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Water Availability Analysis  
and  
Groundwater Recharge Calculations

Shed Creek Winery Use Permit P16-00327 and  
Use Permit Exception to the Conservation Regulations P17-00178  
Planning Commission Hearing November 15, 2017



**CMP Civil Engineering & Land Surveying**  
**1607 Capell Valley Road**  
**Napa, CA 94558**  
**(707) 815-0988**  
**Cameron@CMPEngineering.com**  
**CMPEngineering.com**



Water Availability Analysis Calculations  
 for the  
 Shed Creek Winery

Located at:  
 80 Grapevine Lane  
 Napa, CA 94558

Date: 11/2/2015  
 Rev: 5/27/2016

Project # 00066

<u>Legend</u>
Requires Input
Automatically Calculates
Important Value Automatically Calculates
Important Value Requires Input

Hit ctrl+alt+shift+F9 when finished

<b>WATER AVAILABILITY ANALYSIS- PHASE ONE STUDY</b>			
<b>WATER USE CALCULATIONS FOR EXISTING USE</b>			
<b>RESIDENTIAL</b>	<b>#</b>	<b>FACTOR</b>	<b>AF/YR</b>
PRIMARY RESIDENCES=	1	0.5	0.50
SECONDARY RESIDENCES=	1	0.2	0.20
FARM LBR DWELLING (# OF PPL) =	0	0.06	0.00
		SUB TOTAL=	0.70
<b>NON- RESIDENTIAL CALCULATIONS</b>			
<b>AGRICULTURAL</b>	<b># ACRE</b>	<b>FACTOR</b>	<b>AF/YR</b>
VINEYARD IRRIGATION ONLY=	38	0.2	7.60
VINEYARD HEAT PROTECTION=	38	0.25	9.50
VINEYARD FROST PROTECTION=	38	0.25	9.50
IRRIGATED PASTURE=	0	4	0.00
ORCHARDS=	0.15	4	0.60
LIVESTOCK (SHEEP/COWS)=	0	0.01	0.00
		SUB TOTAL=	27.20
<b>WINERY</b>	<b># GAL</b>	<b>FACTOR</b>	<b>AF/YR</b>
PROCESS WATER=	0	0.0000215	0
DOMESTIC AND LANDSCAPING=	0	0.000005	0.00
		SUB TOTAL=	0.00
<b>INDUSTRIAL</b>	<b># EMPL</b>	<b>FACTOR</b>	<b>AF/YR</b>
FOOD PROCESSING=	0	31	0.00
PRINTING/ PUBLISHING=	0	0.6	0.00
		SUB TOTAL=	0.00
<b>COMMERCIAL</b>	<b># EMPL</b>	<b>FACTOR</b>	<b>AF/YR</b>
OFFICE SPACE=	0	0.01	0.00
WAREHOUSE=	0	0.05	0.00
		SUB TOTAL=	0.00
<b>EXISTING USE TOTALS</b>			
RESIDENTIAL=	0.70	AF/YR	
AGRICULTURAL=	27.20	AF/YR	
WINERY=	0.00	AF/YR	
INDUSTRIAL=	0.00	AF/YR	
COMMERCIAL=	0.00	AF/YR	
OTHER USAGE (LIST BELOW)			
RECYCLED WASTE WATER =		AF/YR	
		AF/YR	
		AF/YR	
		AF/YR	
		AF/YR	
<b>TOTAL EXISTING WATER USE=</b>	<b>9090624</b>	<b>G/YR</b>	
<b>TOTAL EXISTING WATER USE=</b>	<b>27.90</b>	<b>AF/YR</b>	

