DELTA CONSULTING & ENGINEERING
OF ST. HELENA

WATER AVAILABILITY ANALYSIS

FOR THE

AMICI CELLARS
USE PERMIT MODIFICATION

PROJECT LOCATION

3130 OLD LAWLEY TOLL ROAD
CALISTOGA, CA 94515

COUNTY: NAPA
APN: 017-140-035

SEPTEMBER 15, 2019
REVISION #1: MAY 29, 2020
(REVISIONS HIGHLIGHTED IN GRAY)

PREPARED FOR REVIEW BY:

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DELTA CONSULTING & ENGINEERING
OF ST. HELENA

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I. BACKGROUND & PROJECT DESCRIPTION

This water availability analysis was prepared to support the use permit modification application for the Amici Cellars. It has been prepared in accordance with the outline as described in the *Water Availability Analysis (WAA)*, Adopted May 12, 2015, as provided by the County of Napa Planning Building, and Environmental Services Department.

According to the WAA criteria, all discretionary (non-ministerial) projects fall within three tiers of screening when determining the level of groundwater analysis required by the County of Napa for permitting. See Table 1 from the WAA below:

Table 1: Project Screening Criteria Applicability

Tier	Criteria Type	Napa Valley Floor	MST	All Other Areas
1	Water Use	Yes	Yes	Yes
2	Well Interference	No[1]	No[1]	Yes
3	Groundwater/Surface Water Interaction	No[1]	No[1]	No[1]

1. Further analysis may be required under CEQA if substantial evidence, in the record, indicates a potentially significant impact may occur from the project.

The subject parcel is zoned Agriculture Watershed (AW) and located on the edge of the Napa Valley Floor area. For this analysis, it is assumed to be in 'All Other Areas' and is subject to Tier 1 and Tier 2 screening. Tiers 3 screening is not anticipated to be required for this project.

II. TIER 1 ANALYSIS

Tier 1 of the WAA requires the applicant to provide an estimate of the existing and proposed water usage for the subject parcel and compare the estimated parcel water usage to the applicable water use criteria. As noted in Table 2A of the WAA (shown below), the water use criteria are subject to the parcel location.

Table 2A: Water Use Criteria

Project parcel location	Water Use Criteria (acre-feet per acre per year)
Napa Valley Floor	1.0
MST Groundwater Deficient Area	0.3 or no net increase, whichever is less [1]
All Other Areas	Parcel Specific [2]

1. Does not apply to the Ministerial Exemption as outlined in the Groundwater Conservation Ordinance

2. Water use criteria for project shall be considered in relation to the average annual recharge available to project property, as calculated by the applicant or their consultant.

The project parcel is located on the border of the Napa Valley Floor and Eastern Mountains subarea of Napa County. For this analysis, the parcel is assumed to be in the WAA 'All Other Areas'. Per note #2 in Table 2A, the WAA requires the applicant determine the average annual groundwater recharge potential for the entire parcel.

This analysis will identify the existing and proposed water uses on the parcel, estimate the annual water usage, calculate the potential average annual recharge volume available to the parcel, and compare the estimated usage to the potential recharge volume.

A. Parcel Water Use

Appendix B of the WAA includes standardized guidelines for determining the estimated water use for various specified land uses. A summary of these guidelines, including the values applied in this report, are identified in the table below:

Base Input Variables (Range per County of Napa)			
Water Use Guidelines per Appendix B of WAA			
Use	**Recommended Water Use Values**	**Applied Water Use**	**Unit**
Residential			
Primary Residence[1]	0.5 to 0.75	0.5	AF per Year
2nd unit or Farm Labor dwelling	0.20 to 0.30	0.2	AF per Year
Guest House[2]	-	0.05	AF per Year
Pool (Covered)	0.05	0.05	AF per Year
Pool (No Cover)	0.1	0.1	AF per Year
Landscaping	0.1	0.1	AF per 1,000 ft^2
Winery		8	gal to gal of wine (County min: 7)
Process Water	0.0215	0.0246	AF per 1,000 gal Wine Produced per Year
Domestic and Landscaping	0.005	0.005	AF per 1,000 gal Wine Produced per Year
Employees	15	15	Gallons Per Shift
Tasting Room Visitation	3	3	Gallons Per Visitor
Events and Marketing[3]	15	3	Gallons Per Visitor
Vineyards			
Irrigation	0.2 to 0.5	0.5	AF per Acre Planted per Year
Heat Protection	0.25	0.25	AF per Acre Planted per Year
Frost Protection	0.25	0.25	AF per Acre Planted per Year

[1] Includes minor to moderate landscaping

[2] Not included in guidelines

[3] 15 Gallons per visitor with on-site catering. Three gallons per visitor applied (all catering off-site)

B. Existing Water Usage

The existing water use for the parcel consists of the existing winery and associated uses as itemized in the following Table 1 below:

Table 1: Existing Water Uses											
Use	**Value**	**Unit**	**Details**						**Use**		
Winery											
Wine Produced	20	x10^3 (gpy)							0.49	af/yr	83.6%
Employees (Full + Part Time)											
Full-Time	1	ppd	15	gpd	5	dpw	3,750	gpy	0.01	af/yr	2.0%
Part-Time	0	ppd	-	dpw	3	dpw	-	gpy	-	af/yr	0.0%
Tasting Room Visitation	175	ppw	52	wk/yr	9,100	ppy	27,300	gpy	0.08	af/yr	14.3%
Events and Marketing											
events at	15	ppe	4	epy	60	ppy	180	gpy	0.001	af/yr	0.1%
events at	20	ppe	2	epy	40	ppy	120	gpy	0.000	af/yr	0.1%
events at	0	ppe	0	epy	-	ppy	-	gpy	0.000	af/yr	0.0%
Kitchen	0	gpd					-	gpy	0.00	af/yr	0.0%
								Winery Total:	**0.59**	**af/yr**	**100%**
Vineyards											
Irrigation	0	Acres							0.00	af/yr	
Heat Protection	No								0.00	af/yr	
Frost Protection	No								0.00	af/yr	
								Vineyard Total:	**0.0**	**af/yr**	
								Parcel Existing Water Use Total:	**0.59**	**af/yr**	

Abbreviations

dpw = days per week
epy = events per year
ppd = persons per day
ppe = persons per event
ppw = persons per week

Applying the water usage values identified in Appendix B of the WAA to the existing uses on the parcel, the existing water usage for the parcel is estimated at 0.59 acre-feet per year.

C. Proposed Water Usage

The proposed water use for the parcel consists of the winery and associated uses as itemized in the following Table 2:

Table 2: Proposed Water Uses											
Use	**Value**	**Unit**	**Details**						**Use**		
Winery											
Wine Produced (Permitted)	30	$x10^3$ (gpy)					240,000	Gal/yr	0.74	af/yr	81.2%
Employees (Full + Part Time)											
Full-Time	4	ppd	60	gpd	6	dpw	18,000	gpy	0.06	af/yr	6.1%
Part-Time	4	ppd	60	dpw	3	dpw	9,000	gpy	0.03	af/yr	3.0%
Tasting Room Visitation	175	ppw	52	wk/yr	9,100	ppy	27,300	gpy	0.08	af/yr	9.2%
Events and Marketing											
events at	50	ppe	1	epy	50	ppy	150	gpy	0.000	af/yr	0.1%
events at	75	ppe	2	epy	150	ppy	450	gpy	0.001	af/yr	0.2%
events at	25	ppe	8	epy	200	ppy	600	gpy	0.002	af/yr	0.2%
Kitchen	0	gpd					-	gpy	0.00	af/yr	0.0%
								Winery Total:	**0.91**	**af/yr**	**100%**
Vineyards											
Irrigation	0	Acres							0.00	af/yr	
Heat Protection	No								0.00	af/yr	
Frost Protection	No								0.00	af/yr	
								Vineyard Total:	**0.0**	**af/yr**	
								Parcel Proposed Water Use Total:	**0.91**	**af/yr**	

Abbreviations

dpw = days per week
epy = events per year
ppd = persons per day
ppe = persons per event
ppw = persons per week

The estimated proposed water usage on the parcel utilizing the Appendix B values is 0.91 acre-feet per year.

