

Atlas Rock Vineyard
3380 Atlas Peak Road - Hydrology Study
Prepared by Napa Valley Vineyard Engineering, Inc
December 16, 2021

INTRODUCTION

Atlas Rock seeks approval of approximately 1.59 net acres of proposed vineyard. The project lies within APN 033-010-059, a parcel totaling about 4.84 acres, located at 3380 Atlas Peak Road, Napa.

This hydrology study is to determine the anticipated affect the proposed vineyard development project will have on local hydrology and runoff patterns in area A. Hydrologic modeling of existing and proposed conditions was performed using HydroCad, Urban Hydrology for Small Watersheds with the CA-1 rainfall distribution curve. Following is a summary of the data used to complete the hydrologic analysis and the results of this analysis.

RAINFALL DATA

Rainfall depths for the project site were obtained from the National Oceanic and Atmospheric Administration (NOAA) Atlas 14, Volume 6, Version 2, Precipitation Frequency Data for California, which uses the latitude and longitude of the Gonzales Vineyard project are estimated to be 38.4014 N, -122.2405 W, based on information obtained from (NOAA) Atlas 14 site.

The following rainfall data from the NOAA website was used in the analysis:

2 year, 24 hour	4.78 inches
100 year, 24 hour	11.7 inches

Rainfall data for the interim storm events were interpolated as:

5 year, 24 hour	6.19 inches
10 year, 24 hour	7.34 inches
25 year, 24 hour	9.06 inches
50 year, 24 hour	10.4 inches

WATERSHED AREAS

The project site drains toward a blue line stream and lies in the Milliken Reservoir watershed. The points of interest for this analysis are points along a blue line stream. The watershed for Area A is approximately 15.127 acres and was delineated based on topographic data from the Napa County GIS Data Base website. The maps included in Appendix A, depict the watershed, the existing land uses, and the proposed vineyard project.

PRE-PROJECT WATERSHED CONDITIONS

Soil Types

The United States Department of Agriculture Soil Conservation Service Soils Map for Napa County, August 1978, maps the following soil types within the watershed:

SCS #100, Aiken loam 0 to 15% slopes
(Hydrologic Soil Group (HSG) C)

SCS #102, Aiken loam 30 to 50% slopes
(Hydrologic Soil Group (HSG) C)

SCS #151, Hambright rock outcrop complex 2 to 30% slopes
(Hydrologic Soil Group (HSG) D)

SCS #152, Hambright rock outcrop complex 30 to 75% slopes
(Hydrologic Soil Group (HSG) D)

Land Use

Land use within the subject watersheds was analyzed based on the 2020 aerial photograph obtained from the Google GIS website. Area A consists of 2.111 acres of “good” tree canopy, 2.821 acres of “good” brush, 1.257 acres of “fair” brush, 5.872 acres of “good” grassland, 2.068 acres of “fair” grassland, 0.334 acres of “poor” grassland, and 0.664 acre of development. Areas inside the watershed that are considered to be in “fair” or “poor” condition are stated above, all other areas are considered to be in “good” condition. A detailed breakdown of land use by area and hydrologic soil group is included in the HydroCad Reports, Appendix A.

Time of Concentration

The time of concentration represents the time it takes for rainfall in the most hydraulically remote portion of the watershed to reach the point of interest. The time of concentration was estimated assuming sheet flow for 100 feet in the uppermost reaches of the watershed. A shallow concentrated flow regime was used to model the runoff down to the point of interest. Mannings coefficients were selected to represent the respective surface conditions. A detailed breakdown of the time of concentration parameters is included in the HydroCad Reports, Appendix A and are shown on the Drainage Area Map.

POST PROJECT WATERSHED CONDITIONS

Soil Types

The proposed vineyard development occurs within the areas mapped as

SCS #100, Aiken loam 0 to 15% slopes ((HSG) C)

SCS #102, Aiken loam 030 to 50% slopes (HSG) C)

SCS #151, Hambright rock outcrop complex 2 to 30% slopes (HSG) D)

SCS #152, Hambright rock outcrop complex 30 to 75% slopes (HSG) C)

Land Use

The proposed project will convert 0.065 acres of “good” tree canopy, 0.343 acres of “good” brush, 0.490 acres of “fair” brush, 0.170 acres of “good” grassland, 1.184 acres of “fair” grassland, 0.076 acres of “poor” grassland, and 0.141 acres of development. The project proposes a no-till cover crop with strip spray, which is considered a “good” hydrologic condition. Vineyard avenues/turnspaces will be maintained in a no-till cover and are modeled as part of the vineyard. A rock disposal avenue is proposed for part of the vineyard avenue and is modeled as a gravel road. Tree planting is proposed to mitigate the removal of 1993 tree canopy area that will be converted to vineyard. All other areas within the watershed are assumed to remain unchanged including the all-weather access road to the house in the project area. A detailed breakdown of land uses by area and hydrologic soil group is included in the HydroCad Reports, Appendix A.

Time of Concentration

Time of concentration under post-project conditions will not increase in the watersheds. The erosion control measures provided within the project area include. The time of concentration is estimated assuming sheet flow for 100 feet in the uppermost reaches of each watershed area, shallow concentrated flows down the hillside to the POI. A detailed breakdown of the time of concentration parameters is included in the HydroCad Report. Manning’s coefficients were selected to represent the respective surface conditions. A detailed breakdown of the time of concentration parameters is included in the HydroCad Reports, Appendix A and are shown on the Land Use Maps

CALCULATED RUNOFF RATE

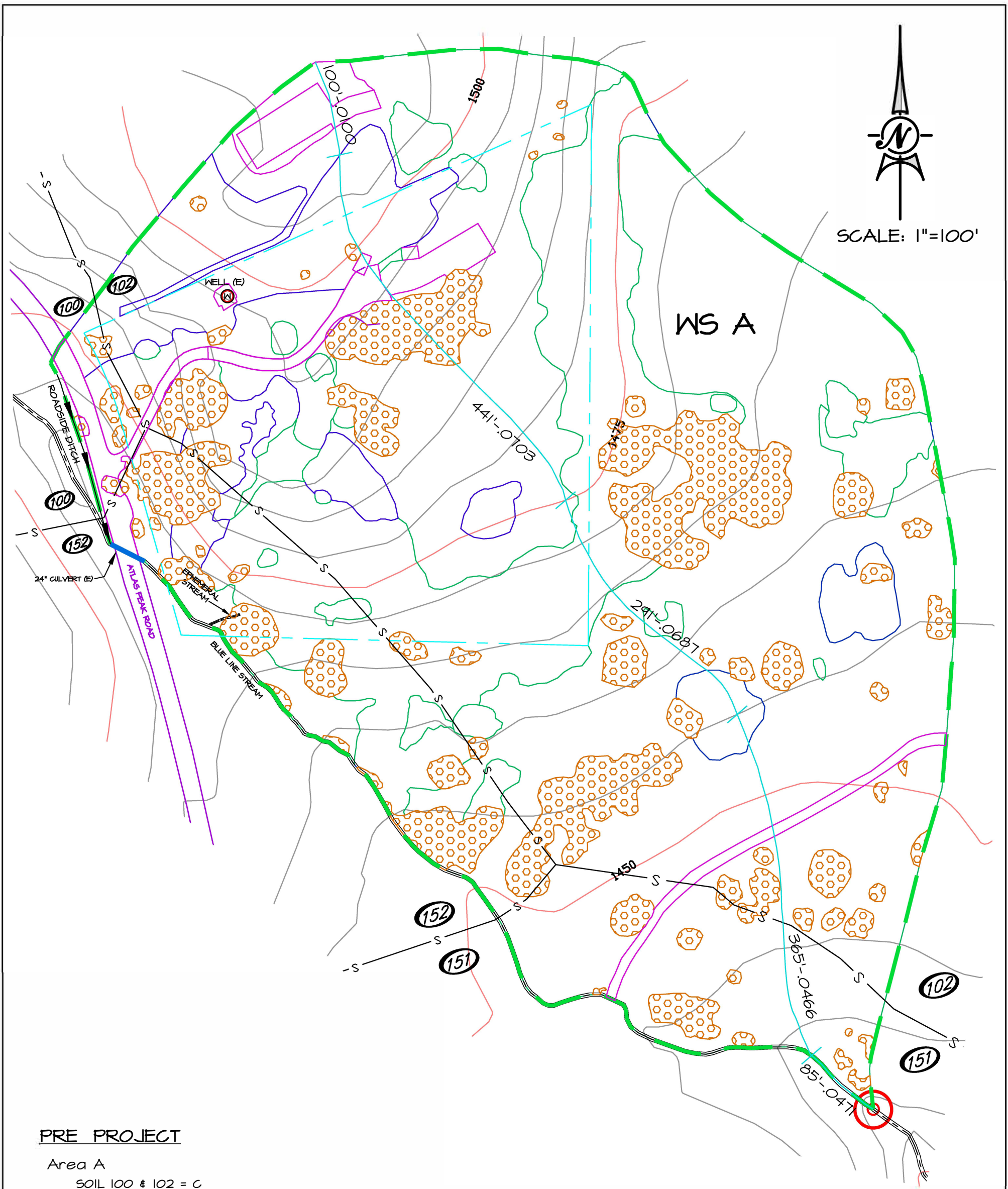
Using the rainfall data, watershed area, land use and time of concentration parameters described above and included in Appendix A, the following runoff rates were calculated:

HydroCad Calculated Peak Runoff Rate (cfs)

24 hr. storm event	2 yr.		5 yr.		10 yr.		25 yr.		50 yr.		100 yr.	
Project Condition	pre	post	pre	post	pre	post	pre	post	pre	post	pre	post
Watershed A	5.54	5.54	8.44	8.44	10.87	10.87	14.57	14.57	17.47	17.47	20.28	20.28

CONCLUSION

The hydrologic analysis presented above and supporting information in the Appendix, demonstrate that the proposed vineyard development with appropriate mitigation measures will not increase the peak runoff rate in the affected watersheds.



