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

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MEMORANDUM

Date: October 6, 2020

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

From: Matthew S. Bueno, P.E.
Rachel Rosasco, E.I.T.

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

Re: Dooley Vineyard Track I ECP
APN 052-460-020
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 April 2020 was revised to include the existing vineyard block as requested by Napa County staff.

HydroCAD software was used to estimate pre- and post-project runoff from the watershed containing the proposed development area. 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.

One (1) watershed was delineated for the hydrologic modeling. The watershed drains north-west off of the property into a roadside ditch that eventual outlets into a tributary of Witweather Creek. Please see the attached figures for the location of the watershed.

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

Forward Silt Loam, 5-39% slopes (Map Unit Symbol 139)
Sobrante Loam, 5-30% slopes (Map Unit Symbol 178)

The Forward Silt Loam and Sobrante Loam soil groups are classified as Hydrologic Soil Group (HSG) C. 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 PPI and Napa County contours. A site visit was then conducted on November, 2019 by Matt Bueno of PPI Engineering to ground truth the orthophotos and determine the existing land use conditions. An additional site visit was made with Napa County and PPI Engineering staff on June 16, 2020 to confirm existing 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. Existing pasture/grass land uses were classified as annual grass. The land use classification of annual grass is based on the Natural Resource Conservation Service *Engineering Field Handbook* Chapter 2-Supplement 1 "Estimating Runoff in California" per guidance from Napa County Engineering staff.

The existing vineyard block now included in the revised ECP was modeled as annual grass in good condition for pre-project calculations. Pre-project conditions for the new transect area were estimated using historic aerial photos that show vegetation comparable to the undeveloped areas prior to vineyard development. Please see the attached figures for existing and proposed land use delineations.

The Time of Concentration (Tc) flow path within the watershed was determined using both PPI 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. Shallow concentrated flow segments were updated to account for the surface type based upon the procedures outlined in Chapter 15 of the *National Engineering Handbook Part 630*. The flow path for the watershed did not change from pre-project to post-project. Please see the attached figures for both the pre- and post-project Tc flow paths by watershed.

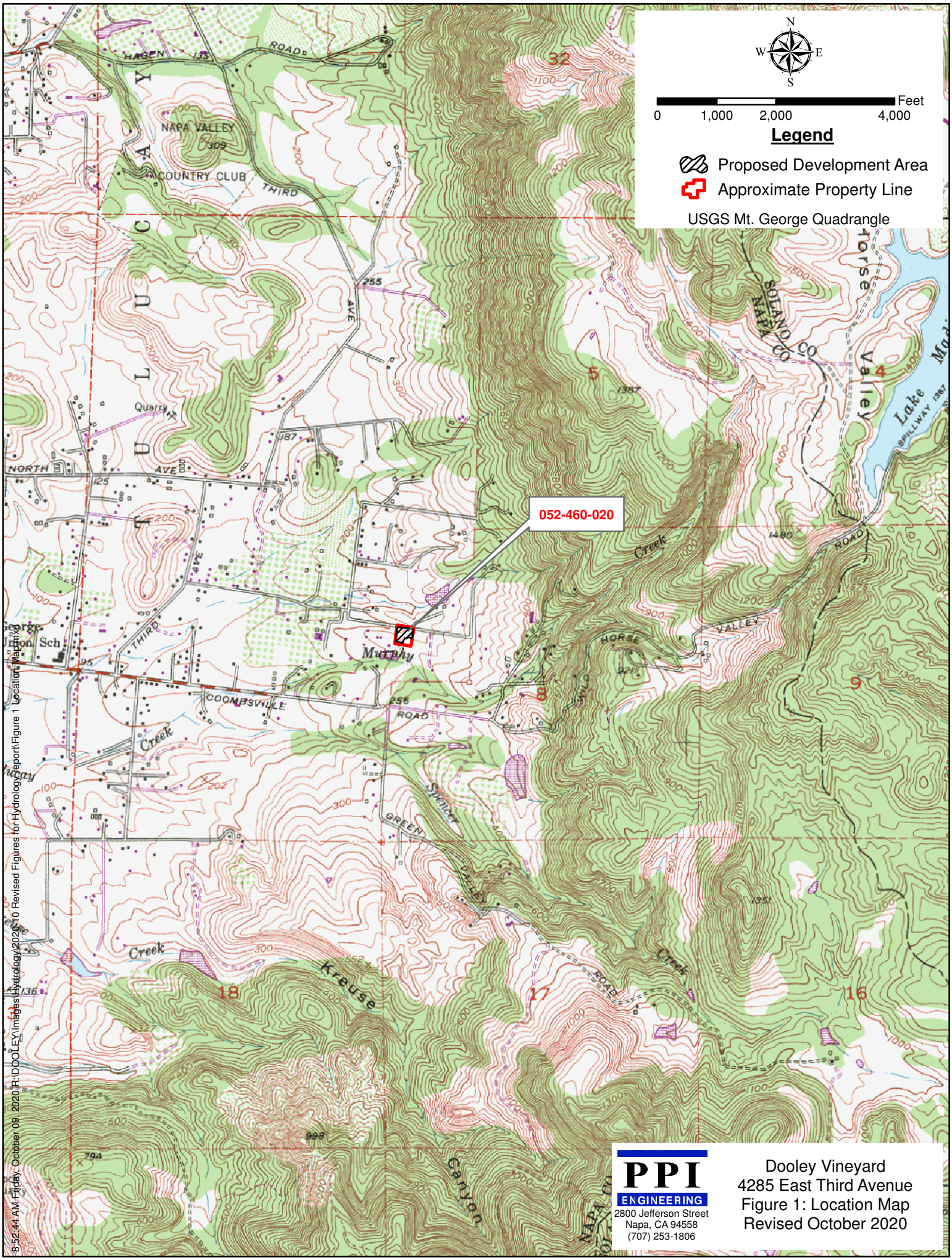
Pre- and post-project runoff calculations from the HydroCAD model are summarized in Table 1. Runoff was calculated for the 2-, 10-, 50-, and 100-year storms respectively.

