Soil Loss Analysis
Harcross Winery/EnanVineyard
Proposed New Vineyard Development
6204 Dry Creek Road
Napa, CA 94559
APN 027-530-006
August 24, 2023

The following analysis evaluates a proposed, approximately 3-acre vineyard development on an approximately 51-acre parcel, located in Napa County, northwest of Napa, California, to determine the proposal's potential to increase sediment delivery from the site. The analysis was prepared by David Steiner, CPESC, CPSWQ, at the request of and in consultation with Mike Muelrath of Applied Civil Engineering. This analysis has adapted the Universal Soil Loss Equation (USLE) protocol developed by the Napa RCD, with guidance from the NRCS (SCS) Field Office Technical Guide, to requirements of the Napa County Engineering Division. Modeled transects are drawn on the accompanying map sheet, provided by Applied Civil Engineering. The accompanying Excel spreadsheet[1] incorporates USLE principles and formulas, as follows:

- The **"R"** value is derived from the median of the predicted range of 2-year/6-hour storms for this site, according to NOAA Atlas 14. A printout of the NOAA Atlas 14 table accompanies this submittal.
- The **"LS"** value is calculated per algorithms based on USDA empirical data, using plotted slope lengths and gradients, over five representative transects through the three proposed, new vineyard blocks. The effects of concave, convex and complex slopes are calculated via USDA segmented slope protocols, which assign greater influence to downslope segments. To avoid excessive soil loss, the proposal breaks up the central transect of Block A with two diversions. The three, separate, resulting flowpaths are modeled separately. Note that while the pre-project segments are of equal length, the post-project flowpaths between diversions are not, but are rather spaced to minimize soil loss and optimize farming efficacy.
- The **"K"** (soil erosivity) and **"T"** (soil loss tolerance) values were taken from the Napa County Web Soil Survey. Copies of the NCWSS printouts accompany this submittal. Where Mapping Unit (soil type) boundaries cross modeled transects, the slope segment algorithm is incorporated into the spreadsheet, to appropriately weight values of these factors, as well.
- Pre-project **"C"** value: To account for varying levels of canopy vegetation and ground cover, the spreadsheet again incorporates USDA segmenting protocols, assigning greater influence to downslope segments. **"C"** factor values assigned to each segment were

_____ [1] _This Excel format segments models transects according to the <u>most complex</u> variable or USLE factor describing conditions along the transect. For example, a transect with five different types or levels of canopy or vegetative cover—but with uniform slope throughout—would nonetheless be assigned five separate slope entries (even though they were all the same), as the transect's segmentation (for <u>all</u> factors) would be based on cover, its most complex variable._

selected from Napa County's interpolations of Table 5 of the "Special Applications for Napa County" USLE pamphlet, based on examination of imagery from Napa County GIS and Google Earth, and on observations during a field visit on May 17, 2023. Details of these findings are as follows:

- Block A, North and Far North Transects: 0 Canopy; 70% Cover: 50% G, 50% W
  (Per winterization specifications of approved residence, under construction.)
  $$C = (.028 \times .5) + (.067 \times .5) = .0475$$

- Block A, West Transect:
  (Per winterization specifications of approved residence, under construction.)
  $$C = (.028 \times .5) + (.067 \times .5) = .0475$$

- Block A, Central Transect:
  - Segment 1: (Per winterization specifications of approved residence, under construction.) 0 Canopy; 70% Cover: 50% G, 50% W
    $$C = (.028 \times .5) + (.067 \times .5) = .0475$$
  - Segment 2: 0 Canopy; 60% Cover: 40%G, 60%W
    $$C = (.042 \times .4 + (. 01 \times .6) = .0714$$
  - Segment 3: 0 Canopy; 60% Cover: 40%G, 60%W
    $$C = (.042 \times .4 + (. 01 \times .6) = .0714$$

- Block B, East Transect: 0 Canopy; 60% Cover: 40% G, 60% W (C = .028)
  $$C = (.042 \times .4 + (. 01 \times .6) = .0714$$
- Block C, South Transect: 0 Canopy; 70% Cover: (40%G, 60% W)
  $$C = (.028 \times .4) + (.067 \times .6) = .0514$$

- Post-project **"C"** values were assigned to reflect the cover crop specifications in the Erosion Control Plan: non-tilled management with 80% cover will be established and maintained in proposed vineyard blocks. Adherence to these specifications will prevent soil loss increase. ECP specifications will also assure that soil loss from the proposed will also conform to the USDA soil loss tolerance "T", as calculated on a weighted, per-acre basis.Specifications for cover maintenance on vineyard avenues are the same as those within vineyard blocks; supplementary practices such as annual applications of seed and straw mulch, per specifications in the Erosion Control Plan, may be necessary to compensate for ground disturbance related to tractor and equipment traffic.
- Pre- and post-project **"P"** (practice) factors are assigned the default maximum value (1).

     Conclusion: With the assumption that the specified cover level will be maintained, calculations predict that soil loss levels in proposed vineyard blocks will not exceed pre-project levels. (Please see accompanying Excel printouts.)

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[2]*The "T" value of the soils on approximately half of Block B's "South" transect is different from that of the balance of the project.*

Enan
Pre-Project USLE
2-yr/6-hr storm, inches   2.36
August 23, 2023

Transect Identification	Enan, Far North, pre-project					
Acres	0.2	acres				
Total Slope Length	78	feet				
Number of Segments	1	segment				
	1	2	3	4	5	
R	106.66	106.66				
Factor (F)	1.00	0.00	0.00	0.00	0.00	
Slope Length	78					
Slope %	11.5					
LS	1.45	0.00	0.00	0.00	0.00	
K	0.32					
C	0.048					70: 50,50
P	1.00	1.00	1.00	1.00	1.00	
T	2.00	1.00				2.00
(F) (LS) (K) (C)	0.022053	0.0000	0.0000	0.0000	0.0000	0.0221
A = (R) (F) (LS) (K) (C) (P)	2.35	0.00	0.00	0.00	0.00	2.35 tons/acre/year
						0.47 tons/year

Enan
Post-Project USLE
2-yr/6-hr storm, inches   1.84
August 23, 2023

Transect Identification	Enan, Far North, post-project					
Acres	0.2	acres				
Total Slope Length	78	feet				
Number of Segments	1	segment				
	1	2	3	4	5	
R	106.66	106.66				
Factor (F)	1.00	0.00	0.00	0.00	0.00	
Slope Length	78					
Slope %	11.5					
LS	1.45	0.00	0.00	0.00	0.00	
K	0.32					
C	0.022					80NT
P	1.00	1.00	1.00	1.00	1.00	
T	2.00					2.00
(F) (LS) (K) (C)	0.010214	0.0000	0.0000	0.0000	0.0000	0.0102
A = (R) (F) (LS) (K) (C) (P)	1.09	0.00	0.00	0.00	0.00	1.09 tons/acre/year
						0.22 tons/year