PRE PROJECT

Area A

SOIL 100 & 102 = C

- TOTAL AREA = 12.339 ACRES
- TREE (GOOD) AREA = 1.508 ACRES
- BRUSH (GOOD) AREA = 2.232 ACRES
- BRUSH (FAIR) AREA = 1.203 ACRES
- GRASS (GOOD) AREA = 4.439 ACRES
- GRASS (FAIR) AREA = 2.065 ACRES
- GRASS (POOR) AREA = 0.292 ACRES
- DEVELOPED AREA = 0.600 ACRES

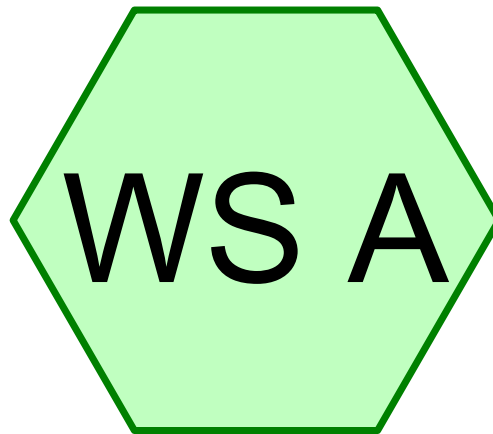
SOIL 151 & 152 = D

- TOTAL AREA = 2.788 ACRES
- TREE (GOOD) AREA = 0.603 ACRES
- BRUSH (GOOD) AREA = 0.589 ACRES
- BRUSH (FAIR) AREA = 0.054 ACRES
- GRASS (GOOD) AREA = 1.433 ACRES
- GRASS (FAIR) AREA = 0.003 ACRES
- GRASS (POOR) AREA = 0.042 ACRES
- DEVELOPED AREA = 0.064 ACRES

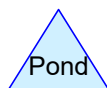
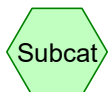
LEGEND

- FLOW PATH
- POINT OF INTEREST
- SOIL TYPE
- SOIL TYPE BOUNDARY
- GRASS & BRUSH AREA
- TREE CANOPY
- WATERSHED BOUNDARY

ATLAS ROCK
3380 ATLAS PEAK ROAD
PRE HYDROLOGY MAP



PRE WS A



Summary for Subcatchment WS A: PRE WS A

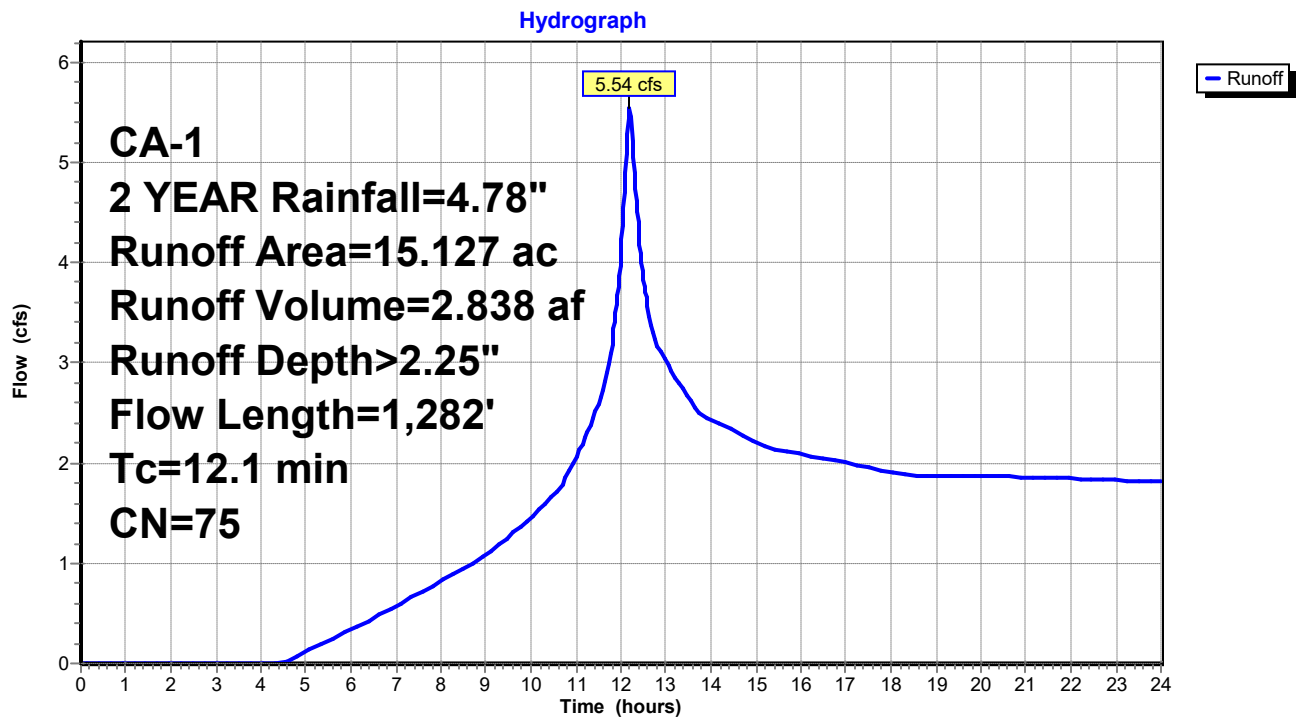
Runoff = 5.54 cfs @ 12.19 hrs, Volume= 2.838 af, Depth> 2.25"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.02 hrs
CA-1 2 YEAR Rainfall=4.78"

Area (ac)	CN	Description
1.203	70	Brush, Fair, HSG C
0.054	77	Brush, Fair, HSG D
2.232	65	Brush, Good, HSG C
0.589	73	Brush, Good, HSG D
0.161	87	Dirt roads, HSG C
0.032	89	Dirt roads, HSG D
0.081	89	Gravel roads, HSG C
2.065	79	Pasture/grassland/range, Fair, HSG C
0.003	84	Pasture/grassland/range, Fair, HSG D
4.439	74	Pasture/grassland/range, Good, HSG C
1.433	80	Pasture/grassland/range, Good, HSG D
0.292	86	Pasture/grassland/range, Poor, HSG C
0.042	89	Pasture/grassland/range, Poor, HSG D
0.207	98	Paved Road, HSG C
0.032	98	Paved Road, HSG D
0.151	98	Roofs, HSG C
1.508	72	Woods/grass comb., Good, HSG C
0.603	79	Woods/grass comb., Good, HSG D
15.127	75	Weighted Average
14.737		97.42% Pervious Area
0.390		2.58% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
1.3	100	0.0100	1.27		Sheet Flow, PRE WS A
					Smooth surfaces n= 0.011 P2= 4.78"
4.0	441	0.0703	1.86		Shallow Concentrated Flow, PRE WS A
					Short Grass Pasture Kv= 7.0 fps
2.6	291	0.0687	1.83		Shallow Concentrated Flow, PRE WS A
					Short Grass Pasture Kv= 7.0 fps
4.0	365	0.0466	1.51		Shallow Concentrated Flow, PRE WS A
					Short Grass Pasture Kv= 7.0 fps
0.2	85	0.0471	7.14	42.84	Channel Flow, PRE WS A
					Area= 6.0 sf Perim= 7.2' r= 0.83'
					n= 0.040 Mountain streams
12.1	1,282	Total			

Subcatchment WS A: PRE WS A



Summary for Subcatchment WS A: PRE WS A

Runoff = 8.44 cfs @ 12.19 hrs, Volume= 4.305 af, Depth> 3.42"

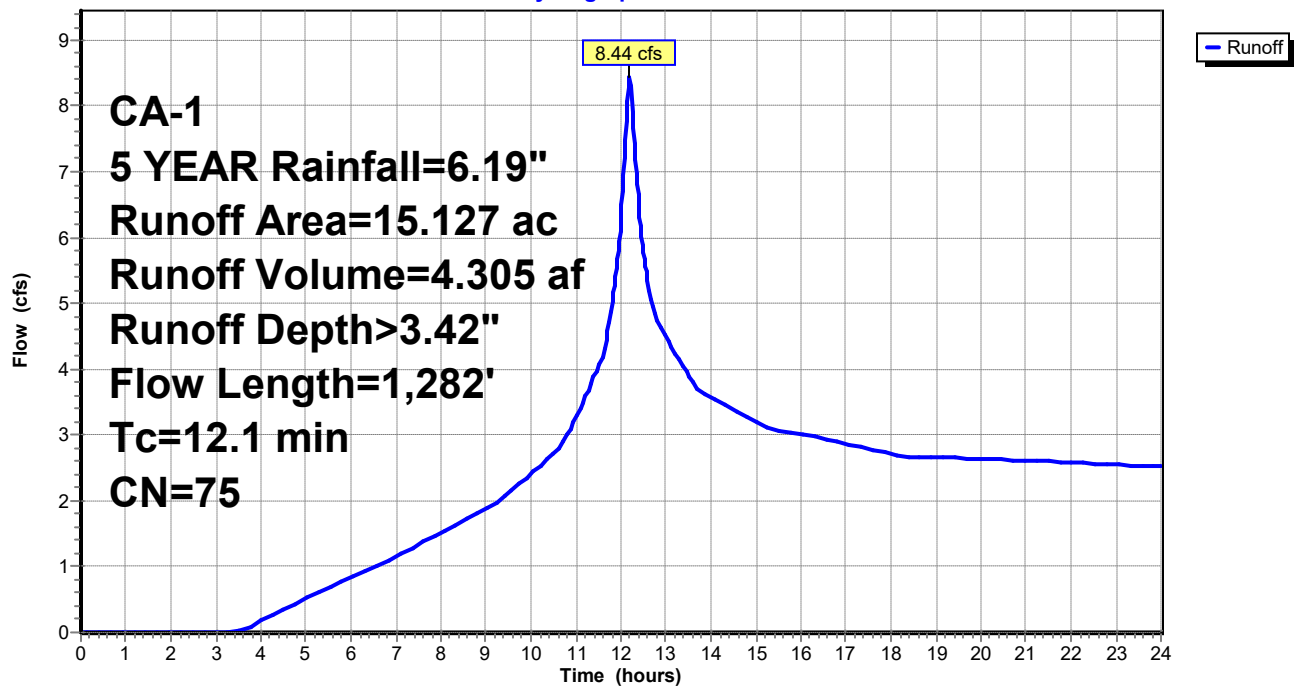
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.02 hrs
CA-1 5 YEAR Rainfall=6.19"

