D.21 Electrical Interference and Safety

This section describes certain effects that are unique to public safety in the vicinity of electrical transmission, including electrical interference and hazards. Please see EIS Section B.5 for information on electric and magnetic fields (EMF). The following discussions address existing environmental conditions in the affected area, identify and analyze environmental impacts, and recommend measures to reduce or avoid adverse impacts anticipated from project construction and operation. In addition, existing laws and regulations relevant to electrical interference and safety are described. In some cases, compliance with these existing laws and regulations would serve to reduce or avoid certain impacts that might otherwise occur with the implementation of the project. Section D.21.1 presents the affected environment for Electrical Interference and Safety. Relevant regulations and standards are summarized in Section D.21.2. Sections D.21.3 through D.21.5 describe the impacts of the Proposed Project and the alternatives. Section D.21.6 presents the mitigation measures and mitigation monitoring requirements, and D.21.7 lists references cited.

D.21.1 Environmental Setting / Affected Environment

This analysis is not presented by segment, as is done for the other resources, because the impact is more general and applies to the entire Proposed Project route.

Electrical Hazards and Interference

Corona, gap discharges, and audible noise from transmission lines consist of high frequency energy; however, they are transmitted at a lower power level than radio and television broadcasts. Therefore, these transmissions attenuate within a short distance from the transmission line. As such, the affected environment would be along the entire length of the transmission line, but only for a narrow width of several hundred feet on each side of the transmission line ROW. Audible noise from transmission lines is addressed in Section D.13 Noise, and is not discussed further in this section.

Radio/Television/Communication/Electronic Equipment Interference

Corona discharges form at the surface of a transmission line conductor when the electric field intensity on the conductor surface exceeds the breakdown strength of air. The breakdown of air generates light, audible noise, radio noise, ozone, conductor vibration, and causes a dissipation of energy (EPRI, 1982). The Institute of Electrical and Electronic Engineers (IEEE) has published a design guide (IEEE Radio Noise Subcommittee, 1971) that is used to limit conductor surface gradients so as to minimize corona levels which would cause electronic interference.

Gap discharges occur when an arc forms across a gap in loose or worn line hardware, and can also be a source of high frequency energy. It is estimated that over 90 percent of radio and television interference problems for electric transmission lines are due to gap discharges. Line hardware is designed to be problem-free, but wind motion, corrosion, and other factors can create a gap discharge condition. When identified, gap discharges can be located and remedied by utilities by tightening loose fittings or replacing worn hardware.

Electric fields from power lines do not typically pose interference problems for electronic equipment in businesses since the equipment is shielded by buildings and walls. However, magnetic fields can penetrate buildings and walls, thereby interacting with electronic equipment. Depending upon the sensitivity of equipment, the magnetic fields have been found to interfere with electric equipment operation. Review of this phenomenon in regard to the sensitivity of electrical equipment identifies a number of thresholds for magnetic field interference. Interference with cathode ray tube (CRT) type televisions or computer monitors can be detected at magnetic field levels of 10 mG and above, while large screen or high-resolution CRT monitors can be susceptible to interference at levels as low as 5 mG. Other specialized equipment, such as medical equipment or testing equipment can be sensitive at levels below 5 mG. Equipment that may be susceptible to very low magnetic field strengths is typically installed in specialized and controlled environments, since even building wiring, lights, and other equipment can generate magnetic fields of 5 mG or higher.

The most common electronic equipment that can be susceptible to magnetic field interference is older CRT televisions or computer monitors. Magnetic field interference results in disturbances to the image displayed on the monitor, often described as screen distortion, "jitter," or other visual defects. In most cases it is annoying, and at its worst, it can prevent use of the monitor. This type of interference is a recognized problem in the video monitor industry. As a result, there are manufacturers who specialize in monitor interference solutions and shielding equipment. Possible solutions to this problem include: relocation of the monitor, use of magnetic shield enclosures, software programs, and replacement of CRT monitors with current technology displays that are not susceptible to magnetic field interference.

