WASTEWATER FEASIBILITY STUDY

E & C Winery

Rockville Road and Russell Road
Fairfield, CA 94534
APNs: 027-251-280 and 027-251-290

SUMMIT

CIVIL STRUCTURAL ELECTRICAL WATER|WASTEWATER PLANNING

Project No. 2017071
September 20, 2019
Revised January 13, 2022

UTILITIES/SERVICE SYSTEMS

WATER SUPPLY

Domestic water for the E & C Winery will be served by a new on-site well permitted by Solano County. The well will supply water to a Public Water System for the winery, permitted by the State. Initially, irrigation water will be supplied by a combination of existing entitlements from the Suisun-Solano Water Authority/Solano Irrigation District (SID) and the existing onsite well located on parcel 027-251-280. As production increases, treated process wastewater (PW) will also be used for onsite irrigation.

DOMESTIC WASTEWATER

Domestic wastewater will be generated from employees, tasting visitors, and event guests. Peak domestic flows are assumed to be the same for Phase I and II (Enclosure A). The peak sanitary sewage flow is estimated to be 5,035 gallons per day (gpd). A new onsite wastewater treatment system (OWTS) will be installed to treat all sanitary sewage flows from the proposed project. Based on the recent soils evaluation conducted on October 10, 2018, suitable soils exist for a pretreatment and subsurface drip type system (refer to the Use Permit drawings for proposed location of primary disposal and reserve areas).

Domestic wastewater will be collected from restrooms and other fixtures within the facility, conveyed to a central collection point, and then treated on site. The location of the domestic wastewater treatment system will be determined during the design phase. The primary system will include septic tanks with effluent filters, pump tanks, a pretreatment system (e.g. Advantex recirculating filters), a dosing tank, and a subsurface disposal field utilizing drip tubing.

A Site Soil Evaluation was conducted on October 9, 2018 with Registered Environmental Health Specialist Jeffrey Bell of Solano County and confirmed that there is predominantly sandy clay loam with weak to moderate structure in the proposed sewage disposal area. A soil sample was collected for hydrometer testing to confirm the field texturing (Enclosure A). Percolation testing was not conducted, as sandy clay loam is approved for onsite wastewater disposal in Solano County with an assigned soil application rate of 0.417 gallons per square foot per day (gal/SF/day). A soil application rate of 0.417 gallons/square foot/day requires 13,000 SF of primary disposal area and 26,000 SF of reserve disposal area (Table 1).

Table 1. Summary of total domestic wastewater disposal area.

Parameter	Phase 2
Primary Disposal Area (SF)	13,000
Additional Reserve Area (SF)	26,000
Total Area (SF)	**39,000**

PROCESS WASTEWATER

The winery intends to utilize either onsite treatment ponds or an alternate package treatment system to treat PW. The treated effluent will be reclaimed onsite for irrigation of vineyards, orchards and/or landscape planting. The PW treatment system will be developed on the west side of the property.

Estimated peak daily and annual PW flows by phase are summarized in Table 2. Complete PW flow calculations and flow summary are included in Enclosure B.

Table 2. Summary of estimated PW flows by phase.

Parameter	Phase 1	Phase 2
Annual Wine Production (gallons per year)	125,000	500,000
PW Generation Rate (gal PW per gal Wine) [1]	6.0	6.0
Annual PW Flow (gallons per year)	750,000	3,000,000
Average Day Peak Harvest PW Flow (gpd) [2]	4,100	16,400

1. PW generation rate based on industry standard.
2. Assumes the peak harvest month accounts for 16.4% of annual flows, based on similar sized wineries. Peak month flow is divided by 30 days.

Based on the system PW flows and typical winery wastewater characteristics, the required footprint of the treatment system and the effluent storage tank was approximated. A pond water balance for the ultimate buildout was performed to determine preliminary sizing of a pond treatment system (Enclosure B). The balance shows approximately 1 acre of PW treatment ponds is required for treatment and a minimum of 9 acres of vineyards are required for treated PW irrigation disposal. The minimum disposal area is based on an estimate of the percolation rate for the site using available data from the United States Geological Survey's (USGS) Web Soil Survey tool. The proposed pond size is estimated to be capable of meeting all requirements of the State Water Resource Control Board's Statewide General Waste Discharge Requirements (WDRs) for Wineries (General Winery Order). Utilization of a package treatment system in-lieu of treatment ponds will drastically reduce the required footprint for PW treatment. Alternately, the PW flows from Phase 1 could be disposed of in a sub-surface leachfield following percolation testing and approval by Solano County Environmental Health.

