Appendix IS-3

2021 Project Geology and Geologic Hazards Update

Project Nos.
6538.VCC.001
6538.0ES.001

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Ms. Ashley Rogers
Principal Planner
Eyestone Environmental
2121 Rosecrans Avenue, Suite 3355
El Segundo, CA 90245

Subject: Entrada South and Valencia Commerce Center
Newhall Ranch
Valencia, California

PROJECT GEOLOGY AND GEOLOGIC HAZARDS UPDATE

Dear Ms. Rogers:

The purpose of this report is to provide geotechnical opinions with respect to the description of site conditions, impacts, and mitigation measures presented in Section 4.13 – Geology and Geologic Hazards of the State-certified EIR (SCH No. 2000011025) for the Newhall Ranch Resource Management and Development Plan and Spineflower Conservation Plan (RMDP/SCP, hereinafter referred to as the 2017 Approved Project). Section 4.13 describes the existing geologic conditions and evaluates the potential for significant environmental impacts related to geologic hazards and processes for the 2017 Approved Project.

The information and analysis presented in Section 4.13 of the State-certified EIR are predominantly based on geotechnical engineering reports from Allan E. Seward Engineering Geology, Inc., and R.T. Frankian & Associates from 1994 to 2007. This report provides an updated point-by-point assessment of Section 4.13, with a comparison to the most current available geologic publications and site-specific geotechnical reports for the Project.

This report also considers whether the proposed incremental changes in the Entrada South and Valencia Commerce Center planning areas (hereinafter referred to as the Modified Project), as compared to the 2017 Approved Project, would result in new geotechnical impacts or a substantial increase in the severity of previously identified significant impacts. Of relevance to this analysis, the development footprints within the Entrada South and Valencia Commerce Center (VCC) planning areas would not increase under the Modified Project. Instead, the incremental changes proposed by the Modified Project would result in increased environmental protections within Unnamed Canyon 2, Hasley Creek and Castaic Creek by reducing permanent impacts through the enhanced preservation of on-site open space.

The information and conclusions presented herein demonstrate that further analysis of the Modified Project's potential geotechnical impacts is not required in the Supplemental Environmental Impact Report (SEIR) pursuant to CEQA Guidelines Sections 15162 and 15163.

EXISTING GEOTECHNICAL DATA

The following studies incorporate relevant work completed since 1998 for the Entrada South and Valencia Commerce Center planning areas; many of these studies post-date the reports referenced in Section 4.13.2 – Methodology of the State-certified EIR.

TABLE 1

CONSULTANT	REPORT TYPE	REPORT AREA	REFERENCE
R.T. Frankian & Associates	100-Scale Plan Review	Entrada South	March 18, 2005; Job No. 2004-700-21, Volume I and II.
R.T. Frankian & Associates	Response to Los Angeles County Department of Public Works, Geotechnical Review	Entrada South	April 6, 2007; Job No. 2004-700-22, Volume I and II.
R.T. Frankian & Associates	Response to Los Angeles County Department of Public Works Geotechnical Review No. 2, Vesting Tentative Tract Map No. 53295	Entrada North and South	Job No. 2004-700-22; January 16, 2008
R.T. Frankian & Associates	Geotechnical Investigation	Entrada South	January 15, 2008; Job No. 2004-701-22.
R.T. Frankian & Associates	Response to Los Angeles County, Department of Public Works, Geotechnical Review No. 2	Entrada South	January 16, 2008; Job No. 2004-700-22.
R.T. Frankian & Associates	100-Scale Plan Review	Entrada South	November 13, 2009; Job No. 2004-700-21.
R.T. Frankian & Associates	100-Scale Plan Review	Entrada South	September 16, 2013; Job No. 2004-700-021.
R.T. Frankian & Associates	Geologic/Geotechnical Evaluation for Environmental Impact Report	Entrada South	October 31, 2013; Job No. 2004-700-52(R2).
R.T. Frankian & Associates	Geotechnical Update Report and Revised Plan Review	Entrada South	September 28, 2017; Job No. 2004-700-021.
Allan E. Seward Engineering Geology, Inc.	Summary of Conditions	Valencia Commerce Center	Job No. 98-10541-5; March 5, 1998
Allan E. Seward Engineering Geology, Inc.	Holser Fault Investigation	Valencia Commerce Center	Job No. 00-1219-9; April 12, 2000
Geolabs-Westlake Village	Geotechnical Investigation and Surface Fault Rupture Hazard Assessment	Valencia Commerce Center	W.O. 9083; May 31, 2007
Leighton & Associates, Inc.	Updated Geotechnical Report and Responses to County of Los Angeles Review Comments	Valencia Commerce Center	Project No. 10738.001; February 9, 2015
Leighton & Associates, Inc.	Updated Geotechnical Report and Responses to County of Los Angeles Review Comments	Valencia Commerce Center	Project No. 10738.001; December 3, 2015.

Previous geotechnical investigations described in the above-referenced reports for Plan Areas 1 through 3 at Valencia Commerce Center included 34 conventional borings (hollow-stem auger and mud-rotary), 28 large-diameter bucket-auger borings, 40 cone penetration test (CPT) soundings, 18 fault trenches, and 67 test pits. Previous geotechnical investigations for Entrada South included 7 hollow-stem auger boreholes, 7 large-diameter bucket-auger boreholes, 5 cone penetration test (CPT) soundings, and 62 test pits. These reports also included laboratory testing of soil samples recovered from the borings and test pits; fault hazard assessments; and geotechnical analyses to evaluate expected ground shaking levels, slope stability, seismically induced vertical and lateral ground displacement, settlement of native soil, and expansion potential of soil. In addition, they contain gradational characteristics of borrow areas for suitability in the soil-cement stabilized creek banks.

The reports listed in Table 1 have not identified any new or unique impacts not previously disclosed and considered in the State-certified EIR.

REGULATORY BACKGROUND

Geotechnical constraints are comprehensively addressed and remedied through the application of mandatory regulatory compliance standards in place at the local level. For example, development associated with the Modified Project will be designed and constructed in accordance with the Los Angeles County's Building Code, the County of Los Angeles Grading Guidelines, County of Los Angeles Department of Public Works Manual for Preparation of Geotechnical Reports, and the 2019 California Building Code (CBC), which is based on International Building Code (IBC) standards. New construction, alteration, or rehabilitation also shall comply with applicable ordinances set forth by the County and/or by the most recent County building and seismic codes in effect at the time of project design.

Prior to approval of the tentative map, a 100-scale tentative subdivision map geotechnical/engineering geology report will be completed and submitted to Los Angeles County for review and approval, as required by the Los Angeles Department of Public Works Manual for Preparation of Geotechnical Reports Section 2.2.2.

Consistent with the County's Grading Code and adopted Grading Guidelines (January 1, 2008), the Modified Project shall comply with the following regulatory requirements.

General Grading

- All grading and construction shall conform to the latest County of Los Angeles Building Codes and the State Model Water Efficiency Landscape Ordinance unless specifically noted on grading plans.
- Prior to issuance of a grading permit, three (3) sets of current (less than one-year-old) soils engineering and/or geology investigation reports shall be submitted to the Los Angeles County Department of Public Works. They shall provide:
    a. Information on the nature, distribution, physical and engineering properties of the soil on site and/or soil to be used as fill, and include recommendations on grading procedures.
    b. Provide copies of the original soils engineering and/or geologic reports and all supplemental/addendum reports for the grading files.

c. The reports must comply with the provisions of the "Manual for Preparation of Geotechnical Reports."

- The Soil Engineer shall provide sufficient inspections during the preparation of the natural ground and the placement and compaction of the fill to be satisfied that the work is being performed in accordance with the plan and applicable Code requirements.
- All fill shall be compacted to the following minimum relative compaction criteria.

a. 90 percent of maximum dry density within 40 feet of finish grade

b. 93 percent of maximum dry density deeper than 40 feet below finish grade, unless a lower relative compaction (not less than 90 percent of maximum dry density) is justified by the geotechnical engineer. The relative compaction shall be determined by A.S.T.M. soil compaction test D1557-91 where applicable: Where not applicable, a test acceptable to the Building Official shall be used. (Section J107.5 of the County of Los Angeles Building Code.)

Expansive Soil

- If expansive soil is encountered during grading, recommendations shall be implemented to reduce the hazard, including but not limited to removing expansive soil and replacing with engineered fill, installing drainage systems, using stiffened foundation systems, or conducting engineered preparation of building pads.
- Building pads located in cut/fill transition areas shall be overexcavated a minimum of three (3) feet below the proposed bottom of footing.

Slope Stability

- The slope of cut surfaces shall be no steeper than is safe for the intended use, and shall be not more than one unit vertical in two units horizontal (50 percent slope) unless the owner or the owner's authorized agent furnishes a geotechnical or an engineering geology report, or both, justifying a steeper slope.
- Fill slopes shall not be constructed on natural slopes steeper than 2 units horizontal to 1 unit vertical (50 percent slope). The ground surface shall be prepared to receive fill by removing vegetation, topsoil and other unsuitable materials (including any existing fill that does not meet the requirements of this Appendix), and scarifying the ground to provide a bond with the fill material.
- Subdrains shall be provided under all fills placed in natural drainage courses and in other locations where seepage is evident, except where the Geotechnical Engineer or Engineering Geologist recommends otherwise.

Erosion

- All active grading projects with grading proposed within the rainy season, October 15 to April 15, require an Erosion and Sediment Control Plan (ESCP). Grading permits will not be issued until ESCPs are approved or details for erosion control are included with the grading plan. (Section J110 of the County of Los Angeles Building Code.)

- Erosion is a problem for all graded slopes higher than 30 feet. For slopes flatter than 3 units horizontal to 1 unit vertical and steeper than 5 units horizontal to 1 unit vertical, a paved swale or ditch shall be installed at 30-foot vertical intervals to control surface drainage and debris.
- The surface of all cut slopes more than 5 feet in height and fill slopes more than 3 feet in height shall be protected against damage from erosion by planting with grass or ground cover plants. (Section J110 of the County of Los Angeles Building Code.) Slopes exceeding 15 feet in vertical height shall also be planted with shrubs, spaced at maximum 10 feet on centers; or trees, spaced at not to exceed 20 feet on center; or a combination of shrubs and trees at equivalent spacing, in addition to the grass or ground cover plants.
- Prior to any construction activities, including grading, all stormwater pollution prevention measures including erosion control devices which contain sediments must be installed.

Consistent with the County of Los Angeles Department of Public Works Manual for Preparation of Geotechnical Reports (July 1, 2013), the County of Los Angeles Building Code, and the Alquist-Priolo Earthquake Fault Zoning Act, reporting and design for the Modified Project shall comply with the following regulatory requirements.

General Reporting

- The soils engineering and geotechnical reports must demonstrate that property and public welfare will be safeguarded in accordance with current County Codes and policies. Provisions in the County of Los Angeles Building Code Section 110.2 require that the building site will be free of geotechnical hazards, such as landslide, settlement, or slippage, and that the proposed work will not adversely affect off-site property. County of Los Angeles Building Code Section 111 requires the report contain a finding to show compliance with Section 110.2.
- The geotechnical report in support of a grading plan must address the existing on-site conditions, identify potential geologic and geotechnical hazards, and provide conclusions and recommendations for the proposed development. Supporting data, analyses, and calculations for the basis of the conclusions and recommendations must be provided within the report. The data, analyses, and calculations must be in sufficient detail to demonstrate that the proposed grading will not cause, or be affected by, on-site and off-site geologic and geotechnical hazards.

Corrective Grading

- Corrective work necessary to address geologic and geotechnical hazards must be addressed at the tentative map stage.

Slope Stability

- Slope stability analysis (including establishing design criteria and performing calculations) will generally be required for all cut, fill, and natural slopes when the slope gradient is steeper than 2 units horizontal to 1 unit vertical and/or any gradient when the slope height exceeds 30 feet. Slope stability analyses may be required for any slope height or gradient when there are indications that the slope may not meet County minimum standards.

- Slope stability analyses must be accompanied by a summary of the input parameters, types of analyses conducted, results of analyses, and prints of the input and output conducted by either hand calculation or computer software.
- The minimum factor of safety for gross static stability is 1.50 for static loads.
- The minimum factor of safety for pseudostatic stability is 1.10 for loading due to seismic shaking

Artificial Fill

- Engineered fill and proposed structures shall not be placed into or founded on unsuitable soil. The geotechnical consultants must demonstrate that engineered fill and proposed structures will be placed on competent natural materials or certified engineering fill.

