

**A.M. BAIRD**

ENGINEERING & SURVEYING, INC.

1257 Main Street • P.O. Box 396 • Fortuna, CA. 95540 • (707) 725-5182 • Fax (707) 725-5581

**CONSULTING - LAND DEVELOPMENT - DESIGN - SURVEYING**

# SOILS ENGINEERING

Geologic R-2

## SOILS REPORT

PREPARED FOR

**Seth Glasson**  
**APN: 033-110-003**  
**1897 Red Rock Road**

**Garberville, Humboldt County, CA**

PREPARED BY:

**ALLAN M. BAIRD, RCE 23681**



January 25, 2019  
Job# 19\_4814





January 25, 2019  
Building Official  
County of Humboldt Building Department  
3015 H Street  
Eureka, California 95501

**Humboldt County R2 Report:** 1897 Red Rock Road  
Garberville, CA 95542  
AP# 033-110-003  
Client: Seth Glasson; Job# 19\_4814

## **INTRODUCTION**

At the request Mr. Glasson, A.M. Baird Engineering has reviewed the above referenced lot in Garberville, California for a soil's suitability report. This report is furnished to satisfy the soils criteria as required by Humboldt County for an "R2" Geological Report as pertaining to commercial construction. Observations of this inspection regarding the site, soils, and topography are the contents of this report.

## **SITE LOCATION AND DESCRIPTION**

Garberville is located some 67 road miles south-southeast of Eureka. The site is located at approximately 1,100-ft in elevation above the Pacific Ocean per Google Earth Pro 2019. The parcel is designated as APN: 033-110-003 and is  $\pm 112.17$  acres. Access to the proposed parcel is provided by Red Rock Road. This lot slopes southeast at 0-5%. See Enclosed Site Map

## **SOIL CONDITIONS**

Soil sampling on the parcel revealed zero to six inches of black (Munsell color 10 YR 2/1) topsoil, with very gravelly contents and no roots. The subsoil below this is comprised of dark yellowish brown (Munsell color 10 YR 4/6) consisting of at least 37% coarse content by weight. The subsoil is the target load bearing soil for the placement of the foundation (see recommendation #1). There is no indication in the surrounding area of any slumps, faults, or springs that would be detrimental to the building site.

## **GROUNDWATER**

No groundwater or soil mottling was encountered during the soils investigation.

## **SLOPE STABILITY AND SURFACE DRAINAGE HAZARDS**

The nature of the entire property appears to be stable and should remain stable provided the recommendations given in this report are followed. Areas disturbed during construction activities should be re-vegetated prior to the rainy season. Impermeable surfaces such as driveways and rooftops should be designed to uniformly diffuse runoff away from structures, and significant quantities of concentrated runoff should not be discharged over slopes greater than 20%.



## GEOLOGICAL HAZARDS

This area of California is seismically very active and is subject to earthquakes of large magnitude, which can produce significant ground shaking. This high to very high level of risk of seismic hazard is typical for Garberville.

In general, there are many sources of large magnitude earthquakes that could potentially affect this project area. These sources include but are not limited to the Garberville-Briceland Fault Zone located within one mile the project, the San Andreas Fault which leads out to sea at Point Delgada, the subducted Gorda Oceanic Crustal Plate North of Shelter Cove, the complex northwesterly oriented fault systems surrounding the Humboldt Bay area (including the Little Salmon, Mad River, Freshwater, and Gorda Fault Zones), and the Cascadia Subduction Zone near Cape Mendocino.

The San Andreas Fault has produced major earthquakes in this area at intervals of approximately 75-150 years. Earthquakes with average magnitudes of 5.8 occur on average every 2 years at varying locations in or near Humboldt County, and geological evidence suggests that the San Andreas Fault is capable of generating magnitudes much higher (7+). This high to very high level of risk of seismic hazard is typical for Northern California, and residents assume this risk when they choose to build in this area. Earthquakes capable of causing intense ground shaking and structural damage can be expected to occur within the design life of the proposed structure (40+ years). Residents should be aware of this inherent risk, and should understand that these risks cannot be fully eliminated with engineered design. As required, all structural design should be in conformance with the 2016 California Building Code (CBC) Seismic Design Category (SDC) E (Section 1613A, 2016 CBC). Latitude and Longitude values were taken from the Humboldt County Web GIS website (County of Humboldt, 2016). Site-specific soil parameters were calculated using the USGS U.S. Seismic Design Map (Table 1) (USGS, 2019):



