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Water Availability Analysis & Technical, Managerial & Financial Capacity Worksheet

Aloft Winery P16-00429-UP
Planning Commission Hearing Date September 5, 2018

September 2016
Revised May 2017
Job No. 14-26

BARTELT ENGINEERING

WATER AVAILABILITY ANALYSIS FOR ALOFT WINERY 430 COLD SPRINGS ROAD, NAPA COUNTY, CA APN 024-340-010

As required by Napa County Planning, Building & Environmental Services (PBES), this analysis outlines the availability of groundwater for a potential winery and tasting room located on the subject parcel at 430 Cold Springs Road, Angwin, CA 94508.

PROJECT DESCRIPTION

The project proposes the installation of a new access road through APN 024-340-011 and APN 024-340-010 to provide access to a proposed tasting room, commercial kitchen, full crush winery and wine caves on a 50.07± acre parcel (APN 024-340-010) with the intent of the facility having the capability of producing 50,000 gallons of wine per year. APN 024-340-010 is currently developed with 23.2± acres of vineyard, access roads and three (3) stormwater infiltration detention basins. Vineyard area is estimated to reduce to 20.9± acres as a result of the proposed improvements. Refer to the attached Use Permit drawings for the existing and proposed development for both parcels.

Along with the proposed wine production at the site, the project proposes a moderate staffing and marketing plan which includes six (6) full-time employees, two (2) part-time employees and two (2) seasonal (harvest) employees. The project also proposes to offer private tour and tasting appointments for a maximum number of twenty (20) guests per day. Furthermore, the Applicant plans to offer two (2) food and wine pairing lunch or dinner events per month for parties up to 40 persons. Additionally, the Applicant intends to host four (4) wine club event per year for groups of up to 75 persons, with up to five (5) additional event staff. Two (2) 125 person large event with 10 additional event staff per year is also being proposed at the winery.

EXHIBITS

The associated USGS "Topographic Site Location Map" shows the project site and approximate property line locations. Information regarding the location of existing wells and structures are shown on the associated Use Permit Drawings and attached "Geological Site & Neighboring Well Location Map". All exhibits and drawings mentioned above were prepared by Bartelt Engineering.

WATER USE CRITERIA

TABLE 1: SCREENING CRITERIA	
Parcel Zoning	Agricultural Watershed (AW)
Project Parcel Location	All Other Areas
Parcel Size	50.07± acres
Water Use Criteria	Parcel Specific
Well and Spring Interference	No
Groundwater/Surface Water Interaction	No
Screening Tier	Tier 1

As summarized in Table 1, the subject parcel is located in the Agricultural Watershed (AW) Zoning District. Per the PBES Water Availability Analysis (WAA)-Guidance Document dated May 12, 2015 the water use criteria for a parcel located in the Napa Valley Floor and/or All Other Areas that are not designated as a groundwater deficient area without any well or spring interference must follow Tier 1 requirements. The water use criteria for the area of the project zoned AW is parcel specific and must be considered in relation to the average annual recharge available to the project property.

WATER DEMAND

Estimated Water Use

The total water demand for the existing and proposed uses for the project is calculated below based on the *Guidelines for Estimating Residential and Non-residential Water Use* from the WAA Guidance Document (2015):

TABLE 2A: EXISTING WATER DEMAND	
Description	**Estimated Water Usage (acre-feet/year)**
Winery (0 gallons per year)	
Process Water	0.0
Domestic and Landscaping Water	0.0
Vineyard (23.2± acres)[1]	
Irrigation	7.75
Heat and Frost Protection	0
Total Existing Water Demand =	7.75

[1] Vineyard irrigation water usage is based on irrigation data provided by Barbour Vineyard Management for Cold Springs Vineyards from the 2011-2015 seasons.

TABLE 2B: PROPOSED WATER DEMAND	
Description	**Estimated Water Usage (acre-feet/year)**
Winery (50,000 gallons per year)	
Process Water	1.08
Domestic and Landscaping Water	0.25
Vineyard (20.9± acres)[2]	
Irrigation	7.02
Heat and Frost Protection	0
Total Proposed Water Demand =	8.34

As shown in Table 2A and Table 2B, the water demand is estimated to increase from 7.75 to 8.34 acre feet per year as part of the proposed improvements. Treated winery process wastewater (300,000 gallons/year or 0.92 acre-feet/year) is proposed to be beneficially reused as a source for vineyard irrigation. Reusing treated process wastewater for vineyard irrigation would reduce the proposed water demand to 7.42 acre-feet/year and be below the existing water demand of 7.75 acre-feet/year. Refer to the attached Table I and Table II for existing and proposed water demand calculations as well as the Onsite Wastewater Dispersal Feasibility Study prepared by Bartelt Engineering for further information regarding the proposed reuse of treated winery process wastewater for vineyard irrigation.

SOURCE WATER INFORMATION

The subject parcel currently sources water from the existing onsite "winery" well which is located northwest of the proposed winery facility and currently supplies irrigation water. The project proposes to use the existing "winery" well as the water source for the proposed project which must be capable of meeting the water demand shown in Table 2B.

Prior to use, domestic water is proposed to be stored in one (1) 20,000 gallon storage tank. Irrigation water is proposed to be stored in one designated (1) 80,000 gallon storage tank and fire protection water is also proposed to be stored in one designated (1) 100,000 gallon storage tank.

Well Description

Per the Well Completion Report, the "winery" well was constructed in 2005 by McClean & Williams. The well is reported to be constructed of 8 inch diameter PVC F480 casing to a completed depth of 670 feet with a 62 foot cement annular seal. Refer to the attached Well Completion Report for more information.

[2] Vineyard irrigation water usage is based on irrigation data provided by Barbour Vineyard Management for Cold Springs Vineyards from the 2011-2015 seasons.

Yield Test

A yield test was performed on the "winery" well by McClean & Williams during the time of drilling. Prior to the start of the yield test, static water level was recorded at 132 feet below surface. A sustained yield of 150 gallons per minute (gpm) was recorded after eight (8) hours of continuous pumping.

Water System Classification

Per PBES guidelines, the water system may be regulated as a transient non-community public water system (TNCWS). A TNCWS is identified as a water system that has less than five (5) connections, serves less than 25 yearlong residents and serves 25 people per day at least 60 days per year. Refer to the Technical, Managerial and Financial (TMF) Capacity Worksheet included with the Use Permit Application for further information.

Neighboring Water Source(s)

Based on review of neighboring property records at Napa County PBES and discussions with PBES staff, there does not appear to be any neighboring wells located within 500 feet of the proposed project well. Refer to the associated Use Permit Drawings prepared by Bartelt Engineering for location of the existing onsite wells, neighboring wells and nearby creeks.

Water Quality

Water quality results were not available for the "winery" well (project well) prior to completion of this WAA.

GROUNDWATER OVERVIEW

According to the Napa County Watershed Information & Conservation Council (WICC), the subject parcel is located in the Western Mountains Groundwater Subarea of Napa County.

The Western Mountains Subarea includes some volcanic rocks with additional exposures of the sedimentary Great Valley Sequence and metamorphic Franciscan Complex. The Napa County Groundwater Monitoring Program tested wells in this area in 2014 and 2015. The observed groundwater depth in these wells ranged from 44 feet to 240 feet from ground surface. Ground elevations range from 390 feet to 1,660 feet, mean sea level. The groundwater quality available in this subarea is reported to be generally of good quality. Elevated levels of iron and manganese occur, along with lower than average pH indicating more acidity than groundwater in the Napa Valley Floor.

GEOLOGICAL FEATURES

The attached "Geological Site & Well Location Map" prepared by Bartelt Engineering shows the parcel boundaries, approximate well locations and surrounding geologic materials. The background for the exhibit is sourced from the "Geological Map of Napa County" from the USGS Investigations Map 2918. The project area appears to be completely underlain with Sonoma Volcanics (map unit Tpmr)

Per the Napa County Baseline Data Report (2005), Sonoma Volcanics consist of dacite, rhyolite and andesite rock types. These rocks are commonly exposed over much of Napa Valley. In terms of groundwater resources, tuffaceous units within the Sonoma Volcanics host significant volumes of groundwater under both confined and unconfined conditions.

