

MEMORANDUM

Date: October 13, 2021

To: Patrick Ryan, Napa County Planning, Building, and Environmental Services

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

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

Re: Red Boat Vineyard Track I ECP
APN 039-380-037
Soil Loss Analysis

This memo transmits the findings of a soil loss modeling analysis for the above-referenced Track I Erosion Control Plan (ECP). The Universal Soil Loss Equation (USLE) was used to predict pre-project and post-project soil loss from within the proposed vineyard development areas. A combination of topographic maps, aerial imagery, and site visits were used to determine pre-project transect locations, slopes, and cover values. Pre-project and post-project cover values are consistent with the United States Department of Agriculture (USDA) – Natural Resource Conservation Service (NRCS) publication titled “The Universal Soil Loss Equation Special Applications for Napa County, California” (May 1994).

A site visit was conducted on June 8, 2021 by Matt Bueno and Rachel Rosasco to determine the pre-project cover value of the proposed blocks. The proposed development area was inspected, and the cover values used in this analysis represents existing conditions at the time of the visit. The post-project cover value was calculated using the percent cover specified in the ECP. This analysis is limited to the proposed vineyard areas as well as vineyard avenues (9.0 gross acres).

The project area was split into six different transect areas. Block 1 is covered by transect areas 1A and 1B. Block 2 is covered by transect areas 2A, 2B, and 3A. Block 3 is covered by transect areas 2A, 3A, and 3B. For modeling purposes, transects 3A and 3B were modeled using a segmented length and steepness (LS) value. Transect 1B was modeled using a segmented K as well as a segmented LS as a result of the transect passing through two different soil types. The segmented LS and KLS values were calculated concurrently for these transects according to the procedure outlined in the *USDA Agriculture Handbook Number 537, Predicting Rainfall Erosion Losses*.

The model, summarized on pages 2 and 3 of the supporting documents (attached), predicts a net decrease of approximately 3.2 tons of soil loss when comparing pre-project to post-project conditions. The ECP has been designed to ensure compliance with Napa County policies requiring no-net-increase in soil loss for post-project conditions. Please see the following supporting documents that contain data tables, calculations, maps of transect locations, and results from the analysis.



**Red Boat Vineyard Track I ECP
USLE Calculation Sheets**

Red Boat Vineyard Track I ECP
USLE Calculations
PPI Engineering
10/13/2021
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USLE Calculations - Block Summary Sheet

Proposed Block	Proposed Development Acres	Pre-Project Soil Loss (tons/year)	Post-Project Soil Loss (tons/year)	Net Increase/Decrease (tons/year)
1	1.33	2.62	1.83	0.79
2	4.21	4.18	2.92	1.26
3	3.45	3.74	2.61	1.12
Totals	8.99	10.54	7.37	3.17

Note: Individual estimates may not add to the totals due to rounding

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USLE Calculations
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USLE Calculations - Transect Summary Sheet

Proposed Block Transect	Proposed Development Acres	Pre-Project Soil Loss (tons/year)	Post-Project Soil Loss (tons/year)	Net Increase/Decrease (tons/year)
1A	1.13	2.45	1.72	0.74
1B	0.20	0.17	0.12	0.05
2A	3.36	3.60	2.52	1.08
2B	0.85	0.58	0.41	0.18
3A	1.53	1.51	1.05	0.45
3B	1.92	2.23	1.56	0.67
Totals	8.99	10.54	7.37	3.17

Note: Individual estimates may not add to the totals due to rounding

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Transect 1A, Pre-Project

Proposed Development Acres:	1.13
Soil Unit No. (100-182):	179
Soil Name:	Sobranite
K, Soil Erodibility:	0.32
T, Soil Loss Tolerance (tons/acre):	2
R, Rainfall:	50
Total Transect Length (ft):	135
Number of Segments:	1
Individual Segment Lengths (ft):	135
Segment:	
Gradient (%):	21
m:	
Individual LS:	4.31
Factor:	
Product:	
LS, Length and Steepness:	4.31
Total Transect Average Gradient (%):	21
Farming Practice:	Up & Down Hill
P, Practice Factor (Table 6) ¹ :	1.00
Vegetative Canopy:	No Canopy
Canopy Cover:	0%
Ground Cover:	70%
Percent Grass:	90%
Percent Weeds:	10%
C, Cover (Table 5) ¹ :	0.031
A, Soil Loss (tons/acre):	2.17
Soil Loss in Proposed Development (tons):	2.45

