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GEOLOGIC RECONNAISSANCE

RANCHO GUEJITO AGRICULTURAL AREAS ROCKWOOD VILLAGE AND VINEYARD RANCH SAN DIEGO COUNTY, CALIFORNIA

PREPARED FOR

RANCHO GUEJITO CORPORATION
ESCONDIDO, CALIFORNIA

MARCH 20, 2015
PROJECT NO. 07841-32-06

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Project No. 07841-32-06
March 20, 2015

Rancho Guejito Corporation
17224 San Pasqual Valley Road
Escondido, California 92027

Attention: Mr. Hank Rupp

Subject: GEOLOGIC RECONNAISSANCE
RANCHO GUEJITO AGRICULTURAL AREAS
ROCKWOOD VILLAGE AND VINEYARD RANCH
SAN DIEGO COUNTY, CALIFORNIA

Dear Mr. Rupp:

In accordance with your authorization of our Proposal No. LG-15038, dated February 5, 2015, we have prepared this geologic reconnaissance for the subject areas of Rancho Guejito located east of the city of Escondido in San Diego County, California. The accompanying report describes the soil and geologic conditions in the three areas and discusses the anticipated geotechnical considerations for grading of the agricultural roads as presently planned. No geologic conditions were observed that would preclude development of the groves as proposed.

Should you have questions regarding this report, or if we may be of further service, please contact the undersigned at your convenience.

Very truly yours,

GEOCON INCORPORATED

David B. Evans
CEG 1860

PROFESSIONAL GEOLOGIST
DAVID B. EVANS
NO. 1860
CERTIFIED ENGINEERING GEOLOGIST
STATE OF CALIFORNIA

Trevor E. Myers
RCE 63773

REGISTERED PROFESSIONAL ENGINEER
TREVOR E. MYERS
No. RCE63773
CIVIL
STATE OF CALIFORNIA

DBE:TEM:dmc

(2) Addressee
(6/del) Rick Engineering Company
Attention: Mr. Tim Gabrielson

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GEOLOGIC RECONNAISSANCE

1. PURPOSE AND SCOPE

This report presents the results of a geologic reconnaissance for three proposed agricultural areas on the Rancho Guejito property located in San Diego County, California (see Vicinity Map, Figure 1), specifically, Vineyard Ranch and Rockwood Village. Rockwood Village is separated into 2 sub-areas identified as Upper Rockwood and Lower Rockwood. The purpose of this study was to identify geotechnical conditions and potential geologic hazards that could impact the development of avocado groves as presently proposed. It is understood that the County of San Diego has requested this study to address the minor grading with respect to geologic hazards or other potential geotechnical concerns.

The scope of our study included a review of readily available published geologic literature pertinent to the property (see List of References), performing a limited field geologic reconnaissance, geologic mapping, reviewing stereoscopic aerial photographs of the areas and preparing this report summarizing our findings as they relate to geologic hazards such as faulting, seismicity, liquefaction potential, rock fall hazards and slope stability. We also reviewed the project plans entitled *Agricultural Clearing & Grove Road Grading Plan for: Rancho Guejito - Rockwood Village and Vineyard Ranch*, prepared by Rick Engineering Company, undated.

2. SITE AND PROJECT DESCRIPTION

The three study areas are located in the southwest portion of the Rancho Guejito property. It is understood that the proposed farming areas consist of approximately 270 acres (Upper Rockwood), 20 acres (Vineyard Ranch) and 58 acres (Lower Rockwood) of essentially undeveloped land. We understand that a network of grove roads is proposed to provide access for farming of avocados. We also understand that the roads will generally follow the natural terrain and be approximately 10-feet-wide. Grading will consist of minor cuts and fills.

The proposed farming areas in Rockwood Village consist of rugged mountainous terrain dissected by generally east-flowing drainages that convey runoff into Guejito Creek. The groves in Vineyard Ranch are situated around conical shaped granitic outcrops with a more subdued relief. A large portion of the Vineyard Ranch grove already supports active avocado farming. Abundant boulder outcrops of granitic rock are present in all three areas. Site vegetation in the undeveloped areas ranges from grasses to coastal sage scrub.

