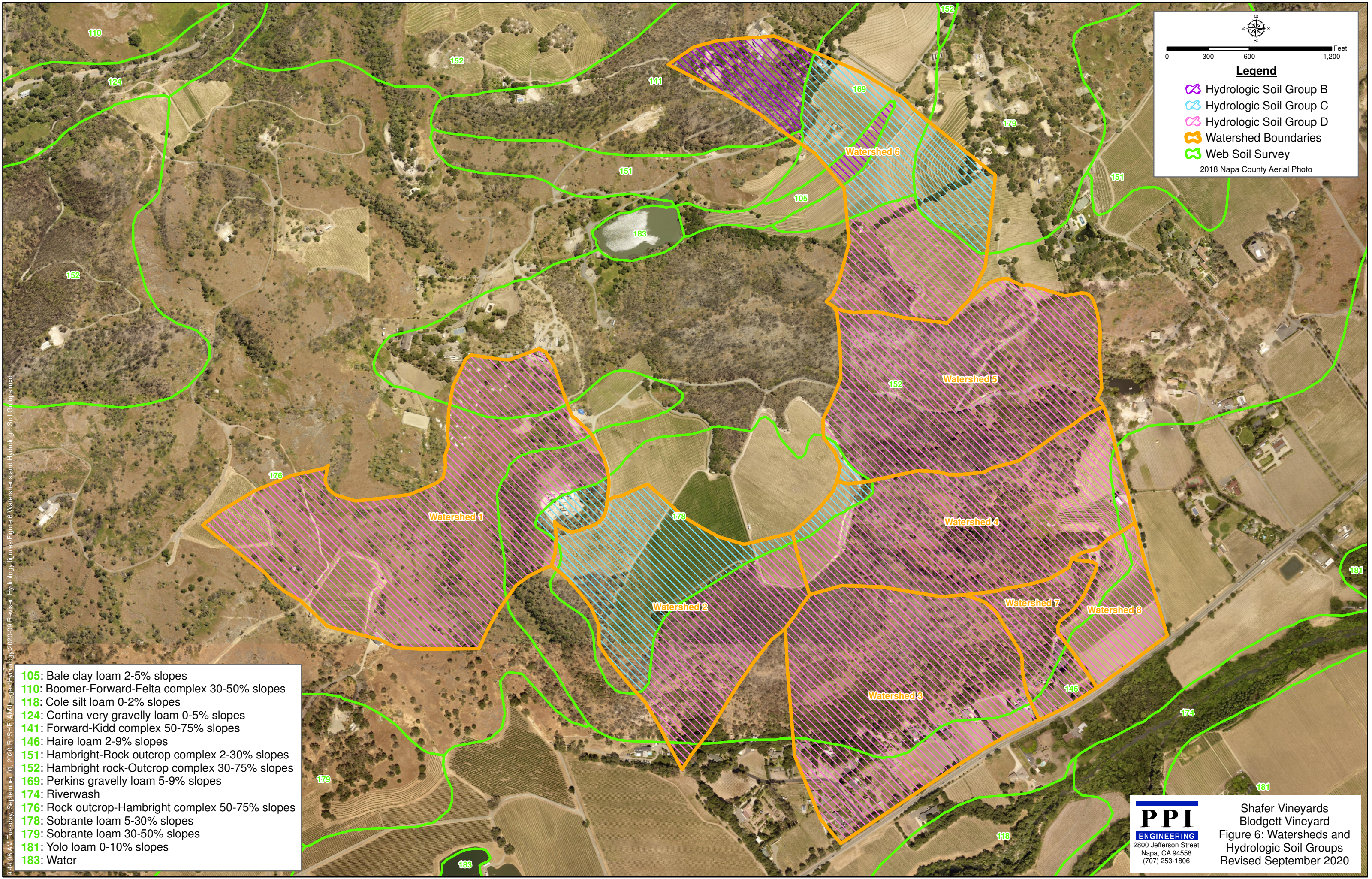Watershed 7
Watershed 8

0 300 600 1,200 Feet

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Shafer Vineyards
Blodgett Vineyard
Figure 5: Developed Land Use
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Legend

- Hydrologic Soil Group B
- Hydrologic Soil Group C
- Hydrologic Soil Group D
- Watershed Boundaries
- Web Soil Survey

2018 Napa County Aerial Photo

105: Bale clay loam 2-5% slopes
110: Boomer-Forward-Felta complex 30-50% slopes
118: Cole silt loam 0-2% slopes
124: Cortina very gravelly loam 0-5% slopes
141: Forward-Kidd complex 50-75% slopes
146: Haire loam 2-9% slopes
151: Hambright-Rock outcrop complex 2-30% slopes
152: Hambright rock-Outcrop complex 30-75% slopes
169: Perkins gravelly loam 5-9% slopes
174: Riverwash
176: Rock outcrop-Hambright complex 50-75% slopes
178: Sobrante loam 5-30% slopes
179: Sobrante loam 30-50% slopes
181: Yolo loam 0-10% slopes
183: Water

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Shafer Vineyards
Blodgett Vineyard
Figure 6: Watersheds and
Hydrologic Soil Groups
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Legend

- Pre-Project Sheet Flow
- Pre-Project Shallow Concentrated Flow
- Pre-Project Channel Flow
- Watershed Boundaries
- American Aerial 10' Index Contours
- American Aerial 2' Intermediate Contours
- Napa County 25' Index Contours
- Napa County 5' Intermediate Contours

2018 Napa County Aerial Photo

Feet
0   300   600   1,200

Watershed 1
Watershed 2
Watershed 3
Watershed 4
Watershed 5
Watershed 6
Watershed 7
Watershed 8

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Legend

- Post-Project Sheet Flow
- Post-Project Shallow Concentrated Flow
- Post-Project Channel Flow
- Watershed Boundaries
- American Aerial 10' Index Contours
- American Aerial 2' Intermediate Contours
- Napa County 25' Index Contours
- Napa County 5' Intermediate Contours

2018 Napa County Aerial Photo

Watershed 6
Watershed 5
Watershed 1
Watershed 4
Watershed 2
Watershed 7
Watershed 8
Watershed 3

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Shafer Vineyards
Blodgett Vineyard
Figure 8: Post-Project Time of
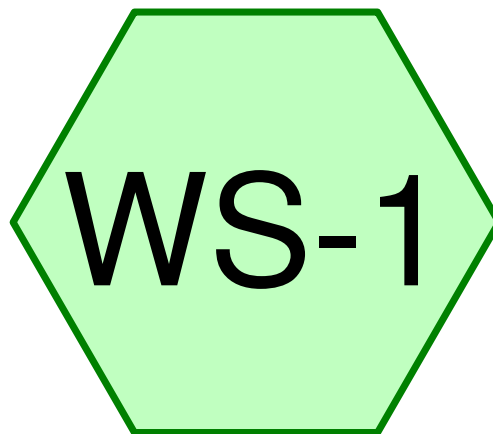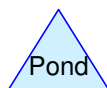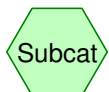Concentration Flow Paths
Revised September 2020

ATTACHMENT B

HYDROCAD ANALYSES

WS-1

Subcat WS-1

Pre-Project WS1
Prepared by PPI Engineering, Revised Sept. 2020
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Type IA 24-hr 2 year Rainfall=3.23"
Printed 9/2/2020
Page 2

Summary for Subcatchment WS-1: Subcat WS-1

Runoff   =   21.36 cfs @   8.14 hrs, Volume=   8.750 af, Depth= 1.43"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.02 hrs
Type IA 24-hr 2 year Rainfall=3.23"

Area (ac)	CN	Description
* 0.000	0	, HSG C
* 0.000	0	, HSG D
0.151	75	Annual Grass, Good, HSG C
30.008	81	Annual Grass, Good, HSG D
0.481	89	Dirt roads, HSG D
0.908	82	Farmsteads, HSG C
1.584	86	Farmsteads, HSG D
0.130	96	Gravel surface, HSG D
3.137	84	Vineyard, Fair, HSG D
0.003	75	Vineyard, Good, HSG C
4.898	81	Vineyard, Good, HSG D
1.195	70	Woods, Good, HSG C
12.232	77	Woods, Good, HSG D
0.735	72	Woods/grass comb., Good, HSG C
18.220	79	Woods/grass comb., Good, HSG D
73.681	80	Weighted Average
73.681		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.9	100	0.1200	0.24		**Sheet Flow, Sheet**
					Grass: Dense n= 0.240 P2= 3.23"
1.5	167	0.1400	1.87		**Shallow Concentrated Flow, Shallow 1 - Woodlands**
					Woodland Kv= 5.0 fps
0.9	451	0.1200	8.60	17.20	**Trap/Vee/Rect Channel Flow, Existing Ditch**
					Bot.W=0.00' D=1.00' Z= 2.0 '/' Top.W=4.00'
					n= 0.035
4.1	385	0.1000	1.58		**Shallow Concentrated Flow, Shallow 2 - Woodlands**
					Woodland Kv= 5.0 fps
6.6	736	0.0700	1.85		**Shallow Concentrated Flow, Shallow 3 - Short Grass**
					Short Grass Pasture Kv= 7.0 fps
0.3	421	0.1400	26.47	1,088.62	**Trap/Vee/Rect Channel Flow, Channel 1**
					Bot.W=6.50' D=3.50' Z= 1.5 '/' Top.W=17.00'
					n= 0.035
0.9	878	0.0900	15.65	281.77	**Trap/Vee/Rect Channel Flow, Channel 2**
					Bot.W=6.00' D=2.00' Z= 1.5 '/' Top.W=12.00'
					n= 0.035
21.2	3,138	Total			

Pre-Project WS1
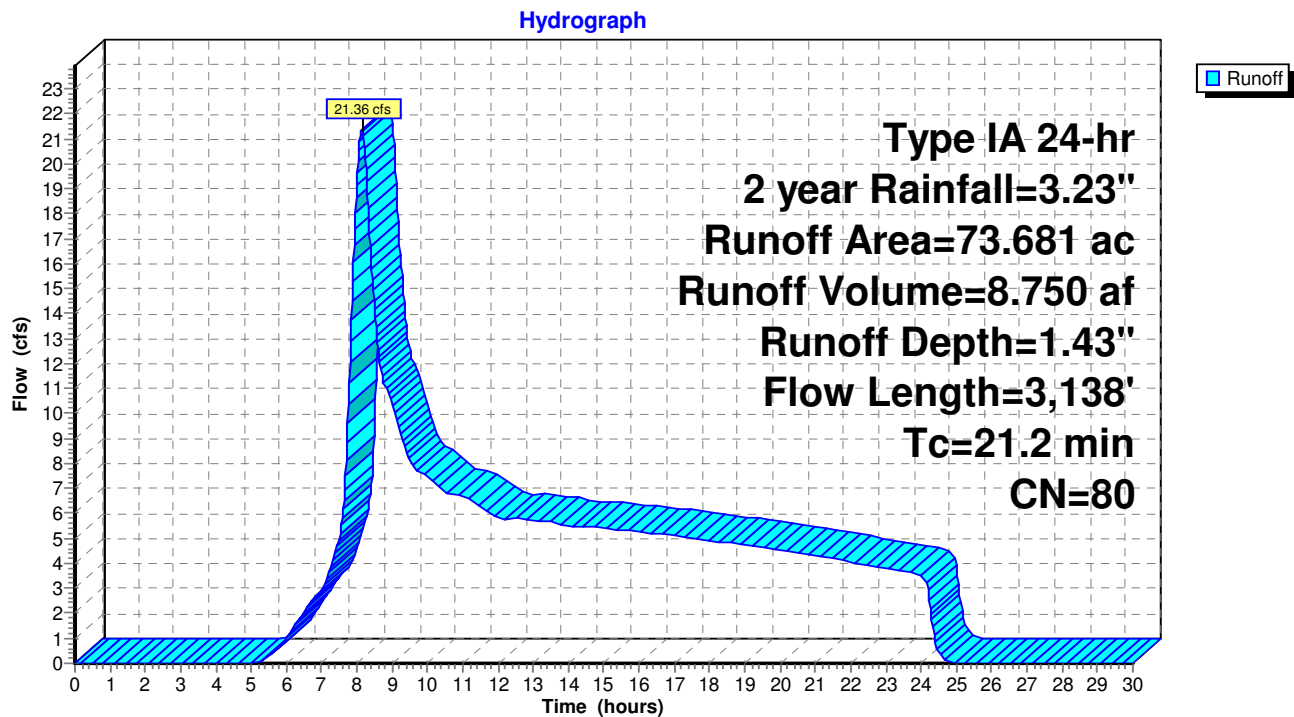Prepared by PPI Engineering, Revised Sept. 2020
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Type IA 24-hr 2 year Rainfall=3.23"
Printed 9/2/2020
Page 3

Subcatchment WS-1: Subcat WS-1

Hydrograph

**Type IA 24-hr
2 year Rainfall=3.23"
Runoff Area=73.681 ac
Runoff Volume=8.750 af
Runoff Depth=1.43"
Flow Length=3,138'
Tc=21.2 min
CN=80**

□ Runoff

21.36 cfs

Summary for Subcatchment WS-1: Subcat WS-1

Runoff   =   46.99 cfs @   8.12 hrs, Volume=   17.228 af, Depth= 2.81"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.02 hrs
Type IA 24-hr 10 year Rainfall=4.90"

	Area (ac)	CN	Description
*	0.000	0	, HSG C
*	0.000	0	, HSG D
	0.151	75	Annual Grass, Good, HSG C
	30.008	81	Annual Grass, Good, HSG D
	0.481	89	Dirt roads, HSG D
	0.908	82	Farmsteads, HSG C
	1.584	86	Farmsteads, HSG D
	0.130	96	Gravel surface, HSG D
	3.137	84	Vineyard, Fair, HSG D
	0.003	75	Vineyard, Good, HSG C
	4.898	81	Vineyard, Good, HSG D
	1.195	70	Woods, Good, HSG C
	12.232	77	Woods, Good, HSG D
	0.735	72	Woods/grass comb., Good, HSG C
	18.220	79	Woods/grass comb., Good, HSG D
	73.681	80	Weighted Average
	73.681		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.9	100	0.1200	0.24		**Sheet Flow, Sheet** Grass: Dense n= 0.240 P2= 3.23"
1.5	167	0.1400	1.87		**Shallow Concentrated Flow, Shallow 1 - Woodlands** Woodland Kv= 5.0 fps
0.9	451	0.1200	8.60	17.20	**Trap/Vee/Rect Channel Flow, Existing Ditch** Bot.W=0.00' D=1.00' Z= 2.0 '/' Top.W=4.00' n= 0.035
4.1	385	0.1000	1.58		**Shallow Concentrated Flow, Shallow 2 - Woodlands** Woodland Kv= 5.0 fps
6.6	736	0.0700	1.85		**Shallow Concentrated Flow, Shallow 3 - Short Grass** Short Grass Pasture Kv= 7.0 fps
0.3	421	0.1400	26.47	1,088.62	**Trap/Vee/Rect Channel Flow, Channel 1** Bot.W=6.50' D=3.50' Z= 1.5 '/' Top.W=17.00' n= 0.035
0.9	878	0.0900	15.65	281.77	**Trap/Vee/Rect Channel Flow, Channel 2** Bot.W=6.00' D=2.00' Z= 1.5 '/' Top.W=12.00' n= 0.035
21.2	3,138				Total

Pre-Project WS1
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Type IA 24-hr 10 year Rainfall=4.90"
Printed 9/2/2020
Page 5

Subcatchment WS-1: Subcat WS-1

Hydrograph

Type IA 24-hr
10 year Rainfall=4.90"
Runoff Area=73.681 ac
Runoff Volume=17.228 af
Runoff Depth=2.81"
Flow Length=3,138'
Tc=21.2 min
CN=80

46.99 cfs

Runoff

Pre-Project WS1
Prepared by PPI Engineering, Revised Sept. 2020
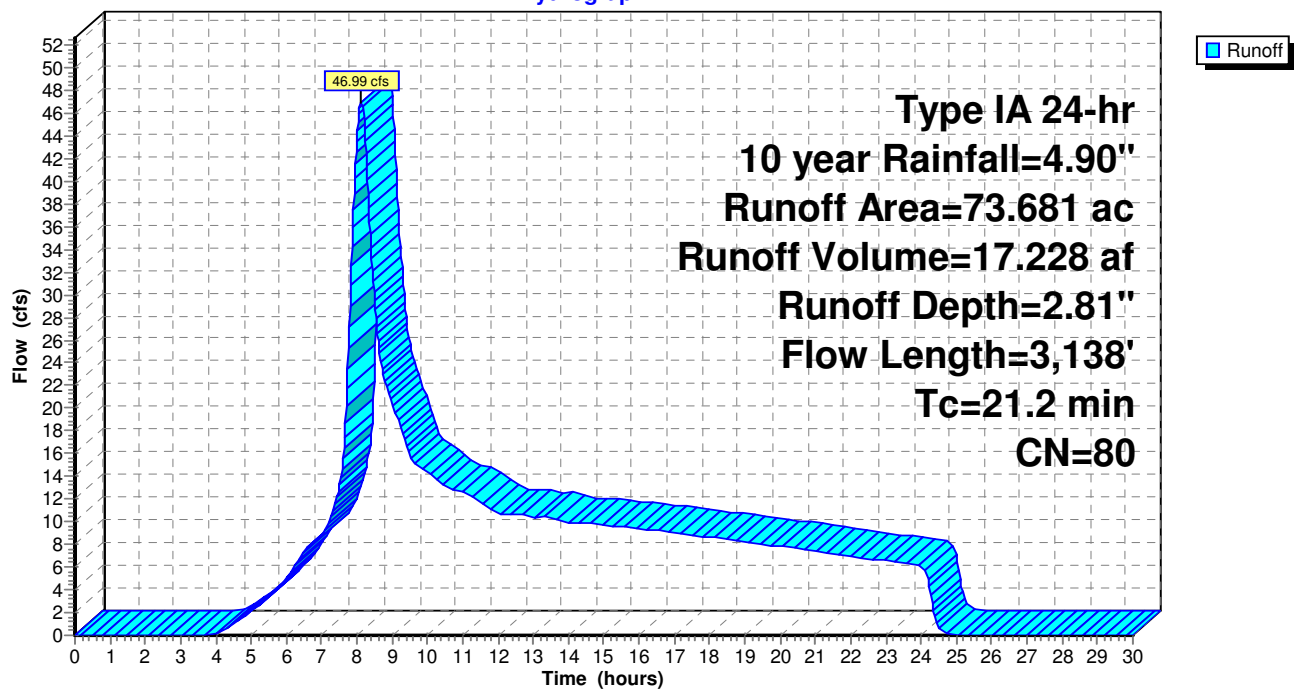HydroCAD® 10.00-24 s/n 09429 © 2018 HydroCAD Software Solutions LLC

Type IA 24-hr 50 year Rainfall=6.61"
Printed 9/2/2020
Page 6

Summary for Subcatchment WS-1: Subcat WS-1

Runoff   =   75.65 cfs @   8.12 hrs, Volume=   26.623 af, Depth= 4.34"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.02 hrs
Type IA 24-hr 50 year Rainfall=6.61"

Area (ac)	CN	Description
* 0.000	0	, HSG C
* 0.000	0	, HSG D
0.151	75	Annual Grass, Good, HSG C
30.008	81	Annual Grass, Good, HSG D
0.481	89	Dirt roads, HSG D
0.908	82	Farmsteads, HSG C
1.584	86	Farmsteads, HSG D
0.130	96	Gravel surface, HSG D
3.137	84	Vineyard, Fair, HSG D
0.003	75	Vineyard, Good, HSG C
4.898	81	Vineyard, Good, HSG D
1.195	70	Woods, Good, HSG C
12.232	77	Woods, Good, HSG D
0.735	72	Woods/grass comb., Good, HSG C
18.220	79	Woods/grass comb., Good, HSG D
73.681	80	Weighted Average
73.681		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.9	100	0.1200	0.24		**Sheet Flow, Sheet** Grass: Dense n= 0.240 P2= 3.23"
1.5	167	0.1400	1.87		**Shallow Concentrated Flow, Shallow 1 - Woodlands** Woodland Kv= 5.0 fps
0.9	451	0.1200	8.60	17.20	**Trap/Vee/Rect Channel Flow, Existing Ditch** Bot.W=0.00' D=1.00' Z= 2.0 '/' Top.W=4.00' n= 0.035
4.1	385	0.1000	1.58		**Shallow Concentrated Flow, Shallow 2 - Woodlands** Woodland Kv= 5.0 fps
6.6	736	0.0700	1.85		**Shallow Concentrated Flow, Shallow 3 - Short Grass** Short Grass Pasture Kv= 7.0 fps
0.3	421	0.1400	26.47	1,088.62	**Trap/Vee/Rect Channel Flow, Channel 1** Bot.W=6.50' D=3.50' Z= 1.5 '/' Top.W=17.00' n= 0.035
0.9	878	0.0900	15.65	281.77	**Trap/Vee/Rect Channel Flow, Channel 2** Bot.W=6.00' D=2.00' Z= 1.5 '/' Top.W=12.00' n= 0.035
21.2	3,138	Total			

Pre-Project WS1
Prepared by PPI Engineering, Revised Sept. 2020
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Type IA 24-hr 50 year Rainfall=6.61"
Printed 9/2/2020
Page 7

Subcatchment WS-1: Subcat WS-1

Hydrograph

Type IA 24-hr
50 year Rainfall=6.61"
Runoff Area=73.681 ac
Runoff Volume=26.623 af
Runoff Depth=4.34"
Flow Length=3,138'
Tc=21.2 min
CN=80

Pre-Project WS1
Prepared by PPI Engineering, Revised Sept. 2020
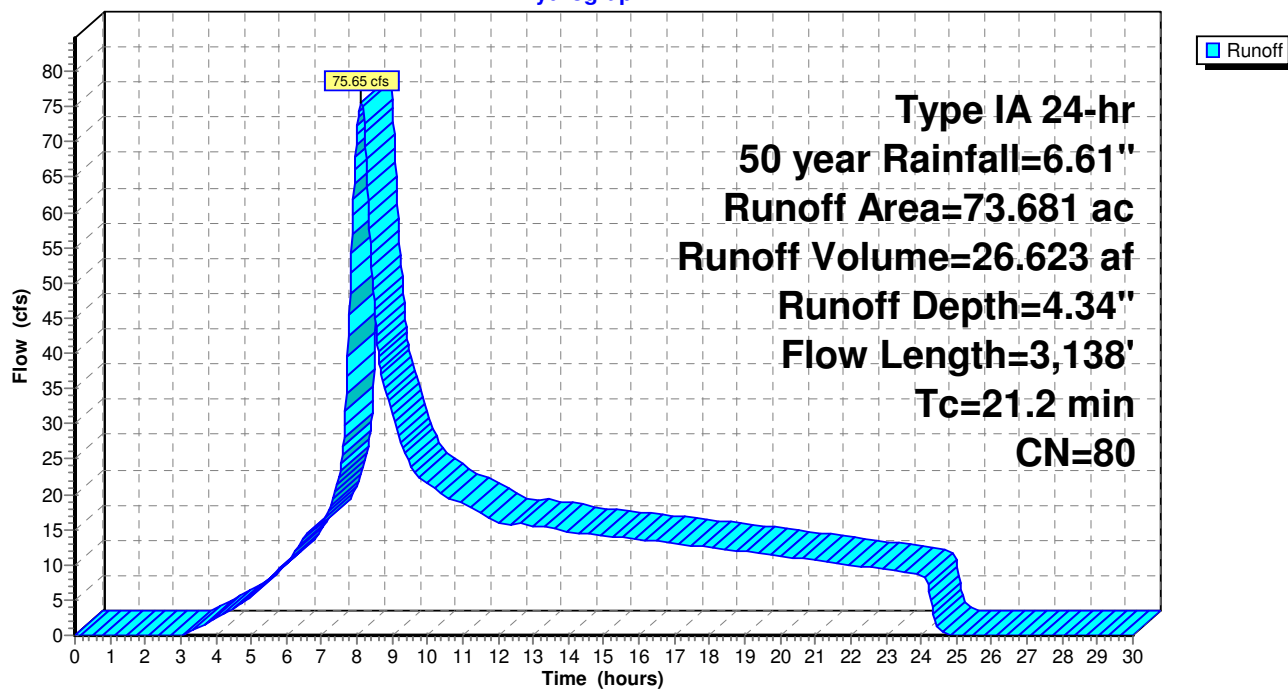HydroCAD® 10.00-24 s/n 09429 © 2018 HydroCAD Software Solutions LLC

Type IA 24-hr 100 year Rainfall=7.33"
Printed 9/2/2020
Page 8

Summary for Subcatchment WS-1: Subcat WS-1

Runoff = 88.04 cfs @ 8.12 hrs, Volume= 30.700 af, Depth= 5.00"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.02 hrs
Type IA 24-hr 100 year Rainfall=7.33"

Area (ac)		CN	Description
*	0.000	0	, HSG C
*	0.000	0	, HSG D
	0.151	75	Annual Grass, Good, HSG C
	30.008	81	Annual Grass, Good, HSG D
	0.481	89	Dirt roads, HSG D
	0.908	82	Farmsteads, HSG C
	1.584	86	Farmsteads, HSG D
	0.130	96	Gravel surface, HSG D
	3.137	84	Vineyard, Fair, HSG D
	0.003	75	Vineyard, Good, HSG C
	4.898	81	Vineyard, Good, HSG D
	1.195	70	Woods, Good, HSG C
	12.232	77	Woods, Good, HSG D
	0.735	72	Woods/grass comb., Good, HSG C
	18.220	79	Woods/grass comb., Good, HSG D
	73.681	80	Weighted Average
	73.681		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.9	100	0.1200	0.24		**Sheet Flow, Sheet**
					Grass: Dense n= 0.240 P2= 3.23"
1.5	167	0.1400	1.87		**Shallow Concentrated Flow, Shallow 1 - Woodlands**
					Woodland Kv= 5.0 fps
0.9	451	0.1200	8.60	17.20	**Trap/Vee/Rect Channel Flow, Existing Ditch**
					Bot.W=0.00' D=1.00' Z= 2.0 '/' Top.W=4.00'
					n= 0.035
4.1	385	0.1000	1.58		**Shallow Concentrated Flow, Shallow 2 - Woodlands**
					Woodland Kv= 5.0 fps
6.6	736	0.0700	1.85		**Shallow Concentrated Flow, Shallow 3 - Short Grass**
					Short Grass Pasture Kv= 7.0 fps
0.3	421	0.1400	26.47	1,088.62	**Trap/Vee/Rect Channel Flow, Channel 1**
					Bot.W=6.50' D=3.50' Z= 1.5 '/' Top.W=17.00'
					n= 0.035
0.9	878	0.0900	15.65	281.77	**Trap/Vee/Rect Channel Flow, Channel 2**
					Bot.W=6.00' D=2.00' Z= 1.5 '/' Top.W=12.00'
					n= 0.035
21.2	3,138				Total

Pre-Project WS1
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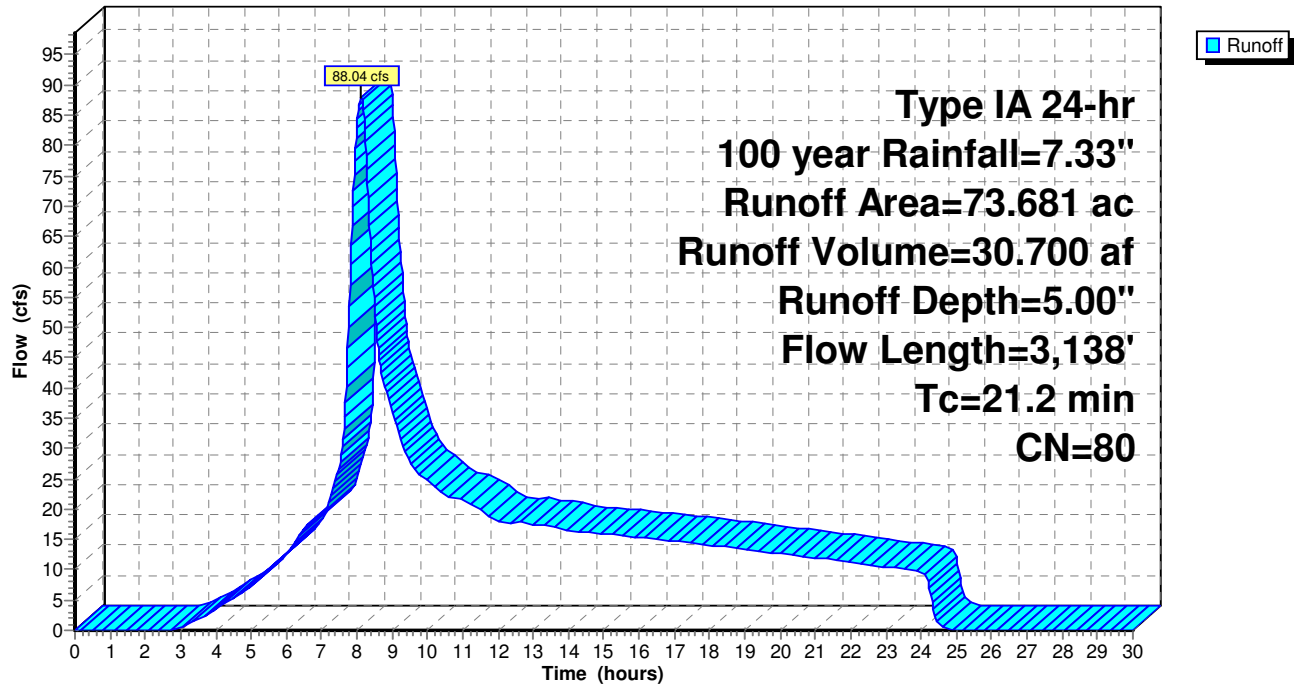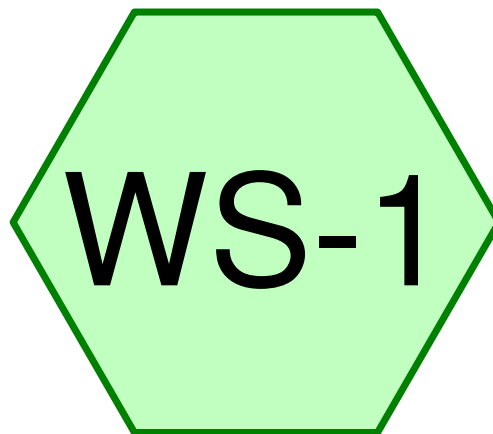*Type IA 24-hr 100 year Rainfall=7.33"*
Printed 9/2/2020
Page 9

Subcatchment WS-1: Subcat WS-1

Hydrograph

**Type IA 24-hr
100 year Rainfall=7.33"
Runoff Area=73.681 ac
Runoff Volume=30.700 af
Runoff Depth=5.00"
Flow Length=3,138'
Tc=21.2 min
CN=80**

88.04 cfs

□ Runoff

WS-1

Subcat WS-1

Subcat   Reach   Pond   Link

Post-Project WS1
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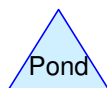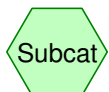*Type IA 24-hr 2 year Rainfall=3.23"*
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Summary for Subcatchment WS-1: Subcat WS-1

Runoff   =   20.38 cfs @   8.20 hrs, Volume=   8.750 af, Depth= 1.43"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.02 hrs
Type IA 24-hr 2 year Rainfall=3.23"

Area (ac)	CN	Description
* 0.000	0	, HSG C
* 0.000	0	, HSG D
0.007	75	Annual Grass, Good, HSG C
27.171	81	Annual Grass, Good, HSG D
0.481	89	Dirt roads, HSG D
0.899	82	Farmsteads, HSG C
1.425	86	Farmsteads, HSG D
0.130	96	Gravel surface, HSG D
3.082	84	Vineyard, Fair, HSG D
0.476	75	Vineyard, Good, HSG C
10.643	81	Vineyard, Good, HSG D
0.875	70	Woods, Good, HSG C
10.728	77	Woods, Good, HSG D
0.735	72	Woods/grass comb., Good, HSG C
17.029	79	Woods/grass comb., Good, HSG D
73.681	80	Weighted Average
73.681		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.9	100	0.1200	0.24		**Sheet Flow, Sheet 1** Grass: Dense n= 0.240 P2= 3.23"
1.1	167	0.1400	2.62		**Shallow Concentrated Flow, Shallow 1 - Short Grass** Short Grass Pasture Kv= 7.0 fps
0.5	250	0.1000	7.85	15.70	**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	431	0.1500	11.90	6.49	**Pipe Channel, 10" SWCPP** 10.0" Round Area= 0.5 sf Perim= 2.6' r= 0.21' n= 0.017 PPI 10in CPP
9.2	100	0.0600	0.18		**Sheet Flow, Sheet 2** Grass: Dense n= 0.240 P2= 3.23"
6.5	720	0.0700	1.85		**Shallow Concentrated Flow, Shallow 2 - Short Grass** Short Grass Pasture Kv= 7.0 fps
0.3	421	0.1400	26.47	1,088.62	**Trap/Vee/Rect Channel Flow, Channel 1** Bot.W=6.50' D=3.50' Z= 1.5 '/' Top.W=17.00' n= 0.035
0.9	878	0.0900	15.65	281.77	**Trap/Vee/Rect Channel Flow, Channel 2** Bot.W=6.00' D=2.00' Z= 1.5 '/' Top.W=12.00' n= 0.035
26.0	3,067	Total			

Post-Project WS1
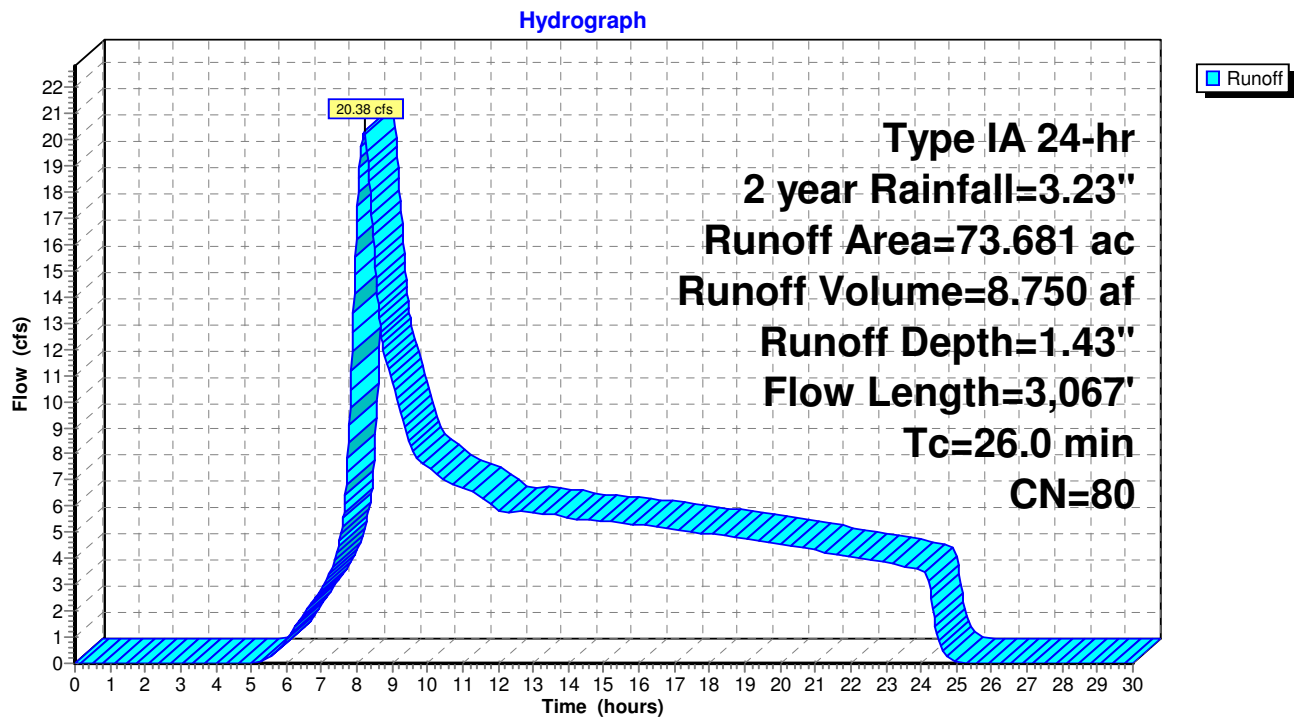Prepared by PPI Engineering, Revised Sept. 2020
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Type IA 24-hr 2 year Rainfall=3.23"
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Subcatchment WS-1: Subcat WS-1

Hydrograph

**Type IA 24-hr
2 year Rainfall=3.23"
Runoff Area=73.681 ac
Runoff Volume=8.750 af
Runoff Depth=1.43"
Flow Length=3,067'
Tc=26.0 min
CN=80**

20.38 cfs

Runoff

Post-Project WS1
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Type IA 24-hr 10 year Rainfall=4.90"
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Summary for Subcatchment WS-1: Subcat WS-1

Runoff = 44.99 cfs @ 8.18 hrs, Volume= 17.228 af, Depth= 2.81"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.02 hrs
Type IA 24-hr 10 year Rainfall=4.90"

	Area (ac)	CN	Description
*	0.000	0	, HSG C
*	0.000	0	, HSG D
	0.007	75	Annual Grass, Good, HSG C
	27.171	81	Annual Grass, Good, HSG D
	0.481	89	Dirt roads, HSG D
	0.899	82	Farmsteads, HSG C
	1.425	86	Farmsteads, HSG D
	0.130	96	Gravel surface, HSG D
	3.082	84	Vineyard, Fair, HSG D
	0.476	75	Vineyard, Good, HSG C
	10.643	81	Vineyard, Good, HSG D
	0.875	70	Woods, Good, HSG C
	10.728	77	Woods, Good, HSG D
	0.735	72	Woods/grass comb., Good, HSG C
	17.029	79	Woods/grass comb., Good, HSG D
	73.681	80	Weighted Average
	73.681		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.9	100	0.1200	0.24		**Sheet Flow, Sheet 1** Grass: Dense n= 0.240 P2= 3.23"
1.1	167	0.1400	2.62		**Shallow Concentrated Flow, Shallow 1 - Short Grass** Short Grass Pasture Kv= 7.0 fps
0.5	250	0.1000	7.85	15.70	**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	431	0.1500	11.90	6.49	**Pipe Channel, 10" SWCPP** 10.0" Round Area= 0.5 sf Perim= 2.6' r= 0.21' n= 0.017 PPI 10in CPP
9.2	100	0.0600	0.18		**Sheet Flow, Sheet 2** Grass: Dense n= 0.240 P2= 3.23"
6.5	720	0.0700	1.85		**Shallow Concentrated Flow, Shallow 2 - Short Grass** Short Grass Pasture Kv= 7.0 fps
0.3	421	0.1400	26.47	1,088.62	**Trap/Vee/Rect Channel Flow, Channel 1** Bot.W=6.50' D=3.50' Z= 1.5 '/' Top.W=17.00' n= 0.035
0.9	878	0.0900	15.65	281.77	**Trap/Vee/Rect Channel Flow, Channel 2** Bot.W=6.00' D=2.00' Z= 1.5 '/' Top.W=12.00' n= 0.035
26.0	3,067				Total

Post-Project WS1
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Type IA 24-hr 10 year Rainfall=4.90"
Printed 9/2/2020
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Subcatchment WS-1: Subcat WS-1

Hydrograph

Type IA 24-hr
10 year Rainfall=4.90"
Runoff Area=73.681 ac
Runoff Volume=17.228 af
Runoff Depth=2.81"
Flow Length=3,067'
Tc=26.0 min
CN=80

44.99 cfs

Runoff

Post-Project WS1
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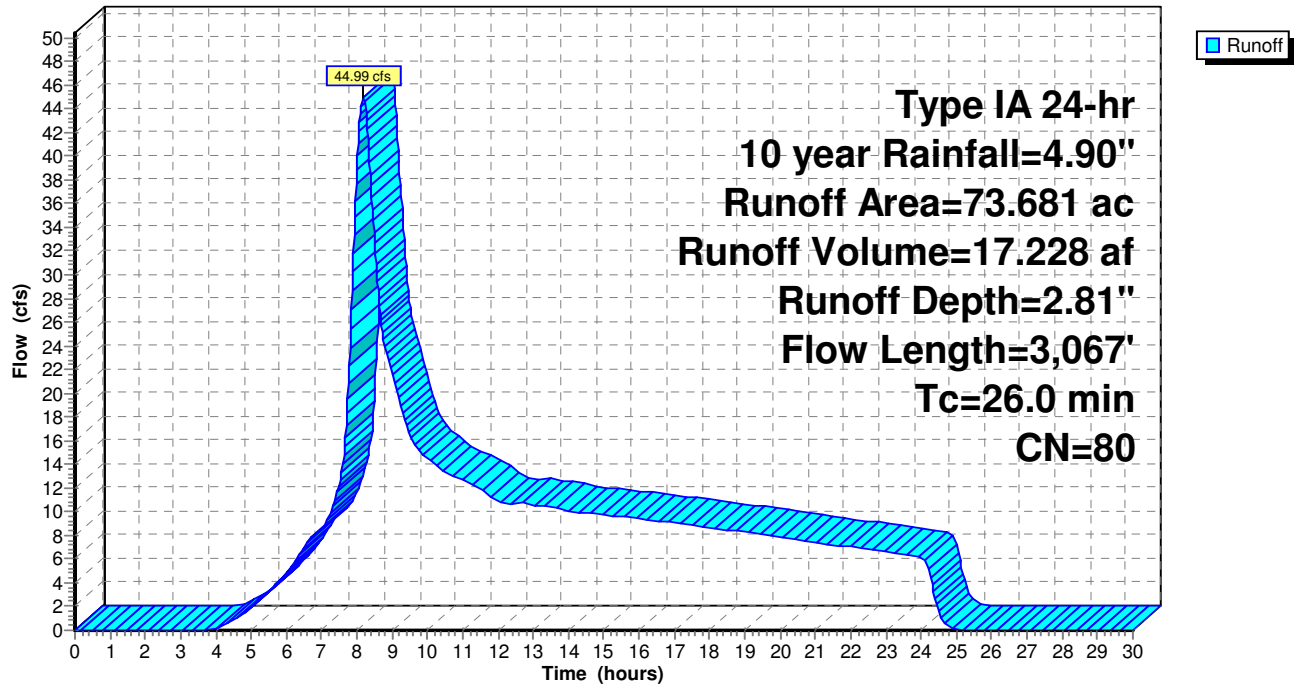HydroCAD® 10.00-24 s/n 09429 © 2018 HydroCAD Software Solutions LLC

Type IA 24-hr 50 year Rainfall=6.61"
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Summary for Subcatchment WS-1: Subcat WS-1

Runoff   =   72.52 cfs @   8.17 hrs, Volume=   26.623 af, Depth= 4.34"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.02 hrs
Type IA 24-hr 50 year Rainfall=6.61"

