6. Alternative 2 (SCE's Proposed Project): Impacts and Mitigation Measures

6.1 Direct and Indirect Effects Analysis

The geologic, seismic, and paleontologic impacts of the proposed Project are discussed below under subheadings corresponding to each of the significance criterion presented in the preceding section. The analysis describes the impacts of the proposed Project related to geologic and seismic hazards, mineral resources, and paleontology and, for each criterion, determines whether implementation of the proposed Project would result in significant impacts.

Unique geologic features (Criterion GEO1)

No unique geologic features or geologic features of unusual scientific value for study or interpretation would be disturbed or otherwise adversely affected by the proposed Project Segments. No impact would occur.

Known mineral and/or energy resources (Criterion GEO2)

Although known sand and gravel resources, limestone and dolomite, and stone quarries are located within the general Project area, only Segment 7 is located within or adjacent to areas of active production of these resources. The Segment 7 alignment traverses adjacent to and across several active gravel quarries in the Irwindale area; the Irwindale Pit consists of three adjacent pits (commonly known as Irwindale Pits #1, #2, and #3), owned by the United Rock Products Corp, and of which two are currently in operation (CGS, 2004). The Project ROW crosses a portion of the easternmost pit; however the towers for the existing transmission line are located outside of the existing quarry boundaries and it is assumed that any new towers would be at similar tower spacing. Given the distance of these sites from the ROW, and the ability of mining-related equipment and vehicles to cross the ROW if necessary, construction and operation of the TRTP transmission line is not expected to interfere with future access to any metallic or non-metallic mineral resources.

Impact G-1: Project activities could interfere with access to known energy resources.

The Segment 7, 11, and 8A ROWs cross the Montebello oil and gas field and the Segment 8A ROW also crosses the northern edge of the Brea-Olinda oil and gas field. These alignments do not traverse through the active well fields; however they do pass adjacent to several active well fields and traverse along and cross access roads for the fields. Because these alignments do not cross within the active well fields, operation of the Project in the existing ROWs is not expected to interfere in access to or operation of these existing oil fields. However, construction activities for the segments, which would include construction vehicle traffic such as excavators and haulers for fill and spoils, cranes and trucks for transportation and construction of towers and transmission lines, and traveling and working along oil field access roads, could interfere with ongoing operation with the oil fields. Implementation of Mitigation Measure G-1 (Coordination with oil field operations) is recommended.

Mitigation Measure for Impact G-1

G-1 **Coordination with oil field operations.** Operations and management personnel for the oil fields shall be consulted regarding access requirements, and SCE and its contractors shall coordinate construction activities across and along necessary oil field access roads in a manner to limit interference with oil field operations. A plan to avoid or minimize interference with oil field operations shall be prepared in conjunction with oil field operators prior to construction. SCE shall document compliance with this measure by submitting the plan to the CPUC for review 30 days prior to the start of construction in the affected Project segments.

CEQA Significance Conclusion

Construction traffic and work areas for the proposed Project (Segments 7, 11, and 8A) along oil field access roads could interfere with daily operation of the oil field, including but not limited to impeding access to oil field structures and facilities by temporarily blocking access roads during construction. Implementation of Mitigation Measure G-1 (Coordination with oil field operations) would reduce potential impacts to less than significant (Class II) by requiring coordination with the oil field operators to identify and minimize potential areas of interference.

Triggering or acceleration of geologic processes, such as landslides, soil erosion, or loss of topsoil, during construction (Criterion GEO3)

Impact G-2: Erosion could be triggered or accelerated due to construction activities.

Soils along all of the proposed segments (Segments 4, 5, 6, 7, 8, 9, 10, and 11) of the proposed Project alignment have potential hazards of erosion for off-road/off-trail ranging from slight to very severe and on-road/on-trail ranging from slight to severe. Excavation and grading for tower, substation, and switching station foundations, staging and work areas, access roads, and spur roads would loosen soil and trigger or accelerate erosion. Implementation of Mitigation Measure H-1a (Implement an Erosion Control Plan and demonstrate compliance with water quality permits) which is fully described in the EIR/EIS, Section 3.8.6.1 (Hydrology and Water Quality), is also relevant to issues related to soil erosion and is recommended.

Mitigation Measure for Impact G-2

H-1a **Implement an Erosion Control Plan and demonstrate compliance with water quality permits.** SCE shall develop and submit to the CPUC and USDA Forest Service for approval 30 days prior to construction an Erosion Control Plan, and implement Best Management Practices (BMPs), as described below. (Note: The Erosion Control Plan may be part of the same document as the Stormwater Pollution Prevention Plan.) Within the Erosion Control Plan, the applicant shall identify the location of all soil-disturbing activities, including but not limited to new and/or improved access and spur roads, the location of all streams and drainage structures that would be directly affected by soil-disturbing activities (such as stream crossings by access roads), and the location and type of all BMPs that would be installed to protect aquatic resources. The Erosion Control Plan shall include a proposed schedule for the implementation and maintenance of erosion control measures and a description of the erosion control practices, including appropriate design details. As part of the Erosion Control Plan, SCE shall maintain a logbook of all precipitation events within the Project area that produce more than one inch of precipitation within a 24-hour period. The logbook shall contain the date of the precipitation event, the approximate duration of the event, and the amount of precipitation (measured as the largest amount recorded by a rain gage or weather station within one mile of the Project).