3. SOIL AND GEOLOGIC CONDITIONS

Based on our observations during the site reconnaissance, the property is underlain by surficial deposits consisting of undocumented fill, topsoil, alluvium, colluvium, and granitic bedrock. The

surficial soils and geologic formation are discussed below. The estimated extent of several of these units is shown on the Geologic Map, Figures 2 through 4.

3.1 Undocumented Fill (Not Mapped)

Relatively minor amounts of undocumented fill are present where existing roads have been graded on the hillsides. The fills generally comprise the outboard portion of the alignments where cut and side-cast grading operations occurred. The larger embankments are located along old access roads in Upper Rockwood and to a lesser extent in Lower Rockwood. The embankments are expected to contain boulders of various sizes.

3.2 Topsoil (Not Mapped)

Topsoil is present across most of the sites overlying the granitic rock with an estimated thickness of 2 to 4 feet. The topsoil exposed in rivulets appears to consist of reddish brown silty sand to sandy silt with some rock fragments.

3.3 Alluvium (Qal)

Alluvium is present within the drainages that cross each site with an estimated thickness of 5 to 15 feet. Since the grove sites are primarily underlain by granitic rock, the alluvium derived from this material is granular in nature with a relatively low cohesion. Based on a review of the plans, it appears that grading has been designed to generally avoid the alluvial areas with the exception of several road crossings.

3.4 Colluvium (Qcol)

Colluvial aprons are common where steep slopes become gentle and allow the accumulation of boulders and thicker topsoil deposits from down-slope movement. Colluvium consisting of soil and nested boulders is also present within the steep drainage areas near rock outcrops, particularly in Lower Rockwood. Based on our observations of several colluvial deposits exposed along erosional gullies in Rockwood Village, we estimate the thickness of colluvium can range from 5 to 15 feet-thick.

3.5 Granitic Rock (Kgr)

Granitic rock, mainly Tonalite composition, underlies the surficial deposits in all three areas. The rock is slightly to deeply weathered and consists of an upper decomposed mantle overlying a stronger, less weathered rock. Abundant spherical boulder outcrops and knobs and domes of fresh rock are present in Rockwood Village and Vineyard Ranch. Grading in the rock outcrop and shallow hardrock areas will be difficult and may require line and grade adjustments to avoid blasting.

4. GROUNDWATER

Ephemeral drainages convey runoff from Rockwood Village into Guejito Creek. The Vineyard Ranch grove also contains an ephemeral stream that discharges into a south flowing depression along Guejito Truck Trail. Several drainages in all three areas were observed to be moist or found to contain a minor amount of water during our reconnaissance due to recent rainfall.

5. GEOLOGIC HAZARDS

5.1 Faulting and Seismicity

A review of geologic literature and experience with the soil and geologic conditions in the general area indicate that known active, potentially active, or inactive faults are not located in any of the three proposed grove sites.

The Elsinore Fault, located approximately one mile from the northeast property corner of Rancho Guejito, is the closest known active fault. An active fault is defined by the California Geological Survey (CGS) as a fault showing evidence for activity within the last 11,000 years. The CGS has included portions of the Elsinore Fault within State of California Earthquake Fault Zone. The planned development is not located within such a zone.

According to the computer program *EZ-FRISK* (Version 7.62), 7 known active faults are located within a search radius of 50 miles from the property. The nearest known active fault is the Elsinore Fault, located approximately 11 miles east of the site and is the dominant source of potential ground motion. Earthquakes that might occur on the Elsinore, Newport-Inglewood or Rose Canyon Fault Zones or other faults within the southern California and northern Baja California area are potential generators of significant ground motion at the site. The estimated deterministic maximum earthquake magnitude and peak ground acceleration for the Elsinore Fault is 7.85 and 0.27g, respectively. Table 5.1.1 lists the estimated maximum earthquake magnitude and peak ground acceleration for the most dominant faults in relationship to the site location. We calculated peak ground acceleration (PGA) using Boore-Atkinson (2008) NGA USGS2008, Campbell-Bozorgnia (2008) NGA USGS, and Chiou-Youngs (2008) NGA acceleration-attenuation relationships.

