May 2014
#08-31

BARTELT ENGINEERING

ONSITE WASTEWATER DISPOSAL FEASIBILITY STUDY FOR THE MOUNTAIN PEAK WINERY 3265 SODA CANYON ROAD, NAPA COUNTY, CA 94558 APN 032-500-033

As required by Napa County Planning, Building & Environmental Services, this study outlines the feasibility of providing onsite wastewater disposal for a potential winery and tasting room on the above referenced parcel located at 3265 Soda Canyon Road in Napa, California.

PROJECT DESCRIPTION

It is our understanding that the project proposes to construct a full crush winery on the above referenced parcel with the intent of the facility having the capability of producing 100,000 gallons of wine per year. Along with the proposed wine production at the site, the project proposes a moderate staffing and marketing plan. The project proposes nineteen (19) full-time employees, four (4) part-time employees and four (4) seasonal (harvest) employees. The project also proposes to offer private tour and tasting appointments for a maximum number of eighty (80) guests per day and 350 guests per week. Furthermore, the Applicant plans to offer three (3) food and wine pairing events per month for parties up to 12 persons and three (3) food and wine pairing events per month for parties up to 24 persons. Additionally, the Applicant intends to host four (4) wine club/release events per year for groups of up to 75 persons and two (2) other 125 person auction related event at the winery.

Table 1 summarizes the proposed marketing plan:

TABLE 1: MARKETING PLAN SUMMARY

Guest Experience Proposed	Frequency Proposed	Number of Persons Proposed
Private Tours & Tasting	Daily	80 per day
Food & Wine Pairings	3 per month 3 per month	12 per event 24 per event
Wine Club / Release Events	4 per year	75 per event
Auction Related Events	2 per year	125 per event

As part of our work, representatives from Bartelt Engineering have reviewed the planned operational methods for the winery with our Client, reviewed the parcel files at Napa County Environmental Health, held conversations with Napa County Environmental Health staff, performed a reconnaissance of the site to view existing conditions and conducted a site evaluation on May 29, 2013 to evaluate the feasibility of installing a septic system to serve the proposed winery and tasting room.

This study and the attached Use Permit Drawings will demonstrate that the proposed winery improvements and marketing plan can feasibly be developed and that the parcel can adequately dispose of all wastewater onsite.

WATER USE ANALYSIS

Bartelt Engineering has completed a Phase One Water Availability Analysis for the proposed winery. According to the Phase One Water Analysis, the parcel is allotted 20.88± acre-feet of water per year. The Phase One Water Analysis estimates that the proposed water uses for the entire parcel (vineyard and winery production of 100,000 gallons per year) will be approximately 18.05± acre-feet of water per year (see the Phase One Water Availability Analysis prepared by Bartelt Engineering for more information on the proposed water use).

WASTEWATER ANALYSIS

Winery Production Process Wastewater Flow

The winery facility's production wastewater (PW) flow rates for harvest and non-harvest seasons can be calculated as follows:

Harvest Peak Winery Process Wastewater Flow $(PW)_{HARVEST}$ =

$$\left(\frac{100{,}000 \text{ gallons of wine}}{\text{year}}\right) \times \left(\frac{1.5 \text{ gallons of water}}{1 \text{ gallon of wine}}\right) \times \left(\frac{1 \text{year}}{60 \text{ days of crush}}\right) =$$

Harvest Peak Winery Process Wastewater Flow $(PW)_{HARVEST\ PEAK}$ = 2,500 gallons per day (gpd)

Non-Harvest Peak Winery Process Wastewater Flow $(PW)_{NON\text{-}HARVEST}$ =

$$\left(\frac{100{,}000 \text{ gallons of wine}}{\text{year}}\right) \times \left(\frac{6 \text{ gallons water}}{1 \text{ gallon of wine}}\right) \times \left(\frac{1 \text{ year}}{305 \text{ days}}\right) =$$

Non-Harvest Peak Winery Process Wastewater Flow $(PW)_{NON\text{-}HARVEST}$ = 1,967 gpd

Winery Sanitary Wastewater Flow

All plumbing fixtures in the winery production facility and tasting room will be water saving fixtures per the California Plumbing Code as adopted by the Napa County Building Division. The sanitary wastewater generated at the winery production facility and tasting room including full-time employees, part-time employees, seasonal (harvest) employees and guests (SW_{WINE}) and can be itemized as follows:

Employees (SW Employee):

- 19 Full-Time Employees x 15.0 gpd per employee = 285 gpd
- 4 Part-Time x 15.0 gpd per employee = 60 gpd
- 4 Harvest Season x 15.0 gpd per employee = 60 gpd

Guests[1,2]:

- Private Tours and Tasting (SW Tours & Tasting):
  - (80 guests per day) x (6 gpd per guest) = 480 gpd
- Food and Wine Pairings - Lunch (SW Food & Wine Pairings $_{LUNCH}$):
  - (12 guests per event) x (11 gpd per guest) = 132 gpd per event
- Food and Wine Pairings - Dinner (SW Food & Wine Pairings $_{DINNER}$):
  - (24 guests per event) x (11 gpd per guest) = 264 gpd per event
- Wine Club / Release Events (SW Wine Club / Release Events):
  - (75 guests per event) x (11 gpd per guest) = 825 gpd per event
- Auction Related Events (SW Auction Related Events):
  - (125 guests per event) x (11 gpd per guest) = 1,375 gpd per event

Total Harvest Season Peak Winery Sanitary Wastewater Flow

The total proposed harvest season peak winery sanitary wastewater flow $(SW_{WINE})_{HARVEST}$ is the combination of the winery and tasting room sanitary wastewater flow during the months of August through December (harvest season). Private Tours and Tasting with Food and both Food and Wine Pairings with lunch/dinner may be held on the same day; however, it is planned that Wine Club / Release Events will not occur simultaneously nor be held on the same day as Private Tours and Tasting with Food or Food and Wine Pairings. Furthermore, it is assumed that Auction Related Events will not occur during the harvest season.