D. Water Usage Summary

Summarizing the existing and proposed water uses on the parcel, the proposed annual water use related to the use permit modification will increase by an estimated 0.32 acre-feet per year (35.2% increase). See Table 3 below for the comparison between the existing and proposed water use:

Table 3: Water Use Summary				
Water Use Comparison	**Comparision**		**% Allotment**	
Existing Use	0.59	AF/Year	15.3%	
Proposed Use	0.91	AF/Year	23.6%	
Calculated Water Usage Increase:	**0.32**	**AF/Year**		
Calculated Water Usage % Increase:	**35.2%**			
Parcel Allotment:	**Calculate**	**See Recharge Analysis**		
Parcel Recharge Estimate:	**3.84**	**AF/Year**		

E. Recharge Analysis: Groundwater Basics

In a generalized scenario, groundwater occurs in two different zones: unsaturated and saturated. Free water moves downward via gravity through the unsaturated zone and collects in the saturated zone. Starting at the ground surface and progressing under the ground, numerous soil layers inhibit the progression of water to the saturated zone. Each of these zones has an associated permeability which allows or restricts the downward migration of water. Typically, underlying a particular saturated zone is a layer of impermeable or semi-impermeable soil that restricts the further downward movement of water. The upper portion of the saturated zone is called the 'water table'. The water in the saturated zone is the only water available to supply wells and springs.

Remaining water located in the unsaturated zone is typically held in the void space between soil particles via chemical or electromagnetic bonding/surface tension forces. This water is available for vegetation, plants, or other organisms and is termed 'field capacity' for the moisture content of soil after gravity drainage is complete. Recharge of the saturated zone occurs by percolation of water from the land surface through the unsaturated zone via gravity.

The unsaturated zone can be subdivided into three zones: soil zone, vadose (intermediate) zone, and capillary fringe. The soil zone depth extends from the ground surface to the vadose zone and varies in depth. Typically, the depth is three (3) to six (6) feet. This is the zone that retains water for plant use. Depending on the time of year, this zone can become saturated during rain events, but generally remains unsaturated as excess water that is not held in the soil voids passes through to the saturated zone.

The vadose zone lies below the unsaturated zone and varies in depth. Infiltrating water passes through this zone toward the water table via gravity. Prior to entering the saturated zone, water passes through the capillary fringe zone. This zone is the lowest portion of the unsaturated zone and pulls water up from the saturated zone via attraction between water and soil particles and acts against the pull of gravity.

The saturated zone is also known as an 'aquifer' and are permeable geological units that can transmit quantities of water and act as storage reservoirs. Soil materials commonly referred to as aquifers are:

- Unconsolidated sedimentary deposits
- Fractured or porous sandstone
- Volcanic rocks (basalt, tuff, dolomite, limestone strata)

F. Aquifer Recharge Analysis

In general, an analysis of rainfall runoff as related to its ability to infiltrate and contribute to a groundwater basin is a complex task and includes a number of factors which influence the potential groundwater recharge rates. These factors include, but are not limited to overall climate conditions, local precipitation timing, intensity, and duration, regional and local geology underlying the subject parcel, soil type and associated permeability of the various layers, and the land gradient. In addition, the timing between and intensity of individual storm events can significantly affect the potential for runoff or infiltration to occur. Infiltration factors include rainfall intensity, amounts, and duration and are related to prior storm events as to influence on soil moisture conditions and the potential for infiltration versus runoff. Each of these factors include sub-factors; all of which are beyond the scope of this analysis.

The following general water availability analysis is based a methodology which was obtained from background studies and reports as noted below. The analysis generalizes the available volume of potential groundwater recharge based as related to average annual precipitation, the most restrictive soil permeability in the unsaturated zone, and the land gradient on the subject parcel. Its premise relies upon a review each of these generalized factors in determining the parcel's potential to convey rainwater to groundwater. It shall not be considered a detailed analysis of the localized or regional geology and the subject parcel's contribution to known groundwater basins. It will not assess any potential contribution to subsurface runoff which is defined as the runoff infiltrating the surface soil and moving towards streams as ephemeral shallow perched groundwater above the main groundwater level.

Following is a summary of the factors utilized and associated with this water availability analysis.

1. Local Precipitation

   Precipitation infiltration and associated runoff is a major contributing factor to groundwater and/or aquifer recharge. In order to estimate the local precipitation at the subject parcel, historical rainfall data was reviewed from the Calistoga, CA station Cooperative Observer Program (COOP) station #041312 collected by the Western Regional Climate Center (WRCC). The rainfall station in proximity to the project site:

   - Calistoga (Station #041312, ~2.5 miles distant)

   The station's data collection period and average annual precipitation is listed in Table 4 below:

Table 4: Precipitation Information

Western Regional Climate Center (WRCC) Precipitation Data

	Station	Date	Precipitation (in)
	Calistoga, CA (041312)	03-01-1906 to 05-20-2016	37.55
	-	-	0
	-	-	0
	-	-	0
		Total Average Annual Precipication:	**37.55**
		Total Rainfall volume on parcel:	**37.7 ac-ft/yr**

Below is a vicinity map showing the proximity of the rainfall station relative to the project site. The map does not have a scale.

Combining the area of the parcel (12.05 acres) with the average annual rainfall yields the total average volume of water falling on the parcel of 37.7 acre-ft per year.

While the quantity of rainfall derived on the subject property is identified by using precipitation records, parcel area, and basic volume calculations, the quantity of precipitation that infiltrates into the ground and recharges the groundwater is a percentage of this water due to runoff, infiltration, and evapotranspiration. The amount of the rainfall that can potentially infiltrate to contribute to the aquifer is based on complex factors including geology of the area. These complex factors are not a part of this analysis. For this simplified analysis, the soil units found on the subject parcel and their associated saturated permeability are used to estimate the infiltration potential of precipitation.

2. Soil Permeability

Information on soil units and soil permeability is publicly available via the Web Soil Survey (websoilsurvey.sc.egov.usda.gov). This website was produced by the National Cooperative Soil Survey and is operated by the United States Department of Agriculture (USDA) Natural Resources Conservation Service (NRCS).

The Web Soil Survey was referenced to map the soil units on the subject property and each unit's respective estimated permeability. The Web Soil Survey provides the Saturated Hydraulic Conductivity (K_{sat}) for each soil formation in micrometers per second. Due to the complex nature of soil types and soil combinations that produce each unique soil formation, a weighted average of the minimum permeability of all soil layers found in a formation is used. See Appendix D for the Web Soil Survey Report prepared for this parcel, including a more detailed description of how the K_{sat} is calculated. As reflected in the soil survey, Table 5 below notes the soil unit number, unit name, permeability, and associated acreage on the subject parcel.