Consolidation and Hydrocompression

- The geotechnical consultant shall evaluate the possibility that consolidation and/or hydrocompression may occur within on-site fill soil and conduct appropriate field sampling and testing and laboratory tests to quantify the full collapse potential of applicable soil layers.

Liquefaction

- The geotechnical report must consider liquefaction potential of the foundation soil and make recommendations to protect the public during such an event.

Lateral Spread

- Soil layers having equivalent (N1)60 blow counts less than or equal to 15 should be evaluated to assess the lateral spreading hazard.

Expansive Soil and Rock

- Geotechnical reports shall provide the EI test results, or equivalent, when expansive soil and/or rock are determined to be on site. Test results that indicate an EI greater than (>) 50 shall be addressed with data and analyses to support pressures acting on proposed structures.

Corrosion Testing

- Chemical testing (sulfate, chloride, resistivity, pH, etc.) of on-site soil shall address the presence of chemicals deleterious to concrete and ferrous materials. The tests must be conducted in accordance with California Test Methods, Department of Transportation, or equivalent.
- An evaluation of the site soil should include sampling and corrosion testing of the in-situ soil to remain in place and potential fill sources.

Erosion

- The geotechnical engineer shall evaluate the erosive properties of the soil and make appropriate recommendations to eliminate slope failure due to erosion caused by rainfall and irrigation of the slope. Soil with an effective saturated cohesion of less than 250 psf is considered susceptible to surface erosion.

Landslide Stabilization

- Landslide stabilization includes the stabilization of existing and potential landslides. It is required that a determination be made regarding the stability of ancient, inactive, active, and potential landslides.
- If landslides that do not meet the County minimum standards are to remain, it must be demonstrated that they will not adversely affect the proposed development and that the proposed development, including landscape watering and septic systems, will not affect the landslide. When unmitigated geologic hazards are part of a subdivision development, the entire areas affected by the hazard must be designated as Restricted Use Areas (RUAs).

Active Faulting

- An "active fault," as defined by the State Mining and Geology Board (SMGB), is a fault that has had surface displacement within Holocene time (about the last 11,700 years), hence constituting a potential hazard to structures that might be located across it.
- No structure for human occupancy, identified as a project under California Public Resource Code Section 2621.6 (Alquist-Priolo Earthquake Fault Zoning Act), shall be permitted to be placed across the trace of an active fault. Furthermore, as the area within fifty (50) feet of such active faults shall be presumed to be underlain by active branches of that fault unless proven otherwise by an appropriate geologic investigation and report prepared as specified in Section 3603(d) of this subchapter, no such structures shall be permitted in this area.

THRESHOLDS OF SIGNIFICANCE, IMPACT, AND MITIGATION

This section of the report summarizes the significance criteria, environmental impact findings, and mitigation measures identified in the State-certified EIR to reduce impacts to less than significant levels. The Significance Threshold Criteria 1-7 (Section 4.13.5 of the State-certified EIR) are denoted in *italic font* below. The State-certified EIR's impact findings (Section 4.13.6) and mitigation measures (Section 4.13.7), as well as our opinion, follow each threshold criterion and are written in regular font.

Section 4.13.5 of the State-certified EIR states that *"…geologic hazard impacts would be significant if implementation of the proposed Project or the alternatives would:*

1. *Expose people or structures to potential substantial adverse effects, including the risk of loss, injury, or death involving:*
    - *(a) Rupture of a known earthquake fault, as delineated on the most recent Alquist-Priolo Earthquake Fault Zoning Map issued by the state geologist for the area or based on other substantial evidence of a known fault.*

- *(b) Strong seismic ground shaking.*
- *(c) Seismic-related ground failure, including liquefaction.*
- *(d) Landslides*

1a. The State-certified EIR states that ground rupture, ground failure, and ground shaking from the Holser Fault are considered significant impacts and would potentially result in damage to RMDP infrastructure and people. Further, the State-certified EIR states that "…with mitigation, impacts under Significance Threshold 1 would be less than significant."

The Alquist-Priolo Earthquake Fault Zoning Act defines the term Holocene-active fault as one that has ruptured in the last 11,700 years. For faults considered "Holocene-active", the Alquist-Priolo Act establishes an Earthquake Fault Zone (EFZ) boundary 500 feet away from major active faults and 200 to 300 feet away from well-defined, minor faults. The EFZ maps delineate regulatory zones for known Holocene-active faults. The United States Geological Survey defines the Quaternary as being 2.58 million years old or younger (USGS 2018). The Pleistocene refers to a geologic period extending from the end of Holocene (11,700 years ago) to the end of Quaternary (2.58 million years ago).

As to the Entrada South planning area, no Holocene-active or pre-Holocene faults are known to exist within the planning area and the planning area is not located within an Alquist-Priolo Earthquake Fault Zone. The fault nearest the planning area is the Quaternary-aged Holser Fault, located approximately 0.46 miles northwest of the northwest corner of the site. The Alquist-Priolo mapping has not established an EFZ boundary for the Holser Fault, and the closest trace of the fault is more than 500 feet from the Entrada South planning area. Based on the distance from the site to the fault and the relative age of the fault, we conclude that the fault-rupture hazard at Entrada South is less than significant.

While the Valencia Commerce Center planning area also is not located within an Alquist-Priolo Earthquake Fault Zone, the State-certified EIR concluded that "…one strand of the Holser Fault is mapped within the VCC planning area" and "[t]he Holser Fault may have a recurrence interval slightly longer than Holocene time." (State-certified EIR Section 4.13.4.5.1 – On-Site Faults.) The State-certified EIR stated that implementation of mitigation measures to establish building setback zones, similar to SP-4.1-53 and SP-4.1-54, would reduce the impacts to less than significant. Further, the adopted VCC EIR requires a setback over the Holser Fault, as stated in Mitigation Measure VCC-GEO-1. Building setback zones along a trace of a Holocene-active fault are required as a matter of regulatory compliance (California Code of Regulations, Section 3603(a)).

In conjunction with a site-specific geotechnical investigation, Allan E. Seward Engineering Geology, Inc. (AES, 2000) stated that "…no distinct evidence of Holocene activity has been observed by this firm in over 22,000 lineal feet of trenches and cuts." Therefore, as the Alquist-Priolo Earthquake Fault Zoning Act defines a Holocene-active fault as one that has ruptured in the last 11,700 years, the Holser Fault is not considered active. The City of Santa Clarita General Plan (Safety Element, June 2011) describes the Holser Fault as having last ruptured in the Quaternary period defined as 2.58 million years further confirming the fault is not active.