Transect Identification	Enan, North, pre-project					
Acres	0.2	acres				
Total Slope Length	76	feet				
Number of Segments	2	segments				
	1	2	3	4	5	
R	106.66	106.66				
Factor (F)	0.35	0.65	0.00	0.00	0.00	
Slope Length	76	76				
Slope %	23.7	15.8				
LS	3.79	2.21	0.00	0.00	0.00	
K	0.3	0.3				
C	0.048	0.048				70: 50,50
P	1.00	1.00	1.00	1.00	1.00	
T	2.00	2.00				2.00
(F) (LS) (K) (C)	0.02037	0.0221	0.0000	0.0000	0.0000	0.0424
A = (R) (F) (LS) (K) (C) (P)	2.17	2.35	0.00	0.00	0.00	4.53 tons/acre/year
						0.91 tons/year

Transect Identification	Enan, North, post-project					
Acres	0.2	acres				
Total Slope Length	76	feet				
Number of Segments	2	segments				
	1	2	3	4	5	
R	106.66	106.66				
Factor (F)	0.35	0.65	0.00	0.00	0.00	
Slope Length	76	76				
Slope %	23.7	15.8				
LS	3.79	2.21	0.00	0.00	0.00	
K	0.32	0.32				
C	0.022	0.022				80NT
P	1.00	1.00	1.00	1.00	1.00	
T	2.00	2.00				2.00
(F) (LS) (K) (C)	0.009336	0.0101	0.0000	0.0000	0.0000	0.0194
A = (R) (F) (LS) (K) (C) (P)	1.00	1.08	0.00	0.00	0.00	2.07 tons/acre/year
						0.41 tons/year

Transect Identification		Enan, West, pre-project					
Acres		0.3	acres				
Total Slope Length		108	feet				
Number of Segments		1	segment				
	1	2	3	4	5		
R	106.66	106.66					
Factor (F)	1.00	0.00	0.00	0.00	0.00		
Slope Length	108						
Slope %	15.7						
LS	2.61	0.00	0.00	0.00	0.00		
K	0.32						
C	0.048					70:50,50	
P	1.00	1.00	1.00	1.00	1.00		
T	2.00					2.00	
(F) (LS) (K) (C)	0.0397	0.0000	0.0000	0.0000	0.0000	0.0397	
A = (R) (F) (LS) (K) (C) (P)	4.23	0.00	0.00	0.00	0.00	4.23	tons/acre/year
						1.27	tons/year

Transect Identification		Enan, West, post-project					
Acres		0.3	acres				
Total Slope Length		108	feet				
Number of Segments		1	segment				
	1	2	3	4	5		
R	106.66	106.66					
Factor (F)	1.00	0.00	0.00	0.00	0.00		
Slope Length	108						
Slope %	15.7						
LS	2.61	0.00	0.00	0.00	0.00		
K	0.32						
C	0.022					80NT	
P	1.00	1.00	1.00	1.00	1.00		
T	2.00					2.00	
(F) (LS) (K) (C)	0.018387	0.0000	0.0000	0.0000	0.0000	0.0184	
A = (R) (F) (LS) (K) (C) (P)	1.96	0.00	0.00	0.00	0.00	1.96	tons/acre/year
						0.59	tons/year

Enan, Central, no diversions, pre-project

Transect Identification	Enan, Central, no diversions, pre-project				
Acres	1.6 acres				
Total Slope Length	282 feet				
Number of Segments	3 segments				
	1	2	3	4	5
R	106.66	106.66	106.66	106.66	
Factor (F)	0.19	0.35	0.46	0.00	0.00
Slope Length	282	282	282		
Slope %	18.0	13.8	19.1		
LS	5.07	3.54	5.49	0.00	0.00
K	0.32	0.32	0.32	0.10	
C	0.048	0.071	0.071		
P	1.00	1.00	1.00	1.00	1.00
T	2.00	2.00	2.00		2.00
(F) (LS) (K) (C)	0.014654	0.0283	0.0577	0.0000	0.0000	0.1007
A = (R) (F) (LS) (K) (C) (P)	1.56	3.02	6.16	0.00	0.00	10.74 tons/acre/year
						17.19 tons/year

Enan, Central, upper transect, post-project

Transect Identification	Enan, Central, upper transect, post-project				
Acres	0.4 acres				
Total Slope Length	142 feet				
Number of Segments	1 segment				
	1	2	3	4	5
R	106.66	106.66	106.66	106.66	
Factor (F)	1.00	0.00	0.00	0.00	0.00
Slope Length	142				
Slope %	16.9				
LS	3.31	0.00	0.00	0.00	0.00
K	0.32				
C	0.022				80NT
P	1.00				
T	2.00				2.00
(F) (LS) (K) (C)	0.023289	0.0000	0.0000	0.0000	0.0000	0.0233
A = (R) (F) (LS) (K) (C) (P)	2.48	0.00	0.00	0.00	0.00	2.48 tons/acre/year
						0.99 tons/year

Transect Identification

Transect Identification					
Acres	acres				
Total Slope Length	feet				
Number of Segments	segment				
	1	2	3	4	5
R	106.66	106.66	106.66	106.66	
Factor (F)	N/A	N/A	N/A	N/A	N/A
Slope Length	110				
Slope %	15.5				
LS	2.59	0.00	0.00	0.00	0.00
K	0.32	0.10	0.10	0.10	
C					
P	1.00	1.00	1.00	1.00	1.00
T	2.00				#VALUE!
(F) (LS) (K) (C)	#VALUE!	#VALUE!	#VALUE!	#VALUE!	#VALUE!	#VALUE!
A = (R) (F) (LS) (K) (C) (P)	#VALUE!	#VALUE!	#VALUE!	#VALUE!	#VALUE!	#VALUE!	#VALUE!
						#VALUE!	#VALUE!

Enan, Central, middle transect, post-project

Transect Identification	Enan, Central, middle transect, post-project				
Acres	0.9 acres				
Total Slope Length	100 feet				
Number of Segments	1 segment				
	1	2	3	4	5
R	106.66	106.66	106.66	106.66	
Factor (F)	1.00	0.00	0.00	0.00	0.00
Slope Length	100				
Slope %	15.0				
LS	2.36	0.00	0.00	0.00	0.00
K	0.32				
C	0.022				80NT
P	1.00				
T	2.00				2.00
(F) (LS) (K) (C)	0.016632	0.0000	0.0000	0.0000	0.0000	0.0166
A = (R) (F) (LS) (K) (C) (P)	1.77	0.00	0.00	0.00	0.00	1.77 tons/acre/year
						1.60 tons/year

Table 1 (top-left)

Transect Identification						
Acres		acres				
Total Slope Length		feet				
Number of Segments		segment				
	1	2	3	4	5	
R	106.66	106.66	106.66	106.66		
Factor (F)	N/A	N/A	N/A	N/A	N/A	
Slope Length	70					
Slope %	18.6					
LS	2.64	0.00	0.00	0.00	0.00	
K	0.32	0.10	0.10	0.10		
C						
P	1.00	1.00	1.00	1.00	1.00	
T	2.00					#VALUE!
(F) (LS) (K) (C)	#VALUE!	#VALUE!	#VALUE!	#VALUE!	#VALUE!	#VALUE!
A = (R) (F) (LS) (K) (C) (P)	#VALUE!	#VALUE!	#VALUE!	#VALUE!	#VALUE!	#VALUE! #VALUE!
						#VALUE! #VALUE!