| <b>Table 1: USGS Ground Motion Parameters</b>   |  |
|---|--|
| Latitude  | 40.045980                                    |
| Longitude   | -123.759735                                  |
| Occupancy Category  | II (normal buildings)                        |
| Importance Factor, I  | 1.0  |
| Site Class  | D (stiff soil) (default)                     |
| Site Coefficients   | $F_a=1.0$                                    |
|   | $F_v=1.5$                                    |
| Mapped Spectral Response Acceleration Parameters  | $S_s=1.874$ g (0.2-second spectral response) |
|   | $S_1=0.754$ g (1-second spectral response)   |
| Design Spectral Response Acceleration Parameters  | $S_{MS}=1.874$ g (0.2-second period)         |
|   | $S_{M1}=1.13$ g (1-second period)            |
| Design Spectral Response Acceleration Parameters (five-percent damped design spectral response) | $S_{DS}=1.249$ g (0.2-second period)         |
|   | $S_{D1}=0.754$ g (1-second period)           |
| Seismic Design Category (SDC)   | E ( $S_1>0.75$ g)                            |
| Peak Ground Acceleration ( $S_s/2.5$ )  | 0.7496                                       |

## FLOOD HAZARDS

The site is not within a Federal Emergency Management Agency (FEMA) mapped flood zone nor the Department of Water Resources (DWR) awareness floodplain. The site is not considered to be within a flood prone area.

## EXISTING GRADING (CUT/FILL)

Historical evidence of cut/fill was apparent on the property during this site inspection. The grading work was done sometime after 2005 and more done around 2010 as per Google Earth Pro 2019.

## EARTHQUAKE MOTION HAZARDS

Slope instability, liquefaction, and surface rupture due exclusively to faulting or lateral spreading are not considered consequential as to require specific analysis. Dynamic seismic loading for retaining walls supporting more than six feet of backfill and peak ground acceleration for design purposes shall be  $S_s/2.5$  and ASCE 7-10 Figure 22-7, unless additional site-specific analysis is provided beyond the scope contained herein.

## RECOMMENDATIONS

No expansive soils were encountered during this investigation that require specific recommendations. Single or multilevel structures are suitable uses for this site, and settlement is not anticipated to be detrimental provided considerations are given to the recommendations presented herein:



1) Foundations should be reinforced and be contained in firm, undisturbed native soil. The foundation should be extended a minimum of 18" **past any topsoil or fill** and into natural undisturbed ground for single-story structures, and a minimum of 24" for two-story structures. Spread footings and foundation walls should be reinforced and be at minimum **18" wide for one-story structures and 24" for two story structures**. Foundation should be a minimum of 12" thick and reinforced with rebar. Foundation footing setbacks to slope breaks shall comply with specifications in Section 1808.7 and Figure 1808.7.1 of the 2016 CBC. Additionally, footings shall also comply with the following maximum loads:

| <u>Loading Condition</u>                  | <u>Allowable Bearing Pressure</u> |
|---|-----------------------------------|
| Dead plus long-term live load             | 1000 psf*                         |
| Dead plus all live loads                  | 1500 psf                          |
| Total design loads including wind/seismic | 2000 psf                          |

\*This load may be increased to 1500 psf if design criteria warrant, in which case expected settlement will be 1/2" to 1" total over the length of the structure.

2) Preparation of the building area for grading should include stripping and removal of all vegetation and debris to 5 feet outside the building area. The depth for removal for vegetation and debris will generally be in the neighborhood of 3-6" or less, at times deeper removal may be necessary to remove isolated organic matter and roots. This material is to be removed and should not be reused for any fill within the site area. All surface runoff from completed construction or paved areas of the lot should be controlled to flow and drain away or be routed in such a manner as to not affect the foundation soils themselves. All existing and proposed fill and cut slopes as applicable, are to be re-vegetated or landscaped to prevent erosion. This is to be done to the satisfaction of local building officials. If cutting, grading, or foundation preparation is to be done at a depth greater than 5 feet, it is recommended that this office be contacted for specific comments and recommendations.

3) All surface runoff from developed or paved areas of the lot should be controlled to flow and drain away or be routed in such a manner as to not affect slope stability or the integrity of the foundation soil. Erosion control dissipation devices shall be installed at all locations where water is discharged over slopes greater than 20%.

4) All excavation shall be completed in conformance with Section 1804 of the 2016 CBC. Additionally, earthwork grading/excavation shall be conducted during the dry season, unless constructed in conformance with a grading and erosion control plan and permitted.

5) If any foundation fill is to be used, it shall be approved by the soils engineer and be placed in lifts of 6" to 8", compacted to 95% relative compaction (per ASTM-D 1557). On site soils that have been removed of debris and organic matter are to be considered acceptable for use as compacted fill for the proposed development.



