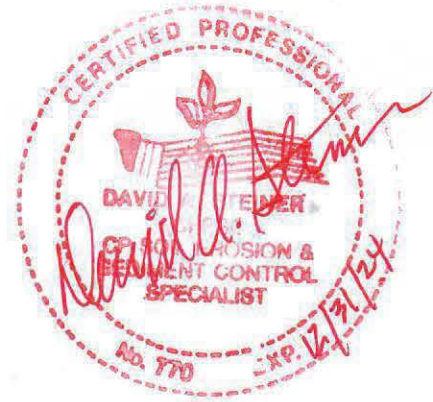


Soil Loss Analysis
230 Long Ranch Road LLC
Proposed New Vineyard Development
230 Long Ranch Road
Napa, CA 94559
APN 032-560-027
March 23, 2024



The following analysis evaluates a proposed, approximately 18.8-acre vineyard development on an approximately 48.4-acre parcel, located in Napa County, northeast of Napa, California, to determine the proposal's potential to increase soil loss and 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, prepared by David Steiner, CPESC, CPSWQ, at the request of and in consultation with Mike Muelrath of Applied Civil Engineering, 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. Specifications of the Erosion Control Plan are also designed to assure adherence to the USDA soil loss tolerance "T." The transects modeled were drawn on the accompanying maps, provided by Applied Civil Engineering. The accompanying Excel spreadsheet¹ incorporates USLE principles and formulas, as follows:

- The **"R"** (rainfall) value is derived from the median value 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 for the site accompanies this analysis.
- The **"K"** (soil erosivity) and **"T"** (soil loss tolerance) values were taken from the Napa County Web Soil Survey.
- The **"LS"** (slope length) value is calculated per algorithms based on USDA empirical data, using plotted slope lengths and gradients, over ten representative transects through the proposed vineyard areas. (Please note that the pre-project "North Transect" of Block 1 will be divided roughly in half, post-project, by a proposed mid-slope diversion. Installation of this structure will divert overland flow from the upper area away from the vineyard, allowing soil loss from the areas above and below the diversion to be modeled separately.)
- Pre-project **"C"**: Cover values were assigned based on a site inspection on March 7, 2024, and examination of aerial photographic imagery (Google Earth and the Napa County GIS).

¹ This Excel format segments modeled transects according to the most complex 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 all factors) would be based on cover, its most complex variable.

- Block 1, North Transect
 - Segment 1: No Canopy; 40% cover: 20G, 80W
 $C = .10 \times .2 + .15 \times .8 = .14$
 - Segment 2: 75% High Brush; 70% Cover: 20G, 80W
 $C = .024 \times .2 + .059 \times .8 = .052$
 - Segments 3-4: 75% High Brush; 60% Cover: 30G,m 70W
 $C = .036 \times .3 + .078 \times .7 = .0654$
- Block 1 Middle Transect
 - Segment 1: No Canopy; 70% Cover: 50G, 50W
 $C = .028 \times .5 + .067 \times .5 = .0475$
 - Segment 2: 75% High Brush; 70% Cover: 50G, 50W
 $C = .024 \times .5 + .059 \times .5 = .0415$
- Block 1 South Transect

75% High Brush; 75% Cover: 50G, 50W
 $.018 \times .5 + .050 \times .5 = .034$
- Block 2 Transect

50% Low Brush; 70% Cover: 40G, 60W
 $.024 \times .4 + .058 \times .6 = .0444$
- Block 3 North Transect
 - Segment 1: No Canopy; 70% Cover: 80G, 20W
 $C = .028 \times .8 + .067 \times .2 = .0353$
 - Segment 2: 50% Low Brush; 70% Cover: 50G, 50W C
 $= .024 \times .5 + .058 \times .5 = .041$
- Block 3 South Transect
 - Segment 1: 25% Low Brush; 85% Cover: 80G, 20W C
 $= .01 \times .8 + .031 \times .2 = .0142$
 - Segments 2-4: 75% High Brush; 70% Cover: 50G, 50W
 $C = .024 \times .5 + .059 \times .5 = .0415$
- Block 4 West Transect
 - Segment 1: 50% Low Brush; 70% Cover: 50G, 50W C
 $= .024 \times .5 + .058 \times .5 = .041$
 - Segments 2-3: 75% High Brush; 60% Cover: 80G, 20W
 $C = .036 \times .8 + .078 \times .2 = .0444$
- Block 4 East Transect

75% High Brush; 60% Cover: 20G, 80W
 $.036 \times .2 + .078 \times .8 = .0696$

- Post-project “C” values are assigned based on the specifications of the Erosion Control Plan, i.e., non-tilled management, with 85% cover ($C = .017$) for Block 1, and 75% cover ($C = .035$) for Blocks 2, 3, and 4. 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 may be necessary to compensate for ground disturbance related to tractor and equipment traffic.
- Pre- and post-project “P” values are assigned the default maximum (1.00), indicating proposed row direction up- and down-hill, that is, no “practice” reduction in soil loss.

Conclusion: With the assumption that the specified cover levels will be maintained, calculations predict that the net soil loss in each of the vineyard blocks will exceed neither pre-project levels nor the USDA soil loss tolerance. (Please see accompanying Excel printouts.)

Long 230
Pre-Project USLE, revised
2-yr/6-hr storm, inches 1.89
May 31, 2024

Transect Identification					
Acres			acres		
Total Slope Length			feet		
Number of Segments			segment		
	1	2	3	4	5
R	65.87	65.87	65.87	65.87	65.87
Factor (F)	N/A	N/A	N/A	N/A	N/A
Slope Length					
Slope %					
LS	0.00	0.00	0.00	0.00	0.00
K					
C					
P	1.00	1.00	1.00	1.00	1.00
T	2.00	2.00			#VALUE!
(F) (LS) (K) (C)	#VALUE!	#VALUE!	#VALUE!	#VALUE!	#VALUE!
A = (R) (F) (LS) (K) (C) (P)	#VALUE!	#VALUE!	#VALUE!	#VALUE!	#VALUE!
					#VALUE!