¹ Tables 5 & 6 - USLE Special Applications for Napa County
Note: Estimates may vary slightly due to rounding

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USLE Calculations
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Transect 1A, Post-Project

Proposed Development Acres:	1.13
Soil Unit No. (100-182):	179
Soil Name:	Sobranite
K, Soil Erodibility:	0.32
T, Soil Loss Tolerance (tons/acre):	2
R, Rainfall:	50
Total Transect Length (ft):	135
Number of Segments:	1
Individual Segment Lengths (ft):	135
Segment:	
Gradient (%):	21
m:	
Individual LS:	4.31
Factor:	
Product:	
LS, Length and Steepness:	4.31
Total Transect Average Gradient (%):	21
Farming Practice:	Up & Down Hill
P, Practice Factor (Table 6) ¹ :	1.00
Cover Strategy:	Permanent
Age of Development:	Over 3 Years
Ground Cover:	80%
C, Cover (Table 4) ¹ :	0.022
A, Soil Loss (tons/acre):	1.52
Soil Loss in Proposed Development (tons):	1.72

¹ Tables 4 & 6 - USLE Special Applications for Napa County
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Red Boat Vineyard Track I ECP
 USLE Calculations
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Transect 1B, Pre-Project

Proposed Development Acres:	0.20	
Soil Unit No. (100-182):	179	152
Soil Name:	Sobranite	Hambright-Rock Outcrop
T, Soil Loss Tolerance (tons/acre):	2	1
R, Rainfall:	50	
K, Soil Erodibility	0.32	0.10
Total Transect Length (ft):	49	
Number of Segments:	2	
Individual Segment Lengths (ft):	25	
Segment:	1	2
Segment Soil Unit No. (100-182):	179	152
Gradient (%):	25	21
m:		
Individual LS:	3.26	2.60
Individual K:	0.32	0.1
Factor:	0.35	0.65
Individual KLS:	0.37	0.17
Total KLS:	0.53	
Total Transect Average Gradient (%):	23	
Farming Practice:	Up & Down Hill	
P, Practice Factor (Table 6) ¹ :	1.00	
Vegetative Canopy:	No Canopy	
Canopy Cover:	25%	
Ground Cover:	70%	
Percent Grass:	90%	
Percent Weeds:	10%	
C, Cover (Table 5) ¹ :	0.031	
A, Soil Loss (tons/acre):	0.84	
Soil Loss in Proposed Development (tons):	0.17	

¹ Tables 5 & 6 - USLE Special Applications for Napa County

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 USLE Calculations
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Transect 1B, Post-Project

Proposed Development Acres:	0.20	
Soil Unit No. (100-182):	179	152
Soil Name:	Sobranite	Hambright-Rock Outcrop
T, Soil Loss Tolerance (tons/acre):	2	1
R, Rainfall:	50	
K, Soil Erodibility:	0.32	0.10
Total Transect Length (ft):	49	
Number of Segments:	2	
Individual Segment Lengths (ft):	25	
Segment:	1	2
Segment Soil Unit No. (100-182):	179	152
Gradient (%):	25	21
m:		
Individual LS:	3.26	2.60
Individual K	0.32	0.1
Factor:	0.35	0.65
Individual KLS	0.37	0.17
Total KLS:	0.53	
Total Transect Average Gradient (%):	23	
Farming Practice:	Up & Down Hill	
P, Practice Factor (Table 6) ¹ :	1.00	
Cover Strategy:	Permanent	
Age of Development:	Over 3 Years	
Ground Cover:	80%	
C, Cover (Table 4) ¹ :	0.022	
A, Soil Loss (tons/acre):	0.59	
Soil Loss in Proposed Development (tons):	0.12	

¹ Tables 4 & 6 - USLE Special Applications for Napa County

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Transect 2A, Pre-Project

Proposed Development Acres:	3.36
Soil Unit No. (100-182):	152
Soil Name:	Hambright-Rock Outcrop
K, Soil Erodibility:	0.1
T, Soil Loss Tolerance (tons/acre):	1
R, Rainfall:	50
Total Transect Length (ft):	237
Number of Segments:	1
Individual Segment Lengths (ft):	237
Segment:	
Gradient (%):	24
m:	
Individual LS:	6.81
Factor:	
Product:	
LS, Length and Steepness:	6.81
Total Transect Average Gradient (%):	24
Farming Practice:	Up & Down Hill
P, Practice Factor (Table 6) ¹ :	1.00
Vegetative Canopy:	No Canopy
Canopy Cover:	0%
Ground Cover:	70%
Percent Grass:	90%
Percent Weeds:	10%
C, Cover (Table 5) ¹ :	0.031
A, Soil Loss (tons/acre):	1.07
Soil Loss in Proposed Development (tons):	3.60

