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Application for Certification

AES Highgrove Project

submitted to

California Energy Commission

submitted by AES Highgrove, LLC,
a wholly owned subsidiary of the AES Corporation

May 2006

The Global Power Company
Lighting up California

Volume 1

EY042006001SAC

Highgrove, LLC

May 25, 2006

Mr. B.B. Blevins
Executive Director
California Energy Commission
1516 Ninth Street
Sacramento, CA 95814-5512

Dear Mr. Blevins:

In accordance with the provisions of Title 20, California Code of Regulations, AES Highgrove, LLC (AES Highgrove) hereby submits this Application for Certification seeking authority to construct and operate the AES Highgrove Project, a 300 megawatt, natural gas-fired power plant to be located in the City of Grand Terrace, California.

As an officer of AES Highgrove, LLC, I hereby attest, under penalty of perjury, that the contents of this application are truthful and accurate to the best of my knowledge.

Dated this 25th day of May, 2006.

Sincerely,

Julie Way
President
AES Highgrove, LLC

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Appendices

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Acronyms and Abbreviations

$\mu g/m^3$	micrograms per cubic meter
°F	degree Fahrenheit
AC	alternating current
ACHP	Advisory Council on Historic Preservation
AFC	Application for Certification
afy	acre-feet per year
AGS	Alamitos Generating Station
AHPA	Archaeological and Historic Preservation Act
ANSI	American National Standards Institute
APE	Affected Project Environment
API	American Petroleum Institute
APLIC	Avian Power Line Interaction Committee
ASME	American Society of Mechanical Engineers
B.P.	before present
BAAQMD	Bay Area Air Quality Management District
BACT	best available control technology
BMPs	best management practices
BNSF	Burlington Northern Santa Fe
BOE	Board of Education
CAAQS	California Ambient Air Quality Standards
Cal-OSHA	California Occupational Safety and Health Administration
Caltrans	California Department of Transportation
CARB	California Air Resources Board
CBC	California Building Code
CCR	California Code of Regulations
CDC	California Department of Conservation
CDFG	California Department of Fish and Game

CDOGGR	California Division of Oil, Gas and Geothermal Resources
CDPD	cellular digital pocket data
CEC	California Energy Commission
CEDD	California Employment Development Department
CEM	continuous emission monitor
CEQA	California Environmental Quality Act
CESA	California Endangered Species Act
CFR	Code of Federal Regulations
CHP	California Highway Patrol
CHRIS	California Historical Resources Information System
CHU	Critical Habitat Unit
CJUSD	Colton Joint Unified School District
CNDDB	California Natural Diversity Data Base
CNEL	Community Noise Equivalent Level
CNPS	California Native Plant Society
CO	carbon monoxide
CPM	Compliance Project Manager
CPUC	California Public Utilities Commission
CRHR	California Register of Historical Resources
CRS	Cultural Resources Specialist
CSC	California species of special concern
CTG	combustion turbine generator
CUPA	Certified Unified Program Agency
CVC	California Vehicle Code
CWA	Clean Water Act
dB	decibels
dBA	decibels, A-weighted
DC	direct current
DCS	distributed control system
DLE	dry low emissions

DLN	dry low-NO_x
DOF	Department of Finance
EAF	equivalent availability factor
EDBR	Economic Development Background Report
EDI	electro deionization
EDPSG	Economic Development/Public Services Group
EIR	Environmental Impact Review
EMF	electromagnetic field
EMWD	Eastern Municipal Water District
ERPG	Emergency Response Planning Guideline
ERPG-2	Maximum airborne concentration below which nearly all individuals could be exposed for up to 2 hours without developing irreversible or serious health effects
FAA	Federal Aviation Administration
FEMA	Federal Emergency Management Agency
FESA	Federal Endangered Species Act
FMMP	Farmland Mapping and Monitoring Program
g	gravity
$g/m^2/year$	grams per square meter per year
GO	General Order (of CPUC)
gpd	gallons per day
gpm	gallons per minute
GWh	gigawatt hours
HBGS	Huntington Beach Generating Station
HCP	Habitat Conservation Plan
HDD	horizontal directional drilling
HHV	higher heating value
HSP	Health and Safety Plan
Hz	hertz
I-215	Interstate 215
I/O	input/output

km	kilometer
kV	kilovolt
kV/m	kilovolts per meter
L_{90}	noise level that is exceeded during 90 percent of the measurement period
L_{eq}	equivalent noise level
L_n	percentile noise level
LO/TO	lock-out/tag-out
LORS	laws, ordinances, regulations, and standards
LOS	level of service
m	meter
mA	milliamperes
MEI	Maximum Exposed Individual
MEIR	Maximum Exposed Individual—Resident
MEIW	Maximum Exposed Individual—Worker
mG	milligauss
mg/kg	milligrams per kilogram
mg/L	milligrams per liter
mgd	million gallons per day
MLD	Most Likely Descendant
Mmax	maximum moment magnitude
MMBtu/hr	million British thermal units per hour
mph	miles per hour
MRZ	Mineral Resource Zone
MSA	Metropolitan Statistical Area
MSDS	Material Safety Data Sheets
MSHCP	Multi Species Habitat Conservation Plan
MUTCD	Manual of Uniform Traffic Control Devices
MW	megawatt
NAAQS	National Ambient Air Quality Standards
NAHC	Native American Heritage Commission

NCCP	Natural Communities Conservation Plan
NFPA	National Fire Protection Association
NH_3	ammonia
NHPA	National Historic Preservation Act
NO_x	oxides of nitrogen
NPCA	Notice of Proposed Construction or Alteration
NPDES	National Pollutant Discharge Elimination System
NRCS	Natural Resources Conservation Service
NRHP	National Register of Historic Places
NSCR	non-selective catalytic reduction
NWP	Nationwide Permit
O&M	operations and maintenance
OAC	Outdoor Adventures Center
OCA	offsite consequence analysis
OEHHA	Office of Environmental Health Hazard Assessment
OSD	Official Soil Descriptions
OSHA	Occupational Safety and Health Act
PAH	polycyclic aromatic hydrocarbons
PCS	plant control system
PEIR	Programmatic Environmental Impact Report
PGA	peak ground acceleration
PM_{10}	particulate matter less than 10 microns in equivalent diameter
PPE	personal protective equipment
ppm	parts per million
ppmvd	parts per million by volume, dry
PRC	Public Resources Code
PRMMP	Paleontological Resources Monitoring and Mitigation Plan
RCRMC	Riverside County Regional Medical Center
REL	reference exposure level
RHWC	Riverside Highland Water Company

RI-TVI	radio interference and television interference
RIX	Rapid Infiltration and Extraction
RMP	Risk Management Plan
RO	reverse osmosis
ROG	reactive organic gases
ROW	right-of-way
RPA	Registered Professional Archaeologist
RTA	Riverside Transit Agency
RTP	Regional Transportation Plan
RUSLE2	Revised Universal Soil Loss Equation
RWQCB	Regional Water Quality Control Board
S&HC	Street and Highways Code
SAA	Streambed Alteration Agreement
SARI	Santa Ana Regional Interceptor
SAWPA	Santa Ana Watershed Project Authority
SBMWD	City of San Bernardino Municipal Water Department
SCADA	Supervisory Control and Data Acquisition
SCAG	Southern California Association of Governments
SCAQMD	South Coast Air Quality Management District
SCE	Southern California Edison
SCR	selective catalytic reduction
SHPO	State Historic Preservation Officer
SLR	San Luis Rey
SMS	Safety Management System
SNA	Significant Natural Area
SNCR	selective non-catalytic reduction
SO_2	sulfur dioxides
SoCalGas	Southern California Gas Company
SVP	Society of Vertebrate Paleontology
SWPPP	Stormwater Pollution Prevention Plan

SWRCB	State Water Resources Control Board
TDS	total dissolved solids
TMP	Traffic Management Plan
TSP	total suspended particulate matter
U2A	EC&C Technologies Incorporated Urea to Ammonia system
UCR	University of California at Riverside
UPRR	Union Pacific Railroad
USACE	U.S. Army Corps of Engineers
USC	United States Code
USEPA	U.S. Environmental Protection Agency
USFWS	U.S. Fish and Wildlife Service
USNPS	U.S. Department of the Interior, National Park Service
VOC	volatile organic compound
WATCH	Work Area Traffic Control Handbook
WEAP	worker environmental awareness program
WEAT	worker environmental awareness training
WGCEP	Working Group on California Earthquake Potential
WMWD	Western Municipal Water District
WQCP	Water Quality Control Plant
WRP	Water Reclamation Plant
WWTP	Wastewater Treatment Plant

SECTION 1.0

Executive Summary

1.1 Introduction

AES Highgrove, LLC (AES) proposes to construct, own, and operate an electrical generating plant in the City of Grand Terrace, San Bernardino County, California. The AES Highgrove Project (Highgrove Project) will be a natural gas-fired, simple-cycle, peaking facility rated at a nominal net generating capacity of 300 megawatts (MW).

This Application for Certification (AFC) for the Highgrove Project has been prepared in accordance with the California Energy Commission's (CEC's) Power Plant Site Certification Regulations (August 2000). This Executive Summary provides an overview of the Project in accordance with Appendix B, Section (a) of the regulations and includes figures taken from other sections of this AFC.

This AFC includes:

- A detailed description of the proposed Project
- An assessment of the Project's potential impacts on the existing environment
- Measures to mitigate Project impacts to assure that environmental issues are properly and responsibly addressed
- A discussion of compliance with applicable laws, ordinances, regulations, and standards (LORS) provided within the project description and each resource section

1.2 Project Overview

The proposed Highgrove Project will be a natural gas-fired, simple-cycle electrical generating facility rated at a nominal net generating capacity of 300 megawatts (MW). The facility will be located at 12700 Taylor Street, in an industrially zoned area in the City of Grand Terrace, San Bernardino County.

The proposed project will be located on property that was once part of Southern California Edison's (SCE's) former Highgrove Generating Station. The Generating Station was constructed in the 1950s and consists of four thermal generating units with a combined nominal capacity of 154 MW, cooling towers, boilers, tanks, and associated equipment. The station initially used both fuel oil and natural gas for fuel supply. Three large fuel oil storage tanks were located north of the generating equipment.

The project will consist of demolition of the existing plant, which is currently idle, and construction of the new Highgrove Project. The new facility will be located on a new 9.8 acre parcel that will include the area formerly occupied by the fuel oil storage tanks (Tank Farm Property) and a portion of the property currently occupied by the generating station equipment (Generating Station Property).

The Highgrove Project will have the following design features:

- Three GE Energy LMS100 combustion turbine generators (CTGs)
- Three two-cell mechanical draft cooling towers to increase gas turbine performance
- State-of-the-art emissions control systems consisting of selective catalytic reduction (SCR) and carbon monoxide (CO) catalysts and water-injected combustors
- Approximately 600 feet (mid-point to mid-point) of new 115-kV transmission line for interconnection to the adjacent Highgrove Substation, located within the current power plant boundaries
- Approximately 7 miles of new 12-inch diameter natural gas pipeline
- Extension of the existing potable water system for approximately 1,300 feet to provide potable water and fire protection to the facility using a line size up to 12 inches diameter
- The proposed cooling water supply source for the project will be water supplied by existing onsite wells, which were used by the former Generating Station.

Figure 1.1-1 shows the location of the project within the project vicinity. Figure 1.1-2 shows the project site and proposed routes for the gas line and potable water line. An aerial photograph showing the appearance of the site prior to construction is presented as Figure 1.1-3. An artist's rendering of the plant and transmission lines after construction is presented as Figure 1.1-4.

1.3 Project Ownership

AES Highgrove, LLC, is a wholly owned subsidiary of The AES Corporation. AES is a global power generation and distribution company, with over 30,000 employees and 123 power generation facilities.

Ownership of the Highgrove Project facility and transmission lines will be by AES Highgrove, LLC. As is consistent with SoCalGas' practice and CPUC law and regulation, the new natural gas pipeline constructed to serve the facility will be owned by SoCalGas. The potable water line will be owned by Riverside Highland Water Company, the local water purveyor for the City of Grand Terrace.

1.4 Facility Location

The plant site will be located at 12700 Taylor Road in Grand Terrace, California. The parcel is located in Section 6, Township 2 South, Range 4 West (San Bernardino South 7.5-minute Quadrangle). Parcel numbers and the names of the landowners within 1,000 feet of the site and within 500 feet of the linear corridors are included in Appendix 1B.

AES currently owns the Generating Station Property (Assessor's Parcel No. 1167-151-67-0000) through a wholly-owned subsidiary, Riverside Canal Power Company. The Tank Farm Property (the south portion of Assessor's Parcel No.1167-151-63-1000) is currently under different ownership, having been sold by SCE to the City of Grand Terrace Redevelopment

Agency after removal of the oil storage tanks. Both land owners have an agreement to "exchange" parcels for mutual benefit: AES prefers the new facility be constructed with a greater setback from the road and the Redevelopment Agency prefers land with more developable frontage. The agreement provides that AES will remove existing equipment from the Generating Station Property. Once these demolition activities are complete, the Redevelopment Agency may, at its option, elect to take title to the Generating Station Property or be compensated in full for the Tank Farm Property. The Agreement further provides for a parcel line split and lot line adjustment such that the parties each retain title to a parcel of comparable size to the one they began with. After these changes, AES will own a 9.8-acre parcel, on which the new facility will be constructed.

1.4 Project Schedule

AES is filing this AFC under the CEC's 12-month licensing process. Demolition activities would begin immediately after: 1) obtaining the license, assuming the project receives a license by the second quarter of 2007; 2) executing a power purchase agreement with a energy retail provider; and 3) completing project financing. Construction and demolition activities are expected to take approximately 15 months. Based on this schedule, pre-operational testing would be expected to commence in the second quarter of 2008, and commercial operation is expected to commence by third quarter 2008.

1.5 Project Alternatives

A "No Project" alternative was considered and rejected. The no project alternative fails to meet the basic project objectives as described in this AFC. In addition, the "No Project" alternative could result in greater fuel consumption and air pollution in the state because older, less-efficient plants with higher air emissions might be used to generate power instead of being replaced with cleaner, more-efficient plants such as the Highgrove Project. In addition, the Highgrove Project would produce power in an area of Southern California that has experienced high demand growth; therefore, increasing grid reliability and reducing dependence on imported power to serve the region's needs. Alternative routes for the natural gas line were also reviewed and found to be less acceptable than the proposed route.

A main objective of the project was to use a site currently adapted to power plant use, to maximize use of existing infrastructure and minimize the distance required for transmission interconnection. Therefore, an evaluation of alternative sites focused on properties in close proximity to the existing Highgrove Substation and within the former SCE Highgrove Generating Station property boundaries. An evaluation of alternative sites within the former Generating Station boundaries was conducted and concluded that the preferred project site would allow the project to be constructed with greater setback from Taylor Street and below existing street grade, reducing the project's visibility.

An alternative water supply analysis was conducted and concluded that there is currently no feasible alternative to using the existing onsite wells for power plant cooling. The analysis studied potential recycled water sources and impaired water sources. In addition to alternative water supply options, an analysis of dry cooling was studied and found to be infeasible.

Several alternative generating technologies were reviewed in a process that led to the selection of a modern, proven, combustion turbine simple-cycle arrangement for Highgrove using natural gas for fuel. The alternative technologies included conventional oil and natural-gas-fired plants, combined-cycle combustion turbines, biomass-fired plants, waste-to-energy plants, solar plants, wind-generation plants, and others. None of these technologies are feasible alternatives to the simple-cycle technology selected for Highgrove. A complete discussion of project alternatives is presented in Section 9.0 along with natural gas pipeline alternatives, and water supply alternatives.

1.6 Environmental Considerations

Sixteen areas of possible environmental impact from the proposed project were investigated. Detailed descriptions and analyses of these areas are presented in Subsections 8.1 through 8.16 of this AFC. With the implementation of reasonable and feasible mitigation measures, there will be no significant environmental effects. The potential effects of some key areas typically of greater interest to CEC staff and public are summarized briefly in this section.