	Area (ac)	CN	Description
*	0.000	0	, HSG C
*	0.000	0	, HSG D
	0.007	75	Annual Grass, Good, HSG C
	27.171	81	Annual Grass, Good, HSG D
	0.481	89	Dirt roads, HSG D
	0.899	82	Farmsteads, HSG C
	1.425	86	Farmsteads, HSG D
	0.130	96	Gravel surface, HSG D
	3.082	84	Vineyard, Fair, HSG D
	0.476	75	Vineyard, Good, HSG C
	10.643	81	Vineyard, Good, HSG D
	0.875	70	Woods, Good, HSG C
	10.728	77	Woods, Good, HSG D
	0.735	72	Woods/grass comb., Good, HSG C
	17.029	79	Woods/grass comb., Good, HSG D
	73.681	80	Weighted Average
	73.681		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.9	100	0.1200	0.24		**Sheet Flow, Sheet 1**
					Grass: Dense n= 0.240 P2= 3.23"
1.1	167	0.1400	2.62		**Shallow Concentrated Flow, Shallow 1 - Short Grass**
					Short Grass Pasture Kv= 7.0 fps
0.5	250	0.1000	7.85	15.70	**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	431	0.1500	11.90	6.49	**Pipe Channel, 10" SWCPP**
					10.0" Round Area= 0.5 sf Perim= 2.6' r= 0.21'
					n= 0.017 PPI 10in CPP
9.2	100	0.0600	0.18		**Sheet Flow, Sheet 2**
					Grass: Dense n= 0.240 P2= 3.23"
6.5	720	0.0700	1.85		**Shallow Concentrated Flow, Shallow 2 - Short Grass**
					Short Grass Pasture Kv= 7.0 fps
0.3	421	0.1400	26.47	1,088.62	**Trap/Vee/Rect Channel Flow, Channel 1**
					Bot.W=6.50' D=3.50' Z= 1.5 '/' Top.W=17.00'
					n= 0.035
0.9	878	0.0900	15.65	281.77	**Trap/Vee/Rect Channel Flow, Channel 2**
					Bot.W=6.00' D=2.00' Z= 1.5 '/' Top.W=12.00'
					n= 0.035
26.0	3,067	Total			

Post-Project WS1
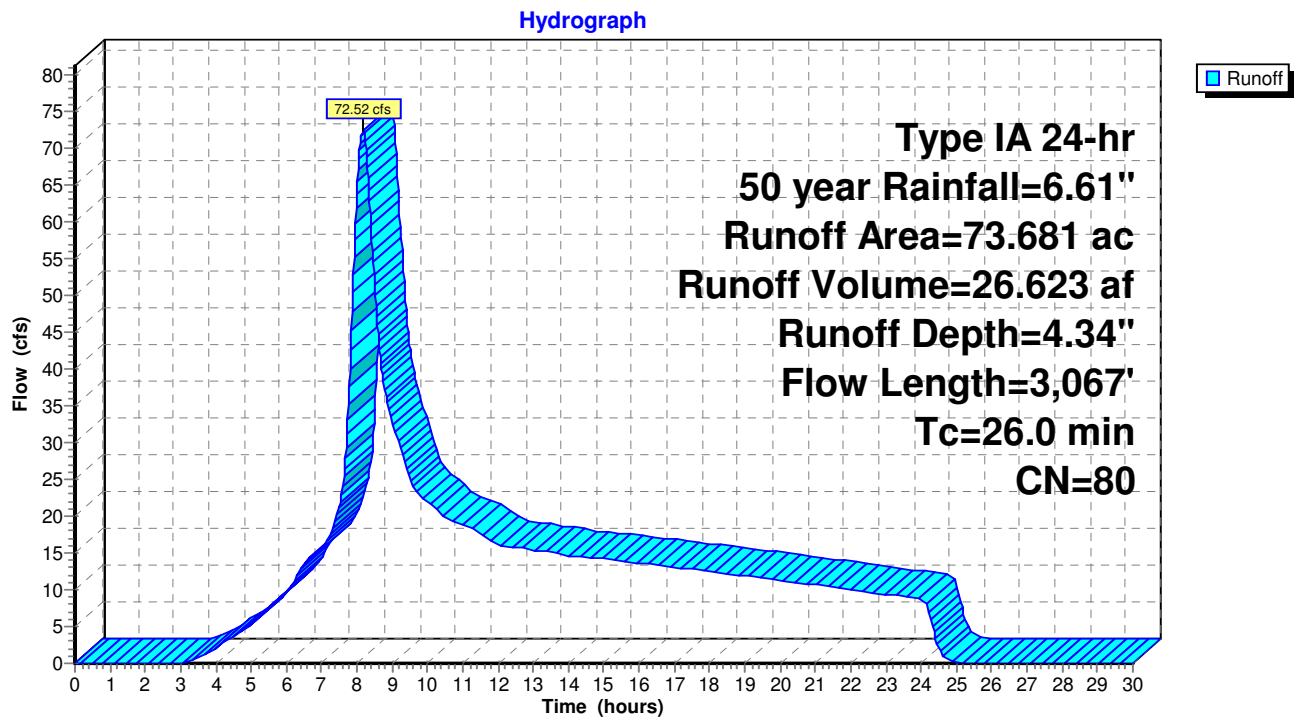Prepared by PPI Engineering, Revised Sept. 2020
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Type IA 24-hr 50 year Rainfall=6.61"
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Subcatchment WS-1: Subcat WS-1

Type IA 24-hr
50 year Rainfall=6.61"
Runoff Area=73.681 ac
Runoff Volume=26.623 af
Runoff Depth=4.34"
Flow Length=3,067'
Tc=26.0 min
CN=80

Summary for Subcatchment WS-1: Subcat WS-1

Runoff   =   84.44 cfs @   8.17 hrs, Volume=   30.700 af, Depth= 5.00"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.02 hrs
Type IA 24-hr 100 year Rainfall=7.33"

	Area (ac)	CN	Description
*	0.000	0	, HSG C
*	0.000	0	, HSG D
	0.007	75	Annual Grass, Good, HSG C
	27.171	81	Annual Grass, Good, HSG D
	0.481	89	Dirt roads, HSG D
	0.899	82	Farmsteads, HSG C
	1.425	86	Farmsteads, HSG D
	0.130	96	Gravel surface, HSG D
	3.082	84	Vineyard, Fair, HSG D
	0.476	75	Vineyard, Good, HSG C
	10.643	81	Vineyard, Good, HSG D
	0.875	70	Woods, Good, HSG C
	10.728	77	Woods, Good, HSG D
	0.735	72	Woods/grass comb., Good, HSG C
	17.029	79	Woods/grass comb., Good, HSG D
	73.681	80	Weighted Average
	73.681		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.9	100	0.1200	0.24		**Sheet Flow, Sheet 1**
					Grass: Dense n= 0.240 P2= 3.23"
1.1	167	0.1400	2.62		**Shallow Concentrated Flow, Shallow 1 - Short Grass**
					Short Grass Pasture Kv= 7.0 fps
0.5	250	0.1000	7.85	15.70	**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	431	0.1500	11.90	6.49	**Pipe Channel, 10" SWCPP**
					10.0" Round Area= 0.5 sf Perim= 2.6' r= 0.21'
					n= 0.017 PPI 10in CPP
9.2	100	0.0600	0.18		**Sheet Flow, Sheet 2**
					Grass: Dense n= 0.240 P2= 3.23"
6.5	720	0.0700	1.85		**Shallow Concentrated Flow, Shallow 2 - Short Grass**
					Short Grass Pasture Kv= 7.0 fps
0.3	421	0.1400	26.47	1,088.62	**Trap/Vee/Rect Channel Flow, Channel 1**
					Bot.W=6.50' D=3.50' Z= 1.5 '/' Top.W=17.00'
					n= 0.035
0.9	878	0.0900	15.65	281.77	**Trap/Vee/Rect Channel Flow, Channel 2**
					Bot.W=6.00' D=2.00' Z= 1.5 '/' Top.W=12.00'
					n= 0.035
26.0	3,067	Total			

Post-Project WS1
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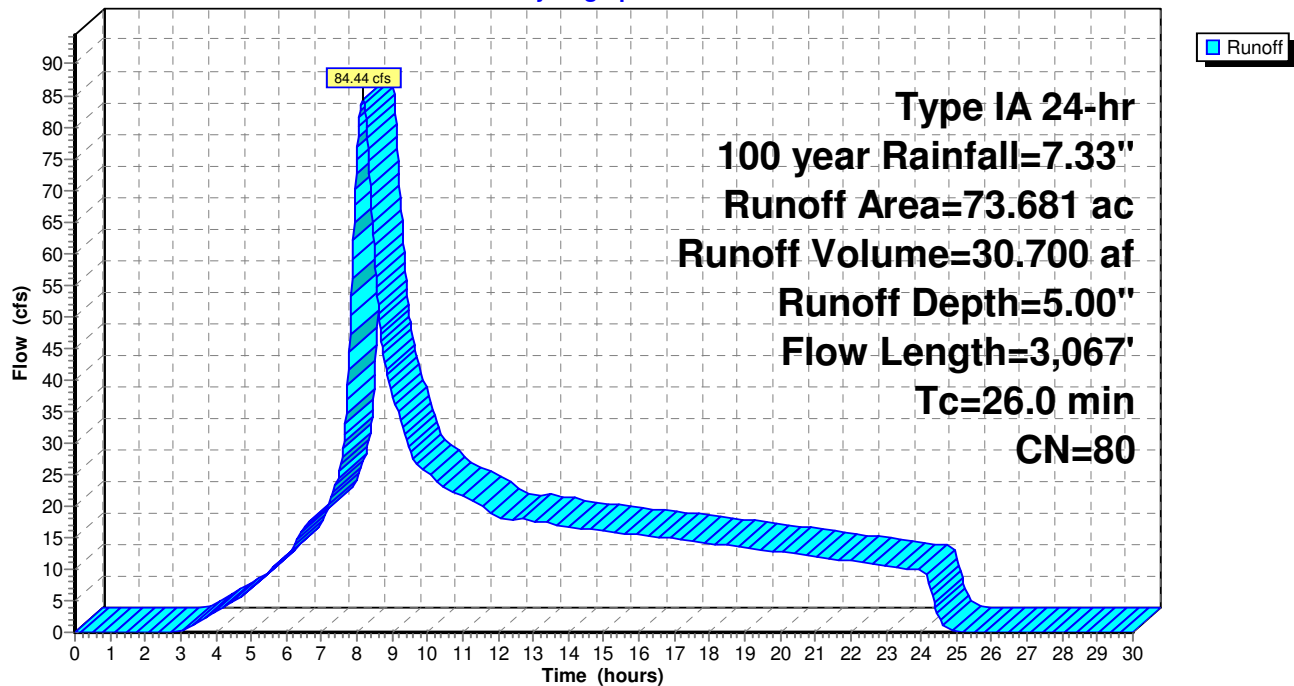HydroCAD® 10.00-24 s/n 09429 © 2018 HydroCAD Software Solutions LLC
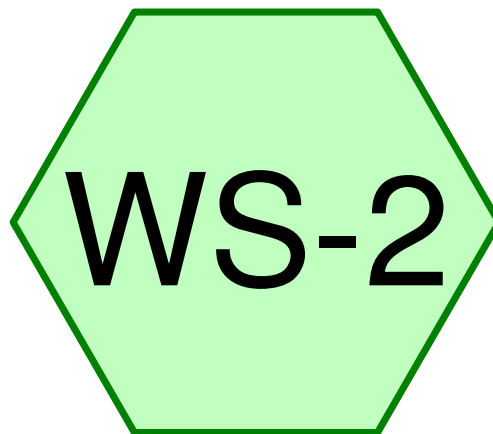
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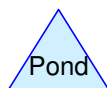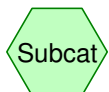Printed 9/2/2020
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Subcatchment WS-1: Subcat WS-1

Hydrograph

**Type IA 24-hr
100 year Rainfall=7.33"
Runoff Area=73.681 ac
Runoff Volume=30.700 af
Runoff Depth=5.00"
Flow Length=3,067'
Tc=26.0 min
CN=80**

84.44 cfs

Runoff

WS-2

Subcat WS-2

Subcat   Reach   Pond   Link

Summary for Subcatchment WS-2: Subcat WS-2

Runoff   =   11.01 cfs @   8.10 hrs, Volume=   4.688 af, Depth= 1.23"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.02 hrs
Type IA 24-hr 2 year Rainfall=3.23"

Area (ac)	CN	Description
* 0.000	0	, HSG C
0.501	79	Annual Grass, Fair, HSG C
0.159	84	Annual Grass, Fair, HSG D
0.556	75	Annual Grass, Good, HSG C
1.424	81	Annual Grass, Good, HSG D
0.160	65	Brush, Good, HSG C
0.611	73	Brush, Good, HSG D
0.485	89	Gravel Roads, HSG C
0.131	96	Gravel surface, HSG C
12.081	79	Vineyard, Fair, HSG C
2.043	84	Vineyard, Fair, HSG D
6.851	75	Vineyard, Good, HSG C
0.182	81	Vineyard, Good, HSG D
2.890	70	Woods, Good, HSG C
17.486	77	Woods, Good, HSG D
0.056	72	Woods/grass comb., Good, HSG C
45.616	77	Weighted Average
45.616		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
9.2	100	0.0600	0.18		**Sheet Flow, Sheet**
					Grass: Dense n= 0.240 P2= 3.23"
6.6	879	0.1000	2.21		**Shallow Concentrated Flow, Shallow - Short Grass**
					Short Grass Pasture Kv= 7.0 fps
1.0	1,327	0.1700	22.73	404.80	**Trap/Vee/Rect Channel Flow, Channel**
					Bot.W=4.00' D=2.50' Z= 1.5 & 1.0 '/' Top.W=10.25'
					n= 0.035
16.8	2,306	Total			

Pre-Project WS2
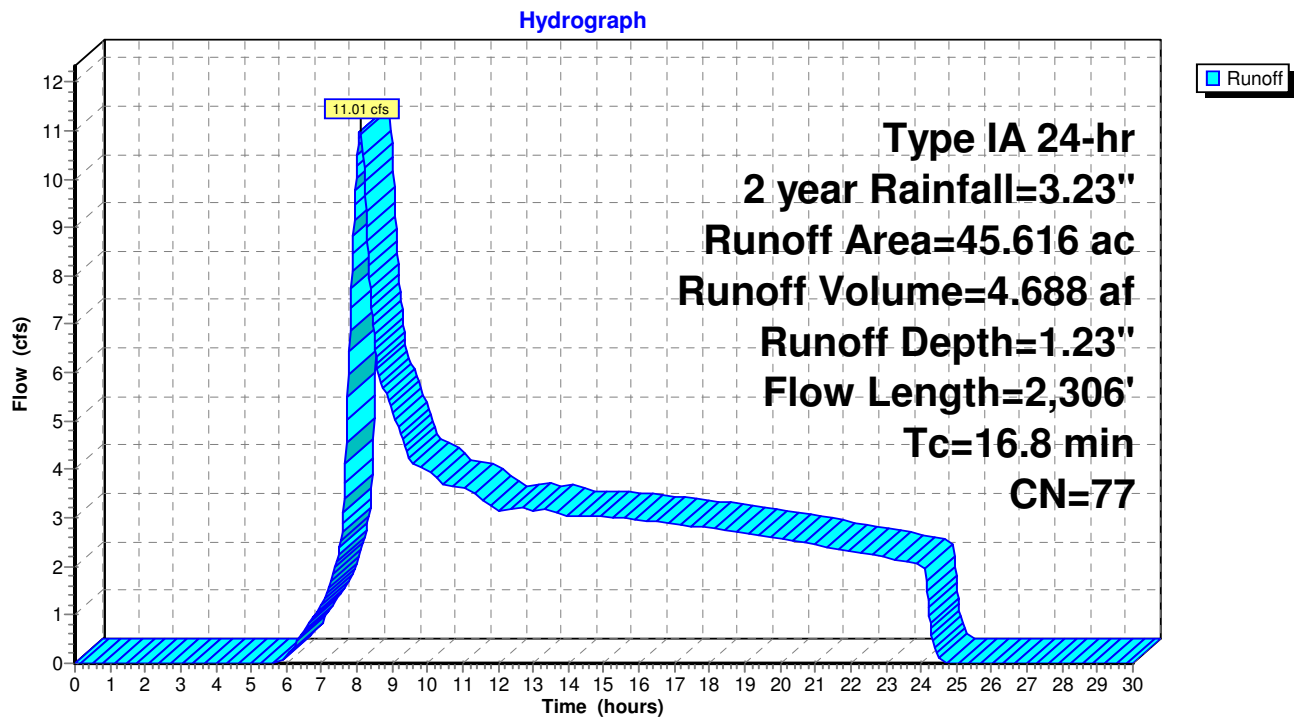Prepared by PPI Engineering, Revised Sept. 2020
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Type IA 24-hr 2 year Rainfall=3.23"
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Subcatchment WS-2: Subcat WS-2

Hydrograph

Type IA 24-hr
2 year Rainfall=3.23"
Runoff Area=45.616 ac
Runoff Volume=4.688 af
Runoff Depth=1.23"
Flow Length=2,306'
Tc=16.8 min
CN=77

11.01 cfs

☐ Runoff

Summary for Subcatchment WS-2: Subcat WS-2

Runoff   =   26.34 cfs @   8.08 hrs, Volume=   9.654 af, Depth= 2.54"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.02 hrs
Type IA 24-hr 10 year Rainfall=4.90"

Area (ac)	CN	Description
* 0.000	0	, HSG C
0.501	79	Annual Grass, Fair, HSG C
0.159	84	Annual Grass, Fair, HSG D
0.556	75	Annual Grass, Good, HSG C
1.424	81	Annual Grass, Good, HSG D
0.160	65	Brush, Good, HSG C
0.611	73	Brush, Good, HSG D
0.485	89	Gravel Roads, HSG C
0.131	96	Gravel surface, HSG C
12.081	79	Vineyard, Fair, HSG C
2.043	84	Vineyard, Fair, HSG D
6.851	75	Vineyard, Good, HSG C
0.182	81	Vineyard, Good, HSG D
2.890	70	Woods, Good, HSG C
17.486	77	Woods, Good, HSG D
0.056	72	Woods/grass comb., Good, HSG C
45.616	77	Weighted Average
45.616		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
9.2	100	0.0600	0.18		**Sheet Flow, Sheet**
					Grass: Dense n= 0.240 P2= 3.23"
6.6	879	0.1000	2.21		**Shallow Concentrated Flow, Shallow - Short Grass**
					Short Grass Pasture Kv= 7.0 fps
1.0	1,327	0.1700	22.73	404.80	**Trap/Vee/Rect Channel Flow, Channel**
					Bot.W=4.00' D=2.50' Z= 1.5 & 1.0 '/' Top.W=10.25'
					n= 0.035
16.8	2,306	Total			

Pre-Project WS2
Prepared by PPI Engineering, Revised Sept. 2020
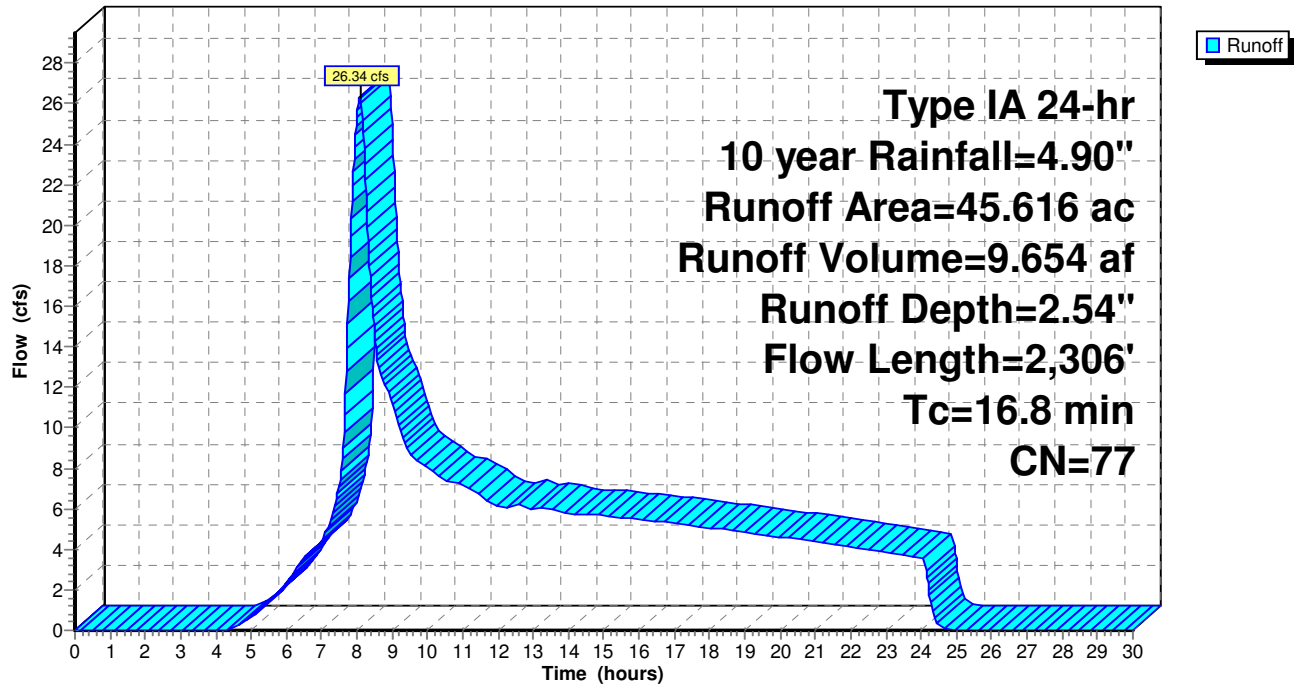HydroCAD® 10.00-24 s/n 09429 © 2018 HydroCAD Software Solutions LLC

Type IA 24-hr 10 year Rainfall=4.90"
Printed 9/2/2020
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Subcatchment WS-2: Subcat WS-2

Hydrograph

Type IA 24-hr
10 year Rainfall=4.90"
Runoff Area=45.616 ac
Runoff Volume=9.654 af
Runoff Depth=2.54"
Flow Length=2,306'
Tc=16.8 min
CN=77

26.34 cfs

□ Runoff

Summary for Subcatchment WS-2: Subcat WS-2

Runoff   =   44.00 cfs @   8.07 hrs, Volume=   15.270 af, Depth= 4.02"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.02 hrs
Type IA 24-hr 50 year Rainfall=6.61"

Area (ac)	CN	Description
* 0.000	0	, HSG C
0.501	79	Annual Grass, Fair, HSG C
0.159	84	Annual Grass, Fair, HSG D
0.556	75	Annual Grass, Good, HSG C
1.424	81	Annual Grass, Good, HSG D
0.160	65	Brush, Good, HSG C
0.611	73	Brush, Good, HSG D
0.485	89	Gravel Roads, HSG C
0.131	96	Gravel surface, HSG C
12.081	79	Vineyard, Fair, HSG C
2.043	84	Vineyard, Fair, HSG D
6.851	75	Vineyard, Good, HSG C
0.182	81	Vineyard, Good, HSG D
2.890	70	Woods, Good, HSG C
17.486	77	Woods, Good, HSG D
0.056	72	Woods/grass comb., Good, HSG C
45.616	77	Weighted Average
45.616		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
9.2	100	0.0600	0.18		**Sheet Flow, Sheet**
					Grass: Dense n= 0.240 P2= 3.23"
6.6	879	0.1000	2.21		**Shallow Concentrated Flow, Shallow - Short Grass**
					Short Grass Pasture Kv= 7.0 fps
1.0	1,327	0.1700	22.73	404.80	**Trap/Vee/Rect Channel Flow, Channel**
					Bot.W=4.00' D=2.50' Z= 1.5 & 1.0 '/' Top.W=10.25'
					n= 0.035
16.8	2,306	Total			

Pre-Project WS2
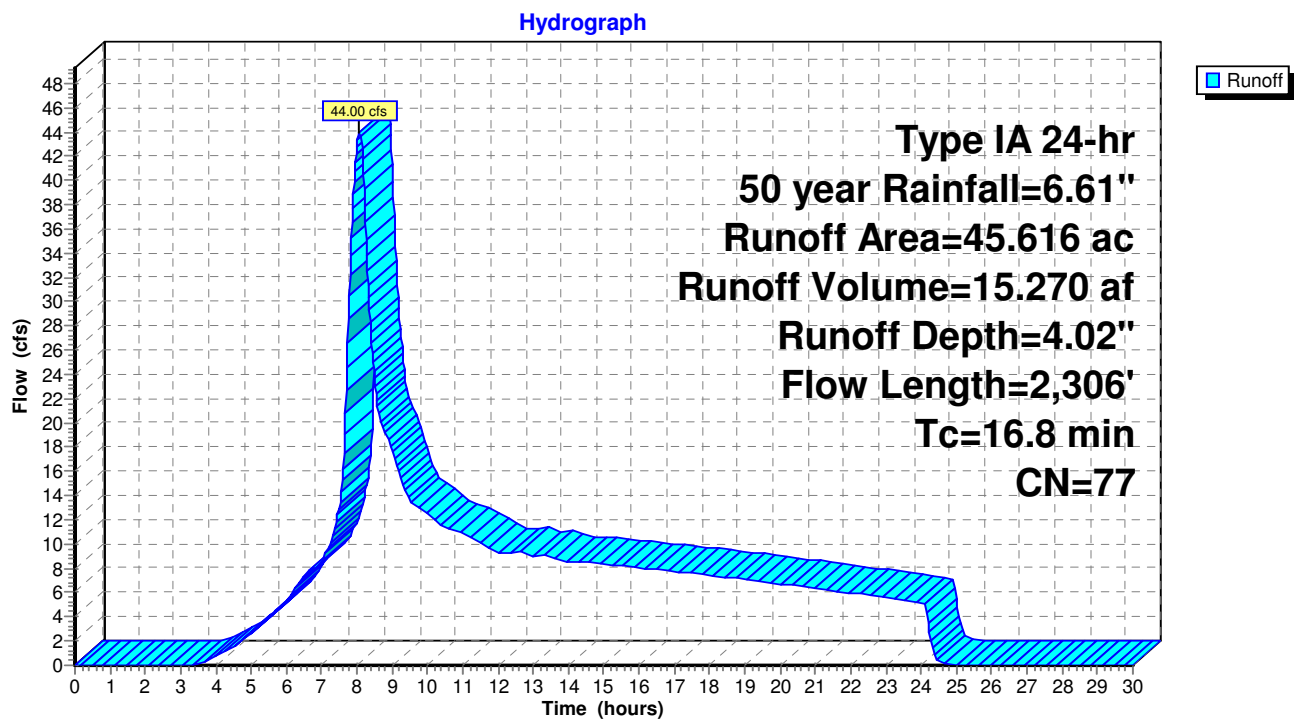Prepared by PPI Engineering, Revised Sept. 2020
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Type IA 24-hr 50 year Rainfall=6.61"
Printed 9/2/2020
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Subcatchment WS-2: Subcat WS-2

Hydrograph

Type IA 24-hr
50 year Rainfall=6.61"
Runoff Area=45.616 ac
Runoff Volume=15.270 af
Runoff Depth=4.02"
Flow Length=2,306'
Tc=16.8 min
CN=77

Pre-Project WS2
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Type IA 24-hr 100 year Rainfall=7.33"
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Summary for Subcatchment WS-2: Subcat WS-2

Runoff   =   51.74 cfs @   8.07 hrs, Volume=   17.728 af, Depth= 4.66"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.02 hrs
Type IA 24-hr 100 year Rainfall=7.33"

Area (ac)	CN	Description
* 0.000	0	, HSG C
0.501	79	Annual Grass, Fair, HSG C
0.159	84	Annual Grass, Fair, HSG D
0.556	75	Annual Grass, Good, HSG C
1.424	81	Annual Grass, Good, HSG D
0.160	65	Brush, Good, HSG C
0.611	73	Brush, Good, HSG D
0.485	89	Gravel Roads, HSG C
0.131	96	Gravel surface, HSG C
12.081	79	Vineyard, Fair, HSG C
2.043	84	Vineyard, Fair, HSG D
6.851	75	Vineyard, Good, HSG C
0.182	81	Vineyard, Good, HSG D
2.890	70	Woods, Good, HSG C
17.486	77	Woods, Good, HSG D
0.056	72	Woods/grass comb., Good, HSG C
45.616	77	Weighted Average
45.616		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
9.2	100	0.0600	0.18		**Sheet Flow, Sheet** Grass: Dense n= 0.240 P2= 3.23"
6.6	879	0.1000	2.21		**Shallow Concentrated Flow, Shallow - Short Grass** Short Grass Pasture Kv= 7.0 fps
1.0	1,327	0.1700	22.73	404.80	**Trap/Vee/Rect Channel Flow, Channel** Bot.W=4.00' D=2.50' Z= 1.5 & 1.0 '/' Top.W=10.25' n= 0.035
16.8	2,306				Total

Pre-Project WS2
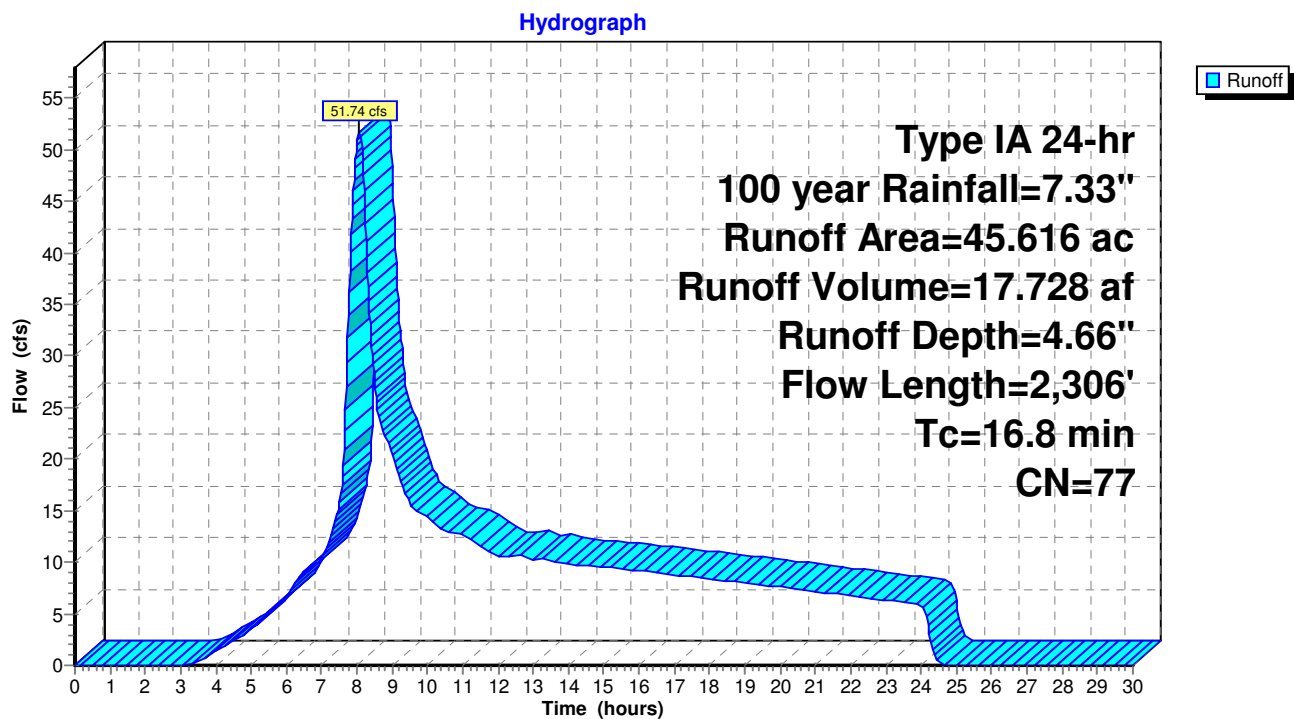Prepared by PPI Engineering, Revised Sept. 2020
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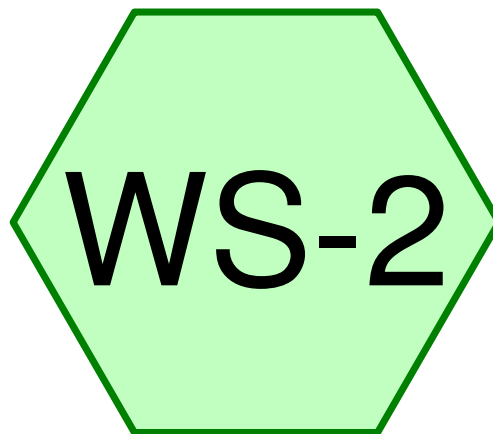
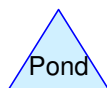*Type IA 24-hr 100 year Rainfall=7.33"*
Printed 9/2/2020
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Subcatchment WS-2: Subcat WS-2

Hydrograph

- Runoff

Type IA 24-hr
100 year Rainfall=7.33"
Runoff Area=45.616 ac
Runoff Volume=17.728 af
Runoff Depth=4.66"
Flow Length=2,306'
Tc=16.8 min
CN=77

51.74 cfs

WS-2

Subcat WS-2

Summary for Subcatchment WS-2: Subcat WS-2

Runoff   =   11.01 cfs @   8.10 hrs, Volume=   4.688 af, Depth= 1.23"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.02 hrs
Type IA 24-hr 2 year Rainfall=3.23"

Area (ac)	CN	Description
* 0.000	0	, HSG C
* 0.000	0	, HSG D
0.501	79	Annual Grass, Fair, HSG C
0.159	84	Annual Grass, Fair, HSG D
0.556	75	Annual Grass, Good, HSG C
1.424	81	Annual Grass, Good, HSG D
0.160	65	Brush, Good, HSG C
0.611	73	Brush, Good, HSG D
0.485	89	Gravel Roads, HSG C
0.131	96	Gravel surface, HSG C
12.081	79	Vineyard, Fair, HSG C
2.027	84	Vineyard, Fair, HSG D
6.851	75	Vineyard, Good, HSG C
0.879	81	Vineyard, Good, HSG D
2.890	70	Woods, Good, HSG C
16.805	77	Woods, Good, HSG D
0.056	72	Woods/grass comb., Good, HSG C
45.616	77	Weighted Average
45.616		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
9.2	100	0.0600	0.18		**Sheet Flow, Sheet**
					Grass: Dense n= 0.240 P2= 3.23"
6.6	879	0.1000	2.21		**Shallow Concentrated Flow, Shallow - Short Grass**
					Short Grass Pasture Kv= 7.0 fps
1.0	1,327	0.1700	22.73	404.80	**Trap/Vee/Rect Channel Flow, Channel**
					Bot.W=4.00' D=2.50' Z= 1.5 & 1.0 '/' Top.W=10.25'
					n= 0.035
16.8	2,306				Total

Post-Project WS2
Type IA 24-hr 2 year Rainfall=3.23"
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Subcatchment WS-2: Subcat WS-2

Hydrograph

Type IA 24-hr
2 year Rainfall=3.23"
Runoff Area=45.616 ac
Runoff Volume=4.688 af
Runoff Depth=1.23"
Flow Length=2,306'
Tc=16.8 min
CN=77

11.01 cfs

Runoff

Post-Project WS2
Type IA 24-hr 10 year Rainfall=4.90"
Prepared by PPI Engineering, Revised Sept. 2020
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Summary for Subcatchment WS-2: Subcat WS-2

Runoff   =   26.34 cfs @   8.08 hrs, Volume=   9.654 af, Depth= 2.54"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.02 hrs
Type IA 24-hr 10 year Rainfall=4.90"

Area (ac)	CN	Description
* 0.000	0	, HSG C
* 0.000	0	, HSG D
0.501	79	Annual Grass, Fair, HSG C
0.159	84	Annual Grass, Fair, HSG D
0.556	75	Annual Grass, Good, HSG C
1.424	81	Annual Grass, Good, HSG D
0.160	65	Brush, Good, HSG C
0.611	73	Brush, Good, HSG D
0.485	89	Gravel Roads, HSG C
0.131	96	Gravel surface, HSG C
12.081	79	Vineyard, Fair, HSG C
2.027	84	Vineyard, Fair, HSG D
6.851	75	Vineyard, Good, HSG C
0.879	81	Vineyard, Good, HSG D
2.890	70	Woods, Good, HSG C
16.805	77	Woods, Good, HSG D
0.056	72	Woods/grass comb., Good, HSG C
45.616	77	Weighted Average
45.616		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
9.2	100	0.0600	0.18		**Sheet Flow, Sheet**
					Grass: Dense n= 0.240 P2= 3.23"
6.6	879	0.1000	2.21		**Shallow Concentrated Flow, Shallow - Short Grass**
					Short Grass Pasture Kv= 7.0 fps
1.0	1,327	0.1700	22.73	404.80	**Trap/Vee/Rect Channel Flow, Channel**
					Bot.W=4.00' D=2.50' Z= 1.5 & 1.0 '/' Top.W=10.25'
					n= 0.035
16.8	2,306				Total

Post-Project WS2
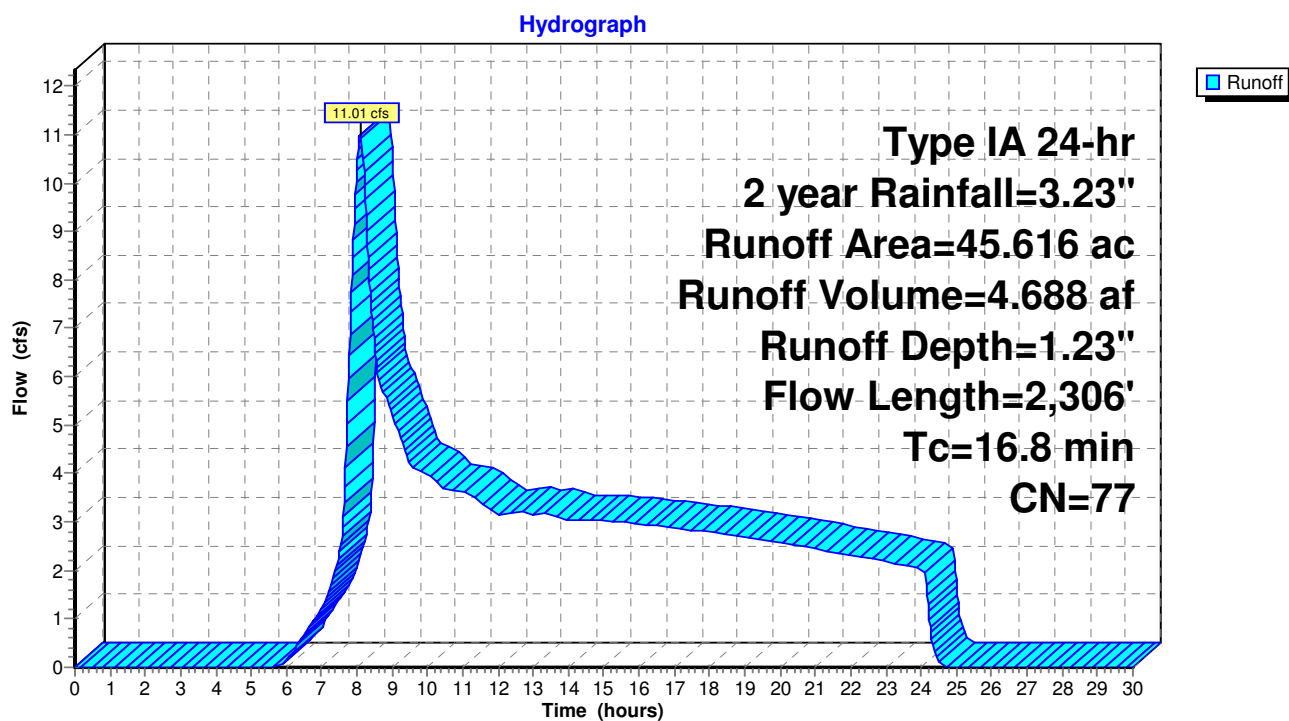Prepared by PPI Engineering, Revised Sept. 2020
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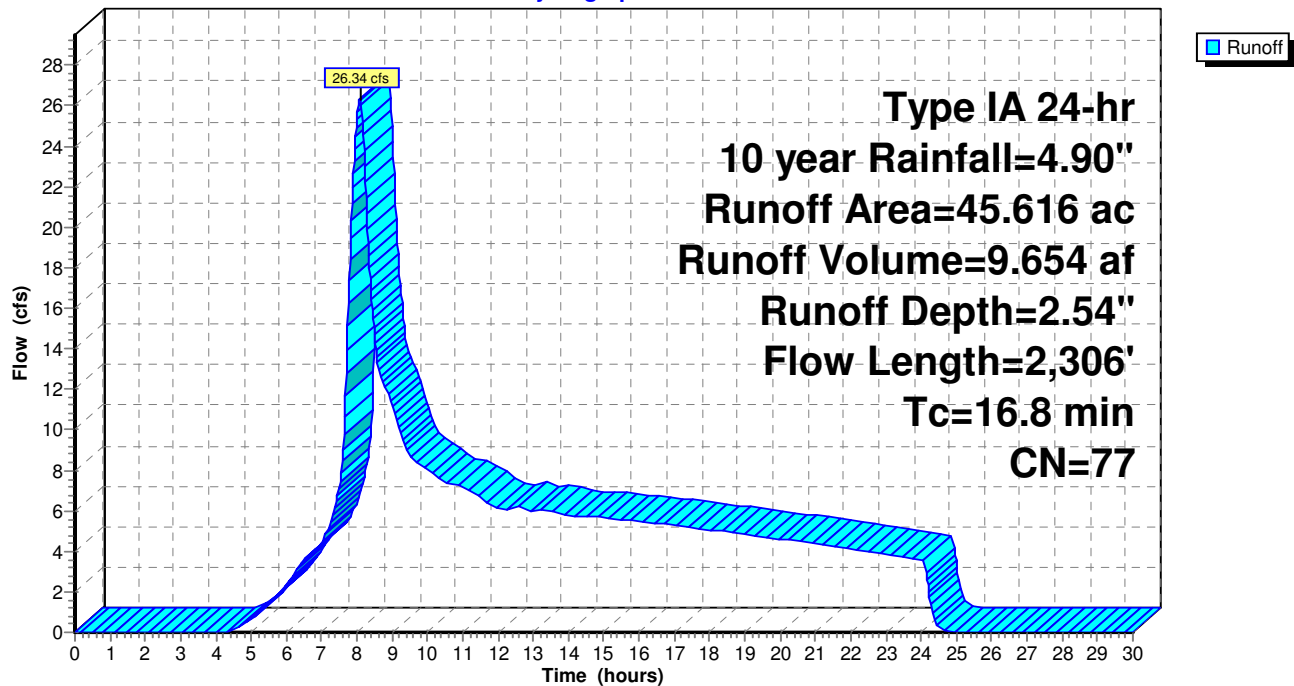*Type IA 24-hr 10 year Rainfall=4.90"*
Printed 9/2/2020
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Subcatchment WS-2: Subcat WS-2

Hydrograph

Type IA 24-hr
10 year Rainfall=4.90"
Runoff Area=45.616 ac
Runoff Volume=9.654 af
Runoff Depth=2.54"
Flow Length=2,306'
Tc=16.8 min
CN=77

Summary for Subcatchment WS-2: Subcat WS-2

Runoff   =   44.00 cfs @   8.07 hrs, Volume=   15.270 af, Depth= 4.02"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.02 hrs
Type IA 24-hr 50 year Rainfall=6.61"

	Area (ac)	CN	Description
*	0.000	0	, HSG C
*	0.000	0	, HSG D
	0.501	79	Annual Grass, Fair, HSG C
	0.159	84	Annual Grass, Fair, HSG D
	0.556	75	Annual Grass, Good, HSG C
	1.424	81	Annual Grass, Good, HSG D
	0.160	65	Brush, Good, HSG C
	0.611	73	Brush, Good, HSG D
	0.485	89	Gravel Roads, HSG C
	0.131	96	Gravel surface, HSG C
	12.081	79	Vineyard, Fair, HSG C
	2.027	84	Vineyard, Fair, HSG D
	6.851	75	Vineyard, Good, HSG C
	0.879	81	Vineyard, Good, HSG D
	2.890	70	Woods, Good, HSG C
	16.805	77	Woods, Good, HSG D
	0.056	72	Woods/grass comb., Good, HSG C
	45.616	77	Weighted Average
	45.616		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
9.2	100	0.0600	0.18		**Sheet Flow, Sheet**
					Grass: Dense n= 0.240 P2= 3.23"
6.6	879	0.1000	2.21		**Shallow Concentrated Flow, Shallow - Short Grass**
					Short Grass Pasture Kv= 7.0 fps
1.0	1,327	0.1700	22.73	404.80	**Trap/Vee/Rect Channel Flow, Channel**
					Bot.W=4.00' D=2.50' Z= 1.5 & 1.0 '/' Top.W=10.25'
					n= 0.035
16.8	2,306				Total