ALL OTHER AREAS ESTIMATED GROUNDWATER RECHARGE

The allowable water allotment for the subject parcel is determined by estimating groundwater recharge. Groundwater recharge can be estimated by understanding the soil properties and geological materials present and their ability to percolate groundwater to the saturated zone of the aquifer. Water flowing into the ground consists primarily of recharge from precipitation, surface water seepage and artificial recharge. Water flowing out of the ground primary involves extraction from wells, spring discharge and evapotranspiration. In Napa County, precipitation has been primarily established as the primary source of groundwater (Kunkel and Upson, 1960). Since the subject parcel is partially located in the Western Mountains Groundwater Subarea with no surrounding creeks located in the proximity of the project area, direct infiltration from rainfall is likely to be the most significant factor for groundwater recharge. Without having site recorded data showing the change in groundwater, this analysis models groundwater recharge as a percent of rainfall. The amount of rainfall that is estimated to recharge groundwater is impacted by a number of factors. Some of these factors include precipitation, soil properties and underlain geological materials.

Precipitation

Precipitation, or rainfall, data used in this analysis is taken from two (2) sources: the PRISM Climate Group at Oregon State University and the National Climate Data Center (NCDC). The PRISM Climate Group provides spatial climate datasets for selected 800 meter or 400 kilometer (km) resolution grid cells. The average annual recorded rainfall data from 1981-2010 (30-year normals) for the project location selected from two (2) 800 meter resolution grid cell is 41.6 inches. The NCDC rainfall data collected rainfall from a cooperative weather station in Angwin from 1961-1990. The average recorded rainfall over this time period was 40.8 inches.

Average rainfall data from PRISM recorded over the past ten (10) years provides more recent rainfall data and shows variation between dry and wet years. The 10-year average (2005 to 2014) from a 400 km resolution grid cell that encompasses the project location is shown in the table below.

Table 3: 10-yr Average Rainfall	
Month	**PRISM Rainfall (inches)**
2014	41.6
2013	8.0
2012	49.4
2011	36.4
2010	53.5
2009	31.1
2008	29.2
2007	21.6
2006	42.8
2005	52.9
2004	37.9
AVERAGE	**36.8**

Based on the rainfall data shown in the above table, it appears rainfall outside of the normal trend occurred in 2013 as a drought year and in 2005 as a very wet year. A typical dry year occurred in 2007 with 21.6 inches of recorded rainfall and a typical wet year occurred in 2012 with 49.4 inches of recorded rainfall.

This analysis uses the most conservative average rainfall data, which in this case is the 10-yr average rainfall rate of 36.8 inches, to estimate groundwater recharge. Refer to the attached Rainfall Data (Table III) for a summary of rainfall data from all sources.

Hydrologic Soil Groups

Per the USDA, hydrologic soil groups (HSG) are based on estimated potential for runoff. Soils are assigned four (4) groups (A, B, C and D) depending on the ability of water to infiltrate the soil. Group A soils have a high infiltration rate (low runoff potential) and group D has very slow infiltrative rates (high runoff potential). The infiltration rate is also affected by site slopes; higher slopes limit the time water is available for infiltration.

A custom soils report was generated by the NRCS Web Soil survey for the subject parcel. The survey shows that several soil types and land slopes are present. The soil types reported to be present on the subject parcel all have a HSG "B" rating with "moderate" infiltrative properties and an estimated infiltrative rate of 0.23 inches per hour. Refer to the attached Soil Map and Hydraulic Soil Group Map for more information regarding soil properties.

Average Year Groundwater Recharge Rate

Based on review of several groundwater publications and WAA prepared for similar type projects, a percent of precipitation is assumed to be available for groundwater recharge. These publications include studies for City of Santa Rosa watersheds as well as Environmental Impact Reports (EIR) for large scale projects. Below is a summary of these references and comparison to the geological materials and HSGs present on the subject parcel:

- The "Groundwater Study" for the 2009 Napa Pipe Project EIR prepared by others, estimates 10.5% of precipitation is available for groundwater recharge in Sonoma Volcanics.
- The "Santa Rosa Plan Watershed Groundwater Management Plan 2014" prepared by the Santa Rosa Plan Basin Advisor Panel includes a specified yield of 0-15% for Sonoma Volcanics. Specified yield refers to the amount of water contained in the saturated zone that flows by gravity and is available to wells (Johnson 1967).
- WAA prepared for the Wools Ranch Winery by Luhdhorff & Scalmanini (L&S) dated 2014 includes a 10% recharge rate for a parcel with primarily slow and some moderate infiltrative soil properties.

Based on the methodology utilized in these studies, a conservative groundwater recharge could be 10% of annual precipitation. A conservative estimate for the project site recharge area is assumed to be equal to the area of the subject parcel (50.07± acres) that appears to be entirely underlain with Sonoma Volcanics. The volume of rainwater that is estimated to be available for groundwater recharge is calculated below:

Annual recharge (acre-ft/yr) = Recharge area (acres) x Precipitation (ft) x Recharge rate

= 50.07 acres x (36.8 in x 1 ft/12 in) x 10%

= 15.3 acre-ft/yr

The estimated annual recharge for the subject parcels is estimated to be 15.3 acre-feet per year.

Dry Year Recharge Rate(s)

When modeling groundwater recharge as a percentage of rainfall, dry rainfall years should also be evaluated. A drought year occurred in 2013 with only eight (8) inches of recorded precipitation near the project area according to the PRISM Database (see Table 3). This is a significantly low rainfall year and is not considered to represent historical rainfall patterns. A typical dry year appears to have occurred in 2007 with 21.6 inches of rainfall. Applying the recharge rate to the recharge area discussed above as a percentage of rainfall, the potential groundwater available during a typical dry year (2007) is 9.0 acre-feet.

SUMMARY

The groundwater demand generated as a result of the proposed development is estimated to increase from 7.75 acre-feet per year (see Table 2A) to 8.34 acre-feet per year (see Table 2B). The groundwater project well is proposed to be sourced from the existing onsite "winery" well. The "winery" well has a reported yield rate of 150 gpm which is more than capable of meeting the proposed water demand.

The available water for the subject parcel is the estimated groundwater recharge for the entire parcel area that is located in All Other Areas and underlain with Sonoma Volcanics. The available water for the subject parcels is estimated to be between 15.3 acre-feet per year during average rainfall years and 9.0 acre-feet per year during dry rainfall years. Both recharge scenarios are estimated to satisfy the project water demand.

CONCLUSION

The above analysis shows that the groundwater demand for the proposed project can feasibly be sourced by the existing project well. Furthermore, the estimated available water for the subject parcels satisfies the Tier 1 Water Use Criterion of the Napa County Water Availability Analysis.

ATTACHMENTS

Geological Site & Neighboring Well Location Map

Table I – Existing Water Demand

Table II – Proposed Water Demand

Table III – Rainfall

Table IV – Soil Group Properties

Table V – Water Availability

Well Completion Report

Soil Map and Hydraulic Soil Group Map

REFERENCES

Brownstein Hyatt Farber Schreck. 2011, August 25. Water Supply Assessment for the Napa Pipe Project Napa County, California.

DHI Water Environment. 2005 - Version 1, November 30. Napa County Baseline Data Report. Chapter 16. Groundwater Hydrology.

Johnson, A. 1967. Specific Yield - Completion of Specific Yields for Various Materials. California Department of Water Resources. Geological Survey Water Supply Paper 1662-D.

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Napa County. 2015, May 12. Water Availability (WAA) - Design, Construction and Guidance Document.

Napa County Watershed Information & Conservation Council (WICC). (n.d.). Retrieved from www.napawatershed.org

National Climate Data Center (NCDC). 1995. Retrieved from www.worldclimate.com

PRISM Climate Group, Oregon State University. 2014. Retrieved from http://prism.oregonstate.edu

