“F”

Wastewater Feasibility Study

Yountville Washington Street Winery (P16-00083)
Planning Commission Hearing October 19, 2016

ONSITE WASTEWATER DISPOSAL FEASIBILITY STUDY

FOR THE

YOUNTVILLE WASHINGTON STREET WINERY

LOCATED AT:
6170 Washington Street
Napa, CA 94558
NAPA COUNTY APN 036-110-009

PREPARED FOR:
James Keller
1775 Lincoln Avenue
Napa, CA 94558
Telephone: (707) 258-5230

PREPARED BY:

APPLIED
CIVIL ENGINEERING
INCORPORATED

2074 West Lincoln Avenue
Napa, California 94558
Telephone: (707) 320-4968
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Job Number: 15-113

Michael R. Muelrath

Michael R. Muelrath R.C.E. 67435

1/28/2016
Date

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INTRODUCTION

James Keller is applying for a Use Permit to construct and operate a new winery at the property located at 6170 Washington Street in Napa County, California. The subject property, known as Napa County Assessor's Parcel Number 036-110-009, is located along the east side of Washington Street approximately 0.6 miles south of the intersection of Washington Street and California Boulevard.

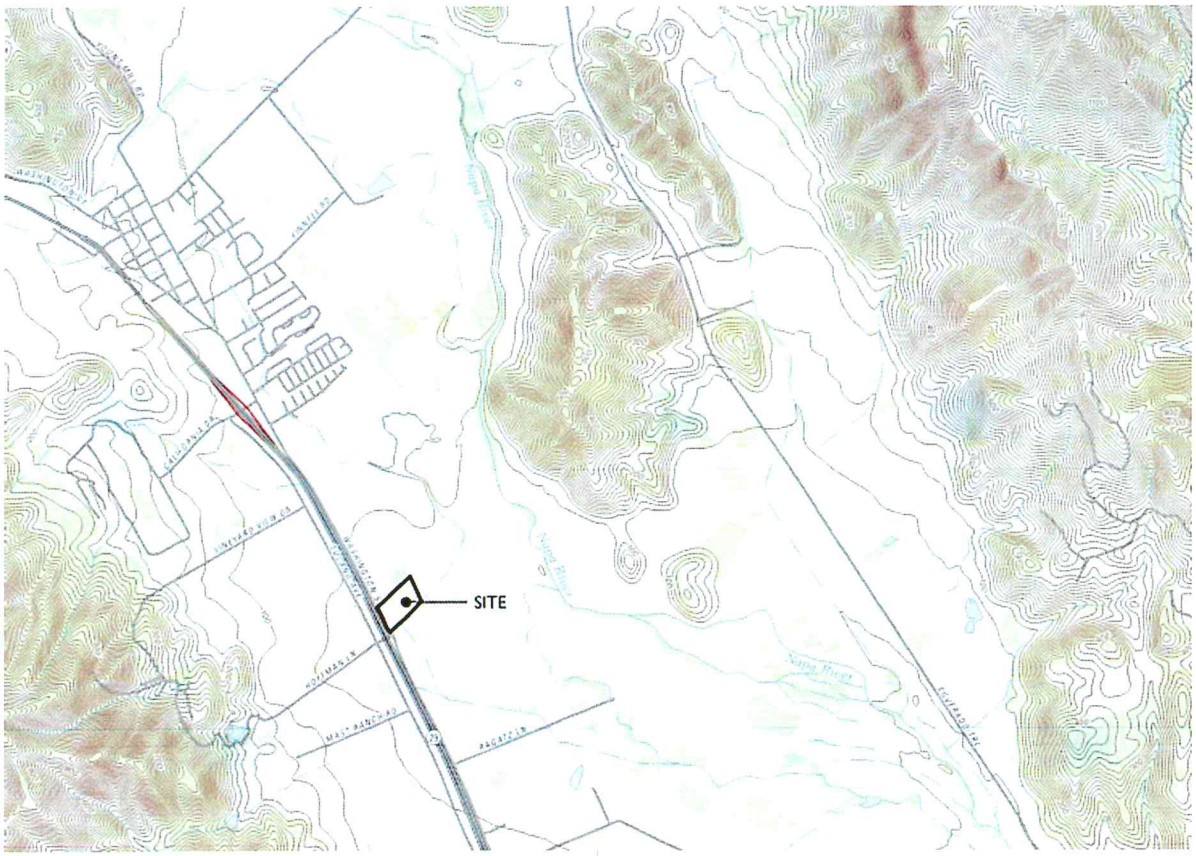

Figure 1: Location Map

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

- Wine Production:
  - 30,000 gallons of wine per year
  - Crushing, fermenting, aging and bottling

- Employees:
  - 3 full time employees
  - 4 part time employees

- Marketing Plan:
  - Daily Tours and Tastings by Appointment
    - 25 visitors per day maximum
  - Marketing Events
    - 10 per year
    - 30 guests maximum
    - Food prepared offsite by catering company
  - Release Events
    - 1 per year
    - 100 guests maximum
    - Food prepared offsite by catering company
    - Portable toilets brought in for guest use

Existing development on the property includes vineyard, a groundwater well, drainage improvements and the access and utility infrastructure typical of these existing agricultural uses. Please see the Yountville Washington Street Winery Conceptual Site Improvement Plans for approximate locations of existing and proposed features.

James Keller 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 via a new onsite wastewater disposal system. The remainder of this report describes the onsite soil conditions, the predicted winery process and sanitary wastewater flows and outlines the conceptual design of an onsite wastewater disposal system.

SOILS INFORMATION

The United States Department of Agriculture Soil Conservation Service Soils Map for Napa County shows the entire property mapped as Clear Lake clay, drained, 0 to 2 percent slopes.

A site specific soils analysis was conducted during a site evaluation performed by ACE on August 26, 2015. The site evaluation consisted of the excavation and observation of sixteen test pits throughout the property. The test pits generally revealed variable depths of acceptable soil with textures varying from clay loam to clay. The limiting conditions that were observed were the presence of seasonally elevated groundwater tables and high clay content soils.

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

PREDICTED WASTEWATER FLOW

The onsite wastewater disposal system will be designed for the peak winery process wastewater flow and the peak sanitary wastewater flow from the proposed winery.

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 45 day crush period. Using these assumptions, the average and peak winery process wastewater flows are calculated as follows:

$$\text{Annual Winery Process Wastewater Flow} = \frac{30{,}000 \text{ gallons wine}}{\text{year}} \times \frac{6 \text{ gallons wastewater}}{1 \text{ gallon wine}}$$

Annual Winery Process Wastewater Flow = 180,000 gallons per year

$$\text{Average Daily Winery Process Wastewater Flow} = \frac{180{,}000 \text{ gallons}}{\text{year}} \times \frac{1 \text{ year}}{365 \text{ days}}$$

Average Daily Winery Process Wastewater Flow = 493 gallons per day (gpd)

$$\text{Peak Winery Process Wastewater Flow} = \frac{30{,}000 \text{ gallons wine}}{\text{year}} \times \frac{1.5 \text{ gallons wastewater}}{1 \text{ gallon wine}} \times \frac{1 \text{ year}}{45 \text{ crush days}}$$

Peak Winery Process Wastewater Flow = 1,000 gpd

Winery Sanitary Wastewater

The peak sanitary wastewater flow from the winery is calculated based on the number of winery employees, the number of daily visitors for tours and tastings and the number of guests attending private marketing events. In accordance with Table 4 of Napa County's "Regulations for Design, Construction, and Installation of Alternative Sewage Treatment Systems" we have used a design flow rate of 15 gallons per day per employee and 3 gallons per day per visitor for tours and

tastings. Table 4 does not specifically address design wastewater flows for guests at marketing events. For marketing events that will have catered meals that are prepared offsite we have conservatively estimated 5 gallons of wastewater per guest. Based on these assumptions, the peak winery sanitary wastewater flows are calculated as follows:

Employees

Peak Sanitary Wastewater Flow = 7 employees X 15 gpd per employee

Peak Sanitary Wastewater Flow = 105 gpd

Daily Tours and Tastings

Peak Sanitary Wastewater Flow = 25 visitors per day X 3 gallons per visitor

Peak Sanitary Wastewater Flow = 75 gpd

Small Marketing Events with Catered Meals Prepared Offsite:

Peak Sanitary Wastewater Flow = 30 guests X 5 gallons per guest

Peak Sanitary Wastewater Flow = 150 gpd

Larger Events with Catered Meals Prepared Offsite:

Peak Sanitary Wastewater Flow = 100 guests X 5 gallons per guest

Peak Sanitary Wastewater Flow = 500 gpd

Total Peak Winery Sanitary Wastewater Flow

As previously noted, all events with more than 30 guests in attendance will utilize portable sanitary facilities to minimize the load on the septic system. Therefore, assuming that daily tours and tastings and a maximum of one marketing event may occur on the same day the total peak winery sanitary wastewater flow is based on employees, daily tours and tastings and a marketing event for 30 people and is calculated as follows:

Total Peak Winery Sanitary Wastewater Flow = 105 gpd + 75 gpd + 150 gpd

Total Peak Winery Sanitary Wastewater Flow = 330 gpd

RECOMMENDATIONS

Based on the anticipated wastewater flows, the proposed site layout and the finding of relatively shallow acceptable soil depths and high clay content soils we recommend that the process and sanitary wastewater generated at the proposed winery be kept separate for treatment and disposal. The sanitary wastewater should be pretreated and disposed of onsite in a subsurface drip type septic system and the process wastewater should be pre-treated and disposed of via irrigation in the onsite vineyard area and/or landscaping around the winery. This dual system will allow for a smaller subsurface drip system than if the two waste streams were combined. Furthermore, using the treated winery process wastewater for irrigation will offset groundwater

demand and result in greater operational flexibility compared to utilizing the domestic waste subsurface drip disposal system for winery process wastewater disposal.

The conceptual designs of the two wastewater disposal systems are outlined in the following sections of this report.

Sanitary Wastewater Disposal Via Subsurface Drip Disposal Field

Required Disposal Field Area

The disposal field area is calculated based upon the design hydraulic loading rate for the soil conditions and the proposed design flow. In accordance with Table 9 of Napa County's "Regulations for Design, Construction, and Installation of Alternative Sewage Treatment Systems" we have used a hydraulic loading rate of 0.1 gpd per square foot based on the findings of clay soils in the planned disposal field area. Since the slope of the natural ground surface in the area of the proposed disposal field is less than 20% no adjustment is required for slope. Based on these design parameters, the required disposal field area is calculated as follows:

$$\text{Required Disposal Field Area} = \frac{\text{Peak Flow}}{\text{Soil Application Rate}}$$

$$\text{Require Disposal Field Area} = \frac{330 \text{ gpd}}{0.1 \text{ gpd per square foot}}$$

Required Disposal Field Area =3,300 square feet

Available Disposal Field Area

Based on the proposed site layout and topographic map prepared by Albion Surveys, we have determined that there is enough area to install approximately 3,300 square feet of subsurface drip disposal field in the vicinity of Test Pits #11 & #12. The conceptual layout of the disposal field is shown on the Yountville Washington Street Winery Conceptual Site Improvement Plans in Appendix 2.

Required Reserve Area

Napa County code requires that an area be set aside to accommodate a future onsite wastewater disposal system in the event that the primary system fails or the soil in the primary area is otherwise rendered unsuitable for wastewater disposal. For subsurface drip type septic systems the reserve area must be 200% of the size of the disposal field area. Based on these design parameters, the required reserve area is calculated as follows:

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

$$\text{Require Reserve Field Area} = 200\% \times \frac{330 \text{ gpd}}{0.1 \text{ gpd per square foot}}$$

Required Reserve Area =6,600 square feet

Available Reserve Area

Based on the proposed site plan and topographic map prepared by Albion Surveys, we have determined that there is enough area to set aside for an additional 6,600 square feet of subsurface drip disposal field in the vicinity of Test Pits #11, #12, #14 & #15 as shown on the Yountville Washington Street Winery Conceptual Site Improvement Plans in Appendix 2.

Pretreatment and Septic Tank Capacity

Pretreatment must be provided to treat the winery sanitary wastewater to meet Napa County pretreated effluent standards (BOD<30 mg/l, TSS < 30 mg/l). There are several options for pretreatment systems that are available to meet this requirement. The Applicant and Engineer will review options and select a suitable pretreatment system designed to meet this requirement prior to application for a sewage permit for the winery sanitary wastewater disposal system. Septic tanks will be sized in accordance with the requirements of the selected pretreatment system.

Process Wastewater Disposal Via Irrigation

Pretreatment

Based on the winery's planned production level and waste flows 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

We propose that disposal of the treated winery process wastewater be via irrigation of the onsite vineyard. The existing vineyard on the winery property totals approximately 7.1 acres after completion of the winery project. For the purpose of this study we have assumed that the winery process wastewater will be applied to approximately 3.3 acres of vineyard that is located to the north of the new winery driveway and outside of the 100' setback to the blueline stream. This is a conservative assumption to simplify this analysis as more vineyard is available outside of the required stream and well setbacks and the treated water can also be used for landscape irrigation. The final irrigation area will be determined and incorporated into the final design with the installation permit application.

In order to accommodate differences in the timing of wastewater generation, irrigation demand, and limitations on wet weather application of treated wastewater 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 calculations assume a monthly winery process wastewater generation rate and a monthly vineyard irrigation schedule based on our past experience with projects of this type. The water balance further assumes that during the summer the treated wastewater will be used to offset the irrigation needs of the vineyard and in the winter application of treated winery process wastewater will be very limited (0.8" maximum per month) to prevent runoff. In the event that winter application is not possible due to extended wet weather patterns winery operations will have to be adjusted to work within the capacity of the storage tank(s) or the tank(s) will need to be emptied by hauling waste to an approved offsite disposal location. The water balance calculations show that the proposed land application area is large enough to accept all of the wastewater generated each month throughout the year without carry over (see Appendix 3). To provide operational flexibility, we recommend that the storage tank(s) have a minimum capacity of at least 10,000 gallons so that a full weeks' worth of peak flow can be contained to allow flexibility in irrigation scheduling during the harvest period.

All application of treated winery process wastewater must comply with the requirements of the Napa County Process Wastewater Guidelines for Surface Drip Irrigation.

CONCLUSION

It is our opinion that the proposed winery sanitary wastewater disposal needs can be served by an engineered subsurface drip type onsite wastewater disposal system and the winery process wastewater can be pretreated and disposed of via irrigation within the onsite vineyard area. Full design calculations and construction plans should 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
"YOUNTVILLE, CA"

SCALE: 1" = 2,000'

