5.14 Transmission Line Safety and Nuisance

This section discusses safety and nuisance issues associated with the transmission system improvements that will interconnect the Ridgecrest Solar Power Project (RSPP or Project) with the Southern California Edison (SCE) regional transmission system. This section discusses the general aspects of the transmission interconnection and also addresses electromagnetic fields (EMF) changes that would occur as a result of the Project.

The Transmission Line Safety and Nuisance discussion presented in the following pages is intended to support compliance by the California Energy Commission (CEC) with the requirements of the California Environmental Quality Act (CEQA), and by the Bureau of Land Management with the requirements of the National Environmental Policy Act (NEPA). The two agencies are conducting a joint review of the Project and a combined CEQA/NEPA document will be prepared.

Summary

Project transmission line safety and nuisance impacts would be less than significant. Analyses indicate that neither Project construction nor operation would result in significant increases in EMF levels or audible noise. Because the Project transmission system will conform to applicable California Public Utilities Commission (CPUC) and other regulatory requirements, induced current and voltage are unlikely to lead to hazardous electrical shocks during construction or operation. Corona caused by power lines can cause interference with radio and television reception. Corona typically becomes a design concern for transmission lines with voltages of 345 kilovolts (kV) and above. Because the Project will be connected at 230 kV, it is expected that no corona-related design issues will be encountered. Due to the sparse development in the vicinity of the Project electric transmission facilities, no adverse effects to local communication networks are anticipated. Project design and construction will adhere to standards and procedures that minimize the likelihood of interference with aircraft communications or avionics.

5.14.1 LORS Compliance

This section provides a list of applicable laws, ordinances, regulations and standards (LORS) that apply to the proposed transmission system improvements. The Project will comply with the applicable LORS during construction and operation.

5.14.1.1 Design and Construction

Table 5.14-1 lists the applicable LORS for the design and construction of the proposed transmission system improvements.

Table 5.14-1 Summary of Applicable Transmission Line Safety and Nuisance LORS

LORS	Applicability	Where Discussed in AFC
Rules for Overhead Electric Line Construction: CPUC General Order (GO) 95	Covers required clearances, grounding techniques, maintenance, and inspection requirements.	Section 5.14.1
High Voltage Electric Safety Orders: Title 8 California Code of Regulations (CCR) Section 2700 et seq.	Establishes essential requirements and minimum standards for installation, operation, and maintenance of electrical equipment.	Section 5.14.1
Construction and Operation of Power and Communication Lines for the Prevention or Mitigation of Inductive Interference: CPUC GO-52	Applies to the design of facilities to provide or mitigate inductive interference.	Section 5.14.1
Institute of Electrical & Electronics Engineers (IEEE) Recommended Practices for Seismic Design of Substations: American National Standards Institute (ANSI)/IEEE 693-2005	Recommends seismic design and construction practices for substations.	Section 5.14.1
IEEE Guide for Fence Safety Clearances in Electric Supply Stations: IEEE 1119	Recommends clearance practices to protect persons outside the facility from electric shock.	Section 5.14.1
Direct Lightning Stroke Shielding of Substations: IEEE 998	Recommends protections for electric system from direct lightning strikes.	Section 5.14.1
Containment of Oil Spills for Substations: IEEE 980	Recommends preventions for release of non-polychlorinated biphenyl oils into the environment.	Section 5.14.1

Electrical Clearances

Typical high-voltage overhead transmission lines are composed of bare conductors connected to supporting structures by means of porcelain, glass, or polymer insulators. The air surrounding the energized conductor acts as the insulating medium. Maintaining sufficient clearances, or air space, around the conductors to protect the public and utility workers is paramount to safe operation. The safety clearance required around the conductors is determined by operating voltages, conductor temperatures, short-term abnormal voltages, wind-blown swinging conductors, contamination of the insulators, clearance needs for workers, and clearance needs for public safety. Minimum clearances are specified in the CPUC GO-95. Electric utilities, state regulators, and local ordinances may specify additional (more restrictive) clearances. Typically, clearances are specified for the following:

- Distance between the energized conductors themselves,
- Distance between the energized conductors and the supporting structure,
- Distance between the energized conductors and other power or communication wires on the same supporting structure, or between other power or communication wires above or below the conductors,
- Distance from the energized conductors to the ground and features such as roadways, railroads, driveways, parking lots, navigable waterways, airports, etc.,
- Distance from the energized conductors to buildings and signs, and
- Distance from the energized conductors to other parallel power lines.