Induced Currents and Shock Hazards

Power line fields can induce voltages and currents on conductive objects, such as metal roofs or buildings, metal fences, and vehicles. Transmission lines are designed to limit the short circuit current, from conductive items beneath the line, to a safe level (less than 5 milliampere). When a person or animal comes in contact with a conductive object, a perceptible current or small electric shock may occur. These small electric shocks cause no physiological harm; however, they may present a nuisance.

Cardiac Pacemakers

An area of concern related to electric fields from transmission lines has been the possibility of interference with cardiac pacemakers. There are two general types of pacemakers: asynchronous and synchronous. The asynchronous pacemaker pulses at a predetermined rate. It is generally immune to interference because it has no sensing circuitry and is not exceptionally complex. The synchronous pacemaker, however, pulses only when its sensing circuitry determines that pacing is necessary. Interference from transmission line electric field may cause a spurious signal on the pacemaker's sensing circuitry. However, when these pacemakers detect a spurious signal, such as a 60 Hz signal, they are programmed to revert to an asynchronous or fixed pacing mode of operation, returning to synchronous operation within a specified time after the signal is no longer detected. Cardiovascular specialists do not consider prolonged asynchronous pacing a problem, since some pacemakers are designed to operate that way. Periods of operation in this mode are commonly induced by cardiologists to check pacemaker performance. So, while transmission line electric fields may interfere with the normal operation of some of the older model pacemakers, the result of the interference is not harmful, and is of short duration (IEEE, 1979; EPRI, 1985).

D.21.1.1 Environmental Setting for Connected Actions

The connected solar projects would be located in rural or remote areas and would interconnect to existing substations. The lines connecting the generators to the substations (gen-tie lines) would be in existing transmission line corridors or require new corridors. The effect in terms of electrical interference and safety would be similar in nature to the Proposed Project. However, the connected action projects are in remote or rural areas and the population in the vicinity of these lines would be low.

D.21.2 Applicable Regulations, Plans, and Standards

Relevant, and potentially relevant, statutes, regulations and policies for electrical interference and safety are discussed below.

D.21.2.1 Federal

Electrical Hazards and Interference

Radio/TV/Communications/Electronic Equipment Interference

There are no federal regulations with specific numerical limits on high frequency emissions from electric power facilities. Federal Communication Commission (FCC) regulations require that transmission lines be operated so that no harmful communication systems interference is produced (FCC regulations).

Induced Currents and Shock Hazards

The National Electrical Safety Code (NESC) specifies that transmission lines be designed to limit the power line field strength at ground level such that the short circuit current from vehicles or large objects near the line will be no more than 5 milliampere (mA). This requirement serves to limit the magnitude of electrical shock that the public could encounter from induced currents on large ungrounded metal objects in the vicinity of transmission lines. Although the NESC is titled as a "National" code it is intended as a guide standard and does not constitute a regulation unless it is adopted and codified by state or municipal governments. In the case of California, the CPUC has issued General Order No. 95 (G.O. 95), Rules for Overhead Electric Line Construction, as the relevant standard for transmission lines.

D.21.2.2 State

California Public Utility Commission Guidelines

Induced Currents and Shock Hazards. Overhead transmission lines must meet the requirements of the CPUC, General Order No. 95, Rules for Overhead Electric Line Construction. This design code addresses shock hazards to the public by providing guidelines on minimum clearances to be maintained for practical safeguarding of persons during the installation, operation, or maintenance of overhead transmission lines and their associated equipment.

D.21.2.3 Local

No local regulations have been identified pertaining to electrical interference and electrical hazards.

D.21.3 Environmental Impacts of the Proposed Project

D.21.3.1 Approach to Impact Assessment

The impact assessment for electrical interference and hazards was conducted through a review of the change in power line field strength in the environment that would occur due to the construction and operation of the project. Within the ROW, the proposed transmission line would be the predominant source of electrical interference and hazards. Further, the area within the transmission line ROW is within the control of SCE with regard to development land use restrictions and public access. In areas outside of the ROW, and as the distance from the transmission line increases, there may be other sources of electrical interference and hazards not associated with the project that affect the level of electrical interference.

