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Girard Winery

1077 Dunaweal Ln., Calistoga, CA 94515
APN: 020-150-017

USE PERMIT
WASTEWATER FEASIBILITY STUDY

Project and Site Background

Vintage Wine Estates owns and operates the existing "Clos Pegase" Winery located at 1060 Dunaweal Ln in Calistoga, Ca (APN: 020-150-012). Vintage Wine Estates also owns the parcel across Dunaweal Ln., (1077 Dunaweal Ln., APN: 020-150-017), which has the existing process wastewater ponds and water well for Clos Pegase.

Vintage Wine Estates is proposing to construct a new winery and tasting room (the Girard Winery) on the above referenced parcel. A production capacity of 200,000 gal of wine annually is proposed for the new Girard Winery. With the Use Permit, it is proposed to also treat the process waste (PW) generated by Girard Winery using the existing Clos Pegase Pond Treatment system. A new collection system and transfer pump sump will be required for Girard Winery. A new aerator in the process waste ponds will also be required. A new sanitary sewage system on-site is proposed to accommodate the winery employees, visitors, and events.

The parcel consists of existing vineyards, water supply well and treatment, an agricultural storage building, 2 PW treatment ponds and an irrigation storage pond. The parcel is generally flat, with a small flow line along the southern property line.

A site plan is provided in Enclosure B displaying the existing site and proposed wastewater system improvements.

SANITARY SEWAGE (SS)

Existing Site Evaluation

A site evaluation was performed by Ben Monroe, P.E. of Always Engineering and Peter Ex of Napa County on November 14, 2013. A total of 16 soil profiles were evaluated and 6 were logged for use. Test pits displayed a sandy clay loam surface soil which ranged in depth from 36" to 56" in depth. Soils were underlain by a sandy loam or loamy sand for a total permeable depth ranging from 49" to 60" in depth. All soil displayed a moderate to strong sub-angular blocky structure. Faint mottling was observed to 24" deep, with increasing intensity with depth below that. Prominent mottling was observed below 48" in all test pits. Additional groundwater monitoring is required onsite to determine if the upper mottling is due to subsurface groundwater or heavy irrigation of the onsite vineyards. At the time of preparation of this study, there has not been sufficient rainfall

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to perform groundwater monitoring and therefore, it is assumed that a minimum of 24" suitable soil is available for septic system design. An interceptor drain is also proposed with this feasibility study to ensure we have the required separation to seasonal groundwater. The Napa County Site Evaluation procedures indicate a Sandy clay loam or sandy loam with moderate structure should be loading at 0.75 to 1.0 gpd using pretreated effluent.

Proposed Wastewater Flows

The proposed onsite sanitary wastewater flow rate is entirely associated with the proposed Girard Winery. The use permit is requesting a similar level of use as Clos Pegase; an average number of 10 employees (15 gpcd) along with 75 visitors (3gpcd), and a peak number of 30 employees (15 gpcd) along with 100 visitors (3 gpcd). There will be one large event per year which will have 500 attendees. Portable toilets will be used for this event. All events will have fully catered food with all preparation and cleanup occurring off site. The proposed wastewater flows are estimated as follows:

Average

Employees

8 FT employees	x	15 gpd/employee	=	120 gpd
3 PT employees	x	7.5 gpd/employee	=	22.5 gpd

Tasting Room

42 tasting visitors	x	3 gpd/visitor	=	126 gpd

Events

75 event visitors	x	5 gpd/visitor	=	375 gpd

TOTAL PROPOSED AVERAGE DESIGN FLOW	=	**643.5 GPD**

Peak

Employees

20 FT employees	x	15 gpd/employee	=	300 gpd
10 PT employees	x	7.5 gpd/employee	=	75 gpd

Tasting Room

100 tasting visitors	x	3 gpd/visitor	=	300 gpd

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Events

200 event visitors x	5 gpd/visitor	=	1,000 gpd

TOTAL PROPOSED PEAK DESIGN FLOW = **1,675 GPD**

Proposed Sanitary Sewage Loading

It is proposed to design a subsurface drip system to accommodate all sanitary sewage dispersal. Sizing as follows:

Proposed Septic System Design Flow: 1,675 gpd
Proposed Pretreated Effluent Loading Rate: 0.6 gpd/sf (Moderate -Strong Sandy Loam/Sandy Clay loam)

This loading rate is within the suitable range for pretreated effluent in the onsite soil types. Because there has not been sufficient rainfall to perform ground water monitoring

Proposed Sanitary Sewage Management System

With improvement to the site, the following tanks are proposed for the Girard Winery septic system. Because a pretreatment system is required for subsurface drip, a septic, recirculation, and sump tank are required for an AdvanTex pretreatment system. Other NSF Certified pretreatment systems may be reviewed at the time of Construction Drawings. Tank sizes are verified using the plumbing code commercial sizing formula.

V = 1,125 + 0.75 x Q
= 1,125 + 0.75 x 1,675 gpd
= 2,381.25 gallons

Septic Tank: 6,000 gallons (3.6 days retention time)
Recirculation Tank: 2,000 gallons (1.2 days retention time)
Sump/Dispersal Equalization Tank: 3,000 gallons (1.8 days retention time)

These tank volumes meet the minimum criteria for an AvanTex pretreatment system.

Leachfield Sizing

The area required for a primary sanitary sewer drip system is as follows:

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Area Required = Flow/Application Rate

= 1,675 gpd / 0.6 gpd/sf

= 2,792 sf

Reserve Area

200% reserve area, or 5,584 sf, is required for this site and is shown adjacneet to the primary septic area on the Use Permit Site Plan.

Irrigation Reuse Alternative

In the event that groundwater monitoring cannot occur prior to the application for construction permits, it is also desired to have the ability to provide a pretreatment and irrigation reuse system. The Lyve Wastewaer System has been used at Alpha Omega Winery to treat and reuse domestic wastewater for irrigation. Also, the Biomicrobics BioBarrier Membrane Bioreactor (MBR) is NSF 350 certified for reuse. A design for a BioBarrier MBR would include the following:

Septic Tank:	2,000 gallons
Processing Tank:	13,000 gallons
Treated Collection Sump:	1,500 gallons
Treated Storage Tank:	40,000 gallons

A storage tank would be provided for period in the winter when irrigation reuse cannot occur. As demonstrated in the process wastewater section of this study, more than sufficient vineyard is available onsite for irrigation dispersal of effluent. Approximately 3 acres is required for process wastewater and a total of 18 acres is available onsite.

If treatment, irrigation, and reuse is proposed for construction of this project, the project must first obtain approval from the San Francisco Bay Regional Water Quality Control Board (SFBREWQCB) for this use. Prior to issuance of building permits, the RWQCB will need to approve of the proposal, and issue Waste Discharge Requirements for the reuse of the sanitary sewage. If future groundwater monitoring cannot occur in a time schedule appropriate for building permits, or does not provide at least 24 inches of separation to groundwater, treatment, irrigation, and reuse will be required for the project. In this event, the RWQCB must also grant system approval prior to building permit issuance.

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PROCESS WASTEWATER (PW)

Existing System

The existing on-site process wastewater system consists of 2 aerated facultative lagoons and an irrigation holding pond. This system is currently treating the process waste from the Clos Pegase winery located across Dunaweal Lane under the same ownership. No sanitary wastewater is discharged into the process wastewater system.

Before entering the process wastewater ponds, the entire flow of process wastewater is filtered through a rotary screen where suspended solids are collected and removed. Biological stabilization occurs in the facultative pond system. The total volume of the existing pond system is approximately 1.5 MG. There is a 10 hp aerator in Pond 1 and a 5 hp aerator in Pond 2. Clos Pegase is currently producing 200,000 gallons of wine with an average annual PW production of 920,000 gallons. This pond system is large enough to provide at least 200 days of retention time at current Clos Pegase average flow conditions. Treated PW is used for irrigation of the onsite vineyards.

Proposed System

The proposed PW system for the new Girard Winery will connect to the existing PW wastewater pond system. The new PW connection will include a pump sump and new aerators to accommodate the increase in flows.

Proposed Flow Calculations

The winery is currently proposing a production of 200,000 gallons of wine per year. Using a monthly PW distribution from multiple wineries and a PW generation rate of 4.6 gal PW per gal wine produced (from Clos Pegase data) flow rates are estimated as follows:

Winery Process Wastewater (PW)

Average Daily Flow	=	2,521 gal PW/day
Average Harvest Day	=	3,950 gal PW/day
Average Day, Peak Harvest Month	=	5,060 gal PW/day (See calculations spreadsheet)

The **design flow proposed** to the system is **10,120 gpd** (5,060 gpd from Girard and 5,060 gpd from Clos Pegase).

Aerator Sizing

The Aerators have been sized using a BOD mass loading and the Aqua-Jet Surface Mechanical Aerator brochure specifications. Calculations (attached) show that a total of 22.5 hp of aerators is required for both ponds. It is proposed to add a second 10 hp

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aerator to Pond 1 for a total of 20 hp in Pond 1. This results in a power to volume (P/V) ratio of 0.21 hp per 1000 ft3. This is sufficient for surface mixing and aeration in Pond 1. Pond 2 has an (E) 5 hp aerator. This provided a P/V ratio of 0.05 hp per 1000 ft3. This is sufficient for surface mixing and to prevent odors in Pond 2. No aeration should be required in the irrigation pond due to dilution, level of treatment exiting Pond 2, and natural aeration from algae. In addition, an Anti-Erosion Assembly is recommended for both aerators, to minimize sediment mixing during periods of low liquid levels in the ponds.

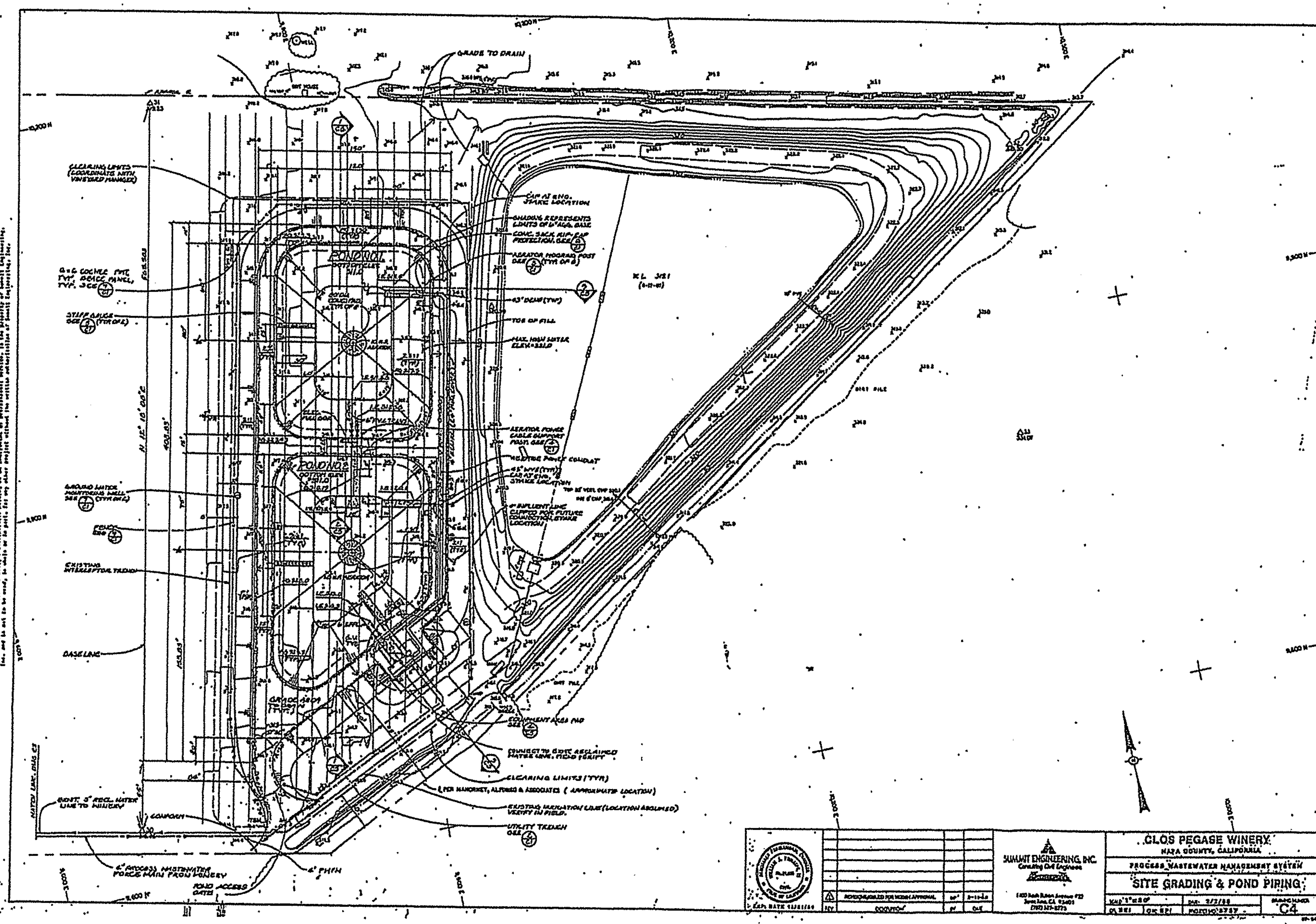
Pond Sizing
The facultative ponds combined volume is roughly 1.5 MG. This provides for a retention time of >140 days at peak month flows (see calculations spreadsheet). Facultative pond systems are sized with a minimum of 60 days in the entire system, and at least 45 days in the first pond. Therefore, this system will have sufficient contact time for treatment before discharge. During the rainy winter months when irrigation needs are low the existing irrigation pond will be used as a detention system to hold excess effluent until the spring months when increased irrigation loading is appropriate.

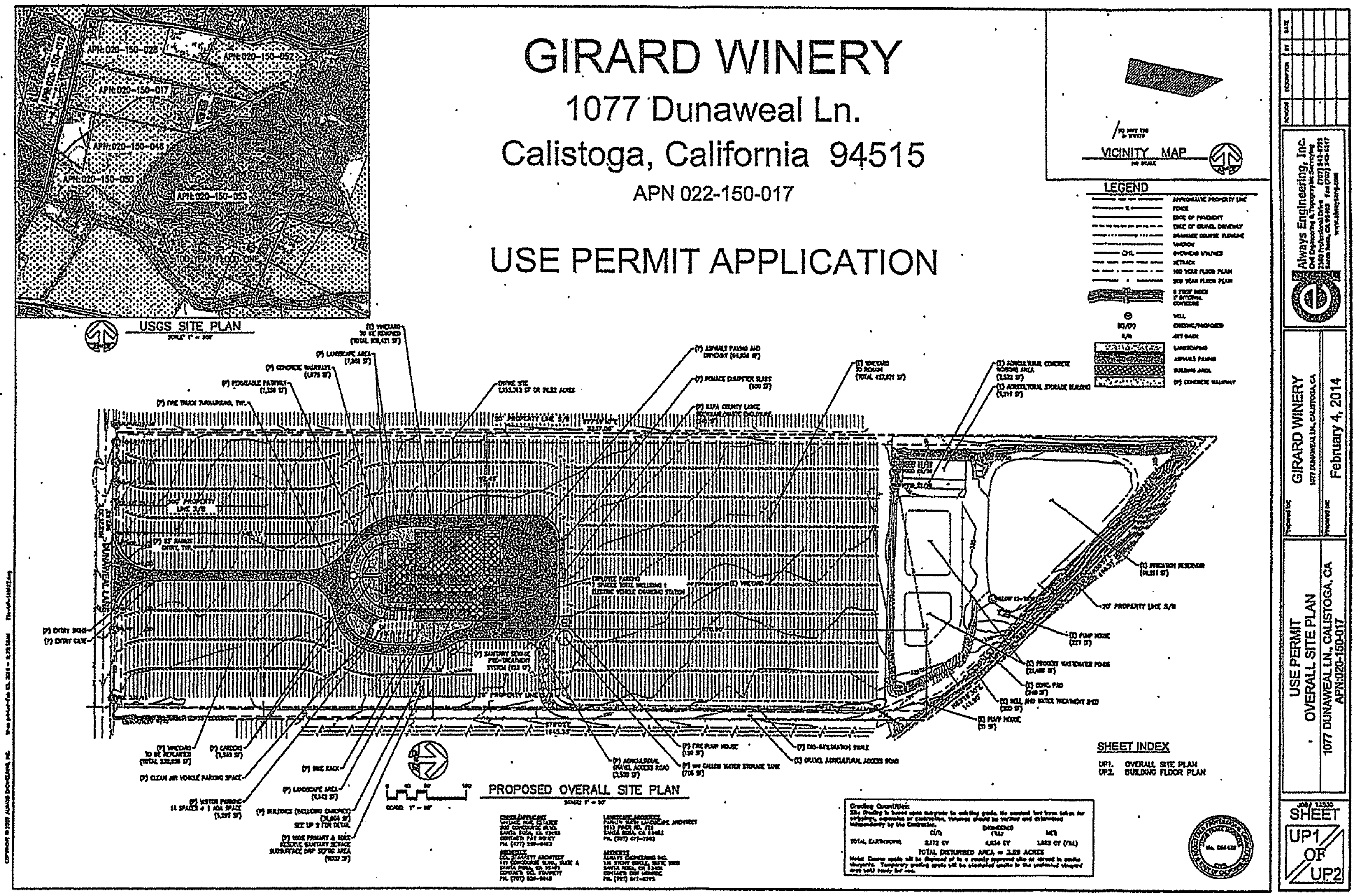
Irrigation Reserve/Dispersal
A total of 7.5 acres of vineyard is required for dispersal of effluent to avoid ponding and concentration.

