RGH CONSULTANTS

Experience is the difference

PRELIMINARY GEOTECHNICAL STUDY REPORT

PELL RESIDENCE
3210 WEST DRY CREEK ROAD
HEALDSBURG, CALIFORNIA

Project Number:

3051.01.01.1

Prepared For:

Bob Pell
6251 Contra Costa Road
Oakland, California 94618

Prepared By:

RGH Consultants

Santa Rosa Office
1305 North Dutton Avenue
Santa Rosa, CA 95401
P: 707-544-1072

Napa Office
1041 Jefferson Street, Suite 4
Napa, CA 94559
P: 707-252-8105

Middletown Office
P.O. Box 852
Middletown, CA 95461
P: 707-987-4602

Ryan Padgett
Project Geologist

Travis A. Whitted
Senior Geotechnical Engineer

PROFESSIONAL GEOLOGIST
RYAN ERIC PADGETT
No. 8982
STATE OF CALIFORNIA

August 19, 2013

REGISTERED PROFESSIONAL ENGINEER
TRAVIS A. WHITTED
No. 2782
GEOTECHNICAL
STATE OF CALIFORNIA

TABLE OF CONTENTS

INTRODUCTION 1

SCOPE 1

SERVICES PROVIDED 1

SITE CONDITIONS 2
- General 2
- Geology 2
- Landslides 2
- Surface 2

DISCUSSION AND CONCLUSIONS 2
- Seismic Hazards 2
  - Faulting 2
  - Seismicity 3
  - Lurching 3
- Geotechnical Issues 3
- Residence Location 3
- Foundations 4
- Erosion and Site Drainage 4
- Groundwater 4
- Supplemental Services 4

LIMITATIONS 4

APPENDICES
- APPENDIX A - PLATES A-1
- APPENDIX B - REFERENCES B-1
- APPENDIX C - DISTRIBUTION C-1
- INFORMATION ABOUT YOUR GEOTECHNICAL REPORT

INTRODUCTION

This report presents the results of our preliminary geotechnical study for the property located at 3210 West Dry Creek Road in Healdsburg, California. The property is designated as Assessor Parcel Number 090-140-038 and is located in the hills west of West Dry Creek Road. The site location is shown on Plate 1.

The undeveloped property is gently to moderately sloping and is heavily wooded. The site is accessed by a dirt road off West Dry Creek Road. We understand it is planned to construct a single-family residence with an attached or detached garage. Auto access would be provided by constructing a new driveway.

The purpose of our study as outlined in our proposal dated August 5, 2013, is to evaluate the soil and geologic conditions to provide geotechnical conclusions regarding the planned use of the property.

SCOPE

Our scope of work was limited to a brief site reconnaissance, a review of selected published geologic data pertinent to the site and preparation of this report. A site-specific subsurface exploration program was not requested, authorized or performed for this phase of our services.

SERVICES PROVIDED

We reviewed select published geologic information pertinent to the site. A list of the geologic references reviewed is presented at the end of this report. On August 1, 2013, our geotechnical engineer and geologist conducted a surficial reconnaissance of the property to observe exposed topographic features, surface soils, rock outcroppings and cut banks.

Based on the geologic literature review and site reconnaissance, we were to develop the following information:

1. A brief description of geologic and surface soil conditions observed during our reconnaissance;

2. Distance to nearby active faults and a discussion of geologic hazards that may affect the proposed project;

3. Our opinions regarding the geotechnical feasibility of the project; and

4. Preliminary conclusions and recommendations concerning:

    a. Primary geotechnical engineering concerns and possible mitigation measures, as applicable;

    b. Suitable foundation systems for the residence;

    c. Stability and feasibility of stable building envelopes and access routes; and

    d. Supplemental geotechnical engineering services.

SITE CONDITIONS

General

Sonoma County is located within the California Coast Range geomorphic province. This province is a geologically complex and seismically active region characterized by sub-parallel northwest-trending faults, mountain ranges and valleys. The oldest bedrock units are the Jurassic-Cretaceous Franciscan Complex, and the Upper Cretaceous Great Valley sequence sediments originally deposited in a marine environment. Subsequently, younger rocks such as the Tertiary-age Sonoma Volcanics group, the Plio-Pleistocene-age Clear Lake Volcanics and sedimentary rocks such as the Guinda, Domengine, Petaluma, Wilson Grove, Cache, Huichica and Glen Ellen formations were deposited throughout the province. Extensive folding and thrust faulting during late Cretaceous through early Tertiary geologic time created complex geologic conditions that underlie the highly varied topography of today. In valleys, the bedrock is covered by thick alluvial soils.