Therefore, the edge of the transmission line ROW was adopted as the point of reference for assessing Project impacts with respect to electrical interference and hazards.

D.21.3.1.1 Applicant Proposed Measures

SCE proposed no Applicant Proposed Measures related to electrical interference and hazards.

D.21.3.2 Impact Criteria

For purposes of the analysis, the Project or an alternative would create electrical interference and safety impacts if maintenance of Project facilities during Project operations would:

- Create interference with radio, television, communications, or electronic equipment.
- Create hazards to the public through Project-induced currents or shocks.
- Create interference with cardiac pacemakers.

D.21.3.3 Impacts and Mitigation Measures

This section presents discussion of impacts related to electrical interference and safety, and mitigation measures for the West of Devers Upgrade Project.

Electrical Hazards and Interference

The Proposed Project would cause changes in power line field strength as the locations of energized conductors would change during construction and in the final configuration of the transmission lines after construction is complete. These changes in field strength at the edge of the ROW could cause the following types of electrical interference and hazards.

Impact EIS-1: Project could create interference with radio, television, communications, or electronic equipment

Electric and magnetic fields from power lines occur at a frequency level that is substantially below the frequency range of communications systems and do not typically pose interference problems for communication equipment, as can be seen from the proliferation of cell phone arrays that are mounted directly on transmission line structures.

Corona or gap discharges related to high frequency radio and television interference impacts are dependent upon several factors, including the strength of broadcast signals and are anticipated to be very localized, if it were to occur. Individual sources of adverse radio/television interference impacts can be located and corrected on power lines. Conversely, magnetic field interference with electronic equipment, such as older CRT monitors, can be corrected through the use of software, shielding, or changes at the monitor location. Mitigation Measures EIS-1a and EIS-1b would limit interference by reducing corona discharges from the energized conductor and by addressing loose connections that result in gap discharges.

Mitigation Measures for Impact EIS-1: Project could create interference with radio, television, communications, or electronic equipment

The Proposed Project's direct and indirect impacts to electrical interference with radio, television, communications, or electronic equipment during O&M would be minimized or avoided through the implementation of Mitigation Measures EIS-1a and EIS-1b, presented below. Mitigation Measure EIS-1a (Limit the conductor surface gradient) ensures reduction of the conductor surface gradient in accordance with the IEEE Radio Noise Design Guide. In addition, Mitigation Measure EIS-1b (Document and resolve electronic interference complaints) ensures complaints regarding electronic interference would be logged and resolved to the extent feasible.

EIS-1a **Limit the conductor surface gradient.** As part of the design and construction process for the project, SCE shall limit the conductor surface gradient in accordance with the Institute of Electrical and Electronic Engineers Radio Noise Design Guide.

EIS-1b **Document and resolve electronic interference complaints.** After energizing the transmission line, SCE shall respond to, document, and resolve radio/television/electronic equipment interference complaints received. These records shall be made available to the CPUC and BLM for review upon request. All unresolved disputes shall be referred by SCE to the CPUC for resolution.

Impact EIS-2: Project-induced currents or shocks would create hazards to the public

Induced currents and voltages on conducting objects near the proposed transmission lines represent a potential adverse impact that can be mitigated. These impacts do not pose a threat in the environment if the conducting objects are properly grounded. Mitigation Measure EIS-2a (Implement grounding measures) would provide a conductive path to ground thereby avoiding a buildup of electrical potential that could discharge as an electrical shock.

Mitigation Measures for Impact EIS-2: Project-induced currents or shock would create hazards to the public

Mitigation Measure EIS-2a (Implement grounding measures) ensures minimization of induced voltages that could create shocks or currents.

EIS-2a **Implement grounding measures.** As part of the siting and construction process, SCE shall identify objects (such as metal fences, metal buildings, and metal pipelines) within and near the right-of-way that have the potential for induced voltages and shall implement electrical grounding of metallic objects in accordance with SCE's standards. The identification of objects shall document the threshold electric field strength and metallic object size at which grounding becomes necessary.

