



VINEYARD DESIGN
EROSION CONTROL
WATER DEVELOPMENT
DRAINAGE
PERMITTING
GPS/GIS

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MEMORANDUM

Date: March 31, 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: Carmelite Vineyard Track I ECP
20 Mt. Carmel Drive, Oakville CA
APN 027-280-006
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 July 22, 2020 by PPI Engineering staff to determine the pre-project cover value of the proposed blocks. An additional site visit was made on September 22, 2020. 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 (4.3 gross acres).

The project area was split into four different transect areas with Blocks 1 and 2 each being split into two transect areas. For modeling purposes, transects 1A, 1B, and 2B were modeled using a segmented cover value (C) in conjunction with the segmented length and steepness value (LS) of each transect. The segmented CLS 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 page 2 of the supporting documents (attached), predicts a net decrease of approximately 1.3 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.



Carmelite Track I
USLE Calculation Sheets

Carmelite Track I
USLE Calculations
PPI Engineering
3/31/2021
RR

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	2.66	4.36	3.49	0.87
2	1.62	1.63	1.23	0.40
Totals	4.28	5.99	4.73	1.27

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

Carmelite Track I
USLE Calculations
PPI Engineering
3/31/2021
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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	0.97	1.39	1.35	0.03
1B	1.69	2.98	2.14	0.84
2A	0.87	0.90	0.60	0.30
2B	0.75	0.73	0.63	0.09
Totals	4.28	5.99	4.73	1.27

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

Carmelite Track I
 USLE Calculations Pre-Project
 PPI Engineering
 3/31/2021
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Transect 1A, Pre-Project

Proposed Development Acres:	0.97		
Soil Unit No. (100-182):	136		
Soil Name:	Felton		
K, Soil Erodibility:	0.15		
T, Soil Loss Tolerance (tons/acre):	3		
R, Rainfall:	75		
Total Transect Length (ft):	427		
Number of Segments:	3		
Individual Segment Lengths (ft):	142		
Segment:	1	2	3
Gradient (%):	19	20	21
m:			
Individual LS:	6.72	7.19	7.67
Individual C:	0.025	0.003	0.025
Factor:	0.19	0.35	0.46
Individual CLS:	0.03	0.01	0.09
Total CLS:	0.13		
Total Transect Average Gradient (%):	20		
Farming Practice:	Up & Down Hill		
P, Practice Factor (Table 6) ¹ :	1.00		
Vegetative Canopy:	Trees 13' Tall	Trees 13' Tall	No Canopy
Canopy Cover:	25%	75%	0%
Ground Cover:	75%	95%	75%
Percent Grass:	85%	100%	85%
Percent Weeds:	15%	0%	15%
C, Cover (Table 5) ¹ :	0.025	0.003	0.025
A, Soil Loss (tons/acre):	1.44		
Soil Loss in Proposed Development (tons) ² :	1.39		

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

² Estimates may vary slightly due to rounding

Carmelite Track I
 USLE Calculations Post-Project
 PPI Engineering
 3/31/2021
 RR

Transect 1A, Post-Project

Proposed Development Acres:	0.97		
Soil Unit No. (100-182):	136		
Soil Name:	Felton		
K, Soil Erodibility:	0.15		
T, Soil Loss Tolerance (tons/acre):	3		
R, Rainfall:	75		
Total Transect Length (ft):	427		
Number of Segments:	3		
Individual Segment Lengths (ft):	142		
Segment:	1	2	3
Gradient (%):	19	20	21
m:			
Individual LS:	6.72	7.19	7.67
Individual C	0.017	0.017	0.017
Factor:	0.19	0.35	0.46
Individual CLS	0.02	0.04	0.06
Total CLS:	0.12		
Total Transect Average Gradient (%):	20		
Farming Practice:	Up & Down Hill		
P, Practice Factor (Table 6) ¹ :	1.00		
Cover Strategy:	Permanent		
Age of Development:	Over 3 Years		
Ground Cover:	85%		
C, Cover (Table 4) ¹ :	0.017		
A, Soil Loss (tons/acre):	1.40		
Soil Loss in Proposed Development (tons) ² :	1.35		