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Transect 2A, Post-Project

Proposed Development Acres:	3.36
Soil Unit No. (100-182):	152
Soil Name:	Hambright-Rock Outcrop
K, Soil Erodibility:	0.1
T, Soil Loss Tolerance (tons/acre):	1
R, Rainfall:	50
Total Transect Length (ft):	237
Number of Segments:	1
Individual Segment Lengths (ft):	237
Segment:	
Gradient (%):	24
m:	
Individual LS:	6.81
Factor:	
Product:	
LS, Length and Steepness:	6.81
Total Transect Average Gradient (%):	24
Farming Practice:	Up & Down Hill
P, Practice Factor (Table 6) ¹ :	1.00
Cover Strategy:	Permanent
Age of Development:	Over 3 Years
Ground Cover:	80%
C, Cover (Table 4) ¹ :	0.022
A, Soil Loss (tons/acre):	0.75
Soil Loss in Proposed Development (tons):	2.52

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Red Boat Vineyard Track I ECP
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Transect 2B, Pre-Project

Proposed Development Acres:	0.85
Soil Unit No. (100-182):	152
Soil Name:	Hambright-Rock Outcrop
K, Soil Erodibility:	0.1
T, Soil Loss Tolerance (tons/acre):	1
R, Rainfall:	50
Total Transect Length (ft):	109
Number of Segments:	1
Individual Segment Lengths (ft):	109
Segment:	
Gradient (%):	23
m:	
Individual LS:	4.37
Factor:	
Product:	
LS, Length and Steepness:	4.37
Total Transect Average Gradient (%):	23
Farming Practice:	Up & Down Hill
P, Practice Factor (Table 6) ¹ :	1.00
Vegetative Canopy:	No Canopy
Canopy Cover:	0%
Ground Cover:	70%
Percent Grass:	90%
Percent Weeds:	10%
C, Cover (Table 5) ¹ :	0.031
A, Soil Loss (tons/acre):	0.69
Soil Loss in Proposed Development (tons):	0.58

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Transect 2B, Post-Project

Proposed Development Acres:	0.85
Soil Unit No. (100-182):	152
Soil Name:	Hambright-Rock Outcrop
K, Soil Erodibility:	0.1
T, Soil Loss Tolerance (tons/acre):	1
R, Rainfall:	50
Total Transect Length (ft):	109
Number of Segments:	1
Individual Segment Lengths (ft):	109
Segment:	
Gradient (%):	23
m:	
Individual LS:	4.37
Factor:	
Product:	
LS, Length and Steepness:	4.37
Total Transect Average Gradient (%):	23
Farming Practice:	Up & Down Hill
P, Practice Factor (Table 6) ¹ :	1.00
Cover Strategy:	Permanent
Age of Development:	Over 3 Years
Ground Cover:	80%
C, Cover (Table 4) ¹ :	0.022
A, Soil Loss (tons/acre):	0.48
Soil Loss in Proposed Development (tons):	0.41

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Transect 3A, Pre-Project

Proposed Development Acres:	1.53	
Soil Unit No. (100-182):	152	
Soil Name:	Hambright-Rock Outcrop	
K, Soil Erodibility:	0.1	
T, Soil Loss Tolerance (tons/acre):	1	
R, Rainfall:	50	
Total Transect Length (ft):	234	
Number of Segments:	2	
Individual Segment Lengths (ft):	117	
Segment:	1	2
Gradient (%):	16	26
m:		
Individual LS:	3.95	7.50
Factor:	0.35	0.65
Product:	1.38	4.87
LS, Length and Steepness:	6.25	
Total Transect Average Gradient (%):	21	
Farming Practice:	Up & Down Hill	
P, Practice Factor (Table 6) ¹ :	1.00	
Vegetative Canopy:	No Canopy	
Canopy Cover:	0%	
Ground Cover:	70%	
Percent Grass:	90%	
Percent Weeds:	10%	
C, Cover (Table 5) ¹ :	0.031	
A, Soil Loss (tons/acre):	0.98	
Soil Loss in Proposed Development (tons):	1.51	

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Red Boat Vineyard Track I ECP
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Transect 3A, Post-Project