Substation/Switchyard Design

The Project anticipates a direct interconnection with the SCE transmission system at a planned 230-kV substation located near and to the west of the Project plant site, although the exact location of this substation has not been finalized. The layout of the Project power block is shown in Figure 2-5 in Section 2.0, Project Description. The layout of the new planned substation where the 230-kV gen-tie line terminates and the interconnection to the SCE transmission system will occur is shown in Figure 2-4. All facilities will be constructed in conformance with the applicable LORS, including, IEEE 1127-1998 (listed in Table 5.14-4), which deals with substation and switchyard design in order to minimize ambient noise and EMF generated from substations; this issue is further discussed in Section 5.14.3.3. A perimeter fence will be constructed around the power block switchyard and the new proposed substation to keep pedestrian traffic away from live equipment and exposure to EMF.

5.14.1.2 Aviation Safety

Table 5.14-2 lists the applicable LORS regarding aviation safety with respect to the proposed transmission system improvements.

Table 5.14-2 Summary of Applicable Transmission System Aviation Safety LORS

LORS	Applicability	Where Discussed in AFC
Objects Affecting the Navigable Air Space: Title 14 Code of Federal Regulations (CFR) Part 77	Describes the criteria used to determine the need for a Federal Aviation Administration (FAA) "Notice of Proposed Construction or Alteration" in cases of potential obstruction hazards.	Section 5.14.3
Proposed Construction and/or Alteration of Objects that May Affect the Navigation Space: FAA Advisory Circular No. 70/7460-1G	Addresses the need to file the "Notice of Proposed Construction or Alteration" (Form 7460) with the FAA in cases of potential for an obstruction hazard.	Section 5.14.3

5.14.1.3 Interference with Radio Frequency Communication

Table 5.14-3 lists the applicable LORS regarding radio frequency communications with respect to the proposed transmission system improvements.

Table 5.14-3 Summary of Applicable Transmission System Radio Frequency Communication LORS

LORS	Applicability	Where Discussed in AFC
Federal Communications Commission: Title 47 CFR Section 15.2524	Prohibits operation of devices that can interfere with radio-frequency communication.	Section 5.14.3
CPUC GO-52	Governs the construction and operation of power and communications lines to prevent or mitigate interference.	Section 5.14.3
CEC staff, Radio Interference and Television Interference(RI-TVI) Criteria (Kern River Cogeneration) Project 82-Application for Certification (AFC)-2, Final Decision, Compliance Plan 13-7	Prescribes the CEC's RI-TVI mitigation requirements, developed and adopted by the CEC in past siting cases.	Section 5.14.3

5.14.1.4 Audible Noise

Table 5.14-4 lists the applicable LORS regarding audible noise with respect to the proposed transmission system improvements.

Table 5.14-4 Summary of Applicable Transmission System Audible Noise LORS

LORS	Applicability	Where Discussed in AFC
IEEE Guide for the Design, Construction, and Operation of Electric Power Substations for Community Acceptance and Environmental Compatibility: IEEE 1127-1998	Specifies standards for minimizing audible noise emitted from substations and switchyards through recommended design practices	Sections 5.14.1 and 5.14.3
Kern County General Plan, Noise Element	County Code Noise Limits	Section 5.14.3

5.14.1.5 Hazardous and Nuisance Shocks

Table 5.14-5 lists the applicable LORS regarding hazardous and nuisance shocks with respect to the proposed transmission system improvements.

Table 5.14-5 Summary of Applicable Transmission System Hazardous and Nuisance Shocks LORS

LORS	Applicability	Where Discussed in AFC
Rules for Overhead Electric Line Construction: CPUC GO-95	Governs clearance requirements to prevent hazardous shocks, grounding techniques to minimize nuisance shocks, and maintenance and inspection requirements.	Section 5.14.3
High Voltage Safety Orders: Title 8 CCR Section 2700 et seq.	Specifies requirements and minimum standards for safely installing, operating, working around, and maintaining electrical installations and equipment.	Section 5.14.3
National Electrical Safety Code (NESC)	Specifies grounding procedures to limit nuisance shocks. Also specifies minimum conductor ground clearances.	Section 5.14.3
IEEE Guide for Fence Safety Clearances in Electric-Supply Stations: IEEE 1119	Specifies the guidelines for grounding-related practices within the right of way (ROW) and substations.	Section 5.14.3
IEEE Guide for Safety in Alternating Current (AC) Substation Grounding: ANSI/IEEE 80	Presents guidelines for assuring safety through proper grounding of AC outdoor substations.	Section 5.14.3

5.14.1.6 Electric and Magnetic Fields

Table 5.14-6 lists the applicable LORS regarding EMF with respect to the proposed transmission system improvements.