**WATER AVAILABILTY CALCULATIONS FOR EXISTING USE**

WELL NUMBER	Q - GPM	AF/YR	
1	5	8.066	
2		0.000	
3		0.000	
4		0.000	
5		0.000	
TOTAL=		5	8.066
SPRING NUMBER	Q - GPM	AF/YR	
1		0.000	
2		0.000	
3		0.000	
4		0.000	
5		0.000	
TOTAL=		0	0.000
TANK #	GAL	AF	
1		0.000	
2		0.000	
3		0.000	
4		0.000	
5		0.000	
TOTAL=		0	0.000
RESERVOIR #	GAL	AF	
1	10752350	33	
2	3909946	12	
3	0		
4	0		
5	0		
TOTAL=		14662296	45
GROUND WATER RECHARGE	AF/YR/ACRE	PARCEL AC	AF/YR
Recharge rate (see attached calc) =	0.60	287.38	172.43
<b>TOTAL AVAILABLE WATER =</b>	<b>56182008</b>	<b>G/YR</b>	
<b>TOTAL AVAILABLE WATER =</b>	<b>172.43</b>	<b>AF/YR</b>	
<b>TOTAL EXISTING WATER USE=</b>	<b>27.90</b>	<b>AF/YR</b>	
<b>REMAINING AVAILABLE WATER =</b>	<b>144.53</b>	<b>AF/YR</b>	

<b>WATER USE CALCULATIONS FOR PROPOSED USE</b>			
<b>RESIDENTIAL</b>	<b>#</b>	<b>FACTOR</b>	<b>AF/YR</b>
PRIMARY RESIDENCES=	1	0.5	0.50
SECONDARY RESIDENCES=	1	0.2	0.20
FARM LBR DWELLING (# OF PPL) =	0	0.06	0.00
		SUB TOTAL=	0.70
<b>NON- RESIDENTIAL CALCULATIONS</b>			
<b>AGRICULTURAL</b>	<b># ACRE</b>	<b>FACTOR</b>	<b>AF/YR</b>
VINEYARD IRRIGATION ONLY=	38	0.2	7.60
VINEYARD HEAT PROTECTION=	38	0.25	9.50
VINEYARD FROST PROTECTION=	38	0.25	9.50
IRRIGATED PASTURE=	0	4	0.00
ORCHARDS=	0.11	4	0.44
LIVESTOCK (SHEEP/COWS)=	0	0.01	0.00
		SUB TOTAL=	27.04
<b>WINERY</b>	<b># GAL</b>	<b>FACTOR</b>	<b>AF/YR</b>
PROCESS WATER=	5000	SEE WW CALC	0.08
DOMESTIC AND LANDSCAPING=	5000	SEE WW CALC	0.15
		SUB TOTAL=	0.23
<b>INDUSTRIAL</b>	<b># EMPL</b>	<b>FACTOR</b>	<b>AF/YR</b>
FOOD PROCESSING=	0	31	0.00
PRINTING/ PUBLISHING=	0	0.6	0.00
		SUB TOTAL=	0.00
<b>COMMERCIAL</b>	<b># EMPL</b>	<b>FACTOR</b>	<b>AF/YR</b>
OFFICE SPACE=	0	0.01	0.00
WAREHOUSE=	0	0.05	0.00
		SUB TOTAL=	0.00
<b>PROPOSED USE TOTALS</b>			
RESIDENTIAL=	0.70	AF/YR	
AGRICULTURAL=	27.04	AF/YR	
WINERY=	0.23	AF/YR	
INDUSTRIAL=	0.00	AF/YR	
COMMERCIAL=	0.00	AF/YR	
OTHER USAGE (LIST BELOW)			
RECYCLED WASTE WATER =	-0.08	AF/YR	
		AF/YR	
		AF/YR	
		AF/YR	
		AF/YR	
<b>TOTAL PROPOSED WATER USE=</b>	<b>9087365</b>	<b>G/YR</b>	
<b>TOTAL PROPOSED WATER USE=</b>	<b>27.89</b>	<b>AF/YR</b>	