Impact EIS-3: The project could create interference with cardiac pacemakers

The function of some pacemakers could be altered by exposure to electric fields that would be generated in the immediate vicinity of the project (i.e., adjacent to the transmission line ROW), potentially resulting in inaccurate detections by the pacemaker of normal cardiac signals or resulting in inappropriate behavior, until the field strength is reduced by the individual leaving the immediate area. However, the biological consequences of transient, reversible pacemaker malfunction are mostly benign because, as discussed above, most modern units revert to a fixed-rate pacing mode, which is life-sustaining (IEEE, 1979). There are, however, exceptions, which include: individuals that are completely dependent on their pacemakers for maintaining all cardiac rhythms; individuals whose pacemakers function in inhibited modes, where field interference could severely compromise cardiovascular function; and individuals with compromised coronary circulation who are prone to episodes of reduced cardiac blood flow (IEEE, 1979).

Such episodes that would occur at the same time that the pacing becomes fixed-rate or irregular are dangerous, because these individuals would be more easily triggered into ventricular fibrillation (EPRI, 1997). The precise coincidence of an individual being exposed to high electric fields within a transmission line ROW and a biological need of that individual for the full function of his/her pacemaker would appear, in general, to be a rare event (IEEE, 1979). However, given the data available, the probability of such a coincidence to occur cannot be estimated. Clear exceptions to this conclusion are individuals who are completely dependent on a pacemaker for all cardiac rhythms (IEEE, 1979).

Given the rarity of an exposure event to occur simultaneously with a biological need for full function pacemakers, it would be unlikely that the transmission line's electric field would cause harmful interference to the operations of cardiac pacemakers. No mitigation is proposed.

D.21.3.4 Impacts of Connected Actions

The impacts of the connected solar projects in terms of electrical interference and safety would be similar to those described for the Proposed Project. The impacts would be created by the gen-tie lines connecting the solar projects to SCE substations. Because of the remote location of the solar projects, the potentially affected population would be small.

Impact EIS-1: Project could create interference with radio, television, communications, or electronic equipment

This impact would be similar to the Proposed Project, but reduced in severity due to the short length and remote location of the gen-tie lines.

Impact EIS-2: Project-induced currents or shocks would create hazards to the public

This impact would be similar to the Proposed Project, but reduced in severity due to the short length and remote location of the gen-tie lines.

Impact EIS-3: The project could create interference with cardiac pacemakers

This impact would be similar to the Proposed Project, but reduced in severity due to the short length and remote location of the gen-tie lines.

D.21.4 Environmental Impacts of Project Alternatives

Three alternatives are considered in this section; all of these alternatives would be located within the existing WOD ROW. The No Action Alternative is evaluated in Section D.21.5. Alternatives are described in detail in Appendix 5 (Alternatives Screening Report) and are summarized in Section C.

Electrical interference and safety within the ROW is described in Section D.21.1.1 above; the description of the environmental setting would apply equally to the alternatives.

D.21.4.1 Tower Relocation Alternative

The Tower Relocation Alternative would locate certain transmission structures in Segments 4, 5, and 6 farther from existing homes than would be the case under the Proposed Project.

Three impacts related to electrical interference and safety were identified for the Proposed Project. These impacts also would apply to the Tower Relocation Alternative, which overall would be the same as the Proposed Project, with the exception of the relocated transmission towers that are described above and in Appendix 5. The full text of all mitigation measures referenced in this section is presented in Section D.21.3.3, except where otherwise noted.

Impact EIS-1: Project could create interference with radio, television, communications, or electronic equipment

In general, the relocated towers would be moved approximately 50 feet farther from the southern edge of the ROW. Relocating towers in the identified project segments would shift the transmission line slightly farther from the edge of the ROW. This nominal change in distance is not expected to substantially alter (increase or decrease) the effects of the transmission line with regard to electric interference, although the risk of electric interference would be reduced very slightly for the nearest residents. Mitigation Measures EIS-1a (Limit the conductor surface gradient) and EIS-1b (Document and resolve electronic interference complaints) would limit interference by reducing corona discharges from the energized conductor and by addressing loose connections that result in gap discharges.