Table 1. Hydrologic Analysis Summary

	Runoff (cfs)		
	Watershed 1		
	Pre-Project	Post-Project	Increase/Decrease
2-Year Storm	0.53	0.53	0.00
10-Year Storm	1.41	1.41	0.00
50-Year Storm	2.40	2.40	0.00
100-Year Storm	2.84	2.84	0.00

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 curve number (CN) nor the time of concentration (Tc) changed for the post-project conditions within the watershed. 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.



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Dooley Vineyard
4285 East Third Avenue
Figure 1: Location Map
Revised October 2020

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Dooley Vineyard
4285 East Third Avenue
Figure 2: Property Boundary
Revised October 2020

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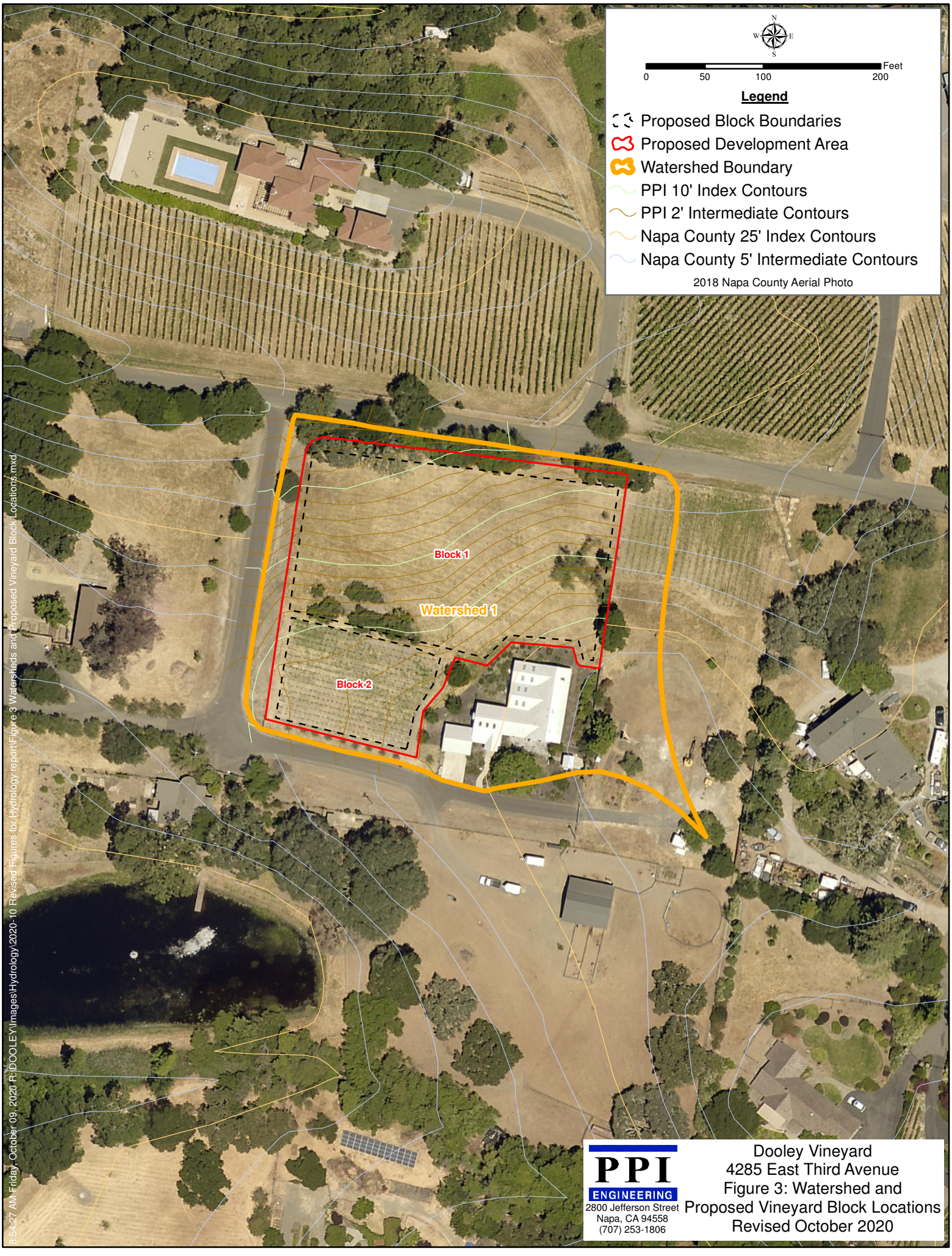