SOLIDS MANAGEMENT

Solid waste (pomace) from the wine fermentation and pressing operations will be stockpiled and disked into the vineyard areas as a soil amendment or hauled offsite for disposal.

ODOR MANAGEMENT

The elements of the PW treatment system will be designed and operated to avoid odor problems. Pump and equalization tanks will contain vents, as necessary, and if odor problems occur due to venting, carbon filters can be added. Within the selected PW treatment system, controls will be included to maintain dissolved oxygen concentrations at a level to prevent odor generation. A tank will be used to store the treated effluent prior to irrigation disposal and can likewise be fitted with a carbon filter on the vent to control odors, or aeration equipment, if necessary. If ponds are used instead of a package treatment system, the facultative nature of the ponds will minimize the potential for nuisance odors. Aeration of the ponds can be increased if necessary to elevate the oxygen content and reduce odors. In either case, the treated effluent should have low biochemical oxygen demand (BOD) concentration in the effluent, and due to the lack of organic substrate, is expected to have limited or no odor generating potential.

ENCLOSURE A

DOMESTIC WASTEWATER CALCULATIONS & SITE EVALUTATION DATA

SUMMIT	E & C WINERY PHASE I and II SANITARY SEWAGE DESIGN CRITERIA	PROJECT NO. 2017071 BY: JM CHK: GG

PHASE 2 DOMESTIC WASTEWATER FLOWS - Peak Visitation Day without Special Event/Wedding

Category	Number of People		Wastewater Generation (GPCD)		Total Wastewater Flow (GPD)
Employees (Production)	11	x	20	=	220
Employees (Hospitality)	6	x	20	=	120
Visitors[1]	65	x	3	=	195
Events [2, 3]	0	x	15	=	0
Total				**=**	**535**

PHASE 2 DOMESTIC WASTEWATER FLOWS - Average Visitation Day with Special Event/Wedding

Category	Number of People		Wastewater Generation (GPCD)		Total Wastewater Flow (GPD)
Employees (Production)	11	x	20	=	220
Employees (Hospitality)	6	x	20	=	120
Visitors[1]	65	x	3	=	195
Special Events/Weddings [4]	300	x	15	=	4,500
Total				**=**	**5,035**

Notes:
1) Wine tasting visitors, no meals served.
2) Events with catered meals prepared offsite. Events will not be held concurrently with special events/weddings.
3) Portable Toilets will supplement the disposal system for events over 100 people
4) Weddings with catered meals prepared offsite, wedding with more than 250 guests requires portable toilets

ANTICIPATED PHASE 2 SUBSURFACE DRIP SYSTEM SIZING

Parameter	Value	Units
Application Rate =	0.417	GPD/SF
Primary System Size =	13,000	SF
Reserve Area (200%) =	26,000	SF
Total Area =	39,000	SF
	0.90	acres

Site Address: Russell Rockville Road, Rockville CA
SEI Job #: 2017071

Soil Profile Log

Logged By: SJW
Date: 10/9/2018

Profile	Horizon (in)	Bndy (in)	% Rock	Structure	Texture	Moisture/ Consistency	Roots	Porosity	Mottling	Sample
SP-1	0-18	G	0-5	1M	SiCL	M-FRB	3F	2F	No	
%	18-40	G	0	1W	SCL	M-F	2F	2F	No	25"
	40-60	C	0	1W	SL	M-F	1F	1VF	No	
	Limiting Layer ->Standing water at 60"									
SP-2	0-20	G	0-5	1M	SiCL	M-FRB	3F	2F	No	
%	20-42	G	0	1W	SCL	M-F	2F	2F	No	
	42-64	C	0	1W	SL	M-F	1F	1VF	No	
	Limiting Layer ->Standing water at 64"									
SP-3	0-21	G	0-5	1M	SiCL	M-FRB	3F	2F	No	
%	21-45	G	0	1W	SCL	M-F	2F	2F	No	
	45-66	C	0	1W	SL	M-F	1F	1VF	No	
	Limiting Layer ->Standing water at 66"									
SP-4	0-17	G	0-5	1M	SiCL	M-FRB	3F	2F	No	
%	17-26	G	0	1W	SCL	M-F	2F	2F	No	
	26-56	C	0	1W	SL	M-F	1F	1VF	No	
	Limiting Layer ->Standing water at 56"									
SP-5	0-20	G	0-5	1M	SiCL	M-FRB	3F	2F	No	
%	20-29	G	0	1W	SCL	M-F	2F	2F	No	
	29-52	C	0	1W	SL	M-F	1F	1VF	No	
	Limiting Layer ->Standing water at 52"									