Geology

The geologic map reviewed (Gutierrez et al., 2012) indicates the property is primarily underlain by Coast Range basalt and andesite. Based on our observation of the surface soils and cut banks, we judge that the portion of the site we observed is underlain by moderately to highly weathered basalt. A portion of the geologic map showing the property and general area is presented as Plate 2.

Landslides

The California Geological Survey geologic maps reviewed (Gutierrez, 2012) do not indicate large-scale slope instability at the site, and we did not observe landslides at the site during our reconnaissance. The geologic map showing the property and general area is presented on Plate 2.

Surface

The property extends primarily over gently to moderately sloping terrain. The vegetation consists of dense mature trees and undergrowth. In general, the ground surface is hard. Even surface soils that appear hard when dry can become soft and compress when saturated. This is a condition generally associated with weak, porous surface soils. Based on our experience with similar sites, the weak and porous surface soils extend to depths of 1 to 2 feet. Natural drainage consists of overland flow across the ground surface that concentrates in natural drainage elements such as swales and creeks.

DISCUSSION AND CONCLUSIONS

Seismic Hazards

Faulting

We did not observe landforms within the area that would indicate the presence of active faults and the site is not within a current Alquist-Priolo Earthquake Fault Zone (Hart, 2007). The nearest Alquist-Priolo Earthquake Fault Zone is the Healdsburg-Rodgers Creek system which is

approximately 8 miles southeast of the site. Therefore, we believe the risk of fault rupture at the site is low. However, the site is within an area affected by strong seismic activity. Several northwest-trending Earthquake Fault Zones exist in close proximity to, and within several miles of, the site (Bortugno, 1982). The shortest distances from the site to these faults are presented in the table below.

ACTIVE FAULT PROXIMITY		
Fault	**Direction**	**Distance-Miles**
San Andreas	SW	19
Healdsburg-Rodgers Creek	NE	2½
Maacama	NE	7

Seismicity

Data presented by the Working Group on California Earthquake Probabilities (2007) estimates the chance of one or more large earthquakes (Magnitude 6.7 or greater) in the San Francisco Bay region within the next 30 years to be approximately 63 percent. Therefore, future seismic shaking should be anticipated at the site. It will be necessary to design and construct the proposed improvements in strict adherence with current standards for earthquake-resistant construction.

Lurching

Seismic slope failure or lurching is a phenomenon that occurs during earthquakes when slopes or man-made embankments yield and displace in the unsupported direction. Provided the foundations are installed as recommended in a design level geotechnical study and the proposed fills are adequately keyed into underlying bedrock material, we judge the potential for impact to the proposed improvements from the occurrence of these phenomena at the site is low. However, some of these secondary earthquake effects are unpredictable as to location and extent, as evidenced by the 1989 Loma Prieta Earthquake.

Geotechnical Issues

Based upon the results of our geologic data review and reconnaissance, we judge that it is geotechnically feasible to construct the proposed residence. The primary geotechnical considerations and potential mitigating measures are discussed in the following sections of the report. These conclusions are preliminary and will need to be verified or modified during final design following a detailed site-specific subsurface exploration, laboratory testing and geotechnical engineering evaluation, as recommended herein.

Residence Location

We did not identify or observe any unstable areas, landslides or rapid erosional areas in the area of the proposed residence. As such, we did not identify any areas that would require restriction of development from a geologic perspective.

Foundations

We anticipate that, in general, after remedial grading of weak, compressible and/or expansive surface soils, spread footings could be used for foundation support. As an alternative, within level areas of deep, weak, compressible and/or expansive soils or in sloping areas, the structure could be supported on a deep foundation system. The system could consist of deep spread footings and/or well reinforced grade beams supported on piers. On sloping terrain the spread footings and the piers and grade beams must be interconnected as a rigid grid and reinforced to resist lateral loads. Either foundation system needs to derive its support in bedrock or in engineered fill keyed into bedrock. Criteria for the design of such systems should be developed by a site specific geotechnical study as recommended in the supplemental services section of this report. These foundations are considered traditional foundation systems.