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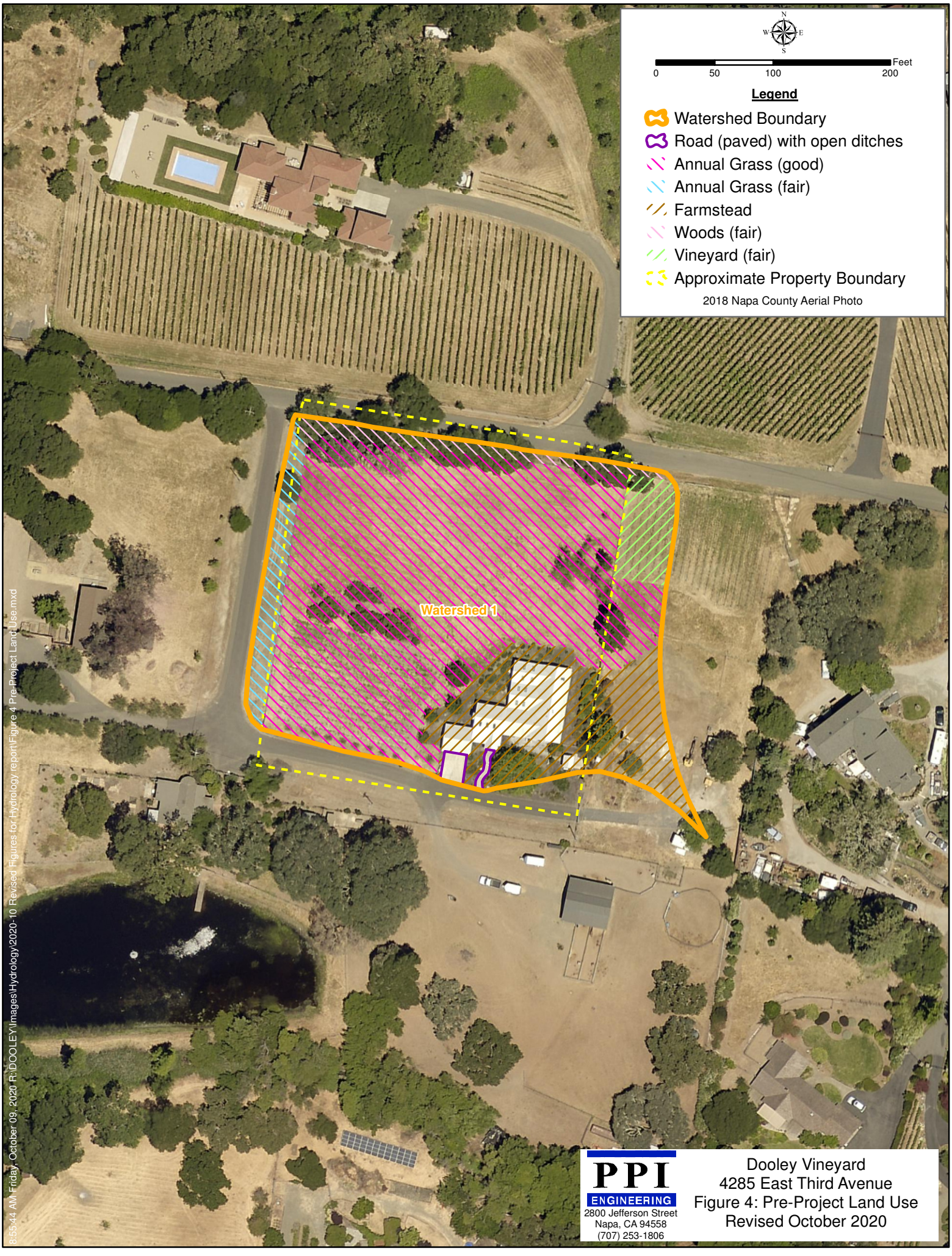
Dooley Vineyard
4285 East Third Avenue
Figure 3: Watershed and
Proposed Vineyard Block Locations
Revised October 2020



8:55:44 AM Friday, October 09, 2020 R:\DOOLEY\Images\Hydrology\2020-10 Revised Figures for Hydrology report\Figure 4 Pre-Project Land Use.mxd

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Dooley Vineyard
4285 East Third Avenue
Figure 4: Pre-Project Land Use
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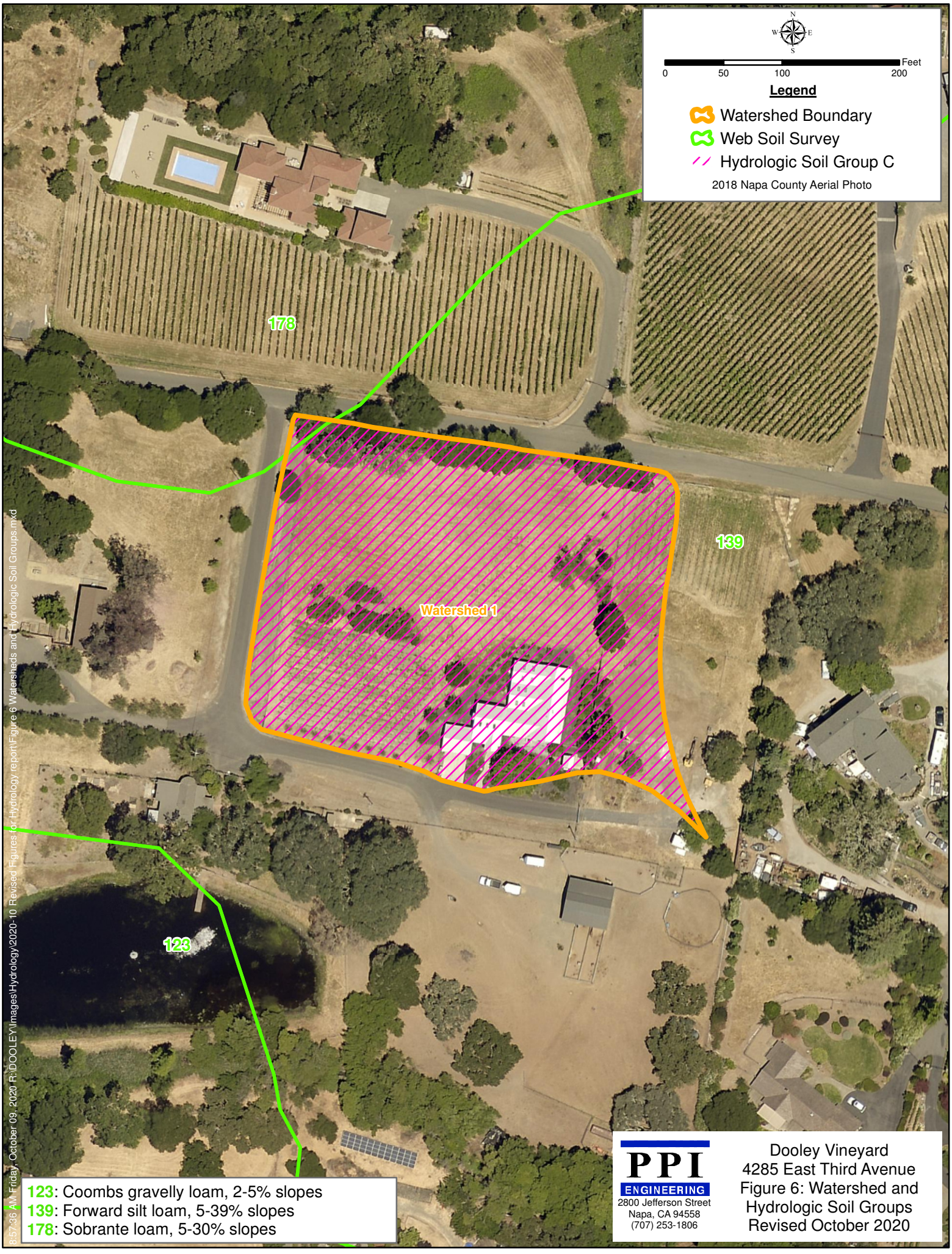
Dooley Vineyard
4285 East Third Avenue
Figure 5: Developed Land Use
Revised October 2020