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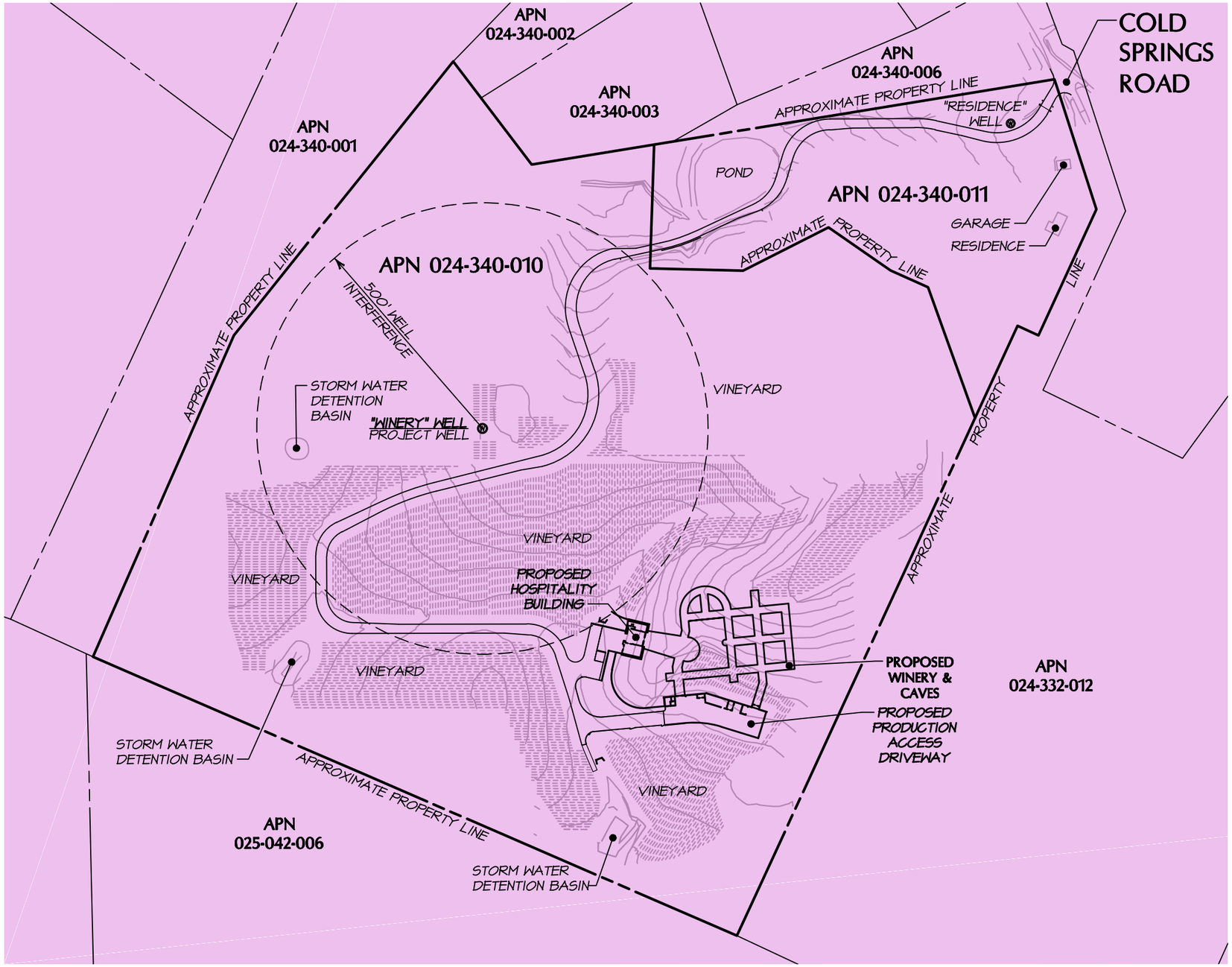
U.S. Geological Survey (USGS). 1960. Geology and Ground Water in the Napa and Sonoma Valleys, Napa and Sonoma Counties, California. US Geological Survey Water Supply Paper 1495.



SCALE: 1" = 250'

LEGEND:

SONOMA VOLCANICS
(MAP UNIT Tpmr)

NOTES:

1. THE GEOLOGICAL MAP DATA USED AS A BASE FOR THIS EXHIBIT WAS TAKEN FROM THE "GEOLOGICAL MAP OF NAPA COUNTY" USGS INVESTIGATIONS MAP 2918 AND DOWNLOADED FROM WWW.NAPAWATERSHEDS.ORG.

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GEOLOGICAL SITE & NEIGHBORING WELL LOCATION MAP

SCALE: 1" = 250'

Aloft Winery
430 Cold Springs Road
Angwin, CA 94508
APN 024-340-010
Job No. 14-26
May 2017
Sheet 1 of 1

May 2017
Job No. 14-26

Aloft Winery
Existing Water Demand
Table I

BARTELT ENGINEERING

Winery Production Limit: **0 gallons/year**
Vineyard Area: **23.2 acres**

EXISTING WATER DEMAND			
Description	**Water Usage Rate[1]**		**Water Demand (acre-feet/year)**
Residential			
Primary Residence	0.75	acre-feet/acre-year	-
Secondary Residence or Farm Labor Dwelling	0.5	acre-feet/acre-year	-
Agricultural			
Vineyards[2]			
Irrigation Only	0.34	acre-feet/acre-year	7.75
Heat Protection	0	acre-feet/acre-year	0
Frost Protection	0	acre-feet/acre-year	0
Irrigated Pastures	4	acre-feet/acre-year	-
Orchards	4	acre-feet/acre-year	-
Livestock (sheep or cows)	0.01	acre-feet/acre-year	-
Winery			
Process Water	2.15	acre-feet/100,000 gallon of wine	-
Domestic & Landscaping	0.5	acre-feet/100,000 gallon of wine	-
Industrial			
Food Processing	31	acre-feet/employee-year	-
Printing/Publishing	0.06	acre-feet/employee-year	
Commercial			-
Office Space	0.01	acre-feet/employee-year	-
Warehouse	0.05	acre-feet/employee-year	-

Estimated Existing Water Demand (acre-feet/year): 7.75
Estimated Existing Water Demand (gallons/year): 2,525,345

1) Water usage rates referenced from *Appendix B: Estimated Water Use of Specified Land Use* from Napa County WAA-Guidance Document (2015) unless noted otherwise
2) Vineyard irrigation water usage is based on irrigation data provided by Barbour Vineyard Management for the Cold Springs Vineyards from 2011-2015 seasons

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Aloft Winery
Proposed Water Demand
Table II

BARTELT ENGINEERING

Winery Production Limit: **50,000 gallons/year**
Vineyard Area: **20.9 acres**

PROPOSED WATER DEMAND			
Description	**Water Usage Rate[1]**		**Water Demand (acre-feet/year)**
Residential			
Primary Residence	0.75	acre-feet/acre-year	-
Secondary Residence or Farm Labor Dwelling	0.5	acre-feet/acre-year	-
Agricultural			
Vineyards[2]			
Irrigation Only	0.34	acre-feet/acre-year	7.02
Heat Protection	0	acre-feet/acre-year	-
Frost Protection	0	acre-feet/acre-year	-
Irrigated Pastures	4	acre-feet/acre-year	-
Orchards	4	acre-feet/acre-year	-
Livestock (sheep or cows)	0.01	acre-feet/acre-year	-
Winery			
Process Water	2.15	acre-feet/100,000 gallon of wine	1.08
Domestic & Landscaping	0.5	acre-feet/100,000 gallon of wine	0.25
Industrial			
Food Processing	31	acre-feet/employee-year	-
Printing/Publishing	0.06	acre-feet/employee-year	
Commercial			-
Office Space	0.01	acre-feet/employee-year	-
Warehouse	0.05	acre-feet/employee-year	-

Estimated Proposed Water Demand (acre-feet/year): 8.34
Estimated Proposed Water Demand (gallons/year): 2,718,653

1) Water usage rates referenced from *Appendix B: Estimated Water Use of Specified Land Use* from Napa County WAA-Guidance Document (2015)
2) Vineyard irrigation water usage is based on irrigation data provided by Barbour Vineyard Management for the Cold Springs Vineyards from 2011-2015 seasons

Aloft Winery
Rainfall
Table III

AVERAGE MONTHLY RAINFALL RATES		
Month	PRISM Rainfall[1] (inches)	NCDC Rainfall[2] (inches)
September	0.3	0.6
October	2.1	2.5
November	4.9	6.2
December	8.1	7.1
January	7.7	9.0
February	8.1	6.4
March	6.0	5.6
April	2.5	2.5
May	1.6	0.6
June	0.3	0.2
July	0.0	0.0
August	0.1	0.1
TOTALS	**41.6**	**40.8**

1) PRISM 30-year normall rainfall data from 1981-2010 averaged from two (2) 800 m^2 spatial grids that emcompass the total project area; see http://prism.oregonstate.edu/
2) Site rainfall from Angwin, CA (NCDC Cooperative Stations 1961-1990); see www.worldclimate.com

10-YR AVERAGE RAINFALL	
Year	PRISM Rainfall[1] (inches)
2014	41.6
2013	8.0
2012	49.4
2011	36.4
2010	53.5
2009	31.1
2008	29.2
2007	21.6
2006	42.8
2005	52.9
2004	37.9
AVERAGE	**36.8**

1) PRISM yearly rainfall data from 2007-2014 from one (1) 400 km spatial grids which emcompass the total project area; see http://prism.oregonstate.edu/

Aloft Winery
Soil Group Properties
Table IV

HYDROLOGIC SOIL GROUP									
Map Unit	Map Unit Name	Slope Range	Hydrologic Rating Group	Acres in AOI (acres)	Percent of AOI (%)	Infiltration Rate (in/hr)		Estimated Infiltration Rate (in/hr)	Weighted Infiltration Rate (in/hr)
138	Forward gravelly loam	2-9%	B	1.6	3.1%	Moderate	0.15-0.30	0.23	0.007
139	Forward gravelly loam	9-30%	B	19.6	39.1%	Moderate	0.15-0.30	0.23	0.090
140	Forward gravelly loam	30-75%	B	28.9	57.8%	Moderate	0.15-0.30	0.23	0.133
TOTALS				50.1	100%				0.23

1) Hydrologic Soil Groups (HSGs) are based on USDA/NRCS Web Soil Survey for the project Area of Interest (AOI)
2) Infiltration Rates for each HSG is referenced from the USDA Urban Hydrology for Small Watersheds, Technical Release 55, June 1986.

