

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



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

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
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Events

75 event visitors	x	5 gpd/visitor	=	375 gpd
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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

$$200 \text{ event visitors} \times 5 \text{ gpd/visitor} = 1,000 \text{ gpd}$$

$$\text{TOTAL PROPOSED PEAK DESIGN FLOW} = 1,675 \text{ GPD}$$

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.

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

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 AdvanTex pretreatment system.

Leachfield Sizing

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

$$\begin{aligned} \text{Area Required} &= \text{Flow/Application Rate} \\ &= 1,675 \text{ gpd} / 0.6 \text{ gpd/sf} \\ &= 2,792 \text{ sf} \end{aligned}$$

Reserve Area

200% reserve area, or 5,584 sf, is required for this site and is shown adjacent 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 Wastewater 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.

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

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

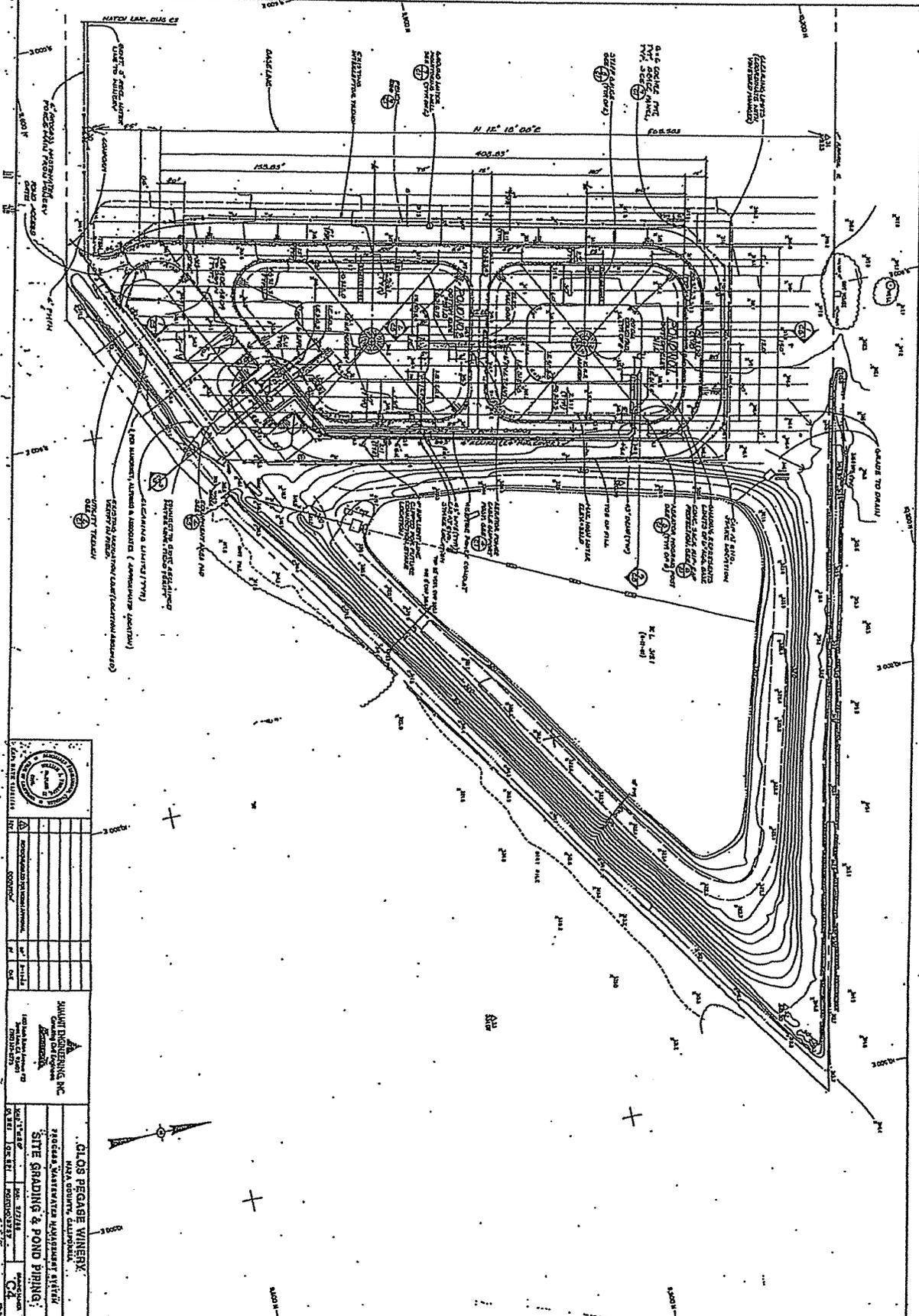
Sanitary Wastewater

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.

This document, and the ideas and designs incorporated herein, as an instrument of professional service, is the property of Small Engineering, Inc. and is not to be used, in whole or in part, for any other project without the written authorization of Small Engineering, Inc.



DATE	NOV 17 2014
PROJECT	CLOSPEGUE WINERY
CLIENT	CLOSPEGUE WINERY
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CLOSPEGUE WINERY 10000 N. 100th St., Suite 100 Redmond, WA 98073 SITE GRADING & POND PILING	

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

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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

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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	=	<u>920,060 gal PW/year</u>

Average Day Flow

$$920,060 \text{ gal PW/year} \div 365 \text{ days} = \underline{2,521 \text{ gal PW/day}}$$

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	=	<u>3,950 gal PW/day</u>

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	=	<u>5,060 gal PW/day</u>

a. 165 Gal wine per ton of grapes is used as a wine industr standard

b. 4.6 gal of PW per gallon wine produced over the course of 1 year is based on hisotrical data from Clos Pegase and existing Girard operations.

c. Percentage of PW produced during each month is based on the average flow distriubtion from 16 wineries

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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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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	=	<u>920,060 gal PW/year</u>

Average Day Flow

$$920,060 \text{ gal PW/year} \div 365 \text{ days} = \underline{2,521 \text{ gal PW/day}}$$

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	=	<u>3,950 gal PW/day</u>

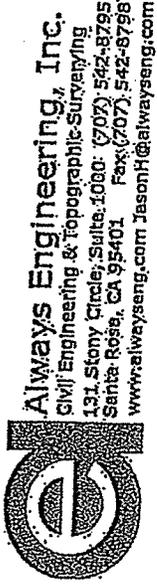
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Total Peak Month Flow ^c	920,060 gal PW/year	x	16.5%	=	151,810 gal PW/month
Average Day, Peak Month Flow	151,810 gal PW/month	÷	30 days	=	<u>5,060 gal PW/day</u>

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 Girard operations.

c. Percentage of PW prodcued during each month is based on the average flow distrubtion from 16 wineries



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Date: 02/20/2014

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Climate Data

Month	Days	Reference Evapotranspiration ¹ (Inches)	Pan Evaporation (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://www.ciml.water.ca.gov/ciml/monthlyETReport.do>

2 Average Monthly Pan Evaporation Rates observed at Berryessa Lake, Ca between 1957 and 1970.

3 Lake evaporation is pan evaporation multiplied by a 0.77 factor.

4 Average precipitation data is from TheWeatherChannel.com for Callistoga, CA
 See <http://www.weather.com/weather/wxclimatology/monthly/94515>

