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Water Availability Analysis

**WATER AVAILABILITY ANALYSIS FOR
THE CASTLEVALE WINERY
3450 CHILES POPE VALLEY ROAD, NAPA COUNTY, CA
APN 025-030-016**

As required by Napa County Planning, Building and Environmental Services (PBES), this analysis outlines the availability of groundwater for a potential winery and tasting room located at 3450 Chiles Pope Valley Road, St. Helena, CA 94574.

PROJECT DESCRIPTION

It is our understanding that the project proposes to construct a full crush winery on the above referenced parcel with the intent of the facility having the capability of producing 30,000 gallons of wine per year. The 55.35± acre subject parcel is currently developed with 30.2± acres of vineyard that will remain in production. Along with the proposed wine production at the site, the project proposes a moderate staffing and marketing plan. The project proposes four (4) full-time employees and two (2) seasonal (harvest) employees. The project also proposes to offer private tour and tasting appointments for a maximum number of 18 visitors per day. Furthermore, the Applicant plans to offer one (1) food and wine pairing event per month for parties up to 30 persons. Additionally, the Applicant intends to host two (2) wine club/release events per year for groups of up to 75 persons and two (2) other 125 person large events at the winery per year.

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 "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	55.35± 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 AND SOURCE DESCRIPTION	
Description	Estimated Water Usage (acre-feet/year)
Winery (0 gallons per year)	
Process Water	0.0
Domestic and Landscaping Water	0.0
Vineyard (30.2± acres)	
Irrigation	15.10
Heat and Frost Protection	0
Total Existing Demand =	15.10

TABLE 2B: PROPOSED WATER DEMAND AND SOURCE DESCRIPTION	
Description	Estimated Water Usage (acre-feet/year)
Winery (30,000 gallons per year)	
Process Water	0.65
Domestic and Landscaping Water	0.15
Vineyard (30.2± acres)	
Irrigation	15.10
Heat and Frost Protection	0
Total Proposed Demand =	15.90

As shown in Table 2A and Table 2B, the water demand is estimated to increase from 15.10 to 15.90 acre-feet per year as part of the proposed improvements. Refer to the attached Table I and Table II for a summary of the existing and proposed water demand calculations.

SOURCE WATER INFORMATION

The proposed source of water for the subject parcel is the existing onsite Well #1. Well #1 is located on the northwesterly side of the parcel near the property line and Chiles Creek. Water from Well #1 is proposed to be stored in one (1) 10,000 gallon domestic storage tank, one (1) 50,000 gallon fire storage tank and one (1) 100,000 gallon irrigation storage tank. Final water demand storage requirements for all uses will be completed during the construction phase of the proposed project.

Well Description

According to the Well Completion Report dated May 4, 2015, Well #1 was constructed between the end of May 2015 and the beginning of June 2015 by Pulliam Well Drilling. The well is reported to be constructed of five (5) inch diameter plastic casing to a completed depth of 354 feet with a 51 foot cement annular seal. Refer to the attached Well Completion Report for more information.

Yield Test

A yield test was performed on Well #1 by Oakville Pump Service, Inc. on February 22, 2017. Prior to the start of the yield test, static water level was recorded at 30 feet below surface. A sustained yield of 1.6 gallons per minute (gpm) was recorded after four (4) hours of continuous pumping. Refer to the attached Well Yield Pump Test for more information.

Water System Classification

Per PBES guidelines, the proposed water system will be regulated as an Individual Water Supply system. Napa County Code of Ordinances states that an Individual Water Supply sourced from a groundwater well must have a sustained minimum yield rate of one (1) gpm after four (4) hours of continuous pumping for each proposed service connection¹. Furthermore, a water storage tank must be provided upstream of the service connection when the sustained yield is less than five (5) gpm.

Neighboring Water Source(s)

As defined in the WAA-Guidance Document, Well #1 is classified as a very low pumping capacity well since the yield rate is less than 10 gpm and the internal casing diameter is less than six (6) inches. For very low pumping capacity wells, interference from well pumping must be evaluated to neighboring well and surface waters that are located within 500 feet of the project well.

¹ The proposed winery is viewed as a single service connection.

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 or surface waters located within 500 feet of Well #1. Refer to the attached Neighboring Water Source Location Map for location of the project well and neighboring water sources.

