



Water Availability Analysis and Water Feasibility Study

Howell Mountain Cemetery P20-00030
Planning Commission Hearing Date (June 17, 2026)



VINEYARD DESIGN
EROSION CONTROL
WATER DEVELOPMENT
DRAINAGE
PERMITTING
GPS/GIS

2800 Jefferson Street
Napa, California 94558
707-253-1806
www.ppiengineering.com

MEMORANDUM

Date: May 11, 2026

To: Enrique Torres, Napa County PBES

From: James R. Bushey, P.E.

Subject: Howell Mountain Cemetery (P20-00030)

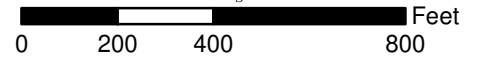
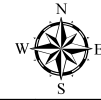
This memo provides additional information regarding construction of a replacement well to serve the referenced Project. During preparation of a map to support the application for a well permit it was discovered that there are existing springs on adjacent parcels that appear to be used for domestic and/or agricultural purposes. Plotting the location of these springs revealed that they are within 1500 feet of the proposed location for the well. The Interim Napa County Well Permit Standards and WAA Requirements, January 2024, shows that a replacement well proposed within 1500 feet of a spring requires a Tier 2 Water Availability Analysis (WAA) unless two conditions are met. The document states that the analysis is not required if: 1) the proposed replacement well is located further away from the neighboring spring than the existing well and 2) there is no increase in groundwater use.

The attached map shows that the proposed location of the replacement well is substantially further from the springs than the existing well and that no other springs or existing wells are known to exist in the vicinity of the proposed well. The WAA prepared by RSA+ dated January 31, 2020, shows that proposed groundwater use will be approximately 18% less than existing use. The actual reduction in groundwater use will be somewhat greater as the project has since been modified based on County comments to eliminate employees at the project site and the projected reduction in groundwater use will be at least 20%.



Notes:

- 1) This document only shows wells in close proximity to the subject parcel, not all wells located within the extents of the aerial photo.
- 2) Existing well and spring locations determined by review of publicly available documents and have not been field verified.



Legend

- Napa County Parcels
- Existing Well
- Proposed Replacement Well
- Neighboring Wells
- Springs
- 500' Neighboring Well Setback
- 1500' Spring Setback
- Blueline Streams

Napa County 2025 Aerial Photo

018-120-043-000

1:1303 PM 5/1/2025 R:\NTR\HOW\images\Howell Mountain Cemetery Well and Spring Map.mxd



2800 Jefferson Street
Napa, CA 94558
(707) 253-1806

Howell Mountain Cemetery
Well and Spring Map

May 2026



VINEYARD DESIGN
EROSION CONTROL
WATER DEVELOPMENT
DRAINAGE
PERMITTING
GPS/GIS

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Napa, California 94558
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MEMORANDUM

Date: July 1, 2025

To: Mr. Ray Zucker
Heron Pacific
Sent via email (rzucker@heronpacific.com)

From: Jim Bushey
Sam Lowthorp

Subject: Groundwater Recharge
P20-00030 Howell Mountain Cemetery
1225 Howell Mountain Road, Angwin, California
APN 018-120-016 & 018-120-027



Introduction

The Howell Mountain Cemetery property (referred to herein as “subject parcels”) is located on parcels 018-120-016 and 018-120-027. The subject parcels are located east of Angwin and consist of ±109.3 acres per the Napa County Assessor’s office. This analysis presents the calculation of parcel-specific groundwater recharge for the subject parcels.

The projected annual water demands presented in this memorandum have been prepared as directed by Napa County in accordance with the Water Availability Analysis Guidance Document (Napa County, 2015). The average annual groundwater recharge for the subject parcel was calculated using parcel-specific recharge based on Napa County’s guidance for parcels located outside of the Napa Valley Floor and groundwater deficient areas.

Groundwater Recharge

All groundwater in Napa Valley, apart from salt water intrusion, is derived from the infiltration of precipitation on the alluvial plains and adjacent mountains (Kunkel and Upson, 1960). There is limited data that includes the subject parcels and no prior water budgets calculating groundwater recharge percentages for nearby parcels could be located.

Luhdorff & Scalmanini Consulting Engineers (LSCE) and MBK Engineers (MBK) previously conducted a water budget analysis for Napa County that covered eight subwatersheds and tributary

watersheds (LSCE and MBK, 2013). The LSCE and MBK report created water balances for the subwatersheds using the following factors:

Inflows – Outflows = Change in Storage

Typical Inflows and Outflows are summarized below (DWR, 2003):

Inflows

- Natural recharge from precipitation;
- Seepage from surface water channels;
- Intentional recharge via ponds, ditches, and injection wells;
- Net recharge of applied water for agricultural and other irrigation uses;
- Unintentional recharge from leaky conveyance pipelines; and
- Subsurface inflows from outside basin boundaries.

Outflows

- Groundwater extraction by wells;
- Groundwater discharge to surface water bodies and springs;
- Evapotranspiration; and
- Subsurface outflow across basin or subbasin boundaries.