N
W
E
S
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100
200
Feet
Legend
Watershed Boundary
Web Soil Survey
Hydrologic Soil Group C
2018 Napa County Aerial Photo
178
139
Watershed 1
123
123: Coombs gravelly loam, 2-5% slopes
139: Forward silt loam, 5-39% slopes
178: Sobrante loam, 5-30% slopes
8:57:36 AM Friday, October 09, 2020 R:\DOOLEY\Images\Hydrology\2020-10 Revised Figures for Hydrology report\Figure 6 Watersheds and Hydrologic Soil Groups.mxd
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Figure 6: Watershed and
Hydrologic Soil Groups
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Dooley Vineyard
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Figure 7: Pre-Project Time of Concentration Flow Paths
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8:58:51 AM Friday, October 09, 2020 R:\DOOLEY\Images\Hydrology\2020-10 Revised Figures for Hydrology report\Figure 8 Time of Concentration Flow Paths.mxd

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Dooley Vineyard
4285 East Third Avenue
Figure 8: Post-Project Time of Concentration Flow Paths
Revised October 2020

Subcat WS-1

Subcat Reach Pond Link

Routing Diagram for Dooley Pre-Project
Prepared by PPI Engineering, Printed 9/24/2020

Summary for Subcatchment WS-1: Subcat WS-1

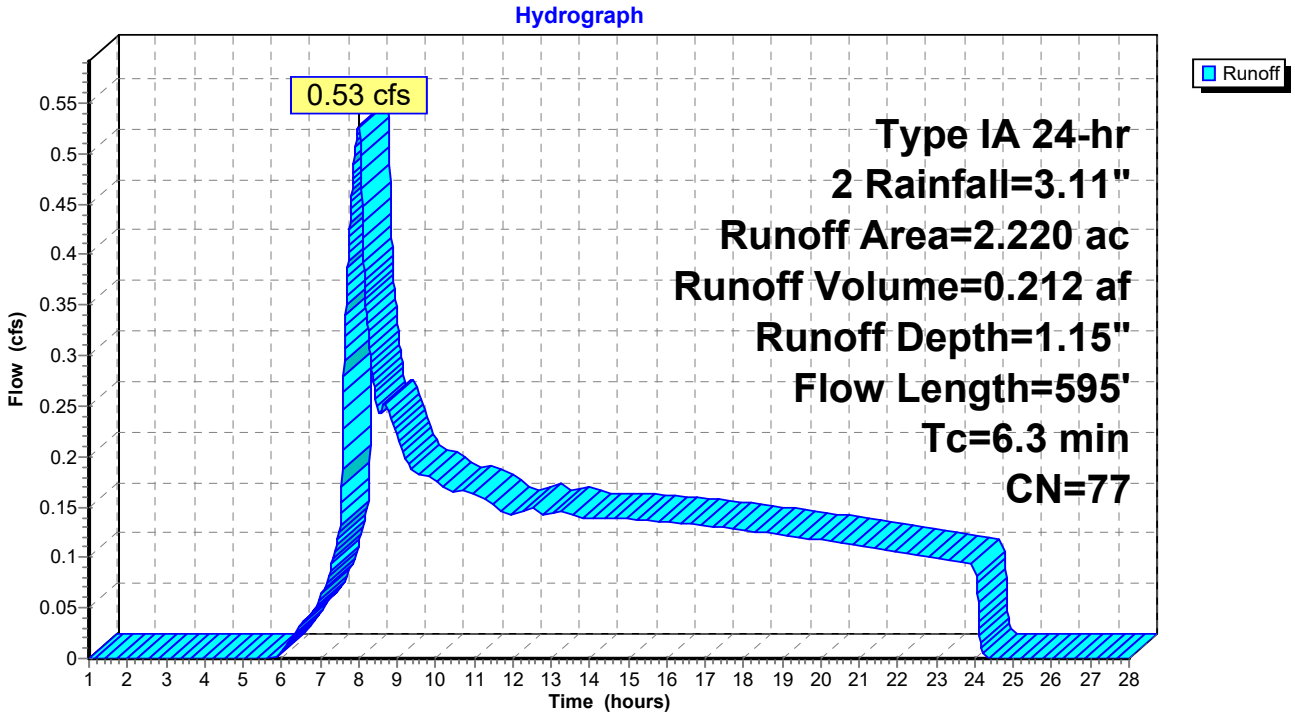
Runoff = 0.53 cfs @ 8.01 hrs, Volume= 0.212 af, Depth= 1.15"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 1.00-28.00 hrs, dt= 0.01 hrs
Type IA 24-hr 2 Rainfall=3.11"

Area (ac)	CN	Description
0.104	79	Annual Grass, Fair, HSG C
1.461	75	Annual Grass, Good, HSG C
0.462	82	Farmsteads, HSG C
0.016	92	Paved roads w/open ditches, 50% imp, HSG C
0.094	79	Vineyard, Fair, HSG C
0.084	73	Woods, Fair, HSG C
2.220	77	Weighted Average
2.212		99.64% Pervious Area
0.008		0.36% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
4.1	100	0.0200	0.40		**Sheet Flow, Sheet** Fallow n= 0.050 P2= 3.11"
1.7	262	0.1300	2.52		**Shallow Concentrated Flow, Shallow - Short Grass** Short Grass Pasture Kv= 7.0 fps
0.5	233	0.0850	7.93	27.76	**Trap/Vee/Rect Channel Flow, Ditch - ESTIMATE** Bot.W=0.50' D=1.00' Z= 3.0 '/' Top.W=6.50' n= 0.035
6.3	595	Total			

