Gilpin Geosciences, Inc
Earthquake & Engineering Geology

July 27, 2021
91695.02

Annalee Sanborn
PPI Engineering, Inc.
2800 Jefferson Street
Napa, CA 94558

Subject: Engineering Geological Evaluation
Veeder Ridge LLC Vineyard
Blocks 1A and 3
3665 Redwood Road
Napa, California

Dear Ms. Sanborn:

We are pleased to present the results of our engineering geological evaluation of the proposed replant of vineyards at the Veeder Ridge LLC Vineyards at 3665 Redwood Road, near Napa, California. The proposed Erosioin Control Plan includes two vineyard blocks were previously planted to vineyard but are currently fallow, Block 1A, and 3 comprising a total 3.1 acres area. The site lies on the southeast flank of Mt. Veeder.

SCOPE OF SERVICES

The purpose of this investigation was to review the proposed vineyard planting for impacts on surface erosion and slope stability. In order to accomplish this, we performed the following tasks:

- reviewed published and unpublished reports and maps of the site;
- reviewed aerial imagery;
- performed a geologic reconnaissance on 15 July 2021; and
- prepared this report.

REGIONAL GEOLOGY

The site is in the Coast Ranges geomorphic province that is characterized by northwest-southeast trending valleys and ridges. These are controlled by folds and faults that resulted from the collision of the Farallon and North American plates and subsequent shearing along the San Andreas Fault. Bedrock in the

region is primarily comprised of Upper Jurassic to Lower Cretaceous (about 160 to 100 million years ago) Great Valley Sequence rocks consisting of interbedded claystone, siltstone, mudstone, and sandstone overlain by Sonoma Volcanic upper Tertiary rocks (about 65 to 1.8 million years ago). Quaternary surficial deposits overlie the Sonoma Volcanics and Great Valley Sequence rocks (Clahan and others, 2004). The site on the northeast flank of a northwest trending ridgeline, is mapped underlain by a large landslide that extends to the base of the slope offsite (Figure 2).

Based on aerial photographic interpretation, Dwyer et al. (1976) have mapped a queried landslide complex on the northeast flank of the ridge that incorporates vineyard Blocks 1A and 3.

The soil mapped at the site is the Bressa Dibble series on 15 to 30 percent slopes and Felton Gravelly loam on 30 to 50% slopes. The Bressa Dibble soils are characterized as developing on weathered sandstone and shale bedrock and are subject to medium runoff and slight to moderate erosion hazards, whereas the Felton series soils are characterized as developing on weathered shale and are subject to rapid runoff and moderate erosion hazards (USDA, 1978).

Faults and Seismicity

The active faults in the area are the West Napa, Green Valley, and Hunting Creek (Berryessa)faults. Numerous damaging earthquakes have occurred along the major San Francisco Bay Area faults in recorded time. For these and other active faults within a 50-kilometer radius of the site, the distance from the site and estimated characteristic moment magnitude[1] [Petersen et al. (2014) & Thompson et al. (2016)] are summarized in Table 1. These references are based on the Third Uniform California Earthquake Rupture Forecast (UCERF3), prepared by Field et al. (2013).

[1] Moment magnitude (M_w) is an energy-based scale and provides a physically meaningful measure of the size of a faulting event. Moment magnitude is directly related to average slip and fault rupture area.

TABLE 1
Regional Faults and Seismicity

Fault Segment	Approximate Distance from Site (km)	Direction	Characteristic Moment Magnitude
West Napa	1.9	Northeast	6.97
Green Valley	15	East	6.30
Hunting Creek (Berryessa)	16	Northeast	6.69
Total Hayward + Rodgers Creek (RC+HN+HS+HE)	16	Southwest	7.58
Rodgers Creek - Healdsburg	16	Southwest	7.19
Hayward (North, HN)	17	Southwest	6.90
Maacama	31	Northwest	7.55
Great Valley 04b (Gordon Valley)	32	East	6.77
Great Valley 05 (Pittsburg - Kirby Hills alt2)	34	East	6.66
Great Valley 05 (Pittsburg - Kirby Hills alt1)	38	East	6.60
Great Valley 04a (Trout Creek)	39	Northeast	6.60
Hunting Creek (Bartlett Springs connector)	39	North	6.79
Concord	40	Southeast	6.45
Collayami	48	North	6.70
Great Valley 06 (Midland alt1)	49	East	7.27
Great Valley 03 (Mysterious Ridge)	49	Northeast	7.03
Total North San Andreas (SAO+SAN+SAP+SAS)	49	Southwest	8.04
North San Andreas (North Coast, SAN)	49	Southwest	7.52

