13. Summary of Mitigation Measures and Monitoring Requirements

The mitigation measures introduced in Sections 6 through 11 of this Specialist Report for Geology, Soils, and Paleontology are presented below in Table 13-1 (Mitigation Monitoring Program – Geology, Soils, and Paleontology), which provides a summary of how each mitigation measure should be implemented and evaluated for effectiveness.

Table 13-1. Mitigation Monitoring Program – Geology, Soils, and Paleontology

Mitigation Measure	Location	Monitoring Requirement	Determination of Effectiveness	Timing of Action
Impact G-1: Project activities could interfere with access to known energy resources				
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.	Segment 7, southern portion of Segment 11, and Segment 8A	• SCE and its contractors shall coordinate construction activities across and along necessary oil field access roads. • SCE shall submit a plan to the CPUC and FS documenting compliance 30 days prior to construction.	Minimize interference with oil field operations.	Prior to, during, and after construction.
Impact G -2: Erosion could be triggered or accelerated due to construction activities				
H-1a: Implement an Erosion Control Plan and demonstrate compliance with water quality permits. SCE shall develop and submit to the CPUC and F S 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	Entire Project Area	• SCE shall submit an Erosion Control Plan and Sediment Transport Plan, including the BMPs contained in this mitigation measure, to the CPUC and FS for review and approval. This erosion control plan will be included in the Project SWPPP. • The applicant shall submit to the CPUC and FS evidence of all required permits. • CPUC and/or FS will monitor compliance during construction.	• BMPs included in the SWPPP are applied, as verified by the EM. • Avoid degradation of surface water quality.	Thirty (30) days prior to and during construction.

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Mitigation Measure	Location	Monitoring Requirement	Determination of Effectiveness	Timing of Action
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.				
Impact G-3: Excavation and grading during construction activities could cause slope instability or trigger landslides				
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	Segments 5, 6, 11, and 8A (specifically where the segments cross moderate to steep hill and mountain terrain)	• Thirty (30) days prior to construction, SCE shall submit a geologic/geotechnical report to the CPUC and FS for review and approval. • CPUC and/or FS will monitor compliance at construction areas.	Project construction activities do not cause slope instabilities, as verified by the EM.	Prior to and during construction.

Table 13-1. Mitigation Monitoring Program – Geology, Soils, and Paleontology

Mitigation Measure	Location	Monitoring Requirement	Determination of Effectiveness	Timing of Action
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.				
Impact G-4: Project structures could be damaged by surface fault rupture at crossings of active faults exposing people or structures to hazards				
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.	Segments 5, 6, 7, 11, and 8A (specifically at, within, and adjacent to potential fault crossings)	• Sixty days prior to construction, SCE shall submit a fault evaluation study to the CPUC and FS for review and approval. • CPUC and/or FS will verify tower placement and monitor for compliance.	Project components at fault crossings are not damaged by surface fault ruptures.	Prior to, during, and after construction.
Impact G-5: Project structures could be damaged by seismically induced groundshaking and/or ground failure exposing people or structures to hazards				
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.	Segments 4, 5, 6, 7, 9, and 11	• Prior to construction, SCE shall submit a geologic/geotechnical report, including site-specific seismic analyses and specific requirements to mitigate damage to Project components from seismic activity, to the CPUC for review and approval. • CPUC /FS will monitor compliance during construction.	• Seismic requirements specified in the geologic/geotechnical report are applied, as verified by the EM. • Seismic activity, such as groundshaking, does not damage Project components.	Prior to, during, and after construction.
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	Portions of Segments 5, 7, 11, 8A, 8B, and 8C underlain by young alluvium	• Sixty (60) days prior to construction, SCE shall submit a geologic/geotechnical report, providing engineering design and construction measures to minimize impacts to the Project from liquefaction, to the CPUC and FS for review	• Engineering design and construction measures recommended in the geologic/ geotechnical report are applied, as verified by the EM. • Liquefaction does not damage Project components.	Prior to, during, and after construction.

Table 13-1. Mitigation Monitoring Program – Geology, Soils, and Paleontology

Mitigation Measure	Location	Monitoring Requirement	Determination of Effectiveness	Timing of Action
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 F S for review at least 60 days before final Project design.		and approval. • CPUC and/or FS will monitor compliance during construction.		
G-3: Conduct geological surveys for landslides and protect against slope instability. (see Impact G-3)	Segments 5, 6, 11, and 8A (specifically where the segments cross moderate to steep hill and mountain terrain)	• Thirty (30) days prior to construction, SCE shall submit a geologic/geotechnical report to the CPUC and FS for review and approval. • CPUC and/or FS will monitor compliance at construction areas.	Project construction activities do not cause slope instabilities, as verified by the EM.	Prior to and during construction
Impact G-6: Project structures could be damaged by problematic soils exposing people or structures to hazards				
G-6: Conduct geotechnical studies to assess soil characteristics and aid in appropriate foundation design. The design-level geotechnical studies to be performed by SCEshall 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 and 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.	Entire Project	• Sixty (60) days prior to construction, SCE shall submit a geologic/geotechnical report to the CPUC and FS for review and approval, including identification of potentially detrimental soil chemicals along the Project alignment and design measures to protect against corrosion and ensure stable foundations. • CPUC and/or FS will monitor compliance during construction.	• Engineering design measures recommended in the geologic/ geotechnical report are applied, as verified by the EM. • Corrosive, expansive, or collapsible soils do not damage Project components.	Prior to, during, and after construction.
Impact G-7: Transmission line structures could be damaged by landslides, earth flows, or debris slides, during operation				
G-3: Conduct geological surveys for landslides and protect against slope instability. (see Impact G-3)	-	-	-	-

Table 13-1. Mitigation Monitoring Program – Geology, Soils, and Paleontology

Mitigation Measure	Location	Monitoring Requirement	Determination of Effectiveness	Timing of Action
Impact G-9: Existing structures could be damaged by ground settlement along the tunnel exposing people or structures to hazards				
G-9: Conduct geotechnical analysis of settlement potential during design and implement a Subsidence Monitoring Program during construction to protect against ground settlement (Alt 5 Only). The potential for ground subsidence to occur during tunneling should be identified during design, and will identify Project-specific trigger levels that would require corrective action should subsidence occur. The settlement analysis would evaluate conditions along the tunnel alignment and at and adjacent to the proposed access shafts. Development and implementation of a Subsidence Monitoring Program is standard practice during construction of large diameter tunnels and access shafts in urban areas. As determined to be necessary, SCE or the tunnel contractor shall implement a subsidence monitoring program during shaft excavation and tunneling to detect subsidence, including measurements of groundwater levels, surface and subsurface settlement, ground movement and displacement, and movement in existing infrastructure as needed. SCE or the contractor will implement corrective actions, such as additional advance grouting or increased tunnel support, if measured displacement reaches the specified trigger levels. In addition, the Project specifications will require that the contractor conduct the tunneling process under pressure at all times to prevent soil loss and the development of narrow chimneys that may migrate to the surface. The results of the geotechnical analysis of settlement, Subsidence Monitoring Plan, and the relevant construction specifications shall be provided to the CPUC for review and approval at least 60 days prior to the start of construction (shaft excavation).	Along Segment 8A for Alternative 5.	• Sixty (60) days prior to construction, SCE shall submit the settlement analysis, the Subsidence Monitoring Program, and relevant construction specifications to the CPUC for review and approval. • CPUC and/or FS will monitor compliance during construction.	Avoid damage to existing structures.	Prior to and during construction.