2.5 Geology and Soils

A Geologic Reconnaissance was completed for Warner Ranch by GEOCON Incorporated. GEOCON's Geologic Reconnaissance is included in this Environmental Impact Report (EIR) as Appendix G, and this EIR section is based on the information in that document. Additional description of some site geology is included in the Mineral Resource Technical Report prepared for this project by Leighton and Associates Inc. (Appendix H).

2.5.1 Existing Conditions

Environmental Setting

Geology

The project site is located in the coastal subprovince of the Peninsular Ranges Geomorphic Province, near the western edge of the Southern California batholith. The topography at the edge of the batholith changes from the more rugged landforms developed on the batholith to the more subdued landforms characteristic of the sedimentary coastal plain. The site is primarily underlain by granitic rocks of the batholith.

The 513.5-acre project site has a relatively flat alluvial plain in its southern portion, with moderate to steep hillsides in the northern and eastern portion, ranging from 350 to 1000 feet amsl (above mean sea level) in elevation. Surface drainage is to the southerly trending alluvial valleys, toward the San Luis Rey River south of the site, across State Route 76 (SR 76). Geologic conditions exposed on the site are crystalline igneous rocks, metamorphic rocks, older and younger alluvial and colluvial deposits, and topsoil. Six geologic formations are present on the site (Figures 2.5-1, Geologic Map, and 2.5-2, Geologic Map on Aerial Photo). Figure 2.5-1 includes the general project outline and surrounding topography. Figure 2.5-2 uses the color aerial photo as its base map.

An overview of the project site geology is provided below.

- Topsoil (unmapped) is present to depths of one to two feet, and consists of loose, clayey sand with occasional gravel.
- Alluvium and Colluvium Deposits (Qal, Qcol) were composed of loose, silty, fine to coarse sands, and gravelly medium to coarse sands, with little to no cohesion. The alluvium in the main drainages exceeds 15 feet in thickness.
- Older Alluvium deposits (Qoal) of Pleistocene or early Holocene age are composed of medium to very dense, fine to coarse sand and clayey sand.
- San Marcos Gabbro (Ksm) is a Cretaceous-age crystalline igneous rock found primarily along the western and eastern boundaries of the site (Figure 2.5-1).

- Granitic Rock (Kwm, Kb) is composed of areas of granodiorite and tonalite, also igneous Cretaceous age rocks. These are found across the majority of the property, and underlie the alluvial units.
- Bedford Canyon (Trbc) is a metasedimentary rock of Triassic-age. It was found in two small areas in the north-central area (Figure 2.5-1). On Warner Ranch, this formation consists of very old weathered and metamorphosed shales located between the two younger units of San Marcos gabbro and Bonsall tonalite.

Groundwater was encountered from approximately 11 to 14 feet in depth in the alluvial deposits. Groundwater elevations are dependent on factors such as seasonal precipitation, irrigation, and land uses. As such, groundwater elevations can vary over the course of any given year, and between years.

A fault trace on a published map was shown to extend across the eastern portion of the project site. Accordingly, a fault investigation was done on this fault trace (Figure 2.5-1). That investigation found the fault trace does not exist (Appendix G). As discussed in the Geologic Reconnaissance Report, this is considered a transitional igneous intrusive boundary between the San Marcos Gabbro and the Bonsall Tonalite. This interface is a Cretaceous-age emplacement of magma against an older rock type, resulting in an irregular welded contact zone that had been interpreted as a fault-related contact (Figure 2.5-3, Transitional Boundary).

No Unique Geology Sites are located on the project site, as listed in the County of San Diego's *Guidelines for Determining Significance, Unique Geology* (County of San Diego 2007a).

Soils

The U.S. Department of Agriculture, Soil Conservation Service has prepared a Soil Survey for San Diego County (Bowman 1973). Soils are analyzed in detail in the Agricultural Resources Technical Report prepared for this project (Appendix N). The following is summarized from that report. Eight major soil types cover approximately 98 percent of the site; an additional five soil types cover the balance. The eight major soil types include:

- **Cieneba–Fallbrook Rocky Sandy Loam (CnG2).** Located mostly in the northern portion of the subject property, Cieneba–Fallbrook Rocky Sandy Loam occupies approximately 177 acres or 34 percent of the subject property. This soil formation is found on 30 percent to 65 percent slopes, is low to medium in fertility, with rapid to very rapid runoff, and a high to very high erosion hazard.
- **Cieneba Sandy Loam (ClG2).** Located in the eastern portion of the study area, Cieneba Sandy Loam soil is found eroded on 30 percent to 65 percent slopes. It occupies approximately 95 acres or 18 percent of the subject property. This soil is steep to very steep. The runoff is rapid to very rapid, and the erosion hazard is high to very high.