The water balance data presented for each watershed spanned eight years and included a range of data including average, dry, and wet year data to estimate an overall average water balance. From this water balance the precipitation recharge potential of the watersheds was extrapolated.

The study areas in LSCE and MBK’s report encompassed roughly 446 square miles of Napa County. The subject parcels are not located within any of the study areas but fall within 1 mile of the “Conn Creek Watershed” which includes part of Angwin, Chiles Valley, and Lake Hennessy. Given the proximity to the subject parcels, the groundwater recharge for the “Conn Creek Watershed”, calculated at 21%, was taken into consideration.

Since the subject parcels lie outside of the watersheds identified by LSCE and MBK, the average recharge rate across all study areas was calculated. Using a weighted average function comparing the size of each watershed outlined in the report and their calculated recharge rates, it was determined that the average recharge rate across all 446 square miles was 15.6%. While this method is a more general approach, its results were taken into consideration.

To better assess geologic similarities, the Santa Rosa Sheet of the Geologic Map of California, prepared by James B. Koenig, was consulted. It was determined that the subject parcels most closely resemble the geologic characteristics of the Redwood Creek and Napa Creek Watersheds, which exhibit recharge rates of 10% and 11%, respectively. These watersheds, like the subject parcels, are largely composed of Cretaceous-era marine sediments. In contrast, other study areas are primarily underlain by Sonoma Volcanics with interspersed alluvial deposits and various marine sediments.

For the purposes of this report, a baseline groundwater recharge rate of 10–11%, consistent with the Redwood and Napa Creek Watersheds, was used. However, due to more sloped terrain, denser vegetation, and a higher proportion of Cretaceous-era marine sediments within the subject parcels—

all factors that can limit recharge—the recharge estimate was further adjusted to a more conservative, site-specific rate of 8%.

The subject parcels are made up of 109.3 acres and receive an average annual rainfall of 33.65 inches per the Napa County PRISM data (MeanPrecip_WY_2012_2021_PRISM). The PRISM grid data was overlaid with current parcel boundaries in ArcGIS to find the approximate number of acres that fall within each overlaid PRISM grid. By doing this, a weighted average is calculated to find the average annual rainfall within the boundaries of a specific parcel. From this data, an average annual rainfall of 33.65 inches was calculated for water years 2012 through 2021 and will serve as the parcel’s “normal” water year conditions. By multiplying the size of the subject parcel by the average annual rainfall, it is estimated that the subject parcel received a total of 3677.95 acre-inches of rain per annum between 2012 and 2021. The 3677.95 acre-inches is then converted to acre-feet for a total of 306.50 acre-feet. Average annual recharge during this period is therefore 8% of the 306.50 acre-feet total annual precipitation or ±24.52 acre-feet of recharge.

Conclusion

The location of the subject parcels offers limited groundwater-related data and no existing water-balance analyses could be located that provide site specific recharge estimates. Since the proposed water demands for the project are below 1 acre-foot per annum, we believe an estimation of groundwater recharge based on publicly available data will suffice in meeting the requirements of this project. A conservative estimate of 8% groundwater recharge was assigned to the subject parcels and groundwater recharge is estimated at 24.52 acre-feet per annum.

References

Koenig, James B., 1963. Geologic Map of California, Santa Rosa Sheet, 1:250,000: California Division of Mines and Geology, Olaf P. Jenkins Edition.

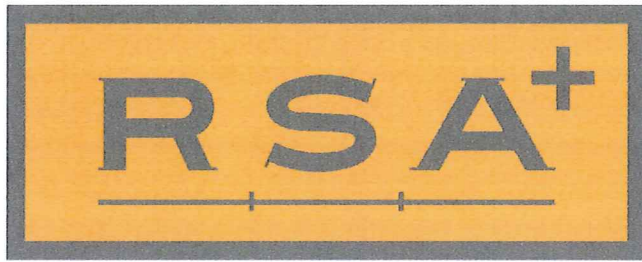
Kunkel, F. and Upson, J.E.. (1960). Geology and Ground Water in Napa and Sonoma Valleys, Napa and Sonoma Counties, California: U.S. Geol. Survey Water-Supply Paper 1495, 252p., with illustrations.

LSCE and MBK Engineers. (2013). Updated hydrogeologic conceptualization and characterization of conditions. Prepared on behalf of Napa County.

Napa County. (2015). Water Availability Analysis (WAA) – Guidance Document: Adopted May 12, 2015, 42p.

Napa County. (2022). Napa County and GSA Response to the Governor’s Emergency Executive Order N-22: Draft document dated June 2, 2022, 56p.

PRISM Climate Group, Oregon State University, <http://prism.oregonstate.edu>, published 10 July 2012.



WATER AVAILABILITY ANALYSIS

HOWELL MOUNTAIN CONSERVATION CEMETERY
1225 HOWELL MOUNTAIN ROAD
NAPA, CA

APN 018-120-16 and 018-120-027

PROPERTY OWNER:

Eternal Preserve Holding LLC
3301 Industrial Avenue
Rocklin, CA 94508



Project# 4117026.0
January 31, 2020



I. Executive Summary

The proposes to develop a conservation cemetery at APN 018-120-016 and 018-120-027. The parcel has an existing 3-bedroom cabin and garage which will be converted to storage. An office with visitor bathroom is proposed. Below is a summary of the existing and proposed water use. Detailed calculations can be found on the next page. A groundwater recharge rate of 0.5 af/yr/acre was adopted for the 105-acre parcel to give a total groundwater recharge of 52.5 af/yr.