Table 5: Soil Information

Parcel Soil Unit Information

			Soil Permeability	
Soil Unit #	Unit Name	Area (acres)	(mm/sec)	(cm/hr)
109	Boomer Gravelly Loam, 30-50% slopes	3.37	6.49	2.34
152	Hambright Rock-Outcrop Complex, 30-75% slopes	8.68	20.4	7.34
-	-	-	-	-
-	-	-	-	-
-	-	-	-	-
	Total Area:	12.05	Acreage ok	

The project site consists of soil units noted in the table above and the calculations below utilize the data from this table as a component of potential infiltration analysis.

3. Land Gradient

In conjunction with the soil permeability, the gradient (land slopes) on which the soil units reside are a factor in determining the potential recharge capacity. As an example, areas with steeper slope gradients and limited vegetation tend to have higher runoff and the gradient relocates a unit of water before that unit has a chance to infiltrate. In general, these steeper areas have a higher percentage of surface rainfall runoff and a smaller percentage of rainfall infiltration. Inversely, land areas with shallow slopes tend to allow for a unit of water to move across the land at a slower pace thusly a lower runoff rate and increased opportunity for infiltration.

For this analysis the parcel slope gradients are classified into three zones:

- less than 15% slope

- 15-25% slope
- greater than 25% slope

The subject property's topographic information was determined from a three-dimensional model created from elevation data obtained from the Napa County GIS Data Catalog (https://gis.napa.ca.gov/). The base contour data (5-foot intervals) was from the Napa River Watershed Area prepared by Towill, Inc. in May, 2003. See Appendix B for the Slope Analysis and Soil Unit Map.

4. Recharge Potential

In this analysis, the groundwater recharge potential of the parcel is based on theoretical methodology using graphical information systems mapping of soil permeability and land slope. The methodology is described in the City of Rohnert Park City-Wide Water Supply Assessment (RPWSA) dated January, 2005. This document notes the "highest recharge rate would be expected to occur in areas with high permeability and low slope, but significant recharge can occur in areas with high permeabilities and high slopes or low permeability and low slopes."[1] "The term "recharge potential" is used because the actual recharge rate is also dependent on other factors such as land use and precipitation patterns".[2] "Typically, soils with a high recharge potential, which occur primarily along stream channels, correspond to the "recharge areas" defined by DWR (California Department of Water Resources)".[3]

The RPWSA describes the methodology which combines soil unit permeability with land gradient (slope) to estimate groundwater recharge. For a particular soil unit, the soil horizon with the lowest permeability was assumed to be the limiting factor for infiltration. The various permeabilities were then grouped into five categories:

- Less than 0.5 cm/hr
- 0.5 to 1.5 cm/hr
- 1.5 to 5 cm/hr
- 5 to 15 cm/hr
- Greater than 15 cm/hr

The methodology examined the slopes on which the soil units reside. The slopes were grouped into three categories:

- Less than 15%
- 15% to 25%
- Greater than 25%

Absent consideration of land use, the soil unit rate limiting permeability and slope are grouped into four 'recharge potential' categories:

- Very Low: permeability <0.5 cm/hr and slope >15%

[1] Section 3.7.2 GIS Mapping of Soil Permeabilities and Slope, City of Rohnert Park-City-wide Water Supply Assessment (Final), January 14, 2005, Luhdorff & Scalmanini Consulting Engineers.
[2] Ibid
[3] Ibid

- Low: permeability <0.5 cm/hr and slope <15%, permeability 0.5 – 1.5 cm/hr and slope <25%
- Moderate: permeability 0.5 – 1.5 cm/hr and slope <15%, permeability 1.5 – 5.0 cm/hr and slope >15%, permeability >5 cm/hr and slope >25%
- High: permeability 1.5 – 5.0 cm/hr and slope <15%, permeability >5 cm/hr and slope 15-25%

Table 6 below is a graphical table of the Potential Recharge slope / permeability model:

Table 6: Recharge Analysis

Potential Recharge Legend

	Permeability (cm/hr)	Slope
Very Low	< 0.5	>15%
Low	< 0.5	<15%
	0.5<1.5	<25%
Moderate	0.5<1.5	< 15%
	1.5<5.0	> 15%
	> 5.0	> 25%
High	1.5<5.0	< 15%
	> 5.0	15% to 25%

For the subject site and project, applying the permeability and slope variables noted in Table 6 above to the parcel, Table 7 below summarizes the estimated recharge potential acreage on the parcel.

Table 7: Calculated Theoretical Recharge Potential Areas

			Slope Classification (ac)		
Soil Unit	Unit Name	Soil Permeability (cm/hr)	< 15%	15% - 25%	> 25%
109	Boomer Gravelly Loam, 30-50% slopes	2.34	0.96	0.18	2.23
152	Hambright Rock-Outcrop Complex, 30-75% slopes	7.34	0.20	0.77	7.71
-	-	-	-	-	-
-	-	-	-	-	-
-	-	-	-	-	-
		Total Area:	1.16	0.95	9.94
		Sum Infiltration Areas:	12.05	ac	

As noted in the table, the potential recharge regions are shown ranging between Moderate (orange), and High (green). The parcel does not have any areas of Very Low or Low recharge potential. Using the areas summarized in this table, the average annual rainfall and a recharge rate percentage were applied to the regions to calculate the theoretical recharge potential volume for the subject parcel using this methodology. The results are summarized in Table 8 below.

Table 8: Calculated Theoretical Recharge Potential Volume

Recharge Potential	Total Area(ac)	Est. Recharge Rate	Recharge Volume (ac-ft)
Very Low	0.00	0%	0.00
Low	0.00	0%	0.00
Moderate	10.89	10%	3.41
High	1.16	12%	0.44
Total:	12.05		3.84

The Estimated Recharge Rate percentage used in the calculation are estimates based on Table ES-1: Summary of Water Balance Model Results shown in the Updated Hydrogeologic Conceptualization and Characterization of Conditions dated January 2013 prepared by Luhdorff &

Scalmanini and MBK Engineers (2013 LS/MBK).

In the 2013 LS/MBK study, a water balance model was created to determine an estimate of the recharge to groundwater in the Napa Valley basis. In a simplified form, a mass balance is the following calculation:

Inflows – Outflows = Change in Storage

The 2013 LS/MBK study prepared a water mass balance estimate for the Napa River watershed (including major tributary watersheds) to estimate the average annual groundwater recharge volume. Key variables evaluated in the study and summarized in water mass balance table ES-1 included the inflow (average annual precipitation) and outflows (river and stream flows, crop evapotranspiration, and infiltration). The infiltration estimates were based on hydraulic properties of soil and alluvial materials. Following is Table ES-1 from the 2013 LS/MBK study:

Table ES-1. Summary of Water Balance Model Results

	Average Annual (acre-feet)					Range (acre-feet)	Recharge (% of Precip.)
Watershed	Precip.	Outflow	Infilt.	ET	Recharge	Recharge	Recharge
Napa River near Napa	**418,500**	**146,800**	**271,700**	**201,900**	**70,600**	**8,300 - 185,900**	**17%**
- Conn Creek	98,200	24,600	73,600	52,200	21,100	4,300 - 40,700	21%
- Dry Creek	33,000	14,200	18,700	16,400	2,000	500 - 6,300	6%
- Napa River at St. Helena	161,400	67,000	94,400	72,500	22,000	2,500 - 60,900	14%
-- Napa River at Calistoga	54,200	23,600	30,600	19,700	10,500	2,000 - 17,200	19%
Milliken Creek	**33,000**	**16,800**	**16,200**	**13,500**	**2,500**	**100 - 7,100**	**8%**
Tulucay Creek	**19,500**	**9,100**	**10,400**	**9,500**	**1,000**	**100 - 2,300**	**5%**
Redwood Creek	**19,300**	**7,800**	**11,500**	**9,500**	**1,900**	**400 - 5,000**	**10%**
Napa Creek at Napa	**32,100**	**14,800**	**17,300**	**13,700**	**3,600**	**600 - 6,900**	**11%**

As noted in the above table, the estimated average annual recharge (as a percentage of precipitation) for the Napa Valley watershed ranges from 5% to 21%.