- 6) All existing and proposed fill and cut slopes are to be re-vegetated to prevent erosion. This is to be done to the satisfaction of local building officials. Existing vegetation beyond the construction area should be left undisturbed if feasible.
- 7) If cutting or grading is to be done at a depth greater than 5 feet, it is recommended that this office be contacted for specific comments and recommendations, including retaining wall design loads.
- 8) Gutters are to extend along all roof lines and lead to down spouts. In turn, down spouts should lead to pipes carrying roof runoff away from the building site, as well as any fill or foundations that may adversely affect the site soil or adjacent slopes.
- 9) Floor slab thickness shall be designed with an assumed vertical modulus sub-grade reaction of 150 psi as appropriate for slabs over engineered fill, or over compacted native material as it exists onsite. At minimum, floor slabs should be reinforced by #3 reinforcing bars at 18" o.c. each way and be underlying by at least 4" of class 2 aggregate base to act as a capillary moisture break, underlying by a vapor barrier. The vapor barrier shall be in direct contact with concrete. Contractor and developer are responsible for determining the extent of waterproofing methods necessary and implementing the appropriate measures as described in recommendation #9, and shall be aware of the current recommendations and guidelines for slabs below grade according to the American Concrete Institute.
- 10) All foundation design and construction shall be in conformance with Chapter 18 of the 2016 CBC. All footings are to meet local requirements for seismic criteria, as required by the 2016 CBC. Seismic design parameters have been included in this report based on latitude and longitude values taken from the Humboldt County Web GIS website (County of Humboldt, 2019).
- 11) Any floor space at or below existing grade level that will be used as inhabitable areas or for storage shall be appropriately dampproofed or waterproofed as described in Section 1805 of the 2016 CBC. These appropriate measures at minimum will constitute installation of 6-mil vapor barrier or equivalent against the foundation or retaining wall, along with drain rock a minimum of 12" thick to the bottom of the footing and made to drain by 4" perforated pipe tight-lines to daylight away from the foundation soils. It is recommended that slabs below grade used for living space be underlain with a minimum of 6" of open graded aggregate instead of 4" as described in recommendation #9 for an increased protection from capillary water infiltration. Additional or superior measures may include installation of sub-slab drainage pipes or geo-textile membranes and should be installed according to current standards of practice.

Additional Fill material recommendations (as applicable):

- Building area fill can be any soils and aggregate less debris, organic material and particles greater than 3", with an expansion index less than or equal to 20, are suitable for building area fills. All fills placed on natural subgrade should be compacted to minimum 95% relative compaction and optimum moisture (ASTM-D 1557).



- Trench back fill soils and aggregate similar to building area fills need to meet gradation and quality requirements for "Structural Back Fill" for Caltrans Standard Specifications.
- For sub-slab sand, a sieve size #4 needs to have 90-100% pass rate, and a sieve size #200 needs to have 1-5% passage. Sub-slab aggregate should have a sieve size of 3/4" with 100% passage and a sieve for #4 with 0% pass rate. All aggregate base used on site shall meet the gradation and quality requirements for Class 2 aggregate base for Caltrans Standard Specifications.

## CLOSURE

Based upon the review conducted by this office of the site and surrounding terrain no further geological evaluation is required; therefore, no geotechnical engineer consultation is warranted. This office shall be contacted if subsurface conditions differ significantly from those stated in this report, or if further investigation or inspection is requested by involved agencies.

It has been assumed that observed soils are representative of the entire subsurface conditions on the lot in question. If it is found during construction that subsoil conditions differ from those described, the conclusions and recommendations of this report should be considered invalid unless the changes are reviewed and the conclusions and recommendations are modified or approved in writing. This analysis was conducted in accordance with the standards maintained by professionals in the engineering field, and the findings presented herein are reasonably representative of site conditions and probable site behavior based on this investigation. Due to the inexact nature of many engineering analyses, including those employed during the preparation of this report, there is no guarantee or warranty expressed or implied. Enclosed in this report are site maps, Assessor's Parcel Maps, and geologic maps as referenced.

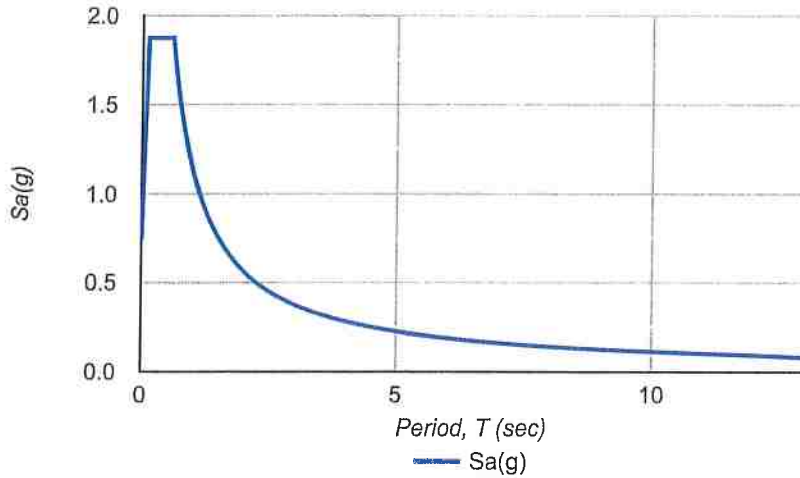
If you have any questions regarding this report, or to schedule an inspection, please feel free to contact this office at (707) 725-5182.