Table 5.14-6 Summary of Applicable Transmission System Electric and Magnetic Fields LORS

LORS	Applicability	Where Discussed in AFC
Rules for Planning and Construction of Electric Generation Line and Substation Facilities in California: CPUC GO-131-D	Specifies application and noticing requirements for new line construction including EMF reduction.	Section 5.14.3
CPUC Decision 93-11-013	Specifies CPUC requirements for reducing power frequency EMF.	Section 5.14.3
IEEE Guide for the Design, Construction, and Operation of Electric Power Substations for Community Acceptance and Environmental Compatibility: IEEE 1127-1998	Specifies standards for minimizing EMF emitted from substations and switchyards through recommended design practices.	Sections 5.14.1 and 5.14.3
Standard Procedures for Measurement of Power Frequency EMF from AC Power Lines: ANSI/IEEE 644-1944	Specifies standard procedures for measuring EMF.	Section 5.14.3
EMF Design Guidelines for Electrical Facilities, SCE, EMF Research and Education, September 2004	SCE's guidelines for EMF reduction through structure design, conductor configuration, circuit phasing, and load balancing. (In keeping with CPUC D.93-11-013 and GO-131.)	Section 5.14.3
Standard Procedures for Measurement of Power Frequency Electric and Magnetic Fields from AC Power Lines: ANSI/IEEE 644-1944	Specifies standard procedures for measuring EMF.	Section 5.14.3

5.14.1.7 Fire Hazards

Table 5.14-7 lists the applicable LORS regarding fire hazards with respect to the proposed transmission system improvements.

Table 5.14-7 Summary of Applicable Transmission System Fire Hazards LORS

LORS	Applicability	Where Discussed in AFC
Fire Prevention Standards for Electric Utilities: Title 14 CCR Sections 1250-1258	Provides specific exemptions from electric pole and tower firebreak and conductor clearances when and where standards apply.	Section 5.14.3
IEEE Guide for Safety in AC Substation Grounding: ANSI/IEEE 80-1986	Presents guidelines for assuring safety through proper grounding of AC outdoor substations.	Section 5.14.3
Rules for Overhead Electric Line Construction: CPUC GO-95, Section 35	Covers all aspects of design, construction, operation, and maintenance of electrical transmission line and fire safety (hazards).	Section 5.14.3

5.14.1.8 Involved Agencies and Required Permits

No specific permits are required that relate specifically to transmission line safety and nuisance issues; therefore no involved agencies are identified.

5.14.2 Affected Environment

The affected environment related to the transmission system is considered to be the area along the new transmission line from the power block switchyard within the Project site to the Project's interconnection point with the SCE transmission system at the new planned substation expected to be located near and to the west of the Project plant site. The length of the offsite overhead transmission line from the edge of the power plant site to the new proposed substation is less than 300 feet. Figure 2.5 in Section 2.0, Project Description, shows the location of the generator step-up (GSU) transformer and the transmission line connecting the Project's plant site power block switchyard to the new planned substation.

5.14.3 Impacts

This section discusses the transmission line safety and nuisance impacts of the Project.

5.14.3.1 Aviation Safety

The Project is located approximately seven miles from the Inyokern Airport and the China Lake Naval Air Weapons Station. There is no available information to suggest that air operation safety issues have arisen from the operation of existing transmission lines in the general Project vicinity. The new 300-foot offsite transmission line will represent a negligible increase in the total length of the existing transmission lines already in the area. It is, therefore, anticipated that no adverse affects would be generated by the Project and impacts on aviation safety would be less than significant.

All Project structures leading from the power block switchyard to the interconnection point would be less than 200 feet in height and are more than 20,000 feet from an airport, so no proposed structure will be identified as an object affecting navigable airspace pursuant to Title 14 CFR Section 77. It is therefore concluded that the FAA will not require a "Notice of Proposed Construction and Alteration (Form 7460) for the Project and the Applicant does not plan to make such a submittal. The Applicant received correspondence from the Department of Defense Sustainability Office that the project, sited within the R-2506 airspace of the R-2508 Complex, would not result in significant mission impacts (Appendix K).

5.14.3.2 Radio Frequency Communications

Transmission line-related radio-frequency interference is one of the indirect effects of transmission line operation and is produced by the physical interactions of line electric fields. Such interference is due to the radio noise produced by the action of the electric fields on the surface of the energized conductor. The process involved is known as corona discharge and can occur within gaps between the conductor and insulators or metal fittings. Since the level of interference depends on factors such as line voltage, distance from the line to the receiving device, orientation of the antenna, signal level, line configuration and weather conditions, maximum interference levels are not specified as design criteria for modern transmission lines. The level of any such interference usually depends on the magnitude of the electric fields involved and the distance from the line. However, the potential for such impacts is minimized by reducing the line electric fields and locating the line away from inhabited areas.

