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Wastewater Feasibility Study

Titus Vineyard Winery P17-00128
Planning Commission Hearing Date August 16, 2017

APPLIED
CIVIL ENGINEERING
INCORPORATED

March 22, 2017

Job No. 11-123

Kim Withrow, REHS
Environmental Health Division
Napa County Planning, Building and Environmental Services Department
1195 Third Street, Suite 210
Napa, CA 94559

Re: Onsite Wastewater Disposal Feasibility Study for the
Titus Winery Use Permit Modification Application
2971 Silverado Trail, St. Helena, California APN 021-353-013 (P13-00367)

Dear Ms. Withrow:

At the request of Lee Titus and Sons LTD we have evaluated the process and sanitary wastewater flows associated with the proposed Use Permit Modification. We have also analyzed the capacity of the existing process and sanitary wastewater systems serving the winery facility to determine if they are adequate to serve the proposed changes in use.

The Use Permit Modification application under consideration proposes the following characteristics:

- Wine Production:
  - 48,000 gallons of wine per year (increase from 24,000 in current Use Permit)
  - Crushing, fermenting, aging and bottling

- Employees (no change from current Use Permit):
  - 10 full time employees
  - 2 part time employees

- Marketing Plan:
  - Daily Tours and Tastings by Appointment
    - 60 visitors per day maximum (increase from 40 in current Use Permit)

- Promotional Tastings with Meals: (no change from current Use Permit)
  - 8 per year
  - 25 guests maximum
  - Food prepared in onsite kitchen or catered
- Wine Club Marketing Events (no change from current Use Permit)
  - 4 per year
  - 125 guests maximum
  - Food prepared offsite by catering company
  - Portable toilets brought in for guest use
- Wine Release Events (no change from current Use Permit)
  - 6 per year
  - 125 guests maximum
  - Food prepared offsite by catering company
  - Portable toilets brought in for guest use
- Wine Auction Events (no change from current Use Permit)
  - 2 per year
  - 125 guests maximum
  - Food prepared offsite by catering company
  - Portable toilets brought in for guest use

Existing improvements on the property include the winery, a residence, ag barn, vineyard, groundwater wells, dirt and gravel driveways and the utility infrastructure typical for this type of residential and agricultural development. No new buildings are proposed. Please see the Titus Winery Use Permit Modification Site Plan for approximate locations of existing facilities.

The remainder of this letter describes the existing process and sanitary wastewater disposal systems, their design capacities, peak flows associated with the proposed changes in use and our analysis and recommendations related to the systems' ability to handle the anticipated wastewater flows associated with the subject Use Permit Modification.

Existing Septic Systems

The winery facility is served by separate process waste and domestic waste treatment and disposal systems. The two systems are described in more detail below.

Existing Winery Process Waste Septic System

The winery facility is serviced by winery process wastewater pretreatment and surface irrigation type system. The winery process waste septic system was designed by Applied Civil Engineering. Installation was performed by McCollum General Engineering and Lyve Systems under permit E14-00776 which was finaled in September 2015. The system was required to handle a design flow of 800 gallons per day (gpd) based on the production level of 24,000 gallons per year. However, as noted in the design calculations prepared by Applied Civil Engineering, additional capacity was designed into the system to allow peak days of up to 1,600 gpd to provide operational flexibility during the peak flow harvest period. The system consists of a 1,500 gallon below ground sump tank, a 10,000 gallon flow equalization tank, a Lyve L10 treatment system, a

5,000 gallon sludge tank, a 10,000 gallon treated wastewater irrigation storage tank and approximately 1.8 acres of surface drip irrigation system within the existing vineyards.