- **Las Posas Stony Fine Sandy Loam (LrG).** Located in the western portion of the subject property, Las Posas Stony Fine Sandy Loam soil is found on 30 percent to 65 percent slopes. It occupies approximately 78 acres or 15 percent of the subject property. This soil is steep to very steep, has medium fertility, runoff is rapid to very rapid, and the erosion hazard is high to very high.
- **Visalia Sandy Loam (VaA).** Located in the southern portion of the subject property, Visalia Sandy Loam occupies approximately 57 acres or 11 percent of the subject property. This nearly level soil has high fertility, slow runoff, and the erosion hazard is slight.
- **Las Posas Stony Fine Sandy Loam (LrE).** Located in the western and southern portions of the subject property, Las Posas Stony Fine Sandy Loam soil is found on 9 percent to 30 percent slopes. It occupies approximately 47 acres or 9 percent of the subject property. This soil is strongly sloping to moderately steep, has medium fertility; runoff is medium to rapid; and the erosion hazard is moderate to high.
- **Ramona Sandy Loam (RaB).** Located in the south-central portion of the subject property, Ramona Sandy Loam soil is found on 2 percent to 5 percent slopes. It occupies approximately 25 acres, or 5 percent of the subject property. This gently sloping soil has medium fertility; the runoff is slow; and the erosion hazard is slight.
- **Ramona Sandy Loam (RaC2).** Located in the south and eastern portions of the subject property, Ramona Sandy Loam soil is found on 5 percent to 9 percent slopes. It occupies approximately 18 acres, or 18percent of the subject property. This moderately sloping soil has medium fertility; the runoff is slow to medium; and the erosion hazard is slight to moderate.
- **Ramona Gravelly Sandy Loam (RcE).** Located in the south-central portion of the subject property, Ramona Gravelly Sandy Loam soil is found on 9 percent to 15 percent slopes. It occupies approximately 8 acres, or 8 percent of the subject property. This moderately steep soil has medium fertility; the runoff is medium to rapid; and the erosion hazard is moderate to high.

Mapping of these soil types on the project site is shown on Figure 2.5-4, Soil Types Found on Site.

2.5.2 Regulatory Setting

State

Alquist–Priolo Earthquake Fault Zoning Act (AP Act)

This California law requires proposed developments incorporating tracts of four or more dwelling units to investigate the potential for ground rupture within Alquist–Priolo Zones (AP

Zones). These zones serve as an official notification of the probability of ground rupture during future earthquakes. Where such zones are designated, no building may be constructed on the line of the fault, and before any construction is allowed, a geologic study must be conducted to determine the locations of all active fault lines in the zone (County of San Diego 2007b).

Uniform Building Code

The Uniform Building Code (UBC) is the primary means for authorizing and enforcing procedures and mechanisms to ensure safe building standards. The UBC uses a hazard classification system to determine what protective measures are required to protect human health and property. The UBC employs a permit system based on hazard classification. The California Building Code (CBC) is based on the UBC, with the addition of more stringent seismic provisions for hospitals, schools, and essential facilities (County of San Diego 2007b).

Local

County of San Diego Grading Ordinance

The County's Grading Ordinance, Chapter 4, includes requirements for maximum slopes, drainage terraces, expansive soils, setbacks from cut and fill slopes, and reporting requirements. Required are a soil engineer's report, and a final engineering geology report, which includes specific approval of the grading as affected by geological factors (County of San Diego 2007b).

County of San Diego General Plan

The County's General Plan Safety Element provides goals, objectives, and policies regarding geological hazards. Of the geological hazards, seismic hazards pose the highest potential for causing widespread damage. All of San Diego County is located within Seismic Zone 4, which is the highest Seismic Zone and, like most of Southern California, is subject to ground shaking. Active faults in the region include segments of the San Jacinto, Elsinore, and Rose Canyon fault zones. Seismic hazard policies listed in the Safety Element reflect State law and adopted guidelines including the CBC, Alquist-Priolo Earthquake Fault Zoning Act, and the State's Guidelines for Evaluating and Mitigating Seismic Hazards in California. Select applicable General Plan policies are listed below:

- **S-7, Reduced Seismic Hazards.** Minimized personal injury and property damage resulting from seismic hazards.
- **S-7.1, Development Location.** Locate development in areas where the risk to people or resources is minimized. In accordance with the California Department of Conservation Special Publication 42, require development be located a minimum of 30 feet from active or potentially active faults, unless an alternative setback distance is approved based on

geologic analysis and feasible engineering design measures adequate to demonstrate that the fault rupture hazard would be avoided.

- **S-7.2, Engineering Measures to Reduce Risk.** Require all development to include engineering measures to reduce risk in accordance with the California Building Code, Uniform Building Code, and other seismic and geologic hazard safety standards, including design and construction standards that regulate land use in areas known to have or potentially have significant seismic and/or other geologic hazards.
- **S-8, Reduced Landslide, Mudslide, and Rock Fall Hazards.** Minimized personal injury and property damage caused by mudslides, landslides, or rock falls.
- **S-8.1, Landslide Risks.** Direct development away from areas with high landslide, mudslide, or rock fall potential when engineering solutions have been determined by the County to be infeasible.
- **S-8.2, Risk of Slope Instability.** Prohibit development from causing or contributing to slope instability.

2.5.3 Analysis of Project Effects and Determination as to Significance

Guidelines for determining significance of geologic hazards of fault rupture, ground shaking, liquefaction, landslides, and expansive soils have been established (County of San Diego 2007b) and are utilized in this EIR section. These include reference to the Alquist–Priolo Earthquake Fault Zoning Act, the UBC, and the CBC, discussed in the previous section.

