

HYDROLOGIC ANALYSIS
CRUSH PARTNERS VINEYARD
NEW VINEYARD DEVELOPMENT
AND VINEYARD REPLANT
WOODEN VALLEY ROAD
NAPA, CA 95448
APN 033-020-040
JUNE 17, 2025



The following analysis evaluates the proposed development of approximately 18.3 acres of new and replanted vineyard (plus 0.3 acres of dirt road, to be managed as vineyard avenue) on the referenced, approximately 28-acre parcel east of St. Helena, California, to determine the project's potential to increase peak storm flow or runoff from the site. This analysis was prepared by David Steiner, CPESC, CPSWQ, at the request and under the supervision of Mr. Mike Muelrath, PE, of Applied Civil Engineering. The proposed project is located near the headwaters of Wooden Valley Creek in the Suisun Creek watershed, centered around a 702-foot promontory knoll. Drainage in four directions from this knoll constitutes too small a proportion of any of the resulting drainage basins to be suitable for evaluation using the standard WinTR-55 application. Furthermore, most of the parameters factored into a full modeling by the application—storm data, time of concentration, and stream flow data—will be unaffected by the proposal. This analysis therefore makes use of a comparison of the site's pre- and post-project land use and hydrologic condition (weighted Curve Numbers) to predict any potential change in peak flow or runoff, with a level of certainty equal to that of the full model. As vineyards are not included among WinTR-55's land use alternatives, the application's other options (including the "Custom Curve Number" field) are adapted for use in the analysis. The specific option selected is found in a California-specific table found in the NRCS Engineering Field Handbook.¹ This table's guidance calls for vineyard Curve Numbers equivalent to those of "annual grass."²

The **Pre-Project Runoff Curve Numbers** were determined based on a site inspection on November 13, 2024, and examination of aerial photographic imagery (Google Earth and the Napa County GIS, 2021), as well as the following factors:

- The existing vineyards on the south side of the parcel, in Blocks 1 and 2, were planted and are being maintained under the specifications of a "Track II" Erosion Control Plan, file #P15-0053. That Plan calls for tillage in alternate rows, with 65% cover. (HSG "C", Vineyard-annual grass, fair condition, CN 79).
- Most of an adjacent, existing vineyard block to the north lies on slopes less than 5%, and was therefore not subject to the ECP requirement. This area is under management identical to that of the above, approved ECP (CN 79).
- However, the slope of a small, adjacent planted area to the north is over 5%, and has been evaluated based on the condition of the undeveloped area further to the north, now proposed as an extension of Block 2. The pre-project Curve Numbers of both the unauthorized planting and the proposed, new vineyard extension were evaluated as "Annual grass", with a mix of "good" and "fair" hydrologic condition (CN 75 and 79, respectively).

¹Engineering Field Handbook, Part 650, Chapter 2, Supplement 1, USDA/NRCS, Oct 2008.

² Owing to the application's limited availability of land use categories, Curve Number printouts have been edited as pdf documents, where necessary to reflect the actual land uses. This submittal includes both edited and unedited (original) iterations of those pages. The unedited CN printouts include land uses selected only for their appropriate numerical values; the edited printouts clarify the correct land use selections, also as shown on the Watershed map sheet's "Watershed Area Summary."

As shown on the accompanying (edited and unedited) pdf printouts of the WinTR-55 Curve Number page, the **Pre-project, weighted CN** of the project area is 78.

- Specifications of the Erosion Control Plan call for non-tilled vineyard floor management with 75% cover (“Vineyard-annual grass, HSG C, good condition”) which implies a **Post-Project, weighted CN** of 75. Existing dirt roads will be incorporated into the project as vineyard avenues, subject to the same cover specifications as the 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.

Conclusion: Assuming the maintenance of the cover crop standards specified by the ECP, the project will not result in any increase in peak flow or runoff.

