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4.1 INTRODUCTION

IID proposes to build, own, and operate the Unit 3 Repower Project near the City of El Centro, within the boundary of IID's existing ECGS Site. The Project is intended to serve growing electrical load demands of the region. The following analysis is intended to evaluate the potential of transmission impacts during the construction and operational phases of this Project. This section discusses the transmission interconnection between the Project and the existing electrical grid. A SIS (see Appendix A, System Impact Study) has been conducted to reflect any impacts of the Project interconnection and operation on the electrical grid.

4.2 TRANSMISSION SYSTEM

The new CTG will generate power at 13.8 kV and will utilize a GSU transformer to increase the voltage to 92 kV to interconnect to the El Centro Switching Station. The existing ECGS Unit 3 STG will continue to utilize its existing GSU transformer and overhead connection to the existing El Centro Switching Station. The existing 92-kV system is a robust system with adequate capacity for the additional Unit 3 CTG interconnection.

The Project interconnects with the existing 92-kV portion of the El Centro Switching Station (the 92-kV Yard) via an overhead line at an approximate length of 2,350 feet and height of 50 to 80 feet. The interconnection facilities are entirely within the existing ECGS Site. The interconnect route will start at the high voltage side of the GSU and connect to a circuit breaker. On the line side of the circuit breaker the interconnection will be monitored by a three-phase potential transformer. The interconnection proceeds west via an A-frame structure, then north around an existing maintenance building, then east within the north boundary of the ECGS Site, then south to the existing El Centro Switching Station. Two existing 161-kV wood line poles that are currently close to the proposed path will be re-located to the east to maintain required line-to-line clearances (see Figure 2-2, ECGS Unit 3 Repower Project Components). The interconnection will terminate at a spare position in the double-breaker, double-bus structure east of the existing CTG position 2-2 (see Figure 4-1, 92 kV Elevations and Details Bay 6). The new position 3-2 will be isolated by two circuit breakers and monitored by a single-phase potential transformer. The 3-2 position protective relays and control instrumentation will be located on a new panel within the existing El Centro Switching Station control building.

4.3 INTERCONNECTION SYSTEM IMPACT STUDY

IID commissioned an SIS to investigate the 84 MW re-powering of El Centro Unit 3 by the summer of 2009. The study investigated the impact of the generation connected at the existing 92 kV El Centro Switching Station. Sensitivity cases were created to review (1) any impacts associated with the maximum existing IID generation and the new Project, and (2) generation proposed in the interconnection queue to the IID transmission system.

This SIS included power flow, stability, and short circuit impacts to both the IID transmission system and the interconnected transmission system. The 2009 summer heavy load case was used as the basis for the SIS. The new resource was scheduled directly to IID as a network resource serving IID loads.

The interconnection of the Project to the existing 92-kV Yard was found to have no significant impact on the IID system. In addition, the Project does not have significant impact on neighboring transmission systems as shown by the minimal change to IID's tie-lines.

The stability analysis concluded the addition of the Project had no significant impacts on the IID or neighboring transmission systems.

The short-circuit analysis found that no Project interrupting capability rating violations would occur due to the increase in short-circuit duties resulting from the generator addition. The incremental impact of the Project on short-circuit levels at the interconnection busses was very minimal and no Project interrupting capability rating violations are anticipated on neighboring utility systems.

In summary, based upon the results of the SIS, the Project configuration will not adversely affect the IID transmission or the interconnected regional transmission system.

4.4 TRANSMISSION LINE SAFETY AND NUISANCE

This section discusses safety and nuisance issues associated with the electrical interconnection of the Project.

4.4.1 Aviation Safety

Federal Aviation Administration (FAA) Regulations, Part 77, establish standards for determining obstructions in navigable airspace and set forth requirements for notification of construction. These regulations require FAA notification for any construction over 200 feet high (above ground level). In addition, notification is required if the obstruction is lower than specified heights and falls within any restricted airspace in the approaches to airports. For airports with runways longer than 3,200 feet, the restricted space extends 20,000 feet (3.3 nautical miles) from the runway. For airports with runways less than 3,200 feet, the restricted space extends 10,000 feet (1.7 nautical miles). For heliports, the restricted space extends 5,000 feet (0.8 nautical mile).

