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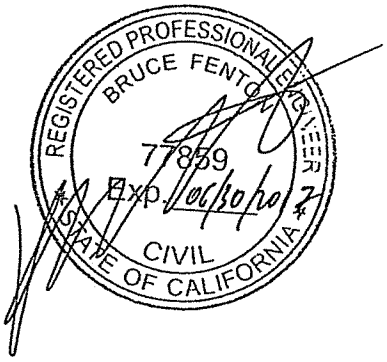
Water Availability Analysis

B Cellars Winery P16-00423
Planning Commission Hearing Date December 20, 2017

WATER AVAILABILITY ANALYSIS

B CELLARS WINERY
701 OAKVILLE CROSSROAD
NAPA, CA

APN 031-070-026



PREPARED FOR:

Duffy Keys – B Cellars
701 Oakville Crossroad
Napa, CA 94558

Project# 4116014.0
October 12, 2016

1515 Fourth Street, Napa, CA 94559 www.rsacivil.com 707.252.3301.v 707.252.4966.f

I. Executive Summary

B Cellars Winery proposes to expand their marketing program and employees. Below is a summary of the existing and proposed water use. A Groundwater recharge rate of 1 af/yr/acre was adopted for the 11.53 acre parcel to give a total groundwater recharge of 11.53 af/yr for the project parcel. See attached water use calculations for detailed calculations of the existing and proposed conditions.

Usage Type	Existing Usage [af/yr]	Proposed Usage [af/yr]
Residence	0.75	0.75
Irrigation		
Winery Landscape	3.17	3.17
Residence Landscape	0.11	0.11
Vineyard	2.05	2.05
Reclaimed Process Water	-0.69	-0.69
Winery		
Process Water	0.69	0.69
Domestic Water	0.30	0.53
Totals (Acre-ft per Year)	**6.38**	**6.61**
Estimated Ground Water Recharge (Acre-ft per Year)	**11.53**	**11.53**

The proposed increase in marketing and employees results in an increase in water use of 0.23 af/yr to a proposed use of 6.61 af/yr. This proposed use is less than the estimated groundwater recharge of 11.53 af/yr.

II. Water Use Calculation

Existing Conditions

Existing Residence Water Demand

Residence – (0.75 af/yr/residence x	1	residence) =	0.75	af/yr
		Total =	**0.75**	**af/yr**

Existing Irrigation Water Demand

Winery Landscape Irrigation taken from WELO =			3.17	af/yr
Residence Landscape Irrigation taken from WELO =			0.11	af/yr
Vineyard – Irrigation only – (0.5 af/ac-yr x	4.10	acres vineyard) =	2.05	af/yr
Reclaimed Process Water used for irrigation - (5 gallons of water x	45,000	gal wine/year =	-0.69	af/yr
		Total =	**4.64**	**af/yr**

Existing Winery Water Demand

Full Time Employees – (15 gal/person/day x 365 days/yr x	8	employees/day) =	0.13	af/yr
Part Time Employees – (15 gal/person/day x 80 days/yr x	5	employees/day) =	0.02	af/yr
Visitors – (3 gal/person/day x 52 weeks/yr x	250	visitors/week) =	0.12	af/yr
Marketing Events (Off-Site Catered) – (30 visitors @ 10 gpd x	12	days/yr) =	0.011	af/yr
Marketing Events (Off-Site Catered) – (100 visitors @ 10 gpd x	2	days/yr) =	0.006	af/yr
Marketing Events (Off-Site Catered) – (150 visitors @ 10 gpd x	2	days/yr) =	0.009	af/yr
Process Water - (5 gallons of water x	45,000	gal wine/year =	0.69	af/yr
		Total =	**0.99**	**af/yr**

Proposed Conditions

Existing Residence Water Demand

Residence – (0.75 af/yr/residence x	1	residence) =	0.75	af/yr
		Total =	**0.75**	**af/yr**