Existing Domestic Waste Septic System

The winery facility restrooms and sinks are serviced by an onsite domestic waste pre-treatment and subsurface drip type septic system. The domestic waste septic system was designed by Applied Civil Engineering. Installation was performed by McCollum General Engineering under permit E14-00777 which was finaled in September 2015. The system was required to handle a design flow of 675 gallons per day (gpd) however, as noted in the design calculations prepared by Applied Civil Engineering, additional drip tubing was installed beyond that which was required to handle the 675 gpd calculated flow. The total length of drip tubing that was installed would correspond to a design flow of 1,080 gpd. The system consists of a 2,000 gallon septic tank, 2,000 gallon recirculation tank, two Orenco Advantex AX20 treatment units, a 2,000 gallon dosing tank and 900 lineal feet of subsurface drip type dispersal system.

Proposed Design Flows

Proposed Process Wastewater Design Flows

We have used the generally accepted standard that six gallons of winery process wastewater are generated for each gallon of wine that is produced each year and that 1.5 gallons of wastewater are generated during the crush period for each gallon of wine that is produced. Based on the 48,000 gallon production capacity and the expectation that both white and red wine will be produced at the winery, we have assumed a conservative 45 day crush period. Using these assumptions, the annual, average daily and peak winery process wastewater flows are calculated as follows:

$$\text{Annual Winery Process Wastewater Flow} = \frac{48{,}000 \text{ gallons wine}}{\text{year}} \times \frac{6 \text{ gallons wastewater}}{1 \text{ gallon wine}}$$

Annual Winery Process Wastewater Flow = 288,000 gallons per year

$$\text{Average Daily Process Wastewater Flow} = \frac{288{,}000 \text{ gallons wastewater}}{\text{year}} \times \frac{1 \text{ year}}{365 \text{ days}}$$

Average Daily Winery Process Wastewater Flow = 789 gallons per day

$$\text{Peak Winery Process Wastewater Flow} = \frac{48{,}000 \text{ gallons wine}}{\text{year}} \times \frac{1.5 \text{ gallons wastewater}}{1 \text{ gallon wine}} \times \frac{1 \text{ year}}{45 \text{ crush days}}$$

Peak Winery Process Wastewater Flow = 1,600 gallons per day (gpd)

Proposed Winery Sanitary Wastewater Design Flows

The peak sanitary wastewater flow from the winery is calculated based on the number of winery employees, the number of daily visitors for tours and tastings and the number of guests attending private marketing events. In accordance with Table 4 of Napa County's "Regulations for Design, Construction, and Installation of Alternative Sewage Treatment Systems" we have used a design flow rate of 15 gallons per day per employee and 3 gallons per day per visitor for tours and tastings. Table 4 does not specifically address design wastewater flows for guests at marketing events. We have conservatively estimated 5 gallons of wastewater per guest at marketing events with catered meals and 15 gallons per guest at marking events with meals prepared onsite (similar to a restaurant). Based on these assumptions, the peak winery sanitary wastewater flows are calculated as follows:

Employees

Peak Sanitary Wastewater Flow = 12 employees X 15 gpd per employee
Peak Sanitary Wastewater Flow = 180 gpd

Daily Tours and Tastings

Peak Sanitary Wastewater Flow = 60 visitors per day X 3 gallons per visitor
Peak Sanitary Wastewater Flow = 180 gpd

Private Promotional Tastings with Meals Prepared Onsite:

Peak Sanitary Wastewater Flow = 25 guests X 15 gallons per guest
Peak Sanitary Wastewater Flow = 375 gpd

Wine Club Marketing Events with Catered Meals

Peak Sanitary Wastewater Flow = 125 guests X 5 gallons per guest
Peak Sanitary Wastewater Flow = 625 gpd

Wine Release Events with Catered Meals

Peak Sanitary Wastewater Flow = 125 guests X 5 gallons per guest
Peak Sanitary Wastewater Flow = 625 gpd

Wine Auction Events with Catered Meals:

Peak Sanitary Wastewater Flow = 125 guests X 5 gallons per guest
Peak Sanitary Wastewater Flow = 625 gpd

