



VINEYARD DESIGN
EROSION CONTROL
WATER DEVELOPMENT
DRAINAGE
PERMITTING
GPS/GIS

2800 Jefferson Street
Napa, California 94558
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www.ppiengineering.com

MEMORANDUM

Date: November 18, 2020

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

From: James R. Bushey, P.E.
Cody J. Corsetti, P.E.

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

Re: Project Pioneer, Track I ECP
APNs 024-080-040, -044, -048 & -049
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 a site visit 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 25, 2019 by Jim Bushey and Annalee Sanborn of PPI Engineering to determine the pre-project cover values for each block and/or transect area. A supplemental site visit was conducted on September 5, 2019 by Cody Corsetti and Austin Lemire-Baeten of PPI Engineering to verify cover values in select areas. An additional site visit was conducted on December 5, 2019 by Austin Lemire-Baeten of PPI Engineering to determine the pre-project cover values in the areas around Block 3. All proposed development areas were inspected, and the cover conditions observed during the site visits were used to determine existing cover values. Post-project cover values were calculated using the percent cover specified in the ECP. This analysis is limited to the proposed vineyard areas as well as vineyard avenues (42.2 gross acres).

The model, summarized on page 2 of the supporting documents (attached), predicts a net decrease of approximately 3.64 tons of soil loss per year for the project as a whole. The ECP has been designed to ensure compliance with Napa County policies requiring no-net-increases 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.



SUPPORTING DOCUMENTS

**Project Pioneer Track I ECP
USLE Calculation Sheets**

Project Pioneer Track I ECP
 USLE Calculations
 PPI Engineering
 11/18/2020
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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) |
|-----------------------|-----------------------------------|--|---|--|
| Block 1 | 3.49 | 2.08 | 1.88 | 0.20 |
| Blocks 2A-2D | 28.80 | 29.40 | 27.26 | 2.14 |
| Block 3 | 9.89 | 13.50 | 12.20 | 1.30 |
| Totals | 42.18 | 44.98 | 41.34 | 3.64 |

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

Project Pioneer Track I ECP
 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) |
|------------------------------------|---|--|---|--|
| 1 | 3.49 | 2.08 | 1.88 | 0.20 |
| 2AB | 13.80 | 17.78 | 16.49 | 1.29 |
| 2ACD | 8.30 | 4.39 | 4.07 | 0.32 |
| 2C | 6.70 | 7.23 | 6.71 | 0.53 |
| 3A | 2.10 | 2.76 | 2.49 | 0.27 |
| 3B | 7.79 | 10.74 | 9.71 | 1.04 |
| Totals | 42.18 | 44.98 | 41.34 | 3.64 |

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

Project Pioneer Track I ECP
 USLE Calculations Pre-Project
 PPI Engineering
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Pre-Project Block 1, Transect 1

| | |
|---|----------------|
| Proposed Development Acres: | 3.49 |
| Soil Unit No. (100-182): | 100 |
| Soil Name: | Aiken |
| K, Soil Erodibility: | 0.24 |
| T, Soil Loss Tolerance (tons/acre): | 3 |
| R, Rainfall: | 85 |
| Total Transect Length (ft): | 210 |
| Number of Segments: | 1 |
| Individual Segment Lengths (ft): | 210 |
| Segment: | |
| Gradient (%): | 5 |
| m: | 0.5 |
| Individual LS: | 0.77 |
| Factor: | |
| Product: | |
| LS, Length and Steepness: | 0.77 |
| Total Transect Average Gradient (%): | 5 |
| Farming Practice: | Up & Down Hill |
| P, Practice Factor (Table 6) ¹ : | 1.00 |
| Vegetative Canopy: | No Canopy |
| Canopy Cover: | 0% |
| Ground Cover: | 75% |
| Percent Grass: | 50% |
| Percent Weeds: | 50% |
| C, Cover (Table 5) ¹ : | 0.038 |
| A, Soil Loss (tons/acre): | 0.59 |
| Soil Loss in Proposed Development (tons): | 2.08 |

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

Project Pioneer Track I ECP
 USLE Calculations Post-Project
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Post-Project Block 1, Transect 1

| | |
|---|----------------|
| Proposed Development Acres: | 3.49 |
| Soil Unit No. (100-182): | 100 |
| Soil Name: | Aiken |
| K, Soil Erodibility: | 0.24 |
| T, Soil Loss Tolerance (tons/acre): | 3 |
| R, Rainfall: | 85 |
| Total Transect Length (ft): | 210 |
| Number of Segments: | 1 |
| Individual Segment Lengths (ft): | 210 |
| Segment: | |
| Gradient (%): | 5 |
| m: | 0.5 |
| Individual LS: | 0.77 |
| Factor: | |
| Product: | |
| LS, Length and Steepness: | 0.77 |
| Total Transect Average Gradient (%): | 5 |
| Farming Practice: | Up & Down Hill |
| P, Practice Factor (Table 6) ¹ : | 1.00 |
| Cover Strategy: | Permanent |
| Age of Development: | Over 3 Years |
| Ground Cover: | 75% |
| C, Cover (Table 4) ¹ : | 0.034 |
| A, Soil Loss (tons/acre): | 0.54 |
| Soil Loss in Proposed Development (tons): | 1.88 |

