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Wastewater Feasibility Study

WHL Winery (P15-00215-UP)
Planning Commission Hearing, February 15, 2017

ONSITE WASTEWATER DISPOSAL FEASIBILITY STUDY

FOR THE

1561 SOUTH WHITEHALL LANE WINERY

LOCATED AT:
1561 South Whitehall Lane
St. Helena, CA 94574
NAPA COUNTY APN 027-460-013

PREPARED FOR:
SWLD LLC
101 Montgomery Street, Suite 2350
San Francisco, CA 94104

PREPARED BY:

APPLIED CIVIL ENGINEERING INCORPORATED

2074 West Lincoln Avenue
Napa, California 94558
Telephone: (707) 320-4968
www.appliedcivil.com

Job Number: 15-109

REGISTERED PROFESSIONAL ENGINEER
MICHAEL R. MUELRATH
NO. 67435
Exp. 12/31/2016
CIVIL
STATE OF CALIFORNIA

Michael R. Muelrath

Michael R. Muelrath R.C.E. 67435

6/15/2015
Date

TIER 1 WATER AVAILABILITY ANALYSIS

FOR THE

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Michael R. Muelrath — 5/6/2016

Michael R. Muelrath R.C.E. 67435 — Date

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INTRODUCTION

SWLD LLC is applying for a Use Permit to construct and operate a new winery at their property located at 1561 South Whitehall Lane in Napa County, California. The subject property, known as Napa County Assessor's Parcel Number 027-460-013, is accessed via Whitehall Lane and South Whitehall Lane located on the west side of State Route 29, approximately 0.4 miles north of the intersection of State Route 29 and Galleron Road.

The Use Permit application under consideration proposes the construction and operation of a new production only winery with the following characteristics:

- Wine Production:
  - 10,000 gallons of wine per year
  - Crushing, fermenting, aging and bottling

- Employees:
  - 2 full time employees
  - 2 part time employees

There are no visitors or marketing plans proposed as part of this application.

Other improvements on the property include residential development consisting of a new Caretaker's House, Main Residence, Guest Cottage, pool, water tanks, accessory structures, approximately 12.5 acres of vineyard (being replanted) and the related access and utility infrastructure. Domestic wastewater from the residential structures will be collected in septic tanks and disposed of in a new leach field that was permitted as part of the ongoing residential development and located in the southern corner of the property. Please refer to the 1561 South Whitehall Lane Winery Use Permit Conceptual Site Plans for approximate locations of all site features.

SWLD LLC has requested that Applied Civil Engineering Incorporated (ACE) evaluate the feasibility of disposing of the winery process wastewater as well as the domestic sanitary wastewater that will be generated by the proposed winery. The remainder of this report describes the onsite soil conditions, the predicted process and sanitary wastewater flows and outlines the conceptual design of an onsite wastewater disposal system to serve the new winery facility.

SOILS INFORMATION

The United States Department of Agriculture Soil Conservation Service Soils Map for Napa County shows the entire property mapped as Maxwell clay, 2 to 9 percent slopes.

A site specific soils analysis was conducted during a site evaluation performed by RAM Engineering on October 26, 2011 (E11-00499). The site evaluation consisted of the excavation and observation of six test pits in the south corner of the property. The test pits generally revealed uniform soil conditions consisting of approximately 36 to 48 inches of acceptable sandy clay loam soil. The limiting conditions encountered were signs of seasonally elevated groundwater as evidenced by redoxomorphic mottling and the occurrence of more than 50% in the soil profile.

Please refer to the Site Evaluation Report in Appendix 4 for additional details.

EXISTING SEPTIC SYSETM INFORMATION

The existing septic system is designed to serve the residential development that is currently under constructed. The design flow from the residential structures and the design capacity of the septic system is 1,000 gallons per day according to the plans and calculations prepared by RAM Engineering and the Napa County Sewage Permit that was issued for installation of the septic system (E12-00443).

PREDICTED WINERY WASTEWATER FLOW

Winery Process Wastewater

We have used the generally accepted standard that six gallons of winery process wastewater are generated for each gallon of wine that is produced each year and that 1.5 gallons of wastewater are generated during the crush period for each gallon of wine that is produced. Based on the size of the winery and our understanding that both red and white wines will be produced we have assumed a 30 day crush period. Using these assumptions, the average and peak winery process wastewater flows are calculated as follows:

$$\text{Annual Winery Process Wastewater Flow} = \frac{10{,}000 \text{ gallons wine}}{\text{year}} \times \frac{6 \text{ gallons wastewater}}{1 \text{ gallon wine}}$$

Annual Winery Process Wastewater Flow = 60,000 gallons per year

$$\text{Average Daily Winery Process Wastewater Flow} = \frac{60{,}000 \text{ gallons}}{\text{year}} \times \frac{1 \text{ year}}{365 \text{ days}}$$

Average Daily Winery Process Wastewater Flow = 164 gallons per day (gpd)

$$\text{Peak Winery Process Wastewater Flow} = \frac{10{,}000 \text{ gallons wine}}{\text{year}} \times \frac{1.5 \text{ gallons wastewater}}{1 \text{ gallon wine}} \times \frac{1 \text{ year}}{30 \text{ crush days}}$$

Peak Winery Process Wastewater Flow = 500 gpd

Winery Sanitary Wastewater

The peak sanitary wastewater flow from the winery is calculated based on the number of winery employees. There are no plans for daily visitors for tours and tastings or private marketing events. In accordance with Table 4 of Napa County's "Regulations for Design, Construction, and Installation of Alternative Sewage Treatment Systems" we have used a design flow rate of 15 gallons per day per employee. Based on these assumptions, the peak winery sanitary wastewater flows are calculated as follows:

<u>Employees</u>

Peak Sanitary Wastewater Flow = 4 employees X 15 gpd per employee

Peak Sanitary Wastewater Flow = 60 gpd

Total Peak Winery Sanitary Wastewater Flow =60 gpd

Residential Sanitary Wastewater

The peak sanitary wastewater flow from the existing residence is calculated based on the number of potential bedrooms in the residence.

In accordance with Napa County Code, the peak flow for a single family residences is calculated as 150 gpd per bedroom for the first 3 bedrooms in each residence and an additional 100 gpd for each bedroom in excess of 5 bedrooms. According to the design calculations prepared by RAM Engineering the Main Residence and Guest Cottage have a total of 6 potential bedrooms and the Caretaker's Residence has a total of 3 potential bedrooms. Therefore the peak residential sanitary wastewater flow is calculated as follows:

Main Residence and Guest Cottage (6 bedrooms)	550 gpd
Caretaker's Residence (3 bedrooms)	450 gpd
Total	1,000 gpd

Peak Residential Sanitary Wastewater Flow = 1,000 gpd

Combined Peak Wastewater Flow

Combined Peak Wastewater Flow = Peak Winery Process Wastewater Flow + Total Peak Winery Sanitary Wastewater Flow + Peak Residential Sanitary Wastewater Flow

Combined Peak Flow = 500 gpd + 60 gpd + 1,000 gpd

Combined Peak Flow = 1,560 gpd

RECOMMENDATIONS

Based on the proposed site configuration, onsite soil conditions and estimated wastewater flows we have determined that there are at least two options for properly disposing of the process and sanitary wastewater generated at the proposed winery. A summary of each option is presented in the following sections of this report.