Usage Type	Existing Usage [af/yr]	Proposed Usage [af/yr]
Residential	0.50	0.00
Landscape	0.00	0.25
Employees	0.00	0.02
Visitors	0.00	0.13
Totals (Acre-ft per Year)	0.50	0.41
Estimated Groundwater Recharge (Acre-ft per Year)	52.5	52.5

The proposed modifications for Howell Mountain Conservation Cemetery project will decrease groundwater use by 0.09 af/yr for the property. The proposed water use for the Howell Mountain Conservation Cemetery of 0.41 af/yr is significantly less than the estimated groundwater recharge rate of 52.5 af/yr.



II. Groundwater Use Calculation

Existing Residential Domestic Water Demand

House – (150 gal/bedroom x 3 bedrooms) = 0.50 af/yr

Existing Landscape Water Demand

Landscape Irrigation – (1 af/ac-yr x 0 acres) = 0.00 af/yr

Total Existing Water Demand Total = 0.50 af/yr

Proposed Cemetery Domestic Water Demand

FT Employees – (15 gal/person/day x 260 days/yr x 2 employees/day) = 0.02 af/yr

Average Visitors – (3 gal/person/day x 365 days/yr x 40 visitors/day) = 0.13 af/yr

Total = 0.16 af/yr

Proposed Landscape Water Demand

Landscape Irrigation – (1 af/ac-yr x 0.25 acres) = 0.25 af/yr

Total Proposed Water Demand Total = 0.41 af/yr



WASTEWATER FEASIBILITY REPORT

HOWELL MOUNTAIN CONSERVATION CEMETERY
1225 HOWELL MOUNTAIN ROAD
ANGWIN, CALIFORNIA

APN 018-120-016 & 027

PROPERTY OWNER:
ETERNAL PRESERVE HOLDING LLC
3301 INDUSTRIAL AVE
ROCKLIN, CA 94508



Project# 4117026.0

January 31, 2020



TABLE OF CONTENTS

INTRODUCTION.....1

DOMESTIC WASTEWATER CHARACTERISTICS.....1

OPERATION AND MAINTENANCE2

CONCLUSION2

APPENDICES

1. VICINITY MAP, USGS SITE MAP, AND SITE EVALUATION



INTRODUCTION

The applicant proposes to develop a conservation cemetery with a visitor's restroom and office. The parcel also has an existing 3-bedroom cabin and garage which will be converted to storage. Howell Mountain Conservation Cemetery is located at 1225 Howell Mountain Road, Napa, California 94558. The APNs are 018-120-016 and 018-120-027 with areas of 105 and 4.3 acres, respectively.

The property has steep slopes on the majority of the parcel with slopes ranging from 5% to 30%. Appendix 1 contains a Site Location Map and a USGS Site Map showing the parcel topography, features and boundary.

This report evaluates the disposal of the domestic wastewater.

DOMESTIC WASTEWATER CHARACTERISTICS

The domestic wastewater system has been sized to accommodate the unit values in Table 1 below. The projected flow is based on Napa County Environmental Management guidelines. The following is a summary of the estimated flows from the proposed site.

Table 1

Source	Number	Projected Flow (gpd)	Total Flow (gpd)
Employees	2	15	30
Visitors	40	3	120
Total Peak Flow			150

DOMESTIC WASTEWATER TREATMENT AND DISPERSAL

For the treatment and dispersal of the domestic wastewater a conventional system is proposed. Wastewater will flow from the visitor's bathroom and office to a 1,200-gallon septic tank, then to a standard dispersal field.

The dispersal field will use underground perforated pipe with a 1-foot deep rock filled trench with 3 feet of acceptable soil below and 1 foot of cover above.

The dispersal field is sized to meet Napa County Environmental Management guidelines for a standard system. The soil in the area for the dispersal field has 60 inches of moderate granular loam with a hydraulic loading rate of 0.33 gal/ft²/day. With a trench depth of 1 foot, the effective infiltrative rate is 2 ft²/LF. The peak daily domestic wastewater flow is 150 gal/day.

$$\text{Linear Feet} = \frac{150 \text{ gal/day}}{2 \frac{\text{ft}^2}{\text{LF}} \left(0.33 \frac{\text{gal}}{\text{sf} * \text{day}} \right)} = 227.3 \text{ LF}$$



The two feet wide trenches will be spaced 12 ft apart because of the 12% slope in the dispersal field area. The system will consist of three lines total, one of 100 ft and two of 65 ft.

A 100% reserve area will be provided.

OPERATION AND MAINTENANCE

The domestic wastewater system will be a standard, gravity-flow system designed so minimal input from cemetery staff is required.

CONCLUSION

This report demonstrates that Howell Mountain Conservation Cemetery can treat and disperse domestic wastewater on site meeting Napa County Environmental Management Design standards for the treatment of domestic wastewater.