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Pond 1 Balance

Month	Start Volume (Mgal)	Input			Output			Volume at end of Month (Mgal)	Water Depth at end of month (feet)	Volume Change (Mgal)
		Process Wastewater In (Mgal)	10 Year Precipitation (Mgal)	Pond Evaporation* (Mgal)	Discharge to Pond 2 (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	0.212	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	0.259	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		

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Pond 2 Balance

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Month	Start Volume (Mgal)	Input			Output			Volume at end of Month (Mgal)	Water Depth (feet)	Volume Change (Mgal)
		Process Wastewater In From Pond 1 (Mgal)	10 Year Precipitation (Mgal)	Pond Evaporation* (Mgal)	Discharge to Irrigation Pond (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	0.150	0.833	10.2	-0.082		
April	0.833	0.179	0.051	0.044	0.100	0.662	8.7	-0.170		
May	0.662	0.231	0.012	0.062	0.200	0.605	8.2	-0.057		
June	0.605	0.211	0.004	0.073	0.200	0.520	7.4	-0.085		
July	0.520	0.312	0.002	0.082	0.200	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	0.250	0.299	5.0	-0.049		
December	0.299	0.278	0.160	0.010	0.200	0.550	7.5	0.231		
Total		2.643	0.813	0.489	3.456			0.000		

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Project: Girard Winery Use Permit

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

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

- 1 Average monthly reference evapotranspiration
- 2 Pasture coefficient from Table 5-1, "Irrigation Coefficients"
- 3 Vineyard coefficient from Table 5-12, "Irrigation Coefficients"
- 4 Crop coefficient times the reference evapotranspiration
- 5 Precipitation for a 10-yr event, refer to the Appendix
- 6 Irrigation demand is the evapotranspiration minus precipitation
- 7 Residual capacity estimates irrigation/precipitation

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 Aeration Calculations

Design Flow
 = Estimated Average Daily Flow
 = 10,010 gal/day
 = 0.010 Mgal/day
 = 38 m³/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 m³/day x 7700 mg BOD/L x 1000 mL/m³ x 0.000001 kg/mg
 = 294.9 kg BOD/day
 = 648.7 lb BOD/day

OXYGEN REQUIREMENTS - The amount of oxygen required 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

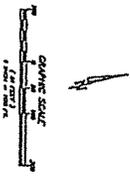
HORSEPOWER REQUIREMENTS - The horsepower of aeration required to provide the necessary amount of oxygen
 Oxygen Transfer Efficiency = 2.0 lbs O2/Hp*hr (3.4 assumes a VBT aerator, model 100)
 Horsepower Requirement = 973.1 lbs O2/day ÷ 2.0 lbs O2/Hp*hr ÷ 24 hr/day
 = 20.3 Hp required

POWER TO VOLUME RATIO (Hp/10³ ft³) - This is used to estimate the amount of mixing which will occur in a pond due to aeration

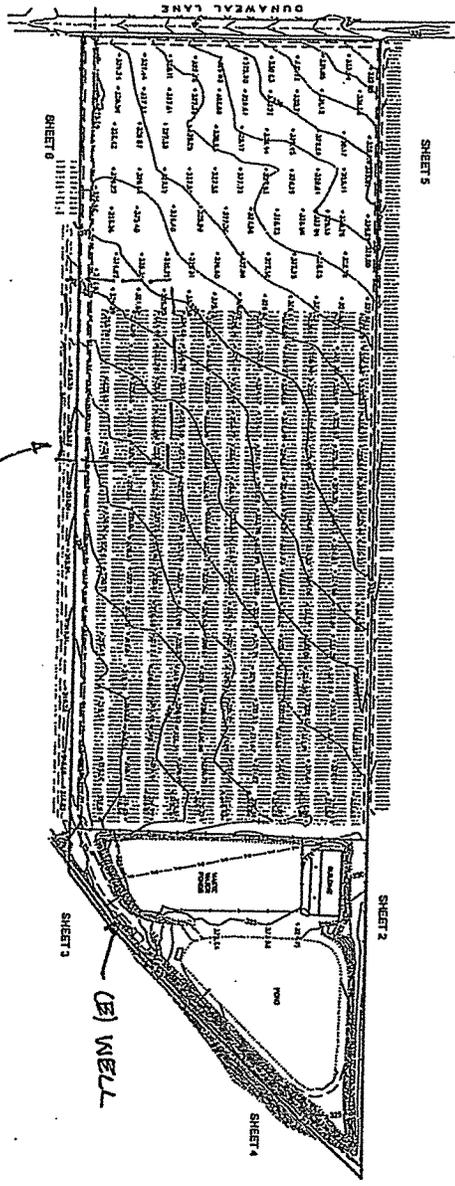
Pond Volume = 0.723 Mgal
 = 722,797 gallons
 = 96,631 ft³
 Number of cells = 2
 Ratio of first to second cell = 2
 Volume in Pond 1 = 722,797 gallons
 = 96,631 ft³
 Volume in Pond 2 = 803,995 gallons
 = 107,486 ft³
 Horsepower in Pond 1, cell 1 = 20 Hp
 Pond 1 Power to Volume Ratio = 0.21 Hp/1000 ft³
 Horsepower in Pond 1, cell 2 = 5 Hp
 Pond 2 Power to Volume Ratio = 0.05 Hp/1000 ft³
 Complete Mix = 0.75 - 1.5 Hp/1000 ft³ (Page 463 of *Small and Decentralized Wastewater Management*)
 Partial Mix = 0.4 - 0.75 Hp/1000 ft³
 Facultative = 0.1 - 0.4 Hp/1000 ft³

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



SITE EVALUATION
11/14/13
EIS-00744



SEE SHEET 2
FOR DETAIL

LEGEND:

1/2"	1:24,000	BOUNDARY
1/4"	1:12,000	BOUNDARY
1/8"	1:6,000	BOUNDARY
1/16"	1:3,000	BOUNDARY
1/32"	1:1,500	BOUNDARY
1/64"	1:750	BOUNDARY
1/128"	1:375	BOUNDARY
1/256"	1:187.5	BOUNDARY
1/512"	1:93.75	BOUNDARY
1/1024"	1:46.875	BOUNDARY
1/2048"	1:23.4375	BOUNDARY
1/4096"	1:11.71875	BOUNDARY
1/8192"	1:5.859375	BOUNDARY
1/16384"	1:2.9296875	BOUNDARY
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13530.0 Vintage Wine Estates_Girard Winery
Wastewater Feasibility Study
February 20, 2014
Revised: May 5, 2014



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

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
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Events

75 event visitors	x	5 gpd/visitor	=	375 gpd
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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
----------------------	---	---------------	---	---------

Events

$$200 \text{ event visitors} \times 5 \text{ gpd/visitor} = 1,000 \text{ gpd}$$

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.

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

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 AdvanTex pretreatment system.

