

December 1, 2021
Project No. 21-2102

Drew Aspegren
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176 Main Street, Suite B
St. Helena, California 94574

**Subject: Engineering Geological and Geotechnical Evaluation
Moshkelani Family Vineyards
APN 025-380-016 and 025-390-009
805 Greenfield Road
St Helena, California**

Dear Mr. Aspegren:

We are pleased to present the results of our engineering geological and geotechnical evaluation of the proposed new vineyards at the Moshkelani Vineyards within two parcels (APN 025-380-016 and 025-390-009) at 805 Greenfield Road, St. Helena in Napa County, California. Moshkelani Vineyards propose to plant 3 new vineyard blocks that have a net area of 9.5 acres. The vineyard blocks proposed for replanting are Blocks A and B at APN 025-390-009 and Block A at APN 025-380-016. The site has an existing house, pool, tennis court, winery, vineyards, three small reservoirs and various ranch buildings.

The site lies within the lower Napa River watershed, and within the Hennessey Reservoir subwatershed, as shown on the Site Location Map, Figure 1.

We understand that this evaluation will supplement the “Moshkelani Family Vineyards, LLC, 805 Greenfield Road, Erosion Control Plan - Track I for New Vineyard”, prepared by Napa Valley Vineyard Engineering, Inc., (August 2021).

SCOPE OF SERVICES

The purpose of this evaluation 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- reviewed published and unpublished reports and maps of the site;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; and,
- performed a geological reconnaissance of the site on September 9, 2021.

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REGIONAL GEOLOGY

The site is in the Coast Ranges geomorphic province, which 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.

The bedrock in the site vicinity is mapped as Sonoma Volcanics sedimentary units (Tpms) composed of unconsolidated sand, silt and gravel derived from volcanic deposits and Sonoma Volcanics rhyolite (Tpmv) (Graymer, 2006; Fox and others, 1973), as shown on the Regional Geologic Map, Figure 2. Franciscan Complex metamorphic rocks are mapped approximately one mile northeast and east of the site.

There are no landslides mapped within the site vicinity (Dwyer and others, 1976).

The soil mapped at the site is the Haire loam on 2 to 9 percent slopes and Sobrante loam on 30 to 50 percent slopes, which are characterized as developing on sedimentary rocks and sandstone, respectively (USDA, 1978).

SITE CONDITIONS

We evaluated site conditions based on aerial photo interpretation and a visit to the site on September 9, 2021.

The property is comprised of two parcels (APN 025-380-016 and 025-390-009) that lie between elevations of approximately 700 and 850 feet north of Lake Hennessey and west of Greenfield Road. The site is characterized by two southwestward-flowing drainages that flow into Conn Creek. The drainages are separated by two prominent southwestward-trending spur-ridges.

The southern ridge is occupied by parcel APN 025-380-016 including a house, pool, tennis courts, pond, existing vineyards and proposed vineyards Block A and B that lie on the northwest and south slopes of the ridge. Proposed Blocks A-B generally slope gently to the northwest and south with gradients between 5.5:1 to 3.5:1 (horizontal to vertical), respectively.

The northern ridge is occupied by parcel APN 025-390-009 including two small ponds that lie at the head of each drainage described above, and the proposed vineyard Block A along the crest and southeast slopes of the ridge. The areas of the proposed blocks have been partially cleared of trees and brush. Proposed Block A generally slopes gently to the southeast and south with gradients between 5:1 to 8:1 (horizontal to vertical) but increases to 3.5:1 near the prominent ridge crest near the center to northeast part of the block.

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We observed Sonoma Volcanics rhyolite in outcrop along the crest of the northern spur-ridge and within an irrigation trench along the southwest part of Block A of parcel APN 025-390-009. Sonoma Volcanics sedimentary units appear to blanket the southern part of the site at parcel APN 025-380-016 as evidenced by the abundant gravel and cobbles and pale-yellow soil exposed in the road cuts and float. Young alluvium, composed of sand, silt, clay, and gravel, is present in the active creek channels. The steep sidewalls of the creek are not near the subject vineyard areas and do not threaten the local slope stability.

We did not observe any signs of significant erosion or global instability in the areas proposed for the new vineyards during our site visit or aerial photograph review.

