SUBCHAPTER 3.2

GEOLOGY/PALEONTOLOGY

3.2 Geology/Paleontology

The 1981 and 1983 EIRs identified geological impacts to developed uses as significant but mitigable, as does the current Project. The 1983 EIR completed a subsequent study focused only on the Hewlett-Packard portion of the site (328 acres). Technical reports prepared for the 1981 and 1983 EIRs (as well as other referenced technical reports not included in Appendix F) are available for review at the County DPLU office. Paleontological issues were included in the 1981 EIR and found less than significant based on the assessment of on-site alluvial deposits. Paleontological resources were not addressed in the 1983 EIR.

Portions of the previous geotechnical and related EIR analyses can be carried forward to the current evaluation, including appropriate information related to stratigraphy; fault locations and activity status; and potential hazards associated with liquefaction, settlement, and landslides. These discussions require supplemental applicable information/conclusions from the current geotechnical studies, however, to reflect updated technical methodologies (e.g., seismicity analysis), industry standards, regulatory requirements, and/or to address the northern parcel of the Proposed Project, which was not included in the area previously evaluated. In addition, pertinent information from the current geotechnical studies is used to supplement or replace the previous EIR analysis based on the current project design (e.g., while both projects had development and open space areas, these uses would be sited in different areas, and the precise location may affect the nature and extent of mitigation measures proposed to address potential impacts). Finally, analysis is required for the issue of paleontology, which could result in significant effects not previously discussed. The reader is referred to text below for updated/revised evaluation of issues related to geology and new analysis of paleontological resources for the Project.

A number of associated technical studies have been prepared for the Proposed Project. These include geotechnical investigations conducted by Shepardson Engineering Associates, Inc. (Shepardson; 2008, 2007, 2006, 2005, and 2003); Pacific Soils Engineering (PSE; 2000); Woodward-Clyde Consultants (Woodward-Clyde; 1982); and Southern California Soil and Testing (1980); as well as a paleontological resource assessment conducted by the San Diego Natural History Museum (2005). These analyses are summarized below along with other applicable data, with the most current geotechnical reports (Shepardson 2008, 2007) and the paleontological assessment (San Diego Natural History Museum 2005) included in Appendix F.

3.2.1 Existing Conditions

Existing Setting

Geological Setting

Regional Geology/Topography

The Project site is located within the Peninsular Ranges Geomorphic Province; a region characterized by northwest-trending structural blocks and intervening fault zones. Typical lithologies in the Peninsular Ranges include a variety of igneous intrusive (i.e., formed below the surface) rocks associated with the Cretaceous (between approximately 65 and 135 million years old) Southern California Batholith (a large igneous intrusive body), with such igneous bodies typically intruded into older metavolcanic and/or metasedimentary units in western San Diego County. Basement rocks in the coastal portion of San Diego County are locally overlain by a sequence of primarily Tertiary (between approximately 2 and 65 million years old) marine and non-marine sedimentary strata, with most of these deposits associated with several sea level advance/retreat cycles over approximately the last 55 million years. Tertiary sedimentary rocks are generally not present in the Project site vicinity, but occur in coastal areas to the west. The described

geologic sequence is locally overlain with Quaternary (less than approximately two million years old) materials such as alluvium, terrace deposits, and topsoil.

Topographically, the Peninsular Ranges Province is composed of generally parallel ranges of steep-sloped hills and mountains separated by alluvial valleys. More recent uplift and erosion has produced the characteristic canyon and mesa topography present today in western San Diego County, as well as the deposition of Quaternary deposits noted above.

Site Geology/Topography

Geologic exposures within the Project site include Cretaceous-age gabbroic igneous intrusive rocks, as well as Quaternary terrace deposits and alluvium. Gabbroic rocks are exposed along steeper slopes in the northern and eastern portions of the Project site and underlie additional on-site areas. Terrace deposits occur widely on shallower slopes and level areas throughout much of the northern and central portions of the site, while alluvium is present within larger drainage courses and in level areas in the southern end of the site. Granitic rocks occur in nearby areas to the north and southeast, and are likely to underlie adjacent portions of the site.

Cretaceous basement rocks within the Project site and vicinity occur at variable depths, ranging from ground level (i.e., surface outcrops) to approximately 20 feet below surface grade in the northern and central portions of the site, to more than 40 feet below grade in the southern site area where thicker alluvial deposits are present.

On-site topography within the site is characterized by generally level alluvial areas associated with a broad canyon in much of the southern and central portions of the property, with these areas flanked by moderately to steeply sloping hills to the north and east. On-site elevations range from approximately 254 feet amsl in low-lying alluvial areas near the southern site boundary, to 850 feet amsl along steeper slopes in the northeastern site corner. Surface drainage from the Project site (and off-site facilities to the east, south, and west) flows primarily south to the San Luis Rey River (with the site primarily through Horse Ranch Creek)**.** Internal drainage from the northern and eastern portions of the site (and adjacent off-site areas) flows predominantly west or southwest through a number of small, unnamed drainages.

Structure/Seismicity

The Project site is located within a broad, seismically active region characterized by a series of northwest-trending faults associated with the San Andreas Fault System. The closest major fault structures are located within the Elsinore-Temecula Fault Zone approximately seven miles to the northeast (Table 3.2-1, Regional Fault Locations and Seismicity Data).

No fault-rupture hazard zones or other seismic hazard designations identified by the California Geologic Survey (CGS) are present within the Project site or the immediate vicinity (California Division of Mines and Geology [CDMG] 1999). The closest CGS Fault-Rupture Hazard Zone designations are located along the noted portion of the Elsinore-Temecula Fault Zone. The described CGS fault-rupture hazard designations are generally intended to "[r]egulate development near active faults so as to mitigate the hazard of surface fault rupture" (CDMG 1999). A short (6.5-mile-long) unnamed fault trace extending near the northeastern portion of the site is mapped as Quaternary in age by the County (2004a), with this same fault trace mapped as pre-Quaternary in age by the CGS (CDMG 1994). The fault trace was not identified during initial Project-related geotechnical field investigation, mapping, and aerial photo review. A follow-up analysis (Shepardson 2007) concurs with the pre-Quaternary age assessment, provides additional historical background on the mapping of this fault, and concludes that that there is not

sufficient cause to warrant any further investigation of this mapped fault, since it is shown as being an inactive fault in the source data, and likely is simply a lineament not related to faulting.

