

# LANDS OF BUTLER

## Water Availability Analysis

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### Property Information:

Owner: Jeff Butler  
Parcel No.: 033-190-006 and 149-010-010



### Report Preparer Information:

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Date: November 5, 2020

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## **Water Availability Analysis – Lands of Butler, APN: 033-190-006 and 149-010-010**

November 5, 2020

Prepared by: Omar Reveles, P.E.

### **Introduction**

Parcel 033-190-006 measures approximately 10.1 acres, and includes the site of a proposed vineyard development of 3.3 acres (5.1 acres including vineyard avenues). The proposed new vineyard development area is on strong sloping ground ranging from 13% to 26% slopes. Elevations at the proposed development area range from approximately 1520 feet to 1695 feet (based on LiDAR Contours from Napa County GIS Database). The owner of the previously mentioned parcel also owns an adjacent parcel in Solano County (APN 149-010-010). An existing well on the Solano County parcel shall be the water source for this proposed vineyard development. This well also serves vineyard on the Solano County parcel, therefore this report shall account for the use and recharge on both parcels. The Solano parcel measures approximately 74.2 acres with 13.9 acres of existing vineyard and 6.0 acres of future vineyard (25.7 acres including avenues). The following report and calculations are intended to describe current water usage, proposed water usage, well capacity and groundwater recharge to demonstrate that using the existing well for the proposed vineyard development will not have an adverse effect on neighboring wells and the aquifer that the well draws from.

### **Tier 1 – Water Use Criteria**

#### **Annual water usage required for activities on parcels 033-190-006 and 149-010-010**

There are currently no water uses on the subject parcels. Vineyard irrigation and associated minor uses (filling of spray tanks, etc.) are the only anticipated usages after the proposed vineyard development. Water usage for vineyard frost and/or heat protection is not anticipated. All calculations discussed in this report are shown in the appendix section.

Because there are currently no water uses on the subject parcels, the current annual water usage is 0.0 acre-feet.

From Napa County WAA guidance document for vineyards (Appendix B – Guidelines for Estimating Non-Residential Water Usage), the range is 0.2 to 0.5 acre-feet per acre per year. For the 13.9 acres of existing vineyard and 6.0 acres of future vineyard on the Solano parcel and the proposed vineyard of 3.3 (net) acres on the Napa parcel, this equates to an annual water usage range between 4.64 and 11.60 acre-feet per year.

A second examination, based on proposed vine spacing and anticipated water usage, for the proposed vineyard was performed. The proposed vineyard spacing is 4' x 8' (vine by row). This equates to 1,361 vines per acre. There are approximately 18,921 vines on the Solano parcel, 8,168 vines to be planted in the future on the Solano parcel and 4,492 vines proposed on the Napa parcel. According to the vineyard manager, this vineyard shall mostly be dry farmed. It is anticipated that annual water usage shall be approximately 31 gallons per vine per year. This equates to a total annual water usage of 3.00 acre-feet per year. Converting this to acre-feet per acre per year equates to 0.13 acre-feet per acre per year, which is less than the lower limit in the county guidelines.

For the purposes of this analysis, the Napa County lower limit shall be used; therefore, 4.64 acre-feet per year shall be used in the calculations for the proposed vineyard area. Allowing an extra 10% for any minor miscellaneous uses brings the annual water usage for the proposed vineyard to 5.10 acre-feet.

There are no other anticipated water uses on the subject parcels; therefore, the anticipated vineyard water usage (5.10 acre-feet per year) is also the total annual water usage requirement for the subject parcels.

### **Peak and average weekly water usage required for activities on parcels 033-190-006 and 149-010-010**

The total number of vines anticipated is 31,581 after vineyard development is complete on both parcels. It is expected that irrigation sets will peak at 2.2 gallons per vine per week and be applied over a period of 2 hours per irrigation set. There shall be 3 irrigation sets per day. Vineyard irrigation shall take place during 5 days of the week. With this irrigation regime 13,896 gallons of water will be required each day for 5 days per week.

From previous calculations, the required volume of irrigation water per day is 13,896 gallons. Assuming that the existing well irrigates the proposed vineyard directly (no intermediate storage), the minimum required well capacity is approximately 39 gallons per minute (gpm). If the well is not capable of this flow, intermediate storage will be required. The estimated yield from the well completion report is 80 gpm.