$(SW\ Employee_{FULL\text{-}TIME + PART\text{-}TIME + SEASONAL})_{HARVEST}$ + $(SW\ T\&T)_{HARVEST}$ + $(SW\ F\&W_{LUNCH + DINNER})_{HARVEST}$ =

(285 + 60 + 60) gpd + 480 gpd + (132 + 264) gpd =

Winery Harvest Season Peak Sanitary Wastewater Flow $(SW_{WINE})_{HARVEST}$ = 1,281gpd

Total Non-Harvest Season Peak Winery Sanitary Wastewater Flow

The total proposed non-harvest season peak winery sanitary wastewater flow $(SW_{WINE})_{NON\text{-}HARVEST}$ is the combination of the winery and tasting room sanitary wastewater flow during the months of January through July and is shown as follows:

$(SW\ Employee_{FULL\text{-}TIME + PART\text{-}TIME})_{NON\text{-}HARVEST}$ + $(SW\ T\&T)_{NON\text{-}HARVEST}$ + $(SW\ F\&W_{LUNCH + DINNER})_{NON\text{-}HARVEST}$ =

(285 + 60) gpd + 480 gpd + (132 + 264) gpd = 1,221 gpd

Again, Private Tours and Tastings with Food and both Food and Wine Pairings with lunch/dinner may be held on the same day; however, it is planned that Wine Club / Release Events and Auction Related Events will not occur simultaneously nor be held on the same day as Private Tours and Tastings with Food or Food and Wine Pairings. Furthermore, because the Auction Related Events occur during the non-harvest season and

[1] Volume rate accounts for 3 gpd to 8 gpd from the commercial kitchen and 3 gpd from restroom use
[2] Represents a maximum as event may occur during harvest or non-harvest seasons

generate greater flows per day than the Private Tours and Tastings with Food and Food and Wine Pairings with lunch/dinner or the Wine Club / Release Events, the winery non-harvest season peak sanitary wastewater flow ($SW_{WINE})_{NON\text{-}HARVEST}$ is calculated as follows:

$(SW\ Employee_{FULL\text{-}TIME + PART\text{-}TIME})_{NON\text{-}HARVEST}$	+	$(SW\ Auction\ Related\ Events)_{NON\text{-}HARVEST}$	=
(285 +60) gpd	+	1,375 gpd	=
Winery Non-Harvest Season Peak Sanitary Wastewater Flow $(SW_{WINE})_{NON\text{-}HARVEST}$			= 1,720 gpd

The greatest harvest and non-harvest season peak process and sanitary wastewater flows are summarized in the following table:

TABLE 2: HARVEST AND NON-HARVEST SEASON PEAK WASTEWATER SUMMARY

Wastewater Source	Harvest (gpd)	Non-Harvest (gpd)
Process Wastewater (PW)	2,500	1,967
Sanitary Wastewater (SW)	1,281	1,720
Combined Wastewater (SW + PW)	3,781	3,687

The greatest total proposed wastewater flow is the combination of the greatest winery facility's production flow (PW) and the winery and tasting room sanitary wastewater (SW_{WINE}) flow that occurs in the same season and on the same day. The project's wastewater treatment system will be designed based on the flows outlined in Table 2.

WASTEWATER EFFLUENT DISPOSAL METHODS

Proposed Seasonal Surface Drip Irrigation Wastewater Disposal System

Bartelt Engineering proposes to dispose of the winery facility's process and sanitary wastewater utilizing a pretreatment system and disposing of the treated wastewater effluent via seasonal surface irrigation to the existing onsite vineyards.

The winery facility's process wastewater treatment system will consist of several steps. The floors of the proposed winery crush pad and caves will be sloped so that all process wastewater is collected in trench drains and floor drains. The drains will be fitted with baskets to collect a majority of the larger debris. The winery process wastewater collected in the trench drains and floor drains will then gravity flow into a trash tank fitted with filters to remove finer solids. From the trash tank, the process wastewater effluent will gravity flow and combine with the winery and tasting room sanitary wastewater effluent before gravity flowing to two (2) 10,000 gallon equalization tanks.

The winery and tasting room sanitary wastewater will gravity flow to a series of septic tanks fitted with filters for solids removal. A grease interceptor tank will be required for the proposed commercial kitchen in the tasting room. From the septic tanks, sanitary wastewater effluent will gravity flow to a sump vault where it will be combined with the

winery process wastewater effluent before gravity flowing to two (2) 10,000 gallon equalization tanks as stated previously.

The combined wastewater effluent in the equalization tanks will be treated by a pretreatment system. After the winery facility's process wastewater and winery and tasting room sanitary wastewater effluent has been treated, the treated effluent will then be stored in storage tanks from which it will be distributed via seasonal surface irrigation on a designated portion of the existing vineyards on the parcel.

Surface Drip Irrigation Wastewater Flow Balance

A wastewater flow balance was determined by estimating the monthly wastewater produced (see Table I), determining the potential/available volume of treated effluent that can be disposed of in the vineyard each month (see Table III), the average irrigation flow based on estimated vineyard irrigation practice (see Table IV) and sizing a storage tank to be able to store excess treated wastewater effluent until it can be properly disposed of in the vineyard (see Table V). Precipitation data for a 10-year return period was used for the irrigation analysis (see Table II). The estimates for a 10-year return period were taken from Oakville 1W Weather Station data derived from 1948-1981 Normals.

The treated wastewater effluent storage tank should have a minimum volume of 50,000 gallons (see attached Table V) to provide for some storage of the treated effluent through the winter months when surface drip land application is minimal and to equalize differences between the wastewater generation rate and the irrigation application rate. Reference evapotranspiration rates and crop coefficients were used to calculate the irrigation demand for the existing vineyard (see Table III). The evapotranspiration rates and crop coefficients were obtained from the California Irrigation Management Information System website[3] for Oakville #77 weather station (attached). It was assumed that available groundwater in the root zone is depleted by May and that irrigation is primarily applied to the vines for the months of May through October. In the months where the irrigation demand exceeds the amount of treated effluent that is available for irrigation, it is assumed that the entire irrigation requirement for the vines is not met or that another water source (onsite well) is used to supply additional irrigation water.

