WASTEWATER FEASIBILITY STUDY

E & C Winery

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

4-19-09

SUMMIT

CIVIL STRUCTURAL ELECTRICAL WATER|WASTEWATER PLANNING

Project No. 2017071
September 2019

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. Based on the flow summary contained in Enclosure A, peak sanitary sewage flows are anticipated to be 7,415 gallons per day (GPD) for Phase 1, 7,815 GPD for Phase 2, and 8,775 GPD for Phase 3. A new on-site 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 areas 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 predominantly sandy clay loam with weak to moderate structure in the proposed sewage disposal area. A soil sample was collected, and hydrometer test performed to confirm the field texturing (laboratory results in 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 primary disposal areas by phase as summarized in Table 1. Additional area will be designated as septic system reserve area for each phase of the project.

Table 1: Summary of total domestic wastewater disposal area, in square feet (SF), required by project phase.

Parameter	Phase 1	Phase 2	Phase 3
Primary Disposal Area (SF)	18,000	19,000	22,000
Additional Reserve Area (SF)	36,000	38,000	44,000
Total Area (SF)	54,000	57,000	66,000

Note: Disposal area totals are cumulative for each phase.

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	Phase 3
Annual Production, GPY	125,000	500,000	2,000,000
Peak Daily PW Flow, GPD	4,100	16,400	43,750
Annual PW Flow, GPY	750,000	3,000,000	8,000,000

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 (see attached PW Aeration Requirements Worksheet). The balance shows approximately 3.5 acres of PW treatment ponds and effluent storage, and a minimum of 10 acres of vineyards for are required for PW treatment and irrigation disposal. 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 1 SANITARY SEWAGE DESIGN CRITERIA	PROJECT NO. 2017071 BY: SW CHK: GG

PHASE 1 DOMESTIC WASTEWATER FLOWS - Peak Visitation Day without Special Event/Wedding

Category	Number of People		Wastewater Generation (GPD)		Total Wastewater Flow (GPD)
Employees (Production)	20	@	20	=	400
Employees (Hospitality)	62	@	20	=	1,240
Visitors[1]	800	@	3	=	2,400
Visitors (with meal)[2]	25	@	15	=	375
Events[3,4]	100	@	15	=	1,500
Total				=	**5,915 GPD**

PHASE 1 DOMESTIC WASTEWATER FLOWS - Average Visitation Day with Special Event/Wedding

Category	Number of People		Wastewater Generation (GPD)		Total Wastewater Flow (GPD)
Employees (Production)	20	@	20	=	400
Employees (Hospitality)	62	@	20	=	1,240
Visitors[1]	800	@	3	=	2,400
Visitors (with meal)[2]	25	@	15	=	375
Events[6]	100	@	15	=	1,500
Special Events/Weddings[5]	100	@	15	=	1,500
Total				=	**7,415 GPD**

Notes:

1) Wine tasting visitors, no meals served
2) Food service will be catered with minimal preparation onsite until the commercial kitchen is developed.
3) Events with catered meals prepared offsite
4) Portable Toilets will supplement the disposal system for events over 100 people
5) Weddings with catered meals prepared offsite, wedding with more than 100 guests requires portable toilets
6) Events will not be held concurrently with special events/weddings

ANTICIPATED PHASE 1 SUBSURFACE DRIP SYSTEM SIZING

Parameter	Value	Units
Application Rate =	0.417	GPD/SF
Primary System Size =	18,000	SF
Reserve Area (200%) =	36,000	SF
Total Area =	54,000	SF
	1.24	acre

SUMMIT	E & C WINERY PHASE 2 SANITARY SEWAGE DESIGN CRITERIA	PROJECT NO. 2017071 BY: SW CHK: GG

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

Category	Number of People		Wastewater Generation (GPD)		Total Wastewater Flow (GPD)
Employees (Production)	40	@	20	=	800
Employees (Hospitality)	62	@	20	=	1,240
Visitors[1]	800	@	3	=	2,400
Visitors (with meal)[2]	25	@	15	=	375
Events[3,4]	100	@	15	=	1,500
Total				=	**6,315 GPD**

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

Category	Number of People		Wastewater Generation (GPD)		Total Wastewater Flow (GPD)
Employees (Production)	40	@	20	=	800
Employees (Hospitality)	62	@	20	=	1,240
Visitors[1]	800	@	3	=	2,400
Visitors (with meal)[2]	25	@	15	=	375
Events[6]	100	@	15	=	1,500
Special Events/Weddings[5]	100	@	15	=	1,500
Total				=	**7,815 GPD**

Notes:

1) Wine tasting visitors, no meals served
2) Food service will be catered with minimal preparation onsite until the commercial kitchen is developed.
3) Events with catered meals prepared offsite
4) Portable Toilets will supplement the disposal system for events over 100 people
5) Weddings with catered meals prepared offsite, wedding with more than 250 guests requires portable toilets
6) Events will not be held concurrently with special events/weddings

ANTICIPATED PHASE 2 SUBSURFACE DRIP SYSTEM SIZING

Parameter	Value	Units
Application Rate =	0.417	GPD/SF
Primary System Size =	19,000	SF
Reserve Area (200%) =	38,000	SF
Total Area =	57,000	SF
	1.31	acre

SUMMIT	E & C WINERY PHASE 3 SANITARY SEWAGE DESIGN CRITERIA	PROJECT NO. 2017071 BY: SW CHK: GG

PHASE 3 DOMESTIC WASTEWATER FLOWS - Peak Visitation Day without Special Event/Wedding

Category	Number of People		Wastewater Generation (GPD)		Total Wastewater Flow (GPD)
Employees (Production)	88	@	20	=	1,760
Employees (Hospitality)	62	@	20	=	1,240
Visitors[1]	800	@	3	=	2,400
Visitors (with meal)[2]	25	@	15	=	375
Events[3,4]	100	@	15	=	1,500
Total				=	**7,275 GPD**

PHASE 3 DOMESTIC WASTEWATER FLOWS - Average Visitation Day with Special Event/Wedding

Category	Number of People		Wastewater Generation (GPD)		Total Wastewater Flow (GPD)
Employees (Production)	88	@	20	=	1,760
Employees (Hospitality)	62	@	20	=	1,240
Visitors[1]	800	@	3	=	2,400
Visitors (with meal)[2]	25	@	15	=	375
Events[6]	100	@	15	=	1,500
Special Events/Weddings[5]	100	@	15	=	1,500
Total				=	**8,775 GPD**

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

ANTICIPATED PHASE 3 SUBSURFACE DRIP SYSTEM SIZING

Parameter	Value	Units
Application Rate =	0.417	GPD/SF
Primary System Size =	22,000	SF
Reserve Area (200%) =	44,000	SF
Total Area =	66,000	SF
	1.52	acre

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.
463 Aviation Blvd., Suite 200, Santa Rosa, CA 95403
707-527-0775

Site Address: Russell and Rockville Rd, 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-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

Summit Engineering, Inc.
463 Aviation Blvd., Suite 200, Santa Rosa, CA 95403
707-527-0775

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	Phase 3	Units
Annual Production	125,000	500,000	2,000,000	gal wine/year
PW Generation Rate [1]	6.0	6.0	4.0	gal PW/gal wine
Annual PW Flow	750,000	3,000,000	8,000,000	gal PW/year
Months of Harvest	Jul-Oct	Jul-Oct	Jul-Oct	
Average 92 Day Harvest Flow	3,745	14,980	39,947	gal PW/day
Average Day Peak Harvest Month Flow	4,100	16,400	43,750	gal PW/day
Average Winter Month Flow (Jan - Mar)	1,785	7,139	19,037	gal PW/day

SUMMIT	E & C WINERY PROCESS WASTEWATER (PW) POND WATER BALANCE	PROJECT NO. BY: CHK:	2017071 SW GG

DESIGN CRITERIA

FULL PRODUCTION

Annual Harvest	12,121	ton/year
Wine Generation Rate	165	gal wine/ton
Annual Production	841,202	cases wine/year
Wine Generation Rate	2.4	gal/case
Annual Production	2,000,000	gal wine/year
PW Generation Rate	4.0	gal PW/gal wine
Annual PW Flow	8,000,000	gal PW/year
Months of Harvest	Aug-Oct	
Average Day Harvest Flow	28,800	gal PW/day
Average Day Peak Harvest Month Flow	43,750	gal PW/day
Pond No. 1 Volume	2.807	Mgal
Pond No. 2 Volume	2.223	Mgal
Total Pond Volume	5.030	Mgal
Pond No. 1 HRT	64.2	days
Pond No. 2 HRT	50.8	days
Total HRT	115.0	days

DESIGN PROCESS WASTEWATER FLOWS

Month	Monthly Percentage of Annual Flow[a] (%)	Monthly Flow (Mgal)
August	6.2%	0.496
September	10.5%	0.836
October	16.4%	1.312
November	12.9%	1.031
December	7.4%	0.593
January	6.4%	0.513
February	6.6%	0.525
March	7.2%	0.578
April	7.6%	0.610
May	6.8%	0.542
June	6.4%	0.516
July	5.6%	0.448
Total	**100%**	**8.000**

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

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

DESIGN CRITERIA

Sizing Parameters

BOD Concentration	7,700	mg/L
Average Day, Peak Harvest Month Flow	43,750	gal PW/day
Oxygen Requirement	1.5	lbs O_2/lb BOD
Oxygen Transfer Rate Floating Brush Aerator)	2.5	lbs O_2/HP - hr
Power/ Volume Ratio, Pond No. 1	0.10 - 0.20	Hp/ 1,000 cu ft
Power/ Volume Ratio, Pond No. 2	0.05 - 0.10	Hp/ 1,000 cu ft
Pond No. 1 Volume	2.81	Mgal
Pond No. 2 Volume	2.22	Mgal

Aeration Pond No. 1

BOD Mass Loading	2,811	lbs BOD/day
Aerator Run Time	24	Hrs/day
Oxygen Requirement	176	lbs O_2
Aerator Horsepower Required	70	Hp
Aerator Horsepower Recommended	75	Hp
Check Power-to-Volume Ratio	0.20	Hp/ 1,000 CF

P\V range desired is 0.10 to 0.20, this will enable oxygen transfer and mixing to occur within the upper 3-4 feet of the pond as required in a facultative aerated lagoon system.

Aerated Pond No. 2

Aerator Hp	20	Hp
P\V	0.07	Hp/ 1,000 CF

SUMMIT	E & C WINERY PROCESS WASTEWATER (PW) Climate Data	PROJECT NO. BY: CHK:	2017071 SW 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	73.8	7.2	9.9	7.6	0.03	0.0	0.1
September	30	71.1	5.0	7.6	5.8	0.21	0.3	0.4
October	31	63.7	3.9	5.3	4.1	1.22	1.7	2.5
November	30	53.4	1.2	2.6	2.0	2.94	4.0	5.9
December	31	46.5	1.2	1.7	1.3	5.06	6.9	10.2
January	31	46.8	0.4	1.5	1.1	4.78	6.5	9.6
February	28	51.5	0.9	2.4	1.8	4.88	6.7	9.8
March	31	55.6	2.9	4.3	3.3	3.41	4.7	6.9
April	30	60.1	4.3	6.7	5.1	1.34	1.8	2.7
May	31	66.2	4.1	9.2	7.1	0.76	1.0	1.5
June	30	71.4	6.6	11.2	8.7	0.18	0.2	0.4
July	31	74.7	7.9	11.5	8.9	0.00	0.0	0.0
Total	**365**		**45.6**	**73.8**	**56.8**	**24.8**	**33.9**	**49.9**

[a] Average monthly temperature from NOAA from 1981-2010

[b] Average monthly reference evapotranspiration data for Zone 8, per CIMIS

[c] Average monthly pan evaporation rates observed at Lake Solano between 1975 and 2005.

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

[e] Average monthly rainfall observed by NOAA in Lodi between 1889 and 2003.