The AES investigation northwest of the VCC planning area identified two west- northwest-trending branches of the Holser Fault referred to as the North Branch and South Branch (AES, 2000). Investigation of the North Branch of the Holser Fault at the VCC planning area yielded no evidence of faulting across the mapped fault trace. Investigation of the South Branch of the Holser Fault

considered the main trace of the fault, and also yielded no evidence of Holocene rupture at the VCC planning area. Although AES concluded that no evidence for Holocene surface fault rupture was found at the VCC planning area, and the recurrence interval for the fault was longer than Holocene time, AES recommended building setbacks from its South Branch. Considering this, the State-certified EIR concluded that ground rupture is considered a significant impact and would potentially result in damage to RMDP infrastructure and people.

In 2007, Geolabs performed a supplemental assessment of surface fault rupture hazards along the Holser Fault as part of a study for the VCC planning area's Tentative Map (TM) 18108. Geolabs stated in its 2007 report:

> "…there is ambiguity in the manner in which AES projected their 160 feet wide Building Setback Zone on TPM 18108 for the Southern Branch or what this zone represents. This inconsistency, coupled with the data recorded offsite regarding the Southern Branch, leads us to believe that AES' projection of the Southern Branch of the Holser Fault is inappropriately located, as we see no evidence for a change in the strike of the Southern Branch according to the data AES has presented in their referenced reports. Assuming that this fault does not break the alluvium, the fault will migrate to the south within the bedrock under the alluvium (based on a consistent 65-degree southerly dip)."

As part of this study, Geolabs performed subsequent subsurface explorations, including a line of cone penetrometer tests (CPTs) completed perpendicular and across Seward's Building Setback Zone of the Southern Branch of the Holser Fault, which revealed "…no evidence of faulted alluvium."

Based on a re-evaluation of the AES (2000) report, its own subsurface investigation, and other published data, Geolabs concluded, "[s]ince this fault did not displace sediments that are clearly pre-Holocene and most likely late-Pleistocene in age, we conclude that it is not active, and that a Building Setback Zone is not required on Tentative Parcel Map 18108 east of Commerce Center Drive."

R.T. Frankian & Associates (RTF&A, 2008) subsequently reviewed and concurred with Geolabs' conclusions. According to a RTF&A 2008 letter, the Los Angeles County Department of Public Works' July 12 and 26, 2007 Review Sheets accept Geolabs' findings with respect to the Holser Fault.

Based on our review of the AES (2000), Geolabs (2007) and RTF&A (2008) reports, and given the pre-Holocene age of the fault, we believe the impact of surface rupture at Valencia Commerce Center is less than significant. Further, all buildings within the Modified Project must comply with the latest California Building Code requirements and Los Angeles County Code standards to address seismic shaking, as required by Modified Project Mitigation Measure GEO-1. Therefore, we do not recommend building setbacks.

1b. The State-certified EIR concluded that strong seismic ground shaking would be significant if implementation of the 2017 Approved Project would expose people or structures to substantial adverse effects including the risk of loss, injury, or death. To mitigate this significant ground shaking impact, Modified Project Mitigation Measure GEO-1 requires that structures be designed using sound engineering judgment and the CBC requirements, as a minimum. Seismic design

provisions of current building codes generally prescribe minimum lateral forces, applied statically to each habitable structure, combined with the gravity forces of dead and live loads. The code-prescribed lateral forces are generally considered to be substantially smaller than the comparable forces that would be associated with a major earthquake. Further Modified Project Mitigation Measure GEO-2 requires implementation of design requirements when the anticipated seismic differential settlement exceeds the County of Los Angeles' 1-inch seismic differential settlement standard. Therefore, structures should be able to: (1) resist minor earthquakes without damage, (2) resist moderate earthquakes without structural damage but with some nonstructural damage, and (3) resist major earthquakes without collapse, but with some structural, as well as nonstructural damage. It is reasonable to expect that well-designed and well-constructed structures will not collapse or cause loss of life in a major earthquake (SEAOC, 1996). These regulatory compliance requirements of the CBC along with Modified Project Mitigation Measures GEO-1 and GEO-2 will reduce impacts to a less than significant level.

1c. The State-certified EIR concluded that soil at the Valencia Commerce Center is not conducive to liquefaction and impacts would be less than significant. Additionally, the State-certified EIR concluded that some isolated liquefaction-prone soil exists at Entrada South at various depths and that mitigation would be required to reduce impact to less than significant.

The Seismic Hazard Zone Report for the Newhall Ranch 7.5-Minute Quadrangle shows portions of both VCC and Entrada South to be potentially susceptible to liquefaction, as shown in Figure 1. Further analyses by Geolabs West Lake Village (2007) and Leighton (2015a and 2015b), concluded that liquefaction mitigation should be incorporated into the proposed Entrada South and Valencia Commerce Center designs to reduce the impacts of liquefaction and dry-sand settlement to less than significant levels.

Based on our review of the existing data and analysis, we agree that seismically induced liquefaction and dry-sand settlement are hazards for both Valencia Commerce Center and Entrada South. The maximum allowable seismic differential settlement permitted by Los Angeles County (2013) is 1 inch, beyond which some form of mitigation is needed. Based on this threshold, some portions of Entrada South and Valencia Commerce Center, where the anticipated seismic differential settlement exceeds the threshold value, will require alluvium removal in accordance with Modified Project Mitigation Measure GEO-2 to reduce the hazard to less than significant levels, as prescribed by the County of Los Angeles Manual for Preparation of Geotechnical Reports. Further, in accordance with Modified Project Mitigation Measure GEO-3, a Corrective Grading Plan delineating the areas where such geotechnical conditions exist shall be prepared by a registered geotechnical engineer and submitted to the Department of Public Works. Therefore, the implementation of Modified Project Mitigation Measures GEO-2 and GEO-3 will reduce the impacts of liquefaction and dry-sand settlement to less than significant levels.

1d. The State-certified EIR concluded that, without mitigation, landslides could result in significant impacts if implementation of the 2017 Approved Project would expose people or structures to substantial adverse geological effects. The significant impact from landslide hazards would be reduced to less than significant through removal of landslide deposits, buttressing landslides in place with drained keyways, or both, similar to Mitigation Measure VCC-GEO-3 already required by the adopted VCC EIR.