Due to the remoteness from inhabited areas of the Project transmission line and new proposed Project substation, no adverse effects to local communication networks are anticipated. The Project transmission line and new proposed substation would be built and maintained in keeping with standard practices that minimize surface irregularities and discontinuities. Moreover, the potential for such corona-related interference is usually of concern for transmission lines of voltages 345 kV and above, and not for 230-kV transmission lines such as are proposed for the Project.

5.14.3.3 Audible Noise

Corona may also produce audible noise from a transmission line. Corona is a function of the voltage of the line, the equivalent diameter of the conductor, and the condition of the conductor and suspension hardware. The electric field gradient is the rate at which the electric field changes and is directly related to the line voltage.

The electric field gradient is greatest near the surface of the conductor. Large-diameter conductors have lower electric field gradients at the conductor surface and, hence, lower corona than smaller conductors, everything else being equal. Also, irregularities (such as nicks and scrapes on the conductor surface) or sharp edges on suspension hardware concentrate the electric field at these locations and, thus, increase corona at these spots. Similarly, contamination on the conductor surface can cause irregularities that are a source for corona. Raindrops, snow, fog, and condensation are also sources of irregularities. Corona typically becomes a design concern for transmission lines having voltages of 345 kV and above. Since the Project will be connected at 230 kV, it is expected that no corona-related design issues will be encountered. Additionally, research by the Electric Power Research Institute (EPRI) has shown that the fair-weather audible noise from modern transmission lines to be generally indistinguishable from background noise at the edge of an ROW of 100 feet or more.

An additional source of audible noise is transformer hum caused by extension and contraction of the core laminations when magnetized. On the Project site, GSU transformer hum is not expected to add any appreciable audible noise to the noise levels discussed in Section 5.8, Noise.

5.14.3.4 Electrical Effects

The electrical effects of high-voltage transmission lines fall into two broad categories: corona effects and field effects. Corona is the ionization of the air at the surface of the energized conductor and suspension hardware due to very high electric field strength. Corona effects were described above and are generally considered in the context of audible noise and radio frequency interference. Field effects are the voltages and currents that may be induced in nearby conducting objects. A transmission line's inherent electric and magnetic fields cause these effects.

Induced Current and Voltages

Hazardous shocks are those that could result from direct or indirect contact between an individual and the energized line, whether overhead or underground. Such shocks are capable of causing serious physiological harm or death and their prevention remains a driving force in the design and operation of transmission and other high-voltage lines.

A conducting object, such as a vehicle or person in an electric field, will experience induced voltages and currents. The strength of the induced current will depend on the electric field strength, the size and shape of the conducting object, and the object-to-ground resistance. When a conducting object is isolated from the ground and a grounded person touches the object, a perceptible current or shock may occur as the current flows to ground and could be characterized as a nuisance shock. Proper design standards will be implemented to prevent hazardous and nuisance shocks by ensuring that metallic objects on or near the ROW are grounded and that sufficient clearances are provided at roadways and parking lots to keep electric fields at these locations low enough to prevent vehicle short-circuit currents from exceeding five milliamperes.

The Project’s transmission interconnection will be constructed in conformance with CPUC GO-95 and Title 8 CCR 2700 requirements. These regulations require sufficient grounding to ensure that hazardous shocks do not occur. Therefore, hazardous shocks are unlikely as a result of Project construction, operation, or maintenance. Additionally, shocks are effectively minimized through grounding procedures specified in the NESC and the joint guidelines of ANSI and IEEE. The Project will follow these procedures and guidelines in order to minimize the potential for hazardous shocks.

Electric and Magnetic Fields

Circulating currents, such as those found in the energized components of electrical motors, home wiring, lighting, and all other electrical appliances, produce electric and magnetic fields, commonly referred to as EMF. The EMF produced by the AC electrical power system in the United States has a frequency of 60 hertz (Hz), meaning that the intensity and orientation of the field changes 60 times per second.

Electric fields around transmission lines are produced by electrical charges on the energized conductor. Electric field strength is directly proportional to the line's voltage; that is, increased voltage produces a higher electric field. At a given distance from the transmission line conductor, the electric field is inversely proportional to the distance from the conductors, so that the electric field strength declines as the distance from the conductor increases. The strength of the electric field is measured in units of kilovolts per meter (kV/m). The electric field around a transmission line remains steady and is not affected by the common daily and seasonal fluctuations in usage of electricity by customers.

Magnetic fields around transmission lines are produced by the level of current flow through the conductors, measured in amperes. The magnetic field strength is also directly proportional to the current; that is, increased amperes produce a stronger magnetic field. The magnetic field is inversely proportional to the distance from the conductors, and thus, like the electric field, the magnetic field strength declines as the distance from the conductor increases. Magnetic fields are expressed in units of milligauss (mG). The current and, therefore the magnetic field around a transmission line, fluctuate daily and seasonally as the usage of electricity varies.