Aloft Winery
Water Availability
Table V

Total Parcel Size: **50.07 acres**

ALLOWABLE WATER ALLOTMENT - NAPA VALLEY FLOOR		
Applicable Parcel Size (acres)	**Water Use Criteria (acre-feet/acre-year)**	**Water Allotment (acre-feet/year)**
0	1.0	0

GROUNDWATER RECHARGE - ALL OTHER AREAS					
Scenario	**Rainfall[1] (inches)**	**(feet)**	**Sonoma Volcanics Recharge Area[2] (acres)**	**Sonoma Volcanics Recharge Rate (%)**	**Estimated Recharge (acre-ft/year)**
10-year Average	36.8	3.1	50.1	10%	15.3
Typical Wet Year (2012)	49.4	4.1	50.1	10%	20.6
Typical Dry Year (2007)	21.6	1.8	50.1	10%	9.0

1) Refer to Table I - Rainfall Data
2) Portion of All Other Areas that appears to be underlain with Sonoma Volcanics, refer to attached Geological Site Location Map for more information

TOTAL WATER AVAILABILITY				
Scenario	**Water Allotment (acre-feet/year)**	**Estimated Recharge (acre-ft/year)**	**Total Water Availability (acre-ft/year)**	**(gallons/year)**
10-year Average	0.00	15.3	15.3	4,998,186
Typical Wet Year (2012)	0.00	20.6	20.6	6,716,490
Typical Dry Year (2007)	0.00	9.0	9.0	2,934,045

DUPLICATE
Driller's Copy

Page ___ of ___
Owner's Well No. _____

STATE OF CALIFORNIA
WELL COMPLETION REPORT
Refer to Instruction Pamphlet
No. 0913057

Date Work Began 9/16/05, Ended 9/24/05
Local Permit Agency Napa
Permit No. E05-0779 Permit Date 9/12/05

DWR USE ONLY — DO NOT FILL IN
STATE WELL NO./STATION NO.
LATITUDE LONGITUDE
APN/TRS/OTHER

GEOLOGIC LOG

ORIENTATION (✓) X VERTICAL ___ HORIZONTAL ___ ANGLE ___ (SPECIFY)
DRILLING METHOD _____ FLUID air foam

DEPTH FROM SURFACE Ft.	to Ft.	DESCRIPTION *Describe material, grain size, color, etc.*
0	20	topsoil, boulders, red adobe clay
20	70	red adobe clay
70	110	gray, brown, black rock
110	130	gray, yellow, black rock
130	150	black gray white rock
150	210	brown, gray, white, black rock
210	230	black, gray, white, yellow, brown
230	250	black, gray, white, yellow
250	290	gray, brown, black rock
290	330	black, gray, white rock
330	370	gray, black, brown rock
370	410	gray, white, brown, black rock
410	530	black, gray, white rock
530	570	gray, brown, black rock
570	610	gray, brown, shale
610	650	shale rock stringers
650	670	soft shale

TOTAL DEPTH OF BORING 670 (Feet)
TOTAL DEPTH OF COMPLETED WELL 580 (Feet)

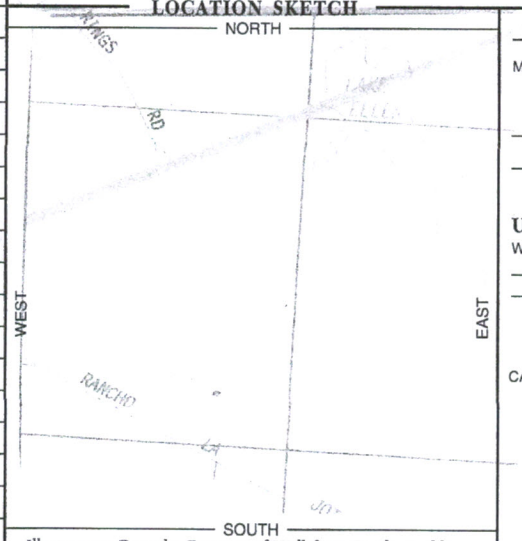
WELL OWNER

Name Peter Mondavi Sr.
Mailing Address P.O. Box 342
CITY St. Helena, CA 94574 STATE ZIP

WELL LOCATION

Address Cold Springs Road
City Angwin
County Napa
APN Book 24 Page 340 Parcel 0101
Township _____ Range _____ Section _____
Lat _____ N Long _____ W
DEG. MIN. SEC. DEG. MIN. SEC.

LOCATION SKETCH



Illustrate or Describe Distance of Well from Roads, Buildings, Fences, Rivers, etc. and attach a map. Use additional paper if necessary. ***PLEASE BE ACCURATE & COMPLETE.***

ACTIVITY (✓)

X NEW WELL
MODIFICATION/REPAIR
___ Deepen
___ Other (Specify)
___ DESTROY *(Describe Procedures and Materials Under "GEOLOGIC LOG")*

USES (✓)

WATER SUPPLY
X Domestic ___ Public
___ Irrigation ___ Industrial
MONITORING ___
TEST WELL ___
CATHODIC PROTECTION ___
HEAT EXCHANGE ___
DIRECT PUSH ___
INJECTION ___
VAPOR EXTRACTION ___
SPARGING ___
REMEDIATION ___
OTHER (SPECIFY) ___

WATER LEVEL & YIELD OF COMPLETED WELL

DEPTH TO FIRST WATER _____ (Ft.) BELOW SURFACE
DEPTH OF STATIC WATER LEVEL 132 (Ft.) & DATE MEASURED 9/24/05
ESTIMATED YIELD * 150. (GPM) & TEST TYPE air
TEST LENGTH 8 (Hrs.) TOTAL DRAWDOWN 570 (Ft.)
** May not be representative of a well's long-term yield.*

CASING (S)

DEPTH FROM SURFACE Ft.	to Ft.	BORE-HOLE DIA. (Inches)	TYPE (✓) BLANK	SCREEN	CON-DUCTOR	FILL PIPE	MATERIAL / GRADE	INTERNAL DIAMETER (Inches)	GAUGE OR WALL THICKNESS	SLOT SIZE IF ANY (Inches)
0	62	14	X				F480	8	200	
62	120	12 3/4	X				F480	8	200	
120	340	12 3/4		X			F480	8	200	factory
340	360	12 3/4	X				F480	8	200	
360	540	12 3/4		X			F480	8	200	factory
540	560	12 3/4	X				F480	8	200	
560	580	12 3/4		X			F480	8	200	factory

ANNULAR MATERIAL

DEPTH FROM SURFACE Ft.	to Ft.	TYPE CE-MENT (✓)	BEN-TONITE (✓)	FILL (✓)	FILTER PACK (TYPE/SIZE)
0	62				Grout
62	580				#6 sand pack

ATTACHMENTS (✓)

___ Geologic Log
___ Well Construction Diagram
___ Geophysical Log(s)
___ Soil/Water Chemical Analyses
___ Other _____

ATTACH ADDITIONAL INFORMATION, IF IT EXISTS.

CERTIFICATION STATEMENT

I, the undersigned, certify that this report is complete and accurate to the best of my knowledge and belief.