Option #1 – Winery Sanitary Wastewater Disposal Via Existing Leach Field and Process Wastewater Disposal Via Hold and Haul

In this scenario the sanitary wastewater would be disposed of via the existing standard septic system that serves the residences and the winery process wastewater would be collected separately, temporarily stored and then would be hauled offsite for treatment and disposal by the Napa Sanitation District, East Bay Municipal Utility District or a similar municipal wastewater treatment plant.

Required Length of Leach Line

The existing leach field was sized to serve the onsite residential uses and did not include extra capacity for the proposed winery. We recommend that two new leach lines be added to supplement the capacity of the existing disposal field. The new leach lines should consist of 85 lineal feet of leach line trenches with infiltrator chambers similar to the existing lines. The resulting total length of trench will be 1,000 feet (existing) plus 170 feet (proposed) for a total of 1,170 lineal feet.

The design capacity for the expanded system is calculated based on the original design criteria presented in the RAM Engineering design calculations including a soil loading rate of 1 gallon per day per three square feet of trench sidewall area and a total effective trench sidewall area of 3 square feet per lineal foot of trench as follows:

$$\text{Design Capacity} = 1{,}170 \text{ lineal feet} \times \frac{3 \text{ square feet}}{\text{lineal foot}} \times \frac{1 \text{ gpd}}{3 \text{ square feet}}$$

Design Capacity = 1,170 gallons per day

The design capacity of the expanded septic system (1,170 gpd) will exceed the anticipated peak wastewater flow from the existing residences and the proposed winery sanitary wastewater flow (1,060 gpd). Although the design capacity will exceed the expected flow we still recommend that two 85 lf lines be added to promote equal distribution amongst the leach lines.

Available Disposal Field Area

Based on the proposed septic system design prepared by RAM Engineering and topographic data prepared by Keir & Wright Civil Engineers and Land Surveyors, we have determined that there is enough area to install two more 85 foot long leach line laterals adjacent to the existing leach field. The conceptual layout of the existing disposal field and proposed expansion is shown on the 1561 South Whitehall Lane Winery Use Permit Conceptual Site Plans in Appendix 2.

Septic Tank Capacity

The winery will require a dedicated septic tank sized to provide at least three days of hydraulic retention time. We recommend that one 1,200 gallon septic tank be installed to serve the winery domestic waste stream.

Reserve Area

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

design flow of 120 gpd per bedroom (9 total bedrooms) and 60 gpd for the winery sanitary wastewater flow and is therefore calculated as follows:

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

$$\text{Require Reserve Field Area} = 200\% \times \frac{1{,}140 \text{ gpd}}{0.6 \text{ gpd per square foot}}$$

Required Reserve Area =3,800 square feet

Based on the proposed site plan we have determined that there is enough area to set aside for 3,800 square feet of subsurface drip disposal field in the vicinity of Test Pits E and F as shown on the 1561 South Whitehall Lane Winery Use Permit Conceptual Site Plans in Appendix 2.

Winery Process Wastewater Disposal

The winery process wastewater hold and haul system must be designed to hold at least seven days of peak flow (7 days x 500 gallons per day = 3,500 gallons), have a water level alarm and be designed and constructed in accordance with the requirements for hold and haul systems as outlined in Napa County Code Section 13.52.035.

Winery Process Wastewater Disposal Reserve Area

Napa County Code requires that an onsite "reserve area" be designated for process wastewater hold and haul systems. The reserve area will be onsite pre-treatment and irrigation as described in Option #2 below.

Option #2 – Winery Sanitary Wastewater Disposal Via Existing Leach Field and Process Wastewater Disposal Via Treatment and Irrigation

In this scenario the sanitary wastewater would be disposed of in the existing residential septic system as previously described in Option #1 and the winery process wastewater would be collected separately, pretreated, stored and disposed of via surface irrigation in the vineyard, landscaping outside of the required 100 foot well and blue line stream setbacks.

Required Disposal Field and Reserve Area

Sanitary wastewater disposal field and reserve areas are the same as described in Option #1 above.

Septic Tank Capacity

Septic tank requirements in this scenario are the same as previously described in Option #1 above.

Process Wastewater Treatment & Disposal

We recommend that treatment be achieved through the use of a package plant type system or other treatment system designed to accept winery process wastewater that is capable of meeting the following treatment requirements:

Parameter	Pre-treatment*	Post Treatment**
pH	3 to 10	6 to 9
BOD_5	500 to 12,000 mg/l	<160 mg/l
TSS	40 to 800 mg/l	<80 mg/l
SS	25 to 100 mg/l	<1 mg/l

* Reference California Regional Water Quality Control Board Central Coast Region General Waste Discharge Requirements Order No. R3-2008-0018 for winery process wastewater characteristics

** Required for discharge to land via surface irrigation by Napa County for samples taken at the discharge of the treatment unit.

Process Wastewater Disposal

To simplify this analysis we have assumed that final disposal of the treated effluent will be via surface drip irrigation in the vineyard. There are approximately 11.4 acres of vineyard area available outside of the required well and stream setbacks. The treated process wastewater may also be able to be used for landscape irrigation outside of all required setbacks which would provide additional flexibility in operation of the disposal system. All application of treated winery process wastewater must comply with the requirements of the Napa County Winery Process Wastewater Guidelines for Surface Drip Irrigation and general wastewater setback requirements for wells and blue-line streams.

In order to accommodate differences in the timing of wastewater generation, irrigation demand and prohibitions on applying water to the land during rainy periods a storage tank will be required. We have prepared a water balance calculation to size a tank that will temporarily store wastewater generated at the winery before it is applied to the vineyard. The water balance calculation assumes a monthly wastewater generation rate and a monthly vineyard irrigation schedule based on our past experience with projects of this type. The water balance calculations show that the water generated by winery production operations each month can be effectively managed after treatment by applying it to the identified vineyard area without excess carryover from month to month. We recommend a minimum storage tank capacity of 5,000 to 10,000 gallons to provide operational flexibility in timing of land applications (see Appendix 3).