Structure
►1=Small Ped, 2=Med Ped, 3=Large Ped
►W=Weak, M=Moderate, S=Strong
►G=Granular, Pl=Platy, Pr=Prismatic, C=Columnar, AB=Angular Blocky, SB=Subangular Blocky, M=Massive, C=Cementitious

Texture
►S=Sand, LS=Loamy Sand, SL=Sandy Loam SCL=Sandy Clay Loam, SC=Sandy Clay SiL=Silt Loam, SiCL=Silty Clay Loam, SiC=Silty Clay L=Loam, CL=Clay Loam, C=Clay

Moisture/Consistency
►M=Moist, D=Dry
►L=Loose, VFRB=Very Friable, FRB=Friable, F=Firm, Vf=Very Firm, XF=Extremely Firm

Roots
►0=None, 1=Few, 2=Common, 3=Many
►F=Fine, M=Medium, C=Coarse, VC=Very Coarse

Porosity
►0=None, 1=Few, 2=Common, 3=Many
►VF=Very Fine, F=Fine, M=Medium, C=Coarse
►0=None, P=Poor, F=Fair, G=Good, E=Excellent

Mottling
►0=None, 1=Few, 2=Common, 3=Many
►F=Faint, D=Distinct, P=Prominent
►O=Oxidation (Reddish), R=Reduction (Grayish), RO=Both

Summit Engineering, Inc.
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707-527-0775

Soil Profile Log

Profile	Horizon (in)	Bndy (in)	% Rock	Structure	Texture	Moisture/ Consistency	Roots	Porosity	Mottling	Sample
SP-6	0-19	G	0-5	1M	SiCL	M-FRB	3F	2F	No	
%	19-52	G	0	1W	SCL	M-F	2F	2F	No	
	52+	C	0	1W	SL	M-F	1F	1VF	No	
	Limiting Layer ->Standing water at 52"									
SP-7	0-19	G	0-5	1M	SiCL	M-FRB	3F	2F	No	
%	19-48	G	0	1W	SCL	M-F	2F	2F	No	
	48-61	C	0	1W	SL	M-F	1F	1VF	No	
	Limiting Layer ->Standing water at 61"									
SP-8	0-18	G	0-5	1M	SiCL	M-FRB	3F	2F	No	
%	18-34	G	0	1W	SCL	M-F	2F	2F	No	2D @ 38"
	34-56	C	0	1W	SL	M-F	1F	1VF	No	
	Limiting Layer ->Standing water at 56"; mottling not severe and presence of roots below mottling indicates drainage									
SP-9	0-18	G	0-5	1M	SiCL	M-FRB	3F	2F	No	
%	18-31	G	0	1W	SCL	M-F	2F	2F	No	F2 @ 24"
	31-60	C	0	1W	CL	M-F	1F	1VF	No	
	Limiting Layer ->Standing water at 60"; mottling not severe and presence of roots below mottling indicates drainage									
SP-10	0-19	G	0-5	1M	SiCL	M-FRB	3F	2F	No	
%	19-40	G	0	1W	SCL	M-F	2F	2F	No	F1 @ 36"
	40-60	C	0	1W	CL	M-F	1F	1VF	No	
	Limiting Layer ->Standing water at 60"; mottling not severe and presence of roots below mottling indicates drainage									

Structure
►1=Small Ped, 2=Med Ped, 3=Large Ped
►W=Weak, M=Moderate, S=Strong
►G=Granular, Pl=Platy, Pr=Prismatic, C=Columnar, AB=Angular Blocky, SB=Subangular Blocky, M=Massive, C=Cementitious

Texture
►S=Sand, LS=Loamy Sand, SL=Sandy Loam SCL=Sandy Clay Loam, SC=Sandy Clay SiL=Silt Loam, SiCL=Silty Clay Loam, SiC=Silty Clay L=Loam, CL=Clay Loam, C=Clay