[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	E & C WINERY PROCESS WASTEWATER (PW) Pond Worksheet	PROJECT NO. BY: CHK:	2017071 SW GG

Pond No. 1

Bottom Width	115.0'	Bottom Radius	15.0'	Start Month	August
Bottom Length	230.0'	Top Radius	35.0'	Min. Depth	5.0'
Interior Side Slope (x:1)	3.0	Depth	10.0'	Annual PW	8.00 Mgal
Length:Width	0.5	Freeboard	2.0'	Initial Depth	10.0'

Depth (ft)	Length (ft)	Width (ft)	Radius (ft)	Surface Area (ft^2)	Total Volume (Mgal)
0	230	115	15	26,257	0.000
1	236	121	17	28,318	0.204
2	242	127	18	30,445	0.424
3	248	133	20	32,641	0.660
4	254	139	22	34,903	0.913
5	260	145	23	37,233	1.182
6	266	151	25	39,629	1.470
7	272	157	27	42,094	1.775
8	278	163	28	44,625	2.100
9	284	169	30	47,223	2.443
10	**290**	**175**	**32**	**49,889**	**2.807**
11	296	181	33	52,622	3.190
12	**302**	**187**	**35**	**55,422**	**3.594**

Pond No. 2

Bottom Width	100.0'	Bottom Radius	15.0'	Start Month	August
Bottom Length	200.0'	Top Radius	35.0'	Min. Depth	3.0'
Interior Side Slope (x:1)	3.0	Depth	10.0'	Divert Volume	7.40 Mgal
Length:Width	0.5	Freeboard	2.0'	Initial Depth	5.0'

Depth (ft)	Length (ft)	Width (ft)	Radius (ft)	Surface Area (ft^2)	Total Volume (Mgal)
0	200	100	15	19,807	0.000
1	206	106	17	21,598	0.155
2	212	112	18	23,455	0.323
3	218	118	20	25,381	0.506
4	224	124	22	27,373	0.703
5	230	130	23	29,433	0.916
6	236	136	25	31,559	1.144
7	242	142	27	33,754	1.388
8	248	148	28	36,015	1.649
9	254	154	30	38,343	1.927
10	**260**	**160**	32	**40,739**	**2.223**
11	266	166	33	43,202	2.537
12	**272**	**172**	**35**	**45,732**	**2.870**

SUMMIT	E & C WINERY PROCESS WASTEWATER (PW) Pond Water Balance	PROJECT NO. 2017071 BY: SW CHK: GG

Pond No. 1

Month	Initial Volume (Mgal)	Pond Evaporation (Mgal)	PW Inflow (Mgal)	10 Year Precipitation (Mgal)	Volume Change (Mgal)	Total Volume (Mgal)	Divert Volume (Mgal)	Final Volume (Mgal)	Final Pond Depth (ft)
August	2.807	-0.236	0.496	0.001	0.261	3.067	0.261	2.807	10.0
September	2.807	-0.182	0.836	0.010	0.665	3.471	0.665	2.807	10.0
October	2.807	-0.126	1.312	0.058	1.244	4.050	1.244	2.807	10.0
November	2.807	-0.062	1.031	0.139	1.108	3.914	1.108	2.807	10.0
December	2.807	-0.040	0.593	0.239	0.792	3.598	0.792	2.807	10.0
January	2.807	-0.035	0.513	0.225	0.703	3.510	0.703	2.807	10.0
February	2.807	-0.057	0.525	0.230	0.698	3.505	0.698	2.807	10.0
March	2.807	-0.102	0.578	0.161	0.636	3.443	0.636	2.807	10.0
April	2.807	-0.159	0.610	0.063	0.514	3.321	0.514	2.807	10.0
May	2.807	-0.221	0.542	0.036	0.356	3.163	0.356	2.807	10.0
June	2.807	-0.269	0.516	0.008	0.255	3.062	0.255	2.807	10.0
July	2.807	-0.276	0.448	0.000	0.171	2.978	0.171	2.807	10.0
Total		-1.766	8.000	1.170	7.404		7.404		