For the subject parcel, we conservatively estimated the average annual recharge rate at 10% for the Moderate range and 12% for the High range. The theoretical estimated average annual groundwater recharge volume is calculated by applying the estimated average rainfall at the subject site to the areas delineated recharge potential zones. Table 8 above summarizes the resulting theoretical annual recharge volume for the project site at 3.84 acre-feet.

G. Water Use and Recharge Summary

Based on the estimated average annual precipitation of 37.55 inches at the subject parcel, the total estimated annual volume of precipitation on the subject property is 37.7 acre-feet, the total estimated proposed water use for the parcel is 0.91 acre-feet (2.4% of annual precipitation volume, 23.7% of estimated annual recharge), and the total estimated annual groundwater recharge amount is 3.84 acre-feet.

It should be noted that the parcel has a reservoir which collects runoff from a large portion of the parcel under a license from the State of California (Permit #16097, License #10029, dated July 5, 1972). The reservoir has a spillway. In the years the applicant has owned the parcel, the applicant has stated minimal reservoir water exiting the reservoir during storms. This would indicate a greater amount of infiltration and/or recharge is occurring above the conclusions stated herein.

The estimated total water use on this parcel of 0.91 acre-feet is less than the theoretical groundwater recharge volume of 3.84 acre-feet and therefore the Tier 1 Water Criterion is met.

III. TIER 2 ANALYSIS

As required by the WAA, projects within the All Other Areas must perform a well interference check to determine if any wells are located on adjoining parcels and are within 500 feet of the wells or springs on the property. Based on well information provided by Napa County, no wells are located within 500 feet of the subject parcel's well. See the Overall Site Plan in Appendix A for adjoining parcels and the approximate location on adjoining well.

IV. REPORT CONCLUSION

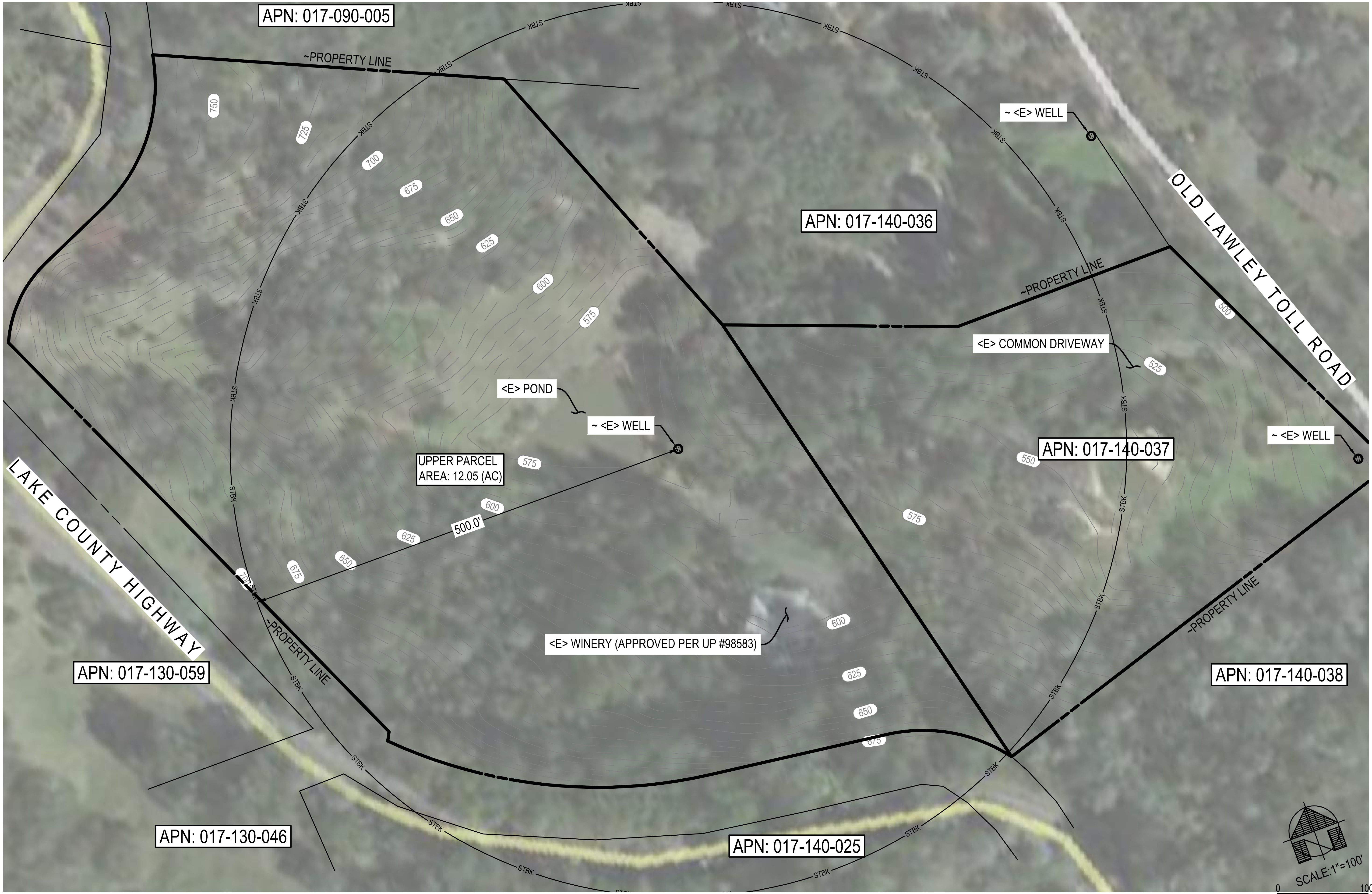
Based on the analysis completed in this report, the proposed use permit modification meets Tier 1 and Tier 2 requirements and the project is therefore in compliance with the requirements of the WAA.

V. APPENDIX

A. Overall Site Plan and Well Map
B. Slope Analysis and Soil Type Map
C. US Department of Agriculture Site Specific Soil Survey

APPENDIX A

Overall Site Plan and Well Map



OVERALL SITE PLAN

IMAGERY FROM GOOGLE EARTH PRO: DATED 02, 2018

AMICI CELLARS WINERY
OVERALL SITE PLAN

CALISTOGA CA

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DATE:	02/13/2019
SCALE:	1"=100'
JOB #:	0-109
APN:	017-140-035