Impact EIS-2: Project-induced currents or shocks would create hazards to the public

The minor adjustment to the location of these towers would not increase the risk of hazards to the public through project-induced currents or shocks. Mitigation Measure EIS-2a (Implement grounding measures) would provide a conductive path to ground thereby avoiding a buildup of electrical potential that could discharge as an electrical shock.

Impact EIS-3: The project could create interference with cardiac pacemakers

The minor adjustment to the location of these towers would not differ from the Proposed Project's minor risk of interference with cardiac pacemakers. No mitigation is proposed.

D.21.4.2 Iowa Street 66 kV Underground Alternative

The Iowa Street 66 kV Underground Alternative would place a 1,600-foot segment of subtransmission line underground, rather than overhead.

Three impacts were identified under the Proposed Project for electrical interference and safety. These impacts also would apply to the Iowa Street 66 kV Underground Alternative, which overall would be the same as the Proposed Project, with the exception of the underground portion of the subtransmission line that is described above and in Appendix 5. The full text of all mitigation measures referenced in this section is presented in Section D.21.3.3, except where otherwise noted.

Impact EIS-1: Project could create interference with radio, television, communications, or electronic equipment

This alternative would place a 1,600-foot segment of 66 kV subtransmission line underground instead of on overhead poles. This short underground segment would decrease slightly the effects of the transmission line with regard to electric interference for the nearest residents. Mitigation Measures EIS-1a (Limit the conductor surface gradient) and EIS-1b (Document and resolve electronic interference complaints) would limit interference by reducing corona discharges from the energized conductor and by addressing loose connections that result in gap discharges.

Impact EIS-2: Project-induced currents or shocks would create hazards to the public

This short underground segment would decrease slightly the Proposed Project's risk to the public through project-induced currents or shocks, because the conductors in this area would be underground and not accessible. There would be transition structures at the north and south ends of the underground segment, and these facilities would still have the potential to create shock hazards. With implementation of Mitigation Measure EIS-2a (Implement grounding measures), this impact would be less than significant (Class II).

Impact EIS-3: The project could create interference with cardiac pacemakers

This short underground segment would decrease slightly the risk of interference with cardiac pacemakers as compared with the Proposed Project. Given the rarity of an exposure event to occur simultaneously with a biological need for full function pacemakers, it would be unlikely that the transmission line's electric field would cause harmful interference to the operations of cardiac pacemakers. No mitigation is proposed.

D.21.4.3 Phased Build Alternative

The Phased Build Alternative would retain existing double-circuit 220 kV transmission structures to the extent feasible, remove single-circuit structures, add new double-circuit 220 kV structures, and string all structures with higher-capacity conductors.

Three impacts were identified under the Proposed Project for electrical interference and safety. These impacts also would apply to the Phased Build Alternative, which would be located in the same corridor as the Proposed Project and would involve similar although less intense construction activities. The full text of all mitigation measures referenced in this section is presented in Section D.21.3.3, except where otherwise noted.

Impact EIS-1: Project could create interference with radio, television, communications, or electronic equipment

Electric and magnetic fields from power lines occur at a frequency level that is substantially below the frequency range of communications systems and do not typically pose interference problems for communication equipment, as can be seen from the proliferation of cell phone arrays that are mounted directly on transmission line structures.

Corona or gap discharges related to high frequency radio and television interference impacts are dependent upon several factors, including the strength of broadcast signals and are anticipated to be very localized, if it were to occur. Individual sources of adverse radio/television interference impacts can be located and corrected on power lines. Conversely, magnetic field interference with electronic equipment, such as older CRT monitors, can be corrected through the use of software, shielding, or changes at the monitor location.