SUMMARY AND CONCLUSIONS

Sanitary Wastewater
With the proposed installation of a new sanitary management system, as discussed in this report, the site is capable of supporting the proposed sanitary sewage loads.

Process Wastewater
With the proposed installation of additional aerators and a collection system and pump station, the existing aerated facultative pond system is sufficient for the proposed Girard Winery PW flows in addition to the existing Clos Pegase Winery PW flows.




GIRARD WINERY
1077 Dunaweal Ln.
Calistoga, California 94515
APN 022-150-017
USE PERMIT APPLICATION
APN:020-150-028
APN:020-150-052
APN:020-150-017
APN:020-150-048
APN:020-150-050
APN:020-150-053
USGS SITE PLAN
VICINITY MAP
LEGEND
DUNAWEAL LANE
PROPOSED OVERALL SITE PLAN
SHEET INDEX
UP1. OVERALL SITE PLAN
UP2. BUILDING FLOOR PLAN
TOTAL DISTURBED AREA = 3.59 ACRES
Always Engineering, Inc.
GIRARD WINERY
February 4, 2014
USE PERMIT
OVERALL SITE PLAN
1077 DUNAWEAL LN., CALISTOGA, CA
APN:020-150-017
SHEET
UP1
OF
UP2

Date: 02/20/2014 Designed By: BM/RO - Always Engineering, Inc.
Project: Girard Winery Use Permit

Girard Winery

Annual Process Wastewater Flow = 920,000 gallons PW/year
*Refer to the design calculations report for additional flow estimates.

Month	Percentage of Annual Flow (%)	Monthly Flow (MGal)	Days
January	6.50%	0.060	31
February	7.00%	0.064	28
March	8.00%	0.074	31
April	7.00%	0.064	30
May	6.50%	0.060	31
June	5.50%	0.051	30
July	6.00%	0.055	31
August	10.50%	0.097	31
September	16.50%	0.152	30
October	12.50%	0.115	31
November	7.50%	0.069	30
December	6.50%	0.060	31
Total	100.00%	0.920	365

Date: 02/20/2014
Project: Girard Winery Use Permit

Designed By: BM/RO - Always Engineering, Inc.

Girard Winery
PROCESS WASTEWATER

Annual Volume

Annual Production (projected)				=	1,212 ton/year
Wine Generation Rate (assumed)[a]				=	165 gal wine/ton
Wine Produced	1,212 ton/year	x	165 gal wine/ton	=	200,013 gal wine/year
Process Wastewater (PW) Generation Rate[b]	(assumed)			=	4.60 gal PW/gal wine
Annual PW Flow	200,013 gal wine/year	x	4.60 gal PW/gal wine	=	***920,060 gal PW/year***

Average Day Flow

	920,060 gal PW/year	÷	365 days	=	***2,521 gal PW/day***

Average Harvest Day

Total Harvest Flow[c]	920,060 gal PW/year	x	39.5%	=	363,424 gal PW/harvest
Average Harvest Flow (3 month harvest)	363,424 gal PW/harvest	÷	92 days	=	***3,950 gal PW/day***

Average Day, Peak harvest Month - Pond Design

Total Peak Month Flow[c]	920,060 gal PW/year	x	16.5%	=	151,810 gal PW/month
Average Day, Peak Month Flow	151,810 gal PW/month	÷	30 days	=	***5,060 gal PW/day***

a. 165 Gal wine per ton of grapes is used as a wine industr standard
b. 4.6 gal of PW per gallon wine prodcued over the course of 1 year is based on hisotrical data from Clos Pegase and existing Griard operations.
c. Percentage of PW prodcued during each month is based on the average flow distirubtion from 16 wineries

Date: 02/20/2014
Project: Girard Winery Use Permit

Designed By: BM/RO - Always Engineering, Inc.

Clos Pegase Winery

Annual Process Wastewater Flow = 920,000 gallons PW/year

*Refer to the design calculations report for additional flow estimates.

Month	Percentage of Annual Flow (%)	Monthly Flow (MGal)	Days
January	6.50%	0.060	31
February	7.00%	0.064	28
March	8.00%	0.074	31
April	7.00%	0.064	30
May	6.50%	0.060	31
June	5.50%	0.051	30
July	6.00%	0.055	31
August	10.50%	0.097	31
September	16.50%	0.152	30
October	12.50%	0.115	31
November	7.50%	0.069	30
December	6.50%	0.060	31
Total	100.00%	0.920	365

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Project: Girard Winery Use Permit

Clos Pegase Winery
PROCESS WASTEWATER

Annual Volume

Annual Production (projected)				=	1,212 ton/year
Wine Generation Rate (assumed)[a]				=	165 gal wine/ton
Wine Produced	1,212 ton/year	x	165 gal wine/ton	=	200,013 gal wine/year
Process Wastewater (PW) Generation Rate[b]	(assumed)			=	4.60 gal PW/gal wine
Annual PW Flow	200,013 gal wine/year	x	4.60 gal PW/gal wine	=	***920,060 gal PW/year***

Average Day Flow

	920,060 gal PW/year	÷	365 days	=	***2,521 gal PW/day***

Average Harvest Day

Total Harvest Flow[c]	920,060 gal PW/year	x	39.5%	=	363,424 gal PW/harvest
Average Harvest Flow (3 month harvest)	363,424 gal PW/harvest	÷	92 days	=	***3,950 gal PW/day***

Average Day, Peak harvest Month - Pond Design

Total Peak Month Flow[c]	920,060 gal PW/year	x	16.5%	=	151,810 gal PW/month
Average Day, Peak Month Flow	151,810 gal PW/month	÷	30 days	=	***5,060 gal PW/day***

a. 165 Gal wine per ton of grapes is used as a wine industr standard
b. 4.6 gal of PW per gallon wine prodcued over the course of 1 year is based on hisotrical data from Clos Pegase and existing Grlard operations.
c. Percentage of PW prodcued during each month is based on the average flow distirubtion from 16 wineries

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Date: 02/20/2014
Project: Girard Winery Use Permit

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Climate Data

Month	Days	Reference Evapotranspiration[1] (inches)	Pan Evaoporation (inches)	Lake Evaporation (inches)	Average Precipitation (inches)	10-Year Precipitation (inches)	100-Year Precipitation (inches)
January	31	1.0	1.5	1.2	9.0	12.9	17.6
February	28	1.5	2.2	1.7	5.6	8.0	11.0
March	31	2.9	3.8	2.9	5.7	8.1	11.2
April	30	4.7	5.8	4.5	2.6	3.7	5.1
May	31	5.8	8.9	6.9	0.6	0.9	1.2
June	30	6.9	11.0	8.5	0.2	0.3	0.4
July	31	7.2	13.2	10.2	0.1	0.1	0.2
August	31	6.4	12.1	9.3	0.2	0.3	0.4
September	30	4.9	8.7	6.7	0.3	0.4	0.6
October	31	3.5	5.7	4.4	2.4	3.4	4.7
November	30	1.6	2.5	1.9	6.8	9.7	13.3
December	31	1.2	1.7	1.3	8.2	11.7	16.1
TOTAL	365.0	47.7	77.0	59.3	41.7	59.6	81.8

1 Reference Evapotranspiration data is for the Angwin FS obtained from the California Irrigation Management Information System
See http://wwwcimis.water.ca.gov/cimis/monthlyEToReport.do
2 Average Monthly Pan Evaopration Rates observed at Berryessa Lake, Ca between 1957 and 1970.
3 Lake evaopration is pan evaporation multiplied by a 0.77 factor.
4 Average precipitation data is from TheWeatherChannel.com for Calistoga, CA
See http://www.weather.com/weather/wxclimatology/monthly/94515

Date: 02/20/2014
Project: Girard Winery Use Permit
Pond 1 Balance

Designed By: BM/RO - Always Engineering, Inc.

Month	Start Volume (Mgal)	Input: Process Wastewater In (Mgal)	Input: 10 Year Precipitation (Mgal)	Output: Pond Evaporation* (Mgal)	Output: Discharge to Pond 2 (Mgal)	Volume at end of Month (Mgal)	Water Depth at end of month (feet)	Volume Change (Mgal)
January	0.300	0.120	0.173	0.009	0.000	0.593	8.7	0.293
February	0.593	0.129	0.108	0.015	0.100	0.730	10.0	0.137
March	0.730	0.147	0.110	0.027	0.257	0.730	10.0	0.000
April	0.730	0.129	0.050	0.042	0.179	0.730	10.0	0.000
May	0.730	0.120	0.012	0.061	0.231	0.630	9.1	-0.100
June	0.630	0.101	0.004	0.070	0.261	0.524	8.0	-0.106
July	0.524	0.110	0.002	0.072	0.312	0.324	5.7	-0.200
August	0.324	0.193	0.004	0.059	0.197	0.324	5.7	0.000
September	0.324	0.304	0.006	0.042	0.309	0.324	5.7	0.000
October	0.324	0.230	0.046	0.027	0.300	0.300	5.4	-0.024
November	0.300	0.138	0.131	0.012	0.269	0.300	5.4	0.000
December	0.300	0.120	0.158	0.008	0.278	0.300	5.4	0.000
Total		1.840	0.803	0.444	2.643			0.000

Date: 02/20/2014
Project: Girard Winery Use Permit
Pond 2 Balance

Designed By: BM/RO - Always Engineering, Inc.

Month	Start Volume (Mgal)	Input: Process Wastewater In From Pond 1 (Mgal)	Input: 10 Year Precipitation (Mgal)	Output: Pond Evaporation* (Mgal)	Output: Discharge to Irrigation Pond (Mgal)	Volume at end of Month (Mgal)	Water Depth (feet)	Volume Change (Mgal)
January	0.530	0.000	0.175	0.011	0.000	0.705	9.1	0.175
February	0.705	0.100	0.109	0.017	0.000	0.915	10.8	0.209
March	0.915	0.257	0.111	0.031	0.450	0.833	10.2	-0.082
April	0.833	0.179	0.051	0.044	0.400	0.662	8.7	-0.170
May	0.662	0.231	0.012	0.062	0.300	0.605	8.2	-0.057
June	0.605	0.211	0.004	0.073	0.300	0.520	7.4	-0.085
July	0.520	0.312	0.002	0.082	0.400	0.434	6.5	-0.086
August	0.434	0.197	0.004	0.068	0.300	0.335	5.4	-0.099
September	0.335	0.309	0.006	0.047	0.300	0.350	5.6	0.015
October	0.350	0.300	0.047	0.031	0.350	0.347	5.5	-0.003
November	0.347	0.269	0.133	0.013	0.450	0.299	5.0	-0.049
December	0.299	0.278	0.160	0.010	0.206	0.530	7.5	0.231
Total		2.643	0.813	0.489	3.456			0.000

Date: 02/20/2014
Project: Girard Winery Use Permit

Landscape	0.5 a
Vineyard =	2.5 a
Pasture =	0 a
Soil perc rate =	1 I

Month	Days	Reference Evapotranspiration[1] (inches)	ersal Capacity		Treated Effluent to Irrigation Pond		Residual Capacity[7] (Mgal)
			i)	(Mgal)	(in)	(Mgal)	
January	31	1.0	)	0.000	0.000	0.000	0.000
February	28	1.6	)	0.000	0.000	0.000	0.000
March	31	3.0	3	0.474	0.460	0.450	0.024
April	30	4.6	0	0.848	0.409	0.400	0.448
May	31	6.0	3	1.373	0.307	0.300	1.073
June	30	7.0	0	1.543	0.307	0.300	1.243
July	31	8.0	6	2.594	0.409	0.400	2.194
August	31	7.0	1	2.619	0.307	0.300	2.319
September	30	5.2	5	2.457	0.307	0.300	2.157
October	31	3.4	2	1.073	0.358	0.350	0.723
November	30	1.4	)	0.541	0.460	0.450	0.091
December	31	0.9	)	0.000	0.211	0.206	-0.206
TOTAL	365.0	49.1	:2	13.520	3.536	3.456	10.064

1 Average monthly reference evapotranspra
2 Pasture coefficient from Table 5-1, "Irrigat
3 Vineayrd coefficient from Table 5-12, "Irrig
4 Crop coefficient times the reference evapo
5 Precipitation for a 10-yr event, refer to the
6 Irrigation demand is the evapotrasnpiratio
7 Residual capacity estimates irrigation/perc

Date: 02/20/2014
Project: Girard Winery Use Permit

Designed By: BM/RO - Always Engineering, Inc.
Aeration Calculations

Design Flow	= Estimated Average Daily Flow							
	= [redacted] gal/day							
	= 0.010 Mgal/day							
	= 38 m^3/day							
	= 38,294 liters/day							

BOD MASS LOADING - Amount of Biochemical Oxygen Demand (BOD) Based on Amount of Organics in Wastewater

BOD into Pond	= [redacted] mg/L	(Table 4-12 & 4-14 of *Small and Decentralized Wastewater Management Systems)*						
BOD Mass Load	= 38 m^3/day	x	7700 mg BOD/L	x	1000 ml/m^3	x	0.000001 kg/mg	
	= 294.9 kg BOD/day							
	= 648.7 lb BOD/day							

OXYGEN REQUIREMENTS - The amount of oxygen requiremed to breakdown the waste in the water

O2 Requirement	= 648.7 lb BOD/day	x	1.5 lbs O2/lb BOD					
	= 973.1 lbs O2/day							

HORSEPOWER REQUIREMENTS - The horsepower of aeration required to provide the necessary amount of oxygen

Oxygen Transfer Efficiency	= [redacted] lbs O2/Hp*hr (3.4 assumes a VBT aerator , model 100)							
Horsepower Requirement	= 973.1 lbs O2/day	÷	1.8 lbs O2/Hp*hr	÷	24 hr/day			
	= 22.5 Hp required							

POWER TO VOLUME RATIO (Hp/10^3 ft^3) - This is used to estimate the amount of mixing which will occur in a pond due to aeration

Pond Volume	= 0.723 Mgal							
	= 722,797 gallons							
	= 96,631 ft^3							
Number if cells	= 2							
Ratio of first to second cell	= 2							
Volume in Pond 1	= 722,797 gallons							
	= 96,631 ft^3							
Volume in Pond 2	= 803,995 gallons							
	= 107,486 ft^3							
Horsepower in Pond 1; cell 1	= [redacted] Hp							
Pond 1 Power to Volume Ratio	= 20 Hp	x	1000 ft^3	÷	96,631 ft^3	÷	1000 ft^3	
	= 0.21 Hp/1000 ft^3							
Horsepower in Pond 1, cell 2	= [redacted] Hp							
Pond 2 Power to Volume Ratio	= 5 Hp	x	1000 ft^3	÷	107,486 ft^3	÷	1000 ft^3	
	= 0.05 Hp/1000 ft^3							
Complete Mix	= 0.75 - 1.5 Hp/1000 ft^3	(Page 463 of *Small and Decentralized Wastewater Management)*						
Partial Mix	= 0.4 - 0.75 Hp/1000 ft^3							
Facultative	= 0.1 - 0.4 Hp/1000 ft^3							

Pond 1
Retention Time (t)/ Estimated Effluent

Cn	= Effluent BOD	
Co	= 7700 mg/L	
n	= 1	for single cell pond
k	= 0.276 d^(-1)	
t	= 71.4 days	
Cn	= 372 mg/L	
Effluent BOD	= 372 mg/L	

Pond 2
Pond 1
Retention Time (t)/ Estimated Effluent

Cn	= Effluent BOD	
Co	= 372 mg/L	
n	= 1	for baffled pond
k	= 0.276 d^(-1)	
t	= 71.4 days	
Cn	= 18 mg/L	
Effluent BOD	= 18 mg/L	

Napa County Department of
Environmental Management

SITE EVALUATION REPORT

Please attach an 8.5" x 11" plot map showing the locations of all test pits triangulated from permanent landmarks or known property corners. The map must be drawn to scale and include a North arrow, surrounding geographic and topographic features, direction and % slope, distance to drainages, water bodies, potential areas for flooding, unstable landforms, existing or proposed roads, structures, utilities, domestic water supplies, wells, ponds, existing wastewater treatment systems and facilities.

