

EXHIBIT C

Soil Loss Analysis
Phillips-Kelham Trust Vineyard Partners
Proposed New Vineyard Development and Re-plant
St. Helena Highway
Yountville, CA
APN 027-490-006
September 2019

The following analysis evaluates a proposed vineyard development and re-plant on approximately 13.8 acres of the referenced 42.9-acre site, southwest of State Highway 29, north of the Town of Yountville, California, to determine the proposed vineyard's potential to increase sediment delivery from the site. The analysis also compares predicted soil loss with the USDA soil loss tolerance standard ("T"). 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, provided by Applied Civil Engineering. The accompanying Excel spreadsheet 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 "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.
- The "LS" value is calculated per algorithms based on USDA empirical data, using plotted slope lengths and gradients, over seven representative transects through the two proposed vineyard blocks. The effects of concave, convex and complex slopes are calculated via USDA segmented slope protocols, which assign greater influence to downslope segments.
- Pre-project "C" value: To account for varying levels of vegetation and ground cover, USDA segmenting protocols—again, assigning greater influence to downslope segments-- have also been applied to "C" factor determinations. Values assigned to each segment were selected from Table 5 of the "Special Applications for Napa County" USLE pamphlet, based on examination of Google Earth imagery and observations during field visits on November 27, 2018, February 11, 2019, and August 19, 2019. Segment 3 of the "East" transect of Block 2 includes the existing vineyard. Although currently under non-tilled management, this old vineyard appears to have been tilled throughout most of its life, judging from its somewhat sparser prevailing cover condition.
- The post-project "C" value modeled in the analysis represents cover crop management (85% cover, non-tilled) that will be necessary to prevent soil loss exceeding either current levels or the USDA soil loss tolerance standard. 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.
- "P" values for both pre- and post-project conditions are assumed to be the default maximum (1).

With the assumption that the specified 85% cover will be maintained, the calculations predict that net soil loss levels from the proposed vineyard to any discrete drainage basin will exceed neither current levels nor the USDA soil loss tolerance (“T”). (Please see accompanying Excel printouts and the explanatory MS Word Addendum.)

Transect Identification		Phillips-Kelham Block 2 North, Pre-project				
Acres		1.1	acres			
Total Slope Length		155	feet			
Number of Segments		1	segment			
		1	2	3	4	5
R		73				
Factor (F)		1.00	0.00	0.00	0.00	0.00
Slope Length		155.00				
Slope %		16.1				
LS		3.24	0.00	0.00	0.00	0.00
K		0.10				
C		0.014				
P		1.00	1.00	1.00	1.00	1.00
(F) (LS) (K) (C)		0.0045	0.0000	0.0000	0.0000	0.0000
A = (R) (F) (LS) (K) (C) (P)		0.33	0.00	0.00	0.00	0.00
						0.0045
						0.36

tons/acre/year
tons/year

Transect Identification		Phillips-Kelham Block 2 North, Post-project				
Acres		1.1	acres			
Total Slope Length		155	feet			
Number of Segments		1	segment			
		1	2	3	4	5
R		73				
Factor (F)		1.00	0.00	0.00	0.00	0.00
Slope Length		155.00				
Slope %		16.1				
LS		3.24	0.00	0.00	0.00	0.00
K		0.10				
C		0.017				
P		1.00	1.00	1.00	1.00	1.00
(F) (LS) (K) (C)		0.0055	0.0000	0.0000	0.0000	0.0000
A = (R) (F) (LS) (K) (C) (P)		0.40	0.00	0.00	0.00	0.00
						0.0055
						0.40

tons/acre/year
tons/year

Transect Identification		Phillips-Kelham Block 2 Mid-South, Pre-project				
Acres		2.5	acres			
Total Slope Length		402	feet			
Number of Segments		1	segment			
		1	2	3	4	5
R		73				
Factor (F)		1.00	0.00	0.00	0.00	0.00
Slope Length		402.00				
Slope %		9.0				
LS		2.35	0.00	0.00	0.00	0.00
K		0.10				
C		0.014				
P		1.00	1.00	1.00	1.00	1.00
(F) (LS) (K) (C)		0.0033	0.0000	0.0000	0.0000	0.0000
A = (R) (F) (LS) (K) (C) (P)		0.24	0.00	0.00	0.00	0.00
						0.0033
						0.24