Existing Irrigation Water Demand

Winery Landscape Irrigation taken from WELO =			3.17	af/yr
Residence Landscape Irrigation taken from WELO =			0.11	af/yr
Vineyard – Irrigation only – (0.5 af/ac-yr x	4.10	acres vineyard) =	2.05	af/yr
Reclaimed Process Water used for irrigation - (5 gallons of water x	45,000	gal wine/year =	-0.69	af/yr
		Total =	**4.64**	**af/yr**

Proposed Winery Water Demand

Full Time Employees – (15 gal/person/day x 365 days/yr x	12	employees/day) =	0.20	af/yr
Part Time Employees – (15 gal/person/day x 125 days/yr x	7.5	employees/day) =	0.04	af/yr
Visitors – (3 gal/person/day x 52 weeks/yr x	450	visitors/week) =	0.22	af/yr
Marketing Events (Off-Site Catered) – (40 visitors @ 10 gpd x	8	days/yr) =	0.010	af/yr
Marketing Events (Off-Site Catered) – (50 visitors @ 10 gpd x	14	days/yr) =	0.021	af/yr
Marketing Events (Off-Site Catered) – (100 visitors @ 10 gpd x	6	days/yr) =	0.018	af/yr
Marketing Events (Off-Site Catered) – (150 visitors @ 10 gpd x	5	days/yr) =	0.023	af/yr
Process Water - (5 gallons of water x	45,000	gal wine/year =	0.69	af/yr
		Total =	**1.22**	**af/yr**

Residence

NAPA WATER EFFICIENT LANDSCAPE WORKSHEETS

SECTION B: WATER EFFICIENT LANDSCAPE WORKSHEETS

Section B1. Hydrozone Information Table

Please complete the hydrozone table(s) for each hydrozone. Use as many tables as necessary to provide the square footage of landscape area per hydrozone.

Hydrozone*	Zone or Valve	Irrigation Method**	Area (Sq. Ft.)	% of Total Landscape Area
shrub/groundcover	low drip	drip	3,188	93
turf	high drip	drip	247	6
trees	moderate bubblers	bubblers	24	1
		Total (Sq. Ft.):	3,437	100%

Summary Hydrozone Table		
Hydrozone*	Area (Sq. Ft.)	% of Total Landscape Area
High Water Use	247	6
Moderate Water Use	24	1
Low Water Use	3,188	93
Total:	3,437	100%

Hydrozone
HW = High Water Use Plants
MW = Moderate Water Use Plants
LW = Low Water Use Plants

**Irrigation Method*
MS = Micro-spray
S = Spray
R = Rotor
B = Bubbler
D = Drip

Section B2. Maximum Applied Water Allowance (MAWA)

The project's Maximum Applied Water Allowance shall be calculated using this equation:

MAWA = (ETo) (0.62) [(0.7 x LA) + (0.3 x SLA)]

where:
MAWA = Maximum Applied Water Allowance (gallons per year)
ETo = Reference Evapotranspiration from *Appendix A* (inches per year)
0.7 = ET Adjustment Factor (ETAF)
LA = Landscaped Area includes Special Landscape Area (square feet)
0.62 = Conversion factor (to gallons per square foot)
SLA = Portion of the landscape area identified as Special Landscape Area (square feet)
0.3 = the additional ET Adjustment Factor for Special Landscape Area (1.0 - 0.7 = 0.3)

Maximum Applied Water Allowance = 66,080 gallons per year

Show calculations.

44.3 x 0.62 x (.7 x 3,437) = 66,080

Effective Precipitation (Eppt)

If considering Effective Precipitation, use 25% (0.25) of annual precipitation. Use the following equation to calculate the Maximum Applied Water Allowance (see Appendix B for rainfall map):

MAWA= (ETo – Eppt) (0.62) [(0.7 x LA) + (0.3 x SLA)]

Maximum Applied Water Allowance = _____ gallons per year

Show calculations.