Permit #: E13-00744
APN: 020-150-017
(County Use Only) Reviewed by: Date:

PLEASE PRINT OR TYPE ALL INFORMATION

Property Owner Vintage Wine Estates dba Girard Winery	x New Construction ☐ Addition ☐ Remodel ☐ Relocation ☐ Other:
Property Owner Mailing Address 205 Concourse Blvd	☐ Residential - # of Bedrooms: Design Flow : gpd
City State Zip Santa Rosa CA 95403	x Commercial – Type: Winery domestic Sanitary Waste: 500-1675 gpd Process Waste: 0 gpd
Site Address/Location 1077 Dunaweal Lane Calistoga, CA 94515	☐ Other: Sanitary Waste: gpd Process Waste: gpd

Evaluation Conducted By:

Company Name Always Engineering, Inc.	Evaluator's Name Ben Monroe, P.E. RCE 70012	Signature (Civil Engineer, R.E.H.S., Geologist, Soil Scientist)
Mailing Address: 131B Stony Circle, Sutie 1000		Telephone Number (707) 542-8795 x 17
City State Zip Santa Rosa, Ca 95401		Date Evaluation Conducted 11/14/2013

Primary Area	Expansion Area
Acceptable Soil Depth: 24-48 in. Test pit #'s: TP1-TP6	Acceptable Soil Depth: 24-48 in. Test pit #'s: TP1-TP6
Soil Application Rate (gal. /sq. ft. /day): 0.75 to 1.0 gpd/sf	Soil Application Rate (gal. /sq. ft. /day):0.75 to 1.0 gpd/sf
System Type(s) Recommended: PD, drip – pending gw	System Type(s) Recommended: PD, drip – pending gw
Slope: 3-5 %. Distance to nearest water source: 1000 ft.	Slope: 3-5 %. Distance to nearest water source: 1000 ft.
Hydrometer test performed? No	Hydrometer test performed? No
Bulk Density test performed? No	Bulk Density test performed? No
Percolation test performed? No	Percolation test performed? No
Groundwater Monitoring Performed? Pending Rain	Groundwater Monitoring Performed? Pending Rain

Site constraints/Recommendations:

- Existing well
- Groundwater monitoring to be performed to identify perched groundwater level due to presence of mottling at less than 24 inches deep.
- Interceptor drain and surface drainage to divert away from septic area recommended.
- Proposed drainage features and grading will need to avoid.
- Additional test pits near wastewater ponds showed signs of significant seasonal saturation and lesser depths of permeable soils. Pits on map but not logged due to time onsite.

Test Pit # 1

PLEASE PRINT OR TYPE ALL INFORMATION

Horizon Depth (Inches)	Boundary	%Rock	Texture	Structure	Consistence			Pores	Roots	Mottling
					Side Wall	Ped	Wet			
34	D/G	15-20	SCL	SAB,3	FR	S	S	3,C	1,M	1,VF
48	D/G	35	SCL	SAB,3	VF	S	SS	3,M	1,M	1,F
60+	----------	<10	SCL	SAB,2	D/L	M	M	1,VF	1,M	2,P

Test Pit #2

Horizon Depth (Inches)	Boundary	%Rock	Texture	Structure	Consistence			Pores	Roots	Mottling
					Side Wall	Ped	Wet			
24	D/G	15-20	SCL	SAB,3	FR	S	S	3,C	1,M	1,VF
56	D/G	35	SCL	SAB,3	VF	S	SS	3,M	1,M	1,F
65+	----------	<10	SCL	SAB,2	D/L	M	M	1,VF	1,M	2,P

Test Pit # 3

Horizon Depth (Inches)	Boundary	%Rock	Texture	Structure	Consistence			Pores	Roots	Mottling
					Side Wall	Ped	Wet			
28	D/G	15-20	SCL	SAB,3	FR	S	S	3,C	1,M	1,VF
60	D/G	15-20	SL/LS	SAB,3	F	M	SS	3,M/F	1,M	1,F
70+	----------	<10	SCL	SAB,2	D/L	M	M	1,VF	1,M	2,P

Test Pit # 4

PLEASE PRINT OR TYPE ALL INFORMATION

Horizon Depth (Inches)	Boundary	%Rock	Texture	Structure	Consistence			Pores	Roots	Mottling
					Side Wall	Ped	Wet			
24	D/G	15-20	SCL	SAB,3	FR	S	S	3,C	1,M	1,VF
49	D/G	25	SCL	SAB,3	FR	F	S	2,M	1,M	2,F
60+	----------	<10	SCL	SAB,2	D/L	L	M	1,VF	1,M	2,P

Test Pit #5

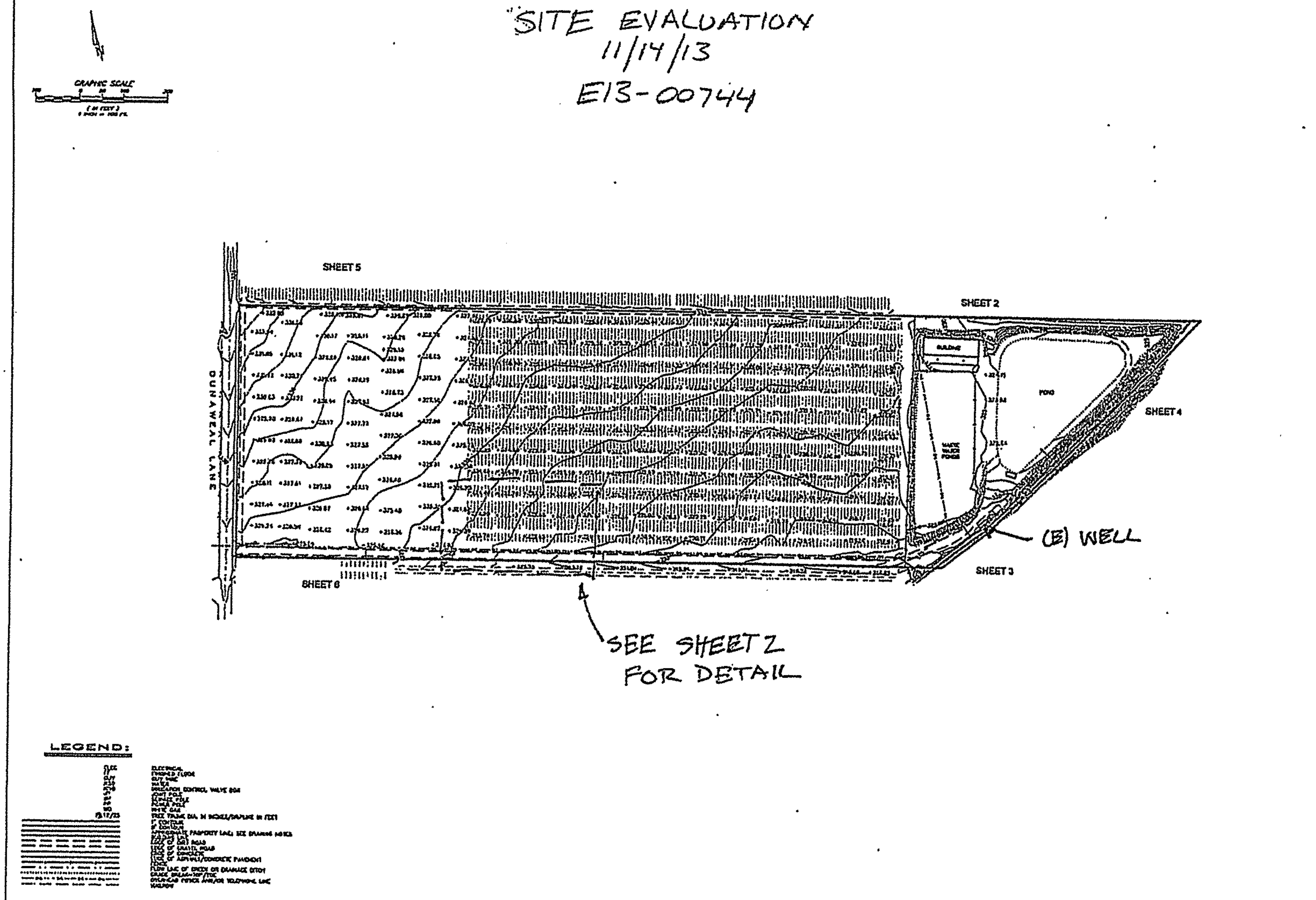
Horizon Depth (Inches)	Boundary	%Rock	Texture	Structure	Consistence			Pores	Roots	Mottling
					Side Wall	Ped	Wet			
24	D/G	15-20	SCL	SAB,3	FR	S	S	3,C	1,M	1,VF
49	D/G	25	SCL	SAB,3	F	M/FR	SS	2,F	1,F	1,F
54+		>50%								

Test Pit # 6

Horizon Depth (Inches)	Boundary	%Rock	Texture	Structure	Consistence			Pores	Roots	Mottling
					Side Wall	Ped	Wet			
36	D/G	15-20	SCL	SAB,3	FR	S	S	3,C	1,M	1,VF
55	D/G	25	SL	G/B,2	L	L	SS	2,C	1,M	1,D
70+		>50%								

SHEET 1 OF 2

SITE EVALUATION
11/14/13
E13-00744



ALBION SURVEYS, INC.

DRAWING NOTES

SITE INFORMATION

ADDRESS: 1077 DUNAWEAL LANE
CALISTOGA, CA 94515

MAP OF TOPOGRAPHY
OF A PORTION OF THE LANDS OF
CLOS PEGASE
COUNTY OF NAPA STATE OF CALIFORNIA

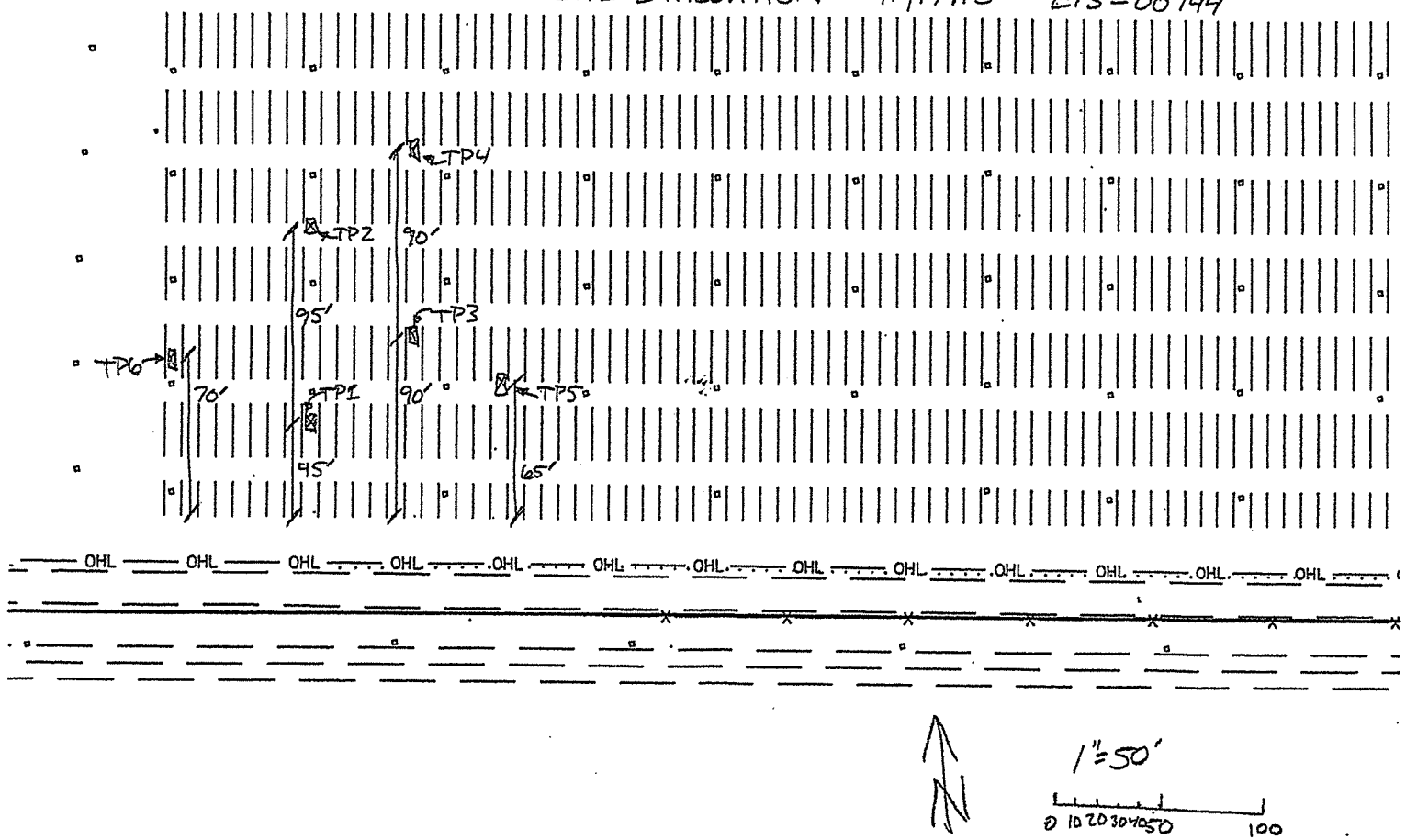
REVISIONS & ADDITIONS

ALBION REFERENCES

1077 DUNAWEAL LN
CALISTOGA, CA
APN: 020-150-017

SHEET 2 OF 2

SITE EVALUATION 11/14/13 E13-00744



13530.0 Vintage Wine Estates_Girard Winery
Wastewater Feasibility Study
February 20, 2014
Revised: May 5, 2014

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Girard Winery

1077 Dunaweal Ln., Calistoga, CA 94515
APN: 020-150-017

USE PERMIT
WASTEWATER FEASIBILITY STUDY

Project and Site Background

Vintage Wine Estates owns and operates the existing "Clos Pegase" Winery located at 1060 Dunaweal Ln in Calistoga, Ca (APN: 020-150-012). Vintage Wine Estates also owns the parcel across Dunaweal Ln., (1077 Dunaweal Ln., APN: 020-150-017), which has the existing process wastewater ponds and water well for Clos Pegase.

Vintage Wine Estates is proposing to construct a new winery and tasting room (the Girard Winery) on the above referenced parcel. A production capacity of 200,000 gal of wine annually is proposed for the new Girard Winery. With the Use Permit, it is proposed to also treat the process waste (PW) generated by Girard Winery using the existing Clos Pegase Pond Treatment system. A new collection system and transfer pump sump will be required for Girard Winery. A new aerator in the process waste ponds will also be required. A new sanitary sewage system on-site is proposed to accommodate the winery employees, visitors, and events.

The parcel consists of existing vineyards, water supply well and treatment, an agricultural storage building, 2 PW treatment ponds and an irrigation storage pond. The parcel is generally flat, with a small flow line along the southern property line.

A site plan is provided in Enclosure B displaying the existing site and proposed wastewater system improvements.

SANITARY SEWAGE (SS)

Existing Site Evaluation

A site evaluation was performed by Ben Monroe, P.E. of Always Engineering and Peter Ex of Napa County on November 14, 2013. A total of 16 soil profiles were evaluated and 6 were logged for use. Test pits displayed a sandy clay loam surface soil which ranged in depth from 36" to 56" in depth. Soils were underlain by a sandy loam or loamy sand for a total permeable depth ranging from 49" to 60" in depth. All soil displayed a moderate to strong sub-angular blocky structure. Faint mottling was observed to 24" deep, with increasing intensity with depth below that. Prominent mottling was observed below 48" in all test pits. Additional groundwater monitoring is required onsite to determine if the upper mottling is due to subsurface groundwater or heavy irrigation of the onsite vineyards. At the time of preparation of this study, there has not been sufficient rainfall

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to perform groundwater monitoring and therefore, it is assumed that a minimum of 24" suitable soil is available for septic system design. An interceptor drain is also proposed with this feasibility study to ensure we have the required separation to seasonal groundwater. The Napa County Site Evaluation procedures indicate a Sandy clay loam or sandy loam with moderate structure should be loading at 0.75 to 1.0 gpd using pretreated effluent.