### **Water availability and recharge for parcels 033-190-006 and 149-010-010**

The subject well is on the Solano County parcel and shall serve both the Solano County and Napa County vineyards, the combined parcels measure approximately 84.3 acres. The mapped surface soils on the subject parcels consist of Hambright Loam and Gilroy Loam. The attached soil and geology map of the Suisun Creek basin shows that the Napa parcel is underlain by tertiary volcanic flow rocks with minor pyroclastic deposits and the boundary between these soils continues into Solano parcel on a trajectory that appears to intersect the subject well. Additionally, the well completion report geologic log reports that volcanic rock was encountered.

For annual recharge, the major source of groundwater is precipitation. From the report USGS WRI 77-82 – Ground Water Hydrology of the Lower Milliken-Sarco-Tuluca Creeks Area, Napa, by M.J. Johnson, 1977 it is estimated that 10% of the annual rainfall reaches the aquifer for recharge purposes. While the well location is outside the study area and to the east of the subject watershed, the report states that the majority of groundwater recharge comes from the hills east of the study area. The area with the greatest recharge is in the Sonoma volcanics consistent with the siting of the well in question. The remaining 90% is lost to runoff, stream flow, evaporation and plant transpiration.

When reviewing the website of the Western Regional Climate Center, the annual rainfall average for the period of 1981-2010 was 25-30 inches. This is a colorized map, so the range is fairly large. Additionally, information was obtained from napa.onerain.com which has a station at Mt George at a gauge elevation of 1,075 feet. This station is located approximately 3.65 miles northwest of the existing well location. The average annual rainfall amount from napa.onerain.com at the Mt George station was 24.47 inches examined from 2001 to 2020. To account for the variation in location, isopluvial maps of Northern California storm events were examined for variations in rainfall amounts between Mt George and the existing well location. Storm events for 2 year/24 hour and 100 year/24 hour were examined at the two locations. It was found that there was approximately 13% more rainfall at the existing well location with respect to the Mt George station, for a given storm event.

If the nearby Mt George average rainfall amount of 24.47 inches is used for calculation purposes and increased by 13%, the resulting average annual rainfall on the subject parcel(s) is approximately 27.65 inches per year. Based on the 27.65 inches of rain per year on the subject parcels of 84.3 acres (combined), the parcels receive approximately 194.25 acre-feet of rainfall per year.

Taking 10% of the 194.25 acre-feet results in 19.42 acre-feet per year of groundwater recharge for the subject parcels. With the usage of 3.3 acre-feet per year and a recharge of 19.42 acre-feet per year yields a usage of 26% of the available groundwater annually.

In reviewing the available data for the Mt George rain station for the time period of the stated mean annual precipitation (2001-2020), it was found that there were two significant years. The first one occurred in water year 2006/2007 with an annual rainfall total of 13.36 inches (55% of average annual rainfall) for that station, which can be considered a dry year. The second occurrence was in water year 2019/2020 with an annual rainfall of 12.17 inches (50% of average annual rainfall) for that station. Conservatively, the driest of the two years (2019/2020) was further analyzed. Using the same logic to equate the rainfall from the Mt George station to the project site, the rainfall for the 2019/2020 water year is 13.75 inches (at the existing well location). Relating the precipitation amount back to a 10% annual recharge yields, 9.66 acre-feet for the subject parcels in 2019/2020. This translates to a water usage of approximately 53% of the available groundwater.

## **Tier 2 – Well and Spring Interference Criterion**

### **Well interference**

There are no additional wells within 500' of the project well. Therefore, the Tier 2 well interference evaluation is not required for this project.

### **Spring interference**

There are no natural springs that are being used for domestic or agricultural purposes within 1500 feet of the proposed well location. Therefore, the Tier 2 spring-aquifer connectivity evaluation is not applicable to this project.

### **Conclusion**

The required water usage for the 13.9 acres of existing vineyard and 6.0 acres of future vineyard on the Solano County parcel, plus the 3.3 (net) acres of proposed vineyard on the Napa County parcel should not adversely affect the well(s) ability to recharge annually. In the event of a shortage of recharge in one year, the required water usage is such that the groundwater should recover in the following years. In the long term, the ground water aquifer being utilized for the intended use should not be compromised or diminished.

There are no wells within 500 feet of the proposed well, therefore; the well interference evaluation is not required for this project.

There are no natural springs that are being used for domestic or agricultural purposes within 1500 feet of the proposed well location, therefore, the spring-aquifer connectivity evaluation is not applicable to this project.