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

Project Pioneer Track I ECP
 USLE Calculations Pre-Project
 PPI Engineering
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Pre-Project Blocks 2A & 2B, Transect 2AB

| | | | | |
|---|----------------|------|------|------|
| Proposed Development Acres: | 13.80 | | | |
| Soil Unit No. (100-182): | 100 | | | |
| Soil Name: | Aiken | | | |
| K, Soil Erodibility: | 0.24 | | | |
| T, Soil Loss Tolerance (tons/acre): | 3 | | | |
| R, Rainfall: | 85 | | | |
| Total Transect Length (ft): | 1268 | | | |
| Number of Segments: | 4 | | | |
| Individual Segment Lengths (ft): | 317 | | | |
| Segment: | 1 | 2 | 3 | 4 |
| Gradient (%): | 14 | 8 | 6 | 3 |
| m: | | 0.5 | 0.5 | 0.3 |
| Individual LS: | 7.66 | 3.52 | 2.39 | 0.61 |
| Factor: | 0.12 | 0.23 | 0.30 | 0.35 |
| Product: | 0.92 | 0.81 | 0.72 | 0.22 |
| LS, Length and Steepness: | 2.66 | | | |
| Total Transect Average Gradient (%): | 8 | | | |
| Farming Practice: | Up & Down Hill | | | |
| P, Practice Factor (Table 6) ¹ : | 1.00 | | | |
| Vegetative Canopy: | No Canopy | | | |
| Canopy Cover: | 0% | | | |
| Ground Cover: | 75% | | | |
| Percent Grass: | 90% | | | |
| Percent Weeds: | 10% | | | |
| C, Cover (Table 5) ¹ : | 0.024 | | | |
| A, Soil Loss (tons/acre): | 1.29 | | | |
| Soil Loss in Proposed Development (tons): | 17.78 | | | |

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

Project Pioneer Track I ECP
 USLE Calculations Post-Project
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Post-Project Blocks 2A & 2B, Transect 2AB

| | | | | |
|---|----------------|------|------|------|
| Proposed Development Acres: | 13.80 | | | |
| Soil Unit No. (100-182): | 100 | | | |
| Soil Name: | Aiken | | | |
| K, Soil Erodibility: | 0.24 | | | |
| T, Soil Loss Tolerance (tons/acre): | 3 | | | |
| R, Rainfall: | 85 | | | |
| Total Transect Length (ft): | 1268 | | | |
| Number of Segments: | 4 | | | |
| Individual Segment Lengths (ft): | 317 | | | |
| Segment: | 1 | 2 | 3 | 4 |
| Gradient (%): | 14 | 8 | 6 | 3 |
| m: | | 0.5 | 0.5 | 0.3 |
| Individual LS: | 7.66 | 3.52 | 2.39 | 0.61 |
| Factor: | 0.12 | 0.23 | 0.30 | 0.35 |
| Product: | 0.92 | 0.81 | 0.72 | 0.22 |
| LS, Length and Steepness: | 2.66 | | | |
| Total Transect Average Gradient (%): | 8 | | | |
| 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): | 1.20 | | | |
| Soil Loss in Proposed Development (tons): | 16.49 | | | |

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

Project Pioneer Track I ECP
 USLE Calculations Pre-Project
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Pre-Project Blocks 2A, 2C, & 2D, Transect 2ACD

| | | | | |
|---|----------------|------|------|------|
| Proposed Development Acres: | 8.30 | | | |
| Soil Unit No. (100-182): | 100 | | | |
| Soil Name: | Aiken | | | |
| K, Soil Erodibility: | 0.24 | | | |
| T, Soil Loss Tolerance (tons/acre): | 3 | | | |
| R, Rainfall: | 85 | | | |
| Total Transect Length (ft): | 737 | | | |
| Number of Segments: | 4 | | | |
| Individual Segment Lengths (ft): | 184 | | | |
| Segment: | 1 | 2 | 3 | 4 |
| Gradient (%): | 15 | 2 | 2 | 2 |
| m: | | 0.3 | 0.3 | 0.3 |
| Individual LS: | 6.42 | 0.37 | 0.37 | 0.37 |
| Factor: | 0.12 | 0.23 | 0.30 | 0.35 |
| Product: | 0.77 | 0.08 | 0.11 | 0.13 |
| LS, Length and Steepness: | 1.09 | | | |
| Total Transect Average Gradient (%): | 5 | | | |
| Farming Practice: | Up & Down Hill | | | |
| P, Practice Factor (Table 6) ¹ : | 1.00 | | | |
| Vegetative Canopy: | No Canopy | | | |
| Canopy Cover: | 0% | | | |
| Ground Cover: | 75% | | | |
| Percent Grass: | 90% | | | |
| Percent Weeds: | 10% | | | |
| C, Cover (Table 5) ¹ : | 0.024 | | | |
| A, Soil Loss (tons/acre): | 0.53 | | | |
| Soil Loss in Proposed Development (tons): | 4.39 | | | |