Proposed Wastewater Flows

The proposed onsite sanitary wastewater flow rate is entirely associated with the proposed Girard Winery. The use permit is requesting a similar level of use as Clos Pegase; an average number of 10 employees (15 gpcd) along with 75 visitors (3gpcd), and a peak number of 30 employees (15 gpcd) along with 100 visitors (3 gpcd). There will be one large event per year which will have 500 attendees. Portable toilets will be used for this event. All events will have fully catered food with all preparation and cleanup occurring off site. The proposed wastewater flows are estimated as follows:

Average

Employees

8 FT employees	x	15 gpd/employee	=	120 gpd
3 PT employees	x	7.5 gpd/employee	=	22.5 gpd

Tasting Room

42 tasting visitors	x	3 gpd/visitor	=	126 gpd

Events

75 event visitors	x	5 gpd/visitor	=	375 gpd

TOTAL PROPOSED AVERAGE DESIGN FLOW	=	**643.5 GPD**

Peak

Employees

20 FT employees	x	15 gpd/employee	=	300 gpd
10 PT employees	x	7.5 gpd/employee	=	75 gpd

Tasting Room

100 tasting visitors	x	3 gpd/visitor	=	300 gpd

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Events

200 event visitors x	5 gpd/visitor	=	1,000 gpd

TOTAL PROPOSED PEAK DESIGN FLOW = **1,675 GPD**

Proposed Sanitary Sewage Loading

It is proposed to design a subsurface drip system to accommodate all sanitary sewage dispersal. Sizing as follows:

Proposed Septic System Design Flow: 1,675 gpd
Proposed Pretreated Effluent Loading Rate: 0.6 gpd/sf (Moderate -Strong Sandy Loam/Sandy Clay loam)

This loading rate is within the suitable range for pretreated effluent in the onsite soil types. Because there has not been sufficient rainfall to perform ground water monitoring

Proposed Sanitary Sewage Management System

With improvement to the site, the following tanks are proposed for the Girard Winery septic system. Because a pretreatment system is required for subsurface drip, a septic, recirculation, and sump tank are required for an AdvanTex pretreatment system. Other NSF Certified pretreatment systems may be reviewed at the time of Construction Drawings. Tank sizes are verified using the plumbing code commercial sizing formula.

$V = 1,125 + 0.75 \times Q$
$= 1,125 + 0.75 \times 1,675 \text{ gpd}$
$= 2,381.25 \text{ gallons}$

Septic Tank: 6,000 gallons (3.6 days retention time)
Recirculation Tank: 2,000 gallons (1.2 days retention time)
Sump/Dispersal Equalization Tank: 3,000 gallons (1.8 days retention time)

These tank volumes meet the minimum criteria for an AvanTex pretreatment system.

Leachfield Sizing

The area required for a primary sanitary sewer drip system is as follows:

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Area Required = Flow/Application Rate

= 1,675 gpd / 0.6 gpd/sf

= 2,792 sf

Reserve Area

200% reserve area, or 5,584 sf, is required for this site and is shown adjacneet to the primary septic area on the Use Permit Site Plan.

Irrigation Reuse Alternative

In the event that groundwater monitoring cannot occur prior to the application for construction permits, it is also desired to have the ability to provide a pretreatment and irrigation reuse system. The Lyve Wastewaer System has been used at Alpha Omega Winery to treat and reuse domestic wastewater for irrigation. Also, the Biomicrobics BioBarrier Membrane Bioreactor (MBR) is NSF 350 certified for reuse. A design for a BioBarrier MBR would include the following:

Septic Tank:	2,000 gallons
Processing Tank:	13,000 gallons
Treated Collection Sump:	1,500 gallons
Treated Storage Tank:	40,000 gallons

A storage tank would be provided for period in the winter when irrigation reuse cannot occur. As demonstrated in the process wastewater section of this study, more than sufficient vineyard is available onsite for irrigation dispersal of effluent. Approximately 3 acres is required for process wastewater and a total of 18 acres is available onsite.

If treatment, irrigation, and reuse is proposed for construction of this project, the project must first obtain approval from the San Francisco Bay Regional Water Quality Control Board (SFBREWQCB) for this use. Prior to issuance of building permits, the RWQCB will need to approve of the proposal, and issue Waste Discharge Requirements for the reuse of the sanitary sewage. If future groundwater monitoring cannot occur in a time schedule appropriate for building permits, or does not provide at least 24 inches of separation to groundwater, treatment, irrigation, and reuse will be required for the project. In this event, the RWQCB must also grant system approval prior to building permit issuance.

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PROCESS WASTEWATER (PW)

Existing System

The existing on-site process wastewater system consists of 2 aerated facultative lagoons and an irrigation holding pond. This system is currently treating the process waste from the Clos Pegase winery located across Dunaweal Lane under the same ownership. No sanitary wastewater is discharged into the process wastewater system.

Before entering the process wastewater ponds, the entire flow of process wastewater is filtered through a rotary screen where suspended solids are collected and removed. Biological stabilization occurs in the facultative pond system. The total volume of the existing pond system is approximately 1.5 MG. There is a 10 hp aerator in Pond 1 and a 5 hp aerator in Pond 2. Clos Pegase is currently producing 200,000 gallons of wine with an average annual PW production of 920,000 gallons. This pond system is large enough to provide at least 200 days of retention time at current Clos Pegase average flow conditions. Treated PW is used for irrigation of the onsite vineyards.

Proposed System

The proposed PW system for the new Girard Winery will connect to the existing PW wastewater pond system. The new PW connection will include a pump sump and new aerators to accommodate the increase in flows.

Proposed Flow Calculations

The winery is currently proposing a production of 200,000 gallons of wine per year. Using a monthly PW distribution from multiple wineries and a PW generation rate of 4.6 gal PW per gal wine produced (from Clos Pegase data) flow rates are estimated as follows:

Winery Process Wastewater (PW)

Average Daily Flow	=	2,521 gal PW/day
Average Harvest Day	=	3,950 gal PW/day
Average Day, Peak Harvest Month	=	5,060 gal PW/day (See calculations spreadsheet)

The **design flow proposed** to the system is **10,120 gpd** (5,060 gpd from Girard and 5,060 gpd from Clos Pegase).

Aerator Sizing

The Aerators have been sized using a BOD mass loading and the Aqua-Jet Surface Mechanical Aerator brochure specifications. Calculations (attached) show that a total of 22.5 hp of aerators is required for both ponds. It is proposed to add a second 10 hp

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aerator to Pond 1 for a total of 20 hp in Pond 1. This results in a power to volume (P/V) ratio of 0.21 hp per 1000 ft3. This is sufficient for surface mixing and aeration in Pond 1. Pond 2 has an (E) 5 hp aerator. This provided a P/V ratio of 0.05 hp per 1000 ft3. This is sufficient for surface mixing and to prevent odors in Pond 2. No aeration should be required in the irrigation pond due to dilution, level of treatment exiting Pond 2, and natural aeration from algae. In addition, an Anti-Erosion Assembly is recommended for both aerators, to minimize sediment mixing during periods of low liquid levels in the ponds.

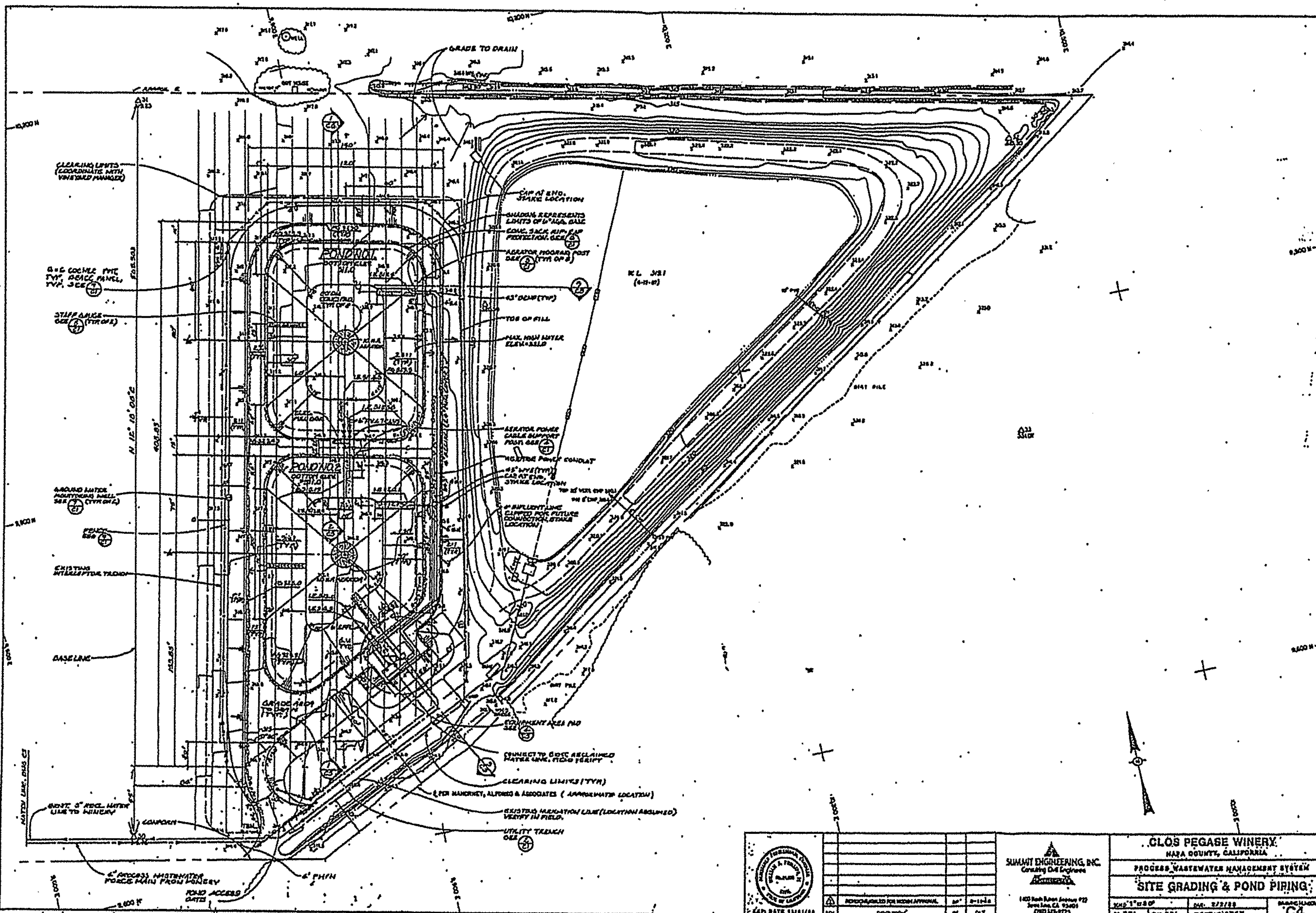
Pond Sizing
The facultative ponds combined volume is roughly 1.5 MG. This provides for a retention time of >140 days at peak month flows (see calculations spreadsheet). Facultative pond systems are sized with a minimum of 60 days in the entire system, and at least 45 days in the first pond. Therefore, this system will have sufficient contact time for treatment before discharge. During the rainy winter months when irrigation needs are low the existing irrigation pond will be used as a detention system to hold excess effluent until the spring months when increased irrigation loading is appropriate.

Irrigation Reserve/Dispersal
A total of 7.5 acres of vineyard is required for dispersal of effluent to avoid ponding and concentration.

SUMMARY AND CONCLUSIONS

Sanitary Wastewater
With the proposed installation of a new sanitary management system, as discussed in this report, the site is capable of supporting the proposed sanitary sewage loads.

Process Wastewater
With the proposed installation of additional aerators and a collection system and pump station, the existing aerated facultative pond system is sufficient for the proposed Girard Winery PW flows in addition to the existing Clos Pegase Winery PW flows.


CLOS PEGASE WINERY
NAPA COUNTY, CALIFORNIA
PROCESS WASTEWATER MANAGEMENT SYSTEM
SITE GRADING & POND PIPING
SUMMIT ENGINEERING, INC.
C4
POND NO. 1
POND NO. 2
GRADE TO DRAIN
CLEARING LIMITS (COORDINATE WITH VINEYARD MANAGER)
CAP AT END, STAKE LOCATION
TOE OF FILL
BASELINE
EXISTING INTERCEPTOR TRENCH
CLEARING LIMITS (TYP)
UTILITY TRENCH
EQUIPMENT AREA PAD
CONFORM
POND ACCESS GATES
N 12° 10' 00" E
405.83'

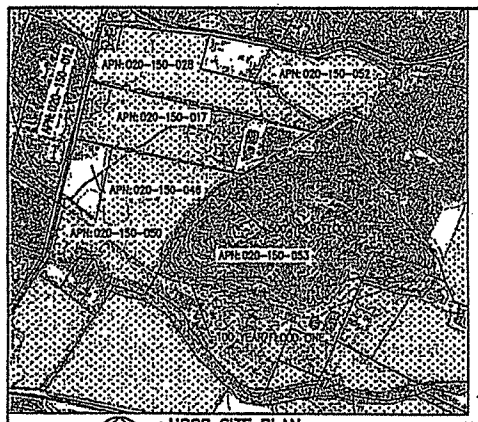
GIRARD WINERY

1077 Dunaweal Ln.

Calistoga, California 94515

APN 022-150-017

USE PERMIT APPLICATION



VICINITY MAP

LEGEND

USGS SITE PLAN

PROPOSED OVERALL SITE PLAN

SHEET INDEX

UP1. OVERALL SITE PLAN
UP2. BUILDING FLOOR PLAN

Always Engineering, Inc.

GIRARD WINERY
1077 DUNAWEAL LN., CALISTOGA, CA

February 4, 2014

USE PERMIT
OVERALL SITE PLAN
1077 DUNAWEAL LN., CALISTOGA, CA
APN:020-150-017

SHEET
UP1
OF
UP2

Date: 02/20/2014 Designed By: BM/RO - Always Engineering, Inc.
Project: Girard Winery Use Permit

Girard Winery

Annual Process Wastewater Flow = 920,000 gallons PW/year
*Refer to the design calculations report for additional flow estimates.

Month	Percentage of Annual Flow (%)	Monthly Flow (MGal)	Days
January	6.50%	0.060	31
February	7.00%	0.064	28
March	8.00%	0.074	31
April	7.00%	0.064	30
May	6.50%	0.060	31
June	5.50%	0.051	30
July	6.00%	0.055	31
August	10.50%	0.097	31
September	16.50%	0.152	30
October	12.50%	0.115	31
November	7.50%	0.069	30
December	6.50%	0.060	31
Total	100.00%	0.920	365

Date: 02/20/2014
Project: Girard Winery Use Permit

Designed By: BM/RO - Always Engineering, Inc.

Girard Winery

PROCESS WASTEWATER

Annual Volume

Annual Production (projected)				=	1,212 ton/year
Wine Generation Rate (assumed)[a]				=	165 gal wine/ton
Wine Produced	1,212 ton/year	x	165 gal wine/ton	=	200,013 gal wine/year
Process Wastewater (PW) Generation Rate[b]	(assumed)			=	4.60 gal PW/gal wine
Annual PW Flow	200,013 gal wine/year	x	4.60 gal PW/gal wine	=	***920,060 gal PW/year***

Average Day Flow

	920,060 gal PW/year	÷	365 days	=	***2,521 gal PW/day***

Average Harvest Day

Total Harvest Flow[c]	920,060 gal PW/year	x	39.5%	=	363,424 gal PW/harvest
Average Harvest Flow (3 month harvest)	363,424 gal PW/harvest	÷	92 days	=	***3,950 gal PW/day***

Average Day, Peak harvest Month - Pond Design

Total Peak Month Flow[c]	920,060 gal PW/year	x	16.5%	=	151,810 gal PW/month
Average Day, Peak Month Flow	151,810 gal PW/month	÷	30 days	=	***5,060 gal PW/day***

a. 165 Gal wine per ton of grapes is used as a wine industr standard
b. 4.6 gal of PW per gallon wine prodcued over the course of 1 year is based on hisotrical data from Clos Pegase and existing Griard operations.
c. Percentage of PW prodcued during each month is based on the average flow distirubtion from 16 wineries

Date: 02/20/2014 Designed By: BM/RO - Always Engineering, Inc.
Project: Girard Winery Use Permit

Clos Pegase Winery

Annual Process Wastewater Flow = 920,000 gallons PW/year
*Refer to the design calculations report for additional flow estimates.

Month	Percentage of Annual Flow (%)	Monthly Flow (MGal)	Days
January	6.50%	0.060	31
February	7.00%	0.064	28
March	8.00%	0.074	31
April	7.00%	0.064	30
May	6.50%	0.060	31
June	5.50%	0.051	30
July	6.00%	0.055	31
August	10.50%	0.097	31
September	16.50%	0.152	30
October	12.50%	0.115	31
November	7.50%	0.069	30
December	6.50%	0.060	31
Total	100.00%	0.920	365

Date: 02/20/2014 Designed By: BM/RO - Always Engineering, Inc.
Project: Girard Winery Use Permit

Clos Pegase Winery
PROCESS WASTEWATER

Annual Volume

Annual Production (projected)				=	1,212 ton/year
Wine Generation Rate (assumed)[a]				=	165 gal wine/ton
Wine Produced	1,212 ton/year	x	165 gal wine/ton	=	200,013 gal wine/year
Process Wastewater (PW) Generation Rate[b]	(assumed)			=	4.60 gal PW/gal wine
Annual PW Flow	200,013 gal wine/year	x	4.60 gal PW/gal wine	=	***920,060 gal PW/year***

Average Day Flow

	920,060 gal PW/year	÷	365 days	=	***2,521 gal PW/day***

Average Harvest Day

Total Harvest Flow[c]	920,060 gal PW/year	x	39.5%	=	363,424 gal PW/harvest
Average Harvest Flow (3 month harvest)	363,424 gal PW/harvest	÷	92 days	=	***3,950 gal PW/day***

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www.alwayseng.com JasonH@alwayseng.com

Date: 02/20/2014
Project: Girard Winery Use Permit

Designed By: BM/RO - Always Engineering, Inc.