tons/acre/year
tons/year

Transect Identification		Phillips-Kelham Block 2 Mid-South, Post-project				
Acres		2.5	acres			
Total Slope Length		402	feet			
Number of Segments		1	segment			
		1	2	3	4	5
R		73				
Factor (F)		1.00	0.00	0.00	0.00	0.00
Slope Length		402.00				
Slope %		9.0				
LS		2.35	0.00	0.00	0.00	0.00
K		0.10				
C		0.017				
P		1.00	1.00	1.00	1.00	1.00
(F) (LS) (K) (C)		0.0040	0.0000	0.0000	0.0000	0.0000
A = (R) (F) (LS) (K) (C) (P)		0.29	0.00	0.00	0.00	0.00
						0.0040
						0.29

tons/acre/year
tons/year

Transect Identification		Phillips-Kelham Block 2 East, Pre-project				
Acres		2.1 acres				
Total Slope Length		315 feet				
Number of Segments		3 segments				
		1	2	3	4	5
R		73	73	73	73	73
Factor (F)		0.19	0.35	0.46	0.00	0.00
Slope Length		315.00	315.00	315.00		
Slope %		14.3	19.0	8.6		
LS		3.93	5.76	1.95	0.00	0.00
K		0.10	0.10	0.10		
C		0.020	0.020	0.027		
P		1.00	1.00	1.00	1.00	1.00
(F) (LS) (K) (C)		0.0015	0.0040	0.0024	0.0000	0.0000
A = (R) (F) (LS) (K) (C) (P)		0.11	0.29	0.18	0.00	0.00

0.0079
0.58 tons/acre/year
1.22 tons/year

Transect Identification		Phillips-Kelham Block 2 East, Post-project				
Acres		2.1 acres				
Total Slope Length		315 feet				
Number of Segments		3 segments				
		1	2	3	4	5
R		73	73	73	73	73
Factor (F)		0.19	0.35	0.46	0.00	0.00
Slope Length		315.00	315.00	315.00		
Slope %		14.3	19.0	8.6		
LS		3.93	5.76	1.95	0.00	0.00
K		0.10	0.10	0.10		
C		0.017	0.017	0.017		
P		1.00	1.00	1.00	1.00	1.00
(F) (LS) (K) (C)		0.0013	0.0034	0.0015	0.0000	0.0000
A = (R) (F) (LS) (K) (C) (P)		0.09	0.25	0.11	0.00	0.00

0.0062
0.45 tons/acre/year
0.95 tons/year

Transect Identification		Phillips-Kelham Block 2 SW, Pre-project				
Acres		3 acres				
Total Slope Length		426 feet				
Number of Segments		3 segments				
		1	2	3	4	5
R		73	73	73	73	73
Factor (F)		0.19	0.35	0.46	0.00	0.00
Slope Length		426.00	426.00	426.00		
Slope %		8.5	10.6	8.5		
LS		2.23	3.03	2.23	0.00	0.00
K		0.10	0.10	0.10		
C		0.020	0.020	0.020		
P		1.00	1.00	1.00	1.00	1.00
(F) (LS) (K) (C)		0.0008	0.0021	0.0020	0.0000	0.0000
A = (R) (F) (LS) (K) (C) (P)		0.06	0.15	0.15	0.00	0.00

0.0050
0.37 tons/acre/year
1.10 tons/year

Transect Identification		Phillips-Kelham Block 2 SW, Post-project				
Acres		3 acres				
Total Slope Length		426 feet				
Number of Segments		3 segments				
		1	2	3	4	5
R		73	73	73	73	73
Factor (F)		0.19	0.35	0.46	0.00	0.00
Slope Length		426.00	426.00	426.00		
Slope %		8.5	10.6	8.5		
LS		2.23	3.03	2.23	0.00	0.00
K		0.10	0.10	0.10		
C		0.017	0.017	0.017		
P		1.00	1.00	1.00	1.00	1.00
(F) (LS) (K) (C)		0.0007	0.0018	0.0017	0.0000	0.0000
A = (R) (F) (LS) (K) (C) (P)		0.05	0.13	0.13	0.00	0.00