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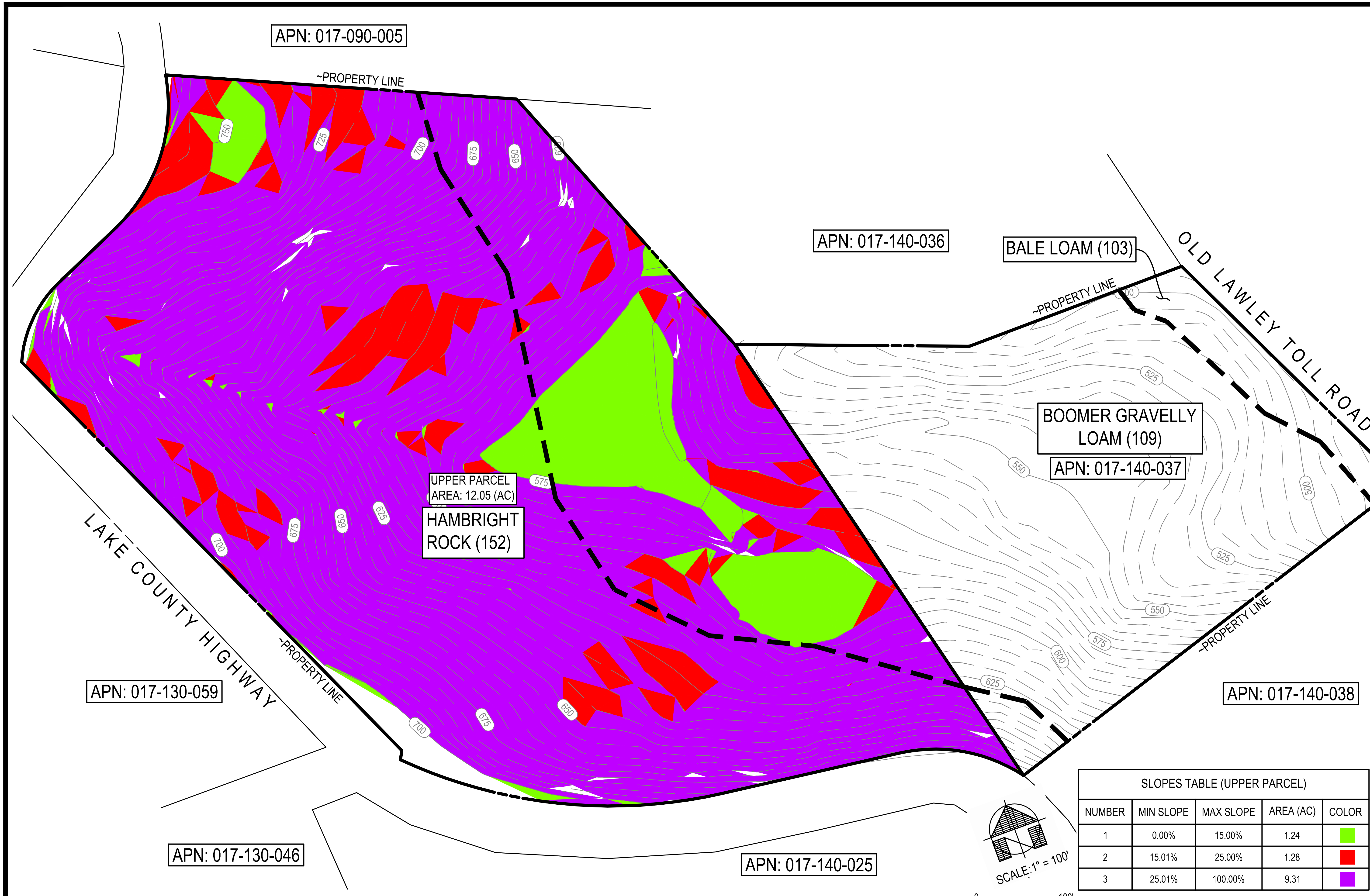
APPENDIX B

Slope Analysis and Soil Unit Map



SLOPES TABLE (UPPER PARCEL)				
NUMBER	MIN SLOPE	MAX SLOPE	AREA (AC)	COLOR
1	0.00%	15.00%	1.24	green
2	15.01%	25.00%	1.28	red
3	25.01%	100.00%	9.31	purple

SLOPE ANALYSIS & SOIL TYPE MAP

AMICI CELLARS WINERY
SLOPE ANALYSIS & SOIL TYPE MAP
CALISTOGA CA

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DATE: 02/13/2019
SCALE: 1"=100'
JOB #: 0-109
APN: 017-140-035

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OF ST. HELENA

APPENDIX C

Soil Survey

United States Department of Agriculture

NRCS

Natural Resources Conservation Service

A product of the National Cooperative Soil Survey, a joint effort of the United States Department of Agriculture and other Federal agencies, State agencies including the Agricultural Experiment Stations, and local participants

Custom Soil Resource Report for

Napa County, California

February 13, 2019

Preface

Soil surveys contain information that affects land use planning in survey areas. They highlight soil limitations that affect various land uses and provide information about the properties of the soils in the survey areas. Soil surveys are designed for many different users, including farmers, ranchers, foresters, agronomists, urban planners, community officials, engineers, developers, builders, and home buyers. Also, conservationists, teachers, students, and specialists in recreation, waste disposal, and pollution control can use the surveys to help them understand, protect, or enhance the environment.

Various land use regulations of Federal, State, and local governments may impose special restrictions on land use or land treatment. Soil surveys identify soil properties that are used in making various land use or land treatment decisions. The information is intended to help the land users identify and reduce the effects of soil limitations on various land uses. The landowner or user is responsible for identifying and complying with existing laws and regulations.

Although soil survey information can be used for general farm, local, and wider area planning, onsite investigation is needed to supplement this information in some cases. Examples include soil quality assessments (http://www.nrcs.usda.gov/wps/portal/nrcs/main/soils/health/) and certain conservation and engineering applications. For more detailed information, contact your local USDA Service Center (https://offices.sc.egov.usda.gov/locator/app?agency=nrcs) or your NRCS State Soil Scientist (http://www.nrcs.usda.gov/wps/portal/nrcs/detail/soils/contactus/?cid=nrcs142p2_053951).

Great differences in soil properties can occur within short distances. Some soils are seasonally wet or subject to flooding. Some are too unstable to be used as a foundation for buildings or roads. Clayey or wet soils are poorly suited to use as septic tank absorption fields. A high water table makes a soil poorly suited to basements or underground installations.

The National Cooperative Soil Survey is a joint effort of the United States Department of Agriculture and other Federal agencies, State agencies including the Agricultural Experiment Stations, and local agencies. The Natural Resources Conservation Service (NRCS) has leadership for the Federal part of the National Cooperative Soil Survey.

Information about soils is updated periodically. Updated information is available through the NRCS Web Soil Survey, the site for official soil survey information.

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How Soil Surveys Are Made

Soil surveys are made to provide information about the soils and miscellaneous areas in a specific area. They include a description of the soils and miscellaneous areas and their location on the landscape and tables that show soil properties and limitations affecting various uses. Soil scientists observed the steepness, length, and shape of the slopes; the general pattern of drainage; the kinds of crops and native plants; and the kinds of bedrock. They observed and described many soil profiles. A soil profile is the sequence of natural layers, or horizons, in a soil. The profile extends from the surface down into the unconsolidated material in which the soil formed or from the surface down to bedrock. The unconsolidated material is devoid of roots and other living organisms and has not been changed by other biological activity.

Currently, soils are mapped according to the boundaries of major land resource areas (MLRAs). MLRAs are geographically associated land resource units that share common characteristics related to physiography, geology, climate, water resources, soils, biological resources, and land uses (USDA, 2006). Soil survey areas typically consist of parts of one or more MLRA.

The soils and miscellaneous areas in a survey area occur in an orderly pattern that is related to the geology, landforms, relief, climate, and natural vegetation of the area. Each kind of soil and miscellaneous area is associated with a particular kind of landform or with a segment of the landform. By observing the soils and miscellaneous areas in the survey area and relating their position to specific segments of the landform, a soil scientist develops a concept, or model, of how they were formed. Thus, during mapping, this model enables the soil scientist to predict with a considerable degree of accuracy the kind of soil or miscellaneous area at a specific location on the landscape.