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

Carmelite Track I
 USLE Calculations Pre-Project
 PPI Engineering
 3/31/2021
 RR

Transect 1B, Pre-Project

Proposed Development Acres:	1.69		
Soil Unit No. (100-182):	136		
Soil Name:	Felton		
K, Soil Erodibility:	0.15		
T, Soil Loss Tolerance (tons/acre):	3		
R, Rainfall:	75		
Total Transect Length (ft):	270		
Number of Segments:	3		
Individual Segment Lengths (ft):	90		
Segment:	1	2	3
Gradient (%):	16	22	27
m:			
Individual LS:	4.24	6.48	8.45
Individual C:	0.003	0.025	0.025
Factor:	0.19	0.35	0.46
Individual CLS:	0.00	0.06	0.10
Total CLS:	0.16		
Total Transect Average Gradient (%):	22		
Farming Practice:	Up & Down Hill		
P, Practice Factor (Table 6) ¹ :	1.00		
Vegetative Canopy:	Trees 13' Tall	No Canopy	No Canopy
Canopy Cover:	50%	0%	0%
Ground Cover:	95%	75%	75%
Percent Grass:	100%	85%	85%
Percent Weeds:	0%	15%	15%
C, Cover (Table 5) ¹ :	0.003	0.025	0.025
A, Soil Loss (tons/acre):	1.76		
Soil Loss in Proposed Development (tons) ² :	2.98		

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

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Carmelite Track I
 USLE Calculations Post-Project
 PPI Engineering
 3/31/2021
 RR

Transect 1B, Post-Project

Proposed Development Acres:	1.69		
Soil Unit No. (100-182):	136		
Soil Name:	Felton		
K, Soil Erodibility:	0.15		
T, Soil Loss Tolerance (tons/acre):	3		
R, Rainfall:	75		
Total Transect Length (ft):	270		
Number of Segments:	3		
Individual Segment Lengths (ft):	90		
Segment:	1	2	3
Gradient (%):	16	22	27
m:			
Individual LS:	4.24	6.48	8.45
Individual C	0.017	0.017	0.017
Factor:	0.19	0.35	0.46
Individual CLS	0.01	0.04	0.07
Total CLS:	0.12		
Total Transect Average Gradient (%):	22		
Farming Practice:	Cross Slope Without Strips		
P, Practice Factor (Table 6) ¹ :	0.95		
Cover Strategy:	Permanent		
Age of Development:	Over 3 Years		
Ground Cover:	85%		
C, Cover (Table 4) ¹ :	0.017		
A, Soil Loss (tons/acre):	1.26		
Soil Loss in Proposed Development (tons) ² :	2.14		

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

Carmelite Track I
USLE Calculations Pre-Project
PPI Engineering
3/31/2021
RR

Transect 2A, Pre-Project

Proposed Development Acres:	0.87
Soil Unit No. (100-182):	136
Soil Name:	Felton
K, Soil Erodibility:	0.15
T, Soil Loss Tolerance (tons/acre):	3
R, Rainfall:	75
Total Transect Length (ft):	241
Number of Segments:	1
Individual Segment Lengths (ft):	241
Segment:	
Gradient (%):	15
m:	
Individual LS:	3.67
Factor:	
Product:	
LS, Length and Steepness:	3.67
Total Transect Average Gradient (%):	15
Farming Practice:	Up & Down Hill
P, Practice Factor (Table 6) ¹ :	1.00
Vegetative Canopy:	Trees 13' Tall
Canopy Cover:	25%
Ground Cover:	75%
Percent Grass:	85%
Percent Weeds:	15%
C, Cover (Table 5) ¹ :	0.025
A, Soil Loss (tons/acre):	1.04
Soil Loss in Proposed Development (tons) ² :	0.90

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

²Estimates may vary slightly due to rounding

Carmelite Track I
USLE Calculations Post-Project
PPI Engineering
3/31/2021
RR

Transect 2A, Post-Project

Proposed Development Acres:	0.87
Soil Unit No. (100-182):	136
Soil Name:	Felton
K, Soil Erodibility:	0.15
T, Soil Loss Tolerance (tons/acre):	3
R, Rainfall:	75
Total Transect Length (ft):	241
Number of Segments:	1
Individual Segment Lengths (ft):	241
Segment:	
Gradient (%):	15
m:	
Individual LS:	3.67
Factor:	
Product:	
LS, Length and Steepness:	3.67
Total Transect Average Gradient (%):	15
Farming Practice:	Up & Down Hill
P, Practice Factor (Table 6) ¹ :	1.00
Cover Strategy:	Permanent
Age of Development:	Over 3 Years
Ground Cover:	85%
C, Cover (Table 4) ¹ :	0.017
A, Soil Loss (tons/acre):	0.69
Soil Loss in Proposed Development (tons) ² :	0.60