**References:**

Water Availability Analysis (WAA) – guidance document, Napa County Board of Supervisors, 2015

Napa One Rain <http://napa.onerain.com>

Geologic Map of California <http://maps.conservation.ca.gov/cgs/gmc/app/index.html>

Watershed Information and Conservation Council – Napa County

[https://www.napawatersheds.org/app\\_pages/view/48](https://www.napawatersheds.org/app_pages/view/48)

Western Regional Climate Center <http://wrcc.dri.edu/>

USGS Water Resources Investigations 77-82 Groundwater Hydrology of the Lower Milliken-Sarco-Tulucaj Creeks Area, Napa County, California, M.J. Johnson, 1977

Napa County GIS database

[http://gis.napa.ca.gov/giscatalog/catalog\\_xml.asp?srch\\_opt=all&db\\_name=x&theme=x&sort\\_order=layer&meta\\_style=fgdc&submit=Submit](http://gis.napa.ca.gov/giscatalog/catalog_xml.asp?srch_opt=all&db_name=x&theme=x&sort_order=layer&meta_style=fgdc&submit=Submit)

## **Appendix**

### Annual Rain Gage Data for Mt. George

Source: napa.onerain.com

Mean Annual Precipitation (2001-2020) = 24.47 inches

Water Year		Inches	% of average	
2019	2020	12.17	50%	Extremely Dry
2018	2019	34.47	141%	
2017	2018	16.35	67%	
2016	2017	46.65	191%	
2015	2016	24.15	99%	
2014	2015	19.42	79%	
2013	2014	17.97	73%	
2012	2013	18.83	77%	
2011	2012	19.66	80%	
2010	2011	35.18	144%	
2009	2010	29.2	119%	
2008	2009	21.59	88%	
2007	2008	20.92	85%	
2006	2007	13.36	55%	Dry
2005	2006	37.47	153%	
2004	2005	28.21	115%	
2003	2004	19.7	80%	
2002	2003	24.11	99%	
2001	2002	25.61	105%	