Proposed Development Acres:	1.53	
Soil Unit No. (100-182):	152	
Soil Name:	Hambright-Rock Outcrop	
K, Soil Erodibility:	0.1	
T, Soil Loss Tolerance (tons/acre):	1	
R, Rainfall:	50	
Total Transect Length (ft):	234	
Number of Segments:	2	
Individual Segment Lengths (ft):	117	
Segment:	1	2
Gradient (%):	16	26
m:		
Individual LS:	3.95	7.50
Factor:	0.35	0.65
Product:	1.38	4.87
LS, Length and Steepness:	6.25	
Total Transect Average Gradient (%):	21	
Farming Practice:	Up & Down Hill	
P, Practice Factor (Table 6) ¹ :	1.00	
Cover Strategy:	Permanent	
Age of Development:	Over 3 Years	
Ground Cover:	80%	
C, Cover (Table 4) ¹ :	0.022	
A, Soil Loss (tons/acre):	0.69	
Soil Loss in Proposed Development (tons):	1.05	

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Transect 3B, Pre-Project

Proposed Development Acres:	1.92	
Soil Unit No. (100-182):	152	
Soil Name:	Hambright-Rock Outcrop	
K, Soil Erodibility:	0.1	
T, Soil Loss Tolerance (tons/acre):	1	
R, Rainfall:	50	
Total Transect Length (ft):	397	
Number of Segments:	2	
Individual Segment Lengths (ft):	199	
Segment:	1	2
Gradient (%):	13	25
m:		
Individual LS:	3.88	9.29
Factor:	0.35	0.65
Product:	1.36	6.04
LS, Length and Steepness:	7.39	
Total Transect Average Gradient (%):	19	
Farming Practice:	Up & Down Hill	
P, Practice Factor (Table 6) ¹ :	1.00	
Vegetative Canopy:	No Canopy	
Canopy Cover:	0%	
Ground Cover:	70%	
Percent Grass:	90%	
Percent Weeds:	10%	
C, Cover (Table 5) ¹ :	0.031	
A, Soil Loss (tons/acre):	1.16	
Soil Loss in Proposed Development (tons):	2.23	

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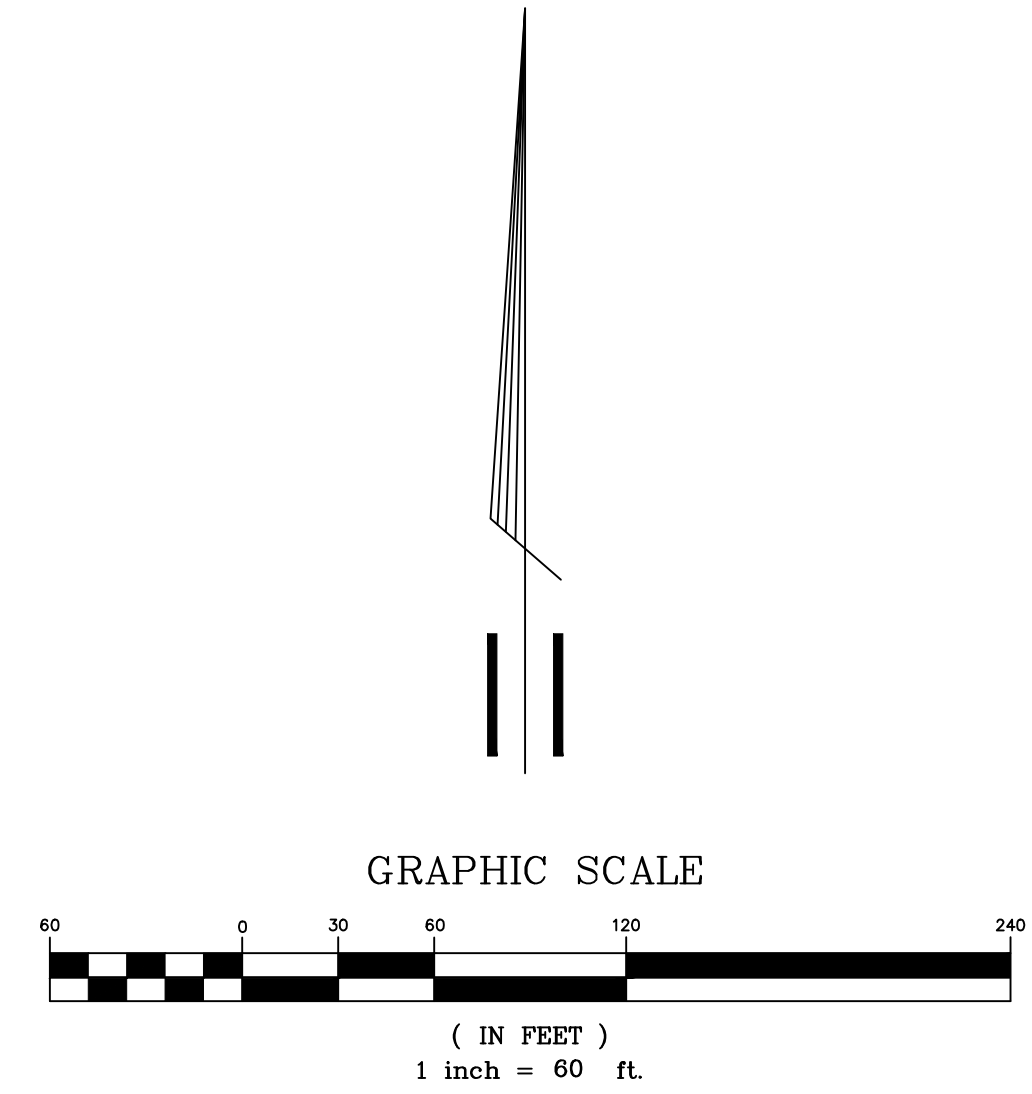
Transect 3B, Post-Project