CONCLUSION

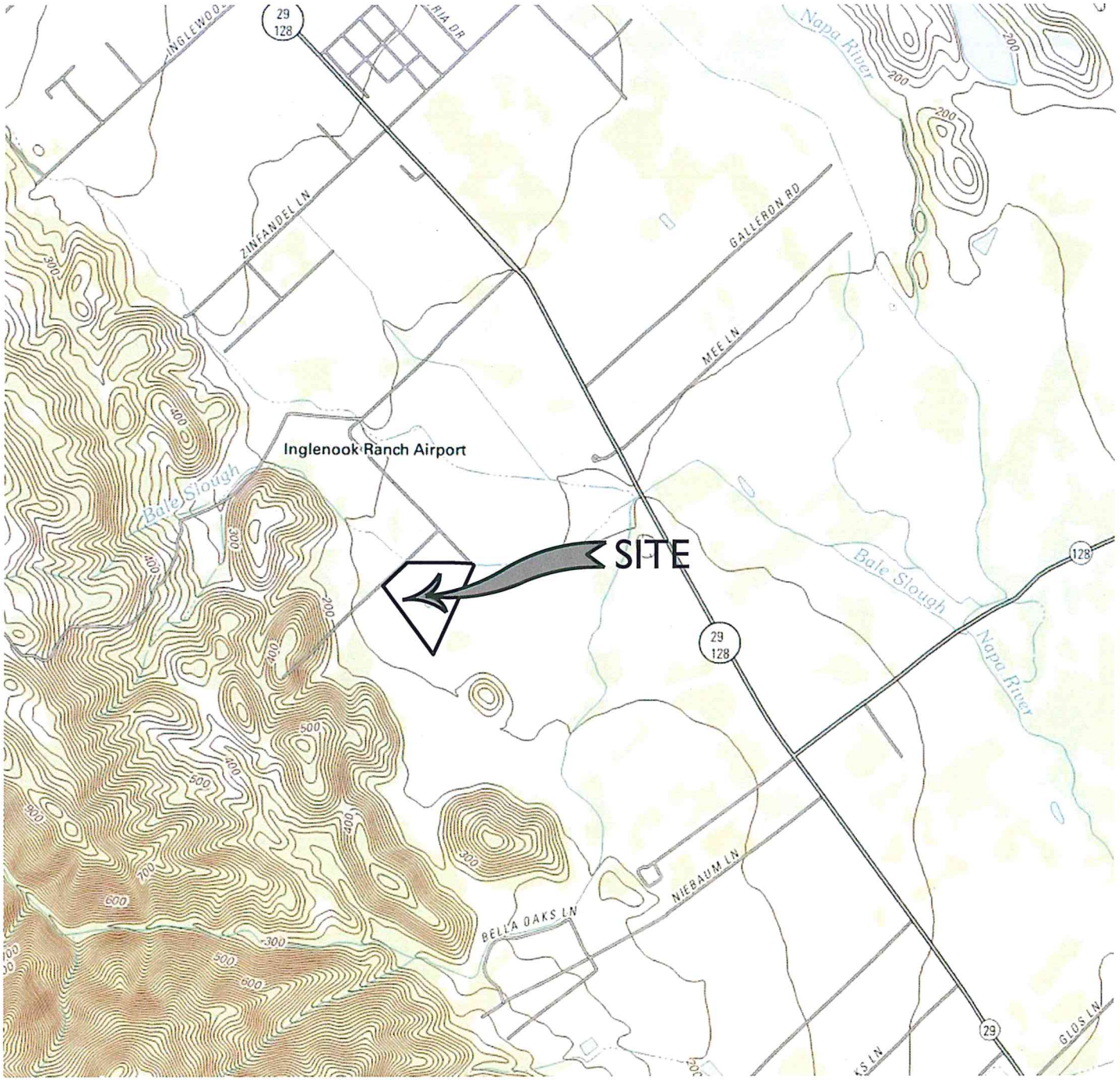
It is our opinion that the wastewater from the proposed winery can be accommodated in either of the two options previously described. Full design calculations and construction plans for the wastewater system(s) must be prepared in accordance with Napa County standards at the time of building permit application.

APPENDIX 1: Site Topography Map

SITE TOPOGRAPHY MAP

REPRESENTS A PORTION OF THE
UNITED STATES GEOLOGICAL SURVEY 7.5 MINUTE QUADRANGLE
"RUTHERFORD, CA"

SCALE: 1" = 2,000'



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1561 SOUTH WHITEHALL LANE WINERY

1561 SOUTH WHITEHALL LANE
ST. HELENA, CA 94574
APN 027-460-013

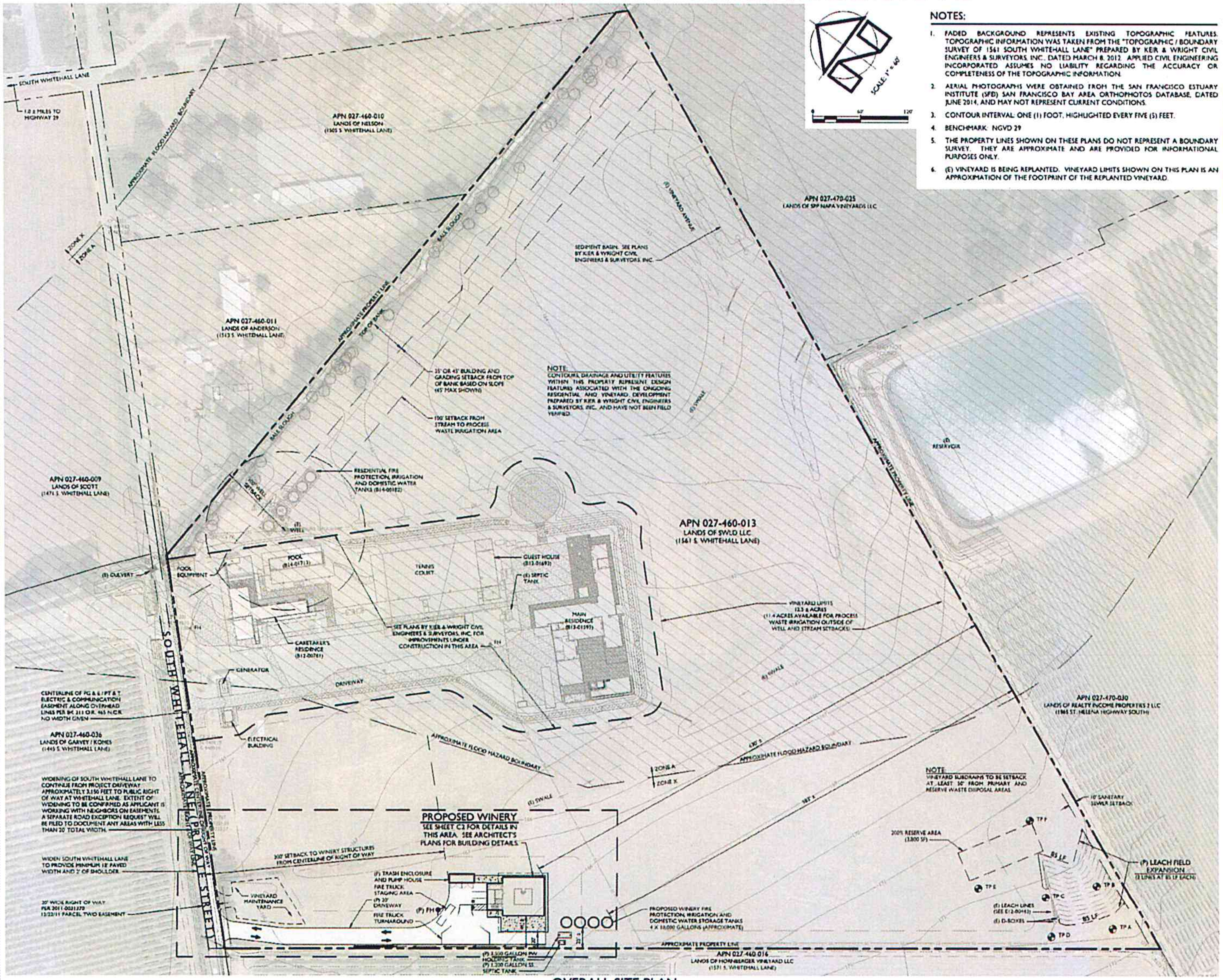
JOB NO. 15-109 PAGE 1 OF 1 JUNE 2015

APPENDIX 2: 1561 South Whitehall Lane Winery Use Permit Conceptual Site Plans

Reduced to 8.5" x 11"