1. According to the County of San Diego *Guidelines For Determining Significance: Geologic Hazards*, a project could result in a significant impact if:
    - The project proposes any building or structure to be used for human occupation over or within 50 feet of the trace of an Alquist–Priolo fault or County Special Study Zone fault, or
    - The project proposes the following uses within an AP Zone which are prohibited by the County:
        - Uses containing structures with a capacity of 300 people or more. Any use having the capacity to serve, house, entertain, or otherwise accommodate 300 or more persons at any one time.
        - Uses with the potential to severely damage the environment or cause major loss of life. Any use having the potential to severely damage the environment or cause major loss of life if destroyed , such as dams, reservoirs, petroleum discharge facilities, and electrical power plants powered by nuclear reactors.

- Specific civic uses. Police and fire stations, schools, hospitals, rest homes, nursing homes, and emergency communication facilities.

2. According to the County of San Diego *Guidelines For Determining Significance: Geologic Hazards,* a project could result in a significant impact if:

   - The project site is located in a County Near-Source Shaking Zone or within Seismic Zone 4 and the project does not conform to the Uniform Building Code (UBC).

3. According to the County of San Diego *Guidelines For Determining Significance: Geologic Hazards,* a project could result in a significant impact if:

   - The project site has the potential to expose people or structures to substantial adverse effects because:
     - The project site has potentially liquefiable soils; and
     - The potentially liquefiable soils are saturated or have the potential to become saturated; and
     - In-situ soil densities are not sufficiently high to preclude liquefaction.

4. According to the County of San Diego *Guidelines for Determining Significance: Geologic Hazards*, a project could result in a significant impact if:

   - The project site would expose people or structures to substantial adverse effects, including the risk of loss, injury, or death involving landslides.
   - The project is located on a geologic unit or soil that is unstable, or would become unstable as a result of the project, potentially resulting in on- or off-site landslide or subsidence.
   - The project site lies directly below or on a known area subject to rockfall which could result in collapse of structures.

5. According to the County of San Diego *Guidelines For Determining Significance: Geologic Hazards,* a project could result in a significant impact if:

   - The project is located on expansive soil, as defined in the Uniform Building Code, and does not conform to the Uniform Building Code and California Building Code.

6. According to the County of San Diego *Guidelines For Determining Significance: Geologic Hazards,* a project could result in a significant impact if:

   - The project results in substantial soil erosion or loss of topsoil.

2.5.3.1 Fault Rupture

Analysis (Guideline 1)

The project site is not within 50 feet of an AP Zone. The project site is not underlain by active, potentially active, or inactive faults. The site is not located within a California Earthquake Fault Zone. Nineteen known active faults are located within a search radius of 50 miles from the property. The nearest known active fault is the Elsinore–Temecula Fault, located approximately four miles to the northeast of the project site. Active faults are defined as those showing evidence of activity within the last 11,000 years; potentially active faults are those considered to have been active within the last 1,600,000 years. With the absence of faults on site, ground rupture due to faulting is not likely.

The proposed project does not include any structures with a capacity of 300 or more persons, or any use with the potential to severely damage the environment if destroyed. The proposed project does include a fire station, but as stated above, the project site is not within an AP Zone. In addition, all proposed structures would be designed and constructed in compliance with the stringent seismic requirements set forth in the UBC and CBC. Implementation of the proposed project would result in **less-than-significant impacts** related to seismic fault rupture.

2.5.3.2 Ground Shaking

Analysis (Guideline 2)

Earthquakes on the Elsinore Fault Zone or other faults in Southern California or northern Baja California are potential generators of ground motion on the site. The project site is located within the 10-kilometer seismic shaking buffer, as mapped by the County of San Diego for its Near-Source Shaking Zones (County of San Diego 2007b). The project would be designed and constructed in conformance with the UBC, CBC, and County Building Code, including required seismic design considerations. Incorporation of recommendations set forth in Appendix G and conformance to required standards would avoid ground shaking hazards and reduce impacts to **less than significant**.

2.5.3.3 Liquefaction

Analysis (Guideline 3)

Liquefaction occurs when soils lose shear strength, and therefore can behave like a viscous fluid. This can allow lateral movement of soil or settlement in place, either of which can reduce the soils' capacities to support building foundations and underground or surface utilities. Liquefaction usually occurs under four conditions: (1) seismic activity, (2) cohesionless soil, (3)

groundwater within 50 feet of the surface, and (4) soil relative densities of less than 70 percent. The last three of these conditions do occur on portions of the project site, within at least some of the mapped alluvium areas, and the first condition (seismic activity) can potentially occur. The depth to groundwater was encountered from approximately 11 to 14 feet in depth in the alluvial deposits. Therefore, the saturated alluvial deposits underlying the site may be prone to liquefaction during an earthquake (Appendix G).