Table 2 (top-right)

Transect Identification	Enan, Central, lower transect, post-project					
Acres	0.3	acres				
Total Slope Length	96	feet				
Number of Segments	1	segment				
	1	2	3	4	5	
R	106.66	106.66	106.66	106.66		
Factor (F)	1.00	0.00	0.00	0.00	0.00	
Slope Length	96					
Slope %	17.7					
LS	2.89	0.00	0.00	0.00	0.00	
K	0.32					
C	0.022					80NT
P	1.00					
T	2.00					2.00
(F) (LS) (K) (C)	0.020378	0.0000	0.0000	0.0000	0.0000	0.0204
A = (R) (F) (LS) (K) (C) (P)	2.17	0.00	0.00	0.00	0.00	2.17 tons/acre/year
						0.65 tons/year

Table 3 (bottom-left)

Transect Identification	Enan, South, pre-project					
Acres	0.7	acres				
Total Slope Length	256	feet				
Number of Segments	4	segments				
	1	2	3	4	5	
R	106.66	106.66	106.66	106.66		
Factor (F)	0.12	0.23	0.30	0.35	0.00	
Slope Length	256	256	256	256		
Slope %	17.3	15.6	20.3	17.2		
LS	4.58	3.99	5.68	4.55	0.00	
K	0.32	0.32	0.15	0.15		
C	0.051	0.051	0.051	0.051		70:40, 60
P	1.00	1.00	1.00	1.00	1.00	
T	2.00	2.00	3.00	3.00		2.65
(F) (LS) (K) (C)	0.009048	0.0151	0.0131	0.0123	0.0000	0.0495
A = (R) (F) (LS) (K) (C) (P)	0.97	1.61	1.40	1.31	0.00	5.28 tons/acre/year
						3.70 tons/year

Table 4 (bottom-right)

Transect Identification	Enan, South, post-project					
Acres	0.7	acres				
Total Slope Length	256	feet				
Number of Segments	4	segments				
	1	2	3	4	5	
R	106.66	106.66	106.66	106.66		
Factor (F)	0.12	0.23	0.30	0.35	0.00	
Slope Length	256	256	256	256		
Slope %	17.3	15.6	20.3	17.2		
LS	4.58	3.99	5.68	4.55	0.00	
K	0.32	0.32	0.15	0.15		
C	0.022	0.022	0.022	0.022		80NT
P	1.00	1.00	1.00	1.00		
T	2.00	2.00	3.00	3.00		2.65
(F) (LS) (K) (C)	0.003872	0.0065	0.0056	0.0053	0.0000	0.0212
A = (R) (F) (LS) (K) (C) (P)	0.41	0.69	0.60	0.56	0.00	2.26 tons/acre/year
						1.58 tons/year

Transect Identification	Enan, East, pre-project					
Acres	0.2	acres				
Total Slope Length	190	feet				
Number of Segments	1	segment				
	1	2	3	4	5	
R	106.66	106.66	106.66	106.66		
Factor (F)	1.00	0.00	0.00	0.00	0.00	
Slope Length	150					
Slope %	14.0					
LS	2.63	0.00	0.00	0.00	0.00	
K	0.32	0.10	0.10	0.10		
C	0.071					60:40, 60
P	1.00	1.00	1.00	1.00	1.00	
T	2.00					2.00
(F) (LS) (K) (C)	0.060184	0.0000	0.0000	0.0000	0.0000	0.0602
A = (R) (F) (LS) (K) (C) (P)	6.42	0.00	0.00	0.00	0.00	6.42 tons/acre/year
						1.28 tons/year

Pre-project
Total soil loss (tons/year)	24.81	
Soil loss/acre (tons/year)	7.75	3.2 Total acres

Transect Identification	Enan, East, post-project					
Acres	0.2	acres				
Total Slope Length	190	feet				
Number of Segments	1	segment				
	1	2	3	4	5	
R	106.66	106.66	106.66	106.66		
Factor (F)	1.00	0.00	0.00	0.00	0.00	
Slope Length	150					
Slope %	14.0					
LS	2.63	0.00	0.00	0.00	0.00	
K	0.32					
C	0.022					80NT
P	1.00					
T	2.00					2.00
(F) (LS) (K) (C)	0.018544	0.0000	0.0000	0.0000	0.0000	0.0185
A = (R) (F) (LS) (K) (C) (P)	1.98	0.00	0.00	0.00	0.00	1.98 tons/acre/year
						0.40 tons/year

Post-project
Total soil loss (tons/year)	6.44	
Soil loss (tons/acre/yr)	2.01	3.2 Total acres
Weighted "T"	2.14	

www.nws.noaa.gov

NOAA's National Weather Service
Hydrometeorological Design Studies Center
Precipitation Frequency Data Server (PFDS)

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NOAA ATLAS 14 POINT PRECIPITATION FREQUENCY ESTIMATES: CA

Data description

Data type: Precipitation depth ⌄   Units: English ⌄   Time series type: Partial duration ⌄

Select location

1) Manually:

   a) By location (decimal degrees, use "-" for S and W):   Latitude: [   ]   Longitude: [   ]   [Submit]

   b) By station (list of CA stations): Select station   ⌄

   c) By address [6402 Dry Creek Rd, Napa, CA, 94558 ✕] [🔍]

2) Use map:

Satellite ⌄
☑ Labels

100m
300ft

a) Select location
  Move crosshair or double click

b) Click on station Icon
  ☐ Show stations on map

Location information:
Name: Napa, California, USA*
Latitude: 38.4097°
Longitude: -122.4585°
Elevation: ** ☼

* Source: ESRI Maps
** Source: USGS

POINT PRECIPITATION FREQUENCY (PF) ESTIMATES
WITH 90% CONFIDENCE INTERVALS AND SUPPLEMENTARY INFORMATION
NOAA Atlas 14, Volume 6, Version 2