Commonly, individual soils on the landscape merge into one another as their characteristics gradually change. To construct an accurate soil map, however, soil scientists must determine the boundaries between the soils. They can observe only a limited number of soil profiles. Nevertheless, these observations, supplemented by an understanding of the soil-vegetation-landscape relationship, are sufficient to verify predictions of the kinds of soil in an area and to determine the boundaries.

Soil scientists recorded the characteristics of the soil profiles that they studied. They noted soil color, texture, size and shape of soil aggregates, kind and amount of rock fragments, distribution of plant roots, reaction, and other features that enable them to identify soils. After describing the soils in the survey area and determining their properties, the soil scientists assigned the soils to taxonomic classes (units). Taxonomic classes are concepts. Each taxonomic class has a set of soil characteristics with precisely defined limits. The classes are used as a basis for comparison to classify soils systematically. Soil taxonomy, the system of taxonomic classification used in the United States, is based mainly on the kind and character of soil properties and the arrangement of horizons within the profile. After the soil scientists classified and named the soils in the survey area, they compared the individual soils with similar soils in the same taxonomic class in other areas so that they could confirm data and assemble additional data based on experience and research.

The objective of soil mapping is not to delineate pure map unit components; the objective is to separate the landscape into landforms or landform segments that have similar use and management requirements. Each map unit is defined by a unique combination of soil components and/or miscellaneous areas in predictable proportions. Some components may be highly contrasting to the other components of the map unit. The presence of minor components in a map unit in no way diminishes the usefulness or accuracy of the data. The delineation of such landforms and landform segments on the map provides sufficient information for the development of resource plans. If intensive use of small areas is planned, onsite investigation is needed to define and locate the soils and miscellaneous areas.

Soil scientists make many field observations in the process of producing a soil map. The frequency of observation is dependent upon several factors, including scale of mapping, intensity of mapping, design of map units, complexity of the landscape, and experience of the soil scientist. Observations are made to test and refine the soil-landscape model and predictions and to verify the classification of the soils at specific locations. Once the soil-landscape model is refined, a significantly smaller number of measurements of individual soil properties are made and recorded. These measurements may include field measurements, such as those for color, depth to bedrock, and texture, and laboratory measurements, such as those for content of sand, silt, clay, salt, and other components. Properties of each soil typically vary from one point to another across the landscape.

Observations for map unit components are aggregated to develop ranges of characteristics for the components. The aggregated values are presented. Direct measurements do not exist for every property presented for every map unit component. Values for some properties are estimated from combinations of other properties.

While a soil survey is in progress, samples of some of the soils in the area generally are collected for laboratory analyses and for engineering tests. Soil scientists interpret the data from these analyses and tests as well as the field-observed characteristics and the soil properties to determine the expected behavior of the soils under different uses. Interpretations for all of the soils are field tested through observation of the soils in different uses and under different levels of management. Some interpretations are modified to fit local conditions, and some new interpretations are developed to meet local needs. Data are assembled from other sources, such as research information, production records, and field experience of specialists. For example, data on crop yields under defined levels of management are assembled from farm records and from field or plot experiments on the same kinds of soil.

Predictions about soil behavior are based not only on soil properties but also on such variables as climate and biological activity. Soil conditions are predictable over long periods of time, but they are not predictable from year to year. For example, soil scientists can predict with a fairly high degree of accuracy that a given soil will have a high water table within certain depths in most years, but they cannot predict that a high water table will always be at a specific level in the soil on a specific date.

After soil scientists located and identified the significant natural bodies of soil in the survey area, they drew the boundaries of these bodies on aerial photographs and identified each as a specific map unit. Aerial photographs show trees, buildings, fields, roads, and rivers, all of which help in locating boundaries accurately.

Soil Map

The soil map section includes the soil map for the defined area of interest, a list of soil map units on the map and extent of each map unit, and cartographic symbols displayed on the map. Also presented are various metadata about data used to produce the map, and a description of each soil map unit.

Soil Map

Map Scale: 1:2,030 if printed on A portrait (8.5" x 11") sheet.

Meters: 0, 30, 60, 120, 180

Feet: 0, 50, 100, 200, 300

N

Map projection: Web Mercator Corner coordinates: WGS84 Edge tics: UTM Zone 10N WGS84

MAP LEGEND

Area of Interest (AOI)

Area of Interest (AOI)

Soils

Soil Map Unit Polygons

Soil Map Unit Lines

Soil Map Unit Points

Special Point Features

Blowout

Borrow Pit

Clay Spot

Closed Depression

Gravel Pit

Gravelly Spot

Landfill

Lava Flow

Marsh or swamp

Mine or Quarry

Miscellaneous Water

Perennial Water

Rock Outcrop

Saline Spot

Sandy Spot

Severely Eroded Spot

Sinkhole

Slide or Slip

Sodic Spot

Spoil Area

Stony Spot

Very Stony Spot

Wet Spot

Other

Special Line Features

Water Features

Streams and Canals

Transportation

Rails

Interstate Highways

US Routes

Major Roads

Local Roads

Background

Aerial Photography

MAP INFORMATION

The soil surveys that comprise your AOI were mapped at 1:24,000.

Warning: Soil Map may not be valid at this 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.

Please rely on the bar scale on each map sheet for map measurements.

Source of Map: Natural Resources Conservation Service
Web Soil Survey URL:
Coordinate System: Web Mercator (EPSG:3857)

Maps from the Web Soil Survey are based on the Web Mercator projection, which preserves direction and shape but distorts distance and area. A projection that preserves area, such as the Albers equal-area conic projection, should be used if more accurate calculations of distance or area are required.

This product is generated from the USDA-NRCS certified data as of the version date(s) listed below.

Soil Survey Area: Napa County, California
Survey Area Data: Version 11, Sep 12, 2018

Soil map units are labeled (as space allows) for map scales 1:50,000 or larger.

Date(s) aerial images were photographed: Dec 31, 2009—Oct 31, 2017

The orthophoto or other base map on which the soil lines were compiled and digitized probably differs from the background imagery displayed on these maps. As a result, some minor shifting of map unit boundaries may be evident.

Map Unit Legend

Map Unit Symbol	Map Unit Name	Acres in AOI	Percent of AOI
109	Boomer gravelly loam, volcanic bedrock, 14 to 60 percent slopes, MLRA 15	2.8	22.6%
152	Hambright rock-Outcrop complex, 30 to 75 percent slopes	9.5	77.4%
Totals for Area of Interest		**12.2**	**100.0%**

Map Unit Descriptions

The map units delineated on the detailed soil maps in a soil survey represent the soils or miscellaneous areas in the survey area. The map unit descriptions, along with the maps, can be used to determine the composition and properties of a unit.

A map unit delineation on a soil map represents an area dominated by one or more major kinds of soil or miscellaneous areas. A map unit is identified and named according to the taxonomic classification of the dominant soils. Within a taxonomic class there are precisely defined limits for the properties of the soils. On the landscape, however, the soils are natural phenomena, and they have the characteristic variability of all natural phenomena. Thus, the range of some observed properties may extend beyond the limits defined for a taxonomic class. Areas of soils of a single taxonomic class rarely, if ever, can be mapped without including areas of other taxonomic classes. Consequently, every map unit is made up of the soils or miscellaneous areas for which it is named and some minor components that belong to taxonomic classes other than those of the major soils.