Area (ac)	CN	Description
1.203	70	Brush, Fair, HSG C
0.054	77	Brush, Fair, HSG D
2.232	65	Brush, Good, HSG C
0.589	73	Brush, Good, HSG D
0.161	87	Dirt roads, HSG C
0.032	89	Dirt roads, HSG D
0.081	89	Gravel roads, HSG C
2.065	79	Pasture/grassland/range, Fair, HSG C
0.003	84	Pasture/grassland/range, Fair, HSG D
4.439	74	Pasture/grassland/range, Good, HSG C
1.433	80	Pasture/grassland/range, Good, HSG D
0.292	86	Pasture/grassland/range, Poor, HSG C
0.042	89	Pasture/grassland/range, Poor, HSG D
0.207	98	Paved Road, HSG C
0.032	98	Paved Road, HSG D
0.151	98	Roofs, HSG C
1.508	72	Woods/grass comb., Good, HSG C
0.603	79	Woods/grass comb., Good, HSG D
15.127	75	Weighted Average
14.737		97.42% Pervious Area
0.390		2.58% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
1.3	100	0.0100	1.27		Sheet Flow, PRE WS A
					Smooth surfaces n= 0.011 P2= 4.78"
4.0	441	0.0703	1.86		Shallow Concentrated Flow, PRE WS A
					Short Grass Pasture Kv= 7.0 fps
2.6	291	0.0687	1.83		Shallow Concentrated Flow, PRE WS A
					Short Grass Pasture Kv= 7.0 fps
4.0	365	0.0466	1.51		Shallow Concentrated Flow, PRE WS A
					Short Grass Pasture Kv= 7.0 fps
0.2	85	0.0471	7.14	42.84	Channel Flow, PRE WS A
					Area= 6.0 sf Perim= 7.2' r= 0.83'
					n= 0.040 Mountain streams
12.1	1,282	Total			

Subcatchment WS A: PRE WS A

Hydrograph



Summary for Subcatchment WS A: PRE WS A

Runoff = 10.87 cfs @ 12.19 hrs, Volume= 5.565 af, Depth> 4.41"

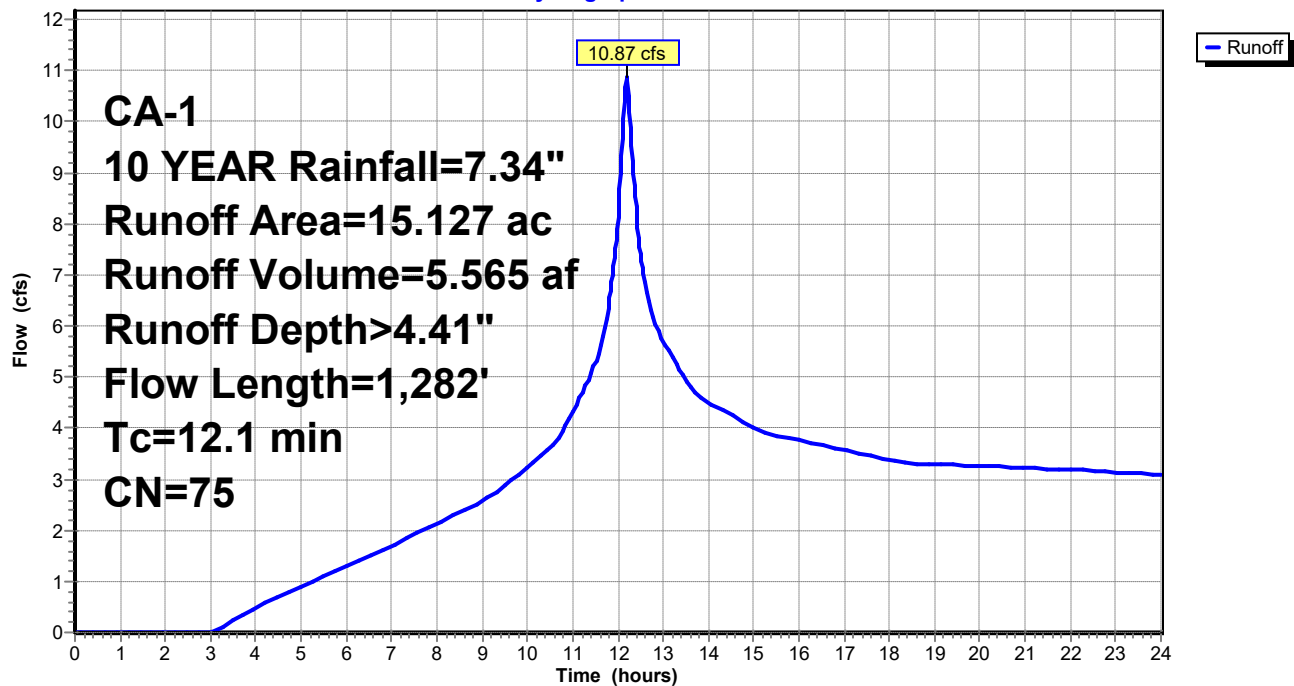
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.02 hrs
CA-1 10 YEAR Rainfall=7.34"

Area (ac)	CN	Description
1.203	70	Brush, Fair, HSG C
0.054	77	Brush, Fair, HSG D
2.232	65	Brush, Good, HSG C
0.589	73	Brush, Good, HSG D
0.161	87	Dirt roads, HSG C
0.032	89	Dirt roads, HSG D
0.081	89	Gravel roads, HSG C
2.065	79	Pasture/grassland/range, Fair, HSG C
0.003	84	Pasture/grassland/range, Fair, HSG D
4.439	74	Pasture/grassland/range, Good, HSG C
1.433	80	Pasture/grassland/range, Good, HSG D
0.292	86	Pasture/grassland/range, Poor, HSG C
0.042	89	Pasture/grassland/range, Poor, HSG D
0.207	98	Paved Road, HSG C
0.032	98	Paved Road, HSG D
0.151	98	Roofs, HSG C
1.508	72	Woods/grass comb., Good, HSG C
0.603	79	Woods/grass comb., Good, HSG D
15.127	75	Weighted Average
14.737		97.42% Pervious Area
0.390		2.58% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
1.3	100	0.0100	1.27		Sheet Flow, PRE WS A
					Smooth surfaces n= 0.011 P2= 4.78"
4.0	441	0.0703	1.86		Shallow Concentrated Flow, PRE WS A
					Short Grass Pasture Kv= 7.0 fps
2.6	291	0.0687	1.83		Shallow Concentrated Flow, PRE WS A
					Short Grass Pasture Kv= 7.0 fps
4.0	365	0.0466	1.51		Shallow Concentrated Flow, PRE WS A
					Short Grass Pasture Kv= 7.0 fps
0.2	85	0.0471	7.14	42.84	Channel Flow, PRE WS A
					Area= 6.0 sf Perim= 7.2' r= 0.83'
					n= 0.040 Mountain streams
12.1	1,282	Total			

Subcatchment WS A: PRE WS A

Hydrograph



Summary for Subcatchment WS A: PRE WS A

Runoff = 14.57 cfs @ 12.19 hrs, Volume= 7.515 af, Depth> 5.96"

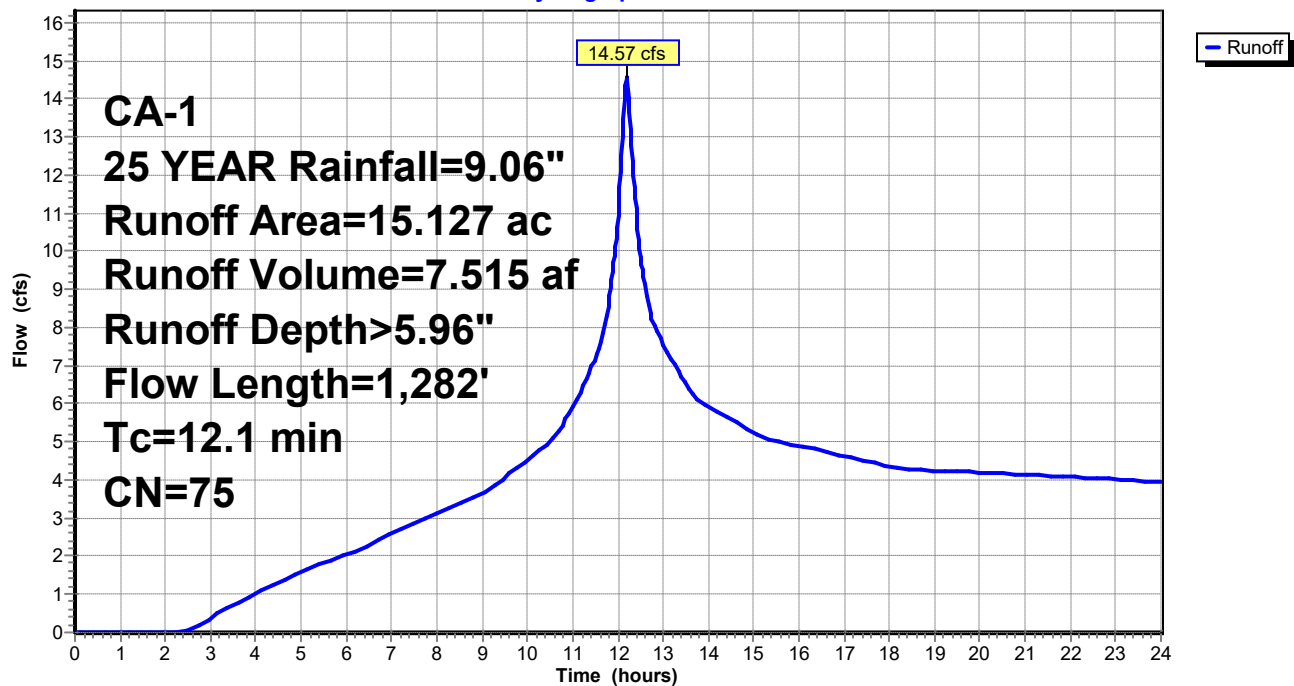
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.02 hrs
CA-1 25 YEAR Rainfall=9.06"