1561 SOUTH WHITEHALL LANE WINERY

USE PERMIT CONCEPTUAL SITE PLANS



OVERALL SITE PLAN

SCALE: 1" = 60'

NOTES:

1. FADED BACKGROUND REPRESENTS EXISTING TOPOGRAPHIC FEATURES. TOPOGRAPHIC INFORMATION WAS TAKEN FROM THE "TOPOGRAPHIC / BOUNDARY SURVEY OF 1561 SOUTH WHITEHALL LANE" PREPARED BY KEIR & WRIGHT CIVIL ENGINEERS & SURVEYORS, INC., DATED MARCH 8, 2012. APPLIED CIVIL ENGINEERING INCORPORATED ASSUMES NO LIABILITY REGARDING THE ACCURACY OR COMPLETENESS OF THE TOPOGRAPHIC INFORMATION.
2. AERIAL PHOTOGRAPHS WERE OBTAINED FROM THE SAN FRANCISCO ESTUARY INSTITUTE (SFEI) SAN FRANCISCO BAY AREA ORTHOPHOTOS DATABASE, DATED JUNE 2014, AND MAY NOT REPRESENT CURRENT CONDITIONS.
3. CONTOUR INTERVAL: ONE (1) FOOT, HIGHLIGHTED EVERY FIVE (5) FEET.
4. BENCHMARK: NGVD 29
5. THE PROPERTY LINES SHOWN ON THESE PLANS DO NOT REPRESENT A BOUNDARY SURVEY. THEY ARE APPROXIMATE AND ARE PROVIDED FOR INFORMATIONAL PURPOSES ONLY.
6. (E) VINEYARD IS BEING REPLANTED. VINEYARD LIMITS SHOWN ON THIS PLAN IS AN APPROXIMATION OF THE FOOTPRINT OF THE REPLANTED VINEYARD.

LOCATION MAP

SCALE: 1" = 4,000'

PROJECT INFORMATION:

PROPERTY OWNER & APPLICANT:
SWLD LLC
101 MONTGOMERY STREET, SUITE 2350
SAN FRANCISCO, CA 94104

SITE ADDRESS:
1561 SOUTH WHITEHALL LANE
ST. HELENA, CA 94574

ASSESSOR'S PARCEL NUMBER:
027-460-013

PARCEL SIZE:
20 ± ACRES

PROJECT SIZE:
0.80 ± ACRES

ZONING:
AGRICULTURAL PRESERVE (AP)

DOMESTIC WATER SOURCE:
PRIVATE WATER WELL AND TANKS

FIRE PROTECTION WATER SOURCE:
PRIVATE TANKS

WASTEWATER DISPOSAL:
SANITARY SEWER: ONSITE TREATMENT AND DISPOSAL
PROCESS WASTE: HOLD AND HAUL OR ONSITE TREATMENT AND DISPOSAL

SHEET INDEX:

C1	OVERALL SITE PLAN
C2	WINERY CONCEPTUAL GRADING AND LAYOUT PLAN
C3	IMPERVIOUS AREA EXHIBIT

FLOOD HAZARD NOTE:

ACCORDING TO THE FEDERAL EMERGENCY MANAGEMENT AGENCY (FEMA) FLOOD INSURANCE RATE MAP (FIRM) MAP NUMBER 06055C0380E, EFFECTIVE SEPTEMBER 26, 2008, ALL OR A PORTION OF THE PROJECT SITE IS LOCATED IN A SPECIAL FLOOD HAZARD AREA SUBJECT TO INUNDATION BY THE 1% CHANCE ANNUAL FLOOD (100 YEAR FLOOD). THE APPROXIMATE FLOOD HAZARD BOUNDARY LINE IS SHOWN ON THIS PLAN. SEE FIRM FOR ADDITIONAL INFORMATION.

GRADING QUANTITIES*

CUT	2,100 ± CY
FILL	20 ± CY
NET**	2,080 ± CY (CUT)

* THIS ESTIMATE IS PROVIDED AS A TOOL FOR THE REVIEWING AGENCIES TO EVALUATE THE ENVIRONMENTAL IMPACTS OF THE PROJECT. IT IS NOT INTENDED TO BE USED FOR CONSTRUCTION PURPOSES. CONTRACTOR IS TO PERFORM THEIR OWN EARTHWORK CALCULATIONS AND SHALL NOT USE THE ESTIMATES PRESENTED ABOVE. THIS ESTIMATE IS BASED ON IN PLACE VOLUMES AND DOES NOT INCLUDE PAVING, AGGREGATES OR SELECT FILL VOLUMES.

** EXCESS SOIL CUT FROM THE PROJECT WILL BE EITHER SPREAD IN A THIN UNIFORM LAYER IN THE VINEYARD AREA OR WILL BE HAULED OFFSITE TO AN APPROVED PROJECT SITE OR LANDFILL.