0.0043
0.31 tons/acre/year
0.93 tons/year

Transect Identification		Block 2 West-North - Pre				
Acres		0.5 acres				
Total Slope Length		270 feet				
Number of Segments		3 segments				
		1	2	3	4	5
R		73	73	73	73	73
Factor (F)		0.19	0.35	0.46	0.00	0.00
Slope Length		270.00	270.00	270.00		
Slope %		28.0	9.0	11.0		
LS		8.84	1.92	2.54	0.00	0.00
K		0.10	0.10	0.10		
C		0.020	0.020	0.031		
P		1.00	1.00	1.00	1.00	1.00
(F) (LS) (K) (C)		0.0034	0.0013	0.0036	0.0000	0.0000
A = (R) (F) (LS) (K) (C) (P)		0.25	0.10	0.26	0.00	0.00
						0.0083
						0.61
						0.30

tons/acre/year
tons/year

Transect Identification		Block 2 West-North - Post				
Acres		0.5 acres				
Total Slope Length		270 feet				
Number of Segments		3 segments				
		1	2	3	4	5
R		73	73	73	73	73
Factor (F)		0.19	0.35	0.46	0.00	0.00
Slope Length		270.00	270.00	270.00		
Slope %		28.0	9.0	11.0		
LS		8.84	1.92	2.54	0.00	0.00
K		0.10	0.10	0.10		
C		0.017	0.017	0.017		
P		1.00	1.00	1.00	1.00	1.00
(F) (LS) (K) (C)		0.0029	0.0011	0.0020	0.0000	0.0000
A = (R) (F) (LS) (K) (C) (P)		0.21	0.08	0.14	0.00	0.00
						0.0060
						0.44
						0.22

tons/acre/year
tons/year

Transect Identification		Block 2 West-South - Pre				
Acres		0.5 acres				
Total Slope Length		180 feet				
Number of Segments		3 segments				
		1	2	3	4	5
R		73	73	73	73	73
Factor (F)		0.19	0.35	0.46	0.00	0.00
Slope Length		180.00	180.00	180.00		
Slope %		30.0	17.0	8.0		
LS		7.87	3.75	1.33	0.00	0.00
K		0.10	0.10	0.10		
C		0.031	0.031	0.031		
P		1.00	1.00	1.00	1.00	1.00
(F) (LS) (K) (C)		0.0046	0.0041	0.0019	0.0000	0.0000
A = (R) (F) (LS) (K) (C) (P)		0.34	0.30	0.14	0.00	0.00
						0.0106
						0.77
						0.39