Moisture/Consistency
►M=Moist, D=Dry
►L=Loose, VFRB=Very Friable, FRB=Friable, F=Firm, Vf=Very Firm, XF=Extremely Firm

Roots
►0=None, 1=Few, 2=Common, 3=Many
►F=Fine, M=Medium, C=Coarse, VC=Very Coarse

Porosity
►0=None, 1=Few, 2=Common, 3=Many
►VF=Very Fine, F=Fine, M=Medium, C=Coarse
►0=None, P=Poor, F=Fair, G=Good, E=Excellent

Mottling
►0=None, 1=Few, 2=Common, 3=Many
►F=Faint, D=Distinct, P=Prominent
►O=Oxidation (Reddish), R=Reduction (Grayish), RO=Both

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ENCLOSURE B

PROCESS WASTEWATER CALCULATIONS

SUMMIT	E & C WINERY PROCESS WASTEWATER (PW) DESIGN CRITERIA	PROJECT NO. 2017071 BY: SW CHK: GG

PROCESS WASTEWATER FLOWS BY PHASE

Parameter	Phase 1	Phase 2	Units
Annual Production	125,000	500,000	gal wine/year
PW Generation Rate [1]	6.0	6.0	gal PW/gal wine
Annual PW Flow	750,000	3,000,000	gal PW/year
Months of Harvest	Jul-Oct	Jul-Oct	
Average 92 Day Harvest Flow	3,745	14,980	gal PW/day
Average Day Peak Harvest Month Flow	4,100	16,400	gal PW/day
Average Winter Month Flow (Jan - Mar)	1,785	7,139	gal PW/day

Notes:
1) PW generation rate based on industry standard data.

SUMMIT ENGINEERING, INC. Consulting Civil Engineers	E & C Winery Pond Water Balance 500,000 Gallons	PROJECT NO. 2017071 BY: JM CHK: GG

DESIGN CRITERIA

FULL PRODUCTION

Annual Harvest	3,030	ton/year
Wine Generation Rate	165	gal wine/ton
Annual Production	500,000	gal wine/year
PW Generation Rate	6.0	gal PW/gal wine
Annual PW Flow (Crush)	3,000,000	gal PW/year
Total Annual PW Volume	3,000,000	
Annual Average PW Flow	8,219	
Months of Harvest	Aug-Oct	
Average Day Harvest Flow	13,000	gal PW/day
Average Day Peak Harvest Month Flow	16,400	gal PW/day
Maximum daily crush rate		tons/day
Peak day generation rate		gal PW/gal wine
Maximum daily PW flow		gal PW/day
Pond No. 1 Volume	1.229	Mgal
Pond No. 2 Volume	0.806	Mgal
Total Pond Volume	2.034	Mgal
Pond No. 1 HRT	74.9	days
Pond No. 2 HRT	49.1	days
Total HRT	124.0	days

DESIGN PROCESS WASTEWATER FLOWS

Month	Monthly Percentage of Annual Flow[a] (%)	Monthly Flow (Mgal)	Monthly Flow (gal)
August	10.5%	0.314	313,569
September	16.4%	0.492	492,135
October	12.9%	0.387	386,626
November	7.4%	0.222	222,340
December	6.4%	0.192	192,470
January	6.6%	0.197	196,923
February	7.2%	0.217	216,674
March	7.6%	0.229	228,885
April	6.8%	0.203	203,208
May	6.4%	0.193	193,472
June	5.6%	0.168	167,841
July	6.2%	0.186	185,856
Total	**100%**	**3.000**	**3,000,000**

[a] Monthly percentage of annual flow based on average of PW flow data from similar wineries.

SUMMIT ENGINEERING, INC. Consulting Civil Engineers	E & C Winery Pond Water Balance Climate Data	PROJECT NO. 2017071 BY: JM CHK: GG