As a part of the UCERF3 project, researchers estimated that the probability of at least one $M_w \geq 6.7$ earthquake occurring in the greater San Francisco Bay Area during a 30-year period (starting in 2014) is 72 percent. The highest probabilities are assigned to sections of the Hayward (South), Calaveras (Central), and the North San Andreas (Santa Cruz Mountains) faults. The respective probabilities are approximately 25, 21 , and 17 percent.

SITE CONDITIONS

We evaluated site conditions based on aerial photo interpretation, and reconnaissance geologic mapping.

The site lies on the flank of Mt Veeder a prominent peak in the northwest-trending Mayacamas Mountain range that separates the Napa and Sonoma Valleys. The vineyard blocks of concern are proposed on gently inclined to near level northeast-facing slopes below a prominent northwest-southeast trending ridgeline.

We reviewed aerial photography of the site to document the site conditions over the period covered by the historic photographs. We list the photographs reviewed in the references.

Vineyard Blocks 1A and 3 lie on and near the edge of a large topographic bench that forms the upper part of an old and dormant slump-type landslide deposit.

We identified the old and dormant landslide complex on the proposed Blocks 1A and 3 bits is characteristic surficial landforms common to these deposits such as: a steep arcuate scarp area, suspicious breaks-in-topographic-slope, a near-level "unit" surface (topographic bench) defining the top of the large slump-type landslide deposit, and irregular drainage features with depressions. Despite the presence of landslide material beneath the Blocks, we did not observe indications of significant erosion or recent slope movement associated with the old landslide complex. The features described above appeared subdued in general, and indicative of a dormant landslide deposit.

We noted no ground surface distress or other signs of slope movement associated with the landslide complex. Unlike active slides the large, dormant, deep-seated deposit landslide complex shows no signs of recent erosion, ground cracks, nor hummocky topography associated with recent movement.

We did not identify any indications of soil creep, active landslides, or significant erosion that would impact or be impacted by the proposed replant. Also, we did not observe any evidence of global instability caused by landslides or soil creep.

CONCLUSIONS AND RECOMMENDATIONS

Based on our research and review of the site conditions, the proposed vineyard is feasible from an erosion control and slope stability perspective. In our opinion, the site contains an old dormant landslide complex. The landslide complex does not exhibit adverse erosion or slope movement over the period of our investigation which includes aerial photography back to 1988.

We do not anticipate any significant changes to the surface conditions caused by the proposed vineyard planting, given implementation of the Erosion Control Plan by PPI Engineering. We did not observe any evidence of global slope instability caused by landslides or soil creep.

Because of the nature of the landslide deposits, care should be taken when directing stormwater surface runoff into unprotected, erosion suceptible, areas of the site. Runoff should be controlled and directed to erosion resistent areas or onto rip rap covered areas.

We recommend that ripping the steeper slopes of the proposed vineyard be limited to a maximum 24-inch depth.

We conclude that the vineyard planting is feasible based on our engineering geological evaluation and the site has favorable slope stability conditions with stable surficial deposits, the stability of which should not be significantly affected by the proposed project.

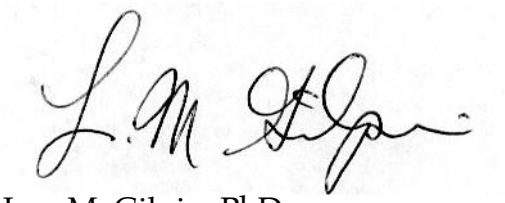
LIMITATIONS

Our services have been performed in accordance with generally accepted principles and practices of the geological profession. This warranty is in lieu of all other warranties, either expressed or implied. In addition, the conclusions and recommendations presented in this report are professional opinions based on the indicated project criteria and data described in this report. They are intended only for the purpose, site location and project indicated.

We trust that this provides you with the information you need. If you have any questions, please call.

Sincerely,

GILPIN GEOSCIENCES, INC.