Pond No. 2

Month	Initial Volume (Mgal)	Pond Evaporation (Mgal)	PW Inflow (Mgal)	10 Year Precipitation (Mgal)	Volume Change (Mgal)	Total Volume (Mgal)	Divert Volume (Mgal)	Final Volume (Mgal)	Final Pond Depth (ft)
August	1.144	-0.149	0.261	0.000	0.112	1.256	0.700	0.556	3.2
September	0.556	-0.094	0.665	0.000	0.571	1.126	0.600	0.526	3.1
October	0.526	-0.065	1.244	0.000	1.179	1.706	1.100	0.606	3.5
November	0.606	-0.033	1.108	0.000	1.075	1.681	1.150	0.531	3.1
December	0.531	-0.021	0.792	0.000	0.771	1.302	0.425	0.877	4.8
January	0.877	-0.021	0.703	0.000	0.683	1.559	0.500	1.059	5.6
February	1.059	-0.035	0.698	0.000	0.664	1.723	0.000	1.723	8.2
March	1.723	-0.075	0.636	0.000	0.561	2.284	0.061	2.223	10.0
April	2.223	-0.130	0.514	0.000	0.384	2.607	0.500	2.107	9.6
May	2.107	-0.176	0.356	0.000	0.180	2.287	0.750	1.537	7.5
June	1.537	-0.188	0.255	0.000	0.067	1.604	0.500	1.104	5.8
July	1.104	-0.172	0.171	0.000	-0.001	1.103	0.056	1.047	5.5
Total		**-1.159**	**7.404**	**0.000**	**6.245**		**6.342**		

SUMMIT	E & C WINERY PROCESS WASTEWATER (PW) Irrigation & Effluent Application Rates	PROJECT NO. 2017071 BY: SW CHK: GG

Applied Irrigation Area Vineyard 10.0 acres
Pasture 10.0 acres

Total Area Available for Irrigation Vineyard 17.0 acres
Pasture 17.0 acres

Month	Reference ET[a]	Pasture Crop Coefficient[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		Excess Capacity
	(in)			(in)	(in)	(in)	(in)	(Mgal)	(d)	(in)	(Mgal)	(in)	(Mgal)	(Mgal)	(in)	(Mgal)
August	7.2	0.9	0.45	6.5	3.2	0.0	4.8	2.623	31	4.96	2.695	9.8	5.318	0.700	1.29	4.62
September	5.0	0.9	0.26	4.5	1.3	0.3	2.6	1.423	30	4.80	2.608	7.4	4.032	0.600	1.10	3.43
October	3.9	0.9	0.07	3.5	0.3	1.7	0.2	0.113	16	2.56	1.391	2.8	1.504	1.100	2.03	0.40
November	1.2	0.8	0.00	1.0	0.0	4.0	0.0	0.000	14	2.24	1.217	2.2	1.217	1.150	2.12	0.07
December	1.2	0.8	0.00	0.9	0.0	6.9	0.0	0.000	5	0.80	0.435	0.8	0.435	0.425	0.78	0.01
January	0.4	0.8	0.00	0.3	0.0	6.5	0.0	0.000	6	0.96	0.522	1.0	0.522	0.500	0.92	0.02
February	0.9	0.8	0.00	0.7	0.0	6.7	0.0	0.000	5	0.80	0.435	0.8	0.435	0.000	0.00	0.43
March	2.9	0.8	0.00	2.3	0.0	4.7	0.0	0.000	12	1.92	1.043	1.9	1.043	0.061	0.11	0.98
April	4.3	0.9	0.16	3.9	0.7	1.8	0.5	0.245	13	2.08	1.130	2.5	1.375	0.500	0.92	0.87
May	4.1	0.9	0.58	3.7	2.4	1.0	2.0	1.097	16	2.56	1.391	4.6	2.488	0.750	1.38	1.74
June	6.6	0.9	0.71	6.0	4.7	0.2	5.1	2.767	17	2.72	1.478	7.8	4.245	0.500	0.92	3.75
July	7.9	0.9	0.64	7.1	5.0	0.0	6.1	3.293	30	4.80	2.608	10.9	5.902	0.056	0.10	5.85
Total	**45.6**			**40.3**	**17.6**	**33.9**	**21.3**	**11.6**	**195.0**	**31.2**	**17.0**	**52.5**	**28.5**	**6.3**	**11.7**	**22.17**

(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, 84-1 wr, SWRCB.
(d) ET=ETo x Kc. A weighted value is determined on the basis of the available irrigated acreage of vineyard and pasture.
(e) Precipitation, 10-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 based on 24-hr post storm criteria for a 100-year return period. Summit Engineering, NBRID Capacity Study, April 1996.
(h) Design percolation rate is 0.79 inches per day for the number of operating day per month. Design perc rate based info from NRCS website. Tolay Fine Sandy Loam soil, high capacity (1.98 - 5.95 in/hr). Selected 1.98 in/hr as basis for calculation. 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.