**WATER AVAILABILITY CALCULATIONS FOR PROPOSED USE**

WELL NUMBER	Q - GPM	AF/YR	
1	4	6.452	
2	10	16.131	
3		0.000	
4		0.000	
5		0.000	
TOTAL=		14	22.584
SPRING NUMBER	Q - GPM	AF/YR	
1		0.000	
2		0.000	
3		0.000	
4		0.000	
5		0.000	
TOTAL=		0	0.000
TANK #	GAL	AF	
1	10000	0.031	
2	10000	0.031	
3	10000	0.031	
4	10000	0.031	
5		0.000	
TOTAL=		40000	0.123
RESERVOIR #	GAL	AF	
1	0		
2	0		
3	0		
4	0		
5	0		
TOTAL=		0	0.000
GROUND WATER RECHARGE	AF/YR/ACRE	PARCEL AC	AF/YR
Recharge rate (see attached calc) =	0.60	287.38	172.43
<b>TOTAL WATER AVAILABLE =</b>		<b>56182008.33</b>	<b>G/YR</b>
<b>TOTAL WATER AVAILABLE =</b>		<b>172.43</b>	<b>AF/YR</b>
<b>TOTAL PROPOSED WATER USE=</b>		<b>27.89</b>	<b>AF/YR</b>
<b>REMAINING AVAILABLE WATER =</b>		<b>144.54</b>	<b>AF/YR</b>

<b>Contact Information</b>	
Property Owner:	William E. Morgan
Owner Address:	80 Grapevine Lane Napa, CA 94558
Applicant:	Robert W. Morgan
Applicant Address:	450 Oak View Drive Vacaville, CA 95688
Applicant Phone:	(707) 718-0044
Applicant Email:	bobm@morgansoutdoorliving.com

### Site Map

Please see the Use Permit Site Plan for the Shed Creek Winery which has been included with this submittal. The said map shows the proposed water source (existing well) for the winery and its proximity to other water sources.

### Narrative

This project involves a proposed winery that will be producing a maximum of 5000 gallons of wine per year with a maximum number of 15 visitors per day. The winery will be located in an existing barn on the subject parcel. The parcel is also home to 38 acres of existing vineyard, all of which are irrigated from the two onsite reservoirs. The parcel also contains a main residence and a second dwelling unit which utilizes the above said well for potable water. It is currently estimated that the main residence together with the second dwelling unit will require 0.70 acre feet of water annually. The proposed winery is estimated to use 0.23 acre feet of water annually. The total proposed draw on the well is estimated to be 0.86 acre feet of water annually. Also proposed is the installation of two 6000 gallon water tanks. The current maximum annual capacity of the well is estimated at 8.07 acre feet of water. Based on these estimates the well has more than enough capacity to serve the existing and proposed uses.

There are no known neighboring wells that exist within 500 feet of the subject winery well. Please see sheet one of the Use Permit Site Plan. The existing calculated annual water use for the subject parcel is 27.90 acre feet. Of this 27.90 acre feet, 0.70 is used by the residences, 26.60 is used by the existing vineyard and 0.60 is used by the existing orchard. The proposed winery is expected to use 0.23 acre feet per year. Of this 0.23 acre feet, 0.08 is process wastewater and 0.15 is domestic. The proposed domestic wastewater system will require part of the orchard to be removed which will decrease the orchards water use by 0.16 acre feet. The 0.08 acre feet of process water will be treated and applied to existing vineyard for irrigation purposes. In the end there is a net negative increase in water use with this proposed winery.

A ground water recharge calculation was completed for this parcel using water balance methods. The details of this calculation can be found below. The groundwater recharge rate was calculated at 0.60 acre feet of water per acre per year. Given this, the maximum allowed water use for this parcel would be 172.43 acre feet of water per year. Comparing the proposed use of 27.89 acre feet per year to the above 172.43 acre feet value it is clear that the subject parcel has more than enough capacity to serve the proposed use.

### Calculations

Please see the attached calculations below.



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Ground Water Recharge Calculations  
 for the  
 Shed Creek Winery