Leachfield Sizing

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

$$\begin{aligned} \text{Area Required} &= \text{Flow/Application Rate} \\ &= 1,675 \text{ gpd} / 0.6 \text{ gpd/sf} \\ &= 2,792 \text{ sf} \end{aligned}$$

Reserve Area

200% reserve area, or 5,584 sf, is required for this site and is shown adjacent 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 Wastewater 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.

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

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

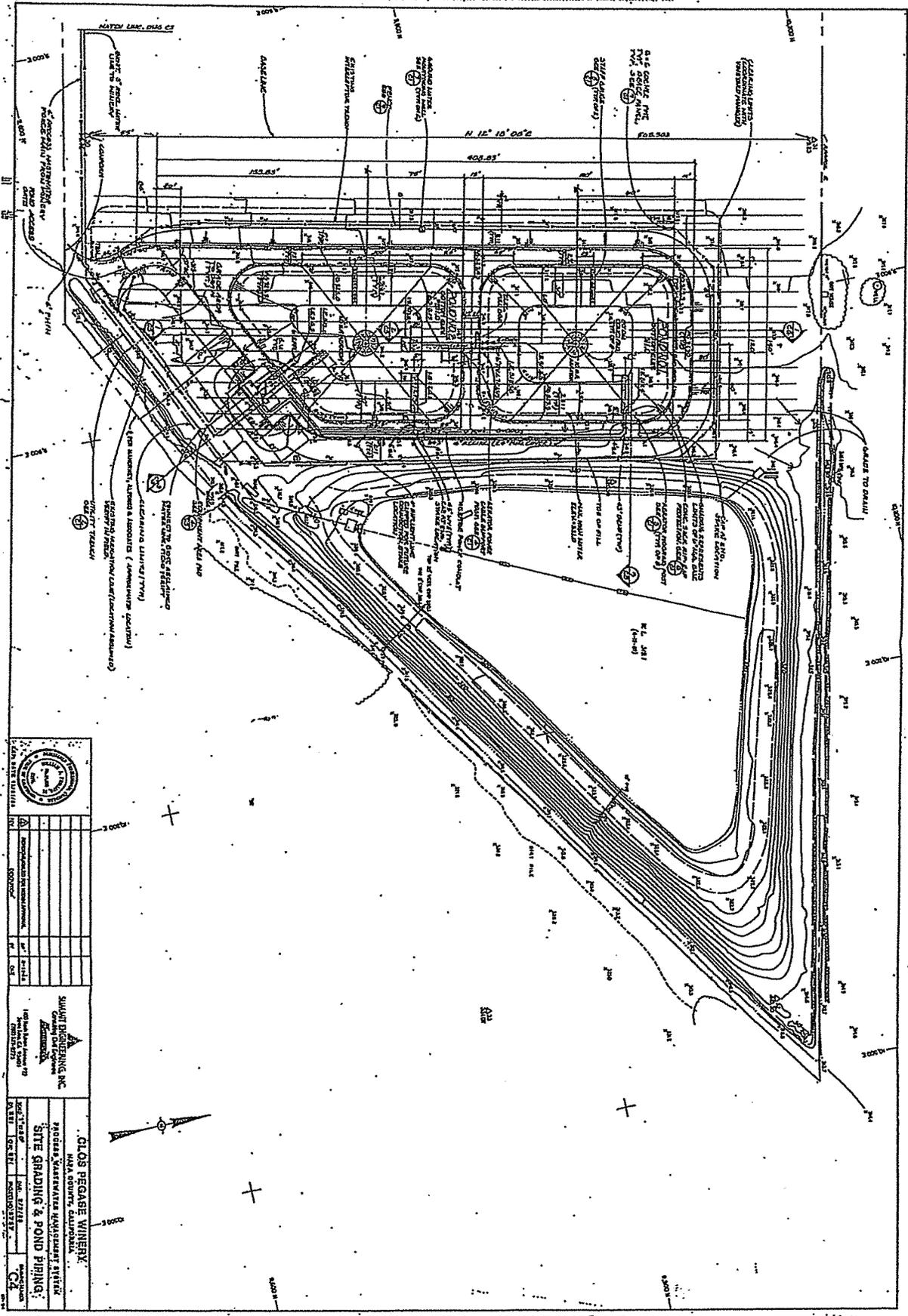
Sanitary Wastewater

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.

This document, and the design and/or engineering drawings, are an endorsement of professional services, in the practice of Licensed Engineering, Inc. and is not to be used, in whole or in part, for any other project without the written authorization of Licensed Engineering, Inc.



DATE	NOV 11 1988
PROJECT	CLDS PEGASE WINERY
DESCRIPTION	PROGRAM WATERWAYS MANAGEMENT STUDY
SCALE	AS SHOWN
BY	DAVID R. TULLER
CHECKED BY	DAVID R. TULLER
DATE	NOV 11 1988
PROJECT	CLDS PEGASE WINERY
DESCRIPTION	PROGRAM WATERWAYS MANAGEMENT STUDY
SCALE	AS SHOWN
BY	DAVID R. TULLER
CHECKED BY	DAVID R. TULLER
DATE	NOV 11 1988

SWIFT ENGINEERING INC.
 10000 Wilshire Blvd., Suite 1000
 Beverly Hills, CA 90210
 (310) 274-1111

CLDS PEGASE WINERY
 4444 COUNTY CALIFORNIA
 PROGRAM WATERWAYS MANAGEMENT STUDY
SITE GRADING & POND PIPING

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

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

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	=	<u>920,060 gal PW/year</u>

Average Day Flow

$$920,060 \text{ gal PW/year} \div 365 \text{ days} = \underline{2,521 \text{ gal PW/day}}$$

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	=	<u>3,950 gal PW/day</u>

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	=	<u>5,060 gal PW/day</u>

a. 165 Gal wine per ton of grapes is used as a wine industry standard

b. 4.6 gal of PW per gallon wine produced over the course of 1 year is based on historical data from Clos Pegase and existing Girard operations.

c. Percentage of PW produced during each month is based on the average flow distribution from 16 wineries

Date: 02/20/2014

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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
Project: Girard Winery Use Permit

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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	= <u>920,060 gal PW/year</u>

Average Day Flow

$$920,060 \text{ gal PW/year} \div 365 \text{ days} = \underline{2,521 \text{ gal PW/day}}$$

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	= <u>3,950 gal PW/day</u>

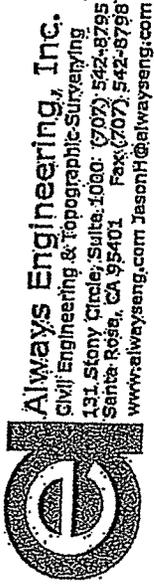
Average Day, Peak harvest Month - Pond Design

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	= <u>5,060 gal PW/day</u>

a. 165 Gal wine per ton of grapes is used as a wine industr standard

b. 4.6 gal of PW per gallon wine prodced over the course of 1 year is based on hisotrical data from Clos Pegase and existing Girard operations.

c. Percentage of PW prodced 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

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

Climate Data

Month	Days	Reference Evapotranspiration ¹ (Inches)	Pan Evaporation (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://www.cimis.water.ca.gov/cimis/monthlyETReport.do>

2 Average Monthly Pan Evaporation Rates observed at Berryessa Lake, Ca between 1957 and 1970.

3 Lake evaporation is pan evaporation multiplied by a 0.77 factor.

4 Average precipitation data is from TheWeatherChannel.com for Callstoga, 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		Output			Volume at end of Month (Mgal)	Water Depth at end of month (feet)	Volume Change (Mgal)
		Process Wastewater In (Mgal)	10 Year Precipitation (Mgal)	Pond Evaporation* (Mgal)	Discharge to Pond 2 (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	0.259	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		Output			Volume at end of Month (Mgal)	Water Depth (feet)	Volume Change (Mgal)
		Process Wastewater In From Pond 1 (Mgal)	10 Year Precipitation (Mgal)	Pond Evaporation* (Mgal)	Discharge to Irrigation Pond (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	0.2150	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	0.7150	0.299	5.0	-0.049	
December	0.299	0.278	0.160	0.010	0.200	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
 Vineyard = 2.5
 Pasture = 0
 Soil perc rate = 1

Month	Days	Reference Evapotranspiration ¹ (Inches)	Precipitation ⁵ (In)	Irrigation Demand ⁶		Residual Capacity ⁷ (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	0.000	0.000	0.000	0.000
April	30	4.6	0.474	0.460	0.450	0.024
May	31	6.0	0.848	0.409	0.400	0.448
June	30	7.0	1.373	0.307	0.300	1.073
July	31	8.0	1.543	0.307	0.300	1.243
August	31	7.0	2.594	0.409	0.400	2.194
September	30	5.2	2.619	0.307	0.300	2.319
October	31	3.4	2.457	0.307	0.300	2.157
November	30	1.4	1.073	0.358	0.350	0.723
December	31	0.9	0.541	0.460	0.450	0.091
TOTAL	365.0	49.1	13.520	3.536	3.456	10.064

- 1 Average monthly reference evapotranspiration
- 2 Pasture coefficient from Table 5-1, "Irrigation Coefficients"
- 3 Vineyard coefficient from Table 5-12, "Irrigation Coefficients"
- 4 Crop coefficient times the reference evapotranspiration
- 5 Precipitation for a 10-yr event, refer to the Appendix
- 6 Irrigation demand is the evapotranspiration minus precipitation
- 7 Residual capacity estimates irrigation/precipitation

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

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

Design Flow = Estimated Average Daily Flow
 = 10,000 gal/day
 = 0.010 Mgal/day
 = 38 m³/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 m³/day x 7700 mg BOD/L x 1000 ml/m³ x 0.000001 kg/mg
 = 294.9 kg BOD/day
 = 648.7 lb BOD/day

OXYGEN REQUIREMENTS - The amount of oxygen required 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

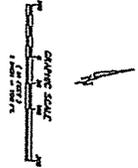
HORSEPOWER REQUIREMENTS - The horsepower of aeration required to provide the necessary amount of oxygen
 Oxygen Transfer Efficiency = 1.8 lbs O2/Hp*hr (3.4 assumes a VBT aerator, model 100)
 Horsepower Requirement = 973.1 lbs O2/day ÷ 1.8 lbs O2/Hp*hr ÷ 24 hr/day
 = 22.5 Hp required

POWER TO VOLUME RATIO (Hp/10³ ft³) - 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 ft³
 Number of cells = 2
 Ratio of first to second cell = 2
 Volume in Pond 1 = 722,797 gallons
 = 96,631 ft³
 Volume in Pond 2 = 803,995 gallons
 = 107,486 ft³
 Horsepower in Pond 1, cell 1 = 20 Hp
 Pond 1 Power to Volume Ratio = 20 Hp ÷ 96,631 ft³ = 0.21 Hp/1000 ft³
 Horsepower in Pond 1, cell 2 = 5 Hp
 Pond 2 Power to Volume Ratio = 5 Hp ÷ 107,486 ft³ = 0.05 Hp/1000 ft³
 Complete Mix = 0.75 - 1.5 Hp/1000 ft³ (Page 463 of *Small and Decentralized Wastewater Management*)
 Partial Mix = 0.4 - 0.75 Hp/1000 ft³
 Facultative = 0.1 - 0.4 Hp/1000 ft³

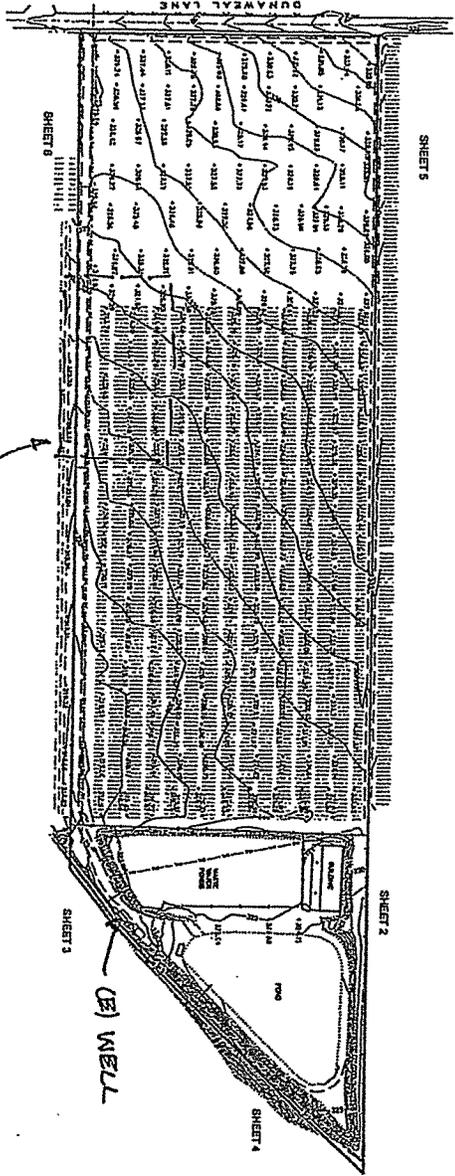
Pond 1
 Retention Time (t) / Estimated Effluent
 C_n = Effluent BOD
 C_o = 7700 mg/L
 n = 1 for single cell pond
 k = 0.276 d⁻¹
 t = 71.4 days
 C_n = 372 mg/L
 Effluent BOD = 372 mg/L

Pond 2
 Pond 1
 Retention Time (t) / Estimated Effluent
 C_n = Effluent BOD
 C_o = 372 mg/L
 n = 1 for baffled pond
 k = 0.276 d⁻¹
 t = 71.4 days
 C_n = 18 mg/L
 Effluent BOD = 18 mg/L



SITE EVALUATION
11/14/13
EIS-00744

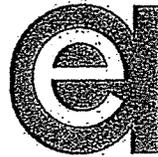
SHEET 1 OF 2



LEGEND:

1/4" = 100'	1/8" = 100'	1/16" = 100'	1/32" = 100'
1/64" = 100'	1/128" = 100'	1/256" = 100'	1/512" = 100'
1/1024" = 100'	1/2048" = 100'	1/4096" = 100'	1/8192" = 100'
1/16384" = 100'	1/32768" = 100'	1/65536" = 100'	1/131072" = 100'
1/262144" = 100'	1/524288" = 100'	1/1048576" = 100'	1/2097152" = 100'
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1/172			

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



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

RECEIVED

MAY

Napa County Planning, Building
& Environmental Services

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

RECEIVED

✓ 7 2014

Napa County Planning, Building
& Environmental Services

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.