Total Peak Winery Sanitary Wastewater Flow

As previously described, portable toilets will be used for all events with more than 25 guests in attendance to minimize the impact on the proposed septic system. Assuming that daily tours and tastings and a maximum of one marketing event may occur on the same day the total peak winery sanitary wastewater flow is based on employees, daily tours and tastings and a private event for 25 people with meals prepared onsite. Based on these assumptions, the peak sanitary wastewater flow is calculated as follows:
Total Peak Winery Sanitary Wastewater Flow = 180 gpd + 180 gpd + 375 gpd

Total Peak Winery Sanitary Wastewater Flow = 735 gpd

Proposed Design Flow vs Existing Capacity Analysis and Recommendations

Winery Process Wastewater
The predicted Winery Process Wastewater Flow for the proposed winery operational characteristics of 1,600 gpd are within the design capacity of the existing treatment system. Our review of the storage tank and irrigation system indicates that and additional 5.2 acres of process waste irrigation area (beyond the 1.8 acres currently utilized) should be installed to accommodate the increased flows. As previously noted, a total of 16.7 acres of vineyard has been approved for use and that area is shown on the Titus Winery Use Permit Modification Conceptual Site Plan. This additional irrigation area will allow the existing 10,000 gallon storage tank to provide adequate storage for the increased flows. While we expect that the Lyve 10 treatment system will easily handle the increased production level we have reviewed with Lyve several ways to increase the capacity of the plant in the future if the need arises.

Winery Process Wastewater Reserve Area
Napa County code does not require a reserve area for winery process waste treatment and irrigation systems. However, there is a significant amount of additional vineyard area available for irrigation with the treated process waste should the need arise in the future.

Winery Domestic Wastewater
The predicted Winery Domestic Wastewater Flow for the proposed winery operational characteristics of 745 gpd is greater than the originally calculated flow for the winery (675 gpd) but still substantially less than the design capacity of the dispersal field (1,080 gpd). Furthermore, we have evaluated the capacity of the septic tank, recirculation tank and dosing tank and confirmed all are adequate for the increased design flow of 735 gpd. No modifications to the existing system are required.

Winery Domestic Wastewater Reserve Area

Napa County code requires that an area be set aside to accommodate a future onsite wastewater disposal system in the event that the primary system fails or the soil in the primary area is otherwise rendered unsuitable for wastewater disposal. For subsurface drip type septic systems the reserve area must be 200% of the size of the disposal field area. The proposed reserve area

must also accommodate room for the existing residence septic system reserve area. We understand from the owner that the existing residence has a total of two potential bedrooms.

The design flow for the reserve area is 735 gpd for the winery sanitary wastewater plus 240 gallons per day for the residence for a total of 975 gpd. Based on these design parameters, the required reserve area is calculated as follows:

$$\text{Required Reserve Area} = 200\% \times \frac{\text{Peak Flow}}{\text{Soil Application Rate}}$$

$$\text{Require Reserve Field Area} = 200\% \times \frac{975 \text{ gpd}}{0.6 \text{ gpd per square foot}}$$

Required Reserve Area =3,250 square feet

Based on the proposed site plan and Napa County GIS topographic data, we have determined that there is enough area to set aside for an additional 3,250 square feet of subsurface drip disposal field in the vicinity of Test Pits #14, #15, #18 & #19 as shown on the Titus Winery Use Permit Modification Site Plan (enclosed).

Summary

The calculations presented above illustrate that the wastewater flows associated with the proposed Use Permit Modification can be accommodated by the existing process waste and domestic waste systems. The only modification that is required is that the process wastewater irrigation area will be expanded by at least 5.2 acres within the currently approved area to provide additional disposal capacity.

We trust that this provides the information you need to process the subject Use Permit Modification. Please feel free to contact us at (707) 320-4968 if you have any questions.