Located at:  
 80 Grapevine Lane  
 Napa, CA 94558

Date: 5/27/2016

Project # 00066

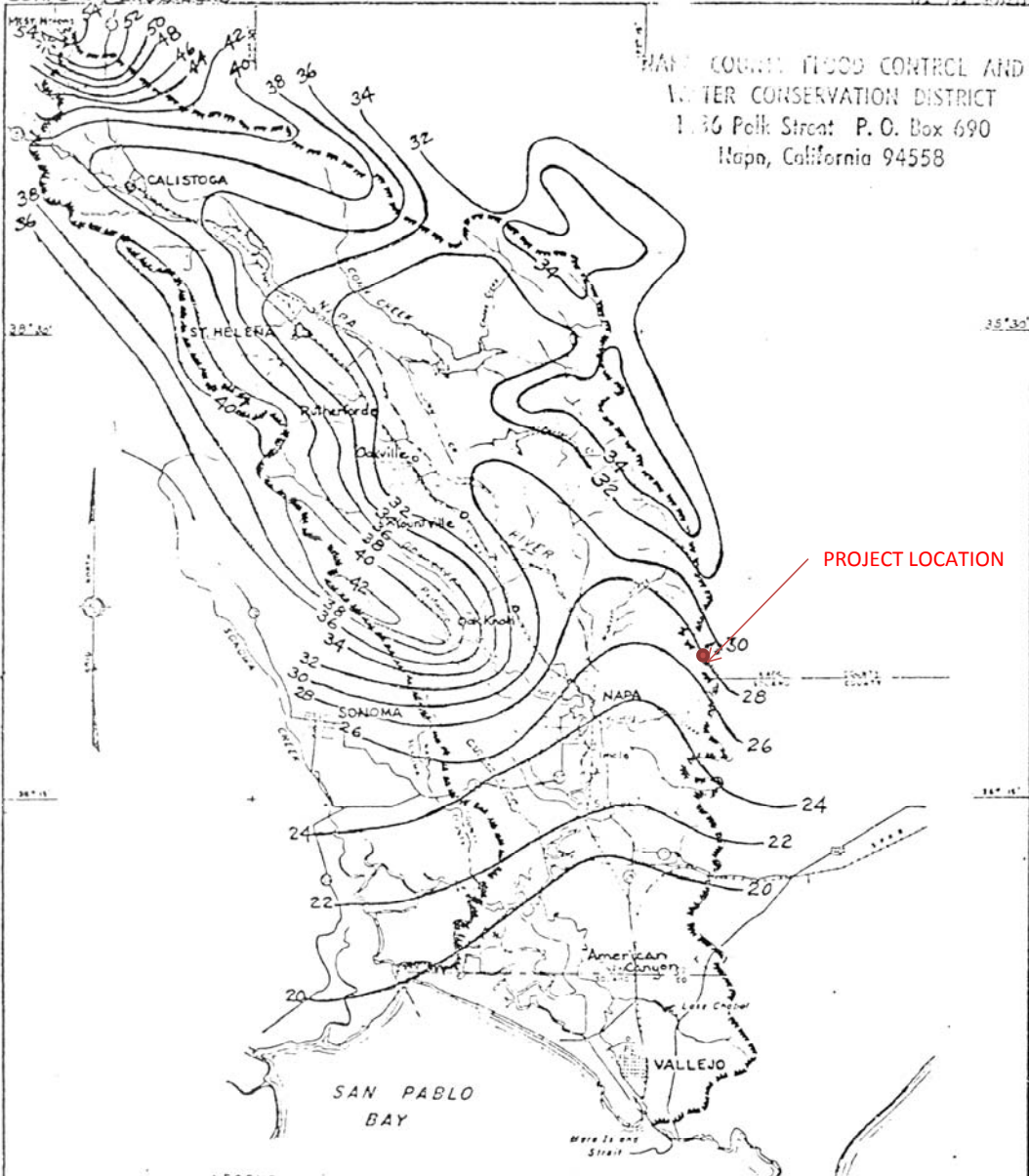
<u>Legend</u>
Requires Input
Automatically Calculates
Important Value Automatically Calculates
Important Value Requires Input

Hit ctrl+alt+shift+F9 when finished.