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



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.

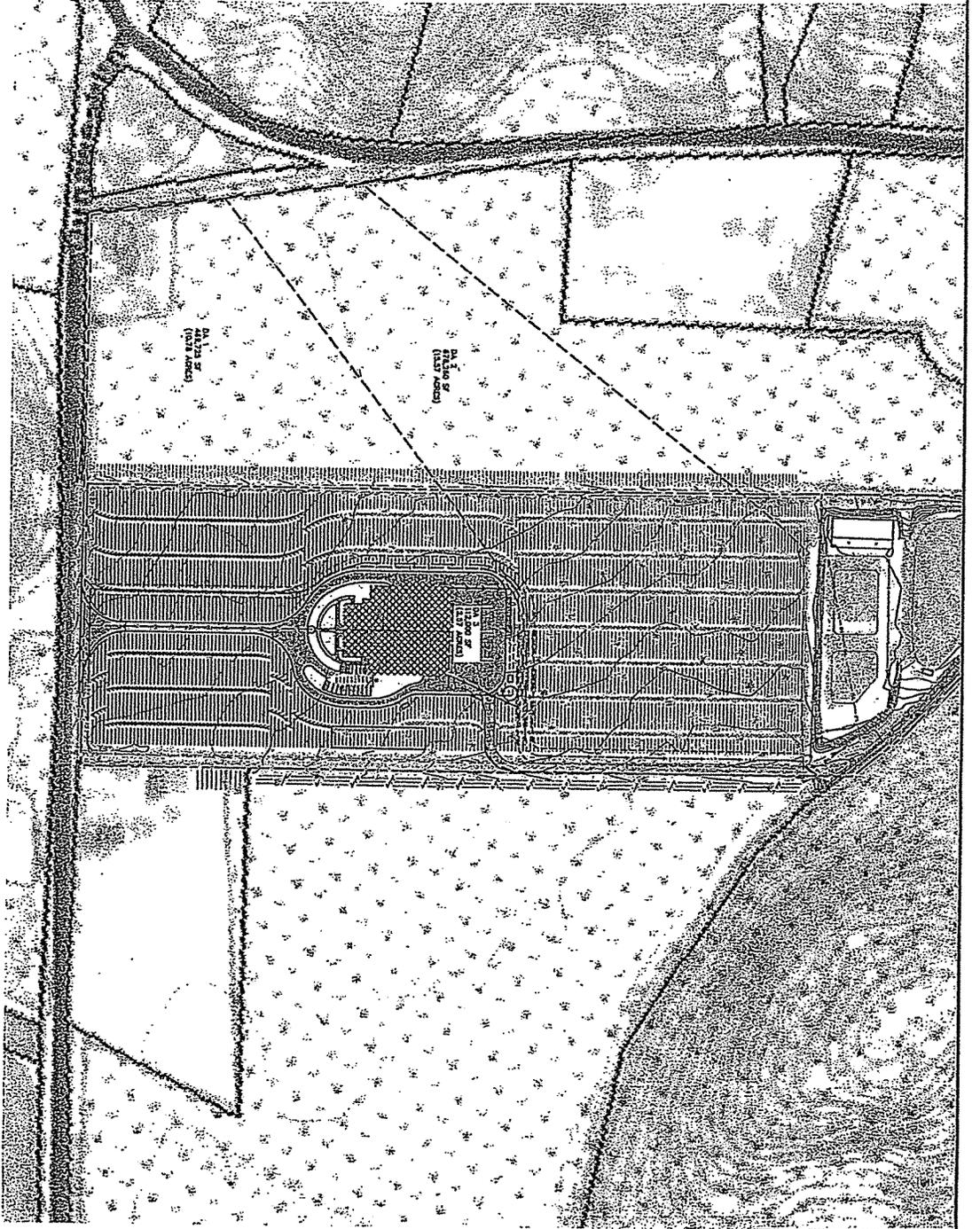
Sincerely,

A handwritten signature in black ink, appearing to read 'Ben Monroe', is written over the typed name.

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

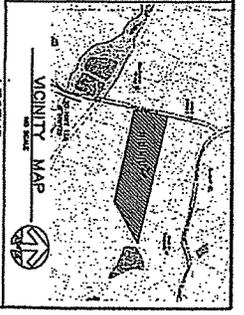
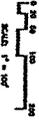


cc: Heather McCollister
Amy Haedt (Vintage Wine Estates)



PROPOSED OVERALL SITE PLAN

SCALE: 1" = 100'



DA 1
OF
DA 1
SHEET

USE PERMIT
EX 1: HYDROLOGY MAP
1077 DUNAWEAR LN., CALISTOGA, CA
APN:020-150-017

Prepared for: **GIRARD WINERY**
1077 DUNAWEAR LN., CALISTOGA, CA
Prepared on: **April 25, 2014**

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Civil Engineering & Topographic Surveying
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Santa Rosa, CA 95403 Fax (707) 542-4798
www.alwayseng.com 3230942@alwayseng.com

REVISION	DESCRIPTION	BY	DATE
1	ISSUE FOR PERMIT	EA	4/25/14



POINT PRECIPITATION FREQUENCY ESTIMATES

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

NOAA, National Weather Service, Silver Spring, Maryland

[PF tabular](#) | [PF graphical](#) | [Maps & aerals](#)

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 (2.69-3.43)	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.

[Back to Top](#)

Annual Average Rainfall =		38 Inches (From Napa 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)		Rainfall Intensity (I = in/hr) From Ex. 9 Intensity- Duration
		10	25	
DA 1	Runoff Coefficient (C) =	0.4		
	10.78	12.08	15.53	
DA 2	Runoff Coefficient (C) =	0.4		
	15.57	17.44	22.42	
DA 3	Runoff Coefficient (C) =	0.8		
	2.57	5.76	7.40	
TOTAL		35.28	45.35	

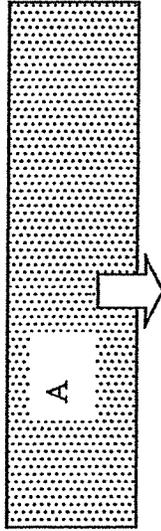
Exhibit 5: Pre vs Post

Pre-Development Total Runoff Volume
 NRCS Curve Number Procedure,
 Weighted Average Volume Technique
 $Q=(P-0.2S)^2/(P+0.8S)$ where, $S=1000/CN-10$

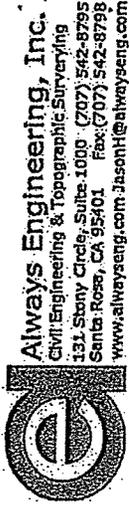
Vintage_Dunaweal Winery
 1077 Dunaweal Ln
 Calistoga, CA 94515
 APN: 020-150-017
 25-Apr-14
 Proposed Winery

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



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 Civil Engineering & Topographic Surveying
 131 Stony Circle, Suite 1000 (707) 842-8795
 Santa Rosa, CA 95401 Fax: (707) 842-8799
 www.alwayseng.com jasonh@alwayseng.com

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



Swale Capacity 0.75 ft n = .0275 short grass

OUTPUT INFORMATION

This report is for a channel running full.