Considerable research has been conducted over the last 30 years on the possible biological effects and human health effects from EMF. This research has produced many studies that offer no uniform conclusions about whether long-term exposure to EMF is harmful or not. In the absence of conclusive evidence, some states, California in particular, have chosen not to specify maximum acceptable levels of EMF. Instead, California mandates a program of prudent avoidance whereby EMF exposure to the public would be minimized by encouraging electric utilities to use low-cost techniques to reduce the levels of EMF.

EMF Assumptions

It is important that any discussion of EMF include the assumptions used to calculate the values and to remember that EMF in the vicinity of power lines varies based on a variety of factors. These factors include line design, the presence of other lines in the ROW, line loading, and distance from the line. The electric field depends on the line voltage; 230 kV has been used nominally throughout this Application for Certification as SCE utilizes the nominal voltage of 230 kV. The magnetic field is proportional to the line current (amperes), which varies based on the interconnected power system loading and the power output of the generating facility as output changes to meet varying demand or as the solar energy varies. The line loading values were based on the nominal load.

The arrangement of the transmission lines along the route is another important consideration for the field calculation. The Project interconnection will occur at the new proposed substation planned to be located almost adjacent to the west of the Project site (see Section 5.14.2); therefore, no other lines are considered in this study. The phase arrangement of the line has been entered into the model used for the field calculation. The phase arrangement is indicated in the conceptual pole configuration in Figure 5.14-1

EMF Calculations

The calculated electric fields are expressed in kV/m and the magnetic fields expressed in mG. The various inputs for the calculations include voltage, maximum load in amperes, current angle (phasing), conductor diameter and spacing, along with relative location of conductors and shield wires. The elevation used for the conductors is the lowest point of the conductors which corresponds to the midpoint between two tangent structures where the conductor sag is the greatest. Table 5.14-8 shows the input values used for modeling and Figure 5.14-1 shows the pole design used for phase configuration and circuit height. The EMF calculation inputs are as follows:

1) All calculations are based on the EPRI Red Book methods (infinite straight wire with flat earth approximation).
2) These approximations are only valid for low frequency (50-60 Hz) AC transmission lines.
3) Bundles are modeled with an equivalent conductor as per EPRI Red Book 8.3.1.
4) The effects of earth return currents (earth resistivity) are ignored when calculating the magnetic field.
5) Wire position is determined by the currently displayed weather case.
6) Wire height used is the height of the wire where the target point is projected upon it.
7) All calculations assume the ground is flat with the same elevation as that of centerline.
8) Station offset is measured from the Project central switchyard take-off structure.
9) Meter height above centerline ground: 3.28 feet.
10) Cross section offset for graph +/-: 75.00 feet.
11) Result interval for graph: 5.00 feet.

Table 5.14-8 EMF Study Conductor Information

Line	Conductor OD (inches)	No. of Conductors	Load Amperes
Gen-Tie Line	1.108	1	630

Figures 5-14.2 and 5.14-3 summarize the results of the EMF Simulation of the interconnecting transmission line and the numerical results at the edges of the ROW are included in Table 5.14-9.

Table 5.14-9 EMF Study Edge of ROW Calculation Results

ROW Edge (feet)	B rms (max magnetic field magnitudes) (mG)	E rms (max electric field magnitudes) (kV/m)
-75.00	12.4	0.042
75.00	18.2	0.053

From Figures 5.14-2 and 5.14-3, the maximum magnitude of the EMF at the edge of the ROW is 18.2 mG and 0.053 kV/m, respectively. While the State of California does not set a statutory limit for EMF levels, the CPUC, which regulates electric transmission lines, mandates EMF reduction as a practicable design criterion for new and upgraded electrical facilities. As a result of this mandate, the regulated electric utilities have developed their own design guidelines to reduce EMF at each new facility. The CEC, which regulates transmission lines to the first point of connection, requires generators to follow the existing guidelines that are in use by local electric utilities or transmission-system owners.

In keeping with the goal of EMF reduction, the interconnections of the Project will be designed and constructed using the principles outlined in the SCE publication, “EMF Design Guidelines for Electrical Facilities.” These guidelines explicitly incorporate the directives of the CPUC by developing design procedures compliant with Decision 93-11-013 and GO-95, and 131-D. That is, when the transmission line structures, conductors, and ROWs are designed and routed according to the SCE guidelines, the transmission line is consistent with the CPUC mandate.

The primary techniques for reducing EMF anywhere along a transmission line are to:

- Increase the pole height for overhead design,
- Minimize the current on the line, and
- Optimize the orientation of the line phases.

The most appropriate technique would be used based on each individual situation to reduce the EMF along a transmission line should it be determined that a reduction in the EMF is required.