The on-site area subject to potential liquefaction generally encompasses the alluvium area (Qal) (see Figure 2.5-1) and is approximately 47.3 acres. A Geotechnical Report has been prepared for the project site that provides a general overview of the existing geologic conditions and soil types on the site. However, a soil engineer's report and a final engineering geology report would be required as mitigation to specify foundation designs, which are adequate to preclude substantial damage to the proposed structure due to liquefaction, which includes specific approval of the project's grading plan be submitted prior to approval of the grading plan. This final geotechnical investigation, including a liquefaction analysis, would identify the liquefaction potential, if any and provide recommendations to address any concerns. As such, based on the initial geologic reconnaissance mapping and review of project preliminary grading plans, Lots 18 through 74, 92 through 100, 104 through 110, 157 through 174, 185 through 207, 213 through 230, 261 through 268, 271 through 273, 289 through 294, 546 through 563, and 578 through 596, and Lot 600 and associated roadways and embankments are located within the saturated alluvial soils and potentially subject to liquefaction. This area subject to potential liquefaction would require approximately 916,268 cubic yards cut in addition to the grading identified on the site plans (2.3 million cubic yards balanced on-site) and would be recompacted for use on-site. Areas where liquefiable soils are encountered would be mitigated using a variety of geotechnical techniques such as stone columns, foundation improvements, and deep dynamic compaction, which is typically implemented during remedial grading. Future geotechnical studies would focus on identifying the physical characteristics of the soils in drainage areas, evaluate their potential for liquefaction, and make recommendations to remediate potential liquefaction. The mitigation report shall be submitted with the building plans and all recommendations of the report shall be incorporated into the design of the buildings.

Liquefaction, if not mitigated during development, could result in raised groundwater, sand boils, differential settlement, and site subsidence resulting in structure, underground utility, and pavement distress. As such, liquefaction and associated effects related to seismic activity are considered **potentially significant impacts (Impact GE-1).**

2.5.3.4 Landslides and Subsidence

Analysis (Guideline 4)

The project site has a relatively flat alluvial plain in its southern portion, with moderate to steep hillsides to the north. As part of the geotechnical study (Appendix G), a geologic reconnaissance and review of 1953 aerial photographs and published geologic maps was performed. During this review, geomorphic evidence such as backscarps, topographic benches, etc., were not observed. Therefore, no features indicative of landsliding that would impact the future development of the property were observed. As a result, impacts from landslides would be **less than significant**

Subsidence is a lowering of the ground surface caused by removal of subsurface material, usually a fluid such as water, petroleum, or gas. Subsidence generally occurs over a large area. A related term, settlement, is also a lowering of the ground surface, but is usually associated with the addition of surface materials, as a berm or building, resulting in compression of the supporting soil. Settlement can be very localized, such as with a single building. The term settlement/collapse is also used with this phenomenon, to include the situation in which the lowering is relatively slow (settlement) or sudden (collapse). At least some of the areas mapped as alluvium were found to be saturated with groundwater (Appendix G). In these areas, subsidence could occur if the project was proposing removal of a large amount of groundwater. In this case, there is a potential for settlement/collapse to occur under the alluvium or colluvium. Both of these units are present within the proposed development envelope (Figures 2.5-1 and 2.5-2). Subsidence and settlement are therefore **potentially significant impacts (Impact GE-2)**.

The risk of rock fall hazards along the perimeter of the project site is considered low because the geologic reconnaissance revealed that nearly all of development perimeter is free of significant rock outcroppings and in the areas where surface rock was observed, the slabs were non-spherical and appeared to be sufficiently embedded in the surrounding weathered matrix (Appendix G). Even though the risk for rock fall hazards is considered low, the proposed project would involve substantial grading, and rock could be encountered subsurface. If not mitigated during development, there would be potential for **significant impacts** to residential property, infrastructure, and buildings, and thereby to human health and safety **(Impact GE-3).**

2.5.3.5 Expansive Soils

Analysis (Guideline 5)

Expansive soils were not encountered on the site, as indicated in the Geologic Reconnaissance (Appendix G). The project has been designed to comply with the UBC and CBC which provide construction techniques to address unstable soils. Should expansive or otherwise unsuitable soils be encountered with future testing as part of the final geotechnical evaluation and found to be

problematic, the applicant would comply with recommendations set forth in the report to address any potential hazards associated with expansive soils. Potential impacts from expansive soils would be **less than significant**.

2.5.3.6 Soil Erosion

Analysis (Guideline 6)

Of the eight major soil types identified on-site, three are rated as having a high to very high erosion hazard: Cieneba–Fallbrook Rocky Sandy Loam, Cieneba Sandy Loam, and Las Posas Stony Fine Sandy Loam with 30 percent to 65 percent slopes. Las Posas Stony Fine Sandy Loam with 9 percent to 30 percent slopes and Ramona Gravely Sand are rated as having a moderate to high erosion hazard.

As shown in the slope analysis (Figure 1-22 in Chapter 1, Project Description), approximately 31percent of the property has slopes between 25 percent and 50 percent, with an additional approximately 28 percent of the property with slopes of 50 percent or greater. The project has been clustered to confine grading to the flatter areas of the property, in the southern portion of the property, with most of the development envelope (approximately 140 acres) in areas of 0percent to 15 percent slopes.

Overall area drainage is from north to south. Most of the property is proposed as Biological Open Space (approximately 359 acres of the 513-acre property). The proposed project is located in the southernmost portion of the property (Figure 1-1), and is therefore down-gradient from the steeper portions of the property to the north. The proposed project would not increase the potential for erosion on these up-gradient areas. In the development envelope, the potential for erosion would increase during grading and construction, as exposed soil is subject to wind and water erosion.