TABLE 5.1.1
DETERMINISTIC SPECTRA SITE PARAMETERS

Fault Name	Distance from Site (miles)	Maximum Earthquake Magnitude (Mw)	Peak Ground Acceleration		
			Boore-Atkinson 2008 (g)	Campbell-Bozorgnia 2008 (g)	Chiou-Youngs 2008 (g)
Elsinore	11	7.85	0.25	0.20	0.27
Earthquake Valley	20	6.8	0.12	0.10	0.09
Newport Inglewood	24	7.5	0.14	0.10	0.12
Rose Canyon	24	6.9	0.11	0.09	0.08
San Jacinto	32	7.88	0.13	0.09	0.12
Coronado Bank	39	7.4	0.09	0.07	0.07
Palos Verdes Connected	39	7.7	0.10	0.08	0.09

We used the computer program *EZ-FRISK* to perform a probabilistic seismic hazard analysis. The computer program *EZ-FRISK* operates under the assumption that the occurrence rate of earthquakes on each mappable Quaternary fault is proportional to the faults slip rate. The program accounts for fault rupture length as a function of earthquake magnitude, and site acceleration estimates are made using the earthquake magnitude and distance from the site to the rupture zone. The program also accounts for uncertainty in each of following: (1) earthquake magnitude, (2) rupture length for a given magnitude, (3) location of the rupture zone, (4) maximum possible magnitude of a given earthquake, and (5) acceleration at the site from a given earthquake along each fault. By calculating the expected accelerations from considered earthquake sources, the program calculates the total average annual expected number of occurrences of site acceleration greater than a specified value. We utilized acceleration-attenuation relationships suggested by Boore-Atkinson (2008) NGA USGS, Campbell-Bozorgnia (2008) NGA USGS, and Chiou-Youngs (2008) in the analysis. Table 5.1.2 presents the site-specific probabilistic seismic hazard parameters including acceleration-attenuation relationships and the probability of exceedence.

TABLE 5.1.2
PROBABILISTIC SEISMIC HAZARD PARAMETERS

Probability of Exceedence	Peak Ground Acceleration		
	Boore-Atkinson, 2007 (g)	Campbell-Bozorgnia, 2008 (g)	Chiou-Youngs, 2008 (g)
2% in a 50 Year Period	0.43	0.43	0.51
5% in a 50 Year Period	0.33	0.32	0.36
10% in a 50 Year Period	0.25	0.25	0.27

The California Geologic Survey (CGS) has a program that calculates the ground motion for a 10 percent of probability of exceedence in 50 years based on an average of several attenuation relationships. Table 5.1.3 presents the calculated results from the *Probabilistic Seismic Hazards Mapping Ground Motion* Page from the CGS website.

TABLE 5.1.3
PROBABILISTIC SITE PARAMETERS FOR SELECTED FAULTS
CALIFORNIA GEOLOGIC SURVEY

Calculated Acceleration (g) Firm Rock	Calculated Acceleration (g) Soft Rock	Calculated Acceleration (g) Alluvium
0.31	0.33	0.36

While listing peak accelerations is useful for comparison of potential effects of fault activity in a region, other considerations are important in seismic design, including the frequency and duration of motion and the soil conditions underlying the site.

5.2 Liquefaction

Liquefaction typically occurs when a site is located in a zone with seismic activity, onsite soil is cohesionless, groundwater is encountered within 50 feet of the surface, and soil relative densities are less than about 70 percent. If all four previous criteria are met, a seismic event could result in a rapid pore-water pressure increase from the earthquake-generated ground accelerations. Since only minor road crossings are proposed in limited drainage areas and the above criteria is not present, the potential for liquefaction and seismically induced settlement occurring within any of the developed grove areas is considered very low.

5.3 Landslides

Our site reconnaissance, examination of aerial photographs and review of available geologic information for the site vicinity did not reveal evidence of landslides in the proposed grove areas.

5.4 Rock Fall Potential

Boulder outcrops are prevalent in all three proposed grove areas which, under certain conditions, could become dislodged and mobilize down-slope. Triggering events could be seismic activity or normal erosion that undermines the support beneath the rock fragments. The highest potential for rock fall occurs where rock outcrops are present on steep hillside terrain, the boulders have weathered to spherical-shaped fragments and the embedment into the surrounding soil mass is nominal. The presence of these conditions can be evaluated during grove road grading and loose boulder material above developed areas can be scaled, if necessary, to provide safe conditions. Areas with a relatively greater potential for rock fall have been identified on Figures 2 through 4. The areas mapped are generally within the proposed grove limits.

6. CONCLUSIONS AND RECOMMENDATIONS

6.1 General

6.1.1 No soil or geologic conditions were observed that, in the opinion of Geocon Incorporated, would preclude the development of the grove areas as proposed, provided the recommendations of this report are followed.

6.2 Compaction of Proposed Fill

6.2.1 Remedial grading of the surficial deposits beneath proposed embankments is not considered necessary. Fills placed during grove road grading should be compacted to reduce the potential for erosion and slope instability. Compaction procedures should consist of moisture conditioning the soil as it is excavated and placing the material in uniform lifts. Compaction effort should then be applied to each lift as the design grades are achieved. Compactive effort should also be applied to slope faces created during the grading.

6.3 Fill Slope Keyways

6.3.1 Prior to placing embankments on slopes steeper than 5:1 (horizontal:vertical), a flat bench should be created to support the fill. The width of the bench may vary depending on the height of the slope. The natural ground should be benched periodically as fills progress.

6.4 Slope Stability

6.4.1 Cut slopes exposing granitic rock should be stable at ratios of 1/2:1 (horizontal:vertical) if they are less than 15 feet in height. In the event surficial deposits are present at the tops of proposed cut slopes, measures such as flattening, rounding or surficial stabilization with jute netting, or similar products should be considered to reduce potential erosion. Fill slopes up to 5-feet-high constructed from properly compacted native soils should possess acceptable stability if inclined at 1.5:1 or flatter.

6.5 Shallow Hardrock

6.5.1 The presence of shallow hardrock and outcrops in areas of planned excavation will require consideration during grove road grading. Roadways that traverse these areas may require line and grade adjustments to avoid blasting.

6.6 Rock Fall Potential

6.6.1 Boulder outcrops are prevalent in all three proposed grove areas. Based on our observations, the proposed groves in Rockwood Village have a relatively greater risk of rock fall compared to Vineyard Ranch. The presence of these conditions and the potential for down-slope movement of the boulders can be evaluated during grove road grading. Loose boulder material above developed areas can be scaled if necessary to provide safe conditions.