Month	Days	Average Temp[a] (F)	Reference Evapotranspiration[b] (in)	Pan Evaporation[c] (in)	Lake Evaporation[d] (in)	Average Precipitation[e] (in)	10-Year Precipitation[f] (in)	100-Year Precipitation[f] (in)
August	31	73.6	6.5	9.9	7.6	0.03	0.0	0.1
September	30	71.7	5.1	7.6	5.8	0.08	0.1	0.2
October	31	65.2	3.4	5.3	4.1	1.11	1.5	2.3
November	30	55.4	1.8	2.6	2.0	2.56	3.6	5.2
December	31	48.4	0.9	1.7	1.3	5.40	7.5	11.0
January	31	48.5	1.2	1.5	1.1	4.68	6.5	9.5
February	28	52.2	1.7	2.4	1.8	4.97	6.9	10.1
March	31	55.9	3.4	4.3	3.3	3.31	4.6	6.7
April	30	59.6	4.8	6.7	5.1	1.47	2.0	3.0
May	31	65	6.2	9.2	7.1	0.74	1.0	1.5
June	30	70.8	6.9	11.2	8.7	0.19	0.3	0.4
July	31	73.8	7.4	11.5	8.9	0.00	0.0	0.0
Total	**365**		**49.4**	**73.8**	**56.8**	**24.5**	**34.1**	**49.8**

[a] Average monthly temperature observed between 1991-2020 for Fairfield, CA (NOAA 2021)

[b] Average monthly reference evaporation rates for Zone 8, CIMIS, DWR, 1999.

[c] Average monthly pan evaporation rates observed at Lake Solano, CA between 1975 and 2005 (Western Regional Climate Center 2022).

[d] Pan evaporation rates adjusted by a factor of 0.77 to determine lake evaporation.

[e] Monthly precipitation normals between 1991-2020 for Fairfield, CA (NOAA 2021)

[f] Average monthly rainfall adjusted by the ratio of 10-yr and 100-yr wet year return storm identified by Pearsons Log III Distribution.

SUMMIT ENGINEERING, INC. Consulting Civil Engineers	E & C Winery Pond Water Balance Pond Worksheet	PROJECT NO. 2017071 BY: JM CHK: GG

Pond No. 1

Bottom Width	-	Bottom Radius	-	Start Month	August
Bottom Length	-	Top Radius	-	Min. Depth	5.0'
Interior Side Slope (x:1)	-	Total Depth	12.0'	Max Operating Depth	10.0'
Length:Width	-	Freeboard	2.0'	Initial Depth	9.0'

Depth (ft)	Surface Area (ft^2)	Total Volume (Mgal)
0	7,500	0.000
1	8,736	0.123
2	10,044	0.246
3	11,424	0.369
4	12,876	0.492
5	14,400	0.614
6	15,996	0.737
7	17,664	0.860
8	19,404	0.983
9	21,216	1.106
10	23,100	1.229
11	25,056	1.352
12	27,084	1.475

0.62 acres

Pond No. 2

Bottom Width	-	Bottom Radius	-	Start Month	August
Bottom Length	-	Top Radius	-	Min. Depth	3.0'
Interior Side Slope (x:1)	-	Total Depth	12.0'	Max Operating Depth	10.0'
Length:Width	-	Freeboard	2.0'	Initial Depth	9.0'

Depth (ft)	Surface Area (ft^2)	Total Volume (Mgal)
0	4,000	0.000
1	4,876	0.081
2	5,824	0.161
3	6,844	0.242
4	7,936	0.322
5	9,100	0.403
6	10,336	0.483
7	11,644	0.564
8	13,024	0.644
9	14,476	0.725
10	16,000	0.806
11	17,596	0.886
12	19,264	0.967

0.44 acres

SUMMIT ENGINEERING, INC. Consulting Civil Engineers	E & C Winery Pond Water Balance 100-Year Design Storm	PROJECT NO. 2017071 BY: JM CHK: GG