FAULTS AND SEISMICITY

The closest active faults to the site are the West Napa, Hunting Creek, and Green Valley faults. Numerous damaging earthquakes have occurred along these faults in recorded time. For these and other active faults within a 500-kilometer radius of the site, the distance from the site and estimated characteristic moment magnitude¹ [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	11	South	6.97
Hunting Creek (Berryessa)	12	Northeast	6.69
Green Valley	23	East	6.30
Hunting Creek (Bartlett Springs connector)	24	Northeast	6.79
Total Hayward + Rodgers Creek (RC+HN+HS+HE)	27	Southwest	7.58
Rodgers Creek - Healdsburg	27	Southwest	7.19
Maacama	28	West	7.55
Great Valley 04b (Gordon Valley)	29	East	6.77
Great Valley 04a (Trout Creek)	31	East	6.60
Great Valley 03 (Mysterious Ridge)	35.3	East	7.03
Collayami	39.6	North	6.70
Hayward (North, HN)	47	Southeast	6.90
Bartlett Springs	48	North	7.54
North San Andreas (North Coast, SAN)	59	West	7.52
Total North San Andreas (SAO+SAN+SAP+SAS)	59	West	8.04

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.

CONCLUSIONS AND RECOMMENDATIONS

Based on our research and review of the site conditions, the areas proposed for the new vineyards appear to be performing well from an erosion control and slope stability perspective. The site has favorable slope stability conditions, combined with competent Sonoma Volcanics bedrock and Sonoma Volcanics sedimentary units underlying the site that

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will not be affected by the planting of the proposed new vineyards. We do not anticipate any significant changes to the slope stability conditions caused by the planting of the proposed new vineyards. Therefore, based on our engineering geological and geotechnical evaluations, we conclude that the planting of the proposed new vineyards are feasible and will not adversely impact slope stability.

The Erosion Control Plan shows several surface runoff control improvements including water bars, rock-lined v ditches, and diversion ditches. These improvements appear appropriate and will contribute to the existing slope stability by reducing the possibility of concentrated runoff impacting erodible areas.

We trust that this provides you with the information that you require. If you have questions, or need additional information please call or email.

LIMITATIONS

Our services have been performed in accordance with generally accepted principles and practices of the geological and geotechnical professions. This warranty is in lieu of all other warranties, either expressed or implied. In addition, the conclusions 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 this letter provides the information required at this time. If you have any questions, please call.

Sincerely yours,
ROCKRIDGE GEOTECHNICAL, INC.



Craig S. Shields, P.E., G.E.
Principal Geotechnical Engineer

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Eric W. Ford, P.G
Professional Geologist

REFERENCES

Dwyer, M. J., Noguchi, N., and O'Rourke, J., 1976, Reconnaissance photo-interpretation 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.

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.