Proposed Development Acres:	1.92	
Soil Unit No. (100-182):	152	
Soil Name:	Hambright-Rock Outcrop	
K, Soil Erodibility:	0.1	
T, Soil Loss Tolerance (tons/acre):	1	
R, Rainfall:	50	
Total Transect Length (ft):	397	
Number of Segments:	2	
Individual Segment Lengths (ft):	199	
Segment:	1	2
Gradient (%):	13	25
m:		
Individual LS:	3.88	9.29
Factor:	0.35	0.65
Product:	1.36	6.04
LS, Length and Steepness:	7.39	
Total Transect Average Gradient (%):	19	
Farming Practice:	Up & Down Hill	
P, Practice Factor (Table 6) ¹ :	1.00	
Cover Strategy:	Permanent	
Age of Development:	Over 3 Years	
Ground Cover:	80%	
C, Cover (Table 4) ¹ :	0.022	
A, Soil Loss (tons/acre):	0.81	
Soil Loss in Proposed Development (tons):	1.56	

¹ Tables 4 & 6 - USLE Special Applications for Napa County
Note: Estimates may vary slightly due to rounding



TOPOGRAPHIC MAPPING SOURCE: AMERICAN AERIAL MAPPING, INC. 2' CONTOUR INTERVAL, APRIL 2021
NAPA COUNTY LIDAR-GENERATED 5' CONTOUR INTERVAL, MAY 2003
2018 NAPA COUNTY AERIAL PHOTO



- LEGEND**
- AMERICAN AERIAL MAPPING, INC. 10' INDEX CONTOUR
 - AMERICAN AERIAL MAPPING, INC. 2' INTERMEDIATE CONTOUR
 - NAPA COUNTY 25' INDEX CONTOUR
 - NAPA COUNTY 5' INTERMEDIATE CONTOUR
 - APPROXIMATE PROPERTY LINE LOCATION
 - EXISTING VINEYARD AREA
 - EXISTING ROAD
 - EXISTING BUILDING
 - PROPOSED VINEYARD DEVELOPMENT BY TRANSECT
 - PROPOSED VINEYARD BLOCK BOUNDARY
 - PROPOSED ROCK FILLED AVENUE
 - USLE TRANSECT SEGMENT WITH SLOPE
 - PROPOSED VINEROW DIRECTION
 - SOIL TYPE BOUNDARY

- USDA SOIL CLASSIFICATIONS:**
- 151 HAMBRIGHT-ROCK OUTCROP COMPLEX, 2-30% SLOPE
 - 152 HAMBRIGHT ROCK-OUTCROP COMPLEX, 30-75% SLOPE
 - 179 SOBRANTE LOAM 30-50% SLOPE



JOB NO: 12110401	SCALE: AS SHOWN	DRAWN BY: JCJ, RR	DATE: 10-13-21	SHEET: 1 OF: 1
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RED BOAT LLC RED BOAT VINEYARD EROSION CONTROL PLAN SOIL LOSS ANALYSIS
DESIGN ENGINEER: J. BUSHEY, M. BUENO, R. ROSASCO