Several additional major active faults are located within approximately 40 miles of the site, as shown in Table 3.2-1. Estimated peak horizontal ground acceleration (or ground shaking) values associated with proximal active faults are also shown, with an estimated maximum peak acceleration value of 0.35 g (where g equals the acceleration due to gravity) identified for the Project site in association with a magnitude 7.1 event along the Elsinore-Julian Fault Zone. The Project site and vicinity (including off-site study areas) are within an area designated as "within 17 kilometers" of the Elsinore Fault Zone on the County of San Diego Near-Source Shaking Zone Hazard Map (2004b). A site-specific analysis of peak ground acceleration was conducted for the Project site. The peak ground acceleration with a 10 percent chance of being exceeded in a 50-year period is 0.35g, with this acceleration value used to evaluate related site-specific hazards such as liquefaction (refer to Section 3.2.3 and Shepardson 2007 in Appendix F).

Paleontological Setting

Paleontology is the science dealing with prehistoric plant and non-human animal life. Paleontological resources (or fossils) typically encompass the remains or traces of hard and resistant materials such as bones, teeth, or shells, although plant materials and occasionally less resistant remains (e.g., tissue or feathers) can also be preserved. The formation of fossils typically involves the rapid burial of plant or animal remains and the formation of casts, molds, or impressions in the associated sediment (which subsequently becomes sedimentary rock). Because of this, the potential for fossil remains in a given geologic formation can be predicted based on known fossil occurrences from similar (or correlated) geologic formations in other locations. Accordingly, while there are no recorded fossil occurrences or collection efforts known from the Project site, paleontological resource potential can be inferred from on-site geology and off-site fossil occurrences in similar materials, as outlined below.

Based on the results of the Project geotechnical investigations, surficial materials and geologic formations observed or expected to occur within the Project site and vicinity include artificial fill, native topsoils, Quaternary alluvium and terrace deposits, and Cretaceous igneous intrusive rocks. Historical artificial fill deposits exhibit no potential for the occurrence of significant paleontological resources, due to their recent age and the destructive nature of their origin (i.e., they have been mechanically processed through methods such as crushing and screening). Similarly, Holocene native topsoil deposits do not exhibit any potential for significant paleontological resource values due to their relatively recent age and methods of formation and deposition (i.e., physical and chemical weathering produces soil that is transported and deposited by methods such as water, wind, and gravity).

Quaternary (Holocene) alluvial materials are assigned a low paleontological resource sensitivity due to their relatively recent age, high-energy formation/deposition environment, and the fact that, with rare exceptions, significant fossil occurrences are unknown from alluvial deposits in San Diego County.

Quaternary (Pleistocene) terrace deposits are assigned a moderate paleontological resource sensitivity based on known occurrences of fossil resources from correlated formations in a number of locations, including terrace deposits associated with the San Luis Rey River to the west in Oceanside, and east of the site near Pala. Specifically, areas to the west have produced important vertebrate fossils including mammoth, mastodon, camel, horse, tapir, and rodent (capybara) remains, while a single tooth from a fossil horse has been recovered from the area to the east (Appendix F).

Igneous intrusive rocks exhibit no potential for the occurrence of paleontological resources due to their molten origin.

Regulatory Framework

Development of the Proposed Project is subject to a number of regulatory requirements and industry standards related to potential geologic/soil hazards and paleontological resources. Geologic/soil requirements and standards typically involve measures to evaluate risk and minimize potential hazards through design and construction techniques, while paleontological requirements are focused on the protection or extraction of paleontological resources through methods such as development monitoring and resource recovery efforts. Specific guidelines with geologic/soil and paleontological resource criteria that may be applicable to the design and construction of the Proposed Project include the San Diego County General Plan Seismic Safety Element; County Guidelines for Determining the Significance – Geologic Hazards (July 30, 2007); County Guidelines for Determining the Significance – Paleontological Resources (January 15, 2009); the County Watershed Protection, Stormwater Management, and Discharge Control Ordinance (Stormwater Ordinance, No. 9926) and associated Stormwater Standards Manual; Title 8, Division 4 (Design Standards and Performance Requirements) and Division 7 (Excavation and Grading), and Title 5, Division 1 (Amendments to the State Building Standards Code) of the San Diego County Code of Regulatory Ordinances; the International Code Council (ICC) International Building Code (IBC; ICC 2006) and related California Building Code (CBC); the Committee of Standard Specifications for Public Works Construction (Greenbook; American Public Works Association 2003); and the NPDES General Construction Activity and General Groundwater Extraction permits (NPDES Permit Nos. CAS000002 and CAG919002, respectively). Summary descriptions of these guidelines are provided below, with specific elements applicable to the Proposed Project discussed in Section 3.2.3.

County Standards

The San Diego County General Plan Seismic Safety Element is intended to identify and evaluate seismic hazards in San Diego County and to provide policies to reduce the loss of life and property damage related to seismic hazards. Associated policies in the Seismic Safety Element applicable to the Proposed Project include requirements for submittal and approval of appropriate geotechnical investigations, as well as conformance with applicable laws and standards such as County Hazard Maps, the Alquist-Priolo Act (for Fault-Rupture Hazard Zones), and the IBC.

Among other requirements, as outlined in Section 4.1.2, Hydrology and Water Resources**,** the County Stormwater Ordinance/Stormwater Standards Manual requires construction-related BMPs to address issues, including erosion and sedimentation. The County may (at its discretion) require the submittal and approval of a Storm Water Pollution Prevention Plan (SWPPP) to address construction-related storm water issues prior to site development. The submittal and approval of a SWPPP under County thresholds would be in addition to similar SWPPP requirements under NPDES thresholds, as described below.

The County Guidelines for Determining Significance – Geologic Hazards (July 30, 2007) provide direction for evaluating environmental effects related to geologic hazards. Specifically, these guidelines address potential adverse effects to life and property (pursuant to applicable CEQA standards) from hazards including fault rupture, ground shaking, liquefaction, landslides, rockfalls, and expansive soils. Significance guidelines are identified for the noted issues, as well as related regulatory standards, analysis and potential mitigation/design methodologies, and reporting requirements.

The County Excavation and Grading requirements are implemented through issuance of grading permits, which apply to most projects involving more than 200 cubic yards of material movement (e.g., grading and excavation). Specific requirements for "Major Grading" include, among other criteria, use of qualified engineering and geotechnical consultants to design and implement grading plans,

implementation of appropriate measures related to issues such as manufactured slope design and construction, and conformance with applicable erosion and storm water controls.