Section B3. Estimated Total Water Use (ETWU)

The project's Estimated Total Water Use is calculated using the following formula:

$$ETWU = (ETo)(0.62)\left(\frac{PF \times HA}{IE} + SLA\right)$$

where:
ETWU = Estimated total water use per year (gallons per year)
ETo = Reference Evapotranspiration (inches per year)
PF = Plant Factor from WUCOLS[2] (*Water Use Classification of Landscape Species, UCCE 2000*)
HA = Hydrozone Area [high, medium, and low water use areas] (square feet)
SLA = Special Landscape Area (square feet)
0.62 = Conversion Factor (to gallons per square foot)
IE = Irrigation Efficiency (minimum 0.71)

Hydrozone Table for Calculating ETWU

Please complete the hydrozone table(s). Use as many tables as necessary.

Hydrozone	Plant Water Use Type(s)	Plant Factor (PF)	Area (HA) (square feet)	PF x HA (square feet)
shrub/groundcover	low	.3	3,188	956
turf	high	.8	247	198
shrub	moderate	.5	24	12
	SLA		Sum 3,437	1,160

Estimated Total Water Use = 35,423 gallons

Show calculations.

44.3 x .62 x 956/.9 = 28,992
44.3 x .62 x 198/.9 = 6,043
44.3 x .62 x 12/.65 = 388
TOTAL = 35,423

[2] To obtain plant factors from WUCOLS, see http://www.water.ca.gov/wateruseefficiency/docs/wucols00.pdf - *Water Use Classification of Landscape Species, UCCE 2000.*

IRRIGATION WATERING SCHEDULES

SUB-SURFACE DRIP IRRIGATION FOR HIGH WATER USE LAWN – VALVES C-1

SPRINKLER MANUFACTURER: TORO | LOCATION: NAPA, CALIFORNIA
PRECIPITATION RATE (INCHES/HOUR): 1.26 | EMITTER SPACING: 12" O.C.
IRRIGATION SYSTEM EFFICIENCY: 0.90 | EMITTER FLOW: 1 GPH
PLANT FACTOR: 0.30
YEAR 2 REDUCTION AMOUNT: =10% OF YEAR 1 (ESTABLISHMENT) RUN TIME MINUTES

	Months	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	TOTAL
ETO PER MONTH (INCHES):		1.30	1.70	2.60	3.60	5.10	6.00	7.10	6.10	4.60	3.10	1.80	0.90	44.30
ETO PER WEEK (INCHES):		0.300	0.393	0.647	0.901	1.178	1.386	1.640	1.409	1.109	0.716	0.346	0.208	
APPLIED ETO PER WEEK (INCHES):		0.100	0.131	0.216	0.300	0.393	0.462	0.547	0.470	0.370	0.239	0.115	0.069	
MINUTES OF WATER PER WEEK:	YEAR 1	5	6	10	14	18	22	25	22	18	11	6	3	
	YEAR 2	4	6	9	13	17	20	24	20	16	10	5	3	
DAYS PER WEEK:	YEAR 1	1	1	2	3	3	3	4	3	3	2	1	1	
	YEAR 2	1	1	2	3	3	3	4	3	3	2	1	1	
MINUTES OF WATER PER DAY:	YEAR 1	5	6	5	5	6	7	7	8	6	6	6	3	
	YEAR 2	4	6	5	4	6	7	6	7	5	5	5	3	
CYCLES PER DAY:	YEAR 1	1	1	1	1	1	1	1	1	1	1	1	1	
	YEAR 2	1	1	1	1	1	1	1	1	1	1	1	1	

SUB-SURFACE DRIP IRRIGATION FOR LOW WATER USE SHRUB/GROUNDCOVER AREAS – VALVES C-2, C-3, C-4, C-5, C-6, C-7, C-9, C-10

SPRINKLER MANUFACTURER: TORO | LOCATION: NAPA, CALIFORNIA
PRECIPITATION RATE (INCHES/HOUR): 0.67 | EMITTER SPACING: 18" O.C.
IRRIGATION SYSTEM EFFICIENCY: 0.90 | EMITTER FLOW: 1 GPH
PLANT FACTOR: 0.30
YEAR 2 REDUCTION AMOUNT: =10% OF YEAR 1 (ESTABLISHMENT) RUN TIME MINUTES