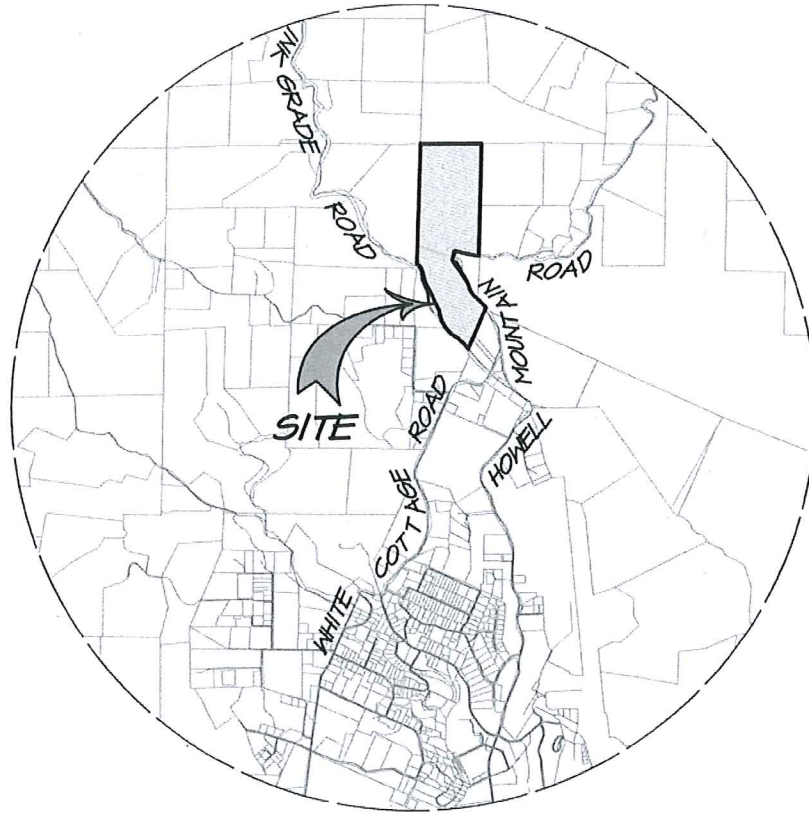
Appendix 1

Vicinity Map, USGS Site Map, and Site Evaluation

HOWELL MOUNTAIN CEMETERY VICINITY MAP

ANGWIN

CALIFORNIA



VICINITY MAP

SCALE: 1" = 4000'

RSA⁺	1515 FOURTH STREET
	NAPA, CALIF. 94559
	OFFICE 707 252.3301
	+ www.RSAcivil.com +

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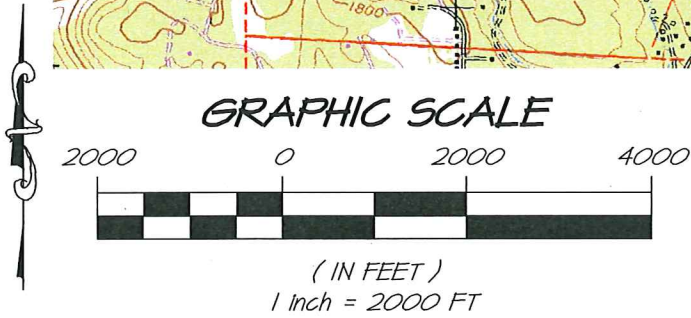
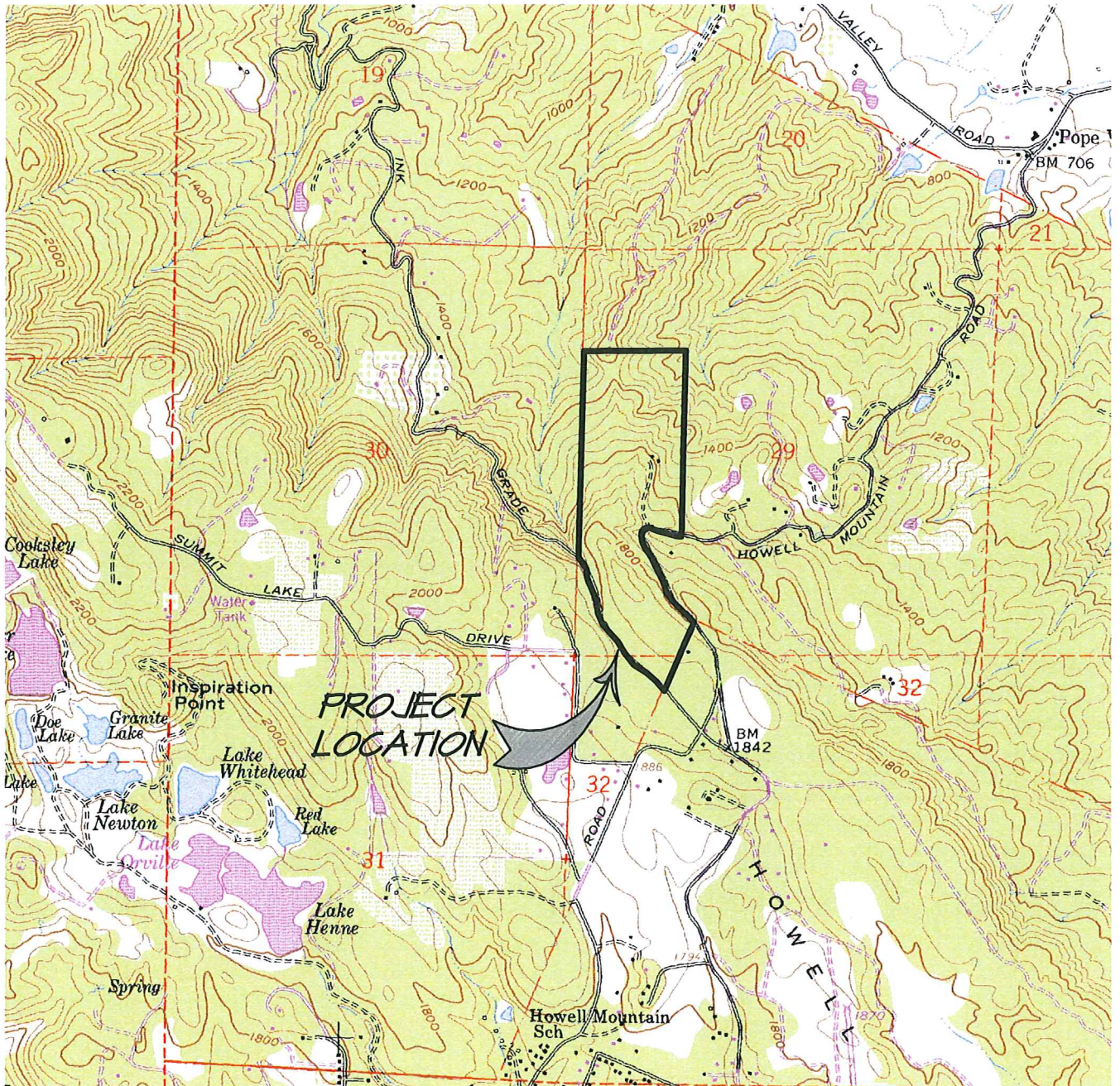
NOV. 7, 2017