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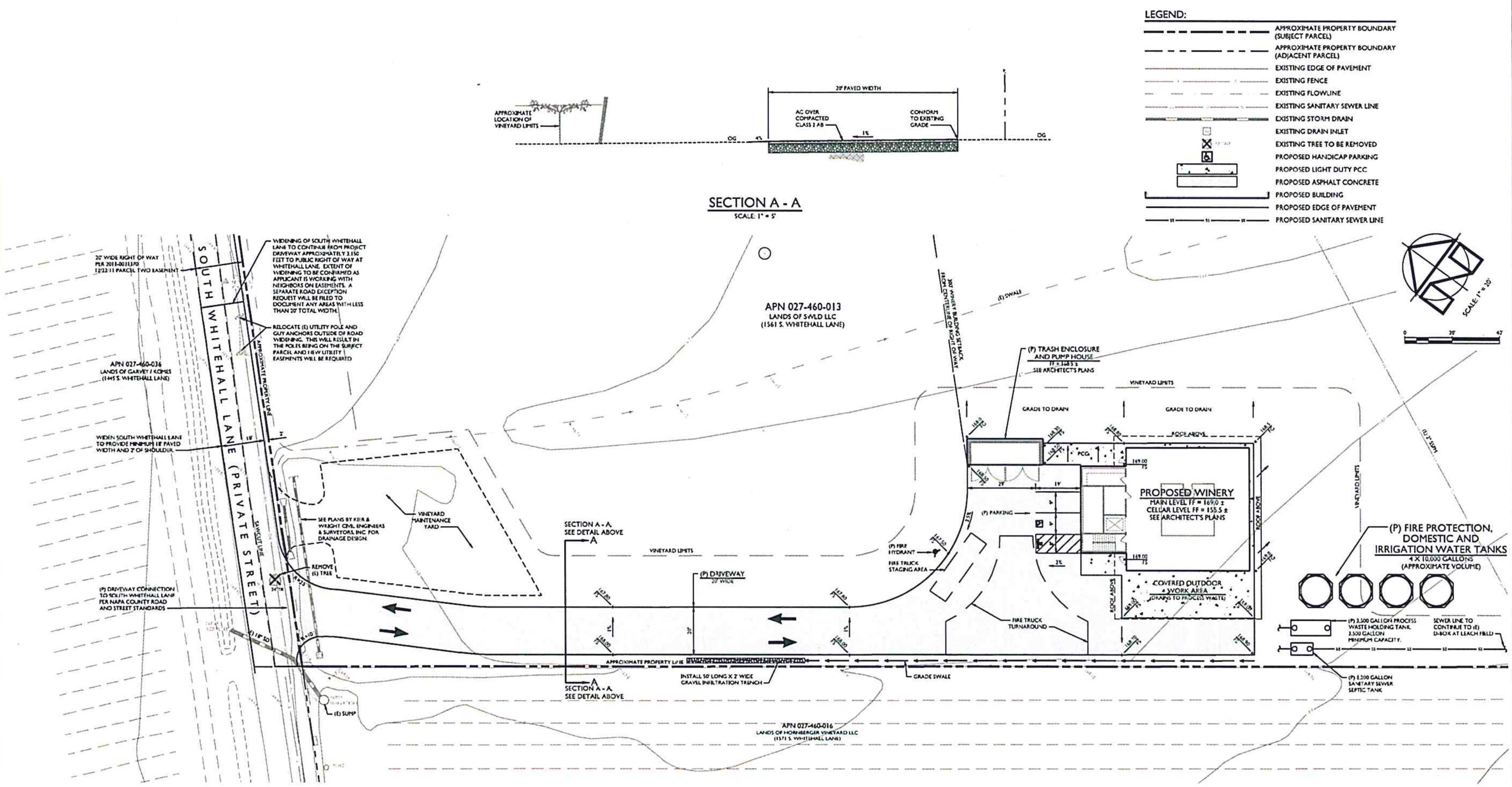
1561 SOUTH WHITEHALL LANE WINERY
USE PERMIT CONCEPTUAL SITE PLANS
OVERALL SITE PLAN

PREPARED UNDER THE DIRECTION OF:

FOR USE PERMIT NOT FOR CONSTRUCTION

DRAWN BY:	www.PowerCAD.net
CHECKED BY:	MRM
DATE:	JUNE 15, 2015
REVISIONS:	BY:
JOB NUMBER:	15-109
FILE:	15-109CONC.DWG
ORIGINAL SIZE:	24" X 36"
SHEET NUMBER:	C1 of 3



WINERY CONCEPTUAL GRADING AND LAYOUT PLAN

SCALE: 1" = 20'

APPLIED CIVIL ENGINEERING INCORPORATED
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Napa, CA 94558
(707) 320-4968 (707) 320-2395 Fax
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1561 SOUTH WHITEHALL LANE WINERY

USE PERMIT CONCEPTUAL SITE PLANS

WINERY CONCEPTUAL GRADING AND LAYOUT PLAN

PREPARED UNDER THE DIRECTION OF:

DRAWN BY: www.PowerCAD.net

CHECKED BY: MRM

DATE: JUNE 15, 2015

REVISIONS: BY:

JOB NUMBER: 15-109

FILE: 15-109CONC.DWG

ORIGINAL SIZE: 24" X 36"

SHEET NUMBER:

C2 OF 3

G:\Projects\15-109 1561 S Whitehall Lane\Drawings_In Progress\15-109conc.dwg 6/12/2015 3:10:44 AM

IMPERVIOUS SURFACE SUMMARY

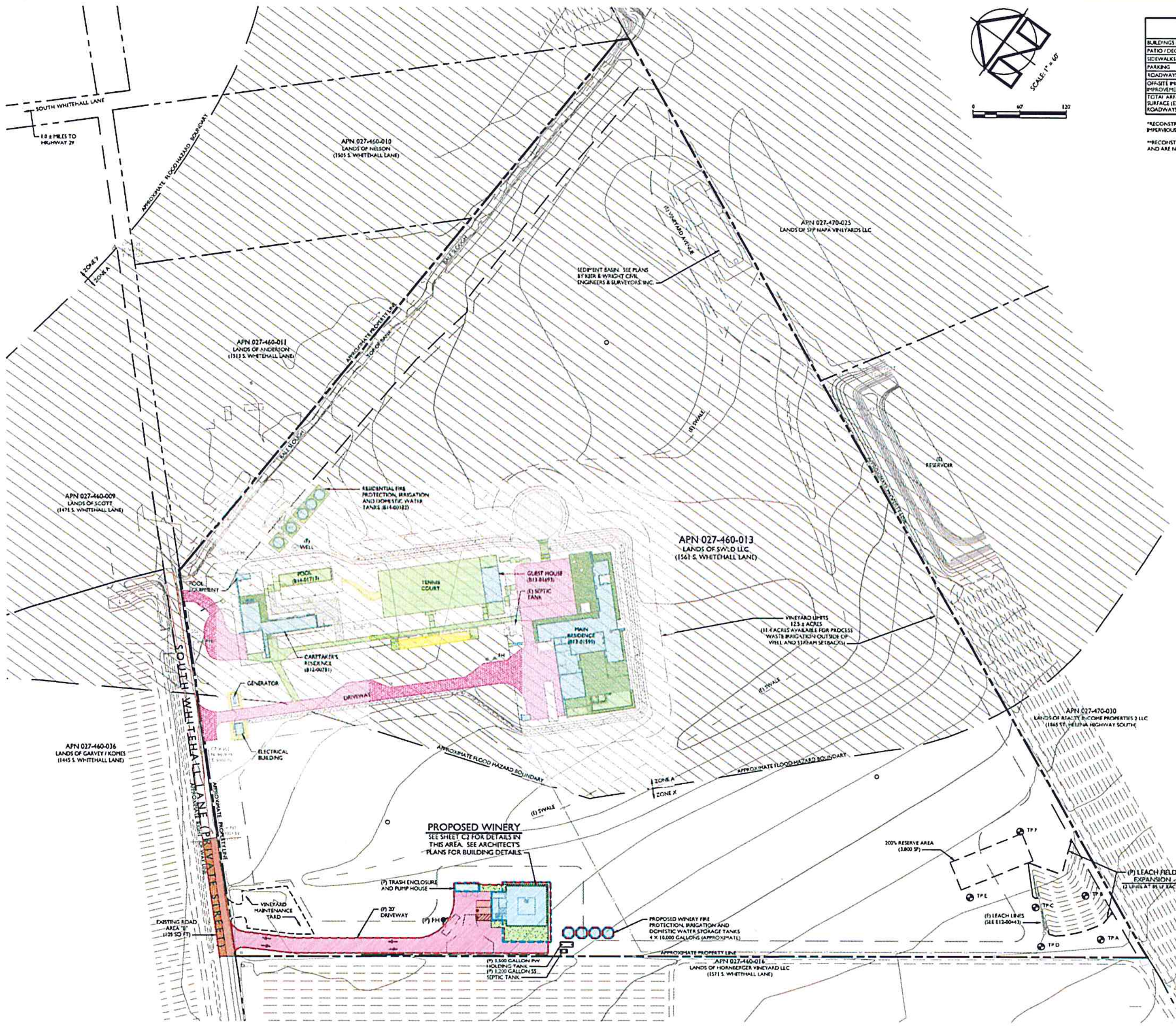
	PRE-PROJECT AREA (SF)	NEW AREA (SF)	RECONSTRUCTED AREA (SF) A*	RECONSTRUCTED AREA (SF) B**	TOTAL NEW AND RECONSTRUCTED AREA (SF)
BUILDINGS / ROOFS	12,360	4,600	0	0	4,600
PATIO / DECKING / PAVERS	23,920	1,830	0	0	1,830
SIDEWALKS / PATHS	1,920	0	0	0	0
PARKING	0	495	0	0	495
ROADWAYS AND DRIVEWAYS	20,570	11,100	7,610	0	18,710
OFF-SITE IMPERVIOUS IMPROVEMENTS	3,375	1,545	1,375	-105	2,815
TOTAL AREA OF IMPERVIOUS SURFACE (EXCLUDING ROADWAYS AND DRIVEWAYS)	38,200	6,925	0		6,925

