

Hydrologic Analysis
Proposed New Vineyard Development
Chen Vineyards
1260 Shady Brook Lane
Napa, CA 94588
052-190-013
November 13, 2023



The following analysis evaluates a 1.3-acre vineyard planting proposal¹ on the referenced, approximately 41.8-acre parcel, to determine the proposal's potential to increase peak flow/ runoff from the site. This analysis was prepared by David Steiner, CPESC, CPSWQ, at the request of, and in consultation with, Mr. Mike Muelrath, PE, of Applied Civil Engineering. Because of the small acreage of the proposed project (relative to the size of the watershed basin in which it lies), the analysis makes use of only the "Weighted Curve Number" portion of USDA Technical Release 55, as expressed in Version 1.00.10 of WinTR-55 "Small Watershed Hydrology", a Windows-based application. As none of the other parameters that would be factored into a full modeling by the application—storm data, time of concentration, or stream flow data—will be affected by the proposal, a comparison of the site's pre- and post-project land use and hydrologic condition (weighted Curve Number) will predict any potential change in peak flow or runoff, with a level of certainty equal to that of the full model.

According to the USDA Web Soil Survey for Napa County, the entire site is underlain by Mapping Unit 152, Hambright-Rock outcrop Complex, in Hydrologic Soil Group "D." The accompanying maps, with pre- and post-project Curve Number polygons, were drawn on aerial/topographic base maps provided by Applied Civil Engineering and BT Drafting. Evaluation of cover on the site is based on examination of Napa County GIS aerial photography (2021) and a site visit on November 9, 2023. 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.² This table's guidance calls for vineyard Curve Numbers equivalent to those of "annual grass."³ ECP specifications call for a non-tilled vineyard crop with 75% cover crop, consistent with the designated "good" hydrologic condition. The curve number breakdown indicates that the proposed development will reduce the weighted CN from 83 to 81, implying a commensurate reduction in runoff.

Conclusion: The proposed vineyard development will not increase peak flows.

¹Includes a .1-acre vineyard avenue connecting the two proposed blocks.

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

³ 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."

DAS

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Pre-project
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) D	.8	84
	Woods - grass combination	(fair) D	.5	82
	Total Area / Weighted Curve Number		1.3	83
			==	==

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Post-project
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	Vineyard (annual grass)	(good) D	1.3	81
Total Area / Weighted Curve Number			1.3 ==	81 ==

[Area of Interest \(AOI\)](#)[Soil Map](#)[Soil Data Explorer](#)[Download Soils Data](#)[Shopping Cart \(Free\)](#)

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Soil Chemical Properties

Soil Erosion Factors

Soil Health Properties

Soil Physical Properties

Available Water Capacity

Available Water Storage

Available Water Supply, 0 to 100 cm

Available Water Supply, 0 to 150 cm

Available Water Supply, 0 to 25 cm

Available Water Supply, 0 to 50 cm

Bulk Density, One-Third Bar

Linear Extensibility

Liquid Limit

Organic Matter

Percent Clay

Percent Sand

Percent Silt

Plasticity Index

Saturated Hydraulic Conductivity (Ksat)

Saturated Hydraulic Conductivity (Ksat), Standard Classes

Surface Texture

Water Content, 15 Bar

Water Content, One-Third Bar

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 Description](#)[View Rating](#)

View Options

Map ☒Table ☒Description of Rating ☒

Rating Options

☐ Detailed Description

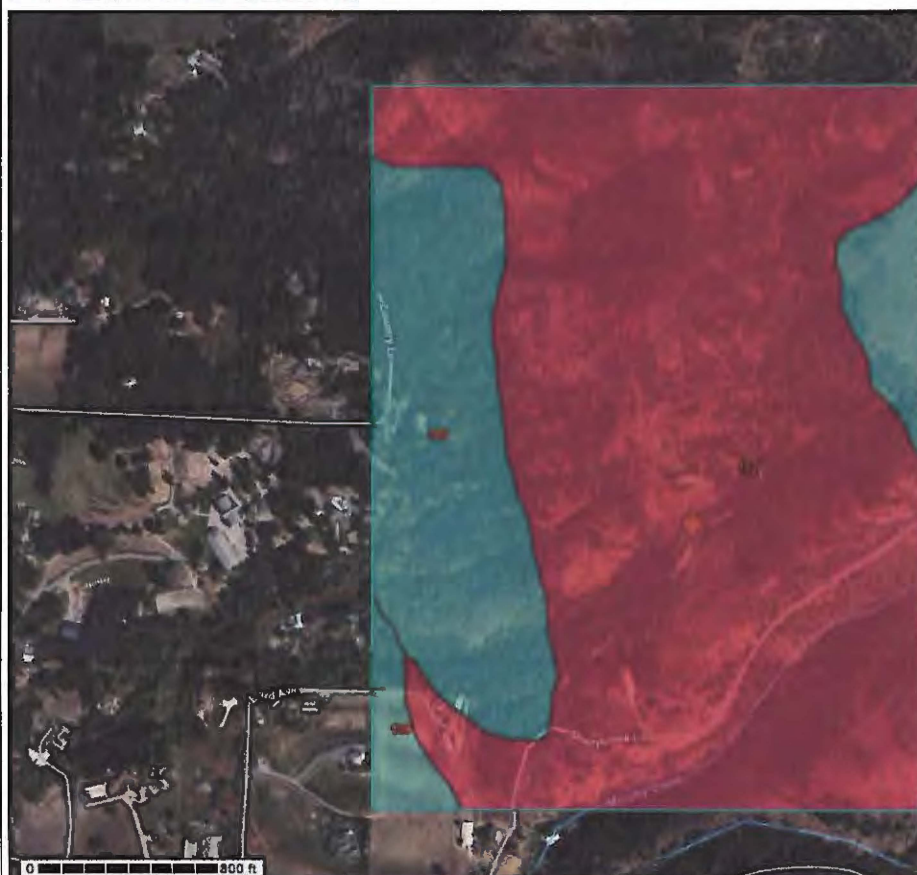
Advanced Options

Aggregation Method Dominant Condition

Component Percent Cutoff

Tie-break Rule Lower

Map — Hydrologic Soil Group


 Scale (not to scale)
**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. Map surveys that comprise your AOI were mapped at 1:24,000. The design of map units and the level of detail on that map scale.

Enlargement of maps beyond the scale of mapping can cause misunderstanding of the detail of map 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
139	Forward silt loam, 5 to 39 percent slopes, MLRA 15	C	4.1	1.8%
140	Forward silt loam, 12 to 57 percent slopes, MLRA 15	C	35.5	15.5%
152	Hambright rock-Outcrop complex, 30 to 75 percent slopes	D	167.2	72.9%
178	Sobrante loam, 5 to 30 percent slopes	C	22.6	9.9%
Totals for Area of Interest			229.4	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.

View Options		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.
Higher		
View Description	View Rating	
Map Unit Name		
Parent Material Name		
Representative Slope		
Soil Slippage Potential		
Subsidence, Initial		
Subsidence, Total		
Unified Soil Classification (Surface)		
Water Features		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

Exhibit 2.1-3

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.