According to IEEE 1127-1998, EMF at the fence line of substations and switchyards is insignificant with respect to the incoming transmission lines and therefore was not considered in the EMF study for the Project. The incoming transmission lines will be designed to maintain minimum ground clearances and thus were included in the study.

Anticipated EMF levels are typical for the Project as designed. If required, pre- and post-interconnection verification measurements could be made consistent with IEEE guidelines.

5.14.3.5 Fire Hazards

The proposed 230-kV transmission interconnection lines will be designed, constructed, and maintained in accordance with the CPUC's GO-95, which establishes clearances from other man-made and natural structures to reduce/avoid fire hazards. The Project will maintain the onsite portions of the transmission line route and immediate area in accordance with existing regulations and accepted industry practices that will include identification and abatement of any fire hazards.

5.14.3.6 Transmission Line Relocation

The Project will require the relocation of roughly 7,500 feet (1.4 miles) of two existing transmission lines owned and operated by SCE. The first is a double-circuit 230-kV line (with one of the circuits currently operated at 115 kV), and the second is a double-circuit 115-kV line. The CPUC has jurisdiction over the relocation of both lines. For the relocation of the 230-kV line, CPUC General Order 131-D may require that SCE obtain a Certificate of Public Convenience and Necessity because the transmission line may be used for operation in excess of 200 kV and none of the exemptions to the requirements that are described in the GO applies; otherwise a Permit to Construct will be required. For the 115-kV line, SCE will be required to obtain a Permit to Construct because the line carries (and will continue to carry) a load of less than 200 kV. The Applicant has initiated discussions with SCE regarding the Certificate of Public Convenience and Necessity/Permit to Construct applications.

The relocation of portions of the 230-kv and 115-kv transmission lines will not have any impacts on EMF, aviation safety, radio communications, or noise, including corona effect. Only 7,500 feet of each transmission line will be rerouted, and each line will be rerouted no more than 1,500 feet from its original location. As the transmission line relocation is subject to CPUC permitting requirements, the relocated portions of the transmission lines will conform to CPUC and other regulatory requirements, including project design and construction standards aimed at minimizing the likelihood of interference with aircraft communications or avionics.