County Building Code standards related to geotechnical concerns include applicable portions of the IBC and related CBC, along with specific County amendments. The County Building Code is implemented through issuance of building permits, which may encompass requirements related to preparation of soils reports and implementation of structural loading and drainage criteria.

Section 87.430, Paleontological Resources, of the San Diego County Code of Regulatory Ordinances states that:

> The County Official may require that a qualified paleontologist be present during all or selected grading operations, to monitor for the presence of paleontological resources. If fossils greater than twelve inches in any dimension are encountered, then all grading operations in the area where they were found shall be suspended immediately and not resumed until authorized by the County Official. The permittee shall immediately notify the County Official of the discovery. The County Official shall investigate and determine the appropriate resource recovery operations, which the permittee shall carry out prior to the County Official's authorization to resume normal grading operations.

The County Guidelines for Determining Significance – Paleontological Resources (January 15, 2009) provide direction for evaluating environmental effects related to paleontological resources, pursuant to related CEQA standards. The guidelines give an overview of paleontological resources and their occurrence in San Diego County, and provide guidance for assessing resource values, identifying the nature and extent of impacts, and establishing mitigation/reporting requirements.

International Building Code and Greenbook Standards

Industry groups such as ICC and the American Public Works Association produce the IBC and Greenbook standards to provide standard specifications for engineering and construction activities, including measures to address geologic and soil issues. Specifically, these measures encompass issues such as seismic parameters (e.g., classifying seismic zones and faults), engineered fill specifications (e.g., compaction and moisture content), expansive soil characteristics, and pavement design. The referenced guidelines, while not comprising formal regulatory requirements per se, are widely accepted by regulatory authorities and are routinely included in related standards such as municipal grading codes. The IBC and Greenbook guidelines are regularly updated to reflect current industry standards and practices, including criteria from sources such as ASTM International (ASTM, formerly known as the American Society for Testing and Materials). The previously noted CBC guidelines are derived from the IBC and encompass criteria specific to California such as geologic and seismic characteristics.

NPDES Standards

The NPDES General Construction Activity Storm Water Permit (Construction Permit) is applicable to projects disturbing one acre or more and is administered by the State Water Resources Control Board (SWRCB) under an agreement with the USEPA, pursuant to Order 99-08-DWQ. Specific conformance requirements include implementing a SWPPP, a monitoring and reporting program and, if applicable, a Storm Water Sampling and Analyses Strategy. The SWPPP and related efforts address, among other issues, construction-related erosion/sedimentation, with required pollution control measures involving the use of best available technology and/or best conventional pollutant control technology. These standards are implemented through the use of appropriate BMPs during Project construction.

The NPDES General Groundwater Extraction Permit (Groundwater Permit) identifies a number of requirements related to disposal of groundwater extracted during construction dewatering activities. While the majority of these requirements are related directly to water quality concerns (refer to Section 4.1.2), they also include erosion/sedimentation controls during discharge.

3.2.2 Guidelines for the Determination of Significance

Guidelines of Significance

Geology

A significant geologic impact would occur if the Proposed Project would result in impacts as described for each topic below:

1. *Soil Erosion, Loss of Topsoil, and Siltation*. The Project results in substantial soil erosion, loss of topsoil, or siltation, and fails to conform to the goals and requirements of applicable federal, state, or local regulations for soil erosion, loss of topsoil, or siltation, including, but not limited to, the Clean Water Act (CWA); NPDES; Porter-Cologne Water Quality Act; County of San Diego Revised Grading Ordinance; and County of San Diego Watershed Protection, Stormwater Management, and Discharge Control ordinances;

2. *Expansive Soils*. The Project is located on expansive soil, as defined in Section 1802.32 of the IBC (2006) and does not conform to the IBC.

3. *Fault Rupture*. The Project proposes any building or structure to be used for human occupancy over or within 50 feet of the trace of an Alquist-Priolo fault or County Special Zone fault.

4. *Ground Shaking*. The Project site is located within a County Near-Source Seismic Shaking Zone or within Seismic Zone 4, and the project would not conform to the IBC.

5. *Landslides*
    a. The Project site would expose people or structures to substantial adverse effects, including the loss, injury, or death involving landslides;
    b. 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 an in- or off-site landslide; and
    c. The Project site lies directly below or on a known area subject to rockfall that could result in collapse of structures.

6. *Liquefaction*. The Project site has the potential to expose people or structures to substantial adverse effects because: (1) the Project site has potentially liquefiable soils; (2) the potentially liquefiable soils are saturated or have the potential to become saturated; and (3) in-situ soil densities are not sufficiently high to preclude liquefaction.

7. *Additional Potential Geotechnical Impacts*. The Project would be located on a geologic unit or soil that is unstable or that would become unstable as a result of the Project, and potentially would result in on- or off-site subsidence or collapse.

Paleontological Resources

A significant geologic impact would occur if the Proposed Project would:

8. Directly or indirectly damage a unique paleontological resource or site.

Guideline Sources

Geology

The guidelines for significant geologic and soil impacts are based on applicable federal, state, and local regulations. Guideline No. 1 is based on the goals and requirements of applicable federal, state, and local agencies including the CWA, NPDES, Porter-Cologne Water Quality Act, and County ordinances. The guideline for determining whether a project would result in substantial erosion, loss of topsoil, or siltation is dependent on whether the project would result in unprotected areas of soil as a result of grading or clearing. Guideline Nos. 2 through 4 are based on state and County hazard zone designations and associated IBC requirements. Guideline No. 2 specifically relies on conformance to the IBC Expansive Soil Standards for construction on soils that are within a high shrink/swell category as defined by the USDA, San Diego Soil Survey. Guideline Nos. 2 through 6 are based on the County Guidelines for Determining the Significance – Geologic Hazards (July 30, 2007), which provide guidance for evaluation adverse environmental effects from geologic hazards on a project. Guideline No. 5 also is based on the Public Safety Element of the County of San Diego General Plan as it pertains to geology, soils, and seismic safety. Guideline No. 7 is derived from CEQA Guidelines Appendix G.

Paleontological Resources

Guideline No. 8 is taken from the County of San Diego Guidelines for Determining Significance – Paleontological Resources (March 19, 2007).