Lou M. Gilpin, PhD
Engineering Geologist

Attachments: References
Figure 1 Location Map
Figure 2 Regional Geology Map

REFERENCES

Clahan, K.B., Wagner, D.L., Saucedo, G.J., Randolph-Loar, C.E., and Sowers, J.M., 2004, Geologic Map of the Napa 7.5′ Quadrangle Napa County, California: A Digital Database: California Geological Survey Preliminary Geologic Map, scale 1:24,000.

Dwyer, M. J., Noguchi, N., and O'Rourke, J., 1976, Reconnaissance photo-interpetation map of landslides in 24 selected 7.5 minute quadrangles in Lake, Napa, Solano, and Sonoma Counties, California: U.S. Geological Survey Open File Report 76-74, St. Helena Quadrangle, scale 1:24,000.

Field, E.H., Biasi, G.P., Bird, P., Dawson, T.E., Felzer, K.R., Jackson, D.D., Johnson, K.M., Jordan, T.H., Madden, C., Michael, A.J., Milner, K.R., Page, M.T., Parsons, T., Powers, P.M., Shaw, B.E., Thatcher, W.R., Weldon, R.J., II, and Zeng, Y., (2013). Uniform California earthquake rupture forecast, version 3 (UCERF3)—The time-independent model: U.S. Geological Survey Open-File Report 2013–1165, 97 p.

Fox, K.T., Sims, J.D., Bartow, J.A., and Helley, E.J., 1973, Preliminary Geologic map of Eastern Sonoma County and western Napa County, California: U.S. Geological Survey Miscellaneous Field Studies MF-483, scale 1:62500.

International Conference of Building Officials, 1988, Maps of known active fault near-source zones in California and adjacent portions of Nevada: prepared by California Division of Conservation Division of Mines and Geology, p. 19, with maps.

Petersen, M.D., Moschetti, M.P., Powers, P.M., Mueller, C.S., Haller, K.M., Frankel, A.D., Zeng, Y., Rezaeian, S., Harmsen, S.C., Boyd, O.S., Field, E.H., Chen, R., Rukstales, K.S., Luco, N., Wheeler, R.L., Williams, R.A., and Olsen, A.H., (2014). Documentation for the 2014 update of the United States national seismic hazard maps: U.S. Geological Survey Open-File Report 2014–1091, 243 p.

PPI Engineering, Inc., 2021, Veeder Ridge LLC Track I, Erosion Control Plan, 2 Sheets, scale 1-inch=100-feet, dated, August, 2021.

Thompson, E.M., Wald, D.J, Worden, B., Field, E.H., Luco, N., Petersen, M.D., Powers, P.M., Badie, R. (2016) Shakemap earthquake scenario: Building Seismic Safety Council 2014 Event Set (BSSC2014). U.S. Geological Survey. DOI: 10.5066/F7V122XD

U.S. Department of Agriculture, 1978, Soil Survey of Napa County, California: U.S. Department of Agriculture Soil Conservation Service, Washington, D.C.

