**Gilpin Geosciences, Inc**
**Earthquake & Engineering Geology**

September 22, 2020
91682.01

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

**Subject: Engineering Geological and Geotechnical Evaluation**
**Project Pioneer**
**APN 024-080-040, -044, -048, & -049**
**1 Angwin Avenue**
**Angwin, California**

Dear Ms. Sanborn:

We are pleased to present the results of our engineering geological and geotechnical evaluation of the proposed new vineyard development adjacent to the Angwin airport. The proposed vineyard areas are accessed via 910 Howell Mountain Road in Angwin, California. We understand that this evaluation will supplement the "Project Pioneer Erosion Control Plan Track I, prepared by PPI Engineering, Inc. (PPI, 2020). The site is accessed via an unimproved ranch road off of Angwin Avenue (Figure 1). We understand the project consists of planting three vineyard blocks, referred to as Blocks 1, 2, and 3, with a total of approximately 35.9 net acres of new vineyard. The site is located within the Lake Hennessy Municipal Watershed.

## SCOPE OF SERVICES

The purpose of this investigation was to review the proposed vineyard development and evaluate the potential impact to local surface erosion and slope stability. To accomplish this, we performed the following tasks:

- reviewed published and unpublished reports and maps of the site;
- reviewed aerial photographs to evaluate the surficial geological features on the site;
- reviewed the PPI Engineering, Inc. Erosion Control Plan; and,

- performed a geologic reconnaissance on 19 November 2019 and 28 January 2020.

## REGIONAL GEOLOGY

The site is located in the Coast Ranges geomorphic province, which is characterized by northwest-southeast trending valleys and ridges (Figure 2). 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. The bedrock in the site vicinity is mapped as Sonoma Volcanics andesitic lava flow (Fox and others, 1973). This unit is characterized by andesite flows with associated assortment of volcanic deposits including tuff, breccias, and bedded tuff deposits.

The site lies on the large plateau formed by volcanic deposits that trends roughly northwest-southeast at elevations between 1,600 and 2,000 feet (USGS, 1960) and comprise the crest of Howell Mountain. The numerous and various sized knolls on Howell Mountain represent harder more erosion-resistant bodies of bedrock that form the relief of up to 100 feet above the gently north- and south- dipping plateau surface. At the northern end of the site, the plateau surface is gently rolling with 100 feet of vertical relief in the proposed vineyard Block 2.

No landslides have been mapped in the site vicinity (Dwyer and others, 1976).

The soil mapped at the site is the Aiken Loam on 2 to 15 percent slopes on Block 1 and the eastern two-thirds of Block 2. The remainder of Block 2 and all of Block 3 are mapped as Aiken Loam on 15 to 30 percent slopes. The Aiken Series of soils are characterized as developing on basic volcanic bedrock (USDA, 1978).

Active faults have been mapped in the vicinity. The closest active fault to the site is the Hunting Creek-Berryessa Fault approximately 8 miles east of the site. The Hunting Creek-Berryessa fault is classified as a type B fault by the UBC, (ICBO, 1988) and is capable of generating a Moment Magnitude 6.9 earthquake.

## SITE CONDITIONS

We evaluated site conditions based on air photo interpretation and a geological reconnaissance. No subsurface exploration was conducted.

The site is characterized by the near-level plateau in the vicinity of the Angwin airport. Block 1 lies just west of the runway and slopes gently towards the west. Block 2 lies adjacent to the northwestern end of the airport runway and is characterized by rolling pasture land that slopes into gentle swales that drain to the west. A wooded area separates the existing pasture from Howell Mountain

Road. Block 3 lies on a gently west-sloping pasture adjacent, and south, of a treated wastewater reservoir.Andesitic volcanic lava is mapped capping this upland plateau. The gentle relief of the surface is probably the result of differential weathering of the associated ash flow and tuff units. (Figure 2). We noted few field stones (boulders) in areas not presently used for pasture.

We did not observe any significant surface erosion or slope instability during our review of the site conditions.

## CONCLUSIONS AND RECOMMENDATIONS

Based on our research and review of the site conditions, the proposed vineyard development appears feasible from the standpoint of engineering geological and geotechnical evaluation. We observed low relief of the volcanic upland surface underlain by strong to very strong andesite and associated volcanic deposits underlying the site that have contributed to the favorable slope stability conditions.

The PPI Erosion Control Plan has proposed several temporary and permanent drainage improvements that include fiber rolls, diversion ditches, and water bars for the vineyard blocks that appear to be appropriate for the intended use.

We did not observe any evidence of significant surface erosion, nor slope instability such as landslides or soil creep. Based on our evaluation, we conclude the proposed vineyard development will not adversely impact the slope stability of the site and adjacent areas. Further, we find the PPI Engineering Erosion Control Plan is appropriate for maintaining site soil stability.

## LIMITATIONS

Our services have been performed in accordance with generally accepted principles and practices of the geological and geotechnical engineering 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

**ROCKRIDGE GEOTECHNICAL**


Craig Shields
Geotechnical Engineer

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

## REFERENCES

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

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.