Erosion and Site Drainage

The long-term satisfactory performance of residential improvements constructed on hillsides results primarily from strict control of surface runoff and subsurface seepage. Uncontrolled erosion could induce sloughing or landsliding. Discharge for roadway culverts and ditches need to be protected against erosion and sloughing by energy dissipators such as rip-rap and gabions, or equivalent protective and energy dissipation measures, as appropriate

Groundwater

Free groundwater seeps or springs were not observed during our reconnaissance. On hillsides, rainwater typically percolates through the porous topsoil and migrates downslope in the form of seepage at the interface of the topsoil and bedrock, and through fractures in the bedrock. Fluctuations in the seepage rates typically occur due to variations in rainfall and other factors such as periodic irrigation.

Supplemental Services

We should perform a detailed design-level geotechnical study prior to the construction of the planned residence. The study should include borings or backhoe pits, laboratory testing and engineering analyses. The geotechnical study should address specific design and locating aspects of each planned structure location, and the data generated should be incorporated into project plans. The plans should then be reviewed by the geotechnical engineer prior to receiving bids for planned work.

LIMITATIONS

This report has been prepared by RGH for the exclusive use of Bob Pell and his consultants to evaluate the geotechnical feasibility of the proposed residence.

Our services consist of professional opinions and conclusions developed in accordance with generally accepted geotechnical engineering principles and practices. We provide no warranty, either expressed or implied. Our conclusions and recommendations are based on the information provided to us, the results of our field reconnaissance, data review, and professional judgment. As such, our conclusions and recommendations should be considered preliminary and for feasibility

and planning purposes only. A subsurface study, such as recommended herein, may reveal conditions different from those inferred by surface observation and data review only. Such subsurface study may warrant a revision to our preliminary conclusions.

Site conditions and cultural features described in the text of this report are those existing at the time of our field reconnaissance on August 1, 2013, and may not necessarily be the same or comparable at other times.

It should be understood that slope failures including landslides, debris flows and erosion are on-going natural processes which gradually wear away the landscape. Residual soils and weathered bedrock can be susceptible to downslope movement, even on apparently stable sites. Such inherent hillside and slope risks are generally more prevalent during periods of intense and prolonged rainfall, which occasionally occur in northern California and/or during earthquakes. Therefore, it must be accepted that occasional slope failure and erosion and deposition of the residual soils and weathered bedrock materials are irreducible risks and hazards of building upon or near the base of any hillside or steep slope throughout northern California. By accepting this report, the client and other recipients acknowledge their understanding and acceptance of these risks and hazards.