Additionally, the logbook shall include a narrative evaluation (and/or a numerical evaluation, if required by the F S or other jurisdictional agency) of the erosion-prevention effectiveness of the existing BMPs, as well as a description of any post-storm modifications to those BMPs. The logbook shall be submitted to the CPUC and F S for review within 30 days following the first storm event (after construction has begun) that produces greater than one inch of precipitation within a 24-hour period. SCE shall re-submit the logbook annually after the first storm of the rainy season that produces more than one inch of precipitation within a 24-hour period. The logbook shall be retired 5 years after completion of construction. In addition to the Erosion Control Plan, the applicant shall submit to the CPUC and the F S evidence of possession of all required permits before engaging in soil-disturbing construction/demolition activities, before entering flowing or ponded water, or before constructing a crossing at flowing or ponded water. Such permits may include, but are not limited to, a Streambed Alteration Agreement from the California Department of Fish and Game, a Clean Water Act (CWA) Section 404 permit from the USACE, a CWA Section 402 NPDES General Permit for Storm Water Discharges Associated with Construction Activities (General Permit) from the applicable Regional Water Quality Control Board(s) (RWQCBs), and/or a CWA Section 401 certification from the applicable RWQCBs. In addition, if construction-related excavation activities on National Forest System (NFS) lands encounter perched groundwater, triggering the need for dewatering activities to occur in compliance with Applicant-Proposed Measure HYD-6 (Drilling and Construction Site Dewatering Management), SCE shall notify the Forest Service at the onset of dewatering and, upon the completion of dewatering activities at the affected site(s), SCE shall submit to the Forest Service written description of all executed dewatering activities, including steps taken to return encountered groundwater to the subsurface.

CEQA Significance Conclusion

The proposed Project would result in significant impacts if erosion were triggered or accelerated by Project construction. Soil loosened by Project construction could migrate by wind or water to nearby waterways potentially causing damage to aquatic habitat, or could add to particulate air pollution if picked up by the wind or disturbed by vehicles. Erosion could cause rutting and loss of topsoil. SCE's APM GEO-3 and APM HYD-1 (Construction SWPPP, see Table 4-1) would partially reduce the amount of erosion that would result from construction by developing and implementing a Project-specific SWPPP as required in accordance with the Clean Water Act. Mitigation Measure H-1a (Implement an Erosion Control Plan and demonstrate compliance with water quality permits) would require that pre-construction plans be developed to identify and properly implement any necessary BMPs to control erosion and/or sedimentation, and for the identification and mitigation of any disturbances to drainages and/or riparian areas. Implementation of this measure would ensure impacts from soil erosion due to Project construction would be less than significant (Class II).

Impact G-3: Excavation and grading during construction activities could cause slope instability or trigger landslides.

Portions of Segments 5, 6, 11, and 8A traverse moderate to steep mountains and hills underlain by landslide prone sedimentary and metamorphic rocks (primarily Pelona Schist, gneisses, and Puente Formation). The alignments also cross numerous mapped landslides (see Tables 2-7, 2-9, 2-11, and 2-12). Destabilization of the natural or constructed slopes could occur as a result of construction activities due to excavation and/or grading operations. Excavation operations associated with tower foundation construction and grading operations for temporary and permanent access roads and staging and work areas could result in slope instability, resulting in landslides, soil creep, or debris flows. Implementation

of Mitigation Measure G-3 (Conduct geological surveys for landslides and protect against slope instability) is recommended.

Mitigation Measure for Impact G-3

G-3 **Conduct geological surveys for landslides and protect against slope instability.** Design-level geotechnical investigations performed by SCE shall include geological surveys for landslides that will allow identification of specific areas with the potential for unstable slopes, landslides, earth flows, and debris flows along the approved transmission line route and in other areas of ground disturbance, such as access and spur roads and staging and work areas. The geotechnical investigations shall evaluate subsurface conditions, identify potential hazards, and provide information for development of excavation plans and procedures. If the results of the geotechnical survey indicate the presence of unstable slopes at or adjacent to Project structures, appropriate support and protection measures shall be designed and implemented to maintain the stability of slopes adjacent to newly graded or re-graded access and spur roads, work areas, and Project structures during and after construction, and to minimize potential for damage to Project facilities. These design measures shall include, but are not limited to, retaining walls, visqueen, removal of unstable materials, and avoidance of highly unstable areas. Appropriate construction methods and procedures, in accordance with State and federal health and safety codes, shall be followed to protect the safety of workers and the public during drilling and excavation operations. SCE shall document compliance with this measure by submitting a report to the CPUC and F S (for NFS lands) for review at least 30 days prior to final Project design. The report shall document the investigations and detail the specific support and protection measures that will be implemented. Additionally, along Segment 8A (between approximately S8A MPs 5.4 and 6.6), where portions of the proposed project alignment and associated access roads are located adjacent to the Puente Hills Landfill in an area where known slope stability issues and landslides are present, SCE shall coordinate with the County Sanitation Districts of Los Angeles County (LACSD) regarding known landslides and landslide repairs along the southwestern boundary of the landfill and shall submit the geological survey and slope stability reports, including recommended support and protection measures for Segment 8 to the LACSD for review at least 30 days prior to final project design.