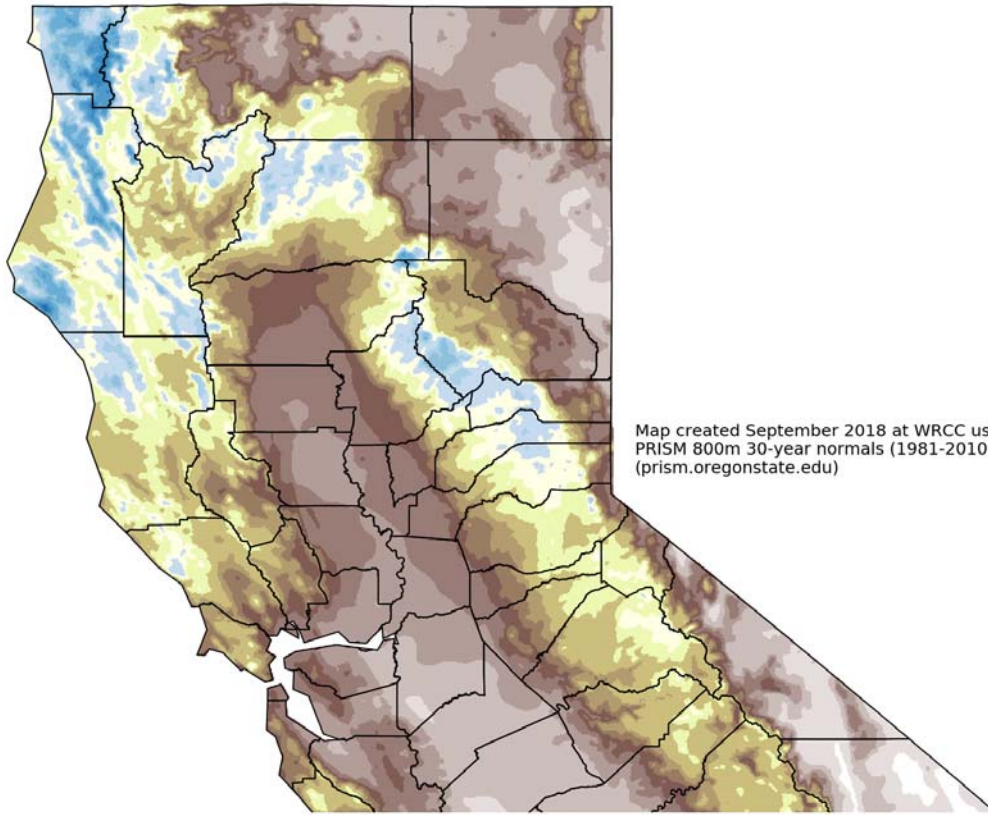




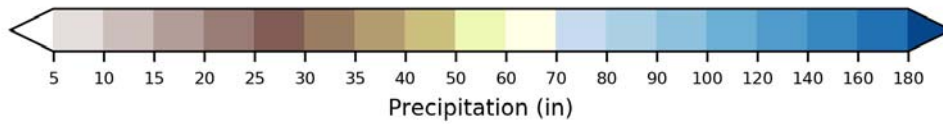


[English units](#) [metric units](#)

### Average Annual Precipitation Northern California



Map created September 2018 at WRCC using PRISM 800m 30-year normals (1981-2010) (prism.oregonstate.edu)



close



1981-2010 Monthly Average Precipitation by State: Arizona

## Water Balance:

### Water Use Estimation

#### **WAA Recommendations**

Use	Appendix B Range	WAA Choice	Unit
Irrigation Only:	0.2 to 0.5	0.20	AF/acre/year
Proposed Vineyard Area (Napa):		3.3	acres
Existing Vineyard Area (Solano):		13.9	acres
Future Vineyard Area (Solano):		6.0	acres
<b>Total Vineyard Usage =</b>		<b>4.64</b>	<b>AF/year</b>
<b>Total Vineyard Usage =</b>		<b>0.20</b>	<b>AF/acre/year</b>

#### **Water use per vine method**

Proposed Vineyard Area (Napa):	3.3	acres
Existing Vineyard Area (Solano):	13.9	acres
Future Vineyard Area (Solano):	6.0	acres
Vineyard Row Spacing:	8	feet
Vineyard Vine Spacing:	4	feet
Proposed Vineyard Vine Count:	4,492	vines
Proposed Vineyard Vine Count (Solano):	18,921	vines
Future Vineyard Vine Count (Solano):	8,168	vines
Proposed Vineyard Vine Density:	1,361	vines/acre
Annual water use:	31	gallons/vine
<b>Total Vineyard Usage =</b>	<b>3.00</b>	<b>AF/year</b>
<b>Total Vineyard Usage =</b>	<b>0.13</b>	<b>AF/acre/year</b>

**Use the Napa County minimum value:**

**4.64 AF/year**

**Add 10% for misc:**

**5.10 AF/year**

### Intermediate Water Storage

Total Vineyard Area:	23.2	acres
Vineyard Row Spacing:	8	feet
Vineyard Vine Spacing:	4	feet
Vineyard Vine Count:	31,581	vines
Peak Irrigation:	2.2	gallons/vine/week
Irrigation Set Duration:	2	hours
Irrigation sets per week:	15	sets/week (3 sets/day 5 days/week)
Peak Irrigation Volume Required =	4,632	gallons/set
Peak Irrigation Volume Required =	13,896	gallons/day
Peak Irrigation Demand =	39	gpm (during each set)

Well capacity = 40 gpm

**Therefore, water storage is not required**

### **Water Availability**

Mt. George mean annual precipitation, Napa One Rain =	24.47 inches
2 yr/24 hr rainfall - NOAA Atlas 14 Volume 6 Version 2 =	3.58 inches at Mt. George
100 yr/24 hr rainfall - NOAA Atlas 14 Volume 6 Version 2 =	8.53 inches at Mt. George
2 yr/24 hr rainfall - NOAA Atlas 14 Volume 6 Version 2 =	4.05 inches at well location
100 yr/24 hr rainfall - NOAA Atlas 14 Volume 6 Version 2 =	9.61 inches at well location
Ratio of rainfall at well location : Mt. George Location	1.13 based on 2 yr/24 hr data
Ratio of rainfall at well location : Mt. George Location	1.13 based on 100 yr/24 hr data
Average mean annual precipitation, Interpolated =	27.65 inches at well location
Average mean annual precipitation, WRCC =	25-30 inches
Use One Rain =	27.65 inches
Interpolated dry year precipitation =	15.10 inches
Interpolated extremely dry year precipitation =	13.75 inches
Parcel size (Napa)	10.1 acres
Parcel size (Solano)	74.2 acres
Total annual rainfall volume	194.25 AF
Percent Recharge*	10%
<b>Annual recharge, normal year =</b>	<b>19.42 AF</b>
<b>Annual recharge, dry year =</b>	<b>10.61 AF</b>
<b>Annual recharge, very dry year =</b>	<b>9.66 AF</b>
<b>Ratio annual use/recharge, normal year =</b>	<b>0.26</b>
<b>Ratio annual use/recharge, dry year =</b>	<b>0.48</b>
<b>Ratio annual use/recharge, very dry year =</b>	<b>0.53</b>