A Stormwater Pollution Prevention Plan (SWPPP) for the construction activities is required under the General Permit for Stormwater Discharges, as administered by the State Water Resources Control Board and the Regional Water Quality Control Board. The SWPPP for this project would be approved prior to the issuance of a grading permit and would include Best Management Practices (BMPs) to minimize erosion and to control sedimentation. Post-construction, disturbed soils would be stabilized mechanically and with revegetation; these procedures would be detailed in the BMPs of the SWPPP. The project design currently includes five bio-retention basins, four dry detention basins, and four vegetated swales. These measures would also ensure maintenance of water quality in stormwater runoff, and are discussed in greater detail in Section 3.2, Hydrology and Water Quality, of this EIR, and in the Stormwater Management Plan (Appendix Q), Preliminary Hydromodification Analysis (Appendix R), and Preliminary Drainage Study (Appendix P).

These project design measures would not result in impacts from erosion or loss of topsoil and the impact would be **less than significant**.

2.5.4 Cumulative Impact Analysis

Potential geologic hazards—fault rupture, ground shaking, liquefaction, landslides and subsidence, and expansive soils—all have the potential to affect the project, rather than the proposed project affecting the environment. Potential impacts of all of these geologic hazards would be less than significant with the mitigation measures provided below. Geologic conditions are localized and largely unique to a site on a project-by-project basis.

The proposed project would not affect the potential for fault rupture, ground shaking, liquefaction, or effects of expansive soils on surrounding properties or the general area. Nor does the proposed project include activities that would cause, or increase the potential for, landslides or subsidence on surrounding properties or the general area. Therefore, there are no cumulative geologic impacts.

Soil erosion could add to cumulative sedimentation impacts in areas downstream of the project site. Design of the project, with its holding basins, and the installed and maintained BMPs of the SWPPP, would prevent contributions to cumulative downstream sedimentation. These steps would reduce the cumulative impacts of sedimentation for this and other cumulative projects, as the existing erosion and ensuing sedimentation presently occurring would be reduced or eliminated. Two projects are proposed approximately five miles upstream of the project in the Pala Creek drainage: Vista Towers (No. 31) and Pala Temecula II Wireless Facility (No. 94). These projects would also be required to control erosion with their permitting processes. The project area drains to the San Luis Rey River, as do the proposed downstream projects: Gregory Canyon Landfill (No. 100), Meadowood (No. 95), and Campus Park (No. 101). As with Warner Ranch, all of these projects have been conditioned to control erosion and ensuing sedimentation.

Given these conditions, the project would not result in a cumulatively considerable contribution to a cumulative impact. Therefore, cumulative impacts from geologic hazards and erosion would be **less than significant**.

2.5.5 Significance of Impacts Prior to Mitigation

Three potentially significant impacts from geologic hazards were identified:

Impact GE-1 Liquefaction associated with seismic events could result in damage to infrastructure and buildings, and thereby to human health and safety.

Impact GE-2 Subsidence and/or settlement associated with compressible soils could result in damage to infrastructure and buildings, and thereby to human health and safety.

Impact GE-3 Rock fall associated with exposed slopes that could result in damage to infrastructure and buildings, and thereby to human health and safety.

2.5.6 Mitigation

M-GE-1 Prior to issuance of a grading permit, a final Geotechnical Report shall be prepared by a Registered Civil or Geotechnical Engineer. The report shall include any additional field efforts, including but not limited to borings and sampling, and associated laboratory testing, to determine if liquefaction, subsidence/settlement, and rock fall are concerns for this project. The report shall specify foundation designs which are adequate to preclude substantial damage to the proposed structures due to liquefaction or subsidence/settlement. The report shall also state the condition of the graded and natural surfaces in proximity to development, and what actions were taken to remediate rock fall if actions were necessary. The report shall be submitted with the building plans, and all recommendations of the report shall be incorporated into the design of the buildings.

Measures developed in that report shall be based on site-specific conditions and will include site-specific measures required to mitigate against potential geologic hazards. Measures developed for concerns about liquefaction and subsidence/ settlement would be similar, and overlap. Those measures would likely include, but not be limited to, the following:

- Deposits of concern shall be over-excavated and recompacted.
- Deposits of concern shall be replaced with engineered fill.
- Fill shall be surcharged (temporary over loading with fill) to facilitate settlement.
- Densification of deposits of concern shall be done in-place, potentially including but not limited to any combination of placement of vibra-stone columns, use of wick and blanket drains, compaction grouting, and dynamic compaction.
- Subdrains shall be incorporated.

M-GE-2 Completion of a Geotechnical Report and implementation of the recommendations described in the report, as specified in mitigation measure M-GE-1 would also mitigate potential impacts from subsidence and/or settlement associated with compressible soils. This Geotechnical Report shall address potential subsidence and settlement issues associated with compressible soils.

M-GE-3 Clearing, grubbing, and grading of the project site provides additional opportunities to observe site conditions, including rock fall potential, and to remediate potential situations during development. Mitigation for potential rock fall requires that the suspected boulders located within the proposed development footprint be removed during grading. If potentially hazardous boulders are identified within the proposed fuel modification zones, they shall either be removed or broken in place. The removal of boulders shall be completed prior to completion of rough grading for each phase of the affected areas of the proposed project with evidence provided to the satisfaction of the Director of Planning and Development Services. Alternate methods for addressing the rock fall hazard such as installation of rock catchment fencing or containment areas may be proposed, but such methods would be subject to review and approval by the County and may involve additional environmental review.