Most minor soils have properties similar to those of the dominant soil or soils in the map unit, and thus they do not affect use and management. These are called noncontrasting, or similar, components. They may or may not be mentioned in a particular map unit description. Other minor components, however, have properties and behavioral characteristics divergent enough to affect use or to require different management. These are called contrasting, or dissimilar, components. They generally are in small areas and could not be mapped separately because of the scale used. Some small areas of strongly contrasting soils or miscellaneous areas are identified by a special symbol on the maps. If included in the database for a given area, the contrasting minor components are identified in the map unit descriptions along with some characteristics of each. A few areas of minor components may not have been observed, and consequently they are not mentioned in the descriptions, especially where the pattern was so complex that it was impractical to make enough observations to identify all the soils and miscellaneous areas on the landscape.

The presence of minor components in a map unit in no way diminishes the usefulness or accuracy of the data. The objective of mapping is not to delineate pure taxonomic classes but rather to separate the landscape into landforms or landform segments that have similar use and management requirements. The delineation of such segments on the map provides sufficient information for the development of resource plans. If intensive use of small areas is planned, however, onsite investigation is needed to define and locate the soils and miscellaneous areas.

An identifying symbol precedes the map unit name in the map unit descriptions. Each description includes general facts about the unit and gives important soil properties and qualities.

Soils that have profiles that are almost alike make up a *soil series*. Except for differences in texture of the surface layer, all the soils of a series have major horizons that are similar in composition, thickness, and arrangement.

Soils of one series can differ in texture of the surface layer, slope, stoniness, salinity, degree of erosion, and other characteristics that affect their use. On the basis of such differences, a soil series is divided into *soil phases*. Most of the areas shown on the detailed soil maps are phases of soil series. The name of a soil phase commonly indicates a feature that affects use or management. For example, Alpha silt loam, 0 to 2 percent slopes, is a phase of the Alpha series.

Some map units are made up of two or more major soils or miscellaneous areas. These map units are complexes, associations, or undifferentiated groups.

A *complex* consists of two or more soils or miscellaneous areas in such an intricate pattern or in such small areas that they cannot be shown separately on the maps. The pattern and proportion of the soils or miscellaneous areas are somewhat similar in all areas. Alpha-Beta complex, 0 to 6 percent slopes, is an example.

An *association* is made up of two or more geographically associated soils or miscellaneous areas that are shown as one unit on the maps. Because of present or anticipated uses of the map units in the survey area, it was not considered practical or necessary to map the soils or miscellaneous areas separately. The pattern and relative proportion of the soils or miscellaneous areas are somewhat similar. Alpha-Beta association, 0 to 2 percent slopes, is an example.

An *undifferentiated group* is made up of two or more soils or miscellaneous areas that could be mapped individually but are mapped as one unit because similar interpretations can be made for use and management. The pattern and proportion of the soils or miscellaneous areas in a mapped area are not uniform. An area can be made up of only one of the major soils or miscellaneous areas, or it can be made up of all of them. Alpha and Beta soils, 0 to 2 percent slopes, is an example.

Some surveys include *miscellaneous areas*. Such areas have little or no soil material and support little or no vegetation. Rock outcrop is an example.

Napa County, California

109—Boomer gravelly loam, volcanic bedrock, 14 to 60 percent slopes, MLRA 15

Map Unit Setting

National map unit symbol: 2w8d3
Elevation: 370 to 2,300 feet
Mean annual precipitation: 34 to 52 inches
Mean annual air temperature: 57 to 61 degrees F
Frost-free period: 262 to 330 days
Farmland classification: Not prime farmland

Map Unit Composition

Boomer and similar soils: 85 percent
Minor components: 15 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Boomer

Setting

Landform: Hillslopes
Landform position (two-dimensional): Backslope
Landform position (three-dimensional): Side slope
Down-slope shape: Convex
Across-slope shape: Convex
Parent material: Colluvium derived from volcanic rock

Typical profile

Oi - 0 to 2 inches: slightly decomposed plant material
A - 2 to 6 inches: gravelly loam
BAt - 6 to 13 inches: gravelly loam
Bt1 - 13 to 24 inches: gravelly clay loam
Bt2 - 24 to 36 inches: gravelly clay loam
Bt3 - 36 to 46 inches: gravelly clay loam
Cr - 46 to 58 inches: cemented bedrock

Properties and qualities

Slope: 14 to 60 percent
Depth to restrictive feature: 40 to 60 inches to paralithic bedrock
Natural drainage class: Well drained
Runoff class: High
Capacity of the most limiting layer to transmit water (Ksat): Moderately low (0.01 to 0.14 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Salinity, maximum in profile: Nonsaline (0.2 to 0.5 mmhos/cm)
Sodium adsorption ratio, maximum in profile: 0.2
Available water storage in profile: Moderate (about 6.6 inches)

Interpretive groups

Land capability classification (irrigated): 6e
Land capability classification (nonirrigated): 6e
Hydrologic Soil Group: C

Hydric soil rating: No

Minor Components

Aiken

Percent of map unit: 5 percent

Forward

Percent of map unit: 5 percent

Kidd

Percent of map unit: 5 percent

152—Hambright rock-Outcrop complex, 30 to 75 percent slopes

Map Unit Setting

National map unit symbol: hdlp
Elevation: 200 to 3,000 feet
Mean annual precipitation: 23 to 35 inches
Mean annual air temperature: 59 to 63 degrees F
Frost-free period: 220 to 260 days
Farmland classification: Not prime farmland

Map Unit Composition

Hambright and similar soils: 50 percent
Rock outcrop: 40 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Hambright

Setting

Landform: Hills
Landform position (two-dimensional): Backslope
Landform position (three-dimensional): Side slope
Down-slope shape: Convex
Across-slope shape: Convex
Parent material: Residuum weathered from basic volcanic rock

Typical profile

H1 - 0 to 12 inches: very stony loam
H2 - 12 to 22 inches: unweathered bedrock

Properties and qualities

Slope: 30 to 75 percent
Depth to restrictive feature: 10 to 20 inches to lithic bedrock
Natural drainage class: Well drained
Runoff class: High
Capacity of the most limiting layer to transmit water (Ksat): Low to high (0.01 to 1.98 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None

Salinity, maximum in profile: Nonsaline to very slightly saline (0.0 to 2.0 mmhos/cm)
Available water storage in profile: Very low (about 1.1 inches)

Interpretive groups

Land capability classification (irrigated): 7e
Land capability classification (nonirrigated): 7e
Hydrologic Soil Group: D
Ecological site: VERY SHALLOW ROCKY (R015XD127CA)
Hydric soil rating: No

Description of Rock Outcrop

Setting

Landform: Hills
Landform position (two-dimensional): Shoulder
Landform position (three-dimensional): Free face
Down-slope shape: Concave
Across-slope shape: Concave
Parent material: Residuum weathered from igneous, metamorphic and sedimentary rock

Properties and qualities

Slope: 30 to 75 percent
Depth to restrictive feature: About 0 inches to lithic bedrock
Runoff class: Very high
Capacity of the most limiting layer to transmit water (Ksat): Very low (0.00 in/hr)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 8
Hydric soil rating: No

Soil Information for All Uses

Soil Properties and Qualities

The Soil Properties and Qualities section includes various soil properties and qualities displayed as thematic maps with a summary table for the soil map units in the selected area of interest. A single value or rating for each map unit is generated by aggregating the interpretive ratings of individual map unit components. This aggregation process is defined for each property or quality.