PF tabular   PF graphical   Supplementary information   🖷 Print page

PDS-based precipitation frequency estimates with 90% confidence intervals (in inches)[1]										
Duration	Average recurrence interval (years)									
	1	2	5	10	25	50	100	200	500	1000
5-min	**0.148** (0.132-0.168)	**0.186** (0.165-0.211)	**0.234** (0.207-0.266)	**0.272** (0.238-0.313)	**0.322** (0.272-0.386)	**0.360** (0.297-0.442)	**0.398** (0.319-0.502)	**0.436** (0.338-0.568)	**0.486** (0.360-0.664)	**0.524** (0.373-0.744)
10-min	**0.213** (0.189-0.241)	**0.266** (0.237-0.303)	**0.335** (0.297-0.382)	**0.390** (0.342-0.448)	**0.462** (0.390-0.553)	**0.516** (0.426-0.633)	**0.571** (0.457-0.719)	**0.625** (0.485-0.814)	**0.697** (0.516-0.952)	**0.751** (0.535-1.07)
15-min	**0.257** (0.229-0.292)	**0.322** (0.286-0.366)	**0.405** (0.359-0.462)	**0.471** (0.413-0.542)	**0.559** (0.472-0.669)	**0.625** (0.515-0.766)	**0.690** (0.553-0.870)	**0.756** (0.586-0.984)	**0.843** (0.624-1.15)	**0.909** (0.647-1.29)
30-min	**0.378** (0.336-0.429)	**0.473** (0.420-0.538)	**0.595** (0.527-0.678)	**0.692** (0.607-0.797)	**0.821** (0.693-0.982)	**0.918** (0.756-1.13)	**1.01** (0.812-1.28)	**1.11** (0.862-1.45)	**1.24** (0.916-1.69)	**1.34** (0.950-1.90)
60-min	**0.578** (0.515-0.657)	**0.724** (0.644-0.824)	**0.911** (0.807-1.04)	**1.06** (0.930-1.22)	**1.26** (1.06-1.51)	**1.41** (1.16-1.72)	**1.55** (1.24-1.96)	**1.70** (1.32-2.22)	**1.90** (1.40-2.59)	**2.05** (1.46-2.90)
2-hr	**0.922** (0.821-1.05)	**1.16** (1.03-1.32)	**1.45** (1.29-1.66)	**1.69** (1.48-1.94)	**1.99** (1.68-2.38)	**2.22** (1.83-2.72)	**2.44** (1.96-3.08)	**2.66** (2.07-3.47)	**2.95** (2.18-4.03)	**3.17** (2.25-4.50)
3-hr	**1.21** (1.08-1.37)	**1.52** (1.35-1.72)	**1.90** (1.68-2.17)	**2.20** (1.93-2.54)	**2.60** (2.19-3.11)	**2.89** (2.38-3.54)	**3.18** (2.55-4.01)	**3.46** (2.69-4.51)	**3.63** (2.83-5.23)	**4.11** (2.92-5.83)

6-hr	1.88 (1.67-2.13)	2.36 (2.09-2.68)	2.96 (2.62-3.37)	3.43 (3.01-3.95)	4.04 (3.41-4.83)	4.49 (3.70-5.50)	4.93 (3.95-6.22)	5.37 (4.16-6.99)	5.93 (4.39-8.10)	6.35 (4.52-9.02)
12-hr	2.71 (2.41-3.08)	3.45 (3.07-3.93)	4.39 (3.89-5.00)	5.12 (4.49-5.90)	6.08 (5.13-7.28)	6.79 (5.60-8.32)	7.49 (6.00-9.44)	8.18 (6.35-10.7)	9.09 (6.73-12.4)	9.76 (6.95-13.9)
24-hr	3.76 (3.38-4.27)	4.85 (4.36-5.51)	6.23 (5.59-7.09)	7.32 (6.52-8.39)	8.76 (7.58-10.3)	9.82 (8.36-11.8)	10.9 (9.07-13.3)	11.9 (9.72-14.9)	13.3 (10.5-17.2)	14.3 (11.0-19.1)
2-day	4.87 (4.38-5.53)	6.26 (5.62-7.11)	8.02 (7.19-9.13)	9.40 (8.37-10.8)	11.2 (9.71-13.2)	12.6 (10.7-15.0)	13.9 (11.6-17.0)	15.2 (12.4-19.0)	16.9 (13.3-21.9)	18.2 (13.9-24.3)
3-day	5.58 (5.01-6.33)	7.14 (6.42-8.12)	9.12 (8.17-10.4)	10.7 (9.50-12.2)	12.7 (11.0-15.0)	14.2 (12.1-17.0)	15.7 (13.1-19.2)	17.1 (14.0-21.4)	19.0 (15.0-24.7)	20.5 (15.6-27.3)
4-day	6.24 (5.61-7.08)	7.98 (7.17-9.07)	10.2 (9.13-11.6)	11.9 (10.6-13.6)	14.2 (12.3-16.7)	15.8 (13.5-18.9)	17.4 (14.5-21.3)	19.0 (15.5-23.8)	21.1 (16.6-27.4)	22.7 (17.3-30.3)
7-day	7.70 (6.92-8.74)	9.87 (8.86-11.2)	12.6 (11.3-14.3)	14.7 (13.1-16.8)	17.4 (15.1-20.5)	19.5 (16.6-23.3)	21.4 (17.9-26.2)	23.4 (19.0-29.3)	25.9 (20.4-33.5)	27.7 (21.2-37.0)
10-day	8.78 (7.89-9.96)	11.3 (10.1-12.8)	14.4 (12.9-16.3)	16.8 (14.9-19.2)	19.9 (17.2-23.4)	22.1 (18.8-26.5)	24.3 (20.3-29.7)	26.5 (21.6-33.2)	29.3 (23.0-37.9)	31.3 (23.9-41.8)
20-day	11.3 (10.2-12.8)	14.6 (13.1-16.5)	18.6 (16.6-21.1)	21.6 (19.2-24.8)	25.5 (22.1-30.0)	28.2 (24.0-33.8)	30.9 (25.8-37.8)	33.5 (27.3-41.9)	36.7 (28.9-47.6)	39.1 (29.9-52.1)
30-day	13.6 (12.2-15.5)	17.5 (15.7-19.9)	22.3 (19.9-25.3)	25.8 (23.0-29.6)	30.3 (26.3-35.7)	33.5 (28.5-40.1)	36.5 (30.4-44.6)	39.4 (32.1-49.3)	43.0 (33.8-55.7)	45.6 (34.8-60.8)
45-day	16.5 (14.8-18.7)	21.1 (19.0-24.0)	26.6 (23.9-30.3)	30.7 (27.4-35.2)	35.8 (31.0-42.2)	39.4 (33.5-47.2)	42.7 (35.7-52.3)	45.9 (37.4-57.5)	49.8 (39.2-64.6)	52.6 (40.2-70.2)
60-day	19.7 (17.7-22.3)	25.0 (22.4-28.4)	31.3 (28.0-35.6)	35.9 (32.0-41.2)	41.6 (36.0-49.0)	45.6 (38.8-54.6)	49.2 (41.1-60.2)	52.7 (42.9-66.0)	56.9 (44.8-73.8)	59.9 (45.8-79.9)

[1] Precipitation frequency (PF) estimates in this table are based on frequency analysis of partial duration series (PDS).

Numbers in parenthesis are PF estimates at lower and upper bounds of the 90% confidence interval. The probability that precipitation frequency estimates (for a given duration and average recurrence interval) will be greater than the upper bound (or less than the lower bound) is 5%. Estimates at upper bounds are not checked against probable maximum precipitation (PMP) estimates and may be higher than currently valid PMP values.

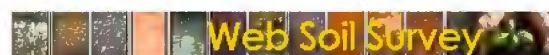Please refer to NOAA Atlas 14 document for more information.