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Exh-Vic Map.dwg

HOWELL MOUNTAIN CONSERVATION CEMETERY USGS QUAD MAP

NAPA COUNTY CALIFORNIA



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JAN. 27, 2020 4117026.0 Exh-USGS.dwg

Test Pit # 1

X = Limiting Horizon	Horizon Depth (Inches)	Boundary	%Rock	Texture	Structure (Grade / Shape)	Consistence			Pores (QTY / Size)	Roots (QTY / Size)	Mottling (QTY / Size/ Contrast)
						Side Wall	Ped	Wet			
	0-36	C	45%	L	MG	H	FRB	S	CF	CC	
	36-72		35%	L	MG	H	FRB	S	FF	FF	
X	72										

Notes: Samples collected from below 36" and from 0-36" for laboratory testing. Bouyoucous Hydrometer testing determined soil type Loam. Limiting condition was bottom of pit. Pit good.

Test Pit # 2

X = Limiting Horizon	Horizon Depth (Inches)	Boundary	%Rock	Texture	Structure (Grade / Shape)	Consistence			Pores (QTY / Size)	Roots (QTY / Size)	Mottling (QTY / Size/ Contrast)
						Side Wall	Ped	Wet			
	0-36	C	45%	L	MG	H	FRB	S	CF	CM	
	36-60	-	35%	L	MG	H	FRB	S	FF	FF	
X	60										

Notes: Hard to form a ball/create ribbon. Limiting condition was bottom of pit. Pit good.

Test Pit # 3

X = Limiting Horizon	Horizon Depth (Inches)	Boundary	%Rock	Texture	Structure (Grade / Shape)	Consistence			Pores (QTY / Size)	Roots (QTY / Size)	Mottling (QTY / Size/ Contrast)
						Side Wall	Ped	Wet			
	0-36	C	45%	L	MG	H	FRB	S	CF	CM	
	0-60		35%	L	MG	H	FRB	S	CF	FF	
X	60										

Notes: Limiting condition was bottom of pit. Pit good.

Test Pit # 4

X = Limiting Horizon	Horizon Depth (Inches)	Boundary	%Rock	Texture	Structure (Grade / Shape)	Consistence			Pores (QTY / Size)	Roots (QTY / Size)	Mottling (QTY / Size/ Contrast)
						Side Wall	Ped	Wet			
	0-30	-	45%	L	MSB	L	FRB	S	CF	CM	
X			35%								

Notes: Hit bedrock @ 30". Pit good.