3.2.3 Analysis of Project Effects and Determination as to Significance

The Project site was reviewed for geotechnical issues in the 1981 and 1983 EIRs and related geotechnical analyses, as well as in more recent geotechnical investigations conducted by PSE (2000) and Shepardson (2008, 2007, 2005, and 2003). Each of these reports note that a number of potentially adverse geology and soils conditions may occur or be encountered during Project implementation and identify several recommendations to address these potential conditions. None of the reports, however, found geotechnical issues to be so substantial that development would be infeasible. Specifically, identified geotechnical concerns and recommendations include potential hazards associated with (1) seismic-related effects such as ground acceleration, liquefaction, and tsunamis/seiches (with potential tsunami/seiche issues addressed in Section 4.2.4); (2) landsliding (rockfalls); (3) expansive soils; (4) saturated soils that may be compressible/collapsible and/or liquefiable; (5) disposal of oversize materials; and (6) manufactured slope stability. Associated measures include a general requirement to complete a detailed geotechnical investigation for the Project site, as well as a number of constraint-specific recommendations derived from field/laboratory observations, regulatory guidelines, and industry standard specifications.

Additional standard practices that would be implemented as part of the detailed geotechnical investigation and site development include review of Project plans by the Project geotechnical engineer to ensure compatibility with geotechnical conclusions, review and appropriate modification of applicable field activities by the Project geotechnical engineer (e.g., grading and manufactured slope construction), and conformance with appropriate regulatory guidelines and industry standards for Project design and construction elements. Specifically, such conformance would encompass design and construction

elements such as seismic loading, excavation, and grading (e.g., removal of unsuitable materials and site preparation); fill parameters (e.g., composition, moisture content, and application methodology), foundations, and footings; manufactured slopes/retaining walls; pavement; drainage; and oversize materials.

The above recommendations and standards have been included in the Proposed Project environmental design considerations (Table 1-13), where applicable, and are part of the Project design. The potential for seismic and non-seismic geologic hazards take these design and related mitigation considerations (as noted below in Section 3.2.6 and in Chapter 8.0) into account, as summarized below. The discussion of potential impacts provided below is also considered applicable to all proposed off-site road and utility development unless otherwise noted.

Potential Impacts from Soil Erosion, Loss of Topsoil, and Siltation (Guideline No. 1)

The Project site and off-site areas encompass a number of topsoils and/or other surficial materials with moderate to high erosion potential. Proposed grading, excavation, demolition, and construction activities would increase the potential for erosion and transport of eroded material (sedimentation) both within and downstream of these areas. Specifically, Project activities would involve (1) removal of surface stabilizing features (e.g., vegetation), (2) creation of manufactured slopes, (3) excavation of existing compacted materials from cut areas, (4) redeposition of excavated (and/or imported) material as fill in proposed development sites, (5) potential sediment/particulate generation from paving and demolition activities, and (6) potential erosion from disposal of extracted groundwater (if required). The influx of sediment into downstream receiving waters could result in direct effects such as increased turbidity and also would provide a transport mechanism for other contaminants such as hydrocarbons that tend to adhere to sediment particles (refer to Section 4.1.2 for additional discussion).

While graded/excavated areas and fill materials would be stabilized through efforts such as compaction and installation of hardscape (paving, etc.) and landscaping, erosion potential would be higher in the short term than for pre-construction conditions. Erosion and sedimentation are not considered to be significant long-term concerns for the Proposed Project, as all developed areas (including off-site infrastructure improvements) would be stabilized through the installation of hardscape, landscaping, or native revegetation. The Proposed Project also would incorporate long-term water quality controls pursuant to the County Stormwater Ordinance/Stormwater Standards Manual and related NPDES Municipal Permit requirements, including measures to avoid or reduce erosion and sedimentation effects (e.g., the use of treatment control BMPs such as storm water filters).

Short-term erosion and sedimentation impacts would be addressed through conformance with the NPDES Construction Permit and County Stormwater Ordinance/Stormwater Standards Manual. Specifically, this would include developing and implementing an authorized SWPPP for proposed construction, including erosion and sedimentation BMPs. While specific BMPs would be determined during the SWPPP process based on site characteristics (soils, slopes, etc.), they would include standard industry measures and guidelines contained in the project SWMP (Appendix L), NPDES Construction Permit text, and County Stormwater Ordinance/Stormwater Standards Manual, as well as the following additional sources: *National Menu of Best Management Practices for Storm Water Phase II* (USEPA 2003), *Stormwater Best Management Practices Handbooks* (California Stormwater Quality Association 2003), and *Caltrans Storm Water Quality Handbooks* (Caltrans 2003).

Typical erosion and sediment control measures that would likely be implemented as part of the Project SWPPP include the following:

- Compliance with seasonal grading restrictions during the rainy season (October 1 to April 30) for applicable locations/conditions.
- Preparation and implementation of a "weather triggered" action plan for construction activities conducted during the rainy season to provide enhanced erosion and sediment control measures prior to predicted storm events (i.e., 40 percent or greater chance of rain).
- Use of phased grading schedules to limit the area subject to erosion at any given time.
- Use of erosion control/stabilizing measures such as geotextiles, mats, fiber rolls, soil binders, or temporary hydroseeding (or other plantings) in appropriate areas (e.g., disturbed areas and graded slopes) established prior to October 1.
- Use of sediment controls to protect the construction site perimeter and prevent off-site sediment transport, including measures such as temporary inlet filters, silt fences, fiber rolls, gravel bags, temporary sediment basins (including temporary basins within the proposed multi-family residential, commercial, and office professional lots, refer to Appendix L), check dams, street sweeping/vacuuming, energy dissipators, stabilized construction access points/sediment stockpiles, and properly fitted covers for sediment transport vehicles.
- Storage of BMP materials in applicable on-site areas to provide "standby" capacity adequate to provide complete protection of exposed areas and prevent off-site sediment transport.
- Provision of training for the personnel responsible for BMP installation and maintenance.
- Use of solid waste management efforts such as proper containment and disposal of construction debris.
- Compliance with local dust control requirements.
- Installation of permanent landscaping, with emphasis on native and/or drought-tolerant varieties, as soon as feasible after construction.
- Implementation of appropriate monitoring and maintenance efforts (e.g., prior to and after storm events) to ensure proper BMP function and efficiency.
- Implementation of sampling/analysis, monitoring/reporting and post-construction management programs per NPDES and/or County requirements.
- Implementation of additional BMPs as necessary to ensure adequate erosion and sediment control.

Erosion and sedimentation BMPs implemented for the Proposed Project would be further defined during the NPDES/County permit and SWPPP review process, with the resulting measures taking priority over the more general types of industry standard measures listed above. Based on implementation of appropriate erosion and sediment control BMPs as part of, and in conformance with, the Project SWPPP (and associated regulatory requirements), construction-related erosion and sedimentation impacts would be **less than significant** (pursuant to identified significance Guideline No. 1).