2.5.7 Conclusions

Three potentially significant impacts from geologic hazards have been identified: liquefaction, subsidence/settlement, and rock fall.

Alterations in the proposed project have been required that avoid or substantially lessen **Impacts GE-1** and **GE-2**. Implementation of the identified mitigation measures **M-GE-1** and **M-GE-2** would reduce both of these impacts to less than significant because it removes and replaces saturated alluvium soils, which could result in liquefaction or subsidence, which would reduce the potential impact to a less-than-significant level consistent with the County's Grading Ordinance; Watershed Protection, Stormwater Management, and Discharge Control Ordinance; and the goals of the other applicable local, state, and federal regulations relating to soil erosion, loss of topsoil, or siltation, and consistent with the CBC and UBC.

Alterations in the proposed project have been required that avoid or substantially lessen **Impact GE-3**. Implementation of the identified mitigation measure **M-GE-3** would reduce the impact to less than significant because it ensures that granitic boulder outcrops are mapped and evaluated, and that action(s) taken to reduce rock falls during significant seismic events. Implementation of these mitigation measures would reduce the potential impact to a less-than-significant level consistent with California Environmental Quality Act (CEQA) Guidelines and the CBC and UBC.

After mitigation, the project would meet all applicable engineering standards. As such, all potential impacts from geologic hazards would be reduced to less than significant with the mitigation proposed.

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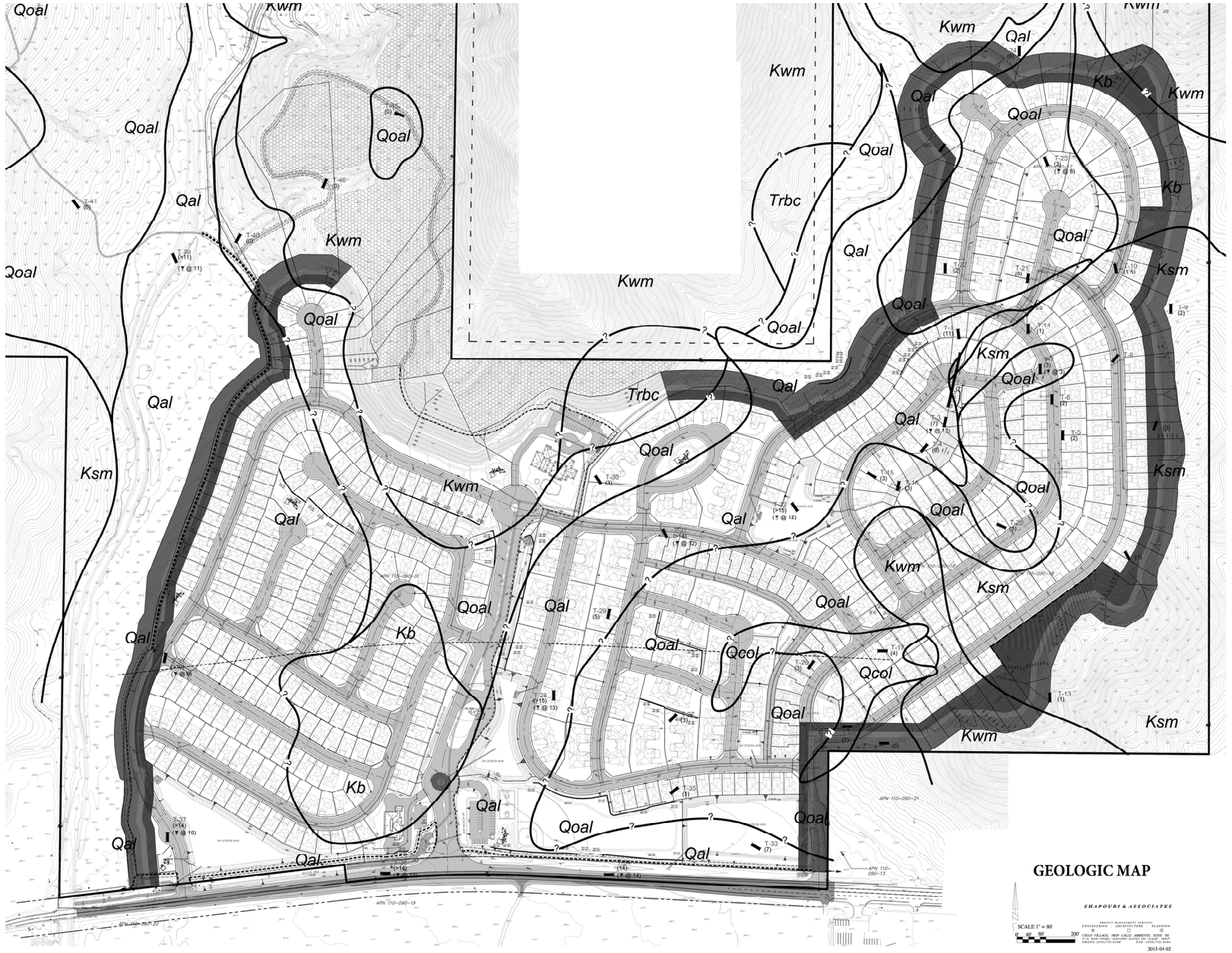