Test Pit # 5

X = Limiting Horizon	Horizon Depth (Inches)	Boundary	%Rock	Texture	Structure (Grade / Shape)	Consistence			Pores (QTY / Size)	Roots (QTY / Size)	Mottling (QTY / Size/ Contrast)
						Side Wall	Ped	Wet			
X	-		>50%								

Notes: Rock close to surface. Pit no good. (15' from disconnected faucet)

Test Pit # 6

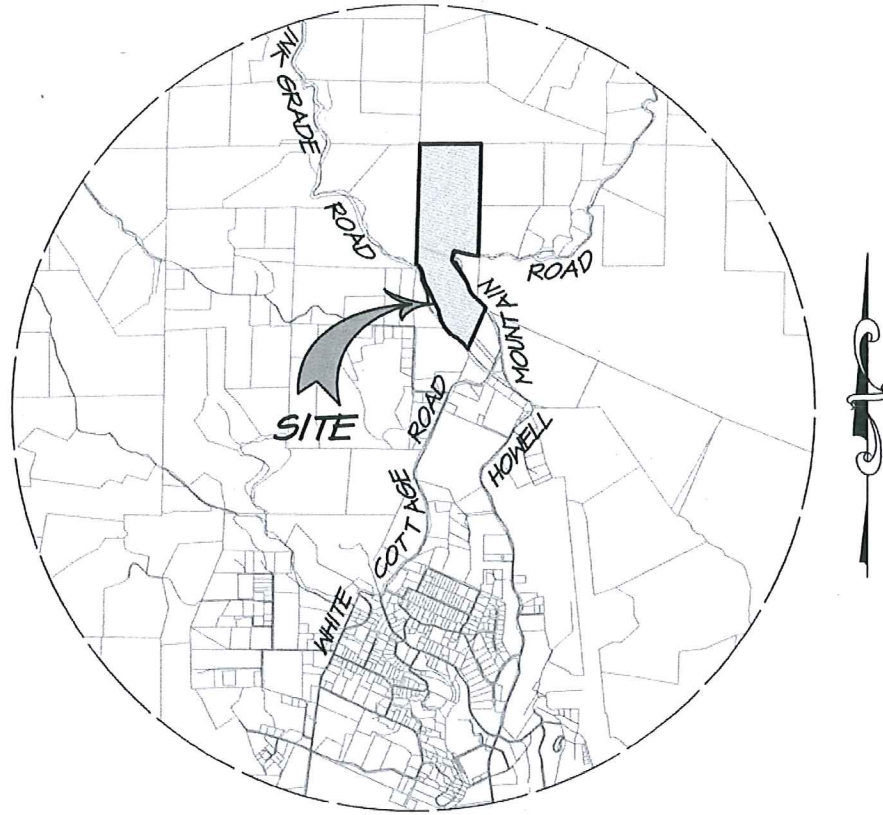
X = Limiting Horizon	Horizon Depth (Inches)	Boundary	%Rock	Texture	Structure (Grade / Shape)	Consistence			Pores (QTY / Size)	Roots (QTY / Size)	Mottling (QTY / Size/ Contrast)
						Side Wall	Ped	Wet			
	0-24	C	45%	L	MG	H	FRB	S	CF	CM	
	24-56		35%	L	MG	H	FRB	S	CF	FF	
X	56										

Notes: Limiting condition was bottom of pit. Pit good.

HOWELL MOUNTAIN CEMETERY VICINITY MAP

ANGWIN

CALIFORNIA



VICINITY MAP

SCALE: 1" = 4000'

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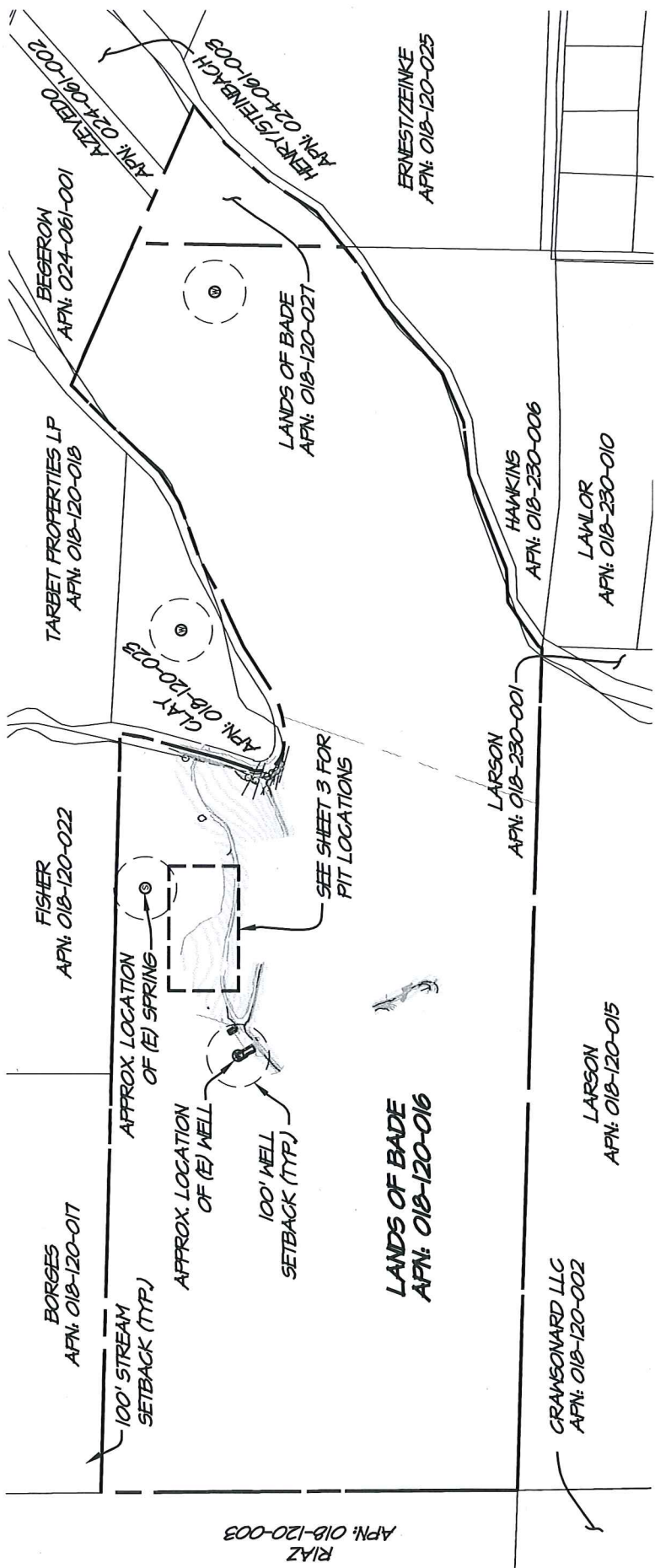
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NOV. 7, 2017