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

Project Pioneer Track I ECP
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Post-Project Blocks 2A, 2C, & 2D, Transect 2ACD

| | | | | |
|---|----------------|------|------|------|
| Proposed Development Acres: | 8.30 | | | |
| Soil Unit No. (100-182): | 100 | | | |
| Soil Name: | Aiken | | | |
| K, Soil Erodibility: | 0.24 | | | |
| T, Soil Loss Tolerance (tons/acre): | 3 | | | |
| R, Rainfall: | 85 | | | |
| Total Transect Length (ft): | 737 | | | |
| Number of Segments: | 4 | | | |
| Individual Segment Lengths (ft): | 184 | | | |
| Segment: | 1 | 2 | 3 | 4 |
| Gradient (%): | 15 | 2 | 2 | 2 |
| m: | | 0.3 | 0.3 | 0.3 |
| Individual LS: | 6.42 | 0.37 | 0.37 | 0.37 |
| Factor: | 0.12 | 0.23 | 0.30 | 0.35 |
| Product: | 0.77 | 0.08 | 0.11 | 0.13 |
| LS, Length and Steepness: | 1.09 | | | |
| Total Transect Average Gradient (%): | 5 | | | |
| 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): | 0.49 | | | |
| Soil Loss in Proposed Development (tons): | 4.07 | | | |

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

Project Pioneer Track I ECP
 USLE Calculations Pre-Project
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Pre-Project Block 2C, Transect 2C

| | |
|---|----------------|
| Proposed Development Acres: | 6.70 |
| Soil Unit No. (100-182): | 100 |
| Soil Name: | Aiken |
| K, Soil Erodibility: | 0.24 |
| T, Soil Loss Tolerance (tons/acre): | 3 |
| R, Rainfall: | 85 |
| Total Transect Length (ft): | 363 |
| Number of Segments: | 1 |
| Individual Segment Lengths (ft): | 363 |
| Segment: | |
| Gradient (%): | 9 |
| m: | 0.5 |
| Individual LS: | 2.23 |
| Factor: | |
| Product: | |
| LS, Length and Steepness: | 2.23 |
| Total Transect Average Gradient (%): | 9 |
| Farming Practice: | Up & Down Hill |
| P, Practice Factor (Table 6) ¹ : | 1.00 |
| Vegetative Canopy: | No Canopy |
| Canopy Cover: | 0% |
| Ground Cover: | 75% |
| Percent Grass: | 90% |
| Percent Weeds: | 10% |
| C, Cover (Table 5) ¹ : | 0.024 |
| A, Soil Loss (tons/acre): | 1.08 |
| Soil Loss in Proposed Development (tons): | 7.23 |

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

Project Pioneer Track I ECP
 USLE Calculations Post-Project
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Post-Project Block 2C, Transect 2C

| | |
|---|----------------|
| Proposed Development Acres: | 6.70 |
| Soil Unit No. (100-182): | 100 |
| Soil Name: | Aiken |
| K, Soil Erodibility: | 0.24 |
| T, Soil Loss Tolerance (tons/acre): | 3 |
| R, Rainfall: | 85 |
| Total Transect Length (ft): | 363 |
| Number of Segments: | 1 |
| Individual Segment Lengths (ft): | 363 |
| Segment: | |
| Gradient (%): | 9 |
| m: | 0.5 |
| Individual LS: | 2.23 |
| Factor: | |
| Product: | |
| LS, Length and Steepness: | 2.23 |
| Total Transect Average Gradient (%): | 9 |
| 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): | 1.00 |
| Soil Loss in Proposed Development (tons): | 6.71 |