Subcatchment WS-1: Subcat WS-1



Summary for Subcatchment WS-1: Subcat WS-1

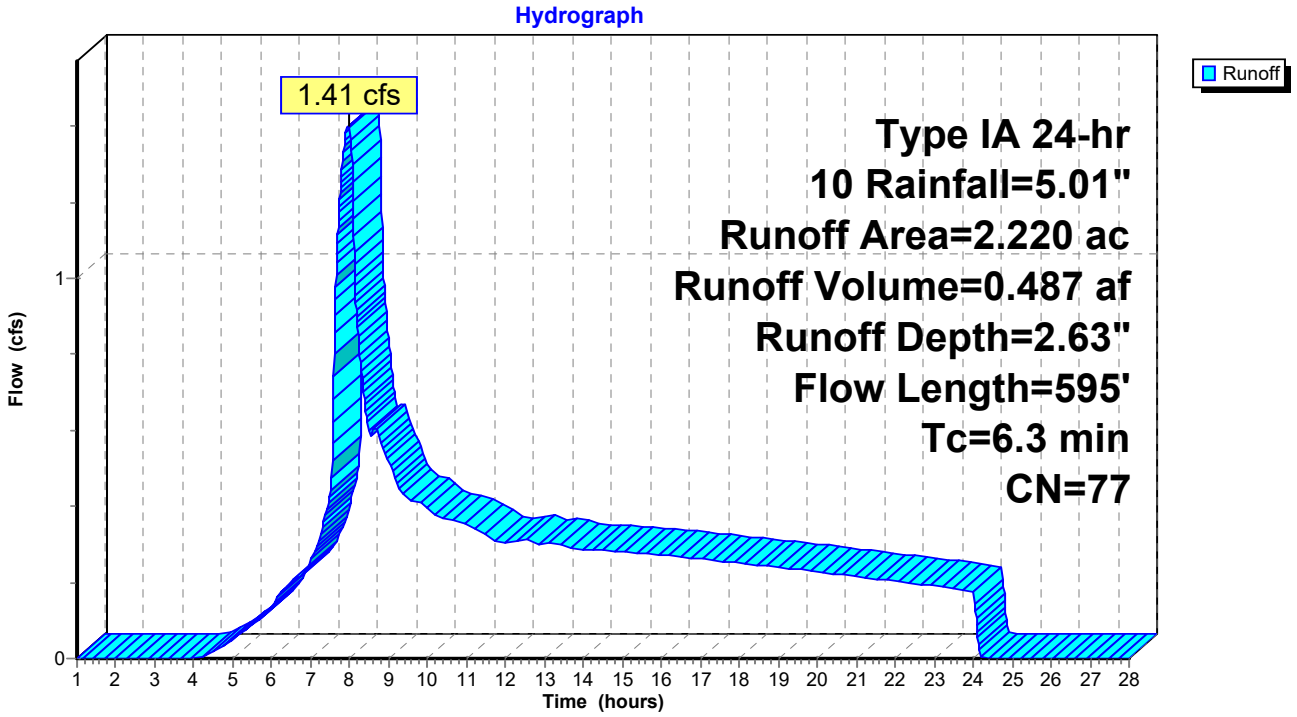
Runoff = 1.41 cfs @ 7.97 hrs, Volume= 0.487 af, Depth= 2.63"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 1.00-28.00 hrs, dt= 0.01 hrs
Type IA 24-hr 10 Rainfall=5.01"

Area (ac)	CN	Description
0.104	79	Annual Grass, Fair, HSG C
1.461	75	Annual Grass, Good, HSG C
0.462	82	Farmsteads, HSG C
0.016	92	Paved roads w/open ditches, 50% imp, HSG C
0.094	79	Vineyard, Fair, HSG C
0.084	73	Woods, Fair, HSG C
2.220	77	Weighted Average
2.212		99.64% Pervious Area
0.008		0.36% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
4.1	100	0.0200	0.40		**Sheet Flow, Sheet** Fallow n= 0.050 P2= 3.11"
1.7	262	0.1300	2.52		**Shallow Concentrated Flow, Shallow - Short Grass** Short Grass Pasture Kv= 7.0 fps
0.5	233	0.0850	7.93	27.76	**Trap/Vee/Rect Channel Flow, Ditch - ESTIMATE** Bot.W=0.50' D=1.00' Z= 3.0 '/' Top.W=6.50' n= 0.035
6.3	595	Total			

Subcatchment WS-1: Subcat WS-1



Summary for Subcatchment WS-1: Subcat WS-1

Runoff = 2.40 cfs @ 7.95 hrs, Volume= 0.793 af, Depth= 4.29"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 1.00-28.00 hrs, dt= 0.01 hrs
Type IA 24-hr 50 Rainfall=6.91"