LIMITATIONS AND UNIFORMITY OF CONDITIONS

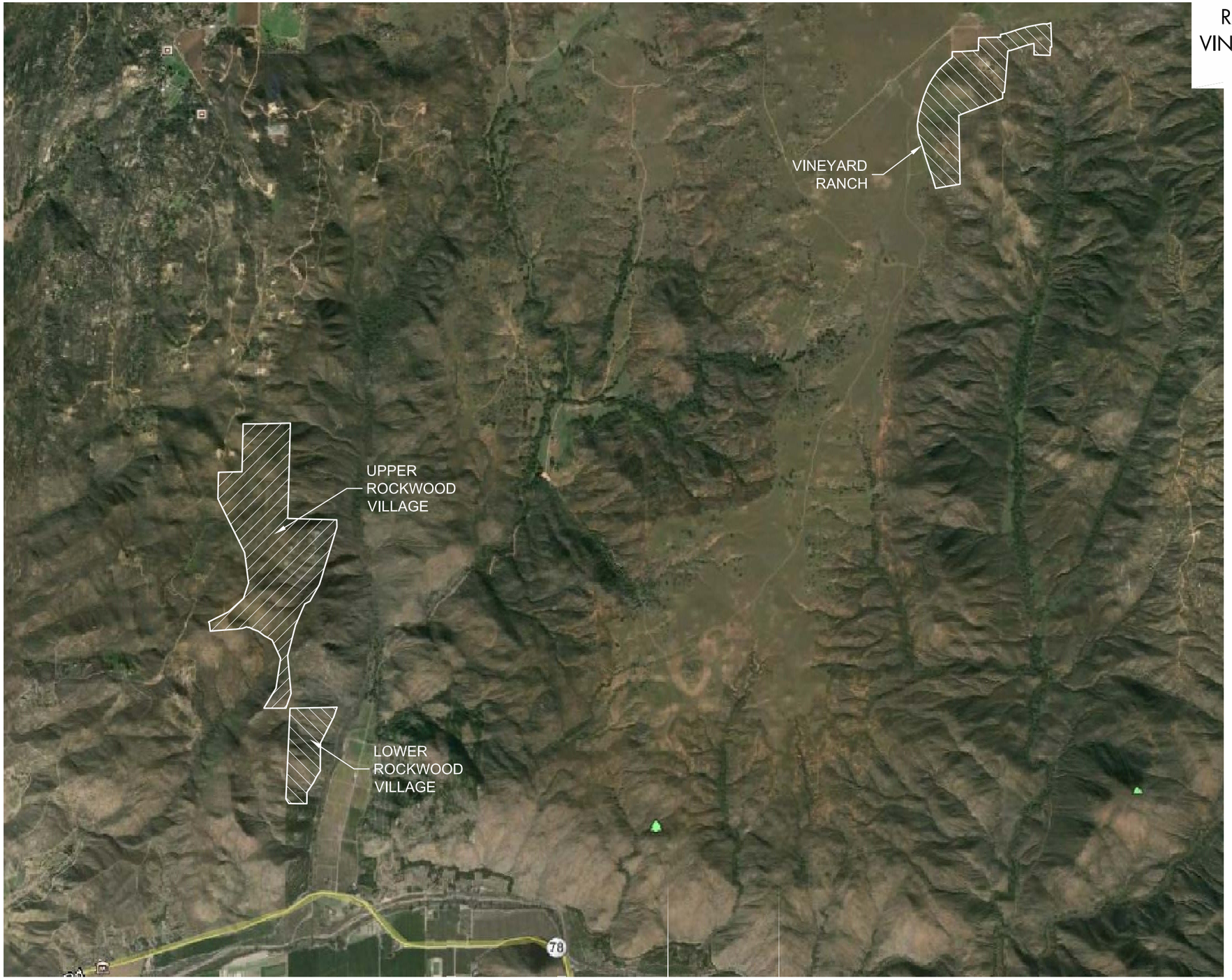
1. The firm that performed the geotechnical investigation for the project should be retained to provide testing and observation services during construction to provide continuity of geotechnical interpretation and to check that the recommendations presented for geotechnical aspects of site development are incorporated during site grading, construction of improvements, and excavation of foundations. If another geotechnical firm is selected to perform the testing and observation services during construction operations, that firm should prepare a letter indicating their intent to assume the responsibilities of project geotechnical engineer of record. A copy of the letter should be provided to the regulatory agency for their records. In addition, that firm should provide revised recommendations concerning the geotechnical aspects of the proposed development, or a written acknowledgement of their concurrence with the recommendations presented in our report. They should also perform additional analyses deemed necessary to assume the role of Geotechnical Engineer of Record.

2. The recommendations of this report pertain only to the site investigated and are based upon the assumption that the soil conditions do not deviate from those disclosed in the investigation. If any variations or undesirable conditions are encountered during construction, or if the proposed construction will differ from that anticipated herein, Geocon Incorporated should be notified so that supplemental recommendations can be given. The evaluation or identification of the potential presence of hazardous or corrosive materials was not part of the scope of services provided by Geocon Incorporated.

3. This report is issued with the understanding that it is the responsibility of the owner or his representative to ensure that the information and recommendations contained herein are brought to the attention of the architect and engineer for the project and incorporated into the plans, and the necessary steps are taken to see that the contractor and subcontractors carry out such recommendations in the field.

4. The findings of this report are valid as of the present date. However, changes in the conditions of a property can occur with the passage of time, whether they be due to natural processes or the works of man on this or adjacent properties. In addition, changes in applicable or appropriate standards may occur, whether they result from legislation or the broadening of knowledge. Accordingly, the findings of this report may be invalidated wholly or partially by changes outside our control. Therefore, this report is subject to review and should not be relied upon after a period of three years.