Area (ac)	CN	Description
1.203	70	Brush, Fair, HSG C
0.054	77	Brush, Fair, HSG D
2.232	65	Brush, Good, HSG C
0.589	73	Brush, Good, HSG D
0.161	87	Dirt roads, HSG C
0.032	89	Dirt roads, HSG D
0.081	89	Gravel roads, HSG C
2.065	79	Pasture/grassland/range, Fair, HSG C
0.003	84	Pasture/grassland/range, Fair, HSG D
4.439	74	Pasture/grassland/range, Good, HSG C
1.433	80	Pasture/grassland/range, Good, HSG D
0.292	86	Pasture/grassland/range, Poor, HSG C
0.042	89	Pasture/grassland/range, Poor, HSG D
0.207	98	Paved Road, HSG C
0.032	98	Paved Road, HSG D
0.151	98	Roofs, HSG C
1.508	72	Woods/grass comb., Good, HSG C
0.603	79	Woods/grass comb., Good, HSG D
15.127	75	Weighted Average
14.737		97.42% Pervious Area
0.390		2.58% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
1.3	100	0.0100	1.27		Sheet Flow, PRE WS A
					Smooth surfaces n= 0.011 P2= 4.78"
4.0	441	0.0703	1.86		Shallow Concentrated Flow, PRE WS A
					Short Grass Pasture Kv= 7.0 fps
2.6	291	0.0687	1.83		Shallow Concentrated Flow, PRE WS A
					Short Grass Pasture Kv= 7.0 fps
4.0	365	0.0466	1.51		Shallow Concentrated Flow, PRE WS A
					Short Grass Pasture Kv= 7.0 fps
0.2	85	0.0471	7.14	42.84	Channel Flow, PRE WS A
					Area= 6.0 sf Perim= 7.2' r= 0.83'
					n= 0.040 Mountain streams
12.1	1,282	Total			

Subcatchment WS A: PRE WS A

Hydrograph



Summary for Subcatchment WS A: PRE WS A

Runoff = 17.47 cfs @ 12.19 hrs, Volume= 9.072 af, Depth> 7.20"

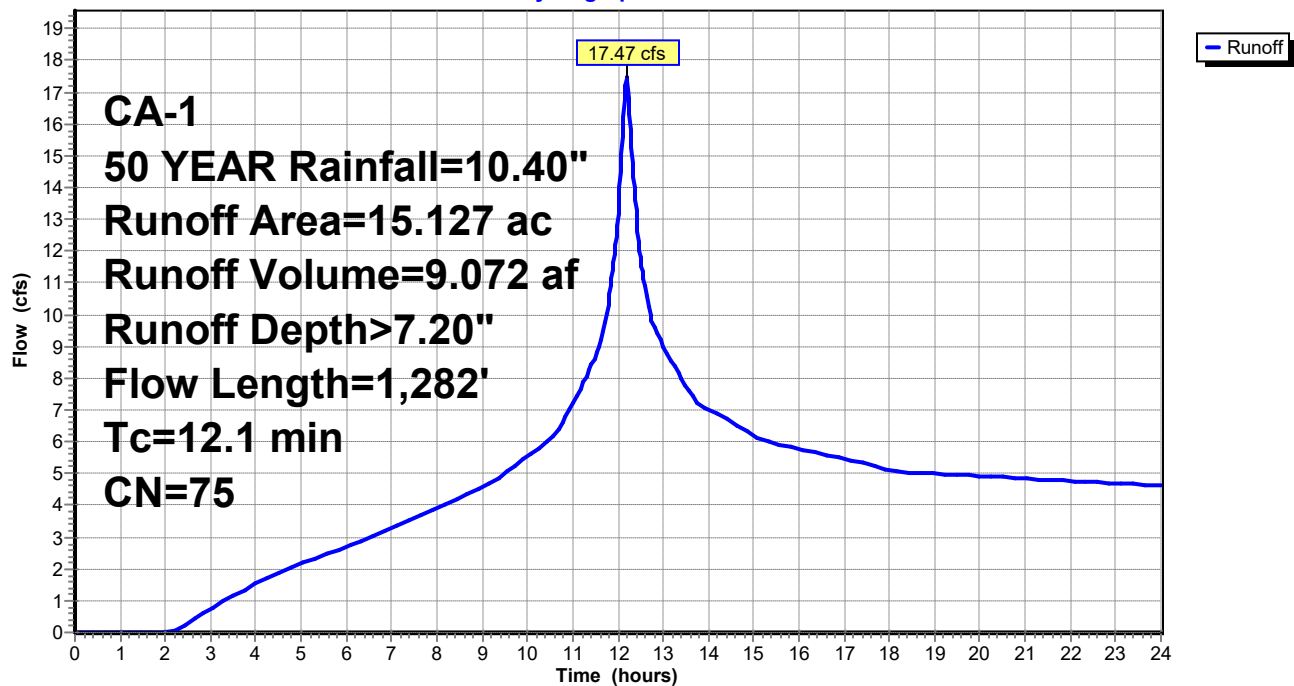
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.02 hrs
CA-1 50 YEAR Rainfall=10.40"

Area (ac)	CN	Description
1.203	70	Brush, Fair, HSG C
0.054	77	Brush, Fair, HSG D
2.232	65	Brush, Good, HSG C
0.589	73	Brush, Good, HSG D
0.161	87	Dirt roads, HSG C
0.032	89	Dirt roads, HSG D
0.081	89	Gravel roads, HSG C
2.065	79	Pasture/grassland/range, Fair, HSG C
0.003	84	Pasture/grassland/range, Fair, HSG D
4.439	74	Pasture/grassland/range, Good, HSG C
1.433	80	Pasture/grassland/range, Good, HSG D
0.292	86	Pasture/grassland/range, Poor, HSG C
0.042	89	Pasture/grassland/range, Poor, HSG D
0.207	98	Paved Road, HSG C
0.032	98	Paved Road, HSG D
0.151	98	Roofs, HSG C
1.508	72	Woods/grass comb., Good, HSG C
0.603	79	Woods/grass comb., Good, HSG D
15.127	75	Weighted Average
14.737		97.42% Pervious Area
0.390		2.58% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
1.3	100	0.0100	1.27		Sheet Flow, PRE WS A
					Smooth surfaces n= 0.011 P2= 4.78"
4.0	441	0.0703	1.86		Shallow Concentrated Flow, PRE WS A
					Short Grass Pasture Kv= 7.0 fps
2.6	291	0.0687	1.83		Shallow Concentrated Flow, PRE WS A
					Short Grass Pasture Kv= 7.0 fps
4.0	365	0.0466	1.51		Shallow Concentrated Flow, PRE WS A
					Short Grass Pasture Kv= 7.0 fps
0.2	85	0.0471	7.14	42.84	Channel Flow, PRE WS A
					Area= 6.0 sf Perim= 7.2' r= 0.83'
					n= 0.040 Mountain streams
12.1	1,282	Total			

Subcatchment WS A: PRE WS A

Hydrograph



Summary for Subcatchment WS A: PRE WS A

Runoff = 20.28 cfs @ 12.19 hrs, Volume= 10.604 af, Depth> 8.41"

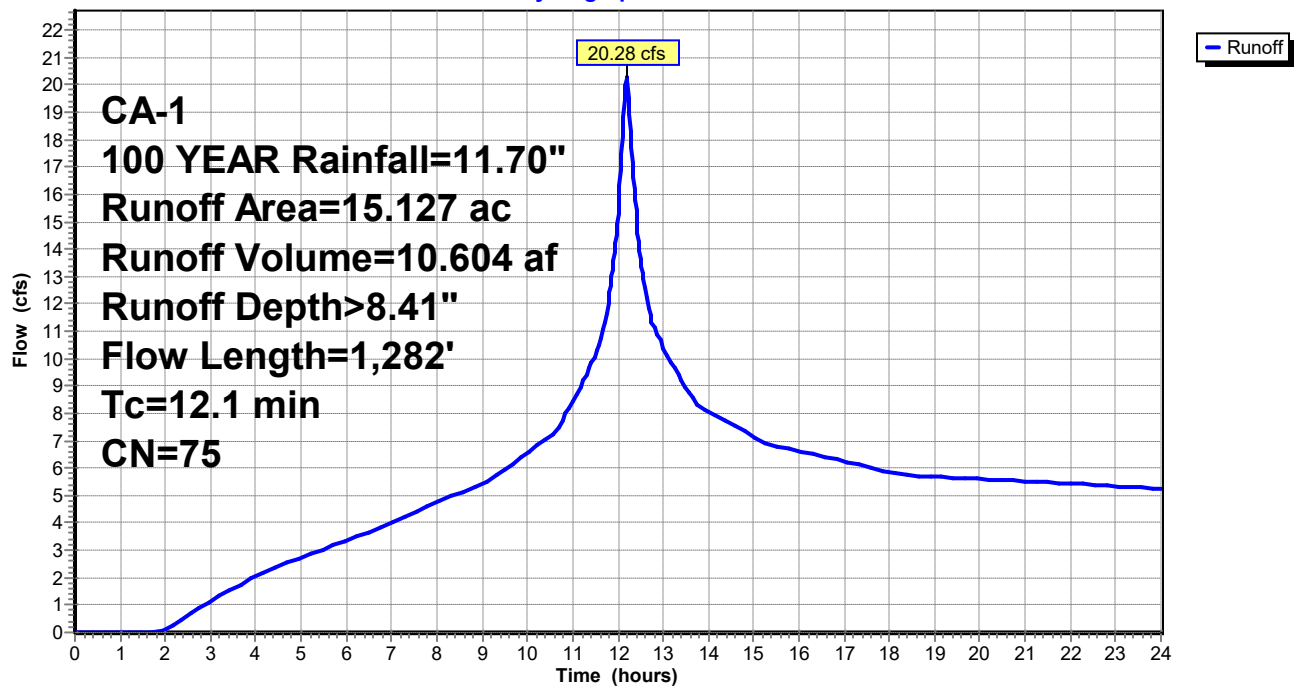
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.02 hrs
CA-1 100 YEAR Rainfall=11.70"