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WASHINGTON STREET WINERY

6170 WASHINGTON STREET
NAPA, CA 94558
APN 036-110-009

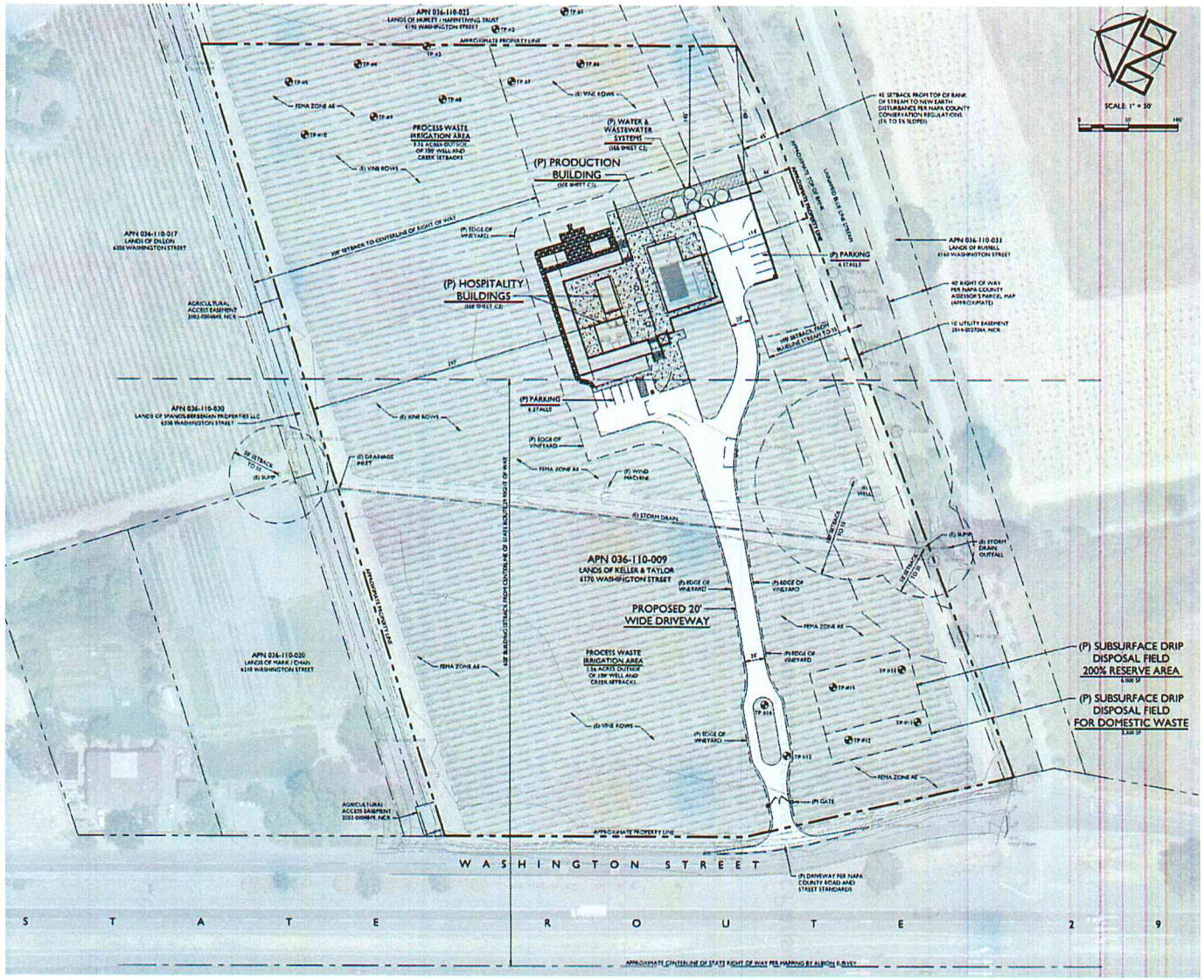
JOB NO. 15-113 PAGE 1 OF 1 JANUARY 2016

APPENDIX 2: Yountville Washington Street Winery Conceptual Site Improvement Plans

Reduced to 8.5" x 11"

YOUNTVILLE WASHINGTON STREET WINERY

CONCEPTUAL SITE IMPROVEMENT PLANS



OVERALL SITE PLAN
SCALE: 1" = 50'

LOCATION MAP
SCALE: 1" = 2,000'

PROJECT INFORMATION:

PROPERTY OWNER & APPLICANT:
BILL AND DOTTIE KELLER &
GARY AND MARY TAYLOR
240 KAANAPALI DRIVE
NAPA, CA 94558

SITE ADDRESS:
6170 WASHINGTON STREET
NAPA, CA 94558

ASSESSOR'S PARCEL NUMBER:
036-110-009

PARCEL SIZE:
10.5 ± ACRES

PROJECT SIZE:
2.1± ACRES

ZONING:
AGRICULTURAL PRESERVE (AP)

DOMESTIC WATER SOURCE:
PRIVATE WELL

FIRE PROTECTION WATER SOURCE:
STORAGE TANK

WASTEWATER DISPOSAL:
ONSITE TREATMENT AND DISPOSAL

SHEET INDEX:

FLOOD HAZARD NOTE:

ACCORDING TO THE FEDERAL EMERGENCY MANAGEMENT AGENCY (FEMA) FLOOD INSURANCE RATE MAP (FIRM) MAP NUMBER 06055C0613E, 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. THE BASE FLOOD ELEVATION HAS BEEN DETERMINED TO BE 80.7 AT THE BUILDING SITE. VERIFY BASE FLOOD ELEVATION WITH NAPA COUNTY PRIOR TO BUILDING PERMIT SUBMITTAL.

NOTES:

1. TEST PITS ONE THROUGH SIXTEEN (TP #1 - TP #16) WERE EXCAVATED BY GALLISHA CONSTRUCTION ON AUGUST 25, 2015 AND WERE WITNESSED BY MIKE MUELRATH OF APPLIED CIVIL ENGINEERING INCORPORATED AND KIM WITHROW OF THE NAPA COUNTY PLANNING, BUILDING AND ENVIRONMENTAL SERVICES DEPARTMENT - ENVIRONMENTAL HEALTH DIVISION.
2. FADED BACKGROUND REPRESENTS EXISTING TOPOGRAPHIC FEATURES. TOPOGRAPHIC INFORMATION WAS TAKEN FROM THE "MAP OF TOPOGRAPHY OF A PORTION OF THE LANDS OF KELLER" PREPARED BY ALBION SURVEYS, INC., DATED JULY 2015 REVISED AUGUST 5, 2015. APPLIED CIVIL ENGINEERING INCORPORATED ASSUMES NO LIABILITY REGARDING THE ACCURACY OR COMPLETENESS OF THE TOPOGRAPHIC INFORMATION.
3. AERIAL PHOTOGRAPH WAS OBTAINED FROM THE SAN FRANCISCO ESTUARY INSTITUTE (SFEI) SAN FRANCISCO BAY AREA ORTHOPHOTOS DATABASE, DATED JUNE 2014 AND MAY NOT REPRESENT CURRENT CONDITIONS.
4. CONTOUR INTERVAL: ONE (1) FOOT, HIGHLIGHTED EVERY FIVE (5) FEET.
5. BENCHMARK: VERTICAL DATUM BASED ON NAVD 88
   HORIZONTAL DATUM BASED ON NAD 83
6. THE PROPERTY LINES SHOWN ON THESE PLANS DO NOT REPRESENT A BOUNDARY SURVEY. THEY ARE APPROXIMATE AND ARE PROVIDED FOR INFORMATIONAL PURPOSES ONLY.