Area (ac)	CN	Description
0.104	79	Annual Grass, Fair, HSG C
1.461	75	Annual Grass, Good, HSG C
0.462	82	Farmsteads, HSG C
0.016	92	Paved roads w/open ditches, 50% imp, HSG C
0.094	79	Vineyard, Fair, HSG C
0.084	73	Woods, Fair, HSG C
2.220	77	Weighted Average
2.212		99.64% Pervious Area
0.008		0.36% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
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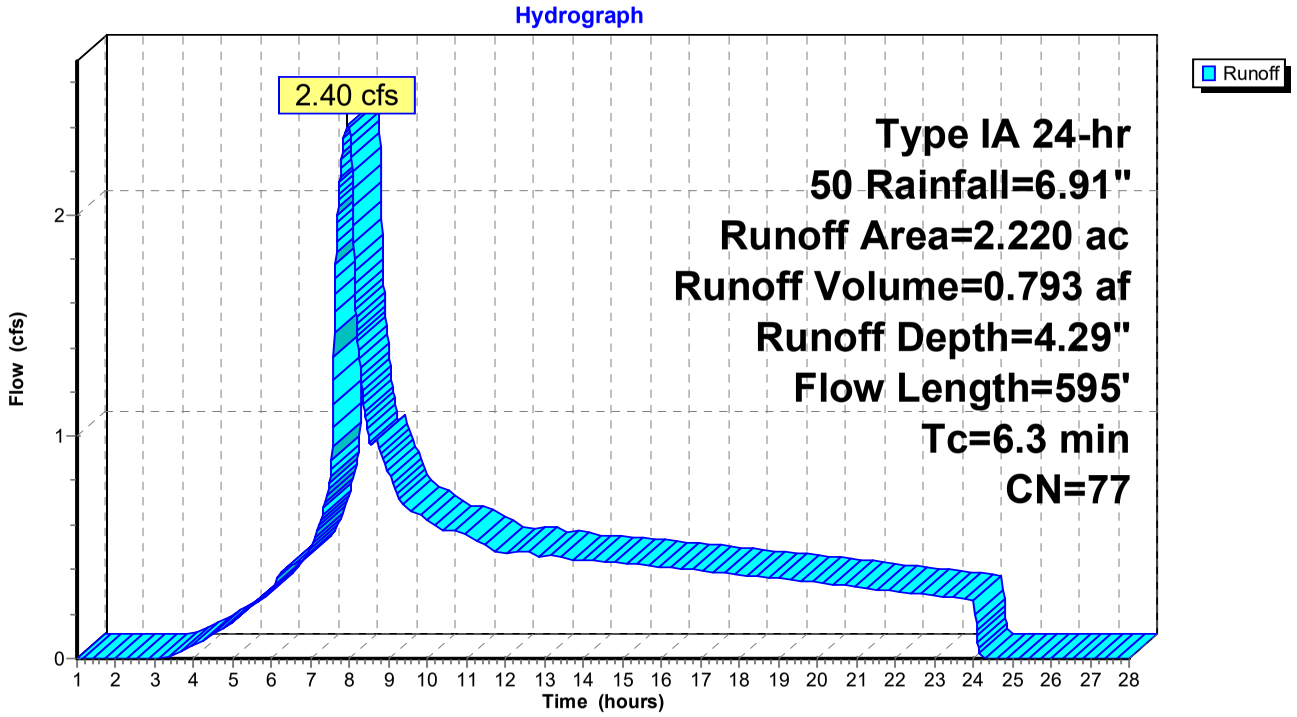
1.7	262	0.1300	2.52		**Shallow Concentrated Flow, Shallow - Short Grass** Short Grass Pasture Kv= 7.0 fps
0.5	233	0.0850	7.93	27.76	**Trap/Vee/Rect Channel Flow, Ditch - ESTIMATE** Bot.W=0.50' D=1.00' Z= 3.0 '/' Top.W=6.50' n= 0.035
6.3	595	Total			

Subcatchment WS-1: Subcat WS-1



Summary for Subcatchment WS-1: Subcat WS-1

Runoff = 2.84 cfs @ 7.93 hrs, Volume= 0.925 af, Depth= 5.00"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 1.00-28.00 hrs, dt= 0.01 hrs
Type IA 24-hr 100 Rainfall=7.70"

Area (ac)	CN	Description
0.104	79	Annual Grass, Fair, HSG C
1.461	75	Annual Grass, Good, HSG C
0.462	82	Farmsteads, HSG C
0.016	92	Paved roads w/open ditches, 50% imp, HSG C
0.094	79	Vineyard, Fair, HSG C
0.084	73	Woods, Fair, HSG C
2.220	77	Weighted Average
2.212		99.64% Pervious Area
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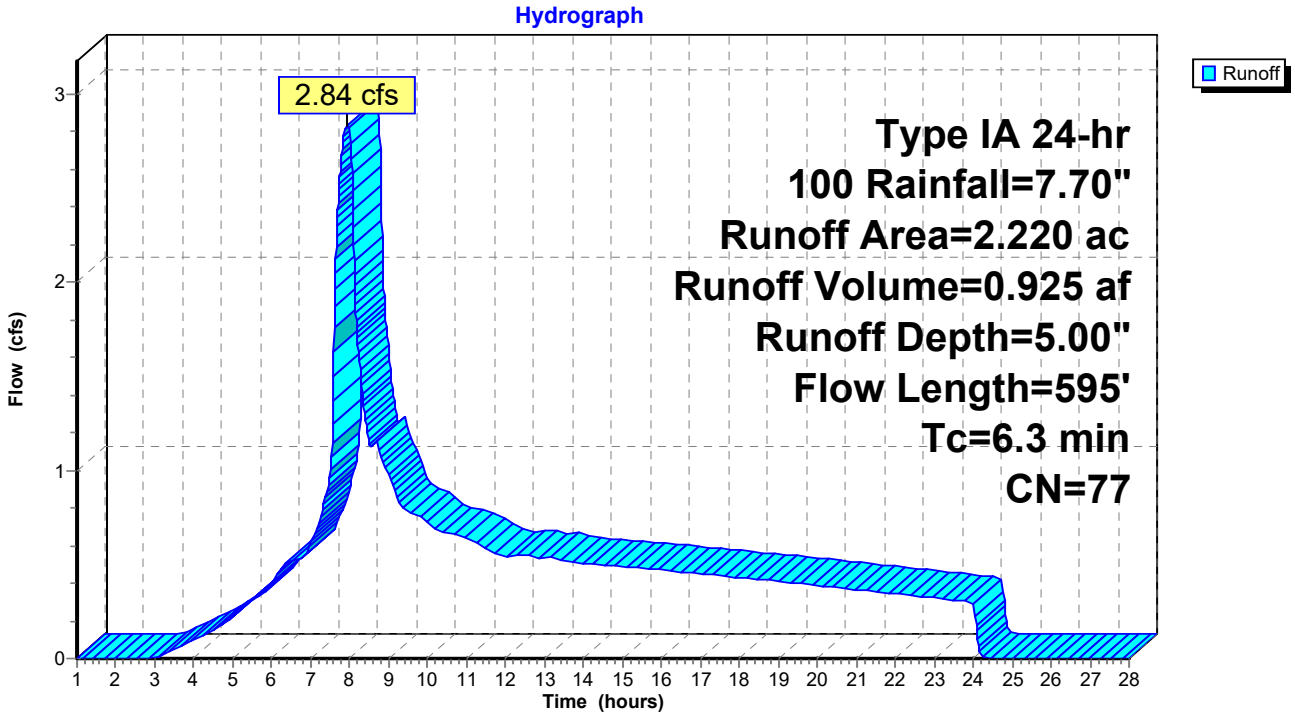
0.5	233	0.0850	7.93	27.76	**Trap/Vee/Rect Channel Flow, Ditch - ESTIMATE** Bot.W=0.50' D=1.00' Z= 3.0 '/' Top.W=6.50' n= 0.035
6.3	595	Total			