The winery effluent surface irrigation drip disposal area design is based on 22.80± acres or approximately 41,382 existing and/or proposed grape vines located on the parcel[4]. The disposal area will need to be verified once all disposal field setbacks are determined. Furthermore, all disposal field areas will need to be labeled with signage indicating the use of treated effluent for irrigation in accordance with Napa County Environmental Health standards.

Alternative Winery and Tasting Room Sanitary Wastewater Dispersal Systems

Bartelt Engineering is also proposing alternatives to combining the winery facility process wastewater and winery and tasting room sanitary wastewater; both alternatives require

---

[3] http://wwwcimis.water.ca.gov

[4] Refer to Bartelt Engineering's approved Track II Vineyard Erosion Control Plan for Mountain Peak Vineyards, LLC dated June 2013 (Napa County P13-00144-ECPA). Area reported herein includes a 5.2± acre reduction of approved plantable acreage as a result of this project's footprint.

two (2) separate wastewater dispersal systems be installed to treat and dispose of the wastewater generated by the winery and tasting room. Under both alternatives, the winery facility process wastewater would be treated and disposed of as described above via surface drip irrigation to the onsite vineyards; however, the winery sanitary wastewater would be kept separate from the process wastewater and disposed of along with the tasting room sanitary wastewater via a subsurface drip or pressure distribution (PD) dispersal field.

Under the subsurface drip and PD alternatives, the winery facility and tasting room sanitary wastewater will gravity flow to a series of septic tanks fitted with filters for solids removal. A grease interceptor tank will be required for the proposed commercial kitchen in the tasting room. From the septic tanks, sanitary wastewater effluent will gravity flow to a recirculation / blend tank from which it will be time dosed to an AdvanTex AX Treatment System. Filtrate from the AdvanTex Treatment system will flow via gravity to a recirculating / splitter valve located at the riser over the inlet compartment of the recirculation / blend tank. The recirculating / splitter valve will direct the filtrate either back into the recirculation / blend tank to mix with incoming septic tank effluent or to the discharge sump tank for delivery to the dispersal field depending on the effluent level in the recirculation / blend tank. Treated effluent stored in the sump tank will then be disposed of via a subsurface drip or pressure distribution dispersal field.

Sanitary Wastewater Effluent Subsurface Drip Disposal Field and Reserve Area

Based on the site evaluation performed by Bartelt Engineering on May 29, 2013, test pits #1 through #7 showed similar results and are acceptable for a subsurface drip dispersal type septic system and 200% reserve area. The site evaluation determined that the soil in the area of these test pits is Clay Loam (CL). According to Napa County Standards, a hydraulic loading rate of 0.60 gal/sf/day is allowed for this soil type using an alternative sewage treatment system[5]. The maximum acceptable soil depth found during the site evaluation was approximately 60 inches. Napa County Standards require a minimum of 24 inches of useable soil below the drip lines and a minimum of six (6) inches and a maximum of eight (8) inches of cover. The maximum acceptable soil depth found at the site allows for 2 inches of useable soil beneath drip emitters buried six (6) inches below the ground surface. The required subsurface drip disposal field area can be calculated as follows:

$$\text{Disposal Field Area} = \left(\frac{\text{design flow rate}}{\text{soil loading rate}}\right) = \left(\frac{1{,}720\ \frac{gal}{day}}{0.6\ \frac{gal}{day \cdot ft^2}}\right) = 2{,}867, \text{ use } 3{,}050 \text{ square feet}$$

200% Reserve Area = 6,100 square feet

Slopes within the disposal field area are less than 20% so the design is based on two (2) foot lateral spacing between drip lines and two (2) foot emitter spacing.

[5] Soil application rate is 0.60 gal/sf/day and 0.75 gal/sf/day for septic tank effluent (STE) and pre-treated effluent (PTE) alternative sewage treatment systems, respectively.

The required number of emitters is calculated as follows:

$$\text{Required Number of Emitters} = 3{,}050 \text{ square feet} \times \frac{1 \text{ emitter}}{4 \text{ square feet}} = 763 \text{ emitters}$$

To make the best use of the available disposal field area we recommend the system consist of four (4) zones, each zone having an area of 763 square feet with a total of 382 lineal feet of drip line per zone. This layout provides 191 emitters per zone or 764 total emitters.

Sanitary Wastewater Effluent Pressure Distribution Disposal Field and Reserve Area

Based on the site evaluation performed by Bartelt Engineering on May 29, 2013, test pits #1 through #7 showed similar results and are acceptable for a pressure distribution (PD) dispersal type septic system and 100% reserve area. The site evaluation determined that the soil in the area of these test pits is Clay Loam (CL). According to Napa County Standards, a hydraulic loading rate of 0.60 gal/sf/day is allowed for this soil type using an alternative sewage treatment system[6]. The maximum acceptable depth found during the site evaluation was approximately 60 inches. Napa County Standards require a minimum of 36 inches below the trench bottom to the limiting condition, unless an approved pretreatment device is provided, then the distance may be reduced to 24 inches. The maximum acceptable soil depth found at the site allows for 36 inches of useable soil beneath the 24 inch deep trench to the limiting condition. The test pits show that a 32 inch deep trench can be constructed that allows for a lateral to be buried 8 inches below original grade and provide 16 inches of backfill below to the bottom of the trench to original grade so long as 8 inches of soil is placed on top of original grade to achieve finish grade. Slopes within the disposal field area are less than 20% and the sidewall area is below the three (3) square feet per linear foot maximum. The minimum required lineal feet of trench for the PD system can be calculated as follows:

$$\text{Required Trench Length} = \left(\frac{\text{design flow rate}}{(\text{effective surface area}) \cdot (\text{soil aplication rate})} \right) =$$

$$\left(\frac{1{,}800 \ \frac{gal}{day}}{0.6 \frac{gal}{day \ ft^2} \times 3.00 \frac{ft^2}{lf}} \right) = 1{,}000.0\pm, \text{ use } 1{,}000 \text{ linear feet}$$

100% Reserve Area = 13,980 square feet

To make the best use of the available disposal field area we recommend the system consist of four (4) subfields, each subfield containing 250 linear feet (lf) of trench for a system total of 1,008 lineal feet of leach line.