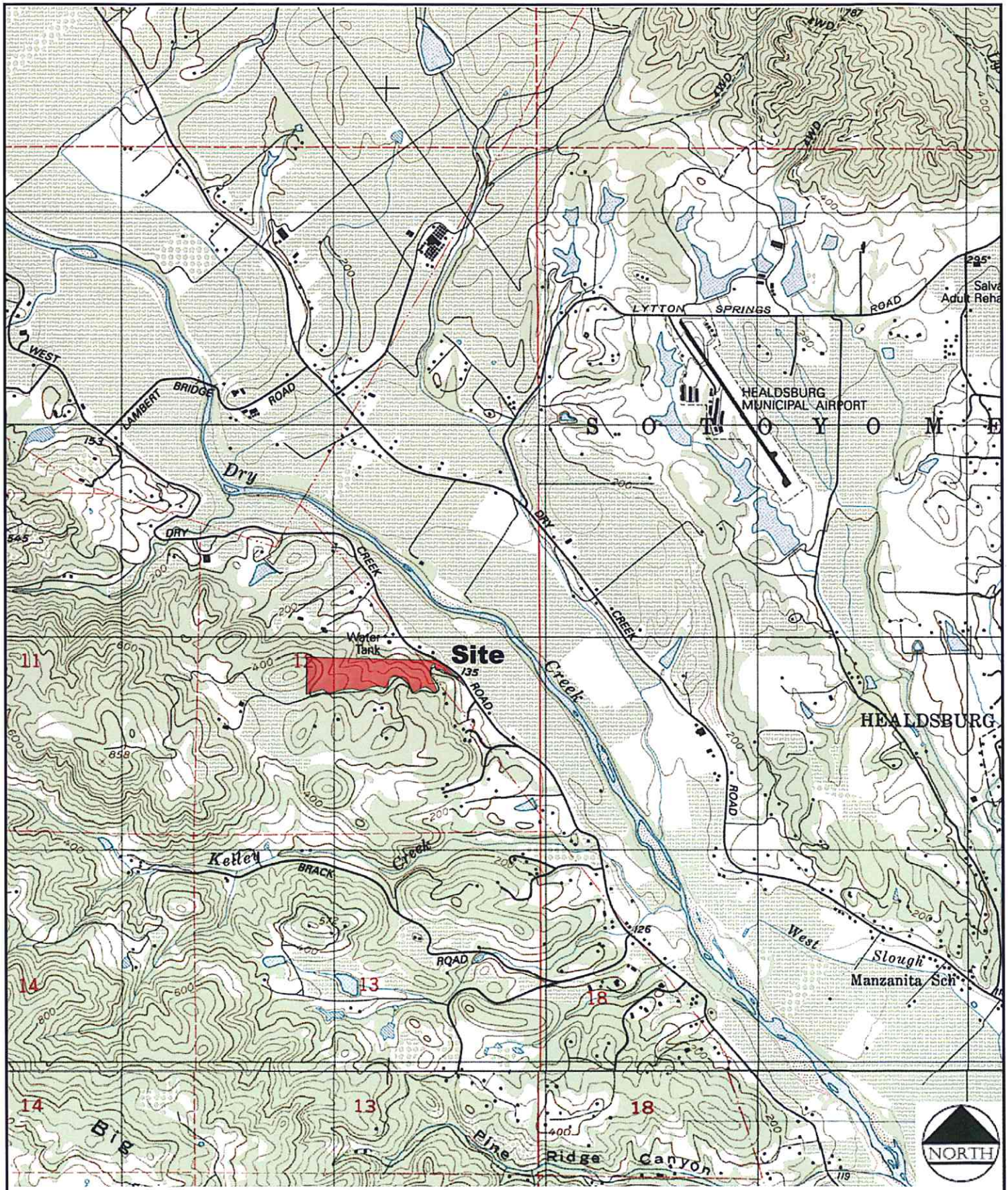
The scope of our services did not include an environmental assessment or a study of the presence (or absence) of hazardous, toxic or corrosive materials in the soil, surface water, groundwater or air on, below, or around this site, nor did it include an evaluation or study for the presence (or absence) of wetlands.