Sincerely,

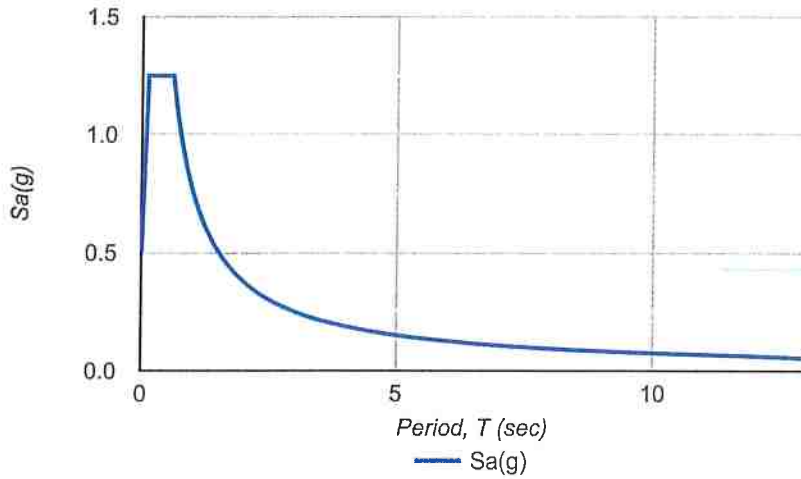
Allan M. Baird  
Principal, RCE# 23681



### MCER Response Spectrum



### Design Response Spectrum



### DISCLAIMER

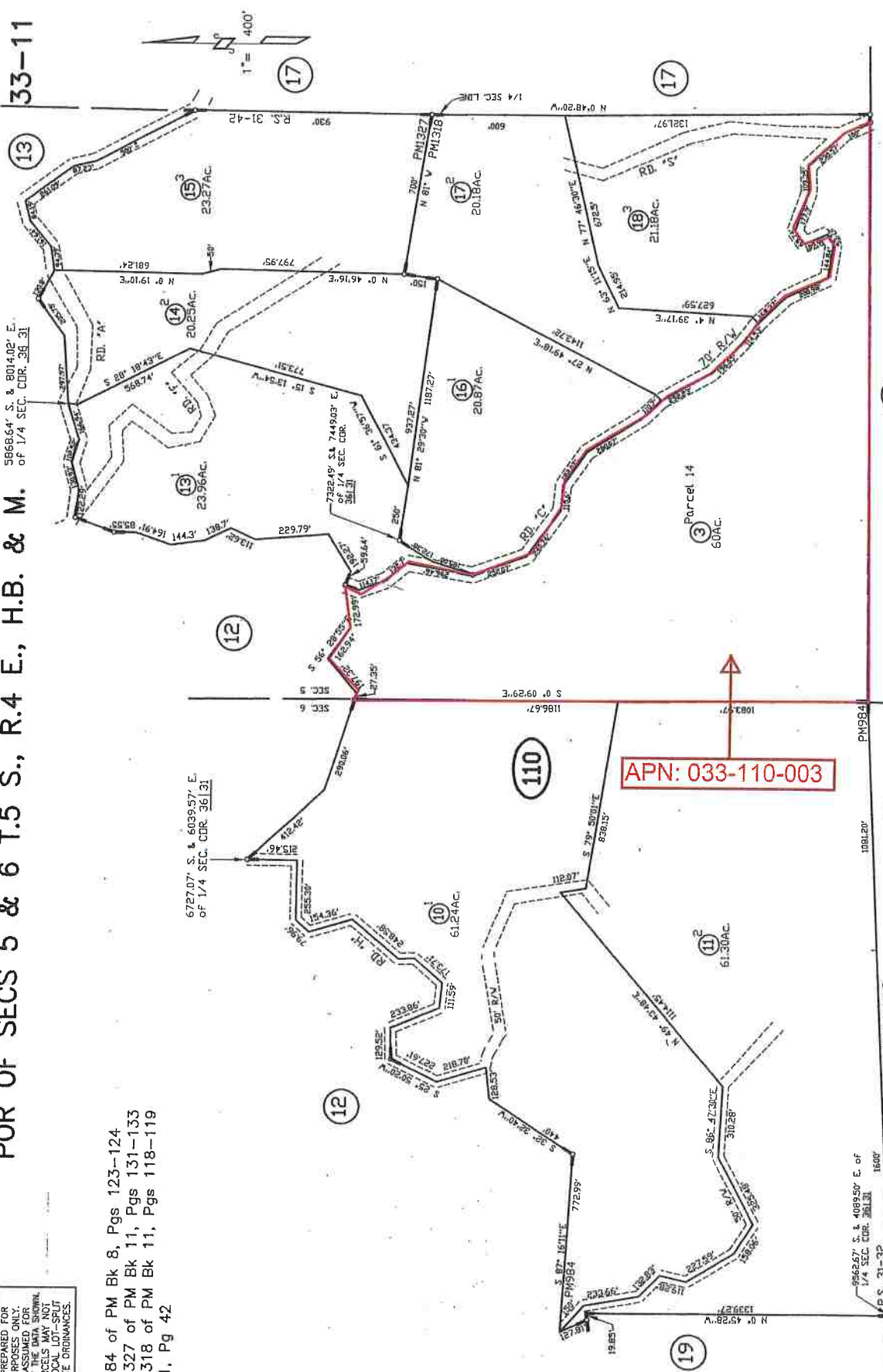
While the information presented on this website is believed to be correct, SEAOOC / OSHPD and its sponsors and contributors assume no responsibility or liability for its accuracy. The material presented in this web application should not be used or relied upon for any specific application without competent examination and verification of its accuracy, suitability and applicability by engineers or other licensed professionals. SEAOOC / OSHPD do not intend that the use of this information replace the sound judgment of such competent professionals, having experience and knowledge in the field of practice, nor to substitute for the standard of care required of such professionals in interpreting and applying the results of the seismic data provided by this website. Users of the information from this website assume all liability arising from such use. Use of the output of this website does not imply approval by the governing building code bodies responsible for building code approval and interpretation for the building site described by latitude/longitude location in the search results of this website.