Sincerely,

Applied Civil Engineering Incorporated

By:

Michael R. Muelrath

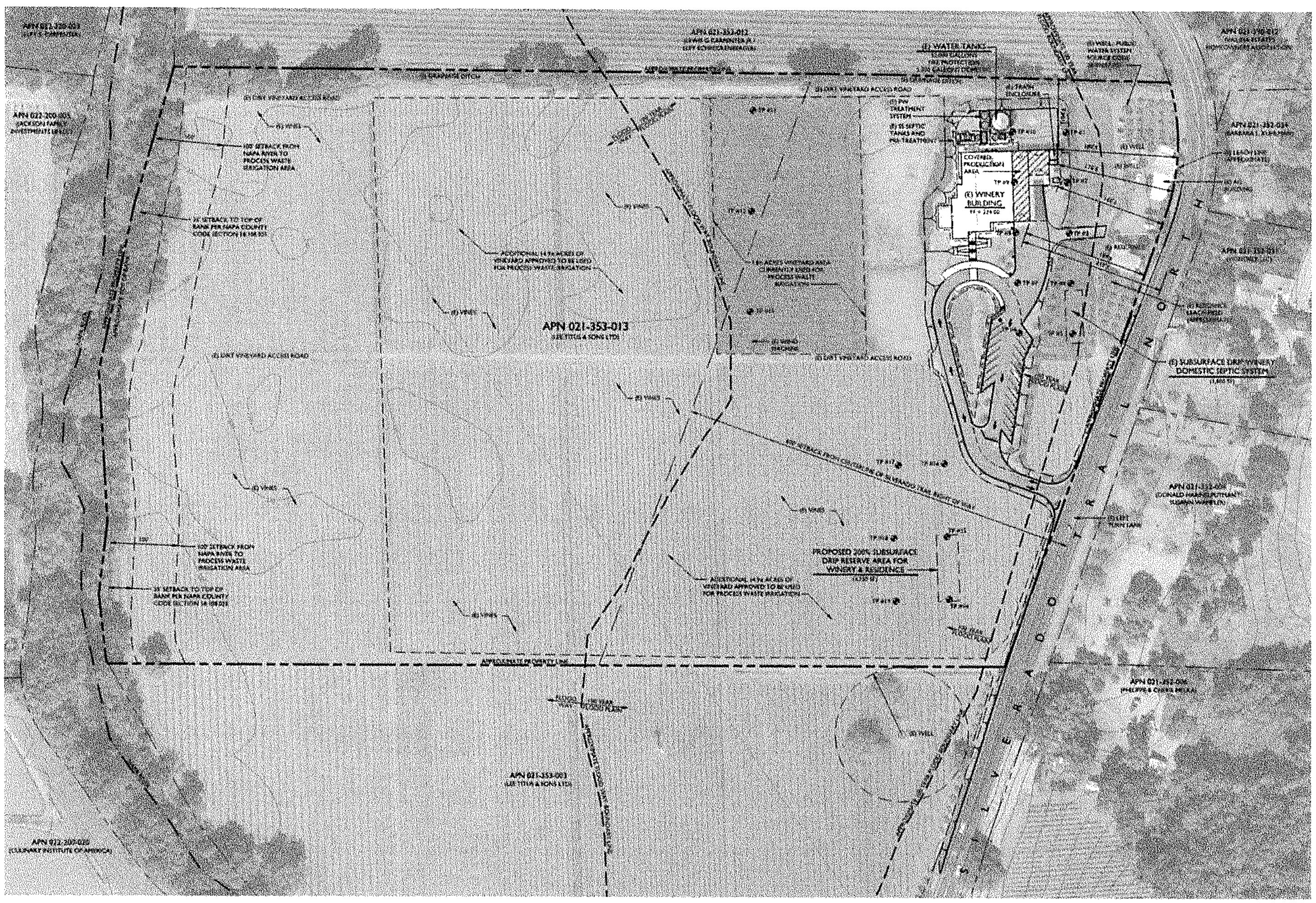
Michael R. Muelrath RCE 67435
Principal

Copy:
Eric Titus, Titus Winery (via email)
Philip Titus, Titus Winery (via email)
Jeffery Redding (via email)