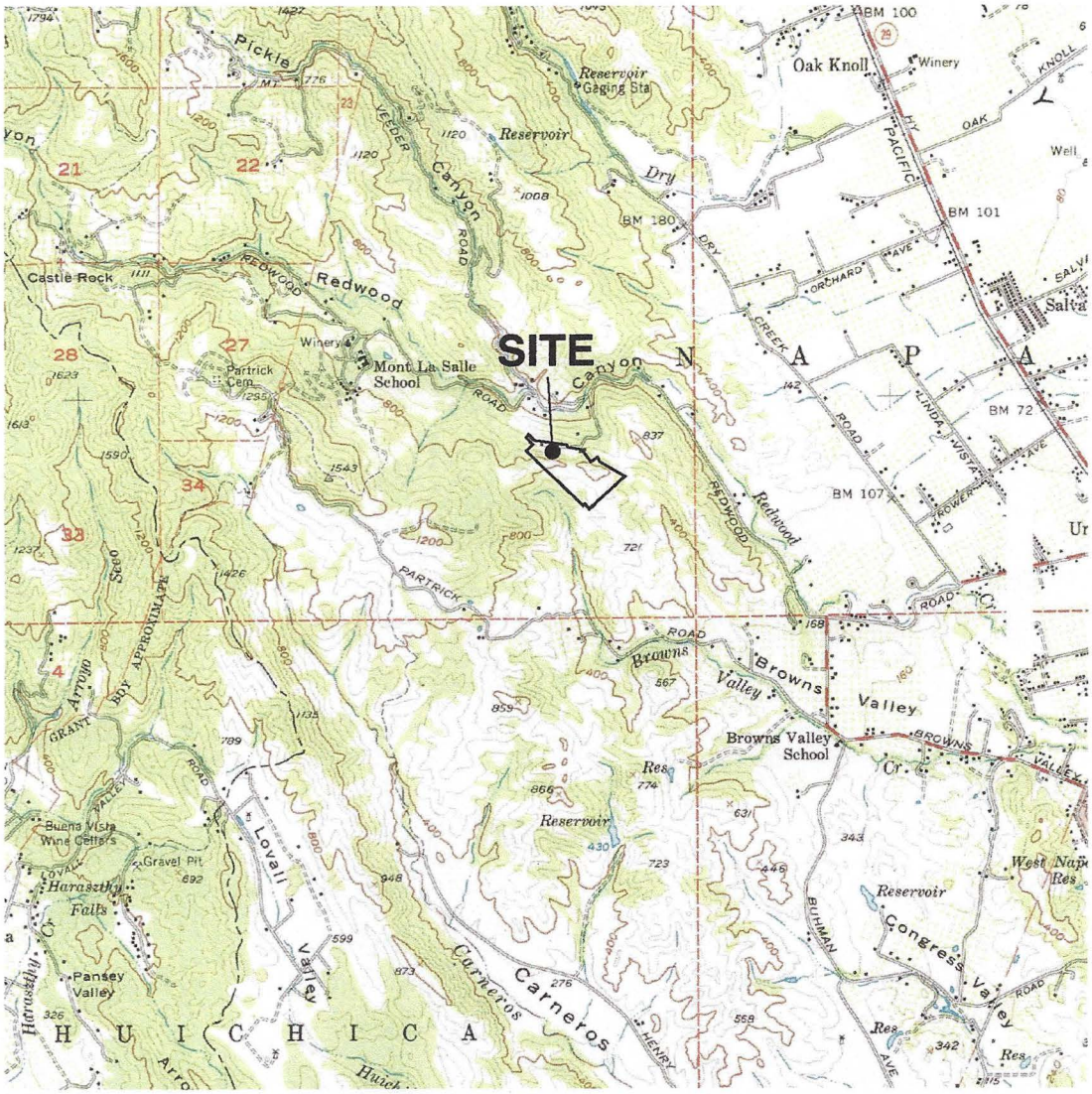
U.S. Geological Survey, 1951, Napa Quadrangle California 15 Minute Series (Topographic), scale 1;62,300.

Wagner, D.L., Clahan, K.B., Randolph-Loar, C.E., and Sowers, J.M., 2004, Geologic Map of the Sonoma 7.5' Quadrangle Sonoma and Napa Counties, California: A Digital Database: California Geological Survey Preliminary Geologic Map, scale 1:24,000.

Aerial Photographs

Date	Photo Number	Scale	Source
11/2/00	CIR 6745-204-20, 21	1:12,000	Pacific Aerial Surveys
8/21/92	CIR 4314-5- 3, 4	1:12,000	Pacific Aerial Surveys
7/8/88	AV 3306-29- 49, 50	1:12,000	Pacific Aerial Surveys