VINEYARD STATISTICS

EXISTING VINEYARD	9.26 ACRES
PROPOSED VINEYARD	7.46 ACRES*

*APPROXIMATELY 1.9 ± ACRES OF VINES WILL BE REMOVED IN ORDER TO ACCOMMODATE DEVELOPMENT OF THE PROPOSED WINERY

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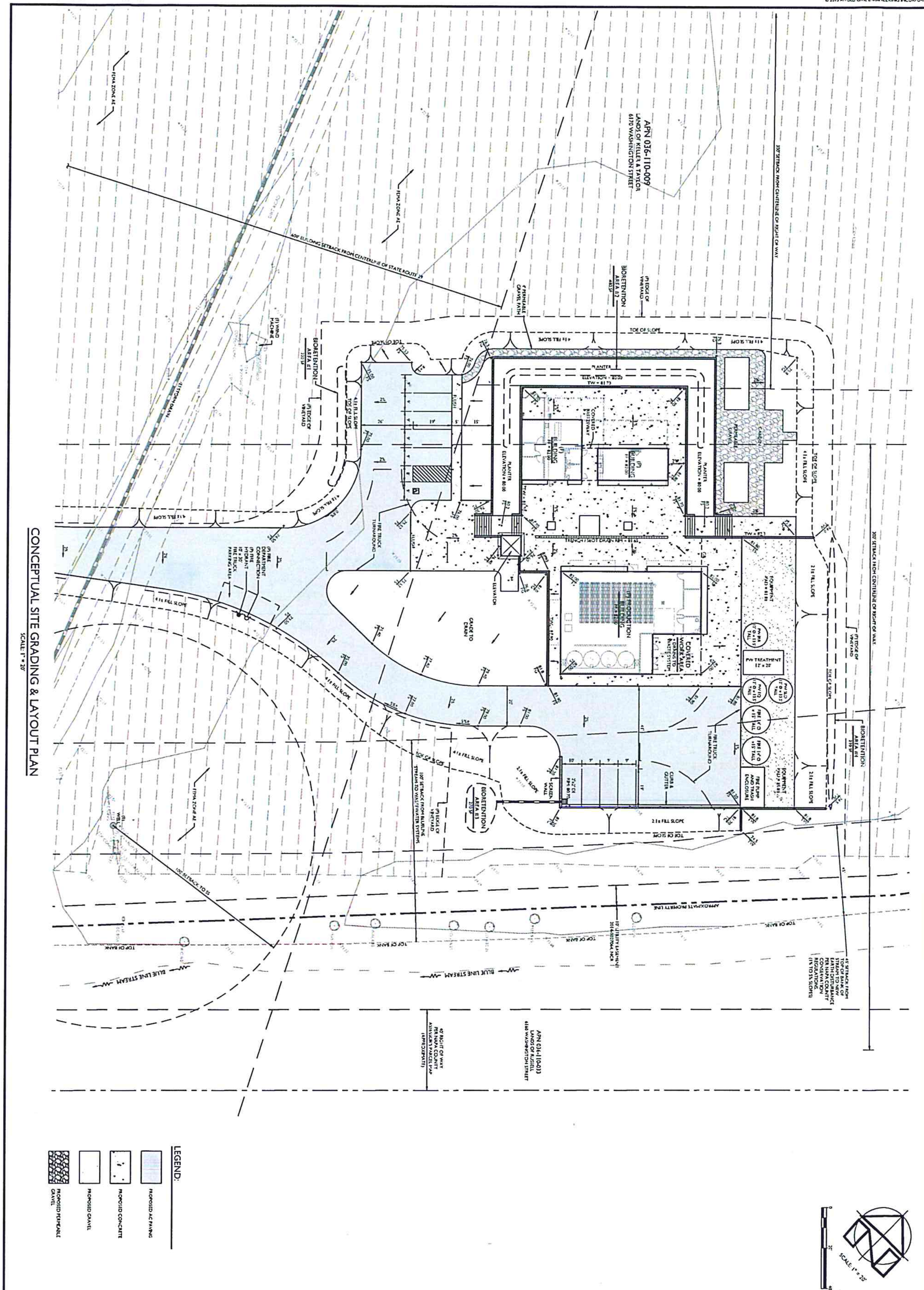
YOUNTVILLE WASHINGTON STREET WINERY
CONCEPTUAL SITE IMPROVEMENT PLANS
OVERALL SITE PLAN

PREPARED UNDER THE DIRECTION OF:

DRAWN BY:	BT DRAFTING
CHECKED BY:	MRM
DATE:	JANUARY 28, 2016
REVISIONS:	BY:
JOB NUMBER:	15-113
FILE:	15-113CONC_OSP.DWG
ORIGINAL SIZE	24" X 36"
SHEET NUMBER:	C1
OF	4



YOUNTVILLE WASHINGTON STREET WINERY

CONCEPTUAL SITE IMPROVEMENT PLANS
CONCEPTUAL SITE GRADING & LAYOUT PLAN

APPLIED
INCORPORATED
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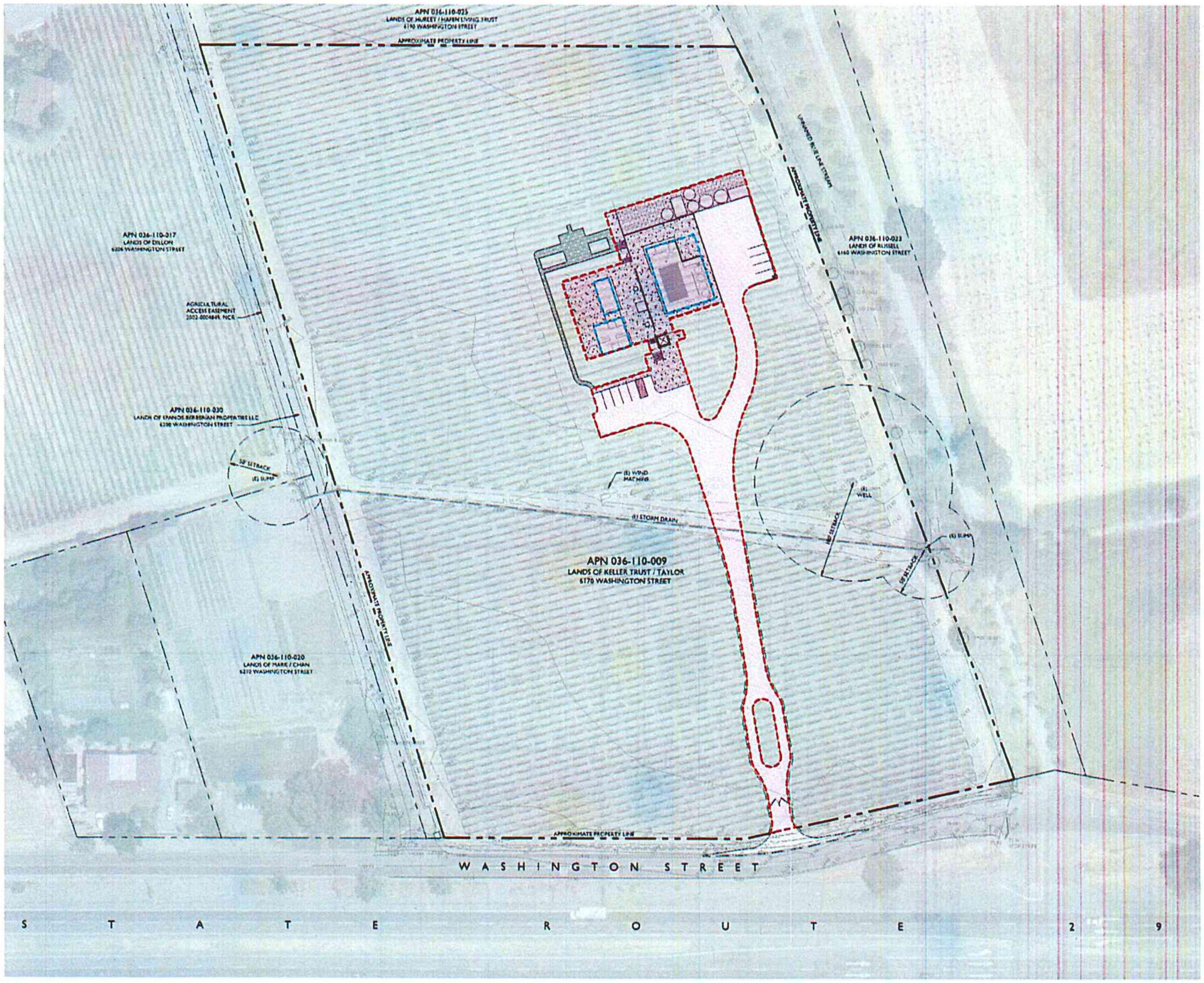
Napa, CA 94558
(707) 320-4968 (707) 320-2395 Fax
www.appliedcivil.com