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

Project Pioneer Track I ECP
 USLE Calculations Pre-Project
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Pre-Project Block 3, Transect 3A

| | |
|---|----------------|
| Proposed Development Acres: | 2.10 |
| Soil Unit No. (100-182): | 101 |
| Soil Name: | Aiken |
| K, Soil Erodibility: | 0.24 |
| T, Soil Loss Tolerance (tons/acre): | 3 |
| R, Rainfall: | 85 |
| Total Transect Length (ft): | 1025 |
| Number of Segments: | 1 |
| Individual Segment Lengths (ft): | 1025 |
| Segment: | |
| Gradient (%): | 5 |
| m: | 0.5 |
| Individual LS: | 1.71 |
| Factor: | |
| Product: | |
| LS, Length and Steepness: | 1.71 |
| Total Transect Average Gradient (%): | 5 |
| Farming Practice: | Up & Down Hill |
| P, Practice Factor (Table 6) ¹ : | 1.00 |
| Vegetative Canopy: | No Canopy |
| Canopy Cover: | 0% |
| Ground Cover: | 75% |
| Percent Grass: | 50% |
| Percent Weeds: | 50% |
| C, Cover (Table 5) ¹ : | 0.038 |
| A, Soil Loss (tons/acre): | 1.31 |
| Soil Loss in Proposed Development (tons): | 2.76 |

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

Project Pioneer Track I ECP
 USLE Calculations Post-Project
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 SM

Post-Project Block 3, Transect 3A

| | |
|---|----------------|
| Proposed Development Acres: | 2.10 |
| Soil Unit No. (100-182): | 101 |
| Soil Name: | Aiken |
| K, Soil Erodibility: | 0.24 |
| T, Soil Loss Tolerance (tons/acre): | 3 |
| R, Rainfall: | 85 |
| Total Transect Length (ft): | 1025 |
| Number of Segments: | 1 |
| Individual Segment Lengths (ft): | 1025 |
| Segment: | |
| Gradient (%): | 5 |
| m: | 0.5 |
| Individual LS: | 1.71 |
| Factor: | |
| Product: | |
| LS, Length and Steepness: | 1.71 |
| Total Transect Average Gradient (%): | 5 |
| Farming Practice: | Up & Down Hill |
| P, Practice Factor (Table 6) ¹ : | 1.00 |
| Cover Strategy: | Permanent |
| Age of Development: | Over 3 Years |
| Ground Cover: | 75% |
| C, Cover (Table 4) ¹ : | 0.034 |
| A, Soil Loss (tons/acre): | 1.19 |
| Soil Loss in Proposed Development (tons): | 2.49 |

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

Project Pioneer Track I ECP
 USLE Calculations Pre-Project
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Pre-Project Block 3, Transect 3B

| | |
|---|----------------|
| Proposed Development Acres: | 7.79 |
| Soil Unit No. (100-182): | 101 |
| Soil Name: | Aiken |
| K, Soil Erodibility: | 0.24 |
| T, Soil Loss Tolerance (tons/acre): | 3 |
| R, Rainfall: | 85 |
| Total Transect Length (ft): | 716 |
| Number of Segments: | 1 |
| Individual Segment Lengths (ft): | 716 |
| Segment: | |
| Gradient (%): | 6 |
| m: | 0.5 |
| Individual LS: | 1.80 |
| Factor: | |
| Product: | |
| LS, Length and Steepness: | 1.80 |
| Total Transect Average Gradient (%): | 6 |
| Farming Practice: | Up & Down Hill |
| P, Practice Factor (Table 6) ¹ : | 1.00 |
| Vegetative Canopy: | No Canopy |
| Canopy Cover: | 0% |
| Ground Cover: | 75% |
| Percent Grass: | 50% |
| Percent Weeds: | 50% |
| C, Cover (Table 5) ¹ : | 0.038 |
| A, Soil Loss (tons/acre): | 1.38 |
| Soil Loss in Proposed Development (tons): | 10.74 |