Since the new structures will be less than 200 feet tall, and there are no public or military airports or heliports near enough for the Project Site to fall within restricted airspace, an FAA air navigation hazard review will not be necessary. The new interconnection structures will pose no threat to aviation safety.

4.4.2 Electrical Clearances

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 the safe operation of the line. The safety clearance required around the conductors is determined by normal operating voltages, conductor temperatures, short-term abnormal voltages, windblown swinging conductors, contamination of the insulators, clearances for workers, and clearances for public safety. Minimum clearances are specified in the California Public Utility Commission (CPUC) General Order (GO) 95. Typically, clearances are specified for the following:

- Distances between energized conductors.

- Distances between energized conductors and supporting structures.
- Distances between 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.
- Distances from energized conductors to the ground and other features such as roadways, railroads, driveways, parking lots, navigable waterways, airports, etc.
- Distances from energized conductors and buildings and signs.
- Distances from energized conductors and other parallel power lines.

The Project design will satisfy all of the above criteria.

4.4.3 Audible Noise and Radio Interference

Corona may result in the production of audible noise from a transmission line. Corona is a function of the voltage of the line, the 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. Corona typically becomes a concern for transmission lines having voltages of 345 kV or more. Since the Project will be connected at 92 kV, it is expected that no corona-related design issues will be encountered, and that the construction and operation of the Project will not result in any significant increase in audible noise or radio interference.

4.4.4 Induced Currents and Hazardous/Nuisance Shocks

The 92-kV transmission interconnection will be designed and constructed in conformance with CPUC GO 95 and Title 8 CCR 2700 requirements. Therefore, hazardous shocks are unlikely to occur as a result of Project construction or operation.

4.4.5 Electric and Magnetic Fields

Operating power lines, like the energized components of electrical motors, home wiring, lighting, and all other electrical appliances, produce an electromagnetic field (EMF). EMF produced by the AC electrical power system in the United States has a frequency of 60 Hz, meaning that the intensity and orientation of the field changes 60 times per second.

Considerable research has been conducted over the past 30 years on the possible biological and human health effects from EMF. This research has produced many studies that offer no uniform conclusions about potential harm of long-term exposure to EMF. In the absence of conclusive or evocative evidence, California has chosen not to specify maximum acceptable levels of EMF. Instead, California mandates a program of prudent avoidance whereby EMF exposure to the public is minimized by encouraging electric utilities to use low-cost techniques to reduce EMF levels. The construction and operation of the Project will not result in any significant increase in EMF levels.

4.5 LAWS, ORDINANCES, REGULATIONS, AND STANDARDS

LORS for design and construction, electric and magnetic fields, hazardous shock, communications interference, aviation safety, and fire hazard are presented in the sections below.

4.5.1 Design and Construction

Table 4.5-1, Design and Construction LORS, lists the applicable LORS for the design and construction of transmission lines and substations.

TABLE 4.5-1
DESIGN AND CONSTRUCTION LORS

LORS	Applicability
Title 8 CCR, Section 2700 et seq. "High Voltage Electrical Safety Orders"	Establishes essential requirements and minimum standards for installation, operation, and maintenance of electrical installation and equipment to provide practical safety and freedom from danger.
GO-52, CPUC, "Construction and Operation of Power and Communication Lines"	Applies to the design of facilities to provide or mitigate inductive interference.
ANSI/IEEE 693, "IEEE Recommended Practices for Seismic Design of Substations"	Recommends design and construction practices.
IEEE 1119, "IEEE Guide for Fence Safety Clearances in Electric-Supply Stations"	Recommends clearance practices to protect persons outside the facility from electric shock.
IEEE 998, "Direct Lightning Strike Shielding of Substations"	Recommends protections for electrical system from direct lightning strikes.
IEEE 980, "Containment of Oil Spills for Substations"	Recommends preventions for release of fluids into the environment.

Notes:
ANSI = American National Standards Institute
CCR = California Code of Regulations
CPUC = California Public Utilities Commission
IEEE = Institute of Electrical & Electronics Engineers
LORS = laws, ordinances, regulations, and standards

4.5.2 Electric and Magnetic Fields

The applicable LORS pertaining to EMF interference are tabulated in Table 4.5-2, Electric and Magnetic Field LORS.