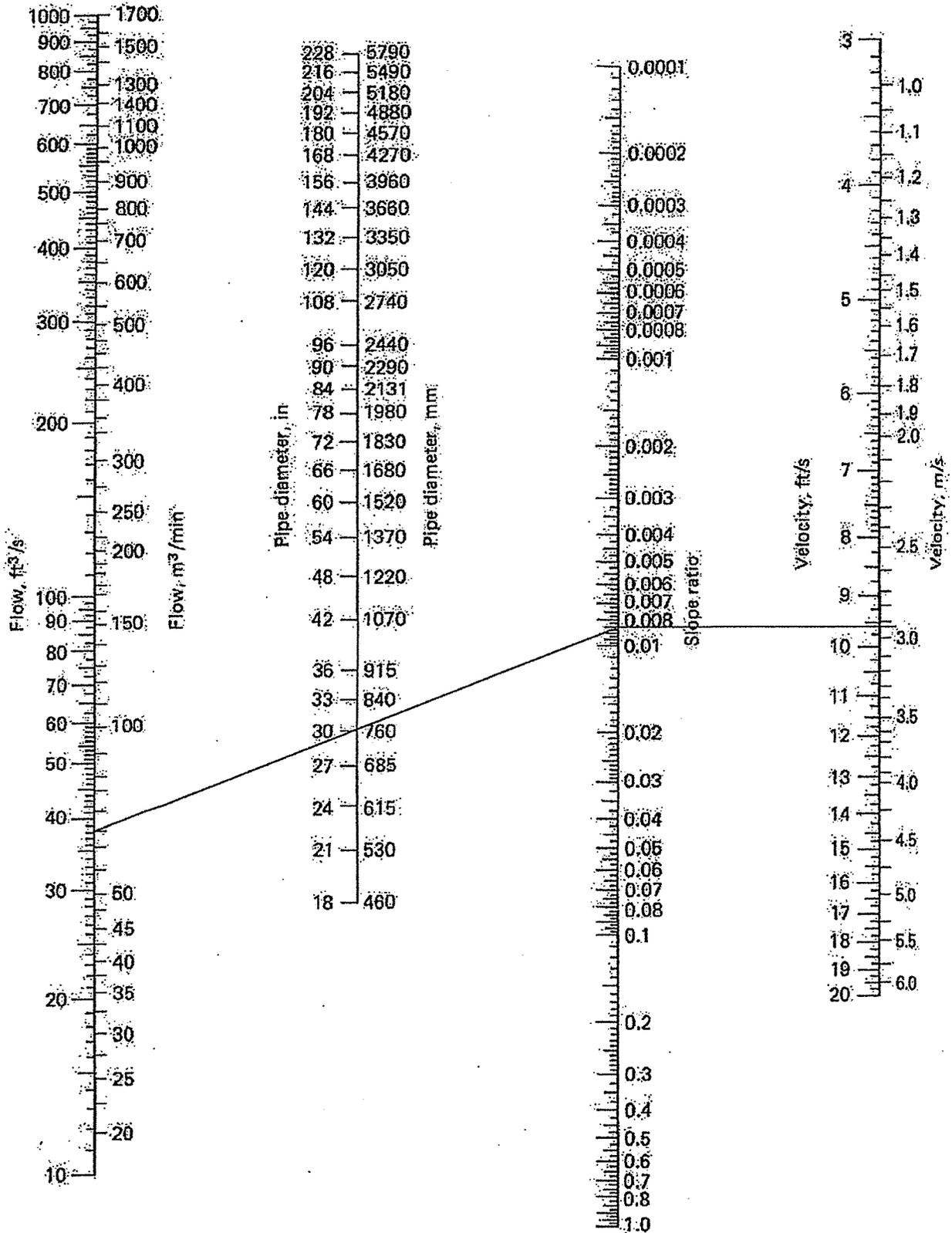
The Flow Capacity is 52.71 cfs
The flow velocity is 4.134 fps

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 perimeter = 32.04 ft
Hydraulic radius = 0.398 ft