The Seismic Hazard Zone Reports for the Val Verde and Newhall 7.5-Minute Quadrangles map portions of Entrada South and Valencia Commerce Center as potentially susceptible to earthquake-induced landslides. Several potential landslide areas have also been mapped, one in Valencia Commerce Center and five in Entrada South, through our geomorphic photointerpretation of stereo-paired aerial photographs. The potential landslides will require supplemental subsurface investigations to confirm the existence or absence of the potential landslides, to meet regulatory compliance standards (Section 3.5.2 of the Manual for Preparation of Geotechnical Reports, 2013). If landslides are found to exist, an assessment of the stability of the landslides must be made to demonstrate that they will not adversely affect the proposed development. A Corrective Grading Plan delineating these areas will be submitted to the County of Los Angeles Department of Public Works as required for regulatory compliance (Section 3.3.3.1 of the Manual for Preparation of Geotechnical Reports, 2013). Landslides identified on the Corrective Grading Plans are to be mitigated through stabilization, removal, and/or building setbacks. With the implementation of these corrective grading measures and the Modified Project Mitigation Measure GEO-3, we believe the impacts of potential landslides will be reduced to less than significant levels.

2. Result in substantial soil erosion or the loss of topsoil.

The State-certified EIR concluded that the effects of substantial soil erosion or loss of topsoil may include undermining of structures and slopes, alterations of surface drainage patters, steepening of slopes, and loss of setback areas and safety zones, and absent mitigation, such impacts are considered significant. Corrective grading measures will be designed to remove unstable soil, stabilize potential landslide areas, and compact engineered fill to meet County of Los Angeles soil compaction requirements, resulting in a reduction of these adverse geological impacts of the 2017 Approved Project to less than significant. By following County of Los Angeles Grading Guidelines and Grading Code prescribed slope setbacks and compaction specifications, together with implementation of Modified Project Mitigation Measure GEO-3, we believe soil erosion and the loss of topsoil impacts will be reduced to less than significant levels.

3. Be located on a geologic unit or soil that is unstable, or that would become unstable as a result of the Project, and potentially result in on- or off-site landslide, lateral spreading, subsidence, liquefaction, or collapse.

The State-certified EIR concluded that the effects of unstable soil, including land and structure subsidence, displacement or crushing of structures due to soil movement, loss of foundation integrity, alteration of surface drainage patterns, steepening of slopes, and loss of setback and safety zones, could result in substantial risks to life or property. Additionally, the State-certified EIR concluded that soil at Valencia Commerce Center is not conducive to liquefaction and impacts would be less than significant under Significance Threshold 3. However, as noted above, Entrada South would have some isolated liquefaction-prone soil at depth, and the thickness of the soil and depth to groundwater table are such that the potential for significant liquefaction impacts “exists.” Lateral spreading hazards do not appear to be present based on the current level of geotechnical exploration.

As previously discussed, the Seismic Hazard Zone Reports for the Val Verde and Newhall 7.5-Minute Quadrangles map substantial portions of Entrada South and Valencia Commerce Center planning areas as potentially susceptible to liquefaction and earthquake-induced landslides. It is our opinion that seismicity-related ground failure, including liquefaction, landslides, and dry-sand settlement, has a potential to expose people or structures to potential substantial

adverse effects, including the risk of loss, injury, or death. A Corrective Grading Plan delineating these areas will be submitted to the County of Los Angeles Department of Public Works as required for regulatory compliance (Section 3.3.3.1 of the Manual for Preparation of Geotechnical Reports, 2013). Areas subject to these hazards are to be mitigated during corrective grading. With the implementation of these corrective grading measures and the Modified Project Mitigation Measure GEO-3, the impacts of on- and off-site potential instability will be reduced to less than significant levels.

4. Be located on expansive soil, (defined in the Uniform Building Code Table 18-b of 1994), or corrosive soil creating substantial risks to life or property.

The State-certified EIR concluded that expansive soil and/or corrosive soil would have significant impact, presenting a risk to the residential, commercial, infrastructure, and land uses. Reddish-brown clayey siltstone lenses in the Saugus Formation are also potentially expansive. Implementation of the 2017 Approved Project would result in a significant adverse impact without mitigation.

Section 3.5.7 of the Manual for Preparation of Geotechnical Reports requires expansion index (EI) testing on expansive soil and/or rock. Should expansive soil be encountered during earthworks, regulatory requirements state that the expansive soil shall be mitigated through implementation of geotechnical design measures to reduce hazard of constructing in expansive soil.

Previous geotechnical characterizations have identified the presence of corrosive soil. Should corrosive soil be encountered during earthworks, regulatory requirements state that the corrosive soil shall be mitigated in accordance with the CBC as a minimum, to reduce hazard of constructing in corrosive soil.

Areas subject to expansive soil and bedrock are to be mitigated during corrective grading. With the implementation of the regulatory requirements and proposed Modified Project Mitigation Measure GEO-3, impacts would be reduced to a less-than-significant level under Significance Threshold 4.

With respect to corrosive soil, Modified Project Mitigation Measure GEO-4 requires that after the site has been mass graded, soil corrosion testing shall be completed and appropriate design requirements shall be implemented in accordance with the CBC, as a minimum. With the implementation of the regulatory requirements of the CBC, and in accordance with the proposed Modified Project Mitigation Measures GEO-3 and GEO-4, the impacts of corrosive soil would be reduced to less than significant.

5. Have soil incapable of adequately supporting the use of septic tanks or alternative wastewater disposal systems, where sewers are not available for the disposal of wastewater.

The State-certified EIR concluded that this threshold was not applicable to the 2017 Approved Project because development facilitated in the Entrada South and Valencia Commerce Center planning areas would be served exclusively by public sewers. The Modified Project does not alter this conclusion as the facilitated development would continue to use public sewers, as previously analyzed.

6. Result in the loss of availability of a known mineral resource that would be of value to the region and the residents of the state; or

The State-certified EIR concluded that the loss of access to mineral resources would not be significant under the 2017 Approved Project. The Modified Project does not alter this conclusion as the development footprint would not increase.

7. Result in the loss of availability of a locally important mineral resource recovery site delineated on a local general plan, specific plan, or other land use map.

See analysis for Threshold 6 above.