**ASSESSOR'S PARCEL MAP**  
 1. THIS MAP WAS PREPARED FOR ASSESSMENT PURPOSES ONLY.  
 2. NO LIABILITY IS ASSUMED FOR THE ACCURACY OF THIS MAP.  
 3. ASSESSOR'S PARCELS MAY NOT COMPLY WITH LOCAL LOT-SPLIT OR BUILDING SITE ORDINANCES.

POR OF SECS 5 & 6 T.5 S., R.4 E., H.B. & M.  
 5865.64' S. & 8014.02' E. OF 1/4 SEC. CDR. 361.31  
 PM NO 984 of PM Bk 8, Pgs 123-124  
 PM NO 1327 of PM Bk 11, Pgs 131-133  
 PM NO 1318 of PM Bk 11, Pgs 118-119  
 RS Bk 31, Pg 42

33-11



NOTE - Assessor's Block Numbers Shown in Ellipses  
 Assessor's Parcel Numbers Shown in Circles

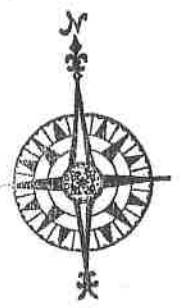


Assessor's Map Bk.33, Pg.11  
 County of Humboldt, CA

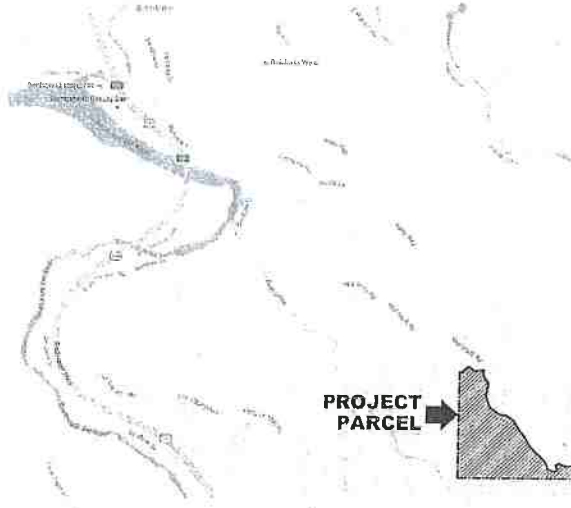


4436  
T. 4 S.  
4435  
(HARRIS)  
1264 II SW  
T. 5 S.  
4434  
4433  
280'  
4432  
4431

APN: 033-110-003



Apr 19 2016 12:57pm  
 C:\Users\NKT\OneDrive\3\_projects\1630.00\_seth\_glasson - permitting\05\_drawing\1630.00\_seth\_glasson\_grading\_recovering.dwg

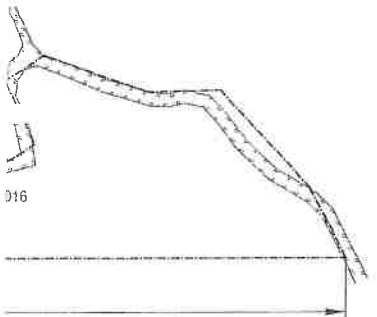


**VICINITY MAP**  
 1"=500'

|   |
|---|
|   |
|   |
|   |
| PROPAGATION, 3480 SF FLOWERING GREENHOUSES TO |
| PROPAGATION AND VEGETATIVE GROWTH ONLY        |
| 16 EXISTING AREA                              |

JRCS WITHIN 600 FEET  
 ONLY.