Estimates from the table in CSV format: Precipitation frequency estimates ⌄   Submit

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K Factor, Rock Free

K Factor, Whole Soil

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☐ Detailed Description

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Aggregation Method Dominant Condition ▾

Component Percent Cutoff

Tie-break Rule
○ Lower
◉ Higher

Layer Options (Horizon Aggregation Method)
◉ Surface Layer (Not applicable)
○ Depth Range (Weighted Average)

Top Depth

Bottom Depth
○ Inches
○ Centimeters

○ All Layers (Weighted Average)

View Description | View Rating

T Factor

Wind Erodibility Group

Wind Erodibility Index

Soil Health Properties

Soil Physical Properties

Soil Qualities and Features

Water Features

Map — K Factor, Whole Soil

Scale (not to scale) ▾

Warning: Soil Ratings Map may not be valid at this scale.

You have zoomed in beyond the scale at which the soil map for this area is intended to be used. Map surveys that comprise your AOI were mapped at 1:24,000. The design of map units and the level of on that map scale.

Enlargement of maps beyond the scale of mapping can cause misunderstanding of the detail of map not show the small areas of contrasting soils that could have been shown at a more detailed scale.

Tables — K Factor, Whole Soil — Summary By Map Unit

Summary by Map Unit — Napa County, California (CA055)

Summary by Map Unit — Napa County, California (CA055)

Map unit symbol	Map unit name	Rating	Acres in AOI	Percent of AOI
136	Felton gravelly loam, 30 to 50 percent slopes	.15	29.4	81.7%
178	Sobrante loam, 5 to 30 percent slopes	.32	6.6	18.3%
Totals for Area of Interest			**36.1**	**100.0%**

Description — K Factor, Whole Soil

Erosion factor K indicates the susceptibility of a soil to sheet and rill erosion by water. Factor K is one of six factors used in the Universal Soil Loss Equation (USLE) and the Revised Universal Soil Loss Equation (RUSLE) to predict the average annual rate of soil loss by sheet and rill erosion in tons per acre per year. The estimates are based primarily on percentage of silt, sand, and organic matter and on soil structure and saturated hydraulic conductivity (Ksat). Values of K range from 0.02 to 0.69. Other factors being equal, the higher the value, the more susceptible the soil is to sheet and rill erosion by water.

USDA United States Department of Agriculture
Natural Resources Conservation Service

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A A A

| Area of Interest (AOI) | Soil Map | Soil Data Explorer | Download Soils Data | Shopping Cart (Free) |

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Soil Erosion Factors

K Factor, Rock Free

K Factor, Whole Soil

T Factor

View Description | View Rating

View Options

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Table ☑

Description of Rating ☑

Rating Options ☐

☐ Detailed Description

Advanced Options

Aggregation Method Dominant Condition ⌄

Component Percent Cutoff

Tie-break Rule ● Lower ○ Higher

Interpret Nulls as Zero ○ Yes ● No

View Description | View Rating
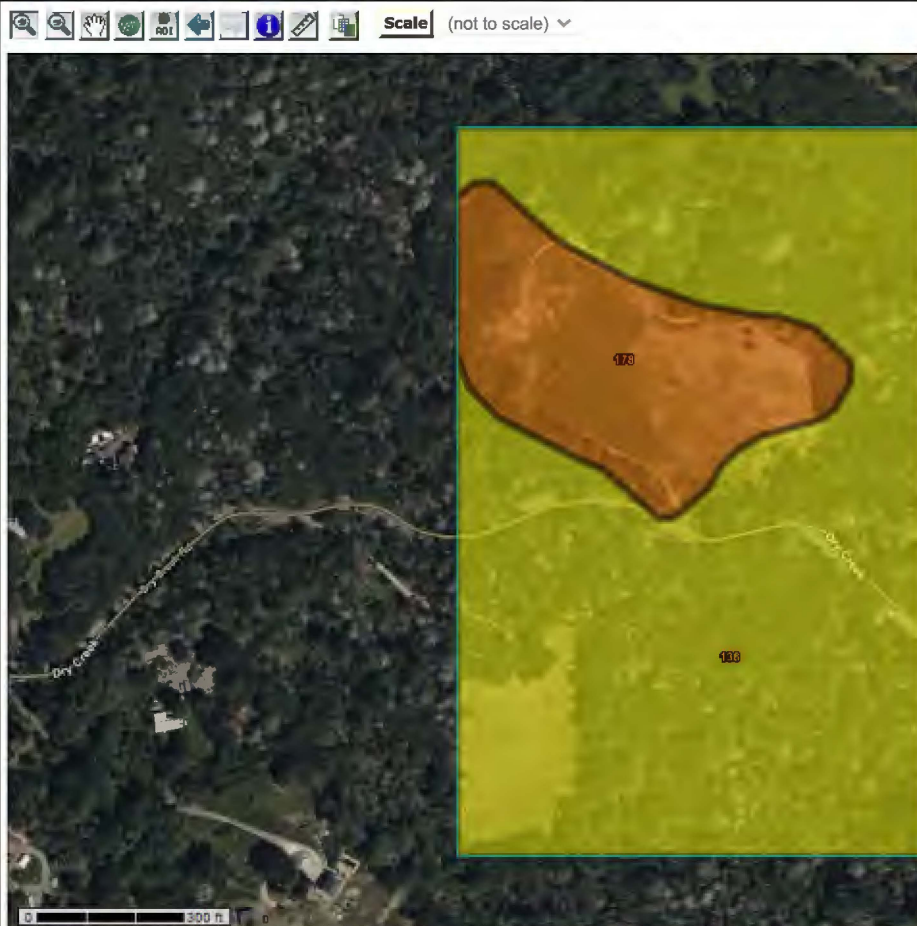
Wind Erodibility Group

Wind Erodibility Index

Soil Health Properties

Soil Physical Properties

Soil Qualities and Features

Water Features

Map — T Factor

Scale (not to scale) ⌄

Warning: Soil Ratings Map may not be valid at this scale.

You have zoomed in beyond the scale at which the soil map for this area is intended to be used. Map surveys that comprise your AOI were mapped at 1:24,000. The design of map units and the level of on that map scale.

Enlargement of maps beyond the scale of mapping can cause misunderstanding of the detail of map not show the small areas of contrasting soils that could have been shown at a more detailed scale.

Tables — T Factor — Summary By Map Unit

Summary by Map Unit — Napa County, California (CA055)

Summary by Map Unit — Napa County, California (CA055)

Map unit symbol	Map unit name	Rating (tons per acre per year)	Acres in AOI	Percent of AOI
136	Felton gravelly loam, 30 to 50 percent slopes	3	29.4	81.7%
178	Sobrante loam, 5 to 30 percent slopes	2	6.6	18.3%
Totals for Area of Interest			**36.1**	**100.0%**

Description — T Factor

The T factor is an estimate of the maximum average annual rate of soil erosion by wind and/or water that can occur without affecting crop productivity over a sustained period. The rate is in tons per acre per year.