Potential Impacts Associated with Expansive Soils and Conformance to the IBC (Guideline No. 2)

Expansive (or shrink-swell) behavior is attributable to the water-holding capacity of clay minerals and can adversely affect the integrity of facilities such as pavement or structure foundations. Portions of the northern Project site are located within Expansive Soils Zones associated with clay soils, as mapped by the County (2004c). While much of this area is proposed for open space and would not be subject to associated effects, portions of the mapped expansive soils extend into areas identified for single-family

residential development. The remainder of the Project site and off-site facility areas are not within any mapped Expansive Soil Zones (County 2004c). The Project geotechnical investigations also identified variable expansion potential within the Project site and specifically note that moderately to highly expansive material may potentially occur on site.

Specific efforts to address expansive soils would include recommendations in the Project geotechnical investigations such as burial in deeper fills, use of stiffer slab/foundation design, presaturation, and overexcavation (Shepardson 2006, PSE 2000); additional recommendations provided in the updated Project geotechnical analyses (Shepardson 2008, 2007); and industry standard measures from sources such as the IBC involving removal of unsuitable deposits and replacement with engineered fill or selective grading techniques (i.e., placing a cap of low-expansive material). Implementation of design and construction recommendations provided in the Project geotechnical investigations and additional testing/field observations, as well as conformance with applicable County and IBC, or other pertinent guidelines, would avoid or reduce adverse effects related to expansive soils. Accordingly, impacts associated with expansive soils would be **less than significant**.

Potential Impacts Associated with Fault Rupture (Guideline No. 3)

Development within the Project site is not expected to be subject to significant hazards related to seismic ground rupture and/or related effects such as lurching (i.e., the rolling motion of surface materials associated with passing seismic waves), because no known active or potentially active faults are located within or adjacent to the site. While the potential for on-site ground rupture and lurching cannot be totally discounted, the potential for these types of effects is identified as "unlikely." Based on the noted conditions. Implementation of the Proposed Project would result in **less than significant impacts** related to seismic ground rupture.

Potential Impacts Associated with Near-source Seismic Shaking Zones and Conformance to the IBC (Guideline No. 4)

The Project site is within an area designated as "within 17 kilometers" of the Elsinore Fault Zone on the County of San Diego Near-Source Shaking Zone Hazard Map, with an estimated site-specific peak ground acceleration value of 0.35g. An assessment of potential seismic-related effects is provided below, including ground rupture, ground acceleration, and liquefaction/seismic settlement (with potential tsunamis/seiches issues described in Section 4.2.4). Potential effects related to seismic and non-seismic landslide hazards are discussed separately below under Guideline No. 5.

The peak ground acceleration level for the Project site and vicinity (0.35g) is generally representative of similar areas in southern California and could potentially result in adverse effects to proposed facilities such as structures, foundations, and/or utilities. The Project design would incorporate measures to accommodate projected seismic loading pursuant to recommendations in the Project geotechnical investigations and further detailed geotechnical analysis conducted prior to issuance of a grading permit, as well as applicable seismic elements of the IBC and County Building Code. Specifically, such measures would include incorporating the noted peak ground acceleration levels, as well as parameters related to subsurface profile type, acceleration and velocity coefficients, seismic zone, and seismic source (including type and distance). Implementation of and conformance with such recommendations and standards would effectively avoid or reduce potential seismic ground acceleration hazards to **less than significant impacts**.

Potential Impacts Associated with Landslides (Guideline No. 5)

Landsliding can be triggered by one or more specific or combination of events, such as seismic activity, gravity, fires, and precipitation. The Project site and vicinity are not included in any state-defined Landslide Hazard Zones (County 2004e), although the northern and central potions of the Project site are within or adjacent to a "Landslide Susceptibility Area" as designated by the County (County 2007c). In addition, as discussed in Section 3.2.1, portions of the mapped terrace deposits in the northeastern portion of the site may potentially encompass debris flows. If such deposits exist, it is anticipated that they could be mitigated with relatively minimal additional grading. Nonetheless, potentially significant landslide hazards may be identified during preparation of grading plans or subsequent detailed geotechnical investigation/Project construction. This is identified as a **significant impact**. (**Impact GE-1**)

Based on site reconnaissance, it was concluded that there is essentially no potential for rockfall hazards from the hillsides underlain by Gabbroic rocks (i.e., the northern, northeastern, and northwestern portions of the site). Potential rockfall hazards in the southeastern portion of the site also are considered to be low because a street would occupy the area at the toe of the slope area, rather than residential (or other) structures. In addition, the Project site is over 500 feet away from the toe of the slope on Rosemary's Mountain. Project impacts associated with rockfall would be **less than significant**.

Potential Impacts from Liquefaction (Guideline No. 6)

Liquefaction is the phenomenon whereby soils lose shear strength and exhibit fluid-like flow behavior. Loose, granular soils with relative densities of less than approximately 70 percent are most susceptible to these effects, with liquefaction potential greatest in saturated soils at depths of less than approximately 10 feet. Liquefaction most typically results from seismic ground acceleration, with the related loss of support and/or related effects such as lateral spreading (i.e., when loose, saturated sediments flow toward a free face) and seismic (dynamic) settlement, potentially resulting in significant impacts to surface and subsurface facilities including foundations and underground utilities. The Project site and off-site roadway/utility corridors are not within any identified Liquefaction Hazard Zones, as mapped by the County (2004d). The Project geotechnical investigations, however, identify several areas within the site and vicinity that are potentially subject to liquefaction and related effects such as dynamic settlement. Specifically, areas with identified potential liquefaction and related hazards include the majority of alluvial materials to depths of approximately 20 to 35 feet in the southern and central portions of the site (and most off-site road/utility corridors), as well as portions of the terrace deposits located at lower elevations in areas with shallow groundwater. Accordingly, Project-related seismically induced liquefaction and related effects are identified as potentially **significant impacts**. (**Impact GE-2**)

Additional Potential Geotechnical Impacts (Guideline No. 7)

The Project geotechnical investigations identify a number of additional potential concerns related to settlement or collapse of surficial and bedrock materials, disposal of oversize materials, and manufactured slope instability. These potential hazards are summarized below.