MITIGATION

Modified Project Mitigation Measures

The State-certified EIR did not identify any specific mitigation measures for the Entrada South or VCC planning areas, but concluded that adoption and implementation of measures similar to those previously adopted for the Newhall Ranch Specific Plan, in combination with the VCC-specific mitigation measures from the County-certified EIR, would ensure that geology and geologic hazard impacts would be less than significant. The following mitigation measures achieve an equivalent level of mitigation as the previously adopted Specific Plan measures related to geology and geologic hazards, shall apply to the Entrada South and VCC planning areas, and will ensure that potential impacts related to geology and geological hazards within the Entrada South and VCC planning areas are reduced to less than significant.

GEO-1 Prior to the issue of building permits, all structures shall be designed using sound engineering judgment and the latest California Building Code (CBC) requirements, as a minimum, which prescribe minimum lateral forces, applied statically to each habitable structure, combined with the gravity forces of dead and live loads.

GEO-2 Prior to issuance of rough grading permits, and in those portions of the Entrada South and VCC planning areas beneath habitable structural improvements where the anticipated seismic differential settlement exceeds the County of Los Angeles' one-inch seismic differential settlement standard, one or more of the following design requirements will be implemented:

a. Alluvium removal to reduce liquefaction-induced settlement to less than 1 inch.

b. Ground improvements such as rammed aggregate piers (RAPs), deep soil mixing (DSM), or stone columns to reduce liquefaction-induced settlement to less than 1 inch.

c. Ground improvements such as deep dynamic compaction (DDC) or compaction grouting to reduce liquefaction-induced settlement to less than 1 inch.

d. Sufficiently stiff foundations or deep foundations.

e. An approved alternative design requirement capable of reducing liquefaction induced settlement to less than 1 inch.

The above design requirements shall be performed by removing and/or improving enough liquefiable alluvium to achieve a less than 1-inch seismic differential settlement, pursuant to the County of Los Angeles Manual for Preparation of Geotechnical Reports, or by specific foundation design. Geotechnical recommendations and design requirements shall be presented and approved as a conceptual design at the 100-scale grading plan stage and as a detailed design at the 40-scale grading plan stage.

GEO-3 Prior to issuance of rough grading permit, in order to address landslides, unstable soil, liquefaction, expansive soil and dry-sand settlement, a Corrective Grading Plan delineating the areas where such geotechnical conditions exist shall be prepared by a registered geotechnical engineer and submitted to the Department of Public Works pursuant to the County of Los Angeles Manual for Preparation of Geotechnical Reports. The Corrective Grading Plan shall address the following.

a. Project grading shall include a combination of ground modification and/or structural mitigation in areas subject to liquefaction to reduce the risk to an acceptable level (as defined by CGS in Special Publication 117a, Chapter 2, or as superseded by CGS guidance in effect at the time of implementation of this measure). Ground modification shall consist of the removal of some of the soil material subject to liquefaction and/or elevating the site grades over the material subject to liquefaction. The recommended depth of removal for mitigation of liquefaction ranges from 5 to 30 feet. Structures shall be designed to resist the anticipated static and seismic total and differential settlements.

b. Landslides shall be stabilized and/or removed, and/or building setbacks shall be used to protect structural integrity.

c. Grading and engineering design requirements shall address the removal of unstable soil, stabilization of potential landslide areas, and compaction of engineered fill to meet County of Los Angeles soil compaction requirements (County of Los Angeles Grading Guidelines, 2008).

d. Areas where expansive soil is encountered shall include grading measures designed to reduce hazard of construction in expansive soil including but not limited to removing expansive soil and replacing with engineered fill, installing drainage systems, using stiffened foundations systems, or conducting engineered preparation of building pads.

GEO-4 Prior to the issue of building permits, and after the site has been mass graded, soil corrosion testing shall be completed and appropriate design requirements shall be implemented in accordance with the latest California Building Code (CBC) as a minimum, to reduce the hazard of construction in corrosive soil.

Mitigation Measures from County-Certified EIR for VCC

Mitigation measures previously adopted by the County applicable to the Modified Project's VCC planning area include VCC-GEO-1 through VCC-GEO-5, as set forth below. Italicized parentheticals are used to provide additional information and clarification regarding the implementation of a particular measure's requirements.

VCC-GEO-1 A minimum 60-80 foot setback over the Holser Fault is part of the project design. Potential impacts from ground shaking will be mitigated by compliance with Section 2312(d) of the Los Angeles County Building Code. *(Building setbacks are no longer required within the VCC Planning Area based upon additional, subsequent geotechnical investigation reports. Building design will continue to comply with the Los Angeles County Building Code and regulatory standards for purposes of mitigating ground shaking, as required by mitigation measure GEO-1 for the Modified Project. No further action is required.)*

VCC-GEO-2 All cut slopes will be designed at 2:1 gradients. If cut slopes are steeper than the bedding, then buttresses, retaining walls and/or stability equivalents will be provided. *(This mitigation measure is superseded by regulatory compliance, specifically compliance with the County's Grading Code and adopted Grading Guidelines (January 1, 2008). No further action is required.)*

VCC-GEO-3 Landslides will be stabilized with shear keys and/or removal and compaction. *(This mitigation measure is superseded by mitigation measure GEO-3 for the Modified Project. No further action is required.)*

VCC-GEO-4 Expansive bedrock will be removed and replaced with certified fill or special foundations will be designed. Fills will be designed at 2:1 gradients. *(This mitigation measure is superseded by mitigation measure GEO-3 for the Modified Project. No further action is required.)*

VCC-GEO-5 All major canyon fills, buttresses, stability fills, shear keys, and retaining walls will require subdrains. *(This mitigation measure is superseded by regulatory compliance, specifically compliance with the County's Grading Code and adopted Grading Guidelines (January 1, 2008). No further action is required.)*

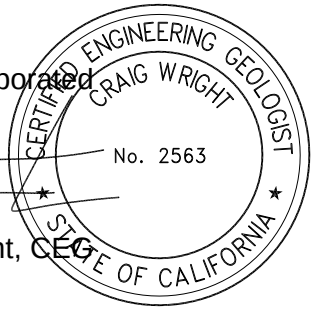
CONCLUSIONS

The Modified Project would not result in any new significant impacts or increase the severity of previously identified significant impacts related to geology and soil. The location of the Modified Project is unchanged, and geotechnical conditions on the site are unchanged. Based on 2007 and 2008 fault studies, we conclude that building setbacks from the Holser Fault, previously adopted for Valencia Commerce Center, will not be necessary. The mitigation measures identified in the State-certified EIR and supplemental corrective grading measures outlined above, provide the means to reduce Geology and Geologic Hazard impacts to less-than-significant levels.