Post-Project WS2
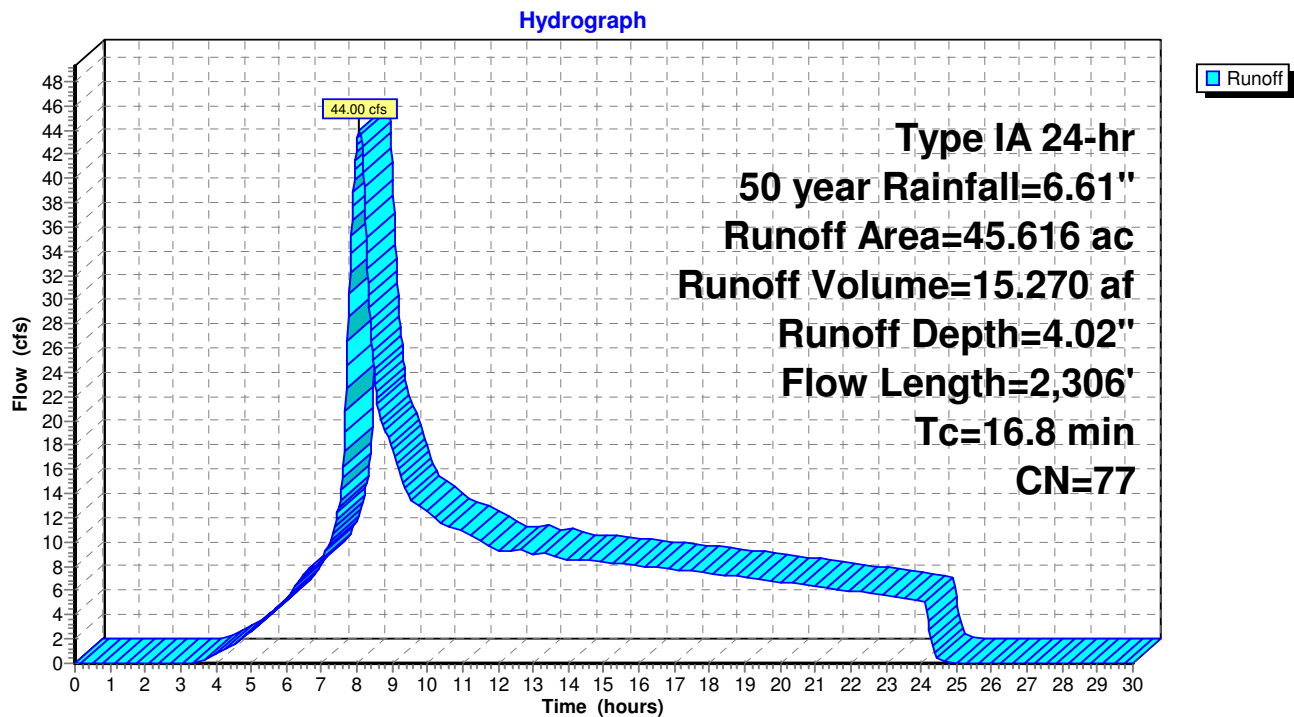Prepared by PPI Engineering, Revised Sept. 2020
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Type IA 24-hr 50 year Rainfall=6.61"
Printed 9/2/2020
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Subcatchment WS-2: Subcat WS-2

Hydrograph

Type IA 24-hr
50 year Rainfall=6.61"
Runoff Area=45.616 ac
Runoff Volume=15.270 af
Runoff Depth=4.02"
Flow Length=2,306'
Tc=16.8 min
CN=77

44.00 cfs

Runoff

Summary for Subcatchment WS-2: Subcat WS-2

Runoff   =   51.74 cfs @   8.07 hrs, Volume=   17.728 af, Depth= 4.66"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.02 hrs
Type IA 24-hr 100 year Rainfall=7.33"

Area (ac)	CN	Description
* 0.000	0	, HSG C
* 0.000	0	, HSG D
0.501	79	Annual Grass, Fair, HSG C
0.159	84	Annual Grass, Fair, HSG D
0.556	75	Annual Grass, Good, HSG C
1.424	81	Annual Grass, Good, HSG D
0.160	65	Brush, Good, HSG C
0.611	73	Brush, Good, HSG D
0.485	89	Gravel Roads, HSG C
0.131	96	Gravel surface, HSG C
12.081	79	Vineyard, Fair, HSG C
2.027	84	Vineyard, Fair, HSG D
6.851	75	Vineyard, Good, HSG C
0.879	81	Vineyard, Good, HSG D
2.890	70	Woods, Good, HSG C
16.805	77	Woods, Good, HSG D
0.056	72	Woods/grass comb., Good, HSG C
45.616	77	Weighted Average
45.616		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
9.2	100	0.0600	0.18		**Sheet Flow, Sheet**
					Grass: Dense n= 0.240 P2= 3.23"
6.6	879	0.1000	2.21		**Shallow Concentrated Flow, Shallow - Short Grass**
					Short Grass Pasture Kv= 7.0 fps
1.0	1,327	0.1700	22.73	404.80	**Trap/Vee/Rect Channel Flow, Channel**
					Bot.W=4.00' D=2.50' Z= 1.5 & 1.0 '/' Top.W=10.25'
					n= 0.035
16.8	2,306				Total

Post-Project WS2
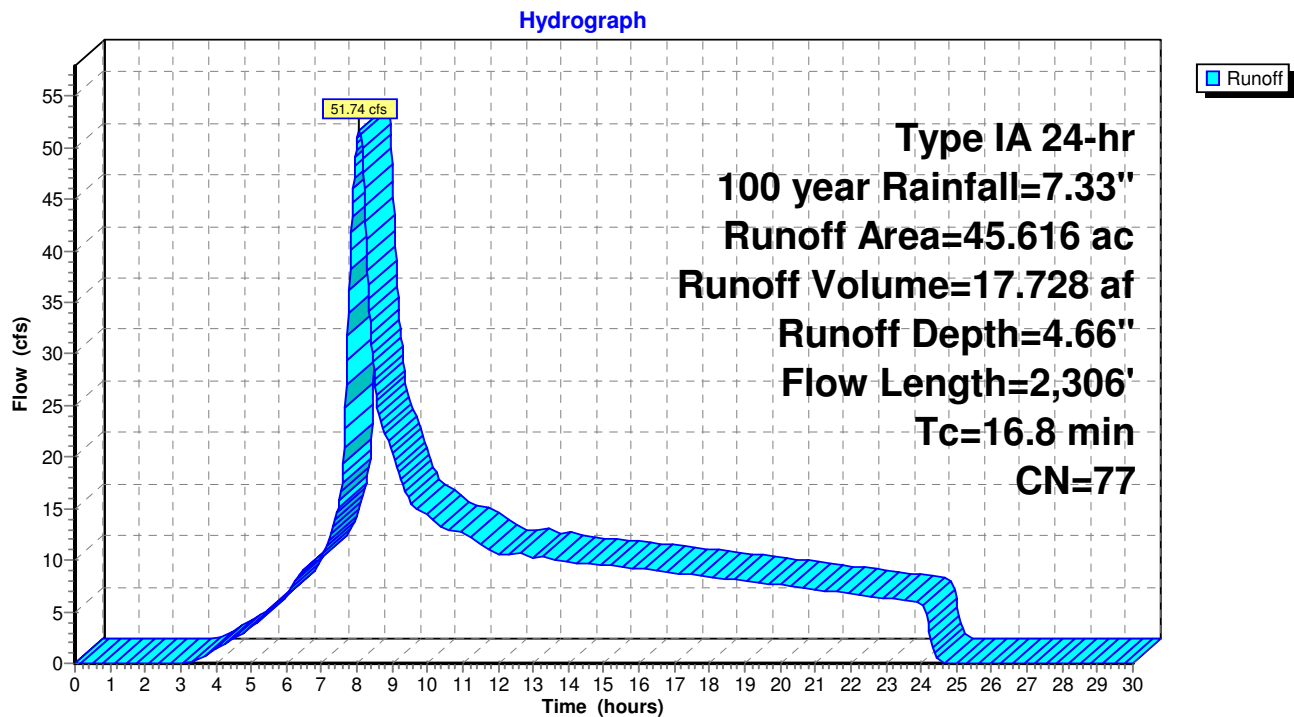Prepared by PPI Engineering, Revised Sept. 2020
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Type IA 24-hr 100 year Rainfall=7.33"
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Subcatchment WS-2: Subcat WS-2
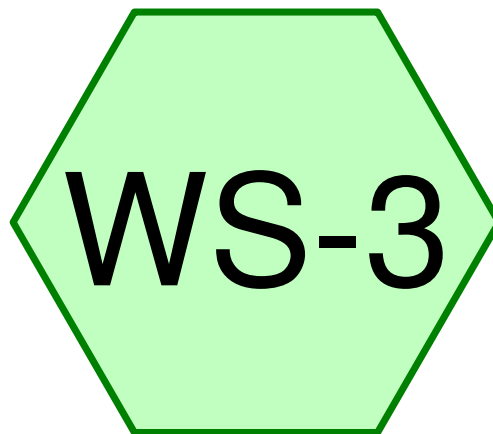
Hydrograph

Type IA 24-hr
100 year Rainfall=7.33"
Runoff Area=45.616 ac
Runoff Volume=17.728 af
Runoff Depth=4.66"
Flow Length=2,306'
Tc=16.8 min
CN=77

51.74 cfs

WS-3

Subcat WS-3

Summary for Subcatchment WS-3: Subcat WS-3

Runoff   =   15.32 cfs @   8.17 hrs, Volume=   6.421 af, Depth= 1.43"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.02 hrs
Type IA 24-hr 2 year Rainfall=3.23"

Area (ac)	CN	Description
* 0.000	0	, HSG D
5.641	81	Annual Grass, Good, HSG D
4.713	73	Brush, Good, HSG D
6.924	86	Farmsteads, HSG D
0.165	91	Gravel Roads, HSG D
1.439	93	Paved roads w/open ditches, 50% imp, HSG D
7.413	84	Vineyard, Fair, HSG D
26.596	77	Woods, Good, HSG D
1.177	79	Woods/grass comb., Good, HSG D
54.068	80	Weighted Average
53.348		98.67% Pervious Area
0.720		1.33% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
9.4	38	0.0900	0.07		**Sheet Flow, Sheet**
					Woods: Dense underbrush n= 0.800 P2= 3.23"
6.9	1,168	0.3200	2.83		**Shallow Concentrated Flow, Shallow - Woodlands**
					Woodland Kv= 5.0 fps
2.0	186	0.0500	1.57		**Shallow Concentrated Flow, Shallow - Short Grass**
					Short Grass Pasture Kv= 7.0 fps
1.9	407	0.0200	3.51	7.02	**Trap/Vee/Rect Channel Flow, Ditch 1**
					Bot.W=0.00' D=1.00' Z= 2.0 '/' Top.W=4.00'
					n= 0.035
3.5	744	0.0200	3.51	7.02	**Trap/Vee/Rect Channel Flow, Ditch 2**
					Bot.W=0.00' D=1.00' Z= 2.0 '/' Top.W=4.00'
					n= 0.035
23.7	2,543	Total			

Pre-Project WS3
Type IA 24-hr 2 year Rainfall=3.23"
Prepared by PPI Engineering, Revised Sept. 2020
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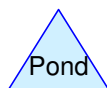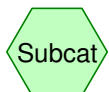HydroCAD® 10.00-24 s/n 09429 © 2018 HydroCAD Software Solutions LLC
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Subcatchment WS-3: Subcat WS-3

Hydrograph

15.32 cfs

**Type IA 24-hr
2 year Rainfall=3.23"
Runoff Area=54.068 ac
Runoff Volume=6.421 af
Runoff Depth=1.43"
Flow Length=2,543'
Tc=23.7 min
CN=80**

Runoff

Pre-Project WS3
Prepared by PPI Engineering, Revised Sept. 2020
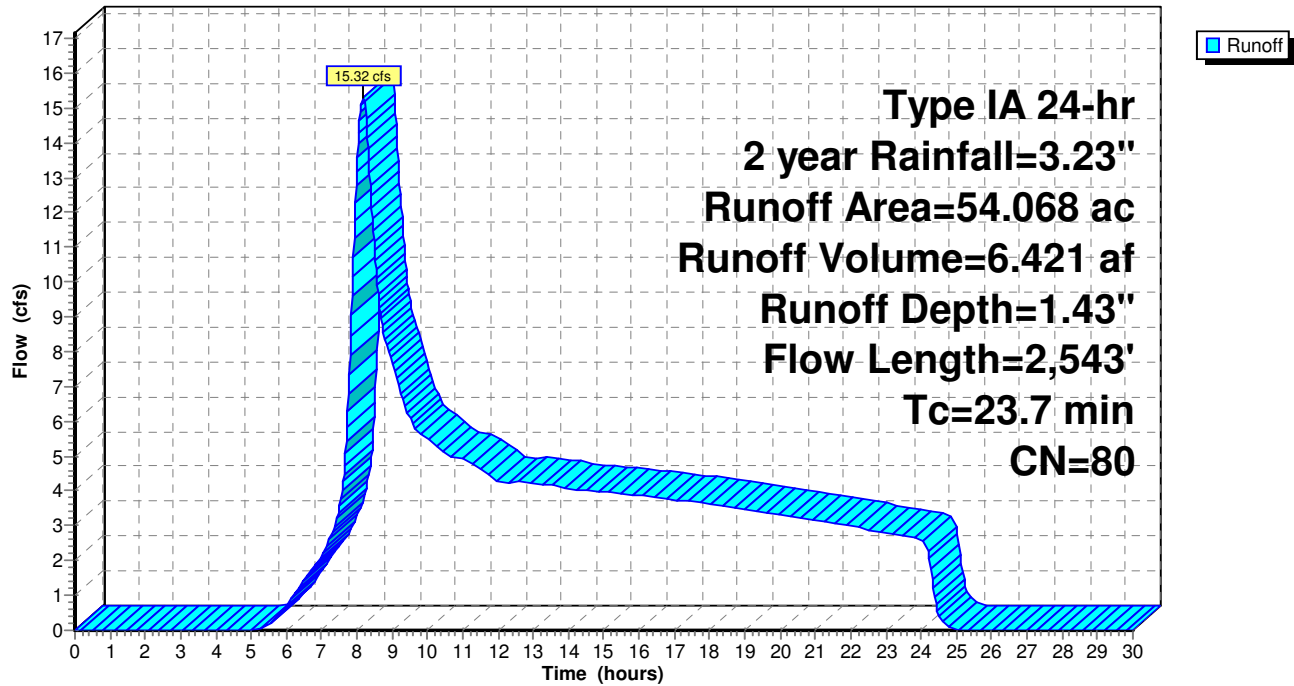HydroCAD® 10.00-24 s/n 09429 © 2018 HydroCAD Software Solutions LLC

Type IA 24-hr 10 year Rainfall=4.90"
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Summary for Subcatchment WS-3: Subcat WS-3

Runoff   =   33.72 cfs @   8.15 hrs, Volume=   12.642 af, Depth= 2.81"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.02 hrs
Type IA 24-hr 10 year Rainfall=4.90"

Area (ac)	CN	Description
* 0.000	0	, HSG D
5.641	81	Annual Grass, Good, HSG D
4.713	73	Brush, Good, HSG D
6.924	86	Farmsteads, HSG D
0.165	91	Gravel Roads, HSG D
1.439	93	Paved roads w/open ditches, 50% imp, HSG D
7.413	84	Vineyard, Fair, HSG D
26.596	77	Woods, Good, HSG D
1.177	79	Woods/grass comb., Good, HSG D
54.068	80	Weighted Average
53.348		98.67% Pervious Area
0.720		1.33% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
9.4	38	0.0900	0.07		**Sheet Flow, Sheet**
					Woods: Dense underbrush n= 0.800 P2= 3.23"
6.9	1,168	0.3200	2.83		**Shallow Concentrated Flow, Shallow - Woodlands**
					Woodland Kv= 5.0 fps
2.0	186	0.0500	1.57		**Shallow Concentrated Flow, Shallow - Short Grass**
					Short Grass Pasture Kv= 7.0 fps
1.9	407	0.0200	3.51	7.02	**Trap/Vee/Rect Channel Flow, Ditch 1**
					Bot.W=0.00' D=1.00' Z= 2.0 '/' Top.W=4.00'
					n= 0.035
3.5	744	0.0200	3.51	7.02	**Trap/Vee/Rect Channel Flow, Ditch 2**
					Bot.W=0.00' D=1.00' Z= 2.0 '/' Top.W=4.00'
					n= 0.035
23.7	2,543	Total			

Pre-Project WS3
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Type IA 24-hr 10 year Rainfall=4.90"
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Subcatchment WS-3: Subcat WS-3

Hydrograph

Type IA 24-hr
10 year Rainfall=4.90"
Runoff Area=54.068 ac
Runoff Volume=12.642 af
Runoff Depth=2.81"
Flow Length=2,543'
Tc=23.7 min
CN=80

Pre-Project WS3
Prepared by PPI Engineering, Revised Sept. 2020
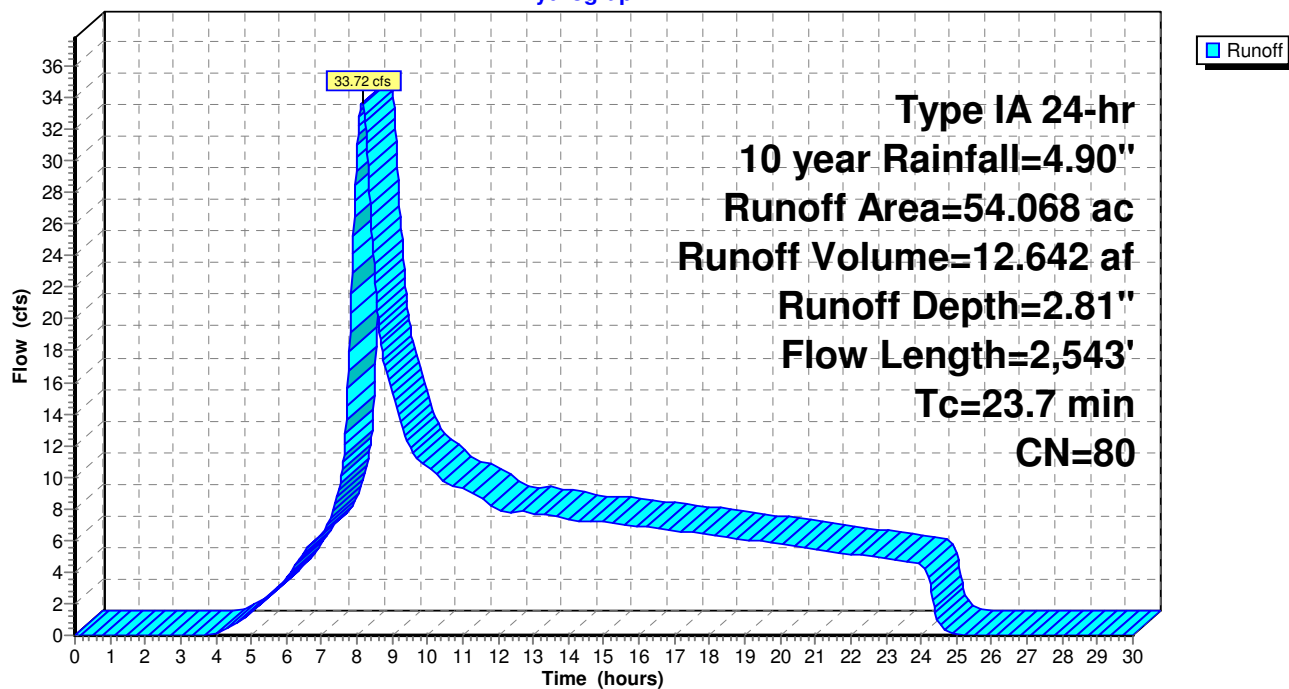HydroCAD® 10.00-24 s/n 09429 © 2018 HydroCAD Software Solutions LLC

Type IA 24-hr 50 year Rainfall=6.61"
Printed 9/2/2020
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Summary for Subcatchment WS-3: Subcat WS-3

Runoff   =   54.36 cfs @   8.14 hrs, Volume=   19.536 af, Depth= 4.34"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.02 hrs
Type IA 24-hr 50 year Rainfall=6.61"

Area (ac)	CN	Description
* 0.000	0	, HSG D
5.641	81	Annual Grass, Good, HSG D
4.713	73	Brush, Good, HSG D
6.924	86	Farmsteads, HSG D
0.165	91	Gravel Roads, HSG D
1.439	93	Paved roads w/open ditches, 50% imp, HSG D
7.413	84	Vineyard, Fair, HSG D
26.596	77	Woods, Good, HSG D
1.177	79	Woods/grass comb., Good, HSG D
54.068	80	Weighted Average
53.348		98.67% Pervious Area
0.720		1.33% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
9.4	38	0.0900	0.07		**Sheet Flow, Sheet**
					Woods: Dense underbrush n= 0.800 P2= 3.23"
6.9	1,168	0.3200	2.83		**Shallow Concentrated Flow, Shallow - Woodlands**
					Woodland Kv= 5.0 fps
2.0	186	0.0500	1.57		**Shallow Concentrated Flow, Shallow - Short Grass**
					Short Grass Pasture Kv= 7.0 fps
1.9	407	0.0200	3.51	7.02	**Trap/Vee/Rect Channel Flow, Ditch 1**
					Bot.W=0.00' D=1.00' Z= 2.0 '/' Top.W=4.00'
					n= 0.035
3.5	744	0.0200	3.51	7.02	**Trap/Vee/Rect Channel Flow, Ditch 2**
					Bot.W=0.00' D=1.00' Z= 2.0 '/' Top.W=4.00'
					n= 0.035
23.7	2,543				Total

Pre-Project WS3
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Type IA 24-hr 50 year Rainfall=6.61"
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Subcatchment WS-3: Subcat WS-3

Hydrograph

Type IA 24-hr
50 year Rainfall=6.61"
Runoff Area=54.068 ac
Runoff Volume=19.536 af
Runoff Depth=4.34"
Flow Length=2,543'
Tc=23.7 min
CN=80

54.36 cfs

Runoff

Summary for Subcatchment WS-3: Subcat WS-3

Runoff   =   63.28 cfs @   8.14 hrs, Volume=   22.528 af, Depth= 5.00"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.02 hrs
Type IA 24-hr 100 year Rainfall=7.33"

Area (ac)	CN	Description
* 0.000	0	, HSG D
5.641	81	Annual Grass, Good, HSG D
4.713	73	Brush, Good, HSG D
6.924	86	Farmsteads, HSG D
0.165	91	Gravel Roads, HSG D
1.439	93	Paved roads w/open ditches, 50% imp, HSG D
7.413	84	Vineyard, Fair, HSG D
26.596	77	Woods, Good, HSG D
1.177	79	Woods/grass comb., Good, HSG D
54.068	80	Weighted Average
53.348		98.67% Pervious Area
0.720		1.33% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
9.4	38	0.0900	0.07		**Sheet Flow, Sheet**
					Woods: Dense underbrush n= 0.800 P2= 3.23"
6.9	1,168	0.3200	2.83		**Shallow Concentrated Flow, Shallow - Woodlands**
					Woodland Kv= 5.0 fps
2.0	186	0.0500	1.57		**Shallow Concentrated Flow, Shallow - Short Grass**
					Short Grass Pasture Kv= 7.0 fps
1.9	407	0.0200	3.51	7.02	**Trap/Vee/Rect Channel Flow, Ditch 1**
					Bot.W=0.00' D=1.00' Z= 2.0 '/' Top.W=4.00'
					n= 0.035
3.5	744	0.0200	3.51	7.02	**Trap/Vee/Rect Channel Flow, Ditch 2**
					Bot.W=0.00' D=1.00' Z= 2.0 '/' Top.W=4.00'
					n= 0.035
23.7	2,543	Total			

Pre-Project WS3
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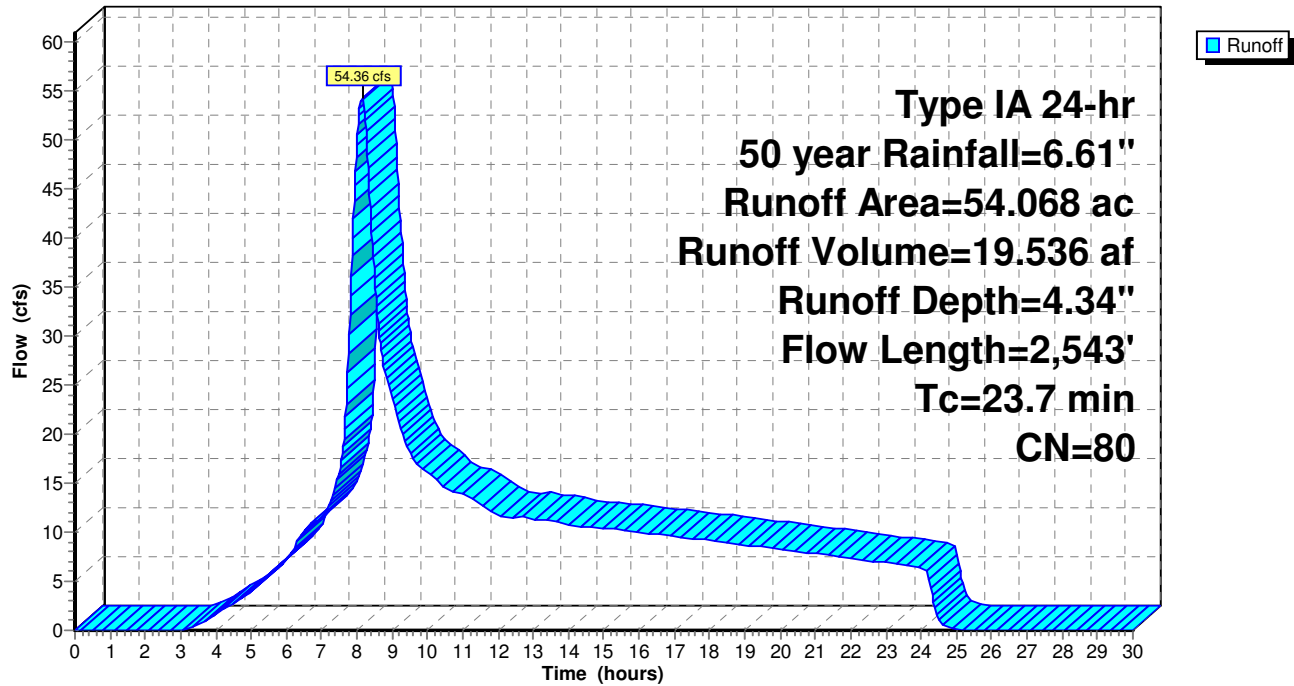
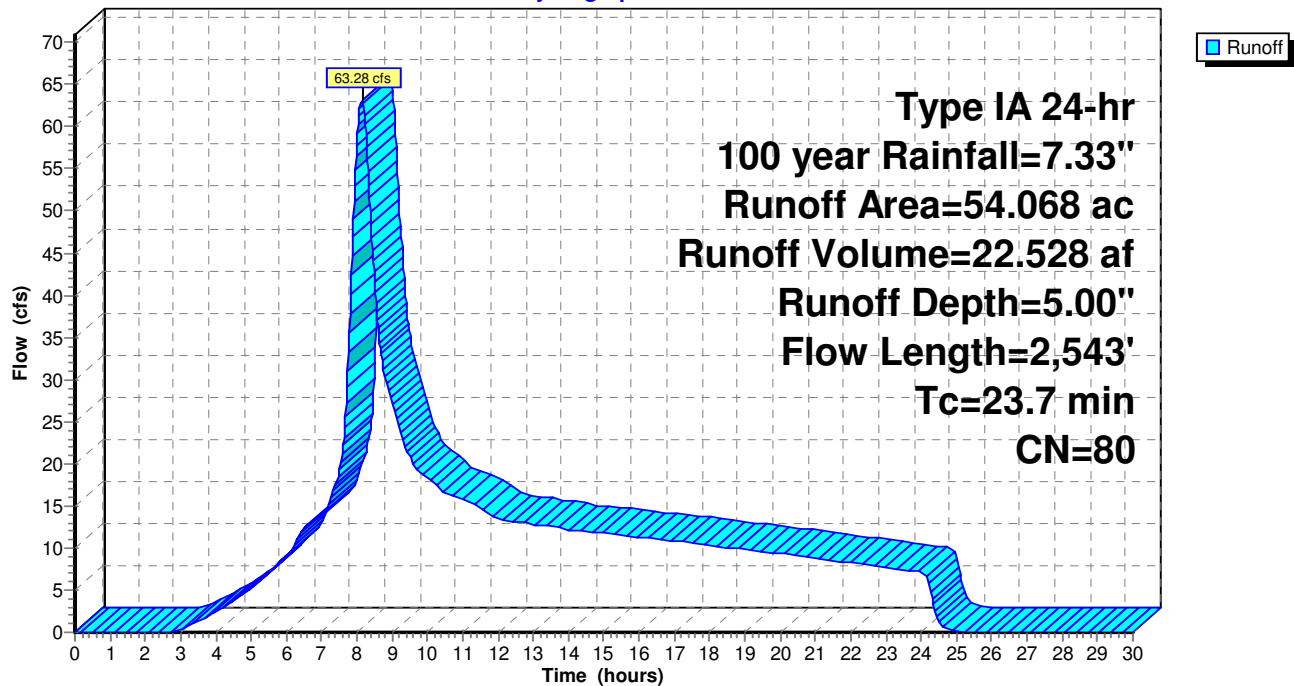*Type IA 24-hr 100 year Rainfall=7.33"*
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Subcatchment WS-3: Subcat WS-3

Hydrograph

Type IA 24-hr
100 year Rainfall=7.33"
Runoff Area=54.068 ac
Runoff Volume=22.528 af
Runoff Depth=5.00"
Flow Length=2,543'
Tc=23.7 min
CN=80

63.28 cfs

☐ Runoff

WS-3

Subcat WS-3

Subcat   Reach   Pond   Link

Post-Project WS3
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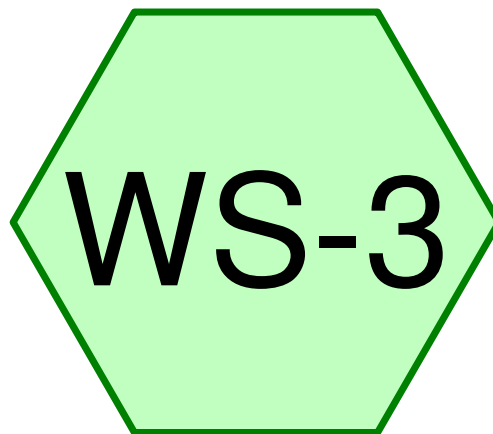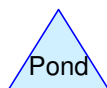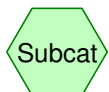*Type IA 24-hr 2 year Rainfall=3.23"*
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Summary for Subcatchment WS-3: Subcat WS-3

Runoff   =   14.35 cfs @   8.26 hrs, Volume=   6.421 af, Depth= 1.43"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.02 hrs
Type IA 24-hr 2 year Rainfall=3.23"

Area (ac)	CN	Description
* 0.000	0	, HSG D
5.505	81	Annual Grass, Good, HSG D
1.667	73	Brush, Good, HSG D
6.924	86	Farmsteads, HSG D
0.165	91	Gravel Roads, HSG D
1.439	93	Paved roads w/open ditches, 50% imp, HSG D
7.413	84	Vineyard, Fair, HSG D
6.422	81	Vineyard, Good, HSG D
23.356	77	Woods, Good, HSG D
1.177	79	Woods/grass comb., Good, HSG D
54.068	80	Weighted Average
53.348		98.67% Pervious Area
0.720		1.33% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
7.8	100	0.0900	0.21		**Sheet Flow, Sheet 1**
					Grass: Dense n= 0.240 P2= 3.23"
0.3	63	0.2700	3.64		**Shallow Concentrated Flow, Shallow 1 - Short Grass**
					Short Grass Pasture Kv= 7.0 fps
9.3	73	0.3400	0.13		**Sheet Flow, Sheet 2**
					Woods: Dense underbrush n= 0.800 P2= 3.23"
5.6	969	0.3300	2.87		**Shallow Concentrated Flow, Shallow 2 - Woodlands**
					Woodland Kv= 5.0 fps
2.0	186	0.0500	1.57		**Shallow Concentrated Flow, Shallow 3 - Short Grass**
					Short Grass Pasture Kv= 7.0 fps
1.9	407	0.0200	3.51	7.02	**Trap/Vee/Rect Channel Flow, Ditch 1**
					Bot.W=0.00' D=1.00' Z= 2.0 '/' Top.W=4.00'
					n= 0.035
3.5	744	0.0200	3.51	7.02	**Trap/Vee/Rect Channel Flow, Ditch 2**
					Bot.W=0.00' D=1.00' Z= 2.0 '/' Top.W=4.00'
					n= 0.035
30.4	2,542	Total			

Post-Project WS3
Type IA 24-hr 2 year Rainfall=3.23"
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Subcatchment WS-3: Subcat WS-3

**Type IA 24-hr
2 year Rainfall=3.23"
Runoff Area=54.068 ac
Runoff Volume=6.421 af
Runoff Depth=1.43"
Flow Length=2,542'
Tc=30.4 min
CN=80**

Post-Project WS3
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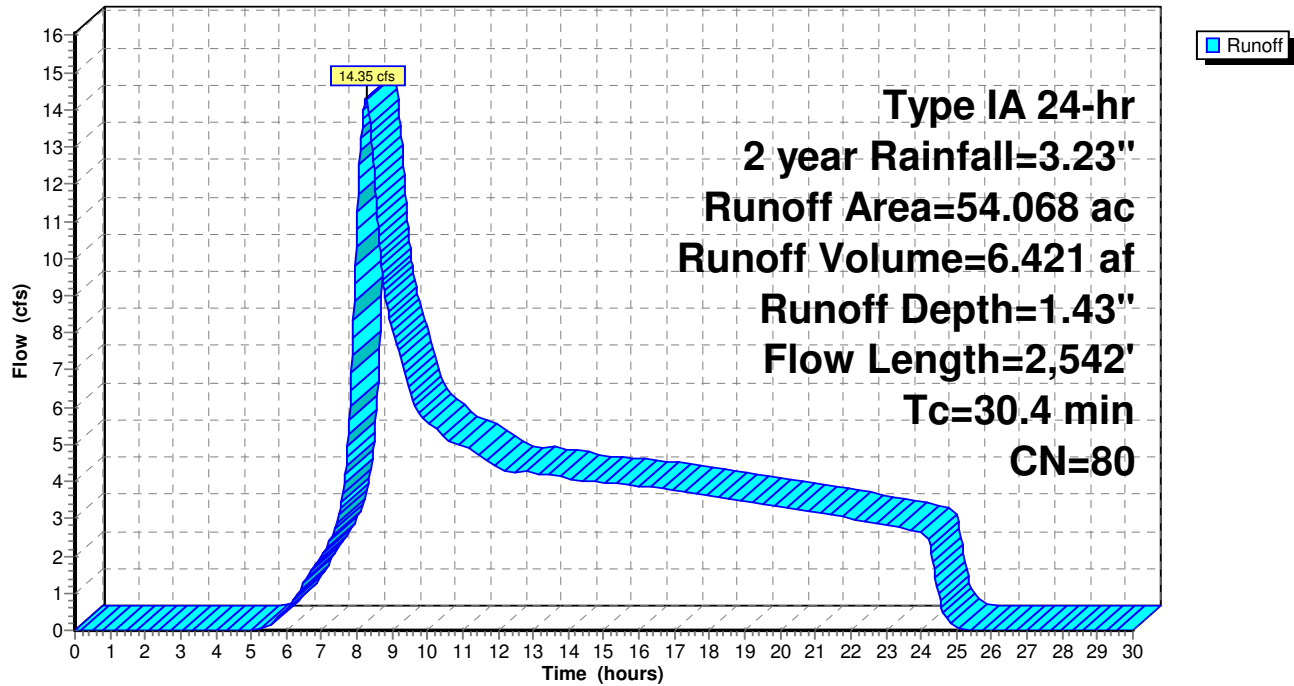HydroCAD® 10.00-24 s/n 09429 © 2018 HydroCAD Software Solutions LLC

Type IA 24-hr 10 year Rainfall=4.90"
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Summary for Subcatchment WS-3: Subcat WS-3

Runoff   =   31.69 cfs @   8.23 hrs, Volume=   12.642 af, Depth= 2.81"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.02 hrs
Type IA 24-hr 10 year Rainfall=4.90"

Area (ac)	CN	Description
* 0.000	0	, HSG D
5.505	81	Annual Grass, Good, HSG D
1.667	73	Brush, Good, HSG D
6.924	86	Farmsteads, HSG D
0.165	91	Gravel Roads, HSG D
1.439	93	Paved roads w/open ditches, 50% imp, HSG D
7.413	84	Vineyard, Fair, HSG D
6.422	81	Vineyard, Good, HSG D
23.356	77	Woods, Good, HSG D
1.177	79	Woods/grass comb., Good, HSG D
54.068	80	Weighted Average
53.348		98.67% Pervious Area
0.720		1.33% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
7.8	100	0.0900	0.21		**Sheet Flow, Sheet 1**
					Grass: Dense n= 0.240 P2= 3.23"
0.3	63	0.2700	3.64		**Shallow Concentrated Flow, Shallow 1 - Short Grass**
					Short Grass Pasture Kv= 7.0 fps
9.3	73	0.3400	0.13		**Sheet Flow, Sheet 2**
					Woods: Dense underbrush n= 0.800 P2= 3.23"
5.6	969	0.3300	2.87		**Shallow Concentrated Flow, Shallow 2 - Woodlands**
					Woodland Kv= 5.0 fps
2.0	186	0.0500	1.57		**Shallow Concentrated Flow, Shallow 3 - Short Grass**
					Short Grass Pasture Kv= 7.0 fps
1.9	407	0.0200	3.51	7.02	**Trap/Vee/Rect Channel Flow, Ditch 1**
					Bot.W=0.00' D=1.00' Z= 2.0 '/' Top.W=4.00'
					n= 0.035
3.5	744	0.0200	3.51	7.02	**Trap/Vee/Rect Channel Flow, Ditch 2**
					Bot.W=0.00' D=1.00' Z= 2.0 '/' Top.W=4.00'
					n= 0.035
30.4	2,542	Total			

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Type IA 24-hr 10 year Rainfall=4.90"
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Subcatchment WS-3: Subcat WS-3

Hydrograph

**Type IA 24-hr
10 year Rainfall=4.90"
Runoff Area=54.068 ac
Runoff Volume=12.642 af
Runoff Depth=2.81"
Flow Length=2,542'
Tc=30.4 min
CN=80**

31.69 cfs

Runoff

Post-Project WS3
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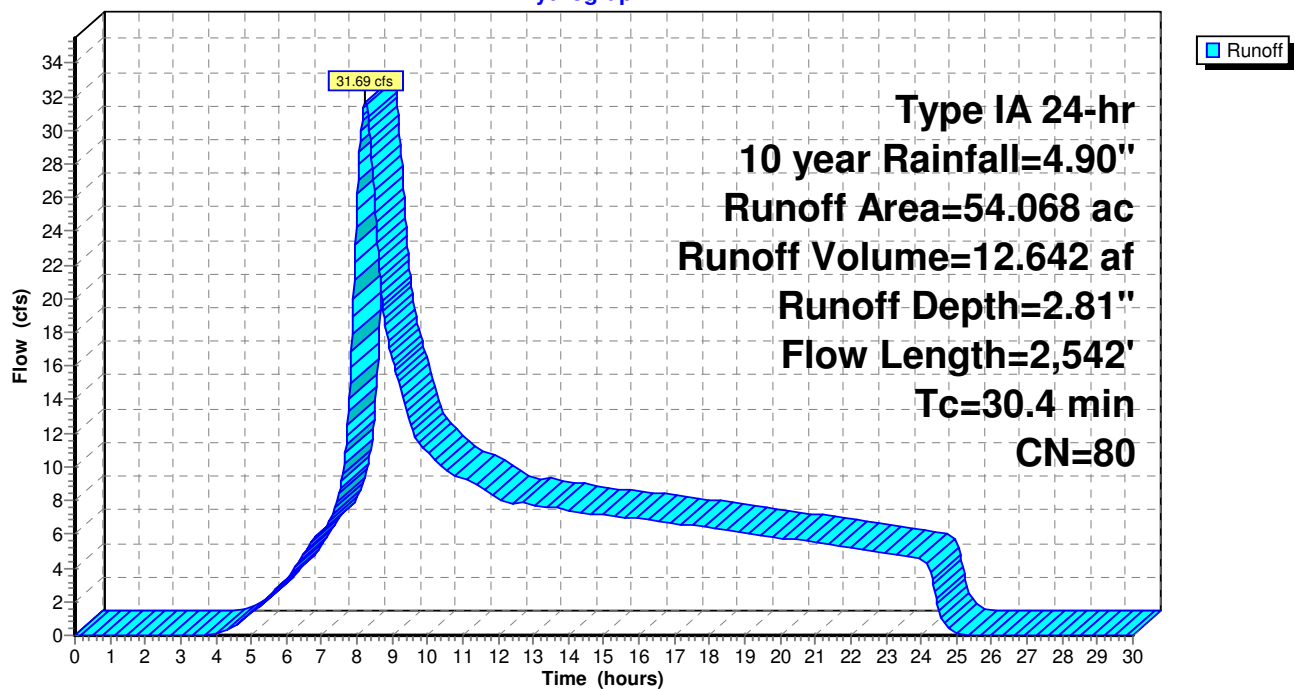HydroCAD® 10.00-24 s/n 09429 © 2018 HydroCAD Software Solutions LLC

Type IA 24-hr 50 year Rainfall=6.61"
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Summary for Subcatchment WS-3: Subcat WS-3

Runoff   =   51.16 cfs @   8.22 hrs, Volume=   19.536 af, Depth= 4.34"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.02 hrs
Type IA 24-hr 50 year Rainfall=6.61"

	Area (ac)	CN	Description
*	0.000	0	, HSG D
	5.505	81	Annual Grass, Good, HSG D
	1.667	73	Brush, Good, HSG D
	6.924	86	Farmsteads, HSG D
	0.165	91	Gravel Roads, HSG D
	1.439	93	Paved roads w/open ditches, 50% imp, HSG D
	7.413	84	Vineyard, Fair, HSG D
	6.422	81	Vineyard, Good, HSG D
	23.356	77	Woods, Good, HSG D
	1.177	79	Woods/grass comb., Good, HSG D
	54.068	80	Weighted Average
	53.348		98.67% Pervious Area
	0.720		1.33% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
7.8	100	0.0900	0.21		**Sheet Flow, Sheet 1**
					Grass: Dense n= 0.240 P2= 3.23"
0.3	63	0.2700	3.64		**Shallow Concentrated Flow, Shallow 1 - Short Grass**
					Short Grass Pasture Kv= 7.0 fps
9.3	73	0.3400	0.13		**Sheet Flow, Sheet 2**
					Woods: Dense underbrush n= 0.800 P2= 3.23"
5.6	969	0.3300	2.87		**Shallow Concentrated Flow, Shallow 2 - Woodlands**
					Woodland Kv= 5.0 fps
2.0	186	0.0500	1.57		**Shallow Concentrated Flow, Shallow 3 - Short Grass**
					Short Grass Pasture Kv= 7.0 fps
1.9	407	0.0200	3.51	7.02	**Trap/Vee/Rect Channel Flow, Ditch 1**
					Bot.W=0.00' D=1.00' Z= 2.0 '/' Top.W=4.00'
					n= 0.035
3.5	744	0.0200	3.51	7.02	**Trap/Vee/Rect Channel Flow, Ditch 2**
					Bot.W=0.00' D=1.00' Z= 2.0 '/' Top.W=4.00'
					n= 0.035
30.4	2,542	Total			