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Exh-Vic Map.dwg

HOWELL MOUNTAIN CEMETERY PIT MAP



RSA⁺

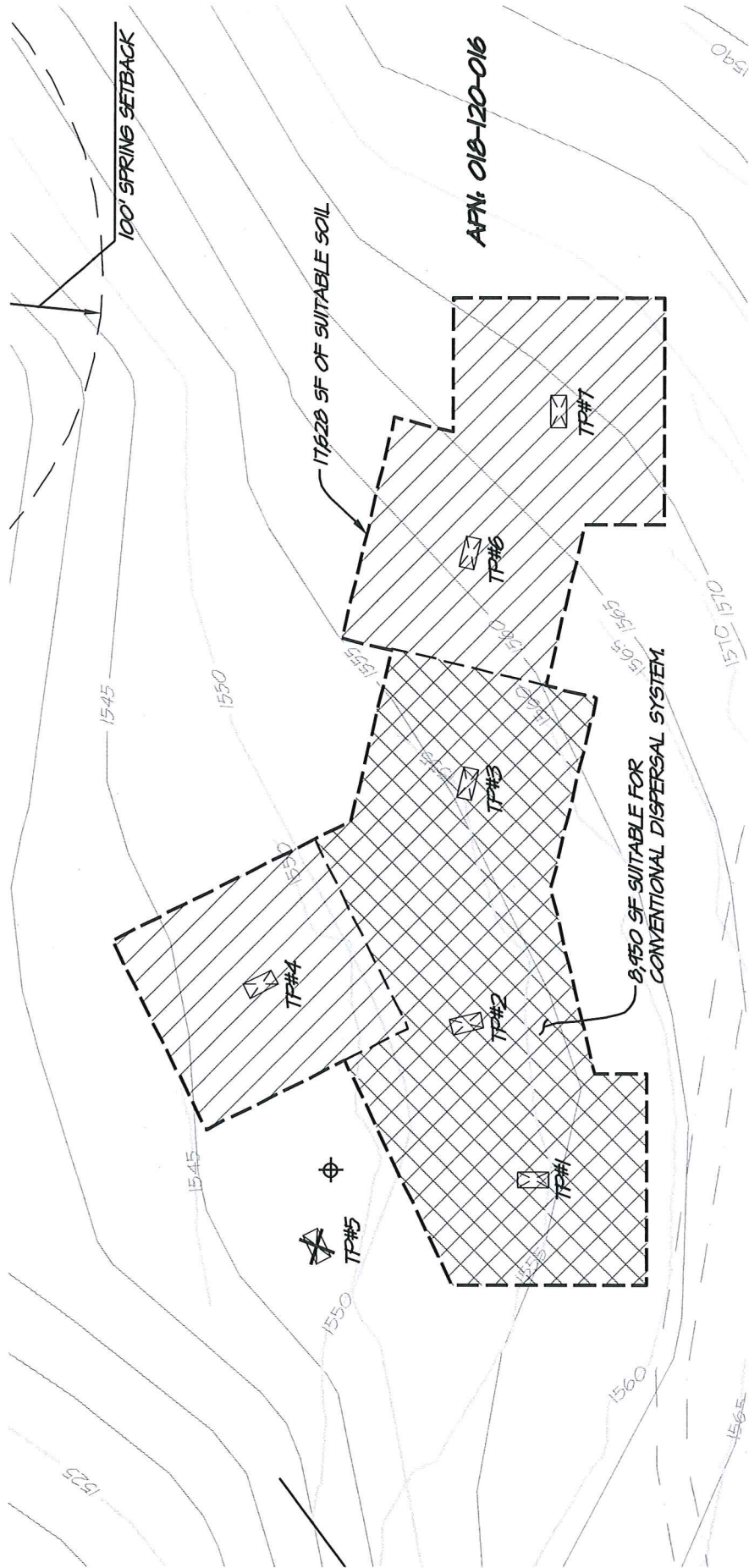
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SITE EVALUATION DATE: AUGUST 30, 2017
 APN: 020-180-016
 ADDRESS: 1225 HOWELL MTN RD N
 ANGIN CA 94508
 ENV. HEALTH INSPECTOR: MAUREEN SHIELDS-BOWN