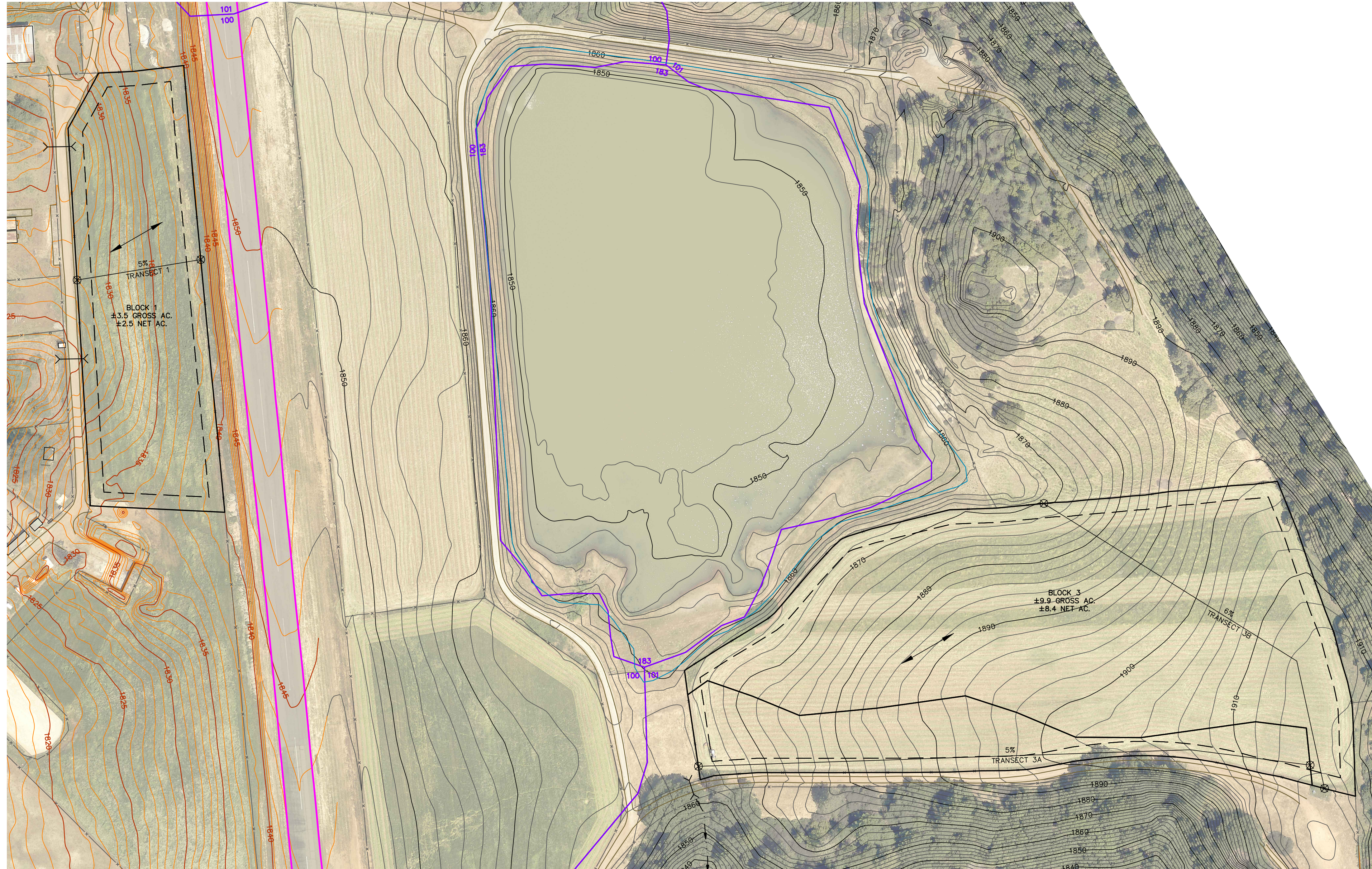
¹ Tables 5 & 6 - USLE Special Applications for Napa County