NAME McLean & Williams, Inc.
(PERSON, FIRM, OR CORPORATION) (TYPED OR PRINTED)

ADDRESS 976 El Camino Ave., Napa, CA 94559
CITY STATE ZIP

Signed _____
C-57 LICENSED WATER WELL CONTRACTOR

DATE SIGNED 2/1/06

C-57 LICENSE NUMBER 395352

DWR 188 REV. 05-03

IF ADDITIONAL SPACE IS NEEDED, USE NEXT CONSECUTIVELY NUMBERED FORM

CUSTOMER #: M025
NAME: Peter Mondavi Family/Krug
STREET: Cold Springs Road
CITY: Angwin
WELL LOCATION:

HOME PHONE:
WORK PHONE:
OTHER PHONE:

COMMENTS:

WELL #: A P #: 24-340-010
CLASS: 1B DEPTH: 670'
CASING SIZE AND TYPE: 8" pvc
CASING DEPTH: 580'
PERF: 120'-580' SEAL: 62'
STATIC LEVEL: 132'
DRAWDOWN: 570' AFTER: 8 hrs
YIELD: 150.gpm TESTED: air
TEST PIPE SETTING: 1"-500'-4"-572'
EQUIPMENT: TH60
WELL DRILLED DATE: 09/24/05
WELL CLEANED DATE:
CLEANED WELL FROM:
BOOSTER PUMP:
STORAGE TANK:

PUMP MAKE:
PUMP TYPE:
PUMP MODEL
H P: VOLT PH:
PUMP SERIAL #:
WARRANTY:
PUMP INSTALL DATE:
PUMP SETTING:
CHECK VALVE(S):
PUMP SAVER:
PIPE SIZE: TYPE / SCH:
WIRE:
PRESSURE TANK:
TANK INSTALL DATE:
OPEN DISCHARGE DATE:
LAB WORK

BACKFLOW MAKE PSI: METER #:
BF SERIAL #: BF MODEL: BF SIZE:

LOCATION:

PURPOSE:
WELL LOG:
0 - 20 topsoil, boulders, red adobe clay
20 - 70 red adobe clay
70 - 110 gray, brown, black rock
110 - 130 gray, yellow, black rock
130 - 150 black gray white rock
150 - 210 brown, gray, white, black rock
210 - 230 black, gray, white, yellow, brown
230 - 250 black, gray, white, yellow
250 - 290 gray, brown, black rock

GENERAL INFORMATION:

290 - 330 black, gray, white rock

330 - 370 gray, black, brown rock

370 - 410 gray, white, brown, black rock

410 - 530 black, gray, white rock

530 - 570 gray, brown, black rock

570 - 610 gray, brown, shale

610 - 650 shale rock stringers

650 - 670 soft shale

United States Department of Agriculture

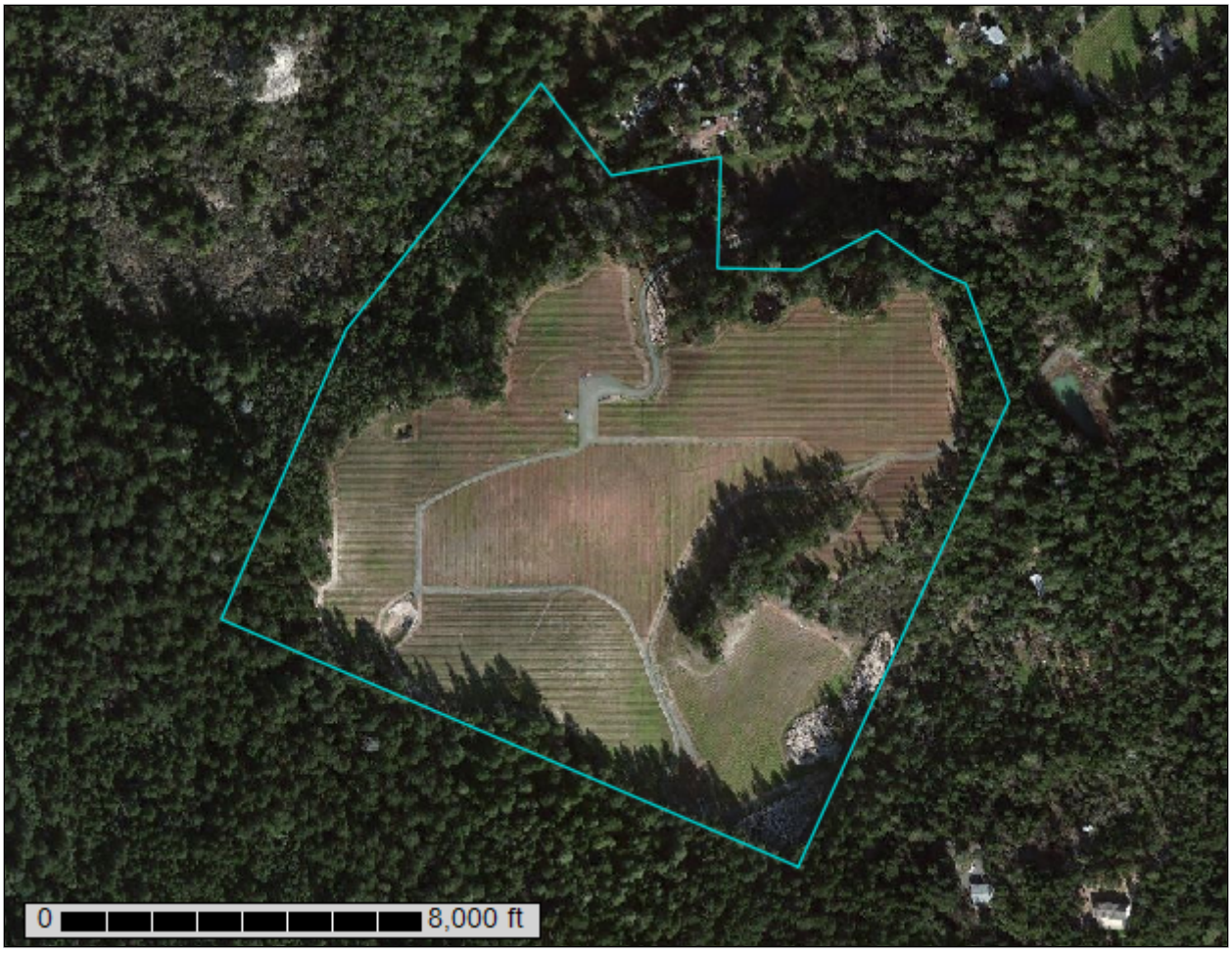
NRCS

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

Aloft Winery



August 8, 2016

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 (http://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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Contents

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.

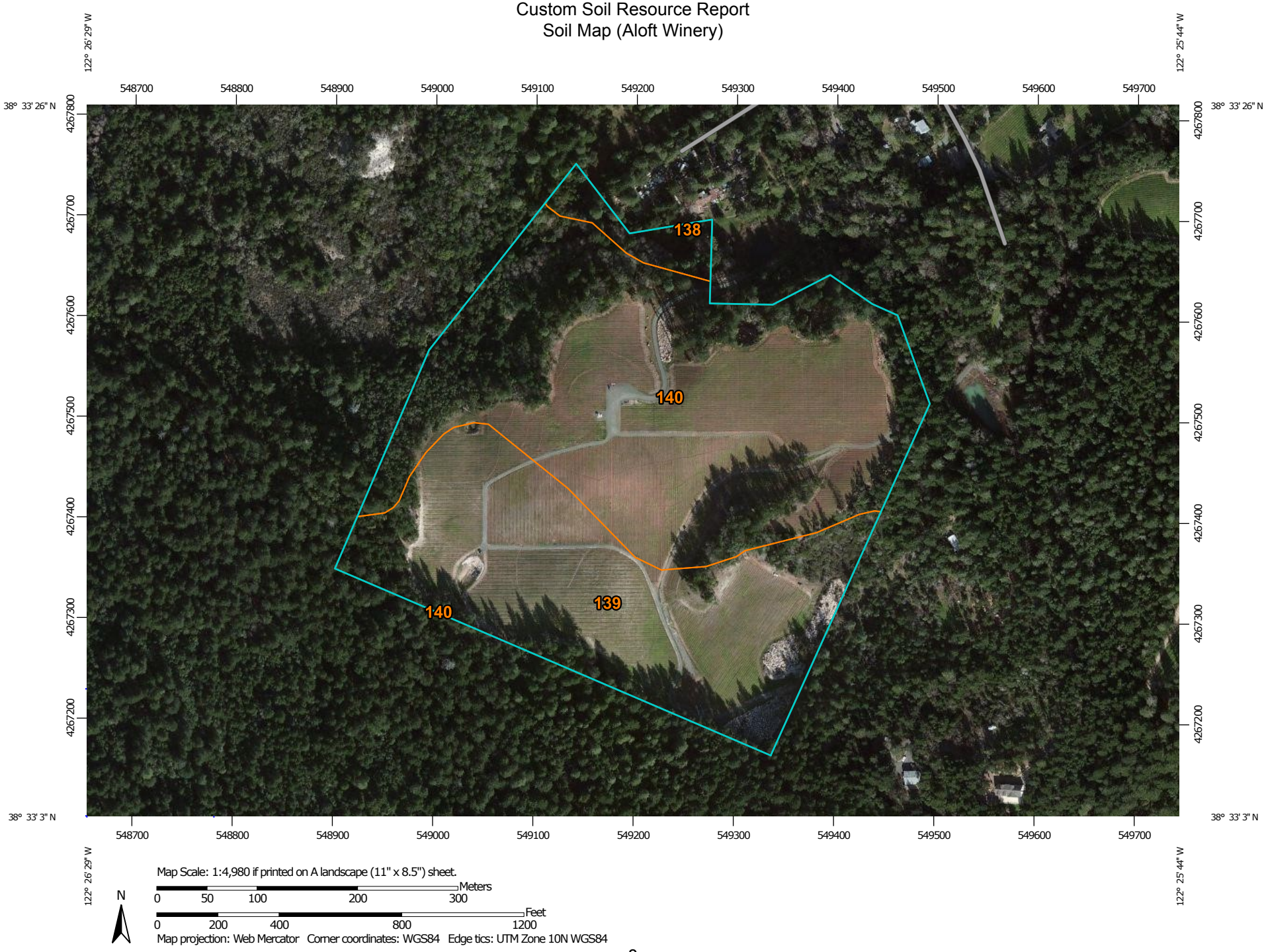
Predictions about soil behavior are based not only on soil properties but also on such variables as climate and biological activity. Soil conditions are predictable over long periods of time, but they are not predictable from year to year. For example, soil scientists can predict with a fairly high degree 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.