HOWELL MOUNTAIN CEMETERY PIT LOCATIONS



LEGEND

- TP#1 TEST PIT
- TP#1 NOT GOOD



GRAPHIC SCALE



(IN FEET)
1 inch = 40 FT

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SITE EVALUATION DATE: AUGUST 30, 2017
APN: 030-120-016
ADDRESS: 1225 HOWELL MTN RD N
ANGWIN, GA 94508
ENV. HEALTH INSPECTOR: MAUREEN SHIELDS-BOWEN



WATER SYSTEM FEASIBILITY STUDY FOR A REGULATED SYSTEM

HOWELL MOUNTAIN CONSERVATION CEMETERY
1225 HOWELL MOUNTAIN ROAD
ANGWIN, CA

APN 018-120-016 & 027

Prepared for:

Eternal Preserve Holding LLC
3301 Industrial Avenue
Rocklin, CA 94508



Project #4117026.0

January 31, 2020



TECHNICAL CAPACITY

System Description

The proposed Howell Mountain Conservation Cemetery is located at 1225 Howell Mountain Road. The existing well on the subject parcel will serve the proposed office and restrooms.

A Transient-Noncommunity water system is proposed to serve the Howell Mountain Conservation Cemetery.

The well on the parcel has a 53' seal. This well will be used for the public water system for the Howell Mountain Conservation Cemetery. No chemical or biological treatment will be performed on the well water unless quarterly testing results deem further treatment is necessary. Water for the Public Water System will be stored in the proposed tank. See the Use Permit-Utility Plan for system layout.

Twenty-Year Evaluation of Projected Water Demand

Based on the Tier 1 Water Use Calculations, the annual public water demand (employees and visitors) is 0.16-acre feet per year (52,200 gallons per year). The average daily public water demand is 143 gallons per day. Peak daily public water demand is estimated at 286 gallons per day, being 200% of average daily demand.

Twenty-Year Evaluation of Water Supply Capacity

Additional non-public water demand for the site includes landscape irrigation. The proposed non-public water use for the parcel is 0.25-acre feet per year or 81,500 gallons per year or 223 gallons per day.

The existing water source is capable of supporting the proposed peak daily groundwater demand of 509 gal/day. The existing well has a capacity of 30 gpm. When pumped on a 50% operational basis (pumping 12 hours per day), the daily projected well yield is 21,600 gallons per day. This exceeds the peak daily demand on the public well.

$$30 \text{ gpm} * 720 \text{ min/day} = 21,600$$
$$21,600 \text{ gal/day} \geq 509 \text{ gal/day (peak public daily demand)}$$

Source Adequacy

The existing well has a 53-ft annular seal that complies with Napa County Code 13.12.380 as Class IA wells for a Public Water System. The Application and Permit to Construct a Water Well document outlines the well construction and inspection by the Department of Environmental Management Application and Permit is on file at Napa County.

Water Quality

Water sampling will be conducted prior to operation of the system. Water quality is expected to meet or exceed all requirements of Chapter 15 of Title 22, California Code of Regulations (CCR).

CONSOLIDATION

An investigation of the adjacent Public Water Systems within 3 miles of the project has been performed using the map viewer provided on the California Environmental Health Tracking Program website. The Howell Mountain Water Distribution System is within 3 miles but does not have the infrastructure to provide service to the Howell Mountain Conservation Cemetery.



MANAGERIAL

General

The owner of the water system will be the property owner of the parcel. The costs of operation will be covered in the cemetery operation costs. The owner will also hold the responsibility of water system manager for the property.

Operation and Maintenance

The following is a summary of the required Operations and Maintenance schedule:

Tasks	Frequency	Action
System Water Level	Daily	Visual Inspection
System Pressure and Conveyance	Daily	Visual Inspection
Water Tanks	Quarterly	Visual Inspection
Manually Operate Valves and Pumps	Quarterly	Operation
Water Quality Test & Reporting	Quarterly	Unit Samples Taken & Reported to Napa Co.

A certified distribution operator or treatment operator (T1 level or above) as specified by Chapter 13 of Title 22 CCR contracted by the owner will be responsible for system repairs.

Monitoring and Testing

Water quality testing will be conducted to comply with Chapter 15 of Title 22 of CCR. Samples will be taken to Caltest or an approved laboratory for testing.

FINANCIAL

Below is a brief summary of the system’s annual estimated financial capacity. Capital improvement costs and installation of the distribution system are estimated to be a one-time expense of \$30,000.

Capital Improvements

Equipment: \$30,000

Annual Operating Cost

Power: \$2,000

Maintenance: \$1,500

Water Quality Testing: \$1,500

Total: \$5,000

Projected Annual Gross Revenue: \$1,750,000

Annual Operating Costs: \$1,400,000 (20% profit)

Percent of Total Operating Costs: 0.4%