LEGEND

- *Qal* .....ALLUVIUM
- *Qcol* .....COLLUVIUM
- *Qoal* .....OLD ALLUVIUM
- *Kwm* .....WOODSON MT. GRANODIORITE
- *Kb* .....BONSALL TONALITE
- *Ksm* .....SAN MARCOS GABBRO
- *Trbc* .....BEDFORD CANYON FORMATION
- .....APPROX. LOCATION OF GEOLOGIC CONTACT (Queried Where Uncertain)
- FG-13 .....APPROX. LOCATION OF EXPLORATORY BACKHOE TRENCH
- (>15) .....PRELIMINARY ESTIMATED THICKNESS OF SURFICIAL DEPOSIT REQUIRING REMEDIAL GRADING
- (▼ @ 12) .....DEPTH TO SEEPAGE / GROUNDWATER

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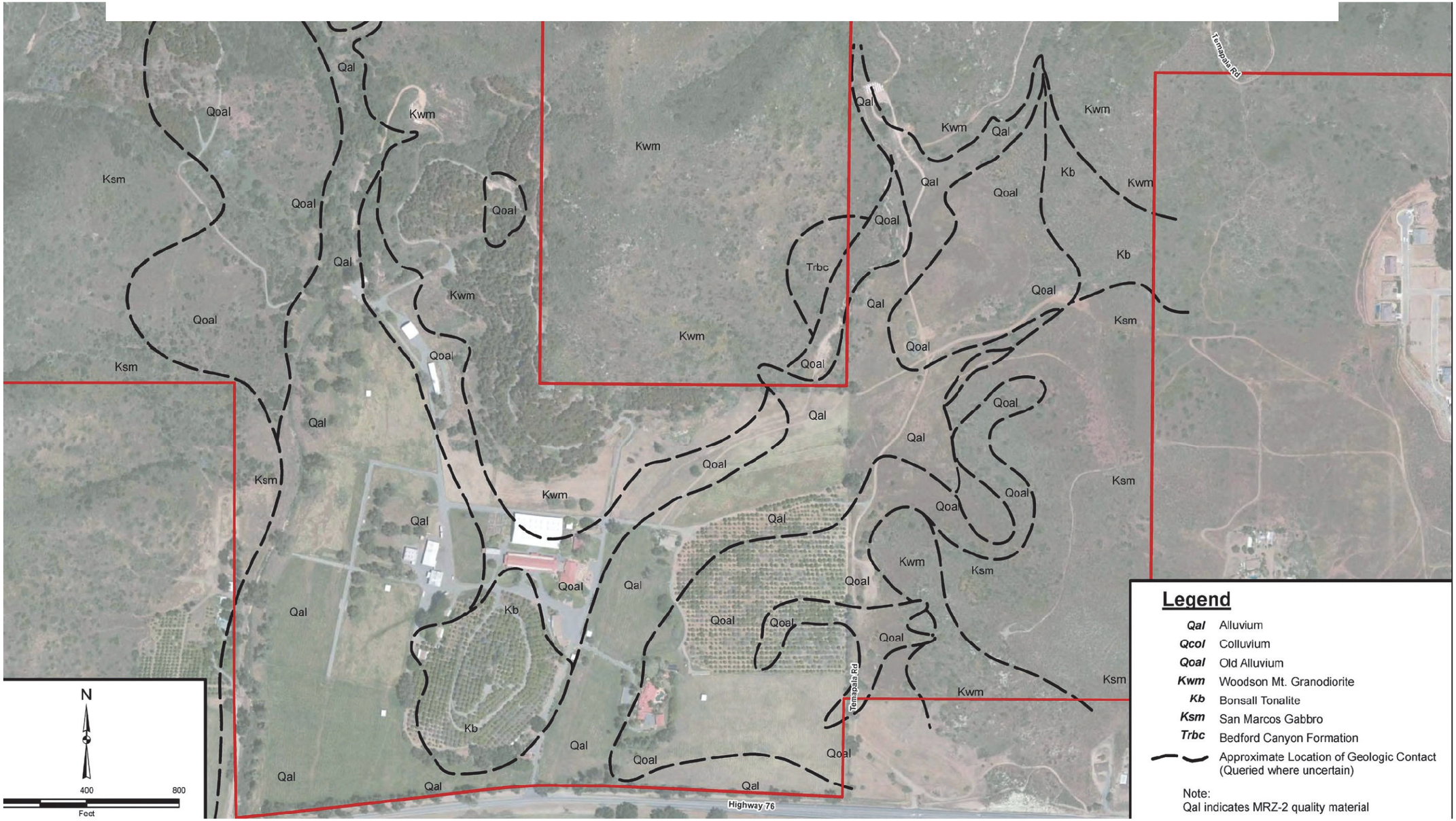