In the locations where the structures in this alternative would be farther from the edge of the ROW than the Proposed Project structures, the potential for project-induced electrical interference would be reduced. The same as for the Proposed Project, corona or gap discharges related to high frequency radio and television interference adverse effects are dependent upon several factors, including the strength of broadcast signals and are anticipated to be very localized, if they were to occur. Individual sources of adverse radio/television interference impacts can be located and corrected on power lines. Conversely, magnetic field interference with electronic equipment, such as older CRT monitors, can be corrected through the use of software, shielding, or changes at the monitor location. Mitigation Measures EIS-1a (Limit the conductor surface gradient) and EIS-1b (Document and resolve electronic interference complaints) would limit interference by reducing corona discharges from the energized conductor and by addressing loose connections that result in gap discharges.

Impact EIS-2: Project-induced currents or shocks would create hazards to the public

Induced currents and voltages on conducting objects near the proposed transmission lines represent a potential adverse impact that can be mitigated. These impacts do not pose a threat in the environment if the conducting objects are properly grounded.

Due to the Segment 4, 5, and 6 locations where the alternative would be further from the edge of ROW than the Proposed Project, the potential for hazards to the public due to project-induced currents may be reduced for the nearest residents compared to the Proposed Project. However, because much of the ROW is accessible to the public the risk of project-induced currents or shocks would be substantially the same regardless of the tower locations within the ROW. The same as for the Proposed Project, induced currents and voltages on conducting objects near the proposed transmission lines represent a potential adverse impact that can be mitigated. These impacts do not pose a threat in the environment if the conducting objects are properly grounded. Mitigation Measure EIS-2a (Implement grounding measures) would provide a conductive path to ground thereby avoiding a buildup of electrical potential that could discharge as an electrical shock.

Impact EIS-3: The project could create interference with cardiac pacemakers

The potential for interference with cardiac pacemakers would be slightly reduced compared to the Proposed Project for locations along the corridor where the structures in this alternative would be located further from the edge of the ROW. However, because much of the ROW is accessible to the public the risk of interference with cardiac pacemakers would be substantially the same regardless of the tower locations within the ROW. The same as for the Proposed Project, the function of some pacemakers could be altered by exposure to electric fields that would be generated in the immediate vicinity of the project (i.e., adjacent to the transmission line ROW), potentially resulting in inaccurate detections by the pacemaker of normal cardiac signals or resulting in inappropriate behavior, until the field strength is reduced by the individual leaving the immediate area. However, the biological consequences of transient, reversible pacemaker malfunction are mostly benign because, as discussed in Section D.21.3.3, most modern units revert to a fixed-rate pacing mode, which is life-sustaining. Given the rarity of an exposure event to occur simultaneously with a biological need for full function pacemakers, it would be unlikely that the transmission line's electric field would cause harmful interference to the operations of cardiac pacemakers. No mitigation is proposed.

D.21.5 Environmental Impacts of No Action Alternative

D.21.5.1 No Action Alternative Option 1

No Action Alternative Option 1 is described in Section C.6.3.1. It would consist of a new 500 kV circuit, primarily following the Devers-Valley transmission corridor and extending 26 miles between Devers Substation. It would also require a new 40-acre substation south of Beaumont, and 4 new 220 kV circuits extending 7 miles from the new Beaumont Substation to El Casco Substation, primarily following the existing El Casco 115 kV ROW. The remainder of the No Action Alternative, from El Casco Substation to the San Bernardino and Vista Substations, would be identical to the Proposed Project. Information on environmental resources and project impacts is derived from the Devers–Palo Verde 500 kV No. 2 Project EIR/EIS (CPUC and BLM, 2006) and the El Casco System Project Draft EIR (CPUC, 2007); which include nearly all of the No Action alignment.