FIGURES



N

0 1 Mile

Approximate Scale

SITE LOCATION MAP

BLOCKS 1A & 3
VEEDER RIDGE LLC
Napa, California

Date 7/27/21	Project No. 91695.02	Figure 1

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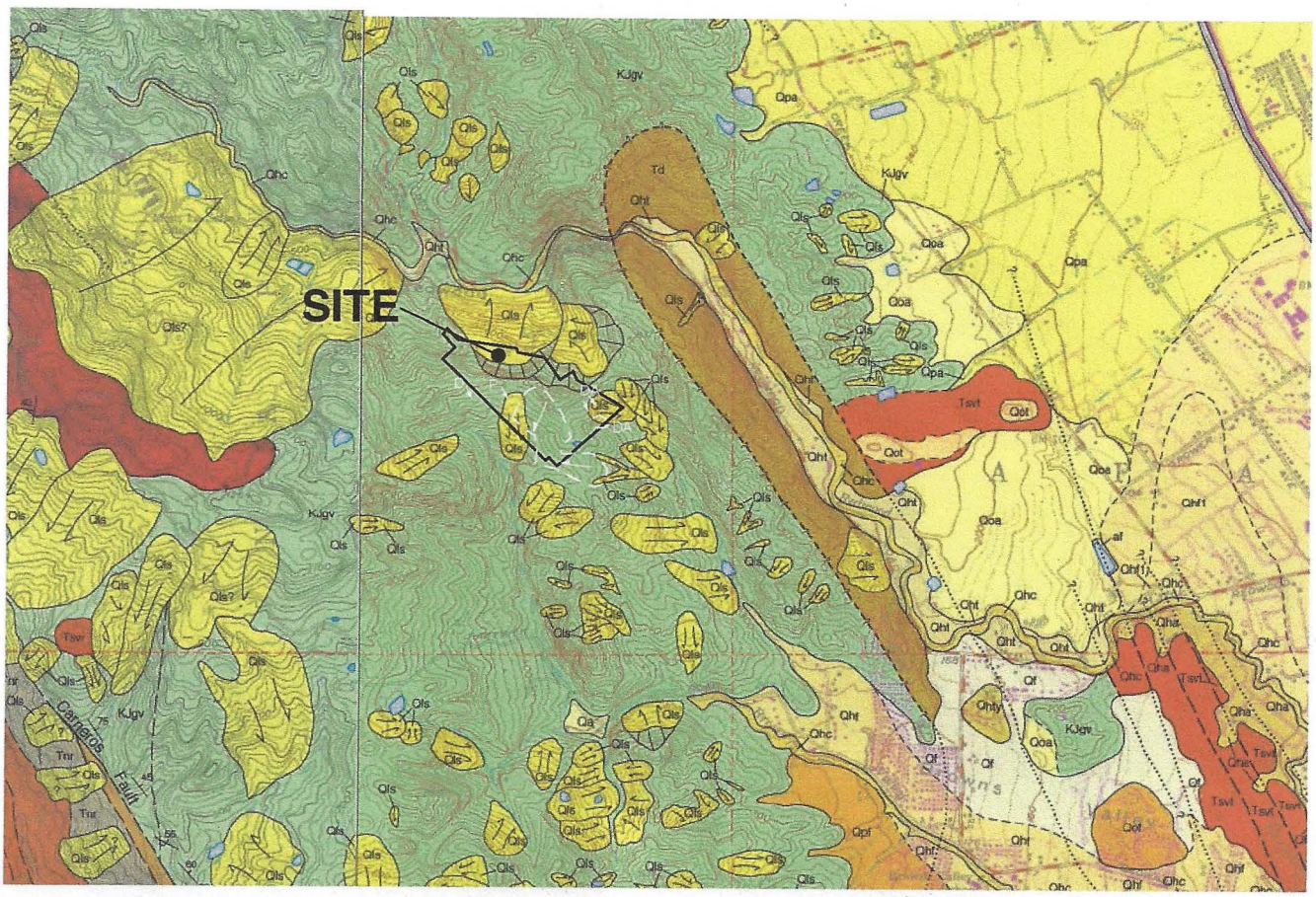
Reference: USGS 15 Minute Sonoma Quadrangle, 1951



EXPLANATION

Geologic Units

af -artificial fill
Qa - alluvium
Qls - Landslide
Qhc - Alluvium (Holocene)
Qf - alluvial fan
Th - Huichica & Glen Ellen Formations, undivided

Sonoma Volcanics
Tsvr - Rhyolite ash flow tuff
Tsvt - Tuff

Td - Domingene Sandstone
Tnr - Neroly Sandstone
Tms - Sandstone

Great Valley Sequence
Kgv - sandstone, pebble conglomerate, sitlstone, and shale

Geologic contact - dashed where covered, queried where uncertain

Fault - dashed where covered, queried where uncertain

34
Strike of bedding - with direction and magnitude of dip

Landslide Zone from Dwyer and others (1976)

Small Landslide - P, Probable; D, Definite, A, Activity recent.

Reference: Wagner and others, 2004; Clahan and others, 2004; Dwyer and others, 1976.

N

0 2,000 Feet

Approximate Scale

REGIONAL GEOLOGY MAP

BLOCKS 1A & 3
VEEDER RIDGE LLC
Napa, California

Date 7/27/21	Project No. 91695.02	Figure 2

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