RANCHO GUEJITO AGRICULTURAL AREAS;
VINEYARD RANCH AND ROCKWOOD VILLAGE
SAN DIEGO COUNTY, CALIFORNIA



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VICINITY MAP

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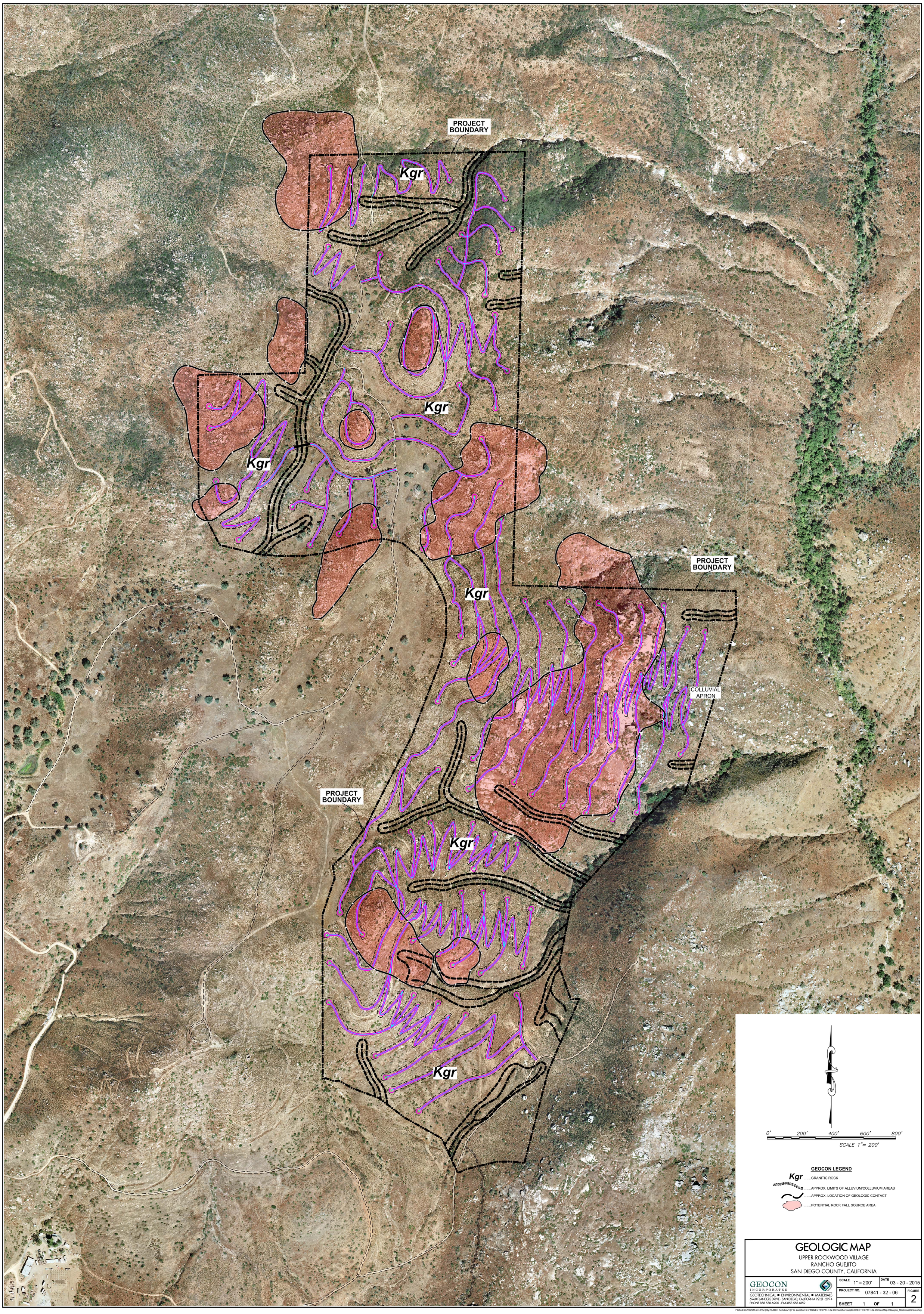
PROJECT NO. 07841 - 32 - 06
FIGURE 1
DATE 03 - 20 - 2015



GEOLOGIC MAP

UPPER ROCKWOOD VILLAGE
RANCHO GUEJITO
SAN DIEGO COUNTY, CALIFORNIA

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SCALE 1" = 200'	DATE 03 - 20 - 2015		
PROJECT NO. 07841 - 32 - 06		FIGURE 2	
SHEET 1 OF 1			