Soil Physical Properties

Soil Physical Properties are measured or inferred from direct observations in the field or laboratory. Examples of soil physical properties include percent clay, organic matter, saturated hydraulic conductivity, available water capacity, and bulk density.

Saturated Hydraulic Conductivity (Ksat), Standard Classes

Saturated hydraulic conductivity (Ksat) refers to the ease with which pores in a saturated soil transmit water. The estimates are expressed in terms of micrometers per second. They are based on soil characteristics observed in the field, particularly structure, porosity, and texture. Saturated hydraulic conductivity is considered in the design of soil drainage systems and septic tank absorption fields.

For each soil layer, this attribute is actually recorded as three separate values in the database. A low value and a high value indicate the range of this attribute for the soil component. A "representative" value indicates the expected value of this attribute for the component. For this soil property, only the representative value is used.

The numeric Ksat values have been grouped according to standard Ksat class limits. The classes are:

Very low: 0.00 to 0.01

Low: 0.01 to 0.1

Moderately low: 0.1 to 1.0

Moderately high: 1 to 10

High: 10 to 100

Very high: 100 to 705

Map—Saturated Hydraulic Conductivity (Ksat), Standard Classes

MAP LEGEND

Area of Interest (AOI)

- Area of Interest (AOI)

Soils

Soil Rating Polygons

- Very Low (0.0 - 0.01)
- Low (0.01 - 0.1)
- Moderately Low (0.1 - 1)
- Moderately High (1 - 10)
- High (10 - 100)
- Very High (100 - 705)
- Not rated or not available

Soil Rating Lines

- Very Low (0.0 - 0.01)
- Low (0.01 - 0.1)
- Moderately Low (0.1 - 1)
- Moderately High (1 - 10)
- High (10 - 100)
- Very High (100 - 705)
- Not rated or not available

Soil Rating Points

- Very Low (0.0 - 0.01)
- Low (0.01 - 0.1)
- Moderately Low (0.1 - 1)
- Moderately High (1 - 10)
- High (10 - 100)
- Very High (100 - 705)
- Not rated or not available

Water Features

- Streams and Canals

Transportation

- Rails
- Interstate Highways
- US Routes
- Major Roads
- Local Roads

Background

- Aerial Photography

MAP INFORMATION

The soil surveys that comprise your AOI were mapped at 1:24,000.

Warning: Soil Map may not be valid at this 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.

Please rely on the bar scale on each map sheet for map measurements.

Source of Map: Natural Resources Conservation Service
Web Soil Survey URL:
Coordinate System: Web Mercator (EPSG:3857)

Maps from the Web Soil Survey are based on the Web Mercator projection, which preserves direction and shape but distorts distance and area. A projection that preserves area, such as the Albers equal-area conic projection, should be used if more accurate calculations of distance or area are required.

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Survey Area Data: Version 11, Sep 12, 2018

Soil map units are labeled (as space allows) for map scales 1:50,000 or larger.

Date(s) aerial images were photographed: Dec 31, 2009—Oct 31, 2017

The orthophoto or other base map on which the soil lines were compiled and digitized probably differs from the background imagery displayed on these maps. As a result, some minor shifting of map unit boundaries may be evident.

Table—Saturated Hydraulic Conductivity (Ksat), Standard Classes

Map unit symbol	Map unit name	Rating (micrometers per second)	Acres in AOI	Percent of AOI
109	Boomer gravelly loam, volcanic bedrock, 14 to 60 percent slopes, MLRA 15	6.4868	2.8	22.6%
152	Hambright rock-Outcrop complex, 30 to 75 percent slopes	20.4040	9.5	77.4%
Totals for Area of Interest			**12.2**	**100.0%**

Rating Options—Saturated Hydraulic Conductivity (Ksat), Standard Classes

Units of Measure: micrometers per second

Aggregation Method: Weighted Average

Component Percent Cutoff: None Specified

Tie-break Rule: Fastest

Interpret Nulls as Zero: No

Layer Options (Horizon Aggregation Method): All Layers (Weighted Average)

Ecological Site Assessment

Individual soil map unit components can be correlated to a particular ecological site. The Ecological Site Assessment section includes ecological site descriptions, plant growth curves, state and transition models, and selected National Plants database information.

All Ecological Sites — Rangeland

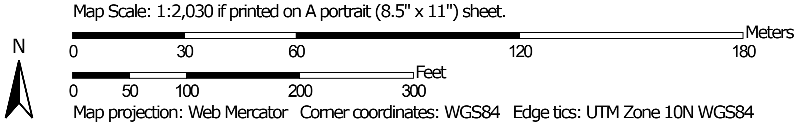
An "ecological site" is the product of all the environmental factors responsible for its development. It has characteristic soils that have developed over time; a characteristic hydrology, particularly infiltration and runoff, that has developed over time; and a characteristic plant community (kind and amount of vegetation). The vegetation, soils, and hydrology are all interrelated. Each is influenced by the others and influences the development of the others. For example, the hydrology of the site is influenced by development of the soil and plant community. The plant community on an ecological site is typified by an association of species that differs from that of other ecological sites in the kind and/or proportion of species or in total production.

An ecological site name provides a general description of a particular ecological site. For example, "Loamy Upland" is the name of a rangeland ecological site. An "ecological site ID" is the symbol assigned to a particular ecological site.

The map identifies the dominant ecological site for each map unit, aggregated by dominant condition. Other ecological sites may occur within each map unit. Each map unit typically consists of one or more components (soils and/or miscellaneous areas). Each soil component is associated with an ecological site. Miscellaneous areas, such as rock outcrop, sand dunes, and badlands, have little or no soil material and support little or no vegetation and therefore are not linked to an ecological site. The table below the map lists all of the ecological sites for each map unit component in your area of interest.

Map—Dominant Ecological Site

Map Scale: 1:2,030 if printed on A portrait (8.5" x 11") sheet.



Map projection: Web Mercator Corner coordinates: WGS84 Edge tics: UTM Zone 10N WGS84

MAP LEGEND

Area of Interest (AOI)

Area of Interest (AOI)

Soils

Soil Rating Polygons

R015XD127CA

Not rated or not available

Soil Rating Lines

R015XD127CA

Not rated or not available

Soil Rating Points

R015XD127CA

Not rated or not available

Water Features

Streams and Canals

Transportation

Rails

Interstate Highways

US Routes

Major Roads

Local Roads

Background

Aerial Photography

MAP INFORMATION

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Source of Map: Natural Resources Conservation Service
Web Soil Survey URL:
Coordinate System: Web Mercator (EPSG:3857)

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Soil map units are labeled (as space allows) for map scales 1:50,000 or larger.

Date(s) aerial images were photographed: Dec 31, 2009—Oct 31, 2017

The orthophoto or other base map on which the soil lines were compiled and digitized probably differs from the background imagery displayed on these maps. As a result, some minor shifting of map unit boundaries may be evident.

Table—Ecological Sites by Map Unit Component

Map unit symbol	Map unit name	Component name (percent)	Ecological site	Acres in AOI	Percent of AOI
109	Boomer gravelly loam, volcanic bedrock, 14 to 60 percent slopes, MLRA 15	Boomer (85%)		2.8	22.6%
		Aiken (5%)			
		Forward (5%)			
		Kidd (5%)			
152	Hambright rock-Outcrop complex, 30 to 75 percent slopes	Hambright (50%)	R015XD127CA — VERY SHALLOW ROCKY	9.5	77.4%
		Rock outcrop (40%)			
Totals for Area of Interest				**12.2**	**100.0%**

References

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