Project Pioneer Track I ECP
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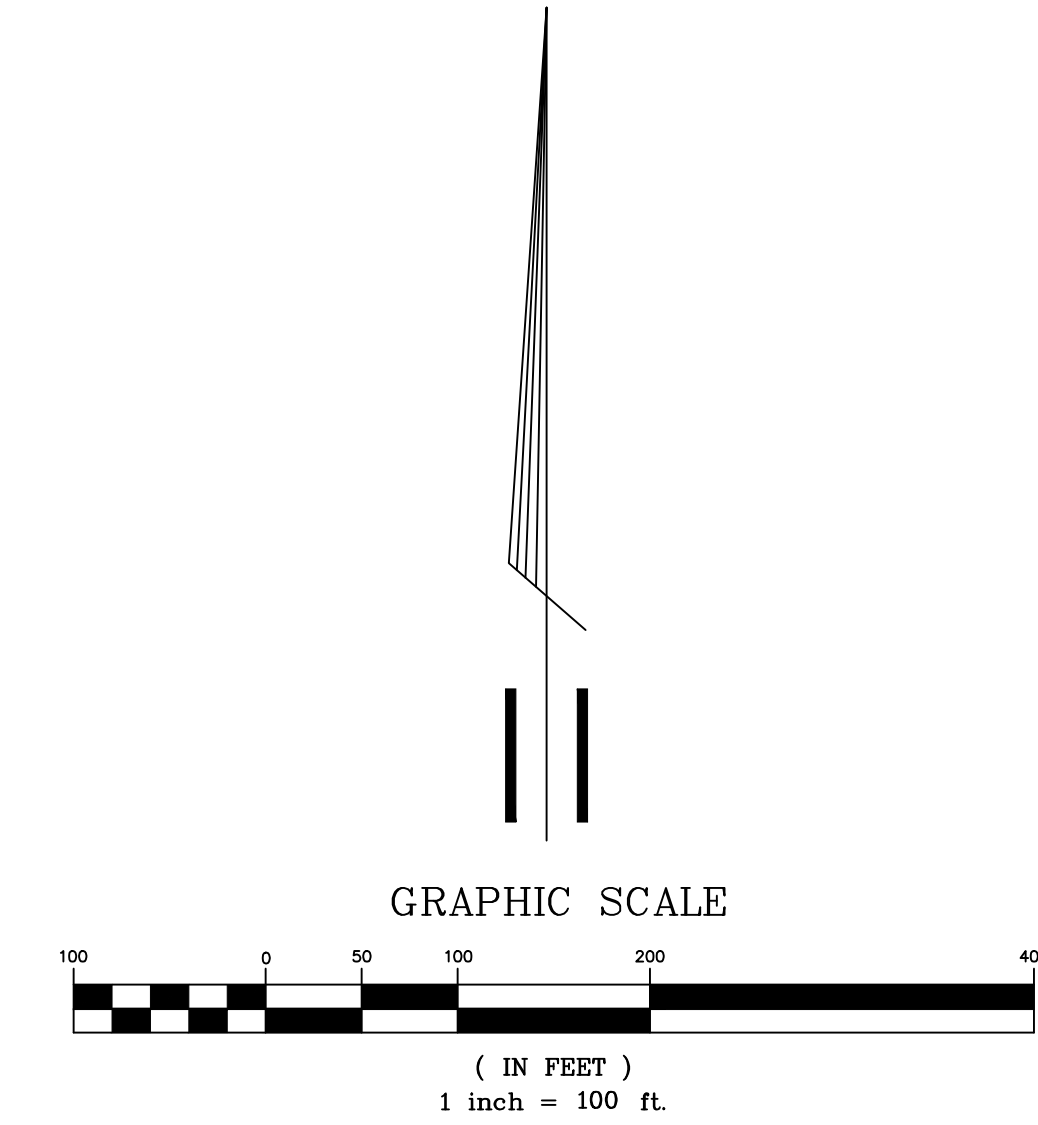
Post-Project Block 3, Transect 3B

| | |
|---|----------------|
| Proposed Development Acres: | 7.79 |
| Soil Unit No. (100-182): | 101 |
| Soil Name: | Aiken |
| K, Soil Erodibility: | 0.24 |
| T, Soil Loss Tolerance (tons/acre): | 3 |
| R, Rainfall: | 85 |
| Total Transect Length (ft): | 716 |
| Number of Segments: | 1 |
| Individual Segment Lengths (ft): | 716 |
| Segment: | |
| Gradient (%): | 6 |
| m: | 0.5 |
| Individual LS: | 1.80 |
| Factor: | |
| Product: | |
| LS, Length and Steepness: | 1.80 |
| Total Transect Average Gradient (%): | 6 |
| Farming Practice: | Up & Down Hill |
| P, Practice Factor (Table 6) ¹ : | 1.00 |
| Cover Strategy: | Permanent |
| Age of Development: | Over 3 Years |
| Ground Cover: | 75% |
| C, Cover (Table 4) ¹ : | 0.034 |
| A, Soil Loss (tons/acre): | 1.25 |
| Soil Loss in Proposed Development (tons): | 9.71 |