Custom Soil Resource Report
Soil Map (Aloft Winery)



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: http://websoilsurvey.nrcs.usda.gov
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 8, Sep 23, 2015

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

Date(s) aerial images were photographed: Feb 4, 2012—Feb 17, 2012

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 (Aloft Winery)

Napa County, California (CA055)			
Map Unit Symbol	**Map Unit Name**	**Acres in AOI**	**Percent of AOI**
138	Forward gravelly loam, 2 to 9 percent slopes	1.6	3.1%
139	Forward gravelly loam, 9 to 30 percent slopes	19.6	39.1%
140	Forward gravelly loam, 30 to 75 percent slopes	28.9	57.8%
Totals for Area of Interest		**50.1**	**100.0%**

Map Unit Descriptions (Aloft Winery)

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

138—Forward gravelly loam, 2 to 9 percent slopes

Map Unit Setting

National map unit symbol: hdl7
Elevation: 400 to 4,500 feet
Mean annual precipitation: 30 to 50 inches
Mean annual air temperature: 54 to 55 degrees F
Frost-free period: 200 to 230 days
Farmland classification: Not prime farmland

Map Unit Composition

Forward and similar soils: 85 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Forward

Setting

Landform: Hillslopes
Landform position (two-dimensional): Backslope
Landform position (three-dimensional): Side slope
Down-slope shape: Concave
Across-slope shape: Concave
Parent material: Residuum weathered from rhyolite

Typical profile

H1 - 0 to 4 inches: gravelly loam
H2 - 4 to 35 inches: loam, gravelly loam
H2 - 4 to 35 inches: weathered bedrock
H3 - 35 to 59 inches:

Properties and qualities

Slope: 2 to 9 percent
Depth to restrictive feature: 20 to 40 inches to paralithic bedrock
Natural drainage class: Well drained
Runoff class: Medium
Capacity of the most limiting layer to transmit water (Ksat): Very low to moderately low (0.00 to 0.06 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: Low (about 6.0 inches)

Interpretive groups

Land capability classification (irrigated): 4e
Land capability classification (nonirrigated): 4e
Hydrologic Soil Group: B

139—Forward gravelly loam, 9 to 30 percent slopes

Map Unit Setting

National map unit symbol: hdl8
Elevation: 400 to 4,500 feet
Mean annual precipitation: 30 to 50 inches
Mean annual air temperature: 54 to 55 degrees F
Frost-free period: 200 to 230 days
Farmland classification: Not prime farmland

Map Unit Composition

Forward and similar soils: 85 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Forward

Setting

Landform: Hillslopes
Landform position (two-dimensional): Backslope
Landform position (three-dimensional): Side slope
Down-slope shape: Convex
Across-slope shape: Convex
Parent material: Residuum weathered from rhyolite

Typical profile

H1 - 0 to 4 inches: gravelly loam
H2 - 4 to 35 inches: loam, gravelly loam
H2 - 4 to 35 inches: weathered bedrock
H3 - 35 to 59 inches:

Properties and qualities

Slope: 9 to 30 percent
Depth to restrictive feature: 20 to 40 inches to paralithic bedrock
Natural drainage class: Well drained
Runoff class: High
Capacity of the most limiting layer to transmit water (Ksat): Very low to moderately low (0.00 to 0.06 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: Low (about 6.0 inches)

Interpretive groups

Land capability classification (irrigated): 4e
Land capability classification (nonirrigated): 4e
Hydrologic Soil Group: B

140—Forward gravelly loam, 30 to 75 percent slopes

Map Unit Setting

National map unit symbol: hdl9
Elevation: 400 to 4,500 feet
Mean annual precipitation: 30 to 50 inches
Mean annual air temperature: 54 to 55 degrees F
Frost-free period: 200 to 230 days
Farmland classification: Not prime farmland

Map Unit Composition

Forward and similar soils: 85 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Forward

Setting

Landform: Hillslopes
Landform position (two-dimensional): Backslope
Landform position (three-dimensional): Side slope
Down-slope shape: Convex
Across-slope shape: Convex
Parent material: Residuum weathered from rhyolite

Typical profile

H1 - 0 to 4 inches: gravelly loam
H2 - 4 to 35 inches: loam, gravelly loam
H2 - 4 to 35 inches: weathered bedrock
H3 - 35 to 59 inches:

Properties and qualities

Slope: 30 to 75 percent
Depth to restrictive feature: 20 to 40 inches to paralithic bedrock
Natural drainage class: Well drained
Runoff class: High
Capacity of the most limiting layer to transmit water (Ksat): Very low to moderately low (0.00 to 0.06 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: Low (about 6.0 inches)

Interpretive groups

Land capability classification (irrigated): 7e
Land capability classification (nonirrigated): 7e
Hydrologic Soil Group: B

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 Qualities and Features

Soil qualities are behavior and performance attributes that are not directly measured, but are inferred from observations of dynamic conditions and from soil properties. Example soil qualities include natural drainage, and frost action. Soil features are attributes that are not directly part of the soil. Example soil features include slope and depth to restrictive layer. These features can greatly impact the use and management of the soil.

Hydrologic Soil Group (Aloft Winery)

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.

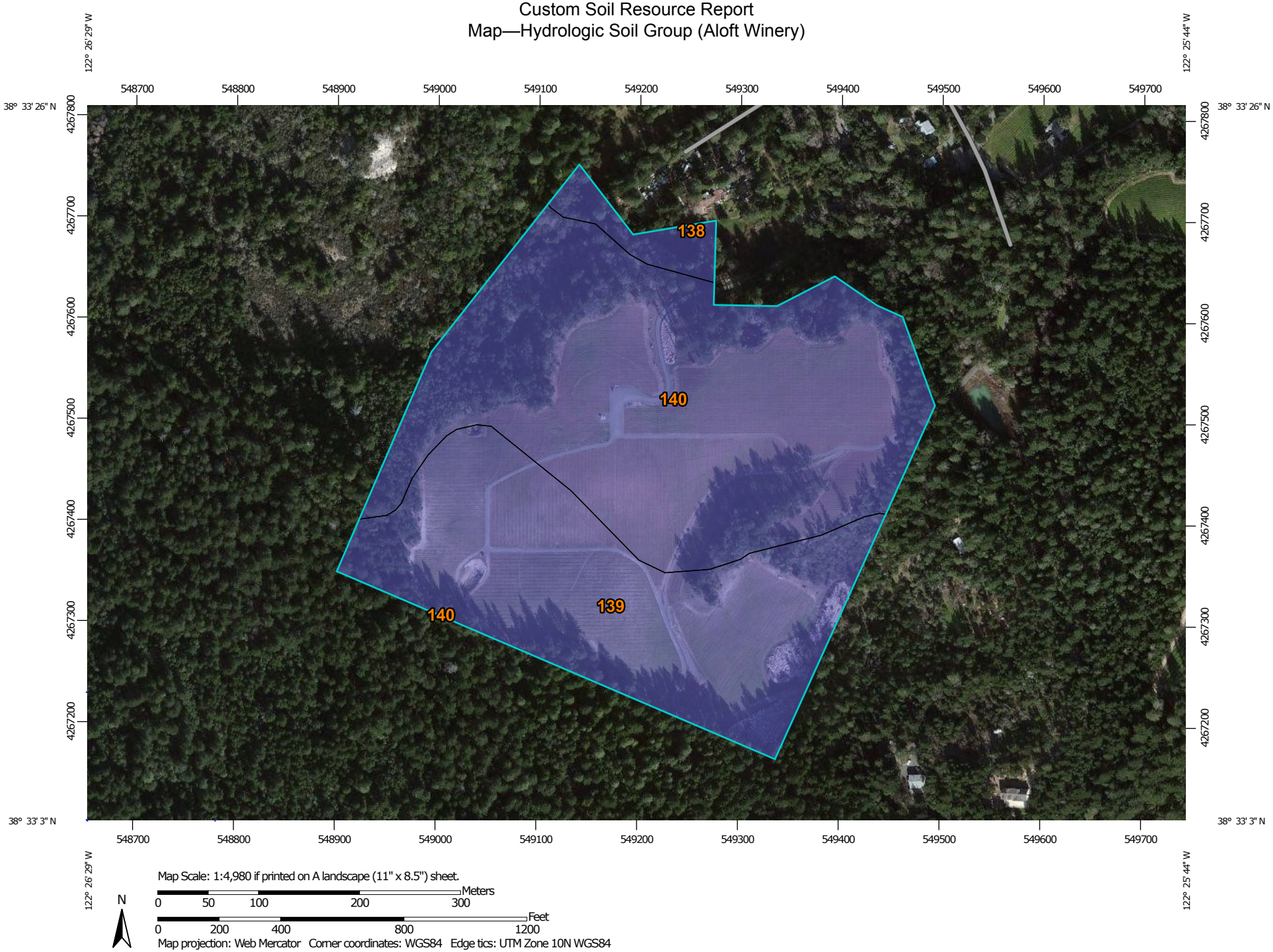
Group B. Soils having a moderate infiltration rate when thoroughly wet. These consist chiefly of moderately deep or deep, moderately well drained or well drained soils that have moderately fine texture to moderately coarse texture. These soils have a moderate rate of water transmission.