10-GALLON, AND (3)4800-GALLON  
 TIVATION AREA-1.05 ACRES TOTAL  
 ES  
 LLON  
 NEIGHBORING RESIDENCE  
 1219'  
 ESSORY TO CULTIVATION, BUILT BEFORE 2005



016

1"  
 GRAPHIC SCALE MEASURES 1 INCH  
 ON FULL-SIZE PLANS.



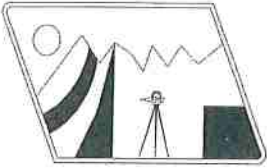
NATHAN K. TOEWS, PE  
 CA RCE 70251  
 NKT-PE@OUTLOOK.COM  
 707-502-0582

| NO. | HISTORY / REVISION | BY | CHK. | DATE |
|-----|--------------------|----|------|------|
|     |                    |    |      |      |
|     |                    |    |      |      |
|     |                    |    |      |      |
|     |                    |    |      |      |

**SITE IMPROVEMENTS**  
 1897 RED ROCK ROAD, GARBERVILLE, CA 95542, APN 033-110-003  
**CULTIVATION SITE PLAN**  
 SETH GLASSON  
 PO BOX 1664, REDWAY, CA 95560

|            |            |
|------------|------------|
| DATE       | 12-05-2016 |
| JOB NUMBER | 1630.00    |
| SHEET      |            |

C2.0A



# A.M. BAIRD

ENGINEERING & SURVEYING, INC.

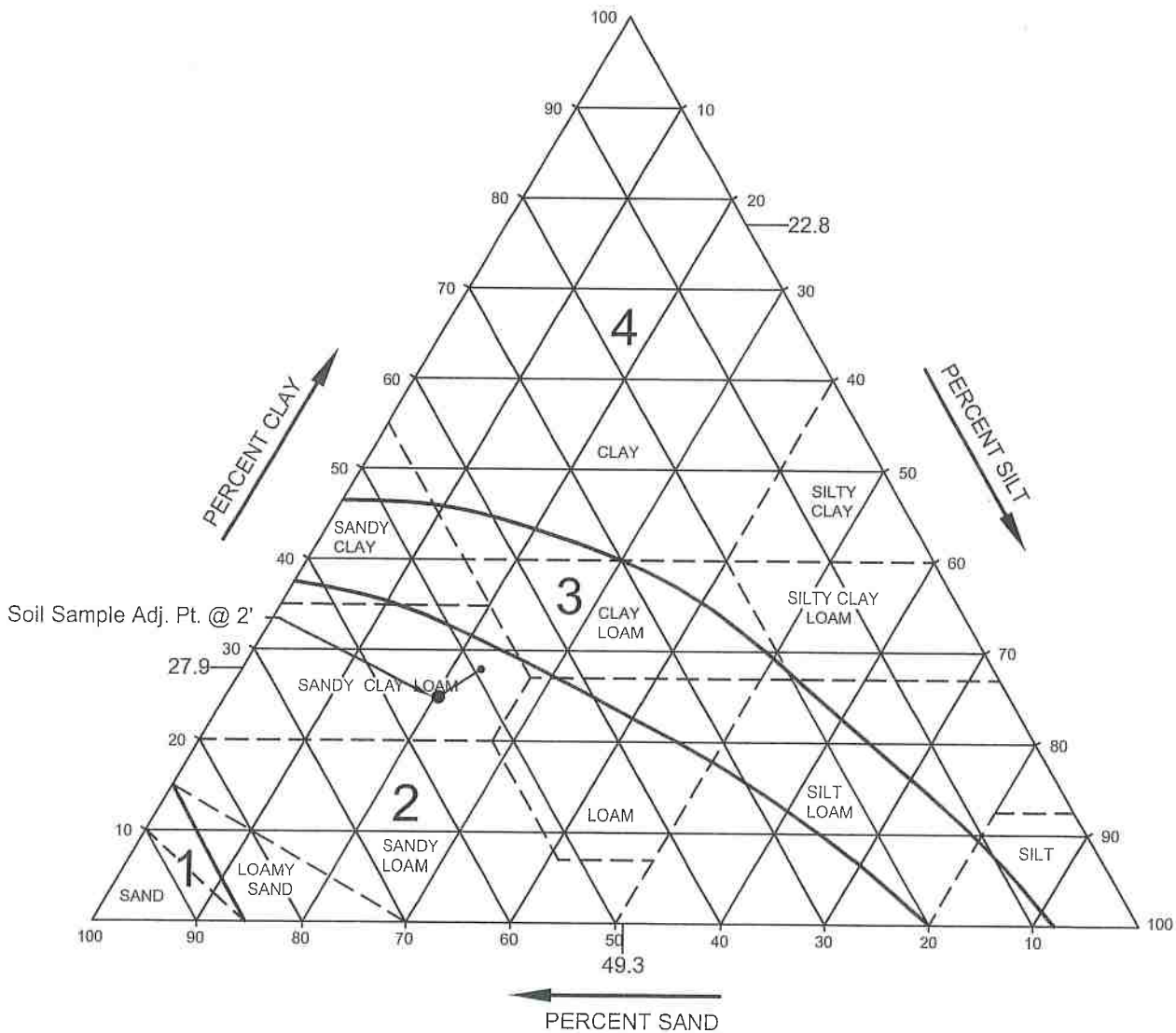
1257 Main Street • P.O. Box 396 • Fortuna, CA. 95540 • (707) 725-5182 • Fax (707) 725-5581