Pond No. 1

Month	Initial Volume [a]	Pond Evaporation [b]	PW Inflow (includes Stormwater) [c,1]	100-Year Precipitation	Volume Change [d]	Total Volume [e]	Divert Volume [f]	Final Volume [g]	Final Pond Depth [h]	Volume Check [i]	Surface Area
	(Mgal)	(Mgal)	(Mgal)	(Mgal)	(Mgal)	(Mgal)	(Mgal)	(Mgal)	(ft)	(Mgal)	(ft^2)
August	1.106	-0.100	0.314	0.001	0.214	1.320	0.091	1.229	10.0	0.091	21,216
September	1.229	-0.084	0.492	0.002	0.410	1.639	0.410	1.229	10.0	0.410	23,100
October	1.229	-0.058	0.387	0.030	0.358	1.587	0.358	1.229	10.0	0.358	23,100
November	1.229	-0.029	0.222	0.069	0.262	1.491	0.262	1.229	10.0	0.262	23,100
December	1.229	-0.019	0.192	0.145	0.319	1.548	0.319	1.229	10.0	0.319	23,100
January	1.229	-0.016	0.197	0.126	0.306	1.535	0.306	1.229	10.0	0.306	23,100
February	1.229	-0.026	0.217	0.133	0.324	1.553	0.324	1.229	10.0	0.324	23,100
March	1.229	-0.047	0.229	0.089	0.270	1.499	0.270	1.229	10.0	0.270	23,100
April	1.229	-0.074	0.203	0.039	0.169	1.398	0.169	1.229	10.0	0.169	23,100
May	1.229	-0.102	0.193	0.020	0.111	1.340	0.111	1.229	10.0	0.111	23,100
June	1.229	-0.125	0.168	0.005	0.048	1.277	0.048	1.229	10.0	0.048	23,100
July	1.229	-0.128	0.186	0.000	0.058	1.287	0.181	1.106	9.0	0.181	23,100
Total		**-0.809**	**3.000**	**0.659**	**2.850**		**2.850**			**2.850**	

Pond No. 2

Month	Initial Volume [a]	Pond Evaporation [b]	PW Inflow [c,2]	100-Year Precipitation	Volume Change [d]	Total Volume [e]	Divert Volume [f]	Final Volume [g]	Final Pond Depth [h]	Volume Check [i]	Surface Area
	(Mgal)	(Mgal)	(Mgal)	(Mgal)	(Mgal)	(Mgal)	(Mgal)	(Mgal)	(ft)	(Mgal)	(ft^2)
August	0.725	-0.069	0.091	0.001	0.023	0.748	0.023	0.725	9.0	0.023	14,476
September	0.725	-0.053	0.410	0.001	0.359	1.084	0.278	0.806	10.0	0.278	14,476
October	0.806	-0.040	0.358	0.020	0.338	1.144	0.338	0.806	10.0	0.338	16,000
November	0.806	-0.020	0.262	0.047	0.289	1.095	0.289	0.806	10.0	0.289	16,000
December	0.806	-0.013	0.319	0.099	0.405	1.210	0.405	0.806	10.0	0.405	16,000
January	0.806	-0.011	0.306	0.086	0.381	1.186	0.381	0.806	10.0	0.381	16,000
February	0.806	-0.018	0.324	0.091	0.397	1.202	0.397	0.806	10.0	0.397	16,000
March	0.806	-0.033	0.270	0.061	0.298	1.104	0.298	0.806	10.0	0.298	16,000
April	0.806	-0.051	0.169	0.027	0.145	0.950	0.145	0.806	10.0	0.145	16,000
May	0.806	-0.071	0.111	0.014	0.053	0.859	0.053	0.806	10.0	0.053	16,000
June	0.806	-0.086	0.048	0.003	-0.035	0.771	0.000	0.771	9.5	0.000	16,000
July	0.771	-0.084	0.181	0.000	0.097	0.868	0.143	0.725	9.0	0.143	15,238
Total		**-0.550**	**2.850**	**0.449**	**2.750**		**2.750**			**2.750**	

[a] Volume of each pond at the beginning of each month.
[b] Estimated pond evaporation by month based on starting volume.
[c,1] Process wastewater inflow to Pond 1. Includes estimate of stormwater runoff (if applicable).
[c,2] Inflow to Pond 2 is set to the Pond 1 divert volume.
[d] Volume change is equal to the sum of pond evaporation, PW inflow, and precipitation.
[e] Total volume is equal to initial volume plus the volume change.
[f] Divert volume is the amount of PW that exceeds a set pond volume (related to maximum pond height; Total de
[g] Final volume is equal to the total volume minus the divert volume.
[h] Pond depth associated with final volume.
[i] Determines difference between total volume and volume associated with the pond height to help determine dive

SUMMIT ENGINEERING, INC. Consulting Civil Engineers	E & C Winery Pond Water Balance Irrigation & Effluent Application Rates	PROJECT NO. 2017071 BY: JM CHK: GG