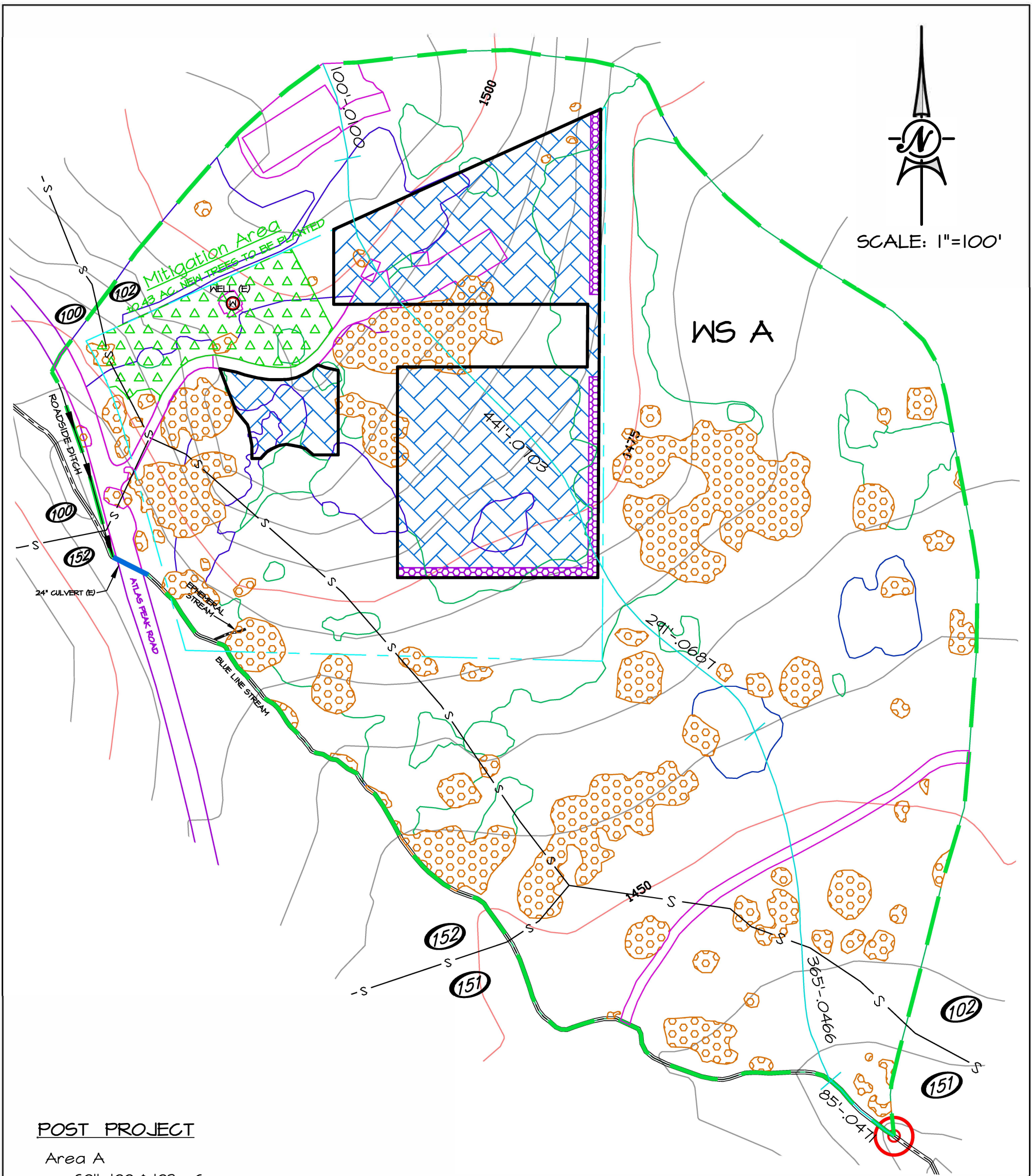
Area (ac)	CN	Description
1.203	70	Brush, Fair, HSG C
0.054	77	Brush, Fair, HSG D
2.232	65	Brush, Good, HSG C
0.589	73	Brush, Good, HSG D
0.161	87	Dirt roads, HSG C
0.032	89	Dirt roads, HSG D
0.081	89	Gravel roads, HSG C
2.065	79	Pasture/grassland/range, Fair, HSG C
0.003	84	Pasture/grassland/range, Fair, HSG D
4.439	74	Pasture/grassland/range, Good, HSG C
1.433	80	Pasture/grassland/range, Good, HSG D
0.292	86	Pasture/grassland/range, Poor, HSG C
0.042	89	Pasture/grassland/range, Poor, HSG D
0.207	98	Paved Road, HSG C
0.032	98	Paved Road, HSG D
0.151	98	Roofs, HSG C
1.508	72	Woods/grass comb., Good, HSG C
0.603	79	Woods/grass comb., Good, HSG D
15.127	75	Weighted Average
14.737		97.42% Pervious Area
0.390		2.58% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
1.3	100	0.0100	1.27		Sheet Flow, PRE WS A
					Smooth surfaces n= 0.011 P2= 4.78"
4.0	441	0.0703	1.86		Shallow Concentrated Flow, PRE WS A
					Short Grass Pasture Kv= 7.0 fps
2.6	291	0.0687	1.83		Shallow Concentrated Flow, PRE WS A
					Short Grass Pasture Kv= 7.0 fps
4.0	365	0.0466	1.51		Shallow Concentrated Flow, PRE WS A
					Short Grass Pasture Kv= 7.0 fps
0.2	85	0.0471	7.14	42.84	Channel Flow, PRE WS A
					Area= 6.0 sf Perim= 7.2' r= 0.83'
					n= 0.040 Mountain streams
12.1	1,282	Total			

Subcatchment WS A: PRE WS A

Hydrograph





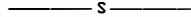
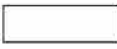
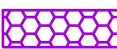

 SCALE: 1"=100'

POST PROJECT

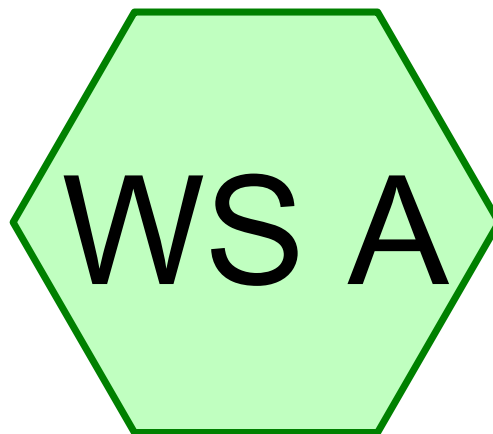
Area A

- SOIL 100 & 102 = C
 - TOTAL AREA = 12.339 ACRES
 - TREE (GOOD) AREA = 1.443 ACRES
 - BRUSH (GOOD) AREA = 1.889 ACRES
 - BRUSH (FAIR) AREA = 0.713 ACRES
 - GRASS (GOOD) AREA = 4.269 ACRES
 - GRASS (FAIR) AREA = 0.881 ACRES
 - GRASS (POOR) AREA = 0.216 ACRES
 - DEVELOPED AREA = 0.459 ACRES
 - NEW VINEYARD AREA = 1.906 ACRES
 - ROCK DISPOSAL AVENUE = 0.133 ACRES
 - TREE PLANTING AREA = 0.430 ACRES
- SOIL 151 & 152 = D
 - TOTAL AREA = 2.788 ACRES
 - TREE (GOOD) AREA = 0.603 ACRES
 - BRUSH (GOOD) AREA = 0.589 ACRES
 - BRUSH (FAIR) AREA = 0.054 ACRES
 - GRASS (GOOD) AREA = 1.433 ACRES
 - GRASS (FAIR) AREA = 0.003 ACRES
 - GRASS (POOR) AREA = 0.042 ACRES
 - DEVELOPED AREA = 0.064 ACRES

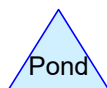
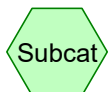
LEGEND

-  FLOW PATH
-  POINT OF INTEREST
-  SOIL TYPE
-  SOIL TYPE BOUNDARY
-  GRASS & BRUSH AREA
-  TREE CANOPY
-  TREE PLANTING AREA
-  ROCK DISPOSAL AVENUE
-  PROPOSED VINEYARD
-  PROPOSED VINEYARD AREA
-  WATERSHED BOUNDARY