No Action Alternative Transmission Lines and Beaumont Substation. Development of the 500 kV/220 kV transmission line from Devers to El Casco Substation would cause changes in power line field strength at the edge of the ROW. This could cause interference with radio, television, communications or electronic equipment and induce currents or shocks that would be hazards. The potential for these impacts to occur is common to all high-voltage lines. Mitigation measures include limiting the conductor surface gradient as part of the design and construction process (in accordance with the IEEE Radio Noise Design Guide); documenting and resolving individual complaints of interference; and implementing grounding measures for metal fences, metal building, metal pipelines, etc., within and near the ROW. Another potential impact is interference with cardiac pacemakers. However, most modern pacemakers revert to a fixed-rate pacing mode during transient events. Given the rarity of an exposure event to occur simultaneously with a biological need for full function pacemakers, it would be unlikely that the transmission line's electric field would cause harmful interference to the operations of cardiac pacemakers.

D.21.5.2 No Action Alternative Option 2

No Action Alternative Option 2 would require the construction of over 40 miles of new 500 kV transmission line, following the existing Valley-Serrano 500 kV line. The alternative is described in Section C.6.3.2, and illustrated on Figure C-6b. The ROW between the Valley Substation and the Serrano Substation contains an existing 500 kV transmission line. This alternative would add a second 500 kV circuit within or adjacent to the existing ROW. Operation of this new circuit would cause changes in the power line field strength at the edge of the ROW. These changes could cause interference with radio, television, communications or electronic equipment. The new circuit could also create a hazard for workers or the public through induced currents or shocks. The function of some pacemakers could be altered by exposure to electric fields that would be generated in the immediate vicinity of the new 500 kV circuit. Electrical interference with modern cardiac pacemakers is not a substantial threat to public health because most modern pacemakers are designed to revert to a fixed-rate pacing mode, which is life-sustaining. The potential electrical interference and electrical hazards associated with the new 500 kV circuit would not be substantially different than under existing conditions, and can be reduced through implementation of recommended mitigation described in the Proposed Project and Option 1.

D.21.6 Mitigation Monitoring, Compliance, and Reporting

Table D.21-1 presents the mitigation monitoring, compliance, and reporting actions for electrical interference and safety.

Table D.21-1. Mitigation Monitoring Program – Electrical Interference and Safety

MITIGATION MEASURE	**EIS-1a: Limit the Conductor Surface Gradient.** As part of the design and construction process for the project, SCE shall limit the conductor surface gradient in accordance with the Institute of Electrical and Electronic Engineers Radio Noise Design Guide.
Location	Entire project
Monitoring / Reporting Action	CPUC/BLM monitor verifies that SCE has complied with mitigation measure in project design and construction.
Effectiveness Criteria	Conductor surface gradient is limited in accordance with the Institute of Electrical and Electronic Engineers Radio Noise Design Guide
Responsible Agency	CPUC/BLM
Timing	Prior to start of construction

Table D.21-1. Mitigation Monitoring Program – Electrical Interference and Safety

MITIGATION MEASURE	**EIS-1b: Document and Resolve Electronic Interference Complaints.** After energizing the transmission line, SCE shall respond to, document, and resolve radio/television/electronic equipment interference complaints received. These records shall be made available to the CPUC and BLM for review upon request. All unresolved disputes shall be referred by SCE to the CPUC for resolution.
Location	Entire project
Monitoring / Reporting Action	CPUC/BLM monitor or designee reviews records as needed.
Effectiveness Criteria	Complaints are addressed and resolved.
Responsible Agency	CPUC/BLM
Timing	Throughout project duration
MITIGATION MEASURE	**EIS-2a: Implement Grounding Measures.** As part of the siting and construction process, SCE shall identify objects (such as metal fences, metal buildings, and metal pipelines) within and near the right-of-way that have the potential for induced voltages and shall implement electrical grounding of metallic objects in accordance with SCE's standards. The identification of objects shall document the threshold electric field strength and metallic object size at which grounding becomes necessary.
Location	Entire project
Monitoring / Reporting Action	CPUC/BLM monitor confirms that SCE has program to ground objects consistent with SCE standards.
Effectiveness Criteria	Objects are grounded effectively
Responsible Agency	BLM/CPUC
Timing	During construction

D.21.7 References

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