Long 230
Post-Project USLE, revised
2-yr/6-hr storm, inches 1.89
May 31, 2024

Transect Identification					
Acres	1.1	acres			
Total Slope Length	290	feet			
Number of Segments	2	segments	(Below diversion)		
	1	2	3	4	5
R	65.87	65.87	65.87	65.87	65.87
Factor (F)	0.35	0.65	0.00	0.00	0.00
Slope Length	290	290			
Slope %	23.6	27.0			
LS	7.36	8.75	0.00	0.00	0.00
K	0.32	0.32			
C	0.017	0.017			85, NT
P	1.00	1.00			
T	2.00	2.00			2.00
(F) (LS) (K) (C)	0.014015	0.0309	0.0000	0.0000	0.0000
A = (R) (F) (LS) (K) (C) (P)	0.92	2.04	0.00	0.00	0.00
					2.96 tons/acre/year
					3.26 tons/year

Transect Identification					
Acres			acres		
Total Slope Length			feet		
Number of Segments			segment		
	1	2	3	4	5
R	65.87	65.87	65.87	65.87	65.87
Factor (F)	N/A	N/A	N/A	N/A	N/A
Slope Length	612	612	612	612	
Slope %	15.0	17.0	23.5	28.1	
LS	5.84	6.92	10.63	13.37	0.00
K	0.32	0.32	0.32	0.32	
C					
P	1.00	1.00	1.00	1.00	1.00
T	2.00	2.00	2.00	2.00	#VALUE!
(F) (LS) (K) (C)	#VALUE!	#VALUE!	#VALUE!	#VALUE!	#VALUE!
A = (R) (F) (LS) (K) (C) (P)	#VALUE!	#VALUE!	#VALUE!	#VALUE!	#VALUE!
					#VALUE!

Transect Identification					
Acres	1.9	acres			
Total Slope Length	290	feet			
Number of Segments	2	segments	(Above diversion)		
	1	2	3	4	5
R	65.87	65.87	65.87	65.87	65.87
Factor (F)	0.35	0.65	0.00	0.00	0.00
Slope Length	290	290			
Slope %	16.0	16.5			
LS	4.39	4.58	0.00	0.00	0.00
K	0.32	0.32			
C	0.017	0.017			85, NT
P	1.00	1.00			
T	2.00	2.00			2.00
(F) (LS) (K) (C)	0.00836	0.0162	0.0000	0.0000	0.0000
A = (R) (F) (LS) (K) (C) (P)	0.55	1.07	0.00	0.00	0.00
					1.62 tons/acre/year
					3.07 tons/year

Transect Identification		Long 230 Block 1 north, pre			
Acres		3	acres		
Total Slope Length		580	feet		
Number of Segments		4	segments		
	1	2	3	4	5
R	65.87	65.87	65.87	65.87	65.87
Factor (F)	0.12	0.23	0.30	0.35	0.00
Slope Length	580	580	580	580	
Slope %	16.0	16.5	23.6	27.0	
LS	6.21	6.47	10.41	12.38	0.00
K	0.32	0.32	0.32	0.32	
C	0.140	0.052	0.065	0.065	
P	1.00	1.00	1.00	1.00	1.00
T	2.00	2.00	2.00	2.00	2.00
(F) (LS) (K) (C)	0.033383	0.0248	0.0654	0.0907	0.0000
A = (R) (F) (LS) (K) (C) (P)	2.20	1.63	4.31	5.97	0.00

tons/acre/year
42.33 tons/year

Transect Identification		Long 230 Block 1 north, post			
Acres		3	acres		
Total Slope Length		580	feet		
Number of Segments		4	segments (no diversions)		
	1	2	3	4	5
R	65.87	65.87	65.87	65.87	65.87
Factor (F)	0.12	0.23	0.30	0.35	0.00
Slope Length	580	580	580	580	
Slope %	16.0	16.5	23.6	27.0	
LS	6.21	6.47	10.41	12.38	0.00
K	0.32	0.32	0.32	0.32	
C	0.017	0.017	0.017	0.017	85, NT
P	1.00	1.00	1.00	1.00	
T	2.00	2.00	2.00	2.00	2.00
(F) (LS) (K) (C)	0.004054	0.0081	0.0170	0.0236	0.0000
A = (R) (F) (LS) (K) (C) (P)	0.27	0.53	1.12	1.55	0.00

tons/acre/year
10.42 tons/year

Transect Identification		Long 230 Block 1 Mid, pre			
Acres		2.7	acres		
Total Slope Length		310	feet		
Number of Segments		2	segments		
	1	2	3	4	5
R	65.87	65.87	65.87	65.87	65.87
Factor (F)	0.35	0.65	0.00	0.00	0.00
Slope Length	310	310			
Slope %	24.5	11.6			
LS	7.99	2.93	0.00	0.00	0.00
K	0.10	0.10			
C	0.048	0.042			
P	1.00	1.00	1.00	1.00	1.00
T	1.00	1.00			1.00
(F) (LS) (K) (C)	0.013281	0.0079	0.0000	0.0000	0.0000
A = (R) (F) (LS) (K) (C) (P)	0.87	0.52	0.00	0.00	0.00

tons/acre/year
3.77 tons/year

Transect Identification		Long 230 Block 1 Mid, post			
Acres		2.7	acres		
Total Slope Length		310	feet		
Number of Segments		2	segments		
	1	2	3	4	5
R	65.87	65.87	65.87	65.87	65.87
Factor (F)	0.35	0.65	0.00	0.00	0.00
Slope Length	310	310			
Slope %	24.5	11.6			
LS	7.99	2.93	0.00	0.00	0.00
K	0.10	0.10			
C	0.017	0.017			85, NT
P	1.00	1.00			
T	1.00	1.00			1.00
(F) (LS) (K) (C)	0.004753	0.0032	0.0000	0.0000	0.0000
A = (R) (F) (LS) (K) (C) (P)	0.31	0.21	0.00	0.00	0.00

tons/acre/year
1.42 tons/year

Transect Identification		Long 230 Block 1 South, pre				
Acres		4.5	acres			
Total Slope Length		360	feet			
Number of Segments		1	segment			
	1	2	3	4	5	
R	65.87	65.87	65.87	65.87	65.87	
Factor (F)	1.00	0.00	0.00	0.00	0.00	
Slope Length	360					
Slope %	12.5					
LS	3.49	0.00	0.00	0.00	0.00	
K	0.10					
C	0.034					
P	1.00	1.00	1.00	1.00	1.00	
T	1.00					1.00
(F) (LS) (K) (C)	0.011883	0.0000	0.0000	0.0000	0.0000	0.0119
A = (R) (F) (LS) (K) (C) (P)	0.78	0.00	0.00	0.00	0.00	0.78 tons/acre/year
						3.52 tons/year

Transect Identification		Long 230 Block 1 South, post				
Acres		4.5	acres			
Total Slope Length		360	feet			
Number of Segments		1	segment			
	1	2	3	4	5	
R	65.87	65.87	65.87	65.87	65.87	
Factor (F)	1.00	0.00	0.00	0.00	0.00	
Slope Length	360					
Slope %	12.5					
LS	3.49	0.00	0.00	0.00	0.00	
K	0.10					
C	0.017					85, NT
P	1.00	1.00				
T	1.00					1.00
(F) (LS) (K) (C)	0.005941	0.0000	0.0000	0.0000	0.0000	0.0059
A = (R) (F) (LS) (K) (C) (P)	0.39	0.00	0.00	0.00	0.00	0.39 tons/acre/year
						1.76 tons/year

Transect Identification		Long 230 Block 2, pre				
Acres		1.3	acres			
Total Slope Length		200	feet			
Number of Segments		1	segment			
	1	2	3	4	5	
R	65.87	65.87	65.87	65.87	65.87	
Factor (F)	1.00	0.00	0.00	0.00	0.00	
Slope Length	200					
Slope %	5.1					
LS	0.77	0.00	0.00	0.00	0.00	
K	0.10					
C	0.044					
P	1.00	1.00	1.00	1.00	1.00	
T	1.00					1.00
(F) (LS) (K) (C)	0.003439	0.0000	0.0000	0.0000	0.0000	0.0034
A = (R) (F) (LS) (K) (C) (P)	0.23	0.00	0.00	0.00	0.00	0.23 tons/acre/year
						0.29 tons/year

Transect Identification		Long 230 Block 2, post				
Acres		1.3	acres			
Total Slope Length		200	feet			
Number of Segments		1	segment			
	1	2	3	4	5	
R	65.87	65.87	65.87	65.87	65.87	
Factor (F)	1.00	0.00	0.00	0.00	0.00	
Slope Length	200					
Slope %	5.1					
LS	0.77	0.00	0.00	0.00	0.00	
K	0.10					
C	0.035					75, NT
P	1.00	1.00				
T	1.00					1.00
(F) (LS) (K) (C)	0.002711	0.0000	0.0000	0.0000	0.0000	0.0027
A = (R) (F) (LS) (K) (C) (P)	0.18	0.00	0.00	0.00	0.00	0.18 tons/acre/year
						0.23 tons/year

Transect Identification		Long 230 Block 3 North, pre				
Acres		2.6	acres			
Total Slope Length		372	feet			
Number of Segments		2	segments			
	1	2	3	4	5	
R	65.87	65.87	65.87	65.87	65.87	
Factor (F)	0.35	0.65	0.00	0.00	0.00	
Slope Length	372	372				
Slope %	5.9	7.0				
LS	1.27	1.59	0.00	0.00	0.00	
K	0.10	0.10				
C	0.035	0.041				
P	1.00	1.00	1.00	1.00	1.00	
T	1.00	1.00				1.00
(F) (LS) (K) (C)	0.001566	0.0042	0.0000	0.0000	0.0000	0.0058
A = (R) (F) (LS) (K) (C) (P)	0.10	0.28	0.00	0.00	0.00	0.38 tons/acre/year
						0.99 tons/year

Transect Identification		Long 230 Block 3 North, post				
Acres		2.6	acres			
Total Slope Length		372	feet			
Number of Segments		2	segments			
	1	2	3	4	5	
R	65.87	65.87	65.87	65.87	65.87	
Factor (F)	0.35	0.65	0.00	0.00	0.00	
Slope Length	372	372				
Slope %	5.9	7.0				
LS	1.27	1.59	0.00	0.00	0.00	
K	0.10	0.10				
C	0.035	0.035				75, NT
P	1.00	1.00				
T	1.00	1.00				1.00
(F) (LS) (K) (C)	0.001553		0.0000	0.0000	0.0000	0.0016
A = (R) (F) (LS) (K) (C) (P)	0.10	0.24	0.00	0.00	0.00	0.34 tons/acre/year
						0.88 tons/year

Transect Identification		Long 230 Block 3 South, pre				
Acres		2.7	acres			
Total Slope Length		512	feet			
Number of Segments		4	segments			
	1	2	3	4	5	
R	65.87	65.87	65.87	65.87	65.87	
Factor (F)	0.12	0.23	0.30	0.35	0.00	
Slope Length	512	512	512	512		
Slope %	6.3	6.3	8.6	12.5		
LS	1.62	1.62	2.48	4.17	0.00	
K	0.10	0.10	0.10	0.10		
C	0.014	0.042	0.042	0.042		
P	1.00	1.00	1.00	1.00	1.00	
T	1.00	1.00	1.00	1.00		1.00
(F) (LS) (K) (C)	0.000276	0.0015	0.0031	0.0061	0.0000	0.0110
A = (R) (F) (LS) (K) (C) (P)	0.02	0.10	0.20	0.40	0.00	0.72 tons/acre/year
						1.95 tons/year

Transect Identification		Long 230 Block 3 South, post				
Acres		2.7	acres			
Total Slope Length		512	feet			
Number of Segments		4	segments			
	1	2	3	4	5	
R	65.87	65.87	65.87	65.87	65.87	
Factor (F)	0.12	0.23	0.30	0.35	0.00	
Slope Length	512	512	512	512		
Slope %	6.3	6.3	8.6	12.5		
LS	1.62	1.62	2.48	4.17	0.00	
K	0.10	0.10	0.10	0.10		
C	0.035	0.035	0.035	0.035		75, NT
P	1.00	1.00	1.00	1.00		
T	1.00	1.00	1.00	1.00		1.00
(F) (LS) (K) (C)	0.00068	0.0013	0.0026	0.0051	0.0000	0.0097
A = (R) (F) (LS) (K) (C) (P)	0.04	0.09	0.17	0.34	0.00	0.64 tons/acre/year
						1.72 tons/year

Transect Identification		Long 230 Block 4 West, pre			
Acres		1.1	acres		
Total Slope Length		351	feet		
Number of Segments		3	segments		
	1	2	3	4	5
R	65.87	65.87	65.87	65.87	65.87
Factor (F)	0.19	0.35	0.46	0.00	0.00
Slope Length	351	351	351		
Slope %	6.0	19.3	15.9		
LS	1.26	6.21	4.79	0.00	0.00
K	0.10	0.10	0.10		
C	0.041	0.044	0.044	0.044	
P	1.00	1.00	1.00	1.00	1.00
T	1.00	1.00	1.00		1.00
(F) (LS) (K) (C)	0.00098	0.0097	0.0098	0.0000	0.0000
A = (R) (F) (LS) (K) (C) (P)	0.06	0.64	0.64	0.00	0.00
					1.00
					0.0204
					1.35 tons/acre/year
					1.48 tons/year

Transect Identification		Long 230 Block 4 West, post			
Acres		1.1	acres		
Total Slope Length		351	feet		
Number of Segments		3	segments		
	1	2	3	4	5
R	65.87	65.87	65.87	65.87	65.87
Factor (F)	0.19	0.35	0.46	0.00	0.00
Slope Length	351	351	351		
Slope %	6.0	19.3	15.9		
LS	1.26	6.21	4.79	0.00	0.00
K	0.10	0.10	0.10		
C	0.035	0.035	0.035		75, NT
P	1.00	1.00	1.00		
T	1.00	1.00	1.00		1.00
(F) (LS) (K) (C)	0.000837	0.0076	0.0077	0.0000	0.0000
A = (R) (F) (LS) (K) (C) (P)	0.06	0.50	0.51	0.00	0.00
					1.00
					0.0162
					1.06 tons/acre/year
					1.17 tons/year

Transect Identification		Long 230 Block 4 East, pre			
Acres		0.9	acres		
Total Slope Length		239	feet		
Number of Segments		1	segment		
	1	2	3	4	5
R	65.87	65.87	65.87	65.87	65.87
Factor (F)	1.00	0.00	0.00	0.00	0.00
Slope Length	239				
Slope %	15.4				
LS	3.79	0.00	0.00	0.00	0.00
K	0.10				
C	0.070				
P	1.00				1.00
T	1.00				1.00
(F) (LS) (K) (C)	0.026344	0.0000	0.0000	0.0000	0.0000
A = (R) (F) (LS) (K) (C) (P)	1.74	0.00	0.00	0.00	0.00
					1.00
					0.0263
					1.74 tons/acre/year
					1.56 tons/year

Transect Identification		Long 230 Block 4 East, post			
Acres		0.9	acres		
Total Slope Length		239	feet		
Number of Segments		1	segment		
	1	2	3	4	5
R	65.87	65.87	65.87	65.87	65.87
Factor (F)	1.00	0.00	0.00	0.00	0.00
Slope Length	239				
Slope %	15.4				
LS	3.79	0.00	0.00	0.00	0.00
K	0.10				
C	0.035				75, NT
P	1.00				
T	1.00				1.00
(F) (LS) (K) (C)	0.013248	0.0000	0.0000	0.0000	0.0000
A = (R) (F) (LS) (K) (C) (P)	0.87	0.00	0.00	0.00	0.00
					1.00
					0.0132
					0.87 tons/acre/year
					0.79 tons/year

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**NOAA ATLAS 14 POINT PRECIPITATION FREQUENCY ESTIMATES: CA****Data description**

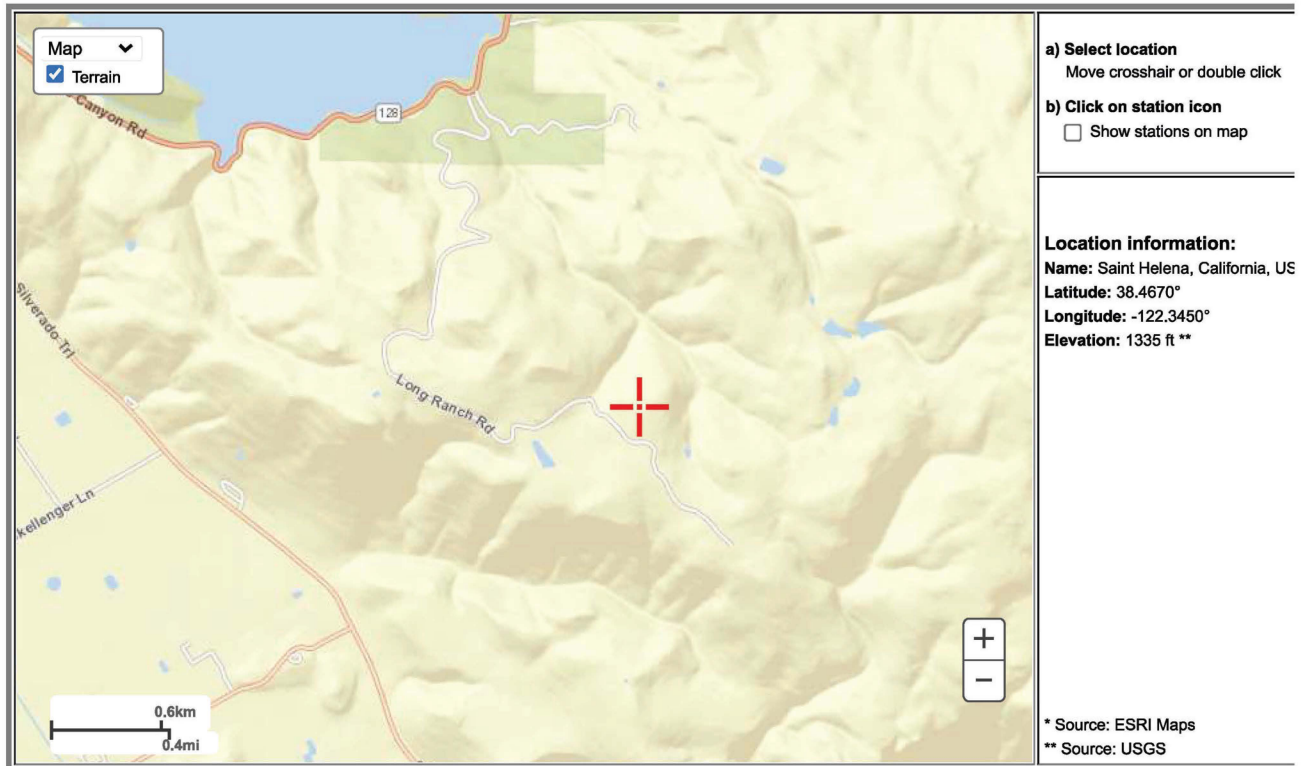
Data type: **Precipitation depth** Units: **English** Time series type: **Partial duration**

Select location**1) Manually:**

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

b) By station (list of CA stations):

c) By address [Q](#)

2) Use map:

a) **Select location**
Move crosshair or double click

b) **Click on station icon**
☐ Show stations on map

Location information:
Name: Saint Helena, California, US
Latitude: 38.4670°
Longitude: -122.3450°
Elevation: 1335 ft **

* 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	0.142 (0.126-0.161)	0.173 (0.154-0.197)	0.215 (0.190-0.245)	0.249 (0.219-0.287)	0.297 (0.251-0.356)	0.336 (0.277-0.411)	0.375 (0.301-0.473)	0.417 (0.324-0.543)	0.477 (0.353-0.650)	0.525 (0.374-0.744)
10-min	0.203 (0.181-0.231)	0.248 (0.221-0.282)	0.308 (0.273-0.351)	0.357 (0.314-0.411)	0.426 (0.360-0.510)	0.481 (0.397-0.589)	0.538 (0.431-0.678)	0.598 (0.465-0.778)	0.684 (0.507-0.932)	0.752 (0.536-1.07)
15-min	0.246 (0.219-0.279)	0.300 (0.267-0.341)	0.372 (0.330-0.424)	0.432 (0.379-0.497)	0.516 (0.436-0.617)	0.582 (0.480-0.712)	0.651 (0.522-0.819)	0.724 (0.562-0.941)	0.827 (0.613-1.13)	0.910 (0.649-1.29)
30-min	0.356 (0.317-0.404)	0.434 (0.386-0.494)	0.539 (0.477-0.614)	0.626 (0.549-0.720)	0.746 (0.630-0.893)	0.842 (0.694-1.03)	0.942 (0.755-1.19)	1.05 (0.814-1.36)	1.20 (0.887-1.63)	1.32 (0.939-1.87)
60-min	0.522 (0.464-0.592)	0.637 (0.566-0.724)	0.790 (0.700-0.900)	0.917 (0.805-1.06)	1.09 (0.924-1.31)	1.23 (1.02-1.51)	1.38 (1.11-1.74)	1.54 (1.19-2.00)	1.75 (1.30-2.39)	1.93 (1.38-2.74)
2-hr	0.793 (0.706-0.900)	0.968 (0.861-1.10)	1.20 (1.06-1.37)	1.38 (1.22-1.59)	1.64 (1.38-1.96)	1.84 (1.51-2.25)	2.03 (1.63-2.56)	2.24 (1.74-2.91)	2.52 (1.87-3.43)	2.74 (1.95-3.88)
3-hr	1.02 (0.907-1.16)	1.25 (1.11-1.42)	1.54 (1.36-1.76)	1.78 (1.56-2.04)	2.10 (1.77-2.51)	2.34 (1.93-2.87)	2.58 (2.07-3.26)	2.84 (2.20-3.69)	3.17 (2.35-4.32)	3.43 (2.45-4.86)

6-hr	1.54 (1.37-1.75)	1.89 (1.68-2.15)	2.34 (2.07-2.67)	2.70 (2.37-3.10)	3.17 (2.68-3.79)	3.53 (2.91-4.32)	3.88 (3.12-4.89)	4.24 (3.30-5.52)	4.72 (3.50-6.44)	5.08 (3.62-7.20)
12-hr	2.19 (1.95-2.48)	2.72 (2.42-3.10)	3.40 (3.02-3.88)	3.95 (3.46-4.54)	4.66 (3.94-5.57)	5.19 (4.28-6.36)	5.72 (4.59-7.20)	6.25 (4.85-8.13)	6.94 (5.15-9.46)	7.47 (5.32-10.6)
24-hr	3.07 (2.76-3.48)	3.89 (3.49-4.41)	4.93 (4.42-5.61)	5.75 (5.12-6.59)	6.84 (5.93-8.05)	7.65 (6.51-9.16)	8.45 (7.05-10.3)	9.25 (7.54-11.6)	10.3 (8.12-13.3)	11.1 (8.49-14.8)
2-day	4.03 (3.62-4.57)	5.14 (4.62-5.84)	6.57 (5.89-7.47)	7.70 (6.85-8.82)	9.19 (7.96-10.8)	10.3 (8.77-12.3)	11.4 (9.52-13.9)	12.5 (10.2-15.7)	14.0 (11.0-18.1)	15.1 (11.5-20.1)
3-day	4.69 (4.22-5.33)	6.02 (5.40-6.83)	7.70 (6.90-8.77)	9.04 (8.05-10.4)	10.8 (9.37-12.7)	12.1 (10.3-14.5)	13.5 (11.2-16.5)	14.8 (12.1-18.5)	16.6 (13.0-21.5)	17.9 (13.7-23.9)
4-day	5.22 (4.69-5.92)	6.70 (6.02-7.60)	8.58 (7.69-9.77)	10.1 (8.98-11.5)	12.1 (10.4-14.2)	13.5 (11.5-16.2)	15.0 (12.5-18.3)	16.5 (13.4-20.6)	18.4 (14.5-23.9)	19.9 (15.2-26.6)
7-day	6.43 (5.79-7.30)	8.26 (7.42-9.38)	10.6 (9.48-12.0)	12.4 (11.0-14.2)	14.8 (12.8-17.4)	16.5 (14.1-19.8)	18.3 (15.3-22.4)	20.0 (16.3-25.1)	22.3 (17.6-28.9)	24.0 (18.4-32.0)
10-day	7.26 (6.53-8.24)	9.32 (8.38-10.6)	11.9 (10.7-13.6)	13.9 (12.4-16.0)	16.6 (14.4-19.5)	18.5 (15.8-22.2)	20.4 (17.0-25.0)	22.3 (18.2-27.9)	24.8 (19.5-32.1)	26.6 (20.3-35.4)
20-day	9.50 (8.54-10.8)	12.2 (11.0-13.9)	15.6 (14.0-17.7)	18.2 (16.2-20.8)	21.5 (18.6-25.3)	23.9 (20.3-28.6)	26.2 (21.8-32.0)	28.4 (23.2-35.5)	31.3 (24.6-40.5)	33.4 (25.5-44.5)
30-day	11.5 (10.3-13.0)	14.8 (13.3-16.8)	18.7 (16.8-21.3)	21.8 (19.4-24.9)	25.6 (22.2-30.1)	28.3 (24.1-33.9)	30.9 (25.8-37.8)	33.5 (27.3-41.9)	36.7 (28.9-47.5)	39.0 (29.8-52.0)
45-day	14.0 (12.6-15.9)	17.8 (16.0-20.3)	22.5 (20.2-25.6)	26.0 (23.1-29.8)	30.4 (26.3-35.8)	33.5 (28.5-40.1)	36.4 (30.4-44.5)	39.2 (32.0-49.1)	42.7 (33.6-55.3)	45.2 (34.6-60.3)
60-day	16.7 (15.0-18.9)	21.1 (19.0-24.0)	26.4 (23.7-30.0)	30.4 (27.0-34.8)	35.3 (30.6-41.5)	38.7 (33.0-46.4)	41.9 (35.0-51.3)	45.0 (36.7-56.3)	48.8 (38.5-63.3)	51.5 (39.4-68.7)

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](#)

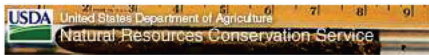
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National Weather Service
Office of Water Prediction (OWP)
1325 East West Highway
Silver Spring, MD 20910
Page Author: [HDSC webmaster](#)
Page last modified: April 21, 2017

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Soil Erosion Factors

K Factor, Rock Free

K Factor, Whole Soil

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Aggregation Method

Dominant Condition

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☐ Lower☐ Higher

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☒ Surface Layer (Not applicable)
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Method)

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☐ Inches☐ Centimeters☐ All Layers (Weighted Average)[View Description](#)[View Rating](#)

T Factor

Wind Erodibility Group

Wind Erodibility Index

Soil Health Properties

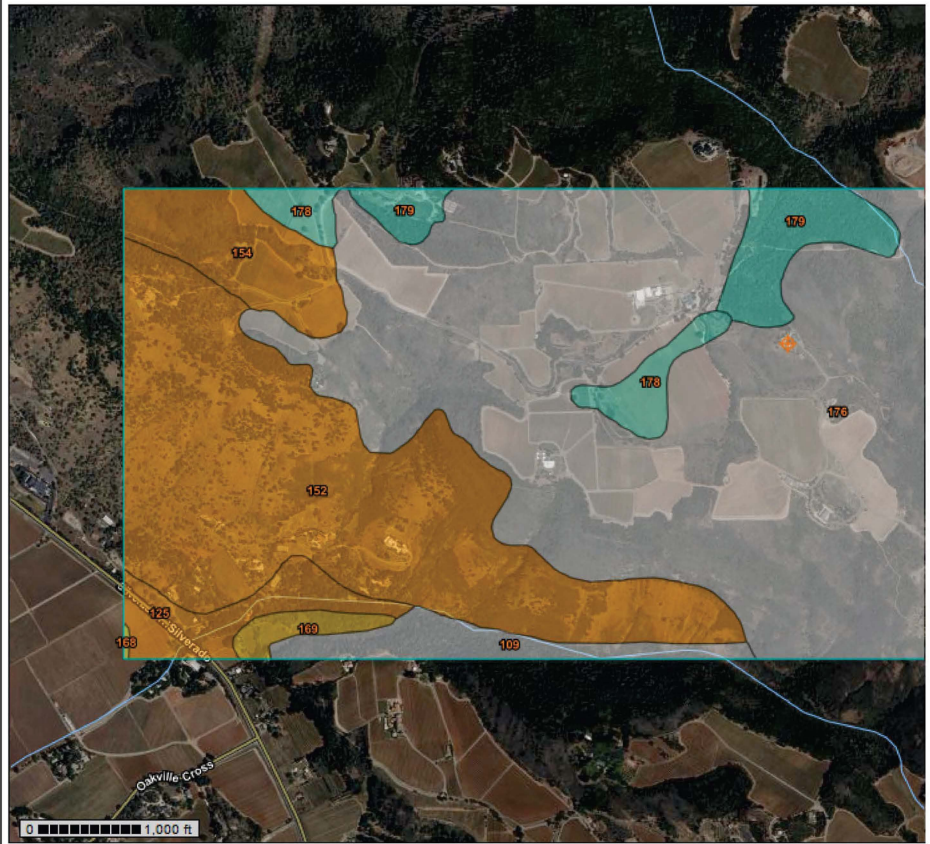
Soil Physical Properties

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 soil surveys that comprise your AOI were mapped at 1:24,000. The design of map units and the level dependent on that map scale.

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

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
109	Boomer gravelly loam, volcanic bedrock, 14 to 60 percent slopes, MLRA 15		26.4	2.2%
125	Cortina very stony loam, 0 to 5 percent slopes	.10	26.3	2.2%
152	Hambright rock-Outcrop complex, 30 to 75 percent slopes	.10	229.3	19.5%
154	Henneke gravelly loam, 30 to 75 percent slopes	.10	41.2	3.5%
168	Perkins gravelly loam, 1 to 10 percent slopes, MLRA 14	.20	0.4	0.0%
169	Perkins gravelly loam, 5 to 9 percent slopes	.15	8.7	0.7%
Totals for Area of Interest			1,173.5	100.0%

Summary by Map Unit — Napa County, California (CA055)				
Map unit symbol	Map unit name	Rating	Acres in AOI	Percent of AOI
176	Rock outcrop-Hambright complex, 50 to 75 percent slopes		770.8	65.7%
178	Sobranite loam, 5 to 30 percent slopes	.32	31.4	2.7%
179	Sobranite loam, 30 to 50 percent slopes	.32	37.7	3.2%
183	Water		1.3	0.1%
Totals for Area of Interest			1,173.5	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.

"Erosion factor Kw (whole soil)" indicates the erodibility of the whole soil. The estimates are modified by the presence of rock fragments.

Factor K does not apply to organic horizons and is not reported for those layers.

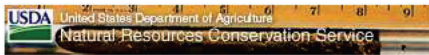
Rating Options — K Factor, Whole Soil

Aggregation Method: Dominant Condition

Component Percent Cutoff: *None Specified*

Tie-break Rule: Higher

Layer Options (Horizon Aggregation Method): Surface Layer (Not applicable)

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Soil Erosion Factors

K Factor, Rock Free

K Factor, Whole Soil

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Aggregation Method Dominant Condition

Component Percent
Cutoff

Tie-break Rule

☐ Lower☒ HigherLayer 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)

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

Map unit symbol	Map unit name	Rating	Acres in AOI	Percent of AOI
176	Rock outcrop-Hambright complex, 50 to 75 percent slopes		66.0	86.2%
178	Sobrante loam, 5 to 30 percent slopes	.32	1.9	2.5%
179	Sobrante loam, 30 to 50 percent slopes	.32	8.7	11.4%
Totals for Area of Interest			76.6	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.

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by the presence of rock fragments.
Factor K does not apply to organic horizons and is not reported for those layers.
Rating Options — K Factor, Whole Soil
Aggregation Method: Dominant Condition
Component Percent Cutoff: None Specified
Tie-break Rule: Higher
Layer Options (Horizon Aggregation Method): Surface Layer (Not applicable)


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K Factor, Rock Free

K Factor, Whole Soil

T Factor

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Map ☒Table ☒Description of Rating ☒

Rating Options

☐ Detailed Description

Advanced Options

Aggregation Method Dominant Condition

Component Percent Cutoff

Tie-break Rule ☒ Lower ☐ HigherInterpret Nulls as Zero ☐ Yes ☒ No
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Wind Erodibility Group

Wind Erodibility Index

Soil Health Properties

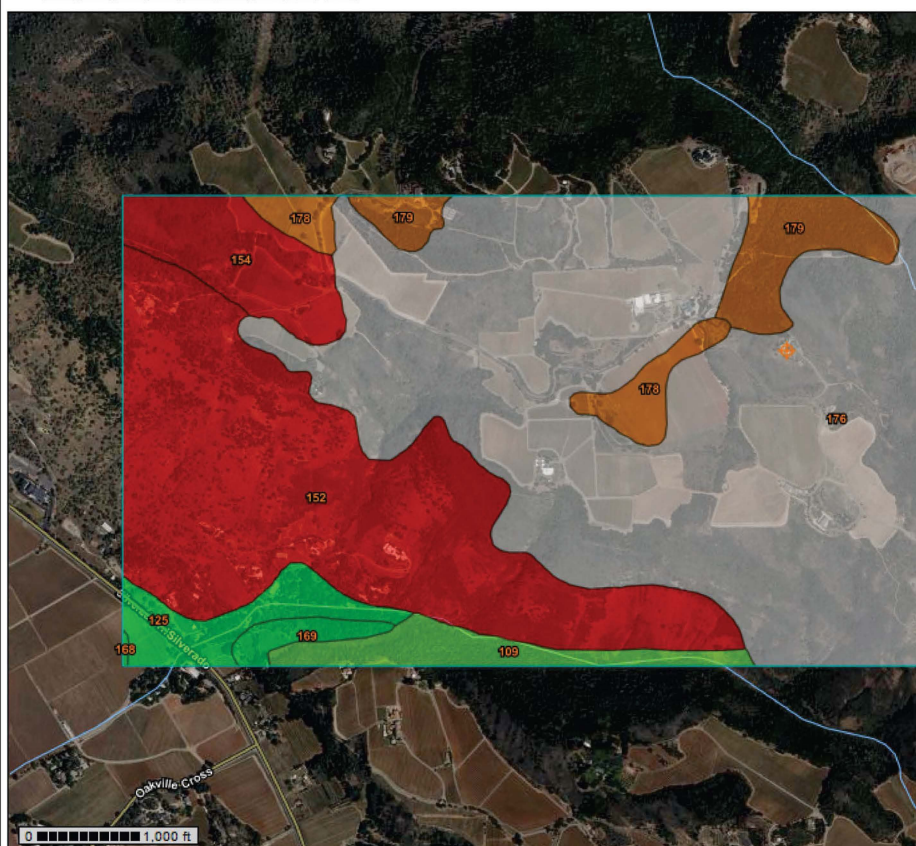
Soil Physical Properties

Soil Qualities and Features

Water Features

Map — T Factor

Scale (not to scale)

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Totals for Area of Interest			1,173.5	100.0%

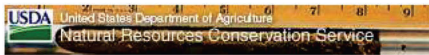
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183	Water		1.3	0.1%
Totals for Area of Interest			1,173.5	100.0%

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

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Soil Erosion Factors

K Factor, Rock Free

K Factor, Whole Soil

T Factor

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Map ☒Table ☒Description of Rating ☒

Rating Options

☐ Detailed Description

Advanced Options

Aggregation Method Dominant Condition

Component Percent Cutoff

Tie-break Rule ☒ Lower ☐ HigherInterpret Nulls as Zero ☐ Yes ☒ No[View Description](#)[View Rating](#)