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

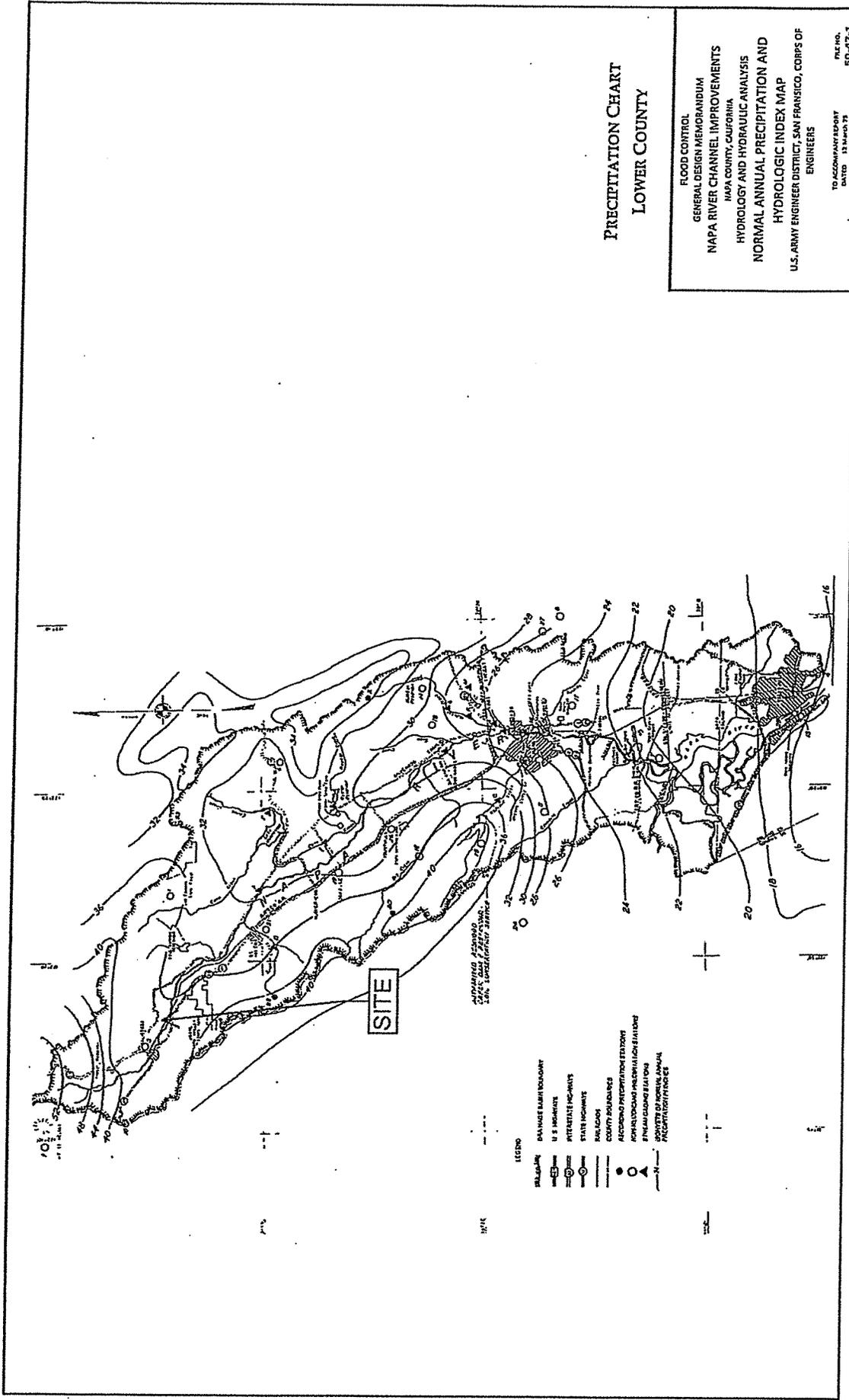


Exhibit 8: MEAN ANNUAL PRECIPITATION VS. 60 MINUTE RAINFALL
1077 Dunaweal Ln.
April 25, 2014

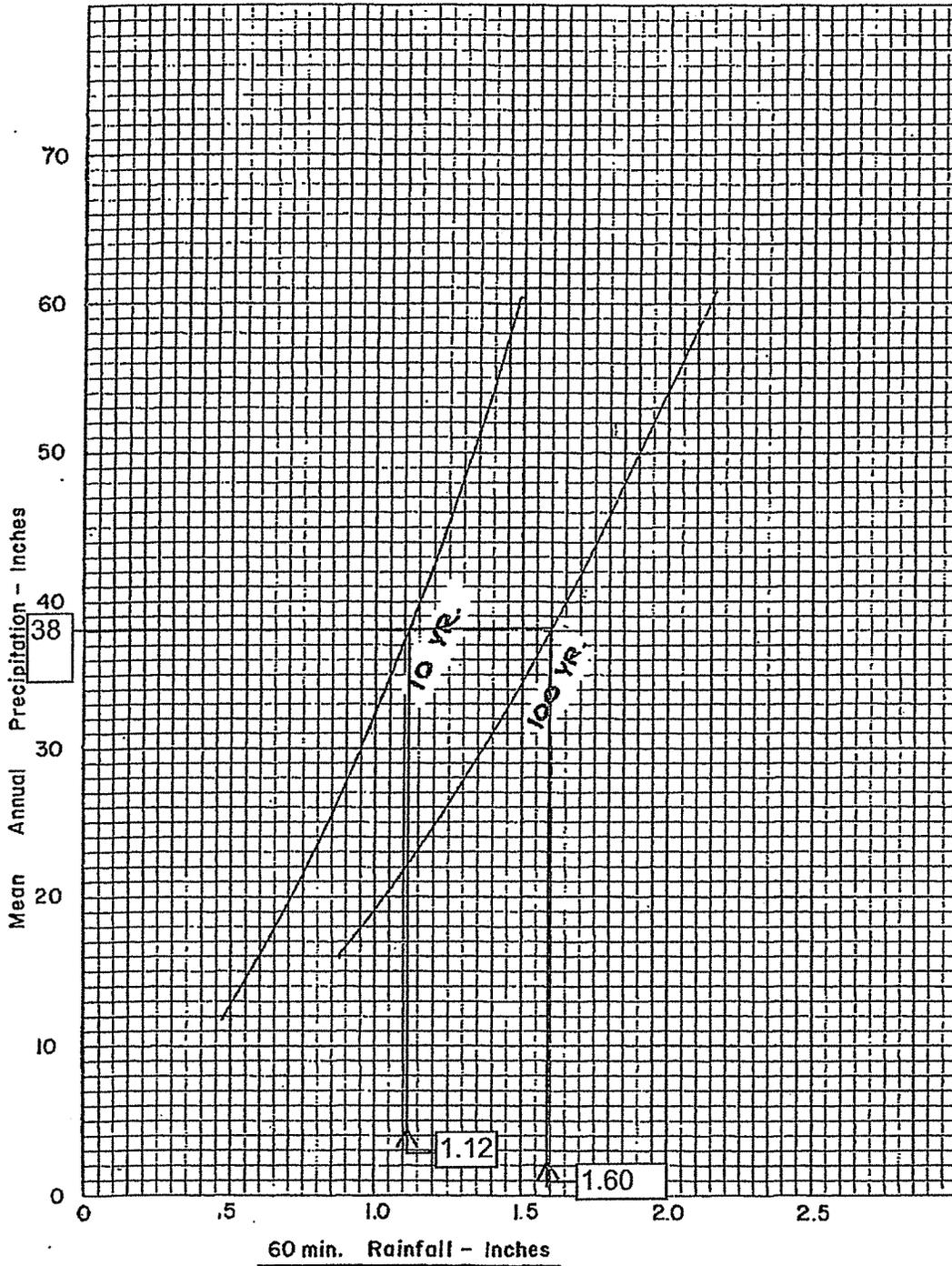
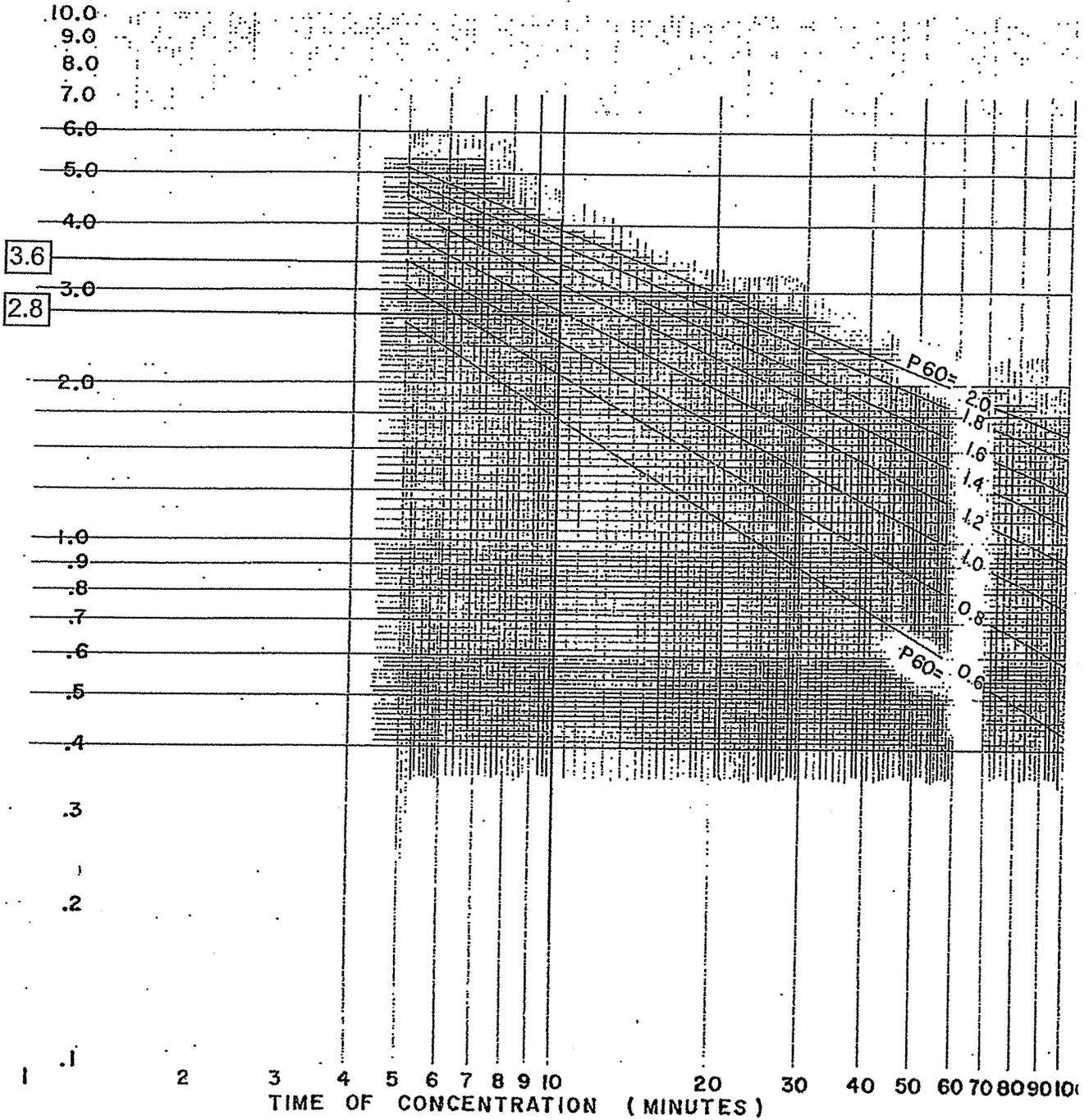