DAS

Crush partners
Pre-project, CN only, rev2
Napa County, California

Sub-Area Land Use and Curve Number Details

Sub-Area Identifier	Land Use	Hydrologic Soil Group	Sub-Area Area (ac)	Curve Number
Main	Open space; grass cover 50% to 75%	(fair) C	3.5	79
	Dirt (w/ right-of-way)	C	.3	87
	Residential districts (1 acre)	C	8.5	79
	Row Crop SR + Crop residue	(good) B	5.7	75
	Woods - grass combination	(good) C	.6	72
	Total Area / Weighted Curve Number		18.6	78
			====	==

DAS

Crush partners
Pre-project, CN only, rev2
Napa County, California

Sub-Area Land Use and Curve Number Details

Sub-Area Identifier	Land Use		Hydrologic Soil Group	Sub-Area Area (ac)	Curve Number
Main	Annual grass	(fair)	C	3.5	79
	Dirt Road (w/ right-of-way)		C	.3	87
	Vineyard (annual grass)	(fair)	C	8.5	79
	Annual grass	(good)	B	5.7	75
	Woods - grass combination	(good)	C	.6	72
	Total Area / Weighted Curve Number			18.6 ====	78 ==

DAS

Crush partners
Post-project, CN only, rev 2
Napa County, California

Sub-Area Land Use and Curve Number Details

Sub-Area Identifier	Land Use	Hydrologic Soil Group	Sub-Area Area (ac)	Curve Number
Main	User defined urban (Click button or	C	18.6	75
	Total Area / Weighted Curve Number		18.6 ====	75 ==

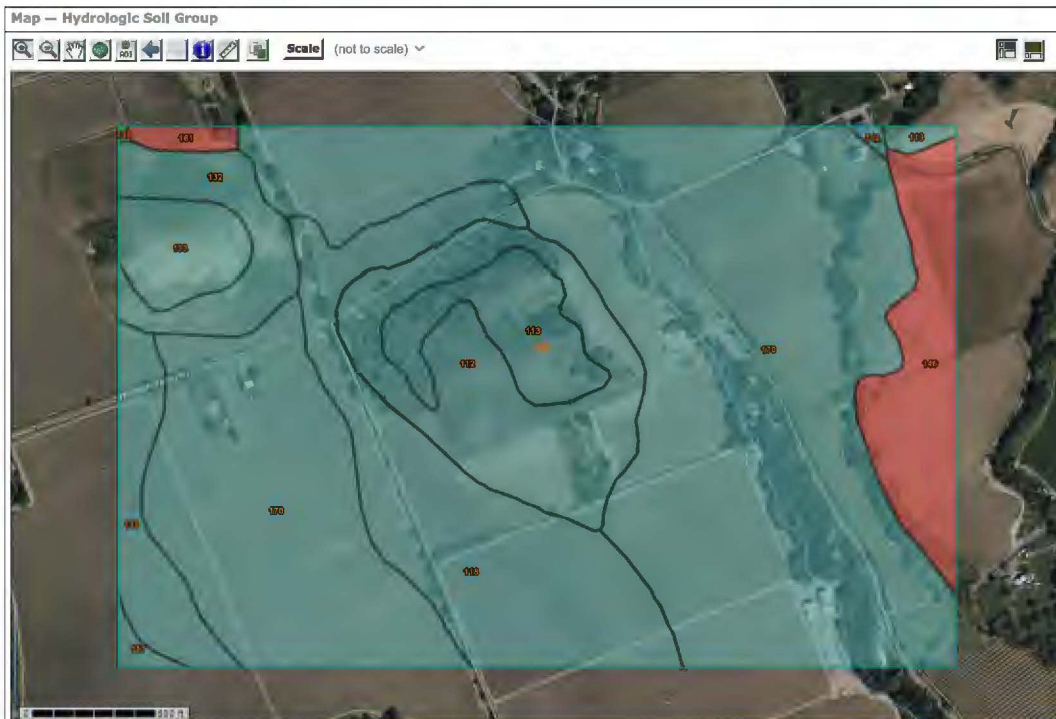
DAS

Crush partners
Post-project, CN only, rev 2
Napa County, California

Sub-Area Land Use and Curve Number Details

Sub-Area Identifier	Land Use	Hydrologic Soil Group	Sub-Area Area (ac)	Curve Number
Main	Vineyards (annual grass)	(good) C	18.6	75
Total Area / Weighted Curve Number			18.6 ====	75 ==

Search
Properties and Qualities Ratings
Open AllClose All
Soil Chemical Properties
Soil Erosion Factors
Soil Health Properties
Soil Physical Properties
Soil Qualities and Features
AASHTO Group Classification (Surface)
AASHTO Group Index
Depth to a Selected Soil Restrictive Layer
Depth to Any Soil Restrictive Layer
Depth to Bedrock
Drainage Class
Frost Action
Frost-Free Days
Hydrologic Soil Group
View DescriptionView Rating
View Options
Map☒ Table☒ Description of Rating☒ Rating Options☐ ☐ Detailed Description
Advanced Options
Aggregation MethodDominant Condition Component Percent Cutoff Tie-break RuleLowerHigher
View DescriptionView Rating
Map Unit Name
Parent Material Name
Representative Slope
Soil Slippage Potential
Subsidence, Initial
Subsidence, Total
Unified Soil Classification (Surface)
Water Features



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. Mapping of soils is done at a particular scale. The soil surveys that comprise your AOI were mapped at 1:24,000. The design of map units and the level of detail shown in the resulting soil map are dependent on that map scale.

Enlargement of maps beyond the scale of mapping can cause misunderstanding of the detail of mapping and accuracy of soil line placement. The maps do not show the small areas of contrasting soils that could have been shown at a more detailed scale.

Tables – Hydrologic Soil Group – 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	
112	Bressa-Dibble complex, 5 to 15 percent slopes	C	24.3	9.8%	
113	Bressa-Dibble complex, 15 to 30 percent slopes	C	10.4	4.2%	
117	Clear Lake clay, overwashed	C	0.9	0.4%	
118	Cole silt loam, 0 to 2 percent slopes, MLRA 14	C	42.6	17.1%	
132	Fagan clay loam, 15 to 30 percent slopes	C	9.5	3.8%	
133	Fagan clay loam, 30 to 50 percent slopes	C	6.5	2.6%	
146	Haire loam, 2 to 9 percent slopes	D	15.1	6.1%	
161	Maxwell clay, 2 to 9 percent slopes	D	1.4	0.6%	
170	Pleasanton loam, 0 to 2 percent slopes, MLRA 14	C	138.0	55.5%	
Totals for Area of Interest			248.8	100.0%	

Description — Hydrologic Soil Group

Hydrologic soil groups are based on estimates of runoff potential. Soils are assigned to one of four groups according to the rate of water infiltration when the soils are not protected by vegetation, are thoroughly wet, and receive precipitation from long-duration storms.

The soils in the United States are assigned to four groups (A, B, C, and D) and three dual classes (A/D, B/D, and C/D). The groups are defined as follows:

Group A. Soils having a high infiltration rate (low runoff potential) when thoroughly wet. These consist mainly of deep, well drained to excessively drained sands or gravelly sands. These soils have a high rate of water transmission.

Group B. Soils having a moderate infiltration rate when thoroughly wet. These consist chiefly of moderately deep or deep, moderately well drained or well drained soils that have moderately fine texture to moderately coarse texture. These soils have a moderate rate of water transmission.

Group C. Soils having a slow infiltration rate when thoroughly wet. These consist chiefly of soils having a layer that impedes the downward movement of water or soils of moderately fine texture or fine texture. These soils have a slow rate of water transmission.

Group D. Soils having a very slow infiltration rate (high runoff potential) when thoroughly wet. These consist chiefly of clays that have a high shrink-swell potential, soils that have a high water table, soils that have a claypan or clay layer at or near the surface, and soils that are shallow over nearly impervious material. These soils have a very slow rate of water transmission.

If a soil is assigned to a dual hydrologic group (A/D, B/D, or C/D), the first letter is for drained areas and the second is for undrained areas. Only the soils that in their natural condition are in group D are assigned to dual classes.

Rating Options — Hydrologic Soil Group

Aggregation Method: Dominant Condition

Component Percent Cutoff: *None Specified*

Tie-break Rule: Higher

Land Use	Cover	Hydrologic 1/ Condition	Hydrologic Soil Group			
	Treatment or Practice		A	B	C	D
Orchards, deciduous		(See accompanying land-use description)				
Orchards, Evergreen		Poor	55	72	81	86
		Fair	42	64	76	82
		Good	33	58	72	79
Vineyards		(See accompanying land-use description)				
NON-CULTIVATED AGRICULTURAL LAND (Grassland, Woodland, Brushland)						
Annual grass		Poor	65	78	86	89
		Fair	49	69	79	84
		Good	38	61	75	81
Broadleaf chaparral		Poor	53	70	80	85
		Fair	40	63	75	81
		Good	31	57	71	78
Meadow		Poor	63	77	84	90
		Fair	58	70	78	84
		Good	30	58	72	78
Narrowleaf chaparral		Poor	70	82	88	90
		Fair	55	72	81	86
Open brush		Poor	61	76	84	88
		Fair	46	66	77	83
		Good	41	63	75	81

Close-seeded legumes or rotation meadow, contour - Close-seeded legumes or rotation meadow planted on the contour or in straight rows on land with 2 percent slopes or less.

Irrigated pasture - Irrigated land that is planted to perennial grasses and legumes for production of forage and which is cultivated only to establish or renew the stand of plants. For hydrologic purposes, dryland pasture is considered as annual grass.

Orchards, Deciduous - Land planted to such deciduous trees as apples, apricots, pears, walnuts, and almonds. Soil protection during the rainy season is dependent on ground cover. This ground cover may be annual grass or perennial grass cover crops with or without legumes, occasionally legumes alone.

Use curve numbers that apply to the land use or the kind and condition of cover during storm periods; for example, Annual grass curve numbers for annual grass or grass-legume cover. Where orchards are kept bare by disking or the use of herbicides, use Fallow curve numbers.

Because of management practices, ground cover in orchards is seldom continuous. Only orchards untilled with more than 75 percent of the ground surface continuously protected by cover are in Good Hydrologic Condition, others are Fair or Poor.

Orchards, Evergreen - Land planted to evergreen trees which include citrus, avocado, and Christmas tree plantations. Soil protection is dependent on ground cover or litter. This ground cover may be annual grass or perennial grass cover crops with or without legumes alone; or the ground protection may be litter where tree canopy is sufficiently dense to produce an effective amount of fallen leaves.

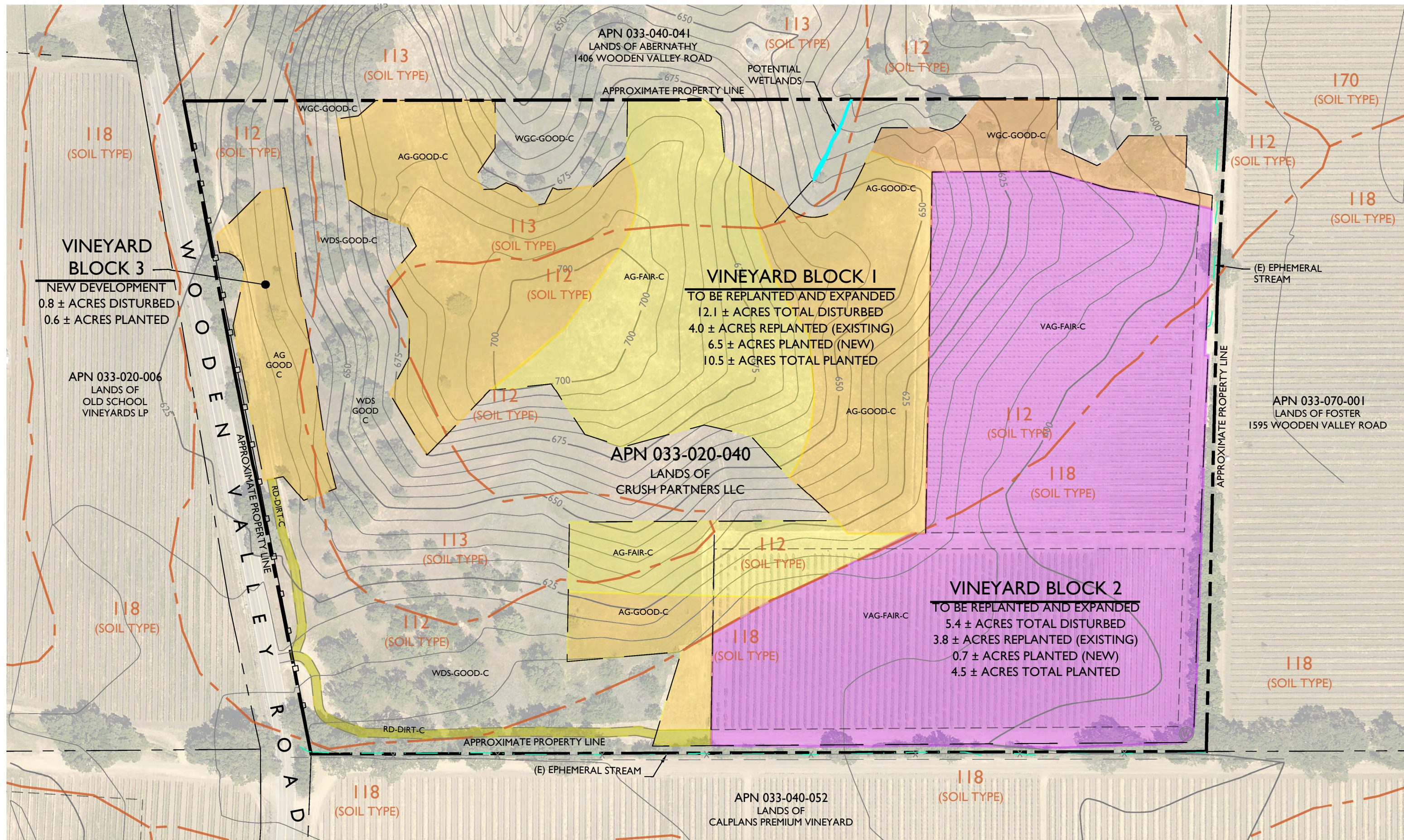
Because of management practices, ground cover in orchards is seldom continuous. Only untilled orchards with more than 75 percent of the ground surface continuously protected by litter or plant cover are in Good Hydrologic Condition, others are Fair or Poor.

Vineyards - Land planted to grapes. Soil protection during the rainy season is dependent on ground cover. This ground cover may be annual grass or perennial grass cover crops with or without legumes, occasionally legumes alone.

Use curve numbers that apply to the land use or the kind and condition of cover during the storm periods; for example, Annual grass curve numbers for annual grass or grass legume cover. Where vineyards are kept bare by disking or the use of herbicides, use Fallow curve numbers.

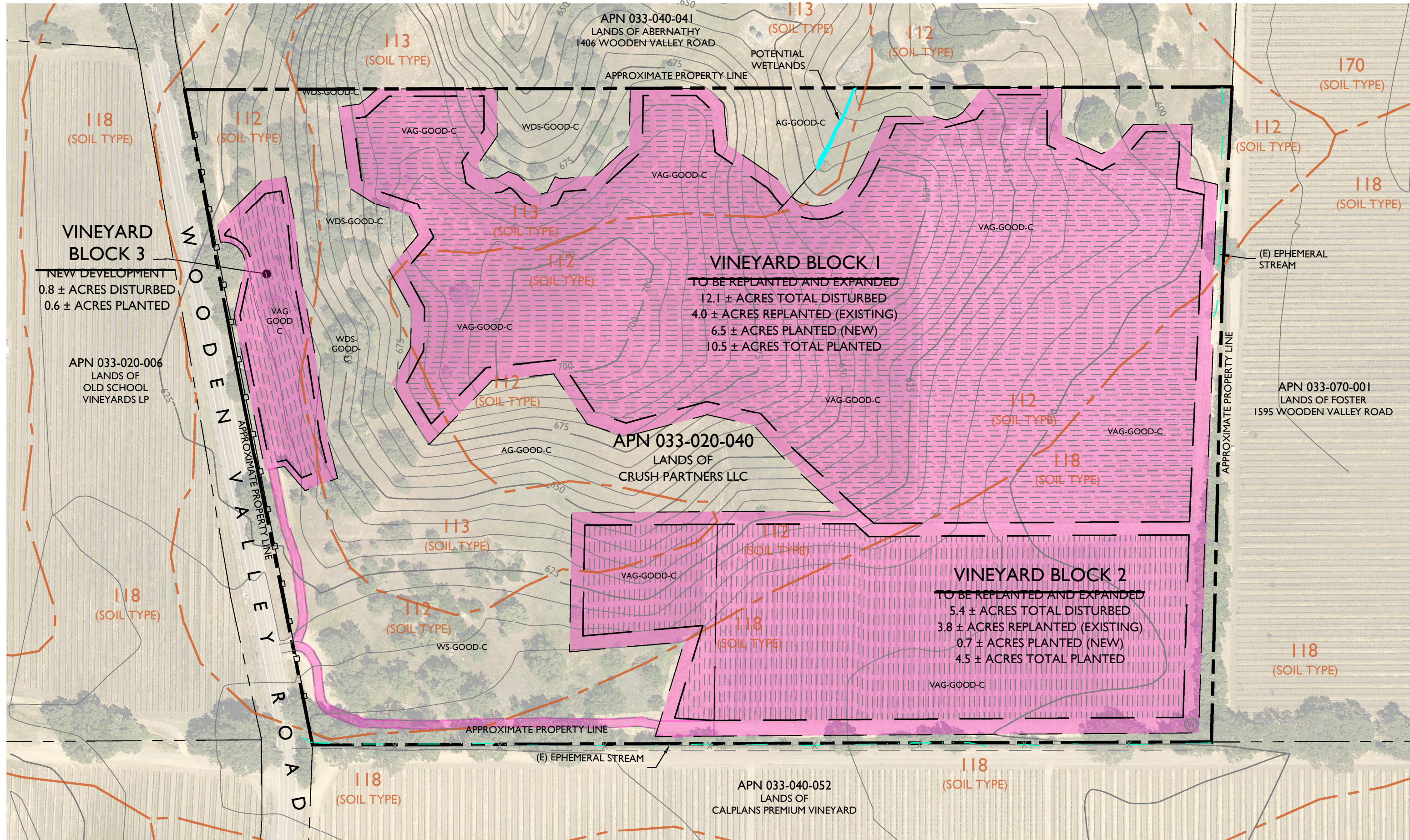
CRUSH PARTNERS LLC

WATERSHED EXHIBIT



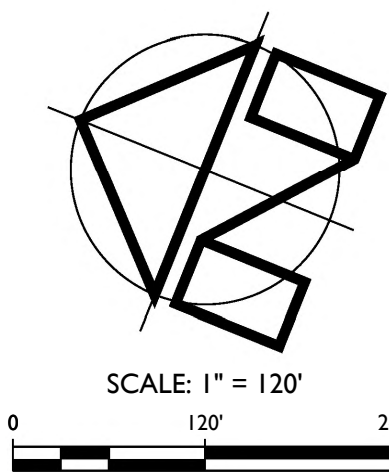
WATERSHED AREA "A" - EXISTING CONDITIONS

SCALE: 1" = 120'