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.

Custom Soil Resource Report
Map—Hydrologic Soil Group (Aloft Winery)



MAP LEGEND

Area of Interest (AOI)
- Area of Interest (AOI)

Soils

Soil Rating Polygons
- A
- A/D
- B
- B/D
- C
- C/D
- D
- Not rated or not available

Soil Rating Lines
- A
- A/D
- B
- B/D
- C
- C/D
- D
- Not rated or not available

Soil Rating Points
- A
- A/D
- B
- B/D
- C
- C/D
- D
- 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: http://websoilsurvey.nrcs.usda.gov
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 8, Sep 23, 2015

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

Date(s) aerial images were photographed: Feb 4, 2012—Feb 17, 2012

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—Hydrologic Soil Group (Aloft Winery)

Hydrologic Soil Group— Summary by Map Unit — Napa County, California (CA055)				
Map unit symbol	**Map unit name**	**Rating**	**Acres in AOI**	**Percent of AOI**
138	Forward gravelly loam, 2 to 9 percent slopes	B	1.6	3.1%
139	Forward gravelly loam, 9 to 30 percent slopes	B	19.6	39.1%
140	Forward gravelly loam, 30 to 75 percent slopes	B	28.9	57.8%
Totals for Area of Interest			**50.1**	**100.0%**

Rating Options—Hydrologic Soil Group (Aloft Winery)

Aggregation Method: Dominant Condition

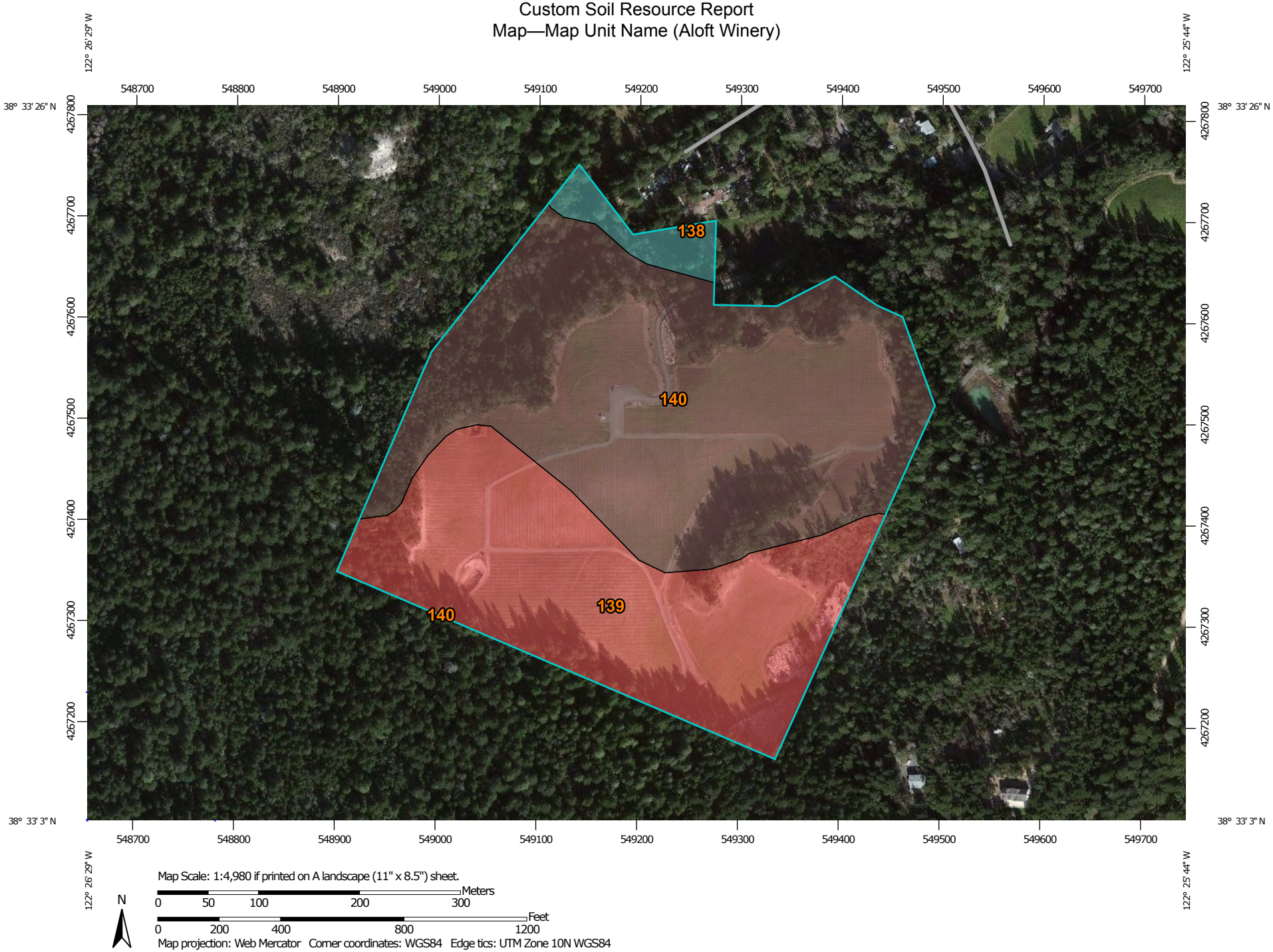
Component Percent Cutoff: None Specified

Tie-break Rule: Higher

Map Unit Name (Aloft Winery)

A soil map unit is a collection of soil areas or nonsoil areas (miscellaneous areas) delineated in a soil survey. Each map unit is given a name that uniquely identifies the unit in a particular soil survey area.

Map—Map Unit Name (Aloft Winery)



MAP LEGEND

Area of Interest (AOI)

- Area of Interest (AOI)

Soils

Soil Rating Polygons

- Forward gravelly loam, 2 to 9 percent slopes
- Forward gravelly loam, 30 to 75 percent slopes
- Forward gravelly loam, 9 to 30 percent slopes
- Not rated or not available

Soil Rating Lines

- Forward gravelly loam, 2 to 9 percent slopes
- Forward gravelly loam, 30 to 75 percent slopes
- Forward gravelly loam, 9 to 30 percent slopes
- Not rated or not available

Soil Rating Points

- Forward gravelly loam, 2 to 9 percent slopes
- Forward gravelly loam, 30 to 75 percent slopes
- Forward gravelly loam, 9 to 30 percent slopes
- 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: http://websoilsurvey.nrcs.usda.gov
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 8, Sep 23, 2015

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

Date(s) aerial images were photographed: Feb 4, 2012—Feb 17, 2012

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—Map Unit Name (Aloft Winery)

Map Unit Name— Summary by Map Unit — Napa County, California (CA055)				
Map unit symbol	**Map unit name**	**Rating**	**Acres in AOI**	**Percent of AOI**
138	Forward gravelly loam, 2 to 9 percent slopes	Forward gravelly loam, 2 to 9 percent slopes	1.6	3.1%
139	Forward gravelly loam, 9 to 30 percent slopes	Forward gravelly loam, 9 to 30 percent slopes	19.6	39.1%
140	Forward gravelly loam, 30 to 75 percent slopes	Forward gravelly loam, 30 to 75 percent slopes	28.9	57.8%
Totals for Area of Interest			**50.1**	**100.0%**

Rating Options—Map Unit Name (Aloft Winery)

Aggregation Method: No Aggregation Necessary

Tie-break Rule: Lower

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September 2016
Revised May 2017
Job No. 14-26

BARTELT ENGINEERING

TECHNICAL, MANAGERIAL AND FINANCIAL CAPACITY WORKSHEET FOR ALOFT WINERY
430 COLD SPRINGS ROAD, ANGWIN, CA
APN 024-340-010

As required by Napa County Planning, Building & Environmental Services (PBES), the following Technical, Managerial and Financial (TMF) Capacity Worksheet outlines the potential requirements associated with a proposed public water system serving the proposed winery and tasting room located on the subject parcel at 430 Cold Springs Road, Angwin, CA 94508.