	Months	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	TOTAL
ETO PER MONTH (INCHES):		1.30	1.70	2.60	3.60	5.10	6.00	7.10	6.10	4.60	3.10	1.80	0.90	44.30
ETO PER WEEK (INCHES):		0.300	0.393	0.647	0.901	1.178	1.386	1.640	1.409	1.109	0.716	0.346	0.208	
APPLIED ETO PER WEEK (INCHES):		0.100	0.131	0.216	0.300	0.393	0.462	0.547	0.470	0.370	0.239	0.115	0.069	
MINUTES OF WATER PER WEEK:	YEAR 1	11	14	23	32	41	49	58	49	39	25	12	7	
	YEAR 2	9	12	20	28	37	44	52	44	35	23	11	7	
DAYS PER WEEK:	YEAR 1	1	1	2	3	3	4	4	4	3	2	1	1	
	YEAR 2	1	1	2	3	3	4	4	4	3	2	1	1	
MINUTES OF WATER PER DAY:	YEAR 1	11	14	11	11	14	12	14	12	13	13	12	7	
	YEAR 2	9	12	10	9	12	11	13	11	12	11	11	7	
CYCLES PER DAY:	YEAR 1	1	1	1	1	1	1	1	1	1	1	1	1	
	YEAR 2	1	1	1	1	1	1	1	1	1	1	1	1	

BUBBLER IRRIGATION FOR MODERATE WATER USE SHRUBS – VALVES C-11

SPRINKLER MANUFACTURER: HUNTER | LOCATION: HUNTER
PRECIPITATION RATE (INCHES/HOUR): 4.65 | HEAD SPACING: VARIE
IRRIGATION SYSTEM EFFICIENCY: 0.65 | HEAD GPM: VARIE
PLANT FACTOR: 0.50
YEAR 2 REDUCTION AMOUNT: =10% OF YEAR 1 (ESTABLISHMENT) RUN TIME MINU

	Months	JAN	FEB	MAR	APR	MAY	JUN	JU
ETO PER MONTH (INCHES):		1.30	1.70	2.60	3.60	5.10	6.00	7.1
ETO PER WEEK (INCHES):		0.300	0.393	0.647	0.901	1.178	1.386	1.6
APPLIED ETO PER WEEK (INCHES):		0.177	0.231	0.380	0.530	0.693	0.816	0.9
MINUTES OF WATER PER WEEK:	YEAR 1	2	3	5	7	9	10	12
	YEAR 2	2	3	4	6	8	9	11
DAYS PER WEEK:	YEAR 1	1	1	2	3	3	3	3
	YEAR 2	1	1	2	3	3	3	3
MINUTES OF WATER PER DAY:	YEAR 1	2	3	2	2	3	3	4
	YEAR 2	2	3	2	2	3	3	4
CYCLES PER DAY:	YEAR 1	1	1	1	1	1	1	1
	YEAR 2	1	1	1	1	1	1	1

Winery

SECTION B: WATER EFFICIENT LANDSCAPE WORKSHEETS

Section B1. Hydrozone Information Table

Please complete the hydrozone table(s) for each hydrozone. Use as many tables as necessary to provide the square footage of landscape area per hydrozone.

Hydrozone*	Zone or Valve	Irrigation Method**	Area (Sq. Ft.)	% of Total Landscape Area
shrub/g.cover	low drip	drip	19,385	30
shrub/g.cover	moderate dri[p	drip	5,709	9
turf	high spray	spray	4,953	8
bio-retention	moderate rotors	MP rotators	31,318	49
tree	moderate bubblers	bubblers	2,484	3
		Total (Sq. Ft.):	63,849	100%

Summary Hydrozone Table		
Hydrozone*	Area (Sq. Ft.)	% of Total Landscape Area
High Water Use	4,953	8
Moderate Water Use	39,511	58
Low Water Use	19,385	
Total:	63,849	100%