[6] Soil application rate is 0.60 gal/sf/day and 0.75 gal/sf/day for septic tank effluent (STE) and pre-treated effluent (PTE) alternative sewage treatment systems, respectively.

TANK SIZING

Utilizing the pretreatment system and seasonal surface irrigation, all septic tanks should be sized to provide a minimum of two (2) days retention time during peak wastewater flow. Based on discussions with the manufacturers of pretreatment systems, the equalization tank should be sized for a minimum of one and a half (1.5) days of peak flow capacity. The irrigation storage tank should be sized based on vineyard irrigation demands and flow balance calculations, see enclosed spreadsheets for preliminary calculations on treated wastewater flows and irrigation demands.

Under the alternative designs, the septic tanks should be sized to provide a minimum of five (5) days of retention time during peak wastewater flow. A grease interceptor tank will be required for the proposed commercial kitchen in the tasting room and should be sized for a minimum retention time of three (3) days. Any recirculation/blend/equalization tank or dosing tank should be sized for a minimum of one and a half (1.5) days of peak wastewater flow.

Regardless of the system, all septic tanks should have a Zabel A300 filter or approved equal installed at the outlet to aid in the screening of suspended solids and the reduction of BOD in the wastewater effluent stream.

Wine Cave Setbacks to Septic Systems

We have reviewed Napa County Environmental Health files to determine if there are any septic systems located within 400 feet of the proposed cave location. Based on the Napa County Geographic Information System topographic maps and parcel boundary overlay, we have identified several parcels with existing septic systems that fall within 400 feet of the proposed cave that are at an elevation that is equal to or higher than the proposed cave finish floor. The identified parcels and the associated septic systems are shown on the enclosed "Cave and Septic Location Map".

The following is a summary of our findings per Napa County Environmental Health records regarding the existing septic systems on the identified parcels:

APN 032-500-033 (subject parcel)	There is an existing residential septic system that was installed in 2005. The septic system is located at an elevation higher than the proposed cave floor and 152± feet to the northeast. This system will be used during Phase I and demolished during Phase II of the project. The project does propose to install a pretreatment system with storage tanks to be located more than 550± feet from the proposed cave and at an elevation lower than the proposed cave.
APN 032-500-041	There is one (1) existing septic system on the parcel that was installed in 1976. The septic system is located at an elevation lower than the proposed cave floor and 550± feet to the east. The location of the septic system is situated on slopes that drain away from the proposed cave location.
APN 032-230-001	There is one (1) existing septic system on the parcel that was installed in 1972 and expanded in 1977. The septic system is located at an elevation higher than the proposed cave floor and 125± feet to the south. The location of the septic system is situated on slopes that drain towards the proposed cave location. This septic system is separated from the proposed cave location by Soda Canyon Road and a road side ditch.
APN 032-230-010	There is one (1) existing septic system on the parcel that was installed in 1971. The septic system is located at an elevation higher than the proposed cave floor and 250± feet to the southeast. The location of the septic system is situated on slopes that drain away from the proposed cave location. This septic system is separated from the proposed cave location by Soda Canyon Road and a road side ditch.

The following parcels are in the surrounding area and are adjacent to properties within the 400 foot cave setback. These properties are not expected to drain towards the proposed cave location.

APN 032-230-002, -003, -008, -009, -011 and -012

The following parcels are located within the 400 foot cave setback, however they are downhill of the subject parcel or their natural drainage is either away from or does not allow drainage towards the proposed cave location.

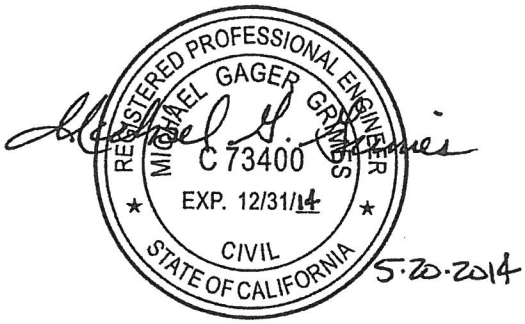
APN 032-440-021 and -022
APN 032-500-032

CONCLUSIONS

The Phase One Water Analysis shows that there is an adequate water allotment to support a 100,000 gallon per year winery on the parcel.

The parcel will be able to support the proposed 100,000 gallon winery and tasting room by utilizing a pretreatment system to treat the combined process wastewater and the sanitary sewer wastewater effluent and dispose of treated effluent through surface drip irrigation to the vineyard or the alternative options of disposing of the treated process wastewater effluent utilizing a pretreatment system to treat the effluent and dispose of the treated effluent through a surface drip irrigation to the vineyard and disposing of the sanitary sewer effluent through either an onsite subsurface drip or a pressure distribution type dispersal field utilizing an AdvanTex AX Treatment System to pretreat the sanitary sewer effluent.

The above calculations should assist you in processing the subject Use Permit Application. Full design calculations and construction plans will be completed after approval of the Use Permit under consideration.



REFERENCES

California Onsite Wastewater Association (COWA). "Pumping and Pressure Distribution Systems." May 1998.

Geoflow, Inc. *Wastewater Design, Installation and Maintenance Guidelines.* v1, 2007.

Napa County Department of Environmental Management. "Design, Construction and Installation of Alternative Sewage Treatment Systems." April 12, 2010.

Telsco Industries. "Turf Irrigation Manual." By James A. Watkins. 1987.

U.S. Department of Health, Education and Welfare, Public Health Service Publication. *Manual of Septic-Tank Practice.* 1967.

U.S. Environmental Protection Agency. "Onsite Wastewater Treatment Systems Manual." February 2002.