PROJECT DESCRIPTION

The project proposes the installation of a new access road through APN 024-340-011 and APN 024-340-010 to provide access to a proposed tasting room, commercial kitchen, full crush winery and wine caves on a 50.07± acre parcel (APN 024-340-010) with the intent of the facility having the capability of producing 50,000 gallons of wine per year. APN 024-340-010 is currently developed with 23.2± acres of vineyard, access roads and three (3) stormwater infiltration detention basins. Vineyard area is estimated to reduce to 20.9± acres as a result of the proposed improvements. Refer to the attached Use Permit drawings for the existing and proposed development for both parcels.

Along with the proposed wine production at the site, the project proposes a moderate staffing and marketing plan which includes six (6) full-time employees, two (2) part-time employees and two (2) seasonal (harvest) employees. The project also proposes to offer private tour and tasting appointments for a maximum number of twenty (20) guests per day. Furthermore, the Applicant plans to offer two (2) food and wine pairing lunch or dinner events per month for parties up to 40 persons. Additionally, the Applicant intends to host four (4) wine club event per year for groups of up to 75 persons, with up to five (5) additional event staff. Two (2) 125 person large event with 10 additional event staff per year is also being proposed at the winery.

Although the proposed project serves less than five (5) connections, serves less than 25 yearlong residents and does not serve 25 people per day at least 60 days per year, a commercial kitchen is proposed. Therefore, under PBES guidelines the Aloft Winery may be required to operate and maintain a regulated transient non-community public water system (TNCWS). The following TMF Capacity Worksheet describes the water source, management and financial aspects for the proposed public water system.

WATER SYSTEM OVERVIEW

TABLE 1: WATER SYSTEM OVERVIEW	
Water System Name	Aloft Winery
Location/Address	430 Cold Springs Road, Angwin, CA APN 024-340-010
Application Type	New System
Water System ID	XX-XXXX (to be assigned)
Water System Classification	Transient Non-community (TNC)
Name of Person(s) Who Prepared the Report	Christina Nicholson, P.E. Staff Engineer Bartelt Engineering
Water Source	Well

TECHNICAL CAPACITY

System Description

There is one (1) existing well located on the subject parcel that has the appropriate 50+ foot annular seal. Under proposed conditions the existing well is estimated to satisfy all water demands, including domestic water demands, fire protection demands, vineyard irrigation demands and landscape demands. The proposed public water system will be isolated utilizing a backflow prevention device or double check valve to separate treated domestic water from untreated irrigation water and fire protection water. The water treatment equipment will most likely include micron filters, calcite filter, water softener, storage tanks, booster pumps, pressure tanks and ultraviolet disinfection. Treatment and disinfection equipment requirements may vary based on water quality testing. Final design and layout of the water system will be included in the public water system permit application and the forthcoming improvement plans.

It is anticipated that the water service connections will be at the proposed winery and caves only. The existing residence located on the front parcel (APN 024-340-011) is served by a separate well ("residence" well) and will not be part of the public water system.

One Year Projection

Based on the proposed number of employees and proposed marketing events the peak daily flow is estimated to be 2,477 gpd (during harvest) and the average daily flow is estimated to be 1,514 gallons per day. Modeling the average daily flow as an annual amount, the proposed project is estimated to use around 552,610 gallons per year of domestic water.

Based on the Well Completion Report, the estimated water yield from the existing groundwater well that meets the annular seal depth is 150 gallons per minute; therefore, the

proposed water system should have more than adequate capacity to meet projected domestic water demands. Refer to the Onsite Wastewater Dispersal Feasibility Study prepared by Bartelt Engineering for additional information on estimated production and domestic water demands. A well yield test may need to be performed per Napa County requirements prior to submittal of the public water system permit to determine the sustainable pump yield.

The projected water system service area, water demand and the number of users are expected to remain constant over the next several years with no future plan for expansion.

SOURCE ADEQUACY

Groundwater

The existing well which provides irrigation water to the existing vineyards was constructed with a 62 foot annular seal which exceeds the minimum standards for a non-community water system and therefore can be utilized as the public water system source.

Surface Water Treatment

The source for the water system will be a groundwater well; therefore, no surface water treatment is anticipated or required.

Water Supply Capacity

It is anticipated that any required non-community water system will be able to supply the minimum three (3) gallons per minute for at least 24 hours for each service connection. It is anticipated that the water system may contain two (2) separate water service connections. To assist in offsetting peak water demand periods, adequate storage will be provided prior to use.

Water Quality

Groundwater sample results from the existing groundwater wells are not yet available. Any results of samples taken from the existing well for the purpose of a non-community water system will be forwarded to Napa County PBES and included as part of the public water system permit application.

CONSOLIDATION WITH OTHER WATER SYSTEMS

The closest municipal water system in the vicinity of the project site is the Howell Mountain Municipal Water Company. Consolidation with this municipal water system is not proposed nor feasible due to the remote location of the project site. If municipal water service were to become available in the future it may be considered as an alternate source; however, this is very unlikely. There is no anticipated consolidation with other (existing) non-community water systems near the site.

MANAGERIAL

Organizational Ability

The Owner of the water system is primarily responsible for the review and overseeing of all winery financial and business decisions to ensure financial stability of the winery, in addition to allocating appropriate staffing levels and assigning responsibilities to ensure continuous water system quality. The water system will be primarily managed by the winery Facilities Manager. The Facilities Manager is responsible for managing the day-to-day operations of the winery including periodic inspection of the water system and will obtain sufficient training to inspect, operate and maintain the water system equipment within specified parameters to meet state water quality standards; in addition, the Facilities Manager will also take groundwater samples as necessary and submit the samples to a local laboratory for testing. If necessary, the Facilities Manager and any other employees working with the water system will attend classes in water distribution systems for certification at Solano Community College (or other suitable school) and will maintain a working knowledge of changes in codes and requirements associated with the water system. The Facilities Manager will obtain support from a Certified Operator if it becomes necessary to make modifications to the water system. Approximately five percent (5%) of the Facilities Manager's time will be dedicated to inspecting, monitoring and quality sampling of the water system.

The Facilities Manager will typically perform visual inspections, routine operation and maintenance of the well head, storage and pressure tanks, booster pumps, pressure gauges, meters and valves checking for signs of leaks or damage, proper operation, maintain lubricant levels, eliminate potential electrical or chemical hazards, clean storage tanks, etc.; in addition, to bacteriological and chemical monitoring and reporting.

Water Rights

The existing groundwater well is located on the parcel associated with the proposed winery (APN 024-340-010).

FINANCIAL

The water system will generate no revenue of its own. The water system expenses are covered as part of the general fund for winery operations. Most of the capital expenditures over a 10 year period will be minor. Annual maintenance and repair will be accomplished by onsite winery personnel, assisted by a private contractor (such as Oakville Pump or North Coast Water Works) and will be covered in the winery general fund. The expenses associated with water testing will also be covered as part of the winery general fund. Tests will be conducted by a private testing company (such as CalTest or Brelje and Race Laboratory).

General item costs associated with the water system are estimated as follows:

- Onsite water system personnel: Approximately 20 hrs/month or $800 per month.
- Contractors (as needed): Average $500 per month.
- Sampling and testing: $200 per quarter, or $800 per year
- Total Operating Costs: Approximately $700 per month or $8,400 per year

It is estimated that the total operating and installation costs associated with the water system for the first year will be approximately $25,000 including employee allocated time, training, facilities and maintenance.

CONCLUSION

The water system for the proposed project is anticipated to be regulated by the State of California and Napa County PBES. Following approval of the Use Permit, the Applicant understands that all permit requirements for the public water system will be submitted prior to issuance of any building permits associated with the proposed development.