Rating Options — T Factor

Units of Measure: tons per acre per year

Aggregation Method: Dominant Condition

Component Percent Cutoff: *None Specified*

Tie-break Rule: Lower

Interpret Nulls as Zero: No

HARCROSS WINERY VINEYARD
UNIVERSAL SOIL LOSS EQUATION EXHIBITS

SCALE: 1" = 3,000'

SCALE: 1" = 30'
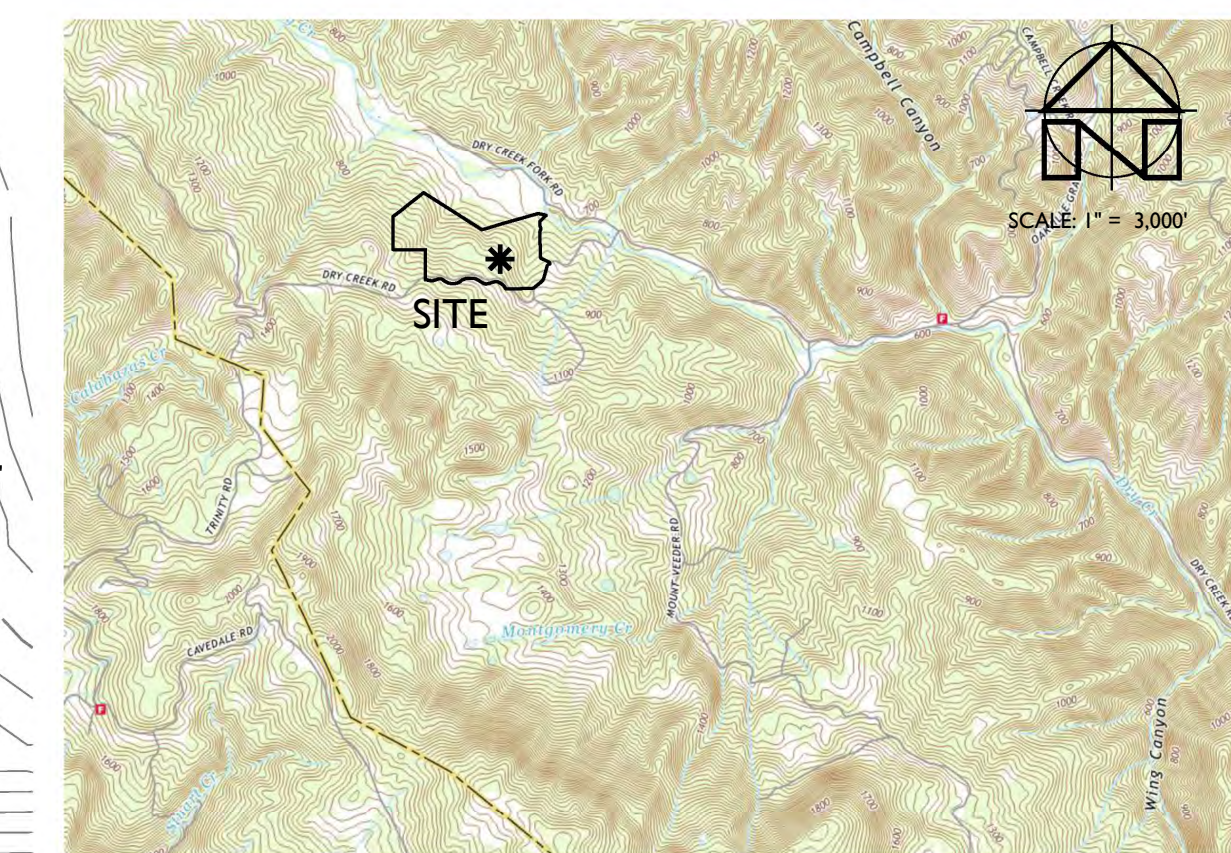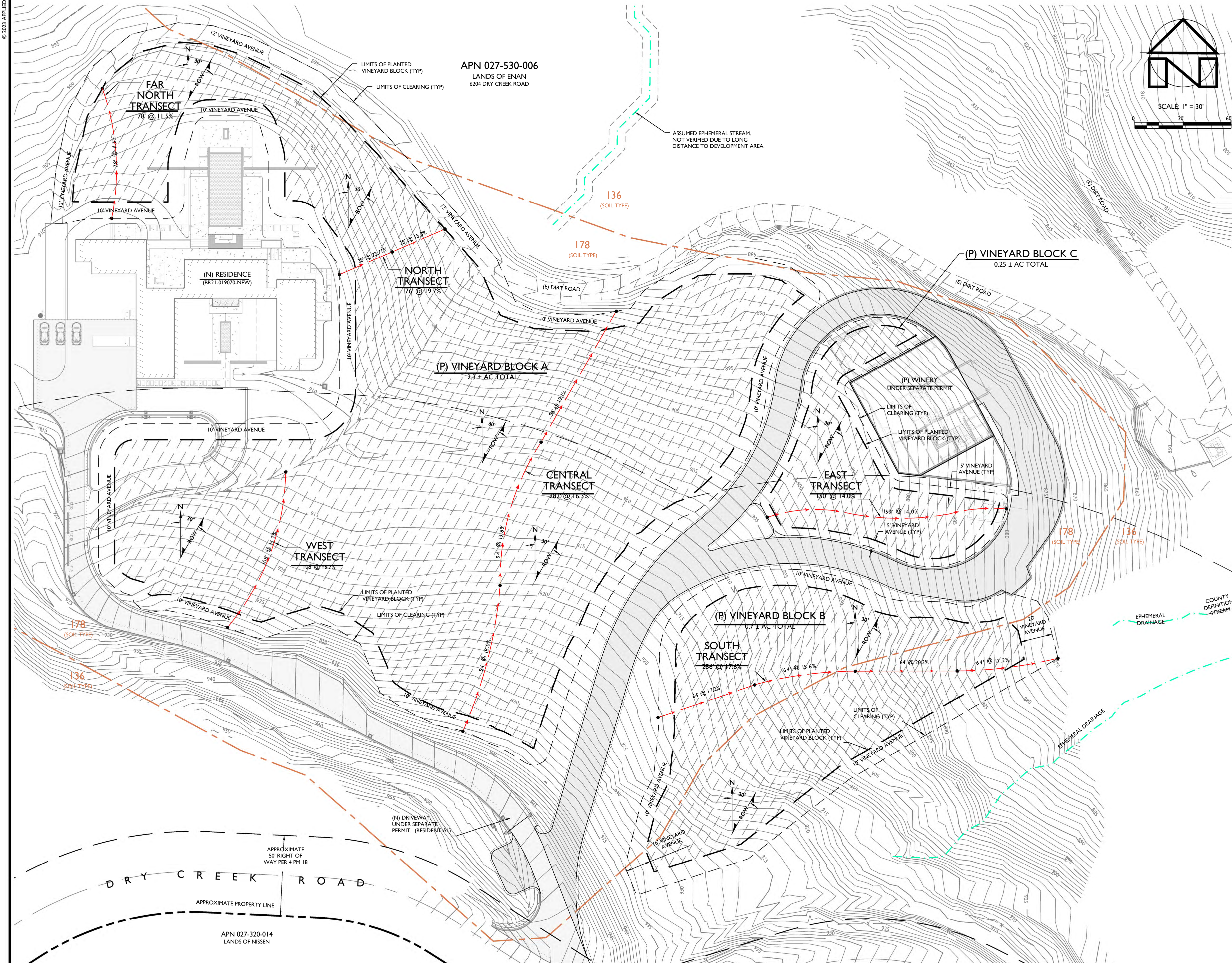
LOCATION MAP
SCALE: 1" = 3,000'