Post-Project WS3
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Type IA 24-hr 50 year Rainfall=6.61"
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Subcatchment WS-3: Subcat WS-3

Hydrograph

**Type IA 24-hr
50 year Rainfall=6.61"
Runoff Area=54.068 ac
Runoff Volume=19.536 af
Runoff Depth=4.34"
Flow Length=2,542'
Tc=30.4 min
CN=80**

51.16 cfs

☐ Runoff

Summary for Subcatchment WS-3: Subcat WS-3

Runoff   =   59.59 cfs @   8.22 hrs, Volume=   22.528 af, Depth= 5.00"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.02 hrs
Type IA 24-hr 100 year Rainfall=7.33"

Area (ac)	CN	Description
* 0.000	0	, HSG D
5.505	81	Annual Grass, Good, HSG D
1.667	73	Brush, Good, HSG D
6.924	86	Farmsteads, HSG D
0.165	91	Gravel Roads, HSG D
1.439	93	Paved roads w/open ditches, 50% imp, HSG D
7.413	84	Vineyard, Fair, HSG D
6.422	81	Vineyard, Good, HSG D
23.356	77	Woods, Good, HSG D
1.177	79	Woods/grass comb., Good, HSG D
54.068	80	Weighted Average
53.348		98.67% Pervious Area
0.720		1.33% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
7.8	100	0.0900	0.21		**Sheet Flow, Sheet 1** Grass: Dense n= 0.240 P2= 3.23"
0.3	63	0.2700	3.64		**Shallow Concentrated Flow, Shallow 1 - Short Grass** Short Grass Pasture Kv= 7.0 fps
9.3	73	0.3400	0.13		**Sheet Flow, Sheet 2** Woods: Dense underbrush n= 0.800 P2= 3.23"
5.6	969	0.3300	2.87		**Shallow Concentrated Flow, Shallow 2 - Woodlands** Woodland Kv= 5.0 fps
2.0	186	0.0500	1.57		**Shallow Concentrated Flow, Shallow 3 - Short Grass** Short Grass Pasture Kv= 7.0 fps
1.9	407	0.0200	3.51	7.02	**Trap/Vee/Rect Channel Flow, Ditch 1** Bot.W=0.00' D=1.00' Z= 2.0 '/' Top.W=4.00' n= 0.035
3.5	744	0.0200	3.51	7.02	**Trap/Vee/Rect Channel Flow, Ditch 2** Bot.W=0.00' D=1.00' Z= 2.0 '/' Top.W=4.00' n= 0.035
30.4	2,542	Total			

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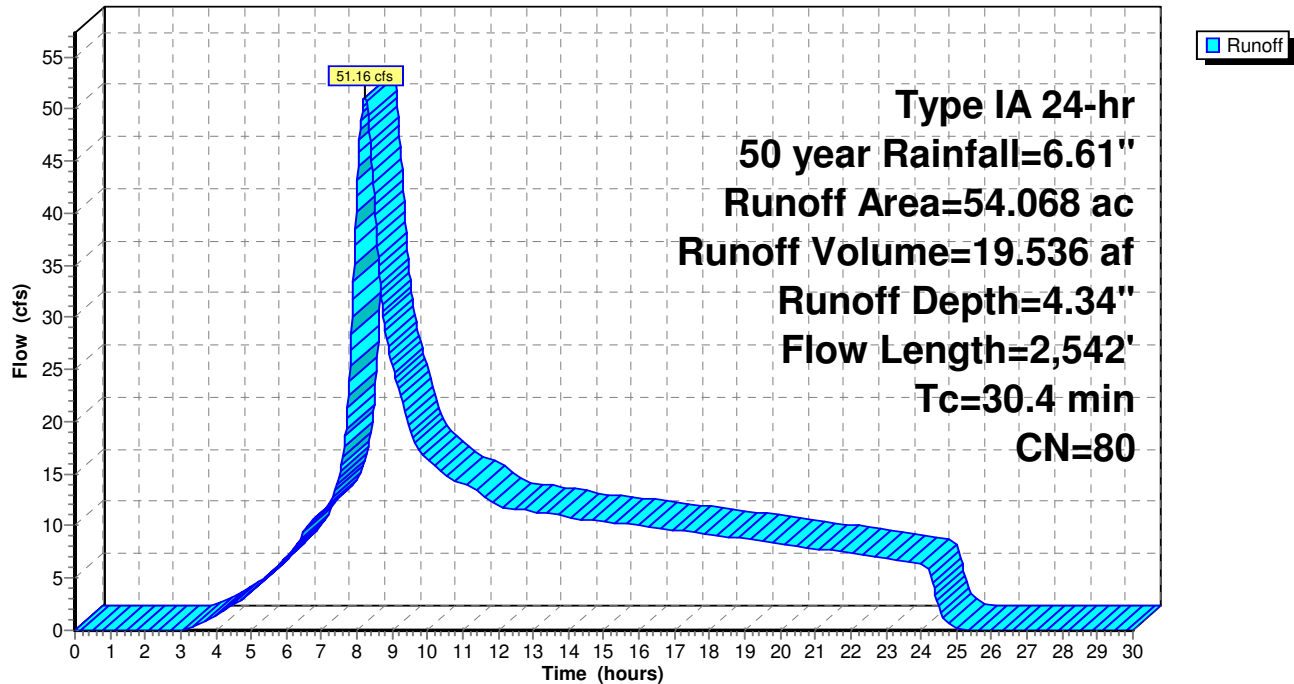HydroCAD® 10.00-24 s/n 09429 © 2018 HydroCAD Software Solutions LLC

Type IA 24-hr 100 year Rainfall=7.33"
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Subcatchment WS-3: Subcat WS-3

Hydrograph

Type IA 24-hr
100 year Rainfall=7.33"
Runoff Area=54.068 ac
Runoff Volume=22.528 af
Runoff Depth=5.00"
Flow Length=2,542'
Tc=30.4 min
CN=80

59.59 cfs

Runoff

WS-4

Subcat WS-4

Subcat   Reach   Pond   Link

Summary for Subcatchment WS-4: Subcat WS-4

Runoff   =   13.06 cfs @   8.09 hrs, Volume=   5.249 af, Depth= 1.36"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.02 hrs
Type IA 24-hr 2 year Rainfall=3.23"

Area (ac)	CN	Description
* 0.000	0	, HSG D
0.025	75	Annual Grass, Good, HSG C
10.075	81	Annual Grass, Good, HSG D
2.545	73	Brush, Good, HSG D
0.127	94	Fallow, bare soil, HSG D
0.711	86	Farmsteads, HSG D
0.217	96	Gravel surface, HSG D
1.767	79	Vineyard, Fair, HSG C
8.477	84	Vineyard, Fair, HSG D
0.103	98	Water Surface, HSG D
0.259	70	Woods, Good, HSG C
22.025	77	Woods, Good, HSG D
0.007	79	Woods/grass comb., Good, HSG D
46.337	79	Weighted Average
46.234		99.78% Pervious Area
0.103		0.22% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
9.4	18	0.0200	0.03		**Sheet Flow, Sheet**
					Woods: Dense underbrush n= 0.800 P2= 3.23"
4.6	646	0.2200	2.35		**Shallow Concentrated Flow, Shallow 1- Woodlands**
					Woodland Kv= 5.0 fps
0.5	71	0.1400	2.62		**Shallow Concentrated Flow, Shallow 2 - Short Grass**
					Short Grass Pasture Kv= 7.0 fps
1.1	1,106	0.1500	16.56	239.12	**Trap/Vee/Rect Channel Flow, Stream 1**
					Bot.W=5.50' D=1.50' Z= 2.5 & 3.0 '/' Top.W=13.75'
					n= 0.035
0.1	114	0.1000	13.91	135.65	**Trap/Vee/Rect Channel Flow, Pond Overflow**
					Bot.W=5.00' D=1.50' Z= 1.0 '/' Top.W=8.00'
					n= 0.035
0.8	731	0.0600	15.00	337.57	**Trap/Vee/Rect Channel Flow, Stream 2**
					Bot.W=4.50' D=3.00' Z= 1.0 '/' Top.W=10.50'
					n= 0.035
16.5	2,686	Total			

Subcatchment WS-4: Subcat WS-4

Hydrograph

Type IA 24-hr
2 year Rainfall=3.23"
Runoff Area=46.337 ac
Runoff Volume=5.249 af
Runoff Depth=1.36"
Flow Length=2,686'
Tc=16.5 min
CN=79

13.06 cfs

Flow (cfs)

Time (hours)

Pre-Project WS4
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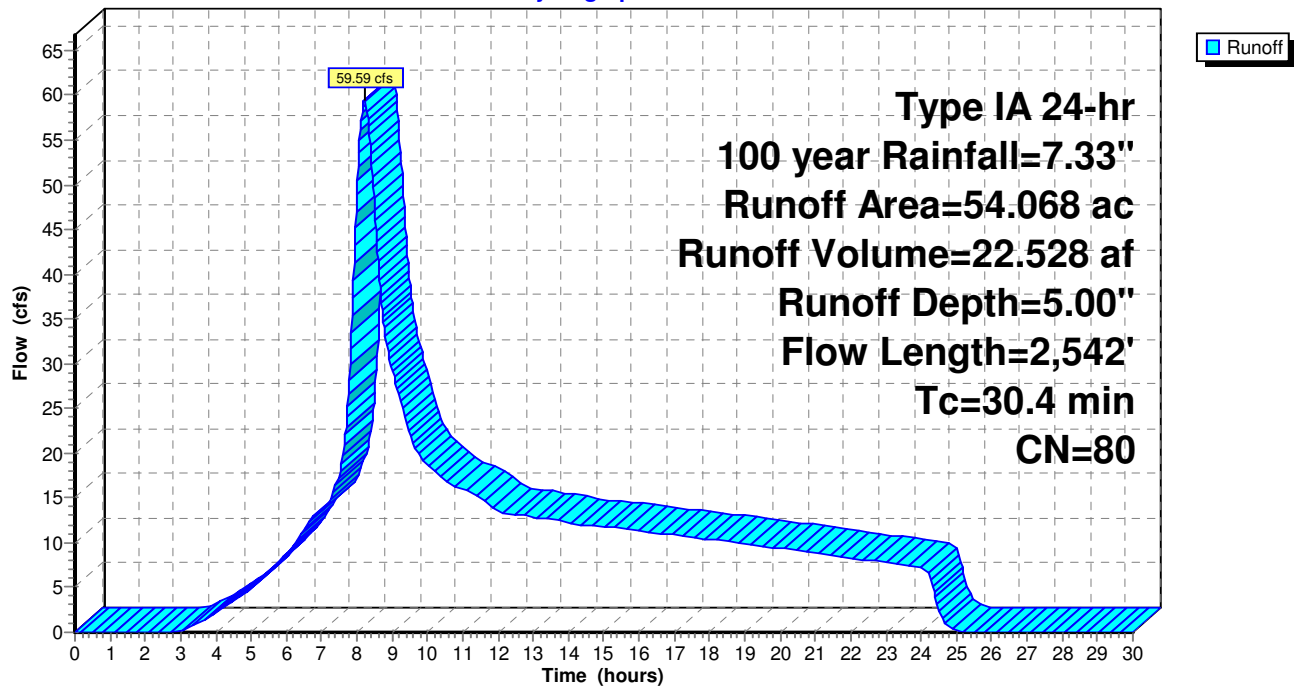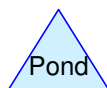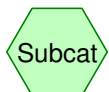*Type IA 24-hr 10 year Rainfall=4.90"*
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Summary for Subcatchment WS-4: Subcat WS-4

Runoff   =   29.41 cfs @   8.08 hrs, Volume=   10.487 af, Depth= 2.72"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.02 hrs
Type IA 24-hr 10 year Rainfall=4.90"

Area (ac)	CN	Description
* 0.000	0	, HSG D
0.025	75	Annual Grass, Good, HSG C
10.075	81	Annual Grass, Good, HSG D
2.545	73	Brush, Good, HSG D
0.127	94	Fallow, bare soil, HSG D
0.711	86	Farmsteads, HSG D
0.217	96	Gravel surface, HSG D
1.767	79	Vineyard, Fair, HSG C
8.477	84	Vineyard, Fair, HSG D
0.103	98	Water Surface, HSG D
0.259	70	Woods, Good, HSG C
22.025	77	Woods, Good, HSG D
0.007	79	Woods/grass comb., Good, HSG D
46.337	79	Weighted Average
46.234		99.78% Pervious Area
0.103		0.22% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
9.4	18	0.0200	0.03		**Sheet Flow, Sheet** Woods: Dense underbrush n= 0.800 P2= 3.23"
4.6	646	0.2200	2.35		**Shallow Concentrated Flow, Shallow 1- Woodlands** Woodland Kv= 5.0 fps
0.5	71	0.1400	2.62		**Shallow Concentrated Flow, Shallow 2 - Short Grass** Short Grass Pasture Kv= 7.0 fps
1.1	1,106	0.1500	16.56	239.12	**Trap/Vee/Rect Channel Flow, Stream 1** Bot.W=5.50' D=1.50' Z= 2.5 & 3.0 '/' Top.W=13.75' n= 0.035
0.1	114	0.1000	13.91	135.65	**Trap/Vee/Rect Channel Flow, Pond Overflow** Bot.W=5.00' D=1.50' Z= 1.0 '/' Top.W=8.00' n= 0.035
0.8	731	0.0600	15.00	337.57	**Trap/Vee/Rect Channel Flow, Stream 2** Bot.W=4.50' D=3.00' Z= 1.0 '/' Top.W=10.50' n= 0.035
16.5	2,686	Total			

Pre-Project WS4
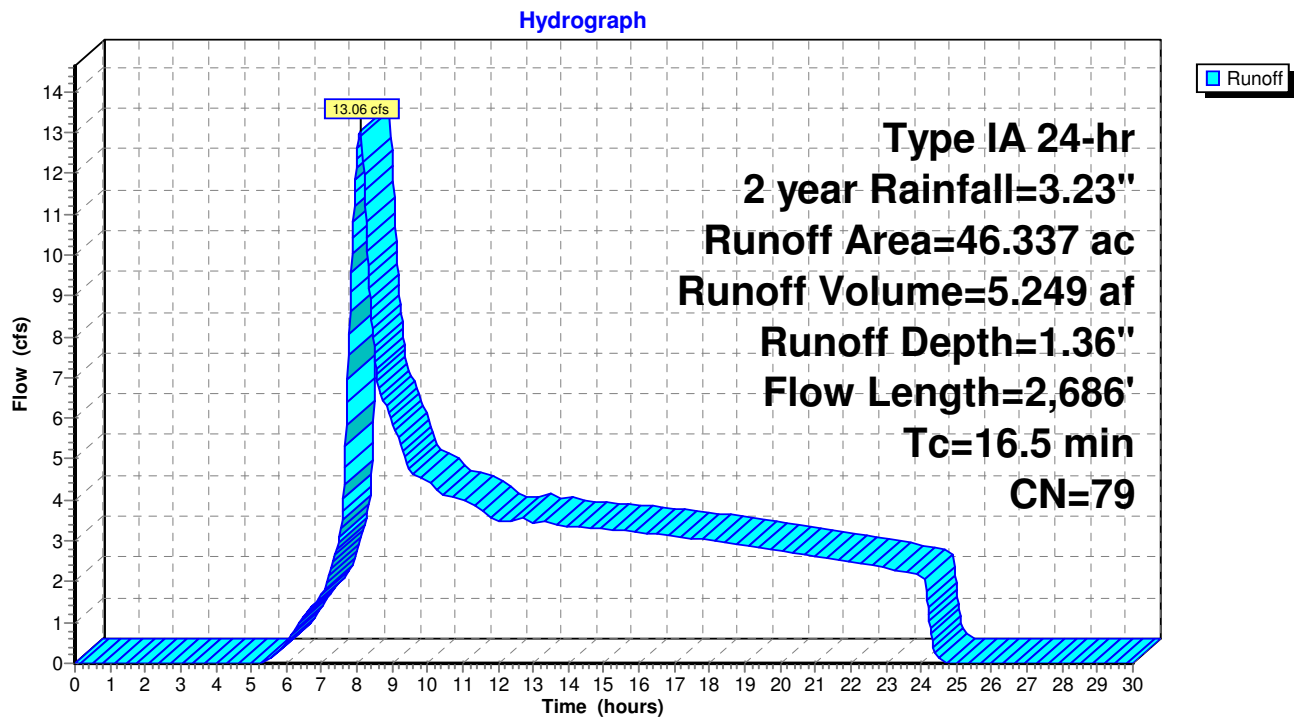Prepared by PPI Engineering, Revised Sept. 2020
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Type IA 24-hr 10 year Rainfall=4.90"
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Subcatchment WS-4: Subcat WS-4

Hydrograph

Type IA 24-hr
10 year Rainfall=4.90"
Runoff Area=46.337 ac
Runoff Volume=10.487 af
Runoff Depth=2.72"
Flow Length=2,686'
Tc=16.5 min
CN=79

29.41 cfs

Runoff

Pre-Project WS4
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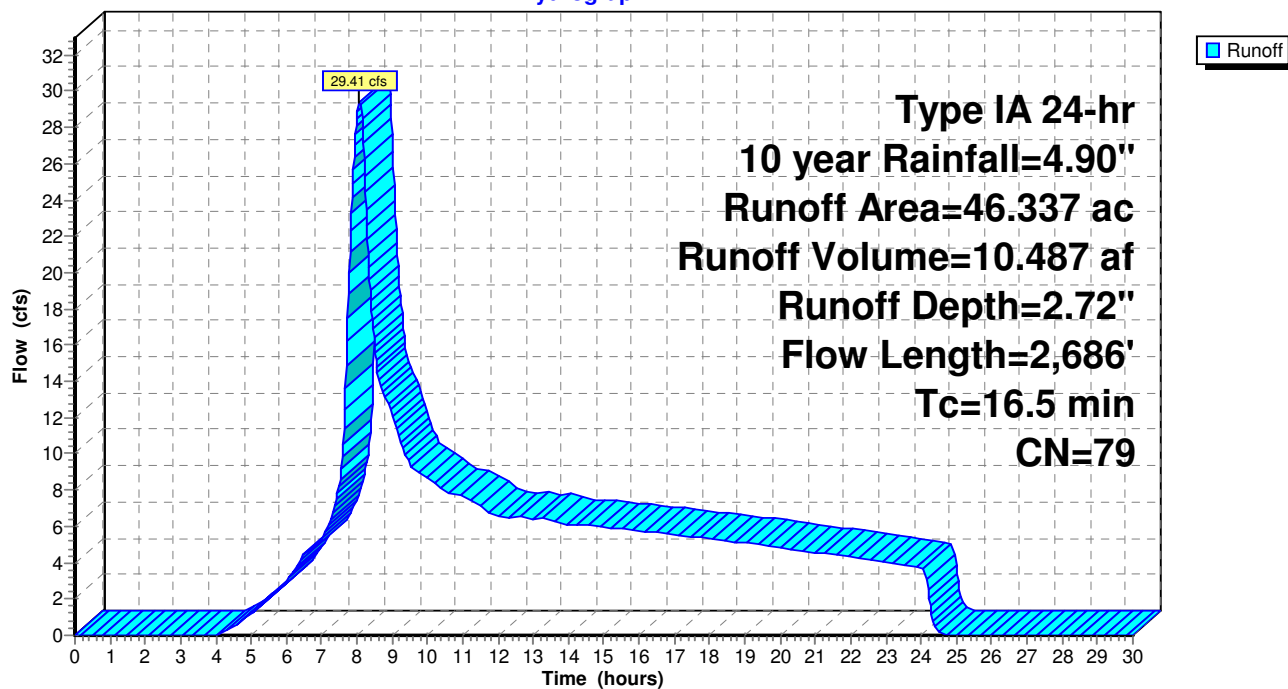HydroCAD® 10.00-24 s/n 09429 © 2018 HydroCAD Software Solutions LLC

Type IA 24-hr 50 year Rainfall=6.61"
Printed 9/2/2020
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Summary for Subcatchment WS-4: Subcat WS-4

Runoff   =   47.82 cfs @   8.07 hrs, Volume=   16.330 af, Depth= 4.23"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.02 hrs
Type IA 24-hr 50 year Rainfall=6.61"

Area (ac)	CN	Description
* 0.000	0	, HSG D
0.025	75	Annual Grass, Good, HSG C
10.075	81	Annual Grass, Good, HSG D
2.545	73	Brush, Good, HSG D
0.127	94	Fallow, bare soil, HSG D
0.711	86	Farmsteads, HSG D
0.217	96	Gravel surface, HSG D
1.767	79	Vineyard, Fair, HSG C
8.477	84	Vineyard, Fair, HSG D
0.103	98	Water Surface, HSG D
0.259	70	Woods, Good, HSG C
22.025	77	Woods, Good, HSG D
0.007	79	Woods/grass comb., Good, HSG D
46.337	79	Weighted Average
46.234		99.78% Pervious Area
0.103		0.22% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
9.4	18	0.0200	0.03		**Sheet Flow, Sheet**
					Woods: Dense underbrush n= 0.800 P2= 3.23"
4.6	646	0.2200	2.35		**Shallow Concentrated Flow, Shallow 1- Woodlands**
					Woodland Kv= 5.0 fps
0.5	71	0.1400	2.62		**Shallow Concentrated Flow, Shallow 2 - Short Grass**
					Short Grass Pasture Kv= 7.0 fps
1.1	1,106	0.1500	16.56	239.12	**Trap/Vee/Rect Channel Flow, Stream 1**
					Bot.W=5.50' D=1.50' Z= 2.5 & 3.0 '/' Top.W=13.75'
					n= 0.035
0.1	114	0.1000	13.91	135.65	**Trap/Vee/Rect Channel Flow, Pond Overflow**
					Bot.W=5.00' D=1.50' Z= 1.0 '/' Top.W=8.00'
					n= 0.035
0.8	731	0.0600	15.00	337.57	**Trap/Vee/Rect Channel Flow, Stream 2**
					Bot.W=4.50' D=3.00' Z= 1.0 '/' Top.W=10.50'
					n= 0.035
16.5	2,686	Total			

Pre-Project WS4
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Type IA 24-hr 50 year Rainfall=6.61"
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Subcatchment WS-4: Subcat WS-4

Hydrograph

Type IA 24-hr
50 year Rainfall=6.61"
Runoff Area=46.337 ac
Runoff Volume=16.330 af
Runoff Depth=4.23"
Flow Length=2,686'
Tc=16.5 min
CN=79

Pre-Project WS4
Prepared by PPI Engineering, Revised Sept. 2020
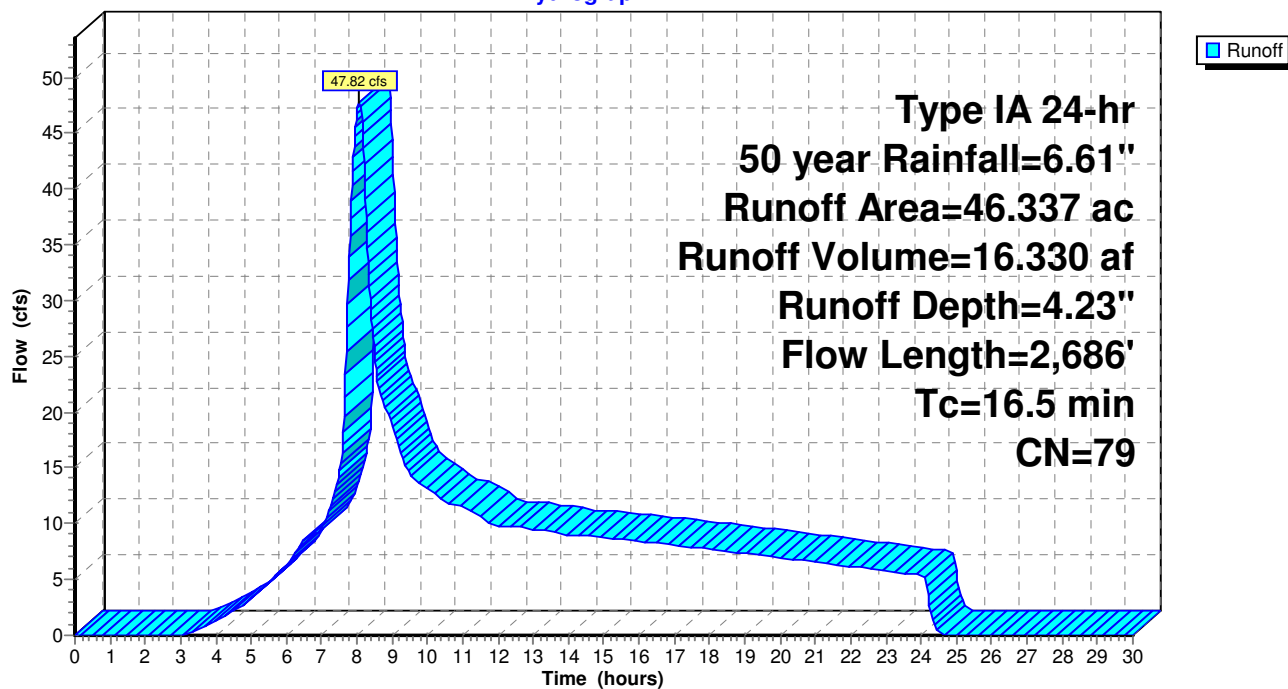HydroCAD® 10.00-24 s/n 09429 © 2018 HydroCAD Software Solutions LLC

Type IA 24-hr 100 year Rainfall=7.33"
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Summary for Subcatchment WS-4: Subcat WS-4

Runoff   =   55.82 cfs @   8.07 hrs, Volume=   18.872 af, Depth= 4.89"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.02 hrs
Type IA 24-hr 100 year Rainfall=7.33"

Area (ac)	CN	Description
* 0.000	0	, HSG D
0.025	75	Annual Grass, Good, HSG C
10.075	81	Annual Grass, Good, HSG D
2.545	73	Brush, Good, HSG D
0.127	94	Fallow, bare soil, HSG D
0.711	86	Farmsteads, HSG D
0.217	96	Gravel surface, HSG D
1.767	79	Vineyard, Fair, HSG C
8.477	84	Vineyard, Fair, HSG D
0.103	98	Water Surface, HSG D
0.259	70	Woods, Good, HSG C
22.025	77	Woods, Good, HSG D
0.007	79	Woods/grass comb., Good, HSG D
46.337	79	Weighted Average
46.234		99.78% Pervious Area
0.103		0.22% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
9.4	18	0.0200	0.03		**Sheet Flow, Sheet** Woods: Dense underbrush n= 0.800 P2= 3.23"
4.6	646	0.2200	2.35		**Shallow Concentrated Flow, Shallow 1- Woodlands** Woodland Kv= 5.0 fps
0.5	71	0.1400	2.62		**Shallow Concentrated Flow, Shallow 2 - Short Grass** Short Grass Pasture Kv= 7.0 fps
1.1	1,106	0.1500	16.56	239.12	**Trap/Vee/Rect Channel Flow, Stream 1** Bot.W=5.50' D=1.50' Z= 2.5 & 3.0 '/' Top.W=13.75' n= 0.035
0.1	114	0.1000	13.91	135.65	**Trap/Vee/Rect Channel Flow, Pond Overflow** Bot.W=5.00' D=1.50' Z= 1.0 '/' Top.W=8.00' n= 0.035
0.8	731	0.0600	15.00	337.57	**Trap/Vee/Rect Channel Flow, Stream 2** Bot.W=4.50' D=3.00' Z= 1.0 '/' Top.W=10.50' n= 0.035
16.5	2,686	Total			

Pre-Project WS4
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Type IA 24-hr 100 year Rainfall=7.33"
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Subcatchment WS-4: Subcat WS-4

Hydrograph

Legend: ☐ Runoff

55.82 cfs

Type IA 24-hr
100 year Rainfall=7.33"
Runoff Area=46.337 ac
Runoff Volume=18.872 af
Runoff Depth=4.89"
Flow Length=2,686'
Tc=16.5 min
CN=79

Flow (cfs) vs. Time (hours)

WS-4

Subcat WS-4

Post-Project WS4
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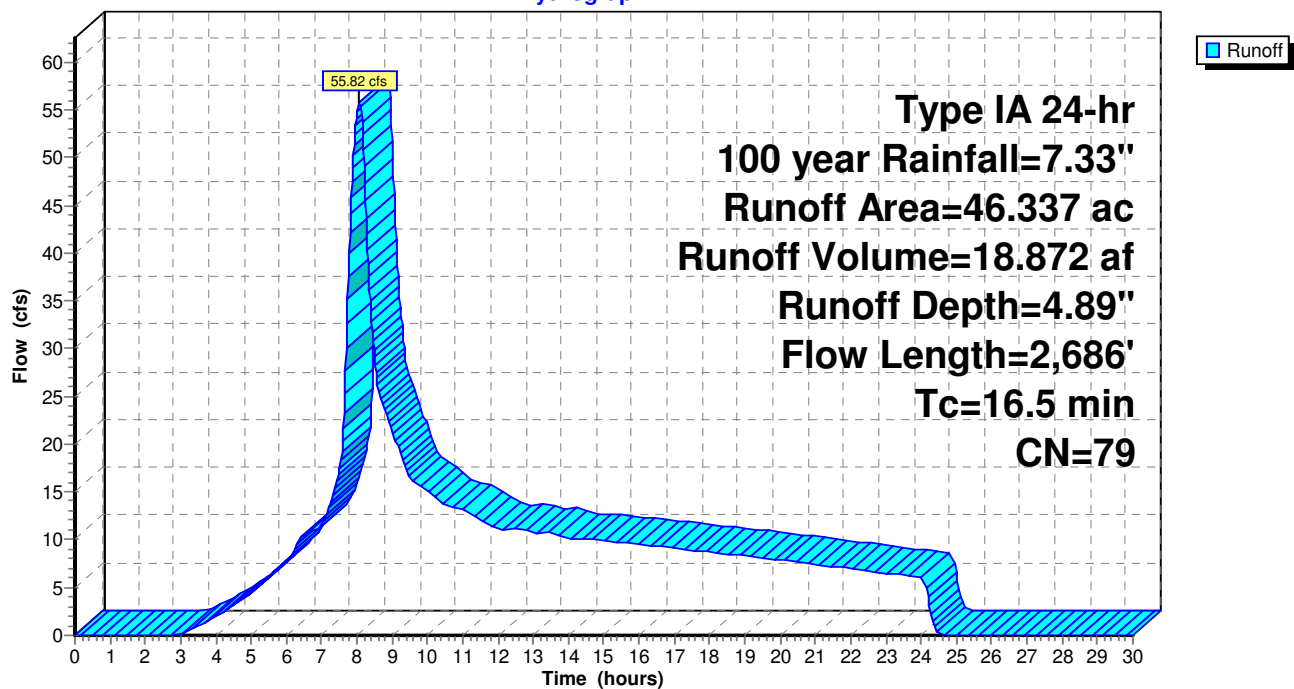HydroCAD® 10.00-24 s/n 09429 © 2018 HydroCAD Software Solutions LLC

Type IA 24-hr 2 year Rainfall=3.23"
Printed 9/2/2020
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Summary for Subcatchment WS-4: Subcat WS-4

Runoff   =   13.00 cfs @   8.18 hrs, Volume=   5.503 af, Depth= 1.43"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.02 hrs
Type IA 24-hr 2 year Rainfall=3.23"

Area (ac)	CN	Description
* 0.000	0	, HSG D
0.001	75	Annual Grass, Good, HSG C
9.729	81	Annual Grass, Good, HSG D
1.348	73	Brush, Good, HSG D
0.060	94	Fallow, bare soil, HSG D
0.353	86	Farmsteads, HSG D
0.217	96	Gravel surface, HSG D
1.767	79	Vineyard, Fair, HSG C
8.471	84	Vineyard, Fair, HSG D
0.264	75	Vineyard, Good, HSG C
5.075	81	Vineyard, Good, HSG D
0.103	98	Water Surface, HSG D
0.019	70	Woods, Good, HSG C
18.924	77	Woods, Good, HSG D
0.007	79	Woods/grass comb., Good, HSG D
46.337	80	Weighted Average
46.234		99.78% Pervious Area
0.103		0.22% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
9.3	59	0.0200	0.11		**Sheet Flow, Sheet 1**
					Grass: Dense n= 0.240 P2= 3.23"
1.8	281	0.1400	2.62		**Shallow Concentrated Flow, Shallow 1 - Short Grass**
					Short Grass Pasture Kv= 7.0 fps
9.3	70	0.3100	0.12		**Sheet Flow, Sheet 2**
					Woods: Dense underbrush n= 0.800 P2= 3.23"
1.7	254	0.2500	2.50		**Shallow Concentrated Flow, Shallow 2 - Woodlands**
					Woodland Kv= 5.0 fps
0.5	71	0.1400	2.62		**Shallow Concentrated Flow, Shallow 3 - Short Grass**
					Short Grass Pasture Kv= 7.0 fps
1.1	1,106	0.1500	16.56	239.12	**Trap/Vee/Rect Channel Flow, Stream 1**
					Bot.W=5.50' D=1.50' Z= 2.5 & 3.0 '/' Top.W=13.75'
					n= 0.035
0.1	114	0.1000	13.91	135.65	**Trap/Vee/Rect Channel Flow, Pond Overflow**
					Bot.W=5.00' D=1.50' Z= 1.0 '/' Top.W=8.00'
					n= 0.035
0.8	731	0.0600	15.00	337.57	**Trap/Vee/Rect Channel Flow, Stream 2**
					Bot.W=4.50' D=3.00' Z= 1.0 '/' Top.W=10.50'
					n= 0.035
24.6	2,686	Total			

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Type IA 24-hr 2 year Rainfall=3.23"
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Subcatchment WS-4: Subcat WS-4
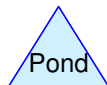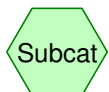

Hydrograph

□ Runoff

13.00 cfs

**Type IA 24-hr
2 year Rainfall=3.23"
Runoff Area=46.337 ac
Runoff Volume=5.503 af
Runoff Depth=1.43"
Flow Length=2,686'
Tc=24.6 min
CN=80**

Flow (cfs)

Time (hours)

Post-Project WS4
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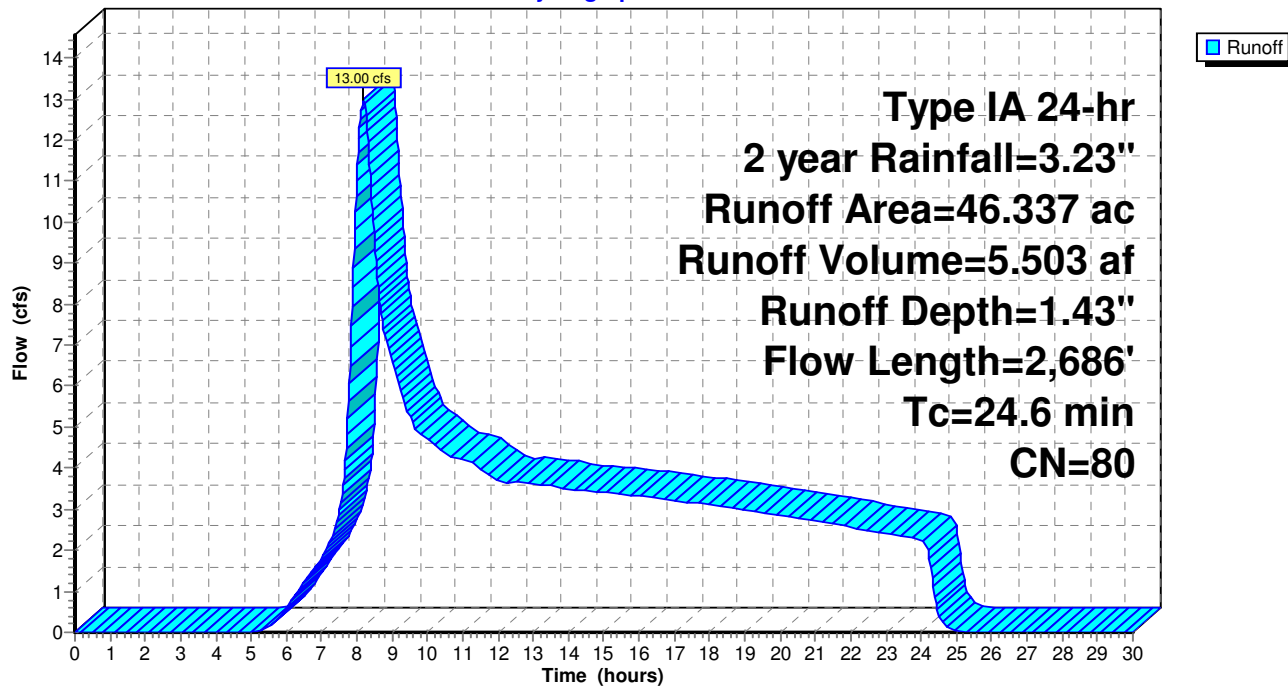HydroCAD® 10.00-24 s/n 09429 © 2018 HydroCAD Software Solutions LLC

Type IA 24-hr 10 year Rainfall=4.90"
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Summary for Subcatchment WS-4: Subcat WS-4

Runoff   =   28.65 cfs @   8.17 hrs, Volume=   10.834 af, Depth= 2.81"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.02 hrs
Type IA 24-hr 10 year Rainfall=4.90"

Area (ac)	CN	Description
* 0.000	0	, HSG D
0.001	75	Annual Grass, Good, HSG C
9.729	81	Annual Grass, Good, HSG D
1.348	73	Brush, Good, HSG D
0.060	94	Fallow, bare soil, HSG D
0.353	86	Farmsteads, HSG D
0.217	96	Gravel surface, HSG D
1.767	79	Vineyard, Fair, HSG C
8.471	84	Vineyard, Fair, HSG D
0.264	75	Vineyard, Good, HSG C
5.075	81	Vineyard, Good, HSG D
0.103	98	Water Surface, HSG D
0.019	70	Woods, Good, HSG C
18.924	77	Woods, Good, HSG D
0.007	79	Woods/grass comb., Good, HSG D
46.337	80	Weighted Average
46.234		99.78% Pervious Area
0.103		0.22% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
9.3	59	0.0200	0.11		**Sheet Flow, Sheet 1** Grass: Dense n= 0.240 P2= 3.23"
1.8	281	0.1400	2.62		**Shallow Concentrated Flow, Shallow 1 - Short Grass** Short Grass Pasture Kv= 7.0 fps
9.3	70	0.3100	0.12		**Sheet Flow, Sheet 2** Woods: Dense underbrush n= 0.800 P2= 3.23"
1.7	254	0.2500	2.50		**Shallow Concentrated Flow, Shallow 2 - Woodlands** Woodland Kv= 5.0 fps
0.5	71	0.1400	2.62		**Shallow Concentrated Flow, Shallow 3 - Short Grass** Short Grass Pasture Kv= 7.0 fps
1.1	1,106	0.1500	16.56	239.12	**Trap/Vee/Rect Channel Flow, Stream 1** Bot.W=5.50' D=1.50' Z= 2.5 & 3.0 '/' Top.W=13.75' n= 0.035
0.1	114	0.1000	13.91	135.65	**Trap/Vee/Rect Channel Flow, Pond Overflow** Bot.W=5.00' D=1.50' Z= 1.0 '/' Top.W=8.00' n= 0.035
0.8	731	0.0600	15.00	337.57	**Trap/Vee/Rect Channel Flow, Stream 2** Bot.W=4.50' D=3.00' Z= 1.0 '/' Top.W=10.50' n= 0.035
24.6	2,686	Total			

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Type IA 24-hr 10 year Rainfall=4.90"
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Subcatchment WS-4: Subcat WS-4

Hydrograph

Type IA 24-hr
10 year Rainfall=4.90"
Runoff Area=46.337 ac
Runoff Volume=10.834 af
Runoff Depth=2.81"
Flow Length=2,686'
Tc=24.6 min
CN=80

28.65 cfs

Post-Project WS4
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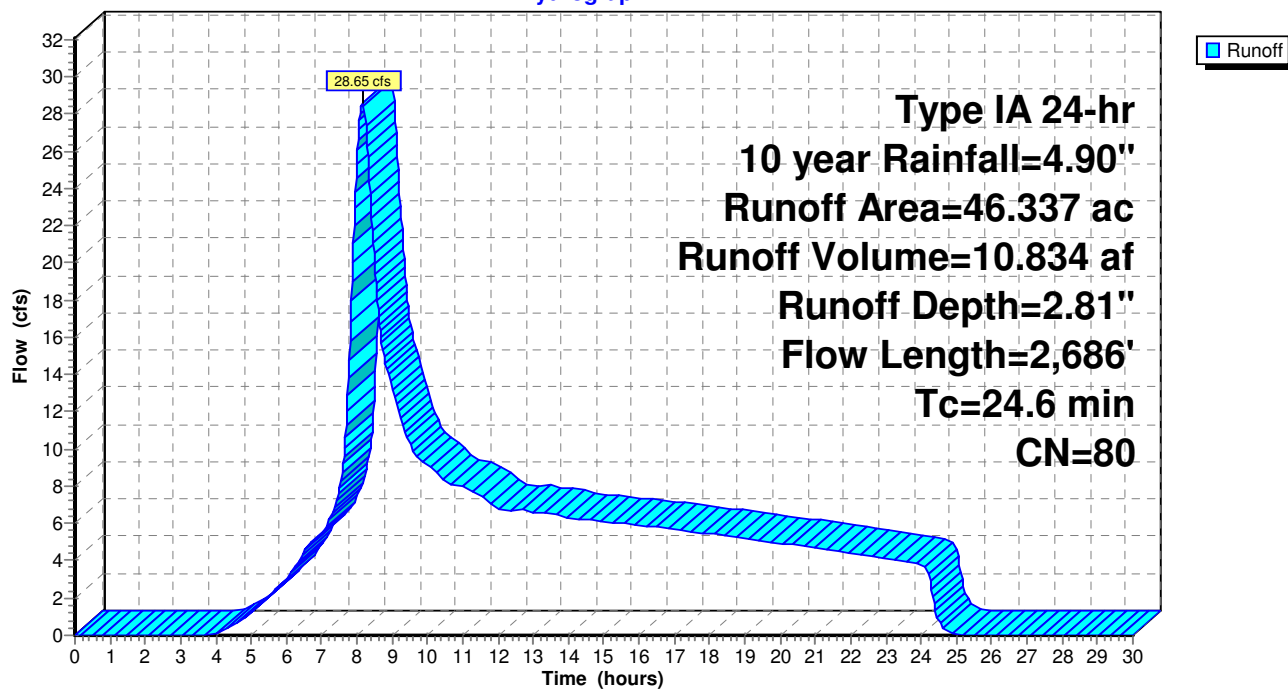HydroCAD® 10.00-24 s/n 09429 © 2018 HydroCAD Software Solutions LLC

Type IA 24-hr 50 year Rainfall=6.61"
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Summary for Subcatchment WS-4: Subcat WS-4

Runoff   =   46.16 cfs @   8.16 hrs, Volume=   16.743 af, Depth= 4.34"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.02 hrs
Type IA 24-hr 50 year Rainfall=6.61"