** Hydrozone*
HW = High Water Use Plants
MW = Moderate Water Use Plants
LW = Low Water Use Plants

***Irrigation Method*
MS = Micro-spray
S = Spray
R = Rotor
B = Bubbler
D = Drip

Section B2. Maximum Applied Water Allowance (MAWA)

The project's Maximum Applied Water Allowance shall be calculated using this equation:

$$MAWA = (ETo)\ (0.62)\ [(0.7 \times LA) + (0.3 \times SLA)]$$

where:

MAWA = Maximum Applied Water Allowance (gallons per year)
ETo = Reference Evapotranspiration from *Appendix A* (inches per year)
0.7 = ET Adjustment Factor (ETAF)
LA = Landscaped Area includes Special Landscape Area (square feet)
0.62 = Conversion factor (to gallons per square foot)
SLA = Portion of the landscape area identified as Special Landscape Area (square feet)
0.3 = the additional ET Adjustment Factor for Special Landscape Area (1.0 - 0.7 = 0.3)

Maximum Applied Water Allowance = 1,227,574 **gallons per year**

Show calculations.

44.3 x 0.62 x (.7 x 63,849) = 1,227,574

Effective Precipitation (Eppt)

If considering Effective Precipitation, use 25% (0.25) of annual precipitation. Use the following equation to calculate the Maximum Applied Water Allowance (see Appendix B for rainfall map):

$$MAWA = (ETo - Eppt)\ (0.62)\ [(0.7 \times LA) + (0.3 \times SLA)]$$

Maximum Applied Water Allowance = _____ **gallons per year**

Show calculations.

Section B3. Estimated Total Water Use (ETWU)

The project's Estimated Total Water Use is calculated using the following formula:

$$ETWU = (ETo)(0.62)\left(\frac{PF \times HA}{IE} + SLA\right)$$

where:

ETWU = Estimated total water use per year (gallons per year)
ETo = Reference Evapotranspiration (inches per year)
PF = Plant Factor from WUCOLS[2] (*Water Use Classification of Landscape Species, UCCE 2000*)
HA = Hydrozone Area [high, medium, and low water use areas] (square feet)
SLA = Special Landscape Area (square feet)
0.62 = Conversion Factor (to gallons per square foot)
IE = Irrigation Efficiency (minimum 0.71)

Hydrozone Table for Calculating ETWU

Please complete the hydrozone table(s). Use as many tables as necessary.

Hydrozone	Plant Water Use Type(s)	Plant Factor (PF)	Area (HA) (square feet)	PF x HA (square feet)
shrub/groundcover	low	.3	19,385	5,816
shrub/groundcover	moderate	.5	5,709	2,854
bioretention	moderate	.5	31,318	15,659
turf	high	.8	4,953	3,962
trees	moderate	.5	2,484	1,242
			Sum	
	SLA		63,849	29,533