SITE

PROJECT INFORMATION:
PROPERTY OWNER & APPLICANT:
BASIL AND ROBIN ENAN
1765 POPPY AVENUE
MENLO PARK, CA 94025

SITE ADDRESS:
6402 DRY CREEK ROAD
NAPA, CA 94558

ASSESSOR'S PARCEL NUMBER:
027-530-006

PARCEL SIZE:
51 ± ACRES

ZONING:
AGRICULTURAL WATERSHED (AW)

SHEET INDEX:
1 UNIVERSAL SOIL LOSS EQUATION EXHIBIT - PRE-PROJECT
2 UNIVERSAL SOIL LOSS EQUATION EXHIBIT - POST-PROJECT

FLOOD HAZARD NOTE:
ACCORDING TO THE FEDERAL EMERGENCY MANAGEMENT AGENCY (FEMA) FLOOD INSURANCE RATE MAP (FIRM) MAP NUMBER 06055C0390E, EFFECTIVE SEPTEMBER 26, 2008, THE PROJECT SITE IS NOT LOCATED IN A SPECIAL FLOOD HAZARD AREA.

NOTES:
1. FADED BACKGROUND REPRESENTS EXISTING TOPOGRAPHIC FEATURES. TOPOGRAPHIC INFORMATION WAS TAKEN FROM THE "MAP OF TOPOGRAPHY OF A PORTION OF THE LANDS OF ENAN" PREPARED BY ALBION SURVEYS, INC., DATED JANUARY 30, 2020, UPDATED MARCH 22, 2022. APPLIED CIVIL ENGINEERING INCORPORATED ASSUMES NO LIABILITY REGARDING THE ACCURACY OR COMPLETENESS OF THE TOPOGRAPHIC INFORMATION.

2. AERIAL PHOTOGRAPHS IARE NADIR IMAGES CAPTURED BY PICTOMETRY INTERNATIONAL DATED JULY 15, 2021 AND MAY NOT REPRESENT CURRENT CONDITIONS.

3. CONTOUR INTERVAL: ONE (1) FOOT, HIGHLIGHTED EVERY FIVE (5) FEET.

4. VERTICAL DATUM: NAVD 88

5. THE PROPERTY LINES SHOWN ON THESE PLANS DO NOT REPRESENT A BOUNDARY SURVEY. THEY ARE APPROXIMATE AND ARE PROVIDED FOR INFORMATIONAL PURPOSES ONLY.

LEGEND:
APPROXIMATE PROPERTY LINE
SOIL TYPE BOUNDARY
COUNTY DEFINITION STREAM
EPHEMERAL STREAM
PROPOSED VINEYARD AVENUE / LIMIT OF GRADING
PROPOSED VINEYARD BLOCK / LIMIT OF RIPPING
VINE ROWS / VINE ROW DIRECTION
TRANSECT SEGMENTS

SOIL TYPE LEGEND:
136 FELTON GRAVELLY LOAM, 30 TO 50 PERCENT SLOPES
178 SOBRANTE LOAM, 5 TO 30 PERCENT SLOPES

SOIL TYPE BOUNDARIES SHOWN ON THIS MAP ARE BASED ON THE NAPA COUNTY GEOGRAPHIC INFORMATION SYSTEM DATA AND SHOULD BE CONSIDERED APPROXIMATE.

HARCROSS WINERY VINEYARD
UNIVERSAL SOIL LOSS EQUATION EXHIBITS
UNIVERSAL SOIL LOSS EQUATION EXHIBIT - PRE-PROJECT

UNIVERSAL SOIL LOSS EQUATION EXHIBIT - PRE-PROJECT
SCALE: 1" = 30'

Drawing labels:
FAR NORTH TRANSECT 78' @ 11.5%
NORTH TRANSECT 76' @ 19.7%
CENTRAL TRANSECT 282' @ 16.3%
WEST TRANSECT 108' @ 19.2%
EAST TRANSECT 150' @ 14.0%
SOUTH TRANSECT 356' @ 17.6%

APN 027-530-006
LANDS OF ENAN
6204 DRY CREEK ROAD

(N) RESIDENCE (BP21-019070-NEW)

(P) VINEYARD BLOCK A 2.3 ± AC TOTAL
(P) VINEYARD BLOCK B 0.7 ± AC TOTAL
(P) VINEYARD BLOCK C 0.25 ± AC TOTAL

(P) WINERY UNDER SEPARATE PERMIT

LIMITS OF PLANTED VINEYARD BLOCK (TYP)
LIMITS OF CLEARING (TYP)

ASSUMED EPHEMERAL STREAM. NOT VERIFIED DUE TO LONG DISTANCE TO DEVELOPMENT AREA.

136 (SOIL TYPE)
178 (SOIL TYPE)

(E) DIRT ROAD

12' VINEYARD AVENUE
10' VINEYARD AVENUE
5' VINEYARD AVENUE (TYP)

COUNTY DEFINITION STREAM
EPHEMERAL DRAINAGE

(N) DRIVEWAY UNDER SEPARATE PERMIT (RESIDENTIAL)

APPROXIMATE 50' RIGHT OF WAY PER 4 PH 18
APPROXIMATE PROPERTY LINE
DRY CREEK ROAD
APN 027-320-014
LANDS OF NISSEN

APPLIED
CIVIL ENGINEERING

2160 Jefferson Street, Suite 230
Napa, CA 94559
(707) 320-4968 www.appliedcivil.com

HARCROSS WINERY VINEYARD

UNIVERSAL SOIL LOSS EQUATION EXHIBITS
UNIVERSAL SOIL LOSS EQUATION EXHIBIT - POST-PROJECT

SCALE: 1" = 30'

PREPARED UNDER THE DIRECTION OF:

MICHAEL A. MUELLRATH
NO. 67435
Exp. 12/31/2024
8/24/2023
PROFESSIONAL ENGINEER · CIVIL · STATE OF CALIFORNIA

DRAWN BY:
PowerCAD LLC

CHECKED BY:
MRM

DATE:
AUGUST 24, 2023

REVISIONS: BY:
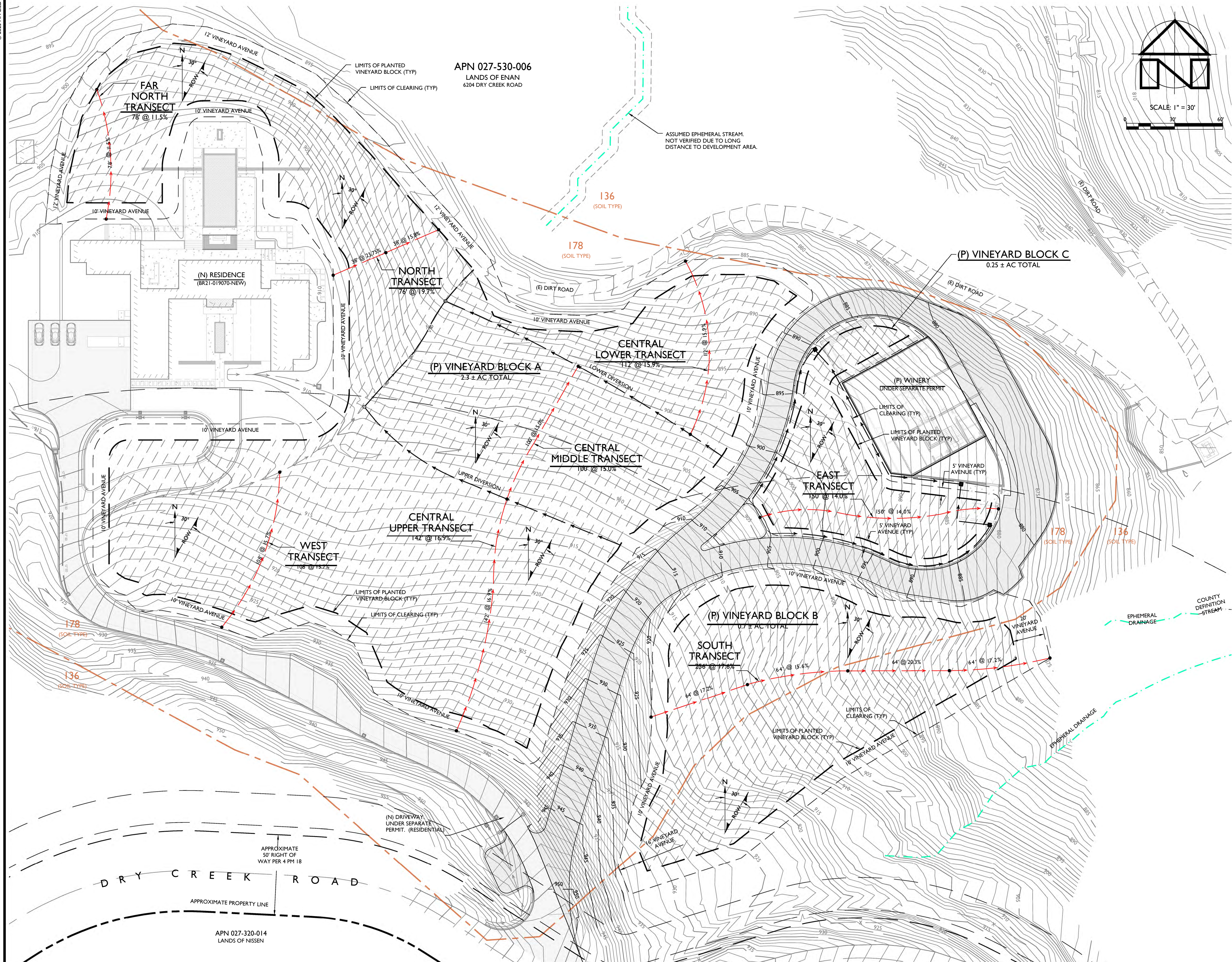8/24/2023 — YMS
PERMIT SUBMITTAL

JOB NUMBER:
19-140

FILE:
19-140EXH-USLE.DWG

ORIGINAL SIZE:
24" X 36"

SHEET NUMBER:
2
OF
2

APN 027-530-006
LANDS OF ENAN
6204 DRY CREEK ROAD

ASSUMED EPHEMERAL STREAM. NOT VERIFIED DUE TO LONG DISTANCE TO DEVELOPMENT AREA.

136 (SOIL TYPE)
178 (SOIL TYPE)

12' VINEYARD AVENUE
10' VINEYARD AVENUE

FAR NORTH TRANSECT
78' @ 11.5%

LIMITS OF PLANTED VINEYARD BLOCK (TYP)
LIMITS OF CLEARING (TYP)

(N) RESIDENCE
(BR21-019070-NEW)

NORTH TRANSECT
76' @ 19.7%

(E) DIRT ROAD
(E) DIRT ROAD

(P) VINEYARD BLOCK C
0.25 ± AC TOTAL

(P) VINEYARD BLOCK A
2.3 ± AC TOTAL

CENTRAL LOWER TRANSECT
112' @ 15.9%

LOWER DIVERSION

(P) WINERY
UNDER SEPARATE PERMIT
LIMITS OF CLEARING (TYP)
LIMITS OF PLANTED VINEYARD BLOCK (TYP)

5' VINEYARD AVENUE (TYP)

CENTRAL MIDDLE TRANSECT
100' @ 15.0%

UPPER DIVERSION

EAST TRANSECT
150' @ 14.0%

156' @ 14.6%

CENTRAL UPPER TRANSECT
142' @ 16.9%

WEST TRANSECT
106' @ 19.2%

LIMITS OF PLANTED VINEYARD BLOCK (TYP)
LIMITS OF CLEARING (TYP)

(P) VINEYARD BLOCK B
0.7 ± AC TOTAL

SOUTH TRANSECT
136' @ 17.6%

64' @ 15.6% 64' @ 20.3% 64' @ 17.2%

178 (SOIL TYPE)
136 (SOIL TYPE)

10' VINEYARD AVENUE
20' VINEYARD AVENUE

EPHEMERAL DRAINAGE
COUNTY DEFINITION STREAM

LIMITS OF CLEARING (TYP)
LIMITS OF PLANTED VINEYARD BLOCK (TYP)

(N) DRIVEWAY UNDER SEPARATE PERMIT. (RESIDENTIAL)

EPHEMERAL DRAINAGE

APPROXIMATE 50' RIGHT OF WAY PER 4 PH 18

DRY CREEK ROAD

APPROXIMATE PROPERTY LINE

APN 027-320-014
LANDS OF NISSEN

LEGEND:

Symbol	Description
	APPROXIMATE PROPERTY LINE
	SOIL TYPE BOUNDARY
	COUNTY DEFINITION STREAM
	EPHEMERAL STREAM
	PROPOSED VINEYARD AVENUE / LIMIT OF GRADING
	PROPOSED VINEYARD BLOCK / LIMIT OF RIPPING
ROW	VINE ROWS / VINE ROW DIRECTION
	TRANSECT SEGMENTS

SOIL TYPE LEGEND:

136   FELTON GRAVELLY LOAM, 30 TO 50 PERCENT SLOPES

178   SOBRANTE LOAM, 5 TO 30 PERCENT SLOPES

SOIL TYPE BOUNDARIES SHOWN ON THIS MAP ARE BASED ON THE NAPA COUNTY GEOGRAPHIC INFORMATION SYSTEM DATA AND SHOULD BE CONSIDERED APPROXIMATE.

UNIVERSAL SOIL LOSS EQUATION EXHIBIT - POST-PROJECT

SCALE: 1" = 30'