PREPARED UNDER THE DIRECTION OF:

FOR USE PERMIT REVIEW NOT FOR CONSTRUCTION

DRAWN BY:	BT DRAFTING
CHECKED BY:	MRM
DATE:	JANUARY 28, 2016
REVISIONS:	BY:
JOB NUMBER:	15-113
FILE:	15-113CONC_GRA.DWG
ORIGINAL SIZE:	24" X 36"
SHEET NUMBER:	C2 OF 4



IMPERVIOUS SURFACE EXHIBIT

SCALE: 1" = 50'

SCALE: 1" = 50'

IMPERVIOUS SURFACE SUMMARY

	PRE PROJECT AREA (SF)	NEW AREA (SF)	*RECONSTRUCTED AREA (SF)	TOTAL NEW AND RECONSTRUCTED AREA (SF)
TOTAL IMPERVIOUS AREAS	0	43,295	0	43,295

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

5,039± SF — WINERY DEVELOPMENT AREA

43,955± SF — WINERY COVERAGE AREA

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YOUNTVILLE WASHINGTON STREET WINERY

CONCEPTUAL SITE IMPROVEMENT PLANS
IMPERVIOUS SURFACE EXHIBIT

PREPARED UNDER THE DIRECTION OF:

NOT FOR CONSTRUCTION — FOR USE PER REVIEW

DRAWN BY: BT DRAFTING
CHECKED BY: MRM
DATE: JANUARY 28, 2016
REVISIONS: BY:

JOB NUMBER: 15-113
FILE: 15-113CONC_IMPER.DWG
ORIGINAL SIZE: 24" X 36"
SHEET NUMBER: C3 OF 4

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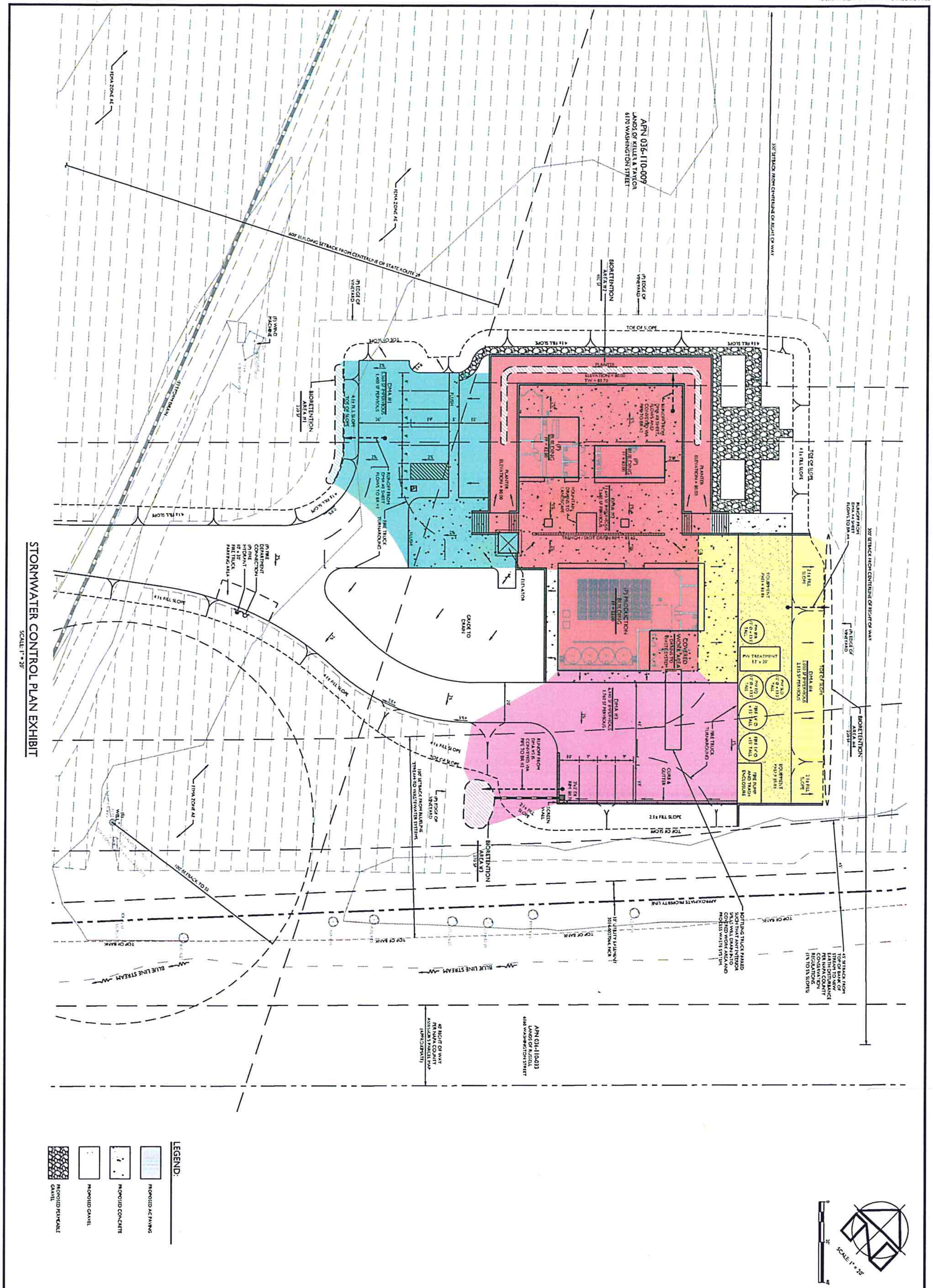

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YOUNTVILLE WASHINGTON STREET WINERY

CONCEPTUAL SITE IMPROVEMENT PLANS
STORMWATER CONTROL PLAN EXHIBIT

PREPARED UNDER THE DIRECTION OF:

FOR USE PERMIT REVIEW NOT FOR CONSTRUCTION

DRAWN BY: BT DRAFTING
CHECKED BY: MRH
DATE: JANUARY 28, 2016
REVISIONS: BY:

JOB NUMBER: 15-113
FILE: 15-113CONC_SCP.DWG
ORIGINAL SIZE: 24" X 36"
SHEET NUMBER:

C4 OF 4

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	9,000	71,682	0
February	0	9,000	71,682	0
March	0	9,000	71,682	0
April	0	7,200	71,682	0
May	0	7,200	53,906	0
June	0	9,000	134,764	0
July	0	18,000	134,764	0
August	0	32,400	80,858	0
September	0	32,400	80,858	0
October	0	27,000	53,906	0
November	0	10,800	71,682	0
December	0	9,000	71,682	0
		180,000	969,149	

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	30,000 gallons
Wastewater Generation Rate	6 gallons per gallon of wine
Annual Wasewater Generation	180,000 gallons
Crush Season Length	45 days
Wastewater Generated During Crush	1.5 gallons per gallon of wine
Peak Wastewater Generation Rate	1,000 gallons per day

Winery Process Wastewater Generation Table			
Month	Percentage of Annual Total	Monthy Flow (gallons)	Average Flow (gpd)
January	5.0%	9,000	290
February	5.0%	9,000	321
March	5.0%	9,000	290
April	4.0%	7,200	240
May	4.0%	7,200	232
June	5.0%	9,000	300
July	10.0%	18,000	581
August	18.0%	32,400	1,045
September	18.0%	32,400	1,080
October	15.0%	27,000	871
November	6.0%	10,800	360
December	5.0%	9,000	290
Total	100.0%	180,000	

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	3.3 acres
Vine Row Spacing (approx)	8 feet
Vine Spacing (approx)	8 feet (varies from 6 to 8 feet)
Vine density	681 vines per acre (estimated)
Total Vine Count	2,246 vines

Irrigation Information:

Seasonal Irrigation[1]	240.0 gallons per vine (May through October)
Non-Irrigation Application	0.8 inches per month October through April