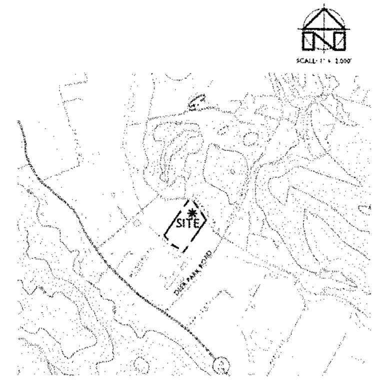
Attachments:
Titus Winery Use Permit Modification Site Plan
Irrigation Storage Tank Water Balance

TITUS WINERY

USE PERMIT MODIFICATION SITE PLAN



OVERALL SITE PLAN
SCALE: 1" = 80'



LOCATION MAP
SCALE: 1" = 2,000'

PROJECT INFORMATION

PROPERTY OWNER & APPLICANT:
LEE TITUS & SONS LTD
CARE OF: ERIC TITUS
3264 EHLERS LANE
ST. HELENA, CA 94574

SITE ADDRESS:
2971 SILVERADO TRAIL NORTH
ST. HELENA, CA 94574

ASSESSOR'S PARCEL NUMBER:
021-353-013

PARCEL SIZE:
31.77± ACRES

ZONING:
AGRICULTURAL PRESERVE (AP)

DOMESTIC WATER SOURCE:
PRIVATE WELL

FIRE PROTECTION WATER SOURCE:
STORAGE TANK

WASTEWATER DISPOSAL:
ONSITE TREATMENT AND DISPOSAL

SHEET INDEX:

C1	OVERALL SITE PLAN
C2	PHOTOGRAPH EXHIBIT

NOTES:

1. FADED BACKGROUND REPRESENTS EXISTING TOPOGRAPHIC FEATURES. THE TOPOGRAPHIC INFORMATION SHOWN ON THIS PLAN WAS OBTAINED FROM THE NAPA COUNTY GEOGRAPHIC INFORMATION SYSTEM (GIS) DATABASE. ELEVATIONS ARE NOT INDICATION OF NEW TOPOGRAPHY RESULTING FROM BUILDING OF THE WINERY FACILITY. APPLIED CIVIL ENGINEERING INCORPORATED ASSUMES NO LIABILITY REGARDING THE ACCURACY OR COMPLETENESS OF THE TOPOGRAPHIC INFORMATION.
2. AERIAL PHOTOGRAPHS WERE OBTAINED FROM THE SAN FRANCISCO ESTUARY INSTITUTE (SFEI) SAN FRANCISCO BAY AREA ORTHOPHOTOS DATABASE, DATED JUNE 2014 AND GOOGLE EARTH IMAGE DATED MARCH 16, 2016 AND MAY NOT REPRESENT CURRENT CONDITIONS.
3. CONTOUR INTERVAL: FIVE (5) FEET, HIGHLIGHTED EVERY TWENTY FIVE (25) FEET
4. BENCHMARK: VERTICAL DATUM BASED ON NAVD 88
5. THE PROPERTY LINES SHOWN ON THESE PLANS DO NOT REPRESENT A BOUNDARY SURVEY. THEY ARE APPROXIMATE AND ARE PROVIDED FOR INFORMATIONAL PURPOSES ONLY.
6. ACCORDING TO FEMA FIRM COMMUNITY PANEL 06055C0263E THE SUBJECT PARCEL IS DETERMINED TO BE WITHIN THE FEMA FLOOD ZONE. SEE FEMA FIRM COMMUNITY PANEL 06055C0263E FOR MORE INFORMATION.
7. TEST PITS ONE THROUGH THIRTEEN (TP #1 - TP #13) WERE EXCAVATED BY PINA VINEYARD MANAGEMENT ON DECEMBER 15, 2011 AND WERE WITNESSED BY MIKE MUELRATH OF APPLIED CIVIL ENGINEERING INCORPORATED AND A REPRESENTATIVE OF THE NAPA COUNTY PLANNING, BUILDING AND ENVIRONMENTAL SERVICES DEPARTMENT - ENVIRONMENTAL HEALTH DIVISION (SEE E11-00603)
8. TEST PITS FOURTEEN THROUGH NINETEEN (TP #14 - TP #19) WERE EXCAVATED BY PINA VINEYARD MANAGEMENT ON FEBRUARY 6, 2013 AND WERE WITNESSED BY MIKE MUELRATH OF APPLIED CIVIL ENGINEERING INCORPORATED AND A REPRESENTATIVE OF THE NAPA COUNTY PLANNING, BUILDING AND ENVIRONMENTAL SERVICES DEPARTMENT - ENVIRONMENTAL HEALTH DIVISION (SEE E13-00029).