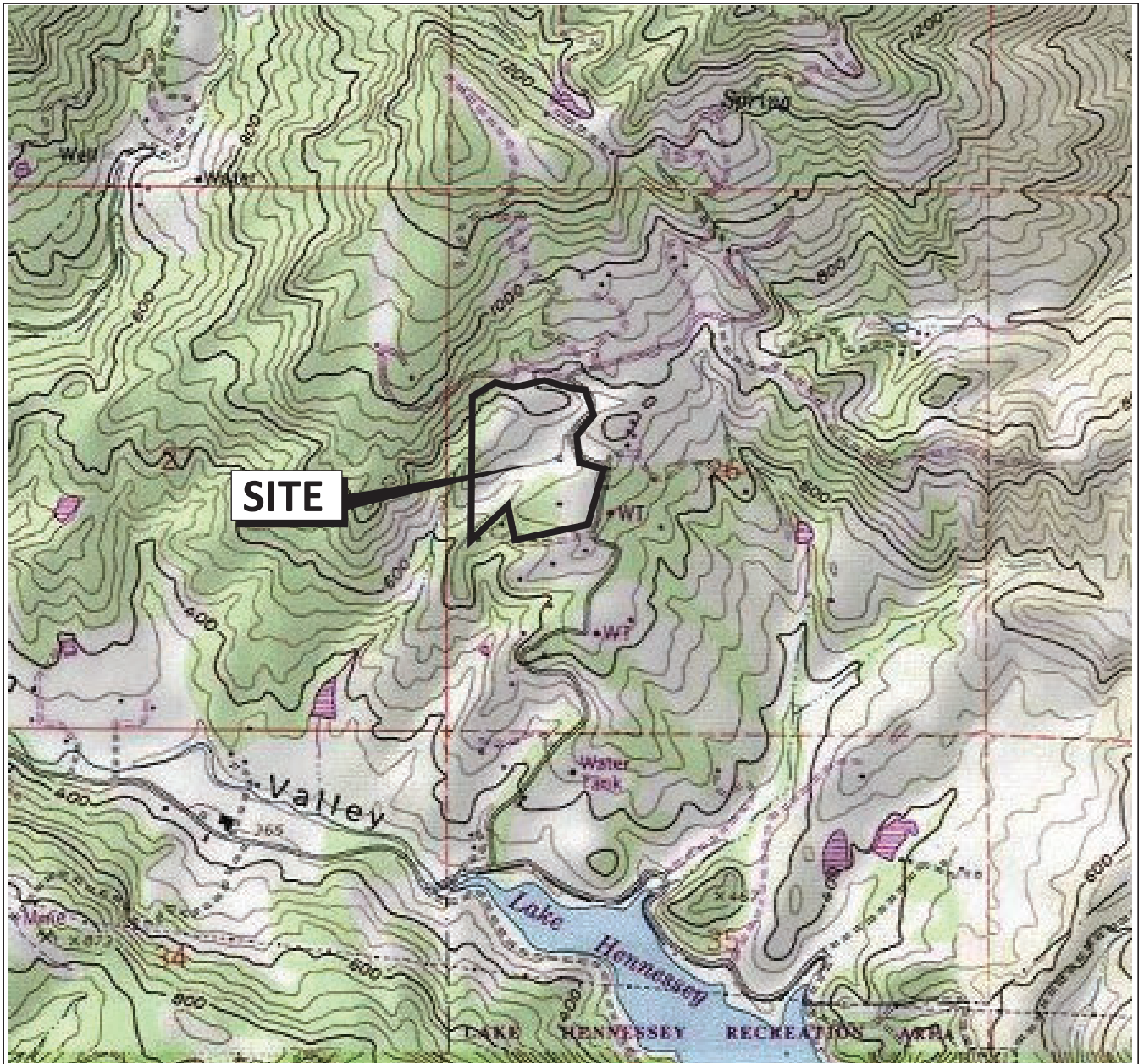
Graymer, R.W., Moring, B.C., Saucedo, G.J., Wentworth, C.M., Brabb, E.E., and Knudsen K.L., (2006). Geologic Map of the San Francisco Bay Region. U.S. Geologic Survey, Scientific Investigation Map 2918. Napa Valley Vineyard Engineering, Inc., 2021, Moshkelani Family Vineyards, LLC, 805 Greenfield Road, Erosion Control Plan - Track I - New Vineyard.

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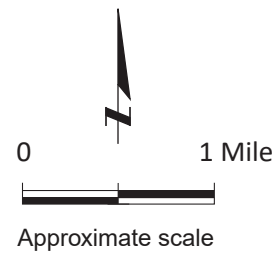
U.S. Geological Survey, 2018, St Helena Quadrangle California 7.5 Minute Series (Topographic), scale 1:24,000. U.S. Geological Survey Working Group, 2013, Uniform California earthquake rupture forecast, version 3 (UCERF3)—The time-independent model: U.S. Geological Survey Open-File Report 2013-1165, 97 p., California Geological Survey Special Report 228, and Southern California Earthquake Center Publication 1792, <http://pubs.usgs.gov/of/2013/1165/>.

AERIAL PHOTOGRAPHS

<u>Date</u>	<u>Photo Number</u>	<u>Scale</u>	<u>Source</u>
11/2/00	CIR 6745-204- 11,12	1:12,000	Pacific Aerial Survey