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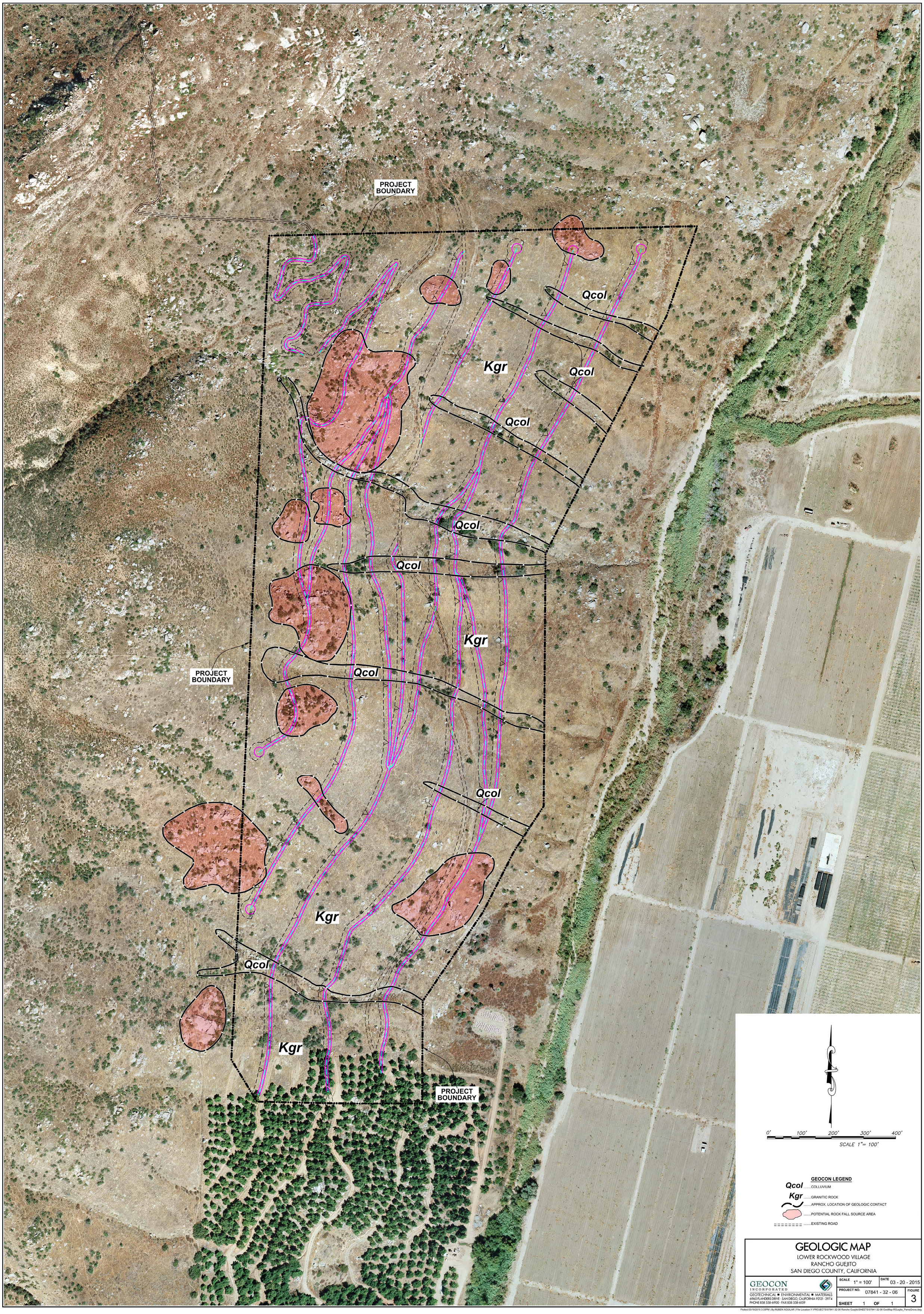