ATLAS ROCK
 3380 ATLAS PEAK ROAD
 POST HYDROLOGY MAP



POST WS A



Routing Diagram for 21ECPAtlasRock_POST_Hydro
Prepared by Napa Valley Vineyard Engineering, Printed 1/31/2022
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21ECPAtlasRock_POST_Hydro

CA-1 2 YEAR Rainfall=4.78"

Prepared by Napa Valley Vineyard Engineering

Printed 1/31/2022

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Summary for Subcatchment WS A: POST WS A

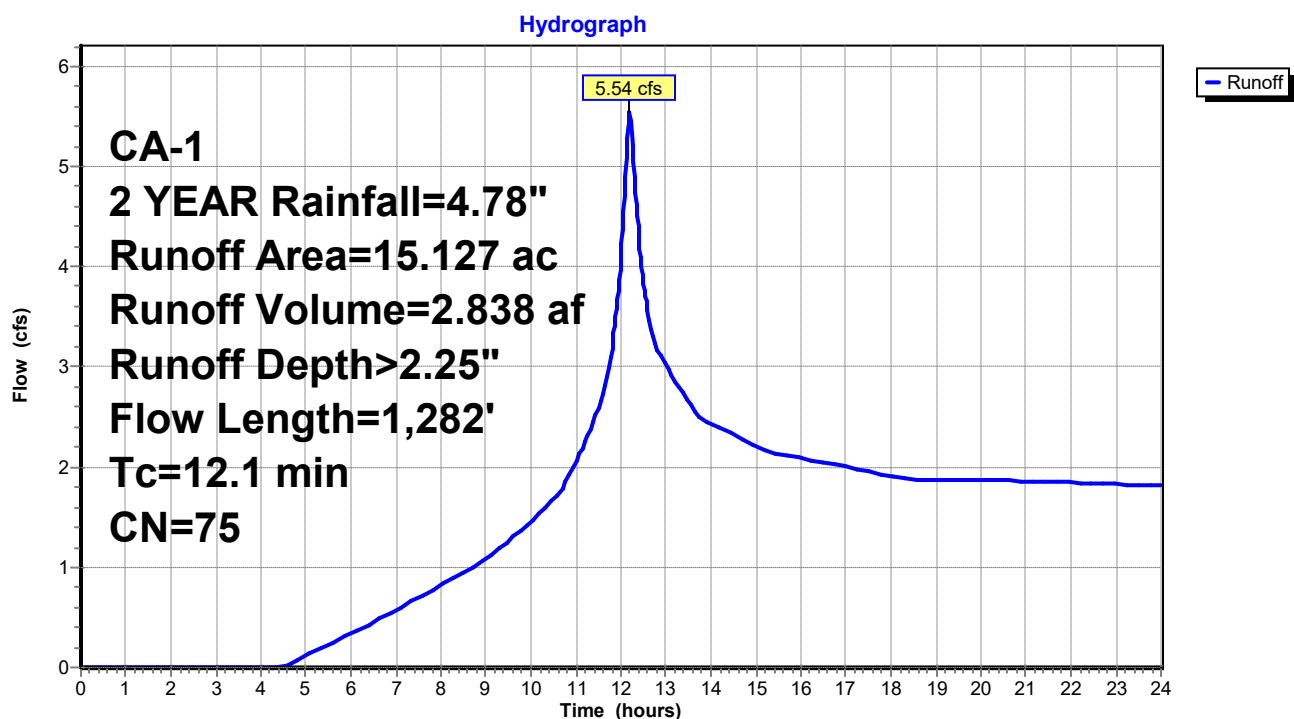
Runoff = 5.54 cfs @ 12.19 hrs, Volume= 2.838 af, Depth> 2.25"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.02 hrs
CA-1 2 YEAR Rainfall=4.78"

Area (ac)	CN	Description
0.713	70	Brush, Fair, HSG C
0.054	77	Brush, Fair, HSG D
1.889	65	Brush, Good, HSG C
0.589	73	Brush, Good, HSG D
0.075	87	Dirt roads, HSG C
0.032	89	Dirt roads, HSG D
0.057	89	Gravel roads, HSG C
0.881	79	Pasture/grassland/range, Fair, HSG C
0.003	84	Pasture/grassland/range, Fair, HSG D
4.269	74	Pasture/grassland/range, Good, HSG C
1.433	80	Pasture/grassland/range, Good, HSG D
0.216	86	Pasture/grassland/range, Poor, HSG C
0.042	89	Pasture/grassland/range, Poor, HSG D
0.207	98	Paved Road, HSG C
0.032	98	Paved Road, HSG D
0.120	98	Roofs, HSG C
1.906	75	Vineyard (P), Good, HSG C
1.443	72	Woods/grass comb., Good, HSG C
0.603	79	Woods/grass comb., Good, HSG D
* 0.430	72	Mitigation Area - Tree Planting, Good, HSG C
* 0.133	89	Rock Disposal Avenue (P), HSG C
15.127	75	Weighted Average
14.768		97.63% Pervious Area
0.359		2.37% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
1.3	100	0.0100	1.27		Sheet Flow, POST WS A Smooth surfaces n= 0.011 P2= 4.78"
4.0	441	0.0703	1.86		Shallow Concentrated Flow, POST WS A Short Grass Pasture Kv= 7.0 fps
2.6	291	0.0687	1.83		Shallow Concentrated Flow, POST WS A Short Grass Pasture Kv= 7.0 fps
4.0	365	0.0466	1.51		Shallow Concentrated Flow, POST WS A Short Grass Pasture Kv= 7.0 fps
0.2	85	0.0471	7.14	42.84	Channel Flow, POST WS A Area= 6.0 sf Perim= 7.2' r= 0.83' n= 0.040 Mountain streams
12.1	1,282	Total			

Subcatchment WS A: POST WS A



21ECPAtlasRock_POST_Hydro

CA-1 5 YEAR Rainfall=6.19"

Prepared by Napa Valley Vineyard Engineering

Printed 1/31/2022

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Summary for Subcatchment WS A: POST WS A

Runoff = 8.44 cfs @ 12.19 hrs, Volume= 4.305 af, Depth> 3.42"

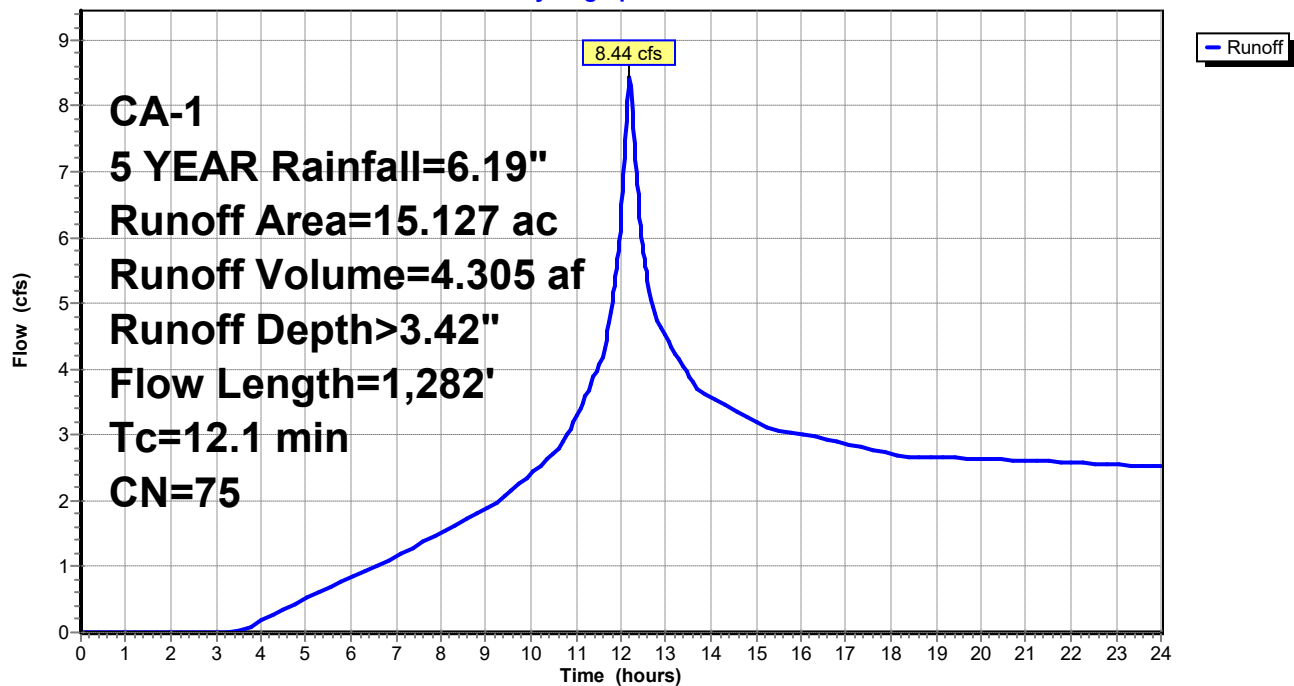
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.02 hrs
CA-1 5 YEAR Rainfall=6.19"

Area (ac)	CN	Description
0.713	70	Brush, Fair, HSG C
0.054	77	Brush, Fair, HSG D
1.889	65	Brush, Good, HSG C
0.589	73	Brush, Good, HSG D
0.075	87	Dirt roads, HSG C
0.032	89	Dirt roads, HSG D
0.057	89	Gravel roads, HSG C
0.881	79	Pasture/grassland/range, Fair, HSG C
0.003	84	Pasture/grassland/range, Fair, HSG D
4.269	74	Pasture/grassland/range, Good, HSG C
1.433	80	Pasture/grassland/range, Good, HSG D
0.216	86	Pasture/grassland/range, Poor, HSG C
0.042	89	Pasture/grassland/range, Poor, HSG D
0.207	98	Paved Road, HSG C
0.032	98	Paved Road, HSG D
0.120	98	Roofs, HSG C
1.906	75	Vineyard (P), Good, HSG C
1.443	72	Woods/grass comb., Good, HSG C
0.603	79	Woods/grass comb., Good, HSG D
* 0.430	72	Mitigation Area - Tree Planting, Good, HSG C
* 0.133	89	Rock Disposal Avenue (P), HSG C
15.127	75	Weighted Average
14.768		97.63% Pervious Area
0.359		2.37% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
1.3	100	0.0100	1.27		Sheet Flow, POST WS A Smooth surfaces n= 0.011 P2= 4.78"
4.0	441	0.0703	1.86		Shallow Concentrated Flow, POST WS A Short Grass Pasture Kv= 7.0 fps
2.6	291	0.0687	1.83		Shallow Concentrated Flow, POST WS A Short Grass Pasture Kv= 7.0 fps
4.0	365	0.0466	1.51		Shallow Concentrated Flow, POST WS A Short Grass Pasture Kv= 7.0 fps
0.2	85	0.0471	7.14	42.84	Channel Flow, POST WS A Area= 6.0 sf Perim= 7.2' r= 0.83' n= 0.040 Mountain streams
12.1	1,282	Total			

Subcatchment WS A: POST WS A

Hydrograph



21ECPAtlasRock_POST_Hydro

CA-1 10 YEAR Rainfall=7.34"

Prepared by Napa Valley Vineyard Engineering

Printed 1/31/2022

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Summary for Subcatchment WS A: POST WS A

Runoff = 10.87 cfs @ 12.19 hrs, Volume= 5.565 af, Depth> 4.41"

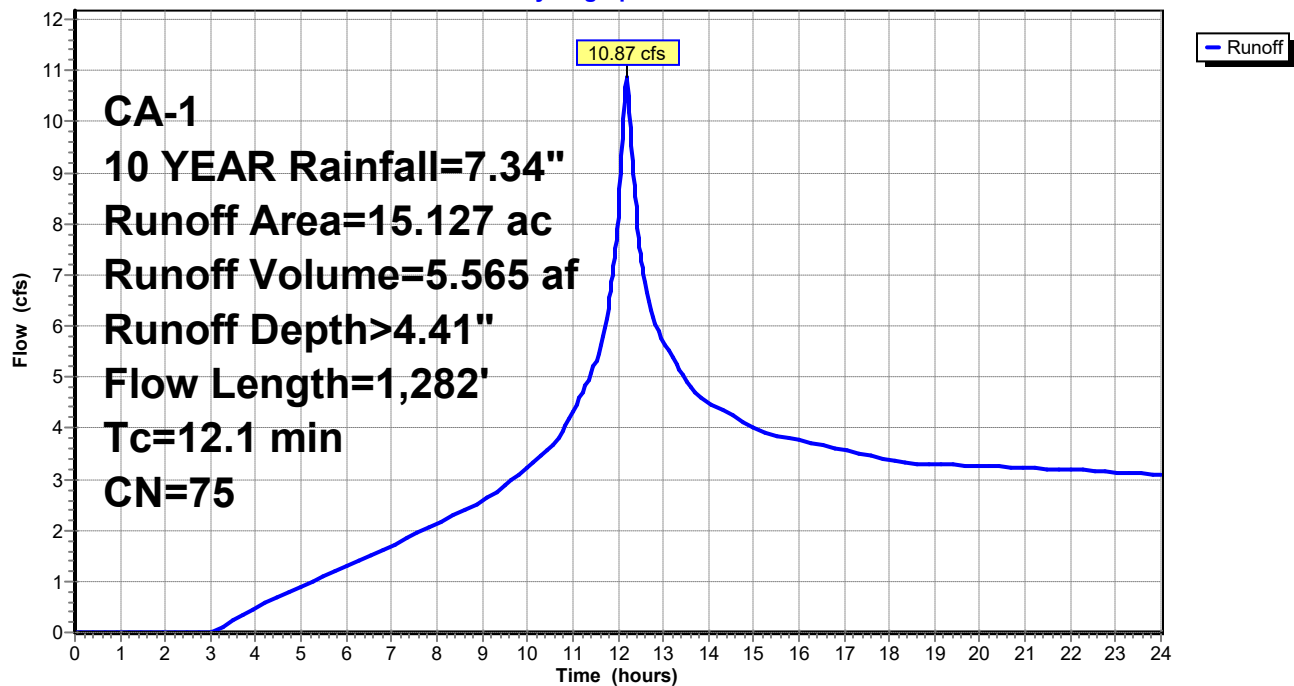
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.02 hrs
CA-1 10 YEAR Rainfall=7.34"

Area (ac)	CN	Description
0.713	70	Brush, Fair, HSG C
0.054	77	Brush, Fair, HSG D
1.889	65	Brush, Good, HSG C
0.589	73	Brush, Good, HSG D
0.075	87	Dirt roads, HSG C
0.032	89	Dirt roads, HSG D
0.057	89	Gravel roads, HSG C
0.881	79	Pasture/grassland/range, Fair, HSG C
0.003	84	Pasture/grassland/range, Fair, HSG D
4.269	74	Pasture/grassland/range, Good, HSG C
1.433	80	Pasture/grassland/range, Good, HSG D
0.216	86	Pasture/grassland/range, Poor, HSG C
0.042	89	Pasture/grassland/range, Poor, HSG D
0.207	98	Paved Road, HSG C
0.032	98	Paved Road, HSG D
0.120	98	Roofs, HSG C
1.906	75	Vineyard (P), Good, HSG C
1.443	72	Woods/grass comb., Good, HSG C
0.603	79	Woods/grass comb., Good, HSG D
* 0.430	72	Mitigation Area - Tree Planting, Good, HSG C
* 0.133	89	Rock Disposal Avenue (P), HSG C
15.127	75	Weighted Average
14.768		97.63% Pervious Area
0.359		2.37% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
1.3	100	0.0100	1.27		Sheet Flow, POST WS A Smooth surfaces n= 0.011 P2= 4.78"
4.0	441	0.0703	1.86		Shallow Concentrated Flow, POST WS A Short Grass Pasture Kv= 7.0 fps
2.6	291	0.0687	1.83		Shallow Concentrated Flow, POST WS A Short Grass Pasture Kv= 7.0 fps
4.0	365	0.0466	1.51		Shallow Concentrated Flow, POST WS A Short Grass Pasture Kv= 7.0 fps
0.2	85	0.0471	7.14	42.84	Channel Flow, POST WS A Area= 6.0 sf Perim= 7.2' r= 0.83' n= 0.040 Mountain streams
12.1	1,282	Total			

Subcatchment WS A: POST WS A

Hydrograph



21ECPAtlasRock_POST_Hydro

CA-1 25 YEAR Rainfall=9.06"

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Summary for Subcatchment WS A: POST WS A

Runoff = 14.57 cfs @ 12.19 hrs, Volume= 7.515 af, Depth> 5.96"

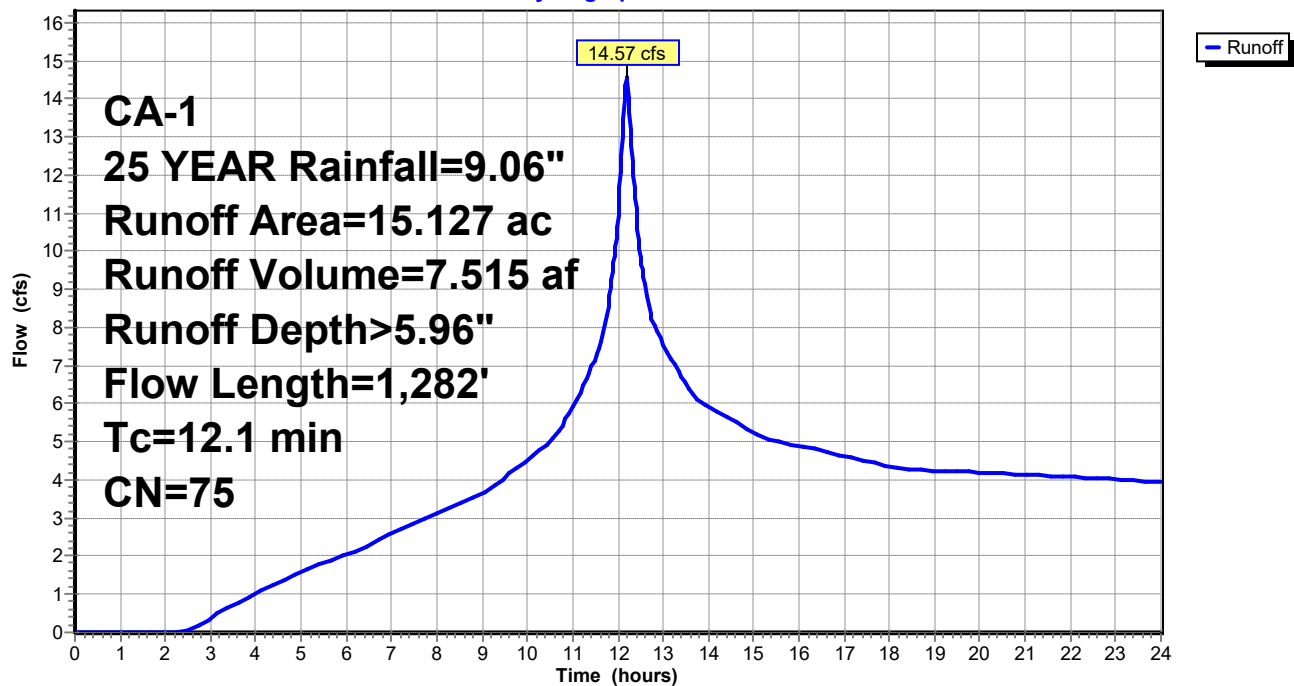
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.02 hrs
CA-1 25 YEAR Rainfall=9.06"