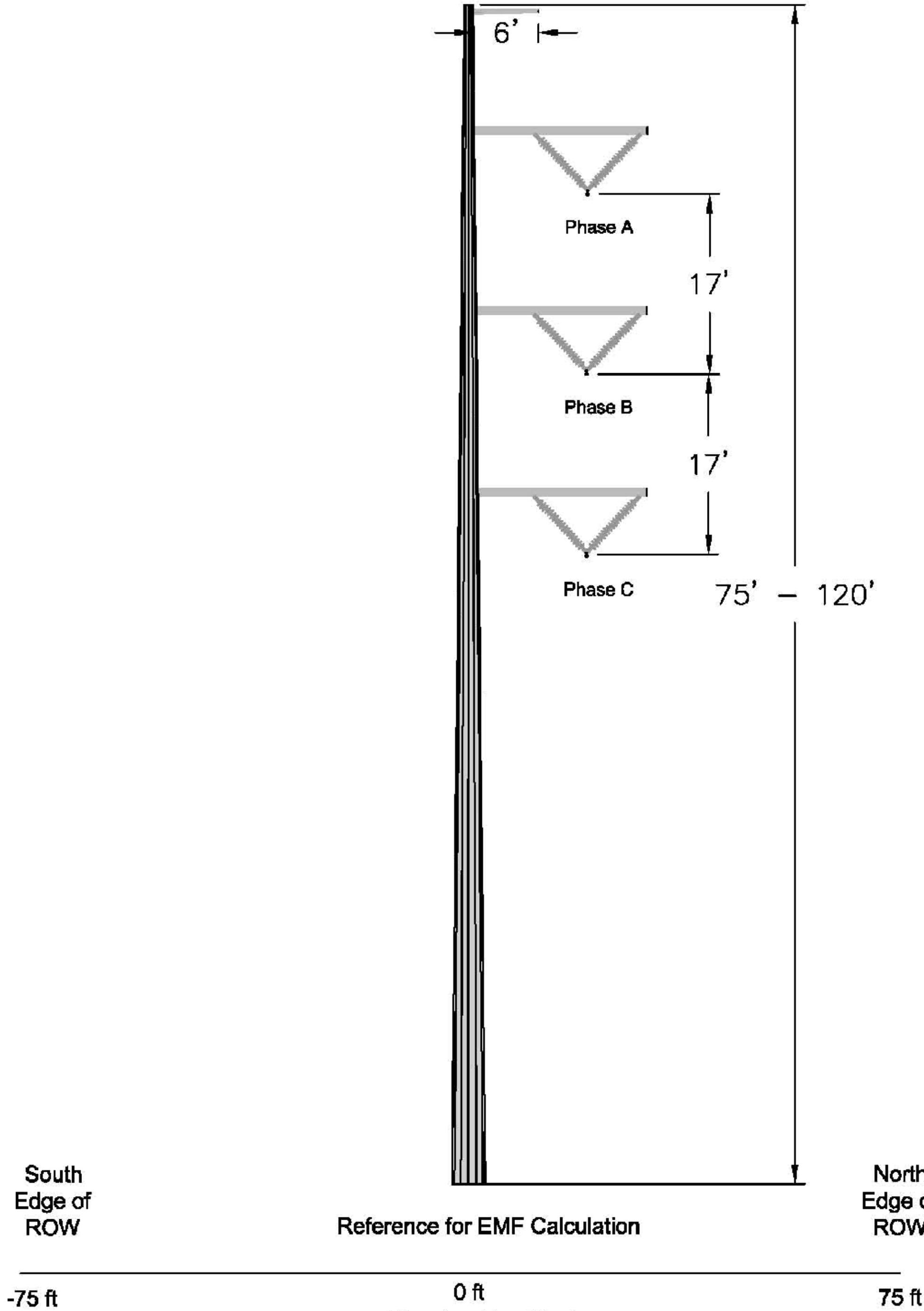
5.14.4 Mitigation Measures

No significant transmission line-related impacts were identified as a result of the Project studies. The Project will be designed, constructed, operated, and maintained in accordance with the applicable LORS and in order to minimize EMF at the edges of the ROW. Impacts will be less than significant with Project implementation as described in this section (e.g., insulators and hardware selected to minimize corona, noise procedures to investigate and resolve interference complaints). No additional mitigation is required.

However, should additional currently unforeseen issues arise, they will be addressed to ensure that impacts remain less than significant.

5.14.5 References

EPRI, 1982. Red Book – Transmission Line Reference Book, 2nd Edition, Chapter 8 (pp. 329-417): Field Effects of Overhead Transmission Lines and Stations – Deno, D. W. and Zaffanella, L. E.



View Looking West
Not to Scale
All Dimensions and Phasing are Estimates
and are Provided for Purposes of Calculating EMF only

Project Location

Ridgecrest Solar Power Project

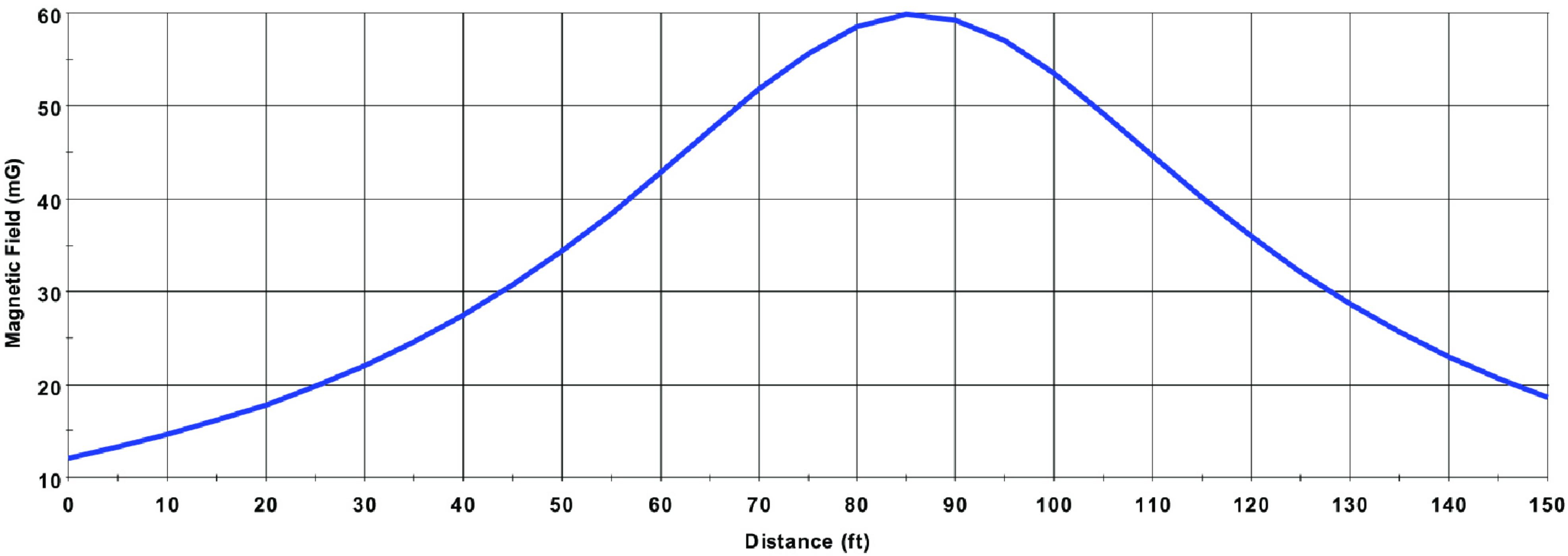
Figure 5.14-1
230 kV Single Circuit
Structure Evaluation