Area (ac)	CN	Description
* 0.000	0	, HSG D
0.001	75	Annual Grass, Good, HSG C
9.729	81	Annual Grass, Good, HSG D
1.348	73	Brush, Good, HSG D
0.060	94	Fallow, bare soil, HSG D
0.353	86	Farmsteads, HSG D
0.217	96	Gravel surface, HSG D
1.767	79	Vineyard, Fair, HSG C
8.471	84	Vineyard, Fair, HSG D
0.264	75	Vineyard, Good, HSG C
5.075	81	Vineyard, Good, HSG D
0.103	98	Water Surface, HSG D
0.019	70	Woods, Good, HSG C
18.924	77	Woods, Good, HSG D
0.007	79	Woods/grass comb., Good, HSG D
46.337	80	Weighted Average
46.234		99.78% Pervious Area
0.103		0.22% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
9.3	59	0.0200	0.11		**Sheet Flow, Sheet 1**
					Grass: Dense n= 0.240 P2= 3.23"
1.8	281	0.1400	2.62		**Shallow Concentrated Flow, Shallow 1 - Short Grass**
					Short Grass Pasture Kv= 7.0 fps
9.3	70	0.3100	0.12		**Sheet Flow, Sheet 2**
					Woods: Dense underbrush n= 0.800 P2= 3.23"
1.7	254	0.2500	2.50		**Shallow Concentrated Flow, Shallow 2 - Woodlands**
					Woodland Kv= 5.0 fps
0.5	71	0.1400	2.62		**Shallow Concentrated Flow, Shallow 3 - Short Grass**
					Short Grass Pasture Kv= 7.0 fps
1.1	1,106	0.1500	16.56	239.12	**Trap/Vee/Rect Channel Flow, Stream 1**
					Bot.W=5.50' D=1.50' Z= 2.5 & 3.0 '/' Top.W=13.75'
					n= 0.035
0.1	114	0.1000	13.91	135.65	**Trap/Vee/Rect Channel Flow, Pond Overflow**
					Bot.W=5.00' D=1.50' Z= 1.0 '/' Top.W=8.00'
					n= 0.035
0.8	731	0.0600	15.00	337.57	**Trap/Vee/Rect Channel Flow, Stream 2**
					Bot.W=4.50' D=3.00' Z= 1.0 '/' Top.W=10.50'
					n= 0.035
24.6	2,686	Total			

Post-Project WS4
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Type IA 24-hr 50 year Rainfall=6.61"
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Subcatchment WS-4: Subcat WS-4

Hydrograph

Type IA 24-hr
50 year Rainfall=6.61"
Runoff Area=46.337 ac
Runoff Volume=16.743 af
Runoff Depth=4.34"
Flow Length=2,686'
Tc=24.6 min
CN=80

46.16 cfs

■ Runoff

Post-Project WS4
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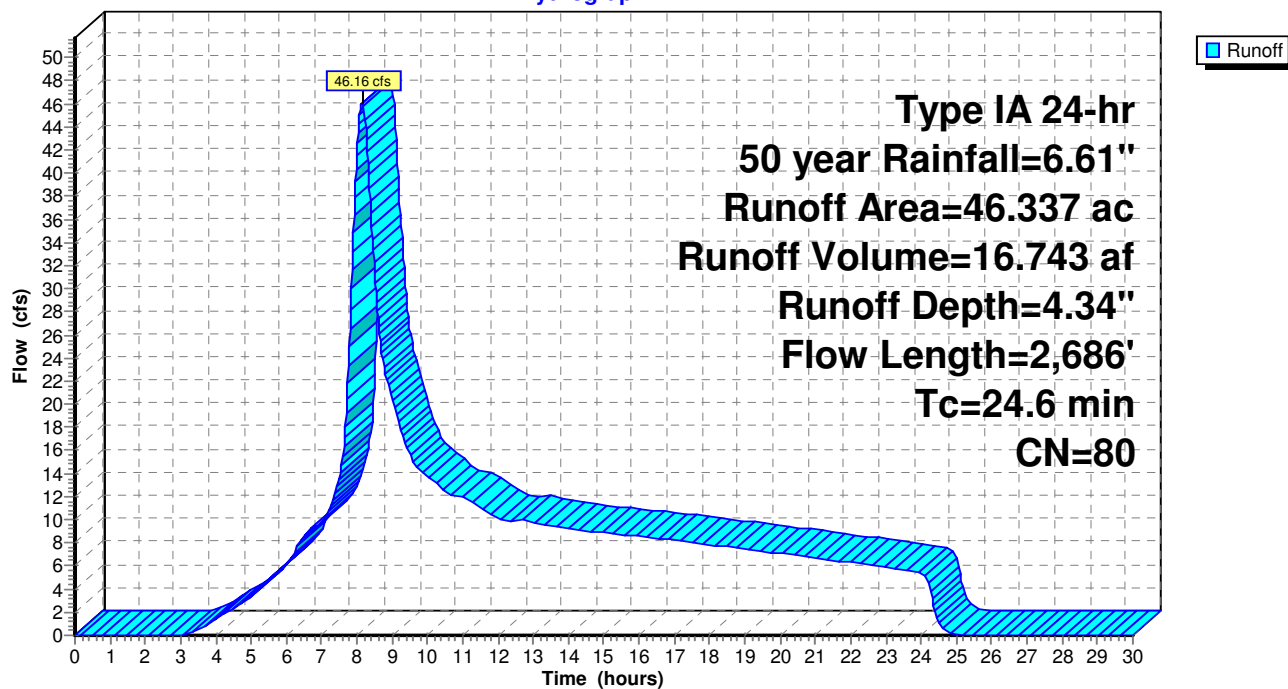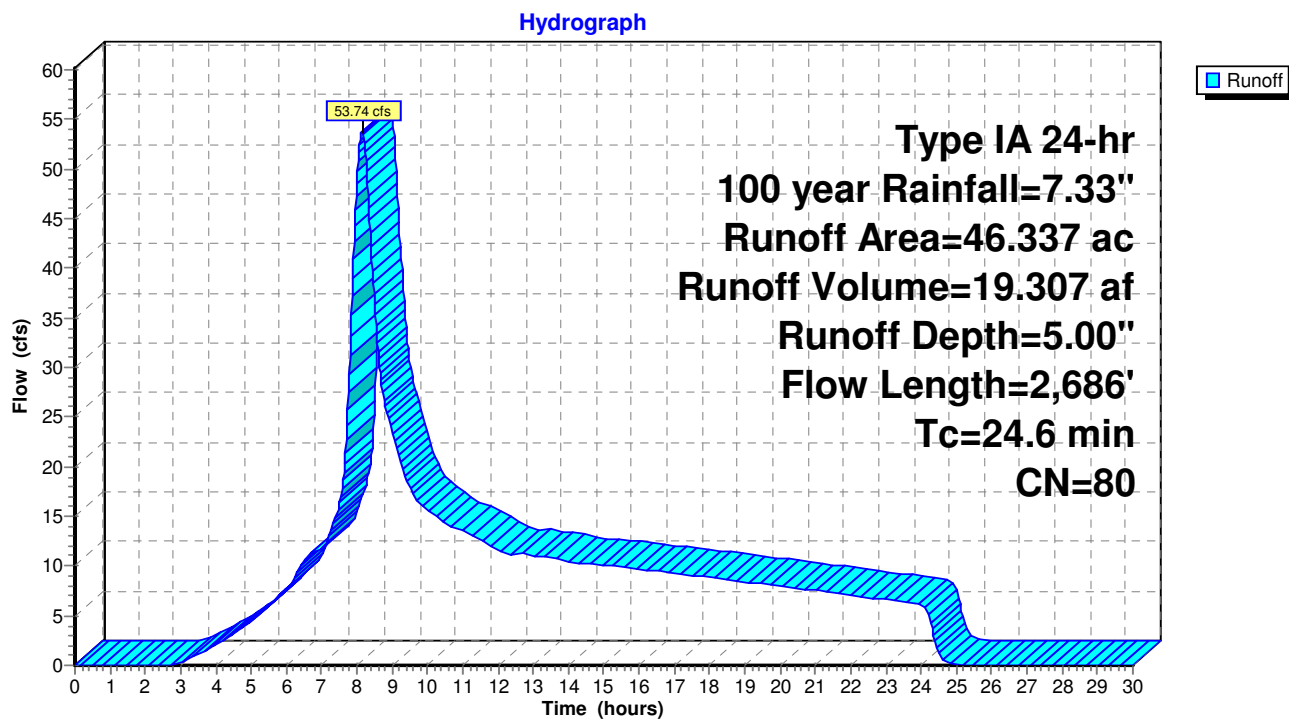HydroCAD® 10.00-24 s/n 09429 © 2018 HydroCAD Software Solutions LLC

Type IA 24-hr 100 year Rainfall=7.33"
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Summary for Subcatchment WS-4: Subcat WS-4

Runoff   =   53.74 cfs @   8.15 hrs, Volume=   19.307 af, Depth= 5.00"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.02 hrs
Type IA 24-hr 100 year Rainfall=7.33"

Area (ac)	CN	Description
* 0.000	0	, HSG D
0.001	75	Annual Grass, Good, HSG C
9.729	81	Annual Grass, Good, HSG D
1.348	73	Brush, Good, HSG D
0.060	94	Fallow, bare soil, HSG D
0.353	86	Farmsteads, HSG D
0.217	96	Gravel surface, HSG D
1.767	79	Vineyard, Fair, HSG C
8.471	84	Vineyard, Fair, HSG D
0.264	75	Vineyard, Good, HSG C
5.075	81	Vineyard, Good, HSG D
0.103	98	Water Surface, HSG D
0.019	70	Woods, Good, HSG C
18.924	77	Woods, Good, HSG D
0.007	79	Woods/grass comb., Good, HSG D
46.337	80	Weighted Average
46.234		99.78% Pervious Area
0.103		0.22% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
9.3	59	0.0200	0.11		**Sheet Flow, Sheet 1**
					Grass: Dense n= 0.240 P2= 3.23"
1.8	281	0.1400	2.62		**Shallow Concentrated Flow, Shallow 1 - Short Grass**
					Short Grass Pasture Kv= 7.0 fps
9.3	70	0.3100	0.12		**Sheet Flow, Sheet 2**
					Woods: Dense underbrush n= 0.800 P2= 3.23"
1.7	254	0.2500	2.50		**Shallow Concentrated Flow, Shallow 2 - Woodlands**
					Woodland Kv= 5.0 fps
0.5	71	0.1400	2.62		**Shallow Concentrated Flow, Shallow 3 - Short Grass**
					Short Grass Pasture Kv= 7.0 fps
1.1	1,106	0.1500	16.56	239.12	**Trap/Vee/Rect Channel Flow, Stream 1**
					Bot.W=5.50' D=1.50' Z= 2.5 & 3.0 '/' Top.W=13.75'
					n= 0.035
0.1	114	0.1000	13.91	135.65	**Trap/Vee/Rect Channel Flow, Pond Overflow**
					Bot.W=5.00' D=1.50' Z= 1.0 '/' Top.W=8.00'
					n= 0.035
0.8	731	0.0600	15.00	337.57	**Trap/Vee/Rect Channel Flow, Stream 2**
					Bot.W=4.50' D=3.00' Z= 1.0 '/' Top.W=10.50'
					n= 0.035
24.6	2,686	Total			

Post-Project WS4
Type IA 24-hr 100 year Rainfall=7.33"

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Subcatchment WS-4: Subcat WS-4

Hydrograph

Type IA 24-hr
100 year Rainfall=7.33"
Runoff Area=46.337 ac
Runoff Volume=19.307 af
Runoff Depth=5.00"
Flow Length=2,686'
Tc=24.6 min
CN=80

53.74 cfs

Runoff

WS-5

Subcat WS-5

Summary for Subcatchment WS-5: Subcat WS-5

Runoff   =   13.67 cfs @   8.08 hrs, Volume=   5.547 af, Depth= 1.30"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.02 hrs
Type IA 24-hr 2 year Rainfall=3.23"

Area (ac)	CN	Description
* 0.000	0	, HSG D
5.234	81	Annual Grass, Good, HSG D
0.028	65	Brush, Good, HSG C
2.050	73	Brush, Good, HSG D
0.484	91	Gravel Roads, HSG D
1.038	93	Paved roads w/open ditches, 50% imp, HSG D
0.674	79	Vineyard, Fair, HSG C
1.081	84	Vineyard, Fair, HSG D
0.442	81	Vineyard, Good, HSG D
0.004	98	Water Surface, HSG D
0.024	70	Woods, Good, HSG C
38.798	77	Woods, Good, HSG D
1.525	79	Woods/grass comb., Good, HSG D
51.383	78	Weighted Average
50.860		98.98% Pervious Area
0.523		1.02% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
9.2	35	0.0800	0.06		**Sheet Flow, Sheet**
					Woods: Dense underbrush n= 0.800 P2= 3.23"
3.4	600	0.3400	2.92		**Shallow Concentrated Flow, Shallow - Woodlands**
					Woodland Kv= 5.0 fps
2.1	2,075	0.0600	16.63	798.43	**Trap/Vee/Rect Channel Flow, Stream**
					Bot.W=10.00' D=3.00' Z= 1.0 & 3.0 '/' Top.W=22.00'
					n= 0.035
14.7	2,710	Total			

Pre-Project WS5
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Type IA 24-hr 2 year Rainfall=3.23"
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Subcatchment WS-5: Subcat WS-5

Hydrograph

Type IA 24-hr
2 year Rainfall=3.23"
Runoff Area=51.383 ac
Runoff Volume=5.547 af
Runoff Depth=1.30"
Flow Length=2,710'
Tc=14.7 min
CN=78

13.67 cfs

☐ Runoff

Pre-Project WS5
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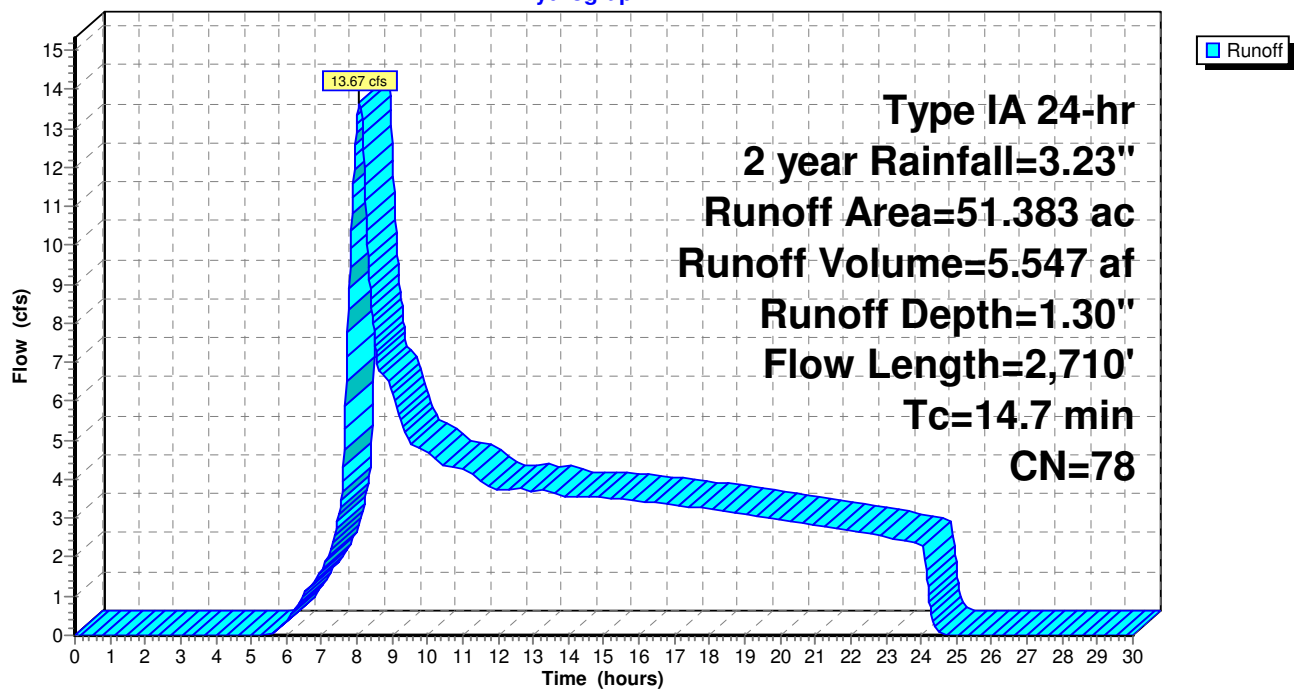*Type IA 24-hr 10 year Rainfall=4.90"*
Printed 9/2/2020
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Summary for Subcatchment WS-5: Subcat WS-5

Runoff   =   31.58 cfs @   8.06 hrs, Volume=   11.249 af, Depth= 2.63"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.02 hrs
Type IA 24-hr 10 year Rainfall=4.90"

Area (ac)	CN	Description
* 0.000	0	, HSG D
5.234	81	Annual Grass, Good, HSG D
0.028	65	Brush, Good, HSG C
2.050	73	Brush, Good, HSG D
0.484	91	Gravel Roads, HSG D
1.038	93	Paved roads w/open ditches, 50% imp, HSG D
0.674	79	Vineyard, Fair, HSG C
1.081	84	Vineyard, Fair, HSG D
0.442	81	Vineyard, Good, HSG D
0.004	98	Water Surface, HSG D
0.024	70	Woods, Good, HSG C
38.798	77	Woods, Good, HSG D
1.525	79	Woods/grass comb., Good, HSG D
51.383	78	Weighted Average
50.860		98.98% Pervious Area
0.523		1.02% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
9.2	35	0.0800	0.06		**Sheet Flow, Sheet**
					Woods: Dense underbrush n= 0.800 P2= 3.23"
3.4	600	0.3400	2.92		**Shallow Concentrated Flow, Shallow - Woodlands**
					Woodland Kv= 5.0 fps
2.1	2,075	0.0600	16.63	798.43	**Trap/Vee/Rect Channel Flow, Stream**
					Bot.W=10.00' D=3.00' Z= 1.0 & 3.0 '/' Top.W=22.00'
					n= 0.035
14.7	2,710		Total		

Pre-Project WS5
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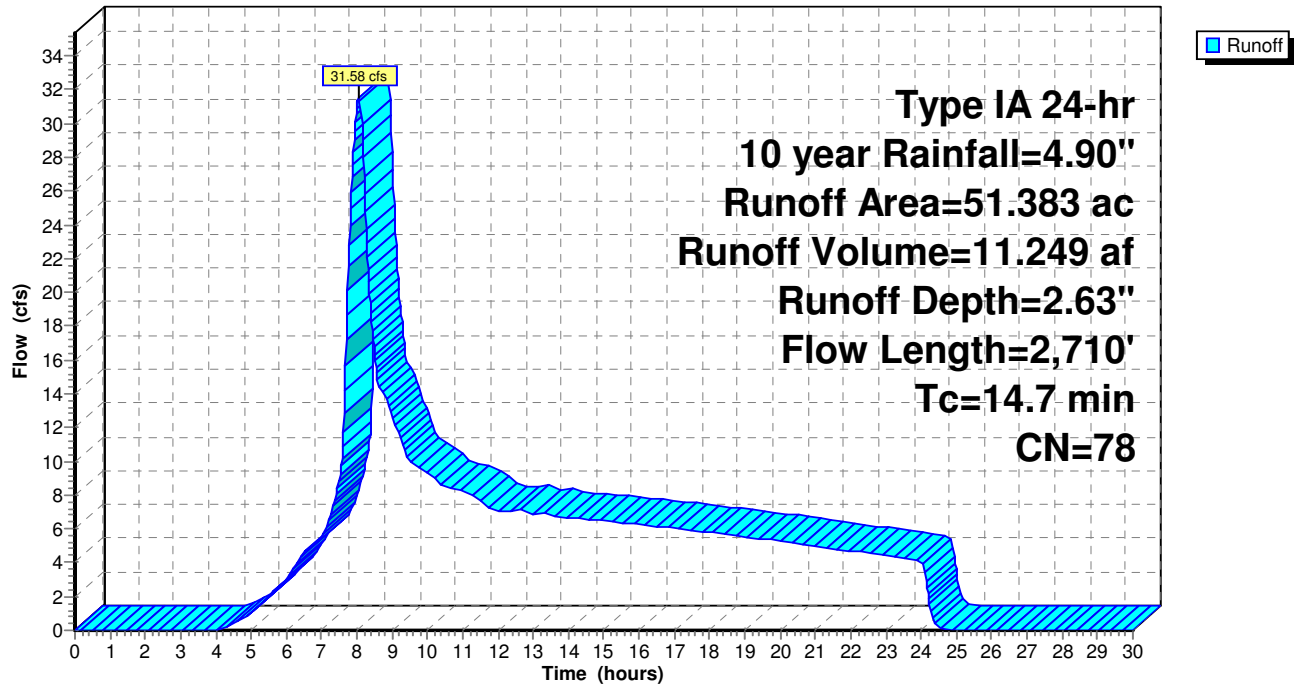HydroCAD® 10.00-24 s/n 09429 © 2018 HydroCAD Software Solutions LLC

Type IA 24-hr 10 year Rainfall=4.90"
Printed 9/2/2020
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Subcatchment WS-5: Subcat WS-5

Hydrograph

Legend: ☐ Runoff

**Type IA 24-hr
10 year Rainfall=4.90"
Runoff Area=51.383 ac
Runoff Volume=11.249 af
Runoff Depth=2.63"
Flow Length=2,710'
Tc=14.7 min
CN=78**

31.58 cfs

Summary for Subcatchment WS-5: Subcat WS-5

Runoff   =   51.98 cfs @   8.05 hrs, Volume=   17.653 af, Depth= 4.12"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.02 hrs
Type IA 24-hr 50 year Rainfall=6.61"

Area (ac)	CN	Description
* 0.000	0	, HSG D
5.234	81	Annual Grass, Good, HSG D
0.028	65	Brush, Good, HSG C
2.050	73	Brush, Good, HSG D
0.484	91	Gravel Roads, HSG D
1.038	93	Paved roads w/open ditches, 50% imp, HSG D
0.674	79	Vineyard, Fair, HSG C
1.081	84	Vineyard, Fair, HSG D
0.442	81	Vineyard, Good, HSG D
0.004	98	Water Surface, HSG D
0.024	70	Woods, Good, HSG C
38.798	77	Woods, Good, HSG D
1.525	79	Woods/grass comb., Good, HSG D
51.383	78	Weighted Average
50.860		98.98% Pervious Area
0.523		1.02% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
9.2	35	0.0800	0.06		**Sheet Flow, Sheet**
					Woods: Dense underbrush n= 0.800 P2= 3.23"
3.4	600	0.3400	2.92		**Shallow Concentrated Flow, Shallow - Woodlands**
					Woodland Kv= 5.0 fps
2.1	2,075	0.0600	16.63	798.43	**Trap/Vee/Rect Channel Flow, Stream**
					Bot.W=10.00' D=3.00' Z= 1.0 & 3.0 '/' Top.W=22.00'
					n= 0.035
14.7	2,710	Total			

Pre-Project WS5
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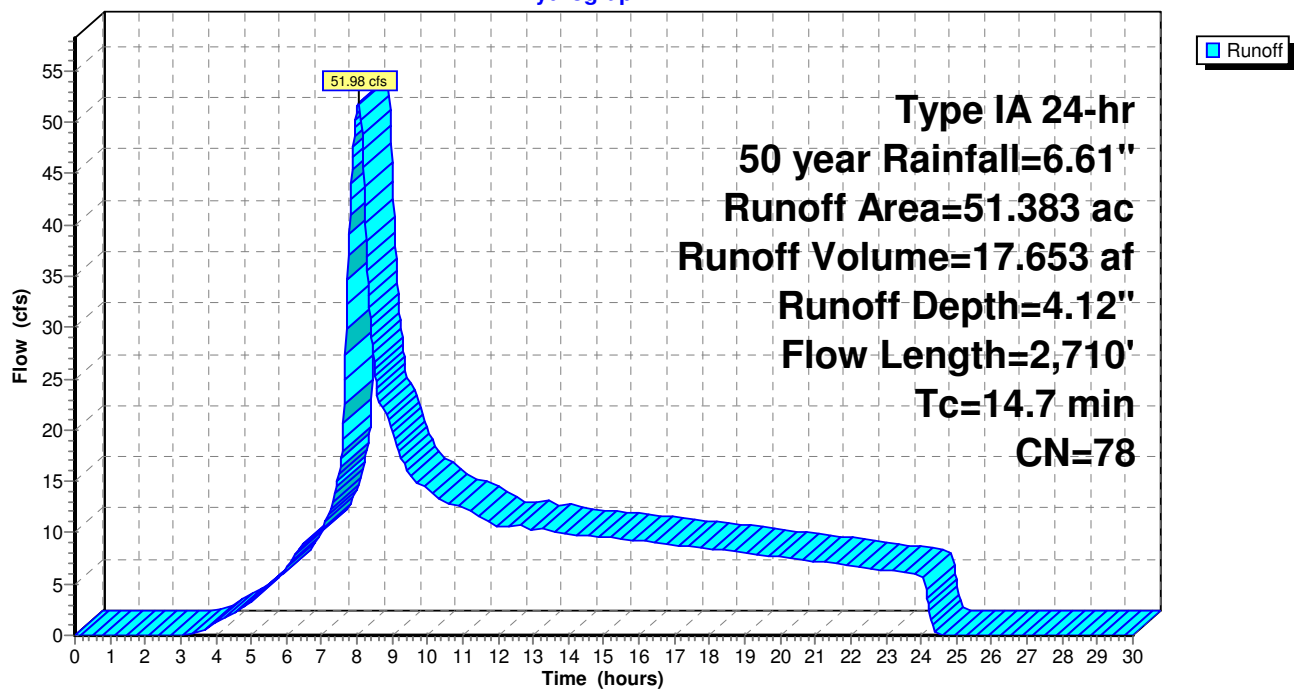HydroCAD® 10.00-24 s/n 09429 © 2018 HydroCAD Software Solutions LLC

Type IA 24-hr 50 year Rainfall=6.61"
Printed 9/2/2020
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Subcatchment WS-5: Subcat WS-5

Hydrograph

- □ Runoff

51.98 cfs

**Type IA 24-hr
50 year Rainfall=6.61"
Runoff Area=51.383 ac
Runoff Volume=17.653 af
Runoff Depth=4.12"
Flow Length=2,710'
Tc=14.7 min
CN=78**

Flow (cfs) — Time (hours)

Pre-Project WS5
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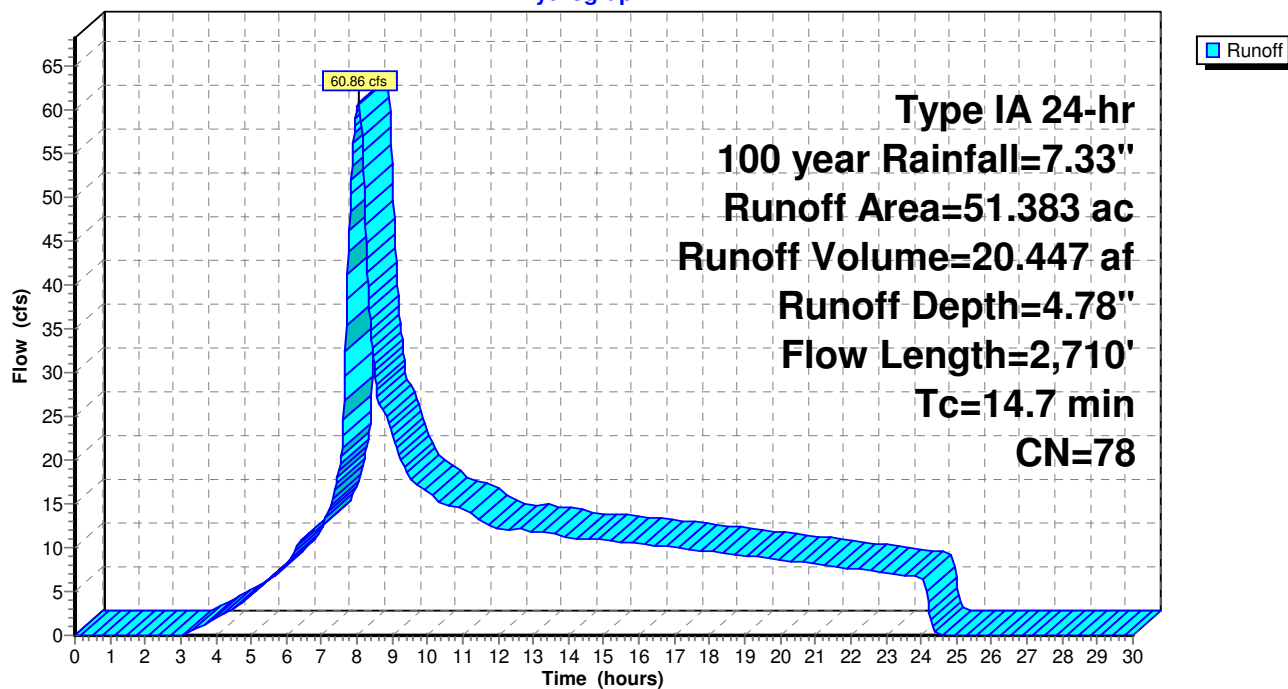HydroCAD® 10.00-24 s/n 09429 © 2018 HydroCAD Software Solutions LLC

Type IA 24-hr 100 year Rainfall=7.33"
Printed 9/2/2020
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Summary for Subcatchment WS-5: Subcat WS-5

Runoff   =   60.86 cfs @   8.05 hrs, Volume=   20.447 af, Depth= 4.78"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.02 hrs
Type IA 24-hr 100 year Rainfall=7.33"

Area (ac)	CN	Description
* 0.000	0	, HSG D
5.234	81	Annual Grass, Good, HSG D
0.028	65	Brush, Good, HSG C
2.050	73	Brush, Good, HSG D
0.484	91	Gravel Roads, HSG D
1.038	93	Paved roads w/open ditches, 50% imp, HSG D
0.674	79	Vineyard, Fair, HSG C
1.081	84	Vineyard, Fair, HSG D
0.442	81	Vineyard, Good, HSG D
0.004	98	Water Surface, HSG D
0.024	70	Woods, Good, HSG C
38.798	77	Woods, Good, HSG D
1.525	79	Woods/grass comb., Good, HSG D
51.383	78	Weighted Average
50.860		98.98% Pervious Area
0.523		1.02% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
9.2	35	0.0800	0.06		**Sheet Flow, Sheet**
					Woods: Dense underbrush n= 0.800 P2= 3.23"
3.4	600	0.3400	2.92		**Shallow Concentrated Flow, Shallow - Woodlands**
					Woodland Kv= 5.0 fps
2.1	2,075	0.0600	16.63	798.43	**Trap/Vee/Rect Channel Flow, Stream**
					Bot.W=10.00' D=3.00' Z= 1.0 & 3.0 '/' Top.W=22.00'
					n= 0.035
14.7	2,710				Total

Subcatchment WS-5: Subcat WS-5

Hydrograph

Type IA 24-hr
100 year Rainfall=7.33"
Runoff Area=51.383 ac
Runoff Volume=20.447 af
Runoff Depth=4.78"
Flow Length=2,710'
Tc=14.7 min
CN=78

60.86 cfs

☐ Runoff

WS-5

Subcat WS-5

Subcat · Reach · Pond · Link

Summary for Subcatchment WS-5: Subcat WS-5

Runoff   =   13.67 cfs @   8.08 hrs, Volume=   5.547 af, Depth= 1.30"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.02 hrs
Type IA 24-hr 2 year Rainfall=3.23"

Area (ac)	CN	Description
* 0.000	0	, HSG D
3.640	81	Annual Grass, Good, HSG D
0.000	65	Brush, Good, HSG C
1.903	73	Brush, Good, HSG D
0.479	91	Gravel Roads, HSG D
1.017	93	Paved roads w/open ditches, 50% imp, HSG D
0.647	79	Vineyard, Fair, HSG C
1.064	84	Vineyard, Fair, HSG D
0.079	75	Vineyard, Good, HSG C
6.209	81	Vineyard, Good, HSG D
0.004	98	Water Surface, HSG D
34.816	77	Woods, Good, HSG D
1.525	79	Woods/grass comb., Good, HSG D
51.383	78	Weighted Average
50.870		99.00% Pervious Area
0.513		1.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
9.2	35	0.0800	0.06		**Sheet Flow, Sheet**
					Woods: Dense underbrush n= 0.800 P2= 3.23"
3.4	600	0.3400	2.92		**Shallow Concentrated Flow, Shallow - Woodlands**
					Woodland Kv= 5.0 fps
2.1	2,075	0.0600	16.63	798.43	**Trap/Vee/Rect Channel Flow, Stream**
					Bot.W=10.00' D=3.00' Z= 1.0 & 3.0 '/' Top.W=22.00'
					n= 0.035
14.7	2,710	Total			

Post-Project WS5
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Type IA 24-hr 2 year Rainfall=3.23"
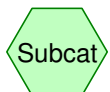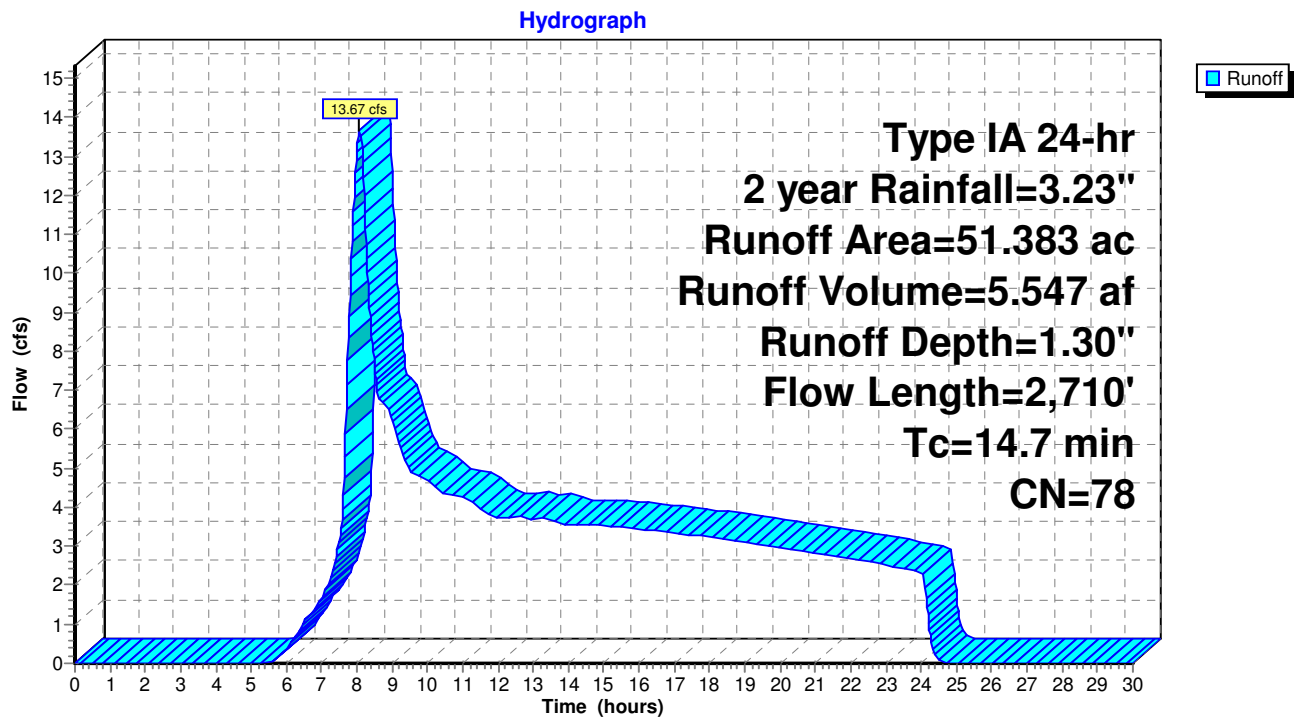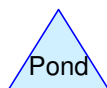Printed 9/2/2020
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Subcatchment WS-5: Subcat WS-5

Hydrograph

Type IA 24-hr
2 year Rainfall=3.23"
Runoff Area=51.383 ac
Runoff Volume=5.547 af
Runoff Depth=1.30"
Flow Length=2,710'
Tc=14.7 min
CN=78

13.67 cfs

☐ Runoff

Flow (cfs)

Time (hours)

Post-Project WS5
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Type IA 24-hr 10 year Rainfall=4.90"
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Summary for Subcatchment WS-5: Subcat WS-5

Runoff   =   31.58 cfs @   8.06 hrs, Volume=   11.249 af, Depth= 2.63"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.02 hrs
Type IA 24-hr 10 year Rainfall=4.90"

Area (ac)	CN	Description
* 0.000	0	, HSG D
3.640	81	Annual Grass, Good, HSG D
0.000	65	Brush, Good, HSG C
1.903	73	Brush, Good, HSG D
0.479	91	Gravel Roads, HSG D
1.017	93	Paved roads w/open ditches, 50% imp, HSG D
0.647	79	Vineyard, Fair, HSG C
1.064	84	Vineyard, Fair, HSG D
0.079	75	Vineyard, Good, HSG C
6.209	81	Vineyard, Good, HSG D
0.004	98	Water Surface, HSG D
34.816	77	Woods, Good, HSG D
1.525	79	Woods/grass comb., Good, HSG D
51.383	78	Weighted Average
50.870		99.00% Pervious Area
0.513		1.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
9.2	35	0.0800	0.06		**Sheet Flow, Sheet**
					Woods: Dense underbrush n= 0.800 P2= 3.23"
3.4	600	0.3400	2.92		**Shallow Concentrated Flow, Shallow - Woodlands**
					Woodland Kv= 5.0 fps
2.1	2,075	0.0600	16.63	798.43	**Trap/Vee/Rect Channel Flow, Stream**
					Bot.W=10.00' D=3.00' Z= 1.0 & 3.0 '/' Top.W=22.00'
					n= 0.035
14.7	2,710	Total			

Subcatchment WS-5: Subcat WS-5

Hydrograph

**Type IA 24-hr
10 year Rainfall=4.90"
Runoff Area=51.383 ac
Runoff Volume=11.249 af
Runoff Depth=2.63"
Flow Length=2,710'
Tc=14.7 min
CN=78**

31.58 cfs

Summary for Subcatchment WS-5: Subcat WS-5

Runoff   =   51.98 cfs @   8.05 hrs, Volume=   17.653 af, Depth= 4.12"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.02 hrs
Type IA 24-hr 50 year Rainfall=6.61"

Area (ac)	CN	Description
* 0.000	0	, HSG D
3.640	81	Annual Grass, Good, HSG D
0.000	65	Brush, Good, HSG C
1.903	73	Brush, Good, HSG D
0.479	91	Gravel Roads, HSG D
1.017	93	Paved roads w/open ditches, 50% imp, HSG D
0.647	79	Vineyard, Fair, HSG C
1.064	84	Vineyard, Fair, HSG D
0.079	75	Vineyard, Good, HSG C
6.209	81	Vineyard, Good, HSG D
0.004	98	Water Surface, HSG D
34.816	77	Woods, Good, HSG D
1.525	79	Woods/grass comb., Good, HSG D
51.383	78	Weighted Average
50.870		99.00% Pervious Area
0.513		1.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
9.2	35	0.0800	0.06		**Sheet Flow, Sheet**
					Woods: Dense underbrush n= 0.800 P2= 3.23"
3.4	600	0.3400	2.92		**Shallow Concentrated Flow, Shallow - Woodlands**
					Woodland Kv= 5.0 fps
2.1	2,075	0.0600	16.63	798.43	**Trap/Vee/Rect Channel Flow, Stream**
					Bot.W=10.00' D=3.00' Z= 1.0 & 3.0 '/' Top.W=22.00'
					n= 0.035
14.7	2,710	Total			

Post-Project WS5
Prepared by PPI Engineering, Revised Sept. 2020
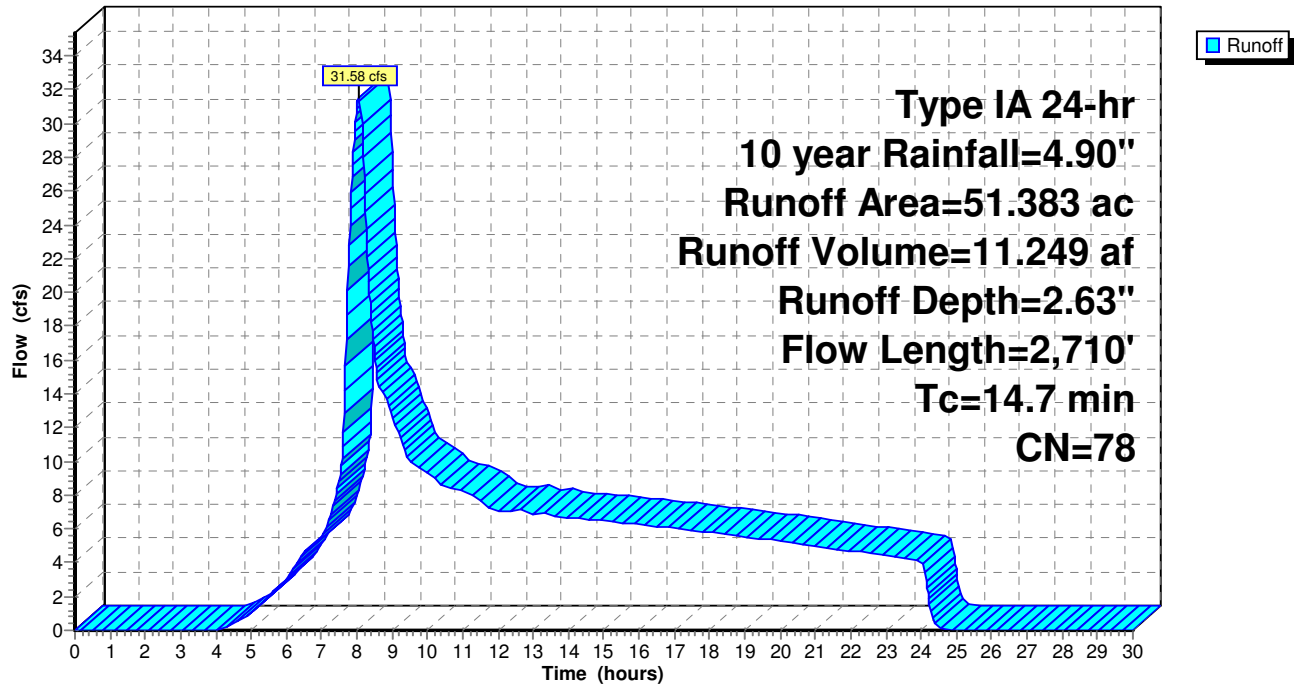HydroCAD® 10.00-24 s/n 09429 © 2018 HydroCAD Software Solutions LLC