TABLE 4.5-2
ELECTRIC AND MAGNETIC FIELD LORS

LORS	Applicability
Decision 93-11-013, CPUC	CPUC position on EMF reduction.
GO-131-D, CPUC, "Rules for Planning and Construction of Electric Generation, Line, and Substation Facilities in California"	CPUC construction Application requirements, including requirements related to EMF reduction.
ANSI/IEEE 644-1994, "Standard Procedures for Measurement of Power Frequency Electric and Magnetic Fields from AC Power Lines"	Standard procedure for measuring EMF from an electric line that is in service.

Notes:
AC = alternating current
ANSI = American National Standards Institute
CPUC = California Public Utilities Commission
EMF = electromagnetic field
IEEE = Institute of Electrical & Electronics Engineers
LORS = laws, ordinances, regulations, and standards

4.5.3 Hazardous Shock

Table 4.5-3, Hazardous Shock LORS, lists LORS regarding hazardous shock protection that apply to the Project.

TABLE 4.5-3
HAZARDOUS SHOCK LORS

LORS	Applicability
8 CCR 2700 et seq. "High Voltage Electrical Safety Orders"	Establishes essential requirements and minimum standards for installation, operation, and maintenance of electrical equipment to provide practical safety and freedom from danger.
ANSI/IEEE 80, "IEEE Guide for Safety in AC Substation Grounding"	Presents guidelines for assuring safety through proper grounding of AC outdoor substations.
NESC, ANSI C2, Section 9, Article 92, Paragraph E; Article 93, Paragraph C	Covers grounding methods for electrical supply and communications facilities.

Notes:
AC = alternating current
ANSI = American National Standards Institute
CCR = California Code of Regulations
IEEE = Institute of Electrical & Electronics Engineers
LORS = laws, ordinances, regulations, and standards
NESC = National Electrical Safety Code

4.5.4 Communications Interference

The applicable LORS pertaining to communication interference are tabulated in Table 4.5-4, Communications Interference LORS.

TABLE 4.5-4
COMMUNICATIONS INTERFERENCE LORS

LORS	Applicability
47 CFR 15.25, "Operating Requirements, Incidental Radiation"	Prohibits operations of any device emitting incidental radiation that causes interference to communications; the regulation also requires mitigation for any device that causes interference.
GO-52, CPUC	Covers all aspects of the construction, operation, and maintenance of power and communication lines and specifically applies to the prevention or mitigation of inductive interference.
CEC staff, Radio Interference and Television Interference (RI-TVI) Criteria (Kern River Cogeneration) Project 82-AFC-2, Final Decision, Compliance Plan 13-7	Prescribes the CEC's RI-TVI mitigation requirements, developed and adopted by the CEC in past citing cases.

Notes:
CEC = California Energy Commission
CFR = Code of Federal Regulations
CPUC = California Public Utilities Commission
LORS = laws, ordinances, regulations, and standards

4.5.5 Aviation Safety

Table 4.5-5, Aviation Safety LORS, lists the aviation safety LORS that may apply to the proposed construction and operation of the Project.

TABLE 4.5-5
AVIATION SAFETY LORS

LORS	Applicability
Title 14 CFR, Part 77, "Objects Affecting Navigable Airspace"	Describes the criteria used to determine whether a "Notice of Proposed Construction or Alteration" (NPCA, FAA Form 7460-1) is required for potential obstruction hazards.
FAA Advisory Circular No. 70/7460-1G, "Obstruction Marking and Lighting"	Describes the FAA standards for marking and lighting of obstructions as identified by FAA Regulations Part 77.
PUC, Sections 21656-21660	Discusses the permit requirements for construction of possible obstructions in the vicinity of aircraft landing areas, in navigable airspace, and near the boundary of airports.