tons/acre/year
tons/year

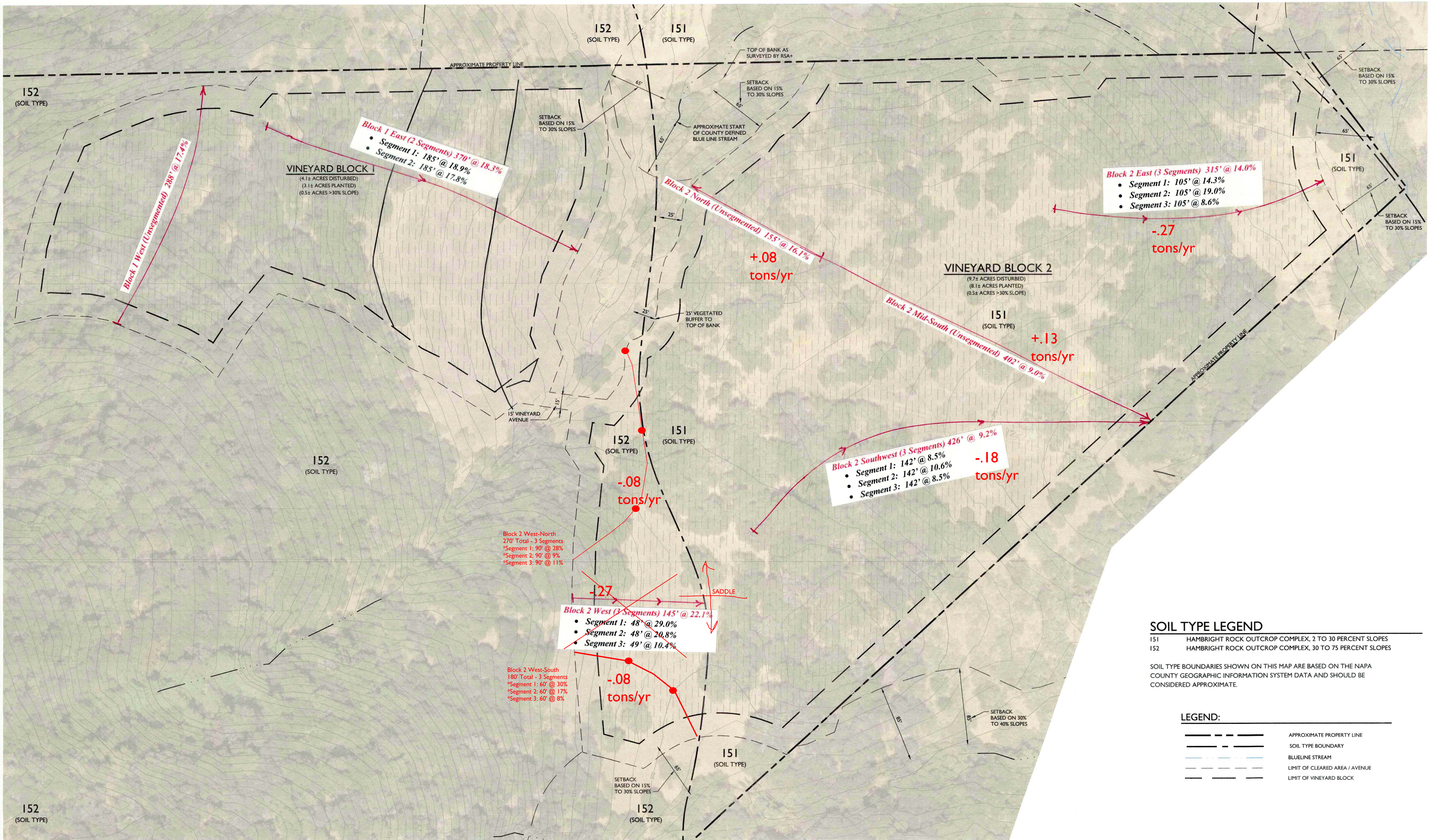
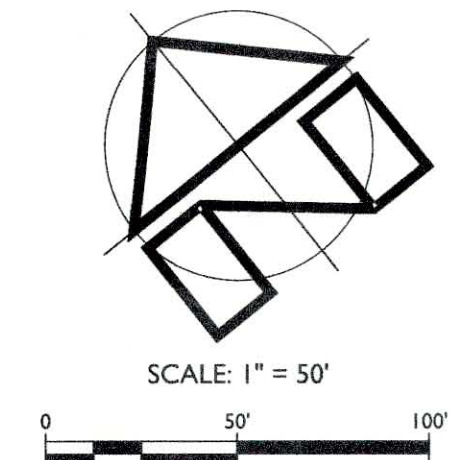
Transect Identification		Block 2 West-South - Post				
Acres		0.5 acres				
Total Slope Length		180 feet				
Number of Segments		3 segments				
		1	2	3	4	5
R		73	73	73	73	73
Factor (F)		0.19	0.35	0.46	0.00	0.00
Slope Length		180.00	180.00	180.00		
Slope %		30.0	17.0	8.0		
LS		7.87	3.75	1.33	0.00	0.00
K		0.10	0.10	0.10		
C		0.017	0.017	0.017		
P		1.00	1.00	1.00	1.00	1.00
(F) (LS) (K) (C)		0.0025	0.0022	0.0010	0.0000	0.0000
A = (R) (F) (LS) (K) (C) (P)		0.19	0.16	0.08	0.00	0.00
						0.0058
						0.42
						0.21

tons/acre/year
tons/year

Phillips-Kelham
 Soil Loss Analysis for Vineyard Proposal
 Explanatory Addendum to Excel Worksheets