Irrigation Schedule					
Month	Monthly Percentage[2]	Irrigation per Vine (gallons)	Seasonal Irrigation (gallons)	Non-Seasonal Irrigation Application (gallons)	Total (gallons)
January		0.0	0	71,682	71,682
February		0.0	0	71,682	71,682
March		0.0	0	71,682	71,682
April		0.0	0	71,682	71,682
May	10%	24.0	53,906	0	53,906
June	25%	60.0	134,764	0	134,764
July	25%	60.0	134,764	0	134,764
August	15%	36.0	80,858	0	80,858
September	15%	36.0	80,858	0	80,858
October	10%	24.0	53,906	0	53,906
November		0.0	0	71,682	71,682
December		0.0	0	71,682	71,682
Total	100%	240.0	539,055	430,094	969,149

Notes:

1. Irrigation per vine is based on 0.5 acre-feet per acre of vines per 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 and Test Pit Map

Napa County Division of Environmental Health

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 #: E15-00254
APN: 020-180-037
(County Use Only) Reviewed by: Date:

PLEASE PRINT OR TYPE ALL INFORMATION

Property Owner Bill & Dottie Keller Trust and Gary & Mary Taylor	X New Construction ☐ Addition ☐ Remodel ☐ Relocation ☐ Other:
Property Owner Mailing Address 240 Kaanapali Drive	☐ Residential - # of Bedrooms: Design Flow: gpd
City State Zip Napa CA 94558	X Commercial – Type: Winery Sanitary Waste: ~270 gpd Process Waste: ~1,000 gpd
Site Address/Location 6170 Washington Street Napa, CA 94558	☐ Other: Sanitary Waste: gpd Process Waste: gpd

Evaluation Conducted By:

Company Name Applied Civil Engineering Incorporated	Evaluator's Name Michael R. Muelrath, R.C.E. 67435	Signature (Civil Engineer, R.E.H.S., Geologist, Soil Scientist) Michael R. Muelrath
Mailing Address: 2074 West Lincoln Avenue		Telephone Number (707) 320-4968
City State Zip Napa CA 94558		Date Evaluation Conducted August 26, 2015

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

Primary Area	Expansion Area
Acceptable Soil Depth: 24-30 inches Test pit #'s: 11 through 16	Acceptable Soil Depth: 24-30 inches Test pit #'s: 11 through 16
Soil Application Rate (gal. /sq. ft. /day): 0.1	Soil Application Rate (gal. /sq. ft. /day): 0.1
System Type(s) Recommended: Pretreatment and Subsurface Drip	System Type(s) Recommended: Pretreatment and Subsurface Drip
Slope: 0% to 2% Distance to nearest water source: 100' +	Slope: 0% to 2% Distance to nearest water source: 100' +
Hydrometer test performed? No X Yes ☐ (attach results)	Hydrometer test performed? No X Yes ☐ (attach results)
Bulk Density test performed? No X Yes ☐ (attach results)	Bulk Density test performed? No X Yes ☐ (attach results)
Percolation test performed? No X Yes ☐ (attach results)	Percolation test performed? No X Yes ☐ (attach results)
Groundwater Monitoring Performed? No X Yes ☐ (attach results)	Groundwater Monitoring Performed? No X Yes ☐ (attach results)

Site constraints/Recommendations:

This site evaluation was performed to locate an area that is suitable to support a wastewater system for a future winery. The main constraints are the well, road and creek setbacks as well as high clay content soils and seasonally elevated water tables.

Test pits #1 & #2 could also be used for a subsurface drip dispersal field however an easement or a lot line adjustment would be required since these two pits are located on a neighboring property. The test pits were dug on the neighboring property with the expectation that a lot line adjustment would be filed.

Test Pits #3 to #10 may also be viable if groundwater monitoring is performed and it is determined that there is 24 inches of separation to seasonal groundwater levels.

In the absence of groundwater monitoring data and / or lot line adjustment we recommend a subsurface drip system in the vicinity of Test Pits #11 through #16.

Test Pit #1

PLEASE PRINT OR TYPE ALL INFORMATION

Horizon Depth (Inches)	Boundary	%Rock	Texture	Structure	Consistence			Pores	Roots	Mottling
					Side Wall	Ped	Wet			
0-25	G	0-15	SCL	MSB	SH	FRB	SS	CF/CM	FF/FM	NONE
25-30	G	0-15	SCL	MSB	SH	FRB	SS	CF/CM	FF/FM	CFFt
30-48		0-15	C	MSB	H	VF	S	FF	FF	NONE

Acceptable soil depth = 25"

Test Pit #2

Horizon Depth (Inches)	Boundary	%Rock	Texture	Structure	Consistence			Pores	Roots	Mottling
					Side Wall	Ped	Wet			
0-24	G	0-15	SCL	MSB	S	FRB	SS	FF/FM	FF/FM/ FC	NONE
24-29	G	0-15	SCL	MSB	SH	FRB	SS	FF/FM	FF/FM/ FC	CMD
29-50		0-15	C	MSB	H	VF	S	FF	FF	NONE

Acceptable soil depth = 24"

Test Pit #3

Horizon Depth (Inches)	Boundary	%Rock	Texture	Structure	Consistence			Pores	Roots	Mottling
					Side Wall	Ped	Wet			
0-20	G	0-15	SCL	MSB	SH	FRB	SS	FF/FM	FF/FM	NONE
20-26	G	0-15	SCL	MSB	SH	FRB	SS	FF/FM	FF/FM	CFFt
26-48		0-15	C	MSB	H	VF	S	FF	FF	NONE

Acceptable soil depth = 20"

Test Pit #4

Horizon Depth (Inches)	Boundary	%Rock	Texture	Structure	Consistence			Pores	Roots	Mottling
					Side Wall	Ped	Wet			
0-18	G	0-15	SCL	MSB	SH	FRB	SS	FF	FF/FM	NONE
18-19	G	0-15	SCL	MSB	SH	FRB	SS	FF	FF/FM	CFFt
19-42		0-15	C	MSB	H	VF	S	FF	FF	NONE

Acceptable soil depth = 18"

Test Pit #5

Horizon Depth (Inches)	Boundary	%Rock	Texture	Structure	Consistence			Pores	Roots	Mottling
					Side Wall	Ped	Wet			
0-12	G	0-15	SCL	MSB	H	FRB	SS	CF/FM	FF/FM	NONE
12-18	G	0-15	SCL	MSB	SH	FRB	SS	CF/FM	FF/FM	CFFt
18-48		0-15	C	MSB	H	VF	S	FF	FF	NONE

Acceptable soil depth = 12"

Test Pit #6

Horizon Depth (Inches)	Boundary	%Rock	Texture	Structure	Consistence			Pores	Roots	Mottling
					Side Wall	Ped	Wet			
0-20	G	0-15	SCL	MSB	SH	FRB	SS	FF	FF/FM	NONE
20-28	G	0-15	SCL	MSB	SH	FRB	SS	FF	FF/FM	CMD
28-42		0-15	C	MSB	H	VF	S	FF	FF	NONE

Acceptable soil depth = 20"

Test Pit #7

Horizon Depth (Inches)	Boundary	%Rock	Texture	Structure	Consistence			Pores	Roots	Mottling
					Side Wall	Ped	Wet			
0-18	G	0-15	SCL	MSB	SH	FRB	SS	CF/CM	FF/FM	NONE
18-26	G	0-15	SCL	MSB	SH	FRB	SS	CF/CM	FF/FM	CMFt
26-42		0-15	C	MSB	H	VF	S	FF	FF	NONE

Acceptable soil depth = 18"

Test Pit #8

Horizon Depth (Inches)	Boundary	%Rock	Texture	Structure	Consistence			Pores	Roots	Mottling
					Side Wall	Ped	Wet			
0-16	G	0-15	SCL	MSB	SH	FRB	SS	CF/CM	FF/FM	NONE
16-24	G	0-15	SCL	MSB	SH	FRB	SS	CF/CM	FF/FM	CMFt
24-48		0-15	C	MSB	H	VF	S	FF	FF	NONE

Acceptable soil depth = 16"

Test Pit #9

Horizon Depth (Inches)	Boundary	%Rock	Texture	Structure	Consistence			Pores	Roots	Mottling
					Side Wall	Ped	Wet			
0-12	G	0-15	SCL	MSB	SH	FRB	SS	CF/CM	FF/FM	NONE
12-26	G	0-15	SCL	MSB	SH	FRB	SS	CF/CM	FF/FM	CMD
26-48		0-15	C	MSB	H	VF	S	FF	FF	NONE

Acceptable soil depth = 12"

Test Pit #10

Horizon Depth (Inches)	Boundary	%Rock	Texture	Structure	Consistence			Pores	Roots	Mottling
					Side Wall	Ped	Wet			
0-12	G	0-15	SCL	MSB	SH	FRB	SS	CF/CM	FF/FM	NONE
12-22	G	0-15	SCL	MSB	SH	FRB	SS	CF/CM	FF/FM	CMD
22-48		0-15	C	MSB	H	VF	S	FF	FF	NONE

Acceptable soil depth = 12"

Test Pit #11

Horizon Depth (Inches)	Boundary	%Rock	Texture	Structure	Consistence			Pores	Roots	Mottling
					Side Wall	Ped	Wet			
0-26	G	0-15	C	MSB	H	VF	S	FF	FF	NONE
26-36		0-15	C	MSB	H	VF	S	FF	FF	FMFt

Acceptable soil depth = 26"

Test Pit #12

Horizon Depth (Inches)	Boundary	%Rock	Texture	Structure	Consistence			Pores	Roots	Mottling
					Side Wall	Ped	Wet			
0-30	G	0-15	C	MSB	H	VF	S	FF	FF	NONE
30-48		0-15	C	MSB	H	VF	S	FF	FF	FMFt

Acceptable soil depth = 30"

Test Pit #13

Horizon Depth (Inches)	Boundary	%Rock	Texture	Structure	Consistence			Pores	Roots	Mottling
					Side Wall	Ped	Wet			
0-30	G	0-15	C	MSB	H	VF	S	FF	FF	NONE
30-48		0-15	C	MSB	H	VF	S	FF	FF	FMFt

Acceptable soil depth = 30"

Test Pit #14

Horizon Depth (Inches)	Boundary	%Rock	Texture	Structure	Consistence			Pores	Roots	Mottling
					Side Wall	Ped	Wet			
0-24	G	0-15	C	MSB	H	VF	S	FF	FF	NONE
24-48		0-15	C	MSB	H	VF	S	FF	FF	FMFt

Acceptable soil depth = 24"

Test Pit #15

Horizon Depth (Inches)	Boundary	%Rock	Texture	Structure	Consistence			Pores	Roots	Mottling
					Side Wall	Ped	Wet			
0-24	G	0-15	C	MSB	H	VF	S	FF	FF	NONE
24-48		0-15	C	MSB	H	VF	S	FF	FF	FMFt

Acceptable soil depth = 24"

Test Pit #16

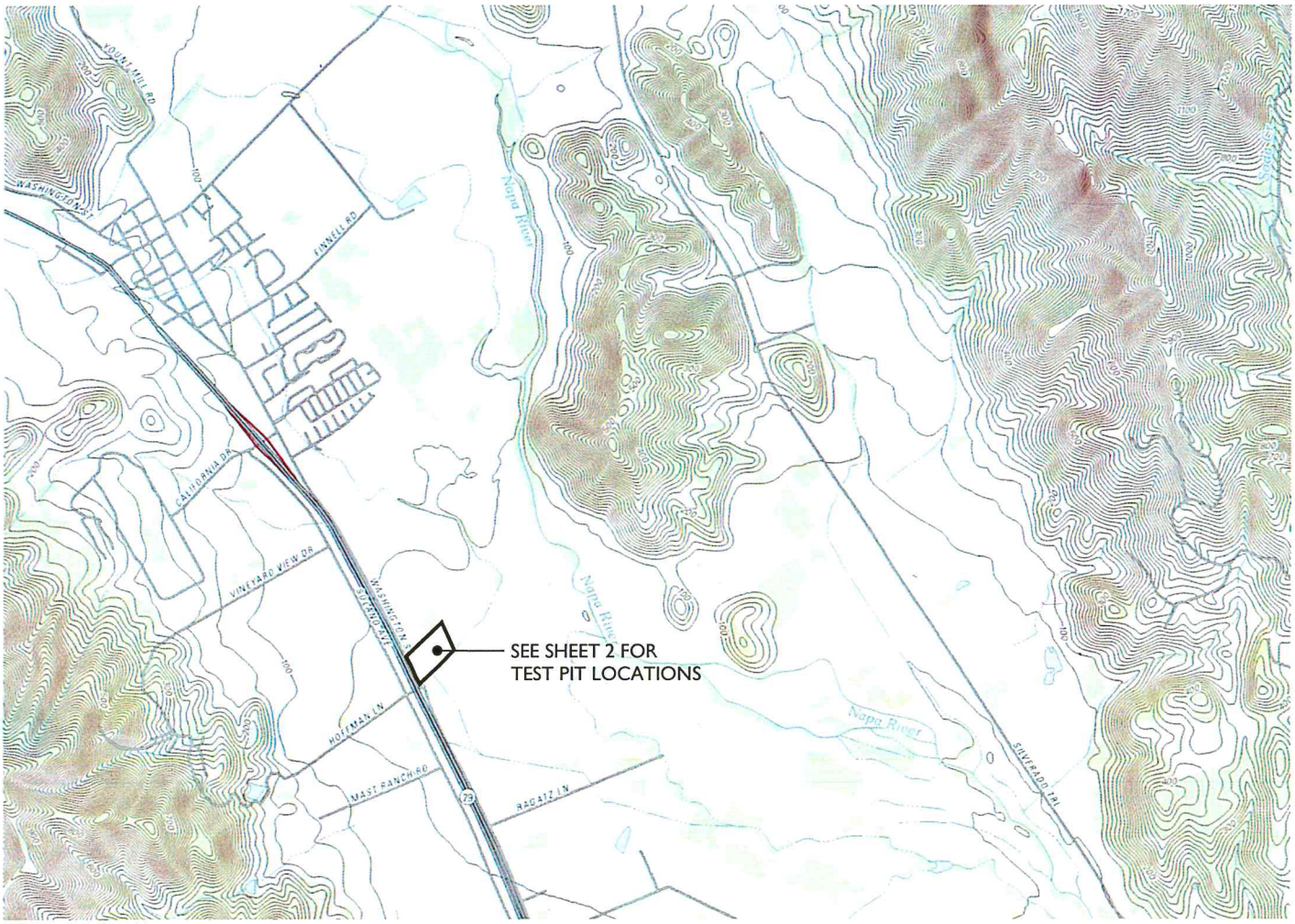
Horizon Depth (Inches)	Boundary	%Rock	Texture	Structure	Consistence			Pores	Roots	Mottling
					Side Wall	Ped	Wet			
0-28	G	0-15	C	MSB	H	VF	S	FF	FF	NONE
28-48		0-15	C	MSB	H	VF	S	FF	FF	FMFt

Acceptable soil depth = 28"