APPLIED
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DESIGNED BY: MRM
DRAWN BY: BT DRAFTING
CHECKED BY: MRM

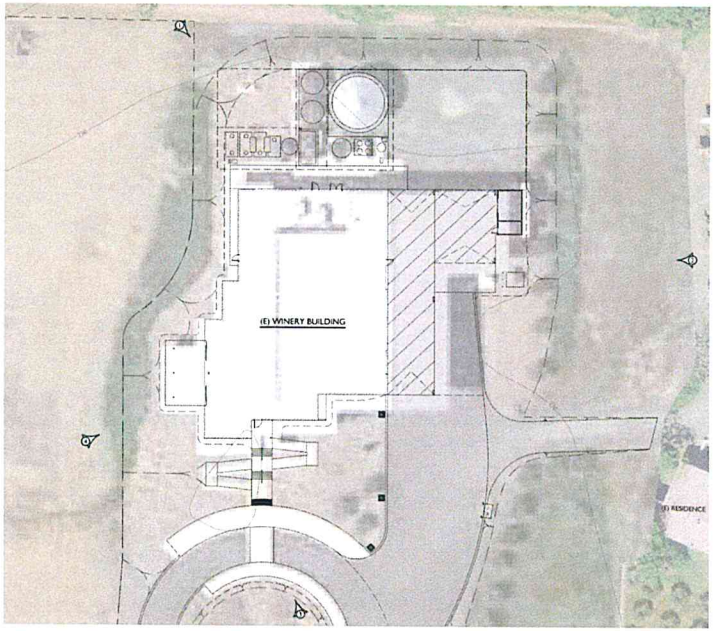
TITUS WINERY
USE PERMIT MODIFICATION SITE PLAN
OVERALL SITE PLAN

TITUS WINERY
2971 SILVERADO TRAIL NORTH
ST. HELENA, CA 94574
NAPA COUNTY APN 021-353-013

DATE: MARCH 22, 2017
JOB NUMBER: 11-123
FILE: 11-123MP_OSP.DWG
ORIGINAL SIZE: 24" X 36"
SCALE: AS NOTED
SHEET NUMBER: C1 OF 2

PHOTO 1
LOOKING EASTERLY TOWARDS WINERY BUILDING

PHOTO 4
LOOKING NORTHERLY TOWARDS WINERY BUILDING



SITE PHOTO EXHIBIT
SCALE: 1" = 30'

PHOTO 2
LOOKING SOUTHERLY TOWARDS WINERY BUILDING

PHOTO 3
LOOKING WESTERLY TOWARDS WINERY

LEGEND:
PHOTO LOCATION AND DIRECTION

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DESIGNED BY: MRM
DRAWN BY: BT DRAFTING
CHECKED BY: MRM

TITUS WINERY
USE PERMIT MODIFICATION SITE PLAN
SITE PHOTO EXHIBIT

TITUS WINERY
2971 SILVERADO TRAIL NORTH
ST. HELENA, CA 94574
NAPA COUNTY APN 021-353-013

DATE: MARCH 22, 2017
JOB NUMBER: 11-123
FILE: 11-123IMP. PHOTO.DWG
ORIGINAL SIZE: 24" X 36"
SCALE: AS NOTED
SHEET NUMBER: C2
OF 2