Subcatchment WS-1: Subcat WS-1



Subcat WS-1

Subcat Reach Pond Link

Routing Diagram for Dooley Post Project
Prepared by PPI Engineering, Printed 9/24/2020

Summary for Subcatchment WS-1: Subcat WS-1

Runoff = 0.53 cfs @ 8.01 hrs, Volume= 0.212 af, Depth= 1.15"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 1.00-28.00 hrs, dt= 0.01 hrs
Type IA 24-hr 2 Rainfall=3.11"

Area (ac)	CN	Description
0.104	79	Annual Grass, Fair, HSG C
0.138	75	Annual Grass, Good, HSG C
0.462	82	Farmsteads, HSG C
0.016	92	Paved roads w/open ditches, 50% imp, HSG C
0.094	79	Vineyard, Fair, HSG C
1.323	75	Vineyard, Good, HSG C
0.084	73	Woods, Fair, HSG C
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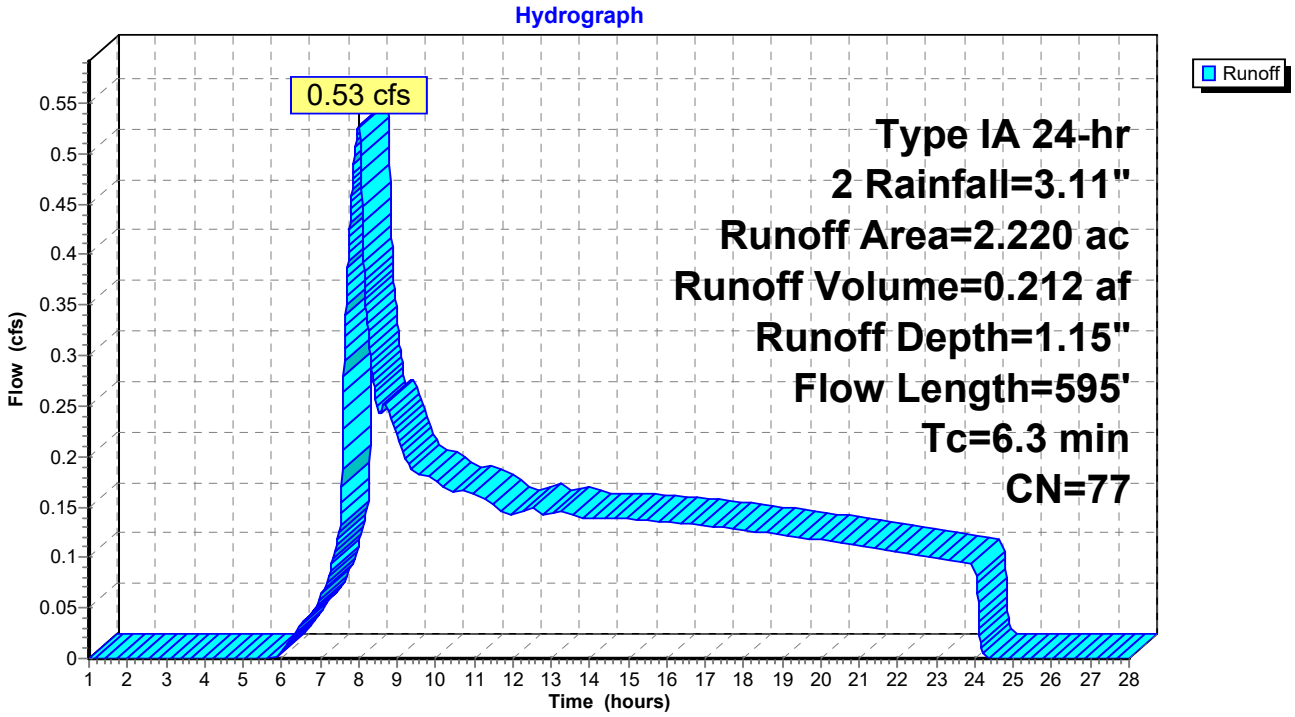
6.3	595	Total			

Subcatchment WS-1: Subcat WS-1



Summary for Subcatchment WS-1: Subcat WS-1

Runoff = 1.41 cfs @ 7.97 hrs, Volume= 0.487 af, Depth= 2.63"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 1.00-28.00 hrs, dt= 0.01 hrs
Type IA 24-hr 10 Rainfall=5.01"