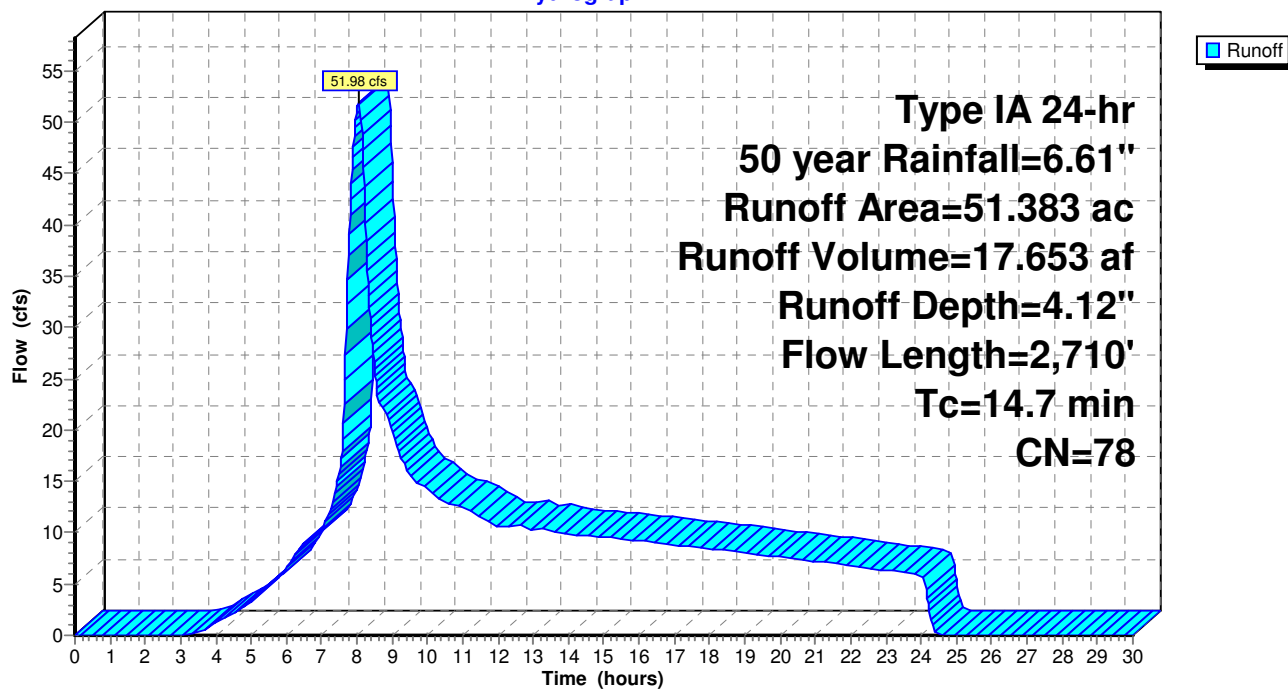*Type IA 24-hr 50 year Rainfall=6.61"*
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Subcatchment WS-5: Subcat WS-5

Hydrograph

Type IA 24-hr
50 year Rainfall=6.61"
Runoff Area=51.383 ac
Runoff Volume=17.653 af
Runoff Depth=4.12"
Flow Length=2,710'
Tc=14.7 min
CN=78

51.98 cfs

Runoff

Summary for Subcatchment WS-5: Subcat WS-5

Runoff   =   60.86 cfs @   8.05 hrs, Volume=   20.447 af, Depth= 4.78"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.02 hrs
Type IA 24-hr 100 year Rainfall=7.33"

Area (ac)	CN	Description
* 0.000	0	, HSG D
3.640	81	Annual Grass, Good, HSG D
0.000	65	Brush, Good, HSG C
1.903	73	Brush, Good, HSG D
0.479	91	Gravel Roads, HSG D
1.017	93	Paved roads w/open ditches, 50% imp, HSG D
0.647	79	Vineyard, Fair, HSG C
1.064	84	Vineyard, Fair, HSG D
0.079	75	Vineyard, Good, HSG C
6.209	81	Vineyard, Good, HSG D
0.004	98	Water Surface, HSG D
34.816	77	Woods, Good, HSG D
1.525	79	Woods/grass comb., Good, HSG D
51.383	78	Weighted Average
50.870		99.00% Pervious Area
0.513		1.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
9.2	35	0.0800	0.06		**Sheet Flow, Sheet**
					Woods: Dense underbrush n= 0.800 P2= 3.23"
3.4	600	0.3400	2.92		**Shallow Concentrated Flow, Shallow - Woodlands**
					Woodland Kv= 5.0 fps
2.1	2,075	0.0600	16.63	798.43	**Trap/Vee/Rect Channel Flow, Stream**
					Bot.W=10.00' D=3.00' Z= 1.0 & 3.0 '/' Top.W=22.00'
					n= 0.035
14.7	2,710	Total			

Post-Project WS5
Type IA 24-hr 100 year Rainfall=7.33"
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Subcatchment WS-5: Subcat WS-5

Hydrograph

**Type IA 24-hr
100 year Rainfall=7.33"
Runoff Area=51.383 ac
Runoff Volume=20.447 af
Runoff Depth=4.78"
Flow Length=2,710'
Tc=14.7 min
CN=78**

60.86 cfs

WS-6

Subcat WS-6

Subcat   Reach   Pond   Link

Summary for Subcatchment WS-6: Subcat WS-6

Runoff   =   10.02 cfs @   8.14 hrs, Volume=   4.668 af, Depth= 1.11"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.02 hrs
Type IA 24-hr 2 year Rainfall=3.23"

Area (ac)	CN	Description
* 0.000	0	, HSG B
* 0.000	0	, HSG C
0.599	61	Annual Grass, Good, HSG B
0.103	75	Annual Grass, Good, HSG C
3.118	81	Annual Grass, Good, HSG D
0.641	48	Brush, Good, HSG B
0.609	73	Brush, Good, HSG D
1.552	74	Farmsteads, HSG B
0.809	82	Farmsteads, HSG C
0.314	89	Paved roads w/open ditches, 50% imp, HSG B
0.132	92	Paved roads w/open ditches, 50% imp, HSG C
2.072	69	Vineyard, Fair, HSG B
9.731	79	Vineyard, Fair, HSG C
8.590	84	Vineyard, Fair, HSG D
10.292	75	Vineyard, Good, HSG C
0.886	81	Vineyard, Good, HSG D
6.310	55	Woods, Good, HSG B
1.127	70	Woods, Good, HSG C
3.011	77	Woods, Good, HSG D
0.369	58	Woods/grass comb., Good, HSG B
0.001	72	Woods/grass comb., Good, HSG C
50.268	75	Weighted Average
50.045		99.56% Pervious Area
0.223		0.44% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
9.4	63	0.2500	0.11		**Sheet Flow, Sheet**
					Woods: Dense underbrush n= 0.800 P2= 3.23"
6.8	1,002	0.2400	2.45		**Shallow Concentrated Flow, Shallow 1 - Woodlands**
					Woodland Kv= 5.0 fps
0.0	23	0.2200	11.06	8.69	**Pipe Channel, Culvert**
					12.0" Round Area= 0.8 sf Perim= 3.1' r= 0.25'
					n= 0.025
0.3	43	0.3000	2.74		**Shallow Concentrated Flow, Shallow 2 - Woodlands**
					Woodland Kv= 5.0 fps
1.4	566	0.0600	6.89	2.40	**Pipe Channel, Pipe 1**
					8.0" Round Area= 0.3 sf Perim= 2.1' r= 0.17'
					n= 0.016 PPI 8in CPP
1.3	363	0.0200	4.63	3.64	**Pipe Channel, Pipe 2**
					12.0" Round Area= 0.8 sf Perim= 3.1' r= 0.25'
					n= 0.018
19.2	2,060				Total

Subcatchment WS-6: Subcat WS-6

Hydrograph

Type IA 24-hr
2 year Rainfall=3.23"
Runoff Area=50.268 ac
Runoff Volume=4.668 af
Runoff Depth=1.11"
Flow Length=2,060'
Tc=19.2 min
CN=75

10.02 cfs

Runoff

Pre-Project WS6
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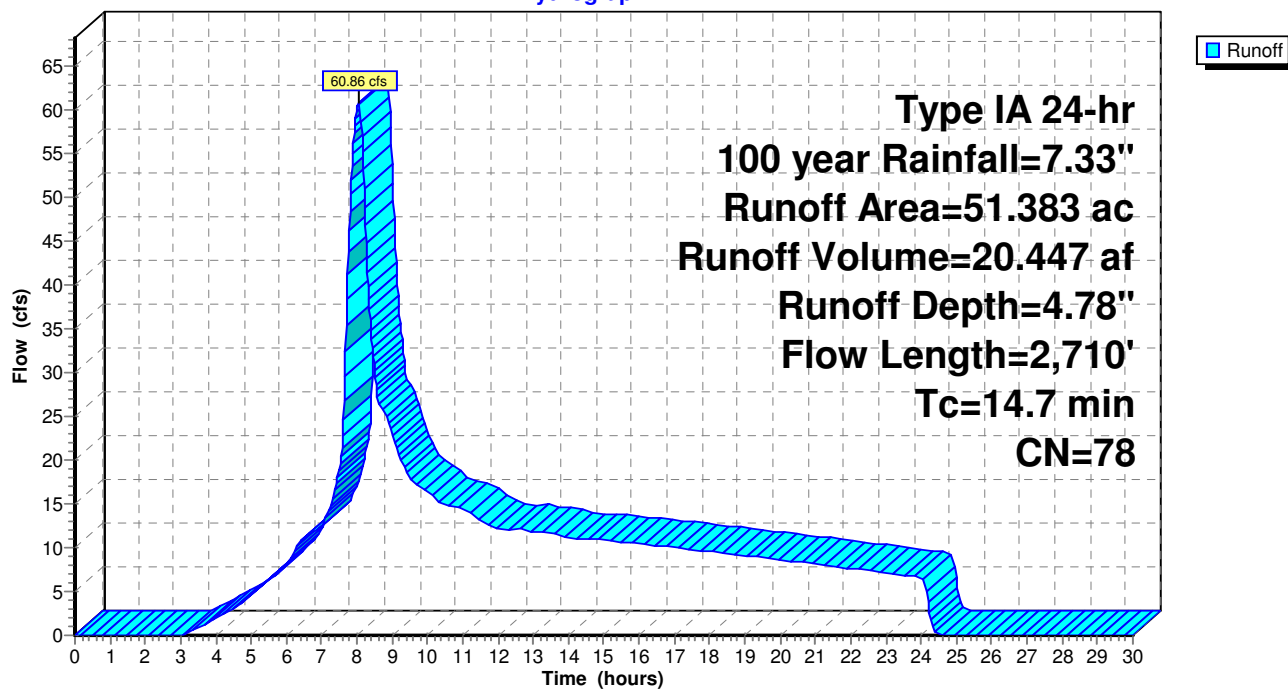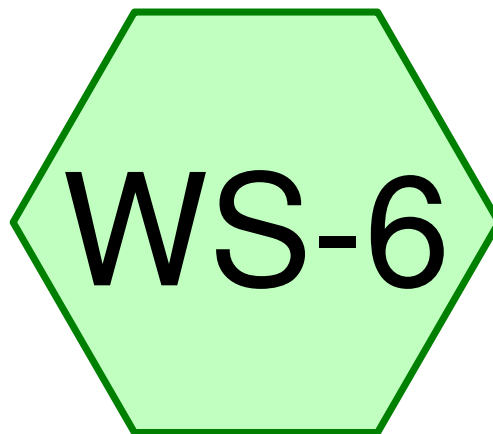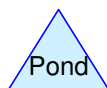*Type IA 24-hr 10 year Rainfall=4.90"*
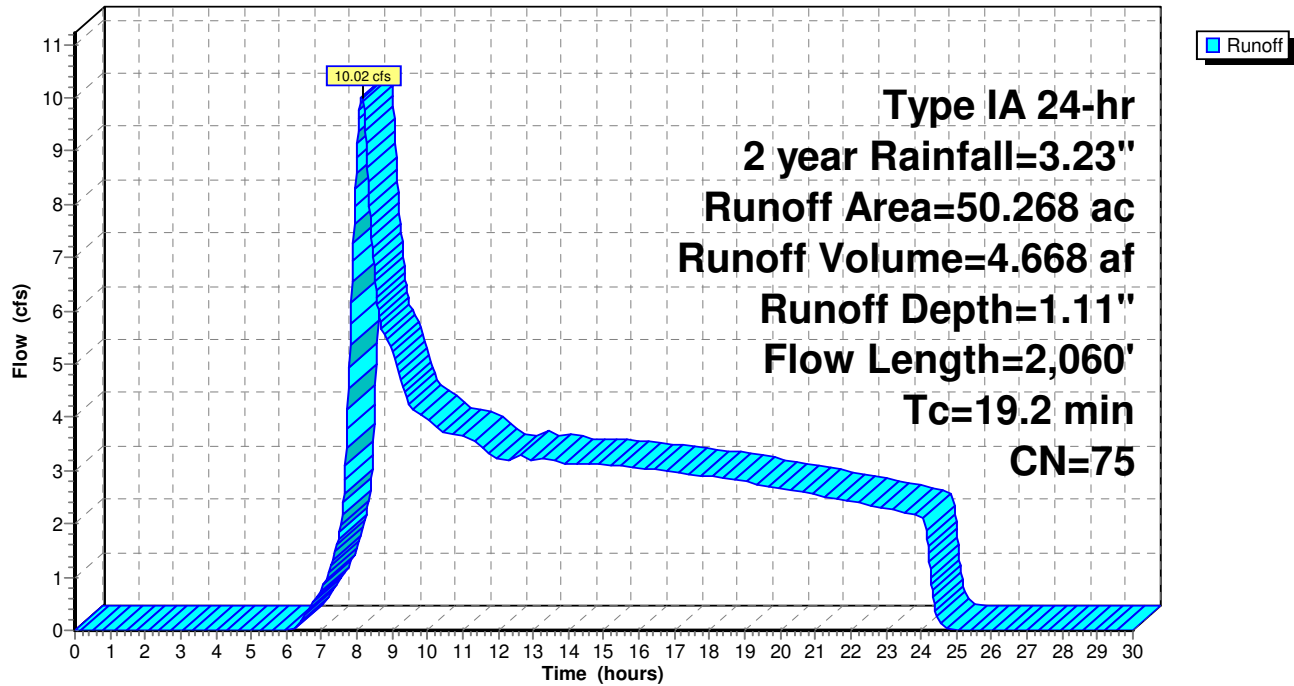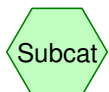Printed 9/2/2020
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Summary for Subcatchment WS-6: Subcat WS-6

Runoff   =   25.75 cfs @   8.11 hrs, Volume=   9.921 af, Depth= 2.37"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.02 hrs
Type IA 24-hr 10 year Rainfall=4.90"

Area (ac)	CN	Description
* 0.000	0	, HSG B
* 0.000	0	, HSG C
0.599	61	Annual Grass, Good, HSG B
0.103	75	Annual Grass, Good, HSG C
3.118	81	Annual Grass, Good, HSG D
0.641	48	Brush, Good, HSG B
0.609	73	Brush, Good, HSG D
1.552	74	Farmsteads, HSG B
0.809	82	Farmsteads, HSG C
0.314	89	Paved roads w/open ditches, 50% imp, HSG B
0.132	92	Paved roads w/open ditches, 50% imp, HSG C
2.072	69	Vineyard, Fair, HSG B
9.731	79	Vineyard, Fair, HSG C
8.590	84	Vineyard, Fair, HSG D
10.292	75	Vineyard, Good, HSG C
0.886	81	Vineyard, Good, HSG D
6.310	55	Woods, Good, HSG B
1.127	70	Woods, Good, HSG C
3.011	77	Woods, Good, HSG D
0.369	58	Woods/grass comb., Good, HSG B
0.001	72	Woods/grass comb., Good, HSG C
50.268	75	Weighted Average
50.045		99.56% Pervious Area
0.223		0.44% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
9.4	63	0.2500	0.11		**Sheet Flow, Sheet**
					Woods: Dense underbrush n= 0.800 P2= 3.23"
6.8	1,002	0.2400	2.45		**Shallow Concentrated Flow, Shallow 1 - Woodlands**
					Woodland Kv= 5.0 fps
0.0	23	0.2200	11.06	8.69	**Pipe Channel, Culvert**
					12.0" Round Area= 0.8 sf Perim= 3.1' r= 0.25'
					n= 0.025
0.3	43	0.3000	2.74		**Shallow Concentrated Flow, Shallow 2 - Woodlands**
					Woodland Kv= 5.0 fps
1.4	566	0.0600	6.89	2.40	**Pipe Channel, Pipe 1**
					8.0" Round Area= 0.3 sf Perim= 2.1' r= 0.17'
					n= 0.016 PPI 8in CPP
1.3	363	0.0200	4.63	3.64	**Pipe Channel, Pipe 2**
					12.0" Round Area= 0.8 sf Perim= 3.1' r= 0.25'
					n= 0.018
19.2	2,060				Total

Pre-Project WS6
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Type IA 24-hr 10 year Rainfall=4.90"
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Subcatchment WS-6: Subcat WS-6

Hydrograph

Type IA 24-hr
10 year Rainfall=4.90"
Runoff Area=50.268 ac
Runoff Volume=9.921 af
Runoff Depth=2.37"
Flow Length=2,060'
Tc=19.2 min
CN=75

25.75 cfs

Runoff

Pre-Project WS6
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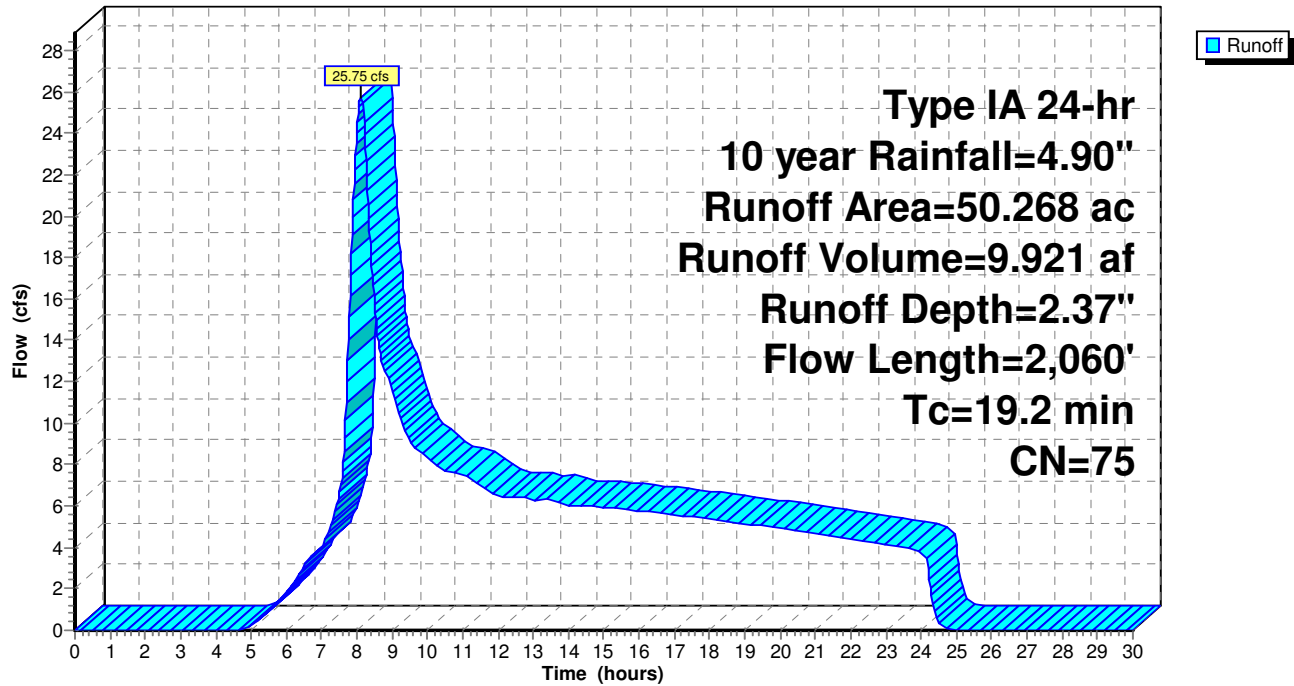HydroCAD® 10.00-24 s/n 09429 © 2018 HydroCAD Software Solutions LLC

Type IA 24-hr 50 year Rainfall=6.61"
Printed 9/2/2020
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Summary for Subcatchment WS-6: Subcat WS-6

Runoff   =   44.30 cfs @   8.10 hrs, Volume=   15.951 af, Depth= 3.81"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.02 hrs
Type IA 24-hr 50 year Rainfall=6.61"

	Area (ac)	CN	Description
*	0.000	0	, HSG B
*	0.000	0	, HSG C
	0.599	61	Annual Grass, Good, HSG B
	0.103	75	Annual Grass, Good, HSG C
	3.118	81	Annual Grass, Good, HSG D
	0.641	48	Brush, Good, HSG B
	0.609	73	Brush, Good, HSG D
	1.552	74	Farmsteads, HSG B
	0.809	82	Farmsteads, HSG C
	0.314	89	Paved roads w/open ditches, 50% imp, HSG B
	0.132	92	Paved roads w/open ditches, 50% imp, HSG C
	2.072	69	Vineyard, Fair, HSG B
	9.731	79	Vineyard, Fair, HSG C
	8.590	84	Vineyard, Fair, HSG D
	10.292	75	Vineyard, Good, HSG C
	0.886	81	Vineyard, Good, HSG D
	6.310	55	Woods, Good, HSG B
	1.127	70	Woods, Good, HSG C
	3.011	77	Woods, Good, HSG D
	0.369	58	Woods/grass comb., Good, HSG B
	0.001	72	Woods/grass comb., Good, HSG C
	50.268	75	Weighted Average
	50.045		99.56% Pervious Area
	0.223		0.44% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
9.4	63	0.2500	0.11		**Sheet Flow, Sheet**
					Woods: Dense underbrush n= 0.800 P2= 3.23"
6.8	1,002	0.2400	2.45		**Shallow Concentrated Flow, Shallow 1 - Woodlands**
					Woodland Kv= 5.0 fps
0.0	23	0.2200	11.06	8.69	**Pipe Channel, Culvert**
					12.0" Round Area= 0.8 sf Perim= 3.1' r= 0.25'
					n= 0.025
0.3	43	0.3000	2.74		**Shallow Concentrated Flow, Shallow 2 - Woodlands**
					Woodland Kv= 5.0 fps
1.4	566	0.0600	6.89	2.40	**Pipe Channel, Pipe 1**
					8.0" Round Area= 0.3 sf Perim= 2.1' r= 0.17'
					n= 0.016 PPI 8in CPP
1.3	363	0.0200	4.63	3.64	**Pipe Channel, Pipe 2**
					12.0" Round Area= 0.8 sf Perim= 3.1' r= 0.25'
					n= 0.018
19.2	2,060				Total

Pre-Project WS6
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Type IA 24-hr 50 year Rainfall=6.61"
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Subcatchment WS-6: Subcat WS-6

Hydrograph

Type IA 24-hr
50 year Rainfall=6.61"
Runoff Area=50.268 ac
Runoff Volume=15.951 af
Runoff Depth=3.81"
Flow Length=2,060'
Tc=19.2 min
CN=75

44.30 cfs

Runoff

Pre-Project WS6
Prepared by PPI Engineering, Revised Sept. 2020
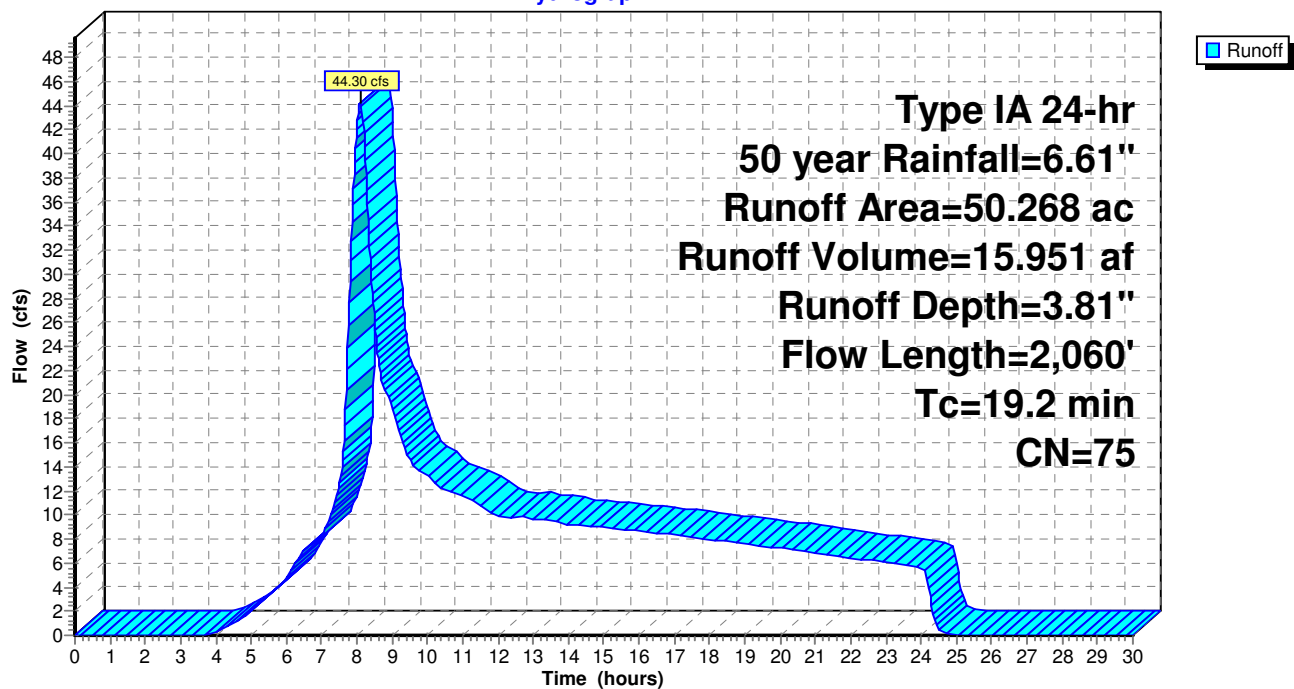HydroCAD® 10.00-24 s/n 09429 © 2018 HydroCAD Software Solutions LLC

Type IA 24-hr 100 year Rainfall=7.33"
Printed 9/2/2020
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Summary for Subcatchment WS-6: Subcat WS-6

Runoff   =   52.52 cfs @   8.10 hrs, Volume=   18.605 af, Depth= 4.44"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.02 hrs
Type IA 24-hr 100 year Rainfall=7.33"

	Area (ac)	CN	Description
*	0.000	0	, HSG B
*	0.000	0	, HSG C
	0.599	61	Annual Grass, Good, HSG B
	0.103	75	Annual Grass, Good, HSG C
	3.118	81	Annual Grass, Good, HSG D
	0.641	48	Brush, Good, HSG B
	0.609	73	Brush, Good, HSG D
	1.552	74	Farmsteads, HSG B
	0.809	82	Farmsteads, HSG C
	0.314	89	Paved roads w/open ditches, 50% imp, HSG B
	0.132	92	Paved roads w/open ditches, 50% imp, HSG C
	2.072	69	Vineyard, Fair, HSG B
	9.731	79	Vineyard, Fair, HSG C
	8.590	84	Vineyard, Fair, HSG D
	10.292	75	Vineyard, Good, HSG C
	0.886	81	Vineyard, Good, HSG D
	6.310	55	Woods, Good, HSG B
	1.127	70	Woods, Good, HSG C
	3.011	77	Woods, Good, HSG D
	0.369	58	Woods/grass comb., Good, HSG B
	0.001	72	Woods/grass comb., Good, HSG C
	50.268	75	Weighted Average
	50.045		99.56% Pervious Area
	0.223		0.44% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
9.4	63	0.2500	0.11		**Sheet Flow, Sheet**
					Woods: Dense underbrush n= 0.800 P2= 3.23"
6.8	1,002	0.2400	2.45		**Shallow Concentrated Flow, Shallow 1 - Woodlands**
					Woodland Kv= 5.0 fps
0.0	23	0.2200	11.06	8.69	**Pipe Channel, Culvert**
					12.0" Round Area= 0.8 sf Perim= 3.1' r= 0.25'
					n= 0.025
0.3	43	0.3000	2.74		**Shallow Concentrated Flow, Shallow 2 - Woodlands**
					Woodland Kv= 5.0 fps
1.4	566	0.0600	6.89	2.40	**Pipe Channel, Pipe 1**
					8.0" Round Area= 0.3 sf Perim= 2.1' r= 0.17'
					n= 0.016 PPI 8in CPP
1.3	363	0.0200	4.63	3.64	**Pipe Channel, Pipe 2**
					12.0" Round Area= 0.8 sf Perim= 3.1' r= 0.25'
					n= 0.018
19.2	2,060				Total

Pre-Project WS6
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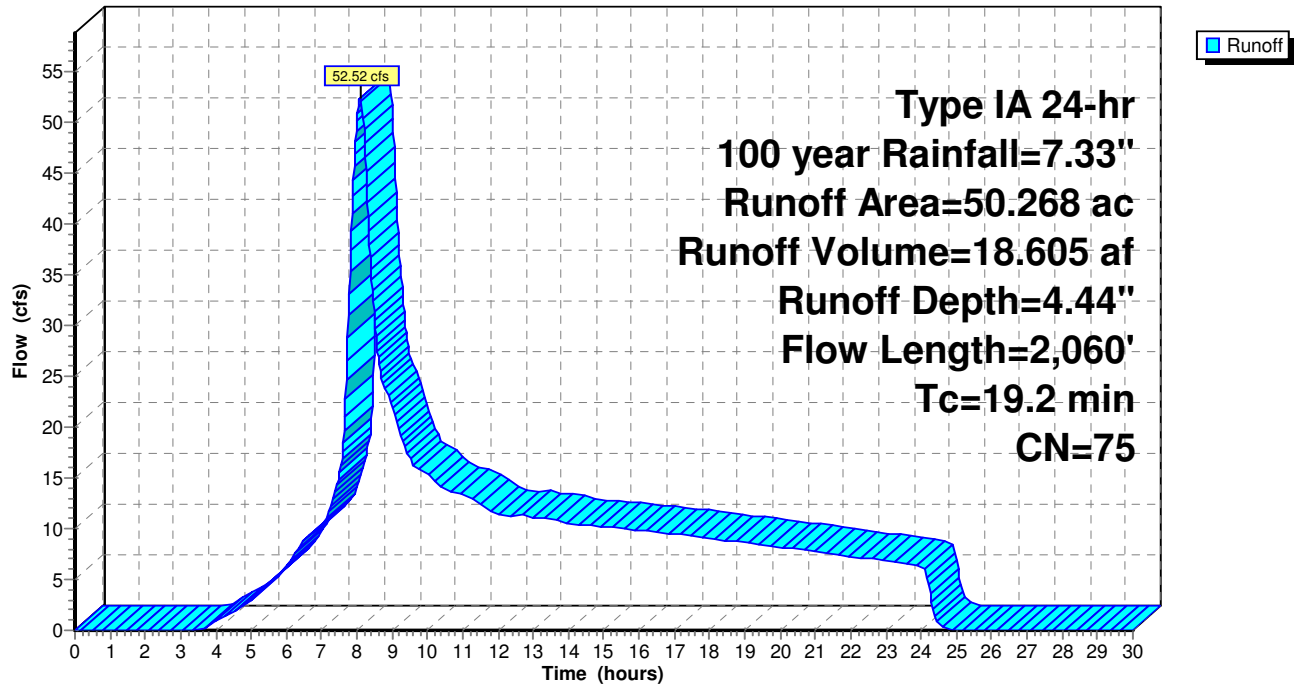*Type IA 24-hr 100 year Rainfall=7.33"*
Printed 9/2/2020
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Subcatchment WS-6: Subcat WS-6

Hydrograph

**Type IA 24-hr
100 year Rainfall=7.33"
Runoff Area=50.268 ac
Runoff Volume=18.605 af
Runoff Depth=4.44"
Flow Length=2,060'
Tc=19.2 min
CN=75**

52.52 cfs

Runoff

WS-6

Subcat WS-6

Post-Project WS6
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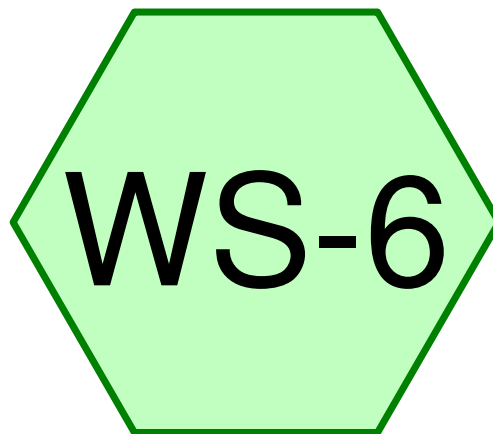
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Printed 9/2/2020
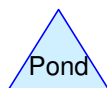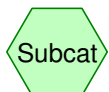Page 101

Summary for Subcatchment WS-6: Subcat WS-6

Runoff   =   10.02 cfs @   8.14 hrs, Volume=   4.668 af, Depth= 1.11"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.02 hrs
Type IA 24-hr 2 year Rainfall=3.23"

	Area (ac)	CN	Description
*	0.000	0	, HSG B
*	0.000	0	, HSG C
*	0.000	0	, HSG D
	0.599	61	Annual Grass, Good, HSG B
	0.103	75	Annual Grass, Good, HSG C
	1.603	81	Annual Grass, Good, HSG D
	0.641	48	Brush, Good, HSG B
	0.413	73	Brush, Good, HSG D
	1.552	74	Farmsteads, HSG B
	0.809	82	Farmsteads, HSG C
	0.314	89	Paved roads w/open ditches, 50% imp, HSG B
	0.132	92	Paved roads w/open ditches, 50% imp, HSG C
	2.072	69	Vineyard, Fair, HSG B
	9.731	79	Vineyard, Fair, HSG C
	8.518	84	Vineyard, Fair, HSG D
	10.292	75	Vineyard, Good, HSG C
	3.939	81	Vineyard, Good, HSG D
	6.310	55	Woods, Good, HSG B
	1.127	70	Woods, Good, HSG C
	1.742	77	Woods, Good, HSG D
	0.369	58	Woods/grass comb., Good, HSG B
	0.001	72	Woods/grass comb., Good, HSG C
	50.268	75	Weighted Average
	50.045		99.56% Pervious Area
	0.223		0.44% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
9.4	63	0.2500	0.11		**Sheet Flow, Sheet**
					Woods: Dense underbrush n= 0.800 P2= 3.23"
6.8	1,002	0.2400	2.45		**Shallow Concentrated Flow, Shallow 1 - Woodlands**
					Woodland Kv= 5.0 fps
0.0	23	0.2200	11.06	8.69	**Pipe Channel, Culvert**
					12.0" Round Area= 0.8 sf Perim= 3.1' r= 0.25'
					n= 0.025
0.3	43	0.3000	2.74		**Shallow Concentrated Flow, Shallow 2 - Woodlands**
					Woodland Kv= 5.0 fps
1.4	566	0.0600	6.89	2.40	**Pipe Channel, Pipe 1**
					8.0" Round Area= 0.3 sf Perim= 2.1' r= 0.17'
					n= 0.016 PPI 8in CPP
1.3	363	0.0200	4.63	3.64	**Pipe Channel, Pipe 2**
					12.0" Round Area= 0.8 sf Perim= 3.1' r= 0.25'
					n= 0.018

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Type IA 24-hr 2 year Rainfall=3.23"
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19.2   2,060   Total

Subcatchment WS-6: Subcat WS-6

Hydrograph

Type IA 24-hr
2 year Rainfall=3.23"
Runoff Area=50.268 ac
Runoff Volume=4.668 af
Runoff Depth=1.11"
Flow Length=2,060'
Tc=19.2 min
CN=75

Post-Project WS6
Prepared by PPI Engineering, Revised Sept. 2020
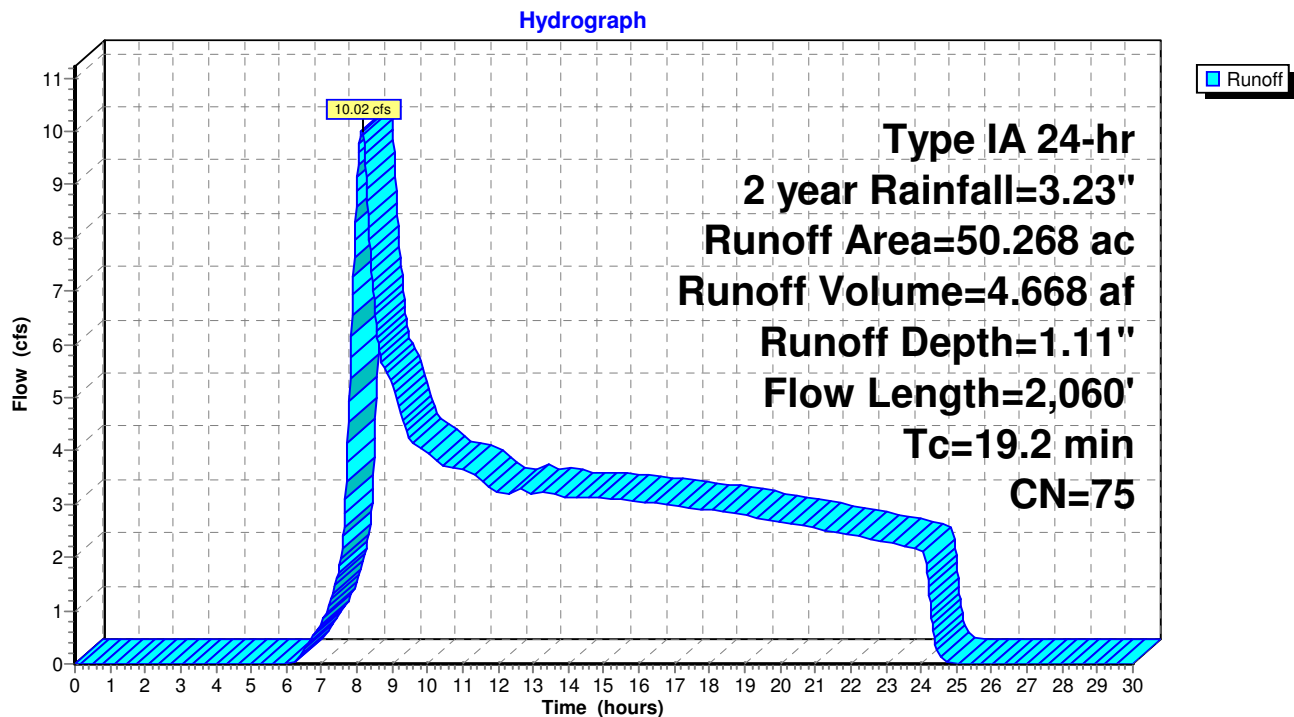HydroCAD® 10.00-24 s/n 09429 © 2018 HydroCAD Software Solutions LLC

Type IA 24-hr 10 year Rainfall=4.90"
Printed 9/2/2020
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Summary for Subcatchment WS-6: Subcat WS-6

Runoff   =   25.75 cfs @   8.11 hrs, Volume=   9.921 af, Depth= 2.37"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.02 hrs
Type IA 24-hr 10 year Rainfall=4.90"

Area (ac)	CN	Description
* 0.000	0	, HSG B
* 0.000	0	, HSG C
* 0.000	0	, HSG D
0.599	61	Annual Grass, Good, HSG B
0.103	75	Annual Grass, Good, HSG C
1.603	81	Annual Grass, Good, HSG D
0.641	48	Brush, Good, HSG B
0.413	73	Brush, Good, HSG D
1.552	74	Farmsteads, HSG B
0.809	82	Farmsteads, HSG C
0.314	89	Paved roads w/open ditches, 50% imp, HSG B
0.132	92	Paved roads w/open ditches, 50% imp, HSG C
2.072	69	Vineyard, Fair, HSG B
9.731	79	Vineyard, Fair, HSG C
8.518	84	Vineyard, Fair, HSG D
10.292	75	Vineyard, Good, HSG C
3.939	81	Vineyard, Good, HSG D
6.310	55	Woods, Good, HSG B
1.127	70	Woods, Good, HSG C
1.742	77	Woods, Good, HSG D
0.369	58	Woods/grass comb., Good, HSG B
0.001	72	Woods/grass comb., Good, HSG C
50.268	75	Weighted Average
50.045		99.56% Pervious Area
0.223		0.44% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
9.4	63	0.2500	0.11		**Sheet Flow, Sheet**
					Woods: Dense underbrush n= 0.800 P2= 3.23"
6.8	1,002	0.2400	2.45		**Shallow Concentrated Flow, Shallow 1 - Woodlands**
					Woodland Kv= 5.0 fps
0.0	23	0.2200	11.06	8.69	**Pipe Channel, Culvert**
					12.0" Round Area= 0.8 sf Perim= 3.1' r= 0.25'
					n= 0.025
0.3	43	0.3000	2.74		**Shallow Concentrated Flow, Shallow 2 - Woodlands**
					Woodland Kv= 5.0 fps
1.4	566	0.0600	6.89	2.40	**Pipe Channel, Pipe 1**
					8.0" Round Area= 0.3 sf Perim= 2.1' r= 0.17'
					n= 0.016 PPI 8in CPP
1.3	363	0.0200	4.63	3.64	**Pipe Channel, Pipe 2**
					12.0" Round Area= 0.8 sf Perim= 3.1' r= 0.25'
					n= 0.018

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Type IA 24-hr 10 year Rainfall=4.90"
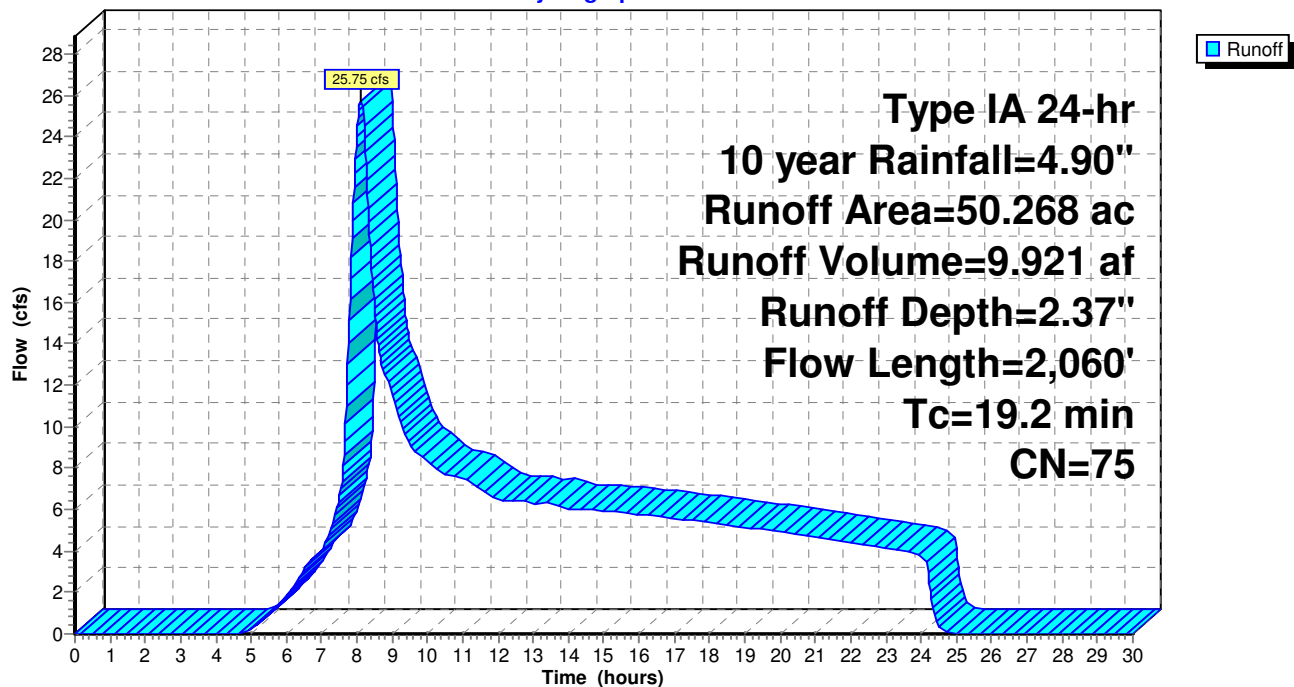Printed 9/2/2020
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19.2   2,060   Total

Subcatchment WS-6: Subcat WS-6

Hydrograph

Type IA 24-hr
10 year Rainfall=4.90"
Runoff Area=50.268 ac
Runoff Volume=9.921 af
Runoff Depth=2.37"
Flow Length=2,060'
Tc=19.2 min
CN=75