LEGEND

Boundary	Texture	Structure	Consistence			Pores	Roots	Mottling
			Side Wall	Ped	Wet			
A=Abrupt <1"	**S**=Sand	**W**=Weak	**L**=Loose	**L**=Loose	**NS**=NonSticky	**Quantity:**	**Quantity:**	**Quantity:**
C=Clear 1"-2.5"	**LS**=Loamy Sand	**M**=Moderate	**S**=Soft	**VFRB**=Very Friable	**SS**=Slightly Sticky	**F**=Few	**F**=Few	**F**=Few
G=Gradual 2.5"-5"	**SL**=Sandy Loam	**S**=Strong	**SH**=Slightly Hard	**FRB**=Friable	**S**=Sticky	**C**=Common	**C**=Common	**C**=Common
D=Difuse >5"	**SCL**=Sandy Clay Loam	**G**=Granular	**H**=Hard	**F**=Firm	**VS**=Very Sticky	**M**=Many	**M**=Many	**M**=Many
	SC=Sandy Clay	**Pl**=Platy	**VH**=Very Hard	**VF**=Very Firm	**NP**=NonPlastic	**Size:**	**Size:**	**Size:**
	CL=Clay Loam	**Pr**=Prismatic	**ExH**=Extremely Hard	**ExF**=Extremely Firm	**SP**=Slightly Plastic	**VF**=Very Fine	**F**=Fine	**F**=Fine
	L=Loam	**C**=Columnar			**P**=Plastic	**F**=Fine	**M**=Medium	**M**=Medium
	C=Clay	**B**=Blocky			**VP**=Very Plastic	**M**=Medium	**C**=Coarse	**C**=Coarse
	SiC=Silty Clay	**AB**=Angular Blocky				**C**=Coarse	**VC**=Very Coarse	**Contrast:**
	SiCL=Silty Clay Loam	**SB**=Subangular Blocky				**VC**=Very Coarse	**ExC**=Extremely Coarse	**Ft**=Faint
	SiL=Silt Loam	**M**=Massive						**D**=Distinct
	Si=Silt	**SG**=Single Grain						**P**=Prominent
		CEM=Cemented						

Notes:
Structure is recorded as Modifier then Structure - for example, Moderate (M) Subangular Blocky (SB) is recorded as MSB
Pores and Roots are recorded as Quantity then Size – for example Few (F) Coarse (C) is recorded as FC
Mottling is recorded as Quantity then Size then Contrast – for example Few (F) Coarse (C) Distinct (D) is recorded as FCD



LOCATION MAP

SCALE: 1" = 3,000'

NOTES:

1. TEST PITS ONE THROUGH SIXTEEN (TP #1 - TP #16) WERE EXCAVATED BY GALUSHA CONSTRUCTION ON AUGUST 26, 2015 AND WERE WITNESSED BY MIKE MUELRATH OF APPLIED CIVIL ENGINEERING INCORPORATED AND KIM WITHROW OF THE NAPA COUNTY PLANNING, BUILDING AND ENVIRONMENTAL SERVICES DEPARTMENT - ENVIRONMENTAL HEALTH DIVISION.
2. FADED BACKGROUND REPRESENTS EXISTING TOPOGRAPHIC FEATURES. TOPOGRAPHIC INFORMATION WAS TAKEN FROM THE "MAP OF TOPOGRAPHY OF A PORTION OF THE LANDS OF KELLER" PREPARED BY ALBION SURVEYS, INC., DATED JULY 2015 REVISED AUGUST 5, 2015. APPLIED CIVIL ENGINEERING INCORPORATED ASSUMES NO LIABILITY REGARDING THE ACCURACY OR COMPLETENESS OF THE TOPOGRAPHIC INFORMATION.
3. AERIAL PHOTOGRAPH WAS OBTAINED FROM THE SAN FRANCISCO ESTUARY INSTITUTE (SFEI) SAN FRANCISCO BAY AREA ORTHOPHOTOS DATABASE, DATED JUNE 2014 AND MAY NOT REPRESENT CURRENT CONDITIONS.
4. ACCORDING TO THE FEDERAL EMERGENCY MANAGEMENT AGENCY (FEMA) FLOOD INSURANCE RATE MAP (FIRM) MAP NUMBER 06055C0413E, 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.

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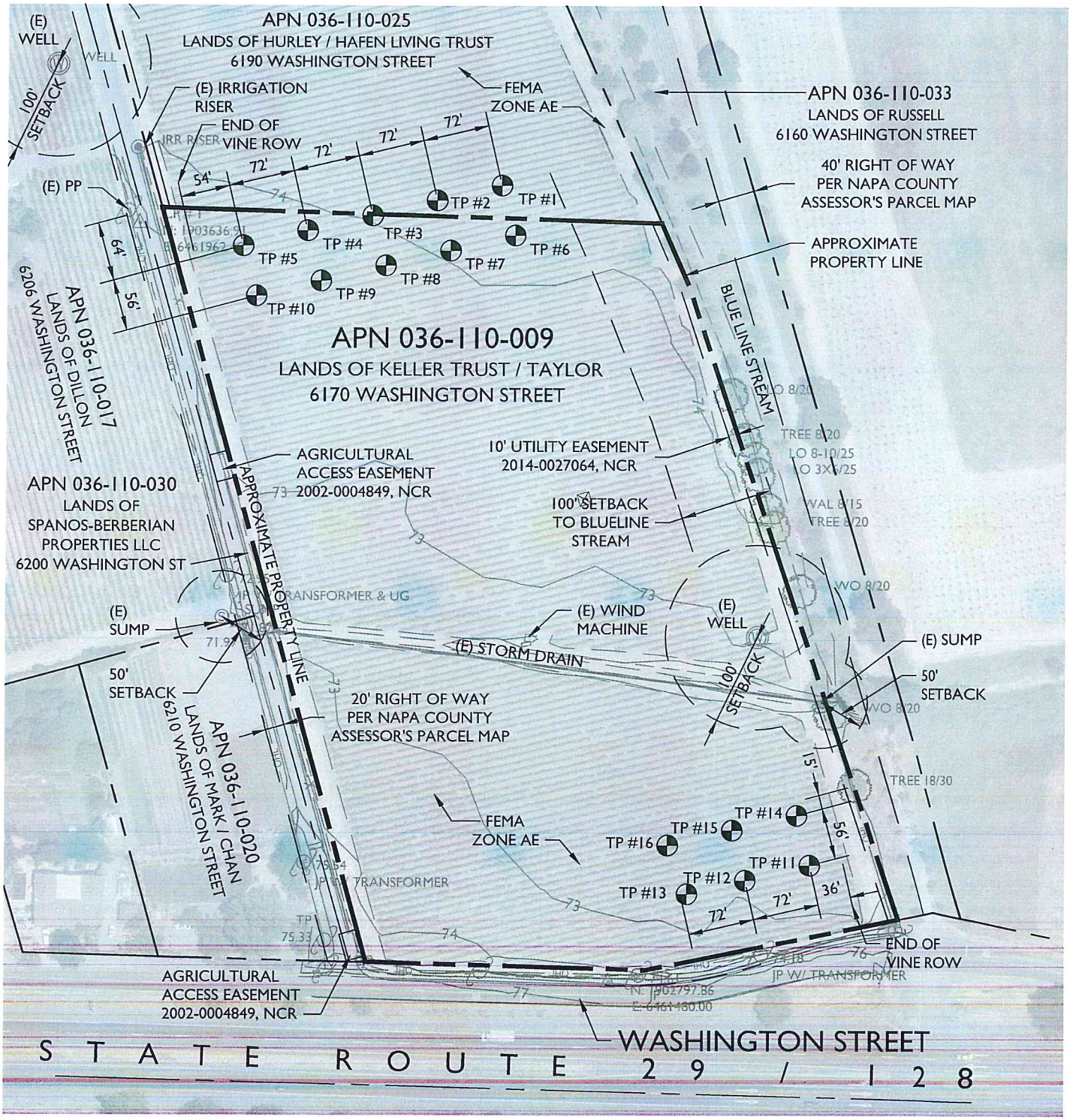
APN 036-110-009

SCALE: 1" = 3,000'



TEST PIT MAP

SCALE: 1" = 150'

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SCALE: 1" = 150'

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