<u>Settlement/Collapse</u>

A number of surficial and bedrock materials (including alluvial soils and terrace deposits) within the site may be subject to settlement/collapse under load. In addition, Shepardson (2003) concluded that "Further investigation may encounter collapsible soils to various depths greater than 5 feet" within the on-site terrace deposits. Accordingly, the potential exists for significant settlement/collapse impacts to occur within the Project site. This risk of settlement/collapse constitutes a potentially **significant impact**. (**Impact GE-3**)

Oversize Materials

Shallow bedrock occurs in portions of the Project site and off-site road/utility areas and would likely be encountered during Project site grading and excavation. Areas of gabbroic bedrock would likely be subject to excavation by standard or heavy ripping equipment to depths of approximately 30 feet, although local non-rippable zones or boulders requiring blasting could be encountered at shallower depths. Granitic rocks (if encountered) would likely require blasting at depths below near-surface weathered zones (Shepardson 2003, PSE 2000). While heavy ripping and blasting requirements associated with shallow bedrock are expected to be minimal (Shepardson 2007) and would not pose geotechnical constraints, the generation of oversize rock fragments (i.e., greater than approximately eight inches in maximum dimension) could pose potential development hazards if improperly handled or placed on site. Specifically, the presence of oversize materials in engineered fills can result in effects such as differential compaction and settlement (i.e., varying degrees of settlement over short distances), with related issues including adverse effects to overlying structures, pavement, or drainage. Specific measures that may be used to address potential impacts related to the generation of oversize materials include selective disposal (e.g., burial in deeper fills), crushing, or use in landscaping efforts. Implementation of these types of measures, as well as conformance with other pertinent geotechnical recommendations and applicable standards (e.g., the IBC), would avoid or reduce potential effects related to disposal of oversize materials to constitute **less than significant impacts**.

Manufactured Slope Instability

Manufactured (cut and fill) slopes can be subject to instability effects from causes such as geologic structure, strength of materials, height, inclination, and orientation. The Project geotechnical investigations identify a number of measures to address potential issues related to manufactured slope instability, including:

- Use of drained replacement (stabilization) fills for cut slopes exposing fractured or faulted bedrock, alluvium, or colluvium.
- Replacement with drained compacted fill, or construction at lower (layback) angles, for cut slopes that are steeper and oriented in the same direction as exposed geologic contacts and fracture patterns.
- Construction of fill slopes at maximum ratios of 2:1 (horizontal to vertical).
- Installation of terrace drains at approximately 30-vertical-foot intervals on fill slopes.
- Use of increased compaction standards (i.e., 93 to 95 percent) for deeper fills (more than 50 feet).
- Use of subsurface drainage for fill slopes.
- Avoidance of side hill fill slopes wherever feasible.

Implementation of the above-described recommendations, as well as conformance with other pertinent geotechnical recommendations and applicable standards (e.g., the IBC), would avoid or reduce potential effects related to the stability of manufactured slopes, resulting in **less than significant impacts**.

Residential Foundation Design

A number of preliminary recommendations for residential foundation design are based on assumptions such as the location of residential structures outside areas of mapped alluvial deposits (Shepardson 2007). Specifically, these include measures related to the location and depth of footings for facilities proposed in

proximity to slope faces, within areas of deep fill, or within areas of differential fill depths, as well as design criteria for slabs-on-grade such as thickness, reinforcement, moisture barriers, and use of expansion joints (exterior slabs). Implementation of these and other applicable recommendations in the subsequent detailed geotechnical investigation would avoid or reduce associated potential effects to foundation stability/integrity, resulting in **less than significant impacts**.

Potential Impacts Associated with Direct or Indirect Damage of a Unique Paleontological Resources or Sites (Guideline No. 8)

The Project Paleontological Resource Assessment (Appendix F) includes a review of pertinent published and unpublished literature, as well as site reconnaissance to identify resource sensitivity and potential impacts/mitigation requirements associated with implementation of the Proposed Project. The conclusions and recommendation identified in that investigation are summarized below, with additional information provided in Appendix F.

The following conclusions regarding paleontological resource sensitivity were provided in the Project Paleontological Resource Assessment for surficial and geologic units within the Project site and vicinity: (1) artificial fill, native topsoils, and igneous (gabbroic and granitic) rocks exhibit no paleontological resource sensitivity; (2) alluvial deposits exhibit a low paleontological resource sensitivity; and (3) terrace deposits exhibit a moderate paleontological resource sensitivity. Based on these sensitivity ratings, the Project Paleontological Resource Assessment concludes that Project grading, including shallow excavations and minor grading activities, would have the potential to significantly impact paleontological resources preserved within the described terrace deposits. These potential effects to paleontological resources would constitute **significant impacts**. (**Impact P-1**)

3.2.4 Cumulative Impact Analysis

Geology

As noted above, all potential Project-specific geotechnical impacts would be avoided or reduced below identified significance guidelines through conformance with geotechnical recommendations and established regulatory requirements as part of the project design, or the Mitigation Measures identified in Section 3.2.6 of this subchapter. With the exception of erosion/sedimentation (as discussed below), potential geology and soils effects are inherently restricted to the areas proposed for development and would not contribute to cumulative impacts associated with other planned or proposed development. That is, issues including seismic ground acceleration and liquefaction, as well as landsliding, expansive soils, settlement/collapse, disposal of oversize materials, manufactured slope instability, and foundation design would involve effects to (and not from) the proposed development, and/or are specific to on-site conditions. Accordingly, addressing these potential hazards for the proposed development would involve using measures to conform with existing requirements, and/or site-specific design and construction efforts that have no relationship to, or impact on, off-site areas. Avoiding liquefaction impacts through mitigation consisting of excavation/replacement of unsuitable materials, for example, would not affect or be affected by similar deposits/hazards in off-site areas. Because of the site-specific nature of these potential hazards and the measures to address them, there would be no connection to similar potential issues or cumulative effects to or from other properties.

Implementation of the Proposed Project would result in potential on- and off-site erosion and sedimentation impacts related to Project development. The influx of sediment into downstream receiving waters could result in direct effects such as increased turbidity and also would provide a transport mechanism for other contaminants such as hydrocarbons that tend to adhere to sediment particles. The Project would conform with applicable short-term (construction) and long-term regulatory requirements

related to erosion and sedimentation issues, including the NPDES General Construction Activity, General Groundwater Extraction and Municipal permits, as well as associated County storm water standards (refer to Section 4.1.2, for additional information**)**. Specific measures to provide such conformance would include the implementation of a Project SWPPP encompassing detailed construction-related erosion and sedimentation controls, as well as long-term efforts such as maintaining predevelopment runoff levels, using energy dissipators to reduce runoff velocities, and installing structural BMPs (e.g., filtering devices) to remove sediment from Project site flows prior to off-site discharge. Based on the strict requirements identified in the listed NPDES permits and the fact that other planned and proposed developments in the Project vicinity would be required to implement similar controls, no significant cumulative erosion and sedimentation impacts are anticipated and any Project contributions to this less than significant regional effect would similarly be **less than significant**.