1.6.1 Air Quality

The site is located in an area designated as nonattainment for State and federal ozone air quality standards, and for State fine particulate matter (PM10) standards and a federal nonattainment area for CO (carbon monoxide). The South Coast Air Quality Management District (SCAQMD) has requested re-designation of CO to a status of attainment. An assessment of the impact to air quality was performed using detailed air dispersion modeling. The potential air impacts from the Highgrove Project will be mitigated by the installation and operation of Lowest Achievable Emission Rate/Best Available Control Technology (LAER/BACT) for the combustion turbines and cooling towers. Emission reduction credits (ERCs) have and will be obtained to offset increases in emissions of volatile organic compounds (VOCs), PM10 and CO (if required). RECLAIM Trading Credits (RTCs) will be provided to offset oxides of nitrogen (NOx) emissions. Offsets will be obtained from the SCAQMD Priority Reserve and/or from the SCAQMD bank, or from other sources such as shutdowns, or non-traditional sources of emission reduction credits. The combination of the detailed air quality modeling analyses and these mitigation measures will result in the project having no significant adverse impact on air quality. See Subsection 8.1, Air Quality, for a detailed analysis.

1.6.2 Alternative Water Supply

The Highgrove Project will be a peaking facility and, at the maximum expected annual capacity factor of 30 percent, is anticipated to use approximately 358 acre-feet per year of water for process and domestic water needs including cooling tower makeup, evaporative cooling, irrigation, NOx water injection and potable use. Unlike a combined-cycle power plant, the Highgrove Project will use a relatively small amount of water for power plant cooling. Approximately 60 percent (about 209 acre-feet per year) of the total amount of water required to generate electricity will be used for power plant cooling.

The CEC encourages the redevelopment of existing “brownfield” power plant sites compared to constructing a new plant on a site not previously used for power plant operations. Environmental benefits of this policy include replacement of old technologies with new, efficient, environmentally-friendly, generating technologies, siting plants in areas of existing industrial use, and location of power generation facilities near existing grid infrastructure and demand centers. While redevelopment of the former Generating Station offers these benefits, it also reduces the project's flexibility to site the plant near an existing recycled water service system.

Due to the lack of a feasible recycled or impaired water source to serve the Highgrove Project, water for cooling and operations will be provided by existing onsite wells that served historical power plant needs. AES is continuing to search for available and feasible alternatives to the use of the onsite wells. See Section 9.0, Alternatives for a detailed discussion of the alternative water supplies evaluated by AES.

1.6.3 Visual Resources

The most prominent features of the new Highgrove Project will be the exhaust stacks that will be 80 feet tall from the plant's base, which is approximately 10 feet below the grade of Taylor Street. The new project will include a berm, wall and landscaping to further reduce visibility from Taylor Street.

In addition, the Project will include demolition of the old generating station equipment. The existing generating station has an aged appearance and uses steam generation technology, which is characterized by tall prominent steel boiler structures and large cooling towers. The facility, built in the 1950s before Grand Terrace was incorporated, was constructed with minimal screening and minimal setback from Taylor Street. Therefore, demolition of the existing facility will improve the aesthetic environment along Taylor Street.

1.7 Key Benefits

The Highgrove Project results in the redevelopment of an existing "brownfield" power plant site, replacing aging and idle industrial equipment with a state-of-the art power generation facility. Specific benefits of the Highgrove Project include:

- Demolition of an aged facility and replacement with a modern facility with a less obtrusive visual presence. The project site has been selected to allow development farthest from the Taylor Street area.
- Replacement of an old, inefficient power generating facility with no environmental controls with a new facility having state-of-the-art emissions controls.
- Construction of an efficient, quick-start, peaking facility on a site currently adapted to power plant use
- Construction of a peaking facility in an area experiencing high demand growth, improving grid reliability and reducing dependence on imported power
- Use of an electricity generating technology that can generate power during times of peak demand, when other renewable resources such as wind turbines may be unable to produce electricity

- Minimal transmission line lengths resulting from siting the project adjacent to an existing substation
- Creation of up to 147 peak construction jobs
- Significant property tax revenues to both the City and the Redevelopment Agency

1.8 Persons Who Prepared the AFC

Persons with primary responsibility for the preparation of each section of this AFC are listed in Appendix 1D.

1.9 Laws, Ordinances, Regulations, and Standards (LORS)

Each section addresses the relevant LORS and addresses compliance with them.

1.10 Permitting Requirements

Each section provides a list of applicable federal, state, and local permits that would be required by each jurisdiction for the project.

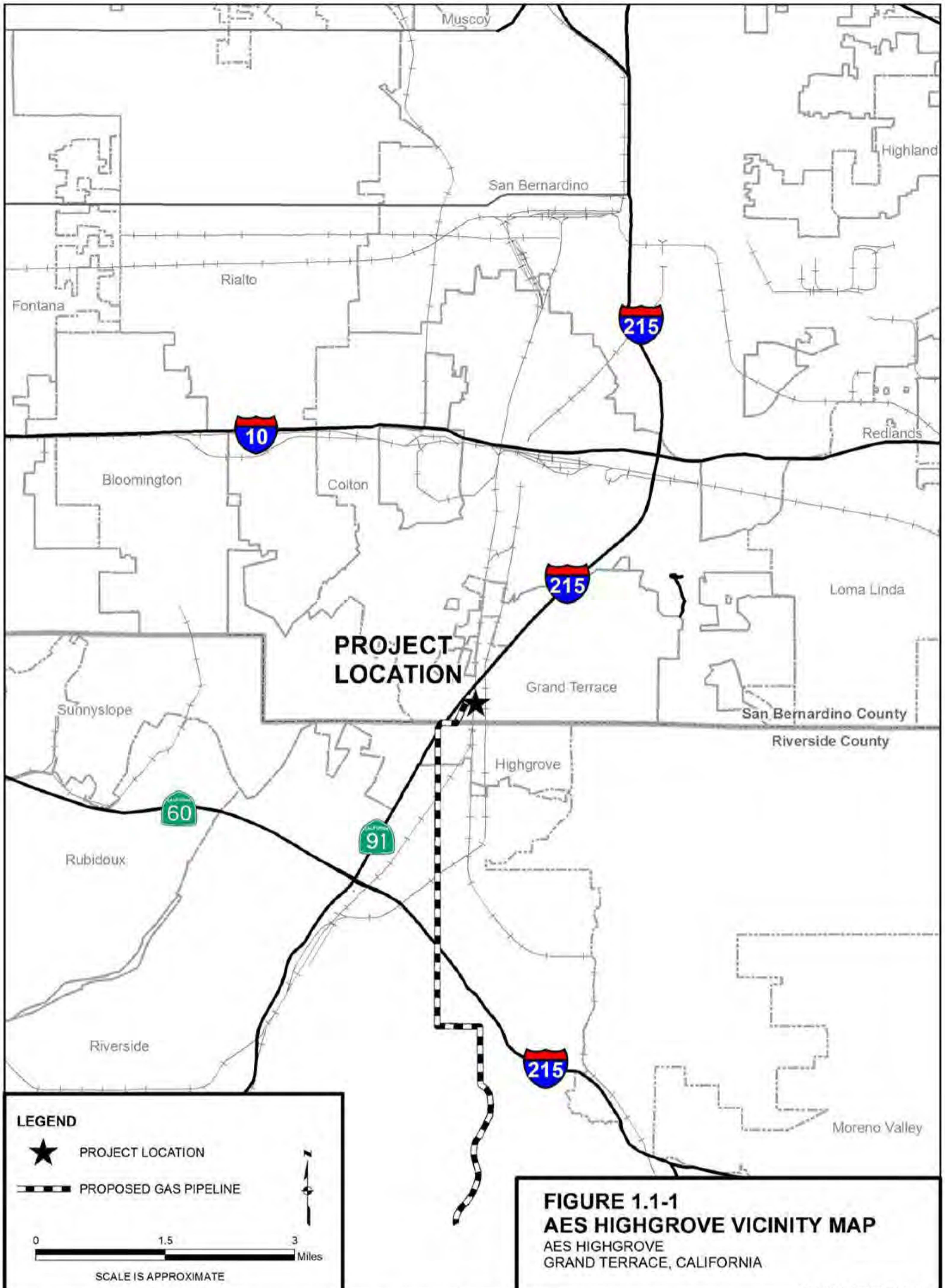

FIGURE 1.1-1
AES HIGHGROVE VICINITY MAP
AES HIGHGROVE
GRAND TERRACE, CALIFORNIA

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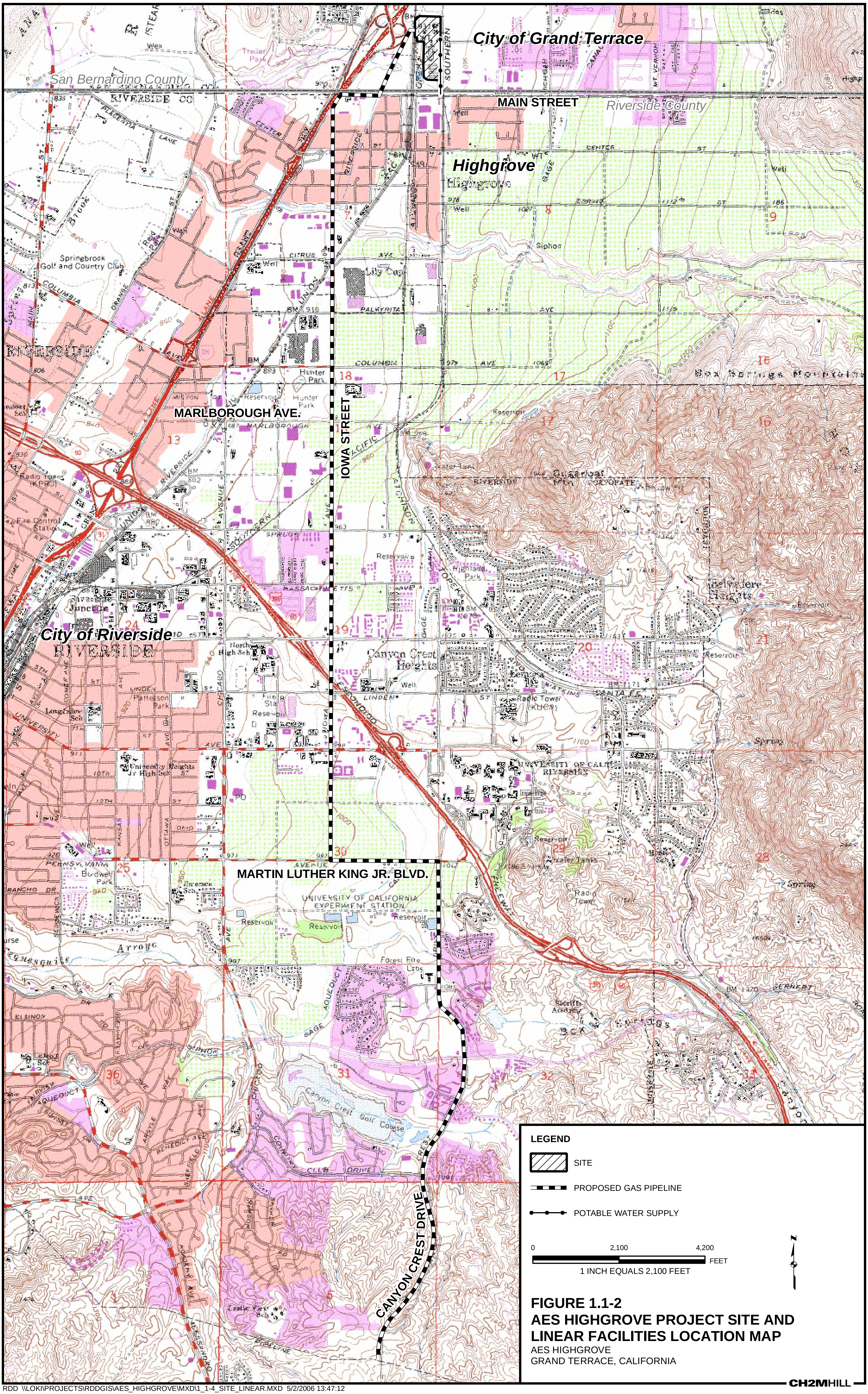

FIGURE 1.1-2
AES HIGHGROVE PROJECT SITE AND LINEAR FACILITIES LOCATION MAP
AES HIGHGROVE
GRAND TERRACE, CALIFORNIA

FIGURE 1.1-3
APPEARANCE OF
SITE BEFORE CONSTRUCTION
AES HIGHGROVE
GRAND TERRACE, CALIFORNIA

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FIGURE 1.1-4
APPEARANCE OF SITE AFTER CONSTRUCTION
AES HIGHGROVE
GRAND TERRACE, CALIFORNIA

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SECTION 2.0

Project Description

2.1 Introduction

The AES Highgrove Project will be a nominal 300-megawatt (MW) peaking facility consisting of three natural-gas-fired turbines and associated equipment. The facility will be located at 12700 Taylor Street, in an industrially zoned area in the City of Grand Terrace, San Bernardino County, on the site of a plant formerly owned by Southern California Edison (SCE). The project will consist of demolition of the existing plant and constructing the new Highgrove facility on property that was once used by the former generating station for fuel oil storage.

The plant will utilize 3 GE LMS100 simple cycle gas turbines for the project and high-efficiency emissions control technology to meet best available control technology (BACT) requirements. The GE LMS100 technology is approximately 10 percent more efficient than older gas turbine models typically used for peaking. These high efficiencies and associated environmental benefits, are achieved primarily through the addition of an intercooler to the gas turbine cycle. The intercooler requires a source of cooling water and a cooling tower to achieve maximum efficiency on hot days, although cooling water needs will be significantly less than that required for a combined cycle facility.

The project will include the following linear facilities:

- Approximately 600 feet (measured from center point to center point) of onsite electrical transmission lines to connect to SCE's electrical transmission system at the 115-kV Highgrove Substation, directly adjacent to the project
- Extension of the existing potable water system for approximately 1,300 feet to provide potable water and fire protection to the facility using a line size up to 12 inches diameter
- Construction of a 12-inch-diameter natural gas supply line, approximately 7 miles long
- Interconnection to an existing sewer line on Taylor Street for sanitary waste

AES Highgrove has performed a detailed review of available and future water supply alternatives for the project. At the present time, the only alternative considered feasible for process water supply needs is use of the existing onsite wells. At this time, there is inadequate information to confirm the availability, quality, quantity, duration, and impacts of any alternative supply that would support the project's objectives and the immediate need for peaking power in Southern California. AES Highgrove continues to work with local water agencies to evaluate alternative sources to the use of the onsite wells. A more detailed discussion of the alternatives considered is provided in Section 9.0, Alternatives.

Figure 2.1-1, located at the end of this section, shows the location of the Project Site, proposed natural gas supply line, and potable water supply line.

2.1.2 Project Site Overview

The new facility will be located on property that was once part of SCE's former Highgrove Generating Station, which was constructed in the 1950s. Equipment in the Highgrove Generating Station consisted of four thermal generating units with a nominal capacity of 154 MW (combined), cooling towers, boilers, tanks, and associated equipment. The station initially utilized both fuel oil and natural gas for fuel supply. The fuel oil storage tanks were located north of the generating equipment.

The existing plant, currently known as Riverside Canal Power Company, was used for peaking service before and during the 2000-2001 California power crisis. The plant was decommissioned shortly after being acquired by AES in 2001 due to the lack of environmental controls.

When the Highgrove Generating Station was under SCE ownership, different areas of the property were characterized by four general areas of activity:

- SCE's 115-kV electrical substation (Highgrove Substation)
- Generating equipment (boilers, steam turbine-generators, cooling towers and auxiliary equipment, etc.) and controls for the SCE 115-kV substation located in the generator control room (Generating Station Property)
- Fuel oil storage tanks (Tank Farm Property)
- Cage Park Property, a privately owned park used by SCE and its employees

Figure 2.1-2 shows the location of each of these areas. Activities associated with each area, with respect to this project, are described below.