Climate Data

Month	Days	Reference Evapotranspiration[1] (inches)	Pan Evaoporation (inches)	Lake Evaporation (inches)	Average Precipitation (inches)	10-Year Precipitation (inches)	100-Year Precipitation (inches)
January	31	1.0	1.5	1.2	9.0	12.9	17.6
February	28	1.5	2.2	1.7	5.6	8.0	11.0
March	31	2.9	3.8	2.9	5.7	8.1	11.2
April	30	4.7	5.8	4.5	2.6	3.7	5.1
May	31	5.8	8.9	6.9	0.6	0.9	1.2
June	30	6.9	11.0	8.5	0.2	0.3	0.4
July	31	7.2	13.2	10.2	0.1	0.1	0.2
August	31	6.4	12.1	9.3	0.2	0.3	0.4
September	30	4.9	8.7	6.7	0.3	0.4	0.6
October	31	3.5	5.7	4.4	2.4	3.4	4.7
November	30	1.6	2.5	1.9	6.8	9.7	13.3
December	31	1.2	1.7	1.3	8.2	11.7	16.1
TOTAL	365.0	47.7	77.0	59.3	41.7	59.6	81.8

1 Reference Evapotranspiration data is for the Angwin FS obtained from the California Irrigation Management Information System
See http://wwwcimis.water.ca.gov/cimis/monthlyEToReport.do
2 Average Monthly Pan Evaopration Rates observed at Berryessa Lake, Ca between 1957 and 1970.
3 Lake evaopration is pan evaporation multiplied by a 0.77 factor.
4 Average precipitation data is from TheWeatherChannel.com for Calistoga, CA
See http://www.weather.com/weather/wxclimatology/monthly/94515

Date: 02/20/2014
Project: Girard Winery Use Permit
Pond 1 Balance

Designed By: BM/RO - Always Engineering, Inc.

Month	Start Volume	Input		Output		Volume at end of Month	Water Depth at end of month	Volume Change
		Process Wastewater In	10 Year Precipitation	Pond Evaporation*	Discharge to Pond 2			
	(Mgal)	(Mgal)	(Mgal)	(Mgal)	(Mgal)	(Mgal)	(feet)	(Mgal)
January	0.300	0.120	0.173	0.009	0.000	0.593	8.7	0.293
February	0.593	0.129	0.108	0.015	0.100	0.730	10.0	0.137
March	0.730	0.147	0.110	0.027	0.257	0.730	10.0	0.000
April	0.730	0.129	0.050	0.042	0.179	0.730	10.0	0.000
May	0.730	0.120	0.012	0.061	0.231	0.630	9.1	-0.100
June	0.630	0.101	0.004	0.070	0.211	0.524	8.0	-0.106
July	0.524	0.110	0.002	0.072	0.312	0.324	5.7	-0.200
August	0.324	0.193	0.004	0.059	0.197	0.324	5.7	0.000
September	0.324	0.304	0.006	0.042	0.309	0.324	5.7	0.000
October	0.324	0.230	0.046	0.027	0.300	0.300	5.4	-0.024
November	0.300	0.138	0.131	0.012	0.269	0.300	5.4	0.000
December	0.300	0.120	0.158	0.008	0.278	0.300	5.4	0.000
Total		1.840	0.803	0.444	2.643			0.000

Date: 02/20/2014
Project: Girard Winery Use Permit
Pond 2 Balance

Designed By: BM/RO - Always Engineering, Inc.

Month	Start Volume (Mgal)	Input: Process Wastewater In From Pond 1 (Mgal)	Input: 10 Year Precipitation (Mgal)	Output: Pond Evaporation* (Mgal)	Output: Discharge to Irrigation Pond (Mgal)	Volume at end of Month (Mgal)	Water Depth (feet)	Volume Change (Mgal)
January	0.560	0.000	0.175	0.011	0.000	0.705	9.1	0.175
February	0.705	0.100	0.109	0.017	0.000	0.915	10.8	0.209
March	0.915	0.257	0.111	0.031	0.450	0.833	10.2	-0.082
April	0.833	0.179	0.051	0.044	0.400	0.662	8.7	-0.170
May	0.662	0.231	0.012	0.062	0.300	0.605	8.2	-0.057
June	0.605	0.211	0.004	0.073	0.300	0.520	7.4	-0.085
July	0.520	0.312	0.002	0.082	0.400	0.434	6.5	-0.086
August	0.434	0.197	0.004	0.068	0.300	0.335	5.4	-0.099
September	0.335	0.309	0.006	0.047	0.300	0.350	5.6	0.015
October	0.350	0.300	0.047	0.031	0.350	0.347	5.5	-0.003
November	0.347	0.269	0.133	0.013	0.450	0.299	5.0	-0.049
December	0.299	0.278	0.160	0.010	0.206	0.530	7.5	0.231
Total		2.643	0.813	0.489	3.456			0.000

Date: 02/20/2014
Project: Girard Winery Use Permit

Landscape	0.5 a
Vineyard =	2.5 a
Pasture =	0 a
Soil perc rate =	1 i

Month	Days	Reference Evapotranspiration[1] (inches)	ersal Capacity (Mgal)	Treated Effluent to Irrigation Pond (in)	Treated Effluent to Irrigation Pond (Mgal)	Residual Capacity[7] (Mgal)
January	31	1.0	0.000	0.000	0.000	0.000
February	28	1.6	0.000	0.000	0.000	0.000
March	31	3.0	0.474	0.460	0.450	0.024
April	30	4.6	0.848	0.409	0.400	0.448
May	31	6.0	1.373	0.307	0.300	1.073
June	30	7.0	1.543	0.307	0.300	1.243
July	31	8.0	2.594	0.409	0.400	2.194
August	31	7.0	2.619	0.307	0.300	2.319
September	30	5.2	2.457	0.307	0.300	2.157
October	31	3.4	1.073	0.358	0.350	0.723
November	30	1.4	0.541	0.460	0.450	0.091
December	31	0.9	0.000	0.211	0.206	-0.206
TOTAL	365.0	49.1	13.520	3.536	3.456	10.064

1 Average monthly reference evapotranspri
2 Pasture coefficient from Table 5-1, "Irrigati
3 Vineayrd coefficient from Table 5-12, "Irrig
4 Crop coefficient times the reference evapo
5 Precipitation for a 10-yr event, refer to the
6 Irrigation demand is the evapotrasnpiratio
7 Residual capacity estimates irrigation/perc

Date: 02/20/2014
Project: Girard Winery Use Permit

Designed By: BM/RO - Always Engineering, Inc.
Aeration Calculations

Design Flow	= Estimated Average Daily Flow							
	= 10,120 gal/day							
	= 0.010 Mgal/day							
	= 38 m^3/day							
	= 38,294 liters/day							

BOD MASS LOADING - Amount of Biochemical Oxygen Demand (BOD) Based on Amount of Organics in Wastewater

BOD into Pond	= 7700 mg/L	(Table 4-12 & 4-14 of *Small and Decentralized Wastewater Management Systems)*						
BOD Mass Load	= 38 m^3/day	x	7700 mg BOD/L	x	1000 ml/m^3	x	0.000001 kg/mg	
	= 294.9 kg BOD/day							
	= 648.7 lb BOD/day							

OXYGEN REQUIREMENTS - The amount of oxygen requiremed to breakdown the waste in the water

O2 Requirement	= 648.7 lb BOD/day	x	1.5 lbs O2/lb BOD					
	= 973.1 lbs O2/day							

HORSEPOWER REQUIREMENTS - The horsepower of aeration required to provide the necessary amount of oxygen

Oxygen Transfer Efficiency	= 1.8 lbs O2/Hp*hr (3.4 assumes a VBT aerator , model 100)							
Horsepower Requirement	= 973.1 lbs O2/day	÷	1.8 lbs O2/Hp*hr	÷	24 hr/day			
	= 22.5 Hp required							

POWER TO VOLUME RATIO (Hp/10^3 ft^3) - This is used to estimate the amount of mixing which will occur in a pond due to aeration

Pond Volume	= 0.723 Mgal							
	= 722,797 gallons							
	= 96,631 ft^3							
Number if cells	= 2							
Ratio of first to second cell	= 2							
Volume in Pond 1	= 722,797 gallons							
	= 96,631 ft^3							
Volume in Pond 2	= 803,995 gallons							
	= 107,486 ft^3							
Horsepower in Pond 1; cell 1	= 20 Hp							
Pond 1 Power to Volume Ratio	= 20 Hp	x	1000 ft^3	÷	96,631 ft^3	÷	1000 ft^3	
	= 0.21 Hp/1000 ft^3							
Horsepower in Pond 1, cell 2	= 5 Hp							
Pond 2 Power to Volume Ratio	= 5 Hp	x	1000 ft^3	÷	107,486 ft^3	÷	1000 ft^3	
	= 0.05 Hp/1000 ft^3							
Complete Mix	= 0.75 - 1.5 Hp/1000 ft^3	(Page 463 of *Small and Decentralized Wastewater Management)*						
Partial Mix	= 0.4 - 0.75 Hp/1000 ft^3							
Facultative	= 0.1 - 0.4 Hp/1000 ft^3							

Pond 1
Retention Time (t)/ Estimated Effluent

Cn	= Effluent BOD	
Co	= 7700 mg/L	
n	= 1	for single cell pond
k	= 0.276 d^(-1)	
t	= 71.4 days	
Cn	= 372 mg/L	
Effluent BOD	= 372 mg/L	

Pond 2
Pond 1
Retention Time (t)/ Estimated Effluent

Cn	= Effluent BOD	
Co	= 372 mg/L	
n	= 1	for baffled pond
k	= 0.276 d^(-1)	
t	= 71.4 days	
Cn	= 18 mg/L	
Effluent BOD	= 18 mg/L	

Napa County Department of
Environmental Management

SITE EVALUATION REPORT

Please attach an 8.5" x 11" plot map showing the locations of all test pits triangulated from permanent landmarks or known property corners. The map must be drawn to scale and include a North arrow, surrounding geographic and topographic features, direction and % slope, distance to drainages, water bodies, potential areas for flooding, unstable landforms, existing or proposed roads, structures, utilities, domestic water supplies, wells, ponds, existing wastewater treatment systems and facilities.

Permit #: E13-00744
APN: 020-150-017
(County Use Only) Reviewed by: Date:

PLEASE PRINT OR TYPE ALL INFORMATION

Property Owner Vintage Wine Estates dba Girard Winery	x New Construction ☐ Addition ☐ Remodel ☐ Relocation ☐ Other:
Property Owner Mailing Address 205 Concourse Blvd	☐ Residential - # of Bedrooms: Design Flow : gpd
City State Zip Santa Rosa CA 95403	x Commercial – Type: Winery domestic Sanitary Waste: 500-1675 gpd Process Waste: 0 gpd
Site Address/Location 1077 Dunaweal Lane Calistoga, CA 94515	☐ Other: Sanitary Waste: gpd Process Waste: gpd

Evaluation Conducted By:

Company Name Always Engineering, Inc.	Evaluator's Name Ben Monroe, P.E. RCE 70012	Signature (Civil Engineer, R.E.H.S., Geologist, Soil Scientist)
Mailing Address: 131B Stony Circle, Sutie 1000		Telephone Number (707) 542-8795 x 17
City State Zip Santa Rosa, Ca 95401		Date Evaluation Conducted 11/14/2013

Primary Area	Expansion Area
Acceptable Soil Depth: 24-48 in. Test pit #'s: TP1-TP6	Acceptable Soil Depth: 24-48 in. Test pit #'s: TP1-TP6
Soil Application Rate (gal. /sq. ft. /day): 0.75 to 1.0 gpd/sf	Soil Application Rate (gal. /sq. ft. /day):0.75 to 1.0 gpd/sf
System Type(s) Recommended: PD, drip – pending gw	System Type(s) Recommended: PD, drip – pending gw
Slope: 3-5 %. Distance to nearest water source: 1000 ft.	Slope: 3-5 %. Distance to nearest water source: 1000 ft.
Hydrometer test performed? No	Hydrometer test performed? No
Bulk Density test performed? No	Bulk Density test performed? No
Percolation test performed? No	Percolation test performed? No
Groundwater Monitoring Performed? Pending Rain	Groundwater Monitoring Performed? Pending Rain

Site constraints/Recommendations:

- Existing well
- Groundwater monitoring to be performed to identify perched groundwater level due to presence of mottling at less than 24 inches deep.
- Interceptor drain and surface drainage to divert away from septic area recommended.
- Proposed drainage features and grading will need to avoid.
- Additional test pits near wastewater ponds showed signs of significant seasonal saturation and lesser depths of permeable soils. Pits on map but not logged due to time onsite.

Test Pit # 1

PLEASE PRINT OR TYPE ALL INFORMATION

Horizon Depth (Inches)	Boundary	%Rock	Texture	Structure	Consistence			Pores	Roots	Mottling
					Side Wall	Ped	Wet			
34	D/G	15-20	SCL	SAB,3	FR	S	S	3,C	1,M	1,VF
48	D/G	35	SCL	SAB,3	VF	S	SS	3,M	1,M	1,F
60+	----------	<10	SCL	SAB,2	D/L	M	M	1,VF	1,M	2,P

Test Pit #2

Horizon Depth (Inches)	Boundary	%Rock	Texture	Structure	Consistence			Pores	Roots	Mottling
					Side Wall	Ped	Wet			
24	D/G	15-20	SCL	SAB,3	FR	S	S	3,C	1,M	1,VF
56	D/G	35	SCL	SAB,3	VF	S	SS	3,M	1,M	1,F
65+	----------	<10	SCL	SAB,2	D/L	M	M	1,VF	1,M	2,P

Test Pit # 3

Horizon Depth (Inches)	Boundary	%Rock	Texture	Structure	Consistence			Pores	Roots	Mottling
					Side Wall	Ped	Wet			
28	D/G	15-20	SCL	SAB,3	FR	S	S	3,C	1,M	1,VF
60	D/G	15-20	SL/LS	SAB,3	F	M	SS	3,M/F	1,M	1,F
70+	----------	<10	SCL	SAB,2	D/L	M	M	1,VF	1,M	2,P

Test Pit # 4

PLEASE PRINT OR TYPE ALL INFORMATION

Horizon Depth (Inches)	Boundary	%Rock	Texture	Structure	Consistence			Pores	Roots	Mottling
					Side Wall	Ped	Wet			
24	D/G	15-20	SCL	SAB,3	FR	S	S	3,C	1,M	1,VF
49	D/G	25	SCL	SAB,3	FR	F	S	2,M	1,M	2,F
60+	----------	<10	SCL	SAB,2	D/L	L	M	1,VF	1,M	2,P