*RECONSTRUCTED AREAS (A) ARE EXISTING IMPERVIOUS SURFACES THAT ARE BEING REPLACED WITH NEW IMPERVIOUS SURFACES.

**RECONSTRUCTED AREAS (B) ARE EXISTING IMPERVIOUS SURFACES THAT ARE BEING COMPLETELY REMOVED AND ARE NOT BEING REPLACED WITH NEW IMPERVIOUS SURFACES.

18,260 ± SF — WINERY COVERAGE AREA

6,340 ± SF — WINERY DEVELOPMENT AREA



IMPERVIOUS SURFACE EXHIBIT

SCALE: 1" = 60'

1561 SOUTH WHITEHALL LANE WINERY

USE PERMIT CONCEPTUAL SITE PLANS
IMPERVIOUS SURFACE EXHIBIT

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www.appliedce.com

PREPARED UNDER THE DIRECTION OF:

DRAWN BY: www.PowerCAD.net
CHECKED BY: MRM
DATE: JUNE 15, 2015
REVISIONS: BY:

JOB NUMBER: 15-109
FILE: 15-109CONC.DWG
ORIGINAL SIZE: 24" X 36"
SHEET NUMBER: C3 OF 3

APPENDIX 3: Water Storage Tank Water Balance Calculations

Irrigation Storage Tank Water Balance

Month	Beginning Balance	Process Wastewater	Land Application Capacity	Ending Balance
January	0	3,000	247,630	0
February	0	3,000	247,630	0
March	0	3,000	247,630	0
April	0	2,400	247,630	0
May	0	2,400	186,219	0
June	0	3,000	465,548	0
July	0	6,000	465,548	0
August	0	7,800	526,958	0
September	0	15,000	526,958	0
October	0	7,800	433,849	0
November	0	3,600	247,630	0
December	0	3,000	247,630	0
		60,000	4,090,859	

Notes:

1. All values shown above for beginning balance, inflow, outflow and ending balance are in units of gallons.
2. See attached tables for detailed explanation of process wastewater and irrigation data presented in this table.
3. This water balance is based on the assumption that the tank is empy in August, just prior to crush.
4. This table is intended to illustrate waste disposal capability only. Where irrigation demand exceeds availble treated wastewater availability additional irrigation water will be provided by another source.

Winery Process Wastewater Generation Analysis

Annual Wine Production	10,000 gallons
Wastewater Generation Rate	6 gallons per gallon of wine
Annual Wasewater Generation	60,000 gallons
Crush Season Length	30 days
Wastewater Generated During Crush	1.5 gallons per gallon of wine
Peak Wastewater Generation Rate	500 gallons per day

Winery Process Wastewater Generation Table			
Month	Percentage of Annual Total	Monthy Flow (gallons)	Average Flow (gpd)
January	5.0%	3,000	97
February	5.0%	3,000	107
March	5.0%	3,000	97
April	4.0%	2,400	80
May	4.0%	2,400	77
June	5.0%	3,000	100
July	10.0%	6,000	194
August	13.0%	7,800	252
September	25.0%	15,000	500
October	13.0%	7,800	252
November	6.0%	3,600	120
December	5.0%	3,000	97
Total	100.0%	60,000	

Notes:

1. Wastewater generation rates and monthly proportioning are based on our past experience with similar projects.

Irrigation Schedule Analsysis

Vineyard Information:

Total acres of vines	11.4 acres	
Vine Row Spacing (approx)	6 feet	
Vine Spacing (approx)	4 feet	
Vine density	1,815 vines per acre (average)	
Total Vine Count	20,691 vines	

Irrigation Information:

Seasonal Irrigation[1]	90.0 gallons per vine (May through October)	
Non-Irrigation Application	0.8 inches	October through April

Irrigation Schedule					
Month	Monthly Percentage[2]	Irrigation per Vine (gallons)	Irrigation (gallons)	Non-Seasonal Irrigation Application (gallons)	Total (gallons)
January		0.0	0	247,630	247,630
February		0.0	0	247,630	247,630
March		0.0	0	247,630	247,630
April		0.0	0	247,630	247,630
May	10%	9.0	186,219	0	186,219
June	25%	22.5	465,548	0	465,548
July	25%	22.5	465,548	0	465,548
August	15%	13.5	279,329	247,630	526,958
September	15%	13.5	279,329	247,630	526,958
October	10%	9.0	186,219	247,630	433,849
November		0.0	0	247,630	247,630
December		0.0	0	247,630	247,630
Total	100%	90.0	1,862,190	2,228,669	4,090,859

Notes:

1. Irrigation per vine is based on 0.5 acre-feet per acre of vines per Phase 1 WAA.
2. Monthly vineyard irrigation percentages are based on our past experience with projects of this type.
3. Non-Irrigation Application is for managing tank levels and assumes a maximum of 5 operational days per month based on historic weather data (Summit Engineering NBRID Capacity Study, 1996) and a saturated soil infiltration rate of 0.1 gallons per square foot per day uniformly over the entire area.