We note that subsequent geotechnical studies have occurred since the State-certified EIR was completed, and Mitigation Measures similar to those previously adopted for the Newhall Ranch Specific Plan have been applied to the Modified Project above, in accordance with the design standards and performance objectives of the applicable regulatory framework (e.g., County building standards), and Los Angeles County Geotechnical and Materials Engineering Division review and approval. Compliance with the regulatory framework and CEQA mitigation measures would reduce geotechnical impacts to levels that are less than significant.

Sincerely,

ENGEO Incorporated



Craig S. Wright, CEG

Uri Eliahu, GE

csw/ps/ue/jf

Attachments: List of References
Figure 1 – Seismic Hazard Zone Map

PROJECT REFERENCES

1. Allan E. Seward (1998); Geologic Report – Summary of Conditions – Termination of Geologic Services; PM 19784-01, Phase I Grading Activities, Valencia Commerce Center, Castaic, California; March 5, 1998; Job No. 98-10541-5.

2. Allan E. Seward (2000); Holser Fault Investigation, TPM 18108, Castaic California; April 12, 2000; Job No. 00-1219-9.

3. R.T. Frankian & Associates (2000); Geotechnical Tentative Parcel Map Review Tentative Parcel Map No. 18108 And Geotechnical Investigation Channel Linings Castaic Creek and Hasley Creek Canyon Creek, Castaic, California, Volumes I through III; April 15, 2000; Job No. 99-800-21 and 99-801-01.

4. R.T. Frankian & Associates; 100-Scale Plan Review, Vesting Tentative Tract Map No. 53295, Valencia, California; March 18, 2005; Job No. 2004-700-21, Volume I and II.

5. R.T. Frankian & Associates; Response to Los Angeles County Department of Public Works, Geotechnical Review, Vesting Tentative Tract Map No. 53295, The Entrada Project, Valencia, California; April 6, 2007; Job No. 2004-700-22, Volume I and II.

6. Geolabs; Geotechnical Investigation and Surface Fault Rupture Hazard Assessment, Tentative Parcel Map 18108, Castaic, California; May 31, 2007.

7. R.T. Frankian and Associates; Response to Los Angles [sic] County Department of Public Works Geotechnical Review No. 2, Vesting Tentative Tract Map No. 53295, The Entrada Project, Valencia, California; January 18, 2008.

8. R.T. Frankian & Associates; Geotechnical Investigation, Proposed Bank Stabilization, North of Feedmill Road, Vesting Tentative Tract Map No. 53295, The Entrada Project, Santa Clarita, California; January 15, 2008; Job No. 2004-701-22.

9. R.T. Frankian & Associates; Response to Los Angeles County, Department of Public Works, Geotechnical Review No. 2, Vesting Tentative Tract Map No. 53295, The Entrada Project, Valencia, California; January 16, 2008; Job No. 2004-700-22.

10. R.T. Frankian & Associates; Response to Los Angeles County Department of Public Works Geotechnical Review No. 2, Vesting Tentative Tract Map No. 53295; January 16, 2008; Job No. 2004-700-22.

11. R.T. Frankian & Associates; 100-Scale Plan Review, Revised Vesting Tentative Tract Map No. 53295 and response to County of Los Angeles Review Sheets, The Entrada Project, Valencia, California; November 13, 2009; Job No. 2004-700-21.

12. R.T. Frankian & Associates; 100-Scale Plan Review, Revised Vesting Tentative Tract Map No. 53295, Entrada South, Los Angeles County, California; September 16, 2013; Job No. 2004-700-021.

PROJECT REFERENCES (Continued)

13. R.T. Frankian & Associates; Geologic/Geotechnical Evaluation for Environmental Impact Report, Entrada South Project, Los Angeles County, California; October 31, 2013; Job No. 2004-700-52(R2).

14. Leighton & Associates, Inc. (2016); Preliminary Geotechnical Investigation Infiltration Feasibility For Low Impact Development (LID) Design Features, Vesting Tentative Parcel Map No. 18108, Valencia Commerce Center, Los Angeles County, California; February 8, 2016; Project No. 10738.001.

15. Leighton & Associates, Inc. (2015b); Updated Geotechnical Report and Responses to County of Los Angeles Review Comments 60-Scale Grading Plan Review, Vesting Tentative Parcel Map No. 18108, Los Angeles County, California; December 3, 2015; Project No. 10738.001.

16. Leighton & Associates, Inc. (2015a); Updated Geotechnical Report and Responses to County of Los Angeles Review Comments – 60-Scale Grading Plan Review Vesting Tentative Parcel Map No. 18108, Unincorporated Area of the County of Los Angeles, California; February 9, 2015; Project No. 10738.001.

17. R.T. Franklian & Associates; Geotechnical Update Report and Revised Plan Review, Vesting Tentative Tract Map No. 53295, Entrada South, Los Angeles County, California; September 28, 2017; Job No. 2004-700-021.

TECHNICAL REFERENCES

Bryant, W. and Hart, E. (2007). Special Publication 42, “Fault-Rupture Hazard Zones in California”, Interim Revision 2007, California Department of Conservation.

California Building Code, 2016.

California Geologic Survey, 2008, Special Publication 117A, Guidelines for Evaluating and Mitigating Seismic Hazards in California.

California Geologic Survey, 1997, Seismic Hazard Zone Repot 004.

Dibblee. T.W., Jr (1996). Geologic Map of the Newhall Quadrangle, Los Angeles County, California; Dibblee Geological Foundation Map DF-56, Scale 1:24,000.