Water Quality

Water quality results were not available for Well #1 (project well) prior to completion of this WAA.

GROUNDWATER SUBAREA

According to the Napa County Watershed Information & Conservation Council (WICC), the subject parcel is located in the Central Interior Valleys of Napa County. The Central Interior Valleys consists of approximately 30,493 acres and has two (2) wells that are being monitored. Further information about the Central Interior Valleys groundwater subarea and well monitoring data was unavailable prior to completion of this WAA.

WATERSHED INFORMATION

The subject parcel is located in the Chiles Creek – Main Fork Watershed, which is a sub basin of the Napa Valley Watershed. The Chiles Creek – Main Fork Watershed is a domestic watershed that feeds into the Lake Hennessey reservoir.

GEOLOGICAL FEATURES

According to the Soil and Geology Map located on the WICC website, the subject parcel and surrounding areas appear to be underlain with surficial deposits (Quaternary) and the Great Valley Complex (Cretaceous-Jurassic).

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). 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.

Precipitation

Precipitation, or rainfall, data used in this analysis is taken from the PRISM Climate Group at Oregon State University. 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 one (1) 400 km resolution grid cell is 37.7 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	38.5
2013	7.4
2012	46.3
2011	33.6
2010	51.3
2009	29.9
2008	27.9
2007	20.5
2006	40.5
2005	51.2
AVERAGE	34.7

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 20.5 inches of recorded rainfall and a typical wet year occurred in 2012 with 46.3 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 34.7 inches, to estimate groundwater recharge. Refer to the attached Rainfall Data (Table III) for a summary of rainfall data.

Average Year Groundwater Recharge Rate

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

- 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 Luhdorff & 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. The recharge area is equivalent to the subject parcel (55.35± acres). The volume of rainwater that is estimated to be available for groundwater recharge is calculated below:

$$\begin{aligned} \text{Annual recharge (acre-ft/yr)} &= \text{Recharge area (acres)} \times \text{Precipitation (ft)} \times \text{Recharge rate} \\ &= 55.35 \text{ acres} \times (34.7 \text{ in} \times 1 \text{ ft}/12 \text{ in}) \times 10\% \\ &= 16.0 \text{ acre-ft/yr} \end{aligned}$$

The estimated annual recharge for the subject parcel is estimated to be 16.0 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. According to the rainfall data from PRISM Database (see Table 3) a dry year appears to have occurred in 2007 with 20.5 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 could be as low as 9.4 acre-feet.

SUMMARY

The groundwater demand generated as a result of the proposed development is estimated to increase from 15.1 acre-feet per year to 15.9 acre-feet per year (see Table 2A and Table 2B). The groundwater project well is proposed to be sourced from the existing onsite Well #1 which has a reported yield rate of 1.6 gpm. Water storage tank(s) are proposed for storage of well water prior to use within the winery and vineyards.

The available water for the subject parcel is the estimated groundwater recharge for the entire parcel area that is located within the “All Other Areas” of Napa County. The available water for the subject parcels is estimated to be 16.0 acre-feet per year during average rainfall years which is greater than the proposed project demand of 15.9 acre-feet per year.

Since water availability is related to annual rainfall, aquifer storage may be reduced during dry weather years. If the amount of groundwater available for use is limited or less than the estimated project water demands, the amount of water utilized for vineyard irrigation water would need to decrease or another water source would need to be developed.

CONCLUSION

The WAA shows that the water demand for the proposed project can be sourced from the existing project well along with the addition of water storage tank(s) prior to use. Furthermore, the estimated available water for the subject parcels satisfies the Tier 1 Water Use Criterion of the Napa County Water Availability Analysis.

ATTACHMENTS

Neighboring Well Location Map
Table I – Existing Water Demand
Table II – Proposed Water Demand
Table III – Rainfall
Table IV – Water Availability
Well Completion Report
Well Yield Test Results

REFERENCES

- Brownstein Hyatt Farber Schreck. 2011; August 25. Water Supply Assessment for the Napa Pipe Project Napa County, California.
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- Stamski, R. 2007. Geologic map and map database of eastern Sonoma and western Napa Counties, California. U.S. Geological Survey Scientific Investigations Map 2956.
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