Irrigation Storage Tank Water Balance

Month	Beginning Balance	Process Wastewater	Land Application	Ending Balance
January	0	14,400	152,053	0
February	0	14,400	152,053	0
March	0	14,400	152,053	0
April	0	11,520	152,053	0
May	0	11,520	47,644	0
June	0	14,400	119,109	0
July	0	21,600	119,109	0
August	0	28,800	71,466	0
September	0	47,520	71,466	0
October	0	43,200	199,697	0
November	0	37,440	152,053	0
December	0	28,800	152,053	0
		288,000	1,540,812	

Notes:

1. All values shown above for beginning balance, inflow, outflow and ending balance are in units of gallons.
2. See attached tables for detailed explanation of process wastewater and irrigation data presented in this table.
3. This water balance is based on the assumption that the tank is empty in August, just prior to crush.
4. Where irrigation demand exceeds treated wastewater availability additional irrigation water will be provided by a well or non-irrigation land application will be reduced accordingly.

Winery Process Wastewater Generation Analysis

Annual Wine Production	48,000 gallons
Wastewater Generation Rate	6 gallons per gallon of wine
Annual Wastewater Generation	288,000 gallons
Crush Season Length	45 days
Wastewater Generated During Crush	1.5 gallons per gallon of wine
Peak Wastewater Generation Rate	1,600 gallons per day

Winery Process Wastewater Generation Table			
Month	Percentage of Annual Total	Monthly Flow (gallons)	Average Flow (gpd)
January	5.0%	14,400	465
February	5.0%	14,400	514
March	5.0%	14,400	465
April	4.0%	11,520	384
May	4.0%	11,520	372
June	5.0%	14,400	480
July	7.5%	21,600	697
August	10.0%	28,800	929
September	16.5%	47,520	1,584
October	15.0%	43,200	1,394
November	13.0%	37,440	1,248
December	10.0%	28,800	929
Total	100.0%	288,000	

Notes:

1. Wastewater generation rates and monthly proportioning are based on our past experience with similar projects and input from the winery management team.

Irrigation Schedule Analysis

Vineyard Information:

Total acres of vines	7 acres
Vine Row Spacing	8 feet
Vine Spacing	6 feet
Vine density	908 vines per acre
Total Vine Count	6,353 vines

Irrigation Information:

Seasonal Irrigation[1]	75.0 gallons per vine (May through October)	
Non-Irrigation Application	0.8 inches	October through April

Irrigation Schedule					
Month	Monthly Percentage[2]	Irrigation per Vine (gallons)	Irrigation (gallons)	Non-Irrigation Application (gallons)	Total (gallons)
January		0.0	0	152,053	152,053
February		0.0	0	152,053	152,053
March		0.0	0	152,053	152,053
April		0.0	0	152,053	152,053
May	10%	7.5	47,644	0	47,644
June	25%	18.8	119,109	0	119,109
July	25%	18.8	119,109	0	119,109
August	15%	11.3	71,466	0	71,466
September	15%	11.3	71,466	0	71,466
October	10%	7.5	47,644	152,053	199,697
November		0.0	0	152,053	152,053
December		0.0	0	152,053	152,053
Total	100%	75.0	476,438	1,064,374	1,540,812

Notes:

1. Irrigation per vine is based on 0.2 acre-feet per acre of vines
2. Monthly vineyard irrigation percentages are based on our past experience with projects of this type.
3. Non-Irrigation Application is for managing tank levels and assumes a maximum of 5 operational days per month based on historic weather data (Summit Engineering NBRID Capacity Study, 1996) and a saturated soil infiltration rate of 0.1 gallons per square foot per day uniformly over the entire area. This is the maximum that can be applied during the non-irrigation season and less may be applied depending on water usage at the winery.