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SOURCE: Geocon

FIGURE 2.5-2

Geologic Map on Aerial Photo

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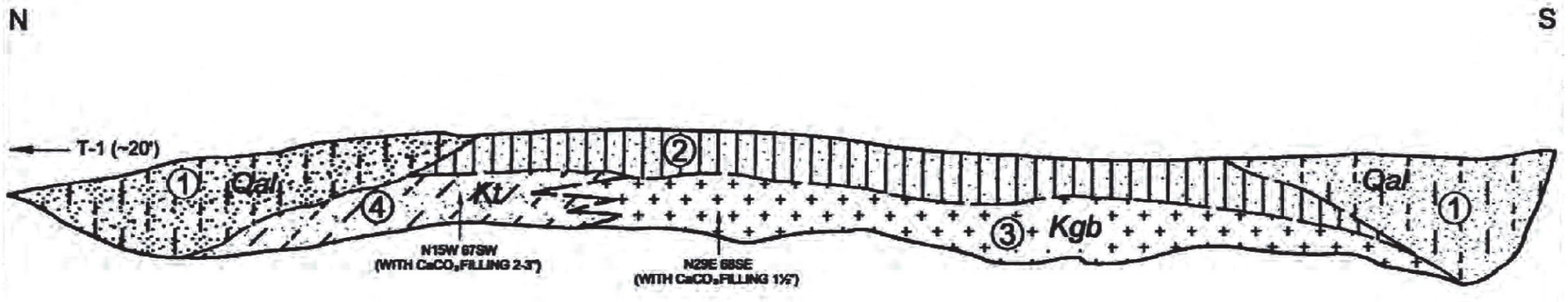

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SOURCE: Geocon

FIGURE 2.5-3

Transitional Boundary

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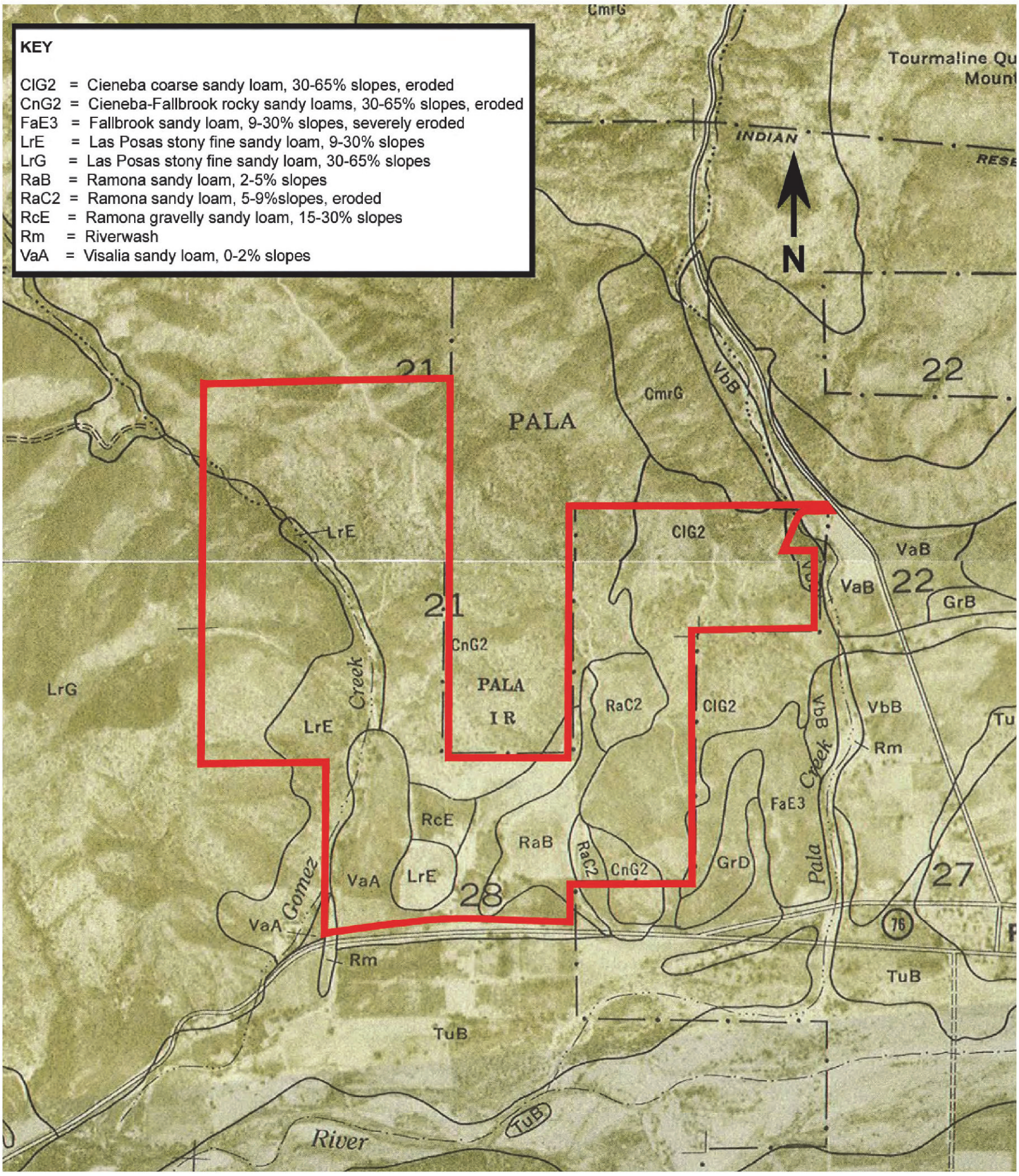

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SOURCE: Geocon

FIGURE 2.5-4

Soil Types Found On Site

WARNER RANCH PROJECT - ENVIRONMENTAL IMPACT REPORT

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