\* USGS Water Resources Investigations 77-82 Groundwater Hydrology of the Lower Milliken-Sarco-Tuluca Creek Area, Napa County, California, M.J. Johnson, 1977

State of California  
**Well Completion Report**  
 Form DWR 188 Auto-Completed 11/11/2019  
 WCR2019-012829

Owner's Well Number WW1 Date Work Began 07/25/2019 Date Work Ended 08/01/2019  
 Local Permit Agency Solano County Department of Resource Management - Environmental Health  
 Secondary Permit Agency \_\_\_\_\_ Permit Number W2019-0095 Permit Date 06/20/2019

Well Owner (must remain confidential pursuant to Water Code 13752)	Planned Use and Activity
Name <u>XXXXXXXXXXXXXXXXXXXX</u>	Activity <u>New Well</u>
Mailing Address <u>XXXXXXXXXXXXXXXXXXXX</u> <u>XXXXXXXXXXXXXXXXXXXX</u>	Planned Use <u>Water Supply Domestic</u>
City <u>XXXXXXXXXXXXXXXXXXXX</u> State <u>XX</u> Zip <u>XXXXX</u>	

Well Location	
Address <u>1775 Twin Sisters RD</u>	APN <u>0149-010-010</u>
City <u>Fairfield</u> Zip <u>94534</u> County <u>Solano</u>	Township <u>05 N</u>
Latitude <u>38 18 56.6</u> N Longitude <u>-122 10 16.81</u> W	Range <u>03 W</u>
Deg. Min. Sec. Deg. Min. Sec.	Section <u>02</u>
Dec. Lat. <u>38.3157222</u> Dec. Long. <u>-122.1713361</u>	Baseline Meridian <u>Mount Diablo</u>
Vertical Datum _____ Horizontal Datum <u>WGS84</u>	Ground Surface Elevation _____
Location Accuracy <u>20 Ft</u> Location Determination Method _____	Elevation Accuracy _____
	Elevation Determination Method _____

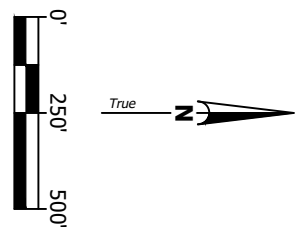
Borehole Information	
Orientation <u>Vertical</u> Specify _____	
Drilling Method <u>Direct Rotary</u> Drilling Fluid <u>Polymer</u>	
Total Depth of Boring <u>150</u> Feet	
Total Depth of Completed Well <u>150</u> Feet	

Water Level and Yield of Completed Well	
Depth to first water <u>30</u> (Feet below surface)	
Depth to Static _____	
Water Level <u>71</u> (Feet) Date Measured <u>07/31/2019</u>	
Estimated Yield* <u>80</u> (GPM) Test Type <u>Air Lift</u>	
Test Length <u>3.5</u> (Hours) Total Drawdown <u>79</u> (feet)	
*May not be representative of a well's long term yield.	

Geologic Log - Free Form		
Depth from Surface	Feet to Feet	Description
0	4	Brown volcanic sand, gravel, clay
4	12	Tan yellow silty sandy tufa
12	20	Red silty sand with gravel
20	28	Red sand - brown volcanic clay
28	38	Red and brown sandy clay with rock
38	70	Red, brown and multi-colored volcanic rock
70	105	Multi-colored highly fractured volcanic rock
105	116	Green volcanic clay
116	119	Fractured volcanic rock
119	126	Gray clay
126	150	Gray claystone with blue sandstone, fractured, trace of volcanic rock







**Site Plan**  
Scale: 1" = 500'

SHEET  <b>1</b>  OF 1	PROJECT NO. 180901-0121
	DRAWING NO. 01 01
	SCALE 1" = 500'
	DATE 11/5/2020

**BUTLER VINEYARDS**  
**WELL LOCATION SITE PLAN**

www.acmeng.com  
1700 Soscol Avenue  
Ste. 9, Napa, CA 94559  
707-253-ACME



DESIGNED BY	OR
DRAWN BY	OR
CHECKED BY	OR