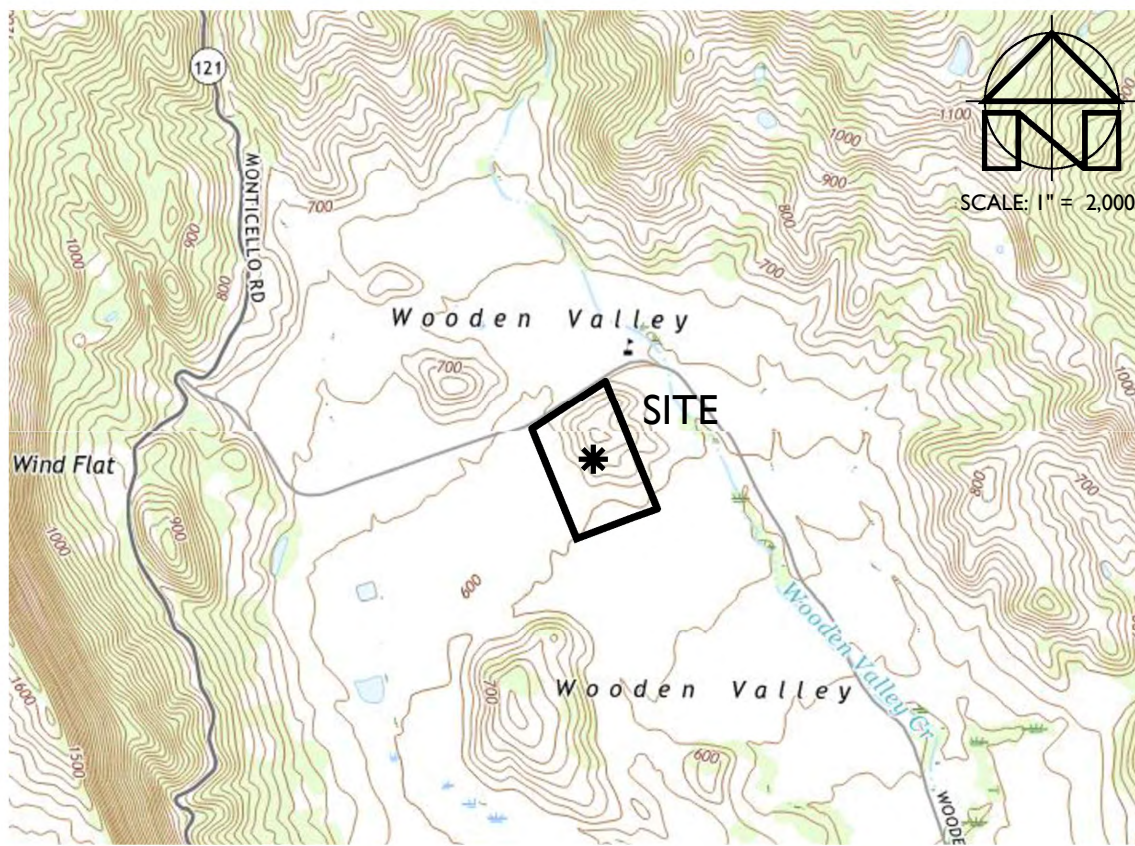


WATERSHED AREA "A" - PROPOSED CONDITIONS

SCALE: 1" = 120'



WATERSHED AREA "A" SUMMARY							
PLAN SYMBOL	LAND USE DESCRIPTION	HYDROLOGIC CONDITION	HYDROLOGIC SOIL GROUP	CURVE NUMBER (CN)	PRE-PROJECT (ACRES)	REMOVED/ ADDED (ACRES)	POST-PROJECT
RD-DIRT-C	DIRT ROAD	N/A	C	87	0.3 ± AC	-0.3 ± AC	0.0 ± AC
WGC-GOOD-C	WOODS, GRASS	GOOD	C	72	0.6 ± AC	-0.6 ± AC	0.0 ± AC
AG-GOOD-C	ANNUAL GRASS	GOOD	C	75	5.7 ± AC	-5.7 ± AC	0.0 ± AC
AG-FAIR-C	ANNUAL GRASS	FAIR	C	79	3.5 ± AC	-3.5 ± AC	0.0 ± AC
VAG-FAIR-C	VINEYARD - ANNUAL GRASS (PRE)	FAIR	C	79	8.5 ± AC	-8.5 ± AC	0.0 ± AC
VAG-GOOD-C	VINEYARD - ANNUAL GRASS (POST)	GOOD	C	75	0.0 ± AC	19.0 ± AC	19.0 ± AC
TOTALS					18.6 ± AC	0.0 ± AC	18.6 ± AC



LOCATION MAP

SCALE: 1" = 2,000'

PROJECT INFORMATION:

PROPERTY OWNER & APPLICANT:

CRUSH PARTNERS LLC
CARE OF: ROB LLOYD
25 ENTERPRISE COURT
NAPA, CA 94558

SITE ADDRESS:

WOODEN VALLEY ROAD
NAPA, CA 94558

ASSESSOR'S PARCEL NUMBER:

033-020-040

PARCEL SIZE:

27.98 ± ACRES

PROJECT SIZE:

18.6 ± ACRES TOTAL DISTURBED (INCLUDES ACCESS ROAD)