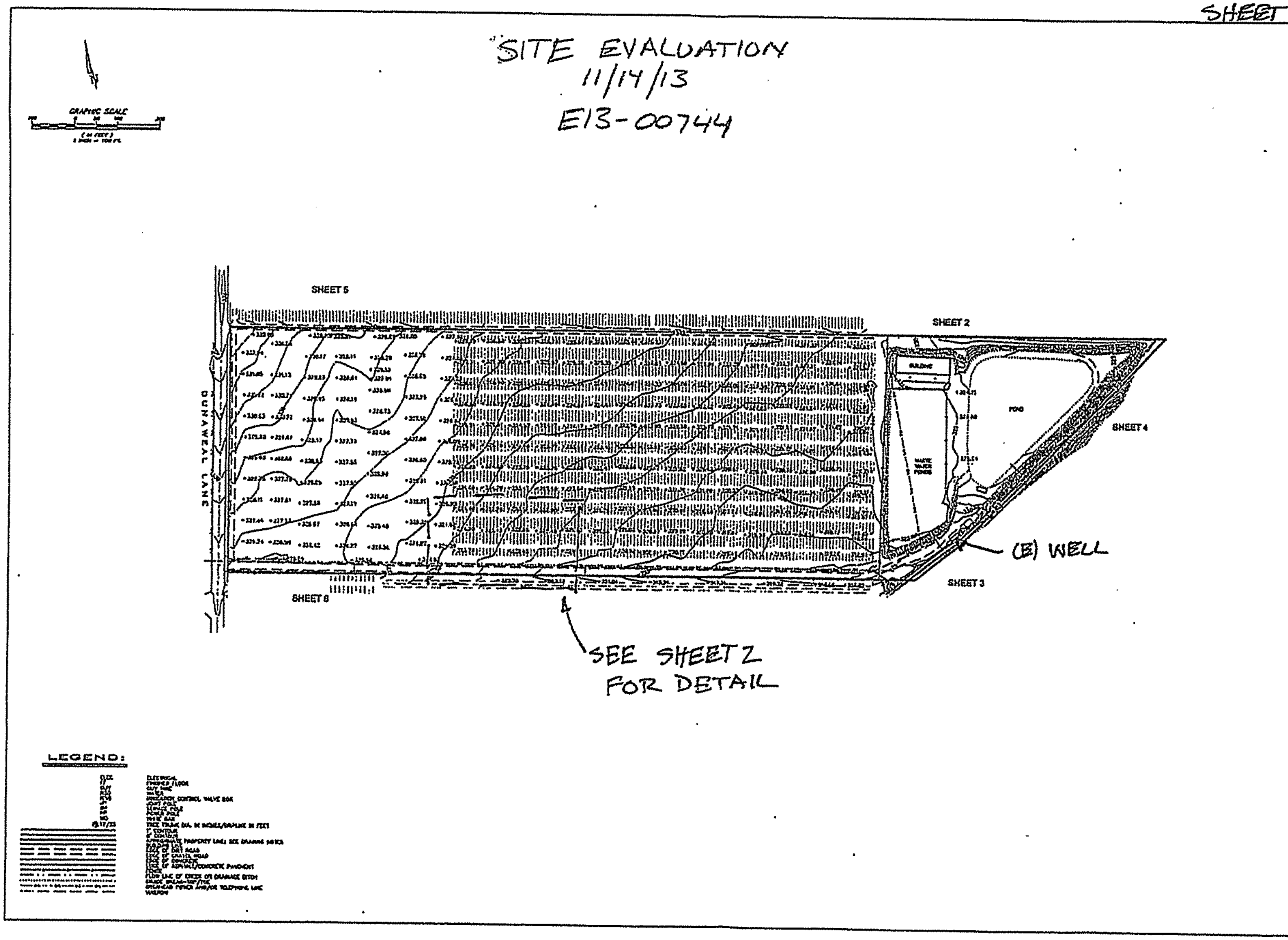
Test Pit #5

Horizon Depth (Inches)	Boundary	%Rock	Texture	Structure	Consistence			Pores	Roots	Mottling
					Side Wall	Ped	Wet			
24	D/G	15-20	SCL	SAB,3	FR	S	S	3,C	1,M	1,VF
49	D/G	25	SCL	SAB,3	F	M/FR	SS	2,F	1,F	1,F
54+		>50%								

Test Pit # 6

Horizon Depth (Inches)	Boundary	%Rock	Texture	Structure	Consistence			Pores	Roots	Mottling
					Side Wall	Ped	Wet			
36	D/G	15-20	SCL	SAB,3	FR	S	S	3,C	1,M	1,VF
55	D/G	25	SL	G/B,2	L	L	SS	2,C	1,M	1,D
70+		>50%								

SHEET 1 OF 2



ALBION SURVEYS, INC.

DRAWING NOTES

SITE INFORMATION

MAP OF TOPOGRAPHY

OF A PORTION OF THE LANDS OF

CLOS PEGASE

COUNTY OF NAPA STATE OF CALIFORNIA

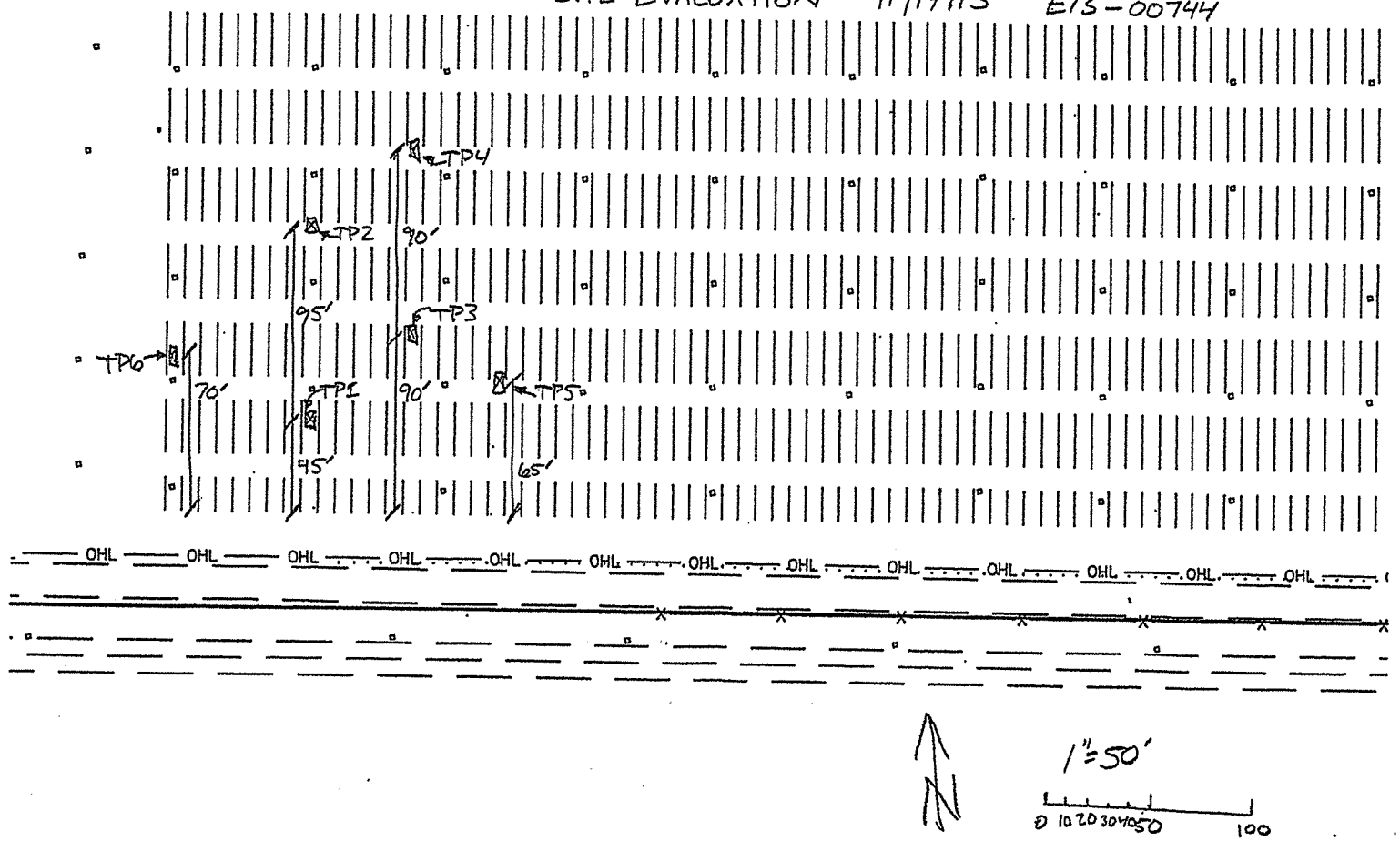
REVISIONS & ADDITIONS

ALBION REFERENCES

1077 DUNAWEAL LN
CALISTOGA, CA
APN: 020-150-017

SHEET 2 OF 2

SITE EVALUATION 11/14/13 E13-00744



13530.0 Dunaweal Winery
Storm Drainge for Use Permit
modification
April 28, 2014

Always Engineering, Inc.
Civil Engineering & Topographic Surveying
131 Stony Circle, Suite 1000 (707) 542-8795
Santa Rosa, CA 95401 Fax (707) 542-8798
www.alwayseng.com JasonH@alwayseng.com

Jeanette Doss
Napa County Department of Public Works
1195 3rd St., Room 201
Napa, CA 94555

Project: Use Permit Modification for Dunaweal Winery,
1077 Dunaweal Ln.
APN 020-150-017
File #14-00053

Jeannette,

This correspondence is provided to satisfy the requirements list in the Memorandum of Incompleteness dated April 3, 2013.

Vintage Wine Estates is proposing to construct the Girard Winery and associated improvements on the parcel located at 1077 Dunaweal Ln., Calistoga CA (APN 020-150-017). The parcel is currently a planted vineyard with a Waste Water Pond treatment system for process waste presently located in the rear of the parcel.

The proposed AC driveway, parking, and winery accessory structures will result in an increase in impervious area of approximately 130,803 sf (3.003 acres). Our preliminary calculations show this will result in an increase in the 2-yr 24-hr storm water runoff of approximately 16,722 cf. At this stage of design, we are anticipating utilizing a bio-retention swale with subsurface storage chambers totaling 910 LF. During detailed design, alternative methods such as pipes/chambers under paved areas or other acceptable retention methods may be used to provide the required volume retention.

The anticipated surface flow across the project site due to the 10-yr Storm is approximately 35.28 cfs. It is proposed to direct this flow around the project site using a grass lined trapezoidal swale 0.75' deep, 2' wide at the bottom, and 32' wide at the top which will accommodate 52.71 cfs.

The sizing of pipes was reviewed as well. Runoff from the entire site can be accommodated with a 30" pipe with a minimum 1% slope. However, the site will likely be split into multiple smaller drainage areas with multiple smaller pipes discharging into the proposed bioswale.

Always Engineering, Inc.
Civil Engineering & Topographic Surveying
131 Stony Circle, Suite 1000 (707) 542-8795
Santa Rosa, CA 95401 Fax (707) 542-8798
www.alwayseng.com JasonH@alwayseng.com

To assist with your review the following is attached:

- Stormwater Runoff Management Plan (SRMP)
- Ex 1: Hydrology Map
- Ex 2: NOAA Precipitation Data
- Ex 3: Drainage Area Calculations
- Ex 4: Composite C and CN Calculations
- Ex 5: Pre vs Post Runoff Calculations
- Ex 6: Swale Calculations and Pipe Sizes
- Ex 7: Precipitation Chart – Lower County
- Ex 8: Mean Annual Precipitation vs. 60 Minute Rainfall
- Ex 9: Intensity – Duration Chart
- Ex 10: Table of Runoff Curve Numbers
- Ex 11: NRCS Hydrologic Soil Group

Please feel free to contact me should you have any questions or require additional information.

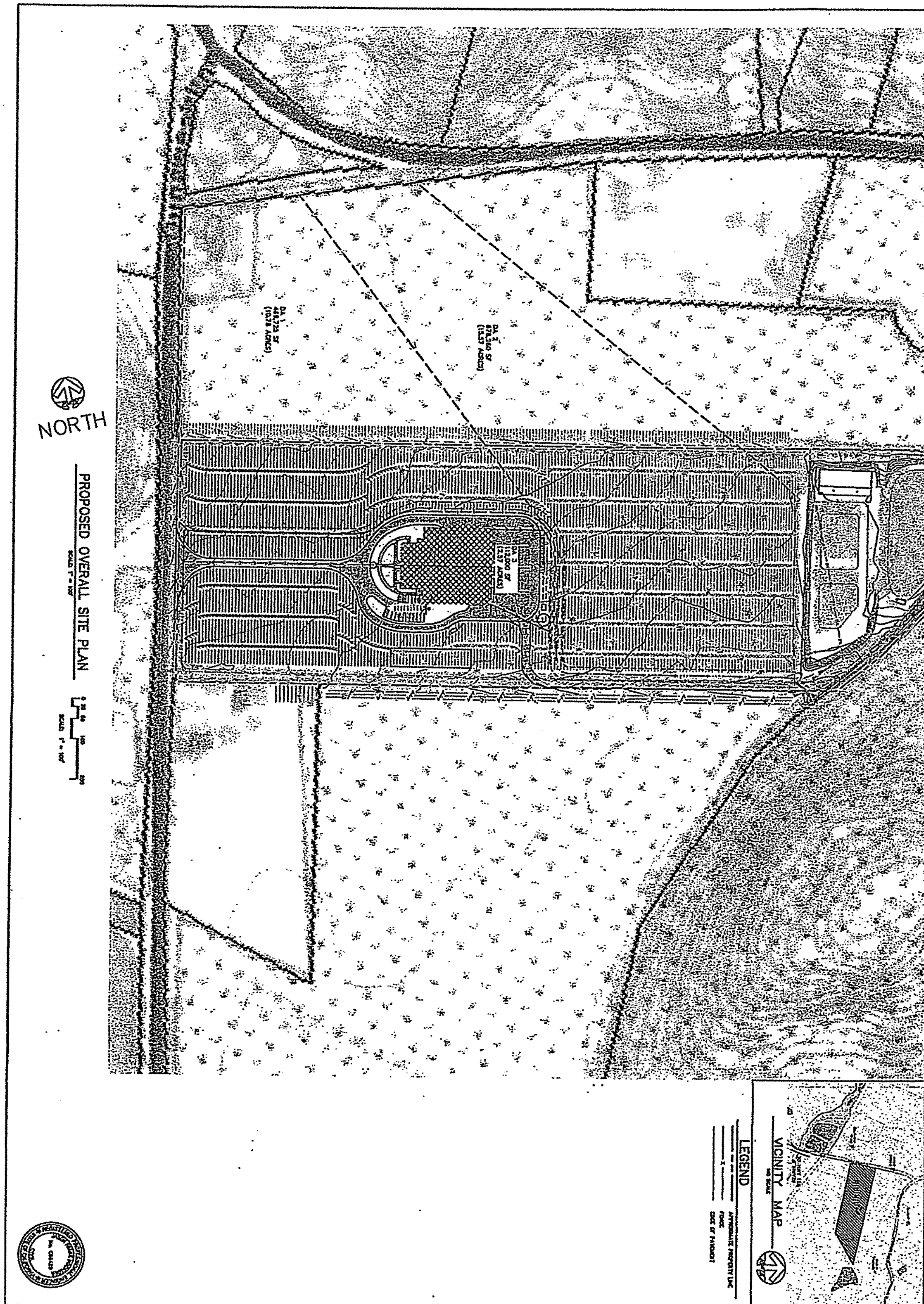
We trust that this letter sufficiently responds to the items of incompleteness. If you require clarification or have any questions, please feel free to contact us.

Sincerely,

Ben Monroe, P.E.
ALWAYS ENGINEERING, INC.
Project Manager

REGISTERED PROFESSIONAL ENGINEER
BENJAMIN W. MONROE
No. 70012
Exp. 9-30-14
CIVIL
STATE OF CALIFORNIA

cc: Heather McCollister
Amy Haedt (Vintage Wine Estates)



SHEET DA 1 OF DA 1	USE PERMIT EX 1: HYDROLOGY MAP 1077 DUNAWEAL LN., CALISTOGA, CA APN:020-150-017	Prepared for: GIRARD WINERY 1077 DUNAWEAL LN., CALISTOGA, CA Prepared on: April 25, 2014	Always Engineering, Inc. Civil Engineering & Topographic Surveying 131 Stony Circle, Suite 1000 (707) 542-8795 Santa Rosa, CA 95401 Fax (707) 542-8798 www.alwayseng.com

Ex 2: NOAA Precipitation Data
1077 Dunaweal Lane
April 25, 2014

Precipitation Frequency Data Server

NOAA Atlas 14, Volume 6, Version 2
Location name: Calistoga, California, US*
Latitude: 38.5725°, Longitude: -122.5537°
Elevation: 329 ft*
* source: Google Maps

POINT PRECIPITATION FREQUENCY ESTIMATES

Sanja Perica, Sarah Dietz, Sarah Heim, Lillian Hiner, Kazungu Maitaria, Deborah Martin, Sandra Pavlovic, Ishani Roy, Carl Trypaluk, Dale Unruh, Fenglin Yan, Michael Yekta, Tan Zhao, Geoffrey Bonnin, Daniel Brewer, Li-Chuan Chen, Tye Parzybok, John Yarchoan

NOAA, National Weather Service, Silver Spring, Maryland

PF_tabular | PF_graphical | Maps_&_aerials

PF tabular

PDS-based point precipitation frequency estimates with 90% confidence intervals (in inches)[1]