Notes:
CFR = Code of Federal Regulations
FAA = Federal Aviation Administration
LORS = laws, ordinances, regulations, and standards
NPCA = National Parks Conservation Association
PUC = Public Utilities Commission

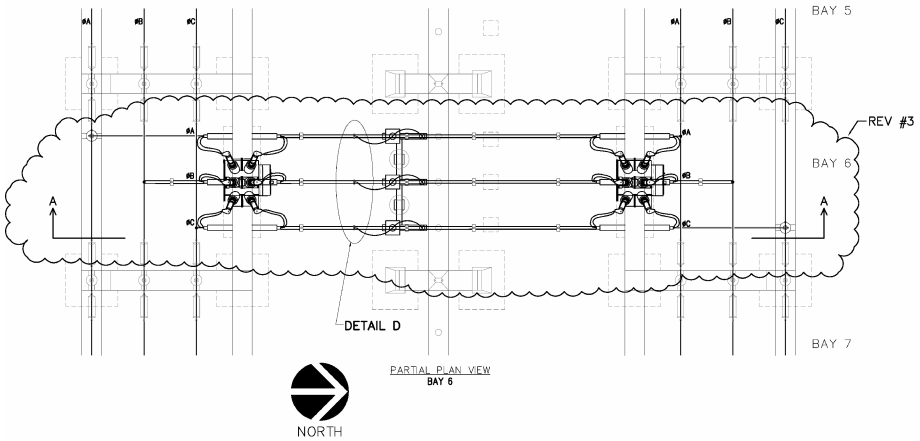
4.5.6 Fire Hazards

Table 4.5-6, Fire Hazard LORS, tabulates the LORS governing fire hazard protection for the Project.

TABLE 4.5-6
FIRE HAZARD LORS

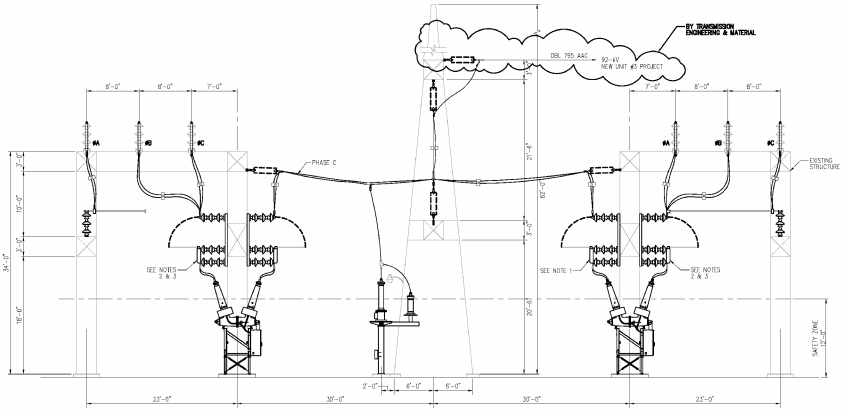
LORS	Applicability
14 CCR Sections 1250-1258, "Fire Prevention Standards for Electric Utilities"	Provides specific exemptions from electric pole and tower firebreak and electric conductor clearance standards, and specifies when and where standards apply.
ANSI/IEEE 80, "IEEE Guide for Safety in AC Substation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

Notes:
AC = alternating current
ANSI = American National Standards Institute
CCR = California Code of Regulations
CPUC = California Public Utilities Commission
IEEE = Institute of Electrical & Electronics Engineers
LORS = laws, ordinances, regulations, and standards

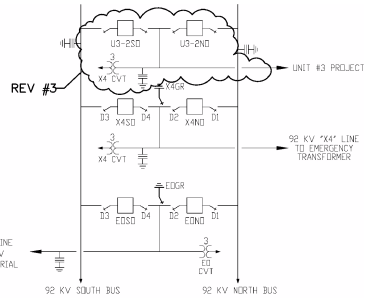


PARTIAL PLAN VIEW
BAY 6

NORTH



SECTION A–A'
BAY 6



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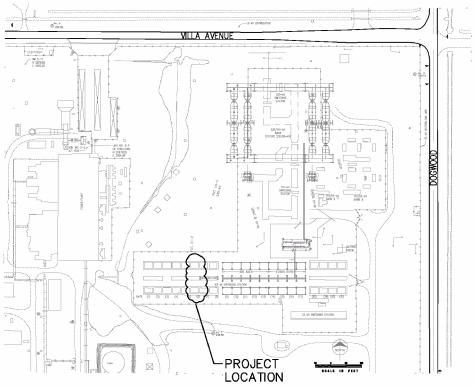

92 kV Elevations and Details Bay 6

El Centro Unit 3 Repower Project
Imperial Irrigation District

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FIGURE 4-1