Exhibit 9: INTENSITY-DURATION CHART

1077 Dunaweal Ln.

April 25, 2014



Based on figure 7-811.6 (-8-64)
State of California
Division of Highways
Planning Manual

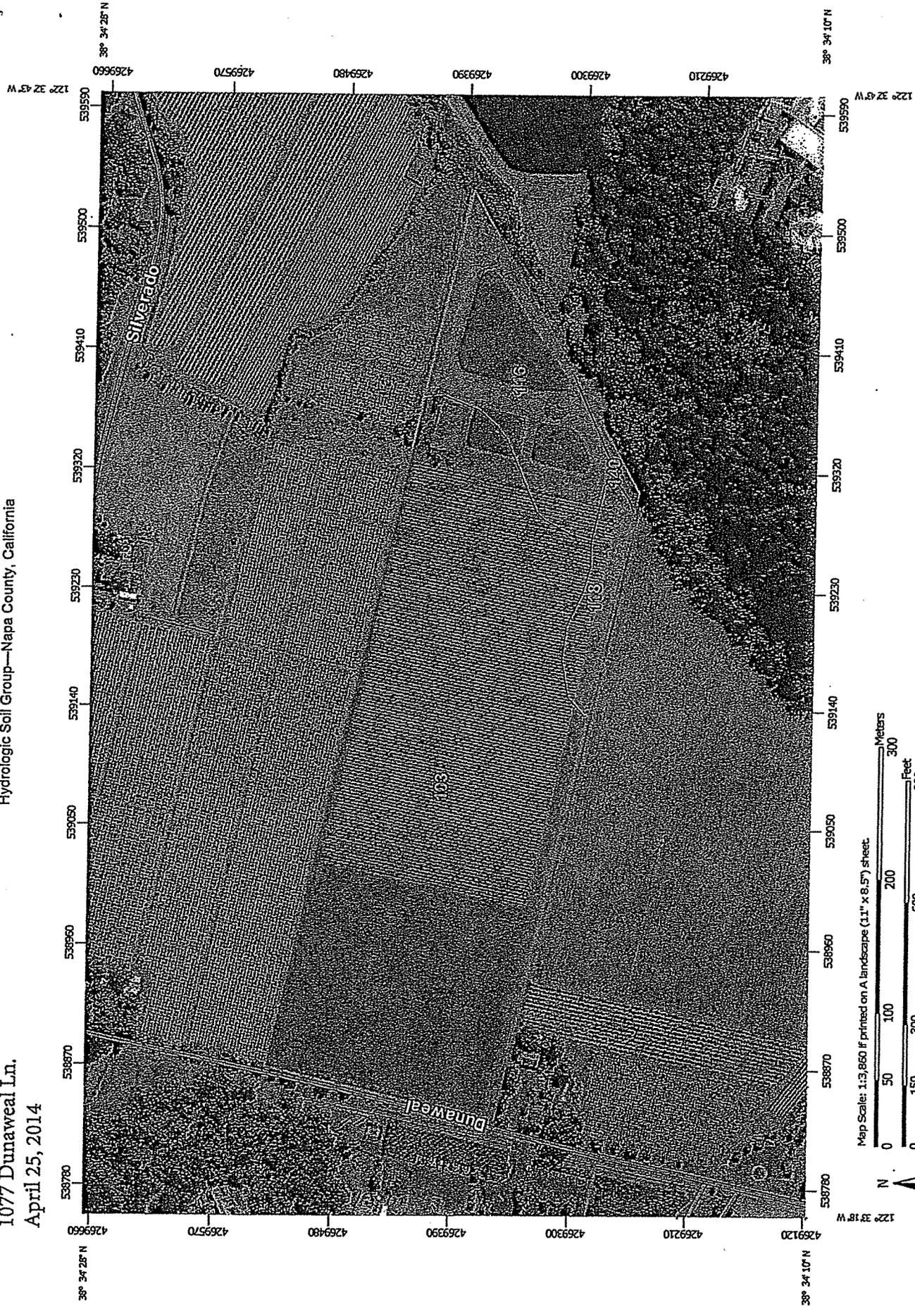
Table of Runoff Curve Numbers (SCS, 1986)

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

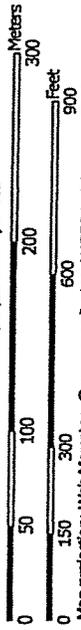
*From Chow et al. (1988).

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

Hydrologic Soil Group—Napa County, California



Map Scale: 1:3,860 if printed on A landscape (11" x 8.5") sheet.



Map projection: Web Mercator Corner coordinates: WGS84 Edge tics: UTM Zone 10N WGS84



Web Soil Survey
National Cooperative Soil Survey

MAP LEGEND

Area of Interest (AOI)		Area of Interest (AOI)		C
Soils		Soil Rating Polygons		C/D
		A		D
		A/D		Not rated or not available
		B		Water Features
		B/D		Streams and Canals
		C		Transportation
		C/D		Rails
		D		Interstate Highways
		Not rated or not available		US Routes
		Soil Rating Lines		Major Roads
		A		Local Roads
		A/D		Background
		B		
		B/D		Aerial Photography
		C		
		C/D		
		D		
		Not rated or not available		
		Soil Rating Points		
		A		
		A/D		
		B		
		B/D		

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.

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.