CEQA Significance Conclusion

The proposed Project would result in significant impacts if unidentified unstable slopes or areas of potentially unstable slopes were disturbed or undercut by construction activities resulting in slope failures. Slope failures could cause damage to the environment, to Project or other nearby structures, and could cause injury or death to workers and/or the public, a significant impact. Prior to final design of substation facilities and transmission line tower foundations, SCE plans to perform geotechnical studies to identify site-specific geologic conditions (APM GEO-2). However, this measure does not identify items to be completed as part of the geotechnical study to identify areas of unstable slopes. Implementation of Mitigation Measure G-3 (Conduct geological surveys for landslides and protect against slope instability) adds specific requirements to the planned geotechnical investigations to be completed prior to final Project design, ensuring that slope instability impacts would be reduced to less than significant (Class II). Implementation of Mitigation Measure G-3 is required along the hill and mountain portions of Segments 5, 6, 11, and 8A to delineate potential areas of unstable slopes near and within work areas and minimize the potential from construction triggered slope failures by avoidance or implementation of slope stabilizing design measures.

Exposure to potential risk of loss or injury due to earthquake-related ground rupture (Criterion GEO4)

Impact G-4: Project structures could be damaged by surface fault rupture at crossings of active faults exposing people or structures to hazards.

Project facilities would be subject to hazards of surface fault rupture at crossings of the active San Andreas (Segment 5), San Gabriel, (Segments 6 and 11), Clamshell-Sawpit (Segment 6), Sierra Madre (Segments 7 and Segment 11 north of S11 MP 19), East Montebello Hills (Segments 7 and 8A), Whittier (Segment 8A), Chino (Segment 8A), and Central Ave (Segment 8A) faults Implementation of Mitigation Measure G-4 (Avoid placement of Project structures within active fault zones) is recommended. Additionally, the portion of the Segment 8A route that crosses and then runs parallel to and within the Whittier fault zone, is at substantial risk of damage to multiple structures should an earthquake and ground rupture occur along this portion of the Whittier fault, however SCE's Event Response and Recovery Protocol manual, which include protocols to be implemented in response to catastrophic events including fault rupture, would allow for quick implementation of operations to repair transmission structures in the event fault surface rupture does cause damage to structures.

Mitigation Measures for Impact G-4

G-4 **Avoid placement of Project structures within active fault zones.** Prior to final Project design SCE shall perform a fault evaluation study to confirm the location of mapped traces of active and potentially active faults crossed by the Project route or other Project structures. For crossings of active faults, the Project design shall be planned so as not to locate towers or other Project structures on the traces of active faults; and in addition, Project components shall be placed as far as feasible outside the areas of mapped fault traces. Compliance with this measure shall be documented to the CPUC and F S in a report submitted for review at least 60 days prior to the start of construction.

CEQA Significance Conclusion

Fault crossings, where multiple feet of displacement are expected along active faults, are best crossed as overhead lines with towers placed well outside the fault zone to allow for the flex in the conductor lines to absorb offset. Damage to Project structures could result in power outages, damage to nearby roads of structures, and injury or death to people, a significant impact. SCE has committed to designing Project elements according to appropriate industry standards and in accordance with good engineering practices (APM GEO-1); prior to final design of substation facilities and transmission line tower foundations SCE would perform geotechnical studies to identify site-specific geologic conditions (APM GEO-2). However, APM GEO-1 and APM GEO-2 do not specify that fault studies will be performed to prevent placement of towers on active fault traces, nor do they address issues related to potential fault rupture damage to transmission line facilities where it is not feasible to locate towers outside of active fault zones. Mitigation Measures G-4 (Avoid placement of Project structures within active fault zones) reduces impacts associated with overhead active fault crossings to less-than-significant levels (Class II). Proper placement of towers relative to active faults would allow the conductor to distribute fault displacements over a comparatively long span and towers would be less likely to result in structural failure in the event of an earthquake if not placed directly on an active fault trace.

Exposure to potential risk of loss or injury due to seismically induced ground shaking, landslides, liquefaction, settlement, lateral spreading, and/or surface cracking (Criterion GEO5)

Impact G-5: Project structures could be damaged by seismically induced groundshaking and/or ground failure exposing people or structures to hazards.