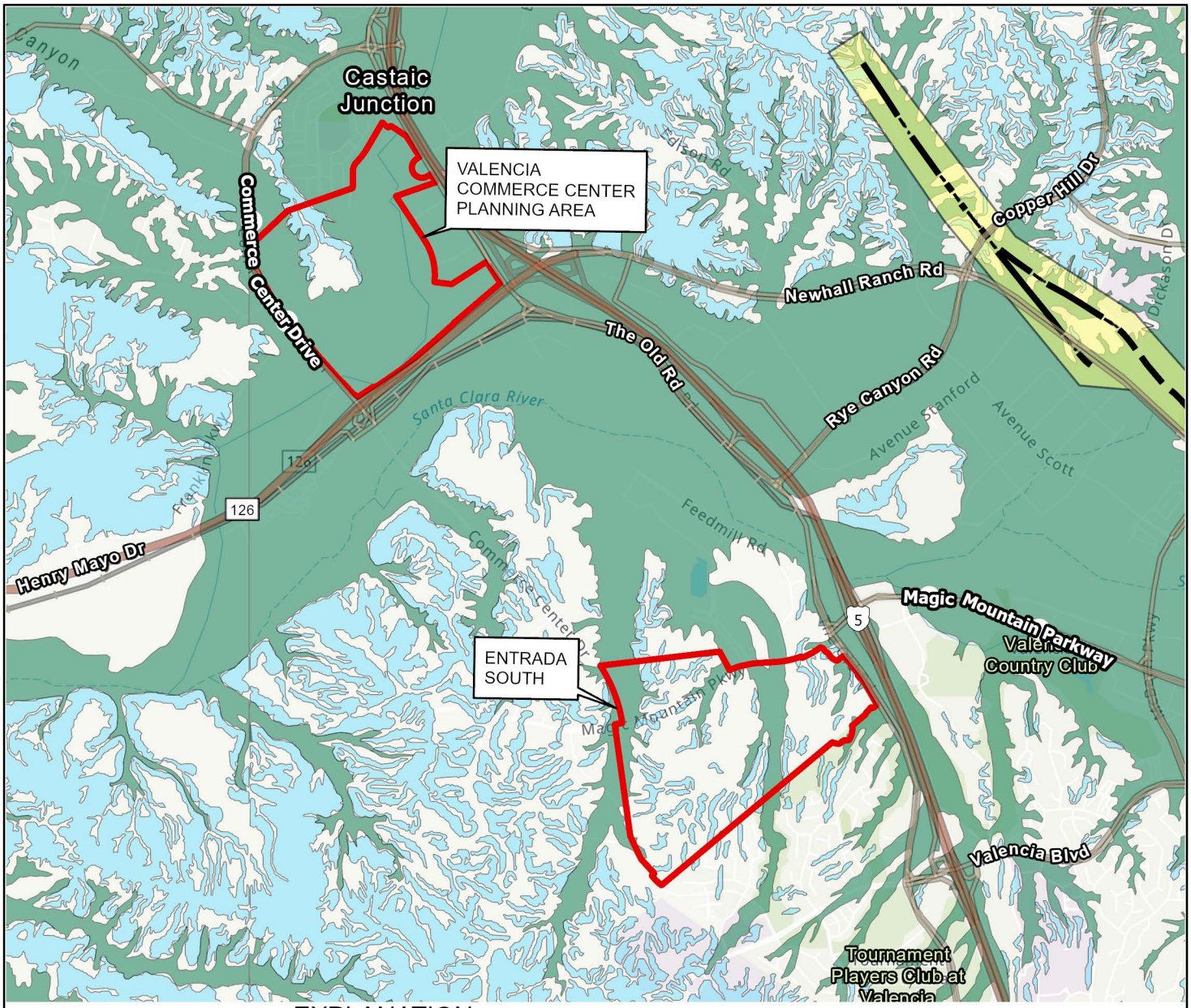
Division of Mines and Geology, 1997, Special Publication 117, Guidelines for Evaluation and Mitigating Seismic Hazards in California, Adopted March 13.

2014 Working Group on California Earthquake Probabilities (2014). The Uniform California Earthquake Rupture Forecast, Version 3 (UCERF 3): U.S. Geological Survey Open-File Report 2013-1165 and California Geological Survey Special Report 228.

PROJECT REFERENCES (Continued)

Structural Engineers Association of California (SEAOC), Seismic Design Recommendations Blue Book, 2019.

United States Geological Survey (USGS), Quaternary Fault and Fold Database of the United States, 2018.



EXPLANATION

ALL LOCATIONS ARE APPROXIMATE

- ACCURATELY LOCATED
- INFERRED
- APPROXIMATELY LOCATED
- CONCEALED

EARTHQUAKE FAULT ZONE
ZONE BOUNDARIES ARE DELINEATED BY STRAIGHT-LINE SEGMENTS; THE BOUNDARIES DEFINE THE ZONE ENCOMPASSING ACTIVE FAULTS THAT CONSTITUTE A POTENTIAL HAZARD TO STRUCTURES FROM SURFACE FAULTING OR CREEP SUCH THAT AVOIDANCE AS DESCRIBED IN PUBLIC RESOURCES CODE SECTION 2621.5(A) WOULD BE REQUIRED

LIQUEFACTION ZONE
AREAS WHERE THE HISTORICAL OCCURRENCE OF LIQUEFACTION, OR LOCAL GEOLOGICAL, GEOTEHNICAL AND GROUND WATER CONDITIONS INDICATE A POTENTIAL L FOR PERMANENT GROUND DISPLACEMENTS SUCH THAT MITIGATION AS DEFINED IN PUBLIC RESOURCES CODE SECTION 2693(C) WOULD BE REQUIRED

EARTHQUAKE-INDUCED LANDSLIDE ZONES
AREAS WHERE THE PREVIOUS OCCURRENCE OF LANDSLIDE MOVEMENT, OR LOCAL TOPOGRAPHIC, GEOLOGICAL, GEOTECHNICAL AND SUBSURFACE WATER CONDITIONS INDICATE A POTENTIAL FOR PERMANENT GROUND DISPLACEMENTS SUCH THAT MITIGATION AS DEFINED IN PUBLIC RESOURCES CODE SECTION 2693(C) WOULD BE REQUIRED.

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FEET

BASEMAP SOURCE: ESRI MAPPING SERVICE
CALIFORNIA DEPARTMENT OF CONSERVATION, CALIFORNIA GEOLOGICAL SURVEY

ENGEO Expect Excellence

SEISMIC HAZARDS ZONE MAP

VALENCIA COMMERCE CENTER AND ENTRADA SOUTH

VALENCIA, CALIFORNIA

PROJECT NO. :	6538.VCC.001
SCALE:	AS SHOWN
DRAWN BY: JV	CHECKED BY: UE

FIGURE NO. 1

PATH: G:\DRAFTING\DRAFTING2_DWG\6538\VCC\P2019.000.932 VALENCIA COMMERCE CENTER\VALENCIA COMMERCE CENTER.APRX
USER: JVERGARA

ORIGINAL FIGURE PRINTED IN COLOR