Wind Erodibility Group

Wind Erodibility Index

Soil Health Properties

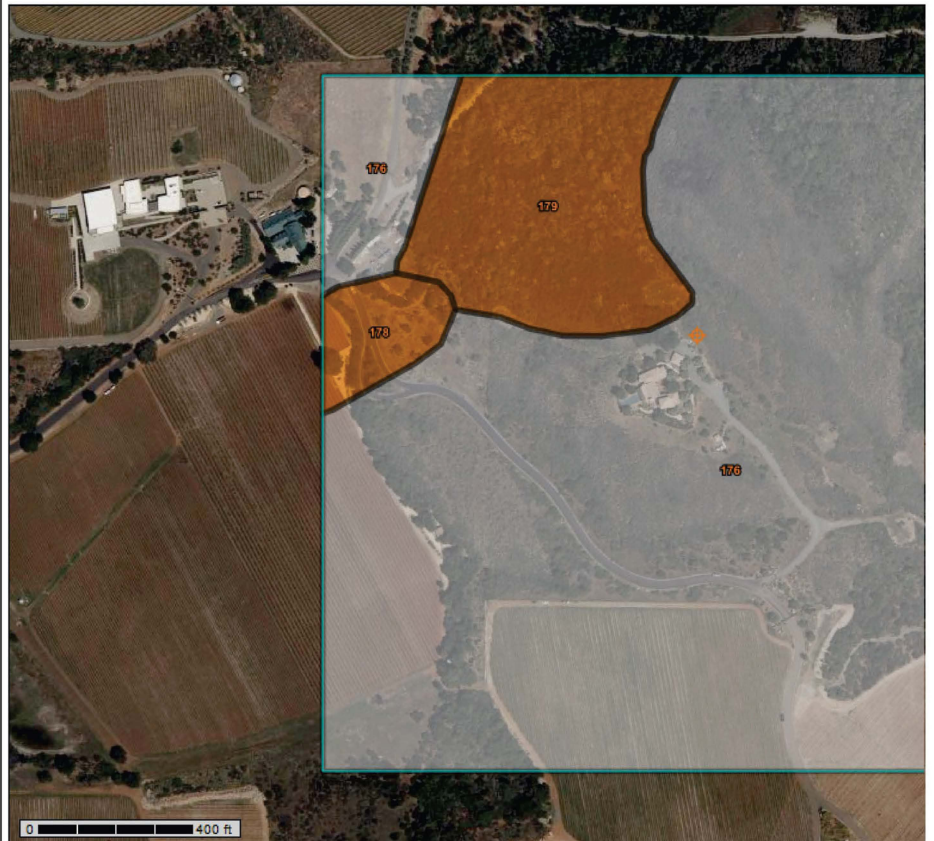
Soil Physical Properties

Soil Qualities and Features

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Map — T Factor

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Description — T Factor

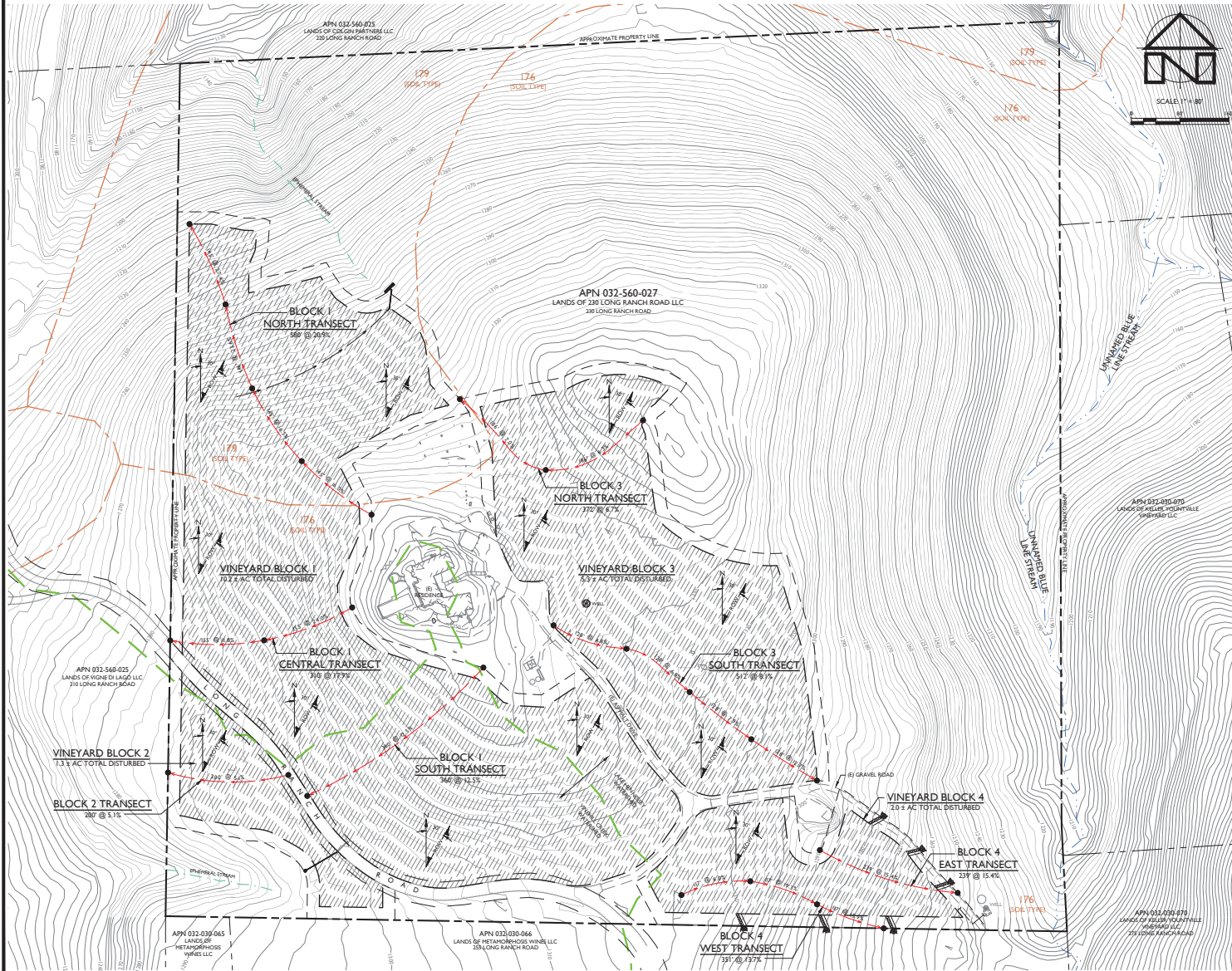
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Rating Options — T Factor

Units of Measure: tons per acre per year
Aggregation Method: Dominant Condition
Component Percent Cutoff: <i>None Specified</i>
Tie-break Rule: Lower
Interpret Nulls as Zero: No

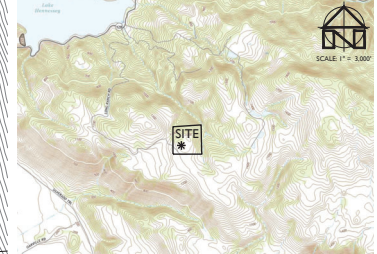
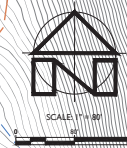
230 LONG RANCH ROAD

UNIVERSAL SOIL LOSS EQUATION EXHIBIT



UNIVERSAL SOIL LOSS EQUATION EXHIBIT

SCALE: 1" = 80'



LOCATION MAP
SCALE: 1" = 3,000'

PROJECT INFORMATION:

PROPERTY OWNER & APPLICANT:
230 LONG RANCH ROAD LLC
230 LONG RANCH ROAD
ST. HELENA, CA 94574

SITE ADDRESS:
230 LONG RANCH ROAD
SAINT HELENA, CA 94574

ASSESSOR'S PARCEL NUMBER:
032-560-027

PARCEL SIZE:
48.4 ± ACRES

PROJECT SIZE:
18.8 ± ACRES TOTAL PLANTED

ZONING:
AGRICULTURAL WATERSHED (AW)

FLOOD HAZARD NOTE:

ACCORDING TO THE FEDERAL EMERGENCY MANAGEMENT AGENCY (FEMA) FLOOD INSURANCE RATE MAP (FIRM) MAP NUMBER 06055C0405E, 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 ELEVATION DATA DERIVED FROM BARE-EARTH SURFACE DIGITAL ELEVATION MODELS (DEM) CREATED FROM LIDAR DATA FLOWN IN 2018 IN RESPONSE TO THE WIDESPREAD 2017 FIRES IN NORTHERN CALIFORNIA AS PART OF ONGOING NATIONWIDE 3DEP (U.S. GEOLOGICAL SURVEY 3D ELEVATION PROGRAM) EFFORTS. APPLIED CIVIL ENGINEERING INCORPORATED ASSUMES NO LIABILITY REGARDING THE ACCURACY OR COMPLETENESS OF THE TOPOGRAPHIC INFORMATION.
2. AERIAL PHOTOGRAPHS ARE NADIR IMAGES CAPTURED BY PICTOMETRY INTERNATIONAL, DATED JULY 15, 2021 AND MAY NOT REPRESENT CURRENT CONDITIONS.
3. CONTOUR INTERVAL: FIVE (5) FEET, HIGHLIGHTED EVERY TWENTY FIVE (25) 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
- BLUE LINE 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:

- 176 ROCK OUTCROP/HAMMBOUGH COMPLEX, 50 TO 75 PERCENT SLOPES
 - 179 SOBRIANTE LOAM, 30 TO 50 PERCENT SLOPES
- SOIL TYPE BOUNDARIES SHOWN ON THIS MAP ARE BASED ON THE NAPA COUNTY GEOGRAPHIC INFORMATION SYSTEM DATA AND SHOULD BE CONSIDERED APPROXIMATE.

APPLIED

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230 LONG RANCH ROAD

UNIVERSAL SOIL LOSS EQUATION EXHIBIT

PREPARED UNDER THE
DIRECTION OF:



DRAWN BY: Power-CAD LLC

CHECKED BY: MBM

DATE: MARCH 20, 2024

REVISIONS: BY: 3/20/2024 TMS
PERMIT SUBMITTAL

JOB NUMBER: 23-105

FILE: 23-105EXH-AJULE.DWG

ORIGINAL SIZE: 24" X 36"

SHEET NUMBER: 1

OF 1