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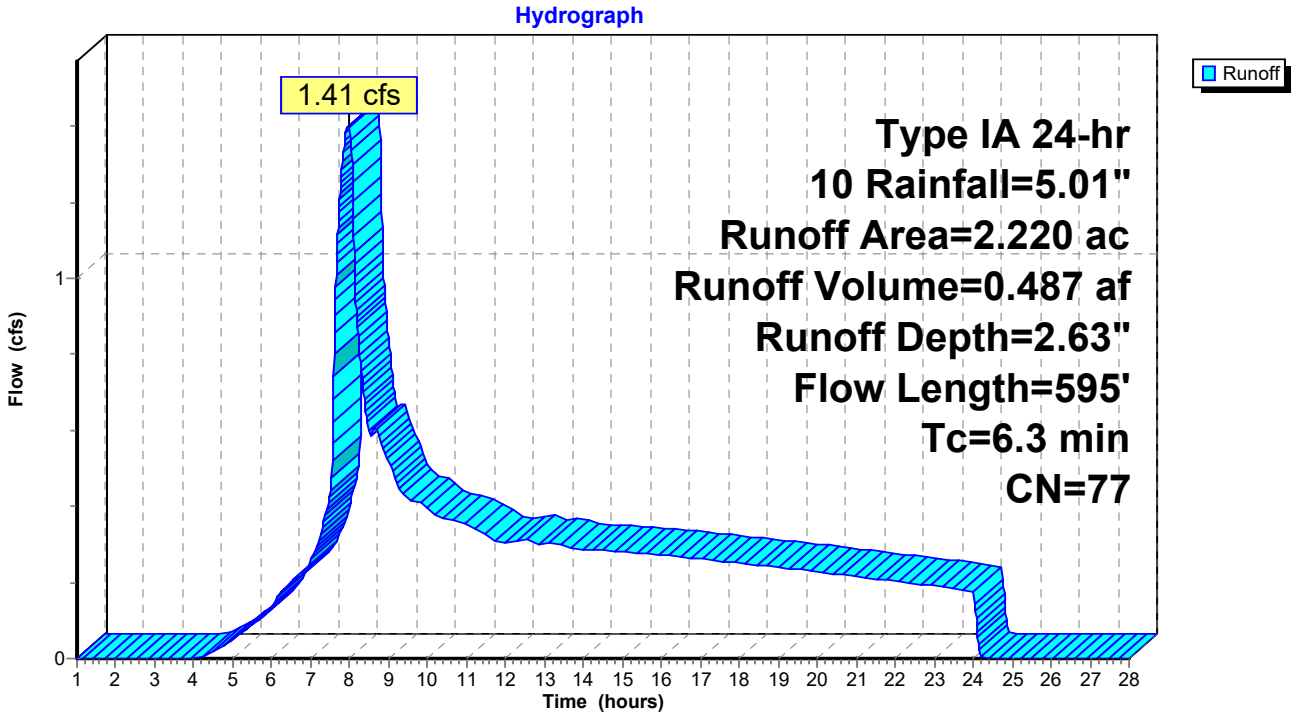
6.3	595	Total			

Subcatchment WS-1: Subcat WS-1



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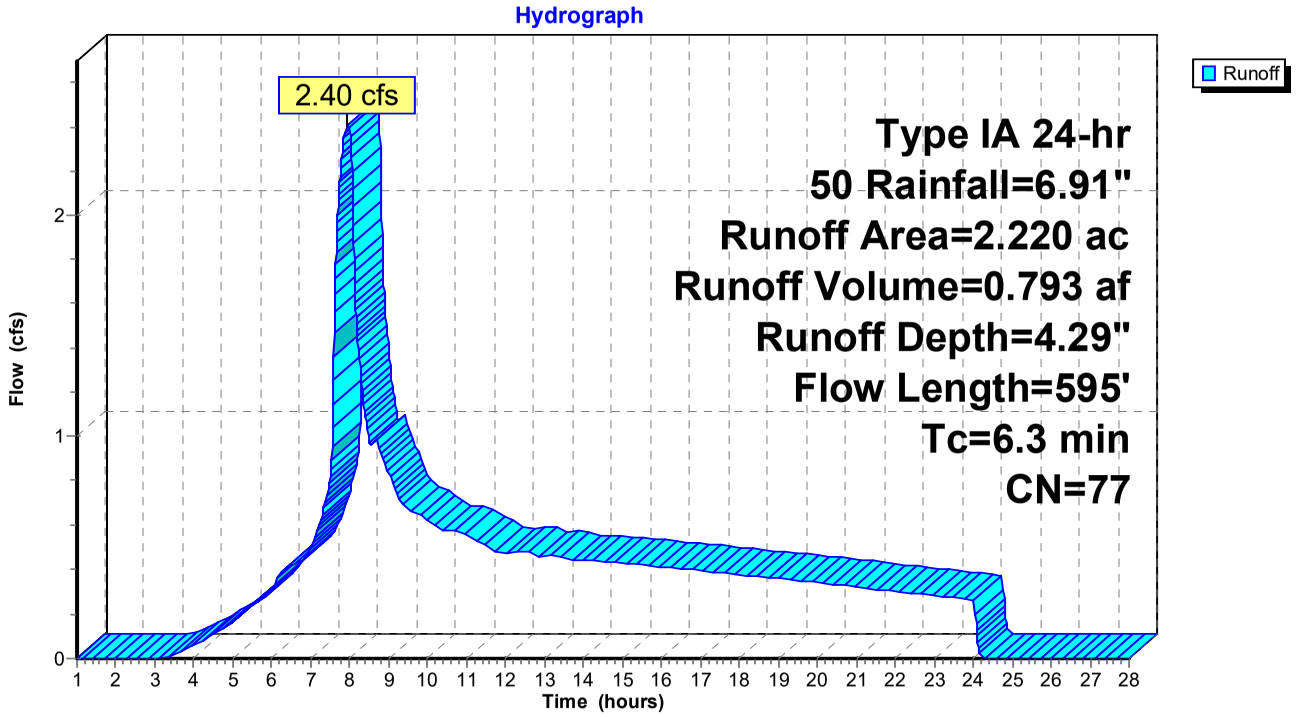
6.3	595	Total			

Subcatchment WS-1: Subcat WS-1



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0.5	233	0.0850	7.93	27.76	**Trap/Vee/Rect Channel Flow, Ditch - ESTIMATE** Bot.W=0.50' D=1.00' Z= 3.0 '/' Top.W=6.50' n= 0.035
6.3	595	Total			

Subcatchment WS-1: Subcat WS-1