2.1.2.1 Highgrove Substation

The 115-kV Highgrove Substation property is a 3.1-acre parcel owned by SCE and located west of the Generating Station equipment. The Substation is an integral part of the SCE-owned regional grid. Controls for the substation are located inside the control rooms of the existing Generating Station.

Before demolition of the existing plant can occur, the substation controls will need to be relocated. It is anticipated that the substation controls and associated telecommunications equipment will be housed in a new building located inside the existing substation boundaries to provide SCE with sole access to SCE's equipment.

The new facility will interconnect to the electrical grid using existing substation bays that will be vacated when the existing plant is demolished. Therefore, the only other project activity that will occur on the Substation property will be those activities associated with the interconnection of the new facility.

2.1.2.2 Generating Station Property

The Generating Station Property encompasses approximately 10.1 acres with frontage on Taylor Street. Equipment currently located on the Generating Station Property includes four small thermal units rated at 30 to 40 MW each, steam turbine-generators and condensers, control buildings, cooling towers, onsite wells for process and nonpotable domestic water supply, administration and maintenance building, storage tanks and fuel delivery equipment. The property is currently owned by a wholly owned subsidiary of AES and is currently operating as Riverside Canal Power Company.

Project activities associated with this property will include demolition of the existing equipment and grading to allow continued access from Taylor Street The existing plant includes some asbestos-insulated piping, and some steel outdoor structures painted with lead-based paint. Removal of these components will be handled by specialty-contractors authorized to perform necessary abatement activities in accordance with applicable laws, ordinances, regulations and standards (LORS). The majority of site demolition activities will include removal of steel structures and equipment which will either be recycled or taken to an appropriate offsite landfill. Demolition activities will include foundation removal and removal of underground piping. Refer to Subsection 8.13, Waste Management, for further discussion on demolition activities. A portion of the Generating Station Property will also be used for parking and laydown area during construction.

2.1.2.3 Tank Farm Property

The Tank Farm Property encompasses approximately 7.6 acres north of the Generating Station Property. At one time, three large storage tanks were located on the property to store fuel oil for the existing plant. When SCE sold the Generating Station property, the Tank Farm Property was excluded from the sale. The oil storage tanks were originally constructed approximately 10 feet below grade inside bermed areas. The fuel oil tanks were later removed from the Tank Farm Property by SCE, and the Tank Farm Property was sold to the City of Grand Terrace Redevelopment Agency, the current owner. All that remains on the vacant site are the berms that used to contain the storage tanks.

AES has entered into an agreement with the Redevelopment Agency to acquire the Tank Farm Property. The agreement provides that AES will remove existing equipment from the Generating Station Property. Once these demolition activities are complete, the Redevelopment Agency may, at its option, elect to take title to the Generating Station Property or be compensated in full for the Tank Farm Property. The Agreement further provides for a parcel line split and lot line adjustment such that the parties each retain title to a parcel of comparable size to the one they began with. After these changes, AES Highgrove will own a 9.8-acre parcel, on which the new facility will be constructed.

Construction of the proposed facility on the new Project Site allows the new facility to be constructed with greater setback from Taylor Street, offering the following benefits:

- Creation of a larger buffer area between the new facility and a proposed high school on the east side of Taylor
- The ability to construct the plant below-grade inside the bermed area, reducing any potential noise and visual impacts in the area
- The ability for the Redevelopment Agency to own a more developable parcel with much greater street frontage than the Tank Farm Property

2.1.2.4 Cage Park Property

Cage Park Property is a 6.5-acre parcel located south of the Generating Station Property. The property was used in the past by SCE as a privately owned park and is currently owned by AES. This property is not part of nor will be affected by the project.

2.1.3 Proposed High School

The Colton Joint Unified School District is proposing the acquisition of a 65-acre site for the construction and operation of High School #3 and adjunct educational facility (collectively, Grand Terrace Educational Facility) in the City of Grand Terrace. The Grand Terrace Educational Facility would be located with Taylor Street on the west, Michigan Street on the east and Main Street on the south. High School #3 is proposed to be a comprehensive high school for 3,000 students in grades 9-12. The school would include approximately 1,300 parking spaces for project students, staff, and visitors and would encompass the westernmost 55 acres of the site. The adjunct educational facility would encompass the easternmost 10 acres of the site at the corner of Michigan Avenue and Main Street. The adjunct facility would consist of approximately 45,000 square feet of space and approximately 100 parking stalls. It is assumed that at any given time during school operating hours, approximately 300 students and 85 staff members would be on this portion of the site. When the school is constructed, a portion of Pico Street, which currently intersects with Taylor Street, would be vacated or “dead-ended” near the existing Pico Park (Colton Joint Unified School District, 2005). The School District anticipates start of construction on the high school in the summer 2006, with classrooms in session by the fall of 2008.

2.2 Generating Facility Description, Design, and Operation

This subsection describes the facility’s conceptual design and proposed operation.

2.2.1 Site Arrangement and Layout

The site layout shown in Figure 2.2-1 and typical elevation views in Figure 2.2-2 illustrate the location and size of the proposed generating facility. Settled areas, parks, and recreational and scenic areas near the site and the proposed transmission line to the adjacent SCE substation are shown in Figure 2.2-3.

The site is located at 12700 Taylor Street, north of the intersection of Taylor and Main streets. Primary access to the site will be provided from Taylor Street at the approximate location used to access the existing Generating Station. A secondary entrance to the site will be provided on the north and will be accessible by public thoroughfare when the future Adventure Way is constructed by the City. (Refer to Subsection 8.4, Land Use for further information related to planned development in the vicinity.)

2.2.2 Process Description

The generating facility will consist of three GE Energy LMS100 natural-gas fired combustion turbine generators (CTGs), for a total nominal generating capacity of 300 MW. Each CTG will be equipped with water injection capability to reduce oxides of nitrogen (NO_x) emissions, selective catalytic reduction (SCR) equipment containing a catalyst to further reduce NOx emissions, and an oxidation catalyst to reduce carbon monoxide (CO) emissions. Auxiliary equipment will include an inlet air filter housing with an evaporative cooler, an intercooler, 2-cell mechanical-draft cooling tower (for each gas turbine), natural gas compressors, water storage tanks, generator step-up, auxiliary and station service transformers and an aqueous ammonia tank.

Each CTG will generate approximately 100 MW at summer design ambient conditions. The project is expected to have an annual capacity factor of approximately 15 to 30 percent, depending on dispatch by the power purchaser to meet customer loads. The generating facility heat balance is shown in Figures 2.2-4. This balance is based on an ambient dry bulb temperature of 80 degrees Fahrenheit (°F) (the expected annual average temperature for peaking operation) with evaporative cooling of the inlet combustion air.

Associated equipment will include emission control systems necessary to meet the proposed emission limits. NO_x emissions will be controlled to 3.5 parts per million by volume, dry basis (ppmvd) corrected to 15 percent oxygen with the combination of water injection in the CTGs and SCR systems in the catalyst housing. A CO catalyst will also be installed in the catalyst housing to limit CO emissions from the CTGs to 6 ppmvd at 15 percent oxygen. Ammonia slip will be limited to 5 ppm at 15 percent O_2.

2.2.3 Generating Facility Cycle

CTG combustion air flows through the inlet air filter and evaporative cooler and associated air inlet ductwork. The air is then compressed in the gas turbine low pressure compressor section and cooled in the gas turbine intercooler before entering the high pressure compressor. The cooled, compressed air then flows to the CTG combustor. Natural gas fuel is injected into the combustor section and ignited. Demineralized water is also injected into the combustor section to control NOx emissions. The hot combustion gases expand through the power turbine sections of the CTGs, causing them to rotate, which drives the electric generators and CTG compressors. Use of the intercooler in the gas turbine compression cycle reduces the energy required to compress the air and results in gross turbine generator efficiencies of approximately 44 percent. The hot combustion gases exit the turbine at approximately 770°F and enter the catalyst housing for exposure to the catalysts to reduce NOx and CO emissions, and exhaust to atmosphere via the exhaust stacks.

2.2.4 Combustion Turbine Generators

2.2.4.1 Combustion Turbine Generators

Electricity will be produced within the generating facility by three GE LMS100 CTGs. The major components of the CTGs are described below.

Thermal energy is produced in the CTGs through the combustion of natural gas, which is converted into mechanical energy required to drive the combustion turbine compressors and electric generators. The LMS100 gas turbine model integrates features of GE Energy's frame and aeroderivative CTG design systems. The low pressure compressor system is derived from the heavy duty frame engine system and the high pressure compressor, combustor and power turbine are derived from the aeroderivative system. Each CTG consists of a stationary combustion turbine generator and associated auxiliary equipment. The CTGs will be equipped with water injection capability to control NOx emissions formed in the combustion process. While GE anticipates future units will be capable of using steam injection and Dry Low Emissions (DLE) combustors, these design options are currently not available. Each CTG will also have a variable bleed valve vent that allows the venting of compressed air to the atmosphere under certain transient compressor operating conditions.

The CTGs will be equipped with the following required accessories to provide safe and reliable operation:

- Evaporative coolers
- Inlet air filters
- Metal acoustical enclosure
- Duplex shell and tube lube oil coolers for the turbine and generator
- Annular Combustor combustion system
- Compressor wash system
- Fire detection and protection system
- Compressor intercooler
- Hydraulic starting system
- Water injection system

The metal acoustical enclosure, which contains the CTGs and accessory equipment, will be located outdoors.

2.2.4.2 Catalyst Housing

The catalyst housings, one for each CTG, are equipped with SCR catalyst modules to further reduce emissions. The SCR emission control system will use vaporized aqueous ammonia in the presence of a catalyst to reduce NO_x in the exhaust gases of the combustion turbine. Diluted ammonia (NH_3) vapor will be injected into the exhaust gas stream via a grid of nozzles located upstream of the catalyst module. The subsequent chemical reaction will reduce NO_x to nitrogen and water, resulting in a NO_x concentration in the exhaust gas no greater than 3.5 ppmvd at 15 percent oxygen (on a 3-hour average basis). The ammonia slip will be limited to 5 ppm.

An oxidation catalyst will also be installed within the housing to control the concentration of CO in the exhaust gas emitted to atmosphere to no greater than 6 ppmvd at 15 percent oxygen. The exhaust from each housing will be discharged from individual 80-foot-tall, 12-foot diameter exhaust stacks.

2.2.5 Major Electrical Equipment and Systems

The bulk of the electric power produced by the facility will be transmitted to the power grid via the connection to the SCE-owned 115-kV Highgrove Substation. A small amount of electric power will be used onsite to power balance-of-plant auxiliaries such as pumps, natural gas compressors, cooling tower fans, control systems, and general facility loads including lighting, heating, and air conditioning. Some will also be converted from alternating current (AC) to direct current (DC), which is used as backup power for control systems and other uses.

Power will be generated by the 3 CTGs at 13.8 kV and stepped up by 3 transformers (generator step-up transformers) to 115 kV for connection to the grid. A fourth transformer (station service transformer) will be installed to start the CTGs using power fed from the grid. Once the units are running, they will serve the facility's auxiliary power needs. An overall single-line diagram of the facility's electrical system is shown on Figure 5.2-1. Each generator will be connected by an isolated-phase bus to fan-cooled step-up transformers that increase the voltage to 115 kV. Surge arresters will be provided at the high-voltage bushings to protect the transformers from surges on the 115-kV system caused by lightning strikes or other system disturbances. The transformers will be set on concrete pads within containment areas designed to contain the non-PCB transformer oil in the event of a leak, spill, or fire. Fire protection systems will also be provided. The high-voltage side of the step-up transformers will be connected to gas insulated (SF6) circuit breakers then to overhead cables approximately 300-900 feet long to the adjacent SCE 115-kV Highgrove Substation. From the substation, power will be transmitted to the grid via transmission lines owned by SCE. Section 5.0, Electrical Transmission, contains additional information regarding the electrical transmission system as well as a summary of the System Impact Study results.

2.2.6 Fuel System

The CTGs will be designed to burn natural gas only. Natural gas requirements at an ambient condition of 80ºF are approximately 850 million British thermal units per hour (MMBtu/hr), per unit, on a higher heating value (HHV) basis.

Natural gas will be delivered to the site via an underground pipeline. (Additional information about natural gas supply can be found in Section 6.0, Gas Supply.) The natural gas will flow through gas scrubber/filtering equipment, gas compressors, a gas pressure control station, and a flow-metering station prior to entering the combustion turbines. The gas company-owned metering station will be located onsite.

Historical data indicates that the pressure at SCE's Line 2001 is expected to vary between 350 and 575 psig. Due to a high air compression ratio, the GE LMS100 unit requires a pressure at the turbine connection of 960 psig, plus or minus 20 psig. Three electric motor-driven gas compressors will be used to boost the pressure to the level required by the gas turbine. The compressors may be located within acoustically treated sound walls or a building, as required to meet noise criteria. (Refer to Subsection 8.05, Noise, for additional information.)

2.2.7 Water Supply and Use

This subsection describes the quantity of water required, the source of the water supply, and water treatment requirements.

2.2.7.1 Water Requirements

The estimated water usage for the plant is provided in Table 2.2-1.

TABLE 2.2-1
Estimated Water Usage

All Uses	Expected Usage	
Average Annual Usage[a]	741 gpm	415 afy
Peak Usage (Maximum Summer Condition) [b]	862 gpm	
Makeup Water for Cooling	**Expected Usage**	
Average Annual Usage[a]	431 gpm	209 afy
Peak Usage (Maximum Summer Condition) [b]	497 gpm	

Basis

[a] Usage is based on an annual operating (capacity) factor of 30%. The ambient temperature assumed for this condition is 80°F.

[b] The ambient temperature assumed for this condition is 97°F.

gpm = gallons per minute; afy = acre-feet per year

Cooling Use is defined as the water supply required to make up losses in the cooling tower resulting from evaporative cooling, drift and blowdown (exclusive of other plant wastewater streams discharged into the cooling tower supply to minimize makeup water requirements).

2.2.7.2 Water Supply

Process water for CTG evaporative cooling and water injection, landscape irrigation, process system makeup, and cooling will be provided by two of four existing onsite wells. Potable water will be used for domestic water uses, fire protection, and as an emergency backup supply. Potable water will be supplied by the Riverside Highland Water Company, via a 1,300-foot-long water line connecting the plant to the water main in Main Street.

Water used for process makeup will be fed directly from the water supply line from the well into a 350,000-gallon aboveground raw water storage tank. This tank will provide approximately 8 hours of operational storage in the event there is a disruption in the water supply. Additional information on water supply and use is found in Section 7.0, Water Supply. Additional information on water supply alternatives is addressed in Section 9.0, Alternatives.

2.2.7.3 Water Quality and Treatment

Figures 7.1-2a and 7.1-2b illustrate the water treatment and distribution system. Water use can be divided into the following four levels based on the quality required: (1) water for the circulating or cooling water system; (2) service water for the plant; (3) demineralized water for NOx injection water; and (4) potable water. Water treatment required to obtain the various levels of quality are described in the following paragraphs. Water quality is described further in Subsection 8.14, Water Resources.

2.2.7.3.1 Water System

Makeup water will be provided from the storage tank to the cooling tower basins as required to replace water losses from evaporation, drift, and blowdown. A chemical feed system will supply water conditioning chemicals to the circulating water to minimize corrosion and control the formation of mineral scale and biofouling. Sulfuric acid will be fed into the circulating water system in proportion to makeup water flow for alkalinity reduction to control the scaling tendency of the circulating water.

The acid feed equipment will consist of a bulk sulfuric acid storage tank and two full-capacity sulfuric acid metering pumps.

To further inhibit scale formation, a polyacrylate solution will be fed into the circulating water system as a sequestering agent in an amount proportional to the circulating water blowdown flow. The scale inhibitor feed equipment will consist of a chemical solution bulk storage tank and two full-capacity scale inhibitor metering pumps.

To prevent biofouling in the circulating water system, sodium hypochlorite will be fed into the system. The hypochlorite feed equipment will consist of a bulk storage tank and 2 full-capacity hypochlorite metering pumps. A bulk storage tank, 100- to 400-gallon totes, and 2 full-capacity metering pumps will be provided for the feeding of either stabilized bromine or sodium bromide as alternate biocides.

2.2.7.3.2 Service Water

Service water for plant functions in which operating personnel may have direct contact will be provided potable water supply. Therefore, no additional treatment is required for these systems.

2.2.7.3.3 Demineralized Water

Demineralized water will be used for NOx injection water. The demineralized water will be produced by a reverse osmosis (RO) and Electro Deionization (EDI) system using service water as the feedstock. The demineralized water will be stored in a 100,000-gallon demineralized water storage tank.

The NOx injection water will be drawn from the demineralized water storage tank. Demineralized water will also be used for the CTG compressor wash water.

2.2.8 Plant Cooling Systems

Three 2-cell cooling towers will be provided to meet gas turbine auxiliary cooling requirements including the lube oil coolers and gas turbine compressor intercooler. Use of cooling water to meet the cooling requirements of the intercooler prevents efficiency and load losses at high ambient temperatures.

Cold water from the cooling tower will be supplied to the gas turbine auxiliaries via a GE-provided pump skid. Cold water supplied to the intercooler cools the compressed air from the low pressure compressor in the gas turbine prior to entering the high pressure compressor. Heat is then rejected from the intercoolers and the heated water returns to the cooling tower. Cold water is also supplied to the gas turbine lube oil coolers. Heat is rejected from the lube oil to the water, and then the hot water is returned to the cooling tower.

2.2.9 Waste Management

Waste management is the process whereby all wastes produced by the project are properly collected, treated if necessary, and disposed of. Wastes include wastewater, solid nonhazardous waste, and both liquid and solid hazardous waste. Waste management is discussed in more detail in Subsection 8.13, Waste Management.

2.2.9.1 Wastewater Collection, Treatment, and Disposal

The primary wastewater collection system will collect process wastewater from all of the plant equipment, including the cooling tower and water treatment equipment. Figures 7.1-2a and 7.1-2b show the expected wastewater streams and flow rates for the Highgrove Project. The second wastewater collection system will collect sanitary wastewater from sinks, toilets, showers, and other sanitary facilities, and discharge to the city sanitary sewer system. The two wastewater systems are described below.

2.2.9.1.1 Circulating Water System Blowdown

Circulating water system blowdown will consist of the process waste streams that have been concentrated and residues of the chemicals added to the circulating water. The cooling tower concentrates these streams near the mineral solubility limit for the constituents of concern (calcium, silica and total dissolved solids). This concentrated water must then be removed from the cooling tower via blowdown to prevent the formation of mineral scale in heat transfer equipment. The chemicals added to the circulating water control scaling and biofouling of the cooling tower and control corrosion of the circulating water piping and intercooler. Cooling tower blowdown will be trucked to the Santa Ana Regional Interceptor (SARI) brine pipeline system, which conveys water to the Orange County Sanitation District wastewater treatment plant, which discharges to an ocean outfall.

2.2.9.1.3 Plant Drains and Oil/Water Separator

General plant drains will collect area washdown, sample drains, and drainage from facility equipment areas. Water from these areas will be collected in a system of floor drains, hub drains, sumps, and piping and routed to the wastewater collection system. Drains that potentially could contain oil or grease will first be routed through an oil/water separator. Clear water from the separator will be directed to the wastewater discharge system and trucked offsite to the SARI line.

Wastewater from combustion turbine water washes will be collected in a holding tank. If cleaning chemicals were not used during the water wash procedure, the wastewater will be discharged to the oil/water separator. Wastewater containing cleaning chemicals will be trucked offsite for disposal at an approved wastewater disposal facility.

2.2.9.1.6 Solid Wastes

AES Highgrove will produce maintenance and plant wastes typical of natural gas-fueled power generation operations. Generation plant wastes include oily rags, broken and rusted metal and machine parts, defective or broken electrical materials, empty containers, and other solid wastes, including the typical refuse generated by workers. Recyclable materials will be taken offsite. Waste collection and disposal will be in accordance with applicable regulatory requirements to minimize health and safety effects.

2.2.9.1.7 Hazardous Wastes

Several methods will be used to properly manage and dispose of hazardous wastes generated by the Highgrove Project. Waste lubricating oil will be recovered and reclaimed by a waste oil recycling contractor. Spent lubrication oil filters will be disposed of in a Class I landfill. Spent SCR and oxidation catalysts will be reclaimed by the supplier or disposed of in accordance with regulatory requirements. Workers will be trained to handle hazardous wastes generated at the site.

Chemical cleaning wastes will consist of detergent solutions used during turbine washing and regular equipment maintenance. These wastes, which may include high metal concentrations, will be temporarily stored onsite in portable tanks and disposed of offsite by the chemical cleaning contractor in accordance with applicable regulatory requirements.

2.2.10 Management of Hazardous Materials

There will be a variety of chemicals stored and used during the construction and operation of the Highgrove Project. The storage, handling, and use of all chemicals will be conducted in accordance with applicable LORS. Chemicals will be stored in appropriate chemical storage facilities. Bulk chemicals will be stored in storage tanks, and other chemicals will be stored in returnable delivery containers. Chemical storage and chemical feed areas will be designed to contain leaks and spills. Berm and drain piping design will allow a full-tank capacity spill without overflowing the berms. For multiple tanks located within the same bermed area, the capacity of the largest single tank will determine the volume of the bermed area and drain piping. Drain piping for volatile chemicals will be trapped and isolated from other drains to eliminate noxious or toxic vapors. After neutralization, if required, water collected from the chemical storage areas will be directed to the cooling tower basin, or trucked offsite for disposal at an approved wastewater disposal facility. Chemicals that may react with each other (e.g., acid and base) shall not use common containment.

The aqueous ammonia storage area will have spill containment and ammonia vapor detection equipment inside the containment area. Aqueous ammonia will be transported, and stored onsite, in a 19 percent solution, by weight.

Safety showers and eyewashes will be provided in the vicinity of all chemical storage and use areas. Hose connections will be provided near the chemical storage and feed areas to flush spills and leaks to the plant wastewater collection system. Approved personal protective equipment will be used by plant personnel during chemical spill containment and cleanup activities. Personnel will be properly trained in the handling of these chemicals and instructed in the procedures to follow in case of a chemical spill or accidental release. Adequate supplies of absorbent material will be stored onsite for spill cleanup.

A list of the chemicals anticipated to be used at the generating facility and their locations is provided in the Hazardous Materials Handling section (Subsection 8.12). This list identifies each chemical by type, intended use, and estimated quantity to be stored onsite. Subsection 8.12 includes additional information on hazardous materials handling.

2.2.11 Emission Control and Monitoring

Air emissions from the combustion of natural gas in the CTGs will be controlled using state-of-the-art systems emissions control systems. Emissions that will be controlled include NO_x, reactive organic gases (ROG), CO, and particulate matter. To ensure that the systems perform correctly, continuous emissions monitoring systems will be used. Subsection 8.1, Air Quality, includes additional information on emission control and monitoring.

2.2.11.1 NO_x Emission Control

SCR will be used to control NO_x concentrations in the exhaust gas emitted to the atmosphere to 3.5 ppmvd at 15 percent oxygen from the gas turbines/SCRs. The SCR process will use aqueous ammonia. Ammonia slip, or the concentration of unreacted ammonia in the exiting exhaust gas, will be limited to 5 ppmvd at 15 percent oxygen from the catalyst housing. The SCR equipment will include a reactor chamber, catalyst modules, ammonia storage system, ammonia vaporization and injection system, and monitoring equipment and sensors.

2.2.11.2 Carbon Monoxide

An oxidizing catalytic converter will be used to reduce the CO concentration in the exhaust gas emitted to the atmosphere from the gas turbines to 6 ppmvd at 15 percent oxygen at the stack.

2.2.11.3 Particulate Emission Control

Particulate emissions will be controlled by the use of natural gas, which is low in particulates, as the sole fuel for the CTGs and through the use of high-efficiency filters on the inlet air supplied to the CTGs.

2.2.11.4 Continuous Emission Monitoring

Continuous emission monitors (CEMs) will sample, analyze, and record fuel gas flow rate, NO_x and CO concentration levels, and percentage of O_2 in the exhaust gas from the three catalyst housing stacks. This system will generate reports of emissions data in accordance with permit requirements. The plant control system (PCS) will alarm when emissions approach or exceed pre-selected limits.

2.2.12 Fire Protection

The fire protection system will be designed to protect personnel and limit property loss and plant downtime in the event of a fire. Fire water will be supplied via a new 8 to 12-inch-diameter connection to a water main, which will be extended from an existing main line on Main Street. This connection will be sized in accordance with National Fire Protection Association (NFPA) guidelines to provide protection from the onsite worst-case single fire (2,000 gpm and a typical pipe velocity of 8 feet per second). Fire water will be provided to a dedicated underground fire loop piping system. Both the fire hydrants and the fixed suppression systems will be supplied from the fire water loop. Fixed fire suppression systems will be installed at determined fire risk areas. Sprinkler systems will also be installed in the Administration Building as required by NFPA and local code requirements. The CTG units will be protected by a CO_2 fire protection system. Hand-held fire extinguishers of the appropriate size and rating will be located in accordance with NFPA 10 throughout the facility. Subsection 8.12, Hazardous Materials Handling, includes additional information for fire and explosion risk, and Subsection 8.8, Socioeconomics, provides information on local fire protection capability.

2.2.13 Plant Auxiliaries

The following systems will support, protect, and control the generating facility.

2.2.13.1 Lighting

The lighting system provides personnel with illumination for operation under normal conditions and for egress under emergency conditions, and includes emergency lighting to perform manual operations during an outage of the normal power source. The system also provides 120-volt convenience outlets for portable lamps and tools.

2.2.13.2 Grounding

The electrical system is susceptible to ground faults, lightning, and switching surges that result in high voltage that constitute a hazard to site personnel and electrical equipment. The station grounding system provides an adequate path to permit the dissipation of current created by these events.

The station grounding grid will be designed for adequate capacity to dissipate heat from ground current under the most severe conditions in areas of high ground fault current concentration. The grid spacing will maintain touch and step voltage potentials within acceptable limits.

Bare conductors will be installed below-grade in a grid pattern. Each junction of the grid will be bonded together by an exothermic weld or compression connection.

Ground resistivity readings will be used to determine the necessary numbers of ground rods and grid spacing to ensure safe step and touch potentials under severe fault conditions.

Grounding stingers will be brought from the ground grid and connected to all building steel and non-energized metallic parts of electrical equipment.

2.2.13.3 Plant Control System

The PCS provides modulating control, digital control, monitoring, and indicating functions for the plant power block systems.

The following functions will be provided:

- Controlling the CTGs and other systems in a coordinated manner
- Controlling the balance-of-plant systems in response to plant demands
- Monitoring controlled plant equipment and process parameters and delivery of this information to plant operators.
- Monitoring the stack CEM units for critical alarms, and collecting data for historical log-in.
- Providing control displays (printed logs, operator interface) for signals generated within the system or received from input/output (I/O)
- Providing consolidated plant process status information through displays presented in a timely and meaningful manner
- Providing alarms for out-of-limit parameters or parameter trends, displaying on operator interface units and recording on an alarm log printer

The PCS will interface with the control systems furnished by the CTG supplier to provide remote control capabilities, as well as data acquisition, annunciation, and historical storage of turbine and generator operating information.

The system will be designed with sufficient redundancy to preclude a single device failure from significantly affecting overall plant control and operation. This also will allow critical control and safety systems to have redundancy of controls, as well as an uninterruptible power source.

2.2.13.4 Cathodic Protection

The cathodic protection system will be designed to control the electrochemical corrosion of designated metal piping buried in the soil. Depending upon the corrosion potential and the site soils, either passive or impressed current cathodic protection will be provided.

2.2.13.5 Freeze Protection

Not required.

2.2.13.6 Service Air

The service air system will supply compressed air to hose connections for general plant use. Service air headers will be routed to hose connections located at various points throughout the facility.

2.2.13.7 Instrument Air

The instrument air system provides dry air to pneumatic operators and devices. An instrument air header will be routed to locations within the facility equipment areas and within the water treatment facility where pneumatic operators and devices will be located.

2.2.14 Interconnection to Electrical Grid

The three CTGs will each be connected to SCE's transmission system via the existing SCE 115-kV Highgrove Substation, immediately adjacent to the Project Site. Each CTG will be connected via a 115-kV overhead transmission line from the high voltage terminals of each unit's generator step-up transformer to a transition structure in the substation. Refer to Section 5.0, Transmission, for additional discussion about the interconnection.

2.2.15 Project Construction

Construction of the generating facility, from demolition, to site preparation and grading, to commercial operation, is expected to take place from second quarter 2007 to the second quarter 2008. Major milestones are listed in Table 2.2-2.

TABLE 2.2-2
Project Schedule Major Milestones

Activity	Date
Demolition	Q2 2007
Startup and Test	Q2 2008
Commercial Operation	Q3 2008

There will be an average and peak workforce of approximately 77 and 147, respectively, of construction craft people, supervisory, support, and construction management personnel onsite during construction (see Table 8.8-8 in the Socioeconomics section).

Construction will be scheduled to occur between 7 a.m. and 7 p.m., Monday through Saturday. Additional hours may be necessary to make up schedule deficiencies, or to complete critical construction activities. During some construction periods and during the startup phase of the project, some activities will continue 24 hours per day, 7 days per week. The peak construction site workforce is expected to occur in months 7 and 8 of the construction period.

Table 2.2-3 provides an estimate of the average and peak construction traffic during the appropriate 11-month construction period.

TABLE 2.2-3
Average and Peak Construction Traffic

Vehicle Type	Average Daily Trips	Peak Daily Trips
Construction Workers	59	113
Delivery	5	8
Heavy Trucks	5	12
Total	**69**	**133**

Construction laydown and parking areas will be within the former plant site, south of the new plant area (Figure 2.2-5). Construction access will be from Taylor Street, as shown on Figure 2.2-1. Materials and equipment will be delivered by truck.

2.2.16 Generating Facility Operation

The Highgrove Project will be designed as a peaking facility to serve load during periods of high demand, which generally occur during daytime hours, and more frequently during the summer than other periods. Because the LMS100 CTGs are more efficient than other peaking units and many of the aging gas-fired steam generation facilities in California, it is expected that the Highgrove Project will operate at an annual capacity factor of 15 to 30 percent.

The proposed Highgrove facility is expected to employ up to 13 full-time employees. Anticipated job classifications are shown in Table 2.2-4.

It is anticipated that all of the electricity produced by the plant will be sold under contract to the power market or on a merchant plant basis. The exact operational profile of the plant will be dependent on weather conditions and the power purchaser's economic dispatch decisions.

Because the capacity will be sold through contract and the prices that will be offered for spot purchases are unknown at this time, the exact mode of operation cannot be described. It is conceivable, however, that the facility could be operated in one or all of the following modes:

- **Summer Design Load**. The facility would be operated at maximum continuous output for as many hours per year as is profitable. As the facility is designed to be a peaking

TABLE 2.2-4
Typical Plant Operation Workforce

Department	Personnel	Shift	Workdays
Operations	7 Operating Technicians 1 Instrument and Controls Technician	Rotating 12-hour shift, 2 operators per shift, 2 relief operators	6-7 days a week
Maintenance	2 Maintenance Technicians	Standard 8-hour days	5 days a week (Maintenance technicians will also work unscheduled days and hours as required [weekends])
Administration	3 Administrators (1 Plant Manager, 1 Assistant Plant Manager/Engineer, 1 Administrative Assistant)	Standard 8-hour days	5 days a week, with additional coverage as required

facility, it is expected to operate only during high ambient temperature periods and/or periods of peak demand.

- **Load Following**. The facility would be operated to meet contractual requirements up to the maximum available output at high load times of the day. The output of the unit would therefore be adjusted periodically to meet whatever load proved profitable to the power purchaser.
- **Partial Shutdown**. This mode of operation can be expected to occur during late evening and early morning hours and on weekends when only a portion of the plant's maximum output may be needed and it is economically favorable to shut down one, two or all three CTGs. If the units are not undergoing maintenance, they will in most cases be available to the power purchaser as non-spinning reserve units.
- **Full Shutdown**. This would occur if forced by equipment malfunction, fuel supply interruption, transmission line disconnect, or scheduled maintenance. Because the Highgrove facility is a peaking unit, full shutdown for economic reasons would be expected for a majority of the off-peak hours of the year, although non-spinning reserve capability would still be available.

In the unlikely event of a situation that causes a long-term cessation of operations, security of the facilities will be maintained on a 24-hour basis, and the California Energy Commission (CEC) will be notified. Depending on the length of shutdown, a contingency plan for the temporary cessation of operations may be implemented. Such contingency plan will be in conformance with all applicable LORS and protection of public health, safety, and the environment. The plan, depending on the expected duration of the shutdown, could include the draining of all chemicals from storage tanks and other equipment and the safe shutdown of all equipment. All wastes from equipment shutdown will be disposed of according to applicable LORS. If the cessation of operations becomes permanent, the plant will be decommissioned (see Section 4.0, Facility Closure).

2.3 Facility Safety Design

The Highgrove facility will be designed to maximize safe operation. Potential hazards that could affect the facility include earthquake, flood, and fire. Facility operators will be trained in safe operation, maintenance, and emergency response procedures to minimize the risk of personal injury and damage to the plant.

2.3.1 Natural Hazards

The principal natural hazard associated with the Highgrove site is earthquakes. The site is located in Seismic Risk Zone 4. Structures will be designed to meet the seismic requirements of CCR Title 24 and the latest edition of the California Building Code (CBC). (See Subsection 8.15, Geologic Hazards and Resources.) This subsection includes a review of potential geologic hazards, seismic ground motion, and potential for soil liquefaction due to ground-shaking. Potential seismic hazards would be mitigated by implementing the CBC construction guidelines. Appendix 10B, Structural Engineering, includes the structural seismic design criteria for the buildings and equipment.

Flooding is not a hazard of concern. According to the Federal Emergency Management Agency (FEMA), the site is not within either the 100- or 500-year flood plain. Subsection 8.14, Water Resources, includes additional information on the potential for flooding.

2.3.2 Emergency Systems and Safety Precautions

This subsection discusses the fire protection systems, emergency medical services, and safety precautions to be used by project personnel. Subsection 8.8, Socioeconomics, includes additional information on area medical services, and Subsection 8.7, Worker Safety, includes additional information on safety for workers. Appendixes 10A through 10G contain the design practices and codes applicable to safety design for the project. Compliance with these requirements will minimize project effects on public and employee safety.

2.3.2.1 Fire Protection Systems

The project will rely on both onsite fire protection systems and local fire protection services.

2.3.2.1.1 Onsite Fire Protection Systems

The fire protection systems are designed to protect personnel and limit property loss and plant downtime from fire or explosion. The project will have the following fire protection systems.

CO2 Fire Protection System

This system protects the combustion turbine, generator, and accessory equipment compartments from fire. The system will have fire detection sensors in all compartments. Actuating one sensor will provide a high-temperature alarm on the combustion turbine control panel. Actuating a second sensor will trip the combustion turbine, turn off ventilation, close ventilation openings, and automatically release the CO2. The CO2 will be discharged at a design concentration adequate to extinguish the fire.

Transformer Deluge Spray System

This system provides fire suppression for the generator transformers and auxiliary power transformers in the event of a fire. The deluge systems are fed by the plant underground fire water system.

Fire Hydrants/Hose Stations

This system will supplement the plant fire protection system. Water will be supplied from the plant underground fire water/domestic water system.

Fire Extinguisher

The plant Administrative/Maintenance Building, water treatment facility, and other structures will be equipped with portable fire extinguishers as required by the local fire department.

2.3.2.1.2 Local Fire Protection Services

In the event of a major fire, the plant personnel will be able to call upon the local Fire Department for assistance. The Hazardous Materials Risk Management Plan (see Subsection 8.12, Hazardous Materials Handling) for the plant will include all information necessary to permit all firefighting and other emergency response agencies to plan and implement safe responses to fires, spills, and other emergencies.

2.3.2.2 Personnel Safety Program

The Highgrove Project will operate in compliance with federal and state occupational safety and health program requirements. Compliance with these programs will minimize project effects on employee safety. These programs are described in Subsection 8.7, Worker Safety.

2.4 Facility Reliability

This subsection discusses the expected facility availability, equipment redundancy, fuel availability, water availability, and project quality control measures.

2.4.1 Facility Availability

Because of the Highgrove Project's predicted high efficiency relative to other units traditionally used for peaking service, it is anticipated that the facility will normally be called upon to operate at annual capacity factors between 15 percent and 30 percent. The facility will be designed to operate between 50 and 100 percent of base load to support dispatch service in response to customer demands for electricity.

The Highgrove facility will be designed for an operating life of 30 years. Reliability and availability projections are based on this operating life. Operation and maintenance procedures will be consistent with industry standard practices to maintain the useful life status of plant components.

The percent of time that the power plant is projected to be operated is defined as the "service factor." The service factor considers the amount of time that a unit is operating and generating power, whether at full or partial load. The projected service factor, which considers the projected percent of time of operation, differs from the "equivalent availability factor" (EAF), which considers the projected percent of energy production capacity achievable.

The EAF may be defined as a weighted average of the percent of full energy production capacity achievable. The projected equivalent availability factor for the Highgrove facility is estimated to be approximately 92 to 98 percent.

The EAF, which is a weighted average of the percent of energy production capacity achievable, differs from the "availability of a unit," which is the percent of time that a unit is available for operation, whether at full load, partial load, or standby.

2.4.2 Redundancy of Critical Components

The following subsections identify equipment redundancy as it applies to project availability. A summary of equipment redundancy is shown in Table 2.4-1. (Final plant design could differ based upon design optimization.)

TABLE 2.4-1
Major Equipment Redundancy

Description	Number	Note
CTGs	Three trains	
Cooling tower	One per CTG	Two-cell mechanical draft design
Demineralizer—RO Systems	Three - 50 % capacity trains	Redundant pumps will be provided.
Gas Compressors	Three - 50 % capacity trains	

2.4.2.1 Simple-cycle Power Block

Three separate combustion turbine power generation trains will operate in parallel within the simple-cycle power block. Each CTG will provide approximately 33 percent of the total power block output. The major components of the simple-cycle power block consist of the following subsystems.

2.4.2.1.1 Combustion Turbine Generator Subsystems

The combustion turbine subsystems include the combustion turbine, inlet air filtration and evaporative inlet cooling system, generator and excitation systems, and turbine control and instrumentation. The combustion turbine is comprised of a compressor section, a combustion section, and a turbine section. Air compressed in the compressor section of the combustion turbine is heated by the combustion of natural gas, and then allowed to expand in the turbine section, which turns the rotor and drives the compressor and generator. Exhaust gas from the combustion turbine will be directed into an SCR to control NO_x emissions and an oxidation catalyst to control CO emissions. The generator will be air cooled. The generator excitation system will be a solid-state static system. Combustion turbine control and instrumentation (interfaced with the distributed control system) will cover the turbine governing system, and the protective system.

2.4.2.2 Distributed Control System (DCS)

The DCS will be a redundant microprocessor-based system that will provide the following functions:

- Control the CTG, and other systems in response to unit load demands (coordinated control)
- Provide control room operator interface
- Monitor plant equipment and process parameters and provide this information to the plant operators in a meaningful format
- Provide visual and audible alarms for abnormal events based on field signals or software-generated signals from plant systems, processes, or equipment

Plant operation will be controlled from the operator panel located in the control room. The operator panel will consist of two individual CRT/keyboard consoles and one engineering workstation. Each CRT/keyboard console will be an independent electronic package so that failure of a single package does not disable more than one CRT/keyboard. The engineering workstation will allow the control system operator interface to be revised by authorized personnel.

2.4.2.5 Demineralized Water System

Makeup to the demineralized water system will be from the raw water storage tank. The demineralized water system will consist of three 50 percent capacity RO units and an EDI (Electro Deionization) system for additional treatment.

2.4.2.6 Demineralized Water Makeup and Storage

The demineralized water makeup and storage subsystem provides demineralized water pumping capabilities to supply high-purity water for use as CTG injection water and wash water. Demineralized water will be stored in one 100,000-gallon water storage tank. The demineralized water storage tank will provide an approximate 14-hour supply of demineralized water at peak load. The system also includes two full-capacity, horizontal, centrifugal, cycle makeup water pumps.

2.4.2.7 Circulating Water System

The circulating water system provides cooling water to the intercooler for the combustion turbine and lube oil coolers. A separate circulating water system is provided for each of the three CTG units. Each system consists of an evaporative-type cooling tower, pumps, and interconnecting piping and valves.

2.4.2.9 Compressed Air

The compressed air system comprises the instrument air and service air subsystems. The service air system supplies compressed air to the instrument air dryers and to hose connections for general plant use. The service air system will include one 100 percent capacity air motor-driven compressor, service air headers, distribution piping, and hose connections. The instrument air system supplies dry compressed air at the required pressure and capacity for all control air demands, including pneumatic controls, transmitters, instruments, and valve operators. The instrument air system will include two 100 percent capacity air dryers with prefilters and after filters, an air receiver, instrument air headers, and distribution piping.

2.4.3 Fuel Availability

Fuel for the facility will be supplied by Southern California Gas Company (SoCalGas). The project will construct a new 7-mile natural gas pipeline line to connect to an existing natural gas interstate transmission pipeline owned by SoCalGas. There is sufficient capacity in the transmission gas line to supply the Highgrove Project. See Section 6.0, Natural Gas Supply for a more detailed description.

2.4.4 Water Availability

Water for the Highgrove Project will be provided by two of four redundant onsite wells. The onsite wells are existing and were used to provide process and domestic water needs when the existing plant was fully operational. Water from Riverside Highland Water Company, via the City's potable water system, will be used as an emergency backup supply. The availability of water to meet the needs of the project is discussed in more detail in Section 7.0, Water Supply.

2.4.5 Project Quality Control

The Quality Control Program that will be applied to the Highgrove Project is summarized in this subsection. The objective of the Quality Control Program is to ensure that all systems and components have the appropriate quality measures applied; whether it be during design, procurement, fabrication, construction, or operation. The goal of the Quality Control Program is to achieve the desired levels of safety, reliability, availability, operability, constructability, and maintainability for the generation of electricity.

The required quality assurance for a system is obtained by applying controls to various activities, according to the activity being performed. For example, the appropriate controls for design work are checking and review, and the appropriate controls for manufacturing and construction are inspection and testing. Appropriate controls will be applied to each of the various activities for the project.

2.4.5.1 Project Stages

For quality assurance planning purposes, the project activities have been divided into the following nine stages that apply to specific periods of time during the project.

2.4.5.1.1 Conceptual Design Criteria

Activities such as definition of requirements and engineering analyses.

2.4.5.1.2 Detail Design

Activities such as the preparation of calculations, drawings, and lists needed to describe, illustrate, or define systems, structures, or components.

2.4.5.1.3 Procurement Specification Preparation

Activities necessary to compile and document the contractual, technical and quality provisions for procurement specifications for plant systems, components, or services.

2.4.5.1.4 Manufacturer's Control and Surveillance

Activities necessary to ensure that the manufacturers conform to the provisions of the procurement specifications.

2.4.5.1.5 Manufacturer Data Review

Activities required to review manufacturers' drawings, data, instructions, procedures, plans, and other documents to ensure coordination of plant systems and components, and conformance to procurement specifications.

2.4.5.1.6 Receipt Inspection

Inspection and review of product at the time of delivery to the construction site.

2.4.5.1.7 Construction/Installation

Inspection and review of storage, installation, cleaning, and initial testing of systems or components at the facility.

2.4.5.1.8 System/Component Testing

Actual operation of generating facility components in a system in a controlled manner to ensure that the performance of systems and components conform to specified requirements.

2.4.5.1.9 Plant Operation

As the project progresses, the design, procurement, fabrication, erection, and checkout of each generating facility system will progress through the nine stages defined above.

2.4.5.2 Quality Control Records

The following quality control records will be maintained for review and reference:

- Project instructions manual
- Design calculations
- Project design manual
- Quality assurance audit reports
- Conformance to construction records drawings
- Procurement specifications (contract issue and change orders)
- Purchase orders and change orders
- Project correspondence

For procured component purchase orders, a list of qualified suppliers and subcontractors will be developed. Before contracts are awarded, the subcontractors' capabilities will be evaluated. The evaluation will consider suppliers' and subcontractors' personnel, production capability, past performance, and quality assurance program.

During construction, field activities are accomplished during the last four stages of the project: receipt inspection, construction/installation, system/component testing, and plant operations. The construction contractor will be contractually responsible for performing the work in accordance with the quality requirements specified by contract.

The subcontractors' quality compliance will be surveyed through inspections, audits, and administration of independent testing contracts.

A plant operation and maintenance program, typical of a project this size, will be implemented by AES Highgrove, to control operation and maintenance quality. A specific program for this project will be defined and implemented during initial plant startup.

2.5 Laws, Ordinances, Regulations, and Standards

The applicable LORS for each engineering discipline are included as part of the Engineering Appendixes 10A through 10G.

2.6 References

Colton Joint Unified School District. 2005. Grand Terrace Educational Facility Environmental Draft Impact Report. September.

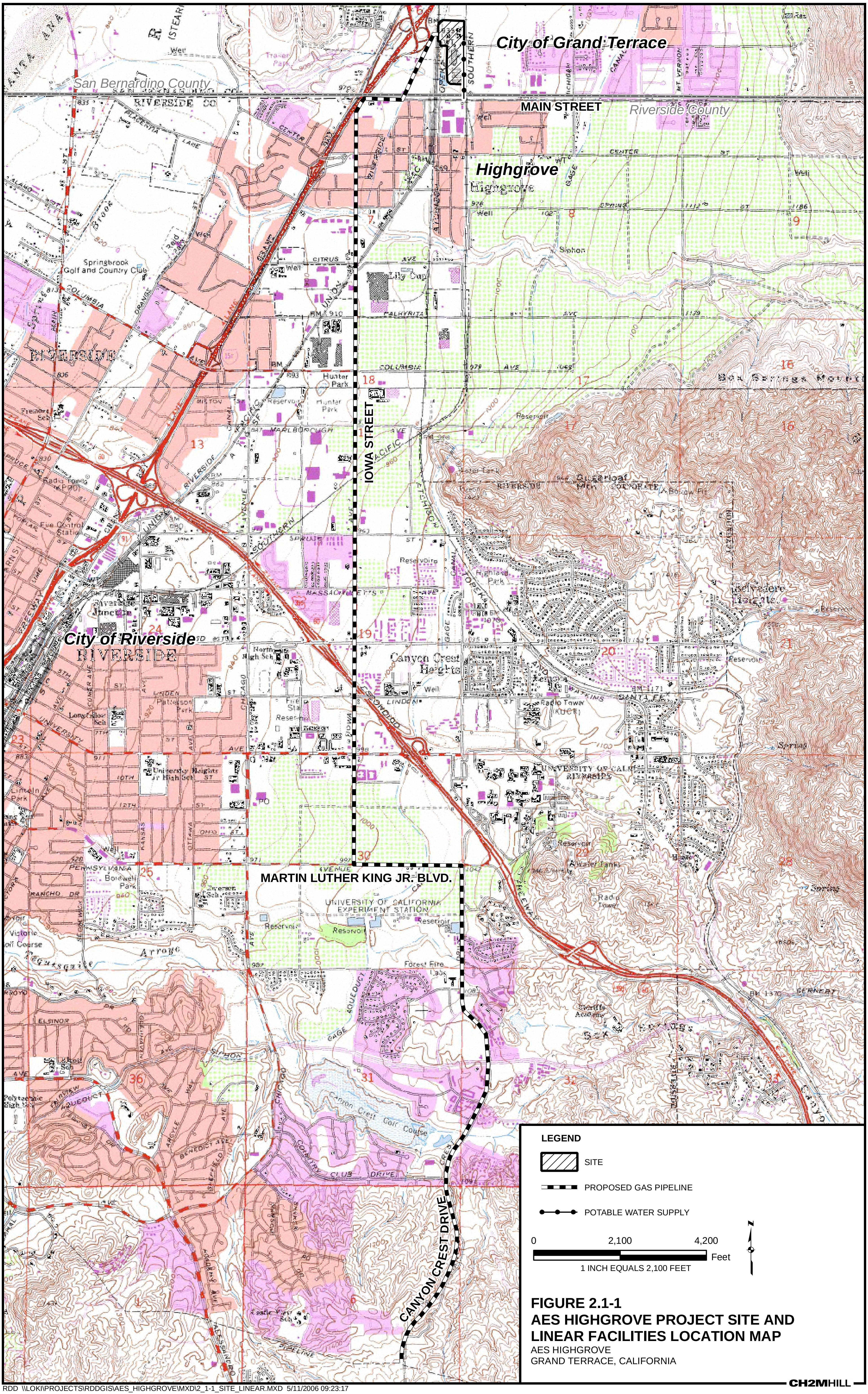


FIGURE 2.1-1
AES HIGHGROVE PROJECT SITE AND LINEAR FACILITIES LOCATION MAP
AES HIGHGROVE
GRAND TERRACE, CALIFORNIA

RDD \\LOKI\PROJECTS\RDDGIS\AES_HIGHGROVE\MXD\2_1-1_SITE_LINEAR.MXD 5/11/2006 09:23:17

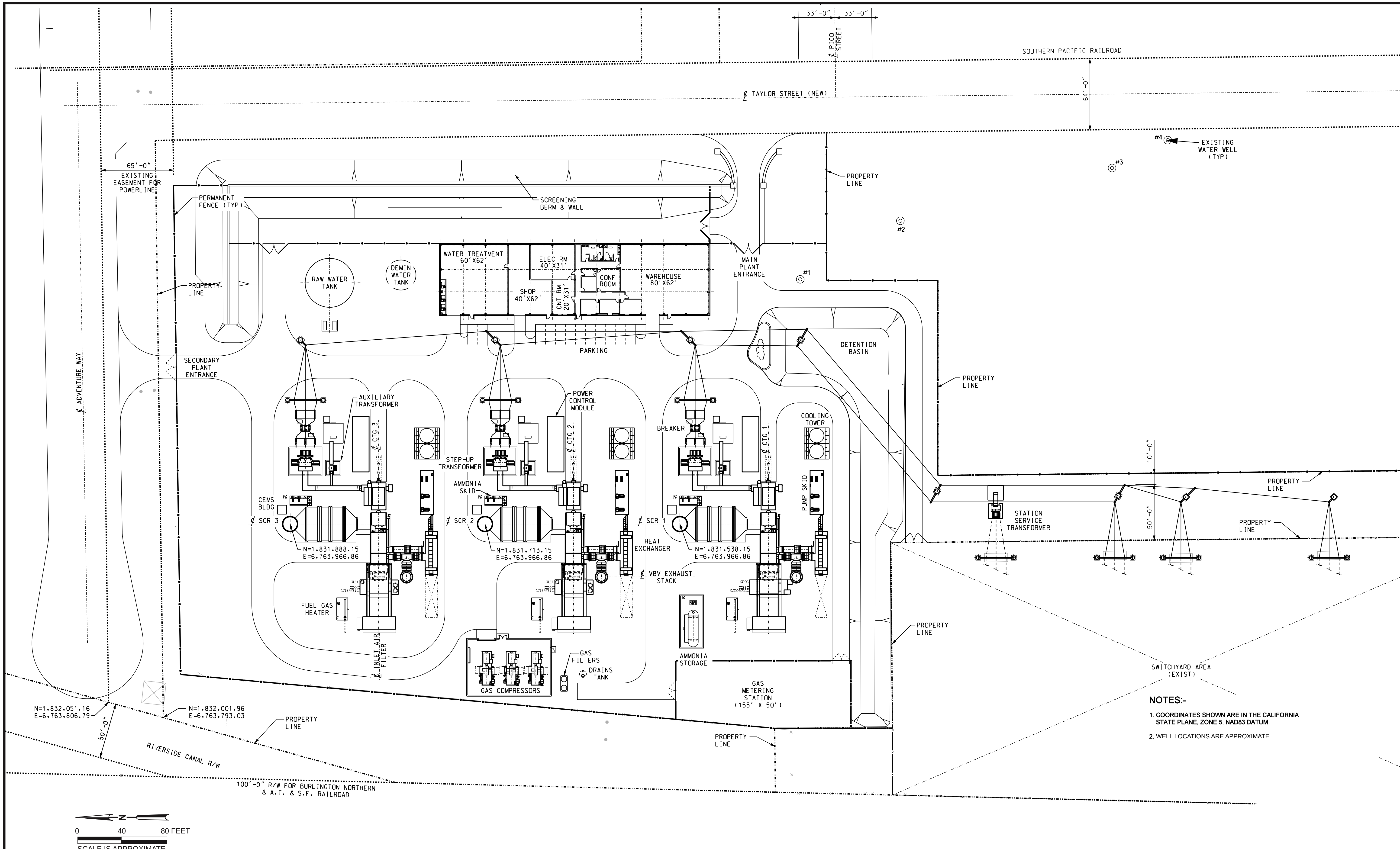
0 250 500 FEET

1 INCH EQUALS 250 FEET

N

FIGURE 2.1-2
HISTORIC AREAS OF ACTIVITY
AES HIGHGROVE
GRAND TERRACE, CALIFORNIA

CH2MHILL



NOTES:-

1. COORDINATES SHOWN ARE IN THE CALIFORNIA STATE PLANE, ZONE 5, NAD83 DATUM.
2. WELL LOCATIONS ARE APPROXIMATE.

FIGURE 2.2-1
GENERAL ARRANGEMENT
AES HIGHGROVE
GRAND TERRACE, CALIFORNIA

CH2MHILL

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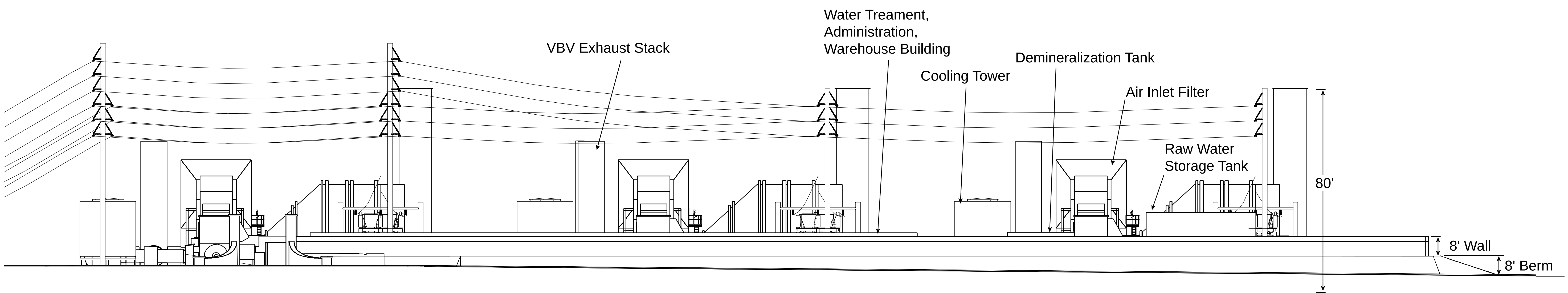

FIGURE 2.2-2
PLANT ELEVATION LOOKING WEST
AES HIGHGROVE
GRAND TERRACE, CALIFORNIA

CH2MHILL

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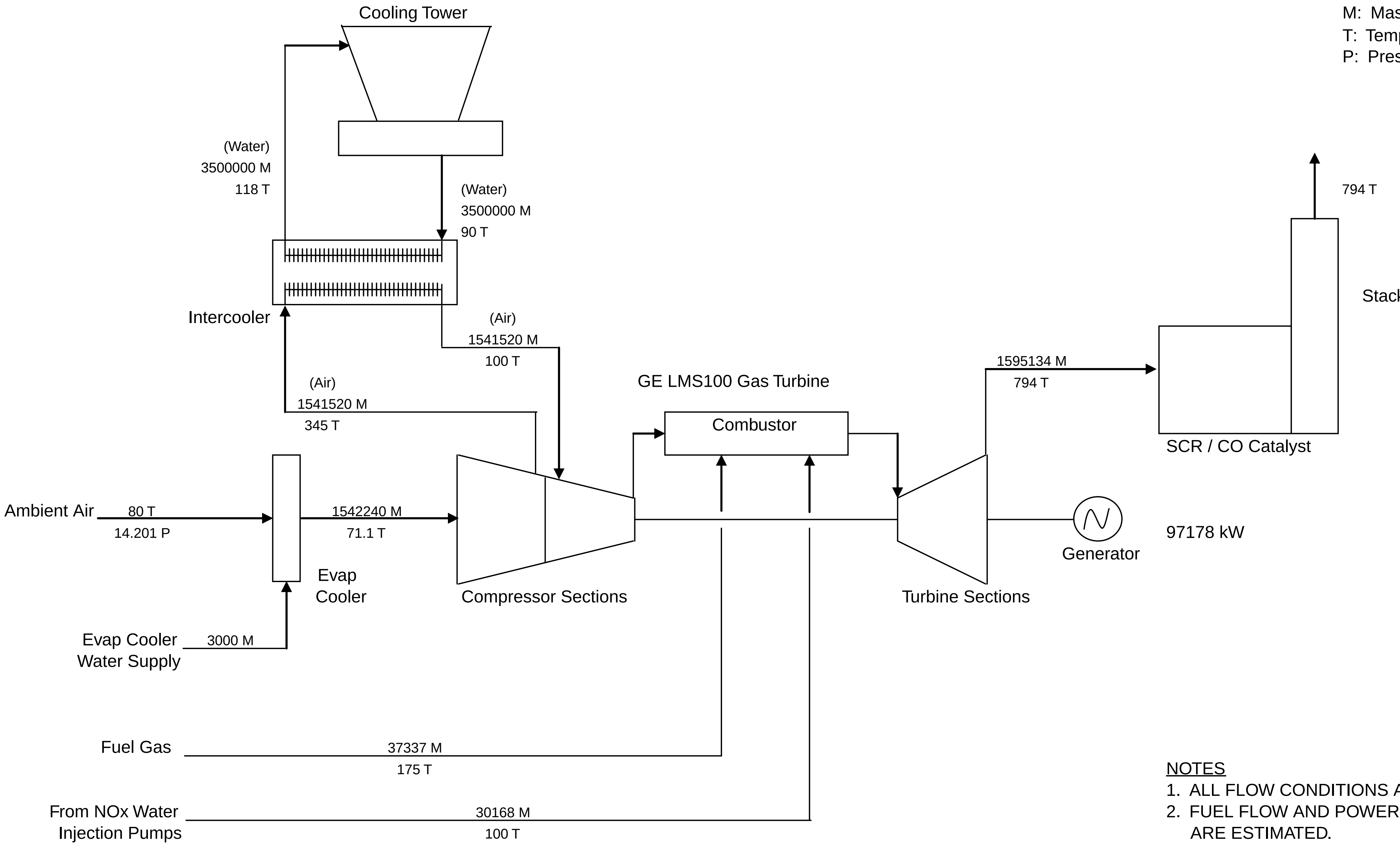
FIGURE 2.2-3
SETTLED AREAS, PARKS, RECREATION, AND SCENIC AREAS NEAR THE SITE
AES HIGHGROVE
GRAND TERRACE, CALIFORNIA

CH2MHILL

M: Mass flow, lb/hr
T: Temperature, deg F
P: Pressure, psia



NOTES
1. ALL FLOW CONDITIONS ARE ESTIMATED.
2. FUEL FLOW AND POWER OUTPUT ARE ESTIMATED.

Ambient Conditions

Dry Bulb Temperature	80	Deg F
Wet Bulb Temperature	70	Deg F
Relative Humidity	60	%

Performance Summary (Per Gas Turbine Except Where Noted)

Gross Output	97178	kW
Auxiliary Loads	3526	kW
Net Power	93652	kW
Heating Value	20577	Btu/lb LHV
Fuel Consumption	768.3	MMBtu/hr LHV
Net Heat Rate	8204	Btu/kW-hr LHV
Net Power-Site Total	280956	kW

Figure source: Worley Parsons, Figure 2.2-5a, Process Flow Diagram Annual Operating Ambient Conditions, 5/10/2006.

FIGURE 2.2-4
HEAT BALANCE
AES HIGHGROVE
GRAND TERRACE, CALIFORNIA

CH2MHILL

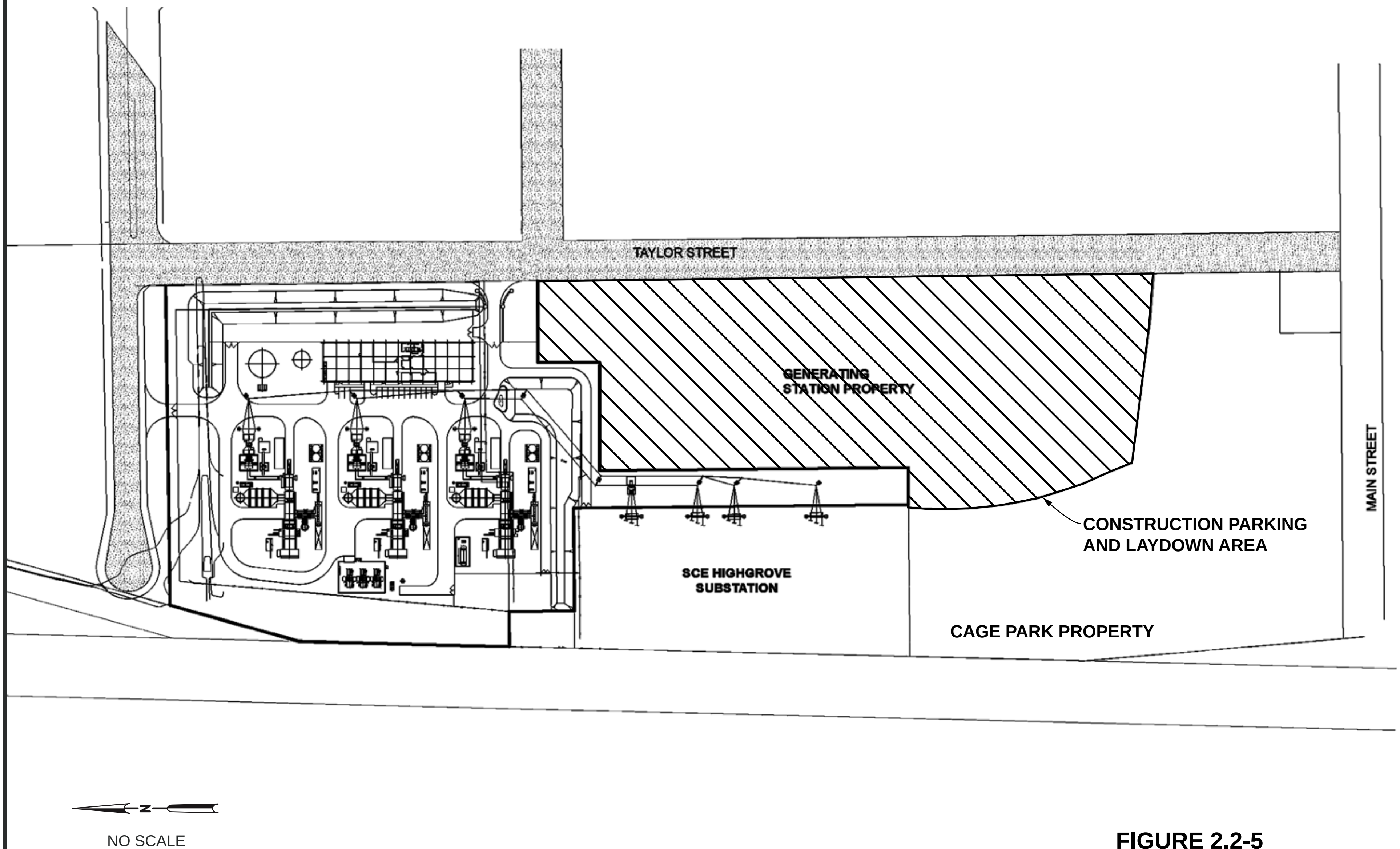


FIGURE 2.2-5
CONSTRUCTION PARKING AND LAYDOWN AREA
AES HIGHGROVE
GRAND TERRACE, CALIFORNIA

CH2MHILL

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SECTION 3.0

Demand Conformance

As of January 1, 2000, the California Energy Commission is no longer required to determine if a proposed project conforms to an integrated assessment of need. Senate Bill 110, which took effect on January 1, 2000 (Cal. Const. Art. 4, Section 8.), states:

"Before the California electricity industry was restructured the regulated cost recovery framework for power plants justified requiring the commission to determine the need for new generation, and site only power plants for which need was established. Now that power plant owners are at risk to recover their investments, it is no longer appropriate to make this determination."

SECTION 4.0

Facility Closure

4.1 Introduction

Facility closure can be temporary or permanent. Temporary closure is defined as a shutdown for a period exceeding the time required for normal maintenance. Causes for temporary closure include a disruption in the supply of natural gas or damage to the plant from earthquake, fire, storm, or other natural acts. Permanent closure is defined as a cessation in operations with no intent to restart operations owing to plant age, damage to the plant beyond repair, economic conditions, or other reasons. Subsection 4.2 discusses temporary facility closure; Subsection 4.3 discusses permanent facility closure.

4.2 Temporary Closure

For a temporary facility closure, where there is no release of hazardous materials, security of the facilities will be maintained on a 24-hour basis, and the California Energy Commission (CEC) and other responsible agencies will be notified. Depending on the length of shutdown necessary, a contingency plan for the temporary cessation of operations will be implemented. The contingency plan will be conducted to ensure conformance with all applicable laws, ordinances, regulations, and standards (LORS) and the protection of public health, safety, and the environment. The plan, depending on the expected duration of the shutdown, may include the draining of all chemicals from storage tanks and other equipment and the safe shutdown of all equipment. All wastes will be disposed of according to applicable LORS, as discussed in Subsection 8.13.

Where the temporary closure includes damage to the facility, and there is a release or threatened release of acutely hazardous materials into the environment, procedures will be followed as set forth in a Risk Management Plan (RMP) to be developed as described in Subsection 8.12. Procedures will include methods to control releases, notification of applicable authorities and the public, emergency response, and training for plant personnel in responding to and controlling releases of hazardous materials. Once the immediate problem is solved, and the acutely hazardous materials release is contained and cleaned up, temporary closure will proceed as described above for a closure where there is no release of hazardous materials.

4.3 Permanent Closure

The planned life of the generation facility is 30 years. However, if the generation facility were still economically viable, it could be operated longer. It is also possible that the facility could become economically noncompetitive earlier than 30 years, forcing early decommissioning. Whenever the facility is permanently closed, the closure procedure will follow a plan that will be developed as described below.

The removal of the facility from service, or decommissioning, may range from "mothballing" to the removal of all equipment and appurtenant facilities, depending on conditions at the time. Because the conditions that would affect the decommissioning decision are largely unknown at this time, these conditions would be presented to the CEC and the City of Grand Terrace when more information is available and the timing for decommissioning is more imminent.

To ensure that public health and safety and the environment are protected during decommissioning, a decommissioning plan will be submitted to the CEC for approval prior to decommissioning. The plan will discuss the following:

- Proposed decommissioning activities for the facility and all appurtenant facilities constructed as part of the facility
- Conformance of the proposed decommissioning activities to all applicable LORS and local/regional plans
- Activities necessary to restore the site if the plan requires removal of all equipment and appurtenant facilities
- Decommissioning alternatives other than complete restoration
- Associated costs of the proposed decommissioning and the source of funds to pay for the decommissioning

In general, the decommissioning plan for the facility will attempt to maximize the recycling of all facility components. AES Highgrove, LLC will attempt to sell unused chemicals back to the suppliers or other purchasers or users. All equipment containing chemicals will be drained and shut down to ensure public health and safety and to protect the environment. All nonhazardous wastes will be collected and disposed of in appropriate landfills or waste collection facilities. All hazardous wastes will be disposed of according to all applicable LORS. The site will be secured 24 hours per day during the decommissioning activities.

SECTION 5.0

Electric Transmission

5.1 Introduction

The proposed AES Highgrove facility project site is located in an industrially zoned area of the City of Grand Terrace, California. An objective for selecting this site location was its proximity to the adjacent Southern California Edison (SCE) Highgrove Substation that will allow the project to interconnect to the electrical grid without crossing private property. Further, the proposed project does not involve construction of new transmission lines or replacement of existing conductors in the regional system or in the vicinity of the plant.

This section describes in further detail the transmission interconnection between the AES Highgrove project and the existing electrical grid, and the anticipated impacts that operation of the facility will have on the flow of electrical power in the region. To better understand the impacts of the proposed project on transmission and power flows, the discussions in this section focus on those areas that allow a critical review of the electrical transmission and interconnection. More specifically, this analysis will contain discussions of:

- The proposed electrical interconnection between the AES Highgrove project and the electrical grid
- The impacts of the electrical interconnection on the existing transmission grid
- Potential nuisances (electrical effects, aviation safety, and fire hazards)
- Safety of the interconnection
- Description of applicable laws, ordinances, regulations, and standards (LORS)

In addition, this section addresses relocation of substation controls by SCE in the existing plant that will be required before the existing plant can be demolished.

5.2 Transmission Interconnection

The project site for the proposed new AES Highgrove facility will be located on a parcel of land directly north and adjacent to SCE's existing Highgrove 115-kilovolt (kV) Substation. For a complete description of the property, please refer to Section 2.0, Project Description. The facility will interconnect to the electrical grid with three 3-phase 115-kV ACSR (aluminum conductor steel-reinforced) aboveground transmission circuits. Figure 2.2-1 shows the location of the new facility and interconnecting transmission lines to the Highgrove Substation.

Each of the three generating units in the proposed new facility will be connected to an existing bay in the Highgrove Substation that will be vacated when the existing facility is demolished. The average length of the aboveground circuits is 600 feet and will be supported on transmission structures employing a monopole design (refer to Figure 2.2-1). Each of the 115-kV circuits from the generating units will connect to SCE-owned transition structures in the eastern portion of the Highgrove Substation. The lines will not cross any private property not owned by either AES Highgrove or SCE. Figure 5-1 shows a single-line diagram of the connection of the project to SCE’s transmission system.

5.3 Interconnection System Impact Study

Southern California Edison has completed a System Impact Study for the Highgrove Project (attached as Appendix 5A). The study modeled the effects on the regional transmission system from the generation that would be added by the proposed Highgrove Project. The study also assessed transmission system operation under stress after addition of the project, for instance, assuming that one or more transmission system components are temporarily inoperable.

Planning criteria and Short-Circuit Duty Criteria for the study included the following:

- Line loading should not exceed 100 percent of a conductor’s thermal rating with all facilities in service
- Line loading should not exceed 135 percent of a conductor’s thermal rating with one line out of service (N-1)
- Short-circuit duty should not exceed a circuit breaker’s interrupting capability with maximum area generation on-line.

Because the Highgrove Project will be interconnecting at the distribution level, the study consists of two parts: an assessment of effects on the distribution system and an assessment of effects on the transmission system (facilities operating at 230 kV and at higher voltages), the results of which are discussed in further detail below.

5.3.1 Distribution System

The Distribution System Assessment was performed for three system load conditions:

1. Peak Loads (based on SCE’s 2005-2014 Distribution Substation Plan)
2. Light Load (assumed to be 50 percent of the peak load forecast)
3. Very Light or Evening Load (assumed to be 35 percent of the peak load forecast)

Two scenarios were considered for each load condition: the 2007 Vista system configuration, and the 2009 Vista system configuration.

With respect to the Distribution System, the System Impact Study concluded that, with the new proposed facility online:

- Thermal loadings on the SCE facilities used to provide the requested distribution service are all within criteria limits
- A Facilities Study would be required to evaluate the need for circuit breaker replacements at the 115-kV, 230-kV, and 500-kV levels since, with the addition of the project, three-phase short-circuit duties and single line-to-ground short-circuit duties increased by .1 kA or more at several existing buses that have duty levels above 60 percent of their nameplate three-phase ratings.

Please refer to the System Impact Study included in Appendix 5A for a detailed discussion of these results.

5.3.2 Transmission System

The Transmission Assessment was performed for two system conditions:

1. 2007 heavy summer load conditions (once in 10-year heat wave assumption) with maximum eastern area generation, and
2. 2007 spring load conditions (65 percent of 2007 heavy summer peak load)

With respect to the Transmission System, the System Impact Study concluded that, with the new proposed facility online:

- Under spring conditions, the project increased an ***existing*** base case overload from 113 percent to 114 percent on the Devers-Valley 500-kV line (resulting in a new 1 percent increase)
- Under summer conditions there were no base case overloads
- A Facilities Study would be required to evaluate the need for circuit breaker replacements or upgrades at the 230-kV and 500-kV levels
- Single-contingency and double-contingency overloads resulted on several transmission lines in both the spring and summer conditions, many of which existed prior to addition of the project

Please refer to the System Impact Study included in Appendix 5A for a detailed discussion of these results.

5.3.3 Mitigation

The mitigation for the potential overload conditions identified in the System Impact Study would be replacements or upgrades of breakers at substations, wave traps and line terminals at existing 230-kV and 500-kV substations, and special protection schemes if these do not jeopardize system integrity or reliability. The mitigation measures that will ultimately be required to interconnect to the electrical grid will be outlined in an Interconnection Facilities Study, performed by SCE. All of the potential mitigation measures will occur inside existing substation boundaries; none will require reconductoring of transmission lines. The existing overload conditions on the Devers-Valley 550-kV line will be addressed by projects ahead of the Highgrove Project in the transmission queue, which have triggered the overload conditions.

5.4 Relocation of Substation Controls

The generating units in the existing plant, formerly known as SCE's Highgrove Generating Station, were constructed in the 1950s by the California Electric Power Company. Since the Generating Station and the Highgrove Substation were constructed at the same time and were owned and operated by a single entity, the controls for the Highgrove Substation were located in the Generating Station's control room. Because the Generating Station will be demolished as part of this project, these controls need to be relocated or replaced before demolition of the existing plant can occur.

AES is in the process of preparing a workplan in conjunction with SCE to define the requirements for the new substation control system. Based on discussions between the parties, it is anticipated that the new substation controls will be housed within the fenceline of the existing Highgrove Substation.

A communications station for the Highgrove Substation and interconnected substations is located on the Tank Farm Property. It is anticipated that this equipment will also be relocated within the Highgrove Substation fenceline.

5.5 Transmission Line Safety and Nuisance

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

5.5.1 Electrical Clearances

Typical high-voltage overhead transmission lines are composed of bare conductors connected to supporting structures by means of porcelain, glass, or plastic 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, wind-blown 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 95 (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
- Distance from the energized conductors to other parallel power lines

5.5.2 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 that occurs at the surface of the energized conductor and suspension hardware due to very high electric field strength at the surface of the metal during certain conditions. Corona may result in radio and television reception interference, audible noise, light, and production of ozone. Corona is generally a principle concern with transmission lines of 345 kV and higher. The AES Highgrove interconnection to the existing SCE 115-kV substation is well below this level and will not be affected by corona effects, audible noise or field effects. 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.

5.5.2.1 Electric and Magnetic Fields

Operating power lines, like the energized components of electrical motors, home wiring, lighting, and all other electrical appliances, produce electric and magnetic fields, commonly referred to as electromagnetic field (EMF). The EMF produced by the alternating current 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 stronger 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, measured in terms of amperes, through the conductors. 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. 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 amperes 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 or evocative evidence, some states, California in particular, have chosen not to specify maximum acceptable levels of EMF. Instead, these states mandate 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.

The Highgrove Project is not required to reconductor any lines in the immediate vicinity of the plant in order to deliver power from the new facility to the electrical grid. Therefore, the ability of the lines to carry additional current will not be increased above existing levels. Since the project is not increasing system voltage or capacity of any transmission lines in the vicinity of the project, the EMF generated by any of these existing lines will be no higher than the existing design levels which can currently exist without the addition of the Highgrove Project.

5.5.2.2 Audible Noise

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.

The electric field gradient is greatest at 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, such as dust or insects, 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 Highgrove Project will be connected at 115 kV, it is highly unlikely that any corona-related design issues will be encountered.

The design, construction and operation of Highgrove Project, including the connection of Highgrove Project with SCE's 115-kV system, will not result in any significant increases in EMF levels or audible noise.

5.5.2.3 Induced Current and Voltages

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 upon 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. Industry-accepted design and construction techniques appropriate for mitigation of hazardous and nuisance shocks will be employed to ensure that metallic objects on or near the right-of-way 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 5 milliamperes (mA).

Magnetic fields can also induce voltages and currents in conducting objects. Typically, this requires a long metallic object, such as a wire fence or aboveground pipeline that is grounded at only one location. A person who closes an electrical loop by grounding the object at a different location will experience a shock similar to that described above for an ungrounded object. Mitigation for this problem is to ensure multiple grounds on fences or pipelines, especially those that are orientated parallel to the transmission line.

The proposed 115-kV interconnection will be 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, operation, or maintenance.

5.5.3 Aviation Safety

Federal Aviation Administration (FAA) Regulations, Part 77 establishes standards for determining obstructions in navigable airspace and sets forth requirements for notification of proposed construction. These regulations require FAA notification for any construction over 200 feet in height above ground level. Notification is also required if the obstruction is lower than specified heights but falls within any restricted airspace in the approach to public or military airports. The closest airport is Flabob Airport approximately 4.6 miles to the southwest and therefore not in the restricted space.

Since the new transmission towers will be less than 200 feet tall, and there are no public or military airports or heliports close enough to the project to trigger additional restrictions, an FAA air navigation hazard review will not be necessary. Further, there are a number of existing transmission lines and structures in the proximity that are taller or comparable in height. As a result of their location and height in relation to the above airfield, the structures of the proposed electrical transmission interconnection will pose no deterrent to aviation safety as defined in the FAA regulations.

5.5.4 Fire Hazards

The proposed 115-kV interconnection will be designed, constructed, and maintained in accordance with CPUC General Orders that establish clearances from other natural and constructed structures as well as tree-trimming requirements to mitigate fire hazards. The Applicant will use trained and qualified maintenance personnel to maintain the interconnection corridor and immediate area of the switchyard in accordance with accepted industry practices that will include recognition and abatement of any fire hazards.

5.6 Applicable Laws, Ordinances, Regulations, and Standards

This section provides a list of applicable LORS that apply to the proposed transmission line, substations and engineering.

5.6.1 Design and Construction

Table 5.6-1 lists the applicable LORS for the design and construction of the proposed interconnection line and substation (as applicable).

TABLE 5.6-1
Design and Construction

LORS	Applicability
GO-95, CPUC, “Rules for Overhead Electric Line Construction”	CPUC rule covers required clearances, grounding techniques, maintenance, and inspection requirements.
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.
NFPA 70 - National Electric Code	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.

TABLE 5.6-1
Design and Construction

LORS	Applicability
IEEE 998, "Direct Lightning Stroke 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.

5.6.2 Electric and Magnetic Fields

The applicable LORS pertaining to EMF interference are tabulated in Table 5.6-2.

TABLE 5.6-2
Electric and Magnetic Fields

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.

5.6.3 Hazardous Shock

Table 5.6-3 lists the LORS regarding hazardous shock protection that apply to the project.

TABLE 5.6-3
Hazardous Shock

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.

5.6.4 Communications Interference

The applicable LORS pertaining to communication interference are tabulated in Table 5.6-4.

TABLE 5.6-4
Communications Interference

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.

5.6.5 Aviation Safety

Table 5.6-5 lists the aviation safety LORS that may apply to the proposed construction and operation of the Highgrove Project.

TABLE 5.6-5
Aviation Safety

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.
CPUC, 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.

5.6.6 Fire Hazards

Table 5.6-6 tabulates the LORS governing fire hazard protection for the Highgrove Project.

TABLE 5.6-6
Fire Hazards

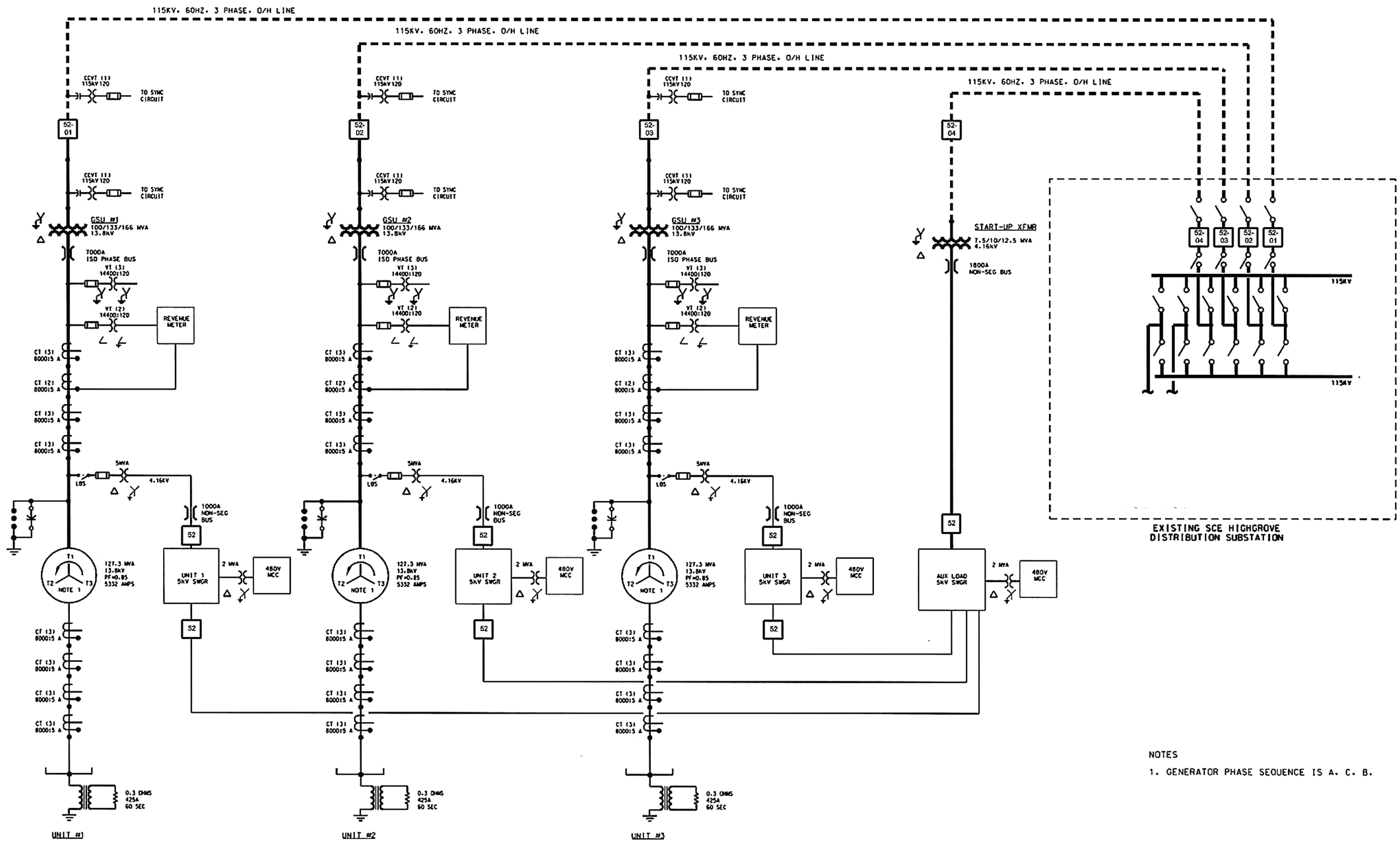
LORS	Applicability
14 CCR Sections 1250-1258, "Fire Prevention Standards for Electric Utilities"	Provides specific exemptions from electric pole and tower firebreak and electric conductor clearance standards, and specifies when and where standards apply
ANSI/IEEE 80, "IEEE Guide for Safety in AC Substation 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).

5.6.7 Jurisdiction

Table 5.6-7 identifies national, state, and local agencies with jurisdiction to issue permits or approvals, conduct inspections, and/or enforce the above-referenced LORS. Table 5.6-7 also identifies the associated responsibilities of these agencies as they relate to the construction and operation of the Highgrove Project.

TABLE 5.6-7
Jurisdiction

Agency or Jurisdiction	Responsibility
CEC	Jurisdiction over new transmission lines associated with thermal power plants that are 50 MW or more (Public Resources Code [PRC] 25500).
CEC	Jurisdiction of lines out of a thermal power plant to the interconnection point to the utility grid (PRC 25107).
CEC	Jurisdiction over modifications of existing facilities that increase peak operating voltage or peak kilowatt capacity 25 percent (PRC 25123).
FAA	Establishes regulations for marking and lighting of obstructions in navigable airspace (AC No. 70/7460-1G).
Local Electrical Inspector	Jurisdiction over safety inspection of electrical installations that connect to the supply of electricity (NFPA 70).
The City of Grand Terrace	Establishes and enforces zoning regulations for specific land uses. Issues variances in accordance with zoning ordinances.
	Issues and enforces certain ordinances and regulations concerning fire prevention and electrical inspection.



NOTES

1. GENERATOR PHASE SEQUENCE IS A. C. B.

NO SCALE

FIGURE 5.2-1
SINGLE-LINE DIAGRAM
AES HIGHGROVE
GRAND TERRACE, CALIFORNIA

CH2MHILL

SECTION 7

Water Supply

This chapter describes the quantity and quality of water required, the proposed primary and back-up water supply sources, water quality, and wastewater discharges for the AES Highgrove Project.

7.1 Water Supply and Use

The Highgrove Project will be constructed on the site of Southern California Edison's former Highgrove Generating Station, which was constructed in the 1950s. Four onsite wells, which together were capable of providing over 3,500 gallons per minute (gpm), were used to provide water for four large cooling towers, process makeup, fire protection and domestic uses. The proposed source of water to serve the limited process water needs of Highgrove Project are two of the onsite wells until an acceptable alternative water source (reclaimed or impaired water) is available. Section 9, Alternatives, contains a description of the alternative sources of supply evaluated.

The gas turbine technology chosen for the Highgrove Project is unique compared to many peaking technologies currently in operation. The high efficiency of the GE LMS100 gas turbine requires an external source of cooling. Use of cooling water will allow the gas turbine to achieve peak efficiency when high temperatures are experienced and electricity demand may be at its highest. Cooling and process demands for the plant include water that will replace water losses in the cooling tower from evaporation, drift, and blowdown. Water will also be used for evaporative cooling of the combustion turbine-generator (CTG) inlet air to improve efficiency; CTG wash water to remove deposits from the turbine blades to improve performance; and CTG water injection to reduce nitrogen oxide (NOx) emissions. Process water would be provided by two of the existing onsite wells and stored in a 350,000-gallon tank.

Water for potable uses (sinks, toilets, showers, drinking fountains, eye wash/safety showers, plant hose stations, etc.) will be provided by the local water purveyor, Riverside Highland Water Company. In addition to these uses, potable water would be used for backup supply when the onsite wells require maintenance or when both wells experience a forced outage. Potable water would be provided through an approximately 4-inch-diameter tap connecting to an existing water main in Main Street, which is approximately 1,300 feet south of the site (see Figure 7.1-1). A separate 10- to 12-inch connection will be used for fire protection and emergency process back-up when the onsite wells need to be maintained.

The following water balances show the projected use of water:

- Annual Average Water Flow (Figure 7.1-2a)
- Peak Water Flow (Figure 7.1-2b)

Based on a maximum expected capacity factor of 30 percent, the Highgrove Project is expected to use an average of 358 acre-feet per year to serve, potable, process, and landscape irrigation water needs (based on an annual average temperature during peaking operation of 80ºF). The instantaneous or steady-state flow corresponding to this condition is approximately 737 gpm. Of the 358 acre-feet per year of water use, approximately 60 percent (or 209 acre-feet per year) is used for power plant cooling. On a peak summer day (at an ambient condition of 97ºF), the instantaneous water consumption for process water needs is expected to be 854 gpm. Water consumption figures are based on all CTGs operating at 100 percent load.

Potable water demands are estimated to average 4.0 gpm, or approximately 2 acre-feet per year. Additional information about water resources is provided in Subsection 8.14, Water Resources.

7.2 Water Quality

Table 7.2-1 summarizes the quality of groundwater based on an analysis from an existing well located at the Highgrove Generating Station site. The quality of the circulating water is discussed in Section 8.14, Water Resources.

TABLE 7.2-1
Estimated Water Quality from Onsite Well

Parameter	Estimated Concentration (mg/L)
Alkalinity (total)	150
Aluminum	0.05
Arsenic (total)	0.0006
Cadmium	< 0.0002
Total Organic Carbon	0.98
Chromium (total)	< 0.001
Iron (total)	< 0.1
Lead (total)	< 0.001
Phosphorus	< 0.1
Calcium	51.7
Magnesium	9.7
Silica	22.2
Chloride	28.0
Total Hardness (as $CaCo_3$)	180
Total Dissolved Solids	280
pH	7.05

mg/L = milligrams per liter.
Source: Calscience Environmental Laboratories, Inc. 2004.

7.3 Water Treatment

The highly efficient gas turbine technology being used by the project requires a high purity source of water for NOx injection water. Therefore, additional water treatment systems will be provided onsite to provide demineralized water for NOx injection. The demineralized water will be produced by a reverse osmosis (RO) and Electro Deionization (EDI) system. Water supply to the demineralizer will be provided from the raw water storage tank and stored in a 150,000-gallon demineralized water storage tank.

The raw water storage tank will provide water for the demineralized water system, cooling tower makeup, gas turbine evaporative cooling, and other minor plant uses. Based on the current raw water analysis, no pretreatment is planned for the raw water supply to the storage tank.

Makeup water for the cooling tower will be pumped from the raw water storage tank to replace water lost from evaporation, drift and blowdown. The cooling tower water will be operated at high cycles of concentration to minimize blowdown and makeup. A chemical feed system will supply water conditioning chemicals to the circulating water to minimize corrosion and control the formation of mineral scale and biofouling. Sulfuric acid will be fed into the circulating water system in proportion to makeup water flow for alkalinity reduction to control the scaling tendency of the circulating water. The acid feed equipment will consist of a bulk sulfuric acid storage tank and two full-capacity sulfuric acid metering pumps.

To further inhibit scale formation, a polyacrylate solution will be fed into the circulating water system as a sequestering agent in an amount proportional to the circulating water blowdown flow. The scale inhibitor feed equipment will consist of a chemical solution bulk storage tank and two full-capacity scale inhibitor metering pumps. In addition, silica scale inhibitor will be used for treatment of the circulating water system in an amount proportional to the circulating water blowdown flow. Depending on raw material compatibility, this product may be blended in with the polyacrylate solution described above, or be fed with its own separate chemical solution bulk storage tank and two full-capacity scale inhibitor metering pumps.

To prevent biofouling in the circulating water system, sodium hypochlorite will be fed into the system. The hypochlorite feed equipment will consist of a bulk storage tank and two full-capacity hypochlorite metering pumps. A bulk storage tank, 100- to 400-gallon totes, and 2 full-capacity metering pumps will be provided for the feeding of either stabilized bromine or sodium bromide as alternate biocides.

7.4 Wastewater Collection and Disposal

To minimize groundwater use and discharge, the project will be designed to recover wastewater sources from other uses within the plant and use these sources as water supply to the cooling tower. In addition, the cooling tower water, concentrated through evaporative cooling losses, would be operated at high cycles of concentration to minimize blowdown and makeup. When operating at 6.5 cycles of concentration, the volume of blowdown is expected to be about 42 acre-feet per year under annual average climatic conditions and about 98 gpm under maximum daily climatic conditions. A portion of this concentrated water will then be removed from the cooling tower via blowdown to prevent mineral scale formation on heat transfer surfaces. The blowdown will be combined with discharges from the plant drain system and trucked offsite to the Santa Ana Regional Interceptor (SARI) brine pipeline system. There will be an onsite area to temporarily store the wastewater in Baker tanks until it is trucked offsite. The SARI pipeline system is described in detail in Section 8.14, Water Resources.

7.4.1 Cooling Tower Drift

Since high efficiency drift eliminators would be used in the cooling towers, the amount of total dissolved solids (TDS) emitted to the atmosphere will be very low. The drift quality is equivalent to the blowdown quality. Assumptions used to evaluate the cooling tower from an Air Quality perspective are further addressed in Section 8.1.

7.4.2 Sanitary Wastewater

Sanitary wastewater from sinks, toilets, showers and other sanitary facilities would be discharged to the existing sewer on Taylor Street. The sanitary wastewater flow will average about 2.0 gpm (equivalent to 2,880 gallons per day [gpd] on a 24-hour basis) (see Subsection 8.14, Water Resources).

7.4.3 Plant Drainage

Miscellaneous general plant drainage would consist of cleanup, sample drainage, equipment leakage, and drainage from facility containment areas. Water from these areas will be collected in a system of floor drains, sumps, and pipes within the facility and discharged to an oil/water separator. The oil-free discharge water would be combined with the cooling tower blowdown and trucked offsite to the SARI pipeline. An average flow of 2 gpm and a peak flow of 5 gpm are projected for these plant service water uses. Potable water from the Riverside Highland Water Company would be used for these purposes. Plant drainage and storm water discharge permitting is addressed further in Section 8.14, Water Resources.

7.5 Water Use Authorization

The Project Site is not currently within the service territory of a water purveyor. The Riverside Highland Water Company serves the City of Grand Terrace and has wells adjacent to the Project Site. The Project Site was most likely never annexed into the service territory because the existing wells were used to serve both process and domestic needs of the plant. However, Riverside Highland Water Company has indicated that it will annex the site in order to provide potable water to serve the proposed facility. Since the Project Site is not currently within any other water company's annexed service territory, Riverside Highland does not anticipate any delays in the annexation process. Prior to water service, AES will purchase shares of the mutual water company and pay applicable connection fee for service. For purposes of this Application for Certification, we have assumed the annexation will occur well before the time the project will require water service.

A summary of the permits required and the permitting agencies related to water resources is provided in Table 8.14-1, Water Resources. Table 7.5-1 provides the contact information for the annexation process.

TABLE 7.5-1
AES Highgrove Water Annexation

Process	Schedule	Agency
Annexation Process	Prior to Commercial Operation	Riverside Highland Water Company 1450 E. Washington Street Colton, CA 92324 Contact: Don Hough, General Manager (909) 825-4128

7.6 References

Calsciences Environmental Laboratories, Inc. 2004. Analytical Report for Well No. 2. Calsciences Work Order 04-11-1181. December 22.