GEOLOGIC MAP

LOWER ROCKWOOD VILLAGE
RANCHO GUEJITO
SAN DIEGO COUNTY, CALIFORNIA

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PROJECT NO. 07841 - 32 - 06		FIGURE 3	
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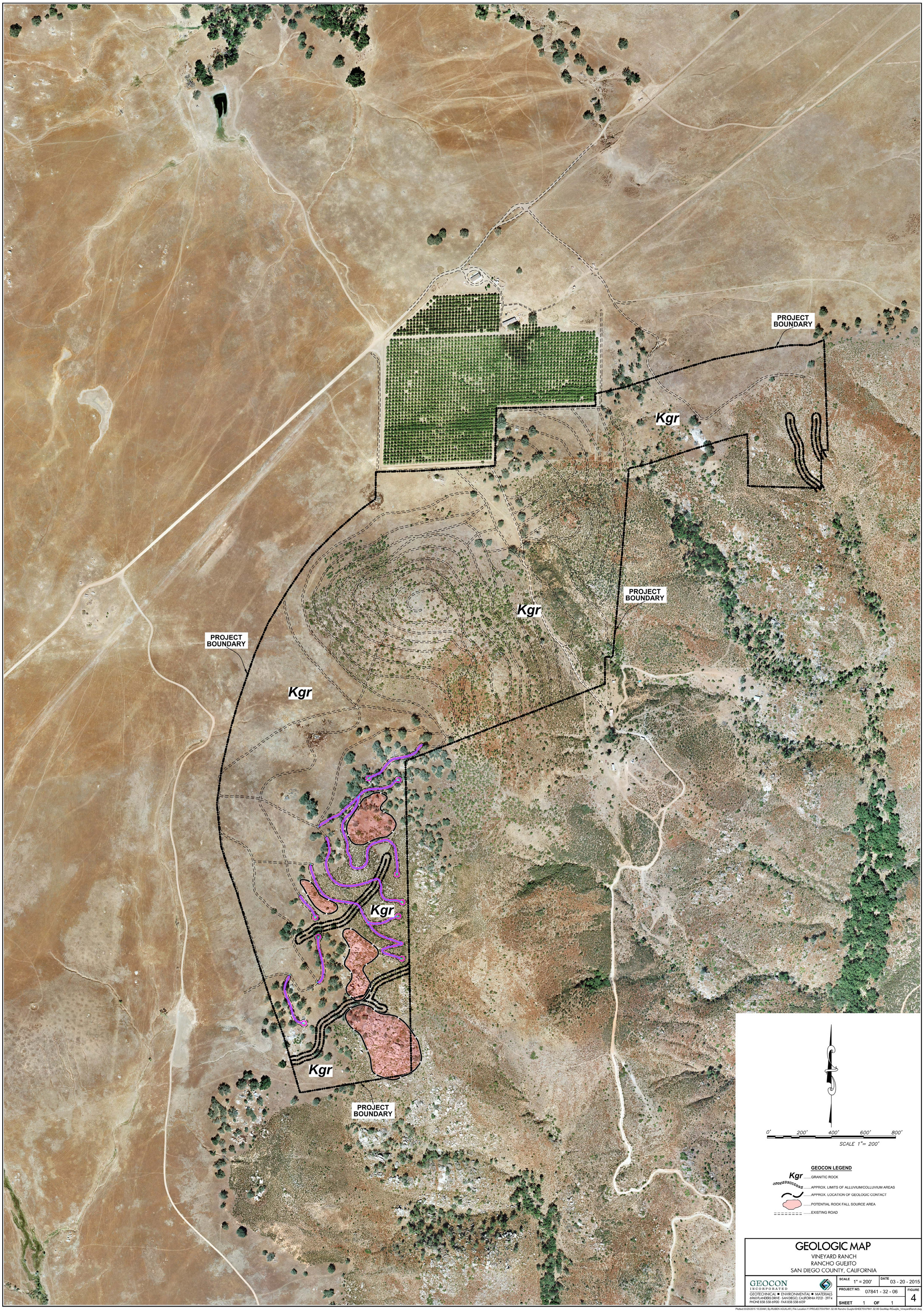

GEOLOGIC MAP

VINEYARD RANCH
RANCHO GUEJITO
SAN DIEGO COUNTY, CALIFORNIA

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SCALE 1" = 200'	DATE 03 - 20 - 2015		
PROJECT NO. 07841 - 32 - 06		FIGURE 4	
SHEET 1 OF 1			

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