Paleontological Resources

All paleontological impacts associated with the Proposed Project and applicable cumulative projects would be less than significant or fully mitigable. The cumulative projects in the vicinity of the Project site include all the projects listed in Table 1-14. All of the listed projects would be subject to similar analysis and (if applicable) mitigation requirements for paleontological resources as described in this subchapter (and pursuant to CEQA). If any additional development projects in the area (i.e., beyond those listed in Table 1-14) result in potential impacts to such resources, they also would be subject to similar requirements for assessing and mitigating impacts to paleontological resources.

The importance of individual resources comes from the research value and the information they can provide to the paleontologist. The information gained from test excavations and data recovery programs at other locations having paleontological resource impacts within the County would be presented in reports and filed with the County of San Diego, as well as a scientific institution with permanent paleontological collections such as the San Diego Natural History Museum. The fossil collections from any potentially significant site also would be curated at such a scientific institution and would be available to other paleontologists for further study. Based on the required regulatory compliance of both the Proposed Project and applicable cumulative projects with analysis and mitigation requirements for paleontological resources under CEQA, implementation of the Proposed Project would not significantly contribute to cumulative paleontological resource impacts. Cumulative Project effects on paleontological resources would be **less than significant**.

3.2.5 Significance Prior to Mitigation

Geology

The following significant impacts related to geology would occur under Project implementation:

Impact GE-1 Potentially significant landslide hazards may be identified during preparation of grading plans or subsequent detailed geotechnical investigation.

Impact GE-2 Areas subject to significant liquefaction impacts may be identified during preparation of grading plans or subsequent detailed geotechnical investigation.

Impact GE-3 Areas subject to significant settlement/collapse impacts may be identified during preparation of grading plans or subsequent detailed geotechnical investigation.

Paleontological Resources

The following significant impact related to paleontological resources would occur under Project implementation:

Impact P-1 Project grading, including shallow excavations and minor grading activities, would have the potential to significantly impact paleontological resources preserved within the described terrace deposits.

3.2.6 Mitigation

Geology

A detailed geotechnical analysis (including efforts such as additional field investigation, borings, sampling, and laboratory testing) shall be conducted prior to implementation of the Proposed Project, with this analysis to include review of Project grading plans and assessment of associated potential impacts from landslides, liquefaction, and settlement/collapse. While the final determination of measures to address these potential hazards would be based on site-specific conditions, grading plans and geotechnical analysis, they likely would include the following types of efforts (as well as conformance with applicable standards such as the IBC) to reduce potential adverse geologic impacts below a level of significance.

Landslide Hazards

Potential measures to address impacts from landslide hazards include the following:

M-GE-1 If potentially unstable landslide deposits or outcrops (e.g., debris flows) are encountered during geotechnical investigation or Project construction, they shall be remediated per direction by the Project Geotechnical Engineer (e.g., by additional grading).

Liquefaction

Potential measures to address impacts from liquefaction and related hazards include the following:

M-GE-2a Deposits subject to potential liquefaction hazards shall be overexcavated and recompacted (or replaced with engineered fill), per direction by the Project Geotechnical Engineer.

M-GE-2b In-place ground modifications (densification) of applicable deposits shall be conducted via methods such as "cement deep soil mixing," placement of vibra-stone columns within wick drains, compaction grouting, or dynamic compaction, per direction by the Project Geotechnical Engineer.

M-GE-2c Subexcavation/recompaction or pre-settling procedures shall be implemented under the raised embankment areas for the proposed Pala Mesa Drive roadway to address potential settlement that otherwise might adversely impact the pavement and infrastructure located within the roadway.

M-GE-2d Confining stresses shall be increased through design (PSE 2000), and subdrains shall be placed in appropriate locations to reduce surficial saturation, per direction by the Project Geotechnical Engineer.

Settlement/Collapse

Potential measures to address impacts from settlement/collapse of surficial materials include the following:

M-GE-3a Implementation of densification measures as described above for potential liquefaction hazards.

M-GE-3b Surcharging of fill (e.g., temporary loading with stockpiled fill) and allowance of appropriate time delays (i.e., to facilitate 90 percent settlement) shall be implemented in applicable areas, per direction by the Project Geotechnical Engineer.

M-GE-3c Wick and blanket drains shall be installed in applicable locations, per direction by the Project Geotechnical Engineer.

Paleontological Resources

The following mitigation measures shall be implemented to ensure that potential adverse impacts to paleontological resources from Proposed Project implementation would be reduced to below a level of significance. Evidence shall be provided to the Director of DPLU that the following notes have been placed on the grading plan:

M-P-1a A qualified paleontologist shall be at the pre-construction meeting to consult with the grading and excavation contractors concerning excavation schedules, paleontological field techniques, and safety issues. A qualified paleontologist is defined as an individual having an M.S. or Ph.D. in paleontology or a related field (e.g., sedimentary or stratagraphic geology, evolutionary biology, etc.), and who has knowledge of San Diego County paleontology and documented experience in professional paleontological procedures and techniques.

M-P-1b The qualified paleontologist shall conduct or supervise the following mitigation tasks associated with full-time monitoring during original cutting of previously undisturbed deposits of moderate paleontological resource sensitivity (i.e., Quaternary river terrace deposits):

1. Monitoring of excavation operations to discover unearthed fossil remains~~, generally involving monitoring of ongoing excavation activities such as sheet grading pads, cutting slopes and roadways, basement and foundation excavations, and trenching~~.

2. Salvage of unearthed fossil remains~~, typically involving simple excavation of the exposed specimens, but possibly also plaster jacketing of individual large and/or fragile specimens, or more elaborate quarry excavation of richly fossiliferous deposits~~.

3. Recording of stratigraphic, geologic and geographic data to provide a context for the recovered fossil remains~~, including accurate plotting (mapping) on grading plans and standard topographic maps of all fossil localities, description of lithologies of fossil-bearing strata, measurement and description of the overall stratigraphic section (unless considered infeasible by the qualified paleontologist), and photographic documentation of the geologic setting~~.

4. Laboratory preparation (cleaning and repair) of collected fossil remains to the point of identification (not exhibition)~~, generally involving removal of enclosing~~

~~sedimentary rock material, stabilization of fragile specimens (using glues and other hardeners), and repair of broken specimens~~.