<b>GROUND WATER RECHARGE CALCULATIONS</b>			
<b>PARCEL VARIABLES</b>			
Parcel size =	287.38	ac	
Average annual rainfall (P) =	28.00	in (from napa county RSS)	
<b>EVAPOTRANSPIRATION (E)</b>			
Crop Type	Area (ac)	E (ac-ft)	
Vineyard =	38.00	7.60	From Water Availability Analysis Calc
Orchard =	0.11	0.44	From Water Availability Analysis Calc
Totals =	38.11	8.04	
Native plants area =	249.27	ac	
Native plants estimated coefficient =	0.40		
Plant density =	75%	%	
Grass refernce ETo =	45.34	in (from Zone 8 ITRC value typ yr)	
Native plant ETc =	18.14	in	
Total annual native plant E =	282.55	ac-ft	
<b>Total annual E for parcel =</b>	<b>290.59</b>	<b>ac- ft</b>	
<b>RUNOFF (R)</b>			
Average runoff relief coefficient =	22%	%	
Average runoff soil coefficient =	6%	%	
Average runoff vegetation coefficient =	6%	%	
Average runoff surface coefficient =	7%	%	
Total Runoff Coefficient =	41%	%	
Average annual rainfall =	670.55	ac-ft	
Runoff producing rainfall =	75%	%	
<b>Total Annual Runoff (R) =</b>	<b>206.20</b>	<b>ac-ft</b>	
<b>ANNUAL GROUND WATER RECHARGE STORAGE (S) = P-(R+E)</b>			
Total Annaul Precipitation (P) =	670.55	ac-ft	
Total Annual Runoff (R) =	206.20	ac-ft	
Total Annual Evapotranpiration (E) =	290.59	ac-ft	
Total Annual Ground Recharge (S) =	<b>173.77</b>	ac-ft	
<b>Annual Recharge Rate Per Acre =</b>	<b>0.60</b>	<b>ac-ft / yr / ac</b>	

NAPA COUNTY FLOOD CONTROL AND  
WATER CONSERVATION DISTRICT  
136 Polk Street P. O. Box 690  
Napa, California 94558



PROJECT LOCATION

LEGEND

- County Boundaries
- U.S. Highways
- State Highways
- Roads
- Outline of Drainage Basin
- Isobaths in inches

REVIEW REPORT FOR FLOOD CONTROL  
AND ALLIED PURPOSES  
NAPA RIVER BASIN  
HYDROLOGY AND HYDRAULICS  
NORMAL ANNUAL  
PRECIPITATION 1906-1956

IN 7 SHEETS SHEET NO 2  
U.S. ARMY ENGINEER DIST SAN FRANCISCO, CALIF.  
DRAWN D. R. B. FILE NO.  
TR-CED. TO ACCOMPAN. REPORT  
CHECKED W. R. T. DATE 1 NOV. 57

**RUN-OFF PRODUCING CHARACTERISTICS OF WATERSHEDS SHOWING  
FACTORS FOR EACH CHARACTERISTIC FOR VARIOUS WATERSHED TYPES**

WATERSHED TYPES AND FACTORS				
Run-off Producing Features	Extreme	High	Normal	Low
Relief	0.28-0.36 Steep, rugged terrain, with average slopes above 30%.	0.20 - 0.28 Rolling, with average slopes of 10 to 30%.	0.14 - 0.20 Rolling, with average slopes of 5 to 10%.	0.08 - 0.14 Relatively flat land, with average slopes of 0 to 5%.
Soil Infiltration	0.12 - 0.16 No effective soil cover either rock or thin soil mantle of negligible infiltration capacity.	0.08 - 0.12 Slow to take up water; clay or shallow loam soils of low infiltration capacity imperfectly or poorly drained.	0.06 - 0.08 Normal; well drained light and medium textured soils sandy loams, silt, and silt loams.	0.04 - 0.06 High; deep sand or other soil that takes up water readily; very light, well drained soils.
Vegtal Cover	0.12-0.16 No effective plant cover; bare or very sparse cover.	0.08-0.12 Poor to fair; clean cultivation crops or poor natural cover; less than 20% of drainage area under good cover.	0.06-0.08 Fair to good; about 50% of area in good grassland or woodland; not more than 50% of area in cultivated crops.	0.04-0.06 Good to excellent; about 90% of drainage area in good grassland, woodland, or equivalent crop.
Surface	0.10-0.12 Negligible; surface depressions, few and shallow; drainageways steep and small; no marshes.	0.08 - 0.10 Low; well-defined system of small drainageways; no ponds or marsh.	0.06 - 0.08 Normal; considerable surface depression storage; lakes, ponds, and marshes	0.04 - 0.06 High; surface storage high; drainage system not sharply defined; large floodplain storage or large number of ponds or marshes.

THE RUNOFF FACTOR IS DETERMINED BY THE SUM OF THE FACTORS FOR RELIEF INFILTRATION, COVER, AND SURFACE. NOT APPLICABLE TO BUILT UP AREAS.

FIGURE 3