Duration	Average recurrence interval (years)									
	1	2	5	10	25	50	100	200	500	1000
5-min	0.154 (0.137-0.175)	0.186 (0.165-0.211)	0.228 (0.202-0.260)	0.263 (0.231-0.303)	0.311 (0.263-0.373)	0.349 (0.288-0.428)	0.389 (0.311-0.490)	0.430 (0.334-0.560)	0.489 (0.362-0.667)	0.536 (0.381-0.760)
10-min	0.221 (0.196-0.251)	0.266 (0.236-0.303)	0.327 (0.289-0.373)	0.377 (0.331-0.434)	0.446 (0.377-0.534)	0.501 (0.413-0.614)	0.557 (0.446-0.703)	0.617 (0.479-0.803)	0.701 (0.519-0.956)	0.768 (0.547-1.09)
15-min	0.267 (0.237-0.303)	0.322 (0.286-0.366)	0.395 (0.350-0.451)	0.456 (0.400-0.525)	0.540 (0.455-0.646)	0.606 (0.499-0.743)	0.674 (0.540-0.850)	0.746 (0.579-0.971)	0.847 (0.627-1.16)	0.929 (0.661-1.32)
30-min	0.392 (0.348-0.445)	0.473 (0.420-0.538)	0.580 (0.514-0.662)	0.669 (0.587-0.771)	0.792 (0.669-0.949)	0.889 (0.732-1.09)	0.990 (0.793-1.25)	1.10 (0.850-1.43)	1.24 (0.921-1.70)	1.36 (0.971-1.94)
60-min	0.573 (0.509-0.650)	0.691 (0.614-0.786)	0.849 (0.751-0.968)	0.979 (0.859-1.13)	1.16 (0.978-1.39)	1.30 (1.07-1.59)	1.45 (1.16-1.82)	1.60 (1.24-2.09)	1.82 (1.35-2.48)	1.99 (1.42-2.83)
2-hr	0.871 (0.775-0.990)	1.05 (0.932-1.19)	1.28 (1.13-1.46)	1.47 (1.29-1.69)	1.72 (1.45-2.05)	1.91 (1.57-2.33)	2.10 (1.68-2.64)	2.29 (1.78-2.98)	2.55 (1.89-3.48)	2.76 (1.96-3.91)
3-hr	1.12 (0.997-1.27)	1.35 (1.20-1.54)	1.65 (1.46-1.88)	1.88 (1.65-2.16)	2.19 (1.85-2.62)	2.42 (1.99-2.97)	2.65 (2.12-3.34)	2.88 (2.24-3.76)	3.19 (2.36-4.36)	3.43 (2.44-4.86)
6-hr	1.70 (1.51-1.93)	2.06 (1.83-2.34)	2.51 (2.22-2.87)	2.87 (2.52-3.30)	3.33 (2.81-3.98)	3.67 (3.02-4.50)	4.00 (3.21-5.05)	4.33 (3.36-5.64)	4.77 (3.53-6.50)	5.09 (3.62-7.22)
12-hr	2.42 (2.16-2.75)	3.01 (2.68-3.43)	3.74 (3.31-4.27)	4.31 (3.78-4.96)	5.04 (4.25-6.03)	5.56 (4.58-6.82)	6.08 (4.87-7.67)	6.59 (5.11-8.57)	7.24 (5.36-9.88)	7.72 (5.50-11.0)
24-hr	3.38 (3.04-3.84)	4.32 (3.88-4.92)	5.49 (4.92-6.25)	6.39 (5.69-7.33)	7.55 (6.54-8.90)	8.39 (7.14-10.1)	9.21 (7.68-11.3)	10.0 (8.16-12.5)	11.1 (8.70-14.3)	11.8 (9.04-15.8)
2-day	4.45 (4.00-5.05)	5.70 (5.12-6.48)	7.29 (6.53-8.30)	8.54 (7.60-9.79)	10.2 (8.81-12.0)	11.4 (9.69-13.7)	12.6 (10.5-15.4)	13.8 (11.2-17.3)	15.3 (12.1-19.9)	16.5 (12.6-22.0)
3-day	5.17 (4.64-5.87)	6.62 (5.95-7.53)	8.49 (7.60-9.67)	9.97 (8.88-11.4)	11.9 (10.3-14.1)	13.4 (11.4-16.1)	14.9 (12.4-18.2)	16.4 (13.4-20.6)	18.4 (14.5-23.9)	19.9 (15.2-26.6)
4-day	5.76 (5.18-6.54)	7.39 (6.63-8.40)	9.48 (8.49-10.8)	11.1 (9.92-12.8)	13.4 (11.6-15.8)	15.1 (12.8-18.1)	16.8 (14.0-20.5)	18.5 (15.0-23.1)	20.8 (16.3-26.9)	22.5 (17.2-30.0)
7-day	7.12 (6.40-8.09)	9.11 (8.18-10.3)	11.7 (10.4-13.3)	13.7 (12.2-15.7)	16.4 (14.2-19.4)	18.5 (15.8-22.2)	20.6 (17.2-25.2)	22.7 (18.5-28.4)	25.5 (20.1-33.1)	27.7 (21.2-37.0)
10-day	8.10 (7.28-9.20)	10.4 (9.30-11.8)	13.2 (11.9-15.1)	15.5 (13.8-17.8)	18.6 (16.1-21.9)	20.8 (17.7-25.0)	23.1 (19.3-28.3)	25.4 (20.7-31.8)	28.4 (22.4-36.8)	30.7 (23.5-41.0)
20-day	10.7 (9.62-12.2)	13.7 (12.3-15.6)	17.4 (15.6-19.9)	20.3 (18.1-23.3)	24.0 (20.8-28.3)	26.7 (22.7-32.0)	29.3 (24.5-35.9)	31.9 (26.0-39.9)	35.2 (27.7-45.6)	37.6 (28.7-50.2)
30-day	12.9 (11.6-14.6)	16.5 (14.8-18.8)	20.9 (18.7-23.8)	24.2 (21.6-27.8)	28.4 (24.6-33.5)	31.4 (26.8-37.7)	34.3 (28.6-42.0)	37.1 (30.2-46.4)	40.5 (31.9-52.6)	43.0 (32.9-57.4)
45-day	15.8 (14.2-17.9)	20.1 (18.1-22.9)	25.3 (22.7-28.8)	29.1 (25.9-33.4)	33.9 (29.4-40.0)	37.3 (31.7-44.7)	40.4 (33.7-49.4)	43.4 (35.3-54.3)	47.0 (37.0-61.0)	49.6 (38.0-66.3)
60-day	18.8 (16.9-21.3)	23.7 (21.3-27.0)	29.6 (26.5-33.7)	33.9 (30.2-38.9)	39.2 (33.9-46.2)	42.8 (36.4-51.3)	46.2 (38.5-56.5)	49.4 (40.2-61.8)	53.3 (41.9-69.1)	56.0 (42.8-74.7)

[1] Precipitation frequency (PF) estimates in this table are based on frequency analysis of partial duration series (PDS).

Numbers in parenthesis are PF estimates at lower and upper bounds of the 90% confidence interval. The probability that precipitation frequency estimates (for a given duration and average recurrence interval) will be greater than the upper bound (or less than the lower bound) is 5%. Estimates at upper bounds are not checked against probable maximum precipitation (PMP) estimates and may be higher than currently valid PMP values.

Please refer to NOAA Atlas 14 document for more information.

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Ex 3:Drainage Area Calculations
1177 Dunaweal Ln.
April 25, 2014

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Annual Average Rainfall = 38 Inches (FromNapa County Precipitation Chart - Lower County)
Time of concentration = 10 minutes (Minimum Pper Napa Road and Street Standards)

Drainage Area- per attached	Watershed Area (acres)	Discharge Rate (cfs) At Return Period (years) 10	25	100	Rainfall Intensity (I = in/hr) From Ex. 9 Intensity-Duration
		2.80		3.60	
	Runoff Coefficient (C) =	0.4			
DA 1	10.78	12.08		15.53	
	Runoff Coefficient (C) =	0.4			
DA 2	15.57	17.44		22.42	
	Runoff Coefficient (C) =	0.8			
DA 3	2.57	5.76		7.40	
TOTAL		35.28		45.35	

Ex 4:Composite C and CN Calculations
1077 Dunaweal Ln.
April 25, 2014

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			EXISTING					PROPOSED				
	Total Area (acre)	Desc.	(acre)	(SQ. FT.)	C Runoff 10 -Yr	C Runoff 85th %	CN group B from SCS	(acre)	(SQ. FT.)	C Runoff 10 -Yr	C Runoff 85th %	CN group B from SCS
DI #1	3.003	Vineyard	2.24	97,601	0.45	0.80	81	0.00	0	0.45	0.10	81
		AC/Roof	0.00	0	0.90	0.10	98	2.62	114,316	0.90	0.80	98
		Undeveloped	0.76	33,202	0.45	0.10	69	0.38	16,487	0.45	0.10	69
	TOTAL		3.00	130,803				3.00	130,803			
	c*a				112,542	81,401	10,196,619			110,304	93,102	12,340,571
	combined c				0.86	0.62	77.95			0.84	0.71	94.34
TOTALS:	3.00			130,803					130,803			
WEIGHTED AVERAGE:					0.86	0.62	77.95			0.84	0.71	94.34

Exhibit 5: Pre vs Post

Pre-Development Total Runoff Volume

NRCS Curve Number Procedure,

Weighted Average Volume Technique

Q=(P-0.2S)^2/(P+0.8S) where, S=1000/CN-10

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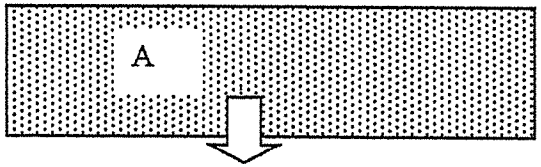
Vintage_ Dunaweal Winery
1077 Dunaweal Ln
Calistoga, CA 94515
APN: 020-150-017
25-Apr-14
Proposed Winery

NOAA 2-Year, 24-Hour Storm (Inches):
4.32

Hydrologic Condition and Direction of Runoff



Area ID	Area (Acres)	Land Use	Soil Group	Combined CN (Curve Number)	S	Q (Rainfall Excess, inches)	Runoff Volume (acre-feet)	Runoff Volume (cu ft)
DA1	3.003	Agricultural	B	77.95	2.83	2.141	0.536	23,339
						Total Runoff Volume	0.54	23,339

Exhibit 5: Pre vs Post

Post-Development Total Runoff Volume

NRCS Curve Number Procedure,

Weighted Average Volume Technique

Q=(P-0.2S)^2/(P+0.8S) where, S=1000/CN-10

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Vintage_ Dunaweal Winery
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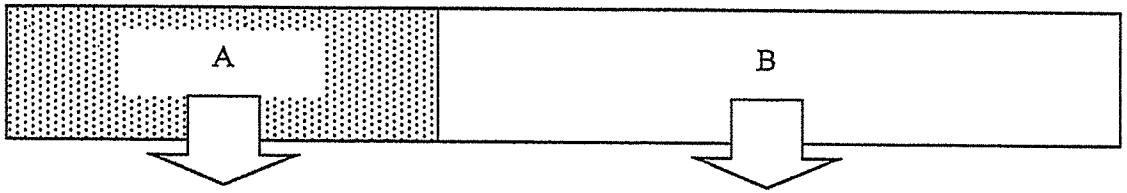
APN: 020-150-017
25-Apr-14
Proposed Winery

NOAA 2-Year, 24-Hour Storm (Inches):
4.32



Area ID	Area (Acres)	Land Use	Soil Group	CN (Curve Number)	S	Q (Rainfall Excess, inches)	Runoff Volume (acre-feet)	Runoff Volume (cu ft)
DA1	3.003	Agricultural	B	94.34	0.60	3.675	0.920	40061
						Total Runoff Volume	0.92	40,061

	acre-feet	cubic-feet
Total Pre-Project Runoff Volume	0.54	23,339
Total Post-Project Runoff Volume	0.92	40,061
Difference in Runoff Volume	0.38388	16,722
Percent Change	72%	72%

Bioretention Swale Linear Volume (cubic ft/ft)	18.41	ft^3/ft
Bioretention Swale Length (ft)	908	lf

Area of Development (Acres)	3.00
Percent of development needed for bioretention.	1%

Ex 6: Swale Calculations & Pipe Sizes
1077 Dunaweal Ln.
April 25, 2014

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Swale Capacity 0.75 ft n = .0275 short grass

OUTPUT INFORMATION

This report is for a channel running full.

The Flow Capacity is 52.71 cfs
The flow velocity is 4.134 fps

CHANNEL PROPERTIES

The friction factor 'n' = 0.0275
The channel slope = 0.0200 ft/ft

'Trapizoidal' Shaped Channel:

Width at top = 32.00ft
Width at bottom = 2.000ft
Height = 0.750ft
Flow Area = 12.75 sq-ft
Wetted perimiter = 32.04 ft
Hydraulic radius = 0.398 ft

Ex 6: Swale Calculations & Pipe
Sizes 1077 Dunaweal Ln.
April 25, 2014

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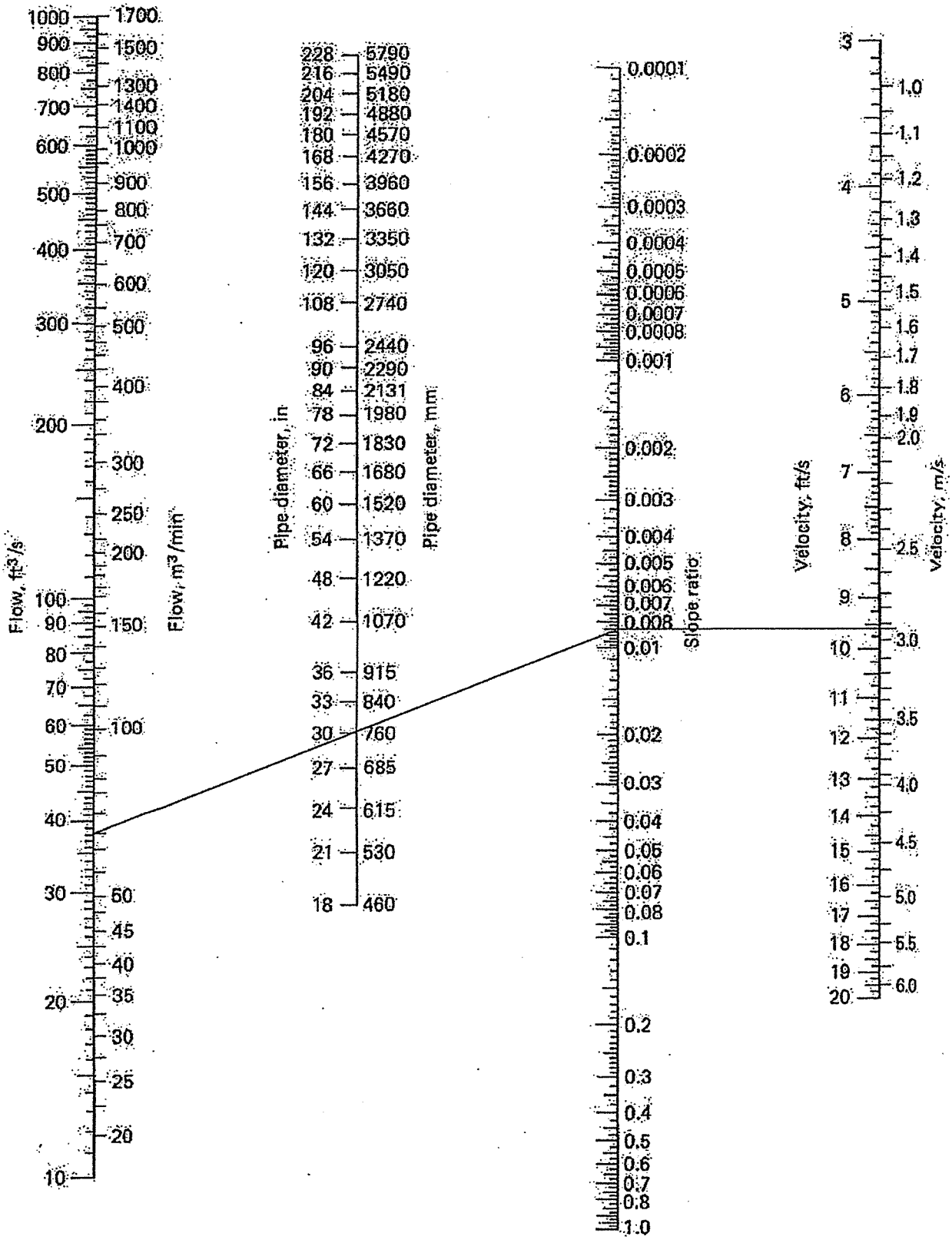


Nomogram for solution of Manning's equation for circular pipes flowing full (n = 0.013)