BARTELT ENGINEERING

Mountain Peak Winery
Process & Sanitary Sewer Wastewater Flow
Table I

Total annual wine production (gallons):	**100,000**
Annual water usage per gallon of wine (gallons):	**6**
Annual process wastewater flow (gallons):	600,000
Average daily process wastewater flow (gpd):	1,644
Annual sanitary sewer wastewater flow (gallons):	535,956

MONTHLY WASTEWATER FLOW (gallons/month):

Process & Sanitary Sewer Wastewater Flow		
Month	**Percent**	**Wastewater Flow**
September	**12.5**	141,995
October	**12.5**	141,995
November	**7.5**	85,197
December	**7.5**	85,197
January	**5.5**	62,478
February	**5.5**	62,478
March	**5.5**	62,478
April	**7.5**	85,197
May	**7.5**	85,197
June	**7.5**	85,197
July	**8.5**	96,556
August	**12.5**	141,995
TOTALS	100.0	1,135,956

Notes:

> Wastewater monthly proportioning is based on historical information

>The annual water usage per gallon of wine is assumed to be 6 gallons.

Map I

BARTELT ENGINEERING

Mountain Peak Winery
Rainfall Rates
Table II

MONTHLY RAINFALL (inches/month):

Rainfall Rates		
Month	Site Rainfall	10-year Rainfall
September	**0.40**	0.56
October	**2.10**	2.94
November	**3.50**	4.90
December	**5.60**	7.84
January	**7.70**	10.78
February	**6.70**	9.38
March	**3.70**	5.18
April	**1.90**	2.66
May	**0.50**	0.70
June	**0.10**	0.14
July	**0.10**	0.14
August	**0.10**	0.14
TOTALS	**32.40**	**45.36**

Notes:

> Site rainfall = Napa, CA (Oakville 1W Weather Station 1948 - 1981). See www.worldclimate.com

> 10 year rainfall = Site rainfall x 1.4

BARTELT ENGINEERING

Mountain Peak Winery
Available Irrigation Flow
Table III - Vineyard

Vineyard Irrigation
Drip Field Area (acres): 22.80

Month	Days	Potential [1] Evapotranspiration, ETo (in)	Grapevine Crop [2] Coefficient, Kc	Grapevine [3] Evapotranspiration, ETc (in)	Precipitation [4] 10-year, $i_{10\text{-}YR}$ (in)	Irrigation [5] Demand (in)	Total Irrigation [6] Available (gallons)
September	30	4.98	1.063	5.3	0.56	4.7	2,929,196.8
October	31	3.46	1.063	3.7	2.94	0.7	455,824.8
November	30	1.63	1.063	1.7	4.90	0.0	0.0
December	31	1.15	1.063	1.2	7.84	0.0	0.0
January	31	1.61	1.063	1.7	10.78	0.0	0.0
February	28	2.57	1.063	2.7	9.38	0.0	0.0
March	31	3.51	1.063	3.7	5.18	0.0	0.0
April	30	5.98	1.063	6.4	2.66	3.7	2,286,863.0
May	31	6.89	1.063	7.3	0.70	6.6	4,098,940.8
June	30	7.33	1.063	7.8	0.14	7.6	4,735,083.4
July	31	7.05	1.063	7.5	0.14	7.4	4,550,896.2
August	31	6.35	1.063	6.7	0.14	6.6	4,090,428.0
TOTALS	365	52.51	12.750	55.8	45.36	37.4	23,147,233.1

(1) Average monthly reference evapotranspiration. Station #77, Oakville, for the period from May 2012 to April 2013. See www.cimis.water.ca.gov
(2) K_c coefficients for grapevines
(3) $ET_c = ET_o \times K_c$
(4) 10-year precipitation = Average precipitation x 1.4. See Rainfall Rates, Table II
(5) Irrigation Demand = ET_c - 10-year precipitation
(6) Total irrigation available (gallons/month) = (No. of acres) x irrigation demand (inches/month) / 12 (inches/foot) x 325851 (gallons/acre-feet)

Grapevine Crop Coefficient (Kc) is calculated based on the following vineyard information:

A = Row Width =	4	feet	
B = Vine Spacing =	6	feet	
C = Area per Vine =	24	sq-ft	
D = Average Width of Measured Shaded Area Between Two Vines	2.5	feet	
E = Shaded Area per Vine = 'B' x 'D' =	15	sq-ft	
Percent Shaded Area, PSA = 'E' / 'C'=	0.625	or	63%

The Grapevine Crop Coefficient (Kc) is calculated with the following equation where 0.017 is the slope of the equation describing the relationship between the percent shaded area and the crop coefficient of Thompson Seedless vines

K_C = PSA x 0.017 = 1.063

References:

> Irrigation of winegrapes in California, By Larry E. Williams, Department of Viticulture & Enology University of California-Davis, and Kearney Agricultural Center
> Irrigation Scheduling of grapevines with Evapotranspiration Data, by Ed Hellman, Viticulture Extension Specialist, AgriLIFE Extension, Texas A&M system
> California Irrigation Management Information System (CIMIS)
> Row width and vine spacing based on Bartelt Engineering's Approved Track II Vineyard Erosion Control Plan for Mountain Peak Vineyards, LLC dated June 2013 Napa County ECPA Permit # P13-00144.

BARTELT ENGINEERING

Mountain Peak Winery
Available vs. Actual Vineyard Process Wastewater Irrigation
Table IV

Vineyard area (acres):	**22.80**
Row width (feet):	**4**
Vine spacing (feet):	**6**
Total number of irrigated vines:	41,382
Seasonal irrigation (May - October):	
Seasonal irrigation per vine (gallons/season):	**120**
Non-Seasonal irrigation (November - April): [1]	
Depth of irrigation (inches/month):	

November	**0.07**
December	**0.13**
January	**0.10**
February	**0.10**
March	**0.10**
April	
Total	**0.56**

AVAILABLE vs. ACTUAL VINEYARD PROCESS WASTEWATER IRRIGATION

Month	Available Irrigation Flow (gallons)	Seasonal Percent (%)	*Actual* Seasonal Irrigation (gal/vine)	Total Irrigation (gallons)
September	2,929,197	**15.0%**	**18.0**	744,879
October	455,825	**15.0%**	**18.0**	744,879
November[1]	0		0.0	43,335
December[1]	0		0.0	80,480
January[1]	0		0.0	61,907
February[1]	0		0.0	61,907
March[1]	0		0.0	61,907
April[1]	2,286,863	**5.0%**	**6.0**	248,293
May	4,098,941	**10.0%**	**12.0**	496,586
June	4,735,083	**15.0%**	**18.0**	744,879
July	4,550,896	**20.0%**	**24.0**	993,172
August	4,090,428	**20.0%**	**24.0**	993,172
TOTAL	**23,147,233**	**100.0%**	**120.0**	**5,275,397**
				16.19 acre-feet