**CONSULTING - LAND DEVELOPMENT - DESIGN - SURVEYING**

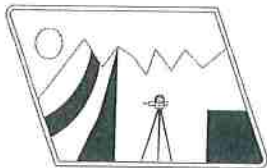
CLIENT: GLASSON

DATE: 1/25/2019

APN: 033-110-003



1. COARSE ADJUSTMENT: Soil Sample @ 2.0' = 4.8%



# A.M. BAIRD

ENGINEERING & SURVEYING, INC.

1257 Main Street • P.O. Box 396 • Fortuna, CA. 95540 • (707) 725-5182 • Fax (707) 725-5581

**CONSULTING - LAND DEVELOPMENT - DESIGN - SURVEYING**

## WORKSHEET FOR SOIL TEXTURE

Project: GLASSON

by: PDS

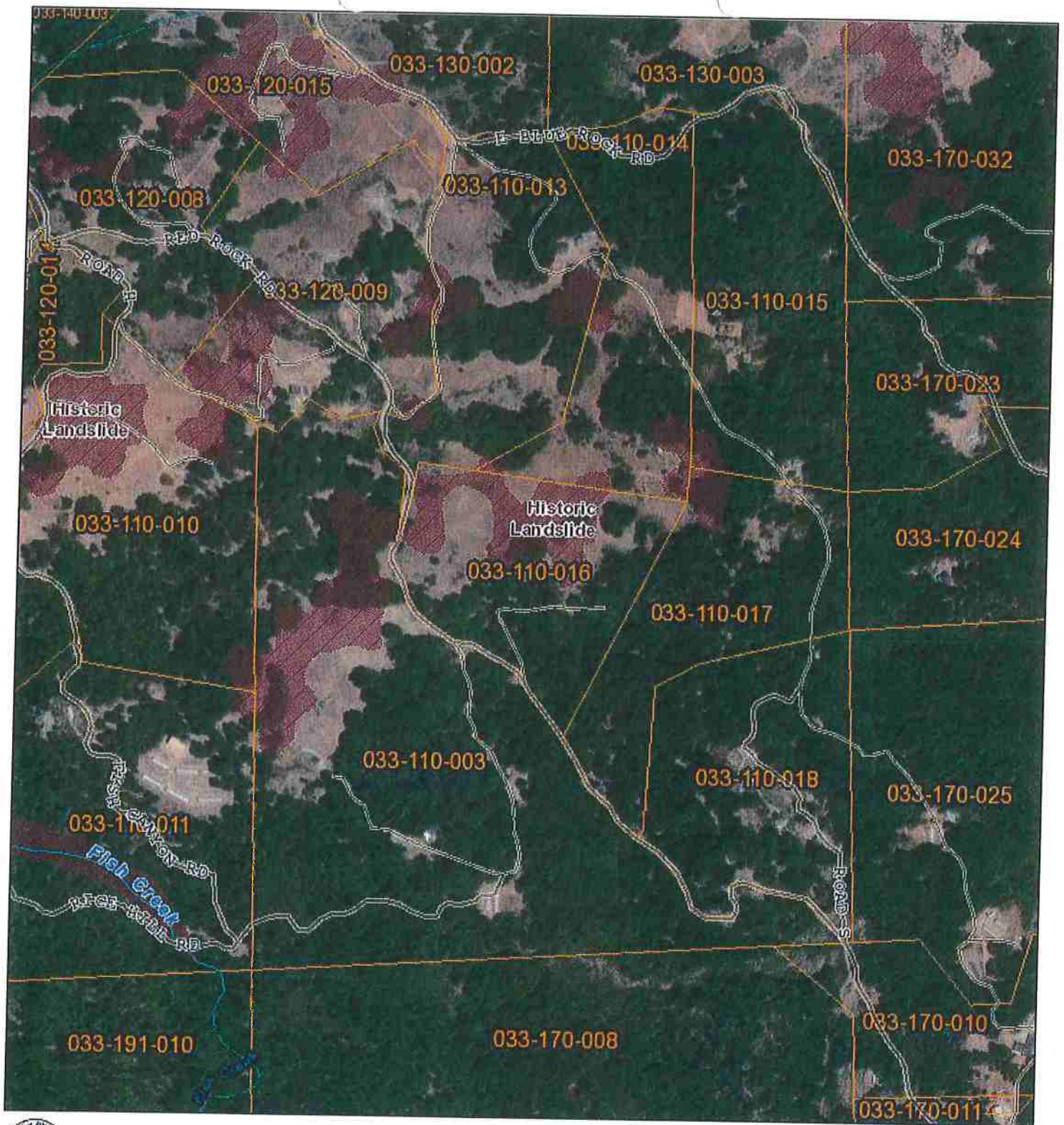
AP#: 033-110-003

Lab

Test Date: 1/25/2019

|                        |  |
|------------------------|--|
| <b>1</b>               | SAMPLE NUMBER                              |
| 1                      | TEST HOLE                                  |
| 0.5-2                  | Depth (ft)                                 |
| 938.9                  | TOTAL SAMPLE WEIGHT (gm)                   |
| 342.3                  | Coarse Weight (gm)                         |
| 75                     | A. Owendry Weight (gm)                     |
| 12:48                  | B. Starting Time (hr:min:sec)              |
| 70.7                   | C. Temp @ 40 sec. (°F)                     |
| 44                     | D. Hydrometer Reading @ 40 sec. (gm/l)     |
| -5.96                  | E. Composite Correction (gm/l)             |
| 38.04                  | F. True Density @ 40sec. (gm/l), (D-E)     |
| 70.1                   | G. Temp @ 2 hrs. (°F)                      |
| 27                     | H. Hydrometer Reading @ 2hrs. (gm/l)       |
| -6.08                  | I. Composite Correction (gm/l)             |
| 20.92                  | J. True Density @ 2 hrs. (gm/l), (H-I)     |
| <b>49.3</b>            | K. % Sand = $100 - [(F/A) \times 100]$     |
| <b>27.9</b>            | L. % Clay = $(J/A) \times 100$             |
| <b>22.8</b>            | M. % Silt = $100 - (K + L)$                |