Summary for Subcatchment WS-6: Subcat WS-6

Runoff   =   44.30 cfs @   8.10 hrs, Volume=   15.951 af, Depth= 3.81"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.02 hrs
Type IA 24-hr 50 year Rainfall=6.61"

	Area (ac)	CN	Description
*	0.000	0	, HSG B
*	0.000	0	, HSG C
*	0.000	0	, HSG D
	0.599	61	Annual Grass, Good, HSG B
	0.103	75	Annual Grass, Good, HSG C
	1.603	81	Annual Grass, Good, HSG D
	0.641	48	Brush, Good, HSG B
	0.413	73	Brush, Good, HSG D
	1.552	74	Farmsteads, HSG B
	0.809	82	Farmsteads, HSG C
	0.314	89	Paved roads w/open ditches, 50% imp, HSG B
	0.132	92	Paved roads w/open ditches, 50% imp, HSG C
	2.072	69	Vineyard, Fair, HSG B
	9.731	79	Vineyard, Fair, HSG C
	8.518	84	Vineyard, Fair, HSG D
	10.292	75	Vineyard, Good, HSG C
	3.939	81	Vineyard, Good, HSG D
	6.310	55	Woods, Good, HSG B
	1.127	70	Woods, Good, HSG C
	1.742	77	Woods, Good, HSG D
	0.369	58	Woods/grass comb., Good, HSG B
	0.001	72	Woods/grass comb., Good, HSG C
	50.268	75	Weighted Average
	50.045		99.56% Pervious Area
	0.223		0.44% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
9.4	63	0.2500	0.11		**Sheet Flow, Sheet**
					Woods: Dense underbrush n= 0.800 P2= 3.23"
6.8	1,002	0.2400	2.45		**Shallow Concentrated Flow, Shallow 1 - Woodlands**
					Woodland Kv= 5.0 fps
0.0	23	0.2200	11.06	8.69	**Pipe Channel, Culvert**
					12.0" Round Area= 0.8 sf Perim= 3.1' r= 0.25'
					n= 0.025
0.3	43	0.3000	2.74		**Shallow Concentrated Flow, Shallow 2 - Woodlands**
					Woodland Kv= 5.0 fps
1.4	566	0.0600	6.89	2.40	**Pipe Channel, Pipe 1**
					8.0" Round Area= 0.3 sf Perim= 2.1' r= 0.17'
					n= 0.016 PPI 8in CPP
1.3	363	0.0200	4.63	3.64	**Pipe Channel, Pipe 2**
					12.0" Round Area= 0.8 sf Perim= 3.1' r= 0.25'
					n= 0.018

Post-Project WS6
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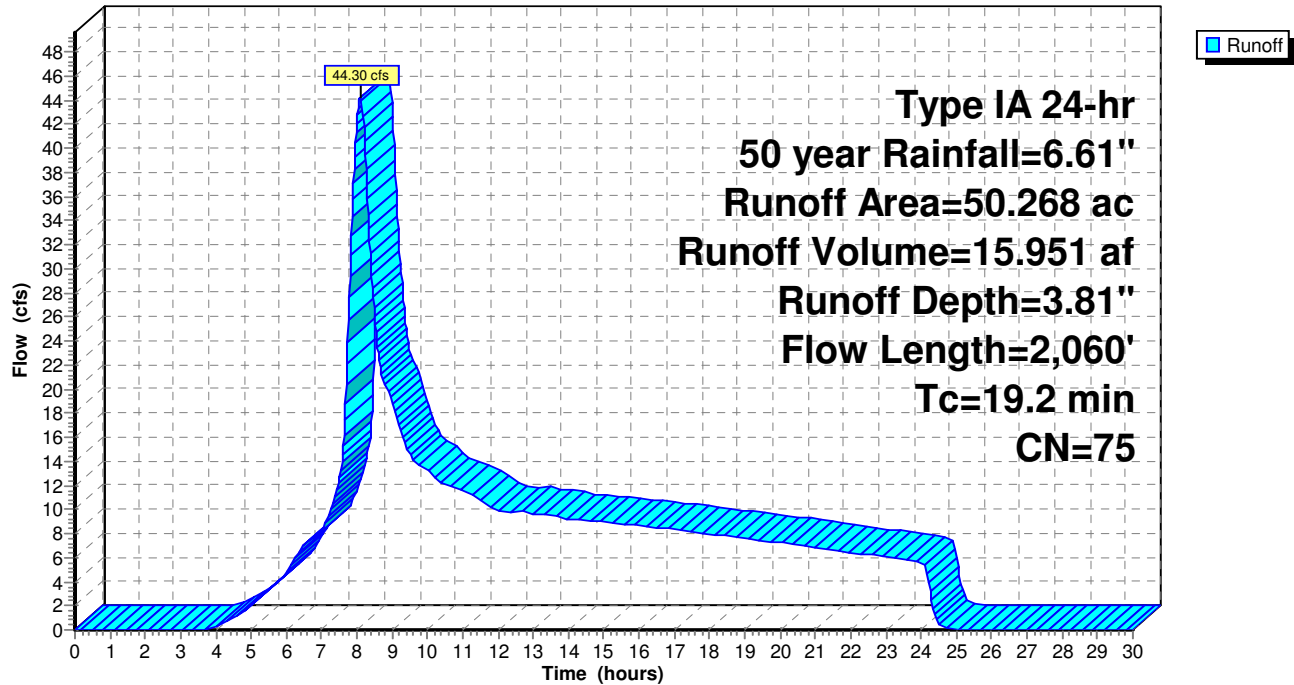*Type IA 24-hr 50 year Rainfall=6.61"*
Printed 9/2/2020
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19.2   2,060   Total

Subcatchment WS-6: Subcat WS-6

Hydrograph

Type IA 24-hr
50 year Rainfall=6.61"
Runoff Area=50.268 ac
Runoff Volume=15.951 af
Runoff Depth=3.81"
Flow Length=2,060'
Tc=19.2 min
CN=75

44.30 cfs

Runoff

Summary for Subcatchment WS-6: Subcat WS-6

Runoff   =   52.52 cfs @   8.10 hrs, Volume=   18.605 af, Depth= 4.44"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.02 hrs
Type IA 24-hr 100 year Rainfall=7.33"

	Area (ac)	CN	Description
*	0.000	0	, HSG B
*	0.000	0	, HSG C
*	0.000	0	, HSG D
	0.599	61	Annual Grass, Good, HSG B
	0.103	75	Annual Grass, Good, HSG C
	1.603	81	Annual Grass, Good, HSG D
	0.641	48	Brush, Good, HSG B
	0.413	73	Brush, Good, HSG D
	1.552	74	Farmsteads, HSG B
	0.809	82	Farmsteads, HSG C
	0.314	89	Paved roads w/open ditches, 50% imp, HSG B
	0.132	92	Paved roads w/open ditches, 50% imp, HSG C
	2.072	69	Vineyard, Fair, HSG B
	9.731	79	Vineyard, Fair, HSG C
	8.518	84	Vineyard, Fair, HSG D
	10.292	75	Vineyard, Good, HSG C
	3.939	81	Vineyard, Good, HSG D
	6.310	55	Woods, Good, HSG B
	1.127	70	Woods, Good, HSG C
	1.742	77	Woods, Good, HSG D
	0.369	58	Woods/grass comb., Good, HSG B
	0.001	72	Woods/grass comb., Good, HSG C
	50.268	75	Weighted Average
	50.045		99.56% Pervious Area
	0.223		0.44% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
9.4	63	0.2500	0.11		**Sheet Flow, Sheet**
					Woods: Dense underbrush n= 0.800 P2= 3.23"
6.8	1,002	0.2400	2.45		**Shallow Concentrated Flow, Shallow 1 - Woodlands**
					Woodland Kv= 5.0 fps
0.0	23	0.2200	11.06	8.69	**Pipe Channel, Culvert**
					12.0" Round Area= 0.8 sf Perim= 3.1' r= 0.25'
					n= 0.025
0.3	43	0.3000	2.74		**Shallow Concentrated Flow, Shallow 2 - Woodlands**
					Woodland Kv= 5.0 fps
1.4	566	0.0600	6.89	2.40	**Pipe Channel, Pipe 1**
					8.0" Round Area= 0.3 sf Perim= 2.1' r= 0.17'
					n= 0.016 PPI 8in CPP
1.3	363	0.0200	4.63	3.64	**Pipe Channel, Pipe 2**
					12.0" Round Area= 0.8 sf Perim= 3.1' r= 0.25'
					n= 0.018

Post-Project WS6
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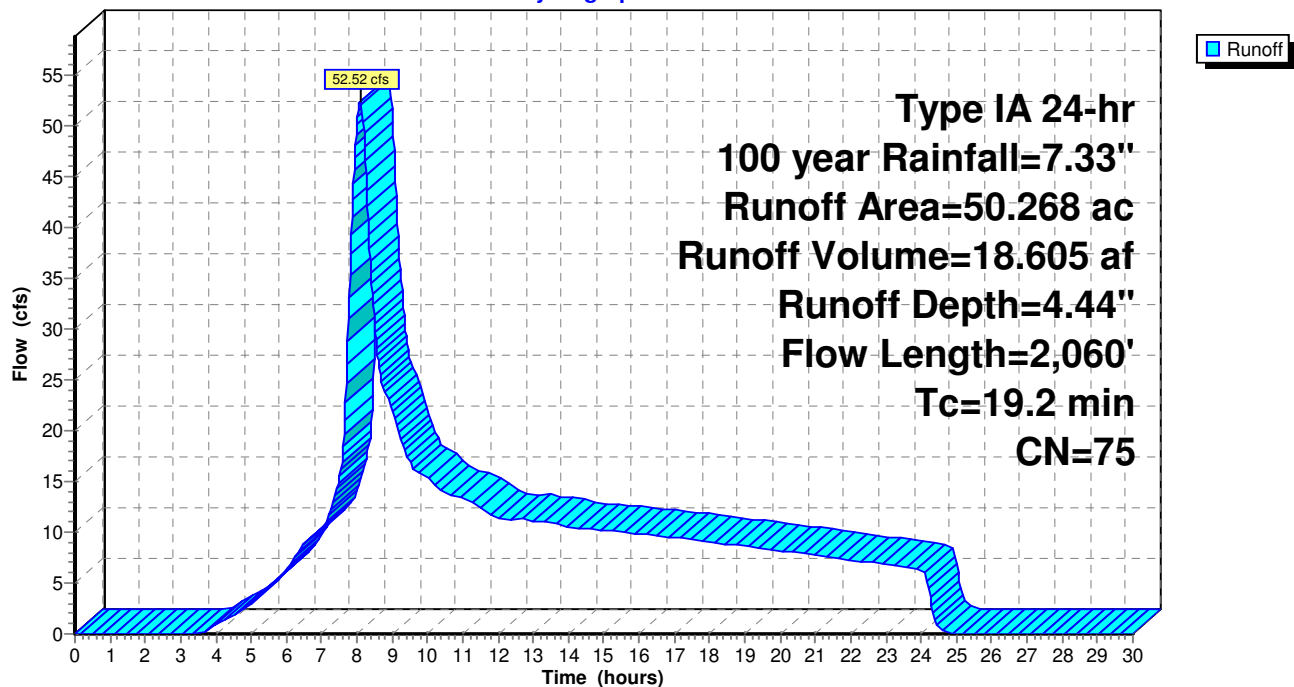*Type IA 24-hr 100 year Rainfall=7.33"*
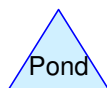Printed 9/2/2020
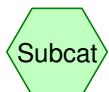Page 108

19.2   2,060   Total

Subcatchment WS-6: Subcat WS-6

Hydrograph

Type IA 24-hr
100 year Rainfall=7.33"
Runoff Area=50.268 ac
Runoff Volume=18.605 af
Runoff Depth=4.44"
Flow Length=2,060'
Tc=19.2 min
CN=75

WS-7

Subcat WS-7

Summary for Subcatchment WS-7: Subcat WS-7

Runoff   =   3.52 cfs @   8.10 hrs, Volume=   1.368 af, Depth= 1.49"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.02 hrs
Type IA 24-hr 2 year Rainfall=3.23"

Area (ac)	CN	Description
* 0.000	0	, HSG D
1.542	81	Annual Grass, Good, HSG D
0.193	73	Brush, Good, HSG D
0.308	94	Fallow, bare soil, HSG D
1.894	86	Farmsteads, HSG D
0.488	93	Paved roads w/open ditches, 50% imp, HSG D
0.878	84	Vineyard, Fair, HSG D
5.254	77	Woods, Good, HSG D
0.439	79	Woods/grass comb., Good, HSG D
10.997	81	Weighted Average
10.753		97.78% Pervious Area
0.244		2.22% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
9.4	52	0.1700	0.09		**Sheet Flow, Sheet**
					Woods: Dense underbrush n= 0.800 P2= 3.23"
5.1	786	0.2600	2.55		**Shallow Concentrated Flow, Shallow 1 - Woodlands**
					Woodland Kv= 5.0 fps
0.5	213	0.1100	6.73		**Shallow Concentrated Flow, Shallow 2 - Paved**
					Paved Kv= 20.3 fps
2.3	193	0.0400	1.40		**Shallow Concentrated Flow, Shallow 3 - Short Grass**
					Short Grass Pasture Kv= 7.0 fps
0.7	143	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
18.0	1,387	Total			

Pre-Project WS7
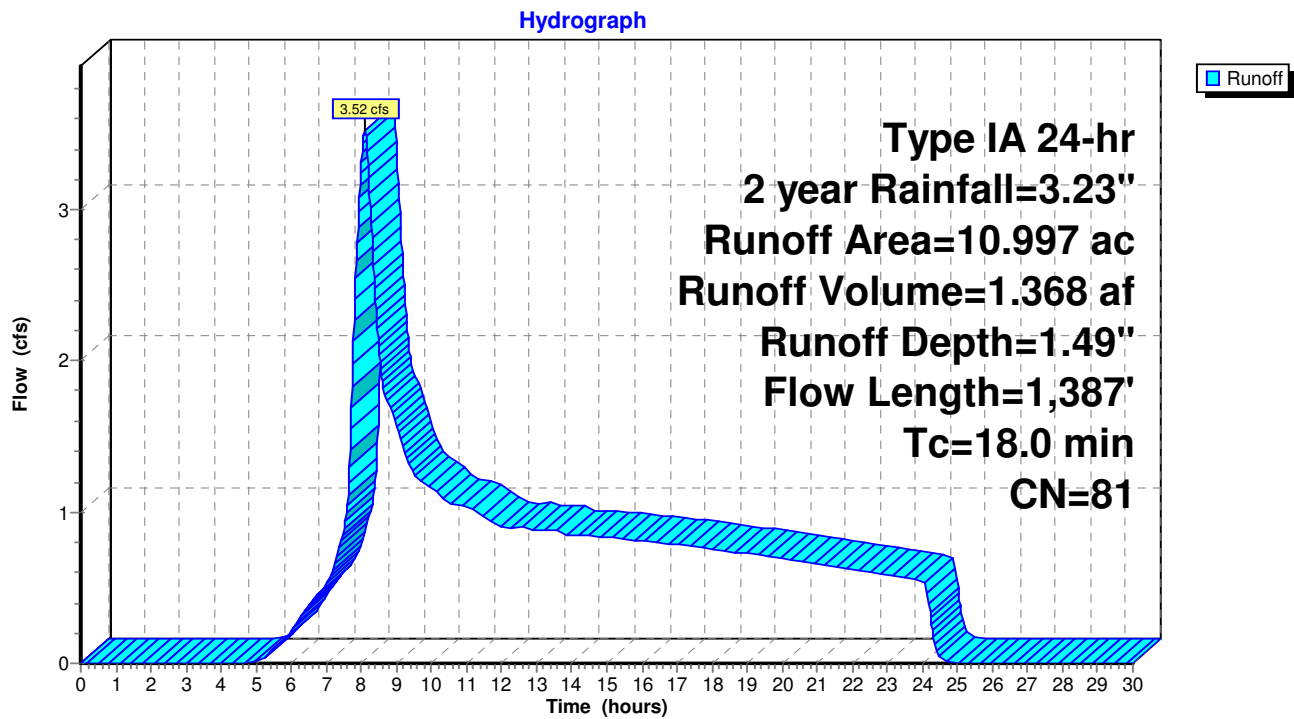Prepared by PPI Engineering, Revised Sept. 2020
HydroCAD® 10.00-24 s/n 09429 © 2018 HydroCAD Software Solutions LLC

Type IA 24-hr 2 year Rainfall=3.23"
Printed 9/2/2020
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Subcatchment WS-7: Subcat WS-7

Hydrograph

**Type IA 24-hr
2 year Rainfall=3.23"
Runoff Area=10.997 ac
Runoff Volume=1.368 af
Runoff Depth=1.49"
Flow Length=1,387'
Tc=18.0 min
CN=81**

Pre-Project WS7
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Type IA 24-hr 10 year Rainfall=4.90"
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Summary for Subcatchment WS-7: Subcat WS-7

Runoff   =   7.52 cfs @   8.09 hrs, Volume=   2.655 af, Depth= 2.90"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.02 hrs
Type IA 24-hr 10 year Rainfall=4.90"

Area (ac)	CN	Description
* 0.000	0	, HSG D
1.542	81	Annual Grass, Good, HSG D
0.193	73	Brush, Good, HSG D
0.308	94	Fallow, bare soil, HSG D
1.894	86	Farmsteads, HSG D
0.488	93	Paved roads w/open ditches, 50% imp, HSG D
0.878	84	Vineyard, Fair, HSG D
5.254	77	Woods, Good, HSG D
0.439	79	Woods/grass comb., Good, HSG D
10.997	81	Weighted Average
10.753		97.78% Pervious Area
0.244		2.22% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
9.4	52	0.1700	0.09		**Sheet Flow, Sheet**
					Woods: Dense underbrush n= 0.800 P2= 3.23"
5.1	786	0.2600	2.55		**Shallow Concentrated Flow, Shallow 1 - Woodlands**
					Woodland Kv= 5.0 fps
0.5	213	0.1100	6.73		**Shallow Concentrated Flow, Shallow 2 - Paved**
					Paved Kv= 20.3 fps
2.3	193	0.0400	1.40		**Shallow Concentrated Flow, Shallow 3 - Short Grass**
					Short Grass Pasture Kv= 7.0 fps
0.7	143	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
18.0	1,387				Total

Pre-Project WS7
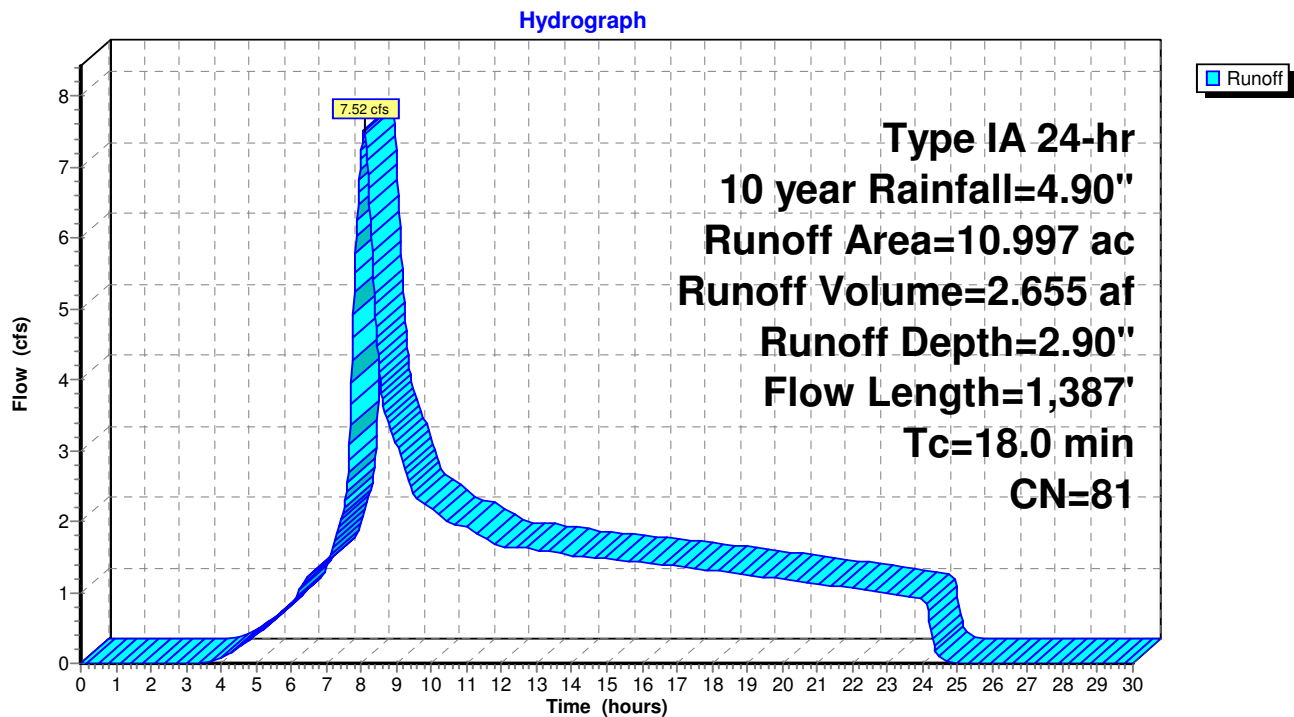Prepared by PPI Engineering, Revised Sept. 2020
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Type IA 24-hr 10 year Rainfall=4.90"
Printed 9/2/2020
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Subcatchment WS-7: Subcat WS-7

Hydrograph

■ Runoff

7.52 cfs

**Type IA 24-hr
10 year Rainfall=4.90"
Runoff Area=10.997 ac
Runoff Volume=2.655 af
Runoff Depth=2.90"
Flow Length=1,387'
Tc=18.0 min
CN=81**

Flow (cfs)

Time (hours)

Summary for Subcatchment WS-7: Subcat WS-7

Runoff   =   11.94 cfs @   8.08 hrs, Volume=   4.072 af, Depth= 4.44"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.02 hrs
Type IA 24-hr 50 year Rainfall=6.61"

Area (ac)	CN	Description
* 0.000	0	, HSG D
1.542	81	Annual Grass, Good, HSG D
0.193	73	Brush, Good, HSG D
0.308	94	Fallow, bare soil, HSG D
1.894	86	Farmsteads, HSG D
0.488	93	Paved roads w/open ditches, 50% imp, HSG D
0.878	84	Vineyard, Fair, HSG D
5.254	77	Woods, Good, HSG D
0.439	79	Woods/grass comb., Good, HSG D
10.997	81	Weighted Average
10.753		97.78% Pervious Area
0.244		2.22% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
9.4	52	0.1700	0.09		**Sheet Flow, Sheet**
					Woods: Dense underbrush n= 0.800 P2= 3.23"
5.1	786	0.2600	2.55		**Shallow Concentrated Flow, Shallow 1 - Woodlands**
					Woodland Kv= 5.0 fps
0.5	213	0.1100	6.73		**Shallow Concentrated Flow, Shallow 2 - Paved**
					Paved Kv= 20.3 fps
2.3	193	0.0400	1.40		**Shallow Concentrated Flow, Shallow 3 - Short Grass**
					Short Grass Pasture Kv= 7.0 fps
0.7	143	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
18.0	1,387				Total

Pre-Project WS7
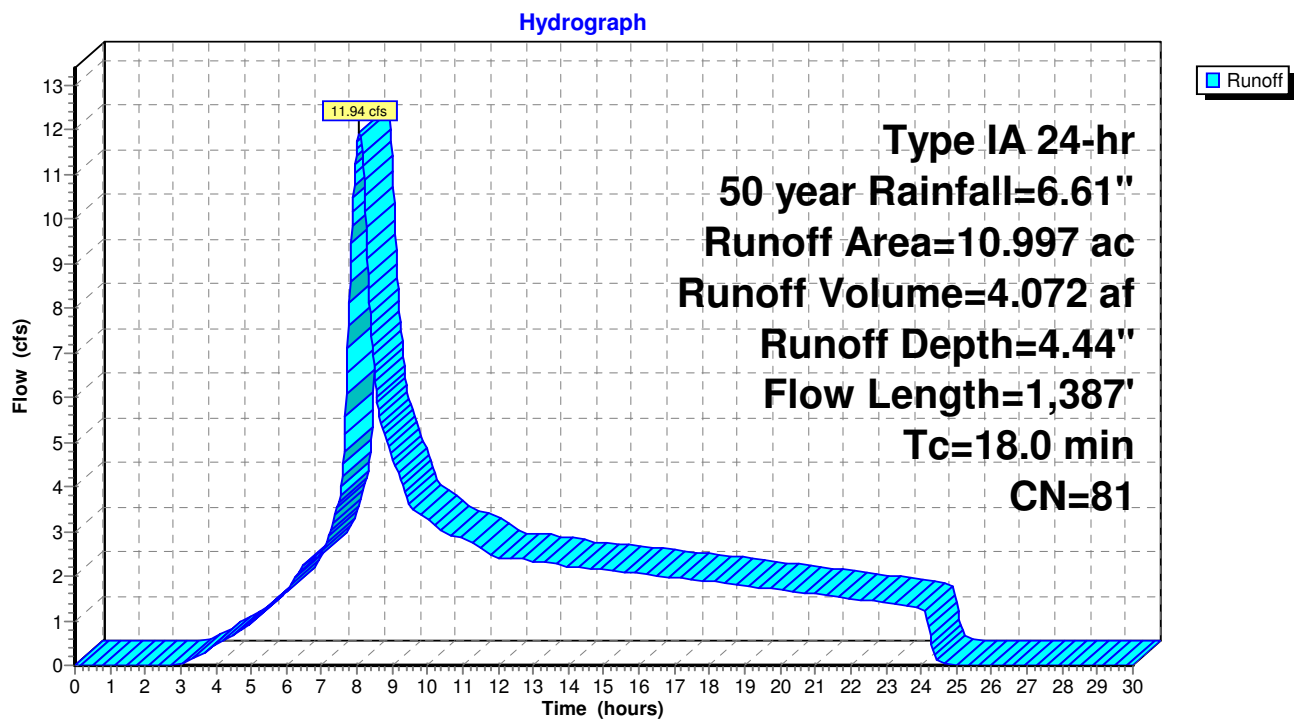Prepared by PPI Engineering, Revised Sept. 2020
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Type IA 24-hr 50 year Rainfall=6.61"
Printed 9/2/2020
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Subcatchment WS-7: Subcat WS-7

Hydrograph

**Type IA 24-hr
50 year Rainfall=6.61"
Runoff Area=10.997 ac
Runoff Volume=4.072 af
Runoff Depth=4.44"
Flow Length=1,387'
Tc=18.0 min
CN=81**

□ Runoff

11.94 cfs

Pre-Project WS7
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Type IA 24-hr 100 year Rainfall=7.33"
Printed 9/2/2020
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Summary for Subcatchment WS-7: Subcat WS-7

Runoff   =   13.84 cfs @   8.08 hrs, Volume=   4.685 af, Depth= 5.11"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.02 hrs
Type IA 24-hr 100 year Rainfall=7.33"

Area (ac)	CN	Description
* 0.000	0	, HSG D
1.542	81	Annual Grass, Good, HSG D
0.193	73	Brush, Good, HSG D
0.308	94	Fallow, bare soil, HSG D
1.894	86	Farmsteads, HSG D
0.488	93	Paved roads w/open ditches, 50% imp, HSG D
0.878	84	Vineyard, Fair, HSG D
5.254	77	Woods, Good, HSG D
0.439	79	Woods/grass comb., Good, HSG D
10.997	81	Weighted Average
10.753		97.78% Pervious Area
0.244		2.22% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
9.4	52	0.1700	0.09		**Sheet Flow, Sheet**
					Woods: Dense underbrush n= 0.800 P2= 3.23"
5.1	786	0.2600	2.55		**Shallow Concentrated Flow, Shallow 1 - Woodlands**
					Woodland Kv= 5.0 fps
0.5	213	0.1100	6.73		**Shallow Concentrated Flow, Shallow 2 - Paved**
					Paved Kv= 20.3 fps
2.3	193	0.0400	1.40		**Shallow Concentrated Flow, Shallow 3 - Short Grass**
					Short Grass Pasture Kv= 7.0 fps
0.7	143	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
18.0	1,387				Total

Pre-Project WS7
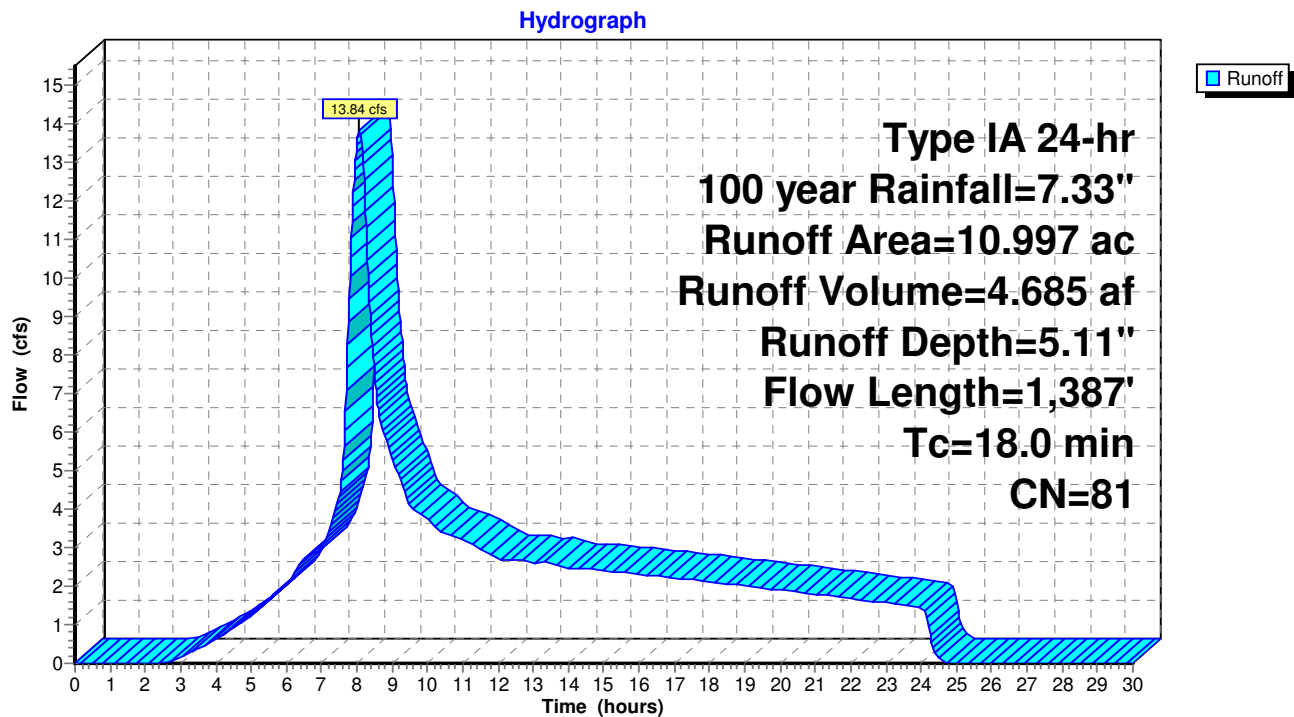Prepared by PPI Engineering, Revised Sept. 2020
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Type IA 24-hr 100 year Rainfall=7.33"
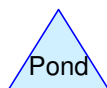Printed 9/2/2020
Page 117

Subcatchment WS-7: Subcat WS-7

Hydrograph

Type IA 24-hr
100 year Rainfall=7.33"
Runoff Area=10.997 ac
Runoff Volume=4.685 af
Runoff Depth=5.11"
Flow Length=1,387'
Tc=18.0 min
CN=81

□ Runoff

13.84 cfs

WS-7

Subcat WS-7

Subcat   Reach   Pond   Link

Summary for Subcatchment WS-7: Subcat WS-7

Runoff   =   3.52 cfs @   8.10 hrs, Volume=   1.368 af, Depth= 1.49"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.02 hrs
Type IA 24-hr 2 year Rainfall=3.23"

Area (ac)	CN	Description
* 0.000	0	, HSG D
1.539	81	Annual Grass, Good, HSG D
0.193	73	Brush, Good, HSG D
0.151	94	Fallow, bare soil, HSG D
1.766	86	Farmsteads, HSG D
0.488	93	Paved roads w/open ditches, 50% imp, HSG D
0.878	84	Vineyard, Fair, HSG D
0.432	81	Vineyard, Good, HSG D
5.111	77	Woods, Good, HSG D
0.439	79	Woods/grass comb., Good, HSG D
10.997	81	Weighted Average
10.753		97.78% Pervious Area
0.244		2.22% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
9.4	52	0.1700	0.09		**Sheet Flow, Sheet**
					Woods: Dense underbrush n= 0.800 P2= 3.23"
5.1	786	0.2600	2.55		**Shallow Concentrated Flow, Shallow 1 - Woodlands**
					Woodland Kv= 5.0 fps
0.5	213	0.1100	6.73		**Shallow Concentrated Flow, Shallow 2 - Paved**
					Paved Kv= 20.3 fps
2.3	193	0.0400	1.40		**Shallow Concentrated Flow, Shallow 3 - Short Grass**
					Short Grass Pasture Kv= 7.0 fps
0.7	143	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
18.0	1,387				Total

Post-Project WS7
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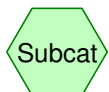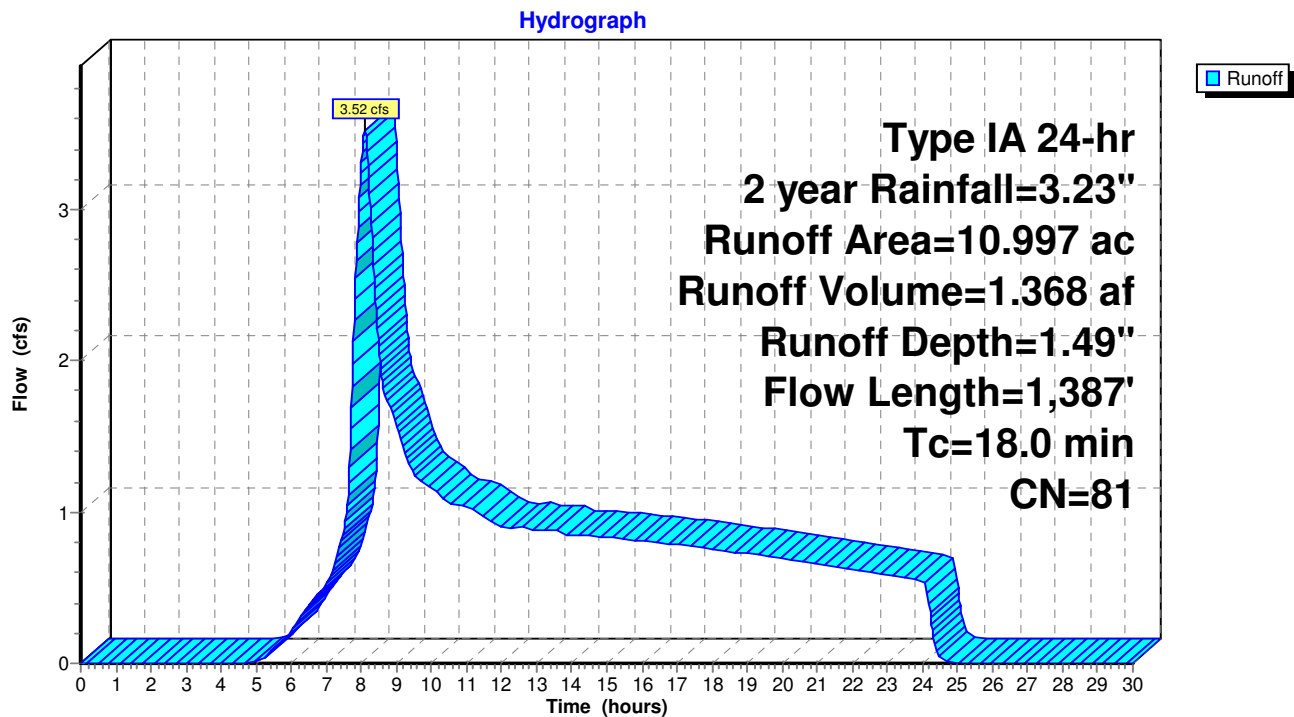*Type IA 24-hr 2 year Rainfall=3.23"*
Printed 9/2/2020
Page 120

Subcatchment WS-7: Subcat WS-7

Hydrograph

Type IA 24-hr
2 year Rainfall=3.23"
Runoff Area=10.997 ac
Runoff Volume=1.368 af
Runoff Depth=1.49"
Flow Length=1,387'
Tc=18.0 min
CN=81

□ Runoff

3.52 cfs

Summary for Subcatchment WS-7: Subcat WS-7

Runoff   =   7.52 cfs @   8.09 hrs, Volume=   2.655 af, Depth= 2.90"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.02 hrs
Type IA 24-hr 10 year Rainfall=4.90"

Area (ac)	CN	Description
* 0.000	0	, HSG D
1.539	81	Annual Grass, Good, HSG D
0.193	73	Brush, Good, HSG D
0.151	94	Fallow, bare soil, HSG D
1.766	86	Farmsteads, HSG D
0.488	93	Paved roads w/open ditches, 50% imp, HSG D
0.878	84	Vineyard, Fair, HSG D
0.432	81	Vineyard, Good, HSG D
5.111	77	Woods, Good, HSG D
0.439	79	Woods/grass comb., Good, HSG D
10.997	81	Weighted Average
10.753		97.78% Pervious Area
0.244		2.22% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
9.4	52	0.1700	0.09		**Sheet Flow, Sheet**
					Woods: Dense underbrush n= 0.800 P2= 3.23"
5.1	786	0.2600	2.55		**Shallow Concentrated Flow, Shallow 1 - Woodlands**
					Woodland Kv= 5.0 fps
0.5	213	0.1100	6.73		**Shallow Concentrated Flow, Shallow 2 - Paved**
					Paved Kv= 20.3 fps
2.3	193	0.0400	1.40		**Shallow Concentrated Flow, Shallow 3 - Short Grass**
					Short Grass Pasture Kv= 7.0 fps
0.7	143	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
18.0	1,387				Total

Post-Project WS7
Type IA 24-hr 10 year Rainfall=4.90"
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Subcatchment WS-7: Subcat WS-7

Hydrograph

**Type IA 24-hr
10 year Rainfall=4.90"
Runoff Area=10.997 ac
Runoff Volume=2.655 af
Runoff Depth=2.90"
Flow Length=1,387'
Tc=18.0 min
CN=81**

7.52 cfs

Runoff

Post-Project WS7
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Type IA 24-hr 50 year Rainfall=6.61"
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Summary for Subcatchment WS-7: Subcat WS-7

Runoff   =   11.94 cfs @   8.08 hrs, Volume=   4.072 af, Depth= 4.44"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.02 hrs
Type IA 24-hr 50 year Rainfall=6.61"

Area (ac)	CN	Description
* 0.000	0	, HSG D
1.539	81	Annual Grass, Good, HSG D
0.193	73	Brush, Good, HSG D
0.151	94	Fallow, bare soil, HSG D
1.766	86	Farmsteads, HSG D
0.488	93	Paved roads w/open ditches, 50% imp, HSG D
0.878	84	Vineyard, Fair, HSG D
0.432	81	Vineyard, Good, HSG D
5.111	77	Woods, Good, HSG D
0.439	79	Woods/grass comb., Good, HSG D
10.997	81	Weighted Average
10.753		97.78% Pervious Area
0.244		2.22% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
9.4	52	0.1700	0.09		**Sheet Flow, Sheet**
					Woods: Dense underbrush n= 0.800 P2= 3.23"
5.1	786	0.2600	2.55		**Shallow Concentrated Flow, Shallow 1 - Woodlands**
					Woodland Kv= 5.0 fps
0.5	213	0.1100	6.73		**Shallow Concentrated Flow, Shallow 2 - Paved**
					Paved Kv= 20.3 fps
2.3	193	0.0400	1.40		**Shallow Concentrated Flow, Shallow 3 - Short Grass**
					Short Grass Pasture Kv= 7.0 fps
0.7	143	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
18.0	1,387	Total			

Post-Project WS7
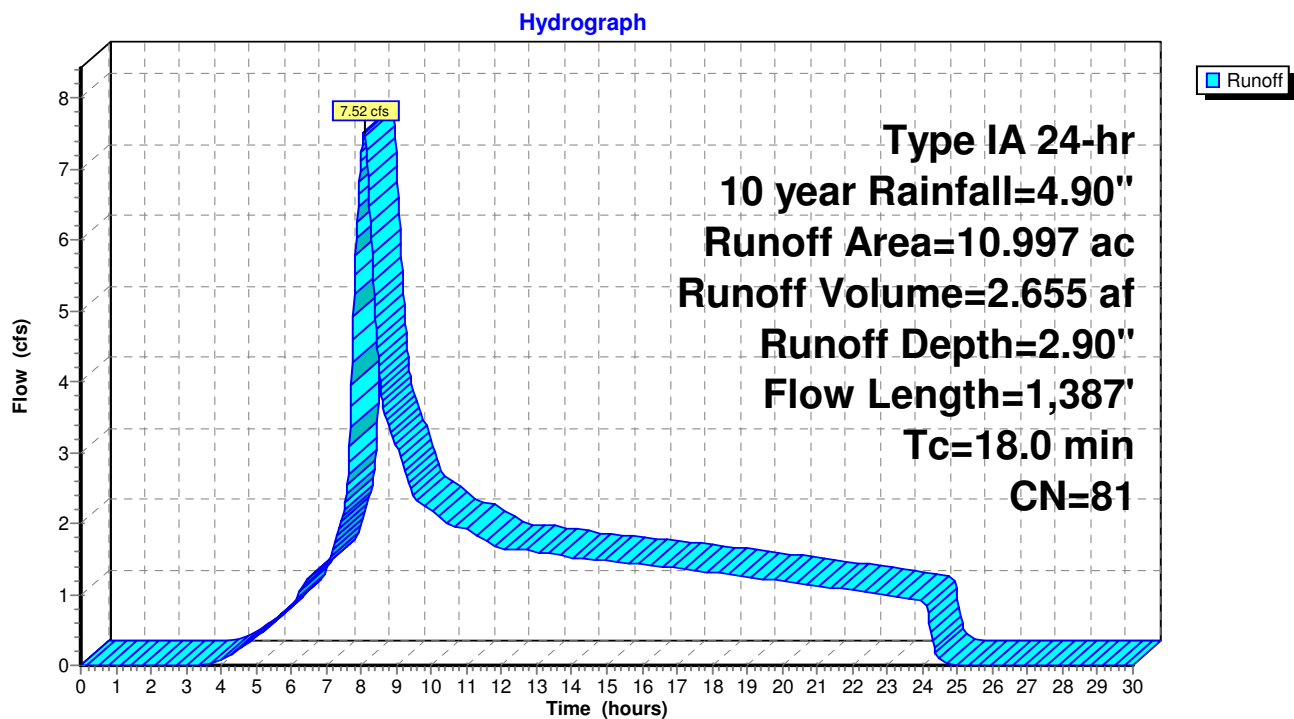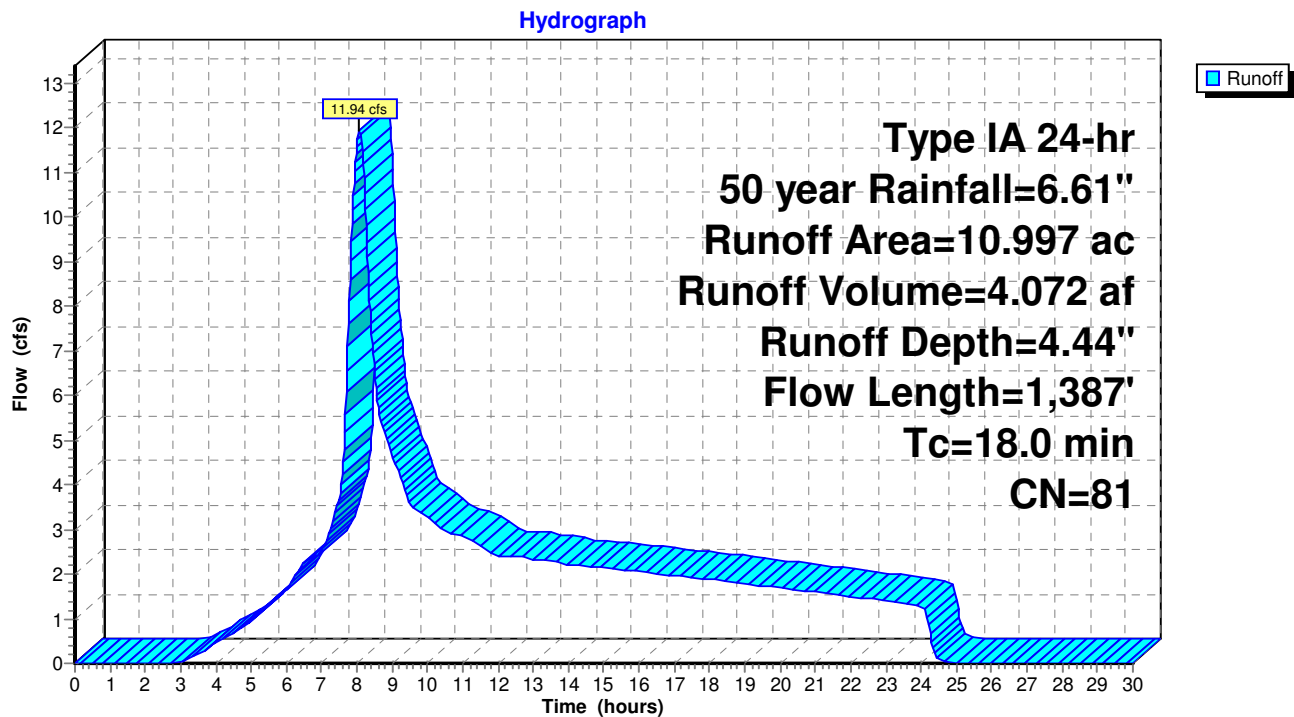Prepared by PPI Engineering, Revised Sept. 2020
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Type IA 24-hr 50 year Rainfall=6.61"
Printed 9/2/2020
Page 124

