Summary

This Specialist Report describes existing Geology, Soils, and Paleontology conditions and analyzes environmental impacts related to geologic hazards and mineral and paleontologic resources that are expected to result from the implementation of Southern California Edison's (SCE's) proposed Tehachapi Renewable Transmission Project (TRTP). This report has been prepared in support of an Environmental Impact Report and Environmental Impact Statement (EIR/EIS) being prepared jointly by the California Public Utilities Commission (CPUC) and the USDA Forest Service for SCE's proposed TRTP.

Implementation of the proposed TRTP would require the approval of a Certificate of Public Convenience and Necessity by the CPUC and a Special Use authorization from the Forest Service. Amendments to the Forest Land Management Plan (Forest Plan) would be required to allow the implementation of the TRTP across National Forest System (NFS) lands in the Angeles National Forest (ANF). Additional approvals and permits from other agencies would also be required and vary by alternative.

Impacts related to geology, soils, and paleontology are evaluated for both the construction and operation of the proposed TRTP. Key issues related to Project construction and operations include the following:

- Presence of geologic hazards such as landslides, unstable slopes, and unsuitable soils that may impact construction activities and operation
- Presence of seismic hazards such as fault rupture, ground cracking, strong ground shaking, liquefaction, and earthquake-induced slope failure that may impact design, construction and operation
- Presence of soils that may be erodible or become erodible due to ground disturbance during construction
- Access to mineral resources such as oil fields and sand, gravel and rock quarries may be impacted by construction activities
- Paleontologic resources would be destroyed by construction activities
- During operation of the Project, geologic and seismic hazards could damage the transmission lines and substations

Overview of the Project Purpose, Proposed Project/Action, and Alternatives

Below is an overview of the alternatives analyzed in this Specialist Report. Pursuant to CEQA (Guidelines Section 15126.6(a)) and NEPA (40 CFR 1505.1(e)), a reasonable range of alternatives to SCE's proposed Project (Alternative 2) are examined in this Specialist Report, which were selected based on the following criteria: (1) the alternative's potential to meet most of the Project objectives/purpose and need; (2) the feasibility of the alternative; and (3) the alternative's ability to address significant environmental issues associated with SCE's proposed Project. As required under CEQA Section 15126.6(e) and NEPA Section 1502.14(d), a No Project/Action Alternative was also considered. The proposed Project and alternatives include the following:

Alternative 1: No Project/Action Alternative. Under the No Project/Action Alternative the Tehachapi Renewable Transmission Project, as proposed, would not be implemented. As such, none of the associated Project activities would occur and the environmental impacts associated specifically with the proposed Project would not occur. However, in the absence of the Project, SCE still would continue to operate and maintain the existing transmission structures, access, and spur roads for operations and maintenance purposes under a variety of agreements (landowners) and permits (Forest Service and US

Army Corps of Engineers). For example, within the ANF, approximately 80 miles of roads are currently being used to access the existing structures along Segments 6 and 11, which the use and maintenance of is authorized through existing roads permits issued by the Forest Service. SCE would also be required to interconnect and integrate power generation facilities into its electric system, as required under Sections 210 and 212 of the Federal Power Act (16 U.S.C. § 824 [i] and [k]) and Sections 3.2 and 5.7 of the CAISO's Tariff. Various scenarios related to electricity generation and transmission reasonably expected to occur in the foreseeable future are identified in see Section 2.1 of the EIR/EIS.

Alternative 2: SCE's Proposed Project. SCE's proposed Project would involve construction, operation, and maintenance of new and upgraded transmission infrastructure along approximately 173 miles of new and existing rights-of-way (ROW) from the Tehachapi Wind Resource Area (TWRA) in southern Kern County south through Los Angeles County and the Angeles National Forest (ANF) and east to the existing Mira Loma Substation in Ontario, San Bernardino County, California. Invasive plant species will be controlled using manual techniques and approved herbicides within the Project area on NFS lands on the ANF. The major components of SCE's proposed Project include the following:

- Build a new single-circuit 500-kV transmission line (T/L) traveling approximately 16.8 miles over new ROW between the approved Windhub Substation and the proposed new Whirlwind Substation (Segment 10).
- Build two new single-circuit 220-kV T/Ls for approximately four miles (travelling parallel) in new ROW between the proposed (not part of Project) Cottonwind Substation to the proposed new Whirlwind Substation (Segment 4 – 220 kV).
- Build a new single-circuit 500-kV T/L for approximately 15.6 miles in new ROW between the proposed new Whirlwind Substation to the existing Antelope Substation (Segment 4 – 500 kV).
- Replace approximately 17.4 miles of the existing Antelope-Vincent 220-kV T/L and the existing Antelope-Mesa 220-kV T/L with only one new T/L built to 500-kV standards in existing ROW between the existing Antelope and Vincent Substations (Segment 5).
- Rebuild approximately 18.7 miles of existing 220-kV T/L to 500-kV standards between the existing Vincent and Gould Substations and construct a new 220-kV circuit on the vacant side of the existing double-circuit structures of the Eagle Rock-Mesa 220-kV T/L between the existing Gould and Mesa Substations (Segment 11).
- Rebuild approximately 31.9 miles of existing 220-kV T/L to 500-kV standards from the existing Vincent Substation to the southern boundary of the ANF, including approximately 26.9 miles of the existing Antelope-Mesa 220-kV T/L and approximately five miles of the existing Rio Hondo-Vincent 220-kV No. 2 T/L (Segment 6).
- Rebuild approximately 15.8 miles of existing Antelope-Mesa 220-kV T/L to 500-kV standards from the southern boundary of the ANF to the existing Mesa Substation (Segment 7).
- Rebuild approximately 33 miles of existing Chino-Mesa 220-kV T/L to 500-kV standards from a point approximately two miles east of the existing Mesa Substation (the "San Gabriel Junction") to the existing Mira Loma Substation. Also rebuild approximately seven miles of the existing Chino-Mira Loma No. 1 line from single-circuit to double-circuit 220-kV structures (Segment 8).
- Build the new Whirlwind Substation, a 500/220-kV substation located approximately four to five miles south of the proposed (no part of Project) Cottonwind Substation near the intersection of 170th Street and Holiday Avenue in Kern County near the TWRA (Segment 9).
- Upgrade the existing Antelope, Vincent, Mesa, Gould, and Mira Loma Substations to accommodate new T/L construction and system compensation elements (Segment 9).
- Install associated telecommunications infrastructure.

Alternative 3: West Lancaster Alternative. This alternative would re-route the new 500-kV T/L in Segment 4, which is currently proposed along 110th Street West, 0.5 miles farther west along 115th Street

West. This alternative represents a refinement of the applicant's proposed Project that would place the T/L along an undeveloped area instead of through development thereby minimizing disturbance to current residences or access to properties located along the paved 110th Street West. As such, land use impacts and visual impacts would be reduced.

Alternative 4: Chino Hills Alternatives. Five route variations in the Chino Hills area have been analyzed, as described below. These routing options have been retained for further analysis, as each would avoid proximity of the T/L to existing residences of the City of Chino Hills; and implementation of one of these routing options would eliminate construction of approximately 16 miles of 500-kV structures along Segment 8A. Segment 8B of the proposed Project, between the Chino and Mira Loma Substations, would still occur under the Alternative 4 routing options.

- ***Route A*** would place a new double-circuit 500-kV T/L in Segment 8A through Chino Hills State Park (CHSP) parallel to and south of an existing double-circuit 220-kV T/L. This alternative route would require construction of a new 500-kV switching station in CHSP, which would allow the new 500-kV T/Ls to connect to existing 500-kV T/Ls located in this area that provide connections to the Mira Loma Substation.
- ***Route B*** represents a modification to Alternative 4 Route A, in which a new double-circuit 500-kV T/L in Segment 8A would be routed completely through CHSP parallel to and north of an existing double-circuit 220-kV T/L. This alternative route would require construction of a new 500-kV switching station, which would be located east of and outside of the CHSP, and would allow the new double-circuit 500-kV T/L to connect to existing 500-kV T/Ls located in this area that provide connections to the Mira Loma Substation.
- ***Route C*** represents a modification to Alternative 4 Route A, in which a new double-circuit 500-kV T/L in Segment 8A would be placed parallel to and south of an existing double-circuit 220-kV T/L up to CHSP. At this point, this alternative route would turn east for approximately 2.4 miles, remaining just north of the CHSP boundary, to a new 500-kV switching station. A portion of the existing single-circuit 500-kV T/Ls within CHSP would be re-routed to tie into the new switching station, which would allow the new double-circuit 500-kV T/L to connect to these existing 500-kV T/Ls to allow power flow to continue on to the Mira Loma Substation. In addition, a portion of the existing 220-kV T/L within CHSP would be re-routed outside of CHSP, paralleling the new 500-kV T/Ls from just west of the CHSP boundary to the new switching station. The re-routed 500-kV and 220-kV T/Ls would proceed north out of the new switching station, and would then re-enter CHSP paralleling the re-routed 500-kV T/Ls to reconnect with the existing 220-kV T/L.
- ***Route C Modified*** is similar to the original Route C option, with the exceptions that (1) the new gas-insulated switching station would be located approximately 2,500 feet northwest of the location described for the original Alternative 4C, (2) transmission line configurations and access roads would be altered to account for relocation of the switching station, and (3) re-routing of the existing single-circuit 500-kV towers in CHSP to the new switching station would occur utilizing double-circuit 500-kV towers.
- ***Route D*** also represents a refinement to Alternative 4 Route A, in which a new double-circuit 500-kV T/L in Segment 8A would be placed parallel to and north of an existing double-circuit 220-kV T/L up to CHSP. At this point, the alternative route would turn east and proceed to follow the northern boundary of CHSP for approximately 4.2 miles, then just east of Bane Canyon the alignment would turn southeast and cut across CHSP for approximately 1.3 miles to a new 500-kV switching station located immediately east of the boundary of CHSP. This switching station would allow the new double-circuit 500-kV T/L to connect to existing 500-kV T/Ls located in this area to provide connections to the Mira Loma Substation.

Alternative 5: Partial Underground Alternative. This alternative would utilize Gas-Insulated Line (GIL) technology to place the proposed overhead lines underground along Segment 8A through the City of Chino Hills from approximately S8A MP 21.9 to 25.4 to reduce significant visual impacts and address other community concerns.

Alternative 6: Maximum Helicopter Construction in the ANF Alternative. This alternative would utilize helicopter construction within the ANF to the maximum extent feasible. This alternative was requested by the Forest Service to reduce ground disturbance within the ANF by minimizing new road

construction through the use of helicopter construction. Helicopter staging/support areas have been identified in the vicinity of Segments 6 and 11 to provide for helicopter construction activities within the ANF. A total of 143 new 500-kV towers would be constructed by helicopter under this alternative: 87 along Segment 6 and 56 along Segment 11.

Alternative 7: 66-kV Subtransmission Alternative. This alternative is comprised of four 66-kV subtransmission line elements, including the following: (1) Undergrounding the existing 66-kV subtransmission line on Segment 7 through the River Commons at the Duck Farm Project (Duck Farm Project) between MP 8.9 and MP 9.9 of Segment 7 as requested by the Board of Supervisors County of Los Angeles to minimize the Project's effects to passive recreation opportunities in the planned Duck Farm Project area; (2) Re-routing and undergrounding the existing 66-kV subtransmission line around the Whittier Narrows Recreation area along Segment 7 (S7 MP 11.4 to 12.025) to provide habitat enhancement for least Bell's vireos as identified by SCE; (3) Re-routing the existing 66-kV subtransmission line through the Whittier Narrows Recreation Area in Segment 7 (S7 MP 12.0 to 13.6) immediately north of the existing 220-kV ROW to reduce the number of structures required (20-foot expanded ROW required); and (4) Re-routing the existing 66-kV subtransmission line around the Whittier Narrows Recreation Area along Segment 8A between the San Gabriel Junction at S8A MP 2.2 and S8A MP 3.8 (2 routing options are provided in this area) to provide habitat enhancement for least Bell's vireos, as identified by SCE.

Summary of Impacts and Mitigation Measures

Direct and Indirect Effects

Table S-1 lists the direct and indirect environmental impacts of the proposed Project and alternatives analyzed in this Specialist Report. The direct and indirect effects of the Project and alternatives are described in full detail in Sections 5 through 11. Alternative 1 (No Project/No Action) impacts are fully described in Section 5; however, because no potential future project information is available an impact significance level for Alternative 1 is not included in the table below.

Significant and Unavoidable Impacts

Significant and unavoidable impacts are those that cannot be reduced to a less-than-significant level with application of recommended mitigation measures. There are no impacts of the proposed Project and alternatives that are considered significant and unavoidable.

Cumulative Impacts

Table S-2 lists the significant cumulative impacts of the proposed Project as described in Section 6.2. This analysis describes the potential for impacts of the proposed Project and alternatives to combine with similar effects of other projects within the geographic scope of the cumulative analysis.

Table S-1. Summary of Impacts and Mitigation Measures

Impact	Impact Significance								Mitigation Measures
	Alt. 1+	Alt. 2	Alt. 3	Alt. 4	Alt. 5	Alt 6	Alt 7	NFS Lands*	
GEOLOGY, SOILS, AND PALEONTOLOGY									
G-1: Project activities could interfere with access to known energy resources.	N/A	Class II	Class II	Class II	Class II	Class II	Class II	No	G-1: Coordination with oil field operations.
G-2: Erosion could be triggered or accelerated due to construction activities.	N/A	Class II	Class II	Class II	Class II	Class II	Class II	Yes	H-1a: Implement an Erosion Control Plan and demonstrate compliance with water quality permits.
G-3: Excavation and grading during construction activities could cause slope instability or trigger landslides.	N/A	Class II	Class II	Class II	Class II	Class II	Class II	Yes	G-3: Conduct geological surveys for landslides and protect against slope instability.
G-4: Project structures could be damaged by surface fault rupture at crossings of active faults exposing people or structures to hazards.	N/A	Class II	Class II	Class II	Class II	Class II	Class II	Yes	G-4: Avoid placement of Project structures within active fault zones.
G-5: Project structures could be damaged by seismically induced groundshaking and/or ground failure exposing people or structures to hazards.	N/A	Class II	Class II	Class II	Class II	Class II	Class II	Yes	G-5a: Reduce effects of groundshaking. G-5b: Conduct geotechnical investigations for liquefaction. G-3. (See Impact G-3)
G-6: Project structures could be damaged by problematic soils exposing people or structures to hazards.	N/A	Class II	Class II	Class II	Class II	Class II	Class II	Yes	G-6: Conduct geotechnical studies to assess soil characteristics and aid in appropriate foundation design.
G-7: Transmission line structures could be damaged by landslides, earth flows, or debris slides, during operation.	N/A	Class II	Class II	Class II	Class II	Class II	Class II	Yes	G-3 (See Impact G-3)
G-8: Grading and excavation could destroy paleontologic resources.	N/A	Class III	Class III	Class III	Class III	Class III	Class III	No	None Recommended
G-9: Existing structures could be damaged by ground settlement along the tunnel exposing people or structures to hazards.	Not Applicable	Not Applicable	Not Applicable	Not Applicable	Class II	Not Applicable	Not Applicable	No	G-9: Conduct geotechnical analysis of settlement potential during design and implement a Subsidence Monitoring Program during construction to protect against ground settlement.

N/A = Not Available

* Indicates that this impact is applicable to the portion of the Project on National Forest System lands.

+ Potential projects would likely traverse the same geographic regions as either the proposed Project or Alternatives 3 through 7, and subsequently introduce similar types of impacts.

Summary Comparison of Alternatives

Section 12 of this Specialist Report provides a comparison of the proposed Project and alternatives based on the analysis presented in Sections 5 through 11. This comparison describes the differences in impacts among the various alternatives, with particular emphasis given to the differences in significant effects. For Geology, Soils, and Paleontology, the differentiators used to compare the alternatives included such considerations as erosion potential (based on soil characteristics and total land disturbance), potential for damage from slope instability or other ground failures both during construction and operation, potential for damage from seismic events (i.e., fault rupture, liquefaction, or seismically induced landslides), and potential to disturb and or destroy unique paleontologic resources.

As described in Table S-3, Alternative 2 (SCE's Proposed Project) would involve the construction of access roads, helicopter and other associated construction staging areas, and a total of 853 new towers. Land disturbance consisting of grading and excavation would be required through approximately 77 miles of hillside and mountain areas with known landslides and unstable slopes, resulting in the potential for impacts from construction triggered slope failures, seismically induced slope failures, and slope failures during Project operation. Slope stability impacts associated with Alternative 3 (West Lancaster), Alternative 5 (Partial Underground), and Alternative 7 (66-kV Subtransmission) would be similar to Alternative 2, as these alternatives would have similar construction through the same hillside and mountain areas for the same distance. Compared to Alternative 2, impacts related to construction triggered landslides under Alternative 6 (Maximum Helicopter Construction in the ANF) are expected to decrease due to the reduction in land disturbance from grading of fewer access and spur roads (approximately 45 acres versus 105 acres) required in the hillside and mountain areas with maximum helicopter construction. Of all the Project alternatives, Alternative 4 (Chino Hills Routes) would have the greatest increase in the amount of construction-related land disturbance in hillside areas with known landslides and slope stability issues and earthquake induced slope failure hazards.

Compared to Alternative 2, construction-related erosion is expected to increase under Alternative 5 (Partial Underground) and Alternative 7 (66-kV Subtransmission) due to increased ground disturbance from underground construction activities, as well as under Alternative 4 (Chino Hills Routes) due to the increased amount of grading required for access roads and new spur roads. Of all the Project alternatives, erosion related impacts would have the greatest decrease under Alternative 6 (Maximum Helicopter Construction in the ANF) due to the reduction in the number of new and upgraded access and spur roads (approximately 42 miles with a $\pm$15% range of 49 to 36 miles), resulting in less ground disturbance in areas with potential erosion issues.

In comparison with the other Project alternatives, Alternative 4 (Routes B and D) and Alternative 5 would result in slightly increased potential for damage from surface fault rupture. Under Routes 4B and 4D, a switching station would be located adjacent to or on the mapped trace of the Alquist-Priolo zoned Chino Fault, while the underground portion of the Alternative 5 alignment would cross the projected trend of the Chino fault.

Compared to the other Project alternatives, the potential to damage or destroy paleontologic resources during construction is expected to increase for Alternative 4 (Chino Hills Routes) and Alternative 7 (66-kV Subtransmission). Alternative 4 would increase ground disturbance in the paleontologically sensitive Puente Formation, while Alternative 7 would cause a slight increase in ground disturbance from underground construction and new 66-kV poles in young alluvium with moderate paleontologic sensitivity.

Of all the Project alternatives, only Alternative 5 (Partial Underground) would create a potential impact from ground subsidence/settlement during and after construction of the tunnel that could result in damage to overlying structures.

Table S-2. Cumulative Effects Matrix – Alternative 2: SCE's Proposed Project

Type of Effect	Direct or Indirect Project Effects	Persistent Influence from Past Actions or Natural Events	Present and Reasonably Foreseeable Future Effects	Potential Cumulative Effect	Cumulative Significance
GEOLOGY, SOILS, AND PALEONTOLOGY					
Disturb unique geologic features (Criterion GEO1)	No unique geologic features would be disturbed (No Impact)	Past actions or events do not have a persistent influence.	No present and reasonably foreseeable future effects.	Project would not be cumulatively considerable.	N/A
Interfere with access to known mineral and/or energy resources (Criterion GEO2)	The proposed alignment traverses the Montebello oil field and the northern edge of the Brea-Olinda oil field (Impact G-1)	Past actions or events do not have a persistent influence.	Other projects could traverse known mineral/energy resource sites, resulting in interference with access.	The interference with access to known mineral/energy resource sites would be short duration and temporary. Project would not be cumulatively considerable.	N/A
Trigger or accelerate geologic processes, such as landslides, substantial soil erosion, or loss of topsoil, during construction (Criterion GEO3)	Erosion could be triggered or accelerated due to construction activities (Impact G-2).	Past actions or events do not have a persistent influence.	Other projects could trigger or accelerate erosion.	Erosion and runoff of sediment is controlled on a project-specific basis. Project would not be cumulatively considerable.	N/A
	Excavation and grading during construction activities could cause slope instability or trigger landslides (Impact G-3)	Past actions or events do not have a persistent influence.	Other projects could trigger landslides or cause slope instability.	If Project triggered slope failure caused other landslides or slope failure in concurrent adjacent projects. However, construction of the proposed Project would preclude other projects from being implemented concurrently in the same location Project would not be cumulatively considerable.	NA
Expose people or structures to potential risk of loss or injury due to earthquake-related ground rupture in the vicinity of major fault crossings (Criterion GEO4)	Project structures could be damaged by surface fault rupture at crossings of active faults exposing people or structures to hazards (Impact G-4)	Past actions or events do not have a persistent influence.	Other projects could cross active faults with potential for ground surface rupture.	Collapse of Project structures and adjacent structures due to fault rupture 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, 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
Expose people or structures to potential risk of loss or injury due to seismically-induced ground shaking, landslides, liquefaction,	Project structures could be damaged by seismically-induced groundshaking and/or ground failure exposing people or structures to hazards (Impact G-5)	Past actions or events do not have a persistent influence.	People or structures of other projects could be at risk of loss or injury from seismically-induced ground shaking and ground failure.	Collapse of Project structures and adjacent structures due to seismically induced ground shaking and ground failure 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, due to similar policies regarding construction within areas of potential	Class III

Table S-2. Cumulative Effects Matrix – Alternative 2: SCE's Proposed Project

Type of Effect	Direct or Indirect Project Effects	Persistent Influence from Past Actions or Natural Events	Present and Reasonably Foreseeable Future Effects	Potential Cumulative Effect	Cumulative Significance
settlement, lateral spreading, and/or surface cracking (Criterion GEO5)				significant 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.	
Expose people or structures to potential risk of loss or injury where corrosive soils or other unsuitable soils are present (Criterion GEO6)	Project structures could be damaged by problematic soils exposing people or structures to hazards (Impact G-6)	Past actions or events do not have a persistent influence.	Other project structures could be damaged by corrosive/expansive soil.	Collapse of Project structures and adjacent structures due to damage from corrosive or other unsuitable soils 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, 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
Results in damage to Project structures where there is potential for future slope failure of existing landslides or unstable slopes (Criterion GEO7)	Transmission line structures could be damaged by landslides, earth flows, or debris slides, during operation (Impact G-7)	Past actions or events do not have a persistent influence.	Future slope failure could damage other project structures located in hillside areas with unstable slopes.	Collapse of Project structures and adjacent structures due to landslides and other slope failures 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, 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
Results in the destruction of a unique paleontologic resource (Criterion GEO8)	Grading and excavation could destroy paleontologic resources (Impact G-8)	Past actions or events do not have a persistent influence.	Other projects could traverse areas with unique paleontologic resources although no adverse impact is likely.	Given the density of past development in the Project area 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. 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 this cumulative impact would be less than significant.	Class III

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Table S-3. Summary Comparison of Environmental Issues/Impacts – Geology, Soils, and Paleontology

Environmental Issues / Impacts	Alternative 1 (No Project/Action)	Alternative 2 (SCE's Proposed Project)	Alternative 3 (West Lancaster)	Alternative 4 (Chino Hills)	Alternative 5 (Partial Underground)	Alternative 6 (Max. Helicopter in ANF)	Alternative 7 (66-kV Subtransmission)
Project activities could interfere with access to known energy resources (Impact G-1)	Construction of new T/Ls of comparable length and new/ upgraded/expanded substations in lieu of the Project would have the same impacts where near active oil fields.	Construct 853 new transmission structures across 172.5 miles near 2 active oil fields.	Construct 852 new transmission structures across 172.9 miles near 2 active oil fields.	Construct 762 (4A), 802 (4C), and 791 (4C Mod) new transmission structures across 157 (4A) to 159 (4C) miles near 2 active oil fields.	Construct 838 new transmission structures across 172.5 miles near 2 active oil fields.	Same as Alternative 2.	Same as Alternative 2.
Erosion could be triggered or accelerated due to construction activities (Impact G-2)	Construction of new T/Ls in areas with comparable soils in lieu of the Project would have the same impacts.	Soil erosion could occur due to grading and excavation at new and modified access and spur roads, storage yards, 853 tower locations, 13 helicopter staging areas, one new substation, and expansion at five existing substations.	Construct approx. 2 miles of new access road; two additional towers and spur roads.	Despite shorter length and fewer towers compared to other alternatives, the potential for erosion is increased due to the need for access/spur roads and graded pads for new switching stations in the Chino Hills State Park (CHSP) and other previously undisturbed areas underlain by erodible soils. Approx. miles of additional roads: Alts 4A & 4B – 6.5 mi; Alts 4C & 4D – 9.5 mi; Alt 4C Mod. – 2.6 mi.	Construction of large transition stations would disturb more soil resulting in increased potential to trigger or accelerate erosion.	Use of helicopter construction results in less grading of access and spur roads compared to Alternative 2. The overall ground disturbance during construction would be reduced by approximately 86 acres compared to Alternative 2, resulting in a decreased potential to trigger or accelerate erosion.	Construction of underground 66-kV re-routes and installation of new poles for the overhead 66-kV routes would require additional excavation and trenching resulting in slightly more disturbance of soil resulting in incrementally increased potential to trigger or accelerate erosion.
Excavation and grading during construction activities could cause slope instability or trigger landslides (Impact G-3)	New T/Ls in hillside areas may or may not encounter areas of landslides and unstable slopes.	Slope failures could be triggered by construction related excavation and grading of access and spur roads, helicopter staging areas, and new towers through approximately 77 miles of hillside and mountain areas with known landslides and unstable slopes.	Same as Alternative 2.	Greater risk of slope instability due to increased length of alignment in landslide prone Puente formation which would result in increased ground disturbance in areas prone to landslides and slope instability as compared to Alternative 2. Approx. mileage of new roads and towers in hillside area with known landslide potential: Alts 4A & 4B – 2.7 mi.; Alts 4C/4C Mod & 4D – 9.5 mi.;	Incrementally less than Alternative 2 because construction bypasses some towers along hillsides in the landslide prone Puente Formation.	Reduced construction and grading of access and spur roads in steep mountainous terrain (approximately 60 less acres of ground disturbance during construction than Alternative 2) resulting in a decreased potential to trigger landslides or slope instability during construction.	Same as Alternative 2.
Project structure damage from surface fault rupture at crossings of active faults exposing people or structures to hazards (Impact G-4)	Construction of new T/Ls may or may not cross active faults with surface rupture potential.	New T/Ls cross or parallel 10 active faults and one potentially active fault.	Same as Alternative 2.	Minor decrease for Alternatives 4A, 4C, and 4C Mod. due to two fewer fault crossings (the northward projection of Chino fault and the potentially active Central Ave faults along Segment 8A). Otherwise the same as Alternative 2 for these three routes. Slightly increased potential for fault rupture for Alternative 4B and 4D due to the location of the switching station adjacent to or on the mapped trace of the Alquist-Priolo zoned Chino Fault, despite these routes not crossing the potentially active Central Avenue fault.	Incrementally increased due to underground construction proposed across the projected trend of the active Chino fault at the eastern end of tunnel and at the eastern transition station.	Same as Alternative 2.	Incrementally increased due to proposed construction of two of the 66-kV re-routes for this alternative, the Segment 7 and the Segment 8A (both Options 1 and 2) Whittier Narrows 66-kV OH re-routes, across the southward projection of the East Montebello Hills fault Otherwise the same as Alternative 2.
Project structure damage from seismically induced groundshaking and/or ground failure exposing people or structures to hazards (Impact G-5)	New T/Ls throughout the southern California will be exposed to seismic groundshaking; may or may not be located in areas susceptible to ground failure (liquefaction, landslides, unstable slopes).	New T/Ls, and new or expanded substations would be exposed to strong to severe groundshaking, and local areas of low to high liquefaction potential, seismically induced landslides and slope failure.	Same as Alternative 2.	Slightly greater risk of earthquake-induced landslides due to the increased length of the alignment and placement of new switching stations and associated access roads in areas underlain by landslide prone Puente Formation. Approx. number of additional towers placed in landslide-prone areas: Alternative 4A - 15; Alternative 4B - 23;	Incrementally less than Alternative 2 because construction bypasses some towers along hillsides in the landslide-prone Puente Formation, resulting in less potential for earthquake induced landslide damage.	Same as Alternative 2.	Same as Alternative 2.

Table S-3. Summary Comparison of Environmental Issues/Impacts – Geology, Soils, and Paleontology

Environmental Issues / Impacts	Alternative 1 (No Project/Action)	Alternative 2 (SCE's Proposed Project)	Alternative 3 (West Lancaster)	Alternative 4 (Chino Hills)	Alternative 5 (Partial Underground)	Alternative 6 (Max. Helicopter in ANF)	Alternative 7 (66-kV Subtransmission)
				Alts 4C/4C Mod & 4D - 28. Liquefaction hazard is slightly decreased due to the decreased length of alignment crossing potentially liquefiable sediments and avoidance of young alluvial sediments of the western Chino Basin.			
Project structure damage from problematic soils exposing people or structures to hazards (Impact G-6)	Construction of new T/Ls and substations may or may not be in areas of unsuitable soil.	New T/Ls, new substation, and expanded substations are located locally in areas of unsuitable soils.	Same as Alternative 2.	Slightly less potential for damage to Project structures due to unsuitable soils because the shorter length would require fewer towers. Approx. reduction in towers: Alternative 4A – 91; Alternative 4B – 72; Alternative 4C/4C Mod – 51; Alternative 4D – 62.	Same as Alternative 2.	Same as Alternative 2.	Same as Alternative 2.
Transmission line structure damage from landslides, earth flows, or debris slides, during operation (Impact G-7)	Construction of new T/Ls and substations may or may not be in hillside areas with landslides or other types of slope failures.	Approximately 360 new towers would be constructed through 77 miles of hillside and mountain areas with known landslides and unstable slopes.	Same as Alternative 2.	Greater risk of slope instability due to increased length of alignment and placement of new switching stations and associated access roads in areas underlain by landslide-prone Puente Formation. Approx. number of additional towers in landslide-prone areas: Alternative 4A - 15; Alternative 4B - 23; Alts 4C/4C Mod & 4D - 28.	Incrementally less than Alternative 2 because construction bypasses some towers along hillsides in the landslide-prone Puente Formation.	Same as Alternative 2	Same as Alternative 2
Grading and excavation could destroy paleontologic resources (Impact G-8)	Construction of comparably-sized substations and length of T/L would have the same impacts as the Project.	Ground disturbance due to construction of new transmission structures and access and spur roads across approximately 66.4 miles of geologic units with moderate to high paleontologic sensitivity.	Same as Alternative 2.	Increased grading and excavation in geologic unit having high paleontologic sensitivity. Approximate miles of additional roads: Alternatives 4A and 4B – 6.5 miles; Alternatives 4C and 4D – 9.5 miles; Alternative 4C Modified – 2.6 miles. Approximate reduction in towers: Alternative 4A – 91; Alternative 4B - 72; Alternative 4C/4C Mod - 51; Alternative 4D - 62.	Incrementally increased due to the greater ground disturbance required for tunneling and construction of the transition stations in units with moderate to high paleontologic sensitivity.	Same as Alternative 2.	Slightly increased due to the greater ground disturbance required for trenching and excavation for underground 66-kV re-routes in units with moderate paleontologic sensitivity.
Existing structures could be damaged by ground settlement along the tunnel exposing people or structures to hazards (Impact G-9)	Construction of new T/Ls may or may not include underground construction and tunneling.	Would not occur because no tunnels would be constructed.	Same as Alternative 2.	Same as Alternative 2.	Short-term (days) and long-term (years) settlement of the ground surface could occur during construction and operation of the tunnel and shafts (underground portion only).	Same as Alternative 2.	Same as Alternative 2.