Applied Irrigation Area

Vineyard	9.0	acres
Pasture	0.0	acres

Total Area Available for Irrigation

Vineyard	17.0	acres
Pasture	17.0	acres

Month	Reference ET[a]	Pasture Coefficent [b]	Vineyard Crop Coefficient[c]	Pasture ET[d]	Vineyard ET[d]	Precipitation[e]	Irrigation Demand[f]		Operating Days per Month[g]	Percolation Capacity[h]		Assimilative Capacity[i]		Effluent Applied [j]		Excess Capacity [k]
	(in)			(in)	(in)	(in)	(in)	(Mgal)	(d)	(in)	(Mgal)	(in)	(Mgal)	(Mgal)	(in)	(Mgal)
August	6.5	0.9	0.5	5.9	2.9	0.1	2.9	0.702	28	4.48	1.096	7.3	1.797	0.023	0.09	1.77
September	5.1	0.9	0.3	4.6	1.3	0.2	1.2	0.285	21	3.36	0.822	4.5	1.106	0.278	1.14	0.83
October	3.4	0.9	0.1	3.1	0.2	2.3	0.0	0.000	20	3.20	0.783	3.2	0.783	0.338	1.38	0.44
November	1.8	0.8	0.0	1.4	0.0	5.2	0.0	0.000	14	2.24	0.548	2.2	0.548	0.289	1.18	0.26
December	0.9	0.8	0.0	0.7	0.0	11.0	0.0	0.000	12	1.92	0.470	1.9	0.470	0.405	1.66	0.06
January	1.2	0.8	0.0	1.0	0.0	9.5	0.0	0.000	12	1.92	0.470	1.9	0.470	0.381	1.56	0.09
February	1.7	0.8	0.0	1.3	0.0	10.1	0.0	0.000	11	1.76	0.430	1.8	0.430	0.397	1.62	0.03
March	3.4	0.8	0.0	2.7	0.0	6.7	0.0	0.000	11	1.76	0.430	1.8	0.430	0.298	1.22	0.13
April	4.8	0.9	0.2	4.3	0.8	3.0	0.0	0.000	14	2.24	0.548	2.2	0.548	0.145	0.59	0.40
May	6.2	0.9	0.6	5.6	3.6	1.5	2.1	0.512	20	3.20	0.783	5.3	1.295	0.053	0.22	1.24
June	6.9	0.9	0.7	6.2	4.9	0.4	4.5	1.104	22	3.52	0.861	8.0	1.965	0.000	0.00	1.96
July	7.4	0.9	0.6	6.7	4.8	0.0	4.8	1.164	26	4.16	1.017	8.9	2.182	0.143	0.58	2.04
Total	**49.4**			**43.6**	**18.5**	**49.8**	**15.4**	**3.8**	**211.0**	**33.8**	**8.3**	**49.2**	**12.0**	**2.7**	**11.3**	**9.27**

(a) Average monthly reference evapotranspiration rates, see Climate Data Worksheet.

(b) Kc coefficients for pasture from Table 5-1, "Irrigation with Reclaimed Municipal Wastewater-A Guidance Manual"- California State Water Resources Control Board, July 1984 (San Joaquin Valley).

(c) Kc coefficients for vineyards from Table 5-12, "Irrigation with Reclaimed Municipal Wastewater-A Guidance Manual"- California State Water Resources Control Board, July 1984 (San Joaquin Valley).

(d) ET=ETo x Kc. A weighted value is determined on the basis of the available irrigated acreage of vineyard and pasture.

(e) Precipitation, 100-year rainfall event, see Climate Data Worksheet.

(f) Irrigation Demand = ET-Precipitation, inches. A weighted value is determined on the basis of the available irrigated acreage of vineyard and pasture.

(g) Number of operating days per month based on estimated irrigation days available for Fairfield, CA. Hourly precipitation data from NOAA between 1972-2013.

(h) Design percolation rate is a maximum of 0.4 inches per day for the number of operating day per month. Design perc rate based on estimated hydraulic conductivity for soils in the area (USGS Websoil Survey) adjusted by a 0.04 safety factor to account for typical slow rate land application design methodology.

(i) Assimilative capacity is the sum of irrigation demand and percolation applied.

(j) Effluent applied is the monthly divert volume from Pond 2 (Sheet 5 of 6). This volume is also represented as a depth spread over the total irrigation area. Applied effluent should be monitored to insure no ponding occurs in the disposal area.

(k) Excess capacity is the difference between the Assimilative Capacity (note i) and the Effluent Applied (note j). This is the estimated remaining disposal capacity of the soil.

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