Moderate to severe groundshaking should be expected in the event of an earthquake on the faults in the Project area and from other major faults in the region, with estimated PGAs ranging from 0.5 to 1.6 g (see Table 2-3). It is likely that the Project facilities would be subjected to at least one moderate or larger earthquake occurring close enough to produce local strong to severe groundshaking along portions of Segments 4, 5, 6, 7, 9, and 11. Local strong to severe groundshaking with vertical and horizontal ground accelerations that could exceed standard design stresses could result in damage to Project structures. Structural damage could result in power outages, damage to nearby roads of structures, and injury or death to nearby people, a significant impact.

Severe to strong groundshaking could result in liquefaction-related phenomena along sections of the proposed Project segments (portions of Segments 5, 7, 11, 8A, 8B, and 8C) that cross young alluvial deposits in the Leona Valley, San Gabriel Valley, eastern Chino Basin, and in active river washes and streams where lenses and pockets of loose seasonally saturated sand may be present. This could result in damage to Project structures should a large earthquake occur during the periods when these soils are saturated, a significant impact. Seismically induced slope failures such as landslides could occur in the event of a large earthquake along portions of the Project. Portions of Segments 5, 6, 11, and 8A are located along hillsides or ridgelines in geologic units of moderate to steep slopes, which are particularly susceptible to this type of ground failure. Some of these areas, which include the Pelona Schist, weathered gneissic bedrock, and Puente Formation, have a high possibility of seismic-induced ground failure in the form of landsliding or ground-cracking resulting in damage to Project structures. Implementation of Mitigation Measures G-3 (Conduct geological surveys for landslides and protect against slope instability), G-5a (Reduce effects of groundshaking), and G-5b (Conduct geotechnical investigations for liquefaction) are recommended.

Mitigation Measures for Impact G-5

G-5a **Reduce effects of groundshaking.** The design-level geotechnical investigations performed by SCE shall include site-specific seismic analyses to evaluate ground accelerations for design of Project components. Based on these findings, Project structure designs shall be modified/strengthened, as deemed appropriate by the Project engineer, if the anticipated seismic forces are found to be greater than standard design load stresses on Project structures. Study results and proposed design modifications shall be provided to the CPUC and F S for review at least 60 days before final Project design.

G-5b **Conduct geotechnical investigations for liquefaction.** Because seismically induced liquefaction-related ground failure has the potential to damage or destroy Project components, the design-level geotechnical investigations to be performed by SCE shall include investigations designed to assess the potential for liquefaction to affect the approved Project and all associated facilities, specifically at tower locations in areas with potential liquefaction-related impacts (portions of Segments 5, 7, 11, 8A, 8B, and 8C underlain by alluvium with the potential for shallow groundwater). Where these hazards are found to exist, appropriate engineering design and construction measures shall be incorporated into the Project designs as deemed appropriate

by the Project engineer. Design measures that would mitigate liquefaction-related impacts could include construction of pile foundations, ground improvement of liquefiable zones, installation of flexible bus connections, and incorporation of slack in cables to allow ground deformations without damage to structures. Study results and proposed solutions to mitigate liquefaction shall be provided to the CPUC and FS for review at least 60 days before final Project design.

CEQA Significance Conclusion

Prior to final design of substation facilities and transmission line tower foundations, SCE plans to perform geotechnical studies to identify site-specific geologic conditions (APM GEO-2). In addition, as part of the Project SCE plans to design new substations in accordance with seismic design requirements based on the IEEE 693 "Recommended Practices for Seismic Design of Substation"and design other Project elements according to appropriate industry standards and in accordance with good engineering practices (APM GEO-1). However, these measures do not identify specific items to be completed as part of the geotechnical study to identify areas of severe groundshaking, potential seismically induced landslides, or potential liquefacton. Implementation of Mitigation Measures G-3 (Conduct geological surveys for landslides and protect against slope instability), G-5a (Reduce effects of groundshaking), and G-5b (Conduct geotechnical investigations for liquefaction) include these specific requirements to the planned geotechnical investigations to be completed prior to final Project design. These specific requirements would ensure that potentially significant impacts for seismically induced groundshaking and potential of seismically-related ground failure along the Project route are reduced to less-than-significant levels (Class II).

Exposure to potential risk of loss or injury where corrosive soils or other unsuitable soils are present (Criterion GEO6)

Impact G-6: Project structures could be damaged by problematic soils exposing people or structures to hazards.

Soils along the proposed Project Segments have a potential to corrode steel and concrete ranging from low to high. In areas where corrosive subsurface exist along the proposed route, the corrosive soils could have a detrimental effect on concrete and metals. Depending on the degree of corrosivity of subsurface soils, concrete and reinforcing steel in concrete structures and bare-metal structures exposed to these soils could deteriorate, eventually leading to structural failures. Expansion potential for the soils along the Project alignment ranges from low to high. Expansive soils can also cause problems to structures. Soils that exhibit shrink-swell behavior are clay-rich and react to changes in moisture content by expanding or contracting. Some of the natural soil types identified along the Project have moderate to high clay contents and many have moderate to high shrink-swell potential. Expansive soils may cause differential and cyclical foundation movements that can cause damage and/or distress to structures and equipment. In addition, potential impacts associated with loose sands or other compressible soils include excessive settlement, low foundation-bearing capacity, and limitation of year-round access to Project facilities. Implementation of Mitigation Measure G-6 (Conduct geotechnical studies to assess soil characteristics and aid in appropriate foundation design) is recommended.

Mitigation Measure for Impact G-6

G-6 **Conduct geotechnical studies to assess soil characteristics and aid in appropriate foundation design.** The design-level geotechnical studies to be performed by SCE shall identify the presence, if any, of potentially detrimental soil chemicals, such as chlorides and sulfates.

Appropriate design measures for protection of reinforcement, concrete, and metal-structural components against corrosion shall be utilized, such as use of corrosion-resistant materials and coatings, increased thickness of Project components exposed to potentially corrosive conditions, and use of passive and/or active cathodic protection systems. The geotechnical studies shall also identify areas with potentially expansive or collapsible soils and include appropriate design features, including excavation of potentially expansive or collapsible soils during construction and replacement with engineered backfill, ground-treatment processes, and redirection of surface water and drainage away from expansive foundation soils. Studies shall conform to industry standards of care and American Society for Testing Materials (ASTM) standards for field and laboratory testing. Study results and proposed solutions shall be provided to the CPUC and F S, as appropriate, for review at least 60 days before final Project design.

CEQA Significance Conclusion

Application of APM GEO-2 (see Table 4-1) would partially reduce the adverse effects of problematic soils by conducting a geotechnical study for the Project. However, this APM is lacking in detail and is inadequate to ensure that unsuitable soils would be properly identified and mitigated. Unidentified expansive and corrosive soils could damage Project structures and facilities s, which could result in power outages, damage to nearby roads or structures, and injury or death to nearby people, a significant impact. Accordingly, implementation of Mitigation Measure G-6 (Conduct geotechnical studies to assess soil characteristics and aid in appropriate foundation design) provides additional detail to ensure that impacts associated with problematic soils are reduced to less-than-significant levels (Class II).

Damage to Project structures due to slope failure (Criterion GEO7)

Impact G-7: Transmission line structures could be damaged by landslides, earth flows, or debris slides, during operation.

Slope instability including landslides, earth flows, and debris flows has the potential to undermine foundations, cause distortion and distress to overlying structures, and displace or destroy Project components. The southern part of Segment 5, Segment 6, the north end of Segment 7, Segment 8A, and the north half of Segment 11, are located in hill and mountain areas with steep slopes, mapped landslides, or geologic materials prone to landslide. Locating transmission line structures within landslides or on unstable slopes would result in result in damage to Project structures. Slope failures could cause damage to Project structures resulting in power outages, damage to nearby roads or structures, and injury or death to nearby people. Implementation of Mitigation Measure G-3 (Conduct geological surveys for landslides and protect against slope instability) is recommended.

CEQA Significance Conclusion

SCE's APM GEO-2 (Perform Geotechnical Studies, see Table 4-1) would partially reduce impacts related to landslide hazards during operations of the Project. However this measure does not specify that surveys for unstable slope would be conducted as part of the planned geotechnical studies. Unidentified unstable slopes or areas of potentially unstable slopes along or nearby and upslope of Project components could fail during the lifetime of the proposed Project resulting in damage to these facilities. To ensure that landslide impacts to Project structures during operation would be reduced to less-than-significant levels (Class II), implementation of Mitigation Measure G-3 (Conduct geological surveys for landslides and protect against slope instability) is required prior to construction for the hill and mountain areas. This will aid in proper identification of areas of potential slope instability allowing for avoidance or stabilization of these areas, reducing potential for damage to structures during Project operation.

Destruction of unique paleontological resources (Criterion GEO8)

Impact G-8: Grading and excavation could destroy paleontologic resources.

Grading activities for new access and spur roads, and excavation for tower and substation building foundations could encounter potentially fossil-bearing deposits throughout nearly all of the proposed Project segments underlain by Quaternary alluvial deposits (Segments 4, 5, 7, 8, 9, 10, and 11) and Tertiary sedimentary rock in the Montebello, Puente, and Chino Hills (Segment 8). Construction activities could destroy the fossils contained in the earth materials and the opportunity to properly retrieve, study, catalog, and archive them would be lost.

CEQA Significance Conclusion

The Applicant will implement APMs PALEO-1 through PALEO-9 which would reduce the potential to destroy scientifically important fossils and would provide for the systematic collection, analysis, and documentation of any such discoveries. SCE's APM PALEO-1 (Retention of Paleontologist), APM PALEO-2 (Conduct Pre-construction survey), and APM PALEO-3 (Prepare and implement a Paleontological Resource Management Plan [PRMP]) would be completed prior to construction to allow a certified paleontologist to plan for and supervise the pre-construction planning and field surveys. SCE's APM PALEO-4 (Environmental training), APM PALEO-5 (Construction monitoring), APM PALEO-6 (Recovery and testing), and APM PALEO-7 (Prepare monthly progress reports) would occur during construction. These activities would train construction supervisors and crews to be aware of paleontologic resources and provide procedures to follow in the event fossils are encountered during excavation. In addition the construction-related paleontology APMs would require a paleontologic monitor, under the supervision of the Project certified paleontologist, to monitor ground-disturbing activities on a part-time or full-time basis in areas with rock units of moderate to high sensitivity. At the conclusion of construction, SCE's APM PALEO-8 (Analysis and prepare final Paleontologic Resource Recovery Report) and APM PALEO-9 (Curation) would provide for documenting and preserving all of the paleontologic resources discovered during construction. The final report and fossil collections would be placed in a museum repository identified before the start of construction in the PRMP.

These measures would reduce the potential for paleontological resources to be destroyed to a less than significant level by ensuring any resources encountered would be identified, documented, and preserved. Impacts would be less than significant (Class III).

6.2 Cumulative Effects Analysis

This section addresses potential cumulative effects that would occur as a result of implementation of the proposed Tehachapi Renewable Transmission Project.

6.2.1 Geographic Extent

The geographic scope for considering cumulative impacts to Geology, Soils, and Paleontology is the proposed Project corridor itself (including proposed substations). This is because geologic conditions, soils, and paleontologic resources occur at specific locales and are unaffected by activities not acting on them directly and any impacts of the proposed Project would be site-specific.

6.2.2 Existing Cumulative Conditions

Past and ongoing development throughout the proposed Project area has resulted in substantial alterations to the natural landscape. Past, existing, and future projects could contribute to the cumulative effects of geology, soils, and paleontologic resources creating any of the following conditions: triggering or acceleration of erosion or slope failures; loss of mineral resources, and damage or loss to paleontologic resources. These conditions would be limited to the areas within and adjacent to the boundaries of individual projects. In order to be cumulatively considerable, such conditions would have to occur at the same time and in the same location as the same or similar conditions of the proposed Project. Seismic impacts (groundshaking, earthquake-induced ground failure, and fault rupture) from the numerous local and regional faults comprise an impact of the geologic environment on individual projects and would not introduce cumulatively considerable impacts.

The actual number and type of resources that might be adversely affected by the cumulative scenario projects is unknowable without a comprehensive inventory of the area within the geographic scope of the cumulative analysis. Development of such an inventory is beyond the reasonable scope of this analysis. Typically, cultural and paleontological resources are identified as part of the permitting process for individual undertakings, and often are discovered only during ground disturbing activities. Applicable laws and regulations, as discussed in Section 3, afford specific protections to discovered resources.

6.2.3 Reasonably Foreseeable Future Projects and Changes

Foreseeable future projects identified for this analysis include major energy and transmission projects, transportation projects, and numerous commercial and residential development projects throughout the jurisdictions traversed by the proposed Project. In addition, projects within NFS lands were also identified. The list was reviewed to identify cumulative projects that would be located close to the proposed Project such that a geologic impact would affect both projects simultaneously. Cumulative geologic impacts could occur where future projects cross or closely parallel the proposed Project. Numerous small to large residential projects are planned along some of the proposed Project segments, including known fault zones (Leona Valley). Finally, projects within NFS lands related to fire fuel management and reduction and road management projects were considered. The passenger rail projects (California High Speed Train, Orangeline Maglev Project, and Metro Gold Line Extension) could experience cumulative impacts if earthquake shaking resulted in structural damage to transmission line towers and closure or damage of the rail lines, trains, or stations. ANF projects to reduce fuel for brush fires and improve roads would not have cumulative impacts related to geologic hazards. Consequently, reasonably foreseeable cumulative projects with potential cumulative impacts related to geologic hazards is limited to parallel and crossing transmission lines, crossing of passenger rail lines, and local commercial/residential developments.

6.2.4 Cumulative Impact Analysis

Impacts of the proposed Project would be cumulatively considerable if they would have the potential to combine with similar impacts of other past, present, or reasonably foreseeable projects. Table 6-1, below, identifies which impacts of the proposed Project would be cumulatively considerable and of those, what the cumulative significance of each impact would be. Impacts that are not found to be cumulatively considerable would not have an incremental effect on the cumulative scenario. Impact classes for cumulative impacts are as follows:

- No Impact: Project would have no impacts or would otherwise not be cumulatively considerable

- Class III: Project impacts would combine with impacts of other projects but cumulative effect is not significant
- Class II: Project impacts would combine with impacts of other projects to create a cumulative effect, but the application of feasible mitigation measures would reduce the incremental effect of the Project to less than significant
- Class I: Project impacts would combine with impacts of other projects to create a cumulative effect that is significant and unavoidable

Table 6-1. Cumulative Impacts for Geology, Soils, and Paleontology– Alternative 2

Impact	Cumulatively Considerable?	Cumulative Significance
G-1: Project activities could interfere with access to known energy resources.	No	No Impact
G-2: Erosion could be triggered or accelerated due to construction activities.	No	No Impact
G-3: Excavation and grading during construction activities could cause slope instability or trigger landslides.	No	No Impact
G-4: Project structures could be damaged by surface fault rupture at crossings of active faults exposing people or structures to hazards.	Yes	Class III
G-5: Project structures could be damaged by seismically induced groundshaking and/or ground failure exposing people or structures to hazards.	Yes	Class III
G-6: Project structures could be damaged by problematic soils exposing people or structures to hazards.	Yes	Class III
G-7: Transmission line structures could be damaged by landslides, earth flows, or debris slides, during operation.	Yes	Class III
G-8: Grading and excavation could destroy paleontologic resources.	Yes	Class III

It has been determined that three impacts associated with the proposed Project, as identified in Section 6.1, would not be cumulatively considerable and therefore would not contribute to cumulative impacts. These impacts include: Impact G-1 (Project activities could interfere with access to known energy resources), Impact G-2 (Erosion could be triggered or accelerated due to construction activities), and Impact G-3 (Excavation and grading during construction activities could cause slope instability or trigger landslides) as described below.

Impact G-1 (Project activities could interfere with access to known energy resources) could occur if Project-related construction interfered with operation of the oil field that the Project traverses. As described in Section 6.1 (Direct and Indirect Effects Analysis), this impact would be less than significant for the proposed Project. The potential for this impact to combine with similar effects of other projects would only occur if other projects were implemented in the same area at the same time as the proposed Project. However, construction of the proposed Project would preclude other projects from being implemented concurrently in the same location. Furthermore, Mitigation Measure G-1 (Coordination with oil field operations) would be implemented to prevent interference with oil field operations. Therefore, proposed Project impacts would not have the potential to combine with similar effects from other projects and would not be cumulatively considerable.

Impact G-2 (Erosion could be triggered or accelerated due to construction activities) could occur during construction-related excavation and grading in areas underlain by soils with high erosion potential. As described in Section 6.1 (Direct and Indirect Effects Analysis), this impact would be less than significant for the proposed Project. The potential for this impact to combine with similar effects of other projects would only occur if other projects were implemented in the same area at the same time as the proposed Project. However, construction of the proposed Project would preclude other projects from being implemented concurrently in the same location. Furthermore Mitigation Measure H-1a (Implement an Erosion Control Plan and demonstrate compliance with water quality permits) would be implemented to

reduce or prevent erosion impacts during construction. Therefore proposed Project impacts would not have the potential to combine with similar effects from other projects and would not be cumulatively considerable.

Impact G-3 (Excavation or grading during construction activities could cause slope instability or trigger landslides) could occur if Project-related excavation and grading were to trigger slope failures. As described in Section 6.1 (Direct and Indirect Effects Analysis), this impact would be less than significant for the proposed Project. The potential for this impact to combine with similar effects of other projects would only occur if other projects were implemented on the same slopes at the same time as the proposed Project. However, construction of the proposed Project would preclude other projects from being implemented concurrently in the same location. Furthermore Mitigation Measure G-3 (Conduct geological surveys for landslides and protect against slope instability) would be implemented to minimize the potential for construction triggered slope failures. Therefore proposed Project impacts would not have the potential to combine with similar effects from other projects and would not be cumulatively considerable.

The potential for cumulatively considerable Geology, Soils, and Paleontology impacts of the proposed Project to combine with similar impacts of other projects within the geographic scope of the cumulative analysis are described below.

- **Project structures could be damaged by surface fault rupture at crossings of active faults (Impact G-4).** As discussed in Section 6.1 (Direct and Indirect Effects Analysis), this impact could damage proposed Project structures in the event of surface fault rupture at crossings of active faults. Failure of Project structures could result in power outages, damage to nearby roads or structures, and injury or death to nearby people. Past and future projects located in close proximity to Project structures would be exposed to the same conditions and therefore the same impacts. Failure of Project structures and adjacent structures would combine to result in a significant impact where such structures are in close proximity to other structures or people, such as other parallel and crossing transmission lines and substations, and residential and commercial developments located adjacent to the Project route along Segments 5, 7, 8 and portions of Segment 11 between S11 MPs 18.5 to 19. However, implementation of Mitigation Measure G-4, which requires Project structures be placed outside of active fault zones, would minimize the proposed Project's contribution to this cumulative impact. Due to similar policies regarding construction within active fault zones that have been imposed on past projects and that will likely be imposed on reasonably foreseeable projects, this cumulative impact would be less than significant (Class III).
- **Project structures could be damaged by seismically induced groundshaking and/or ground failure (Impact G-5).** Large earthquakes on regional faults could result in strong to very strong seismically induced groundshaking, liquefaction, and earthquake induced slope failures, as discussed in Section 6.1. This impact could result in damage to proposed Project structures which could result in power outages, damage to nearby roads or structures, and injury or death to nearby people. Past and future projects located in close proximity to Project structures would be exposed to the same conditions and therefore the same impacts. Failure of Project structures and adjacent structures would combine to result in a significant impact where such structures are in close proximity to other structures or people, such as other parallel and crossing transmission lines and substations, and residential and commercial developments located adjacent to the Project route along Segments 5, 7, 8 and the southern portion of Segment 11. However, implementation of Mitigation Measure G-5a, which requires site-specific seismic analyses to avoid damage from seismic groundshaking, Mitigation Measure G-5b, which requires design-level geotechnical investigations designed to assess the potential for liquefaction and design of Project features to avoid damage liquefaction, and Mitigation Measure G-3, which requires identification of existing and potential unstable slopes to minimize the potential slope failures, would minimize the proposed Project's contribution to this cumulative impact. Due to similar policies regarding construction within areas of potentially substantial seismic shaking and seismically induced ground failures that have been imposed on past projects and that will likely be imposed on reasonably foreseeable projects, this cumulative impact would be less than significant (Class III).

- **Project structures could be damaged by problematic soils exposing people or structures to hazards (Impact G-6)**. Unidentified expansive and corrosive soils could damage Project structures and facilities and could comprise their structural integrity, which could result in power outages, damage to nearby roads or structures, and injury or death to nearby people, as described in Section 6.1 (Direct and Indirect Effects Analysis). Past and future projects located in close proximity to Project structures on the same soil types would be exposed to the same conditions and therefore the same impacts. Failure of Project structures and adjacent structures would combine to result in a significant impact where such structures are in close proximity to other structures or people, such as other parallel and crossing transmission lines and substations, and residential and commercial developments located adjacent to the Project route along Segments 5, 7, 8 and the southern portion of Segment 11. However, implementation of Mitigation Measure G-6, which would require studies to identify the presence of unsuitable soils and designing of Project features to avoid damage from problematic soils, would minimize the proposed Project's contribution to this cumulative impact. Due to similar policies regarding construction within areas of potentially unsuitable and damaging soils that have been imposed on past projects and that will likely be imposed on reasonably foreseeable projects, this cumulative impact would be less than significant (Class III).
- **Project structures could be damaged by landslides, earthflows, debris flows and/or rock fall (Impact G-7).** As discussed in Section 6.1, this impact could result in collapse of proposed Project structures in the event of landslides, earthflows, debris flows and/or rock fall. Collapse of Project structures could result in power outages, damage to nearby roads or structures, and injury or death to nearby people. Past and future projects located in close proximity to Project structures would be exposed to the same conditions and therefore the same impacts. Collapse of Project structures and adjacent structures would combine to result in a significant impact where such structures are in close proximity to other structures or people, such as other parallel and crossing transmission lines and substations, and residential and commercial developments located adjacent to the Project route along Segments 5, 7, 8 and the southern portion of Segment 11. However, implementation of Mitigation Measure G-3, which requires identification of existing and potential unstable slopes to minimize the potential slope failures, would minimize the proposed Project's contribution to this cumulative impact. Due to similar policies regarding construction within areas of unstable and potentially unstable slopes that have been imposed on past projects and that will likely be imposed on reasonably foreseeable projects, this cumulative impact would be less than significant (Class III).
- **Grading and excavation could destroy paleontologic resources (Impact G-8).** Unknown, unrecorded paleontological resources may be found at nearly any development site. As they are discovered, sites are recorded and information retrieved. If the nature of the resource requires it, the resource is protected. When discovered, paleontological resources are treated in accordance with applicable federal and State laws and regulations as well as the mitigation measures and permit requirements applicable to a project. It is not known what paleontological resources, if any, would be affected by development of all present and future projects along and near the proposed Project; however, given the density of past development in these areas and the large number of reasonably foreseeable projects in the area, it is reasonable to assume that paleontologic resources exist and would be expected to be uncovered in at least several of these sites. As with the proposed Project, Applicant Proposed Measures (APMs PALEO-1 through PALEO-9) shall be employed during construction to reduce the potential that any scientifically important fossils would be destroyed and would provide for the systematic collection, analysis, and documentation of any such discoveries. Should resources be discovered during construction of current and future projects, they would be subject to legal requirements designed to protect them, thereby reducing the effect of impacts. Therefore proposed Project impacts, when combined with impacts from past, present and reasonably foreseeable projects would not be significant (Class III) and no additional mitigation measures are necessary.

6.2.5 Mitigation to Reduce the Project's Contribution to Significant Cumulative Effects

Mitigation measures introduced for the proposed Project in Section 6.1 (Direct and Indirect Effects Analysis) would help to reduce the proposed Project's incremental contribution to cumulative impacts. However, no additional mitigation measures have been identified that would reduce cumulative impacts to a less-than-significant level for geologic, soils, and paleontologic resources.