APPENDIX 4: Site Evaluation Report

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 #: E11-00499
APN: 027-460-013
(County Use Only) Reviewed by: Date: 11/14/11

PLEASE PRINT OR TYPE ALL INFORMATION

Property Owner **Bailey Cummings Family LP**	☒ New Construction ☐ Addition ☐ Remodel ☐ Relocation ☐ Other:
Property Owner Mailing Address **1310 Whitehall Lane**	☐ Residential - # of Bedrooms: **TBD** Design Flow: **TBD** gpd
City **Saint Helena** State **CA** Zip **94574**	☐ Commercial – Type: Sanitary Waste: gpd Process Waste: gpd
Site Address/Location **1561 South Whitehall Lane** **Saint Helena, CA 94574**	☐ Other: Sanitary Waste: gpd Process Waste: gpd

Evaluation Conducted By:

Company Name **RAM Engineering**	Evaluator's Name **Tamara Martin, REHS**	Signature (Civil Engineer, R.E.H.S., Geologist, Soil Scientist)
Mailing Address: **130 South Main Street, Suite 201**		Telephone Number **707-824-0266**
City **Sebastopol** State **CA** Zip **95472**		Date Evaluation Conducted **October 25, 2011**

Primary Area	Expansion Area
Acceptable Soil Depth: **48** in. Test pit #'s: **A, B, & C**	Acceptable Soil Depth: **36** in. Test pit #'s: **D, E, & F**
Soil Application Rate (gal. /sq. ft. /day): **Standard= 0.33 & PD= 0.50**	Soil App Rate (gal. /sq. ft. /day): **At-grade or Mound= 0.50 & Drip= 0.6**
System Type(s) Recommended: **Standard or Pressure Distribution (PD)**	System Type(s) Recommended: **At-grade, Mound, or Subsurface Drip**
Slope: **<5** %. Distance to nearest water source: **>100** ft.	Slope: **<5** %. Distance to nearest water source: **>100** ft.
Hydrometer test performed? No ☒ Yes ☐ (attach results)	Hydrometer test performed? No ☒ Yes ☐ (attach results)
Bulk Density test performed? No ☒ Yes ☐ (attach results)	Bulk Density test performed? No ☒ Yes ☐ (attach results)
Groundwater Monitoring Performed? No ☒ Yes ☐ (attach results)	Groundwater Monitoring Performed? No ☒ Yes ☐ (attach results)

Site constraints/Recommendations:

Mottling and high rock content were the limiting conditions at 48" in profiles A, B, and C and at 36" in profiles D, E, and F. Recommend a standard system with fill or a pressure distribution system with fill or pre-treatment in the vicinity of profiles A-C and an at-grade, mound, or subsurface drip dispersal system in the vicinity of profiles D-F.

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Test Pit # A

PLEASE PRINT OR TYPE ALL INFORMATION

Horizon Depth (Inches)	Boundary	%Rock	Texture	Structure	Consistence			Pores	Roots	Mottling
					Side Wall	Ped	Wet			
0-20"	C	<10	SCL	M-SB	SH	Fr	SS	M-C	C-M	/
-48"	C	<40	"	"	"	"	"	"	F-F	/
-69"		<30	"	"	"	"	"	"	"	Ft.

Test Pit # B

Horizon Depth (Inches)	Boundary	%Rock	Texture	Structure	Consistence			Pores	Roots	Mottling
					Side Wall	Ped	Wet			
0-16"	C	<10	Similar	to 1st	Horizon	A	→→	→→	→→	→→
-33"	C	<40	Similar	to 2nd	Horizon	A	→→	→→	→→	→→
-48"	C	<35	Similar	to 3rd	Horizon	A	→→	→→	→→	→→
-69"		<35	Similar	to 3rd	Horizon	A	→→	→→	→→	Ft.

Test Pit # C

Horizon Depth (Inches)	Boundary	%Rock	Texture	Structure	Consistence			Pores	Roots	Mottling
					Side Wall	Ped	Wet			
0-15"	C	<10	Similar	to 1st	Horizon	A	→→	→→	→→	→→
-48"	C	<40	Similar	to 2nd	Horizon	A	→→	→→	→→	→→
-60"	C	<35	Similar	to 3rd	Horizon	A	→→	→→	→→	Ft.
-72"		<10	C	S-M	H	Fr	S	F-F	/	Ft.

Test Pit # D

PLEASE PRINT OR TYPE ALL INFORMATION

Horizon Depth (Inches)	Boundary	%Rock	Texture	Structure	Consistence			Pores	Roots	Mottling
					Side Wall	Ped	Wet			
0-20"	C	<10	Similar	to 1st	Horizon	A	→→	→→	→→	→→
-36"	C	<40	Similar	to 2nd	Horizon	A	→→	→→	→→	→→
-72"		>50	Similar	to 3rd	Horizon	A	→→	→→	→→	→→

Test Pit # E

Horizon Depth (Inches)	Boundary	%Rock	Texture	Structure	Consistence			Pores	Roots	Mottling
					Side Wall	Ped	Wet			
0-36"	C	<10	Similar	to 1st	Horizon	A	→→	→→	→→	→→
-53"	C	<40	Similar	to 2nd	Horizon	A	→→	→→	→→	Ft.
-63"	C	<35	Similar	to 3rd	Horizon	A	→→	→→	→→	Ft.
-69"		<35	Similar	to 4th	Horizon	C	→→	→→	→→	Ft.