15.6 ± ACRES TOTAL PLANTED
7.8 ± ACRES REPLANTED (EXISTING)
7.8 ± ACRES PLANTED (NEW)
0.3 ± ACRES EXISTING ACCESS ROAD

NOTES:

1. THE "BASE" BACKGROUND REPRESENTS EXISTING TOPOGRAPHIC FEATURES. TOPOGRAPHIC INFORMATION WAS TAKEN FROM THE NAPA COUNTY GEOGRAPHIC INFORMATION SYSTEM DATABASE. 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. BENCHMARK: 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.

FLOOD HAZARD NOTE:

ACCORDING TO THE FEDERAL EMERGENCY MANAGEMENT AGENCY (FEMA) FLOOD INSURANCE RATE MAP (FIRM) MAP NUMBER 06095C0125E AND 06095C0230E, EFFECTIVE MAY 4, 2009, THE PROJECT SITE IS NOT LOCATED IN A SPECIAL FLOOD HAZARD AREA.

SOIL TYPE LEGEND:

- | | |
|-----|--|
| 112 | BRESSA-DIBBLE COMPLEX, 5 TO 15 PERCENT SLOPES |
| 113 | BRESSA-DIBBLE COMPLEX, 15 TO 30 PERCENT SLOPES |
| 118 | COLE SILT LOAM, 0 TO 2 PERCENT SLOPES |
| 170 | PLEASANTON LOAM, 0 TO 2 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 |
| --- | EPHEMERAL STREAM |
| --- | EXISTING VINEYARD BLOCK |
| --- | PROPOSED VINEYARD AVENUE |
| --- | PROPOSED VINEYARD BLOCK |