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

² Estimates may vary slightly due to rounding

Carmelite Track I
 USLE Calculations Pre-Project
 PPI Engineering
 3/31/2021
 RR

Transect 2B, Pre-Project

Proposed Development Acres:	0.75	
Soil Unit No. (100-182):	136	
Soil Name:	Felton	
K, Soil Erodibility:	0.15	
T, Soil Loss Tolerance (tons/acre):	3	
R, Rainfall:	75	
Total Transect Length (ft):	150	
Number of Segments:	3	
Individual Segment Lengths (ft):	50	
Segment:	1	2
Gradient (%):	27	17
m:		
Individual LS:	6.30	3.43
Individual C:	0.014	0.025
Factor:	0.35	0.65
Individual CLS:	0.03	0.06
Total CLS:	0.09	
Total Transect Average Gradient (%):	15	
Farming Practice:	Up & Down Hill	
P, Practice Factor (Table 6) ¹ :	1.00	
Vegetative Canopy:	Trees 13' Tall	Trees 13' Tall
Canopy Cover:	25%	50%
Ground Cover:	85%	75%
Percent Grass:	80%	85%
Percent Weeds:	20%	15%
C, Cover (Table 5) ¹ :	0.014	0.025
A, Soil Loss (tons/acre):	0.97	
Soil Loss in Proposed Development (tons) ² :	0.73	

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

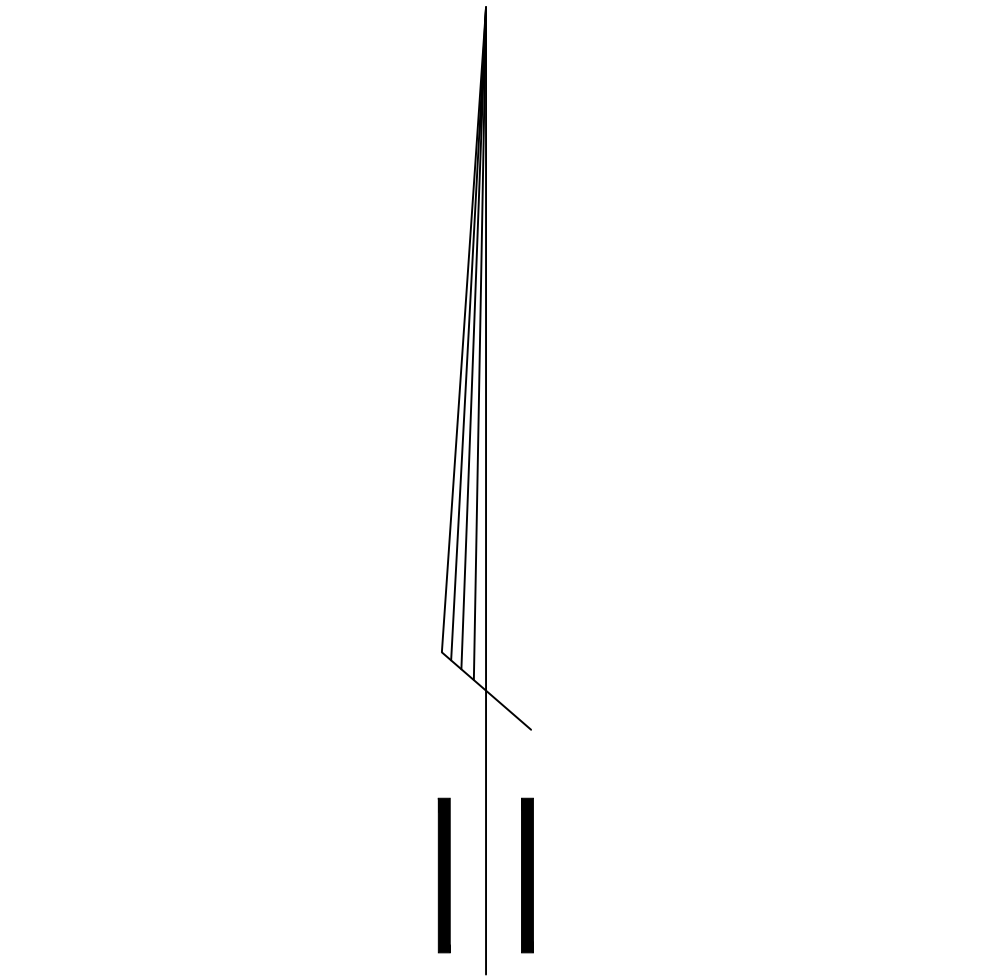
² Estimates may vary slightly due to rounding