| <b>SANDY CLAY LOAM</b> | N. USDA Texture                            |
| <b>2</b>               | O. Soil Percolation Suitability Chart Zone |
| <b>50.7</b>            | P. Combined % Silt and Clay                |
| 36.5                   | Q. Coarse % by weight                      |
| 4.8                    | R. % Coarse Adjustment*                    |

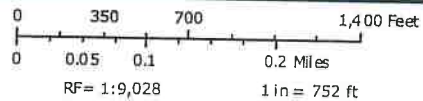
\*  $[(.2)(.00003Q^3 + .0006Q^2 + .5968Q - .0941)]$



## ArcGIS Web Map

Humboldt County Planning and Building Department

- |                           |                           |                           |
|---------------------------|---------------------------|---------------------------|
| <b>Highways and Roads</b> | — Private or Unclassified | — Intermittent            |
| — Principal Arterials     | — Major River or Stream   | — Subsurface              |
| — Minor Arterials         | <b>Blue Line Streams</b>  | — City Boundary           |
| — Major Collectors        | — Perennial 1-3           | — Counties                |
| — Minor Collectors        | — Perennial >4            | — Parcels                 |
| — Local Roads             |                           | — Parcels (no APN labels) |



Printed: January 25, 2019

Web AppBuilder 2.0 for ArcGIS

**Map Disclaimer:**

While every effort has been made to assure the accuracy of this information, it should be understood that it does not have the force & effect of law, rule, or regulation. Should any difference or error occur, the law will take precedence.

Source: Humboldt County GIS, Esri, HERE, Garmin, © OpenStreetMap contributors, and the GIS user community, Source: Esri, DigitalGlobe, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AeroGRID, IGN, and the GIS User Community, FRAP, FEMA, USGS



# Fault Activity Map of California (2010)

California Geological Survey