Reference: USGS, TopoView 2018

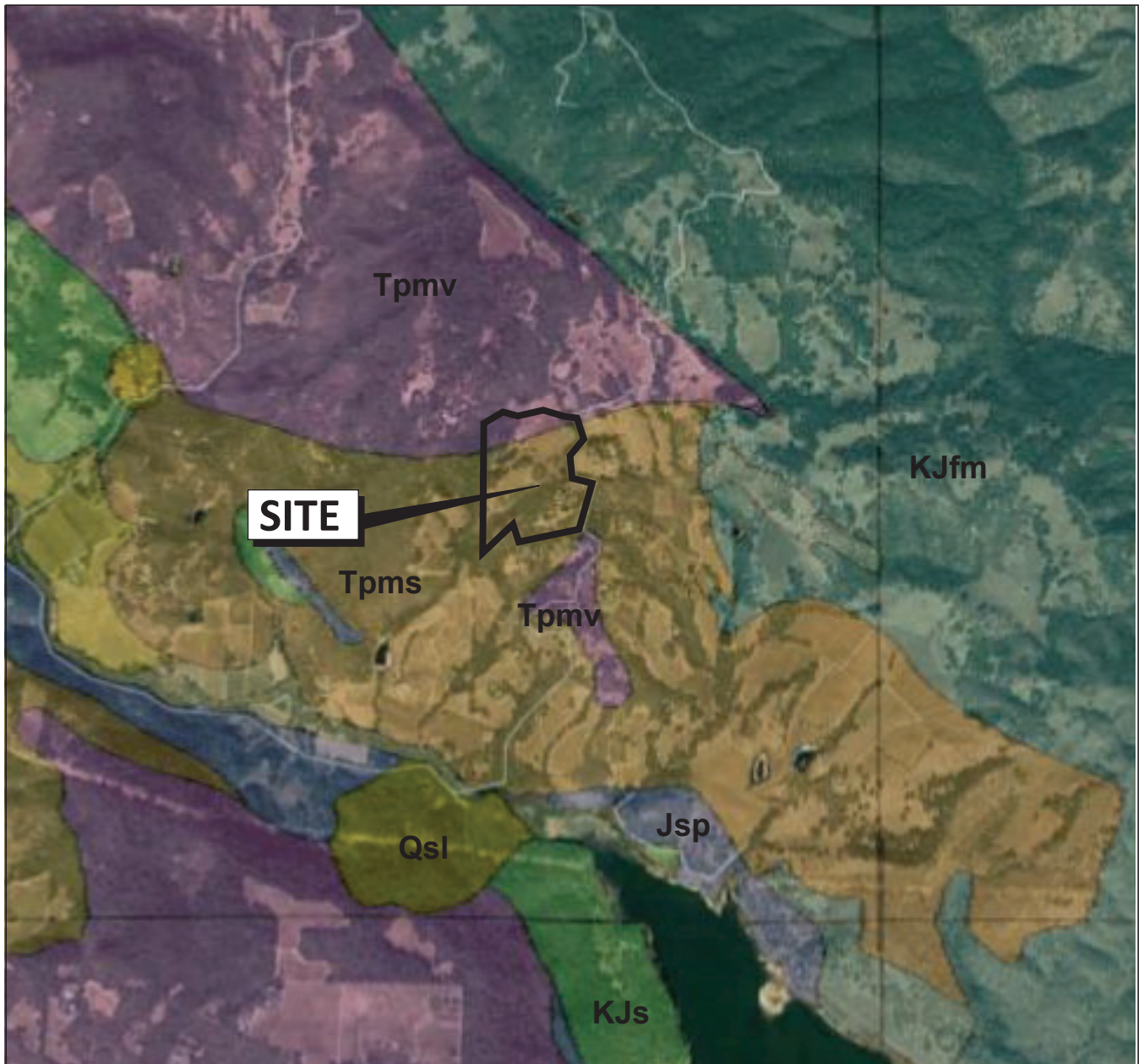


MOSHKELANI FAMILY VINEYARDS
 805 Greenfield Road
 Saint Helena, California



SITE LOCATION MAP

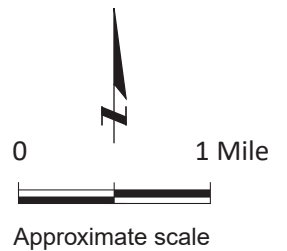
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Reference: Google Earth with U.S.Geological Survey (USGS), Saint Helena 2006

EXPLANATION

- Qsl Hillslope Deposits (Quaternary)
 - Tpmv Sonoma Volcanics (Pliocene and early Miocene)
 - Tpms Sonoma Volcanics - sedimentary deposits (Pliocene and early Miocene)
 - KJfm Franciscan Complex metamorphic rocks (Early Cretaceous and/or Late Jurassic)
- Geologic contact:
dashed where approximate and dotted
where concealed, queried where uncertain



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REGIONAL GEOLOGY MAP



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