Exhibit 7: Precipitation Chart Lower County
1077 Dunaweal Ln.
April 25, 2014

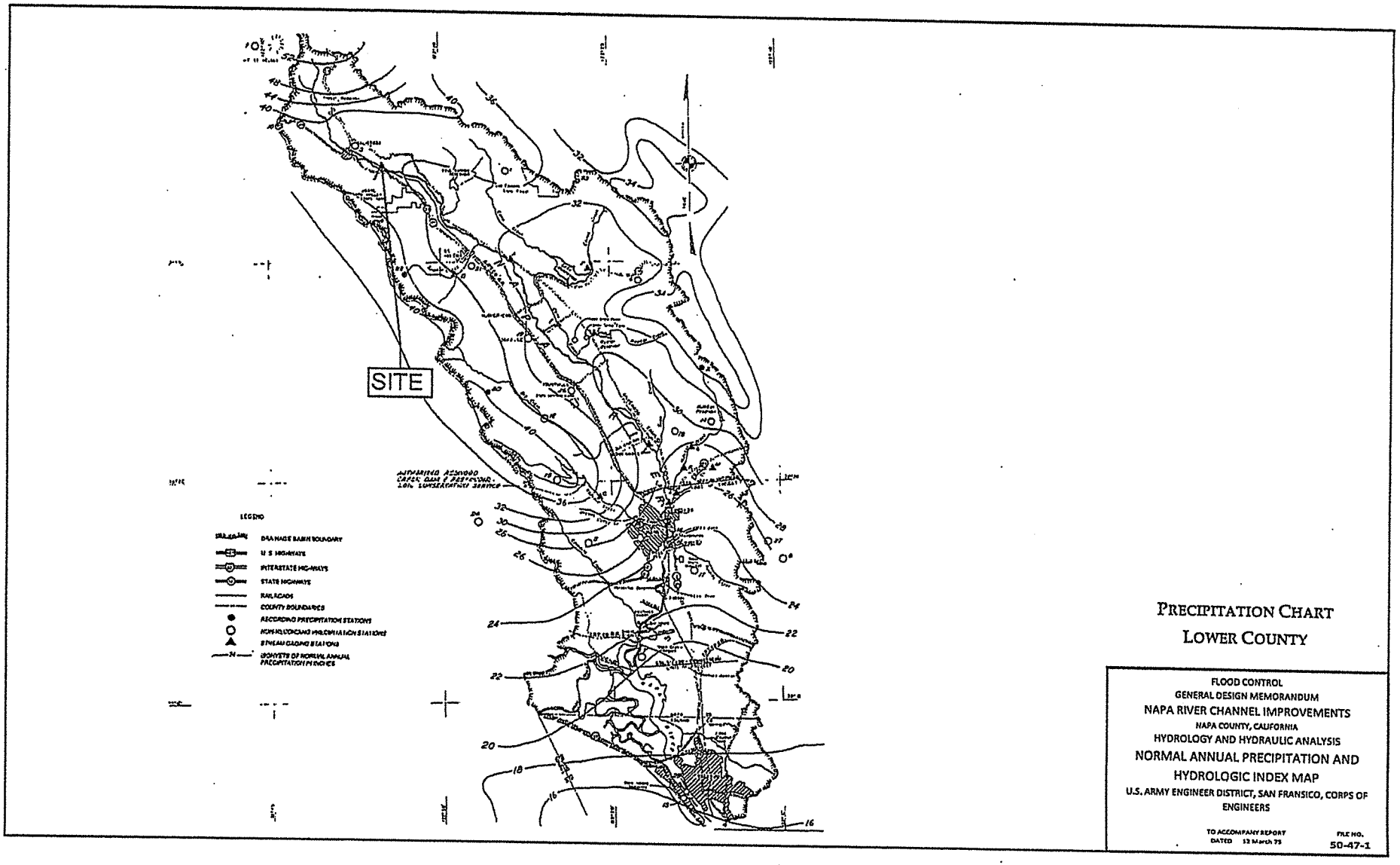


Exhibit 8: MEAN ANNUAL PRECIPITATION VS. 60 MINUTE RAINFALL

1077 Dunaweal Ln.

April 25, 2014

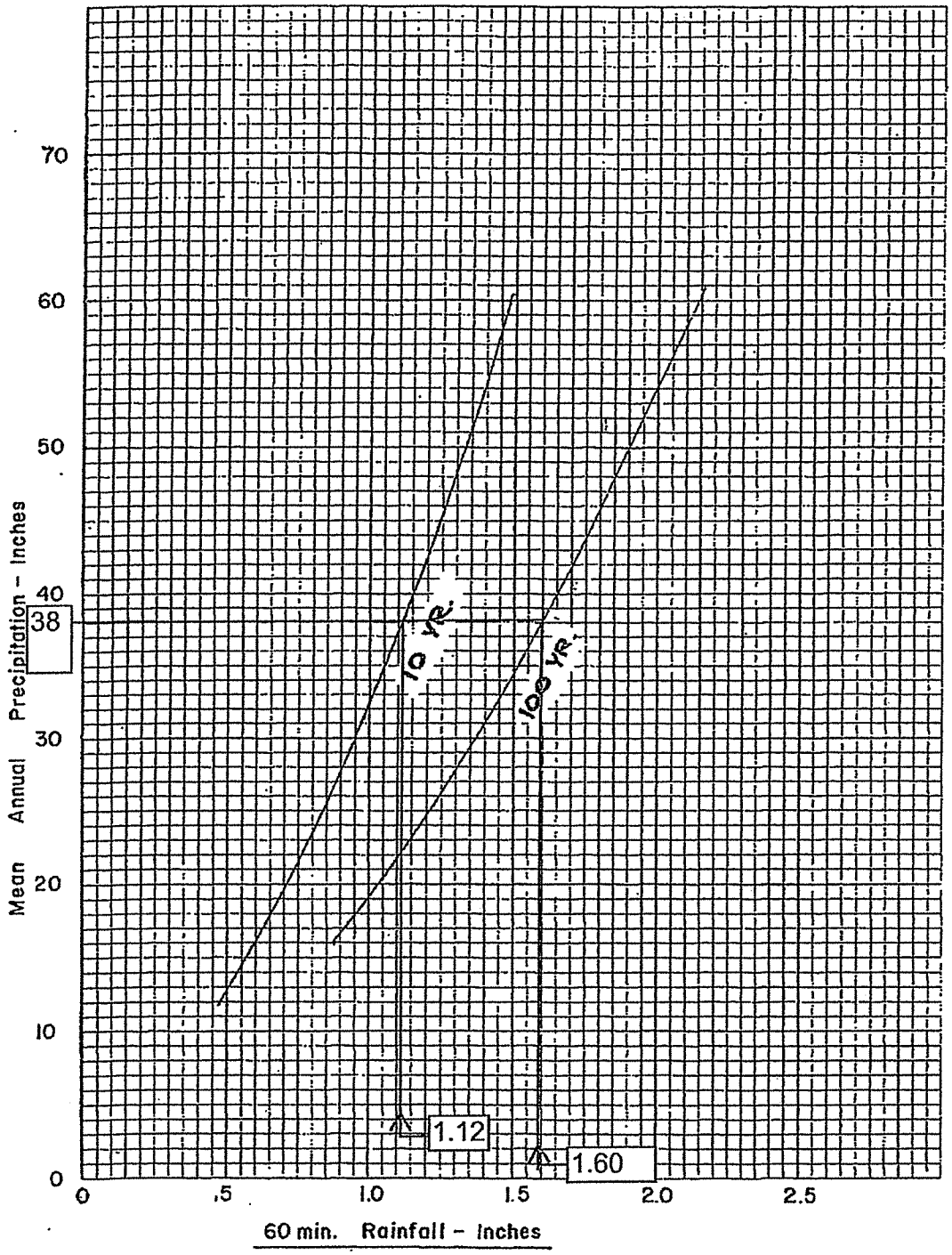
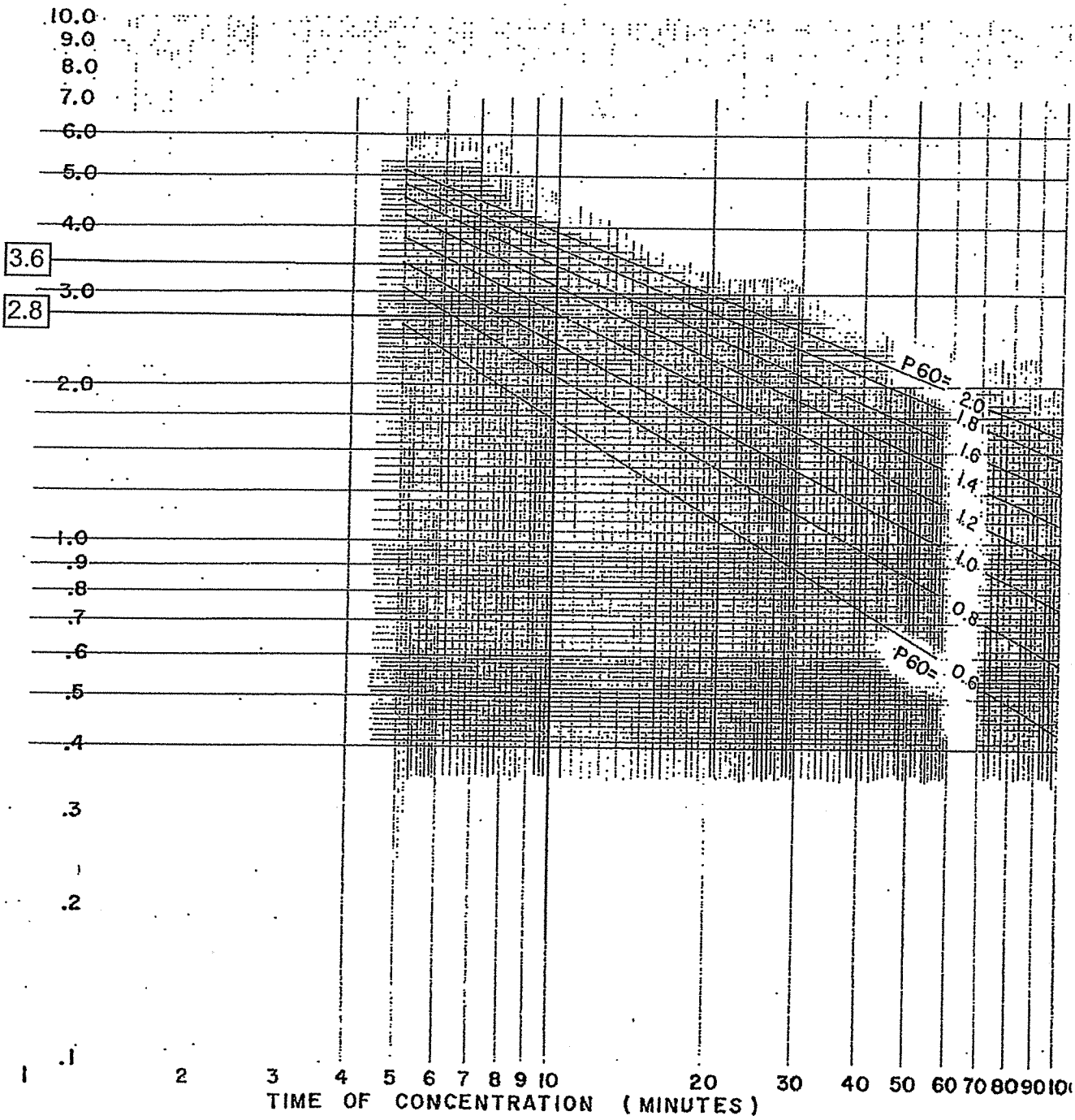


Exhibit 9: INTENSITY – DURATION CHART

1077 Dunaweal Ln.

April 25, 2014



Based on figure 7-8II.6 (-8-64)
State of California
Division of Highways
Planning Manual

Exhibit 10:Table of Runoff Curve Numbers
1077 Dunaweal Ln.
April 25, 2014

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Table of Runoff Curve Numbers (SCS, 1986)

Description of Land Use	Hydrologic Soil Group			
	A	B	C	D
Paved parking lots, roofs, driveways	98	98	98	98
Streets and Roads:				
Paved with curbs and storm sewers	98	98	98	98
Gravel	76	85	89	91
Dirt	72	82	87	89
Cultivated (Agricultural Crop) Land*:				
Without conservation treatment (no terraces)	72	81	88	91
With conservation treatment (terraces, contours)	62	71	78	81
Pasture or Range Land:				
Poor (<50% ground cover or heavily grazed)	68	79	86	89
Good (50-75% ground cover; not heavily grazed)	39	61	74	80
Meadow (grass, no grazing, mowed for hay)	30	58	71	78
Brush (good, >75% ground cover)	30	48	65	73
Woods and Forests:				
Poor (small trees/brush destroyed by over-grazing or burning)	45	66	77	83
Fair (grazing but not burned; some brush)	36	60	73	79
Good (no grazing; brush covers ground)	30	55	70	77
Open Spaces (lawns, parks, golf courses, cemeteries, etc.):				
Fair (grass covers 50-75% of area)	49	69	79	84
Good (grass covers >75% of area)	39	61	74	80
Commercial and Business Districts (85% impervious)	89	92	94	95
Industrial Districts (72% impervious)	81	88	91	93
Residential Areas:				
1/8 Acre lots, about 65% impervious	77	85	90	92
1/4 Acre lots, about 38% impervious	61	75	83	87
1/2 Acre lots, about 25% impervious	54	70	80	85
1 Acre lots, about 20% impervious	51	68	79	84

*From Chow et al. (1988).

Ex 11 NRCS Hydrologic Soil Group
1077 Dunaweal Ln.
April 25, 2014

MAP LEGEND

Area of Interest (AOI)
- Area of Interest (AOI)

Soils

Soil Rating Polygons
- A
- A/D
- B
- B/D
- C
- C/D
- D
- Not rated or not available

Soil Rating Lines
- A
- A/D
- B
- B/D
- C
- C/D
- D
- Not rated or not available

Soil Rating Points
- A
- A/D
- B
- B/D
- C
- C/D
- D
- Not rated or not available

Water Features
- Streams and Canals

Transportation
- Rails
- Interstate Highways
- US Routes
- Major Roads
- Local Roads

Background
- Aerial Photography

MAP INFORMATION

The soil surveys that comprise your AOI were mapped at 1:24,000.

Warning: Soil Map may not be valid at this scale.

Enlargement of maps beyond the scale of mapping can cause misunderstanding of the detail of mapping and accuracy of soil line placement. The maps do not show the small areas of contrasting soils that could have been shown at a more detailed scale.

Please rely on the bar scale on each map sheet for map measurements.

Source of Map: Natural Resources Conservation Service
Web Soil Survey URL: http://websoilsurvey.nrcs.usda.gov
Coordinate System: Web Mercator (EPSG:3857)

Maps from the Web Soil Survey are based on the Web Mercator projection, which preserves direction and shape but distorts distance and area. A projection that preserves area, such as the Albers equal-area conic projection, should be used if more accurate calculations of distance or area are required.

This product is generated from the USDA-NRCS certified data as of the version date(s) listed below.

Soil Survey Area: Napa County, California
Survey Area Data: Version 5, Nov 25, 2013

Soil map units are labeled (as space allows) for map scales 1:50,000 or larger.

Date(s) aerial images were photographed: Nov 2, 2010—Feb 17, 2012

The orthophoto or other base map on which the soil lines were compiled and digitized probably differs from the background imagery displayed on these maps. As a result, some minor shifting of map unit boundaries may be evident.

Ex 11 NRCS Hydrologic Soil Group
1077 Dunaweal Ln.
April 25, 2014

Hydrologic Soil Group

Hydrologic Soil Group—Summary by Map Unit—Napa County, California (CA055)				
Map unit symbol	Map unit name	Rating	Acres in AOI	Percent of AOI
103	Bale loam, 0 to 2 percent slopes	B	20.3	79.3%
116	Clear Lake clay, drained	C	4.0	15.7%
118	Cole silt loam, 0 to 2 percent slopes	C	1.1	4.3%
140	Forward gravelly loam, 30 to 75 percent slopes	B	0.2	0.7%
Totals for Area of Interest			25.5	100.0%

Description

Hydrologic soil groups are based on estimates of runoff potential. Soils are assigned to one of four groups according to the rate of water infiltration when the soils are not protected by vegetation, are thoroughly wet, and receive precipitation from long-duration storms.

The soils in the United States are assigned to four groups (A, B, C, and D) and three dual classes (A/D, B/D, and C/D). The groups are defined as follows:

Group A. Soils having a high infiltration rate (low runoff potential) when thoroughly wet. These consist mainly of deep, well drained to excessively drained sands or gravelly sands. These soils have a high rate of water transmission.

Group B. Soils having a moderate infiltration rate when thoroughly wet. These consist chiefly of moderately deep or deep, moderately well drained or well drained soils that have moderately fine texture to moderately coarse texture. These soils have a moderate rate of water transmission.

Group C. Soils having a slow infiltration rate when thoroughly wet. These consist chiefly of soils having a layer that impedes the downward movement of water or soils of moderately fine texture or fine texture. These soils have a slow rate of water transmission.

Group D. Soils having a very slow infiltration rate (high runoff potential) when thoroughly wet. These consist chiefly of clays that have a high shrink-swell potential, soils that have a high water table, soils that have a claypan or clay layer at or near the surface, and soils that are shallow over nearly impervious material. These soils have a very slow rate of water transmission.

If a soil is assigned to a dual hydrologic group (A/D, B/D, or C/D), the first letter is for drained areas and the second is for undrained areas. Only the soils that in their natural condition are in group D are assigned to dual classes.