[1] *Total non-seasonal irrigation =*
*(vineyard area) * (43,560 sq.-ft./acre) * (depth of irrigation/12 in./ft.) * (7.48 gal./cu.-ft.)*

BARTELT ENGINEERING

Mountain Peak Winery
Treated Process Wastewater Irrigation Storage Tank Balance
Table V

Month	Beginning Balance (gallons)	Wastewater Flow (gallons)	Vineyard Irrigation (gallons)	Tank Volume (gallons)
September	0	141,995	744,879	0
October	0	141,995	744,879	0
November	0	85,197	43,335	41,861
December	41,861	85,197	80,480	46,578
January	46,578	62,478	61,907	47,149
February	47,149	62,478	61,907	47,719
March	47,719	62,478	61,907	48,289
April	48,289	85,197	248,293	0
May	0	85,197	496,586	0
June	0	85,197	744,879	0
July	0	96,556	993,172	0
August	0	141,995	993,172	0
	TOTALS	**1,135,956**	**5,275,397**	
	Average	**94,663**	**439,616**	**19,300**

Recommended Tank Storage (gallons): 50,000
Recommended Tank Storage (acre-feet): 0.15

Notes:

> Water balance calculations assume storage tank is empty at the beginning of November due to post-harvest irrigation.

> In months when the irrigation demand exceeds the beginning balance plus the wastewater flow it is assumed that the full irrigation demand is not met or that the additional irrigation water is supplied from an alternate source (ie. well or import).

BARTELT ENGINEERING

Sanitary Sewer Wastewater
Pressure Distribution (PD) Septic System (ASTS) Design Calculations

Date:	May 2014
Project Name:	Mountain Peak Winery
Project Address:	3265 Soda Canyon Road, Napa, CA 94558
Project APN:	032-500-033
Project Number:	08-31
Design By:	M. Grimes, PE

Perc Rate:

Assigned Perc Rate	**2.5**	inches per hour
Assigned Perc Rate	24	minutes per inch
Converted Perc Rate	0.60	gallons / square foot / day

Trench Design:

Depth of Acceptable Soil (per Site Investigation)	**60**	inches
Design Depth of Lateral Invert Below O.G.	**8**	inches
Design Depth of Trench from Original Grade	**24**	inches
Design Depth of Gravel Cover to Backfill Over Lateral (Crown)	**2**	inches
Requried Additional Fill (OG to FG) to Meet Minimum Req	**8**	inches
Actual Depth of Lateral Invert Below F.G.	**16**	
Actual Depth of Trench from FG	**32**	
Required Separation to Limiting Condition	**36**	inches
Actual Separation to Limiting Condition	**36**	inches
Design Diameter of Lateral	**2**	inches
Actual Depth of Gravel Below Lateral Invert	16	inches
Sidewall Area (square feet / lineal foot)	**3.00**	square feet per lineal foot

Design Flow:

Winery Sanitary Wastewater:

Number of Full Time Employees	**19**	employee
Number of Part Time & Seasonal Employees	**8**	employee
Wastewater Generation Rate per Employee	15	gallons per day
Maximum Number of Guests per Day	**125**	guests per day
Wastewater Generation Rate per Guest	8	gallons per guest
Wastewater Generated for Food preparation per Guest	3	gallons per guest
Estimated Percentage of Usage per Day	100%	
Peak Winery Sanitary Wastewater Flow	1,780.0	gallons per day
∴ Use Design Flow	1,800	gallons per day

BARTELT ENGINEERING

Sanitary Sewer Wastewater
Pressure Distribution (PD) Septic System (ASTS) Design Calculations

Disposal Field Design:		
Calculated Required Length of Trench	1,000.0	lf
Use Length of Trench	1,000	lf
Number of Subfields	4	
Calculated Length of Trench per Subfield	250	
Lateral Length	84	
Calculated Number of Laterals per Subfield	2.98	
Actual Number of Laterals per Subfield	3.00	
Actual Length of Trench per Subfield	252	
Actual Total Length of Trench	1,008	
Factor of Safety	1.01	
Pump System Design:		
Number of Orifices per Subfield	69	
Discharge Rate per Orifice	0.72	gallons per minute / orifice
Total Discharge per Subfield	49.68	gallons per minute
Design Flow Rate	50	gallons per minute
Total Friction Loss Through Plumbing	46	feet
Head at End of Lateral	3	feet
Elevation Head	20	feet
Total Dynamic Head	69	feet
Increase for Pump Aging	20%	
Design Total Dynamic Head	83	feet

GEOFLOW SUBSURFACE DRIP — Field Flow

Job Description:	*Mountain Peak Winery - Sanitary*
Contact:	*Bartelt Engineering*
Prepared by:	*Michael Grimes, PE*
Date:	*May 2014*

Please fill in the shaded areas and drop down menus:
This spreadsheet serves as a guide, and is not a complete hydraulic design.

Worksheet 1- Field Flow

Total field

	Total Quantity of effluent to be disposed per day	1,720	gallons / day
	Hydraulic loading rate	0.60	gallons / sq.ft. / day
	Minimum Dispersal Field Area	2,867	square ft.
	Total Dispersal Field Area	3,050	square ft.