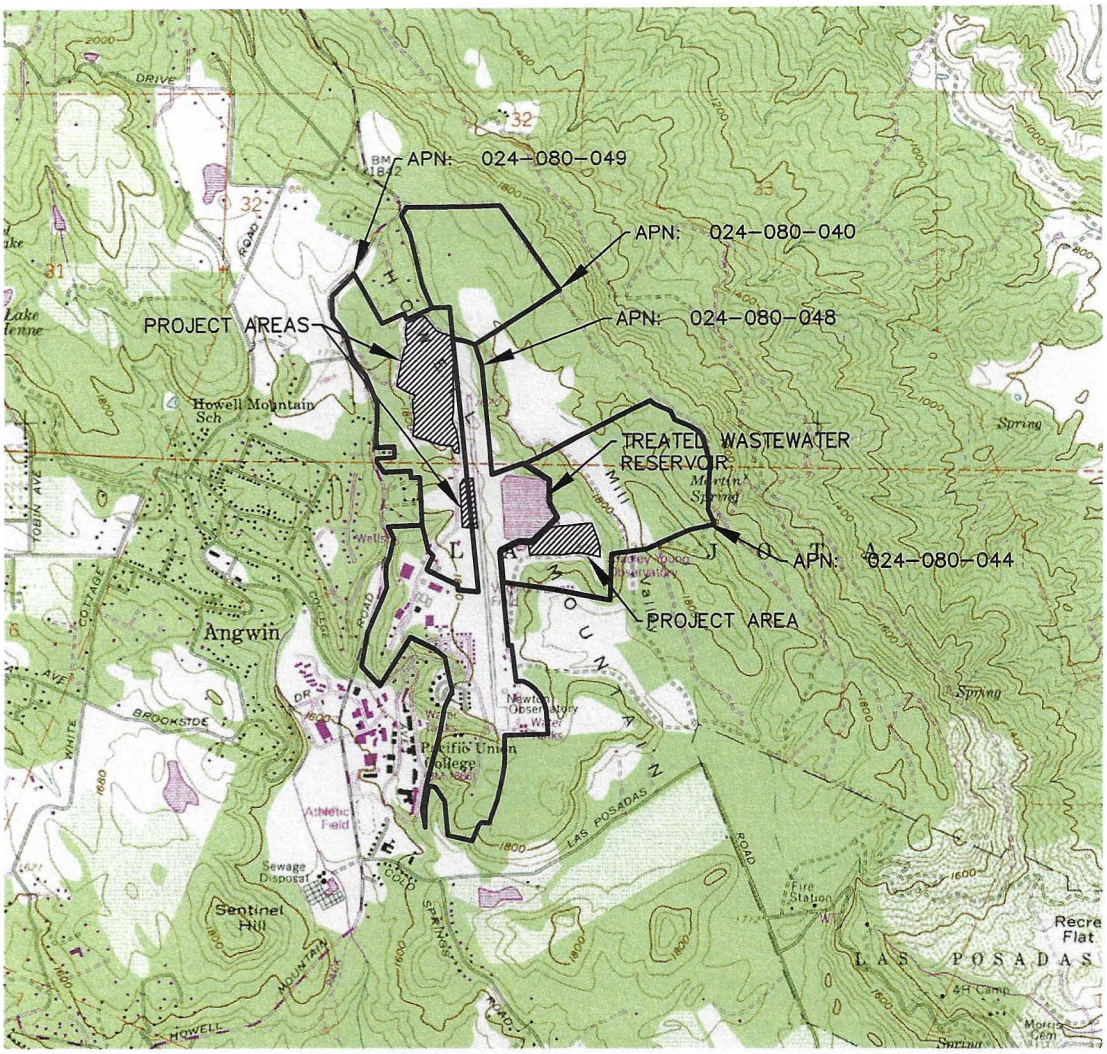
PPI, Inc., 2020, Project Pioneer 1 Angwin Avenue, Erosion Control Plan , 3 Sheets, scale 1-inch=100-feet, January 2020.

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, 1960, St. Helena Quadrangle California 7.5 Minute Series (Topographic), scale 1;24,000.

**Aerial Photographs**

| Date | Photo Number | Scale | Source |
|---|---|---|---|
| 8/27/93 | CIR 4519-11- 9, 10 | 1:12,000 | Pacific Aerial Survey |




USGS St Helena 7.5' Quadrangle

N

2000 ft

Scale

## LOCATION MAP

## PACIFIC UNION COLLEGE DEVELOPMENT

Angwin, California

| Date 11/25/19 | Project No. 91682.02 | Figure 1 |
|---|---|---|

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## EXPLANATION

**Geologic Units**

- Qal - Aluvium
- Qls - landslide deposits

Sonoma Volcanics

- Tsft - ash-flow tuff
- Tsa - andesitic lava
- Tst - pumucitic ash-flow tuff
- Tsr - rhyolite lava flows

0 1 mile

Approximate Scale

N

Base Map: Fox, et al., 1973; U.S.G.S. St Helena Quad.

# REGIONAL GEOLOGY MAP

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Pacific Union College Development
Angwin, California

JOB NUMBER 91682.01

DATE 11/25/19

FIGURE 2