APPENDIX A - PLATES

LIST OF PLATES

Plate 1 Site Location Map

Plate 2 Geologic Map



Reference: Maptech Topoquad, Geyserville, California Quadrangle

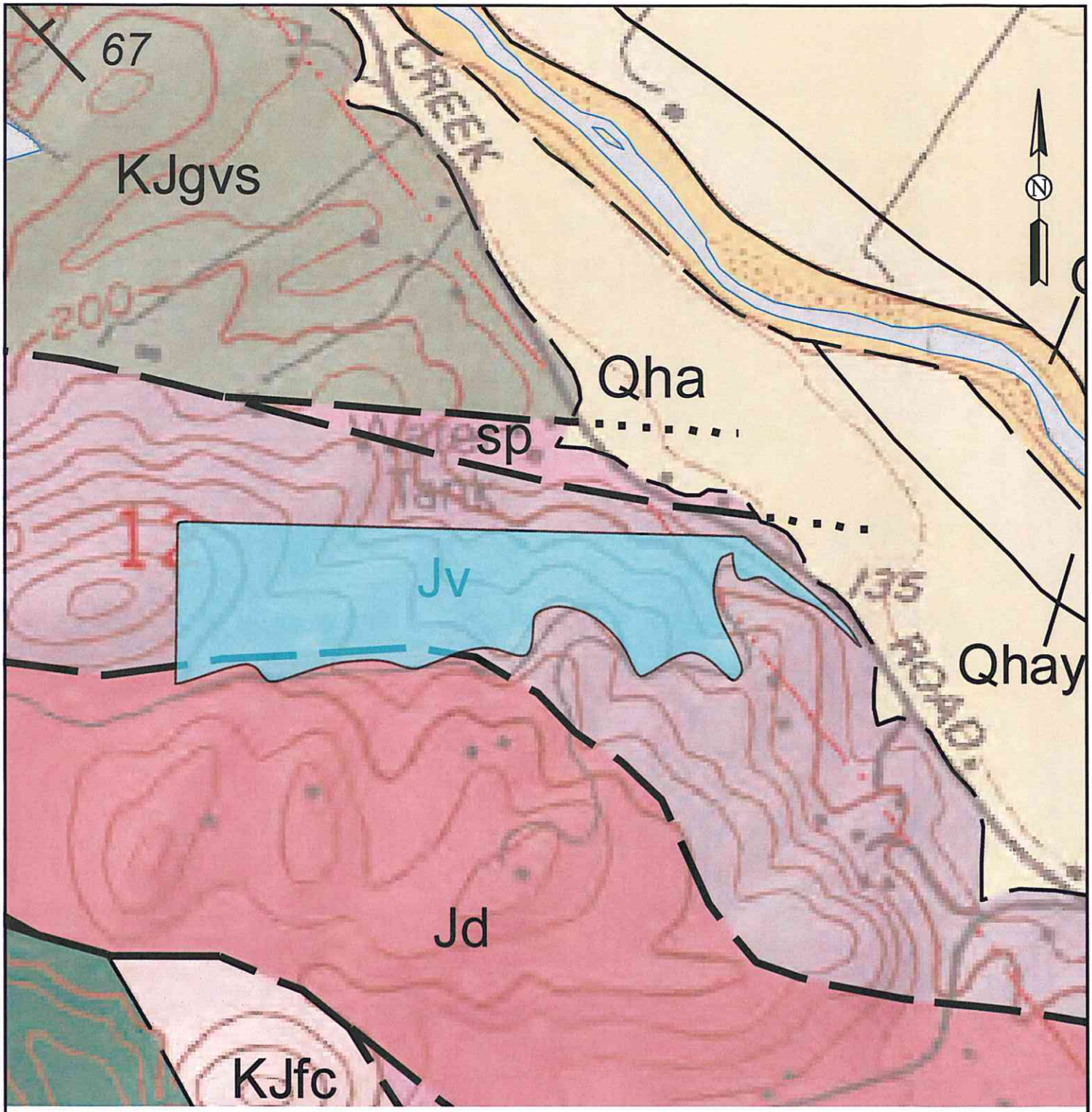
Scale: 1" = 2000'

RGH CONSULTANTS

Job No: 3051.01.01.1 | Date: AUG 2013

SITE LOCATION MAP
Pell Residence
3210 West Dry Creek Road
Healdsburg, California

PLATE
1



KJgvs - Great Valley Sequence, mudstone, shale, and sandstone
Jv - Coast Range Ophiolite, basalt and andesite
Jd - Coast Range Ophiolite, Diabase, gabbro, and diorite
Qha - Alluvial Deposits (Holocene), sand, silt and gravel
Qhay - Alluvial Deposits (latest Holocene), sand, silt, clay and gravel
KJfc - Franciscan Complex, chert
sp - Serpentinite

Reference: Gutierrez, 2012

Scale: 1" = 500'

RGH CONSULTANTS

Job No: 3051.01.01.1 | Date: AUG 2013

GEOLOGIC MAP
Pell Residence
3210 West Dry Creek Road
Healdsburg, California

PLATE
2

APPENDIX B - REFERENCES

Bortugno, E.J., 1982, Map Showing Recency of Faulting, Santa Rosa Quadrangle in Wagner and Bortugno, Geologic Map of the Santa Rosa Quadrangle: California Division of Mines and Geology, Regional Geologic Map Series, Map No. 2A, Santa Rosa Quadrangle, Scale 1:250,000.

Bryant, W.A., and Hart, E.W., Interim Revision 2007, Fault-Rupture Zones in California; California Geological Survey, Special Publication 42, p. 21 with Appendices A through F.

California Building Code, 2007, California Building Standard Commission.

Gutierrez, Carlos I., et al., 2012, Preliminary Geologic Map of the Geyserville 7.5' Quadrangle, Sonoma County, California: A Digital Database: California Geological Survey.

Working Group on California Earthquake Probabilities, 2007, Uniform California Earthquake Rupture Forecast (UCERF): Notes on Southern California Earthquake Center (SCEC) Web Site (http://www.scec.org/ucerf/).

APPENDIX C - DISTRIBUTION

Bob Pell (2,0 and electronically)
6251 Contra Costa Road
Oakland, CA 94618
bob.pell@aecom.com

REP:TAW:rp:lw

Copyright 2013 by RGH Consultants

s:\project files\3001-3250\3051\3051.01.01.1 pell residence\gs report prelim.doc