Flow per zone

	Number of Zones	4	zone(s)
	Dispersal area per zone	763	square ft.
	Choose line spacing between WASTEFLOW lines	2	ft.
	Choose emitter spacing between WASTEFLOW emitters	2	ft.
	Total linear ft.per zone (minimum required)	382	ft. per zone
	Total number of emitters per zone	191	emitters per zone
	Select Wasteflow dripline (16mm)	Wasteflow PC - 1 gph	dripline
	Pressure at the beginning of the dripfield	25	psi
	Feet of Head at the beginning of the dripfield	57.75	ft.
	What is the flow rate per emitter in gph?	1.02	gph
	Dose flow per zone	**3.25**	**gpm**

Note: A few States or Counties require additional flow for flushing. Please check your local regulations.
Flush velocity calculation below is for PC dripline. Classic dripline requires less flow to flush than PC.
Please refer to Geoflow's spreadsheet "Design Flow and Flush Curves" at www.geoflow.com or call 800-8

	If required, choose flush velocity	2	ft/sec
	How many lines of WASTEFLOW per zone?	4	lines
	Fill in the *actual* length of longest dripline lateral	54	ft.
	Flush flow required at the end of each dripline	1.48	gpm
	Total Flow required to achieve flushing velocity	5.92	gpm
	Total Flow per zone- worst case scenario	**9.17**	**gpm**

Select Filters and zone valves

	Select Filter Type	Vortex Screen Filter	
	Recommended Filter (item no.)	AP4E-1F	1" Screen Filter 0-20gpm
	Select Zone Valve Type	Electric Solenoid	-
	Recommended Zone Valve (item no.)	SVLVB-100	1-in. Solenoid valve

Dosing

	Number of doses per day / zone:	10	doses
	Timer ON. Pump run time per dose/zone:	13.15	mins:secs
	Timer OFF. Pump off time between doses	2:10	hrs:mins
	Per Zone - Pump run time per day/zone:	2:12	hrs:mins
	All Zones - Number of doses per day / all zones	40	doses / day
	Allow time for field to pressurize	0:00:30	hrs:mins:secs
	Filter flush timer	0:00:20	hrs:mins:secs
	Drain timer	0:05:00	hrs:mins:secs
	Field flush timer	0:01:00	hrs:mins:secs
	Field flush counter	4	cycles
	Time required to complete all functions per day	**13:23**	hrs:mins
Dose volume per zone		43	gallons per dose

GEOFLOW SUBSURFACE DRIP

Pump Size

Job Description:	Mountain Peak Winery - Sanitary
Contact:	Bartelt Engineering
Prepared by:	Michael Grimes, PE
Date:	May 2014

Pressure losses may be grossly overstated, particularly if designing with WASTEFLOW Classic
The letters on the diagram(right) match the letters in section 2 below.

Worksheet - Pump Sizing

Section 1 - Summary from Worksheet 1	
Flow required to dose field	3.25 gpm
Flow required to flush field	5.92 gpm
Flow required to dose & flush field	9.17 gpm
Filter	AP4E-1F
No. of Zones	4 zones
Zone valve	SVLVB-100
Dripline	Wasteflow PC - 1 gph
Dripline longest lateral	54.00 ft.

Section 2	Ft of head	Pressure
A. Flush line - Losses through return line		
Size of flush line in inches	1.5 inch	
Length of return line	80 ft.	
Equivalent length of fittings	156 ft.	
Elevation change. (if downhill enter 0)	5 ft.	
Pressure loss in 100 ft of pipe	0.42 ft.	0.18 psi
Total pressure loss from end of dripline to return tank	*6.0 ft.*	2.59 psi
B. Dripline - Losses through Wasteflow dripline		
Length of longest dripline lateral	54 ft.	
Minimum dosing pressure required at end of dripline	23.10 ft.	10.00 psi
Loss through dripline during flushing	18.18 ft.	7.87 psi
Total minimum required dripline pressure	*41.28 ft.*	7.87 *psi*
A+B. Minimum Pressure required at beginning of dripfield		
CALCULATED pressure required at beginning of dripfield	*47.27 ft.*	20.46 *psi*
SPECIFIED pressure at beginning of dripfield (from worksht 1)	**57.8 ft.**	25.00 *psi*
Great! SPECIFIED Pressure is greater than CALCULATED Pressure requirement. Go to next step		
C. Drip components - Losses through headworks		
Filter	6.2 ft.	2.70 psi
Zone valve pressure loss (not in diagram)	0.69 ft.	0.30 psi
Flow meter pressure loss (not in diagram)	5.00 ft.	2.16 psi
Other pressure losses	ft.	- psi
Total loss through drip components	**11.93 ft.**	5.16 psi
D. Supply line - Minimum Pressure head required to get from pump tank to top of dripfield		
Size of supply line in inches	1.5 inch	
Length of supply line	75 ft.	
Equivalent length of fittings	218.7 ft.	
Height from pump to tank outlet	5 ft.	
Elevation change. (if downhill enter 0)	-5 ft.	
Pressure loss/gain in 100 ft. of pipe	0.94 ft.	0.41 psi
Total gain or loss from pump to field	*2.8 ft.*	1.20 psi
Total dynamic head	**72.4 ft.**	31.36 *psi*
Pump capacity *	**9.2 gpm**	
Pump Model Number		
Voltz / Hp / phase		

BARTELT ENGINEERING

GREASE INTERCEPTOR SIZING

Project Name: Mountian Peak Winery
Project #: 08-31
Project Address: 3265 Soda Canyon Road
Napa County, CA
APN: 032-500-033

Required Capacity [gal]	=	(Peak No. of meals per Hour)	X	(Waste Flow Rate)	X	(Retention Time)	X	(Storage Factor)
1,875	=	125	x	6	x	2.5	x	1
3,000	Recommended							

Waste Flow Rates:

1 gpd/meal	Food Waste Disposer
2 gpd/meal	Single Service Kitchen
3 gpd/meal	if Single Service Utensils
5 gpd/meal	if Multi-Service Utensils
5 gpd/meal	Without Dishwashing Machine
6 gpd/meal	With Dishwashing Machine

plus type of facility present:

3 gpd/person	bar/cocktail
8 gpd/person	short order

Retention Time:

1.5	if Single Service Utensils (Single Service Kitchen -- Single Serving)
2.5	if Multi-Service Utensils (Commercial Kitchen Waste -- Dishwasher)

Storage Factor:

Fully Equipped Comercial Kitchen

1	if hours of operation are	O 8
2	if hours of operation are	9 O 16
3	if hours of operation are	17 O 24

Single Service Kitchen
1.5

OAKVILLE 1 W, NAPA COUNTY, CALIFORNIA USA

WorldClimate

Weather station **OAKVILLE 1 W, NAPA COUNTY** is at about 38.45°N 122.41°W. Height about 49m / 160 feet above sea level.