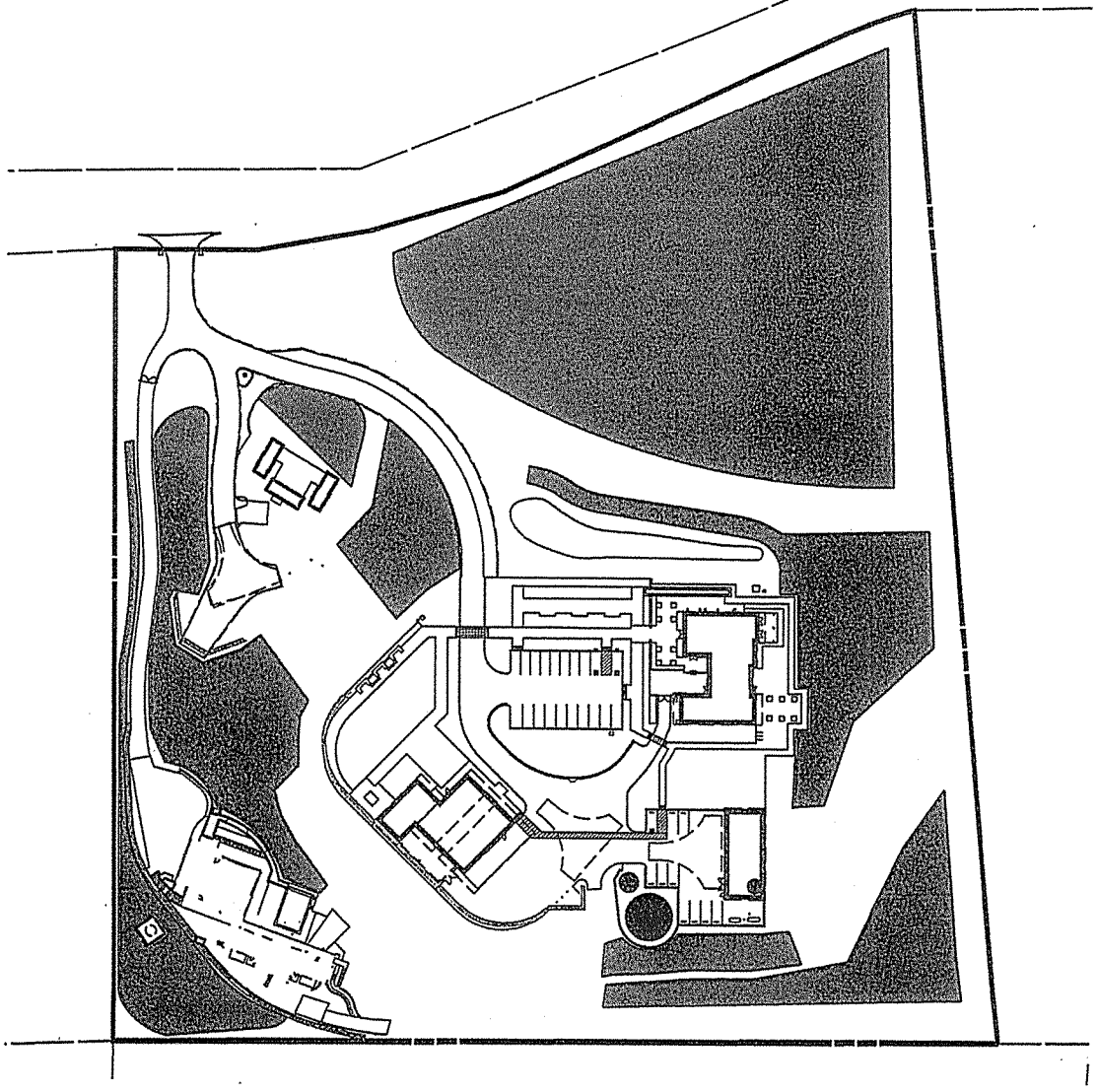
Estimated Total Water Use = 1,033,630 **gallons**

Show calculations.

44.3 x .62 x 5816/.9 = 177,491
44.3 x .62 x 2854/.9 = 87,097
44.3 x .62 x 15659/.75 = 573,453
44.3 x .62 x 3962/.7 = 155,457
44.3 x .62 x 1242/.85 = 40,132
TOTAL 1,033,630

[2] To obtain plant factors from WUCOLS, see http://www.water.ca.gov/wateruseefficiency/docs/wucols00.pdf - *Water Use Classification of Landscape Species, UCCE 2000.*

B CELLARS WINERY
VINEYARD AREA EXHIBIT



HATCH LEGEND

(E/P) VINEYARD TO REMAIN = 4.10 ACRES

NOTE: NO CHANGES TO THE SITE ARE PROPOSED. ALL AREAS REPRESENT EXISTING AND PROPOSED CONDITIONS

GRAPHIC SCALE

100 0 100 200

(IN FEET)
1 inch = 100 FT

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AUG 18, 2016 4116014.0 Exh-WAA.dwg