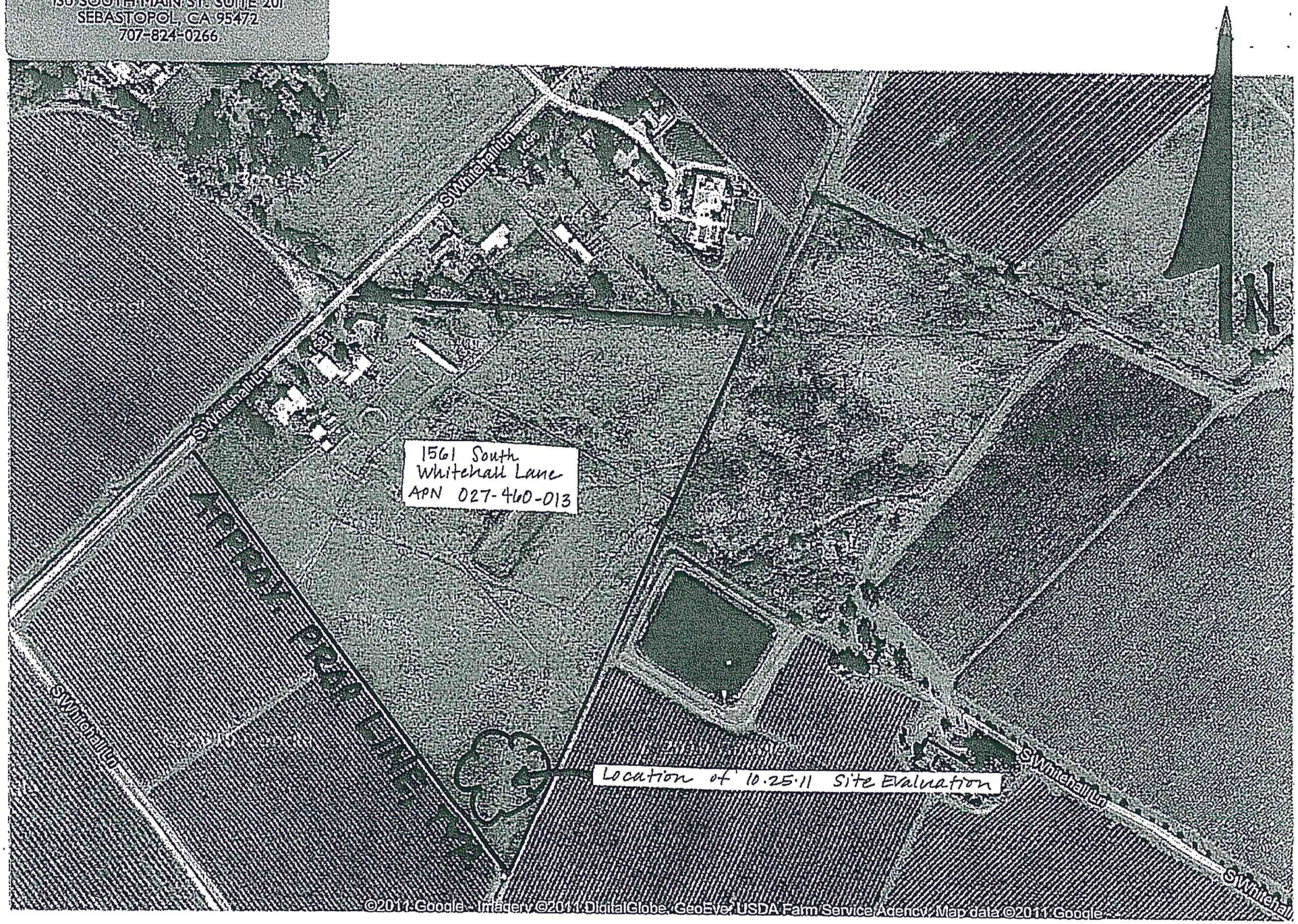
Test Pit # F

Horizon Depth (Inches)	Boundary	%Rock	Texture	Structure	Consistence			Pores	Roots	Mottling
					Side Wall	Ped	Wet			
0-36"	C	<10	Similar	to 1st	Horizon	A	→→	→→	→→	→→
-55"	C	>50	Similar	to 2nd	Horizon	A	→→	→→	→→	→→
-60"	C	<50	Similar	to 3rd	Horizon	A	→→	→→	→→	Ft.

Attach additional sheets as needed

RAM ENGINEERING
130 SOUTH MAIN ST. SUITE 201
SEBASTOPOL, CA 95472
707-824-0266

Site Evaluation 10/25/11



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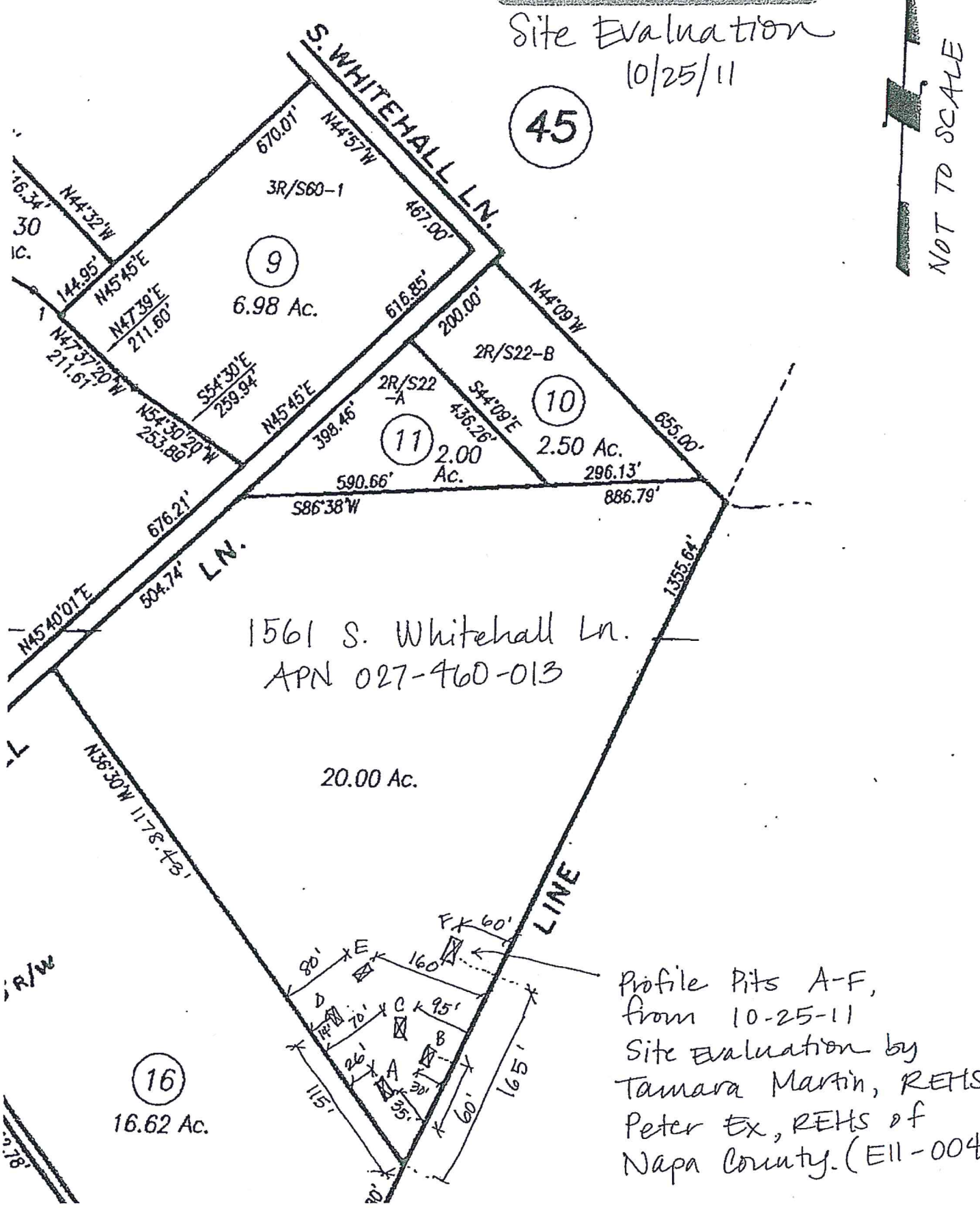

Profile Pits A-F, from 10-25-11 Site Evaluation by Tamara Martin, REHS & Peter Ex, REHS of Napa County. (E11-00499)