5. Curation of prepared fossil remains~~, typically involving scientific identification and cataloging of specimens, and entry of data into one or more accredited institutional (museum or university) collection (specimen/species lot and/or locality) databases~~.

6. Transfer~~ral~~, for archival storage, of cataloged fossil remains and copies of relevant field notes, maps, stratigraphic sections and photographs to an accredited institution (museum or university) in California that maintains paleontological collections. ~~Preferably, this institution will consist of one of the following: (1) San Diego Natural History Museum; (2) Los Angeles County Museum; (3) San Bernardino Museum of Natural History; (4) University of California at Berkeley Museum of Paleontology; or (5) Anza-Borrego Desert State Park.~~

7. Preparation of a final report summarizing the results of the field investigation, laboratory methods, stratigraphic information, types and importance of collected fossils, and any necessary graphics to document the stratigraphy and precise fossil collection localities.

The following conditions shall be included as notes on the Project grading plans:

M-P-1c A qualified paleontologist or paleontological monitor (under the supervision of the qualified paleontologist) shall be on site on a full-time basis during the original cutting of previously undisturbed deposits of moderate paleontological resource sensitivity (i.e., Quaternary river terrace deposits) to inspect exposures for contained fossils. A paleontological monitor is defined as an individual with at least one year of experience in field identification and collection of fossil materials. The paleontological monitor shall work under the direct supervision of the qualified paleontologist.

The Project applicant shall: (1) submit a copy of a letter signed by the qualified paleontologist or paleontological monitor which states that the applicant has retained their services and acknowledges agreement to perform and/or be responsible for concurrence with the Project mitigation measures; and (2) authorize the qualified paleontologist to direct, divert, or halt any grading activity, and to perform all other acts required by the provisions listed below. If the qualified paleontologist or paleontological monitor ascertains that the river terrace deposits are not fossil bearing, the qualified paleontologist shall have the authority to terminate the monitoring program.

1. Monitor all grading and excavation activities in previously undisturbed deposits of moderate paleontological resource sensitivity (i.e., Quaternary river terrace deposits).

2. If paleontological resources are unearthed, the qualified paleontologist or paleontological monitor shall:

   a. Direct, divert, or halt any grading or excavation activity until such time that the sensitivity of the resource can be determined and the appropriate recovery implemented.

   b. Salvage unearthed fossil remains.

   c. Record stratigraphic and geologic data to provide a context for the recovered fossil remains.

d. Prepare collected fossil remains for curation.

e. Curate, catalog and identify all fossil remains to the lowest taxon possible, inventory specimens, assign catalog numbers, and enter the appropriate specimen and locality data into a collection database.

f. Transfer the cataloged fossil remains to an accredited institution (museum or university) in California that maintains paleontological collections for archival storage and/or display.

3. The qualified paleontologist shall prepare a final Paleontological Resources Mitigation Report summarizing the field and laboratory methods used, the stratigraphic units inspected, the types of fossils recovered, and the significance of the curated collection.

3.2.7 Conclusion

Geology

A detailed geotechnical analysis (including efforts such as additional field investigation, borings, sampling, and laboratory testing) shall be conducted prior to implementation of the Proposed Project, with this analysis to include review of Project grading plans and assessment of associated potential impacts from landslides, liquefaction, and settlement/collapse. While the final determination of measures to address these potential hazards would be based on site-specific conditions, grading plans and geotechnical analysis, they likely would include the following types of efforts (as well as conformance with applicable standards such as the IBC) to reduce potential adverse geologic impacts below a level of significance.

Potential Project-specific impacts associated with landslides, liquefaction, and settlement/ collapse (Impacts GE-1 through GE-3, respectively) would be significant and would require mitigation. Standards have been developed to identify and address geologic hazards that may adversely affect health and safety (M-GE-1~~a~~ through M-GE-3c). Mitigation for landslide hazards would include remediation (e.g., by additional grading resulting in removal and replacement) of potentially unstable landslide deposits or outcrops (e.g., debris flows), if encountered. Potential measures to address impacts from liquefaction and related hazards would include overexcavation and recompaction (and replacement with engineered fill) of subject deposits, conduct~~ing~~ of in-place ground modifications (densification) of applicable deposits, implementation of subexcavation/recompaction or pre-settling procedures, and increase~~ing~~ of confining stresses and placement of subdrains in appropriate locations. In addition to implementation of densification measures (if required) as described for potential liquefaction hazards, potential measures to address impacts from settlement/collapse of surficial materials would include surcharging fill (e.g., temporary loading with stockpiled fill) and allowing appropriate time delays, as well as installing wick and blanket drains in applicable locations. The routine restrictions, soil remediation practices, and building standards are accepted at local and state levels to adequately safeguard against foreseeable loss and injury. Mitigation measures therefore would reduce potential impacts related to geologic hazards to less than significant.

Paleontological Resources

Grading and excavation activities associated with development of the Proposed Project could potentially result in significant impacts related to disturbance/destruction of sensitive fossil resources preserved within the Quaternary (Pleistocene) river terrace deposits underlying portions of the Project site (Impact P-1). Mitigation for these impacts would include monitoring during original cutting of previously undisturbed Quaternary river terrace deposits and collection of fossils, if discovered (M-P-1 through M-P-3). The mitigation also ensures that the paleontological monitor has the authority to halt or divert grading activities in the area of any discovery. Implementation of the specified mitigation measures would reduce associated impacts to paleontological resources to below a level of significance, because they would ensure that relevant information contained in the paleontological record, which is important in understanding prehistory, is preserved.

Table 3.2-1
REGIONAL FAULT LOCATIONS AND SEISMICITY DATA

Fault Zone	Distance (miles)	Direction From Site	Earthquake Magnitude	Peak Site Acceleration (g)[1]
Elsinore-Temecula	7	NNW	6.8	0.22
Elsinore-Julian	8.5	ESE	7.1	0.23
Newport-Inglewood	20.7	WNW	6.9	0.11
Rose Canyon	21.7	SSW	6.9	0.11
Elsinore-Glen Ivy	23	NNW	6.8	0.10
San Jacinto-Anza	29.6	ENE	7.2	0.10
San Jacinto-San Jacinto Valley	30.3	NNE	6.9	0.08
Earthquake Valley	35.2	ESE	6.5	0.06
Coronado Bank	37.8	WSW	7.4	0.08

Source: Shepardson 2007
[1] g = the acceleration due to gravity under standard conditions