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



TOPOGRAPHIC MAPPING PROVIDED BY TERRA FIRMA, 2007
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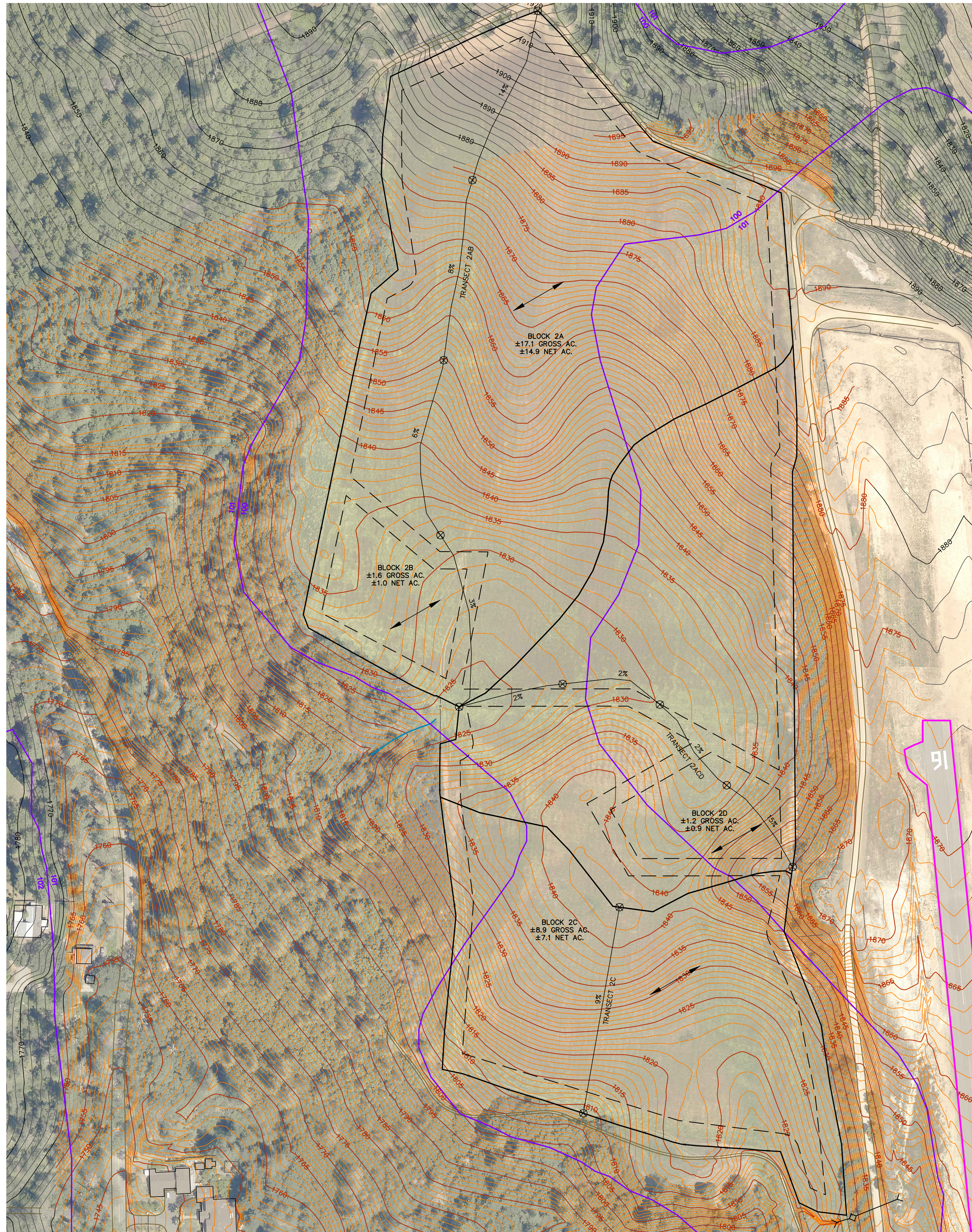
- LEGEND**
- INDEX CONTOUR 5' INTERVAL
 - INTERMEDIATE CONTOUR 1' INTERVAL
 - INDEX CONTOUR 10' INTERVAL
 - INTERMEDIATE CONTOUR 2' INTERVAL
 - RESERVOIR
 - EXISTING ROAD
 - ANGWIN-PARRETT AIRFIELD RUNWAY
 - EXISTING FENCE
 - EXISTING BUILDING
 - EXISTING CULVERT
 - EXISTING DITCH
 - PROPOSED VINEYARD DEVELOPMENT AREA BY TRANSECT
 - PROPOSED VINEYARD BLOCK BOUNDARY
 - PROPOSED VINEYARD DIRECTION
 - USLE TRANSECT WITH SLOPE
 - SOIL TYPE BOUNDARY