Carmelite Track I
 USLE Calculations Post-Project
 PPI Engineering
 3/31/2021
 RR

Transect 2B, Post-Project

Proposed Development Acres:	0.75	
Soil Unit No. (100-182):	136	
Soil Name:	Felton	
K, Soil Erodibility:	0.15	
T, Soil Loss Tolerance (tons/acre):	3	
R, Rainfall:	75	
Total Transect Length (ft):	150	
Number of Segments:	2	
Individual Segment Lengths (ft):	75	
Segment:	1	2
Gradient (%):	27	17
m:		
Individual LS:	6.30	3.43
Individual C	0.017	0.017
Factor:	0.35	0.65
Individual CLS	0.04	0.04
Total CLS:	0.08	
Total Transect Average Gradient (%):	22	
Farming Practice:	Up & Down Hill	
P, Practice Factor (Table 6) ¹ :	1.00	
Cover Strategy:	Permanent	
Age of Development:	Over 3 Years	
Ground Cover:	85%	
C, Cover (Table 4) ¹ :	0.017	
A, Soil Loss (tons/acre):	0.85	
Soil Loss in Proposed Development (tons) ² :	0.63	

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



GRAPHIC SCALE
(IN FEET)
1 inch = 50 ft.

- LEGEND**
- PPI ENGINEERING 10' INDEX CONTOUR
 - PPI ENGINEERING 2' INTERMEDIATE CONTOUR
 - NAPA COUNTY 25' INDEX CONTOUR
 - NAPA COUNTY 5' INTERMEDIATE CONTOUR
 - APPROXIMATE PROPERTY LINE LOCATION
 - EXISTING VINEYARD AREA
 - EXISTING ROAD
 - EXISTING BUILDING
 - EXISTING SURFACE DRAINAGE LINE, ASSUMED LOCATION
 - EXISTING DITCH, APPROXIMATE LOCATION
 - EXISTING DROP INLET, APPROXIMATE LOCATION
 - EXISTING DROP INLET, APPROXIMATE LOCATION
 - EXISTING JUNCTION BOX, APPROXIMATE LOCATION
 - EXISTING CULVERT, APPROXIMATE LOCATION
 - PROPOSED VINEYARD DEVELOPMENT AREA BY TRANSECT
 - PROPOSED VINEYARD BLOCK BOUNDARY
 - USLE TRANSECT SEGMENT WITH SLOPE
 - PROPOSED VINEROW DIRECTION
 - 123
151
 - SOIL TYPE BOUNDARY

- USDA SOIL CLASSIFICATIONS:**
- 123 COOMBS GRAVELLY LOAM 2-5% SLOPES
 - 136 FELTON GRAVELLY LOAM 30-50% SLOPES
 - 151 HAMBRIGHT-ROCK OUTCROP 2-30% SLOPES

TOPOGRAPHIC MAPPING SOURCES: PPI ENGINEERING, 2' CONTOUR INTERVAL, MARCH 2020
2018 NAPA COUNTY ORTHOPHOTO NAPA COUNTY LIDAR-GENERATED 5' CONTOUR INTERVAL, MAY 2003

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JOB NO: 12011201
DWG. NO: 12011201U

SILVER OAK CELLARS CARMELITE VINEYARD			
EROSION CONTROL PLAN			
SOIL LOSS ANALYSIS			
DESIGN ENGINEER: J. BUSHEY, M. BUENO			
SCALE: AS SHOWN	DRAWN BY: JCJ, RR	DATE: 3-31-21	SHEET: 1 OF: 1