Subcatchment WS-7: Subcat WS-7

Hydrograph

Type IA 24-hr
50 year Rainfall=6.61"
Runoff Area=10.997 ac
Runoff Volume=4.072 af
Runoff Depth=4.44"
Flow Length=1,387'
Tc=18.0 min
CN=81

Post-Project WS7
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Type IA 24-hr 100 year Rainfall=7.33"
Printed 9/2/2020
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Summary for Subcatchment WS-7: Subcat WS-7

Runoff   =   13.84 cfs @   8.08 hrs, Volume=   4.685 af, Depth= 5.11"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.02 hrs
Type IA 24-hr 100 year Rainfall=7.33"

Area (ac)	CN	Description
* 0.000	0	, HSG D
1.539	81	Annual Grass, Good, HSG D
0.193	73	Brush, Good, HSG D
0.151	94	Fallow, bare soil, HSG D
1.766	86	Farmsteads, HSG D
0.488	93	Paved roads w/open ditches, 50% imp, HSG D
0.878	84	Vineyard, Fair, HSG D
0.432	81	Vineyard, Good, HSG D
5.111	77	Woods, Good, HSG D
0.439	79	Woods/grass comb., Good, HSG D
10.997	81	Weighted Average
10.753		97.78% Pervious Area
0.244		2.22% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
9.4	52	0.1700	0.09		**Sheet Flow, Sheet**
					Woods: Dense underbrush n= 0.800 P2= 3.23"
5.1	786	0.2600	2.55		**Shallow Concentrated Flow, Shallow 1 - Woodlands**
					Woodland Kv= 5.0 fps
0.5	213	0.1100	6.73		**Shallow Concentrated Flow, Shallow 2 - Paved**
					Paved Kv= 20.3 fps
2.3	193	0.0400	1.40		**Shallow Concentrated Flow, Shallow 3 - Short Grass**
					Short Grass Pasture Kv= 7.0 fps
0.7	143	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
18.0	1,387				Total

Post-Project WS7
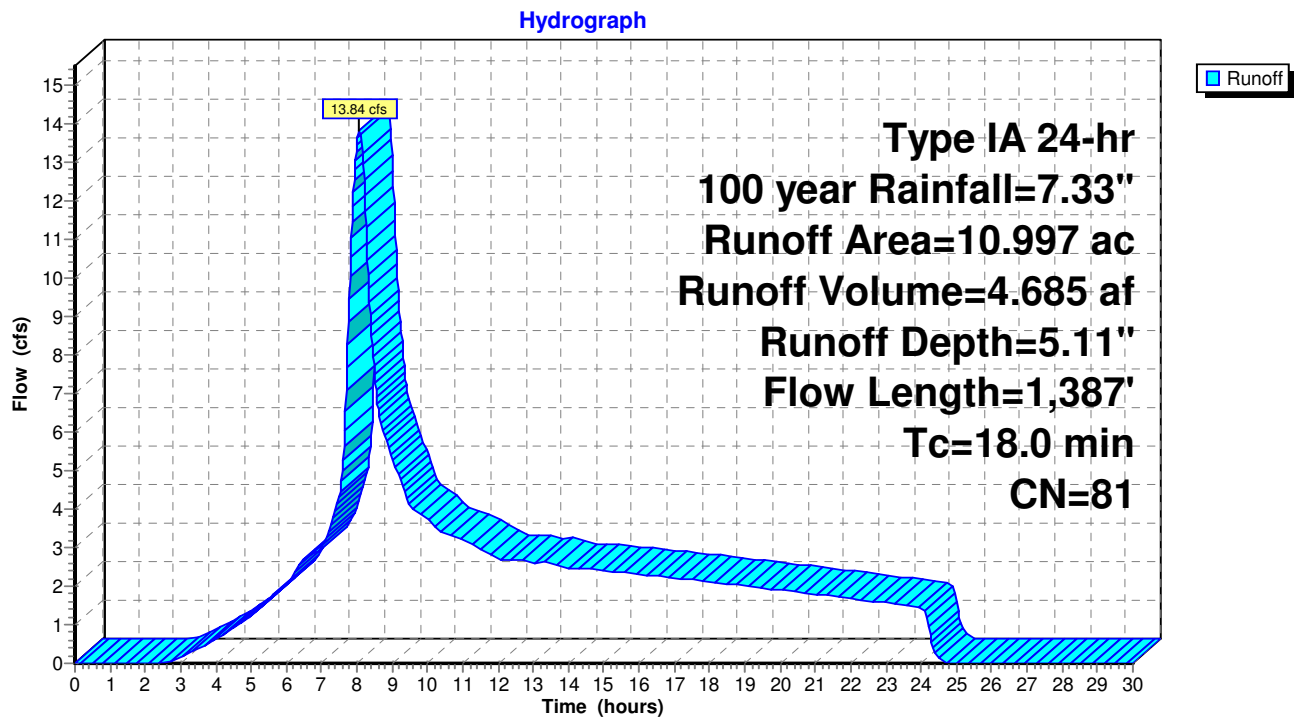Prepared by PPI Engineering, Revised Sept. 2020
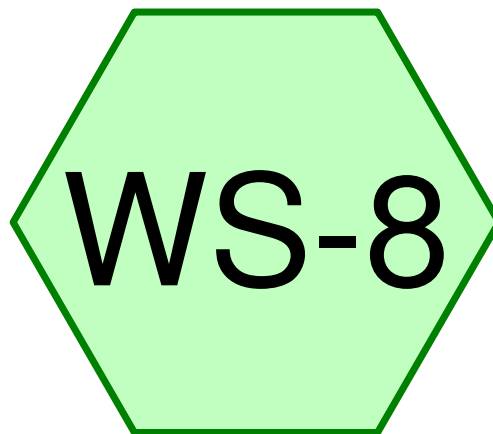HydroCAD® 10.00-24 s/n 09429 © 2018 HydroCAD Software Solutions LLC

Type IA 24-hr 100 year Rainfall=7.33"
Printed 9/2/2020
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Subcatchment WS-7: Subcat WS-7

Hydrograph

Legend: ☐ Runoff

**Type IA 24-hr
100 year Rainfall=7.33"
Runoff Area=10.997 ac
Runoff Volume=4.685 af
Runoff Depth=5.11"
Flow Length=1,387'
Tc=18.0 min
CN=81**

Peak label: 13.84 cfs

WS-8

Subcat WS-8

Summary for Subcatchment WS-8: Subcat WS-8

Runoff   =   4.97 cfs @   7.98 hrs, Volume=   1.718 af, Depth= 1.71"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.02 hrs
Type IA 24-hr 2 year Rainfall=3.23"

Area (ac)	CN	Description
* 0.000	0	, HSG D
0.385	81	Annual Grass, Good, HSG D
0.350	86	Farmsteads, HSG D
0.410	91	Gravel Roads, HSG D
10.120	84	Vineyard, Fair, HSG D
0.809	77	Woods, Good, HSG D
12.075	84	Weighted Average
12.075		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
1.8	100	0.1600	0.95		**Sheet Flow, Sheet**
					Fallow n= 0.050 P2= 3.23"
0.5	122	0.1700	4.12		**Shallow Concentrated Flow, Shallow 1 - Nearly Bare & Untilled**
					Nearly Bare & Untilled Kv= 10.0 fps
2.3	450	0.2100	3.21		**Shallow Concentrated Flow, Shallow 2 - Short Grass**
					Short Grass Pasture Kv= 7.0 fps
2.3	349	0.0100	2.48	4.97	**Trap/Vee/Rect Channel Flow, Ditch**
					Bot.W=0.00' D=1.00' Z= 2.0 '/' Top.W=4.00'
					n= 0.035
6.9	1,021	Total			

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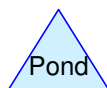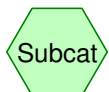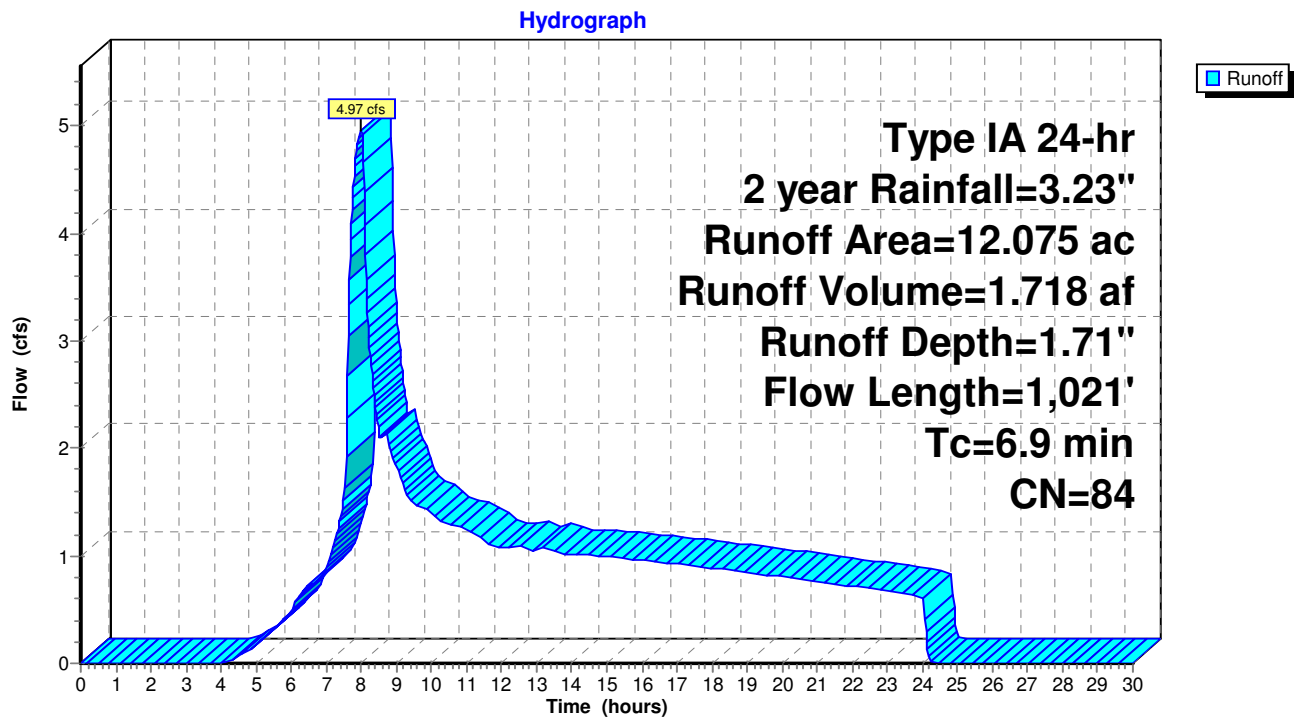*Type IA 24-hr 2 year Rainfall=3.23"*
Printed 9/2/2020
Page 129

Subcatchment WS-8: Subcat WS-8

Hydrograph

Type IA 24-hr
2 year Rainfall=3.23"
Runoff Area=12.075 ac
Runoff Volume=1.718 af
Runoff Depth=1.71"
Flow Length=1,021'
Tc=6.9 min
CN=84

Pre-Project WS8
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Type IA 24-hr 10 year Rainfall=4.90"
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Summary for Subcatchment WS-8: Subcat WS-8

Runoff   =   9.79 cfs @   7.95 hrs, Volume=   3.199 af, Depth= 3.18"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.02 hrs
Type IA 24-hr 10 year Rainfall=4.90"

Area (ac)	CN	Description
* 0.000	0	, HSG D
0.385	81	Annual Grass, Good, HSG D
0.350	86	Farmsteads, HSG D
0.410	91	Gravel Roads, HSG D
10.120	84	Vineyard, Fair, HSG D
0.809	77	Woods, Good, HSG D
12.075	84	Weighted Average
12.075		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
1.8	100	0.1600	0.95		**Sheet Flow, Sheet**
					Fallow n= 0.050 P2= 3.23"
0.5	122	0.1700	4.12		**Shallow Concentrated Flow, Shallow 1 - Nearly Bare & Untilled**
					Nearly Bare & Untilled Kv= 10.0 fps
2.3	450	0.2100	3.21		**Shallow Concentrated Flow, Shallow 2 - Short Grass**
					Short Grass Pasture Kv= 7.0 fps
2.3	349	0.0100	2.48	4.97	**Trap/Vee/Rect Channel Flow, Ditch**
					Bot.W=0.00' D=1.00' Z= 2.0 '/' Top.W=4.00'
					n= 0.035
6.9	1,021	Total			

Pre-Project WS8
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Type IA 24-hr 10 year Rainfall=4.90"
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Subcatchment WS-8: Subcat WS-8

Hydrograph

Type IA 24-hr
10 year Rainfall=4.90"
Runoff Area=12.075 ac
Runoff Volume=3.199 af
Runoff Depth=3.18"
Flow Length=1,021'
Tc=6.9 min
CN=84

□ Runoff

9.79 cfs

Pre-Project WS8
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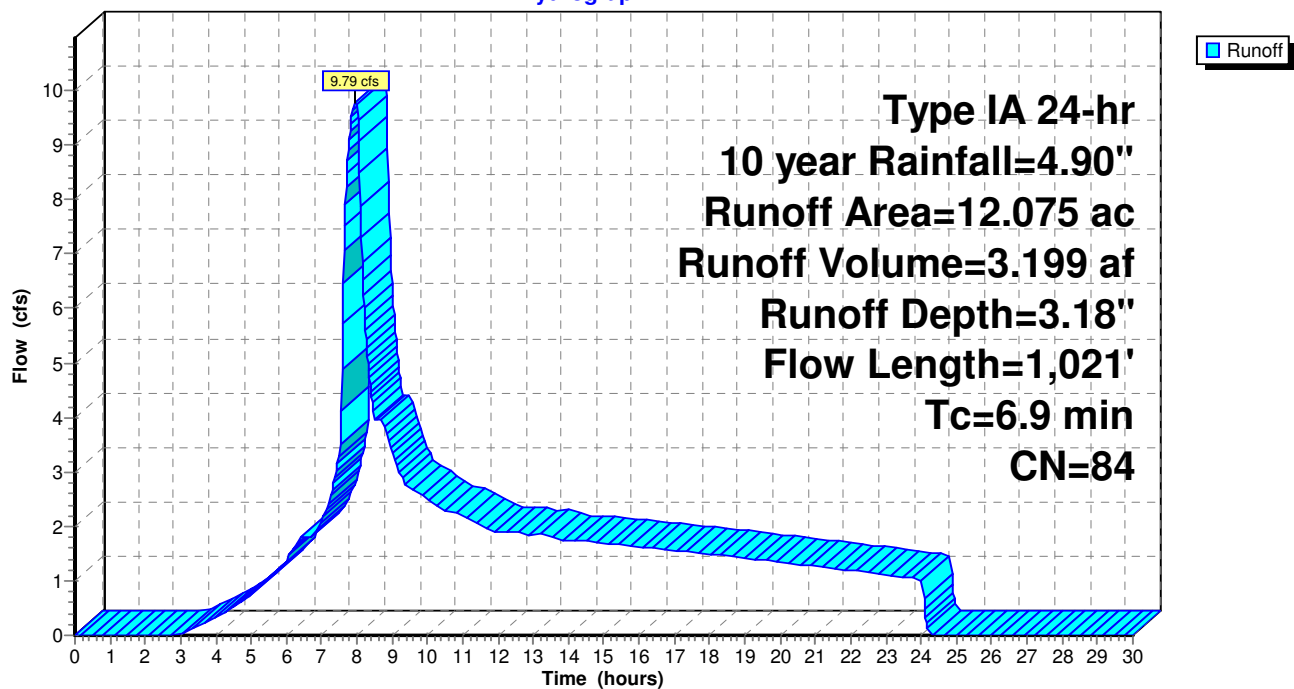HydroCAD® 10.00-24 s/n 09429 © 2018 HydroCAD Software Solutions LLC

Type IA 24-hr 50 year Rainfall=6.61"
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Summary for Subcatchment WS-8: Subcat WS-8

Runoff   =   14.99 cfs @   7.93 hrs, Volume=   4.800 af, Depth= 4.77"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.02 hrs
Type IA 24-hr 50 year Rainfall=6.61"

Area (ac)	CN	Description
* 0.000	0	, HSG D
0.385	81	Annual Grass, Good, HSG D
0.350	86	Farmsteads, HSG D
0.410	91	Gravel Roads, HSG D
10.120	84	Vineyard, Fair, HSG D
0.809	77	Woods, Good, HSG D
12.075	84	Weighted Average
12.075		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
1.8	100	0.1600	0.95		**Sheet Flow, Sheet**
					Fallow n= 0.050 P2= 3.23"
0.5	122	0.1700	4.12		**Shallow Concentrated Flow, Shallow 1 - Nearly Bare & Untilled**
					Nearly Bare & Untilled Kv= 10.0 fps
2.3	450	0.2100	3.21		**Shallow Concentrated Flow, Shallow 2 - Short Grass**
					Short Grass Pasture Kv= 7.0 fps
2.3	349	0.0100	2.48	4.97	**Trap/Vee/Rect Channel Flow, Ditch**
					Bot.W=0.00' D=1.00' Z= 2.0 '/' Top.W=4.00'
					n= 0.035
6.9	1,021	Total			

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Type IA 24-hr 50 year Rainfall=6.61"
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Subcatchment WS-8: Subcat WS-8

Hydrograph

Type IA 24-hr
50 year Rainfall=6.61"
Runoff Area=12.075 ac
Runoff Volume=4.800 af
Runoff Depth=4.77"
Flow Length=1,021'
Tc=6.9 min
CN=84

□ Runoff

14.99 cfs

Pre-Project WS8
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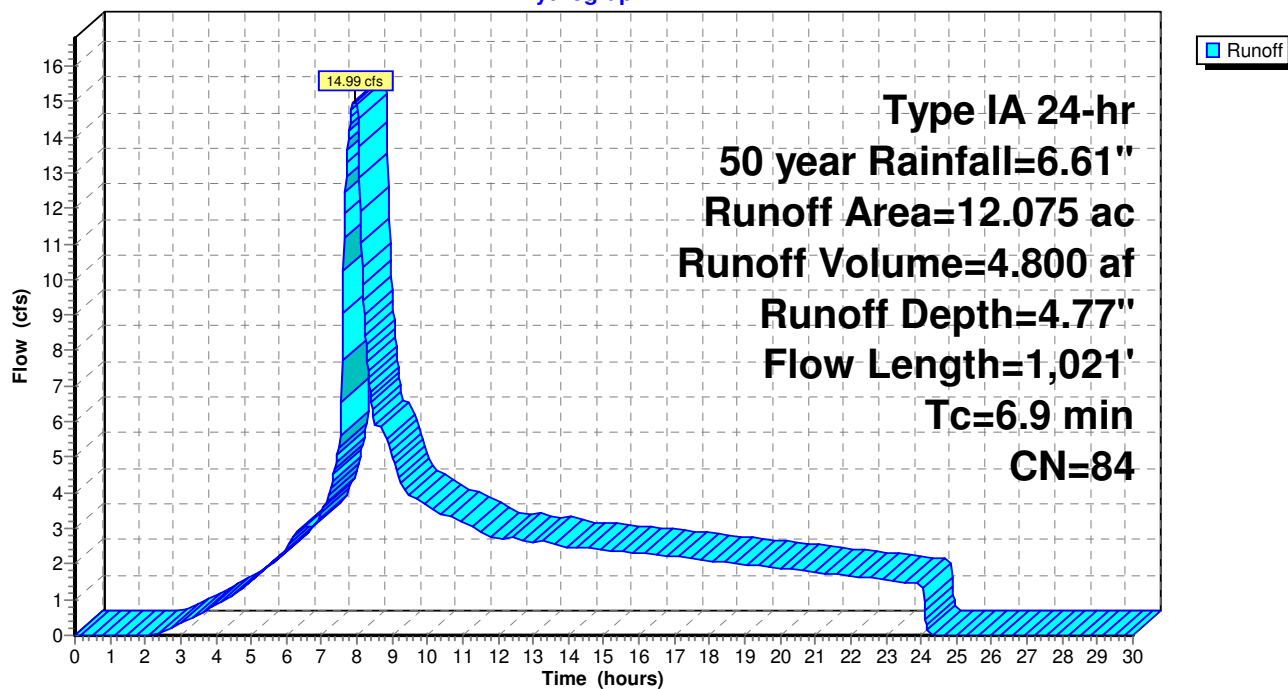*Type IA 24-hr 100 year Rainfall=7.33"*
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Page 134

Summary for Subcatchment WS-8: Subcat WS-8

Runoff   =   17.20 cfs @   7.93 hrs, Volume=   5.488 af, Depth= 5.45"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.02 hrs
Type IA 24-hr 100 year Rainfall=7.33"

Area (ac)	CN	Description
* 0.000	0	, HSG D
0.385	81	Annual Grass, Good, HSG D
0.350	86	Farmsteads, HSG D
0.410	91	Gravel Roads, HSG D
10.120	84	Vineyard, Fair, HSG D
0.809	77	Woods, Good, HSG D
12.075	84	Weighted Average
12.075		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
1.8	100	0.1600	0.95		**Sheet Flow, Sheet** Fallow n= 0.050 P2= 3.23"
0.5	122	0.1700	4.12		**Shallow Concentrated Flow, Shallow 1 - Nearly Bare & Untilled** Nearly Bare & Untilled Kv= 10.0 fps
2.3	450	0.2100	3.21		**Shallow Concentrated Flow, Shallow 2 - Short Grass** Short Grass Pasture Kv= 7.0 fps
2.3	349	0.0100	2.48	4.97	**Trap/Vee/Rect Channel Flow, Ditch** Bot.W=0.00' D=1.00' Z= 2.0 '/' Top.W=4.00' n= 0.035
6.9	1,021				Total

Pre-Project WS8
Type IA 24-hr 100 year Rainfall=7.33"
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Subcatchment WS-8: Subcat WS-8

Hydrograph

**Type IA 24-hr
100 year Rainfall=7.33"
Runoff Area=12.075 ac
Runoff Volume=5.488 af
Runoff Depth=5.45"
Flow Length=1,021'
Tc=6.9 min
CN=84**

17.20 cfs

Runoff

WS-8

Subcat WS-8

Post-Project WS8
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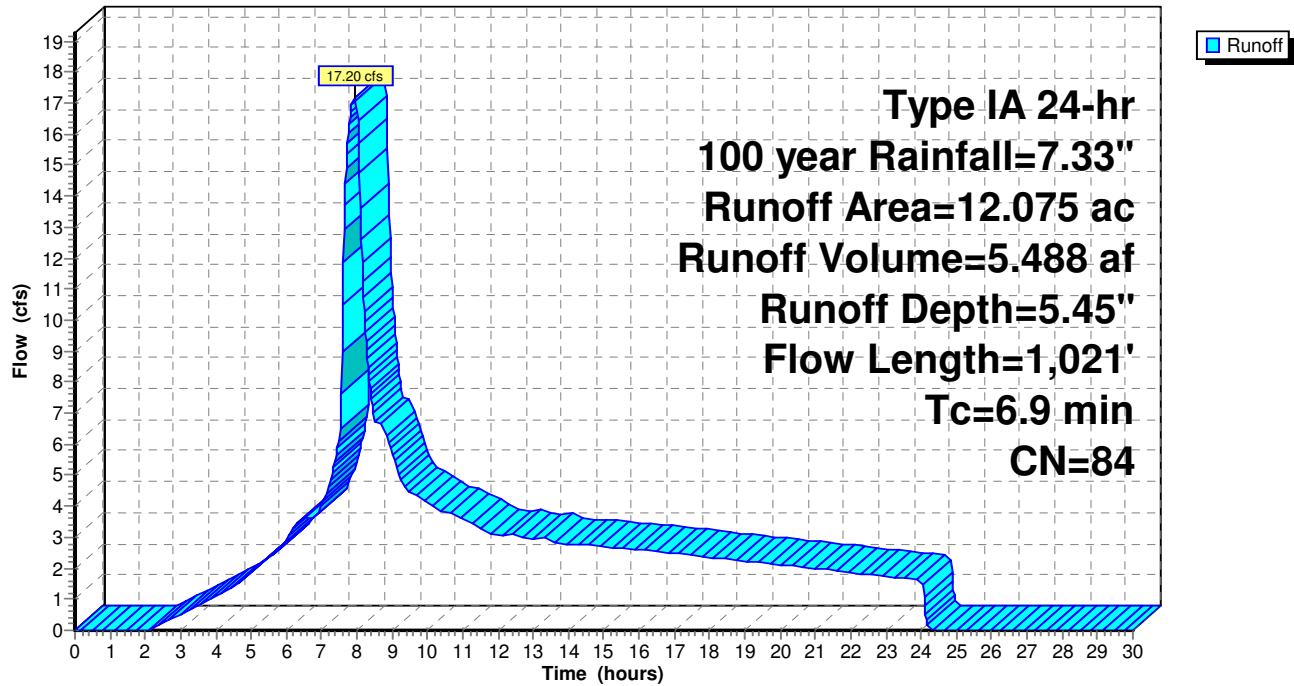HydroCAD® 10.00-24 s/n 09429 © 2018 HydroCAD Software Solutions LLC
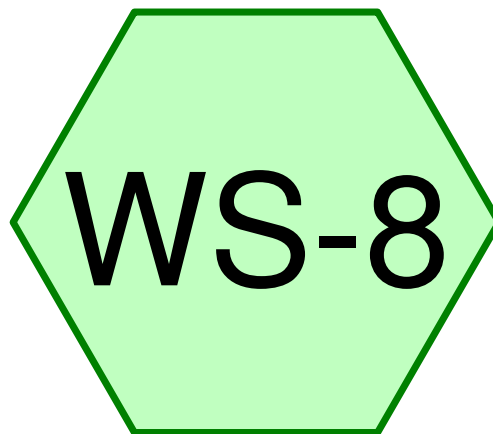
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Printed 9/2/2020
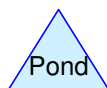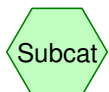Page 137

Summary for Subcatchment WS-8: Subcat WS-8

Runoff   =   4.89 cfs @   8.03 hrs, Volume=   1.718 af, Depth= 1.71"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.02 hrs
Type IA 24-hr 2 year Rainfall=3.23"

Area (ac)	CN	Description
0.385	81	Annual Grass, Good, HSG D
0.017	86	Farmsteads, HSG D
0.410	91	Gravel Roads, HSG D
10.120	84	Vineyard, Fair, HSG D
0.333	81	Vineyard, Good, HSG D
0.809	77	Woods, Good, HSG D
12.075	84	Weighted Average
12.075		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.2	100	0.1600	0.27		**Sheet Flow, Sheet**
					Grass: Dense n= 0.240 P2= 3.23"
3.1	572	0.1900	3.05		**Shallow Concentrated Flow, Shallow - Short Grass**
					Short Grass Pasture Kv= 7.0 fps
2.3	349	0.0100	2.48	4.97	**Trap/Vee/Rect Channel Flow, Ditch**
					Bot.W=0.00' D=1.00' Z= 2.0 '/' Top.W=4.00'
					n= 0.035
11.6	1,021	Total			

Post-Project WS8
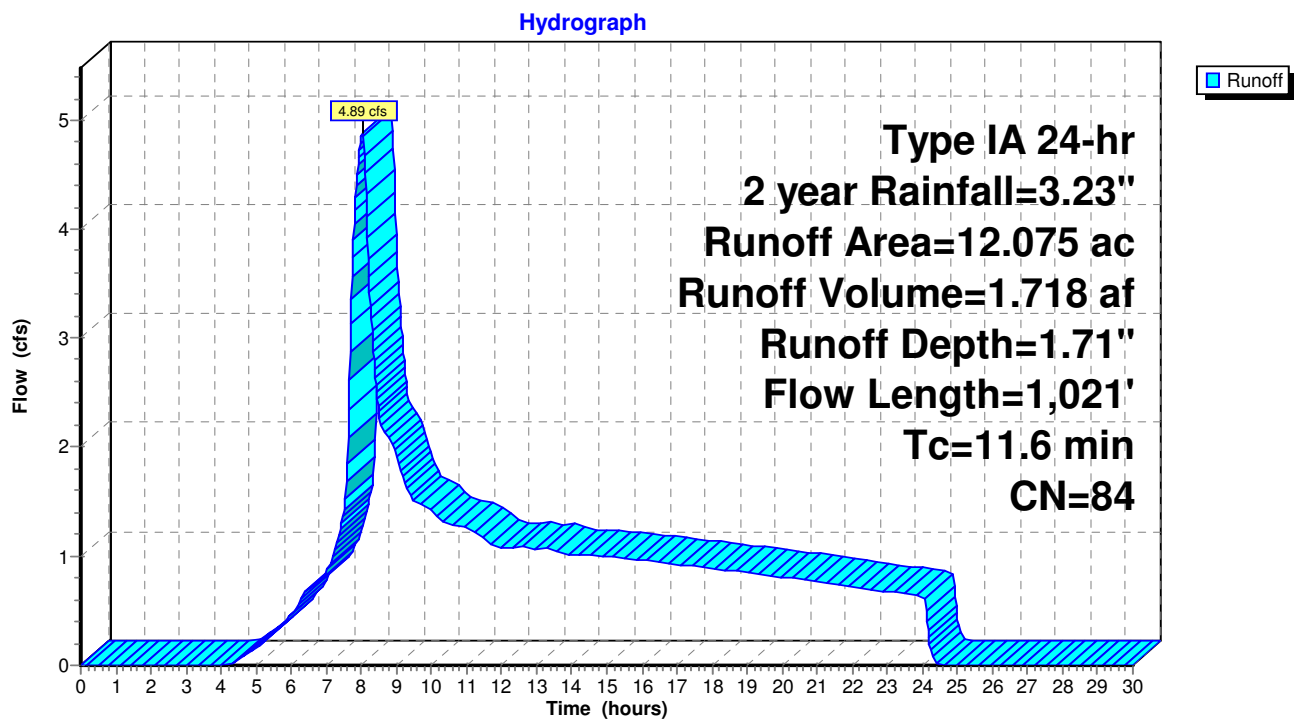Prepared by PPI Engineering, Revised Sept. 2020
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Type IA 24-hr 2 year Rainfall=3.23"
Printed 9/2/2020
Page 138

Subcatchment WS-8: Subcat WS-8

Hydrograph

Type IA 24-hr
2 year Rainfall=3.23"
Runoff Area=12.075 ac
Runoff Volume=1.718 af
Runoff Depth=1.71"
Flow Length=1,021'
Tc=11.6 min
CN=84

4.89 cfs

Runoff

Post-Project WS8
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Type IA 24-hr 10 year Rainfall=4.90"
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Summary for Subcatchment WS-8: Subcat WS-8

Runoff   =   9.67 cfs @   8.01 hrs, Volume=   3.199 af, Depth= 3.18"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.02 hrs
Type IA 24-hr 10 year Rainfall=4.90"

Area (ac)	CN	Description
0.385	81	Annual Grass, Good, HSG D
0.017	86	Farmsteads, HSG D
0.410	91	Gravel Roads, HSG D
10.120	84	Vineyard, Fair, HSG D
0.333	81	Vineyard, Good, HSG D
0.809	77	Woods, Good, HSG D
12.075	84	Weighted Average
12.075		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.2	100	0.1600	0.27		**Sheet Flow, Sheet**
					Grass: Dense n= 0.240 P2= 3.23"
3.1	572	0.1900	3.05		**Shallow Concentrated Flow, Shallow - Short Grass**
					Short Grass Pasture Kv= 7.0 fps
2.3	349	0.0100	2.48	4.97	**Trap/Vee/Rect Channel Flow, Ditch**
					Bot.W=0.00' D=1.00' Z= 2.0 '/' Top.W=4.00'
					n= 0.035
11.6	1,021				Total

Post-Project WS8
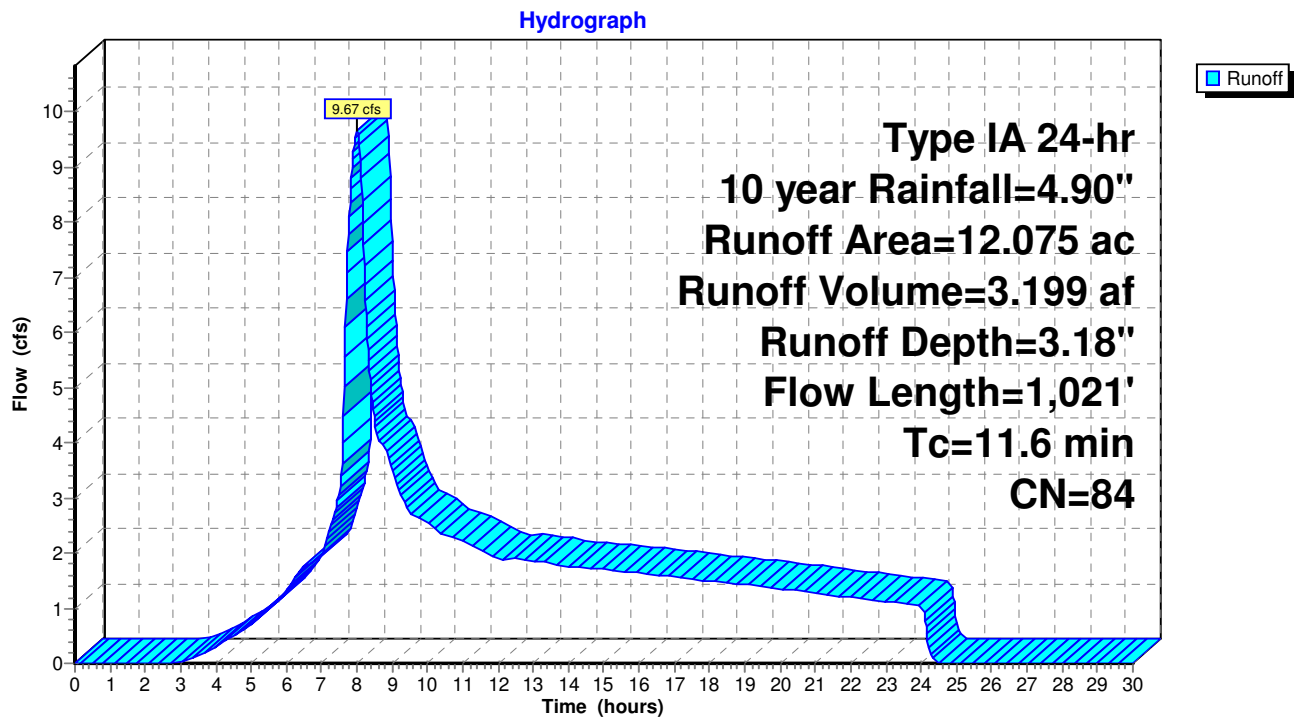Prepared by PPI Engineering, Revised Sept. 2020
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Type IA 24-hr 10 year Rainfall=4.90"
Printed 9/2/2020
Page 140

Subcatchment WS-8: Subcat WS-8

Hydrograph

**Type IA 24-hr
10 year Rainfall=4.90"
Runoff Area=12.075 ac
Runoff Volume=3.199 af
Runoff Depth=3.18"
Flow Length=1,021'
Tc=11.6 min
CN=84**

9.67 cfs

☐ Runoff

Post-Project WS8
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Type IA 24-hr 50 year Rainfall=6.61"
Printed 9/2/2020
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Summary for Subcatchment WS-8: Subcat WS-8

Runoff   =   14.79 cfs @   8.00 hrs, Volume=   4.800 af, Depth= 4.77"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.02 hrs
Type IA 24-hr 50 year Rainfall=6.61"

Area (ac)	CN	Description
0.385	81	Annual Grass, Good, HSG D
0.017	86	Farmsteads, HSG D
0.410	91	Gravel Roads, HSG D
10.120	84	Vineyard, Fair, HSG D
0.333	81	Vineyard, Good, HSG D
0.809	77	Woods, Good, HSG D
12.075	84	Weighted Average
12.075		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.2	100	0.1600	0.27		**Sheet Flow, Sheet**
					Grass: Dense n= 0.240 P2= 3.23"
3.1	572	0.1900	3.05		**Shallow Concentrated Flow, Shallow - Short Grass**
					Short Grass Pasture Kv= 7.0 fps
2.3	349	0.0100	2.48	4.97	**Trap/Vee/Rect Channel Flow, Ditch**
					Bot.W=0.00' D=1.00' Z= 2.0 '/' Top.W=4.00'
					n= 0.035
11.6	1,021	Total			

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Type IA 24-hr 50 year Rainfall=6.61"
Printed 9/2/2020
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Subcatchment WS-8: Subcat WS-8

Hydrograph

**Type IA 24-hr
50 year Rainfall=6.61"
Runoff Area=12.075 ac
Runoff Volume=4.800 af
Runoff Depth=4.77"
Flow Length=1,021'
Tc=11.6 min
CN=84**

14.79 cfs

Runoff

Post-Project WS8
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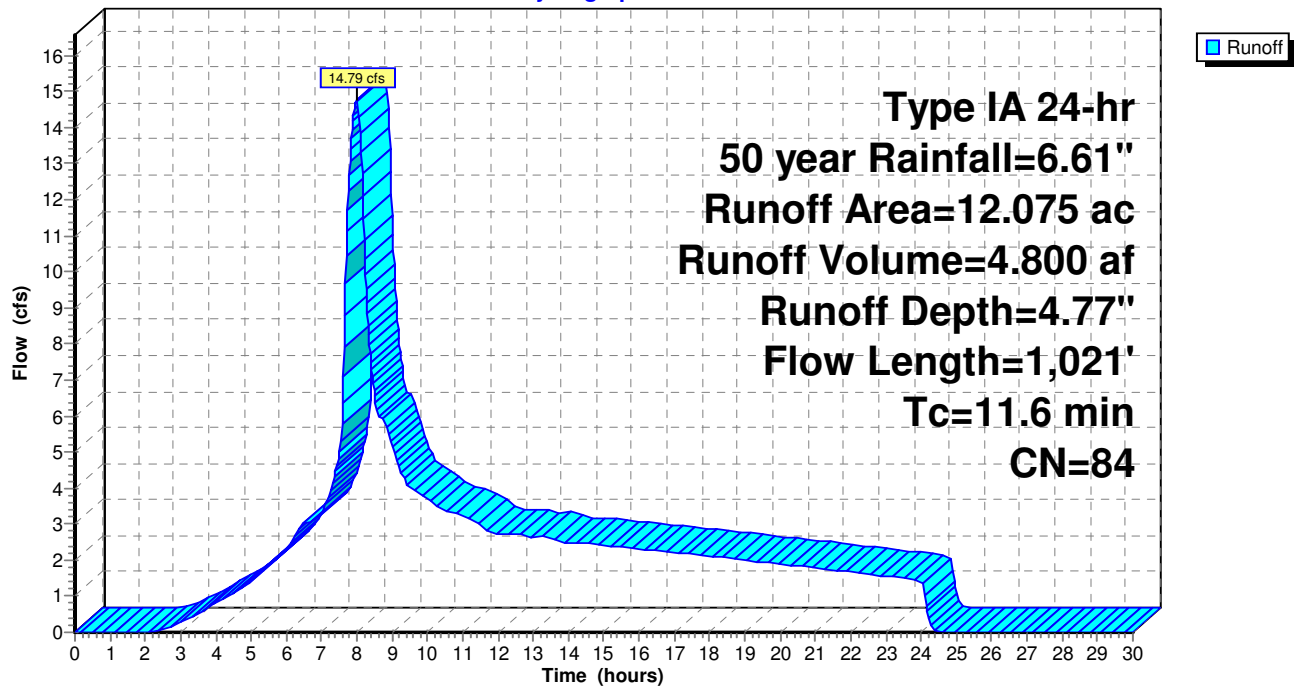HydroCAD® 10.00-24 s/n 09429 © 2018 HydroCAD Software Solutions LLC

Type IA 24-hr 100 year Rainfall=7.33"
Printed 9/2/2020
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Summary for Subcatchment WS-8: Subcat WS-8

Runoff   =   16.97 cfs @   8.00 hrs, Volume=   5.488 af, Depth= 5.45"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.02 hrs
Type IA 24-hr 100 year Rainfall=7.33"

Area (ac)	CN	Description
0.385	81	Annual Grass, Good, HSG D
0.017	86	Farmsteads, HSG D
0.410	91	Gravel Roads, HSG D
10.120	84	Vineyard, Fair, HSG D
0.333	81	Vineyard, Good, HSG D
0.809	77	Woods, Good, HSG D
12.075	84	Weighted Average
12.075		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.2	100	0.1600	0.27		**Sheet Flow, Sheet**
					Grass: Dense n= 0.240 P2= 3.23"
3.1	572	0.1900	3.05		**Shallow Concentrated Flow, Shallow - Short Grass**
					Short Grass Pasture Kv= 7.0 fps
2.3	349	0.0100	2.48	4.97	**Trap/Vee/Rect Channel Flow, Ditch**
					Bot.W=0.00' D=1.00' Z= 2.0 '/' Top.W=4.00'
					n= 0.035
11.6	1,021	Total			

Post-Project WS8
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Type IA 24-hr 100 year Rainfall=7.33"
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Subcatchment WS-8: Subcat WS-8

Hydrograph

Type IA 24-hr
100 year Rainfall=7.33"
Runoff Area=12.075 ac
Runoff Volume=5.488 af
Runoff Depth=5.45"
Flow Length=1,021'
Tc=11.6 min
CN=84

16.97 cfs