Area (ac)	CN	Description
0.713	70	Brush, Fair, HSG C
0.054	77	Brush, Fair, HSG D
1.889	65	Brush, Good, HSG C
0.589	73	Brush, Good, HSG D
0.075	87	Dirt roads, HSG C
0.032	89	Dirt roads, HSG D
0.057	89	Gravel roads, HSG C
0.881	79	Pasture/grassland/range, Fair, HSG C
0.003	84	Pasture/grassland/range, Fair, HSG D
4.269	74	Pasture/grassland/range, Good, HSG C
1.433	80	Pasture/grassland/range, Good, HSG D
0.216	86	Pasture/grassland/range, Poor, HSG C
0.042	89	Pasture/grassland/range, Poor, HSG D
0.207	98	Paved Road, HSG C
0.032	98	Paved Road, HSG D
0.120	98	Roofs, HSG C
1.906	75	Vineyard (P), Good, HSG C
1.443	72	Woods/grass comb., Good, HSG C
0.603	79	Woods/grass comb., Good, HSG D
* 0.430	72	Mitigation Area - Tree Planting, Good, HSG C
* 0.133	89	Rock Disposal Avenue (P), HSG C
15.127	75	Weighted Average
14.768		97.63% Pervious Area
0.359		2.37% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
1.3	100	0.0100	1.27		Sheet Flow, POST WS A Smooth surfaces n= 0.011 P2= 4.78"
4.0	441	0.0703	1.86		Shallow Concentrated Flow, POST WS A Short Grass Pasture Kv= 7.0 fps
2.6	291	0.0687	1.83		Shallow Concentrated Flow, POST WS A Short Grass Pasture Kv= 7.0 fps
4.0	365	0.0466	1.51		Shallow Concentrated Flow, POST WS A Short Grass Pasture Kv= 7.0 fps
0.2	85	0.0471	7.14	42.84	Channel Flow, POST WS A Area= 6.0 sf Perim= 7.2' r= 0.83' n= 0.040 Mountain streams
12.1	1,282	Total			

Subcatchment WS A: POST WS A

Hydrograph



21ECPAtlasRock_POST_Hydro

CA-1 50 YEAR Rainfall=10.40"

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Summary for Subcatchment WS A: POST WS A

Runoff = 17.47 cfs @ 12.19 hrs, Volume= 9.072 af, Depth> 7.20"

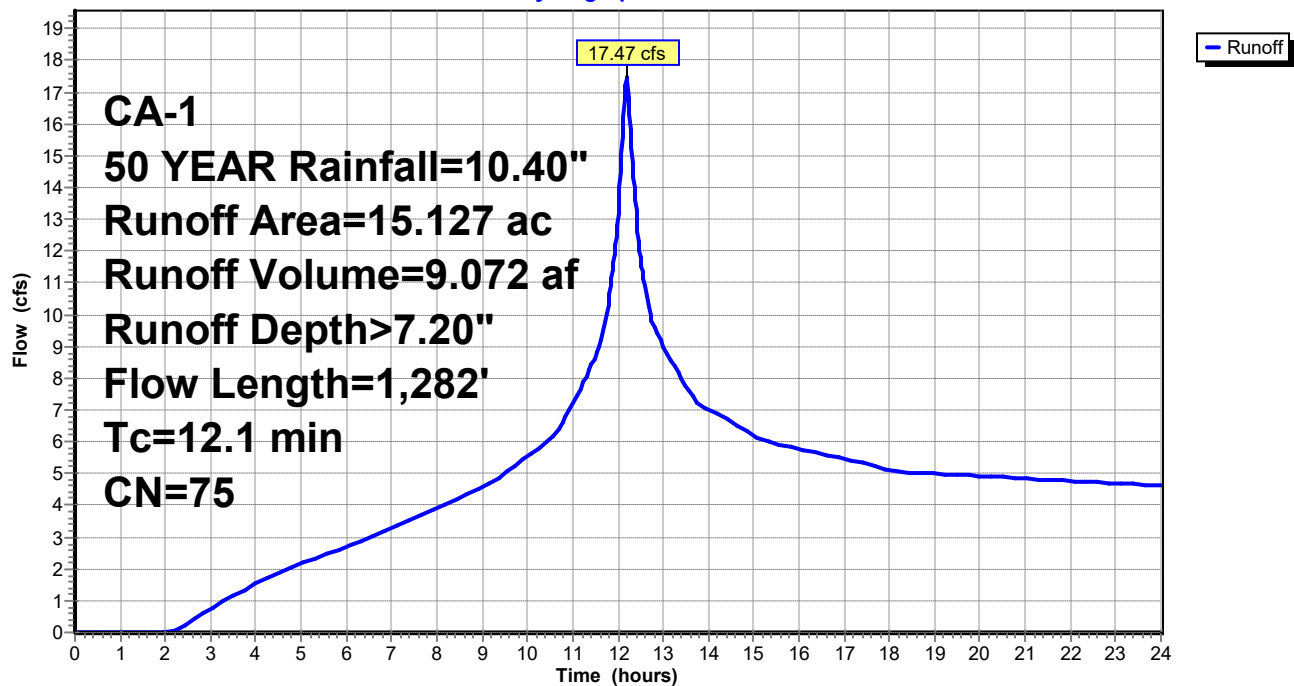
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.02 hrs
CA-1 50 YEAR Rainfall=10.40"

Area (ac)	CN	Description
0.713	70	Brush, Fair, HSG C
0.054	77	Brush, Fair, HSG D
1.889	65	Brush, Good, HSG C
0.589	73	Brush, Good, HSG D
0.075	87	Dirt roads, HSG C
0.032	89	Dirt roads, HSG D
0.057	89	Gravel roads, HSG C
0.881	79	Pasture/grassland/range, Fair, HSG C
0.003	84	Pasture/grassland/range, Fair, HSG D
4.269	74	Pasture/grassland/range, Good, HSG C
1.433	80	Pasture/grassland/range, Good, HSG D
0.216	86	Pasture/grassland/range, Poor, HSG C
0.042	89	Pasture/grassland/range, Poor, HSG D
0.207	98	Paved Road, HSG C
0.032	98	Paved Road, HSG D
0.120	98	Roofs, HSG C
1.906	75	Vineyard (P), Good, HSG C
1.443	72	Woods/grass comb., Good, HSG C
0.603	79	Woods/grass comb., Good, HSG D
* 0.430	72	Mitigation Area - Tree Planting, Good, HSG C
* 0.133	89	Rock Disposal Avenue (P), HSG C
15.127	75	Weighted Average
14.768		97.63% Pervious Area
0.359		2.37% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
1.3	100	0.0100	1.27		Sheet Flow, POST WS A Smooth surfaces n= 0.011 P2= 4.78"
4.0	441	0.0703	1.86		Shallow Concentrated Flow, POST WS A Short Grass Pasture Kv= 7.0 fps
2.6	291	0.0687	1.83		Shallow Concentrated Flow, POST WS A Short Grass Pasture Kv= 7.0 fps
4.0	365	0.0466	1.51		Shallow Concentrated Flow, POST WS A Short Grass Pasture Kv= 7.0 fps
0.2	85	0.0471	7.14	42.84	Channel Flow, POST WS A Area= 6.0 sf Perim= 7.2' r= 0.83' n= 0.040 Mountain streams
12.1	1,282	Total			

Subcatchment WS A: POST WS A

Hydrograph



21ECPAtlasRock_POST_Hydro

CA-1 100 YEAR Rainfall=11.70"

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Summary for Subcatchment WS A: POST WS A

Runoff = 20.28 cfs @ 12.19 hrs, Volume= 10.604 af, Depth> 8.41"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.02 hrs
CA-1 100 YEAR Rainfall=11.70"

Area (ac)	CN	Description
0.713	70	Brush, Fair, HSG C
0.054	77	Brush, Fair, HSG D
1.889	65	Brush, Good, HSG C
0.589	73	Brush, Good, HSG D
0.075	87	Dirt roads, HSG C
0.032	89	Dirt roads, HSG D
0.057	89	Gravel roads, HSG C
0.881	79	Pasture/grassland/range, Fair, HSG C
0.003	84	Pasture/grassland/range, Fair, HSG D
4.269	74	Pasture/grassland/range, Good, HSG C
1.433	80	Pasture/grassland/range, Good, HSG D
0.216	86	Pasture/grassland/range, Poor, HSG C
0.042	89	Pasture/grassland/range, Poor, HSG D
0.207	98	Paved Road, HSG C
0.032	98	Paved Road, HSG D
0.120	98	Roofs, HSG C
1.906	75	Vineyard (P), Good, HSG C
1.443	72	Woods/grass comb., Good, HSG C
0.603	79	Woods/grass comb., Good, HSG D
* 0.430	72	Mitigation Area - Tree Planting, Good, HSG C
* 0.133	89	Rock Disposal Avenue (P), HSG C
15.127	75	Weighted Average
14.768		97.63% Pervious Area
0.359		2.37% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
1.3	100	0.0100	1.27		Sheet Flow, POST WS A Smooth surfaces n= 0.011 P2= 4.78"
4.0	441	0.0703	1.86		Shallow Concentrated Flow, POST WS A Short Grass Pasture Kv= 7.0 fps
2.6	291	0.0687	1.83		Shallow Concentrated Flow, POST WS A Short Grass Pasture Kv= 7.0 fps
4.0	365	0.0466	1.51		Shallow Concentrated Flow, POST WS A Short Grass Pasture Kv= 7.0 fps
0.2	85	0.0471	7.14	42.84	Channel Flow, POST WS A Area= 6.0 sf Perim= 7.2' r= 0.83' n= 0.040 Mountain streams
12.1	1,282	Total			

Subcatchment WS A: POST WS A

Hydrograph