Solar Millennium

AECOM

Project: 12944-003
Date: August 2009

Magnetic Fields



Resultant
Min = 12.059 mG Max = 59.802 mG

Project Location

Ridgecrest Solar Power Project

Figure 5.14-2
220 kV Single Circuit
Magnetic Field

Solar Millennium

AECOM

Project: 12944-003
Date: September 2009

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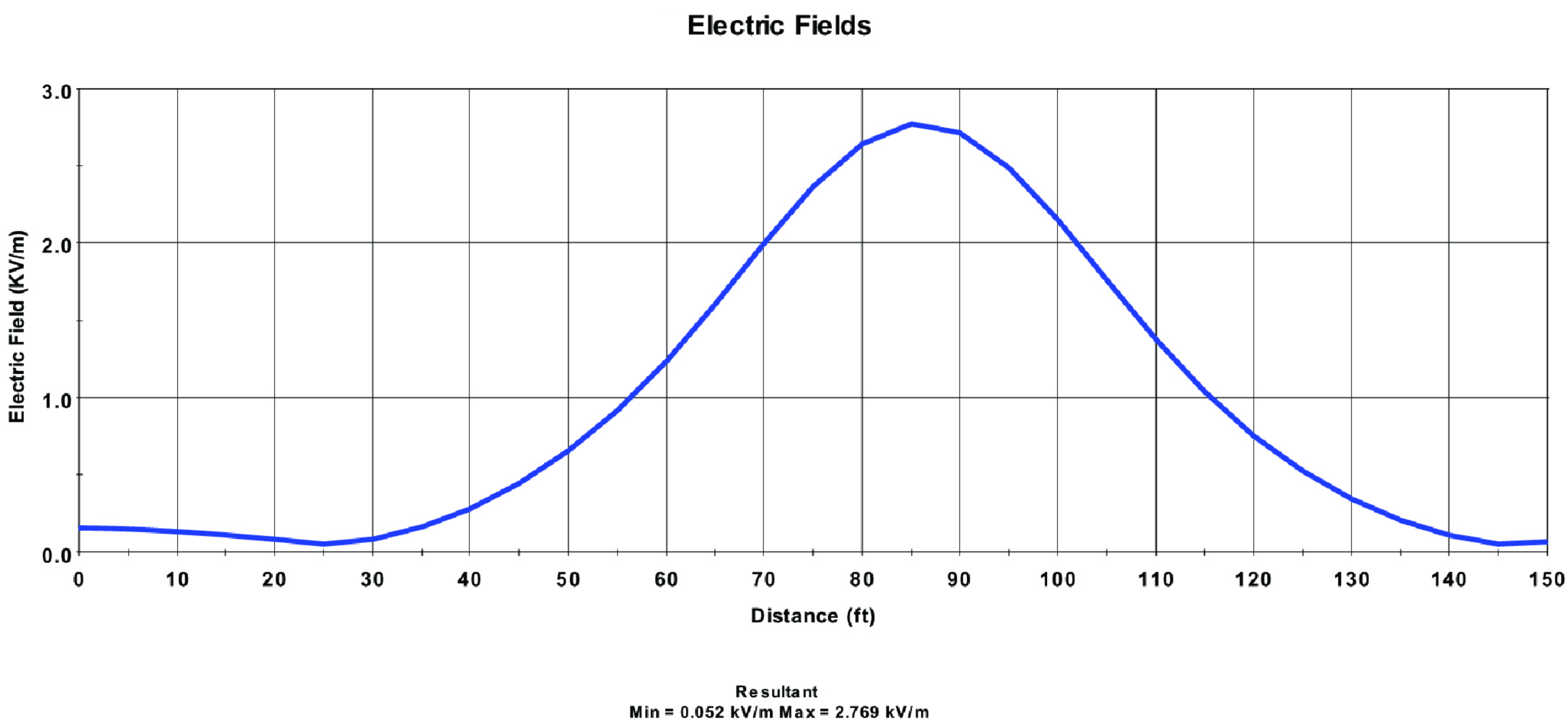

Project Location

Solar Millennium

AECOM

Ridgecrest Solar Power Project

Figure 5.14-3
220 kV Single Circuit
Electric Field

Project: 12944-003
Date: September 2009

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