- Post-Project C: Non-Tilled Management, 85% cover for all Vineyard Blocks
- R, K, and T factors are uniform throughout the site.
- Block 1, West: Transect not segmented
 - Pre-project C: 75% Trees; 90% cover: 10G, 90W
- Block 1 East (2 Segments)
 - Segment 1: 75% Trees; 90% cover: 10G, 90W. 185' @ 18.9% slope
 - Segment 2: 75% Trees; 90% cover: 40G, 60W. 185' @ 17.8% slope
- Block 2 North: Transect not segmented
 - Pre-project C: 75% Trees; 90% cover: 50G, 50W
- Block 2, Mid-south: Transect segmented
 - 25% trees; 90% cover: 10G, 90W. 142' @ 8.5% slope
- Block 2 East (3 Segments)
 - Segment 1: 75% Trees; 90% cover: 10G, 90W. 105' @ 14.3% slope
 - Segment 2: 75% Trees; 90% cover: 10G, 90W. 105' @ 19.0% slope
 - Segment 3: 75% Trees; 80% cover: 50G, 50W. 105' @ 8.6% slope
- Block 2 Southwest (3 Segments)
 - Segment 1: 75% Trees; 90% cover: 10G, 90W. 142' @ 8.5% slope
 - Segment 2: 75% Trees; 90% cover: 10G, 90W. 142' @ 10.6% slope
 - Segment 3: 75% Trees; 90% cover: 10G, 90W. 142' @ 8.5% slope
- Block 2 West: (3 Segments)
 - Segment 1: 75% Trees; 90% cover: 10G, 90W. 48' @ 29.0% slope
 - Segment 2: 75% Trees; 90% cover: 40G, 60W. 48' @ 20.8% slope
 - Segment 3: 75% Trees; 90% cover: 40G, 60W. 48' @ 10.4% slope

USLE Transects



- 151 HAMBRIGHT ROCK OUTCROP COMPLEX, 2 TO 30 PERCENT SLOPES
- 152 HAMBRIGHT ROCK OUTCROP COMPLEX, 30 TO 75 PERCENT SLOPES

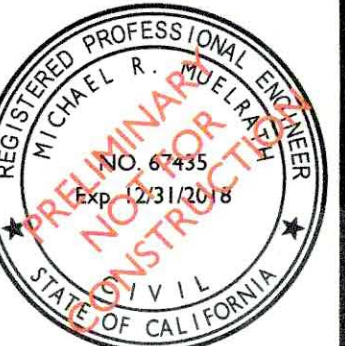
SOIL TYPE BOUNDARIES SHOWN ON THIS MAP ARE BASED ON THE NAPA COUNTY GEOGRAPHIC INFORMATION SYSTEM DATA AND SHOULD BE CONSIDERED APPROXIMATE.

LEGEND:

	APPROXIMATE PROPERTY LINE
	SOIL TYPE BOUNDARY
	BLUELINE STREAM
	LIMIT OF CLEARED AREA / AVENUE
	LIMIT OF VINEYARD BLOCK

TRUST VINEYARD PARTNERS
USLE EXHIBIT

PREPARED UNDER THE DIRECTION OF:



DRAWN BY: BT DRAFTING
CHECKED BY: MRM
DATE: FEBRUARY 2019
REVISIONS: BY:

JOB NUMBER: 18-110
FILE: 18-110EXH_USLE.DWG
ORIGINAL SIZE: 24" X 36"
SHEET NUMBER: