

## **8. Alternative 4 (Chino Hills Routes): Impacts and Mitigation Measures**

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The following section describes Geology, Soils, and Paleontology impacts of Alternative 4 (Chino Hills Route Alternatives), as determined by the significance criteria listed in Section 4. Mitigation measures are introduced where necessary in order to reduce significant impacts to less-than-significant levels.

### **8.1 Direct and Indirect Effects Analysis**

The significance criteria used to identify Geology, Soils, Paleontology are introduced in Section 4.1 (Criteria for Determining Impact Significance). Impacts associated with Alternative 4 are presented below under the applicable significance criterion. As described in Section 2.5 (Affected Environment: Alternative 4), this alternative would follow the same route as the proposed Project with the exception that it would diverge from the proposed Project route along Segment 8A at S8A MP 19.2. Therefore, any impacts of the proposed Project that would occur between S8A MP 19.2 and 35.2 (16 miles) through Chino Hills, Chino, and Ontario would not occur under Alternative 4, although impacts associated with Segment 8B of the proposed Project, between the Chino and Mira Loma Substations, would still occur under Alternative 4. Where the proposed route for Alternative 4 diverges from the proposed Project route at S8A MP 19.2, it would turn to the southeast, crossing through part of Orange County, San Bernardino County, and the CHSP. Therefore, Alternative 4 would introduce the potential to result in Geology, Soils, and Paleontology impacts in these areas which would not be affected by the proposed Project.

As described in Section 1.2.4 (Introduction: Alternative 4), this alternative includes five separate routing options: Route A, Route B, Route C, Route C Modified, and Route D. For the purposes of this impact analysis, the routing options for Alternative 4 are discussed in comparison to each other throughout the following section. As described, the alignment of Alternative 4 would be the same as the proposed Project north of S8A MP 19.2; as such, please see Section 6.1 for a summary of geology, soils, and paleontology impacts that could potentially affect resources along this portion of the Alternative 4 route which is identical to the proposed Project route.

#### **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 Alternative 4. No impact would occur.

#### **Known mineral and/or energy resources (Criterion GEO2)**

Impacts associated with Criterion GEO2 for Alternative 4 would be the same as impacts associated with this criterion for the proposed Project. Although this alternative introduces a re-route of part of Segment 8 of the proposed transmission line, as with the equivalent portion of Segment 8 the reroute does not cross any active energy resource sites and therefore the impacts related to Criterion GEO2 would be the same as for the proposed Project, as presented in Section 6.1, and summarized below.

Impact G-1 (Project activities would interfere with access to known energy resources) would be the same as for the proposed Project. Therefore where the portions of Alternative 4 equivalent to proposed Project Segments 7, 11, and 8 would cross the Montebello oil and gas field and where the Segment 8 equivalent

would cross the northern edge of the Brea-Olinda oil and gas field, there is a potential for Project construction activities to interfere with oil field operations.

**Route A.** This impact would be exactly the same for Alternative 4, Route A, as it would for the proposed Project (please see Section 6.1). Impact G-1, as described in Section 6.1, for Alternative 4, Route A, would require implementation of Mitigation Measure G-1 (Coordination with oil field operations) to reduce potential impacts to less than significant (Class II).

**Route B.** The Route B option would be exactly the same as Route A with regards to Impact G-1. Impact G-1, as described in Section 6.1, for Alternative 4, Route B, would require implementation of Mitigation Measure G-1 (Coordination with oil field operations) to reduce potential impacts to less than significant (Class II).

**Route C.** The Route C option would be exactly the same as Route A with regards to Impact G-1. Impact G-1, as described in Section 6.1, for Alternative 4, Route C, would require implementation of Mitigation Measure G-1 (Coordination with oil field operations) to reduce potential impacts to less than significant (Class II).

**Route C Modified.** The Route C Modified option would be exactly the same as Route A with regard to Impact G-1. Impact G-1, as described in Section 3.7.6.1, for Alternative 4, Route C Modified, would require implementation of Mitigation Measure G-1 (Coordination with oil field operations) to reduce potential impacts to less than significant (Class II).

**Route D.** The Route D option would be exactly the same as Route A with regards to Impact G-1. Impact G-1, as described in Section 6.1, for Alternative 4, Route D, would require implementation of Mitigation Measure G-1 (Coordination with oil field operations) to reduce potential impacts to less than significant (Class II).

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

Impacts associated with Criterion GEO3 for Alternative 4 would be similar to impacts associated with this criterion for the proposed Project. The shorter length of all five routes of this alternative compared to the proposed Project would result in incrementally decreased opportunity to cause construction triggered erosion. However the increased length of the Alternative 4 routes through the Puente Formation than the proposed Project (ranging from 6.2 to 12.4 miles versus 5.9 miles for the comparable portion of Segment 8A), results in a slightly increased potential to trigger or accelerate landslides during Project construction. The impacts and their associated mitigation measures that fall under Criterion GEO3 are summarized in the following paragraphs. Please see Section 6.1 (Direct and Indirect Effects Analysis) for a detailed description of these impacts, as they are similar to the proposed Project.

Impact G-2 (Erosion could be triggered or accelerated due to construction activities) would be similar under Alternative 4 as it would be for the proposed Project (please see Section 6.1). The rerouted portion of Alternative 4 is located in an undeveloped area with moderate to steep slopes and soil with severe to very severe erosion potential. Therefore, there is substantial potential for erosion caused by construction of transmission structures, unpaved access roads, all-weather (e.g., paved) switching station access roads, and graded pads for the switching stations. The remaining portion of Alternative 4 is identical to the equivalent portions of Alternative 2 and the potential of erosion triggered or accelerated due to construction activities is similar, although incrementally decreased due to the shorter alignment length as

presented in Section 6.1, and would require implementation of Mitigation Measure H-1a (Implement an Erosion Control Plan and demonstrate compliance with water quality permits). With implementation of this measure, as described in Section 6.1, Impact G-2 of Alternative 4 would be less than significant (Class II).

**Route A.** The total length of Project construction for Route A would be approximately 16 miles shorter than the proposed Project resulting in reduced ground disturbance and erosion. Impact G-2 would require implementation of Mitigation Measure H-1a (Implement an Erosion Control Plan and demonstrate compliance with water quality permits), as described in detail in Section 6.1, for Alternative 4, Route A, to reduce potential impacts to less than significant (Class II).

**Route B.** Erosion impacts of Route B would be incrementally greater than the impacts of Route A due to the longer alignment (3.5 miles longer than Route A). Impact G-2 would require implementation of Mitigation Measure H-1a (Implement an Erosion Control Plan and demonstrate compliance with water quality permits), as described in detail in Section 6.1, for Alternative 4, Route B, to reduce potential impacts to less than significant (Class II).

**Route C.** New and rerouted transmission lines for Route C would include the removal of about 7.0 miles of transmission line/structures resulting in an incremental increase in erosion impacts. Impact G-2 would require implementation of Mitigation Measure H-1a (Implement an Erosion Control Plan and demonstrate compliance with water quality permits), as described in detail in Section 6.1, for Alternative 4, Route C, to reduce potential impacts to less than significant (Class II).

**Route C Modified.** New and rerouted transmission lines for Route C Modified would include construction of approximately 11.6 miles of new and re-routed transmission line and the removal of about 6.8 miles of transmission line/structures, and grading for the new switching station and its associated several mile long permanent all-weather access road resulting in an incremental increase in erosion impacts relative to Route A. Impact G-2 would require implementation of Mitigation Measure H-1a (Implement an Erosion Control Plan and demonstrate compliance with water quality permits), as described in detail in Section 3.7.6.1, for Alternative 4, Route C Modified, to reduce potential impacts to less than significant (Class II).

**Route D.** Route D of Alternative 4 is about 4 miles longer than Route A resulting in incrementally greater construction-related erosion impacts. Impact G-2 would require implementation of Mitigation Measure H-1a (Implement an Erosion Control Plan and demonstrate compliance with water quality permits), as described in detail in Section 6.1, for Alternative 4, Route D, to reduce potential impacts to less than significant (Class II).

Impact G-3 (Excavation and grading during construction activities could cause slope instability or trigger landslides) would be similar for Alternative 4 as it would for the proposed Project (see Section 6.1). All route options of Alternative 4 are located in hillside areas with mapped landslides and substantial potential for slope failure similar to the equivalent portion of Alternative 2 that traverses the Puente Formation about two to three miles north. The Alternative 4 routes would traverse a slightly greater length of landslide prone Puente Formation than the proposed Project (ranging from 6.2 to 12.4 miles versus 5.9 miles for the comparable portion of Segment 8A), resulting in a slightly increased potential for impacts from landslides and unstable slopes along Alternative 4 compared to the proposed Project (Alternative 2). The remaining portion of Alternative 4 is identical to Alternative 2 and the potential of slope failure or triggered landslides due to construction activities is the same as presented in Section 6.1.

**Route A.** Route A would be only 0.3 miles longer than the proposed Project within hillside areas with slope stability issues resulting in slightly greater potential to cause slope instability or trigger landslides. Additionally the Route A alignment would require the construction of a several mile long permanent all-weather access road along ridgelines and in canyons and a new switch yard in areas underlain by the landslide prone Puente Formation which further increases the potential for construction triggered slope instability. Impact G-3 of Alternative 4, Route A, would require implementation of Mitigation Measure G-3 (Conduct geological surveys for landslides and protect against slope instability), as described in Section 6.1, to reduce impacts to less than significant (Class II).

**Route B.** Construction-triggered slope instability impacts of Route B would be incrementally greater than Route A due to the longer alignment (3.5 miles longer than Route A). Impact G-3 of Alternative 4, Route B, would require implementation of Mitigation Measure G-3 (Conduct geological surveys for landslides and protect against slope instability), as described in Section 6.1, to reduce impacts to less than significant (Class II).

**Route C.** The total length of Route C would be approximately 6 miles longer than Route A resulting in an incremental increase in potential to cause construction-triggered slope instability. Removal of about 7.0 miles of transmission line/structures with nominal ground disturbance and site restoration is not anticipated to result in an increase in slope instability or trigger landslides. Impact G-3 of Alternative 4, Route C, would require implementation of Mitigation Measure G-3 (Conduct geological surveys for landslides and protect against slope instability), as described in Section 6.1, to reduce impacts to less than significant (Class II).

**Route C Modified.** The total length of the Route C Modified transmission line would be approximately 5.5 miles longer than Route A resulting in an incremental increase in potential to cause construction-triggered slope instability. Additionally the Route C Modified alignment would require the construction of a switching station on a hill/ridgetop and an associated several mile long permanent all-weather access road along ridgelines and in canyons underlain by the landslide prone Puente Formation which further increases the potential for construction triggered slope instability. The removal of about 6.8 miles of transmission line/structures with nominal ground disturbance and site restoration is not anticipated to result in an increase in slope instability or trigger landslides. Impact G-3 of Alternative 4, Route C Modified, would require implementation of Mitigation Measure G-3 (Conduct geological surveys for landslides and protect against slope instability), as described in Section 3.7.6.1, to reduce impacts to less than significant (Class II).

**Route D.** Route D of Alternative 4 is about 4 miles longer than Route A resulting in incrementally greater potential for construction-related slope instability impacts. Impact G-3 of Alternative 4, Route D, would require implementation of Mitigation Measure G-3 (Conduct geological surveys for landslides and protect against slope instability), as described in Section 6.1, to reduce impacts to less than significant (Class II).

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

Impacts associated with Criterion GEO4 for Alternative 4 would be the same as impacts associated with this criterion for the proposed Project. Although this alternative introduces a new shorter route for the portion of the Project alignment, eliminating the portion of the alignment equivalent to the end of Segment

8, it does shift the crossing of the Chino fault for two of Alternative 4 route options (Routes B and D) onto the mapped active trace of the fault and into its associated Alquist-Priolo zone. This alternative does avoid both the Chino and Central Ave fault crossings for Routes A, C, and C Modified, and the Chino fault crossing for Routes B and D. Therefore the impacts related to Criterion GEO4 would be similar as for the proposed Project for Routes B and D, as presented in Section 6.1, even though there is one fewer fault crossing (the potentially active Central Avenue Fault) due to the fact that these routes are more impacted by the crossing of the Chino Fault, as described below and in Section 2 above. Alternative 4 Routes A, C, and C Modified have a decreased potential for fault rupture damage due to the two fewer fault crossings. The impact and associated mitigation measures that fall under Criterion GEO4 are summarized in the following paragraph.

Impact G-4 (Project structures could be damaged by surface fault rupture at crossings of active faults exposing people or structures to hazards) would generally be the same for Alternative 4 as it would for the proposed Project (see Section 6.1). The rerouted portion of Alternative 4, Routes A, C, and C Modified do not cross any active faults and therefore there is no potential for fault rupture along these reroutes. However, both the eastern ends of Routes B and D and their associated new switching station would cross and are located on the Alquist-Priolo zoned Chino Fault, resulting in a potential for damage to project facilities from surface fault rupture. The remaining portion of Alternative 4 (west of S8A-19.2) is identical to Alternative 2 and the potential of surface fault rupture is the same as presented in Section 6.1, with the exception that all of the Alternative 4 routes do not cross the Central Ave fault.

**Route A.** This impact would be exactly the same for Alternative 4, Route A, as it would for the proposed Project (please see Section 6.1), with the exception of having one less fault crossings (does not cross the northward trend of the active Chino fault nor the potentially active Central Ave fault). This would result in a minor decrease in the potential for damage to project facilities from fault rupture. Therefore the portions of Alternative 4, Route A, equivalent to Segments 5, 6, 7, 11, and 8A where it crosses 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), and Whittier (Segment 8A) faults would require implementation of Mitigation Measure G-4 (Avoid placement of Project structures within active fault zones), described in detail in Section 6.1, to reduce potential impacts to less than significant (Class II).

**Route B.** The Route B option would be similar to Route A with regards to Impact G-4, with the exception that the eastern end of the Route B alignment and its associated switching station being located across and on the Alquist-Priolo zoned portion of the Chino fault. Although this route would not cross the potentially active Central Avenue Fault, Route B would result in a minor to slight increase for damage to project facilities due to placement of the switching station on the trace of the Alquist-Priolo zoned portion of the Chino Fault. Therefore, in addition to the portions of Alternative 4, Route B, equivalent to Segments 5, 6, 7, 11, and 8A where it crosses 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), and Whittier (Segment 8A) faults, the rerouted portion of Alternative 4, Route B where it crosses and lies on the Chino fault would require implementation of Mitigation Measure G-4 (Avoid placement of Project structures within active fault zones), described in detail in Section 6.1, to reduce potential impacts to less than significant (Class II).

**Route C.** The Route C option would be exactly the same as Route A with regards to Impact G-4. Therefore the portions of Alternative 4, Route C, equivalent to Segments 5, 6, 7, 11, and 8A where it crosses 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), and Whittier (Segment 8A) faults would require implementation of Mitigation Measure G-4 (Avoid placement of Project structures within active fault zones), described in detail in Section 6.1, to reduce potential impacts to less than significant (Class II).

**Route C Modified.** The Route C Modified option would be exactly the same as Route A with regards to Impact G-4. Therefore the portions of Alternative 4, Route C Modified, equivalent to 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), and Whittier (Segment 8A) faults, would require implementation of Mitigation Measure G-4 (Avoid placement of Project structures within active fault zones), described in detail in Section 3.7.6.1, to reduce potential impacts to less than significant (Class II).

**Route D.** The Route D option would be similar to Route A with regards to Impact G-4, with the exception that eastern end of the Route D alignment and its associated switching station across and on the Alquist-Priolo zoned portion of the Chino fault. Despite this route not crossing the potentially active Central Avenue Fault, this results in a minor to slight increase for damage to project facilities due to the placement of the Route D switching station on the trace of the Alquist-Priolo zoned portion of the Chino Fault. Therefore in addition to the portions of Alternative 4, Route D, equivalent to Segments 5, 6, 7, 11, and 8A where it crosses 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), and Whittier (Segment 8A) faults, the rerouted portion of Alternative 4, Route D where it crosses and lies on the Alquist-Priolo zoned Chino fault would require implementation of Mitigation Measure G-4 (Avoid placement of Project structures within active fault zones), described in detail in Section 6.1, to reduce potential impacts to less than significant (Class II).

### **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)**

Impacts associated with Criterion GEO5 for Alternative 4 would be the same as impacts associated with this criterion for the proposed Project. The shorter length of all four routes of this alternative compared to the proposed Project would only result in incrementally decreased opportunity for damage to Project structures from seismically induced groundshaking and ground failures. Therefore the impacts related to Criterion GEO5 would be the same as for the proposed Project, as presented in Section 6.1, and summarized below.

Impact G-5 (Project structures could be damaged by seismically induced groundshaking and/or ground failure exposing people or structures to hazards) would be the same under Alternative 4 as it would for the proposed Project (please see Section 6.1). All the route options under Alternative 4 traverse areas with PGAs ranging from 0.8 to 1.2g, the same as the proposed Project; therefore earthquake induced moderate to strong groundshaking equivalent to that along the corresponding portion of 8A should be expected along these alignments. The potential for landslides and unstable slopes along Alternative 4 are similar, but incrementally increased due to the increased length with the landslide prone Puente Formation, to the

eastern Puente Hills portion of Segment 8A of the proposed Project (see Section 6.1). The potential for liquefaction-related phenomena are the same along Alternative 4 as for the proposed Project. These impacts could cause damage to Project structures that could result in power outages, damage to nearby roads of structures, and injury or death to nearby people, a significant impact.

**Route A.** This impact would be the same for Alternative 4, Route A, regarding groundshaking as it would for the proposed Project (please see Section 6.1). This impact would require implementation of Mitigation Measure G-5a (Reduce effects of groundshaking). However, the increased length (approximately 0.3 mile longer) of transmission line within hillside areas with slope stability issues results in a slightly greater potential for earthquake induced slope failure and would require implementation of Mitigation Measure G-3 (Conduct geological surveys for landslides and protect against slope instability) along portions of Alternative 4, Route A, equivalent to Segments 5, 6, 11, and 8A where they are located along hillsides or ridgelines in geologic units of moderate to steep slopes that are susceptible to slope failures. The decreased length of transmission line through alluvial sediments of the western Chino Basin results in a slightly decreased potential for liquefaction, however this impact would still require implementation of Mitigation Measure G-5b (Conduct geotechnical investigations for liquefaction) along the portions of Alternative 4, Route A, equivalent to the portions of Segments 5, 7, 11, and 8A that cross young alluvial deposits in the Leona Valley, San Gabriel Valley, and active river washes and streams. Implementation of these measures, as described in Section 6.1, would reduce Impact G-5 of Alternative 4, Route A, to less than significant (Class II).

**Route B.** The Route B option would be exactly the same as Route A with regards to Impact G-5, except the potential for earthquake induced slope failures along Route B would be incrementally greater than Route A due to the 3.5 mile longer alignment. This impact would require implementation of Mitigation Measure G-5a (Reduce effects of groundshaking); and Mitigation Measure G-3 (Conduct geological surveys for landslides and protect against slope instability) along portions of Alternative 4, Route B, equivalent to Segments 5, 6, 11, and 8A where they are located along hillsides or ridgelines in geologic units of moderate to steep slopes that are susceptible to slope failures. The decreased length of transmission line through alluvial sediments of the western Chino Basin results in a slightly decreased potential for liquefaction, however this impact would still require implementation of Mitigation Measure G-5b (Conduct geotechnical investigations for liquefaction) along the portions of Alternative 4, Route B, equivalent to the portions of Segments 5, 7, 11, and 8A that cross young alluvial deposits in the Leona Valley, San Gabriel Valley, and active river washes and streams. Implementation of these measures, as described in Section 6.1, would reduce Impact G-5 of Alternative 4, Route B, to less than significant (Class II).

**Route C.** The Route C option would be exactly the same as Route A with regards to Impact G-5, except Route C would consist of a new transmission line alignment and reroutes that total approximately 6 miles more of transmission line than Route A, resulting in an incremental increase in potential for earthquake induced slope failures. This impact would require implementation of Mitigation Measure G-5a (Reduce effects of groundshaking); and Mitigation Measure G-3 (Conduct geological surveys for landslides and protect against slope instability) along portions of Alternative 4, Route B, equivalent to Segments 5, 6, 11, and 8A where they are located along hillsides or ridgelines in geologic units of moderate to steep slopes that are susceptible to slope failures. The decreased length of transmission line through alluvial sediments of the western Chino Basin results in a slightly decreased potential for liquefaction, however this impact would still require

implementation of Mitigation Measure G-5b (Conduct geotechnical investigations for liquefaction) along the portions of Alternative 4, Route C, equivalent to the portions of Segments 5, 7, 11, and 8A that cross young alluvial deposits in the Leona Valley, San Gabriel Valley, and active river washes and streams;. Implementation of these measures, as described in Section 6.1, would reduce Impact G-5 of Alternative 4, Route A, to less than significant (Class II).

**Route C Modified.** The Route C Modified option would be exactly the same as Route A with regards to Impact G-5, except Route C Modified would consist of a new transmission line alignment and reroutes that total approximately 5.4 miles more of transmission line than Route A, resulting in an incremental increase in potential for earthquake induced slope failures. This impact would require implementation of Mitigation Measure G-5a (Reduce effects of groundshaking); and Mitigation Measure G-3 (Conduct geological surveys for landslides and protect against slope instability) along portions of Alternative 4, Route B, equivalent to Segments 5, 6, 11, and 8A where they are located along hillsides or ridgelines in geologic units of moderate to steep slopes that are susceptible to slope failures. The decreased length of transmission line through alluvial sediments of the western Chino Basin results in a slightly decreased potential for liquefaction, however this impact would still require implementation of Mitigation Measure G-5b (Conduct geotechnical investigations for liquefaction) along the portions of Alternative 4, Route C Modified, equivalent to the portions of Segments 5, 7, 11, and 8A that cross young alluvial deposits in the Leona Valley, San Gabriel Valley, and active river washes and streams. Implementation of these measures, as described in Section 3.7.6.1, would reduce Impact G-5 of Alternative 4, Route A, to less than significant (Class II).

**Route D.** The Route D option would be exactly the same as Route A with regards to Impact G-5, except Route D of Alternative 4 is about 4 miles longer than Route A resulting in an incrementally increased potential for earthquake induced slope failures. This impact would require implementation of Mitigation Measure G-5a (Reduce effects of groundshaking); and Mitigation Measure G-3 (Conduct geological surveys for landslides and protect against slope instability) along portions of Alternative 4, Route B, equivalent to Segments 5, 6, 11, and 8A where they are located along hillsides or ridgelines in geologic units of moderate to steep slopes that are susceptible to slope failures. The decreased length of transmission line through alluvial sediments of the western Chino Basin results in a slightly decreased potential for liquefaction, however this impact would still require implementation of Mitigation Measure G-5b (Conduct geotechnical investigations for liquefaction) along the portions of Alternative 4, Route D, equivalent to the portions of Segments 5, 7, 11, and 8A that cross young alluvial deposits in the Leona Valley, San Gabriel Valley, and active river washes and streams. Implementation of these measures, as described in Section 6.1, would reduce Impact G-5 of Alternative 4, Route D, to less than significant (Class II).

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

Impacts associated with Criterion GEO7 for Alternative 4 would be similar to impacts associated with this criterion for the proposed Project. The five route options of Alternative 4 traverse hillside areas of the eastern Puente Hills composed of slightly consolidated Tertiary age marine sedimentary rocks prone to landslides and slope failure. Numerous mapped and suspected landslides and locally unstable slopes occur in the area of Alternative 4, with slope conditions similar to the comparable portion of the proposed Project.

Impact G-7 (Transmission line structures could be damaged by landslides, earth flow, or debris flows, during operation) would be similar for Alternative 4 as it would for the proposed Project (see Section 6.1). Alternative 4 is underlain by the same geologic units and is located in identical terrain as the



proposed Project, which includes the eastern Puente Hills where there is substantial potential for slope failure. The Alternative 4 transmission line routes would traverse a slightly greater length of landslide prone Puente Formation (ranging from 0.3 to 3.3 miles longer) than the equivalent portion of the proposed Project (Segment 8A), and each route would also include a new permanent access road and switching station in hillside areas also underlain by the landslide prone Puente Formation resulting in a minor increase in potential for impacts to project facilities and structures due to slope failures. The remaining portion of Alternative 4 is identical to Alternative 2 and the potential for failure of existing unstable slope or landslides during operation of the Project is the same as presented in Section 6.1.

**Route A.** Route A would be approximately 0.3 miles longer than the proposed Project and would also include new permanent access roads and a new switching station within the hillside areas underlain by the landslide prone Puente Formation resulting in slightly greater potential of slope instability or landslides to impact project facilities and transmission structures during the life of the Project. Impact G-7 of Alternative 4, Route A, would require implementation of Mitigation Measure G-3 (Conduct geological surveys for landslides and protect against slope instability), as described in Section 6.1, to reduce the impact to a level of less than significant (Class II).

**Route B.** Future slope instability or landslide impacts to transmission line structures of Route B would be incrementally greater than Route A due to the 3.5 mile longer alignment. Impact G-7 of Alternative 4, Route B, would require implementation of Mitigation Measure G-3 (Conduct geological surveys for landslides and protect against slope instability), as described in Section 6.1, to reduce the impact to a level of less than significant (Class II).

**Route C.** Route C would consist of a new transmission line alignment and reroutes that total approximately 6 miles more of transmission line alignment than Route A and removal of about 7.0 miles of transmission line/structures resulting in a very small incremental increase in potential for future impacts from slope failure on transmission line structures. Impact G-7 of Alternative 4, Route C, would require implementation of Mitigation Measure G-3 (Conduct geological surveys for landslides and protect against slope instability), as described in Section 6.1, to reduce the impact to a level of less than significant (Class II).

**Route C Modified.** Route C Modified would consist of a new transmission line alignment and reroutes that total approximately 5.4 miles more of transmission line alignment than Route A and removal of about 6.8 miles of transmission line/structures resulting in a very small incremental increase in potential for future impacts from slope failure on transmission line structures. Impact G-7 of Alternative 4, Route C, would require implementation of Mitigation Measure G-3 (Conduct geological surveys for landslides and protect against slope instability), as described in Section 3.7.6.1, to reduce the impact to a level of less than significant (Class II).

**Route D.** Route D of Alternative 4 is about 4 miles longer than Route A resulting in incrementally greater potential for future landslides and slope failure impacts to transmission line structures. Impact G-7 of Alternative 4, Route A, would require implementation of Mitigation Measure G-3 (Conduct geological surveys for landslides and protect against slope instability), as described in Section 6.1, to reduce the impact to a level of less than significant (Class II).

## **Destruction of unique paleontological resources (Criterion GEO8)**

Impacts associated with Criterion GEO8 for Alternative 4 would be similar to impacts associated with this criterion for the proposed Project. The shorter length of all four routes of this alternative compared to the

proposed Project would result in incrementally decreased opportunity to encounter and destroy paleontologic resources as a whole. However, each of the Alternative 4 route options is within the paleontologic-rich Puente Formation (high sensitivity) and is longer than the comparable portion of the proposed Project within these same formations (0.3 to 6.5 miles longer). Alternative 4 would eliminate approximately 3.6 to 9.2 miles of paleontologically sensitive Puente Formation and alluvium along Segment 8A, although 6.8 miles of paleontologically sensitive alluvium along Segment 8B would still be affected.

**Route A.** Although Route A within the highly sensitive Puente Formation is about 0.3 miles longer than the equivalent portion of Segment 8A (S8A MP 19.2 to 25.1), Route A would overall be approximately 16 miles shorter (primarily in paleontologically sensitive units) than the proposed Project. This would result in reduced ground disturbance and potential to encounter paleontologic resources. Although construction could still disturb unique paleontologic resources, as with the proposed Project, application of SCE's planned APMs would reduce the potential for destruction of these resources to less than significant, resulting in no change in the potential for Impact G-8 (Grading and excavation could destroy paleontologic resources) to occur. With implementation of these APMs, as described in Section 6.1, Impact G-8 of Alternative 4, Route A, would be less than significant (Class III).

**Route B.** Paleontologic impacts of Route B would be incrementally greater than the impacts of Route A due to the 3.5 mile longer alignment within the paleontologically sensitive Puente Formation. Although construction could still disturb unique paleontologic resources, as with the proposed Project, application of SCE's planned APMs would reduce the potential for destruction of these resources to less than significant, resulting in no change in the potential for Impact G-8 (Grading and excavation could destroy paleontologic resources) to occur. With implementation of these APMs, as described in Section 6.1, Impact G-8 of Alternative 4, Route B, would be less than significant (Class III).

**Route C.** The new 500-kV transmission line alignment and the 500-kV and 220-kV reroute for Route C would be about 6 miles longer than Route A resulting in an incremental increase in potential for paleontologic impacts. The removal of about 7.0 miles of transmission line/structures would not impact paleontologic resources. Although construction could still disturb unique paleontologic resources, as with the proposed Project, application of SCE's planned APMs would reduce the potential for destruction of these resources to less than significant, resulting in no change in the potential for Impact G-8 (Grading and excavation could destroy paleontologic resources) to occur. With implementation of these APMs, as described in Section 6.1, Impact G-8 of Alternative 4, Route C, would be less than significant (Class III).

**Route C Modified.** The new 500-kV transmission line alignment and the 500-kV and 220-kV reroute for Route C Modified would be approximately 5.4 miles longer than Route A and would require grading for a several mile long all-weather (e.g., paved) access road to the switching station through the highly sensitive Puente Formation, which results in an incremental increase in potential for paleontologic impacts. The removal of about 6.8 miles of transmission line/structures would not impact paleontologic resources. Although construction could still disturb unique paleontologic resources, as with the proposed Project, application of SCE's planned APMs would reduce the potential for destruction of these resources to less than significant, resulting in no change in the potential for Impact G-8 (Grading and excavation could destroy paleontologic resources) to occur.

With implementation of these APMs, as described in Section 3.7.6.1, Impact G-8 of Alternative 4, Route C, would be less than significant (Class III).

**Route D.** Route D of Alternative 4 is about 4 miles longer than Route A resulting in incrementally greater potential for paleontologic impacts. Although construction could still disturb unique paleontologic resources, as with the proposed Project, application of SCE's planned APMs would reduce the potential for destruction of these resources to less than significant, resulting in no change in the potential for Impact G-8 (Grading and excavation could destroy paleontologic resources) to occur. With implementation of these APMs, as described in Section 6.1, Impact G-8 of Alternative 4, Route A, would be less than significant (Class III).

## 8.2 Cumulative Effects Analysis

This section addresses potential cumulative effects that would occur as a result of implementation of Alternative 4. The Alternative 4 routes deviate from the proposed Project beginning about two miles east of State Route 57 (approximately S8A MP 19.2), where the existing Mira Loma-Walnut/Olinda 220-kV double-circuit T/L and the existing un-energized Mesa-Chino T/L (both in the same corridor as that of Segment 8A) separate from one another. The remainder of this alternative route would be identical to that of the proposed Project and would, therefore, result in substantially similar or identical impacts as the proposed Project. The rerouted portion of the Alternative 4 routes generally parallel the proposed Project route for approximately 4 to 6 miles, at a distance of approximately 3 miles south of the proposed Project route. As a result, this alternative traverses the same or similar land uses as the portion of the proposed Project route it is proposed to replace, would require the same types of construction activities to build, and would result in the same operational capacity as the proposed Project.

Based on the substantial similarity of the Alternative 4 route to the proposed Project, this alternative's contribution to cumulative impacts would be similar or identical to that of the proposed Project. However, when compared to the proposed Project, each alternative's contribution to certain cumulative impacts may be incrementally increased or decreased as a result of the rerouted portion of the alternative. Such increases or decreases would result from:

- The nature of the alternative (e.g., underground or overhead);
- The location of the alternative with respect to land uses and specific resources; or
- The location of past, present, or reasonably foreseeable projects with which impacts of the alternative route would have the potential to combine (i.e., the other projects are located such that their impacts would or would not combine with impacts of the alternative, as compared to the proposed Project).

### 8.2.1 Geographic Extent

The geographic extent for the analysis of cumulative impacts related to geology, soils, and paleontology is limited to the Project site and the immediate vicinity surrounding Project substations, laydown areas, and the transmission line ROWs occupied by the proposed alignment. These geographic limits are appropriate to consider the potential cumulative impacts as the geologic materials and terrain at the Project site and directly adjacent to the Project site are the most significant factors to evaluate the potential for geologic hazards, unsuitable soil and paleontologic resources at a project site. Impacts would have the potential to occur during construction and operation and would be limited to the areas where concurrent construction is occurring. The geographic extent for Alternative 4 is identical to the proposed Project, as presented in Section 6.2.1.

### **8.2.2 Existing Cumulative Conditions**

The existing cumulative conditions of Alternative 4 are identical to the proposed Project as discussed in Section 6.2.2.

### **8.2.3 Reasonably Foreseeable Future Projects and Changes**

Reasonably foreseeable future projects and changes to the cumulative scenario for Alternative 4 would be exactly the same as Alternative 2, described in Section 6.2.3.

### **8.2.4 Cumulative Impact Analysis**

As discussed for the proposed Project in Section 6.2.4, Impacts G-1 through G-3 of Alternative 4 would not have the potential to combine with impacts of other past, present and reasonably foreseeable projects for the same reasons discussed in Section 6.2.4. Impacts G-4 through G-8 for Alternative 4, Routes A through D would combine but not be cumulatively significant (Class III) with impacts of other past, present and reasonably foreseeable projects for the same reasons discussed in Section 6.2.4

### **8.2.5 Mitigation to Reduce the Project's Contribution to Significant Cumulative Effects**

Mitigation measures introduced for Alternative 2 in Section 6.1 (Direct and Indirect Effects Analysis) would help to reduce Alternative 4's incremental contribution to cumulative impacts. However, there are no impacts or significant cumulative effects of Alternative 4, Routes A through D, related to Geology, Soils, and Paleontology and no additional mitigation is required.