Average Rainfall

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Year
mm	195.5	170.6	95.2	47.2	11.8	3.4	2.1	1.9	10.1	54.6	89.2	143.1	825.5
inches	7.7	6.7	3.7	1.9	0.5	0.1	0.1	0.1	0.4	2.1	3.5	5.6	32.5

Source: OAKVILLE 1 W, NAPA COUNTY data derived from NCDC Cooperative Stations. 23 complete years between 1948 and 1981

Map of the area around OAKVILLE 1 W, NAPA COUNTY from tiger.census.gov.
Locations outside the continental US are not mapped.

Previous Page - About Worldclimate.Com - Home

CIMIS (California Irrigation Management Information System)

Monthly Report

Rendered in ENGLISH Units.
May 1, 2012 - April 30, 2013
Printed on May 16, 2013
See the bottom of this report for a legend for all flag values.

North Coast Valleys - Oakville - #77

Month Year	Tot ETo (in)	Tot Precip (in)	Avg Sol Rad (Ly/Day)	Avg Vap Pres (mBars)	Avg Max Air Tmp (F)	Avg Min Air Tmp (F)	Avg Air Tmp (F)	Avg Max Rel Hum (%)	Avg Min Rel Hum (%)	Avg Rel Hum (%)	Avg Dew Point (F)	Avg Wind Speed (mph)	Avg Soil Temp (F)
May 2012	6.89	0.00 K	641	10.8 K	79.6	44.7	61.7 K	89 K	35 K	58 K	46.0 K	4.2 K	64.4 K
Jun 2012	7.33	0.00	685	11.9 K	81.9 K	46.7 K	65.2	89	35	57 K	48.6 K	4.5 K	67.4
Jul 2012	7.05	0.00	637	14.3	83.3 K	49.7 K	65.3	92	43	68	54.1	4.2 K	69.4
Aug 2012	6.35	0.00	573	14.1	85.6	49.1 K	65.6	92	39	66	53.7	3.7	70.0
Sep 2012	4.98	0.00	488	12.5	84.1	44.4 K	61.8	94	36	67	50.4	3.1	65.8
Oct 2012	3.46	0.90 K	339	11.9	77.1 K	45.0	59.5	93	42	70	48.7	3.0	62.5
Nov 2012	1.63 K	10.55 K	212 K	11.6 K	66.7 K	41.8 K	53.3 K	97 K	54 K	82	47.9	2.8 K	57.3 K
Dec 2012	1.15	11.39 K	160	9.4 K	57.2 K	37.5 K	46.7	96	62	84 K	42.0 K	3.3	51.3 K
Jan 2013	1.61	0.95 K	219	7.3	60.0 K	31.7 K	44.0	93	44	73	35.5	2.8	46.6
Feb 2013	2.57	0.36	329 K	7.6	64.9	33.8	48.1	92	37	67	36.9	3.5	49.7
Mar 2013	3.51	1.98 K	385 K	10.1 K	68.8	39.5	53.7	94	45	71 K	44.3 K	3.6 K	55.2
Apr 2013	5.98 K	0.78 K	557	9.8 K	77.0 K	44.7	61.0 K	86 K	33 K	55 K	42.9 K	4.9 K	60.9
Totals/Avgs	52.51	26.91	435	10.9	73.8	42.4	57.2	92	42	68	45.9	3.6	60.0

San Francisco Bay - Carneros - #109

Month Year	Tot ETo (in)	Tot Precip (in)	Avg Sol Rad (Ly/Day)	Avg Vap Pres (mBars)	Avg Max Air Tmp (F)	Avg Min Air Tmp (F)	Avg Air Tmp (F)	Avg Max Rel Hum (%)	Avg Min Rel Hum (%)	Avg Rel Hum (%)	Avg Dew Point (F)	Avg Wind Speed (mph)	Avg Soil Temp (F)
May 2012	5.95	0.06	594 K	11.3	74.2 K	42.6 K	58.2	94	45	69	47.7	4.1 K	61.9
Jun 2012	6.40	0.02	607	12.3 K	77.8	45.7 K	62.1 K	92 K	42 K	65 K	49.6 K	4.7 K	64.7
Jul 2012	6.05	0.15	576 K	14.1	77.5 K	49.1 K	62.2	94	50	74	53.7	4.8	66.5
Aug 2012	5.51	0.00	530 K	13.7 K	79.3	47.6 K	61.9	94	47	73 K	52.9 K	4.2	68.2
Sep 2012	4.38	0.03	455 K	12.4	78.6	43.2 K	59.1	95	44	73	50.3	3.4	64.2 K
Oct 2012	3.09 K	1.75 K	304 K	12.5 K	74.9 K	45.0 K	59.4 K	94 K	47 K	73	50.2	2.8 K	61.7 K
Nov 2012	1.66	3.19 K	218	11.5	65.8 K	40.6 K	52.6	96	59	83	47.6	3.1 K	56.1
Dec 2012	1.07	6.80 K	155	9.4 K	56.8 K	36.8 K	46.4	96	65	85 K	42.2 K	3.0	50.7 K
Jan 2013	1.63	0.64	236 K	7.3 K	57.6	30.7 K	42.7	95	52	77 K	35.8 K	2.6	43.9 K
Feb 2013	2.37	0.27	326	7.9	63.4 K	32.8	46.5	95	46	74	38.3	2.7	46.4 K
Mar 2013	3.30	0.66	380	10.3	67.1 K	38.6	52.1	96	52	77	44.9	3.2	51.8
Apr 2013	5.15	0.99 K	535	10.7 K	74.0 K	42.9 K	58.0 K	91 K	43 K	66 K	45.8 K	3.8 K	58.8
Totals/Avgs	46.56	14.56	410	11.1	70.6	41.3	55.1	94	49	74	46.6	3.5	57.9

M - All Daily Values Missing

K - One or More Daily Values Flagged

J - One or More Daily Values Missing L - Missing and Flagged Daily Values

W/sq.m = Ly/day/2.065	inches * 25.4 = mm	C = 5/9 * (F - 32)
m/s = mph * 0.447	kPa = mBars * 0.1	