- USDA SOIL CLASSIFICATIONS:**
- 100 AIKEN LOAM 2-15% SLOPE
 - 101 AIKEN LOAM 15-30% SLOPE
 - 183 WATER

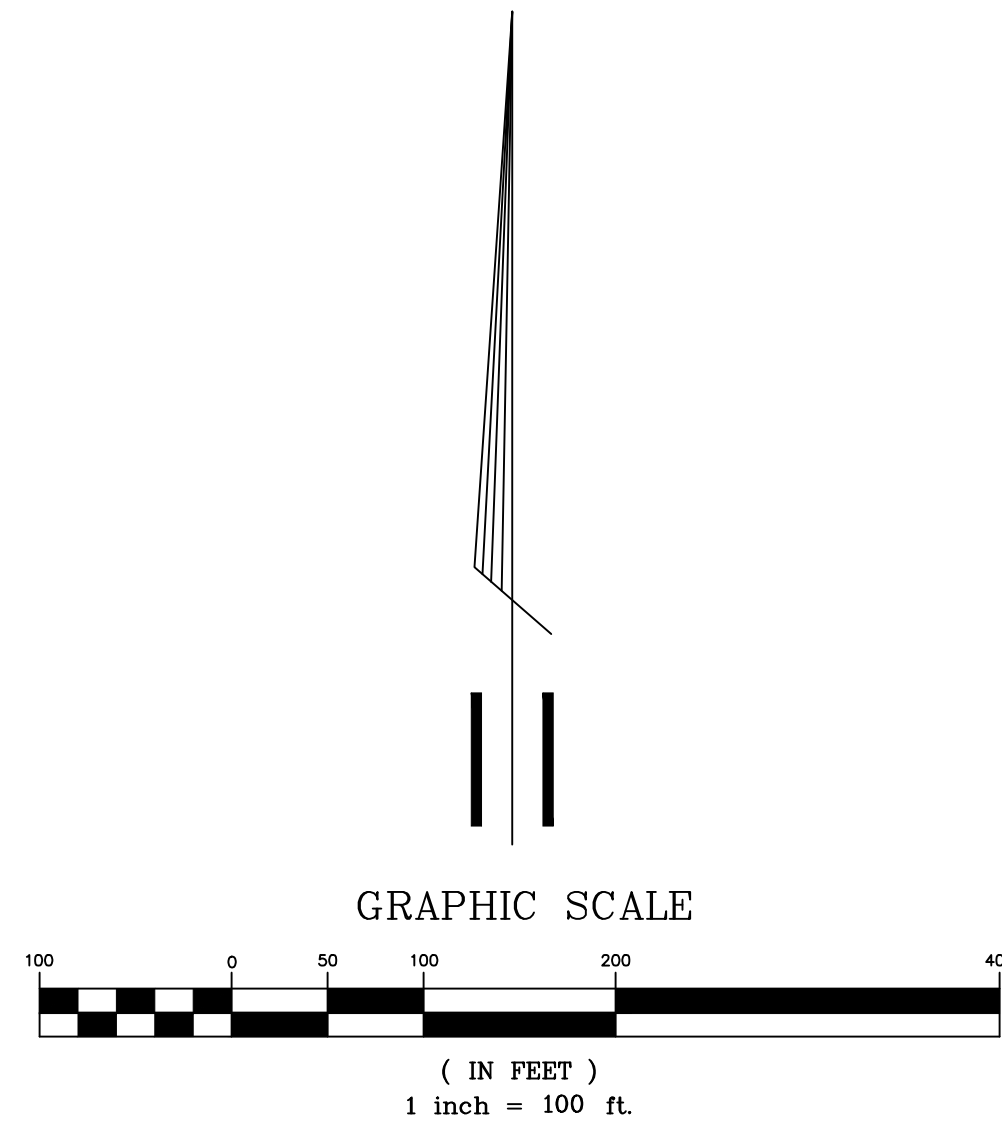


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| | |
|---|-----------------|
| PROJECT PIONEER | |
| 1 ANGWIN AVENUE | |
| SOIL LOSS ANALYSIS | |
| BLOCKS 1 & 3 | |
| DESIGN ENGINEER: J. BUSHEY, C. CORSETTI | |
| JOB NO: 11910501 | SCALE: AS SHOWN |
| DRAWN BY: ALB, SM | DATE: 11-18-20 |
| DWG. NO: 11910501U | SHEET: 1 OF: 2 |



TOPOGRAPHIC MAPPING PROVIDED BY TERRA FIRMA, 2007
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LEGEND

- INDEX CONTOUR 5' INTERVAL
- INTERMEDIATE CONTOUR 1' INTERVAL
- INDEX CONTOUR 10' INTERVAL
- INTERMEDIATE CONTOUR 2' INTERVAL
- EPHEMERAL STREAM, MAPPED BY WRA
- EXISTING ROAD
- ANGWIN-PARRETT AIRFIELD RUNWAY
- EXISTING FENCE
- EXISTING BUILDING
- EXISTING CULVERT
- PROPOSED VINEYARD DEVELOPMENT AREA BY TRANSECT
- PROPOSED VINEYARD BLOCK BOUNDARY
- USLE TRANSECT SEGMENT WITH SLOPE
- PROPOSED VINEYARD DIRECTION
- 100
- 101

USDA SOIL CLASSIFICATIONS:

- 100 AIKEN LOAM 2-15% SLOPE
- 101 AIKEN LOAM 15-30% SLOPE
- 102 AIKEN LOAM 30-50% SLOPE

| | | | |
|---|--|--------------------|----------------|
| PROJECT PIONEER | | | |
| 1 ANGWIN AVENUE | | | |
| SOIL LOSS ANALYSIS | | | |
| BLOCKS 2A-2D | | | |
| DESIGN ENGINEER: J. BUSHEY, C. CORSETTI | | | |
| SCALE: AS SHOWN | | DRAWN BY: ALB, SM | DATE: 11-18-20 |
| JOB NO: 11910501U | | DWG. NO: 11910501U | SHEET: 2 OF: 2 |

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